IBM 3174 Establishment Controller and InfoWindow Display Family

Product Enhancement

Analysis

The **IBM 3174 ISDN Basic Rate Interface Adapter**, a new option for the 3174 Establishment Controller, scheduled for availability in September 1991, will provide downstream communications at a speed of 64K bps for ISDN-attached PS/2s equipped with the IBM ISDN Co-Processor/2 Model 2 Adapter and ISDN Co-Processor Support Program Version 1.1. The 3174 ISDN BRI Adapter will provide four ports, supporting up to eight remote PS/2 ISDN workstations with no contention.

A new release of 3174 operating code, Configuration Support-C, will support the 3174 BRI Adapter while maintaining compatibility with all functions provided by Configuration Support-B. An upgrade is available to customers currently using Configuration Support-B.

By exploiting ISDN's dial-up capabilities, usage-based pricing structure, and higher throughput, this new attachment offers users more configuration flexibility and cost savings, along with faster communications speeds than are possible with analog facilities.

—By Martin Dintzis
Assistant Editor

The 3174 ISDN BRI Adapter costs $4,800; the supporting software license fee ranges from $60 to $1,295, depending on the 3174 model and the level of microcode installed.

Advanced Peer-to-Peer Networking

IBM has also announced the future availability of the **IBM 3174 Establishment Controller Advanced Peer-to-Peer Networking (APPN) Licensed Internal Code (LIC) Feature**. This program adds APPN support to the communications capabilities of Configuration Support-C.

APPN is an extension to IBM's Systems Network Architecture (SNA) and Systems Application Architecture (SAA) that supports distributed networking, allowing network nodes to communicate on a peer-to-peer basis. APPN extends the reach of SNA by providing:

- A dynamic network topology, with a database for recording network changes and a distributed network directory for tracking network resources;
- Dynamic route calculation; and
- Network congestion control. ■

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Advantages

By exploiting ISDN's dial-up capabilities, usage-based pricing structure, and higher throughput, this new attachment offers users more configuration flexibility and costs savings, along with faster communications speeds than are possible with analog facilities.

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Product Summary

Editor's Note
IBM is the predominant force in the synchronous display system market, a market created in 1972 when IBM introduced the first generation of 3270 products. IBM has lost about 50 percent of this market to competitors over the years, however, and recently took steps to bolster its competitive position.

Description
IBM's 3270 product line includes nine upgraded models of the 3174 Controller, the new 3471 and 3472 InfoWindow display families, and a complete line of printers. Together, these products support communications with applications running on IBM hosts.

Strengths
The InfoWindow displays offer higher resolution and improved ergonomics at a more attractive price. IBM's 3174 controller now supports up to three synchronous host connections and is equipped with a faster microprocessor. IBM's reputation for quality products and excellent customer service also contribute to the computer manufacturer's competitive position.

Limitations
Memorex Telex, AT&T, and Lee Data offer communication controllers that support up to four synchronous host connections, and access to multiple synchronous and asynchronous sessions from the same display.

Competition
IBM's chief competitor is Memorex Telex, which has about 28 percent of the market to IBM's 50 percent. AT&T, IDEA Courier, and Lee Data control about 8, 5, and 2 percent of the market, respectively.

Vendor
International Business Machines Corp. (IBM)
Old Orchard Road
Armonk, NY 10504
Contact your local IBM representative.

Price
See pricing section.

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Analysis

Product Strategy

It is no secret that IBM very much wants the millions of 3270 terminals installed over the past 20 years to be traded for new PS/2 computers. Yet, IBM recognizes that many people hesitate to scrap hardware that is serving them well. Not only that, many of the 3270 software programs on company mainframes have not been changed in years because they do what they are supposed to do. Making the commitment to new machines, a new operating system, and new applications may be more of a leap than companies are willing to make. Further, there is still a healthy demand for 3270 terminals.

After letting competitors chip away at its significant 3270 market share, in 1989 IBM concentrated on fortifying itself against further market losses. Leading the new IBM charge was a new line of 3174 controllers and terminals. Its line of InfoWindow terminals are more compact, offer improved resolution and ergonomics, and are more competitively priced—pricing that IBM's competitors will be hard pressed to match.

Perhaps IBM recognized that 3270 terminals were close to becoming commodity items (as personal computers had become). In the PC market, IBM let competitors steal market share from it with cheaper "clone" products. In the case of 3270 terminals, IBM was not willing to let competitors, once again, outperform it in the marketplace.

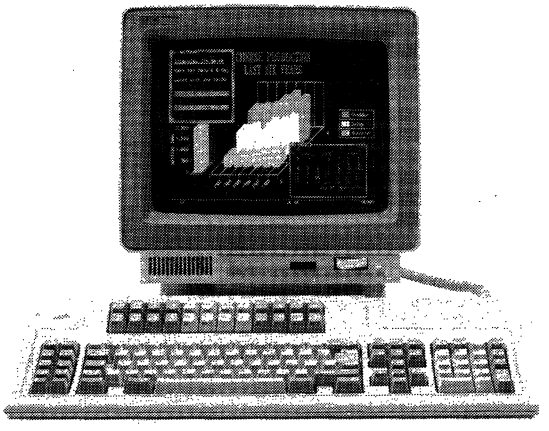
As one analyst commented after the announcement, "IBM's competitors can match it feature for feature, but they may not be able to match it for price." The fallout has already begun. Partially as a result of IBM's moves, competitor Lee Data reorganized in 1989, cutting its workforce by nearly 200, as it tried to weather a large loss.

IBM also enhanced its 3174 controller, which now includes a faster microprocessor that improves throughput for token-ring communications. The new 3174 also supports up to three synchronous host connections, access to up to eight IBM hosts via a token-ring network, and network management functions. The nine new 3174 controller models, however, are about the same price as previous models. IBM has renamed the 3174 product the Establishment Controller, a reflection of the fact that the 3174 now offers connectivity beyond end-user terminals. That is, IBM is portraying the product as offering establishment control and connectivity, not just display control.

Competitive Position

IBM's competitors in the 3270 market include Memorex Telex, AT&T, Lee Data, and IDEA Courier. Its major competitor is Memorex Telex. The leading manufacturer of 3270-compatible displays, Memorex Telex's market share is growing. It boasts strong product support and a complete product line.

Memorex Telex and IDEA Courier have excelled primarily by offering IBM plug-compatibility at a lower price. AT&T and Lee Data were the first to offer controllers and displays that support enhanced functionality, such as access to multiple synchronous hosts and multiple concurrent asynchronous and synchronous terminal sessions with windowing. One of Memorex Telex's network controllers, however, also offers this level of functionality. Today, Memorex Telex's 1174 Network Controller, AT&T's 6544 Multifunction Communication Controller, and Lee Data's ▶



The Graphics-5 3472 Model GC is a seven-color display that supports multiple windows, allowing the user to access up to five alphanumeric sessions and one graphics session simultaneously. Notepads support data transfer between sessions.

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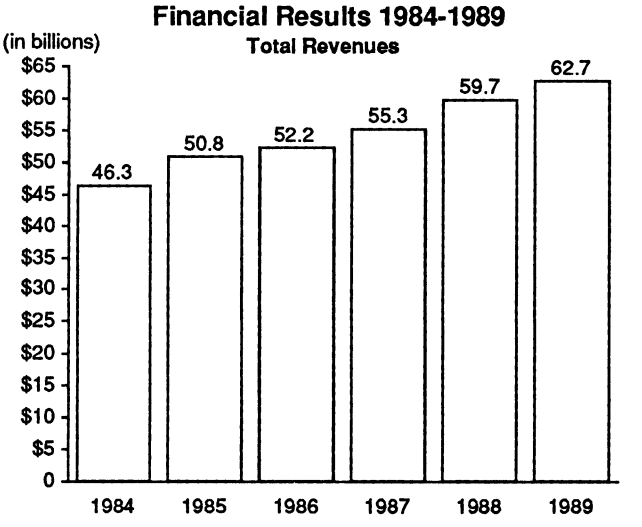
Company Profile
IBM Corporation



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Vice Chairman: Jack D. Kuehler
Sr. VP/Gen. Mgr.: Terry Lautenbach

Company Background
Year Founded: 1914
No. Employees: 400,000 worldwide

IBM is one of the oldest manufacturers of computing equipment in the world. It started out in Poughkeepsie, NY as a small company manufacturing clocks for industrial use and later introduced punched card equipment for business accounting functions. According to *Business Week* and *Fortune*, IBM is among the top five industrial corporations by sales volume. It has dominated the mainframe market for over 30 years and has a strong hold on other industry sectors.

Business Overview
IBM designs, manufactures, markets, and services mainframe computer systems and associated peripherals; minicomputer systems and peripherals, microcomputer/personal computer systems; computer system software; data communication controllers and terminals; other communication products such as modems, voice response systems, and voice messaging systems; local area network communication products; and office typewriters. In addition, IBM provides specialized products and services such as communications carrier and limited time-sharing services; the IBM Information Network, a communications facility with remote storage and computing services; OEM manufacturing of terminals, disk drives, and other products; maintenance service and system supplies; and financial services through its IBM Credit Corp. subsidiary.

Since it introduced its PC line of microcomputers, IBM has had several earning periods where the growth of the company was much less than anticipated. This reflects the competitive nature of this small system market. To compete more effectively in this market, IBM has greatly expanded its software, as well as hardware, efforts and has entered into agreements with several independent software suppliers to provide tools for its entire line of computer products.

For the second time in its history, IBM last year confirmed a reduction in its work force. Approximately 10,000 people are either to take early retirement or accept termination incentives. IBM took a fourth-quarter write-off of $2.3 billion as a restructuring charge.

Financial Profile
Operations results for 1989 showed that net profits fell 35 percent to $3.76 billion, or $6.47 per share. Revenues, however, increased 5.1 percent to $62.7 billion over 1988. Fourth-quarter earnings fell 75 percent to $591 million, or $1.04 per share, due to the $2.3 billion restructuring charge.

Management Statement
Moving more resources close to customers is a cornerstone of IBM's transformation in the computer industry. To that end, in 1988 IBM undertook the most significant restructuring of its business in more than 30 years, establishing seven lines of business and a new organization—IBM United States. This restructuring continued through 1989 and will continue to be dynamic in order to consistently meet the needs of its customers.

IBM notes that it is managing for the long term and, with the steps it has taken and continues to take, it remains confident about the future of its business.

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Table 1. The Evolution of the IBM 3270 Family

1972	IBM delivered the first generation of 3270 devices: the 3270 Control Unit; the 3272 Control Unit; the 3275 Standalone Display Station; the 3277 Cluster Display Station; the 3284 Matrix Printer; the 3286 Matrix Printer; and the 3288 Belt Printer.
1977	IBM introduced a new generation of components offering increased capabilities at much lower prices, including the 3274 Control Unit, the 3276 Control Unit Display Station, and the 3278 Cluster Display Station.
1979	IBM added the first color products: the 3279 Color Display Station and color versions of the 3278 Printer.
1983	March: IBM announced several additions to the 3270 product line, including the 3178 Display Station (a smaller and less expensive version of the popular 3278 Model 2 Display); the 3290 Information Panel, a gas plasma display; four new 3274 Control Unit models (41A, 41C, 41D, and 61C); the 3299 Terminal Multiplexer, a coaxial cable eliminator; and an option permitting the attachment of the IBM PC to the 3278 Display Station. October: IBM introduced the 3270 Personal Computer, a version of IBM's PC capable of supporting up to seven concurrent sessions: four 3270 sessions, one DOS session, and two notepad sessions. IBM also introduced the 3279 Personal Computer Attachment.
1984	IBM unveiled the 3180 Display Station and 3179 Color Display Station.
1985	IBM unveiled two graphics versions of the 3179 Color Display Station, Models G1 and G2, supporting selectable screen formats and all-points-addressable graphics.
1986	IBM realigned the 3270 family to highlight the 3174 Subsystem Control Unit, the first processor to support a token-ring connection and communications with asynchronous hosts. IBM released 3174 controller Models 1L, 1R, 2R, 51R, and 52R that year. The vendor also announced the 3191, 3192, 3193, and 3194 Display Station series.
1987	IBM released 3174 controller Models 3R and 53R and announced Models 81R and 82R.
1989	IBM introduced the 3174 Establishment Controller Models 11L, 11R, 12R, 13R, 61R, 62R, 63R, 91R, and 92R. These models provide greater speed and memory capacity and more connectivity options than the older 3174 units. IBM also introduced the InfoWindow 3471 and 3472 families of displays.

▶ *(Analysis continued)*

Datastar 5000 System all support up to four synchronous host connections and access to five concurrent synchronous and/or ASCII sessions, in any combination.

IBM's enhancements to the 3174 controller have plugged the performance gap between IBM's 3270 Display System and the multifunction systems of IBM's competitors. In deference to what its customers were demanding, in 1989 IBM also reduced prices on its older 3270 display terminals—something that its competitors had feared was coming. This move shook up an already fiercely competitive market, leading some to predict that only three players will remain—AT&T, Memorex Telex, and IBM.

Decision Points

The reliability of IBM's equipment and the dependability and consistency of its maintenance service have always presented a problem to vendors of IBM-compatible equipment. Now, functional improvements and more competitive prices have given IBM an even stronger position in the 3270 market.

The new features of the 3174 Controller have made the controller much more competitive with the multifunction-type systems offered by Memorex Telex, AT&T, and Lee Data. These features include support for up to three host connections, a faster microprocessor that improves throughput in token-ring configurations, twice the base internal memory (2M bytes) and up to 6M bytes of maximum storage, network management capability, and up to five concurrent sessions for attached ASCII displays.

Compared to previous IBM terminals, the InfoWindow displays have more compact designs and include smaller, more comfortable keyboard arrangements. They also provide higher resolution while using less power. The InfoWindow Graphics-5 3472 Model GC display offers up to 70 percent faster screen painting than its predecessor, the 3192-G. Once again, competing vendors will be hard pressed to keep in step with IBM.

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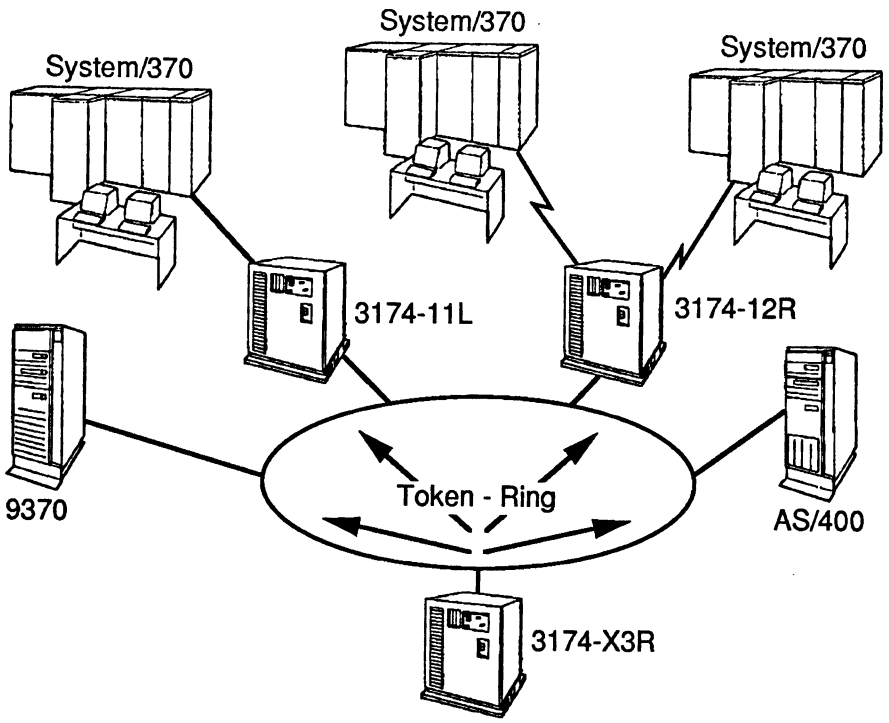

Figure 1.
Single-Link Multihost Support

A token-ring-attached 3174-X3R controller can access up to eight IBM hosts also communicating with the LAN.

Characteristics

Models

The tables provide information about the announcement and release dates of the IBM communication controllers, displays, printers, and software products covered in this report.

3174 Establishment Controller

Models	Date Announced	Date Released
11L, 11R, 12R, 13R, 61R, 62R, 63R, 91R, and 92R	May 1989	May 1989

Displays

Model(s)	Date Announced	Date Released
InfoWindow 3471 Monochrome Display, Models EA and EG	June 1989	June 1989
InfoWindow 3472 Monochrome Display, Models FA, FC, FD, and FG	September 1989	September 1989
InfoWindow Graphics-5 3472 Model GC Display	September 1989	November 1989
3193 Display Station	June 1986	September 1986
3194 Display Station	June 1987	3rd quarter of 1987

Printers

Model(s)	Date Announced	Date Released
Proprinter II	April 1987	April 1987
Proprinter II XL	September 1988	September 1988
Proprinter III and III XL	November 1988	November 1988
Proprinter X24E and XL24E	January 1989	January 1989
Quietwriter III	April 1987	April 1987
Quickwriter	June 1988	June 1988
3812 Model 2 Page Printer	June 1987	June 1987
3816 Model D Page Printer	November 1989	March 1990

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Model(s)	Date Announced	Date Released
3816 Model S Page Printer	April 1989	April 1989
4019 LaserPrinter	October 1989	November 1989
4224 Printer, Models 201, 202, 2C2, 2E2, 2E3, 301, 302, and 3E3	November 1988 or earlier	Information not available
4234 Model 11 Dot Band Printer	February 1989	March 1989
6262 Model D12 Impact Line Printer	February 1988	March 1988
6262 Model D14 Impact Line Printer	February 1988	July 1988
6262 Model D22 Impact Line Printer	October 1989	November 1989

Software

Product	Date Announced	Date Released
Configuration Support A Release 5 microcode	May 1989	May 1989
Configuration Support S Release 5 microcode	May 1989	May 1989
Configuration Support B Release 2 microcode	September 1989	March 1990
PC/Host File Transfer and Terminal Emulator (FTTERM) Release 2.1	July 1989	July 1989

Transmission Specifications

The 3174 controller family supports local, remote, and token-ring gateway communications using BSC, SNA/SDLC, and X.25 protocols. Model 11L, the local controller, provides single-tag interlocked and two-tag high-speed transfer channel operation modes, with rates up to 1.25M bps. The 3174 remote models 11R, 12R, 13R, 61R, 62R, 63R, 91R, and 92R provide the following support as is applicable to the model selected:

- EIA RS-232-C/CCITT V.24/V.28 operation up to a maximum speed of 19.2K bps for BSC and 64K bps for SNA/SDLC;
- CCITT V.35 and X.21 operation up to a maximum speed of 64K bps for SNA/SDLC; and
- X.25 operation up to a maximum speed of 64K bps.

Models 11R, 12R, 61R, 62R, 91R, and 92R operate in half-duplex, point-to-point or multipoint modes on duplex or half-duplex facilities. Switched, X.21, and X.25 network operations are supported only through SNA/SDLC. Models 13R and 63R transmit and receive at 4M or 16M bps using media access protocols conforming with IEEE 802.5 and ECMA 89 standards, and logical link protocols conforming with the IEEE 802.2 standard, over the baseband IBM Token-Ring Network. Devices can be connected to these controllers using coax, the IBM Cabling System (for token-ring network attachment), or twisted pair wire.

Host Computer Software Support

The 3270 subsystem is supported for local and remote operation by IBM System/370, 43XX, 303X, 308X, 3090, 8100, System/1, System/3X, System/88, and AS/400 computer systems. Remote terminals are supported by BTAM (Basic Telecommunications Access Method), TCAM (Telecommunications Access Method), and VTAM (Virtual Telecommunications Access Method).

Components

3174 Establishment Controller

The nine new 3174 models—11L, 11R, 12R, 13R, 61R, 62R, 63R, 91R, and 92R—support several features and capabilities not provided by older models, including the following:

- Support for up to three synchronous host connections, depending upon the model, using the new Concurrent Communication Adapter.
- An increase from one to eight in the number of gateways that can be accessed by a token-ring-attached 3174.
- A faster microprocessor providing a cycle time 62 percent shorter than that of previous models, which greatly improves throughput in channel-attached, token-ring gateway configurations.
- Greater controller memory capacity—2M bytes base storage and up to 6M bytes maximum (depending on the model).
- Coexistance of the Asynchronous Emulation Adapter, which supports connections with asynchronous hosts and devices, and the token-ring gateway function.
- Support for up to five concurrent sessions on ASCII workstations.
- Customization of protocol conversion for ASCII workstations through user-controlled definition tables.
- Improved centralized control of the 3174 by IBM's Central Site Control Facility.

Configuration Support B Microcode combines the capabilities previously provided by two separate controller software products, Configuration Support A and Configuration Support S, while driving the new communications features.

Models 11L, 11R, and 12R are floor-standing units for large clusters. They come with 4 synchronous ports, and are expandable to 32 synchronous and 24 ASCII ports. All three models support up to three synchronous host connections via the Concurrent Communication Adapter. Model 11L is a local controller that provides a System/370-architecture channel interface

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Table 2. Display-Attachable Printers

Printer	Printing Modes/Speeds	Fonts/Character Sizes	Resolution
Proprinter II, II XL	240 cps Fastfont (fast draft) mode 200 cps draft mode 100 cps emphasized mode 40 cps near letter quality mode	3 resident fonts; 5, 6, 8.5, 10, 12, or 17.1 cpi	240 x 144 dots per inch
Proprinter III, III XL	320 cps Fastfont (fast draft) mode 270 cps draft mode 135 cps emphasized mode 65 cps near letter quality mode	3 resident fonts; 5, 6, 8.5, 10, 12, 17.1, or 20 cpi	240 x 144 dots per inch
Proprinter X24E, XL24E	288 or 240 cps draft mode 96 or 80 cps letter-quality mode	4 resident fonts; 5, 6, 8.5, 10, 12, or 17.1 cpi	360 x 180 dots per inch
Quickwriter	330-396 cps draft mode 110-188 cps letter-quality mode 55-65 cps Selectric font mode	8 resident fonts; font download feature 10, 12, 15, or 17.1 cpi	360 x 180 dots per inch
Quietwriter III	160-274 cps draft mode 100-171 cps quality mode 80-136 cps enhanced mode	4 resident fonts; up to 8 additional plus-in or downloadable fonts; 10, 12, or 17.1 cpi	240 x 240 dots per inch
4019 LaserPrinter	10 pages per minute (using legal-size paper), letter-quality text	10 resident fonts; 47 font cards available; multiple point sizes	300 x 300 dots per inch

for SNA and non-SNA attachment. Model 11R provides EIA RS-232-C/CCITT V.24/V.28 and CCITT V.35 interfaces for SNA/SDLC, BSC, or X.25 remote link attachment. Model 12R provides a CCITT X.21 interface for SNA/SDLC or X.25 remote link attachment. Each controller includes 2M bytes of memory, expandable to 6M bytes, and a 1.2M or 2.4M byte diskette drive. A second diskette drive and a 20M byte hard drive are optionally available. The 3174-11L, -11R, and -12R are compatible with the older 3174-1L, -1R, and -2R controllers.

Model 13R is a floor-standing model that provides host attachment via the IBM Token-Ring Network. It can communicate with a System/370 host via an IBM 37XX Communication Controller with the NCP/Token-Ring Interconnection Facility of ACF/NCP, or via a channel-attached 3174 Model 1L or 11L using the Token-Ring Network 3270 Gateway optional feature. This feature consists of the following:

- The Type 3A Dual Speed (16/4M bps) Token-Ring Communication Adapter.
- Configuration Support B microcode or utility and control diskettes for Configuration Support S microcode.
- A token-ring adapter cable.

Equipped with the Type 3A Dual Speed (16/4M bps) Token-Ring Communication Adapter, model 13R supports token-ring communications. It uses media access protocols conforming with IEEE 802.5 and ECMA 89 standards, and logical link protocols conforming with the IEEE 802.2 standard, over the baseband IBM Token-Ring Network.

The 3174-13R optionally supports up to two direct host connections using the Concurrent Communication Adapter. It comes with four synchronous ports, and is expandable to 32 synchronous and 24 ASCII ports. The 3174-13R includes 2M bytes of memory, expandable to 6M bytes, and a 1.2M or 2.4M byte diskette drive. A second diskette drive and a 20M byte hard drive are optionally available. The 3174-13R is compatible with the older 3174-3R controller.

Models 61R and **62R** are tabletop units for medium-sized clusters. They come with 9 standard synchronous ports, and are expandable to 16 synchronous and 8 ASCII ports. They both support up to three synchronous host connections using the Concurrent Communication Adapter. Model 61R provides EIA RS-232-C/CCITT V.24/V.28 and CCITT V.35 interfaces for SNA/SDLC, BSC, or X.25 remote link attachment. Model 62R provides a CCITT X.21 interface for SNA/SDLC or X.25 remote link attachment. Each controller includes 2M bytes of memory, expandable to 4M bytes, and a 1.2M or 2.4M byte diskette drive. A second diskette drive is optionally available. 3174-61R and -62R are compatible with the older 3174-51R and -52R controllers.

Model 63R is a tabletop unit which, like model 13R, supports token-ring communications and host attachment via an IBM 37XX Communication Controller or a channel-attached 3174 Model 1L or 11L equipped with the Token-Ring Network 3270 Gateway optional

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Table 3. Controller-Attachable Printers

Printer	Printing Modes/Speeds	Fonts/Character Sizes	Resolution
3812 Model 2 Page Printer	12 pages per minute (using legal-size paper), letter-quality text	Up to 62 fonts standard; multiple point sizes	240 x 240 dots per inch
3816 Page Printer, Models S and D	24 pages per minute (using legal-size paper), letter-quality text	Up to 61 fonts standard; multiple point sizes	240 x 240 dots per inch
4224 Printer	Models 201 and 301: 200 cps DP processing mode 100 cps DP text processing mode 50 cps near letter quality mode Models 202, 2E2, 2C2, and 302: 400 cps DP processing mode 200 cps DP text processing mode 100 cps near letter quality mode Models 2E3 and 3E3: 600 cps DP processing mode 300 cps DP text processing mode 150 cps near letter quality mode	4 resident fonts; optional font cartridges; 10, 12, or 15 cpi	144 x 144 dots per inch
4234 Model 011 Dot Band Printer	800 lines per minute draft mode 600 lines per minute data processing mode 200 lines per minute near letter quality mode	3 resident fonts; optional loadable fonts available; 10, 12, 13.3, 15, 16.7, or 18 cpi	144 x 144 dots per inch
6262 Impact Line Printer, Models D12, D14, and D22	Model D12: 1200 lines per minute Model D14: 1400 lines per minute Model D22: 2200 lines per minute	The following character set sizes are supported: 48, 64, 94, 128, and 192	Information not available

feature. The 3174-63R comes with 9 standard synchronous ports, is expandable to 16 synchronous and 8 ASCII ports, and optionally supports one direct host connection using the Concurrent Communication Adapter. Model 63R includes 2M bytes of memory, expandable to 4M bytes, and a 1.2M or 2.4M byte diskette drive. A second diskette drive and a 20M byte hard drive are optionally available. The 3174-63R is compatible with the older 3174-53R controller.

Models 91R and **92R** are small tabletop units that support small clusters of IBM 3270 displays and printers for remote attachment to IBM host processors via telecommunications links. Both models come with four synchronous ports and are expandable to eight synchronous ports. Use of the Concurrent Communication Adapter, for communications with more than one IBM host, is not supported on these models. Model 91R provides EIA RS-232-C/CCITT V.24/V.28 and CCITT V.35 interfaces for SNA/SDLC, BSC, or X.25 remote link attachment. Model 92R provides a CCITT X.21 interface for SNA/SDLC or X.25 remote link attachment. Both models come with 2M bytes of memory (not expandable), and a 2.4M byte diskette drive. The 3174-91R and 92R are compatible with the older 3174-81R and -82R controllers.

Controller Microcode

Configuration Support A, which supports ASCII protocol conversion, and Configuration Support S, which supports token-ring gateway operation, were upgraded from Release 4 to Release 5 to provide base functionality for the 3174 Establishment Controller. They include improvements over the old code, such as 64K bps operation for X.25 packet switching (previously limited to 19.2K bps), Graphic Data Display Manager (GDDM) PC-link support, support for both 2.4M byte and 1.2M byte diskette drives, compatibility with the Type 3A Dual

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Speed (16/4M bps) Token-Ring Communication Adapter, and improved channel-attached token-ring gateway performance. These are the last planned enhancements to Configuration Support A and S. Future growth and improvement will be provided through Configuration Support B, which merges the functions of both Release 5 microcode products into a single configuration.

Release 2 of Configuration Support B, made available in March 1990, includes the following enhancements over Release 1 of the same microcode:

- Local format storage, which allows CICS screen format panels to be stored on the 3174.
- Improvements in asynchronous emulation capability, including support for a wider range of ASCII and 3270 displays.
- Type-ahead, the ability to enter keystrokes for the next screen before the display has fully made the transition to that screen.

Multiple Synchronous Host Connections

The new 3174 models support multiple connections to IBM hosts in two ways: through the Concurrent Communication Adapter, and through the Single-Link Multi-Host Support provided for token-ring networks. Both methods require Configuration Support B microcode.

The Concurrent Communication Adapter (CCA) enables a 3174 controller to access an additional IBM host. Up to two CCAs, depending upon the model, can be installed for a maximum of three concurrent synchronous host connections. Two versions of this adapter are available: one supporting RS-232-C (CCITT V.24./V.28) and CCITT V.35 interfaces, the other supporting attachment via the CCITT X.21 interface.

Equipped with a microprocessor, control storage, and a teleprocessing interface, each CCA appears to the host as an additional 3174 controller, communicating at speeds up to 64K bps for SDLC or X.25 protocols, and up to 19.2K bps for BSC protocols. Users of CUT-mode displays can switch between hosts by using the Change Screen key, while users working on DFT mode displays operating in an SNA network can do the same with the Jump Screen key. Use of the Concurrent Communication Adapter is not supported on 3174 models 52R, 53R, 81R, 82R, 91R, and 92R, or on non-SNA DFT-mode displays.

Single-Link Multi-Host Support enables any 3174-X3R controller connected to a token-ring network to access up to eight IBM hosts in communication with the LAN. As shown in Figure 1, Concurrent Communication Adapters can be used to increase the number of accessible hosts. Up to five concurrent sessions are possible for workstations on the LAN.

Terminal Multiplexers

The 3174 Establishment Controller can be configured to connect terminals either directly, via 3299 Terminal Multiplexers, via optional Terminal Multiplexer Adapters, or by a combination of these three options. Each control unit contains an integrated four-port terminal adapter that permits up to four devices to be directly attached; a maximum of 32, 16, or 8 devices, depending upon the model, can be attached by using up to four 3299 Terminal Multiplexers, up to four Terminal Multiplexer Adapters, or any combination (up to four total) of these two options.

Token-Ring Network Access

The Type 3A Dual Speed (16/4M bps) Communication Adapter provides access to an IBM Token-Ring network at selectable speeds of either 16M bps or 4M bps. This adapter is a base feature on models 13R and 63R (as well as the older 3174-3R and -53R). The adapter is optional for 3174 controller models 1L, 1R, 2R, 11L, 11R, 12R, 51R, and 52R.

Terminal Emulation Capability

The Asynchronous Emulation Adapter is an optional feature that allows 3270 display stations operating in control unit mode to emulate an ASCII (IBM 3151 or Digital VT100/220) display terminal. Using the adapter, a display can exchange information over a direct or switched RS-232-C circuit with ASCII applications and public data networks, while maintaining communications, when required, with IBM applications. Attached 3270 printers can also emulate ASCII printers. PS/2 workstations emulating any of the supported ASCII displays can also communicate with 3270 applications. Each adapter provides eight ASCII ports. The large control units can support up to three adapters, or 24 ASCII devices. Intermediate 3174 controllers can support up to eight ASCII devices. With a 3299 multiplexer, the smaller 3174 models can support eight synchronous devices emulating ASCII peripherals.

The IBM PC/Host File Transfer and Terminal Emulator Program (FTTERM) provides 3270 and ASCII (IBM 3101 or Digital VT100/220) terminal emulation, automatic host dial-up, and user-initiated or unattended batch file transfer capabilities for IBM-compatible PCs and PS/2s running under DOS Version 3.3 or later. For 3270 terminal emulation, FTTERM requires the support of a protocol converter, such as an IBM 3174 controller equipped with the Asynchronous Emulation Adapter, an IBM 3708 Network Conversion Unit, an IBM 7171 ASCII Device Attachment Control Unit, or an IBM ES/9370 ASCII Subsystem Controller.

FTTERM supports up to four concurrent synchronous sessions, LAN connectivity, and, when attached to the IBM ES/9370 ASCII Subsystem Controller-II, seven-color presentation. In 3270 mode, up to 20 files can be transferred simultaneously; in ASCII mode, any number of concurrent file transfer operations are possible. An optional High-Level Language Application Program Interface simplifies program development and communications with the host.

Network Management Support

With Configuration Support B microcode, it is possible to distribute or customize microcode residing on different 3174 controllers from a central site using IBM's

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Central Site Customizing Utility (CSCU). This capability, called Central Site Change Management, makes manual updating unnecessary. Other capabilities supported by the new microcode include the running of online diagnostic tests from a NetView console and network asset management—the tracking of the location, status, and utilization of each display and controller.

Displays

The **InfoWindow 3471 Monochrome Display** comes in an amber monochrome version (model EA) and a green monochrome version (model EG). Providing entry-level 3270 functionality, the 3471 includes a flat 14-inch display mounted on a tilt and swivel pedestal, and a low-profile 102-key PS/2-style, 104-key data entry-style, or 122-key typewriter-style keyboard. The 3471 provides a screen arrangement of 24 lines by 80 characters and a resolution of 720 by 402 pixels. Users can switch between five concurrent full-screen alphanumeric sessions with a hot key. The screen includes an operator information area for system messages. With the Vital Product Data feature, the 3471 can transmit user-modifiable identification parameters to the host-based NetView network management system. Other features of the 3471 include an adjustable audible alarm, auto dim, a security keylock, a set of 12 or 24 program function keys, a keyboard layout definition utility for customized keyboard layouts, a screen setup mode, and support for a display-attached printer.

The **InfoWindow 3472 Display** includes four models: FA, FC, FD, and FG. Each display is mounted on a tilt and swivel pedestal, and comes with a 102-key IBM Enhanced-style, 104-key typewriter-style, or 122-key typewriter-style keyboard. Models FA and FG are flat 14-inch amber (FA) and green (FG) monochrome displays supporting a maximum screen resolution of 1,199 by 508 pixels. Model FD includes a 15-inch green monochrome display supporting a maximum screen resolution of 1,200 by 532 pixels. Model FC is a seven-color, 14-inch display supporting a maximum screen resolution of 1,188 by 508 pixels. All models support four selectable screen formats: 24 rows by 80 columns, 32 rows by 80 columns, 27 rows by 132 columns, and 43 rows by 80 columns.

The 3472 supports access to up to five concurrent (full-screen) alphanumeric sessions via a hot key. A Vital Product Data feature enables the display to transmit user-modifiable identification parameters to NetView for device tracking purposes. The 3472 features an adjustable audible alarm, auto dim, a security keylock, 24 program function keys, record/play/pause capability, a keyboard layout definition utility for customized keyboard layouts, a screen setup mode, and support for a display-attached printer and a bar code reader.

The **InfoWindow Graphics-5 3472 Model GC Display**, also referred to as the 3472-G, is the most advanced member of the InfoWindow family, providing seven-color graphics capability and multiple-sessions with windowing on a 14-inch screen. The 3472-G comes with a tilt and swivel pedestal and a choice of a 104- or 122-key, typewriter-style or IBM enhanced-style keyboard. It provides four selectable screen formats: 24 lines by 80 columns, 32 lines by 80 columns, 43 lines by 80 columns, and 27 lines by 132 columns. Maximum resolution for this display is 1,188 by 508 pixels. Draw times for the 3472-G are up to 70 percent faster than its predecessor, the IBM 3192-G. Multisession support permits up to five alphanumeric sessions plus one graphics session simultaneously in overlapping windows. The 3472-G features self-contained help screens, a comprehensive setup mode, record/play/pause capability, session-to-session copy capability (not supported on an ASCII session), a notepad, a keyboard definition utility, and support for a mouse, a display-attached printer or plotter, a tablet device, and a bar code reader.

IBM's Older Displays

IBM continues to market the older 3193 and 3194 display stations along with the InfoWindow families. IBM reduced prices on these older workstations to make them just as price-competitive.

The **3193 Display Station** includes a 15-inch monochrome monitor mounted on a tilt and swivel pedestal, a logic unit, and a low-profile 102- or 122-key typewriter-style keyboard. Screen arrangements of 24 lines by 80 columns, 32 lines by 80 columns, and 48 lines by 80 columns are supported. The screen provides for both alphanumeric and image presentations with a resolution of 1,200 by 880 pixels, and supports all-points-addressable capability. The 3193 displays up to two logical terminals and up to eight partitions. Logical terminal capability allows the operator to view alphanumeric only, image only, or a combination of the two types of presentations. Image presentations are enabled through the use of the IBM 3117 Scanner (with the IBM 3117 Extension Unit) or the IBM 3118 Scanner. Data and images are displayed in white on black, or black on white in reverse video. Features of the 3193 include an audible alarm, auto dim, record/pause/play capability, a screen setup mode, a security keylock, a set of 12 or 24 program function keys, and support for a display-attached printer.

The **3194 Display Station** comes in three variations: a 12-inch color display (model C), a 14-inch color display (model H), and a 15-inch monochrome display (model D). The 3194 is modularly constructed, consisting of a monitor with a tilt and swivel pedestal; logic, which includes a 3.5-inch diskette drive with a 720K-byte memory capacity; and a low-profile 102-, 104-, or 122-key typewriter-style keyboard. All three models support screen arrangements of 24 lines by 80 columns and 32 lines by 80 columns. Additionally, models D and H support screen arrangements of 43 lines by 80 columns and 27 lines by 132 columns. Model C and H color displays support seven colors and resolutions of 720 by 400 and 1,188 by 725 pixels, respectively. The monochrome version supports up to 1,188 by 544 pixel resolution.

The 3194 displays up to two notepad sessions and from one to four host sessions in windows, whose sizes and positions on the screen can be changed. Data

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can be copied from session to session. Other features of the 3194 include an audible alarm, auto dim, a security keylock, a set of 24 program function keys, record/play/pause capability, a screen setup mode, and support for a display-attached printer.

Display-Attachable Printers

The following printers connect directly to an IBM 3270 display. More information about each printer is provided in Table 2.

The **Proprinter** is a desktop dot-matrix printer that comes in six models. The Proprinter II and Proprinter II XL are nine-wire printers that provide Fastfont (fast draft), draft, emphasized, and near-letter-quality printing modes at speeds of 240, 200, 100, and 40 characters per second, respectively. The Proprinter III and Proprinter III XL are nine-wire printers that provide Fastfont, draft, emphasized, and near-letter-quality printing modes at speeds of 320, 270, 135, and 65 characters per second, respectively. The Proprinter X24E and XL24E are 24-pin printers offering higher resolution and faster speeds. Draft printing at 240 to 288 cps and letter-quality printing at 80 to 96 cps are supported on these models. All XL models accommodate paper up to 16.5 inches wide; models II, III, and X24E accommodate paper up to 11 inches wide.

The **Quickwriter** is a high-speed 24-wire dot matrix printer that supports draft mode printing at 330 to 396 cps, letter-quality printing at 110 to 188 cps, and a Selectric font mode producing IBM Selectric typewriter-quality characters at 55 to 65 cps. The Quickwriter accommodates paper up to 16.5 inches wide.

The **Quietwriter III** is a near-silent, nonimpact printer that employs IBM's Resistive Ribbon Thermal Transfer Technology. The Quietwriter III prints 160 to 274 cps in draft mode, 100-171 cps in letter-quality mode, and 80 to 136 cps in enhanced mode. It accommodates paper up to 16.5 inches wide.

The **4019 LaserPrinter** is a compact, nonimpact page printer capable of producing letter-quality text and graphics at up to 10 pages per minute. The 4019 includes a standard 200-sheet auto feeder, supports a variety of fonts, and optionally accommodates a 500-sheet second feeder and auto envelope feeders.

Controller-Attachable Printers

The following printers connect directly to a 3174 Establishment Controller using coaxial cable. More information about each printer is provided in Table 3.

The **3812 Model 2 Page Printer** is a tabletop, cut-sheet printer, producing letter-quality text and all-points-addressable graphics at up to 12 pages per minute. The 3812 comes with up to 62 fonts, and optionally supports a scanner for bar coding and photograph reproductions.

The **3816 Page Printer** models S and D are tabletop, nonimpact multifunction printers that produce letter-quality text and graphics at up to 24 pages per minute. Model S produces one-sided copies, while model D prints single or double-sided pages.

The **4224 Printer** models 201, 202, 2C2, 2E2, 2E3, 301, 302, and 3E3 are heavy-duty dot matrix printers that provide print speeds ranging from 200 to 600 cps in DP processing mode, 100 to 300 cps in DP text processing mode, and 50 to 150 cps in near-letter-quality mode. Models 201 and 301 include 9-wire heads; the other models are 18-wire printers. Model 2C2 offers four- and eight-color printing capability.

The **4234 Model 011 Dot Band Printer** is a floor-standing, matrix impact line printer with a changeable print band, allowing different dot sizes to be selected for varied printer applications. This model supports printing speeds of 800 lines per minute (LPM) in draft mode, 600 LPM in data processing (DP) mode, and 200 LPM in near-letter-quality mode.

The **6262 Impact Line Printer** models D12, D14, and D22 are floor-standing models providing printing speeds of 1,200, 1,400, and 2,200 lines per minute, respectively, with up to 132 characters per line. The 6262 offers a selection of five character sizes.

Technical Support

In 1989, IBM announced that it had consolidated all Maintenance Services, IBM Information Network Services, IBM Professional Services, and account services under a new structure: the IBM ServicePlan. The IBM Maintenance Agreement provides nationwide support 24 hours a day, seven days a week. Customers in the United States can reach the IBM Service Center by calling (800) IBM-SERV. This center routes the call to the appropriate customer engineer via a digital radio dispatch system, usually within two minutes.

Pricing

The following section lists information about prices and annual onsite service charges for the IBM products covered in this report.

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Equipment Prices

		Purchase Price ($)	Annual Maint. ($)
3174 Establishment Controller			
	3174-11L	14,680	290
	3174-11R	11,280	264
	3174-12R	11,280	264
	3174-13R	12,610	330
	3174-61R	6,695	225
	3174-62R	6,695	225
	3174-63R	8,395	290
	3174-91R	3,970	185
	3174-92R	3,970	185
1012	1M Byte Storage Expansion	2,610	82
1014	2M Byte Storage Expansion	3,890	135
1056	20M Byte Hard Disk Drive	2,120	148
3020	Asynchronous Emulation Adapter	2,545	148
3030	Type 3A Dual Speed (16/4M bps) Token-Ring Communication Adapter	3,605	87
3041	Type 1 (EIA RS-232-C/CCITT V.24/V.28) Concurrent Communication Adapter	1,130	—
	Type 2 (X.21) Concurrent Communication Adapter	1,130	—
3103	Terminal Multiplexer Adapter	567	20
Displays			
	InfoWindow 3471 Model EA1 (14-inch, amber monochrome monitor)	1,020	65
	InfoWindow 3471 Model EG1 (14-inch, green monochrome monitor)	1,020	65
	InfoWindow 3472 Model FA1 (14-inch, amber monochrome monitor)	1,330	65
	InfoWindow 3472 Model FC1 (14-inch, color monitor)	1,665	80
	InfoWindow 3472 Model FD1 (15-inch, green monochrome monitor)	1,535	65
	InfoWindow 3472 Model FG1 (14-inch, green monochrome monitor)	1,330	65
	InfoWindow Graphics-5 3472 Model GC	2,460	90
	3193 Model 10 (with 122-key keyboard)	3,495	79
	3193 Model 20 (with 102-key keyboard)	3,495	79
	3194 Model C10 (12-inch, color monitor with 122-key keyboard)	2,820	141
	3194 Model C20 (12-inch, color monitor with 102-key keyboard)	2,820	141
	3194 Model C30 (12-inch, color monitor with 104-key keyboard)	2,820	141
	3194 Model D10 (15-inch, monochrome monitor with 122-key keyboard)	2,475	141
	3194 Model D20 (15-inch, monochrome monitor with 102-key keyboard)	2,475	141
	3194 Model D30 (15-inch, monochrome monitor with 104-key keyboard)	2,475	141
	3194 Model H10 (14-inch, color monitor with 122-key keyboard)	3,275	141
	3194 Model H20 (14-inch, color monitor with 102-key keyboard)	3,275	141
	3194 Model H30 (14-inch, color monitor with 104-key keyboard)	3,275	141
Printers			
	Proprinter II	449	43
	Proprinter II XL	579	111
	Proprinter III	599	43
	Proprinter III XL	799	111
	Proprinter X24E	859	82
	Proprinter XL24E	1,099	97
4001	Optional Font Set	114	—
	Quickwriter	1,765	345
7000	Single Bin Sheet Feeder	362	—
8077	Dual Drawer Sheet Feeder	882	—
	Font Download Option	182	—

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		Purchase Price ($)	Annual Maint. ($)
	Quietwriter III	1,815	212
7000	Single Bin Sheet Feeder	349	—
8077	Dual Drawer Sheet Feeder	349	—
8659	Font Download Option	186	—
	3812 Model 2 Page Printer	10,380	1,584
4001	Optional Font Set	324	—
	3816 Model D Page Printer (produces double-sided pages)	22,570	2,160
	3816 Model S Page Printer (produces single-sided pages)	17,320	1,848
7646	Optional Font Set	325	—
	4019 LaserPrinter	2,395	310
	Optional Envelope Feeder	329	—
	Optional 500-Sheet Second Drawer	399	—
	4224 Printer, Models 201 and 301 (200 cps printing)	4,850	360
	4224 Printer, Models 202 and 302 (400 cps printing)	6,920	504
	4224 Printer Model 2C2 (400 cps printing; color capability)	7,505	624
	4224 Printer Model 2E2 (400 cps printing)	7,505	564
	4224 Printer Model 2E3 (600 cps printing)	8,265	696
	4224 Printer Model 3E3 (600 cps printing)	8,265	696
4001	Continuous Forms Device	258	—
	4234 Model 11 Dot Band Printer	14,330	1,476
	6262 Model D12 Impact Line Printer	25,650	2,340
	6262 Model D14 Impact Line Printer	30,080	2,988
	6262 Model D22 Impact Line Printer	42,640	3,900
Software			
9010	Configuration Support A Microcode Release 5	0	0
9007	Configuration Support S Microcode Release 5	0	0
5010	Configuration Support B Microcode Release 2 (for 3174 controller models 01L, 01R, 02R, 03R, 11L, 11R, 12R, and 13R)	1,130	0
5060	Configuration Support B Microcode Release 2 (for 3174 controller models 51R, 53R, 61R, 62R, and 63R)	566	0
5090	Configuration Support B Microcode Release 2 (for 3174 controller models 91R and 92R	257	0
32F8221	PC/Host File Transfer and Terminal Emulator Program Version 2.1	175	—

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IBM 3270 Information Display System

MANAGEMENT SUMMARY

UPDATE: *This updated version of the 3270 Information Display System report includes information on the long-awaited new controller, the 3174 Subsystem Control Unit. In addition to the 3174, IBM also announced three new display stations: the 3191, 3193, and 3194. This report also includes information on the new 3179 Color Display Station Models G1 and G2, which feature graphics capabilities. In addition, IBM has reduced the purchase prices of various 3270 components.*

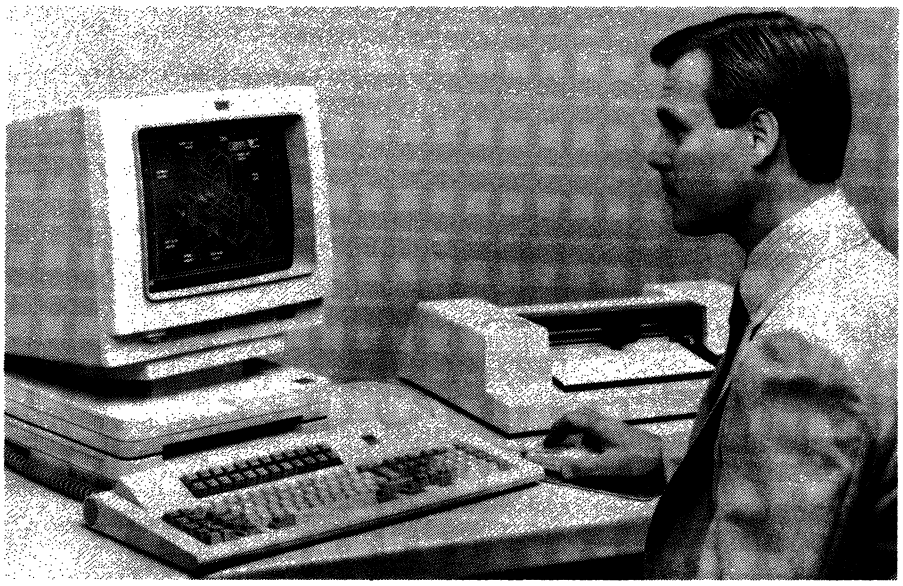
IBM's 3270 Information Display System is the single most important family of products in the display terminal market. This market supports not only IBM, but a significant number of independent manufacturers of 3270-type terminals. Initially, these vendors parlayed lower prices and shorter delivery lead times to capture a share of this market. More recently, enhanced capabilities were added to 3270-compatible systems to make them more attractive to prospective users. Companies like AT&T and Lee Data have added value to their 3270 offerings by providing multifunctionality, including access to both asynchronous and synchronous hosts, and windowing capabilities on their display stations. Others, like Telex and Memorex, have based their product lines on plug-compatibility with the corresponding IBM components. Another major competitor, ITT Courier, has done some of both.

IBM's latest response to these challenges came on June 16, 1986. The company announced several new 3270 family products, the most significant of which is the 3174 Subsystem Control Unit. Also unveiled was a new family of display stations, including the 3191, 3193, and 3194, and a new model of the 3299 Terminal Multiplexer.

The market had waited for IBM to announce a new version of its 3274 control unit for some time. The 3174 Subsystem

The 3270 Information Display System is the most successful and most significant product family in the terminal industry. The 3270 family has spawned a huge market for emulation products. Family members include controllers, display stations (color, monochrome, and plasma), and printers, for use in standalone and cluster configurations in both local and remote environments. IBM has also added personal computing capabilities to the family.

MODELS: 3174 Subsystem Control Unit; 3274 Control Unit; 3276 Control Unit Display Station; 3178, 3180, 3191, 3193, and 3278 Display Stations; 3179, 3194, and 3279 Color Display Stations; 3290 Information Panel; 3262, 3268, 3287, 4250, and 5210 Printers; and 3270 Personal Computer.
DISPLAY: A variety of screen sizes and display formats are available; color and monochrome screens are also available.
KEYBOARD: A variety of keyboard layouts and styles is available; all keyboard models are detachable.
COMPETITION: Telex, ITT Courier, Lee Data, Memorex, AT&T, and several others.
PRICE: Controller purchase prices range from $4,885 to $18,230. Display station prices range from $1,295 to $7,100. Lease and rental agreements are available for some components.



The IBM 3179 Color Display Station Models G1 and G2 combine the eight-color display features of the original 3179 with APA (all-points-addressable) graphics capabilities. The 3179 G models contain a 14-inch (diagonal) screen with a selectable 1,920- or 2,460-character display capacity. When equipped with the 3979 Expansion Unit, the 3179 G models can be equipped with a graphics mouse, color printer, and color plotter.

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IBM 3270 Information Display System

TABLE 1A. IBM 3274 CONTROL UNIT SPECIFICATIONS

	21A	21B	21C	21D	31A	31C	31D	41A	41C	41D	51C	61C
Mode	Local	Local	Remote	Local	Local	Remote	Local	Local	Remote	Local	Remote	Remote
Protocol(s) supported	SNA	Chan.	SNA/ BSC	Chan. APL	SNA	SNA/ BSC	Chan. APL	SNA	SNA/ BSC	Chan. APL	SNA/ BSC	SNA/ BSC
Minimum ports	8	8	8	8	8	8	8	32	32	32	12	16
Maximum ports	32	32	32	32	32	32	32	32	32	32	12	16
Control storage	64K	64K	64K	64K	128K	128K	128K	192K	192K	192K	64K/ 128K	192K
Devices supported (category)	A/B	A/B	A/B	A/B	A/B	A/B	A/B	A	A	A	A/B	A

TABLE 1B. IBM 3174 SUBSYSTEM CONTROL UNIT SPECIFICATIONS

	1L	1R	2R	3R	51R	52R	53R
Mode	Local	Remote	Remote	Remote	Remote	Remote	Remote
Protocol(s) supported	SNA, non-SNA, async.	SNA/ BSC, X.25, async.	SNA, X.21, X.25, async.	Token-Ring	SNA/ BSC, X.25, async.	SNA, X.21, X.25, async.	Token-Ring
Minimum ports	4	4	4	4	9	9	9
Maximum ports	32 plus 24 async.	32 plus 24 async.	32 plus 24 async.	32 plus 24 async.	16 plus 8 async.	16 plus 8 async.	16
Control storage	1M	1M	1M	1M	1M	1M	1M
Devices supported (category)	A	A	A	A	A	A	A

TABLE 2. ATTACHABLE DEVICES

Category A	Category B
3178 Models C1, C2, C3, C4 3179 Models 1, G1, G2 3180 Model 1 (110, 120, 130) 3191 Models A10, B10, A20, B20 3193 Models 010, 020 3194 Models H50, H20 3262 Models 3, 13 3268 Models 2, 2C 3278 Models 1, 2, 3, 4, 5 3279 Models S2A, S2B, S3G, 2X, 3X 3287 Models 1, 2, 1C, 2C 3289 Models 1*, 2* 3290 Model 1** 3270 Personal Computer 4250 Model 1 5160 Model 589 (CUT Mode) 5170 Model 599 (CUT Mode) 5210 Models G1, G2 6580 Models A04, A06, A08, A10, B04, B06, B08, B10	3277 Models 1*, 2* 3284 Models 1*, 2* 3286 Models 1*, 2* 3286 Models 1*, 2* 3286 Models 1*, 2* 3286 Models 1*, 2* 3287 Models 1, 2 3288 Model 2*

**No longer available.*
***Does not attach to 3274 Models 21A, 21B, 21C, 21D.*

Control Unit marks the establishment of a new generation of 3270 controllers. Seven models of the 3174 were introduced; Models 1L, 1R, 2R, and 3R provide for the attachment of up to 32 devices, while Models 51R, 52R, and 53R allow for the attachment of up to 16 devices. The various members of the 3174 family provide for the attachment of various 3270 display stations, printers, and workstations to IBM host processors via a local channel, remote link, IBM Token-Ring Network 3270 Gateway feature, or IBM Token-Ring Network. In addition, an optional feature pro-

CHARACTERISTICS

VENDOR: International Business Machines Corporation (IBM), Old Orchard Road, Armonk, NY 10504. Contact your local IBM representative. In Canada: IBM Canada Ltd., 3500 Steeles Avenue East, Markham, Ontario L3R 2Z1. Telephone (416) 474-2111. Or contact the IBM office in the nearest major city.

DATE OF ANNOUNCEMENT: 3274, 3276, and 3278—May 1977; 3279 and 3274-51C—October 1979; 3274-21A/-21B/-21C/-21D and 3274-31A/C/D—early 1982; 3274-41A/-41C/-41D,3274-61C, 3178, and 3290—March 1983; 3179 and 3180—March 1984; 3174, 3191, 3193, and 3194—June 1986.

DATE OF FIRST DELIVERY: Older components—usually within one year of announcement; 3174-1L—July 1986; 3174-1R/-2R/-51R/-52R—August 1986; 3174-3R/-53R—May 1987; 3191—June 1986; 3193—September 1986; 3194-H50—fourth quarter 1986; 3194-H20—third quarter 1987.

NUMBER DELIVERED TO DATE: Approximately 2 million display terminals (all models).

SERVICED BY: International Business Machines (IBM).

CONFIGURATION

The 3270 family of display/keyboard stations and printers can be configured as a local or remote cluster or as a standalone station. There are now three generations of components (first-generation components are no longer marketed) with a limited degree of mixing permitted within the same subsystem; complete compatibility for communications and applications program support can be achieved with the new components, if desired. Tables 1 and 2 present the overall configurational possibilities. Specific prerequisites are detailed in the discussions of individual components.

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IBM 3270 Information Display System

vides for the attachment of ASCII terminals to the 3174, and 3174 attachment to asynchronous host computers via telecommunications links. The 3174 control unit models are functionally equivalent to the IBM 3274 Control Unit Models 41A, 41C, 41D, and 61C.

The 3191 Display Station is a low-priced, entry-level display. At $1,295, it carries the lowest price tag ever for an IBM 3270 display. The 3191 is available in four models, providing a choice of keyboards and character phosphor (green or amber-gold). Standard features include a 12-inch screen, 1,920-character display capacity, tilt/swivel monitor, and detachable keyboard.

The 3193 Display Station is a multifunctional, monochrome display terminal. The 3193 offers multiple logical terminal capability (up to two logical terminals), as well as multiple partition capability (up to eight partitions). The 3193 combines alphanumeric capabilities with imaging capabilities, when used in conjunction with the new 3117 and 3118 Scanners. Image documents of up to letter or A4 size may be displayed on the 3193's screen, which provides all-points-addressable (APA) screen capability. The 3193 contains a 15-inch monochrome display with 80-character by 48-column screen support.

The 3194 is a seven-color (plus black) display station with advanced functions. A resident set of utility functions makes use of a 3.5-inch diskette drive located in the logic element. Multiple sessions (up to two notepads and one to four host sessions, with windowing) and a keystroke record/play function are supported. The 3194 includes a 14-inch display with a 1,920-character capacity, and a choice of keyboard.

The first generation of 3270 components was introduced by IBM in 1972, and consisted of the 3271 Control Unit; 3272 Control Unit; 3275 Standalone Display Station; 3277 Cluster Display Station; 3284 Matrix Printer; 3286 Matrix Printer; and 3288 Belt Printer. In an announcement that became effective November 16, 1982, IBM has withdrawn the first generation of 3270 products from marketing. The above-mentioned models are no longer marketed by IBM, although it will continue to support existing units.

The second generation of 3270 components was unveiled in 1977, and included the 3274 Control Unit; 3276 Control Unit Display Station; 3278 Cluster Display Station; 3287 Matrix Printer; and the 3289 Belt Printer. IBM has now replaced the original 3274 Control Unit models with Models 3274-21 and -31. These control units contain an improved storage technology, and support extended color, extended highlighting, and presentation graphics functions.

In October 1979, IBM made another major addition to the 3270 family with the introduction of the 3279 Color Display Station. Although the 3279 was not the first color display on the market, it was seen by many industry observers as IBM's acknowledgement that color displays were a legitimate part of a general-purpose system, and not just an unnecessary extravagance. Along with the 3279,

The 3178 Display Station is the replacement for the venerable 3278 display. The 3178 contains an improved ergonomic design, taking up less space than its predecessor. The terminal's modular construction contributes to its ease of use, with a tilt/swivel display and low-profile keyboard.

TRANSMISSION SPECIFICATIONS

The 3174 remote models (1R, 2R, 3R, 51R, 52R, and 53R) provide the following support as is applicable to the model selected:

- **EIA RS-232-C CCITT V.24/28 operation up to a maximum speed of 9600 bps for BSC and 19,200 bps for SNA/SDLC;**
- **CCITT V.35 and X.21 operation up to a maximum speed of 64K bps for SNA/SDLC;**
- **X.25 operation up to a maximum speed of 19,200 bps.**

The 3174 local model (1L) provides single-tag interlocked and two-tag high-speed transfer channel operation modes, with rates up to 1.25M bps.

3174 Models 1R, 2R, 51R, and 52R operate in half-duplex point-to-point or multipoint modes, on duplex or half-duplex nonswitched facilities, and in half-duplex point-to-point mode on switched facilities. Switched, X.21, and X.25 network operations are supported only through SNA/SDLC. 3174 Models 3R and 53R transmit and receive at 4M bps using media access protocols conforming with IEEE 802.5 and ECMA 89 standards, and logical link protocols conforming with the IEEE 802.2 standard, over the baseband IBM Token-Ring Network. ***(For more information on the IBM Token-Ring Network, see Report C11-491-501.)***

3274 Models 21C, 31C, 41C, 51C, and 61C operate in half-duplex point-to-point, or in half- or full-duplex multipoint, using BSC or SDLC protocols, at speeds of 1200/600 (51C only), 2000, 2400/1200, 4800/2400, 7200/3600, and 9600/4800 bits per second on nonswitched facilities. Multipoint and point-to-point communications at speeds up to 19,200 bits per second and point-to-point speeds up to 56K bits per second are also possible where facilities are available.

The 3276 operates in half-duplex point-to-point, or in half- or full-duplex multipoint at speeds of 1200, 2000, 2400,

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IBM 3270 Information Display System

IBM unveiled color versions of the 3287 Printer, as well as a new 3274 Control Unit Model 51C, and enhancements to several existing models.

On March 8, 1983, IBM shook up the 3270-compatible market by announcing several additions to the 3270 product line, while lowering prices on selected models and features of existing products. New products included in this announcement were the 3178 Display Station; the 3290 Information Panel Display; four new 3274 Control Unit models (41A, 41C, 41D, and 61C); the 3299 Terminal Multiplexer; and the IBM 3278 Personal Computer Attachment. On October 18, 1983, IBM enhanced its 3270 product line even further with the introduction of two additional products: the 3270 Personal Computer and the 3279 Personal Computer Attachment. On March 20, 1984, the 3180 Display Station and 3179 Color Display Station were unveiled, and purchase prices for the 3274 Control Unit and selected 3278 and 3279 display models were reduced. In addition, lease/rental plans for the 3274 were discontinued.

On June 18, 1985, IBM unveiled two graphics versions of the 3179 Color Display Station, Models G1 and G2. Compatible with the older 3279 Model S3G, the new 3179 models provide a 14-inch color display with selectable screen capacities of 1,920 and 2,560 characters. Graphics capabilities are enhanced via the units' all-point-addressable (APA) screens.

The 3270 Personal Computer is a version of IBM's Personal Computer designed for use on the 3270 Information Display System. The key feature of the 3270-PC is that it can operate up to seven concurrent sessions: four 3270-type sessions, one Personal Computer DOS session, and two local notepad sessions. The 3270-PC allows the user to view these sessions on multiple windows, which can be manipulated independently. A monochrome or color display may be used. IBM has further enhanced the 3270-PC with graphics (3270-PC/G and 3270-PC/GX) and plasma display models. For more information on the 3270 Personal Computer Family, see Report C22-491-301.

IBM has also unveiled new models of the Personal Computer XT/370 and AT/370 that may be attached to a 3274 Control Unit. Displaywriter attachment to a 3270 system is also now permitted.

COMPETITIVE POSITION

As mentioned previously in this report, the members of the IBM 3270 Information Display System and their competitors comprise the single largest subset of the alphanumeric display terminal market. Studies conducted by various market research firms put the current installed base of 3270-type terminals at well over three million units. Of that installed base, approximately half are IBM terminals; the rest are 3270-compatible models from independent manufacturers. IBM's major competitors in this market include Telex, ITT Courier, AT&T, Lee Data, and Memorex, among others.

4800, 7200, or 9600 (SNA/SDLC only) bits per second on nonswitched facilities. Also, 3276 Models 11, 12, 13, and 14 operate in half-duplex point-to-point on the public switched telephone network at speeds of 1200 or 4800 bits per second, and on public switched data networks at speeds of 2400, 4800, or 9600 bits per second. Models 11 through 14 also operate in half-duplex at 9600 bits per second over a direct attached loop, and at 2400, 4800, or 9600 bits per second over a data link attached loop.

Devices connect to the 3274 controllers via coaxial cable. Devices can connect to the 3174 via coaxial cable, or over IBM Cabling System data grade media. When using the 3174 with the IBM Cabling System data grade media, cabling to devices is via direct attachment to the media. A balun cable assembly is not required at the 3174 end of the cable.

HOST COMPUTER SOFTWARE SUPPORT

A 3270 subsystem is supported for local and remote operation by IBM System/360, System/370, 43XX Series, 303X, 308X, 3090, 8100, Series/1, and System 3 computer systems. Remote terminals are supported by BTAM, TCAM, VTAM, RPG Telecommunications, BSCA Multiline/Multipoint, and Communications Control Program depending on computer system and operating system. The 3274-based local clusters are supported on mainframe configurations under 3272 mode or under VTAM. In general, all new models and configurations of the 3270 can be supported under previous 3270 programming. If Display Exception Monitoring Facility (DEMF) software is installed on the host computer, network support for problem determination/isolation is available to terminals operating in BSC mode. In addition, 3270 display printer components, as well as 3276 clusters, are used with higher level systems such as the IBM 8100 and 3790.

The 3179 Models G1 and G2 are datastream-compatible with all other 3270 displays in alphanumeric application environments. Host interactive graphics support for the 3179 G models is included in an enhancement to Release 4 of Graphical Data Display Manager (GDDM). Screen management functions are extended to interact with graphics and alphanumeric information.

DEVICE CONTROL

The 3270 System operates under the control of the program stored at the remote computer. Under program control, the 3270 can execute any of four types of commands: read, write, control, and sense.

Program Function keys are used to initiate program functions or identify data that can be transmitted with an accompanying program function code.

The 3276, 3178, 3180, and 3278 have two added controls: Cursor Home key and Cursor Select key. The Cursor Home key returns the cursor to the first nonprotected character position. The Cursor Select key causes a selection operation similar to a light pen operation; a light pen (Selector Pen) is optional in addition to this control. The 3179 G models provide a choice of two types of cursor—alphanumeric and graphic (cross or cross hair). Cursor movement on these models has been improved; when the cursor keys are depressed, the cursor accelerates. A Print key is included on 3276/3178/3180/3191/3193/3194/3278 display/keyboards when attached to a 3274 Control Unit or 3174 Subsystem Control Unit; this key causes the displayed data to be transferred to a printer for immediate printing without requiring a host computer command; normal print commands can also be executed. The standard cursor is an underscore. On a 3178, 3180, 3191, 3193, 3194, or 3278 display connected to a 3274 or 3174 controller, the cursor

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IBM 3270 Information Display System

IBM's aggressive strengthening of the 3270 product line has effectively thinned the ranks of the independent 3270-compatible equipment vendors. Of those that remain, Telex has been the most successful. Telex provides a family of plug-compatible replacements for various members of the 3270 family. This plug-compatibility allows Telex terminals to be attached to IBM controllers, and vice versa. Memorex also makes plug-compatible replacements for various 3270 components. By contrast, AT&T and Lee Data provide functional compatibility via their chief 3270-compatible product lines. Lee Data and AT&T provide display terminals that offer the windowing features; in addition, both companies provide access to both synchronous and asynchronous host computers via their terminal systems.

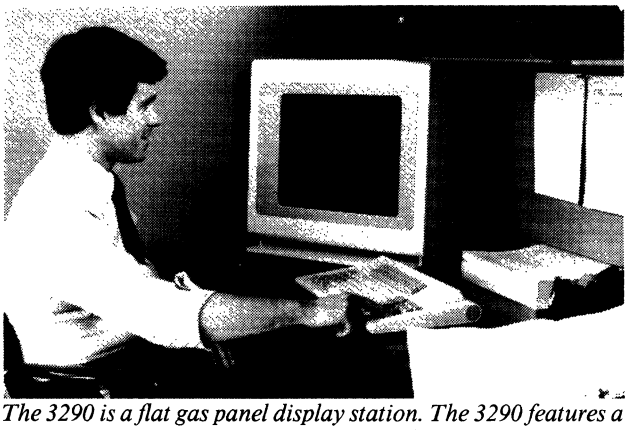
Until the June 1986 announcements, IBM had lagged behind Lee Data and AT&T in adding multifunctionality to the 3270 line. However, the introduction of the 3174 Subsystem Control Unit and the new 319X series of display stations have plugged this gap in IBM's product line. Once again, life has been made more difficult for IBM's competition in the 3270 market.

ADVANTAGES AND RESTRICTIONS

The reliability of IBM's equipment and the dependability and consistency of its maintenance service have always presented a problem to those vendors who manufacture IBM-compatible equipment. The 3270 market had been stable for a few years; lower prices, improved price/performance, and shorter lead times for delivery have allowed several competitors to carve out a healthy market share. However, IBM's recent price reductions (existing models of the 3274, 3276, 3279, and 3287 were all reduced in price), new product introductions, and incorporation of the highly successful Personal Computer into the 3270 line, have put increased pressure on the independents.

Despite various predictions that the market for 3270-type terminals has bottomed out, the demand for these devices continues to be strong. In the future, it is likely that a high percentage of these 3270-type terminals and devices will coexist with personal computers, minicomputers, and asynchronous devices on a local area network (LAN). Many LAN vendors already offer support for 3270 devices on their network products. Now, with the introduction of the new 3174 Subsystem Control Unit, IBM supports the attachment of a 3270 controller on the Token-Ring Network.

Another key feature in this market is functionality. Lee Data has been the pioneer, being the first of the 3270 vendors to offer multiple-host (asynchronous and synchronous) access from a single cluster controller, along with windowing and partitioning features on its 3270 display stations. AT&T followed suit a few months ago with the introduction of the 6500 Multifunction Communication System. Now, IBM offers these features via the 3174 controller and the 3193 and 3194 display stations. IBM has gone one step further by providing imaging capability on the 3193. When used along with the 3117 or 3118 Scanner,



The 3290 is a flat gas panel display station. The 3290 features a screen capacity of 9,920 characters, displayed in orange on a dark background. The terminal's multiple display screen capability allows for concurrent viewing of four 3278 Model 2 screens. Combinations of alphanumeric data and high-resolution graphic images may be displayed simultaneously.

can be standard or reverse video underscore, blinking or nonblinking as selected by the operator.

An Entry Assist capability is available on the 3274 (equipped with Configuration Support D) and 3174 for the 3178, 3179, 3180, 3191, 3193, 3194, 3278, and 3279 displays. Entry Assist allows the operator to enter and edit textual material such as letters, memos, reports, source programs, etc. Entry Assist capabilities are available when the operator enters Document mode. Capabilities available in this mode include tabbing, screen margins, word wrap, word/character delete, and end-of-line warning.

The 3193 display provides up to two logical terminals and up to eight partitions. A Jump key allows the user to activate either logical terminal. A Jump Partition key allows the user to activate any partition. A Clear Partition key erases all of the data in an active partition. A Clear key erases the data in all presentation spaces operating under an active logical terminal. A Setup key puts the terminal in setup mode; this allows the operator to set screen layout (full or split screen), logical terminal attributes (screen layout of each logical terminal, extended attributes, numeric lock on/off, and number of partitions), display polarity, keyboard ID, audible alarm volume, mono/dual case, and local copy (viewport copy or presentation space copy).

The 3193 also provides an imaging capability when used in conjunction with the 3117 Scanner (with 3117 Extension Unit) or the 3118 Scanner. When using multiple logical terminals, the operator can display alphanumeric only, image only, or a combination of both. The 3193 accepts source image data with the following characteristics: compression; horizontal and vertical resolution (240 and 120 PELs per inch horizontally or vertically, or any combination of 200 and 100 PELs horizontally and vertically); image functions (decompression and mapping of image data screen, scale up or down the size of an image, image orientation, image mirror, invert image, image fill, attachment of 3117 or 3118 Scanner for scanning and transmitting images of documents to the host system).

The 3194 provides the user with two notepads and one to four host sessions. Windows are available to view the notepads and sessions. Window management allows the operator to manipulate the window (size, move, hide). A resident set of utility functions makes use of the 3.5-inch diskette drive located in the 3194's logic element. Local utility functions include file transfer from or to host or diskette; diskette management (directory display, erase, copy); memory dump;

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IBM 3270 Information Display System

TABLE A. USER RATINGS OF 3270 DISPLAYS

Model	Number of User Responses	Number of Displays Installed	Weighted Averages*						
			Ease of Operation	Display Clarity	Keyboard Feel & Usability	Ergonomic Features	Hardware Reliability	Maintenance/ Technical Support	Overall Performance
3178	43	17,046	3.5	3.4	3.3	3.3	3.6	3.4	3.5
3179	22	4,275	3.4	3.3	3.4	3.4	3.5	3.5	3.4
3180	15	1,154	3.5	3.5	3.5	3.2	2.9	2.9	3.2
3270-PC	4	257	3.3	3.5	3.3	3.3	4.0	3.5	3.3
3278	44	14,127	3.2	3.5	3.3	2.5	3.4	3.4	3.3
3279	11	1,615	3.4	3.5	3.4	2.5	3.5	3.4	3.5
3290	3	1,105	3.0	3.3	3.3	2.7	3.7	3.3	3.0
3270, unspecified	12	4,468	3.3	3.1	3.3	2.3	3.3	3.0	3.0

**Weighted Average is based on assigning a weight of 4 to each user rating of Excellent, 3 to Good, 2 to Fair, and 1 to Poor.*

the 3193 can display a document, and automatically transmit that document to the host computer without having an operator key it in. All in all, IBM's 3270 line now provides an attractive degree of multifunctionality, and users have yet another reason to stay with the industry leader.

USER REACTION

During January and February 1986, Datapro conducted its first combined LAN/Terminal Users Survey, in conjunction with *Data Communications* magazine. A questionnaire was designed and produced by Datapro and mailed to approximately 10,000 addresses selected at random from a cross section of *Data Communications'* U.S. end-user subscriber base. The users were asked to rate all types of display terminals, integrated voice/data terminals (IVDTs), local area networks (LANs), and protocol conversion devices. A large number of responses on the IBM 3270 Information Display System were received, yielding ratings on various 3270 display stations. These ratings are summarized in Table A.

In addition to the ratings, the users were asked whether or not they would recommend their 3270 equipment to other users with similar applications. Of the 154 users who responded, 129 (84 percent) answered positively, 10 negatively, and the remainder were undecided or did not respond. It should be noted here that nearly half (5) of the users who answered this question negatively were reporting on the older 3278 displays.

For more detailed evaluations of the ratings received by IBM, as well as other terminal and IVDT vendors, see Report C25-010-901, User Ratings of Terminals and IVDTs. The user rating for LANs can be found in Report C11-010-501, User Ratings of Local Area Networks. User ratings of protocol conversion devices can be found in Report C23-010-101, All About Protocol Conversion Systems. □

patch; trace; predefined customization profiles; and customization.

When equipped with the personal computer option, the 3278 display can operate in two modes: host compute and personal compute. These modes provide for concurrent operation of a host program and a Personal Computer program. The user can switch between modes, in order to decide whether it is the host program or personal computer program which receives keystrokes and has its output displayed.

Readers capable of accepting a credit card-sized plastic card with up to 40 characters encoded on a magnetic tape stripe can be connected to the 3278 and 3276 displays. The reader for the 3276 and 3278 displays will accept previously coded cards if the normal end of form control character (not the Hex C optional character) is supported.

COMPONENTS

3174-1L, -1R, -2R, & -3R SUBSYSTEM CONTROL UNITS: Control units that provide control of a local or remote cluster of up to 32 devices. Model 1L is a local controller that provides a System/370-architecture channel interface for SNA and non-SNA attachment. Model 1R provides EIA RS-232-C/CCITT V.24 and CCITT V.35 interfaces for SNA/SDLC, BSC, or X.25 remote attachment. Model 2R provides a CCITT X.21 interface for SNA/SDLC or X.25 remote link attachment. Model 3R provides an IBM Cabling System interface for IBM Token-Ring Network attachment. The control units are functionally equivalent with the 3274 Models 41A, 41C, 41D, and 61C control units operating with Configuration Support D. Each control unit contains a host attachment interface adapter, 1MB of control storage, and a 1.2MB 5.25-inch diskette drive. A second diskette drive is optionally available.

The 3174 control units can be configured to connect terminals either directly, via 3299 Terminal Multiplexers, via optional Terminal Multiplexer Adapters, or by a combination of these three options. Each control unit contains an integrated four-port terminal adapter that permits up to four devices to be directly attached; a maximum of 32 devices can be attached by using up to four 3299 Terminal Multiplexers, up to four Terminal Multiplexer Adapters, or any combination (up to four total) of these two options.

3174 Model 3R provides host attachment via the IBM Token-Ring Network. It communicates with the host processor via an IBM 3720 or 3725 Communication Controller with the NCP/Token-Ring interconnection facility of ACF/NCP Version 4 Release 2, or via a 3174 Model 1L with the IBM Token-Ring Network 3270 Gateway option. The IBM Token-Ring Network 3270 Gateway feature provides the capability for up to 140 Token-Ring-attached devices, as PU 2.0 nodes, to communicate with an IBM host. Any combination of the following devices are supported: IBM 3174-3R/-53R; IBM Personal Computer using the IBM Personal Computer 3270 Emulation Program Version 3; IBM PC using APPC/PC as a PU 2.0 node; and System/36 with the LAN attachment feature and using 3270 emulation or APPC/PC as a PU 2.0 node.

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The Asynchronous Emulation Adapter is an optional feature that allows 3270 display stations operating in control unit mode to emulate an ASCII display terminal (IBM 3101 or Digital Equipment Corporation VT100). The terminal can communicate from the adapter direct, leased, or switched connection via RS-232-C with ASCII applications and public data networks, while providing a connection, when required, to IBM applications. Attached 3270 printers can also emulate an ASCII printer. Personal Computers emulating any of the supported ASCII displays can also communicate with 3270 applications. Each adapter provides eight ASCII ports; the control units can support up to three adapters. These device attachments are in addition to the maximum available on SNA controllers (32); the number of devices supported by non-SNA controllers is limited to 32.

The 3174 Models 1L, 1R, 2R, and 3R provide support for the attachment of Category A devices only, except for the 3278 Model 1.

3174-51R, -52R, & -53R SUBSYSTEM CONTROL UNITS: Control units that provide control of a remote cluster of up to 16 devices. Model 51R provides EIA RS-232-C/CCITT V.24 and CCITT V.35 interfaces for SNA/SDLC, BSC, or X.25 remote attachment. Model 52R provides a CCITT X.21 interface for SNA/SDLC or X.25 remote link attachment. Model 53R provides an IBM Cabling System interface for IBM Token-Ring Network attachment. The control units are functionally equivalent with the 3274 Models 41A, 41C, 41D, and 61C control units operating with Configuration Support D. Each control unit contains a host attachment interface adapter, 1MB of control storage, and a 1.2MB 5.25-inch diskette drive. A second diskette drive is optionally available.

The 3174 control units can be configured to connect terminals either directly, via 3299 Terminal Multiplexers, via optional Terminal Multiplexer Adapters, or by a combination of these three options. Each control unit contains an integrated nine-port terminal adapter that permits up to nine devices to be directly attached; a maximum of 16 devices can be attached by using up to two 3299 Terminal Multiplexers, up to two Terminal Multiplexer Adapters, or any combination (up to two total) of these two options.

3174 Model 53R provides host attachment via the IBM Token-Ring Network. It communicates with the host processor via an IBM 3720 or 3725 Communication Controller with the NCP/Token-Ring interconnection facility of ACF/NCP Version 4 Release 2, or via a 3174 Model 1L with the IBM Token-Ring Network 3270 Gateway option. The IBM Token-Ring Network 3270 Gateway feature provides the capability for up to 140 Token-Ring-attached devices, as PU 2.0 nodes, to communicate with an IBM host. Any combination of the following devices are supported: IBM 3174-3R/-53R; IBM Personal Computer using the IBM Personal Computer 3270 Emulation Program Version 3; IBM PC using APPC/PC as a PU 2.0 node; and System/36 with the LAN attachment feature and using 3270 emulation or APPC/PC as a PU 2.0 node.

The Asynchronous Emulation Adapter is an optional feature that allows 3270 display stations operating in control unit mode to emulate an ASCII display terminal (IBM 3101 or Digital Equipment Corporation VT100). The terminal can communicate from the adapter direct, leased, or switched connection via RS-232-C with ASCII applications and public data networks, while providing a connection, when required, to IBM applications. Attached 3270 printers can also emulate an ASCII printer. Personal Computers emulating any of the supported ASCII displays can also communicate with 3270 applications. Each adapter provides eight ASCII ports; the control units can support one adapter. These device attachments are in addition to the maximum available on SNA controllers (16); the number of devices supported by non-SNA controllers is limited to 16.

The 3174 Models 51R, 52R, and 53R provide support for the attachment of Category A devices only, except for the 3278 Model 1.

3274-21A, -21B, -21C, -21D, -31A, -31C, & -31D CONTROL UNITS: Control units that provide control of a local or remote cluster of up to 32 devices. Models 21A, 21B, 21C, and 21D contain 64K bytes of storage; Models 31A, 31C, and 31D contain 128K bytes of storage. The units are upward-compatible with and supersede predecessor 3274 Models 1A, 1B, 1C, and 1D. They support enhanced storage technology and extended color, extended highlighting, and presentation graphics functions not available on the older models. Models 21A and 31A support a local cluster operating in SNA mode under VTAM, and are upward-compatible with the 3274-1A. Model 21B supports a local cluster operating in 3272-compatible mode, and supersedes the 3274-1B. Models 21C and 31C support a remote cluster operating under BSC or SDLC protocol, and are upward-compatible with the 3274-1C. Models 21D and 31D are upward-compatible with Models 21B and 31C, respectively, and combine local attachment in 3272-compatible mode with an APL/Text control function; the -21D and -31D supercede the 3274-1D.

Operating functions are controlled by feature and systems diskettes customized at installation, using a diskette drive integral with the controller. The 3274-21C/-31C is conditioned for BSC or SDLC operation by loading a program into the controller using interchangeable diskettes.

All models support mixing of the older 3277/3284/3286/3288 (Category B) devices on the same controller with the new 3178/3278/3179/3279/3287/3289 (Category A) devices. The basic controllers each accommodate up to eight of the newer components. One Type A Terminal Adapter is required for each additional group of eight of the new devices. Alternatively, up to four Type B Terminal Adapters, each accommodating up to four 3277/3284/3286/3287/3288 (Category B) devices, can be installed. A single controller can accommodate a cluster of up to 32 terminals, comprised of groups of eight Category A devices and groups of four Category B devices; however, no more than 16 (i.e., four groups) of the 32 terminals can be Category B devices. A minimum of one 3278 display and keyboard is required. The 3287 printer can be attached to either Type A or Type B adapters. A 3278 Model 5 display cannot be attached to a 3274-21B Control Unit.

Control Storage Expansion is required to install Type B Terminal Adapters in the 3274-21A/C and -31A/C; these features are not required to install Type B Adapters in the 3274-21B/D and -31D.

The 3274-21C and -31C require the External Modem Interface Feature and either the Common Communications Adapter (CCA) or the High Performance Communications Adapter. The latter is required if any Type B Terminal Adapters are installed and a transmission speed of 9600 bps is used; otherwise, the CCA is adequate for all transmission combinations.

Dataphone Digital Service is available on Models 21C and 31C via both point-to-point and multipoint adapters. Models 21C and 31C can also be equipped with an Encrypt/Decrypt device that codes and decodes messages using the Federal Data Encryption Standard algorithm.

The APL/Text feature, available on all models except 21B, permits display (on an adapted 3278) or printing (on an adapted 3287) of an expanded 222-character set, including the standard EBCDIC and APL characters plus 37 text-

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specific characters and 10 graphics plot characters. The Text Print feature, available with all models except 21B, permits printing on the 3289 of a 125-character set (93 EBCDIC characters plus the 32-character Text Character set) and character underscore and overprint capabilities.

Enhancements to the 3274 support attachment of the 3279 Color Display Station and 3287 Models 1C and 2C Color Printers. Any 3274 except Model 21B can now be specified with one of three no-charge Configuration Support packages (A, B, or C); Model 21B is always equipped with Configuration Support A. Configuration Support A provides support for most 3270 functions, including base color mode; Support B adds the ability to attach 3278-5 printers, and to perform specific SNA-related functions; Support C includes all Support A and B functions plus certain other functions, including extended color mode, extended highlighting, and programmed symbol set support.

3274-41A, -41C, & -41D CONTROL UNITS: Control unit models which are intended to replace existing 3274 Models 31A, 31C, and 31D, respectively. Models 31A, 31C, and 31D will remain available to support Category B terminal adapter features. These 3274 models provide increased functional capability with 192K of control storage and a double-sided diskette drive. The controllers provide attachment for Category A devices only. These devices can be attached directly to the control unit, eliminating the need for terminal adapters. A new Configuration Support package (D) is specified with the 3274-41A, -41C, and -41D. Configuration Support D provides all currently supported functions available under Configuration Support A, B, and C, plus the new Entry Assist function.

3274-51C CONTROL UNIT: Provides control of a remote cluster of up to 12 displays and printers operating under BSC or SDLC protocol. The basic controller accommodates up to eight Category A devices. Four additional Category B devices can be attached via the Terminal Adapter Type B (#7801). Except for the number of devices supported, the Model 51C offers functions and features equivalent to and compatible with a 3274 Model 1C. In addition, it provides certain features not available using SDLC via a data link or a direct or data link attached loop (this feature provides support for Category A devices only); a 1200 bps integrated modem; and a switched network communications capability. The 3274 Model 51C is also upward-compatible with the 3276 Control Unit Display Station, except that it provides the Printer Authorization Matrix used on other 3274s instead of the Default matrix used on the 3276.

3274-61C CONTROL UNIT: A control unit intended to replace the 3274 Model 51C (with Extended Function Store feature #1800). The 3274-51C will remain available to support Category B terminal adapter features. The 3274-61C provides 192K of control storage, a double-sided diskette, and support for up to 16 Category A devices.

A Configuration Support package (D) is specified with the 3274-61C. Configuration Support D provides all currently supported functions available under Configuration Support A, B, and C, plus the new Entry Assist function. The 3274-61C provides support for only Category A devices. These devices can be directly attached to the control unit, eliminating the need for terminal adapters.

3299-2 TERMINAL MULTIPLEXER: A terminal multiplexer that can be used when connecting Category A devices to a 3274 Control Unit (except the 3274-51C). The 3299-2 can also allow devices to be connected to a 4361 Workstation Adapter or 4702 processor. The 3299 Model 2 can be used with either coaxial cable or the IBM Cabling System media, without the need for baluns (impedance matching devices) at the 3299 end of the cable. When using coaxial cable, the 3299-2 can be located up to 4,920 feet from the 3274 control unit; each terminal can then be located up to an additional 4,920 feet from the 3299-2, allowing terminals to be located up to 9,840 feet from the control unit (or double the distance allowed when the terminal is directly connected to the controller). When using the IBM Cabling System media, the 3299-2 can be located up to 3,280 feet from the 3274; each terminal can then be located up to an additional 3,280 feet from the 3299-2. Baluns are not required on the 3299-2 end of the cable; however, these distances assume that one balun is used in the cable.

3299-3 TERMINAL MULTIPLEXER: A terminal multiplexer that connects devices to a 3174 Subsystem Control Unit or 3274 Control Unit (except the 3274-51C). The 3299-3 can also allow devices to be connected to a 4361 Workstation Adapter or 4702 processor. The 3299-3 uses specified telephone twisted-pair wire between the 3299-3 and connected devices; coax-to-twisted-pair adapters (CTPAs) are not needed. A CTPA is still required on the device end of the telephone twisted-pair wire. The maximum allowable distance between the 3299-3 and attached devices is 900 feet; the distance between the 3299-3 and the control unit is 4,920 feet.

3276 CONTROL UNIT DISPLAY STATION: A controller for small remote clusters; it also includes an integrated display that is functionally equivalent to a Model 3278 Display Station. The 3276 can accommodate up to seven additional displays and printers.

A total of eight models provide combinations of four display capacities and BSC or SDLC operations:

Model 1—960-character display; BSC transmission.
Model 2—1,920-character display; BSC transmission.
Model 3—2,560-character display; BSC transmission.
Model 4—3,440-character display; BSC transmission.
Model 11—960-character display; SDLC transmission.
Model 12—1,920-character display; SDLC transmission.
Model 13—2,560-character display; SDLC transmission.
Model 14—3,440-character display; SDLC transmission.

The BSC models (1/2/3/4) can accommodate any mix of up to seven additional 3278 displays and 3287 and 3289 printers. The added 3278 display cannot have a larger display capacity than the basic 3276 integrated display. However, the SDLC/BSC Switch feature permits alternate protocol operation and also permits intermixing any size display on any "BSC" 3276 model. The SDLC models (11/12/13/14) can accommodate any display size mix. The display screen measures 14 inches (diagonally).

The basic 3276 controller (any model) can accommodate two devices. A Terminal Adapter is required for each additional two devices. Models 11, 12, 13, and 14 can be equipped with an Encrypt/Decrypt device, which codes and decodes messages using the Federal Data Encryption Standard algorithm.

The 3276 requires an External Modem Interface or an Integrated Modem (1200 bps). Five integrated modem features are available for operation over switched or non-switched facilities, providing basic transmission linkage plus optional network backup and manual or auto answer capabilities. Either external or internal modem operation requires a Communications Feature.

Dataphone Digital Service is available on all models via both point-to-point and multipoint adapters. APL/Text functions similar to those provided by the 3274 Control Unit can be implemented by equipping the 3276 with APL/Text Control and Extended Function Base features.

A Color Display Attachment feature (#19540) provides the 3276 with support for an attached 3279 Display Station

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operating in base color mode. This feature requires the previously available Extended Function Base feature (#1068), and does not support operation of a 3279-2B or -3B in extended color mode. (The Color Display Attachment is not required for color printing via a 3287 Model 1C or 2C Color Printer.) Another 3276 enhancement removes the mutually exclusive restriction between the Extended Function Base feature (#1068) and the Encrypt/Decrypt feature (#3680). An audible alarm and security keylock are standard features.

3278 DISPLAY STATION: Five models are available, distinguished by the display capacity. Model 1 displays 12 lines of 80 characters each (960 characters total); Model 2 displays 24 lines of 80 characters each (1,920 total); Model 3 displays 32 lines of 80 characters each (2,560 total); Model 4 displays 43 lines of 80 characters (3,440 total); Model 5 permits operator selection of display arrangements of 24 lines of 80 characters (1,920 total) or 27 lines of 132 characters (3,564 total). The display screen measures 14 inches (diagonally).

A character set of 94 characters, including upper- and lowercase alphabetics, numeric, and special symbols, is displayed. When connected to a 3274, the 3278 can incorporate the APL/Text feature; the Character Set Extension feature and a 4626 or 4629 keyboard are required. A monocase switch provides 3277 compatibility. Each character for Models 1, 2, and 3 is formed by a 7-by-14 matrix; for Models 4 and 5, a 9-by-12 matrix is used. Extended highlighting and symbol set functions (monochromatic only) have been added to Models 2, 3, and 4. A Switch Control Unit permits a 3278 Display to be switched between two controllers.

The 3278 uses the 462X series, 4640, 4651, or 4652 keyboards. The displays can be equipped with a keyboard, numeric lock, address lock, selector light pen, magnetic slot reader, and magnetic hand scanner, as options. The audible alarm and security keylock, previously available as options, are now standard in the base configuration.

462X KEYBOARDS: For use with 3278 displays and 3276 controller/displays. A total of eight models are available with various combinations of layouts, data codes, and program function keys. A complete listing of models and basic characteristics is provided in the price list. All data entry layouts include a separate group of 120 program function keys. All typewriter models include 12 program function keys that are activated by an alternate shift mode. Two models include an additional 12 keys for a total of 24 program function keys; two models include text-oriented characters for use with APL/Text features. All models, except the latter four, have 75 keys. The four expanded typewriter layouts have 87 keys. A Numeric Lock feature is available.

3278 PERSONAL COMPUTER ATTACHMENT: Available for use with the 3278 Display Station (all models). The Personal Computer Attachment option consists of two components: the IBM 3278 Personal Computer Adapter (field-installed by IBM), and the IBM Personal Computer 3278 Attachment Option (installed by the user). This option allows common use of the 3278 display and keyboard with any Personal Computer processor unit; no Personal Computer display or keyboard is required.

3178 DISPLAY STATION: Functionally equivalent to the 3278 Model 2 for base functions. Four models of the 3178 are available, differing only in the keyboard included. Model C1 includes a 75-key Data Entry keyboard; Models C2, C3, and C4 include an 87-key Typewriter keyboard. A numeric pad is included on Models C3 and C4, which differ only in the placement of some functions on the keyboard. All models contain a 12-inch (diagonally measured) display screen with a display capacity of 1,920 characters, arranged in 24 lines of 80 characters each. The 3178 is modularly constructed, consisting of three separate machine elements: video, logic, and keyboard. The video pedestal provides the display with 20 degrees of tilt and 180 degrees of swivel. The keyboard provides adjustments for 6 degrees and 12 degrees of inclination. The 3178 provides a smaller footprint than the 3278, since the logic module can be bracket-mounted on a wall or under a tabletop.

An audible alarm, keyboard numeric lock, and security keylock are standard on the 3178. The 3178 does not support the following 3278 optional features: magnetic reader control, selector light pen, programmed symbols, APL/Text, and extended character set adapter. Also, Models C2 and C4 cannot be intermixed on the same control unit, nor can Model C4 be used on the same control unit with 3278s or 3279s which use typewriter keyboards 4621, 4627, 4628, 4640, 4651, or 4652.

3180 DISPLAY STATION: Functionally equivalent to the 3278 Models 2 through 5 for base functions. Two models are available: Model 1, for use as part of the 3270 Information Display System; and Model 2, for use as part of the 5250 Information Display System (connecting to the IBM System/36 and System/38; for more information, see Report C25-491-301). The 3180 Model 1 contains a 15-inch (diagonally measured) display screen; four operator- or program-selectable screen formats are available: 1,920 characters (24 lines by 80 characters), 2,560 characters (32 lines by 80 characters), 3,440 characters (43 lines by 80 characters), and 3,564 characters (27 lines by 132 characters). The 3180 is modularly constructed, consisting of three separate machine elements: video, logic, and keyboard. The video pedestal provides the display with 20 degrees of tilt and 360 degrees of swivel; the vertical height of the screen can be adjusted up to 5 inches. The 3180 can be selected with a data entry or APL keyboard. Each keyboard layout contains 122 keys, including 24 program function keys and adjustable slope. The keyboard is modifiable; removable key caps can be used to apply unique nomenclature to the keyboard.

3279 COLOR DISPLAY STATION: Five models are currently available, three of which (Models S2A, S2B, and S3G) have been designated standard models, and two of which (Models 2X and 3X) may be used to order customer configurations. These new models replace the previous 3279 Models 2A, 2B, 3A, and 3B. Standard models are designed to provide the customer with easier configurations, a simplified ordering process, and potentially faster delivery times.

The standard models have no optional features other than the selected keyboard. They represent the most popular configurations of the Models 2A, 2B, and 3B. Model S2A supports base color mode, and provides a 1,920-character screen capacity; Model S2B supports extended color mode, and provides a 1,920-character screen capacity plus extended highlighting and APL. Model S3G supports extended color mode, and provides a 2,560-character screen capacity plus extended highlighting, APL, and programmed symbols. Base color mode supports the use of four colors (red, green, blue, and white) as substitutes for existing protect and intensify field attributes. Extended color mode includes the features of the base color mode, provides three additional colors (yellow, pink, and turquoise), and permits field character addressing of color highlighting as an independent attribute. On Models S2B and S3G, extended highlighting consists of the use of reverse video, blinking, and underscoring. Model S3G provides storage of up to six 190-character programmed symbol sets containing user-defined shapes and symbols for use in graphics display representations.

Model 2X can be used to order special configurations equivalent to previous Models 2A and 2B. All Model 2X configurations contain a 1,920-character screen capacity.

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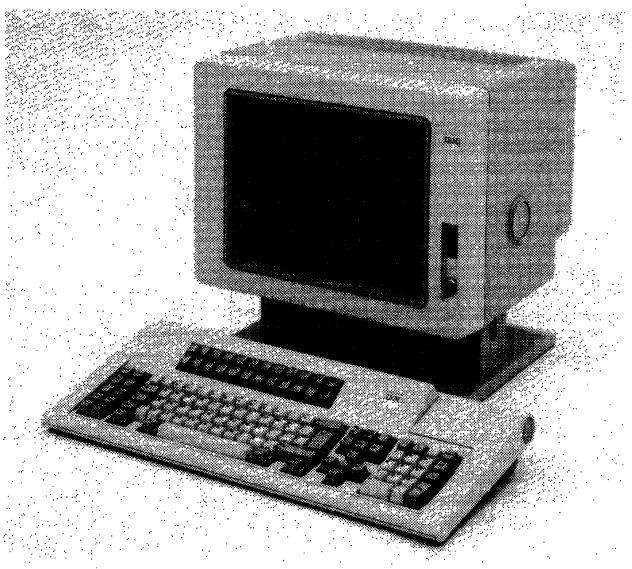

The 3180 Display Station Model 1 is functionally equivalent to the 3278 Display Station Models 2 through 5. The 3180 features a 15-inch (diagonal) screen with tilt, swivel, and height adjustments. The 3180 Display Station Model 2 is supported for use with the 5250 Information Display System.

Model 3X can be used to order special configurations equivalent to Models 3A and 3B. All Model 3X configurations contain a 2,560-character screen capacity. The Extended Function feature, when added to Model 2X or 3X, provides extended color, extended highlighting, and the APL/Text character set.

A 3279 display operating in base color mode can be attached to any Model 3274 Control Unit with any of the Configuration Support packages (A, B, or C) or to a 3276 Control Unit Display Station that supports the 3279's screen capacity and is equipped with the Extended Function Base (#1068) and the Color Display Attachment (#1950) features. A 3279 display using extended color, extended highlighting, or programmed symbols can be attached only to 3274 Models 1A, 1C, 1D, or 51C with Configuration Support C.

4640/4651/4652 KEYBOARDS: For use with 3278 displays or 3279 color displays. The 4640 is an 87-key EBCDIC typewriter overlay keyboard; the 4651 is an 87-key EBCDIC attribute select typewriter keyboard; the 4652 is an 87-key EBCDIC attribute select typewriter/APL keyboard. All three models include keytop annotations for color, extended highlighting, and programmed symbol sets.

3279 PERSONAL COMPUTER ATTACHMENT: Available for use with the 3279 Color Display Station (all models). The personal computer option consists of two components: the IBM 3279 Personal Computer Adapter (field-installed by IBM), and the IBM Personal Computer 3279 Attachment Option (installed by the user). This option allows common use of the 3279 display and keyboard with any Personal Computer processor unit; no Personal Computer display or keyboard is required.

3179 COLOR DISPLAY STATION: Four models are currently available: Model 1, Model 2, Model G1, and Model G2. Model 1, Model G1, and Model G2 are designed for use as part of the 3270 Information Display System; Model 2 is designed for use as part of the 5250 Information Display System (see Report C25-491-301). Model 1 is functionally equivalent to the 3279 Models S2A and S2B. The 3179 Model 1 is equipped with a 14-inch (diagonally measured) display screen with a 1,920-character capacity, arranged in 24 lines of 80 characters each. When executing a 3278 or 3178 application, the 3279 can display information in four base colors: red, green, blue, and white. When attached to an appropriately configured 3274 Control Unit, three additional colors (yellow, turquoise, and pink) may be displayed. The 3179 features a modular construction consisting of three interconnected elements: video, logic, and keyboard. The video pedestal provides the display with 15 degrees of tilt and 180 degrees of swivel. The unit's modifiable keyboard contains 122 keys, including 24 program function keys, cursor control keys, and an integrated numeric pad. Removable keycaps can be used to meet a particular application requirement. The keyboard features a low-profile design and three slope adjustments (6, 12, or 18 degrees).

Models G1 and G2 are graphics versions of the Model 1. Each is equipped with a 14-inch (diagonally measured) display screen with selectable 1,920- (24 lines by 80 characters) or 2,560-character (32 lines by 80 characters) display capacities. The screen is APA (all-points-addressable) for graphics display. Eight colors are displayable: red, green, blue, white, yellow, turquoise, pink, and black. The 3179 G models contain the same modular design as the 3179 Model 1, including tilt/swivel monitor. Model G1 is equipped with a 122-key Typewriter keyboard; Model G2 contains a 122-key Typewriter/APL2 keyboard. Both keyboards include 24 program keys, a numeric pad, and cursor-move keys. Two cursors types are provided—alphanumeric and graphic (cross or cross hair). The graphic cursor supports picture element level (PEL) resolution. Both keyboard styles feature a low-profile design and three slope adjustments.

3979 EXPANSION UNIT: For use with the 3179 Models G1 and G2. The IBM 3979 Expansion Unit provides auxiliary device ports to attach an IBM 5277 Mouse and an IBM 7371 or 7372 Color Plotter. The 3979 Expansion Unit also provides an alternative port for the connection of an IBM Color Jetprinter (3852 Model 2).

3191 DISPLAY STATION: Four models are available, differing in the keyboards included and the character phosphor offered. Models A10 and B10 include the 122-key Typewriter keyboard; Models A20 and B20 include the 102-key IBM Enhanced Keyboard. Models A10 and A20 provide green phosphor characters; Models B10 and B20 offer amber-gold phosphor characters. All models contain a 12-inch (diagonally measured) display screen with a display capacity of 1,920 characters, arranged in 24 lines of 80 characters each. Screen presentation is 720-by-384 picture elements. The 3191 is modularly constructed, consisting of a monitor with tilt/swivel pedestal (19.4 degrees of tilt and 180 degrees of swivel), logic, and a detachable, low-profile keyboard with two angles of inclination (6 or 12 degrees). Audible alarm, auto-dim, and security keylock are standard features on the 3191.

3193 DISPLAY STATION: Two models are available, differing in the keyboards included. Model 010 includes the 122-key Typewriter keyboard, and Model 020 includes the 102-key IBM Enhanced Keyboard. Both models contain a 15-inch (diagonally measured) monochrome display consisting of 880 (horizontal) by 1200 (vertical) dots. The screen supports a display presentation of 48 lines of 80 characters each, plus 3278 Models 2 (1,920 characters), 3 (2,560 characters), and 4 (3,440 characters) screen presentations. The screen provides for both alphanumeric and image presentations, and contains an all-points-addressable (APA) capability. The 3193 can display up to two logical terminals, and up to eight partitions. The logical terminal capability allows the operator to view alphanumeric only, image only, or a combination of the two types of presentations. Image presentations are enable through the use of the IBM 3117 Scanner (with the IBM 3117 Extension Unit) or the IBM 3118 Scanner. Data and images are displayed in white on black, or black on white in reverse video. The 3193 is modularly constructed, consisting of a monitor with tilt/

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swivel pedestal (19.4 degrees of tilt and 180 degrees of swivel), logic, and a detachable, low-profile keyboard with two angles of inclination (6 or 12 degrees). Audible alarm, auto-dim, and security keylock are standard features on the 3193.

3194 COLOR DISPLAY STATION: Two models are available, differing in the keyboards included. Model H50 contains the 122-key Typewriter keyboard; Model H20 includes the 102-key IBM Enhanced Keyboard. Both models contain a 14-inch (diagonally measured) screen with seven-color (plus black) display capability. Screen capacity is 1,920 characters, arranged in 24 lines of 80 characters each. The 3194 can display up to two notepad sessions and from one to four host sessions. Windows can be manipulated (size, move, hide, etc.) to display the various sessions. Data can be copied from session to session. The 3194 is modularly constructed, consisting of a monitor with tilt/swivel pedestal (19.4 degrees of tilt and 180 degrees of swivel), logic (which includes a 3.5-inch diskette drive with a 720KB memory capacity), and a detachable, low-profile keyboard with two angles of inclination (6 or 12 degrees). Audible alarm, auto-dim, and security keylock are standard features on the 3194.

319X KEYBOARDS: The 122-key Typewriter keyboard offers two sets of Program Function (PF) keys. Operators accustomed to the keyboard arrangement of the 3278/3279 displays can use the numeric keypad and adjacent keys as PF keys. Operators familiar with the 3178/3179 displays can use the PF keys positioned near the top of the keyboard. The keypad will operate in the numeric state by pressing the numeric lock key.

The 102-key IBM Enhanced Keyboard separates cursor movement keys and system function keys from the numeric pad area, and PF keys are separated and repositioned above their equivalent numeric keys across the top of the keyboard. The typewriter style of this keyboard is consistent with other IBM keyboards designed for the office environment.

3290 INFORMATION PANEL: A large-capacity, flat gas plasma panel display. The viewing area, measuring 10.7 by 13.4 inches, can accommodate up to 9,920 characters (62 rows by 160 columns) using 5-by-8 dot matrix characters, or up to 5,300 characters (50 rows by 106 columns) using a 7-by-9 dot matrix. The display image is formed by lighting cells under the control of display logic, and appears as orange characters on a black background. The display image is uniform at every point of the viewing area. The 3290 can display high-resolution graphics as well as alphanumeric data.

The 3290 provides a multiple display screen capability which allows concurrent viewing of the following: four 3278/3279 Model 2 screens; two 3278/3279 Model 3 screens; two 3278 Model 4 screens; or two 3278 Model 5 screens. The 3290 can also be configured to display a full-page computer printout (62 rows by 132 columns), two horizontal screens of up to 31 rows by 160 columns, or two vertical screens of up to 62 rows by 80 columns. Up to 16 separately manageable partitions may be designated. Screen management facilities govern multiple interactive screens and multiple copy screens. A 24K-character buffer can be vertically scrolled. The 3290 is datastream-compatible with all currently available 3270 displays.

The 3290 Model 1 is composed of the display panel, power logic unit, and keyboard. Two keyboard styles are available: Data/Typewriter (#4730) and APL (#4731). A numeric keypad and a programmed function keypad are optionally available on both keyboard models. The display panel features a tilt adjustment of up to 5 degrees forward and up to 15 degrees backward. An audible alarm and security keylock are standard. In addition to its availability as the standard Model 1, the components of the 3290 (display panel, power logic unit, and keyboards) may be purchased separately.

4730/4731 KEYBOARDS: For use with the 3290 Information Panel. The 4730 is a Data/Typewriter-style keyboard which contains 24 Program Function keys, located in two rows across the top of the keyboard. Overlays are provided for the Program Function keys to identify the functions associated with each key. The 4731 has a data/typewriter layout as does the 4730, plus modified keytops to allow the entry of 81 APL-specific characters. An APL on/off key permits the keyboard to be switched from basic EBCDIC typewriter mode to APL mode. Both typewriter styles are cable-attached to the 3290 and feature adjustable keyboard slope.

3270 PERSONAL COMPUTER: A version of the IBM Personal Computer designed for use with the 3270 Information Display System. The 3270-PC can operate up to seven concurrent sessions: four 3270-type sessions, one IBM PC DOS 2.0 session, and two local notepad sessions. The user can view these sessions on the 3270-PC's multiple windows; the user also has the ability to move and alter the size of the windows, as well as to define multiple screen layouts. The 3270-PC is now available in six basic models: the 3270-PC, 3270-PC/G (graphics), and 3270-PC/GX (extended graphics), as well as the newer 3270-PC AT, 3270-PC AT/G, and 3270 PC AT/GX. Monochrome, color, and plasma displays are available, depending on the 3270-PC configuration selected.

For more detailed information on the IBM 3270 Personal Computer Family, see Report C22-491-301.

3262-3/-13 LINE PRINTERS: Line printers that can be attached to the 3274 and 3276 (Model 13 only) control units. Maximum rated print speeds for the 3262-1 range from 253 lpm to 650 lpm, depending on the character set used. Maximum rated print speeds for the 3262-13 range from 125 lpm to 325 lpm, depending on the character set used. Line lengths are 132 characters; horizontal spacing is 10 cpi, while vertical spacing is selectable at 3, 4, 6, or 8 lpi. Print format compatibility for 3270 Data Stream (non-SCS) operation is available.

3268-2 MATRIX PRINTER: A printer that can be attached to a 3274 or 3276 control unit. Maximum print speed is 340 cps. The 3268-2 operates in either 3270 mode (BSC or SNA LU3) or SCS (SNA LU1) mode. Line lengths are 132 characters; horizontal spacing is selectable at 10 or 16.7 cpi, and vertical spacing is selectable at 3, 4, 6, or 8 lpi. Continuous forms are advanced via a forms tractor mechanism; up to 6-part forms may be used.

3268-2C COLOR MATRIX PRINTER: A color printer that can be attached to a 3274 or 3276 control unit. Maximum print speed is 340 cps. The 3268-2C operates in either 3270 mode (BSC or SNA LU3) or SCS (SNA LU1) mode. Line lengths are 132 characters; horizontal spacing is selectable at 10 or 16.7 cpi, and vertical spacing is selectable at 3, 4, 6, or 8 lpi. Continuous forms are advanced via a forms tractor mechanism; up to 6-part forms may be used. Two modes of color selection (base and extended) may be selected. Base color printing is the selection of color at the field level as a function of the 3270 Data Stream protect and intensify attribute byte. Extended color is the selection of color at the character level in addition to the field level. Black, red, blue, and green can be printed; extended colors (pink, yellow, turquoise) are printed black by default.

3287-1/-2 MATRIX PRINTERS: These printers can be used with the older (3271/3272) as well as newer (3274/3276) cluster controllers. Model 1 operates at 80 cps; Model 2 operates at 120 cps. Both models achieve these speeds

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through bidirectional printing. Both print 10 characters per inch, 6 or 8 lines per inch, and 132 positions across the page. Separate attachment features are required for connection to a 3274/3276 controller. When connected to a 3274, the 3287 can incorporate the APL/Text feature; an Extended Character Set Adapter and a 3274 Attachment feature are required. A special feature, Extended Print Buffer, is required for operation with 2560, 3440, and 3564 character displays. A programmed symbol set support feature (monochromatic only) is available. A Variable Width Forms Tractor option, as well as Friction Feed Paper Handling option, is available. An audible alarm is a no-cost feature for signaling a forms-out condition; the alarm can also be sounded via a host computer command.

3287-1C/-2C COLOR MATRIX PRINTERS: Two color models that vary only in their rated print speeds: Model 1C prints at a maximum of 80 characters per second and Model 2C at 120 characters per second, when printing bidirectionally with a single color per line. Four colors (red, green, blue, and black) are provided via a multicolor ribbon. Print positions 1 through 120 can be printed in any color, but positions 121 through 132 can only be printed in black. As with the 3279 Display, two levels of color usage are supported. Basic color mode printing is standard on both models and substitutes color for existing protect and intensify field attributes. Extended color mode requires the previously available Extended Character Set Adapter (#3610) and permits user specification of color as an independent character or field attribute. When seven-color displayed data is transferred to a four-color printer, extended colors (pink, yellow, and turquoise) are printed in black. Extended highlighting permits underscoring of printed data, but blinking and reverse video attributes are ignored. Storage for two, four, or six programmed symbol sets, including a four-color business graphics set, is also supported and requires two previously available options, the Extended Character Set Adapter (#3610) and the Extended Print Buffer (#3880). Except for color printing, functions and features of the Models 1C and 2C are equivalent to the 3287 Models 1 and 2, respectively.

The 3287 Models 1C and 2C can be attached to any model of the 3274 Control Unit with a Category A terminal port, and to any 3276 Control Unit Display Station (features #1068 and #1950 are not required). Unlike 3287 Models 1 and 2, they cannot be attached to a 3271 or 3272 Control Unit. When operating with extended color, extended highlighting, and preprogrammed symbol sets, Models 1C and 2C can be attached only to a 3274 Model 1A, 1C, 1D, or 51C with Configuration Support C.

4250-1 APA PRINTER: An all-points-addressable (APA) nonimpact printer with an addressing resolution of 600 dots per inch in both horizontal and vertical directions. The 4250-1 can print text in a wide variety of styles and sizes, as well as graphics objects. The 4250-1 attaches to the 3274 Control Unit Models 31A and 31D via #9112 Configuration Support C or #9124 Configuration Support D; it attaches to the 3274 Models 41A and 41D with no special features required.

5210-G01/-G02 MATRIX PRINTERS: Correspondence quality printers that can be attached to the 3274 and 3276 Control Units. Model G01 prints at 40 cps, while Model G02 prints at 60 cps. Print wheels in 10 pitch, 12 pitch, 15 pitch, or proportional spacing are available to provide a selection of type style and graphics variations with appropriate application programming. Pinfed continuous forms can be used.

PRICING

Previously, all 3270 components were available under the terms of IBM's Lease or Rental Agreement (LRA) or for purchase. IBM's newer components are available for purchase only; in addition, IBM has recently withdrawn its LRA for all models of the 3274 Control Unit. (LRA includes prime shift maintenance; a separate contract is available for purchased units.) All new components are user installed via IBM's new Customer Set-up Policy.

LRA was announced for general application in April 1977. Basically, this arrangement provided for month-to-month rental or for a two-year lease with penalties for early termination (including model downgrades and feature termination). The lease can be extended indefinitely, one year at a time. The monthly charges for the lease arrangement are generally 15 percent lower than the month-to-month arrangement. The prime shift maintenance period is for any consecutive nine hours between 7 a.m. and 6 p.m., Monday through Friday. (The maintenance charges given in the accompanying price list are for prime shift maintenance for purchased equipment and also serve as the basis for calculating extended charges for rented or leased equipment.) Extended period maintenance is available up to 24 hours per day, 7 days per week.

The termination charge for the lease arrangement is the lower of 5 months' charges or 25 percent (5 percent for the 3286 printer) of the remaining value of the lease. (For periods of fewer than 20 months, the 25 percent charge will be lower than the 5-month charge.) *IBM continues to publish lease and rental prices in their IBM Consultants' Manual; therefore, Datapro will continue to supply this pricing, although in many cases the plan is no longer available.*

All 3270 (except the 3178, 3179, 3180, and 3290) components are in maintenance category A, except the 3276 Control Unit Display Station, which is in category D. These categories determine the schedule of extended maintenance charges. The two schedules differ for extended Monday through Friday maintenance, but are the same for Saturday and Sunday maintenance.

The 3174, 3178, 3179, 3180, 3191, 3193, 3194, 3290, 3299, and various other new IBM components are covered under IBM Exchange/Repair Amendment to existing IBM Rent/Lease, Purchase, and Maintenance Agreements. Maintenance is offered, for an annual charge, at four service levels: Customer Carry-in Repair; Customer Carry-in Exchange; Customer On-site Exchange; and IBM On-site Exchange. The prices listed in the price chart for these models are for the IBM On-site Exchange plan.

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EQUIPMENT PRICES

		Monthly Charges*			
		Rental ($)	Lease ($)	Purchase Price ($)	Monthly Maint. ($)
Cluster Controllers					
	3174 Model 1L	—	—	12,950	264***
	3174 Model 1R	—	—	9,950	240***
	3174 Model 2R	—	—	9,950	240***
	3174 Model 3R	—	—	11,450	300***
	3174 Model 51R	—	—	5,900	204***
	3174 Model 52R	—	—	5,900	204***
	3174 Model 53R	—	—	7,400	264***
1011	512KB Storage Expansion; -1L only	—	—	1,300	40***
3025	IBM Token-Ring Network 3270 Gateway; -1L only	—	—	5,000	162***
1012	1MB Storage Expansion; -1L, -1R, -2R, -3R only	—	—	2,300	80***
3103	Terminal Multiplexer Adapter; -1L, -1R, -2R	—	—	500	20***
1046	1.2MB Diskette Drive	—	—	650	120***
3020	Asynchronous Emulation Adapter	—	—	2,250	144***
	3274 Model 21A	944	803	14,220	77.00
	3274 Model 21B	944	803	14,200	80.00
	3274 Model 21C	662	563	9,990	59.00
	3274 Model 21D	944	803	14,220	85.00
	3274 Model 31A	1,107	942	16,650	97.00
	3274 Model 31C	825	702	12,420	79.00
	3274 Model 31D	1,107	942	16,650	105.00
	3274 Model 41A	1,169	995	18,230	62.00
	3274 Model 41C	885	753	13,840	43.00
	3274 Model 41D	1,169	995	18,230	62.00
	3274 Model 51C	304	259	4,885	40.00
	3274 Model 61C	468	398	7,600	29.00
	Terminal Adapters (for Models 21X, 31X, and 51C only)—				
6901	Type A1; devices 9 through 16	55	47	918	2.00
6902	Type A2; devices 17 through 24	55	47	918	2.00
6903	Type A3; devices 25 through 32	55	47	918	2.00
7801	Type B; requires 5550	65	55	986	4.00
7802	Type B1; devices 1 through 4	65	55	986	4.00
7803	Type B2; devices 5 through 8	55	47	831	2.50
7804	Type B3; devices 9 through 12	55	47	831	2.50
7805	Type B4; devices 13 through 16	55	47	831	2.50
1801	Control Storage Expansion	54	46	790	4.00
3701	External Modem Interface; requires 6302 or 6303	17	15	337	3.00
6302	Common Communications Adapter; SDLC or BSC; up to 9600 bps with Type A only Terminal Adapters and up to 7200 bps with Type B or mix; -21C, -31C, -41C, -51C, and -61C only	14	12	365	2.00
6303	High Performance Communications Adapter; SDLC or BSC; 9600 bps with Type B Terminal Adapters or mix; -21C, -31C, -41C, -51C, and -61C only	61	52	1,010	8.50
3680	Encrypt/Decrypt; -21C, -31C, -41C, -51C, and -61C only	90	77	1,780	2.00
5650	Dataphone Digital Service; point-to-point; -21C, -31C, -41C, -51C, and -61C only	38	33	840	1.50
5651	Dataphone Digital Service; multipoint; -21C, -31C, or -51C only	38	33	840	1.50
4850	Loop Adapter; for 8100 System attachment; requires 6303; -51C and -61C only	45	38	797	3.00
5655	X.21 Adapter; nonswitched networks; -41C or -61C only	35	30	800	1.50
5656	X.21 Adapter; switched networks; -41C or -61C only	43	37	800	2.00
	3299-2 Terminal Multiplexer	—	—	1,175	—
	3299-3 Terminal Multiplexer	—	—	795	—

Note: Effective April 21, 1984, IBM will no longer accept lease/rental orders for any model of the 3274 Control Unit.

Controller/Display Stations

	3276 Model 1	317	270	5,380	36.00
	3276 Model 2	324	276	5,535	37.00
	3276 Model 3	329	280	5,680	38.00
	3276 Model 4	343	292	5,830	39.00
	3276 Model 11	317	270	5,380	32.00
	3276 Model 12	324	276	5,535	33.00
	3276 Model 13	329	280	5,680	34.00
	3276 Model 14	343	292	5,830	34.00

**Includes prime-shift maintenance.*
***IBM On-site Exchange, annual charge; other maintenance plans available include: Customer Carry-in Repair, annual charge; Customer Carry-in Exchange, annual charge; Customer On-site Exchange, annual charge.*
****IBM On-site Repair, annual charge.*

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IBM 3270 Information Display System

		Monthly Charges* Rental ($)	Lease ($)	Purchase Price ($)	Monthly Maint. ($)
3255	Terminal Adapter No. 1; devices 3 and 4	24	21	530	1.50
3256	Terminal Adapter No. 2; devices 5 and 6	24	21	530	1.50
3257	Terminal Adapter No. 3; devices 7 and 8	24	21	530	1.50
3701	External Modem Interface; requires 6301 or 6302	17	15	337	3.00
3680	Encrypt/Decrypt; 3276 -11, -12, -13, -14 only	86	73	1,600	2.00
	1200 bps Integrated Modems—				
5500	Nonswitched; requires 6301	31	27	535	5.50
5501	Switched, Auto Answer; requires 6301	42	36	714	2.50
5502	Switched, Manual Answer; requires 6301	31	27	535	3.00
5507	Nonswitched with Switched Backup; requires 6301	46	39	766	5.50
5508	Nonswitched with Switched Backup; Auto Answer; requires 6301	50	43	855	3.00
5650	Dataphone Digital Service; point-to-point	38	33	840	1.50
5651	Dataphone Digital Service; multipoint	38	33	840	1.50
6301	Communications Feature with clock	25	22	543	2.50
6302	Communications Feature without clock	14	12	365	2.00
6315	SDLC/BSC Switch; 3276-1, -2, -3, -4 only	34	29	682	3.00
1067	APL/Text Control; requires 1068	50	43	950	1.00
1950	Color Display Attachment; not available for 3276-1; requires 1068	42	36	758	0.50
1068	Extended Function Base	6	5	190	1.00
Display Stations					
	3278 Model 1	106	90	1,484	10.00
	3278 Model 2	109	93	1,572	10.00
	3278 Model 3	133	113	1,716	10.50
	3278 Model 4	136	116	1,804	12.50
	3278 Model 5	160	136	2,060	12.50
	3178 Model C1; w/75-key Data Entry keyboard	—	—	1,495	107**
	3178 Model C2; w/87-key Typewriter keyboard	—	—	1,550	107**
	3178 Model C3; w/87-key Typewriter keyboard and numeric pad	—	—	1,550	107**
	3178 Model C4; w/87-key Typewriter keyboard and numeric pad	—	—	1,550	107**
	3180 Model 1 (110); w/Typewriter keyboard	—	—	2,095	148**
	3180 Model 1 (120); w/Data Entry keyboard	—	—	2,095	148**
	3180 Model 1 (130); w/APL keyboard	—	—	2,095	148**
	3290 Model 1 Information Panel	363	—	7,100	30.00
	3279 Model S2A	183	156	2,190	19.00
	3279 Model S2B	187	159	2,755	19.00
	3279 Model S3G	282	240	3,115	25.00
	3279 Model 2X	188	160	2,825	19.00
	3279 Model 3X	207	176	2,870	19.00
	3179 Model 1; w/122-key Typewriter keyboard	—	—	2,095	142**
	3179 Model G1; w/122-key Typewriter keyboard	—	—	2,995	142**
	3179 Model G2; w/122-key Typewriter/APL2 keyboard	—	—	2,995	142**
3850	Extended Function (3279 Model 2X or 3X)	14	12	420	2.00
3979	Expansion Unit (3179 Model G1 or G2	—	—	295	18**
	3191 Model A10; w/122-key Typewriter keyboard	—	—	1,295	40**
	3191 Model B10; w/122-key Typewriter keyboard	—	—	1,295	40**
	3191 Model A20; w/102-key IBM Enhanced keyboard	—	—	1,295	40**
	3191 Model B20; w/102-key IBM Enhanced keyboard	—	—	1,295	40**
	3193 Model 010; w/122-key Typewriter keyboard	—	—	2,495	75**
	3193 Model 020; w/102-key IBM Enhanced keyboard	—	—	2,495	75**
	3194 Model H50; w/122-key Typewriter keyboard	—	—	2,895	240**
	3194 Model H20; w/102-key IBM Enhanced keyboard	—	—	2,895	240**
Keyboards					
	For 3276/3278—				
4621	75-Key EBCDIC Typewriter	21	18	417	2.00
4622	75-Key EBCDIC Data Entry	21	18	417	3.00
4623	75-Key EBCDIC Data Entry, keypunch layout	21	18	417	3.00
4624	75-Key ASCII Typewriter	21	18	417	2.00
4626	87-Key EBCDIC Typewriter/Text; 3278 only	25	22	569	2.50
4627	87-Key EBCDIC Typewriter; 3278/3274 only	25	22	569	2.50
4628	87-Key ASCII Typewriter; 3278/3274 only	25	22	569	2.50
4629	87-Key EBCDIC Typewriter/Text; 3278 only	25	22	569	2.50

**Includes prime-shift maintenance.*
***IBM On-site Exchange, annual charge; other maintenance plans available include: Customer Carry-in Repair, annual charge; Customer Carry-in Exchange, annual charge; Customer On-site Exchange, annual charge.*
****IBM On-site Repair, annual charge.*

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IBM 3270 Information Display System

		Monthly Charges*			
		Rental	Lease	Purchase Price	Monthly Maint.
	For 3278/3279—				
4640	87-Key EBCDIC Typewriter Overlay	25	22	569	2.50
4651	87-Key EBCDIC Attribute Select Typewriter	25	22	569	2.50
4652	87-Key EBCDIC Attribute Select Typewriter/APL	25	22	569	2.50
	3276/3278 Display Station Options				
1009	Address Keylock; 3276	—	—	56	—
3620	Character Set Extension; 3276	27	22	644	3.00
3620	Character Set Extension; 3278	28	24	580	2.50
6360	Selector Light Pen; 3276	22	19	548	0.50
6360	Selector Light Pen; 3278	22	19	493	0.50
4999	Magnetic Reader Control; 3276	16	14	379	3.50
4999	Magnetic Reader Control; 3278	16	14	341	3.50
	3278/3279 Display Station Options				
5790	Programmed Symbols (PS-2/PS-4); 3278	39	33	853	3.50
5790	Programmed Symbols (PS-2/PS-4); 3279	58	49	1,210	5.50
8750	Video Output (3279 Model 3X only)	26	22	702	1.00
5315/5316	3270 Personal Computer Attachment; 3278	—	—	1,700	—
5317/5318	3278 Personal Computer Adapter (3278 portion)	—	—	850	—
5321	3278 Personal Computer Attachment (PC portion)	—	—	850	—
5325/5326	3270 Personal Computer Attachment; 3279	—	—	1,950	—
5327/5328	3279 Personal Computer Adapter (3279 portion)	—	—	1,100	—
5322	3279 Personal Computer Attachment (PC portion)	—	—	850	—
	3290 Information Panel Options				
4830	Numeric Keypad	12	—	250	54**
4831	Program Function Keypad	12	—	250	54**
Printers					
	3262 Model 3; 650 lpm	733	624	15,040	202.50
	3262 Model 13; 325 lpm	539	459	12,620	148.00
	3268 Model 2; 340 cps	454	386	7,500	74.00
	3268 Model 2C; color printing; 340 cps	616	—	8,990	92.00
	3287 Model 1; 80 cps	317	270	4,830	40.00
	3287 Model 2; 160 cps	388	330	5,150	50.00
	3287 Model 1C; color printing; 80 cps	393	334	5,210	45.00
	3287 Model 2C; color printing; 120 cps	461	392	5,530	55.00
	3287 Printer Options—				
1066	Data Analysis-APL	17	15	297	—
1120	APL/Text	6	5	165	0.50
3610	Extended Character Set Adapter	23	20	429	3.00
3880	Extended Print Buffer	7	6	198	0.50
8330	3271/3272 Attachment	56	47	860	2.50
8331	3274/3276 Attachment	6	5	165	0.50
8700	Variable Width Forms Tractor	6	5	151	0.50
4110	Friction Feed Paper Handling	6	5	151	0.50
	Programmed Symbols—				
5781	PS-2; storage for first two symbol sets; requires 3610 and 2880	51	44	826	4.00
5782	PS-4; storage for additional four symbol sets; requires 5781	42	36	662	2.50
5783	PS-4A; storage for four symbol sets; including one set with multicolor addressing; requires 3610 and 3880; for 3287-1C and -2C only	93	79	1,485	11.50

Note: Effective April 20, 1984, IBM will no longer accept rental orders for the 3287 Printer.

	4250 Model 1 APA	1,385	—	21,000	170.00
	5210 Model G01; 40 cps	—	—	5,420	63.00
	5210 Model G02; 60 cps	—	—	5,835	69.00

**Includes prime-shift maintenance.*
***IBM On-site Exchange, annual charge; other maintenance plans available include: Customer Carry-in Repair, annual charge; Customer Carry-in Exchange, annual charge; Customer On-site Exchange, annual charge.*
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IBM 3270 Information Display System

Product Enhancement

On February 17, 1987, IBM announced five new members of the 3270 Information Display System family: the 3174 Subsystem Control Unit, Models 81R and 82R; the 3192 Monochrome Display Station; the 3192 Color Display Station; and the 3192 Color Graphics Display Station. Each new unit features enhanced functionality with the displays also featuring enhanced ergonomics. These latest additions carry on IBMs tradition of quality, reliability, and flexibility.

The IBM 3174 Subsystem Control Unit, Models 81R and 82R, provide connectivity options for a variety of 3270 terminal devices. They are designed for users requiring attachment of up to eight remote non-DSL (down stream load) terminal devices. They have been designed and built with Complementary Metal-Oxide Semiconductor (CMOS) technology and Very Large Scale Integration (VLSI) circuitry. This technology has the advantages of smaller size, faster circuitry, lower power requirements, and additional control storage capacity. A Response Time Monitor provides for enhanced network management while Intelligent Printer Data Stream (IPDS) commands enable the host processor to control media handling, error recovery, and the downloading and management of symbol sets and printer-stored objects.

The 3192 display stations are more lightweight and versatile than previous IBM models and each attaches to the IBM System/370 processor. The 3192 Monochrome model offers four user-selectable screen formats on a 15-inch diagonal display screen, while the Color and Color Graphics models offer two screen formats on 14-inch diagonal screens. Seven colors are displayable on the Color and Color Graphics models: red, blue, green, yellow, white, turquoise, and pink.

The 3192 Color Graphics Display Station comes in a choice of four models: G10, G20, G30, and G40. These are follow-on models of the the IBM 3179 G10 and G20.

Each display station provides the user with the convenience of a tilt/swivel monitor. A choice of three slope-adjustable keyboards are also available: 122-key typewriter style, 104-key typewriter style, and 102-key enhanced keyboard. The keyboards feature 24 program function keys, logically oriented cursor control keys, and a numeric keypad on the 122-key and 102-key keyboards only.

General availability for the 3174-81R and 82R is April 1987 and second quarter 1987, respectively. Both models are priced at $3,500. The 3192 Display Stations are all currently available and priced between $1,795 and $2,795. □

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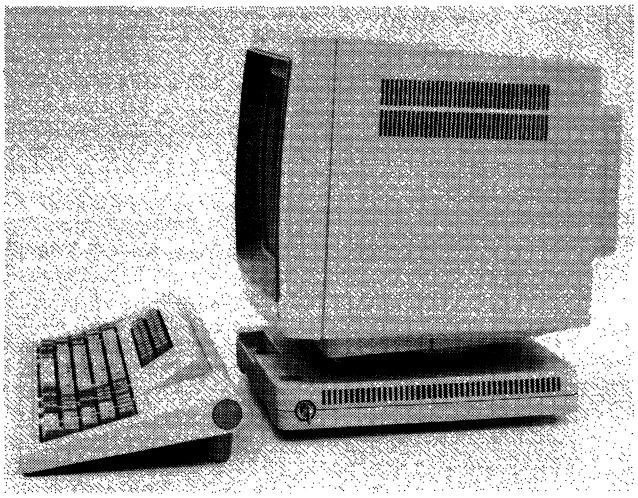
IBM 3270 Information Display System



The 3179 Color Display Station is a compact version of the 3279 Models S2A and S2B. The 3179 features a 14-inch (diagonal) screen with a 1,920-character display capacity. The display monitor can be tilted or swiveled for ease of viewing. The 3179's keyboard has a low-profile design with slope adjustment.

The 3270 Information Display System is the most successful and most significant product family in the terminal industry. The 3270 family has spawned a huge market for emulation products. Family members include controllers, display stations (color, monochrome, and plasma), and printers, for use in standalone and cluster configurations in both local and remote environments. IBM has also added personal computing capabilities to the family.

MODELS: 3274 Control Unit, 3276 Control Unit Display Station, 3178, 3180, and 3278 Display Stations, 3179 and 3279 Color Display Stations, 3290 Information Panel, 3262, 3268, 3287, 4250, and 5210 Printers, and 3270 Personal Computer.
DISPLAY: A variety of screen sizes and display formats are available; color and monochrome screens are also available.
KEYBOARD: A variety of keyboard layouts and styles is available; all keyboard models are detachable.
COMPETITION: Telex, ITT Courier, Lee Data, Memorex, AT&T Teletype, Harris, and several others.
PRICE: Controller purchase prices range from $6,035 to $18,500. Display station prices range from $1,660 to $7,100. Lease and rental agreements are available for some components.

MANAGEMENT SUMMARY

UPDATE: *Since the last publication date of this report, the 3270 Information Display System product line has remained fairly stable. This updated version reflects some price changes, as well as some new printers that now may be used as part of a 3270 system. Detailed coverage of the IBM 3270 Personal Computer Family has been moved to Report C22-491-301.*

IBM's 3270 Information Display System is the single most important family of products in the display terminal market. This market supports not only IBM, but a significant number of independent manufacturers of 3270-type terminals. Initially, these vendors parlayed lower prices and shorter delivery lead times to capture a share of this market. More recently, enhanced capabilities were added to 3270-compatible systems to make them more attractive to prospective users. On March 8, 1983, IBM shook up the market by announcing several additions to the 3270 product line, while lowering prices on selected models and features of existing products. New products included in this announcement were: the 3178 Display Station; the 3290 Information Panel Display; four new 3274 Control Unit models (41A, 41C, 41D, and 61C); the 3299 Terminal Multiplexer; and the IBM 3278 Personal Computer Attachment. On October 18, 1983, IBM enhanced the 3270 product line even further with the introduction of two additional products: the 3270 Personal Computer and the 3279 Personal Computer Attachment. On March 20, 1984, the 3180 Display Station and 3179 Color Display Station were unveiled, and purchase prices for the 3274 Control ➢

CHARACTERISTICS

VENDOR: International Business Machines Corporation (IBM), Old Orchard Road, Armonk, NY 10504. Contact your local IBM representative. In Canada: IBM Canada Ltd., 3500 Steeles Avenue East, Markham, Ontario L3R 2Z1. Telephone (416) 474-2111. Or contact the IBM office in the nearest major city.

DATE OF ANNOUNCEMENT: 3274, 3276, 3278—May 1977; 3279, 3274-51C—October 1979; 3274-21A/B/C/D & -31A/C/D—early 1982; 3274-41A/C/D & -61C, 3178, 3290—March 1983; 3179 & 3180—March 1984.

DATE OF FIRST DELIVERY: Usually within one year of announcement.

NUMBER DELIVERED TO DATE: Approximately 2 million display terminals (all models).

SERVICED BY: International Business Machines.

CONFIGURATION

The 3270 family of display/keyboard stations and printers can be configured as a local or remote cluster or as a standalone station. There are now three generations of components (first generation components are no longer ➢

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IBM 3270 Information Display System

TABLE 1. IBM 3274 CONTROL UNIT SPECIFICATIONS

	21A	21B	21C	21D	31A	31C	31D	41A	41C	41D	51C	61C
Mode	Local	Local	Remote	Local	Local	Remote	Local	Local	Remote	Local	Remote	Remote
Protocol(s) supported	SNA	Chan.	SNA/ BSC	Chan. APL	SNA	SNA/ BSC	Chan. APL	SNA	SNA/ BSC	Chan. APL	SNA/ BSC	SNA/ BSC
Minimum ports	8	8	8	8	8	8	8	32	32	32	12	16
Maximum ports	32	32	32	32	32	32	32	32	32	32	12	16
Control storage	64K	64K	64K	64K	128K	128K	128K	192K	192K	192K	64K/ 128K	192K
Devices supported (category)	A/B	A/B	A/B	A/B	A/B	A/B	A/B	A	A	A	A/B	A

TABLE 2. ATTACHABLE DEVICES

Category A	Category B
3178 Models C1, C2, C3, C4	3277 Models 1*, 2*
3179 Model 1	3284 Models 1*, 2*
3180 Model 1	3286 Models 1*, 2*
3262 Models 3, 13	3287 Models 1, 2
3268 Models 2, 2C	3288 Model 2*
3278 Models 1, 2, 3, 4, 5	
3279 Models S2A, S2B, S3G, 2X, 3X	
3287 Models 1, 2, 1C, 2C	
3289 Models 1*, 2*	
3290 Model 1**	
3270 Personal Computer	
4250 Model 1	
5160 Model 589 (CUT Mode)	
5170 Model 599 (CUT Mode)	
5210 Models G1, G2	
6580 Models A04, A06, A08, A10, B04, B06, B08, B10	

**No longer available.*
***Does not attach to 3274 Models 21A, 21B, 21C, 21D.*

Unit and selected 3278 and 3279 display models were reduced. In addition, lease/rental plans for the 3274 were discontinued.

The 3178 is an ergonomically improved version of the 3278 Model 2 Display Station, the most popular 3270 display model. The 3178 features modular construction, combining three separate machine elements: video, logic, and keyboard. The unit is physically smaller than the 3278, and has a 12-inch display screen, which can be tilted and swiveled. The 3178 is plug-compatible with the 3278 Model 2 for base functions; its purchase price, however, is significantly less. In addition, IBM has announced major price reductions for 3178 volume buyers. A 40 percent discount is available for purchases of 3,000 or more units.

The 3179 is a color version of the 3178. The 3179 incorporates the same modular construction, while adding a larger (14-inch) display screen and a new 122-key modifiable keyboard. Up to seven colors (red, green, blue, white, yellow, turquoise, and pink) may be displayed when the 3179 is attached to an appropriately configured 3274 Control Unit. For 3278 and 3178 applications, data is displayed in the four base colors (red, green, blue, and white). The 3179 is offered with the same volume discount as the 3178.

The 3180 is a large screen (15-inch) version of the 3178 and 3278 displays. It is available in two models, only one of

marketed) with a limited degree of mixing permitted within the same subsystem; complete compatibility for communications and applications program support can be achieved with the new components, if desired. Tables 1 and 2 present the overall configurational possibilities. Specific prerequisites are detailed in the discussions of individual components.

TRANSMISSION SPECIFICATIONS

3274 Models 21C, 31C, 41C, 51C, and 61C operate in half-duplex point-to-point, or in half- or full-duplex multipoint, using BSC or SDLC protocols, at speeds of 1200/600 (51C only), 2000, 2400/1200, 4800/2400, 7200/3600, and 9600/4800 bits per second on nonswitched facilities. Multipoint and point-to-point communications at speeds up to 19,200 bits per second and point-to-point speeds up to 56K bits per second are also possible where facilities are available.

The 3276 operates in half-duplex point-to-point, or in half- or full-duplex multipoint at speeds of 1200, 2000, 2400, 4800, 7200, or 9600 (SNA/SDLC only) bits per second on nonswitched facilities. Also, 3276 Models 11, 12, 13, and 14 operate in half-duplex point-to-point on the public switched telephone network at speeds of 1200 or 4800 bits per second, and on public switched data networks at speeds of 2400, 4800, or 9600 bits per second. Models 11 through 14 also operate in half-duplex at 9600 bits per second over a direct attached loop, and at 2400, 4800, or 9600 bits per second over a data link attached loop.

HOST COMPUTER SOFTWARE SUPPORT

A 3270 subsystem is supported for local and remote operation by IBM System/360, System/370, 4300 Series, 8100, 30XX, Series/1, and System 3 computer systems. Remote terminals are supported by BTAM, TCAM, VTAM, RPG Telecommunications, BSCA Multiline/Multipoint, and Communications Control Program depending on computer system and operating system. The 3274-based local clusters are supported on mainframe configurations under 3272 mode or under VTAM. In general, all new models and configurations of the 3270 can be supported under previous 3270 programming. If Display Exception Monitoring Facility (DEMF) software is installed on the host computer, network support for problem determination/isolation is available to terminals operating in BSC mode. In addition, 3270 display printer components, as well as 3276 clusters, are used with higher-level systems such as the IBM 8100 and 3790.

DEVICE CONTROL

The 3270 System operates under the control of the program stored at the remote computer. Under program control, the 3270 can execute any of four types of commands: read, write, control, and sense.

Read commands initiate transfer of the contents of a device buffer, modified fields within the buffer, buffer addresses or data of fields specified by the selector pen, or the single-byte Attention Identification (AID) code generated by a Program

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IBM 3270 Information Display System

which (Model 1), is intended for use as part of the 3270 family. Model 2 is designed for use as a member of the 5250 Information Display System. Thus, the 3180 is IBM's first display product that can be used with the company's full line of processors.

The 3290 Information Panel currently has no competition from the independent vendors. The 3290 is a large screen (10.7 by 13.4 inches), flat gas plasma panel display station with a screen capacity of 9,920 characters. Designed for use in program development, report retrieval, and data base/data communications applications, the 3290's screen can be divided into up to 16 partitions to provide access to different applications or data bases simultaneously. The screen is made up of a sealed "sandwich" of two flat glass plates, approximately 1/70th of an inch apart. The space between the glass is filled with neon/argon gas; as electrical charges are selectively applied to a wire grid, the gas glows to display orange-on-black images. The 3290 can be attached to the 3274 Control Unit in the same way as all other 3270 terminals.

The new 3274 Control Unit models (41A, 41C, 41D, and 61C) provide increased functionality at a lower price than the models they are intended to replace (31A, 31D, 31C, and 51C; these models will continue to be marketed to accommodate older terminal models not supported on the new models). The new models incorporate 192K of control storage, double-sided diskette capability, and 32 terminal ports. Support for second generation displays and printers is provided in addition to support for the new products. Also supported is the 3299 Terminal Multiplexer. The 3299 functions as a coaxial cable eliminator; it connects to a 3274 Control Unit via a single cable, and can support up to eight terminals via shorter cables that fan out from the 3299 to each device. The 3299 also doubles (to two miles) the distance permitted between the control unit and the terminal.

The IBM 3278/3279 Personal Computer Attachments allow the 3278 Display Station or 3279 Color Display Station to function as an IBM Personal Computer. The attachments consist of two components: the Personal Computer Adapter, which is field-installed by IBM personnel; and the Personal Computer Attachment Option, which is installed by the customer. When equipped with the Personal Computer Attachment, the 3278/3279 display and keyboard become common to both the host processor and the IBM Personal Computer processor.

The 3270 Personal Computer is a version of IBM's Personal Computer designed for use on the 3270 Information Display System. The key feature of the 3270-PC is that it can operate up to seven concurrent sessions: four 3270-type sessions, one Personal Computer DOS session, and two local notepad sessions. The 3270-PC allows the user to view these sessions on multiple windows, which can be manipulated independently. A monochrome or color display may be used. IBM has further enhanced the 3270-PC with graphics (3270-PC/G and 3270-PC/GX) and plasma display models. For more information on the 3270 Personal Computer Family, see Report C22-491-301.

The 3178 Display Station is the replacement for the venerable 3278 display. The 3178 contains an improved ergonomic design, taking up less space than its predecessor. The terminal's modular construction contributes to its ease of use, with a tilt/swivel display and low-profile keyboard.

Function or Program Access key. The 3270 responds to two read commands, Read Buffer and Read Modified. The selector pen is not supported by the 3178 or 3290 displays.

Read Buffer initiates transfer of the contents of the addressed device buffer from the initial or current cursor address. Read Modified initiates one of three operator-initiated functions: Read Modified, Short Read, or Test Request. Read Modified initiates the transfer of all fields modified by the keyboard within the device buffer. The fields are transferred in sequence beginning with the first modified field; all nulls are suppressed. However, when completion of a key-modified field is signaled by a selector pen operation, a resulting Read Modified operation will transfer only the address of the modified field. Short Read initiates transfer of the single-byte AID Code generated by a Program Attention key. Test Request Read performs the same operation as Read Modified; however, a hardware-generated heading precedes the data. Nulls are suppressed as in Read Modified. Only the special heading is transferred if data has not been keyed.

Write commands condition the display or printer to receive a computer message. Two write commands—Write and Erase/Write—load, format, and selectively erase device buffer data, and can also initiate device operations such as starting the printer, resetting the keyboard, and sounding the audible alarm. Both commands are the same except that Erase/Write erases the entire contents of the device buffer before fresh data is written (beginning at the initial buffer address) and Write modifies existing buffer data.

Control commands initiate control unit and/or device operations. There are three control commands: Copy, Select, and Erase All Unprotected. Copy, executed by a remote control unit only, transfers buffer data from one device to another. Select, executed by a 3274 in 3277 mode only, transfers buffer data from the selected device to the controller. Erase All Unprotected initializes the addressed device, erasing all unprotected buffer locations and repositioning the cursor to the initial position of the first unprotected field.

A local 3274 cluster operating under VTAM looks like a remote control unit.

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TABLE A. USER RATINGS OF 3270 CONTROLLERS

Model	Number of User Responses	Number of Controllers Installed	Weighted Averages*						
			Overall Performance	Ease of Installation	Ease of Operation	Ease of Expansion	Reliability of Controller	Reliability of Peripherals	Maintenance/ Technical Support
3274	299	11,244	3.6	3.2	3.4	3.1	3.6	3.5	3.5
3276	57	1,360	3.5	3.3	3.5	2.9	3.6	3.5	3.5
3271	10	34	2.5	2.8	2.6	2.1	3.0	2.9	2.8
3272	12	42	3.2	2.9	3.1	2.8	3.1	3.0	3.2

**Weighted Average is based on assigning a weight of 4 to each user rating of Excellent, 3 to Good, 2 to Fair, and 1 to Poor.*

TABLE B. USER RATINGS OF 3270 DISPLAYS

Model	Number of User Responses	Number of Displays Installed	Weighted Averages*						
			Overall Performance	Ease of Operation	Display Clarity	Keyboard Feel & Usability	Ergonomics	Hardware Reliability	Maintenance/ Technical Support
3178	120	21,348	3.6	3.5	3.3	3.3	3.4	3.6	3.4
3179	37	4,033	3.6	3.5	3.5	3.4	3.6	3.6	3.4
3180	38	2,573	3.6	3.6	3.6	3.3	3.5	3.3	3.2
3270-PC	6	97	4.0	3.2	4.0	3.3	3.8	3.8	3.8
3276	13	913	3.3	3.4	3.4	3.2	1.6	3.5	3.5
3277	32	2,369	3.2	3.0	2.9	2.8	1.9	3.1	3.1
3278	222	53,125	3.6	3.4	3.3	3.2	2.3	3.6	3.5
3279	73	8,264	3.5	3.4	3.2	3.2	2.3	3.6	3.6
3290	18	995	3.7	3.4	3.6	3.4	3.4	3.7	3.4
3270, unspecified	24	17,592	3.4	3.4	3.3	3.3	2.5	3.4	3.4

**Weighted Average is based on assigning a weight of 4 to each user rating of Excellent, 3 to Good, 2 to Fair, and 1 to Poor.*

IBM has also recently unveiled new models of the Personal Computer XT/370 and AT/370 that may be attached to a 3274 Control Unit. Displaywriter attachment to a 3270 system is also now permitted.

The first generation of 3270 components was introduced by IBM in 1972, and consisted of: the 3271 Control Unit; 3272 Control Unit; 3275 Standalone Display Station; 3277 Cluster Display Station; 3284 Matrix Printer; 3286 Matrix Printer; and 3288 Belt Printer. In an announcement that became effective November 16, 1982, IBM has withdrawn the first generation of 3270 products from marketing. The above-mentioned models are no longer marketed by IBM, although it will continue to support existing units. The plug-compatible market for these components is expected to remain quite active for at least another two to three years.

The second generation of 3270 components was unveiled in 1977, and included: the 3274 Control Unit; 3276 Control Unit Display Station; 3278 Cluster Display Station; 3287 Matrix Printer; and the 3289 Belt Printer. IBM has now replaced the original 3274 Control Unit models with Models 3274-21 and -31. These control units contain an improved storage technology, and support extended color, extended highlighting, and presentation graphics functions.

In October 1979, IBM made another major addition to the 3270 family with the introduction of the 3279 Color Display Station. Although the 3279 was not the first color display on the market, it was seen by many industry

Program control by data field provides a flexible formatting capability. A field, identified by an attribute control code (nondisplayed) in the initial character position, can possess any one of several characteristics. The attribute control code can specify a protected or unprotected field (for fixed format operation), beam intensity of brightness (off, normal, or bright), alphanumeric or numeric (automatic shift) input, auto lock or skip, tab stop, or light pen selection.

The Program Tab feature automatically writes successive data fields into successive unprotected data fields defined by a fixed format.

Character Addressing permits a message to be written beginning at any screen location. Addressing can be interspersed with data throughout a message received from the computer. Character Addressing also permits the selective modification of attribute control codes.

Operator controls are provided for cursor control, editing, and program functions. Cursor controls position the cursor up, down, left, or right, step-by-step or repetitively if the key is held depressed. The cursor can also be backspaced one character position, moved to the beginning of the next line or beginning of the next unprotected data field, tabbed to the beginning of the next unprotected data field, and backtabbed to the beginning of the previous unprotected field. Edit controls permit data to be inserted in or deleted from text, character-by-character. Following data is automatically expanded or contracted.

Program Function keys are used to initiate program functions or identify data that can be transmitted with an accompanying program function code.

The 3276, 3178, 3180, and 3278 have two added controls: Cursor Home key and Cursor Select key. The Cursor Home key returns the cursor to the first nonprotected character

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observers as IBM's acknowledgement that color displays were a legitimate part of a general-purpose system, and not just an unnecessary extravagance. Along with the 3279, IBM unveiled color versions of the 3287 Printer, as well as a new 3274 Control Unit Model 51C, and enhancements to several existing models.

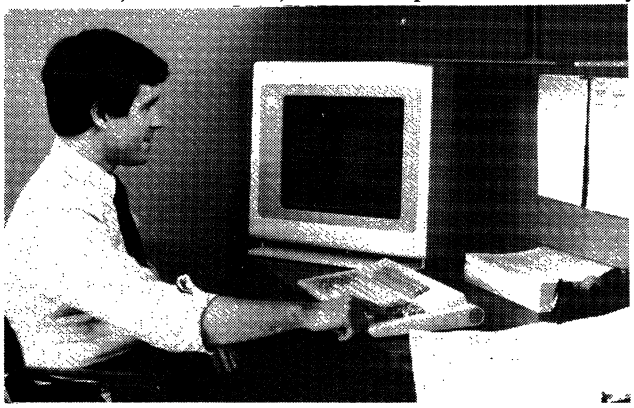
COMPETITIVE POSITION

As mentioned previously in this report, the members of the IBM 3270 Information Display System and their competitors comprise the single largest subset of the alphanumeric display terminal market. Studies conducted by various market research firms put the current installed base of 3270-type terminals at over three million units. Of that installed base, approximately half are IBM terminals; the rest are 3270-compatible models from independent manufacturers. IBM's major competitors in this market include: Telex, ITT Courier, Harris, AT&T Teletype, Lee Data, and Memorex, among others.

ADVANTAGES AND RESTRICTIONS

The reliability of IBM's equipment and the dependability and consistency of its maintenance service have always presented a problem to those vendors who manufacture IBM-compatible equipment. The 3270 market had been stable for a few years; lower prices, improved price/performance, and shorter lead times for delivery have allowed several competitors to carve out a healthy market share. However, IBM's recent price reductions (existing models of the 3274, 3276, 3279, and 3287 were all reduced in price), new product introductions, and incorporation of the highly successful Personal Computer into the 3270 line, have put increased pressure on the independents.

The independents have reacted in a variety of ways. Raytheon Data Systems (once IBM's chief competition in this market) and MDS Trivex were closed down by their parent companies. ITT Courier, Telex, Memorex, Lee Data, and most recently, Harris, have all revamped their product lines, introducing new display, controller, and printer models. Some, like Lee Data, have attempted to add value by



The 3290 is a flat gas panel display station. The 3290 features a screen capacity of 9,920 characters, displayed in orange on a dark background. The terminal's multiple display screen capability allows for concurrent viewing of four 3278 Model 2 screens. Combinations of alphanumeric data and high-resolution graphic images may be displayed simultaneously.

position. The Cursor Select key causes a selection operation similar to a light pen operation; a light pen (Selector Pen) is optional in addition to this control. A Print key is included on 3276/3178/3180/3278 display/keyboards when attached to a 3274 Control Unit; this key causes the displayed data to be transferred to a printer for immediate printing without requiring a host computer command; normal print commands can also be executed. The standard cursor is an underscore. On a 3178, 3180, or 3278 display connected to a 3274 controller, the cursor can be standard or reverse video underscore, blinking or nonblinking as selected by the operator.

An Entry Assist capability is available on the 3274 (equipped with Configuration Support D) for the 3178, 3179, 3180, 3278, and 3279 displays. Entry Assist allows the operator to enter and edit textual material such as letters, memos, reports, source programs, etc. Entry Assist capabilities are available when the operator enters Document mode. Capabilities available in this mode include: tabbing, screen margins, wordwrap, word/character delete, and end-of-line warning.

When equipped with the personal computer option, the 3278 display can operate in two modes: host compute and personal compute. These modes provide for concurrent operation of a host program and a Personal Computer program. The user can switch between modes, in order to decide whether it is the host program or personal computer program which receives keystrokes and has its output displayed.

Readers capable of accepting a credit-card size plastic card with up to 40 characters encoded on a magnetic tape stripe can be connected to all models of displays except the 3178, 3179, 3180, and 3290. The reader for the 3276 and 3278 displays will accept previously coded cards if the normal end of form control character (not the Hex C optional character) is supported.

COMPONENTS

3274-21A, -21B, -21C, -21D, -31A, -31C, AND -31D CONTROL UNITS: Control units that provide control of a local or remote cluster of up to 32 displays or printers. Models 21A, 21B, 21C, and 21D contain 64K bytes of storage; Models 31A, 31C, and 31D contain 128K bytes of storage. The units are upward-compatible with and supercede predecessor 3274 Models 1A, 1B, 1C, and 1D. They support enhanced storage technology and extended color, extended highlighting, and presentation graphics functions not available on the older models. Models 21A and 31A support a local cluster operating in SNA mode under VTAM, and are upward-compatible with the 3274-1A. Model 21B supports a local cluster operating in 3272-compatible mode, and supercedes the 3274-1B. Models 21C and 31C support a remote cluster operating under BSC or SDLC protocol, and are upward-compatible with the 3274-1C. Models 21D and 31D are upward-compatible with Models 21B and 31C, respectively, and combine local attachment in 3272-compatible mode with an APL/Text control function; the -21D and -31D supercede the 3274-1D.

Operating functions are controlled by feature and systems diskettes customized at installation, using a diskette drive integral with the controller. The 3274-21C/-31C is conditioned for BSC or SDLC operation by loading a program into the controller using interchangeable diskettes.

All models support mixing of the older 3277/3284/3286/3288 (Category B) devices on the same controller with the new 3178/3278/3179/3279/3287/3289 (Category A) devices. The basic controllers each accommodate up to eight of the newer components. One Type A Terminal Adapter is required for each additional group of eight of the new

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introducing products not offered by IBM (e.g., a windowing terminal and asynchronous terminal capabilities). ITT Courier and Harris have recently added models or families that provide full plug-compatibility with IBM components (Telex and Memorex already offer this capability over their product line). Virtually all of the independents offer some type of personal computing capability on their systems, via either the IBM Personal Computer or their own PC products. Universally, however, the most noteworthy trend has been in pricing—it has gone down considerably. IBM 3270-type terminals are now more affordable than ever, which is ultimately good news for the user.

USER REACTION

During November and December 1984, Datapro conducted an extensive Terminal Users' Survey in conjunction with *Data Communications* magazine. A questionnaire was designed and produced by Datapro and mailed to approximately 15,000 addresses selected at random from a cross-section of *Data Communications'* U.S. end-user subscriber base. The users were asked to rate all types of display terminals, voice/data workstations, and terminal cluster controllers. A large number of responses on the IBM 3270 Information Display System were received, yielding ratings on both display stations and control units. These ratings are summarized in Tables A and B.

In addition to the ratings, the users were asked whether or not they would recommend their 3270 equipment to other users with similar applications. Of the 378 users who responded to the controller portion, 336 (88 percent) answered that they would recommend their controllers, 13 answered that they would not, and the remainder were undecided or did not answer the question. Of the 583 users who reported on the displays, 460 (79 percent) answered positively, 46 negatively, and the remainder were undecided or did not respond. It should be noted here that many of the users who answered this question negatively were reporting on older equipment (3271 and 3272 control units, 3277 and 3278 displays).

For more detailed evaluations of the ratings received by IBM, as well as other terminal vendors, see Report C25-010-901, User Ratings of Terminals. □

devices. **Alternatively, up to four Type B Terminal Adapters, each accommodating up to four 3277/3284/3286/3287/3288 Category B devices, can be installed. A single controller can accommodate a cluster of up to 32 terminals, comprised of groups of eight Category A devices and groups of four Category B devices; however, no more than 16 (i.e., four groups) of the 32 terminals can be Category B devices. A minimum of one 3278 display and keyboard is required. The 3287 printer can be attached to either Type A or Type B adapters. A 3278 Model 5 display cannot be attached to a 3274-21B Control Unit.**

Control Storage Expansion is required to install Type B Terminal Adapters in the 3274-21A/C and -31A/C; these features are not required to install Type B Adapters in the 3274-21B/D and -31D.

The 3274-21C and -31C require the External Modem Interface Feature and either the Common Communications Adapter or the High Performance Communications Adapter. The latter is required if any Type B Terminal Adapters are installed and a transmission speed of 9600 bps is used; otherwise, the CCA is adequate for all transmission combinations.

Dataphone Digital Service is available on Models 21C and 31C via both point-to-point and multipoint adapters. Models 21C and 31C can also be equipped with an Encrypt/Decrypt device that codes and decodes messages using the Federal Data Encryption Standard algorithm.

The APL/Text feature, available on all models except 21B, permits display (on an adapted 3278) or printing (on an adapted 3287) of an expanded 222-character set, including the standard EBCDIC and APL characters plus 37 text-specific characters and 10 graphics plot characters. The Text Print feature, available with all models except 21B, permits printing on the 3289 of a 125-character set (93 EBCDIC characters plus the 32-character Text Character set) and character underscore and overprint capabilities.

Enhancements to the 3274 support attachment of the 3279 Color Display Station and 3287 Models 1C and 2C Color Printers. Any 3274 except Model 21B can now be specified with one of three no-charge Configuration Support packages (A, B, or C); Model 21B is always equipped with Configuration Support A. Configuration Support A provides support for most 3270 functions, including base color mode; Support B adds the ability to attach 3278-5 printers, and to perform specific SNA-related functions; Support C includes all Support A and B functions plus certain other functions, including extended color mode, extended highlighting, and programmed symbol set support.

3274-41A, -41C, and -41D CONTROL UNITS: Control unit models which are intended to replace existing 3274 Models 31A, 31C, and 31D, respectively. Models 31A, 31C, and 31D will remain available to support Category B terminal adapter features. The new 3274 models provide increased functional capability with 192K of control storage and a double-sided diskette drive. The new controllers provide attachment for Category A devices only. These devices can be attached directly to the control unit, eliminating the need for terminal adapters. A new Configuration Support package (D) is specified with the 3274-41A, -41C, and -41D. Configuration Support D provides all currently supported functions available under Configuration Support A, B, and C, plus the new Entry Assist function.

3274-51C CONTROL UNIT: Provides control of a remote cluster of up to 12 displays and printers operating under BSC or SDLC protocol. The basic controller accommodates up to eight Category A devices. Four additional Category B devices can be attached via the Terminal Adapter Type B (#7801). Except for the number of devices supported, the Model 51C offers equivalent and compatible functions and features to a 3274 Model 1C. In addition, it provides certain features not available using SDLC via a data link or a direct or data link attached loop (this feature provides support for Category A devices only); a 1200 bps integrated modem; and a switched network communications capability. The 3274 Model 51C is also upward-compatible with the 3276 Control Unit Display Station, except that it provides the Printer Authorization Matrix used on other 3274s instead of the Default matrix used on the 3276.

3274-61C CONTROL UNIT: A control unit intended to replace the 3274 Model 51C (with Extended Function Store feature #1800). The 3274-51C will remain available to support Category B terminal adapter features. The 3274-61C provides 192K of control storage, a double-sided diskette, and support for up to 16 Category A devices.

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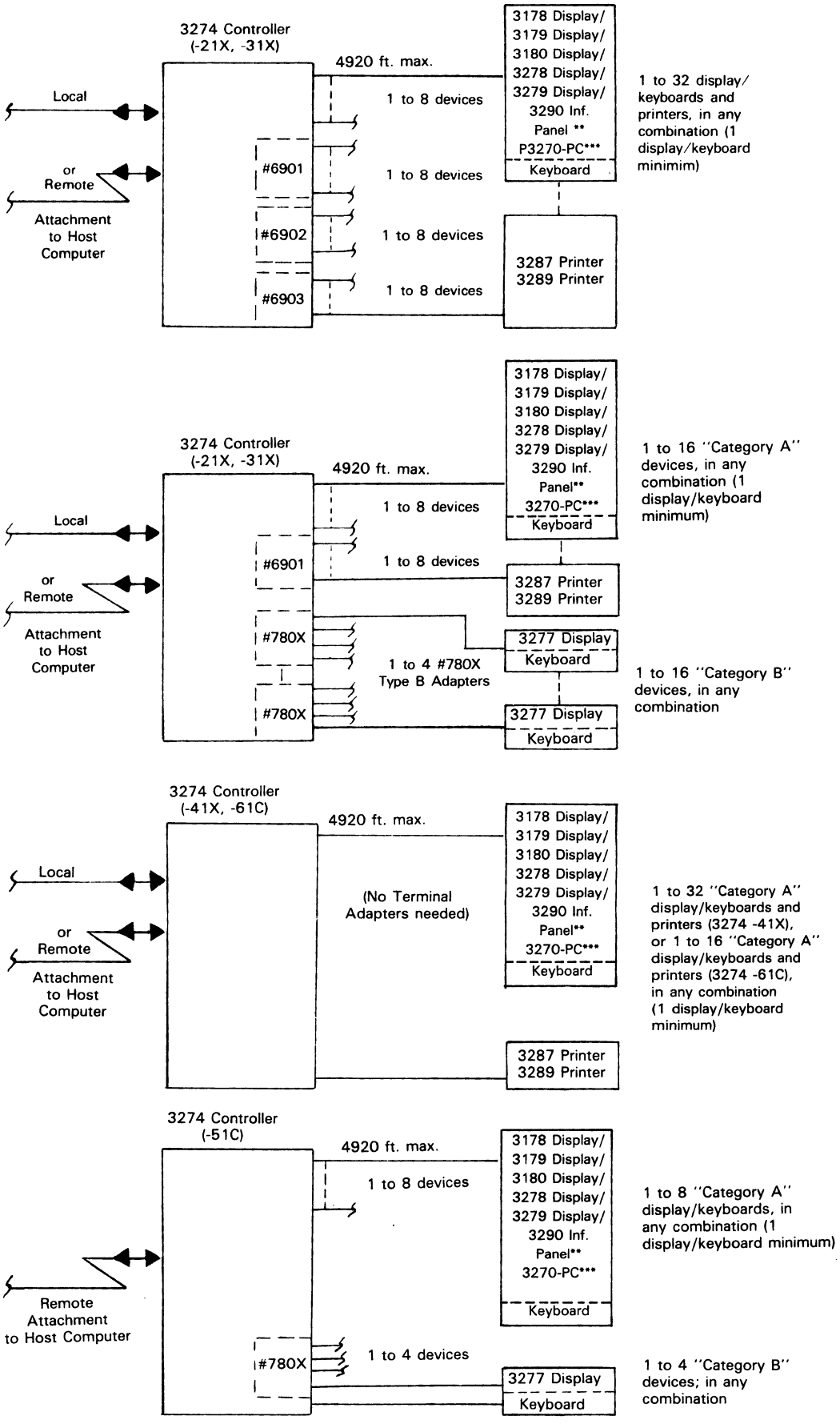
3270 Configurations*



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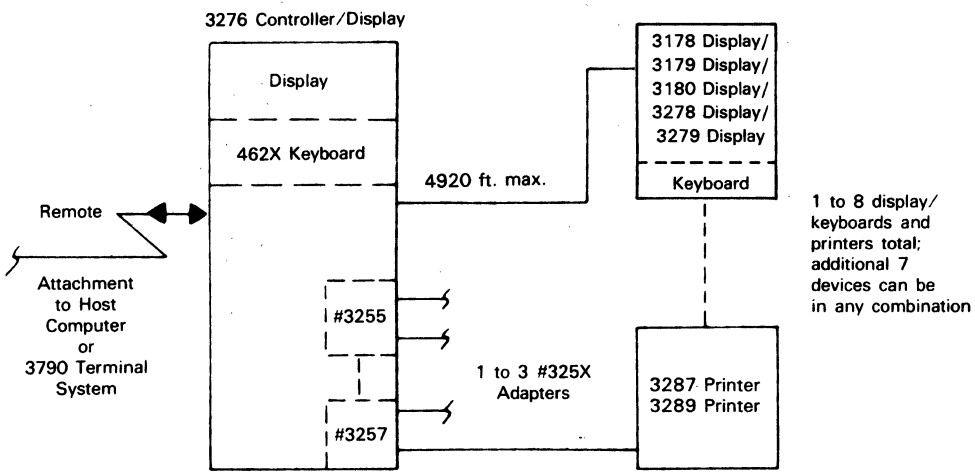

**See text for communications, display, keyboard, and printer models, characteristics, and options.*
***The 3290 utilizes one physical terminal port and up to five addresses; up to 31 3290s may be attached, depending on application and 3274 model.*
****The 3270-PC uses one physical terminal port and up to four addresses.*

A Configuration Support package (D) is specified with the 3274-61C. Configuration Support D provides all currently supported functions available under Configuration Support A, B, and C, plus the new Entry Assist function. The 3274-61C provides support for only Category A devices.- These devices can be directly attached to the control unit, eliminating the need for terminal adapters.

3299 TERMINAL MULTIPLEXER: A coaxial cable eliminator for use with all 3274 control unit models except 3274-51C. The 3299 is connected to a 3274 control unit via a single coaxial cable of up to 4920 feet (1500 meters) in length and can support up to eight Category A devices (Category B devices not supported) via cables (maximum length 4920 feet each) from the 3299 to each device. On the 3274-41X, up to four 3299s can be supported; attachment of the cable on the controller end requires 3274 Specify Option #9901. The 3274-61C supports one 3299, which also requires #9901. The 3274-21X and -31X support up to three 3299s, which require RPQ options 8K1155 and 8K1156 on the controller.

3276 CONTROL UNIT DISPLAY STATION: A controller for small remote clusters; it also includes an integrated display that is functionally equivalent to a Model 3278 Display Station. The 3276 can accommodate up to seven additional displays and printers.

A total of eight models provide combinations of four display capacities and BSC or SDLC operations:

Model 1—960-character display; BSC transmission.
Model 2—1,920-character display; BSC transmission.
Model 3—2,560-character display; BSC transmission.
Model 4—3,440-character display; BSC transmission.
Model 11—960-character display; SDLC transmission.
Model 12—1,920-character display; SDLC transmission.
Model 13—2,560-character display; SDLC transmission.
Model 14—3,440-character display; SDLC transmission.

The BSC models (1/2/3/4) can accommodate any mix of up to seven additional 3278 displays and 3287 and 3289 printers. The added 3278 display cannot have a larger display capacity than the basic 3276 integrated display. However, the SDLC/BSC Switch feature permits alternate protocol operation and also permits intermixing any size display on any "BSC" 3276 model. The SDLC models (11/12/13/14) can accommodate any display size mix. The display screen measures 14 inches (diagonally).

The basic 3276 controller (any model) can accommodate two devices. A Terminal Adapter is required for each additional two devices. Models 11, 12, 13, and 14 can be equipped with an Encrypt/Decrypt device which codes and decodes messages using the Federal Data Encryption Standard algorithm.

The 3276 requires an External Modem Interface or an Integrated Modem (1200 bps). Five integrated modem features are available for operation over switched or non-switched facilities, providing basic transmission linkage plus optional network backup and manual or auto answer capabilities. Either external or internal modem operation requires a Communications Feature.

Dataphone Digital Service is available on all models via both point-to-point and multipoint adapters. APL/Text functions similar to those provided by the 3274 Control Unit can be implemented by equipping the 3276 with APL/Text Control and Extended Function Base features.

A Color Display Attachment feature (#19540) provides the 3276 with support for an attached 3279 Display Station operating in base color mode. This feature requires the previously available Extended Function Base feature (#1068), and does not support operation of a 3279-2B or -3B in extended color mode. (The Color Display Attachment is not required for color printing via a 3287 Model 1C or 2C Color Printer.) Another 3276 enhancement removes the mutually exclusive restriction between the Extended Function Base feature (#1068) and the Encrypt/Decrypt feature (#3680). An audible alarm and security keylock are standard features.

3278 DISPLAY STATION: Five models are available, distinguished by the display capacity. Model 1 displays 12 lines of 80 characters each (960 characters total); Model 2 displays 24 lines of 80 characters each (1,920 total); Model 3 displays 32 lines of 80 characters each (2,560 total); Model 4 displays 43 lines of 80 characters (3,440 total); Model 5 permits operator selection of display arrangements of 24 lines of 80 characters (1,920 total) or 27 lines of 132 characters (3,564 total). The display screen measures 14 inches (diagonally).

A character set of 94 characters, including upper- and lowercase alphabetics, numeric, and special symbols, is displayed. When connected to a 3274, the 3278 can incorporate the APL/Text feature; the Character Set Extension

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feature and a 4626 or 4629 keyboard are required. A monocase switch provides 3277 compatibility. Each character for Models 1, 2, and 3 is formed by a 7-by-14 matrix; for Models 4 and 5—a 9-by-12 matrix is used. Extended highlighting and symbol set functions (monochromatic only) have been added to Models 2, 3, and 4. A Switch Control Unit permits a 3278 Display to be switched between two controllers.

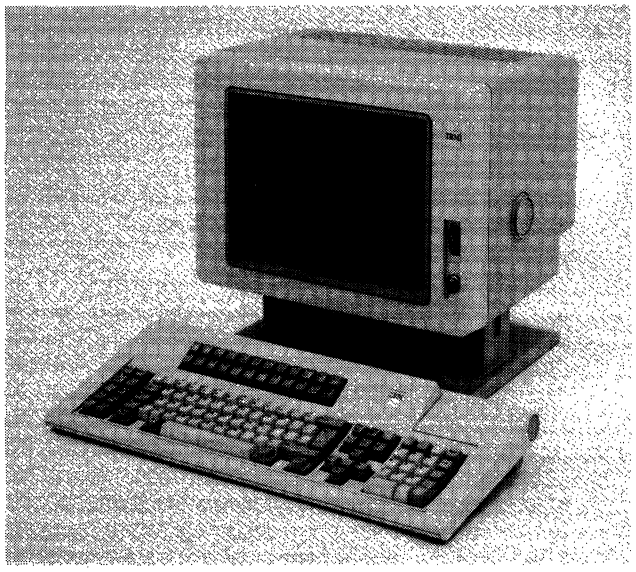
The 3278 uses the 462X series, 4640, 4651, or 4652 keyboards. The displays can be equipped with a keyboard, numeric lock, address lock, selector light pen, magnetic slot reader, and magnetic hand scanner, as options. The audible alarm and security keylock, previously available as options, are now standard in the base configuration.

3278 PERSONAL COMPUTER ATTACHMENT: Available for use with the 3278 Display Station (all models). The personal computer option consists of two components: the IBM 3278 Personal Computer Adapter (field-installed by IBM), and the IBM Personal Computer 3278 Attachment Option (installed by the user). This option allows common use of the 3278 display and keyboard with any Personal Computer processor unit; no Personal Computer display or keyboard is required.

3178 DISPLAY STATION: Functionally equivalent to the 3278 Model 2 for base functions. Four models of the 3178 are available, differing only in the keyboard included. Model C1 includes a 75-key Data Entry keyboard; Models C2, C3, and C4 include an 87-key Typewriter keyboard. A numeric pad is included on Models C3 and C4, which differ only in the placement of some functions on the keyboard. All models contain a 12-inch (diagonally measured) display screen with a display capacity of 1,920 characters, arranged in 24 lines of 80 characters each. The 3178 is modularly constructed, consisting of three separate machine elements: video, logic, and keyboard. The video pedestal provides the display with 20° of tilt and 180° of swivel. The keyboard provides adjustments for 6° and 12° of inclination. The 3178 provides a smaller footprint than the 3278, since the logic module can be bracket-mounted on a wall or under a tabletop.

An audible alarm, keyboard numeric lock, and security keylock are standard on the 3178. The 3178 does not support the following 3278 optional features: magnetic reader control, selector light pen, programmed symbols, APL/Text, and extended character set adapter. Also, Models C2 and C4 cannot be intermixed on the same control unit, nor can Model C4 be used on the same control unit with 3278s or 3279s which use typewriter keyboards 4621, 4627, 4628, 4640, 4651, or 4652.

3180 DISPLAY STATION: Functionally equivalent to the 3278 Models 2 through 5 for base functions. Two models are available: Model 1, for use as part of the 3270 Information Display System; and Model 2, for use as part of the 5250 Information Display System (connecting to the IBM System/36 and System/38; for more information, see Report C25-491-301). The 3180 Model 1 contains a 15-inch (diagonally measured) display screen; four operator- or program-selectable screen formats are available: 1,920 characters (24 lines by 80 characters), 2,560 characters (32 lines by 80 characters), 3,440 characters (43 lines by 80 characters), and 3,564 characters (27 lines by 132 characters). The 3180 is modularly constructed, consisting of three separate machine elements: video, logic, and keyboard. The video pedestal provides the display with 20° of tilt and 360° of swivel; the vertical height of the screen can be adjusted up to 5 inches. The 3180 can be selected with a data entry or APL keyboard. Each keyboard layout contains 122 keys, including 24 program function keys and adjustable slope. The keyboard is modifiable; removable key caps can be used to apply unique nomenclature to the keyboard.



The 3180 Display Station Model 1 is functionally equivalent to the 3278 Display Station Models 2 through 5. The 3180 features a 15-inch (diagonal) screen with tilt, swivel, and height adjustments. The 3180 Display Station Model 2 is supported for use with the 5250 Information Display System.

3279 COLOR DISPLAY STATION: Five models are currently available, three of which (Models S2A, S2B, and S3G) have been designated standard models, and two of which (Models 2X and 3X) may be used to order customer configurations. These new models replace the previous 3279 Models 2A, 2B, 3A, and 3B. Standard models are designed to provide the customer with easier configurations, a simplified ordering process, and potentially faster delivery times.

The standard models have no optional features other than the selected keyboard. They represent the most popular configurations of the Models 2A, 2B, and 3B. Model S2A supports base color mode, and provides a 1,920-character screen capacity; Model S2B supports extended color mode, and provides a 1,920-character screen capacity plus extended highlighting and APL. Model S3G supports extended color mode, and provides a 2,560-character screen capacity plus extended highlighting, APL, and programmed symbols. Base color mode supports the use of four colors (red, green, blue, and white) as substitutes for existing protect and intensify field attributes. Extended color mode includes the features of the base color mode, provides three additional colors (yellow, pink, and turquoise), and permits field character addressing of color highlighting as an independent attribute. On Models S2B and S3G, extended highlighting consists of the use of reverse video, blinking, and underscoring. Model S3G provides storage of up to six 190-character programmed symbol sets containing user-defined shapes and symbols for use in graphic display representations.

Model 2X can be used to order special configurations equivalent to previous Models 2A and 2B. All Model 2X configurations contain a 1,920-character screen capacity. Model 3X can be used to order special configurations equivalent to Models 3A and 3B. All Model 3X configurations contain a 2,560-character screen capacity. The Extended Function feature, when added to Model 2X or 3X, provides extended color, extended highlighting, and the APL/Text character set.

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A 3279 display operating in base color mode can be attached to any Model 3274 Control Unit with any of the Configuration Support packages (A, B, or C) or to a 3276 Control Unit Display Station that supports the 3279's screen capacity and is equipped with the Extended Function Base (#1068) and the Color Display Attachment (#1950) features. A 3279 display using extended color, extended highlighting, or programmed symbols can be attached only to 3274 Models 1A, 1C, 1D, or 51C with Configuration Support C.

3279 PERSONAL COMPUTER ATTACHMENT: Available for use with the 3279 Color Display Station (all models). The personal computer option consists of two components: the IBM 3279 Personal Computer Adapter (field-installed by IBM), and the IBM Personal Computer 3279 Attachment Option (installed by the user). This option allows common use of the 3279 display and keyboard with any Personal Computer processor unit; no Personal Computer display or keyboard is required.

3179 COLOR DISPLAY STATION: Functionally equivalent to the 3279 Models S2A and S2B. The 3179 is equipped with a 14-inch (diagonally measured) display screen with a 1,920-character capacity, arranged in 24 lines of 80 characters each. When executing a 3278 or 3178 application, the 3279 can display information in four base colors: red, green, blue, and white. When attached to an appropriately configured 3274 Control Unit, three additional colors (yellow, turquoise, and pink) may be displayed. The 3179 features a modular construction consisting of three interconnected elements: video, logic, and keyboard. The video pedestal provides the display with 15° of tilt and 180° of swivel. The unit's modifiable keyboard contains 122 keys, including 24 program function keys, cursor control keys, and an integrated numeric pad. Removable keycaps can be used to meet a particular application requirement. The keyboard features a low-profile design and three slope adjustments (6°, 12°, or 18°).

3290 INFORMATION PANEL: A large capacity, flat gas plasma panel display. The viewing area, measuring 10.7 by 13.4 inches, can accommodate up to 9,920 characters (62 rows by 160 columns) using 5-by-8 dot matrix characters, or up to 5,300 characters (50 rows by 106 columns) using a 7-by-9 dot matrix. The display image is formed by lighting cells under the control of display logic, and appears as orange characters on a black background. The display image is uniform at every point of the viewing area. The 3290 can display high-resolution graphics as well as alphanumeric data.

The 3290 provides a multiple display screen capability which allows concurrent viewing of the following: four 3278/3279 Model 2 screens; two 3278/3279 Model 3 screens; two 3278 Model 4 screens; or two 3278 Model 5 screens. The 3290 can also be configured to display a full-page computer printout (62 rows by 132 columns), two horizontal screens of up to 31 rows by 160 columns, or two vertical screens of up to 62 rows by 80 columns. Up to 16 separately manageable partitions may be designated. Screen management facilities govern multiple interactive screens and multiple copy screens. A 24K-character buffer can be vertically scrolled. The 3290 is data stream compatible with all currently available 3270 displays.

The 3290 Model 1 is composed of the display panel, power logic unit, and keyboard. Two keyboard styles are available: Data/Typewriter (#4730) and APL (#4731). A numeric keypad and a programmed function keypad are optionally available on both keyboard models. The display panel features a tilt adjustment of up to 5° forward and up to 15° backward. An audible alarm and security keylock are standard. In addition to its availability as the standard Model 1, the components of the 3290 (display panel, power logic unit, and keyboards) may be purchased separately.

3270 PERSONAL COMPUTER: A version of the IBM Personal Computer designed for use with the 3270 Information Display System. The 3270-PC can operate up to seven concurrent sessions: four 3270-type sessions, one IBM PC DOS 2.0 session, and two local notepad sessions. The user can view these sessions on the 3270-PC's multiple windows; the user also has the ability to move and alter the size of the windows, as well as to define multiple screen layouts. The 3270-PC is now available in three basic models: The 3270-PC, 3270-PC/G (graphics), and 3270-PC/GX (extended graphics). Monochrome, color, and plasma displays are available, depending on the 3270-PC configuration selected.

For more detailed information on the IBM 3270 Personal Computer Family, see Report C22-491-301.

462X KEYBOARDS: For use with 3278 displays and 3276 controller/displays. A total of eight models are available with various combinations of layouts, data codes, and program function keys. A complete listing of models and basic characteristics is provided in the price list. All data entry layouts include a separate group of 120 program function keys. All typewriter models include 12 program function keys that are activated by an alternate shift mode. Two models include an additional 12 keys for a total of 24 program function keys; two models include text-oriented characters for use with APL/Text features. All models, except the latter four, have 75 keys. The four expanded typewriter layouts have 87 keys. A Numeric Lock feature is available.

4640/4651/4652 KEYBOARDS: For use with 3278 displays or 3279 color displays. The 4640 is an 87-key EBCDIC typewriter overlay keyboard; the 4651 is an 87-key EBCDIC attribute select typewriter keyboard; the 4652 is an 87-key EBCDIC attribute select typewriter/APL keyboard. All three models include keytop annotations for color, extended highlighting, and programmed symbol sets.

4730/4731 KEYBOARDS: For use with the 3290 Information Panel. The 4730 is a Data/Typewriter-style keyboard which contains 24 Program Function Keys, located in two rows across the top of the keyboard. Overlays are provided for the Program Function keys to identify the functions associated with each key. The 4731 has a data/typewriter layout as does the 4730, plus modified keytops to allow the entry of 81 APL specific characters. An APL on/off key permits the keyboard to be switched from basic EBCDIC typewriter mode to APL mode. Both typewriter styles are cable-attached to the 3290 and feature adjustable keyboard slope.

3262-3/-13 LINE PRINTERS: Line printers that can be attached to the 3274 and 3276 (Model 13 only) control units. Maximum rated print speeds for the 3262-1 range from 253 lpm to 650 lpm, depending on the character set used. Maximum rated print speeds for the 3262-13 range from 125 lpm to 325 lpm, depending on the character set used. Line lengths are 132 characters; horizontal spacing is 10 cpi, while vertical spacing is selectable at 3, 4, 6, or 8 lpi. Print format compatibility for 3270 Data Stream (non-SCS) operation is available.

3268-2 MATRIX PRINTER: A printer that can be attached to a 3274 or 3276 control unit. Maximum print speed is 340 cps. The 3268-2 operates in either 3270 mode (BSC or SNA LU3) or SCS (SNA LU1) mode. Line lengths are 132 characters; horizontal spacing is selectable at 10 or 16.7 cpi, and vertical spacing is selectable at 3, 4, 6, or 8 lpi. Continuous forms are advanced via a forms tractor mechanism; up to 6-part forms may be used.

3268-2C COLOR MATRIX PRINTER: A color printer that can be attached to a 3274 or 3276 control unit. Maxi-

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mum print speed is 340 cps. The 3268-2C operates in either 3270 mode (BSC or SNA LU3) or SCS (SNA LU1) mode. Line lengths are 132 characters; horizontal spacing is selectable at 10 or 16.7 cpi, and vertical spacing is selectable at 3, 4, 6, or 8 lpi. Continuous forms are advanced via a forms tractor mechanism; up to 6-part forms may be used. Two modes of color selection (base and extended) may be selected. Base color printing is the selection of color at the field level as a function of the 3270 Data Stream protect and intensify attribute byte. Extended color is the selection of color at the character level in addition to the field level. Black, red, blue, and green can be printed; extended colors (pink, yellow, turquoise) are printed black by default.

3287-1/-2 MATRIX PRINTERS: This printer can be used with the older (3271/3272) as well as newer (3274/3276) cluster controllers. Model 1 operates at 80 cps; Model 2 operates at 120 cps. Both models achieve these speeds through bidirectional printing. Both print 10 characters per inch, 6 or 8 lines per inch, and 132 positions across the page. Separate attachment features are required for connection to a 3274/3276 controller. When connected to a 3274, the 3287 can incorporate the APL/Text feature; an Extended Character Set Adapter and a 3274 Attachment feature are required. A special feature, Extended Print Buffer, is required for operation with 2560, 3440, and 3564 character displays. A programmed symbol set support feature (monochromatic only) is available. A Variable Width Forms Tractor option, as well as Friction Feed Paper Handling option, is available. An audible alarm is a no-cost feature for signaling a forms-out condition; the alarm can also be sounded via a host computer command.

3287-1C/-2C COLOR MATRIX PRINTERS: Two color models that vary only in their rated print speeds: Model 1C prints at a maximum of 80 characters per second and Model 2C at 120 characters per second, when printing bidirectionally with a single color per line. Four colors (red, green, blue, and black) are provided via a multicolor ribbon. Print positions 1 through 120 can be printed in any color, but positions 121 through 132 can only be printed in black. As with the 3279 Display, two levels of color usage are supported. Basic color mode printing is standard on both models and substitutes color for existing protect and intensify field attributes. Extended color mode requires the previously available Extended Character Set Adapter (#3610) and permits user specification of color as an independent character or field attribute. When seven-color displayed data is transferred to a four-color printer, extended colors (pink, yellow, and turquoise) are printed in black. Extended highlighting permits underscoring of printed data, but blinking and reverse video attributes are ignored. Storage for two, four, or six programmed symbol sets, including a four-color business graphics set, is also supported and requires two previously available options, the Extended Character Set Adapter (#3610) and the Extended Print Buffer (#3880). Except for color printing, functions and features of the Models 1C and 2C are equivalent to the 3287 Models 1 and 2, respectively.

The 3287 Models 1C and 2C can be attached to any model of the 3274 Control Unit with a Category A terminal port, and to any 3276 Control Unit Display Station (features #1068 and #1950 are not required). Unlike 3287 Models 1 and 2, they cannot be attached to a 3271 or 3272 Control Unit. When operating with extended color, extended highlighting, and preprogrammed symbol sets, Models 1C and 2C can be attached only to a 3274 Model 1A, 1C, 1D, or 51C with configuration Support C.

4250-1 APA PRINTER: An all-points-addressable (APA) nonimpact printer with an addressing resolution of 600 dots per inch in both horizontal and vertical directions. The 4250-1 can print text in a wide variety of styles and sizes, as well as graphics objects. The 4250-1 attaches to the 3274 Control Unit Models 31A and 31D via #9112 Configuration Support C or #9124 Configuration Support D; it attaches to the 3274 Models 41A and 41D with no special features required.

5210-G01/-G02 MATRIX PRINTERS: A correspondence quality printer that can be attached to the 3274 and 3276 Control Units. Model G01 prints at 40 cps, while Model G02 prints at 60 cps. Print wheels in 10 pitch, 12 pitch, 15 pitch, or proportional spacing are available to provide a selection of type style and graphic variations with appropriate application programming. Pinfed continuous forms can be used.

PRICING

Previously, all 3270 components were available under the terms of IBM's Rental or Lease Agreement (LRA) or for purchase. IBM's newer components are available for purchase only; in addition, IBM has recently withdrawn its LRA for all models of the 3274 Control Unit. (LRA includes prime shift maintenance; a separate contract is available for purchased units.) All new components are user installed via IBM's new Customer Set-up Policy.

LRA was announced for general application in April 1977. Basically, this arrangement provides for month-to-month rental or for a two-year lease with penalties for early termination (including model downgrades and feature termination). The lease can be extended indefinitely, one year at a time. The monthly charges for the lease arrangement are generally 15 percent lower than the month-to-month arrangement. The prime shift maintenance period is for any consecutive nine hours between 7 a.m. and 6 p.m., Monday through Friday. (The maintenance charges given in the accompanying price list are for prime shift maintenance for purchased equipment and also serve as the basis for calculating extended charges for rented or leased equipment.) Extended period maintenance is available up to 24 hours per day, 7 days per week.

The termination charge for the lease arrangement is the lower of 5 months' charges or 25 percent (5 percent for the 3286 printer) of the remaining value of the lease. (For periods of fewer than 20 months, the 25 percent charge will be lower than the 5 month charge.)

All 3270 (except the 3178, 3179, 3180, and 3290) components are in maintenance category A, except the 3276 Control Unit Display Station, which is in category D. These categories determine the schedule of extended maintenance charges. The two schedules differ for extended Monday through Friday maintenance, but are the same for Saturday and Sunday maintenance. The premium for extended maintenance is expressed in the table below as a percentage of the basic maintenance charges, which are listed in the accompanying price list.

The 3178, 3179, 3180, and 3290 are covered under IBM Exchange/Repair Amendment to existing IBM Rent/Lease, Purchase, and Maintenance Agreements. Maintenance is offered, for an annual charge, at four service levels: Customer Carry-in Repair; Customer Carry-in Exchange; Customer On-site Exchange; and IBM On-site Exchange.

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EQUIPMENT PRICES

		Monthly Charges*			
		Rental ($)	Lease ($)	Purchase ($)	Monthly Maint. ($)
	Cluster Controllers				
	3274 Model 21A; local, SNA mode	818	696	14,220	72.00
	3274 Model 21B; local, 3272 mode	818	696	14,220	74.50
	3274 Model 21C; remote; requires 3701	573	488	9,900	55.50
	3274 Model 21D; local, 3272 mode	818	696	14,220	79.50
	3274 Model 31A; local, SNA mode	962	816	16,650	90.00
	3274 Model 31C; remote; requires 3701	717	608	12,420	73.50
	3274 Model 31D; local, 3272 mode	962	816	16,650	97.50
	3274 Model 41A; local, SNA mode	1,013	862	18,230	58.00
	3274 Model 41C; remote; requires 3701	767	653	13,840	40.00
	3274 Model 41D; local, 3272 mode	1,013	862	18,230	58.00
	3274 Model 51C; remote; requires 3701	264	225	4,885	37.50
	3274 Model 61C; remote; requires 3701	408	345	7,600	27.00
	Terminal Adapters (for Models 21X, 31X, and 51C only)—				
6901	Type A1; devices 9 through 16	49	42	918	2.00
6902	Type A2; devices 17 through 24	49	42	918	2.00
6903	Type A3; devices 25 through 32	49	42	918	2.00
7801	Type B; requires 5550	56	48	986	4.00
7802	Type B1; devices 1 through 4	56	48	986	4.00
7803	Type B2; devices 5 through 8	49	42	831	2.50
7804	Type B3; devices 9 through 12	49	42	831	2.50
7805	Type B4; devices 13 through 16	49	42	831	2.50
1801	Control Storage Expansion	48	40	790	4.00
3701	External Modem Interface; requires 6302 or 6303	16	14	337	3.00
6302	Common Communications Adapter; SDLC or BSC; up to 9600 bps with Type A only Terminal Adapters and up to 7200 bps with Type B or mix; -21C, -31C, -41C, -51C, and -61C only	14	12	365	2.00
6303	High Performance Communications Adapter; SDLC or BSC; 9600 bps with Type B Terminal Adapters or mix; -21C, -31C, -41C, -51C, and -61C only	54	46	1,010	8.50
8801	Watertight Power Connector; -21A/B/D, -31A/D, and -41A/D	NC	NC	NC	NC
3680	Encrypt/Decrypt; -21C, -31C, -41C, -51C, and -61C only	80	68	1,780	2.00
5650	Dataphone Digital Service; point-to-point; -21C, -31C, -41C, -51C, and -61C only	34	29	840	1.50
5651	Dataphone Digital Service; multipoint; -21C, -31C, or -51C only	34	29	840	1.50
4850	Loop Adapter; for 8100 System attachment; requires 6303; -51C and -61C only	40	34	797	3.00
5655	X.21 Adapter; nonswitched networks; -41C or -61C only	32	27	800	1.50
5656	X.21 Adapter; switched networks; -41C or -61C only	39	33	800	2.00
3299	Terminal Multiplexer	—	—	1,175	—

Note: Effective April 21, 1984, IBM will no longer accept lease/rental orders for any model of the 3274 Control Unit.

	Controller/Display Stations				
	3276 Model 1; 960 char., BSC	275	234	5,380	34.00
	3276 Model 2; 1,920 char., BSC	282	240	5,535	35.00
	3276 Model 3; 2,560 char., BSC	286	243	5,680	36.00
	3276 Model 4; 3,440 char., BSC	298	254	5,830	36.50
	3276 Model 11; 960 char., SDLC	275	234	5,380	30.50
	3276 Model 12; 1,920 char., SDLC	282	240	5,535	31.00
	3276 Model 13; 2,560 char., SDLC	286	243	5,680	31.50
	3276 Model 14; 3,440 char., SDLC	298	254	5,830	32.00
3255	Terminal Adapter No. 1; devices 3 and 4	22	19	530	1.50
3256	Terminal Adapter No. 2; devices 5 and 6	22	19	589	1.50
3257	Terminal Adapter No. 3; devices 7 and 8	22	19	530	1.50
3701	External Modem Interface; requires 6301 or 6302	16	14	337	3.00
3680	Encrypt/Decrypt; 3276 -11, -12, -13, -14 only	80	68	1,600	2.00
	1200 bps Integrated Modems—				
5500	Nonswitched; requires 6301	28	24	535	5.50
5501	Switched, Auto Answer; requires 6301	37	32	714	2.50
5502	Switched, Manual Answer; requires 6301	28	24	535	3.00
5507	Nonswitched with Switched Backup; requires 6301	41	35	766	5.50
5508	Nonswitched with Switched Backup; Auto Answer; requires 6301	45	38	855	3.00

**Includes prime-shift maintenance.*

***Maintenance plans available include: (A) Customer Carry-in Repair, annual charge; (B) Customer Carry-in Exchange, annual charge; (C) Customer On-site Exchange, annual charge; (D) IBM On-site Exchange, annual charge (during warranty period). In some cases, these plans are offered in addition to standard monthly maintenance.*

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		Monthly Charges*			
		Rental ($)	Lease ($)	Purchase ($)	Monthly Maint. ($)
	Controller/Display Stations (Continued)				
5650	Dataphone Digital Service; point-to-point	34	29	840	1.50
5651	Dataphone Digital Service; multipoint	34	29	840	1.50
6301	Communications Feature with clock	23	20	543	2.50
6302	Communications Feature without clock	14	12	365	2.00
6315	SDLC/BSC Switch; 3276-1, -2, -3, -4 only	31	26	682	3.00
1067	APL/Text Control; requires 1068	45	38	950	1.00
1950	Color Display Attachment; not available for 3276-1; requires 1068	38	32	758	0.50
	Cluster Display Stations				
	3278 Model 1; 960 char.	93	79	1,855	10.00
	3278 Model 2; 1,920 char.	96	82	1,965	10.00
	3278 Model 3; 2,560 char.	116	99	2,145	10.50
	3278 Model 4; 3,440 char.	118	101	2,255	12.50
	3278 Model 5; 3,564 char.	139	118	2,575	12.50
	3178 Model C1; 1,920 char., w/75-key Data Entry keyboard	—	—	1,660	**
	3178 Model C2; 1,920 char., w/87-key Typewriter keyboard	—	—	1,720	**
	3178 Model C3; 1,920 char., w/87-key Typewriter keyboard and numeric pad	—	—	1,720	**
	3178 Model C4; 1,920 char., w/87-key Typewriter keyboard and numeric pad	—	—	1,720	**
	3180 Model 1; w/Data Entry or APL keyboard	—	—	2,295	**
	3290 Model 1 Information Panel	315	—	7,100	30.00
	3290 Machine Elements—				
4730	Data/Typewriter Keyboard	22	—	440	**
4731	APL Keyboard	22	—	440	**
1503	3-foot Keyboard Cable	3	—	60	—
1506	6-foot Keyboard Cable	4	—	75	—
3210	Display Panel	160	—	3,600	—
	Power Logic Element	130	—	3,000	**
	Color Display Stations				
	3279 Model S2A; base color; 1,920 char.	160	136	3,160	16.50
	3279 Model S2B; extended color; 1,920 char.	174	148	3,490	18.00
	3279 Model S3G; extended color; 2,560 char.	245	209	5,190	22.00
	3279 Model 2X; base/extended color; 1,920 char.	164	140	3,235	16.50
	3279 Model 3X; base/extended color; 2,560 char.	179	153	3,775	17.00
	3179 Model 1; 1,920 char.; w/122-key Typewriter keyboard	—	—	2,295	**
3850	Extended Function (3279 Model 2X or 3X)	14	12	420	2.00
	Keyboards				
	For 3276/3278—				
4621	75-Key EBCDIC Typewriter	19	16	417	2.00
4622	75-Key EBCDIC Data Entry	19	16	417	3.00
4623	75-Key EBCDIC Data Entry, keypunch layout	19	16	417	3.00
4624	75-Key ASCII Typewriter	19	16	417	2.00
4626	87-Key EBCDIC Typewriter/Text; 3278 only	23	20	569	2.50
4627	87-Key EBCDIC Typewriter; 3278/3274 only	23	20	569	2.50
4628	87-Key ASCII Typewriter; 3278/3274 only	23	20	569	2.50
4629	87-Key EBCDIC Typewriter/Text; 3278 only	23	20	569	2.50
	For 3278/3279—				
4640	87-Key EBCDIC Typewriter Overlay	23	20	569	2.50
4651	87-Key EBCDIC Attribute Select Typewriter	23	20	569	2.50
4652	87-Key EBCDIC Attribute Select Typewriter/APL	23	20	569	2.50
	3276/3278 Display Station Options				
1009	Address Keylock; 3276 only	—	—	62	—
3620	Character Set Extension	25	22	580	2.50
6360	Selector Light Pen	20	17	493	0.50
4999	Magnetic Reader Control	15	13	341	3.50
	Magnetic Slot Reader (Part No. 4123500)	—	—	286	—
	Magnetic Hand Scanner (Part No. 4123495)	—	—	286	—

**Includes prime-shift maintenance.*
***Maintenance plans available include: (A) Customer Carry-in Repair, annual charge; (B) Customer Carry-in Exchange, annual charge; (C) Customer On-site Exchange, annual charge; (D) IBM On-site Exchange, annual charge (during warranty period). In some cases, these plans are offered in addition to standard monthly maintenance.*

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		Monthly Charges*			
		Rental ($)	Lease ($)	Purchase ($)	Monthly Maint. ($)
	3278/3279 Display Station Options				
5790	Programmed Symbols (PS-2/PS-4; 3278 only)	34	29	853	3.50
5790	Programmed Symbols (PS-2/PS-4; 3279 only)	51	43	1,210	5.50
8750	Video Output (3279 Model 3X only)	24	20	702	1.00
5315/5316	3270 Personal Computer Attachment (3278 only)	—	—	1,700	—
5317/5318	3278 Personal Computer Adapter (3278 portion)	—	—	850	—
5321	3278 Personal Computer Attachment (PC portion)	—	—	850	—
5325/5326	3270 Personal Computer Attachment (3279 only)	—	—	1,950	—
5327/5328	3279 Personal Computer Adapter (3279 portion)	—	—	1,100	—
5322	3279 Personal Computer Attachment (PC portion)	—	—	850	—
	3290 Information Panel Options				
4830	Numeric Keypad	12	—	250	**
4831	Program Function Keypad	12	—	250	**
	Printers				
	3262 Model 3; 650 lpm	637	541	15,040	193.00
	3262 Model 13; 325 lpm	468	398	12,620	141.00
	3268 Model 2; 340 cps	394	335	7,500	63.00
	3268 Model 2C; color printing; 340 cps	534	—	8,990	84.00
	3287 Model 1; 80 cps	257	219	4,830	37.50
	3287 Model 2; 160 cps	314	267	5,150	46.50
1066	Data Analysis-APL; 3287 only	15	13	297	—
1120	APL/Text	6	5	165	0.50
3610	Extended Character Set Adapter	20	17	429	3.00
3880	Extended Print Buffer	7	6	198	0.50
8330	3271/3272 Attachment	46	39	860	2.50
8331	3274/3276 Attachment	6	5	165	0.50
8700	Variable Width Forms Tractor	6	5	151	0.50
4110	Friction Feed Paper Handling	6	5	151	0.50
	3287 Model 1C; color printing; 80 cps	318	271	5,210	42.50
	3287 Model 2C; color printing; 120 cps	374	318	5,530	51.50
	Programmed Symbols—				
5781	PS-2; storage for first two symbol sets; requires 3610 and 2880	42	36	826	4.00
5782	PS-4; storage for additional four symbol sets; requires 5781	35	30	662	2.50
5783	PS-4A; storage for four symbol sets; including one set with multicolor addressing; requires 3610 and 3880; for 3287-1C and -2C only	76	65	1,485	11.50

Note: Effective April 20, 1984, IBM will no longer accept rental orders for the 3287 Printer.

	4250 Model 1 APA	1,205	—	21,000	155.00
	5210 Model G01; 40 cps	—	—	5,420	54.00
	5210 Model G02; 60 cps	—	—	5,835	58.50

**Includes prime-shift maintenance.*
***Maintenance plans available include: (A) Customer Carry-in Repair, annual charge; (B) Customer Carry-in Exchange, annual charge; (C) Customer On-site Exchange, annual charge; (D) IBM On-site Exchange, annual charge (during warranty period). In some cases, these plans are offered in addition to standard monthly maintenance.* ■

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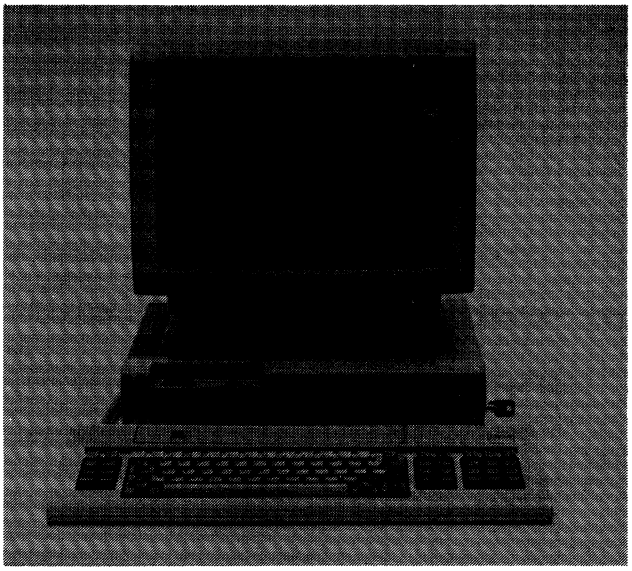
IBM 3270 Information Display System



The 3178 Display Station is a small-screen (12-inch) version of the 3278 Model 2 display. The 3178 incorporates a modular design that includes a tilt/swivel display, low-profile detachable keyboard, and a small footprint. The new 3179 Color Display Station features the same basic design.

The 3270 Information Display System is the most successful and most significant product family in the terminal industry. The 3270 family has spawned a huge market for emulation products. Family members include controllers, display stations (color, monochrome, and plasma), and printers, for use in standalone and cluster configurations in both local and remote environments. IBM has also added personal computing capabilities to the family.

MODELS: 3274 Control Unit, 3276 Control Unit Display Station, 3178, 3180, and 3278 Display Stations, 3179 and 3279 Color Display Stations, 3290 Information Panel, 3287 and 3289 Printers, and 3270–PC Personal Computer. Attachment options are available to equip the 3278 and 3279 with personal computing features.
DISPLAY: A variety of screen sizes and display formats are available; color and monochrome screens are also available.
KEYBOARD: A variety of keyboard layouts and styles is available; all keyboard models are detachable.
COMPETITION: Harris, ITT Courier, Lee Data, Memorex, Racal-Milgo, Raytheon, Teletype, Telex, and several others.
PRICE: Controller purchase prices range from $6,035 to $18,500. Display station prices range from $1,660 to $7,100. Lease and rental agreements are available for some components.

MANAGEMENT SUMMARY

IBM's 3270 Information Display System is the single most important family of products in the display terminal market. This market supports not only IBM, but a significant number of independent manufacturers of 3270-type terminals. Initially, these vendors parlayed lower prices and shorter delivery lead times to capture a share of this market. More recently, enhanced capabilities were added to 3270-compatible systems to make them more attractive to prospective users. On March 8, 1983, IBM shook up the market by announcing several additions to the 3270 product line, while lowering prices on selected models and features of existing products. New products included in this announcement were: the 3178 Display Station; the 3290 Information Panel Display; four new 3274 Control Unit models (41A, 41C, 41D, and 61C); the 3299 Terminal Multiplexer; and the IBM 3278 Personal Computer Attachment. On October 18, 1983, IBM enhanced the 3270 product line even further with the introduction of two additional products: the 3270–PC Personal Computer and the 3279 Personal Computer Attachment. On March 20, 1984, the 3180 Display Station and 3179 Color Display Station were unveiled, and purchase prices for the 3274 Control Unit and selected 3278 and 3279 display models were reduced. In addition, lease/rental plans for the 3274 were discontinued.

The 3178 is an ergonomically-improved version of the 3278 Model 2 Display Station, the most popular 3270 display model. The 3178 features modular construction, ▷

CHARACTERISTICS

VENDOR: International Business Machines Corporation, Old Orchard Road, Armonk, NY 10504. Contact your local IBM representative.

DATE OF ANNOUNCEMENT: 3724, 3276, 3278, 3287, 3289—May 1977; 3279, 3287-1C/2C, 3274-51C—October 1979; 3274-21A/B/C/D & -31A/B/D—early 1982; 3274-41A/C/D & -61C, 3178, 3290—March 1983; 3270-PC—October 1983; 3179 & 3180—March 1984.

DATE OF FIRST DELIVERY: Usually within one year of announcement.

SERVICED BY: International Business Machines.

CONFIGURATION

The 3270 family of display/keyboard stations and printers can be configured as a local or remote cluster or as a standalone station. There are now three generations of components (first generation components are no longer ▶

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IBM 3270 Information Display System

TABLE 1. IBM 3274 CONTROL UNIT SPECIFICATIONS

	21A	21B	21C	21D	31A	31C	31D	41A	41C	41D	51C	61C
Mode	Local	Local	Remote	Local	Local	Remote	Local	Local	Remote	Local	Remote	Remote
Protocol(s) supported	SNA	Chan.	SNA/ BSC	Chan. APL	SNA	SNA/ BSC	Chan. APL	SNA	SNA/ BSC	Chan. APL	SNA/ BSC	SNA/ BSC
Minimum ports	8	8	8	8	8	8	8	32	32	32	12	16
Maximum ports	32	32	32	32	32	32	32	32	32	32	12	16
Control storage	64K	64K	64K	64K	128K	128K	128K	192K	192K	192K	64K/ 128K	192K
Devices supported (category)	A/B	A/B	A/B	A/B	A/B	A/B	A/B	A	A	A	A/B	A

TABLE 2. ATTACHABLE DEVICES

Category A	Category B
3178 Models C1, C2	3277 Models 1*, 2*
3179 Model 1	3284 Models 1*, 2*
3180 Model 1	3286 Models 1*, 2*
3278 Models 1, 2, 3, 4, 5	3287 Models 1, 2
3279 Models S2A, S2B, S3G, 2X, 3X	3288 Model 2*
3287 Models 1, 2, 1C, 2C	
3289 Models 1, 2	
3290 Model 1**	
3270-PC Personal Computer	

**No longer available.*
***Does not attach to 3274 Models 21A, 21B, 21C, 21D.*

combining three separate machine elements: video, logic, and keyboard. The unit is physically smaller than the 3278, and has a 12-inch display screen, which can be tilted and swiveled. The 3178 is plug-compatible with the 3278 Model 2 for base functions; its purchase price, however, is significantly less. In addition, IBM has announced major price reductions for 3178 volume buyers. A 40 percent discount is available for purchases of 3000 or more units.

The 3179 is a color version of the 3178. The 3179 incorporates the same modular construction, while adding a larger (14-inch) display screen and a new 122-key modifiable keyboard. Up to seven colors (red, green, blue, white, yellow, turquoise, and pink) may be displayed when the 3179 is attached to an appropriately configured 3274 Control Unit. For 3278 and 3178 applications, data is displayed in the four base colors (red, green, blue, and white). The 3179 is offered with the same volume discount as the 3178.

The 3180 is a large screen (15-inch) version of the 3178 and 3278 displays. It is available in two models, only one of which (Model 1), is intended for use as part of the 3270 family. Model 2 is designed for use as a member of the 5250 Information Display System. Thus, the 3180 is IBM's first display product that can be used with the company's full line of processors.

The 3290 Information Panel currently has no competition from the independent vendors. The 3290 is a large screen (10.7 by 13.4 inches), flat gas plasma panel display station with a screen capacity of 9920 characters. Designed for use in program development, report retrieval, and data base/

marketed) with a limited degree of mixing permitted within the same subsystem; complete compatibility for communications and applications program support can be achieved with the new components, if desired. Tables 1 and 2 present the overall configurational possibilities. Specific prerequisites are detailed in the discussions of individual components.

TRANSMISSION SPECIFICATIONS

3274 Models 21C, 31C, 41C, 51C, and 61C operate in half-duplex point-to-point, or in half- or full-duplex multipoint, using BSC or SDLC protocols, at speeds of 1200/600 (51C only), 2000, 2400/1200, 4800/2400, 7200/3600, and 9600/4800 bits per second on nonswitched facilities. Multipoint and point-to-point communications at speeds up to 19,200 bits per second and point-to-point speeds up to 56K bits per second are also possible where facilities are available.

The 3276 operates in half-duplex point-to-point, or in half- or full-duplex multipoint at speeds of 1200, 2000, 2400, 4800, 7200, or 9600 (SNA/SDLC only) bits per second on nonswitched facilities. Also, 3276 Models 11, 12, 13 and 14 operate in half-duplex point-to-point on the public switched telephone network at speeds of 1200 or 4800 bits per second, and on public switched data networks at speeds of 2400, 4800, or 9600 bits per second. Models 11 through 14 also operate in half-duplex at 9600 bits per second over a direct attached loop, and at 2400, 4800, or 9600 bits per second over a data link attached loop.

HOST COMPUTER SOFTWARE SUPPORT

A 3270 subsystem is supported for local and remote operation by IBM System/360, System/370, 4300 Series, 8100, 30XX, Series/1, and System 3 computer systems. Remote terminals are supported by BTAM, TCAM, VTAM, RPG Telecommunications, BSCA Multiline/Multipoint, and Communications Control Program depending on computer system and operating system. The 3274-based local clusters are supported on mainframe configurations under 3272 mode or under VTAM. In general, all new models and configurations of the 3270 can be supported under previous 3270 programming. If Display Exception Monitoring Facility (DEMF) software is installed on the host computer, network support for problem determination/isolation is available to terminals operating in BSC mode. In addition, 3270 display printer components, as well as 3276 clusters, are used with higher-level systems such as the IBM 8100 and 3790.

DEVICE CONTROL

The 3270 System operates under the control of the program stored at the remote computer. Under program control, the 3270 can execute any of four types of commands: read, write, control, and sense.

Read commands initiate transfer of the contents of a device buffer, modified fields within the buffer, buffer addresses or

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IBM 3270 Information Display System

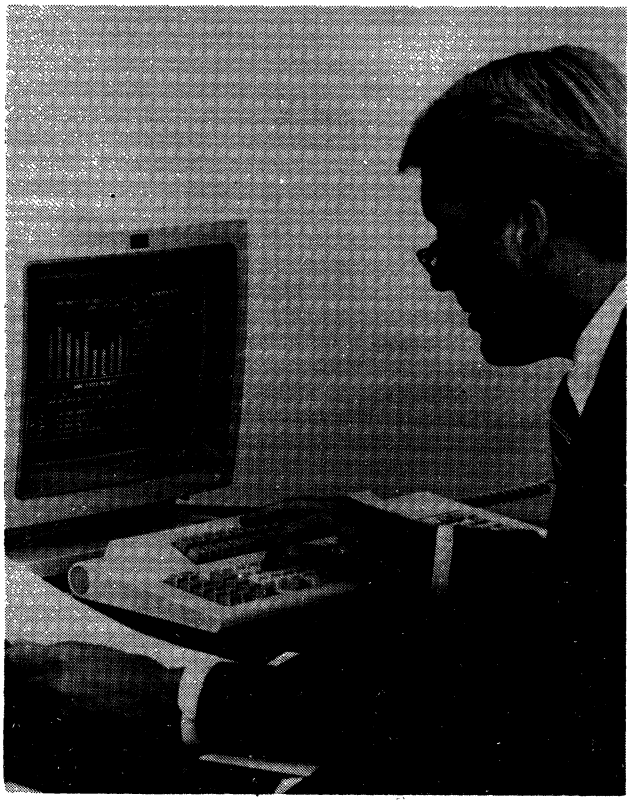
data communications applications, the 3290's screen can be divided into up to 16 partitions to provide access to different applications or data bases simultaneously. The screen is made up of a sealed "sandwich" of two flat glass plates, approximately 1/70th of an inch apart. The space between the glass is filled with neon/argon gas; as electrical charges are selectively applied to a wire grid, the gas glows to display orange-on-black images. The 3290 can be attached to the 3274 Control Unit in the same way as all other 3270 terminals.

The new 3274 Control Unit models (41A, 41C, 41D, and 61C) provide increased functionality at a lower price than the models they are intended to replace (31A, 31D, 31C, and 51C; these models will continue to be marketed to accommodate older terminal models not supported on the new models). The new models incorporate 192K of control storage, double-sided diskette capability, and 32 terminal ports. Support for second generation displays and printers is provided in addition to support for the new products. Also supported is the 3299 Terminal Multiplexer. The 3299 functions as a coaxial cable eliminator; it connects to a 3274 Control Unit via a single cable, and can support up to eight terminals via shorter cables, which fan out from the 3299 to each device. The 3299 also doubles (to two miles) the distance permitted between the control unit and the terminal.

The IBM 3278/3279 Personal Computer Attachments allow the 3278 Display Station or 3279 Color Display Station to function as an IBM Personal Computer. The attachments consist of two components: the Personal Computer Adapter, which is field-installed by IBM personnel; and the Personal Computer Attachment Option, which is installed by the customer. When equipped with the Personal Computer Attachment, the 3278/3279 display and keyboard become common to both the host processor and the IBM Personal Computer processor.

The 3270-PC is a version of IBM's Personal Computer designed for use on the 3270 Information Display System. The key feature of the 3270-PC is that it can operate up to seven concurrent sessions: four 3270-type sessions, one Personal Computer DOS session, and two local notepad sessions. The 3270-PC allows the user to view these sessions on multiple windows, which can be manipulated independently. A monochrome or color display may be used.

The first generation of 3270 components was introduced by IBM in 1972, and consisted of: the 3271 Control Unit; 3272 Control Unit; 3275 Standalone Display Station; 3277 Cluster Display Station; 3284 Matrix Printer; 3286 Matrix Printer; and 3288 Belt Printer. In an announcement that became effective November 16, 1982, IBM has withdrawn the first generation of 3270 products from marketing. The above-mentioned models are no longer marketed by IBM, although it will continue to support existing units. The plug-compatible market for these components is expected to remain quite active for at least another two to three years.



The 3270-PC is a version of IBM's Personal Computer designed for use with the 3270 Information Display System. The key feature of the 3270-PC is the unit's multiple windows—users can operate up to seven concurrent sessions and view them on the screen.

data of fields specified by the selector pen, or the single-byte Attention Identification (AID) code generated by a Program Function or Program Access key. The 3270 responds to two read commands, Read Buffer and Read Modified. The selector pen is not supported by the 3178 or 3290 displays.

Read Buffer initiates transfer of the contents of the addressed device buffer from the initial or current cursor address. Read Modified initiates one of three operator-initiated functions: Read Modified, Short Read, or Test Request. Read Modified initiates the transfer of all fields modified by the keyboard within the device buffer. The fields are transferred in sequence beginning with the first modified field; all nulls are suppressed. However, when completion of a key-modified field is signaled by a selector pen operation, a resulting Read Modified operation will transfer only the address of the modified field. Short Read initiates transfer of the single-byte AID Code generated by a Program Attention key. Test Request Read performs the same operation as Read Modified; however, a hardware-generated heading precedes the data. Nulls are suppressed as in Read Modified. Only the special heading is transferred if data has not been keyed.

Write commands condition the display or printer to receive a computer message. Two write commands—Write and Erase/Write—load, format, and selectively erase device buffer data, and can also initiate device operations such as starting the printer, resetting the keyboard, and sounding the audible alarm. Both commands are the same except that Erase/Write erases the entire contents of the device buffer before fresh data is written (beginning at the initial buffer address) and Write modifies existing buffer data.

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TABLE A. USER RATINGS OF 3270 CONTROLLERS

Model	Number of User Responses	Number of Controllers Installed	Weighted Averages*						
			Overall Performance	Ease of Installation	Ease of Operation	Ease of Expansion	Reliability of Controller	Reliability of Peripherals	Maintenance/ Technical Support
3274	160	1,786	3.5	3.2	3.3	3.0	3.5	3.4	3.3
3276	59	1,434	3.6	3.4	3.4	3.0	3.5	3.5	3.4
3271/3272/ unspecified	16	26	3.2	2.9	3.0	2.5	3.1	3.1	3.0

**Weighted Average is based on assigning a weight of 4 to each user rating of Excellent, 3 to Good, 2 to Fair, and 1 to Poor.*

TABLE B. USER RATINGS OF 3270 DISPLAYS

Model	Number of User Responses	Number of Displays Installed	Weighted Averages*						
			Overall Performance	Ease of Operation	Display Clarity	Keyboard Feel & Usability	Ergonomics	Hardware Reliability	Maintenance/ Technical Support
3178	23	824	3.5	3.1	3.3	3.2	3.2	3.6	3.3
3276	9	1,007	3.3	3.1	3.1	3.4	2.4	3.4	3.6
3277	15	1,163	3.1	2.8	2.9	2.8	2.6	2.5	3.1
3278	134	28,286	3.1	3.5	3.3	3.2	3.1	2.8	3.5
3279	47	4,948	3.5	3.5	3.3	3.2	3.1	3.3	3.5
3270, unspecified	17	1,689	3.3	3.4	3.4	3.4		3.1	3.4

**Weighted Average is based on assigning a weight of 4 to each user rating of Excellent, 3 to Good, 2 to Fair, and 1 to Poor.*

TABLE C. USER RATINGS OF 3270 PRINTERS

Model	Number of User Responses	Number of Printers Installed	Weighted Averages*					
			Overall Performance	Ease of Operation	Print Quality	Noise Level	Hardware Reliability	Maintenance/ Technical Support
3286	5	212	2.8	2.8	3.0	2.6	3.0	3.2
3287	36	1,194	3.3	3.2	3.1	2.7	3.4	3.5

**Weighted Average is based on assigning a weight of 4 to each user rating of Excellent, 3 to Good, 2 to Fair, and 1 to Poor.*

The second generation of 3270 components was unveiled in 1977, and included: the 3274 Control Unit; 3276 Control Unit Display Station; 3278 Cluster Display Station; 3287 Matrix Printer; and the 3289 Belt Printer. IBM has now replaced the original 3274 Control Unit models with Models 3274–21 and –31. These control units contain an improved storage technology, and support extended color, extended highlighting, and presentation graphics functions.

In October 1979, IBM made another major addition to the 3270 family with the introduction of the 3279 Color Display Station. Although the 3279 was not the first color display on the market, it was seen by many industry observers as IBM's acknowledgement that color displays were a legitimate part of a general-purpose system, and not just an unnecessary extravagance. Along with the 3279, IBM unveiled color versions of the 3287 Printer, as well as a new 3274 Control Unit Model 51C, and enhancements to several existing models.

Control commands initiate control unit and/or device operations. There are three control commands: Copy, Select, and Erase All Unprotected. Copy, executed by a remote control unit only, transfers buffer data from one device to another. Select, executed by a 3274 in 3277 mode only, transfers buffer data from the selected device to the controller. Erase All Unprotected initializes the addressed device, erasing all unprotected buffer locations and repositioning the cursor to the initial position of the first unprotected field.

A local 3274 cluster operating under VTAM looks like a remote control unit.

Program control by data field provides a flexible formating capability. A field, identified by an attribute control code (nondisplayed) in the initial character position, can possess any one of several characteristics. The attribute control code can specify a protected or unprotected field (for fixed format operation), beam intensity of brightness (off, normal, or bright), alphanumeric or numeric (automatic shift) input, auto lock or skip, tab stop, or light pen selection.

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COMPETITIVE POSITION

As mentioned previously in this report, the members of the IBM 3270 Information Display System and their competitors comprise the single largest subset of the alphanumeric display terminal market. Studies conducted by various market research firms put the current installed base of 3270-type terminals at around one million units. Of that installed base, approximately half are IBM terminals; the rest are 3270-compatible models from independent manufacturers. IBM's major competitors in this market include: Raytheon, Telex, Harris, Teletype, ITT Courier, Lee Data, Racal-Milgo, and Memorex, among others.

ADVANTAGES AND RESTRICTIONS

The reliability of IBM's equipment and the dependability and consistency of its maintenance service has always presented a problem to those vendors who manufacture IBM-compatible equipment. The 3270 market had been stable for a few years; lower prices, improved price/performance, and shorter lead times for delivery have allowed several competitors to carve out a healthy market share. However, IBM's recent price reductions (existing models of the 3274, 3276, 3279, and 3287 were all reduced in price), new product introductions, and incorporation of the highly successful Personal Computer into the 3270 line, have put increased pressure on the independents.

USER REACTION

During June, July, and August of 1982, Datapro conducted an extensive Terminal Users' Survey in conjunction with *Data Communications* magazine. A questionnaire was designed and produced by Datapro and mailed to approximately 10,000 addresses selected at random from a cross-section of *Data Communications'* U.S. end-user subscriber base. The users were asked to rate all types of terminal equipment, including clustered and standalone displays, intelligent, smart, and dumb displays, and teleprinters. A large number of responses on the IBM 3270 Information Display System were received, yielding ratings on controllers, display stations, and printers. These ratings are summarized in Tables A, B, and C.

In addition to the ratings, the users were asked whether or not they would recommend their 3270 equipment to other users with similar applications. Of the 235 users who responded to the controller portion, 205 answered that they would recommend their controllers, six answered that they would not, and the remainder were undecided or did not answer the question. Of the 245 users who reported on the displays, 204 answered positively, 19 negatively, and the remainder were undecided or did not respond. This question was not tallied for the printer users. □

The Program Tab feature automatically writes successive data fields into successive unprotected data fields defined by a fixed format.

Character Addressing permits a message to be written beginning at any screen location. Addressing can be interspersed with data throughout a message received from the computer. Character Addressing also permits the selective modification of attribute control codes.

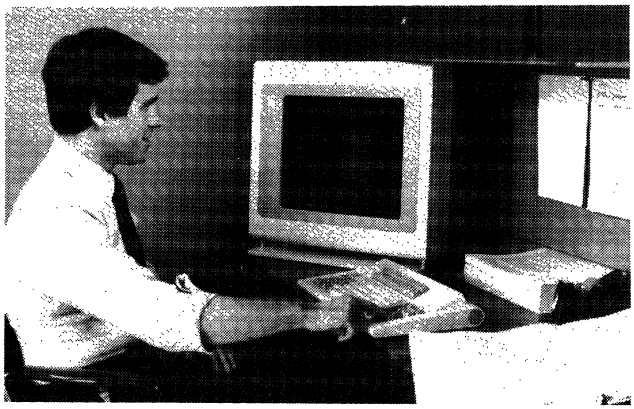
Operator controls are provided for cursor control, editing, and program functions. Cursor controls position the cursor up, down, left, or right, step-by-step or repetitively if the key is held depressed. The cursor can also be backspaced one character position, moved to the beginning of the next line or beginning of the next unprotected data field, tabbed to the beginning of the next unprotected data field, and backtabbed to the beginning of the previous unprotected field. Edit controls permit data to be inserted in or deleted from text, character-by-character. Following data is automatically expanded or contracted.

Program Function keys are used to initiate program functions or identify data that can be transmitted with an accompanying program function code.

The 3276, 3178, 3180, and 3278 have two added controls: Cursor Home key and Cursor Select key. The Cursor Home key returns the cursor to the first nonprotected character position. The Cursor Select key causes a selection operation similar to a light pen operation; a light pen (Selector Pen) is optional in addition to this control. A Print key is included on 3276/3178/3180/3278 display/keyboards when attached to a 3274 Control Unit; this key causes the displayed data to be transferred to a printer for immediate printing without requiring a host computer command; normal print commands can also be executed. The standard cursor is an underscore. On a 3178, 3180, or 3278 display connected to a 3274 controller, the cursor can be standard or reverse video underscore, blinking or nonblinking as selected by the operator.

An Entry Assist capability is available on the 3274 (equipped with Configuration Support D) for the 3178, 3179, 3180, 3278, and 3279 displays. Entry Assist allows the operator to enter and edit textual material such as letters, memos, reports, source programs, etc. Entry Assist capabilities are available when the operator enters Document mode. Capabilities available in this mode include: tabbing, screen margins, wordwrap, word/character delete, and end-of-line warning.

When equipped with the personal computer option, the 3278 display can operate in two modes: host compute and personal compute. These modes provide for concurrent operation of a host program and a Personal Computer program. The user can switch between modes, in order to decide



The 3290 is a flat gas panel display station. The 3290 features a screen capacity of 9920 characters, displayed in orange on a dark background. The terminal's multiple display screen capability allows for concurrent viewing of four 3278 Model 2 screens. Combinations of alphanumeric data and high-resolution graphic images may be displayed simultaneously.

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whether it is the host program or personal computer program which receives keystrokes and has its output displayed.

Readers capable of accepting a credit-card size plastic card with up to 40 characters encoded on a magnetic tape stripe can be connected to all models of displays except the 3178, 3179, 3180, and 3290. The reader for the 3276 and 3278 displays will accept previously coded cards if the normal end of form control character (not the Hex C optional character) is supported.

COMPONENTS

3274–21A, –21B, –21C, –21D, –31A, –31C, AND –31D CONTROL UNITS: provide control of a local or remote cluster of up to 32 displays or printers. Models –21A, –21B, –21C, and –21D contain 64K bytes of storage; Models –31A, –31C, and –31D contain 128K bytes of storage. The units are upward-compatible with and supercede predecessor 3274 Models 1A, 1B, 1C, and 1D. They support enhanced storage technology and extended color, extended highlighting, and presentation graphics functions not available on the older models. Models –21A and –31A support a local cluster operating in SNA mode under VTAM, and are upward-compatible with the 3274–1A. Model –21B supports a local cluster operating in 3272-compatible mode, and supercedes the 3274–1B. Models –21C and –31C support a remote cluster operating under BSC or SDLC protocol, and are upward-compatible with the 3274–1C. Models –21D and –31D are upward-compatible with Models –21B and –31B, respectively, and combine local attachment in 3272-compatible mode with an APL/Text control function; the –21D and –31D supercede the 3274–1D.

Operating functions are controlled by feature and systems diskettes customized at installation, using a diskette drive integral with the controller. The 3274–21C/–31C is conditioned for BSC or SDLC operation by loading a program into the controller using interchangeable diskettes.

All models support mixing of the older 3277/3284/3286/3288 (Category B) devices on the same controller with the new 3178/3278/3179/3279/3287/3289 (Category A) devices. The basic controllers each accommodate up to eight of the newer components. One Type A Terminal Adapter is required for each additional group of eight of the new devices. Alternatively, up to four Type B Terminal Adapters, each accommodating up to four 3277/3284/3286/3287/3288 Category B devices, can be installed. A single controller can accommodate a cluster of up to 32 terminals, comprised of groups of eight Category A devices and groups of four Category B devices; however, no more than 16 (i.e., four groups) of the 32 terminals can be Category B devices. A minimum of one 3278 display and keyboard is required. The 3287 printer can be attached to either Type A or Type B adapters. A 3278 Model 5 display cannot be attached to a 3274–21B/31B Control Unit.

Control Storage Expansion is required to install Type B Terminal Adapters in the 3274–21A/C and –31A/C; these features are not required to install Type B Adapters in the 3274–21B/D and –31B/D.

The 3274–21C and –31C require the External Modem Interface Feature and either the Common Communications Adapter or the High Performance Communications Adapter. The latter is required if any Type B Terminal Adapters are installed and a transmission speed of 9600 bps is used; otherwise the CCA is adequate for all transmission combinations.

Dataphone Digital Service is available on Models 21C and 31C via both point-to-point and multipoint adapters. Models 21C and 31C can also be equipped with an Encrypt/Decrypt device that codes and decodes messages using the Federal Data Encryption Standard algorithm.

The APL/Text feature, available on all models except 21B, permits display (on an adapted 3278) or printing (on an adapted 3287) of an expanded 222-character set, including the standard EBCDIC and APL characters plus 37 text-specific characters and 10 graphics plot characters. The Text Print feature, available with all models except 21B, permits printing on the 3289 of a 125-character set (93 EBCDIC characters plus the 32-character Text Character set) and character underscore and overprint capabilities.

Enhancements to the 3274 support attachment of the 3279 Color Display Station and 3287 Models 1C and 2C Color Printers. Any 3274 except Model 21B can now be specified with one of three no-charge Configuration Support packages (A, B, or C); Model 21B is always equipped with Configuration Support A. Configuration Support A provides support for most 3270 functions, including base color mode; Support B adds the ability to attach 3278–5 printers, and to perform specific SNA-related functions; Support C includes all Support A and B functions plus certain other functions, including extended color mode, extended highlighting, and programmed symbol set support.

3274–41A, –41C and –41D CONTROL UNITS: New control unit models which are intended to replace existing 3274 Models –31A, –31C, and –31D, respectively. Models –31A, –31C, and –31D will remain available to support Category B terminal adapter features. The new 3274 models provide increased functional capability with 192K of control storage and a double-sided diskette drive. The new controllers provide attachment for Category A devices only. These devices can be attached directly to the control unit, eliminating the need for terminal adapters. A new Configuration Support package (D) is specified with the 3274–41A, –41C, and –41D. Configuration Support D provides all currently supported functions available under Configuration Support A, B, and C, plus the new Entry Assist function.

3274–51C CONTROL UNIT: Provides control of a remote cluster of up to 12 displays and printers operating under BSC or SDLC protocol. The basic controller accommodates up to eight Category A devices. Four additional Category B devices can be attached via the Terminal Adapter Type B (#7801). Except for the number of devices supported, the Model 51C offers equivalent and compatible functions and features to a 3274 Model 1C. In addition it provides certain features not available using SDLC via a data link or a direct or data link attached loop (this feature provides support for Category A devices only); a 1200 bps integrated modem; and a switched network communications capability. The 3274 Model 51C is also upward-compatible with the 3276 Control Unit Display Station, except that it provides the Printer Authorization Matrix used on other 3274's instead of the Default matrix used on the 3276.

In June 1982, IBM designated 3274 Control Unit Models 21C, 31A, 31C, 31D, and 51C as standard model configurations. This designation provides the customer with ease of configuration, a simplified ordering process, and potentially faster delivery times when ordering one of these models.

3274–61C CONTROL UNIT: A new control unit intended to replace the 3274 Model 51C (with Extended Function Store feature #1800). The 3274–51C will remain available to support Category B terminal adapter features. The 3274–61C provides 192K of control storage, a double-sided diskette, and support for up to 16 Category A devices.

A new Configuration Support package (D) is specified with the 3274–61C. Configuration Support D provides all currently supported functions available under Configuration Support A, B, and C, plus the new Entry Assist function.

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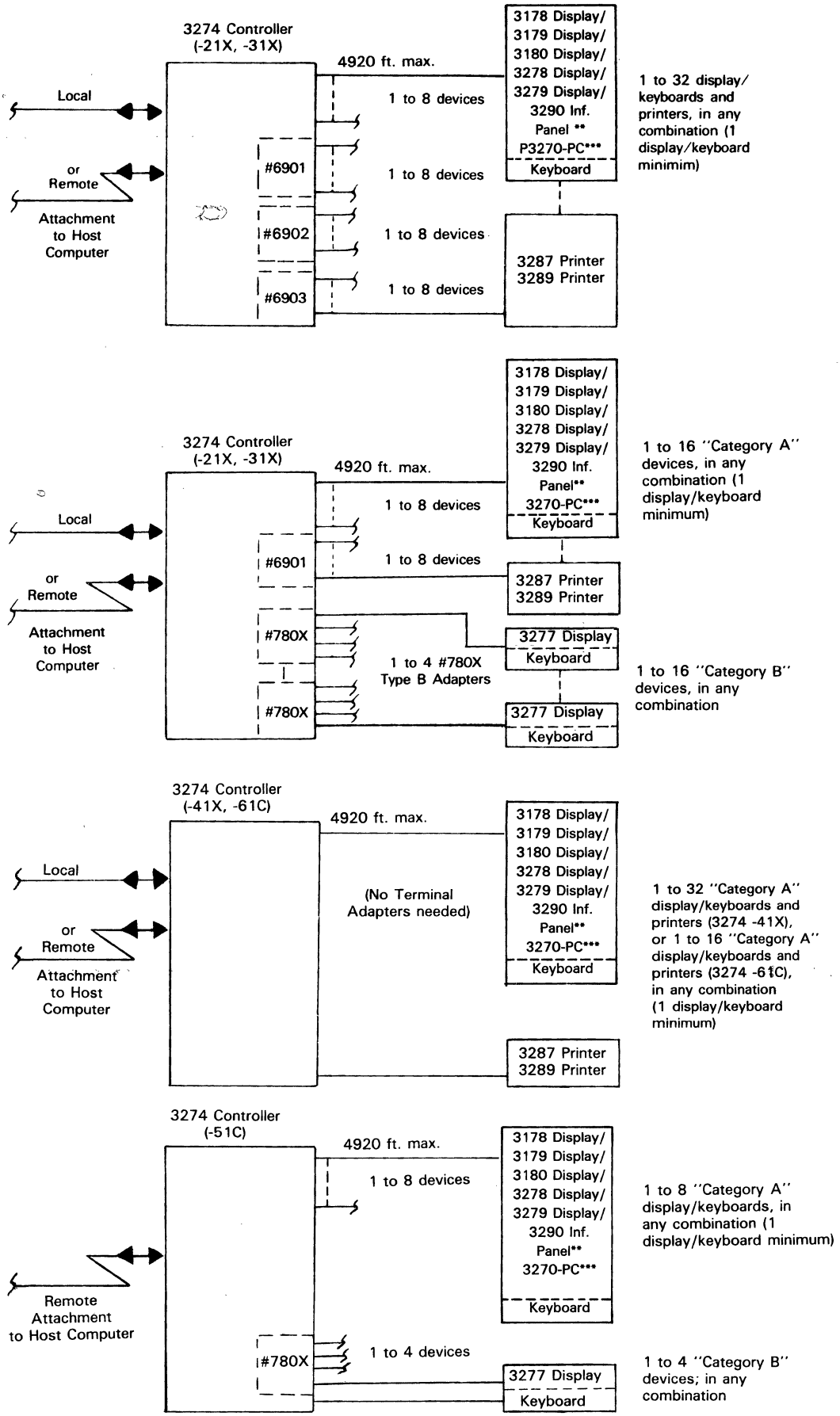
3270 Configurations*



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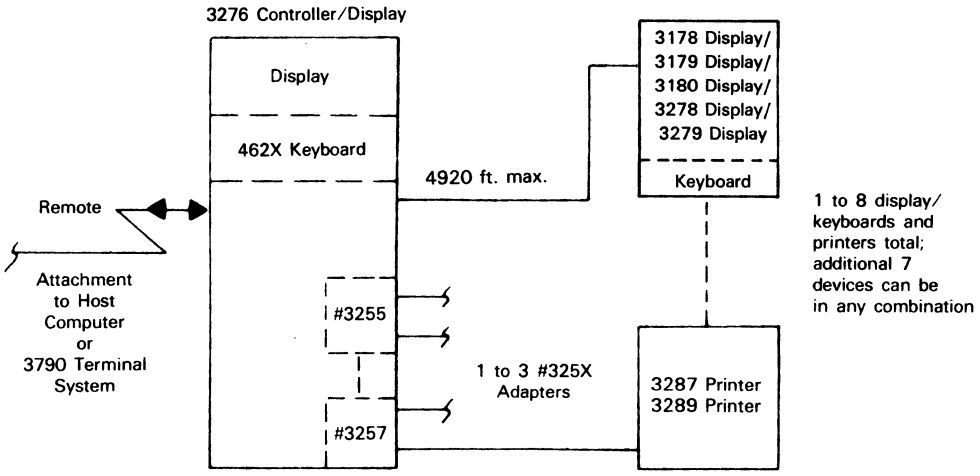

*See text for communications, display, keyboard, and printer models, characteristics, and options.
**The 3290 utilizes one physical terminal port and up to five addresses; up to 31 3290s may be attached, depending on application and 3274 model.
***The 3270-PC uses one physical terminal port and up to four addresses.

The 3274-61C provides support for only Category A devices. These devices can be directly attached to the control unit, eliminating the need for terminal adapters.

3299 TERMINAL MULTIPLEXER: A coaxial cable eliminator for use with all 3274 control unit models except 3274-51C. The 3299 is connected to a 3274 control unit via a single coaxial cable of up to 4920 feet (1500 meters) in length and can support up to eight Category A devices (Category B devices not supported) via cables (maximum length 4920 feet each) from the 3299 to each device. On the 3274-41X, up to four 3299s can be supported; attachment of the cable on the controller end requires 3274 Specify Option #9901. The 3274-61C supports one 3299, which also requires #9901. The 3274-21X and -31X support up to three 3299s, which require RPQ options 8K1155 and 8K1156 on the controller.

3276 CONTROL UNIT DISPLAY STATION: A controller for small remote clusters; it also includes an integrated display that is functionally equivalent to a Model 3278 Display Station. The 3276 can accommodate up to seven additional displays and printers.

A total of eight models provide combinations of four display capacities and BSC or SDLC operations:

Model 1—960 character display; BSC transmission.
Model 2—1920 character display; BSC transmission.
Model 3—2560 character display; BSC transmission.
Model 4—3440 character display; BSC transmission.
Model 11—960 character display; SDLC transmission.
Model 12—1920 character display; SDLC transmission.
Model 13—2560 character display; SDLC transmission.
Model 14—3440 character display; SDLC transmission.

The BSC models (-1/2/3/4) can accommodate any mix of up to seven additional 3278 displays and 3287 and 3289 printers. The added 3278 display cannot have a larger display capacity than the basic 3276 integrated display. However, the SDLC/BSC Switch feature permits alternate protocol operation and also permits intermixing any size display on any "BSC" 3276 model. The SDLC models (-11/12/13/14) can accommodate any display size mix. The display screen measures 14 inches (diagonally).

The basic 3276 controller (any model) can accommodate two devices. A Terminal Adapter is required for each additional two devices. Models 11, 12, 13, and 14 can be equipped with an Encrypt/Decrypt device which codes and decodes messages using the Federal Data Encryption Standard algorithm.

The 3276 requires an External Modem Interface or an Integrated Modem (1200 bps). Five integrated modem features are available for operation over switched or non-switched facilities, providing basic transmission linkage plus optional network backup and manual or auto answer capabilities. Either external or internal modem operation requires a Communications Feature.

Dataphone Digital Service is available on all models via both point-to-point and multipoint adapters. APL/Text functions similar to those provided by the 3274 Control Unit can be implemented by equipping the 3276 with APL/Text Control and Extended Function Base features.

A Color Display Attachment feature (#19540) provides the 3276 with support for an attached 3279 Display Station operating in base color mode. This feature requires the previously available Extended Function Base feature (#1068), and does not support operation of a 3279-2B or -3B in extended color mode. (The Color Display Attachment is not required for color printing via a 3287 Model 1C or 2C Color Printer.) Another 3276 enhancement removes the mutually exclusive restriction between the Extended Function Base feature (#1068) and the Encrypt/Decrypt feature (#3680). An audible alarm and security keylock are standard features.

3278 CLUSTER DISPLAY STATION: Five models are available, distinguished by the display capacity. Model 1 displays 12 lines of 80 characters each (960 characters total); Model 2 displays 24 lines of 80 characters each (1920 total); Model 3 displays 32 lines of 80 characters each (2560 total); Model 4 displays 43 lines of 80 characters (3440 total); Model 5 permits operator selection of display arrangements of 24 lines of 80 characters (1920 total) or 27 lines of 132 characters (3564 total). The display screen measures 14 inches (diagonally).

A character set of 94 characters, including upper and lower case alphabetics, numeric, and special symbols, is displayed. When connected to a 3274, the 3278 can incorporate the APL/Text feature; the Character Set Extension feature and a 4626 or 4629 keyboard are required. A monocase switch provides 3277 compatibility. Each character for Models 1, 2, and 3 is formed by a 7-by-14 matrix; for Models 4 and 5—a 9-by-12 matrix is used. Extended highlighting

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and symbol set functions (monochromatic only) have been added to Models 2, 3, and 4. A Switch Control Unit permits a 3278 Display to be switched between two controllers.

The 3278 uses the 462X series, 4640, 4651, or 4652 keyboards. The displays can be equipped with a keyboard, numeric lock, address lock, selector light pen, magnetic slot reader, and magnetic hand scanner, as options. The audible alarm and security keylock, previously available as options, are now standard in the base configuration.

3278 PERSONAL COMPUTER ATTACHMENT: Available for use with the 3278 Display Station (all models). The personal computer option consists of two components: the IBM 3278 Personal Computer Adapter (field-installed by IBM), and the IBM Personal Computer 3278 Attachment Option (installed by the user). This option allows common use of the 3278 display and keyboard with any Personal Computer processor unit; no Personal Computer display or keyboard is required.

3178 CLUSTER DISPLAY STATION: Functionally equivalent to the 3278 Model 2 for base functions. Four models of the 3178 are available, differing only in the keyboard included. Model C1 includes a 75-key Data Entry keyboard; Models C2, C3, and C4 include an 87-key Typewriter keyboard. A numeric pad is included on Models C3 and C4, which differ only in the placement of some functions on the keyboard. All models contain a 12-inch (diagonally measured) display screen with a display capacity of 1,920 characters, arranged in 24 lines of 80 characters each. The 3178 is modularly constructed, consisting of three separate machine elements: video, logic, and keyboard. The video pedestal provides the display with 20° of tilt and 180° of swivel. The keyboard provides adjustments for 6° and 12° of inclination. The 3178 provides a smaller footprint than the 3278, since the logic module can be bracket-mounted on a wall or under a table top.

An audible alarm, keyboard numeric lock, and security keylock are standard on the 3178. The 3178 does not support the following 3278 optional features: magnetic reader control, selector light pen, programmed symbols, APL/Text, and extended character set adapter. Also, Models C2 and C4 cannot be intermixed on the same control unit, nor can Model C4 be used on the same control unit with 3278s or 3279s which use typewriter keyboards 4621, 4627, 4628, 4640, 4651, or 4652.

3180 CLUSTER DISPLAY STATION: Functionally equivalent to the 3278 Models 2 through 5 for base functions. Two models are available: Model 1, for use as part of the 3270 Information Display System; and Model 2, for use as part of the 5250 Information Display System (connecting to the IBM System/36 and System/38; for more information, see Report C25-491-401). The 3180 Model 1 contains a 15-inch (diagonally measured) display screen; four operator- or program-selectable screen formats are available: 1920 characters (24 lines by 80 characters), 2560 characters (32 lines by 80 characters), 3440 characters (43 lines by 80 characters), and 3564 (27 lines by 132 characters). The 3180 is modularly constructed, consisting of three separate machine elements: video, logic, and keyboard. The video pedestal provides the display with 20° of tilt and 360° of swivel; the vertical height of the screen can be adjusted up to 5 inches. The 3180 can be selected with a typewriter-style or data entry keyboard. Each keyboard layout contains 122 keys, including 24 program function keys and adjustable slope. The keyboard is modifiable; removable key caps can be used to apply unique nomenclature to the keyboard.

3279 COLOR DISPLAY STATION: Five models are currently available, three of which (Models S2A, S2B, and S3G) have been designated standard models, and two of which (Models 2X and 3X) may be used to order customer configurations. These new models replace the previous 3279 Models 2A, 2B, 3A, and 3B. Standard models are designed to provide the customer with easier configurations, a simplified ordering process, and potentially faster delivery times.

The standard models have no optional features other than the selected keyboard. They represent the most popular configurations of the Models 2A, 2B, and 3B. Model S2A supports base color mode, and provides a 1920-character screen capacity; Model S2B supports extended color mode, and provides a 1920-character screen capacity plus extended highlighting and APL. Model S3G supports extended color mode, and provides a 2560-character screen capacity plus extended highlighting, APL, and programmed symbols. Base color mode supports the use of four colors (red, green, blue, and white) as substitutes for existing protect and intensify field attributes. Extended color mode includes the features of the base color mode, provides three additional colors (yellow, pink, and turquoise), and permits field character addressing of color highlighting as an independent attribute. On Models S2B and S3G, extended highlighting consists of the use of reverse video, blinking, and underscoring. Model S3G provides storage of up to six 190-character programmed symbol sets containing user-defined shapes and symbols for use in graphic display representations.

Model 2X can be used to order special configurations equivalent to previous Models 2A, and 2B. All Model 2X configurations contain a 1920-character screen capacity. Model 3X can be used to order special configurations equivalent to Models 3A and 3B. All Model 3X configurations contain a 2560-character screen capacity. The Extended Function feature, when added to Model 2X or 3X, provides extended color, extended highlighting, and the APL/Text character set.

A 3279 display operating in base color mode can be attached to any Model 3274 Control Unit with any of the Configuration Support packages (A, B, or C) or to a 3276 Control Unit Display Station that supports the 3279's screen capacity and is equipped with the Extended Function Base (#1068) and the Color Display Attachment (#1950) features. A 3279 display using extended color, extended highlighting, or programmed symbols can be attached only to 3274 Models 1A, 1C, 1D, or 51C with Configuration Support C.

3179 COLOR DISPLAY STATION: Functionally equivalent to the 3279 Models S2A and S2B. The 3179 is equipped with a 14-inch (diagonally measured) display screen with a 1920-character capacity, arranged in 24 lines of 80 characters each. When executing a 3278 or 3178 application, the 3279 can display information in four base colors: red, green, blue, and white. When attached to an appropriately configured 3274 Control Unit, three additional colors (yellow, turquoise, and pink) may be displayed. The 3179 features a modular construction consisting of three interconnected elements: video, logic, and keyboard. The video pedestal provides the display with 15° of tilt and 180° of swivel. The unit's modifiable keyboard contains 122 keys, including 24 program function keys, cursor control keys, and an integrated numeric pad. Removable keycaps can be used to meet a particular application requirement. The keyboard features a low profile design and three slope adjustments (6°, 12°, or 18°).

3279 PERSONAL COMPUTER ATTACHMENT: Available for use with the 3279 Color Display Station (all models). The personal computer option consists of two components: the IBM 3279 Personal Computer Adapter (field-installed by IBM), and the IBM Personal Computer 3279 Attachment Option (installed by the user). This option allows common use of the 3279 display and keyboard with any Personal Computer processor unit; no Personal Computer display or keyboard is required.

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3290 INFORMATION PANEL: A large capacity, flat gas plasma panel display. The viewing area, measuring 10.7 by 13.4 inches, can accommodate up to 9920 characters (62 rows by 160 columns) using 5-by-8 dot matrix characters, or up to 5300 characters (50 rows by 106 columns) using a 7-by-9 dot matrix. The display image is formed by lighting cells under the control of display logic, and appears as orange characters on a black background. The display image is uniform at every point of the viewing area. The 3290 can display high-resolution graphics as well as alphanumeric data.

The 3290 provides a multiple display screen capability which allows concurrent viewing of the following: four 3278/3279 Model 2 screens; two 3278/3279 Model 3 screens; two 3278 Model 4 screens; or two 3278 Model 5 screens. The 3290 can also be configured to display a full page computer printout (62 rows by 132 columns), two horizontal screens of up to 31 rows by 160 columns, or two vertical screens of up to 62 rows by 80 columns. Up to 16 separately manageable partitions may be designated. Screen management facilities govern multiple interactive screens and multiple copy screens. A 24K-character buffer can be vertically scrolled. The 3290 is data stream compatible with all currently available 3270 displays.

The 3290 Model 1 is composed of the display panel, power logic unit, and keyboard. Two keyboard styles are available: Data/Typewriter (#4730) and APL (#4731). A numeric keypad and a programmed function keypad are optionally available on both keyboard models. The display panel features a tilt adjustment of up to 5° forward and up to 15° backward. An audible alarm and security keylock are standard. In addition to its availability as the standard Model 1, the components of the 3290 (display panel, power logic unit, and keyboards) may be purchased separately.

3270-PC PERSONAL COMPUTER: A version of the IBM Personal Computer designed for use with the 3270 Information Display System. The 3270-PC can operate up to seven concurrent sessions: four 3270-type sessions, one IBM PC DOS 2.0 session, and two local notepad sessions. The user can view these sessions on the 3270-PC's multiple windows; the user also has the ability to move and alter the size of the windows, as well as to define multiple screen layouts. The 3270-PC is available in three versions: 5271 System Unit Models 2, 4, and 6. All versions support the use of a color (14-inch diagonal screen) or monochrome (11½-inch diagonal screen) display with a 25-line by 80-character format. The color monitor displays up to eight colors, and provides a tilt/swivel capability. All versions also support a detachable keyboard with 122 keys, including 24 program function keys and a numeric pad. Model 2 includes 256K bytes of RAM (expandable to 640K bytes), display and keyboard adapters, 3270 system adapter, and one dual-sided diskette drive and adapter. Model 4 provides all of the features of Model 2, plus a second dual-sided diskette drive, a 64/256K-byte memory expansion option, and a graphics printer adapter. Model 6 contains all the features of the Model 4, plus a 10M-byte fixed disk drive and adapter.

IBM has also introduced program products for use with the 3270-PC. The 3270-PC Control Program contains an online tutorial that explains the capabilities and functions of the 3270 Personal Computer. This program product provides the controls necessary for the user to select screen configurations, manipulate and interact with displayed data, and manage screen presentations on the 3270-PC Personal Computer. The 3270-PC File Transfer Program is a host-based program that provides for the transfer of files between a host computer and the 3270-PC Personal Computer. This package is available to meet either VM/SP or MVS/TSO software requirements.

462X KEYBOARDS: For use with 3278 displays and 3276 controller/displays. A total of eight models are available with various combinations of layouts, data codes, and program function keys. A complete listing of models and basic characteristics is provided in the price list. All data entry layouts include a separate group of 120 program function keys. All typewriter models include 12 program function keys that are activated by an alternate shift mode. Two models include an additional 12 keys for a total of 24 program function keys; two models include text-oriented characters for use with APL/Text features. All models, except the latter four, have 75 keys. The four expanded typewriter layouts have 87 keys. A Numeric Lock feature is available.

4640/4651/4652 KEYBOARDS: For use with 3278 displays or 3279 color displays. The 4640 is an 87-key EBCDIC typewriter overlay keyboard; the 4651 is an 87-key EBCDIC attribute select typewriter keyboard; the 4652 is an 87-key EBCDIC attribute select typewriter/APL keyboard. All three models include keytop annotations for color, extended highlighting, and programmed symbol sets.

4730/4731 KEYBOARDS: For use with the 3290 Information Panel. The 4730 is a Data/Typewriter-style keyboard which contains 24 Program Function Keys, located in two rows across the top of the keyboard. Overlays are provided for the Program Function keys to identify the functions associated with each key. The 4731 has a data/typewriter layout as does the 4730, plus modified keytops to allow the entry of 81 APL specific characters. An APL on/off key permits the keyboard to be switched from basic EBCDIC typewriter mode to APL mode. Both typewriter styles are cable-attached to the 3290 and feature adjustable keyboard slope.

3287-1 AND -2 MATRIX PRINTERS: This printer can be used with the older (3271/3272) as well as newer (3274/3276) cluster controllers. Model 1 operates at 80 cps; Model 2 operates at 120 cps. Both models achieve these speeds through bidirectional printing. Both print 10 characters per inch, 6 or 8 lines per inch, and 132 positions across the page. Separate attachment features are required for connection to a 3274/3276 controller. When connected to a 3274, the 3287 can incorporate the APL/Text feature; an Extended Character Set Adapter and a 3274 Attachment feature are required. A special feature, Extended Print Buffer, is required for operation with 2560, 3440, and 3564 character displays. Character formation is 4 of 7-by-8. A programmed symbol set support feature (monochromatic only) is available. A Variable Width Forms Tractor option, as well as Friction Feed Paper Handling option, is available. An audible alarm is a no-cost feature for signaling a forms-out condition; the alarm can also be sounded via a host computer command.

3287-1C and -2C MATRIX PRINTERS: Two color models that vary only in their rated print speeds: Model 1C prints at a maximum of 80 characters per second and Model 2C at 120 characters per second, when printing bidirectionally with a single color per line. Four colors (red, green, blue, and black) are provided via a multicolor ribbon. Print positions 1 through 120 can be printed in any color, but positions 121 through 132 can only be printed in black. As with the 3279 Display, two levels of color usage are supported. Basic color mode printing is standard on both models and substitutes color for existing protect and intensify field attributes. Extended color mode requires the previously available Extended Character Set Adapter (#3610) and permits user specification of color as an independent character or field attribute. When seven-color displayed data is transferred to a four-color printer, extended colors (pink, yellow, and turquoise) are printed in black. Extended highlighting permits underscoring of printed data, but blinking and reverse

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video attributes are ignored. Storage for two, four, or six programmed symbol sets, including a four-color business graphics set, is also supported and requires two previously available options, the Extended Character Set Adapter (#3610) and the Extended Print Buffer (#3880). Except for color printing, functions and features of the Models 1C and 2C are equivalent to the 3287 Models 1 and 2, respectively.

The 3287 Models 1C and 2C can be attached to any model of the 3274 Control Unit with a Category A terminal port, and to any 3276 Control Unit Display Station (features #1068 and #1950 are not required). Unlike 3287 Models 1 and 2, they cannot be attached to a 3271 or 3272 Control Unit. When operating with extended color, extended highlighting, and preprogrammed symbol sets, Models 1C and 2C can be attached only to a 3274 Model 1A, 1C, 1D, or 51C with configuration Support C.

In June 1982, IBM designated 3287 Models 1, 2, and 2C as standard model configurations. This designation provides the customer with ease of configuration, a simplified ordering process, and potentially faster delivery times when ordering one of these models.

3289 BELT PRINTER: A higher-speed printer for use with 3274 and 3276 clusters. The printer is available in two models that differ only in print speed. Model 1 operates at 155 lines per minutes with a 48-character set (both EBCDIC and ASCII are available); performance is reduced to 120 and 80 lines per minute, respectively, when a 64- or 94-character set is used via interchangeable belts. Model 2 operates at a peak speed of 400 lines per minute with a 48-character set, 300 lines per minute with a 64-character set, and 230 lines per minute with a 94-character set. When connected to a 3274, the 3289 can incorporate the Text Print feature; an Extended Character Set Adapter is required. Data is printed at 10 characters per inch and 6 or 8 lines per inch; 132 print positions are provided. An audible Alarm feature (extra-cost) sounds when end of forms is reached or when activated by the host computer.

PRICING

Previously, all 3270 components were available under the terms of IBM's Rental or Lease Agreement (LRA) or for purchase. IBM's newer components are available for purchase only; in addition, IBM has recently withdrawn its LRA for all models of the 3274 Control Unit. (LRA includes prime shift maintenance; a separate contract is available for purchased units.) All new components are user installed via IBM's new Customer Set-up Policy.

LRA was announced for general application in April 1977. Basically, this arrangement provides for month-to-month rental or for a two-year lease with penalties for early termination (including model downgrades and feature termination). The lease can be extended indefinitely, one year at a time. The monthly charges for the lease arrangement are generally 15 percent lower than the month-to-month arrangement. The prime shift maintenance period is for any consecutive nine hours between 7 AM and 6 PM, Monday through Friday. (The maintenance charges given in the accompanying price list are for prime shift maintenance for purchased equipment and also serve as the basis for calculating extended charges for rented or leased equipment.) Extended period maintenance is available up to 24 hours per day, 7 days per week.

The termination charge for the lease arrangement is the lower of 5 months' charges or 25 (5 percent for the 3286 printer) percent of the remaining value of the lease. (For periods of fewer than 20 months, the 25 percent charge will be lower than the 5 month charge.)

All 3270 (except the 3178, 3179, 3180, and 3290) components are in maintenance category A, except the 3276 Control Unit Display Station, which is in category D. These categories determine the schedule of extended maintenance charges. The two schedules differ for extended Monday through Friday maintenance, but are the same for Saturday and Sunday maintenance. The premium for extended maintenance is expressed in the table below as a percentage of the basic maintenance charges, which are listed in the accompanying price list.

The 3178, 3179, 3180, and 3290 are covered under IBM Exchange/Repair Amendment to existing IBM Rent/Lease, Purchase, and Maintenance Agreements. Maintenance is offered, for an annual charge, at four service levels: Customer Carry-in Repair; Customer Carry-in Exchange; Customer On-site Exchange; and IBM On-site Exchange.

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Cluster Controllers				
	3274 Model 21A; local, SNA mode	$ 818	$696	$14,220	$ 72.00
	3274 Model 21B; local, 3272 mode	818	696	14,220	74.50
	3274 Model 21C; remote; requires 3701	573	488	9,900	55.50
	3274 Model 21D; local, 3272 mode	818	696	14,220	79.50
	3274 Model 31A; local, SNA mode	962	816	16,650	90.00
	3274 Model 31C; remote; requires 3701	717	608	12,420	73.50
	3274 Model 31D; local, 3272 mode	962	816	16,650	97.50
	3274 Model 41A; local, SNA mode	1,013	862	18,230	58.00
	3274 Model 41C; remote; requires 3701	767	653	13,840	40.00
	3274 Model 41D; local, 3272 mode	1,013	862	18,230	58.00
	3274 Model 51C; remote; requires 3701	264	225	4,885	37.50
	3274 Model 61C; remote; requires 3701	408	345	7,600	27.00
	Terminal Adapters (for Models –21X, –31X, and –51C only)—				
6901	Type A1; devices 9 through 16	49	42	981	2.00
6902	Type A2; devices 17 through 24	49	42	918	2.00
6903	Type A3; devices 25 through 32	49	42	918	2.00
7801	Type B; requires 5550	56	48	986	4.00

Includes prime-shift maintenance.

***Maintenance plans available include: (A) Customer Carry-in Repair, annual charge; (B) Customer Carry-in Exchange, annual charge; (C) Customer On-site Exchange, annual charge; (D) IBM On-site Exchange, annual charge (during warranty period). In some cases, these plans are offered in addition to standard monthly maintenance.*

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
7802	Type B1; devices 1 through 4	56	48	986	4.00
7803	Type B2; devices 5 through 8	49	42	831	2.50
7804	Type B3; devices 9 through 12	49	42	831	2.50
7805	Type B4; devices 13 through 16	49	42	831	2.50
1801	Control Storage Expansion	48	40	790	4.00
3701	External Modem Interface; requires 6302 or 6303	16	14	337	3.00
6302	Common Communications Adapter; SDLC or BSC; up to 9600 bps with Type A only Terminal Adapters and up to 7200 bps with Type B or mix; –21C, –31C, –41C, –51C, and –61C only	14	12	365	2.00
6303	High Performance Communications Adapter; SDLC or BSC; 9600 bps with Type B Terminal Adapters or mix; –21, –31C, –41C, –51C, and –61C only	54	46	1,010	8.50
8801	Watertight Power Connector; –21A/B/D, –31A/D, and –41A/D	NC	NC	NC	NC
3680	Encrypt/Decrypt; –1C, 3274 –21C, –31C, –41C, –51C, and –61C only	80	68	1,780	2.00
5650	Dataphone Digital Service; point-to-point; –21C, –31C, –41C, –51C, and –61C only	34	29	840	1.50
5651	Dataphone Digital Service; multipoint; –21C, –31C, or –51C only	34	29	840	1.50
4850	Loop Adapter; for 8100 System attachment; requires 6303; –51C and –61C only	40	38	797	3.00
5655	X.21 Adapter; nonswitched networks; –41C or –61C only	32	27	800	1.50
5656	X.21 Adapter; switched networks; –41C or –61C only	39	33	800	2.00
3299	Terminal Multiplexer	—	—	1,175	—

Note: Effective April 21, 1984, IBM will no longer accept lease/rental orders for any model of the 3274 Control Unit.

Controller/Display Stations

	3276 Model 1; 960 char., BSC	275	234	5,380	34.00
	3276 Model 2; 1920 char., BSC	282	240	5,535	35.00
	3276 Model 3; 2560 char., BSC	286	243	5,680	36.00
	3276 Model 4; 3440 char., BSC	298	254	5,830	36.50
	3276 Model 11; 960 char., SDLC	275	234	5,380	30.50
	3276 Model 12; 1920 char., SDLC	282	240	5,535	31.00
	3276 Model 13; 2560 char., SDLC	286	243	5,680	31.50
	3276 Model 14; 3440 char., SDLC	298	254	5,830	32.00
3255	Terminal Adapter No. 1; devices 3 and 4	22	19	530	1.50
3256	Terminal Adapter No. 2; devices 5 and 6	22	19	530	1.50
3257	Terminal Adapter No. 3; devices 7 and 8	22	19	530	1.50
3701	External Modem Interface; requires 6301 or 6302	16	14	337	3.00
3680	Encrypt/Decrypt; 3276 –11, –12, –13, –14 only	80	68	1,600	2.00
	1200 bps Integrated Modems—				
5500	Nonswitched; requires 6301	28	24	535	5.50
5501	Switched, Auto Answer; requires 6301	37	32	714	2.50
5502	Switched, Manual Answer; requires 6301	28	24	535	3.00
5507	Nonswitched with Switched Backup; requires 6301	41	35	766	5.50
5508	Nonswitched with Switched Backup; Auto Answer; requires 6301	45	38	855	3.00
5650	Dataphone Digital Service; point-to-point	34	29	840	1.50
5651	Dataphone Digital Service; multipoint	34	29	840	1.50
6301	Communications Feature with clock	23	20	543	2.50
6302	Communications Feature without clock	14	12	365	2.00
6315	SDLC/BSC Switch; 3276 –1, –2, –3, –4 only	31	26	682	3.00
1067	APL/Text Control; requires 1068	45	38	950	1.00
1950	Color Display Attachment; not available for 3276–1; requires 1068	38	32	758	0.50

Cluster Display Stations

	3278 Model 1; 960 char.	93	79	1,855	10.00
	3278 Model 2; 1920 char.	96	82	1,965	10.00
	3278 Model 3; 2560 char.	116	99	2,145	10.50
	3278 Model 4; 3440 char.	118	101	2,255	11.50
	3278 Model 5; 3564 char.	139	118	2,575	12.50
	3178 Model C1; 1920 char., w/75-key Data Entry keyboard	—	—	1,660	**
	3178 Model C2; 1920 char., w/87-key Typewriter keyboard	—	—	1,720	**
	3178 Model C3; 1920 char., w/87-key Typewriter keyboard and numeric pad	—	—	1,720	**
	3178 Model C4; 1920 char., w/87-key Typewriter keyboard and numeric pad	—	—	1,720	**

**Includes prime-shift maintenance.*
***Maintenance plans available include: (A) Customer Carry-in Repair, annual charge; (B) Customer Carry-in Exchange, annual charge; (C) Customer On-site Exchange, annual charge; (D) IBM On-site Exchange, annual charge (during warranty period). In some cases, these plans are offered in addition to standard monthly maintenance.*

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IBM 3270 Information Display System

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	3178 Machine Elements—				
	75-Key Data Entry Keyboard	—	—	360	—
	87-Key Typewriter Keyboard	—	—	420	—
	Video Element	—	—	350	—
	Logic Element	—	—	950	—
	3180 Model 1; w/Typewriter or Data Entry keyboard	—	—	2,295	**
	3180 Machine Elements—				
	122-Key Typewriter Keyboard	—	—	295	**
	122-Key Data Entry Keyboard	—	—	295	**
	Video Element	—	—	950	**
	Logic Element	—	—	1,015	**
	3290 Model 1 Information Panel	315	—	7,100	30.00
	3290 Machine Elements—				
4730	Data/Typewriter Keyboard	22	—	440	**
4731	APL Keyboard	22	—	440	**
1503	3-foot Keyboard Cable	3	—	60	—
1506	6-foot Keyboard Cable	4	—	75	—
3210	Display Panel	160	—	3,600	—
	Power Logic Element	130	—	3,000	**
	Color Display Stations				
	3279 Model S2A; base color; 1920 char.	160	136	3,160	16.50
	3279 Model S2B; extended color; 1920 char.	160	136	3,490	18.00
	3279 Model S3G; extended color; 2560 char.	180	154	5,190	22.00
	3279 Model 2X; base/extended color; 1920 char.	164	140	3,235	16.50
	3279 Model 3X; base/extended color; 2560 char.	179	153	3,775	17.00
	3179 Model 1; 1920 char.; w/122-key Typewriter keyboard	—	—	2,295	**
3850	Extended Function (Model 2X or 3X)	14	12	420	2.00
	Keyboards				
	For 3276/3278—				
4621	75-Key EBCDIC Typewriter	19	16	417	2.00
4622	75-Key EBCDIC Data Entry	19	16	417	3.00
4623	75-Key EBCDIC Data Entry, keypunch layout	19	16	417	3.00
4624	75-Key ASCII Typewriter	19	16	417	2.00
4626	87-Key EBCDIC Typewriter/Text; 3278 only	23	20	569	2.50
4627	87-Key EBCDIC Typewriter; 3278/3274 only	23	20	569	2.50
4628	87-Key ASCII Typewriter; 3278/3274 only	23	20	569	2.50
4629	87-Key EBCDIC Typewriter/Text; 3278 only	23	20	569	2.50
	For 3278/3279—				
4640	87-Key EBCDIC Typewriter Overlay	23	20	569	2.50
4651	87-Key EBCDIC Attribute Select Typewriter	23	20	569	2.50
4652	87-Key EBCDIC Attribute Select Typewriter/APL	23	20	569	2.50
	3276/3278 Display Station Options				
1009	Address Keylock; 3276 only	—	—	56	—
3620	Character Set Extension	25	22	580	2.50
6360	Selector Light Pen	20	17	493	0.50
4999	Magnetic Reader Control	15	13	341	3.50
	Magnetic Slot Reader (Part No. 4123500)	—	—	286	—
	Magnetic Hand Scanner (Part No. 4123495)	—	—	286	—
	3278/3279 Display Station Options				
5790	Programmed Symbols (PS)	34	29	948	2.50
8750	Video Output (3279 Model 3X only)	24	20	702	1.00
5315/5316	3270 Personal Computer Attachment (3278 only)	—	—	1,700	—
5317/5318	3278 Personal Computer Adapter (3278 portion)	—	—	850	—
5321	3278 Personal Computer Attachment (PC portion)	—	—	850	—
5325/5326	3270 Personal Computer Attachment (3279 only)	—	—	1,950	—
5327/5328	3279 Personal Computer Adapter (3279 portion)	—	—	1,100	—
5322	3279 Personal Computer Attachment (PC portion)	—	—	850	—

**Includes prime-shift maintenance.*

***Maintenance plans available include: (A) Customer Carry-in Repair, annual charge; (B) Customer Carry-in Exchange, annual charge; (C) Customer On-site Exchange, annual charge; (D) IBM On-site Exchange, annual charge (during warranty period). In some cases, these plans are offered in addition to standard monthly maintenance.*

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IBM 3270 Information Display System

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	3290 Information Panel Options				
4830	Numeric Keypad	12	—	250	**
4831	Program Function Keypad	12	—	250	**
	3270–PC Personal Computer				
5271-002	3270–PC w/keyboard	—	—	4,290	**
5271-004	3270–PC w/keyboard	—	—	5,319	**
5271-006	3270–PC w/keyboard	—	—	7,180	**
	3270–PC Machine Elements—				
5272	3270–PC Base Unit	—	—	995	—
5730	3270–PC Keyboard	—	—	295	—
	3270–PC Options				
5151	Monochrome Display	—	—	345	—
5272	Color Display	—	—	—	—
	3270–PC Control Program	—	—	300	—
	3270–PC File Transfer Program	—	—	600	—
	Printers				
	3287 Model 1; 80 cps	257	219	4,830	37.50
	3287 Model 2; 160 cps	314	267	5,150	46.50
1066	Data Analysis-APL; 3287 only	15	13	297	—
1120	APL/Text	6	5	165	0.50
3610	Extended Character Set Adapter	20	17	429	3.00
3880	Extended Print Buffer	7	6	198	0.50
8330	3271/3272 Attachment	46	39	860	2.50
8331	3274/3276 Attachment	6	5	165	0.50
8700	Variable Width Forms Tractor	6	5	151	0.50
4110	Friction Feed Paper Handling	6	5	151	0.50
	3287 Model 1C; color printing; 80 cps	318	271	5,210	42.50
	3287 Model 2C; color printing; 120 cps	374	318	5,530	51.50
	Programmed Symbols—				
5781	PS–2; storage for first two symbol sets; requires 3610 and 2880	42	36	826	4.00
5782	PS–4; storage for additional four symbol sets; requires 5781	35	30	662	2.50
5783	PS–4A; storage for four symbol sets; including one set with multicolor addressing; requires 3610 and 3880; for 3287–1C and –2C only	76	65	1,485	11.50

Note: Effective April 20, 1984, IBM will no longer accept rental orders for the 3287 Printer.

	3289 Model 1; 155 lpm	573	488	8,830	95.00
	3289 Model 2; 400 lpm	868	739	13,140	161.00
1090	Audible Alarm	6	5	192	NC
1130	Text Print	7	6	231	NC

**Includes prime-shift maintenance.*
***Maintenance plans available include: (A) Customer Carry-in Repair, annual charge; (B) Customer Carry-in Exchange, annual charge; (C) Customer On-site Exchange, annual charge; (D) IBM On-site Exchange, annual charge (during warranty period). In some cases, these plans are offered in addition to standard monthly maintenance.* ■

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IBM 3270 Information Display System

MANAGEMENT SUMMARY

IBM's 3270 Information Display System is the single most important family of products in the current display terminal market. The market supports not only IBM, but a significant number of independent manufacturers of 3270-type terminals. Initially, these vendors parlayed lower prices and shorter delivery lead times to capture a share of this market. More recently, enhanced capabilities were added to 3270-compatible systems to make them more attractive to prospective users. For instance, Harris Corporation and Lee Data Corporation have recently added personal computing capabilities to their 3270-compatible systems. On March 8, 1983, IBM announced several new additions to the 3270 product line, while lowering prices on selected models and features of existing products. IBM's actions will have a major impact on this market as a whole (as they always do), and will force their competitors to respond quickly.

The new products announced by IBM include: the 3178 Display Station; the 3290 Information Panel Display; four new 3274 Control Unit models (41A, 41C, 41D, and 61C); the 3299 Terminal Multiplexer; and the IBM 3270 Personal Computer Attachment.

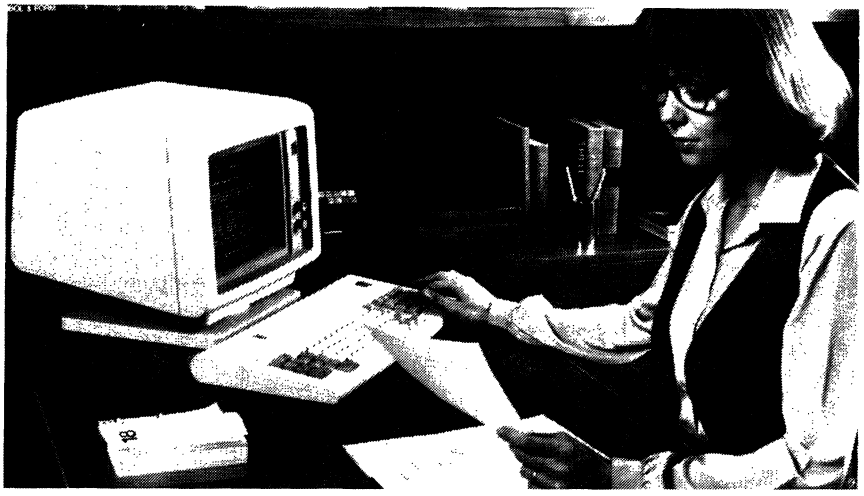
The 3178 is an ergonomically-improved version of the 3278 Model 2 Display Station, the most popular 3270 display model. The 3178 features modular construction, combining three separate machine elements: video, logic, and keyboard. The unit is physically smaller than the 3278, and has a 12-inch display screen, which can be tilted and swivelled. The 3178 is plug-compatible with the 3278 Model 2 for base functions; its purchase price, however, is significantly less. In addition, IBM has announced major price reductions for 3178 volume buyers. A 40 percent discount is available for purchases of 3,000 or more units.

The 3290 Information Panel currently has no competition from the independent vendors. The 3290 is a large screen (10.7 by 13.4 inches), flat gas plasma panel display station

The most significant family in the display terminal market. The 3270 family consists of controllers, display stations (color and monochrome), and printers, for use in stand-alone or cluster configurations in remote or local environments. The 3270 family is also the most widely emulated display system in the industry.

The 3270 family has recently been enhanced with new models and features. Established members of the family include: the 3274 Control Unit Models 21A, 21B, 21C, 21D, 31A, 31C, 31D, & 51C; 3276 Control Unit Display Station Models 1, 2, 3, 4, 11, 12, 13, & 14; 3278 Display Station Models 1 through 5; 3279 Color Display Station Models S2A, S2B, S3G, 2X, & 3X; 3287 Printer Models 1, 2, 1C, & 2C; and 3289 Printer Models 1 & 2. New additions to the family include: 3274 Control Unit Models 41A, 41C, 41D, & 61C; 3178 Display Station Models C1 & C2; 3290 Information Panel; and 3299 Terminal Multiplexer. IBM has also added a personal computer attachment option for the 3278, and reduced purchase prices on most existing models.

Purchase prices for the 3274 Control Units range from $5,430 to $18,500. The 3278 Display Station ranges from $2,060 to $3,070. The new 3178 Display Station is available for purchase only, and is priced from $1,660 to $1,720. Reductions for quantity purchases are available. Standard monthly maintenance is available for the established components and some of the newer ones. New annual maintenance plans are available for the newer components (except the new 3274 models).



The IBM 3178 Display Station is functionally compatible with the popular 3278 Model 2 display. The 3178 features a modular design that results in the keyboard/display having a smaller footprint and less weight than the 3278, since the logic module can be bracket-mounted on the wall or under the desktop. The display screen measures 12 inches (as opposed to the 14-inch screen of the 3278), displays 1,920 characters, and is equipped with tilt capability of up to 20° and swivel capability of 180°. The 3178 is offered for purchase only, with a 40 percent price reduction available for purchases of 3,000 or more units.

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IBM 3270 Information Display System

TABLE 1: IBM 3274 CONTROL UNIT SPECIFICATIONS

	21A	21B	21C	21D	31A	31C	31D	41A	41C	41D	51C	61C
Mode	Local	Local	Remote	Local	Local	Remote	Local	Local	Remote	Local	Remote	Remote
Protocol(s) supported	SNA	Chan.	SNA/BSC	Chan.APL	SNA	SNA/BSC	Chan.APL	SNA	SNA/BSC	Chan.APL	SNA/BSC	SNA/BSC
Minimum ports	8	8	8	8	8	8	8	32	32	32	12	16
Maximum ports	32	32	32	32	32	32	32	32	32	32	12	16
Control storage	64K	64K	64K	64K	128K	128K	128K	192K	192K	192K	64K/128K	192K
Devices supported (category)	A/B	A/B	A/B	A/B	A/B	A/B	A/B	A	A	A	A/B	A

TABLE 2: ATTACHABLE DEVICES

Category A	Category B
3178 Models C1, C2	3277 Models 1*, 2*
3278 Models 1, 2, 3, 4, 5	3284 Models 1*, 2*
3279 Models S2A, S2B, S3G, 2X, 3X	3286 Models 1*, 2*
3287 Models 1, 2, 1C, 2C	3287 Models 1, 2
3289 Models 1, 2	3288 Model 2*
3290 Model 1**	

**No longer available*
***Does not attach to 3274 Models 21A, 21B, 21C, 21D*

with a screen capacity of 9,920 characters. Designed for use in program development, report retrieval, and data base/data communications applications, the 3290's screen can be divided into up to 16 partitions to provide access to different applications or data bases simultaneously. The screen is made up of a sealed "sandwich" of two flat glass plates, approximately 1/70th of an inch apart. The space between the glass is filled with neon/argon gas; as electrical charges are selectively applied to a wire grid, the gas glows to display orange-on-black images. The 3290 can be attached to the 3274 Control Unit in the same way as all other 3270 terminals.

The new 3274 Control Unit models (41A, 41C, 41D, and 61C) provide increased functionality at a lower price than the existing models they are intended to replace (31A, 31D, 31C, and 51C; these models will continue to be marketed to accommodate older terminal models not supported on the new models). The new models incorporate 192K of control storage, double-sided diskette capability, and 32 terminal ports. Support for second generation displays and printers is provided in addition to support for the new products. Also supported is the 3299 Terminal Multiplexer. The 3299 functions as a coaxial cable eliminator; it connects to a 3274 Control Unit via a single cable, and can support up to eight terminals via shorter cables, which fan out from the 3299 to each device. The 3299 also doubles (to two miles) the distance permitted between the control unit and the terminal.

The IBM 3270 Personal Computer Attachment allows the 3278 Display Station to function as an IBM Personal Computer display. The attachment consists of two components: the Personal Computer Adapter, which is field-installed by IBM personnel; and the Personal Computer Attachment Option, which is installed by the customer. When equipped with the Personal Computer Attachment, the 3278 display and keyboard become common to both the host processor and the IBM Personal Computer processor.

CHARACTERISTICS

VENDOR: International Business Machines Corp., Information Systems Group, National Accounts Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914)-696-1900.

DATE OF ANNOUNCEMENT: 3724, 3276, 3278, 3287, 3289,—May 1977; 3279, 3287-1C/2C, 3274-51C—October 1979; 3274-21A/B/C/D & -31A/B/D—early 1982; 3274-41A/C/D & -61C, 3178, 3290—March 1983.

DATE OF FIRST DELIVERY: Usually within one year of announcement.

SERVICED BY: International Business Machines.

CONFIGURATION

The 3270 family of display/keyboard stations and printers can be configured as a local or remote cluster or as a stand-alone station. There are now three generations of components (first generation components are no longer marketed) with a limited degree of mixing permitted within the same sub-system; complete compatibility for communications and applications program support can be achieved with the new components, if desired. Tables 1 and 2 present the overall configurational possibilities. Specific prerequisites are detailed in the discussions of individual components.

TRANSMISSION SPECIFICATIONS

3274 Models 21C, 31C, 41C, 51C, and 61C operate in half-duplex point-to-point, or in half- or full-duplex multipoint, using BSC or SDLC protocols, at speeds of 1200/600 (51C only), 2000, 2400/1200, 4800/2400, 7200/3600, and 9600/4800 bits per second on non-switched facilities. Multipoint and point-to-point communications at speeds up to 19,200 bits per second and point-to-point speeds up to 56K bits per second are also possible where facilities are available.

The 3276 operates in half-duplex point-to-point, or in half- or full-duplex multipoint at speeds of 1200, 2000, 2400, 4800, 7200, or 9600 (SNA/SDLC only) bits per second on non-switched facilities. Also, 3276 Models 11, 12, 13 and 14 operate in half-duplex point-to-point on the public switched telephone network at speeds of 1200 or 4800 bits per second, and on public switched data networks at speeds of 2400, 4800, or 9600 bits per second. Models 11 through 14 also operate in half-duplex at 9600 bits per second over a direct attached loop, and at 2400, 4800, or 9600 bits per second over a data link attached loop.

HOST COMPUTER SOFTWARE SUPPORT

A 3270 subsystem is supported for local and remote operation by IBM System/360, System/370, 4300 Series, 8100, 30XX, Series/1, and System 3 computer systems. Remote

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IBM 3270 Information Display System

Product Enhancement

On October 18, 1983, IBM expanded its 3270 Information Display System with the addition of five new products: the IBM 3270-PC Personal Computer, 3270-PC Control Progam, 3270-PC File Transfer Program, Personal Computer 3278/79 Emulation Adapter, and Personal Computer Attachment for 3279 Color Display Station.

The IBM 3270-PC Personal Computer can provide for operation of up to seven concurrent sessions: four 3270-type sessions, two local notepad sessions, and one IBM PC DOS 2.0 session. One session or parts of several sessions can be displayed on the unit at any location the user chooses. The unit is available in four basic configurations, with prices ranging from $4,290 to $7,180 in single unit quantities. Deliveries are expected to occur by the end of the first quarter of 1984.

The 3270-PC Control Program contains an on-line tutorial that explains the capabilities and functions of the 3270 Personal Computer. This program product provides the controls necessary for the user to select screen configurations, manipulate and interact with displayed data, and manage screen presentations on the 3270-PC Personal Computer. The 3270-PC Control Program is priced at $300, with delivery scheduled for first quarter 1984.

The 3270-PC File Transfer Program is a host-based program that provides for the transfer of files between a host computer and the 3270-PC Personal Computer. This package is available to meet either VM/SP or MVS/TSO software requirements, and is priced at $600 in single quantities. Delivery is scheduled as of first quarter 1984.

The Personal Computer 3278/79 Emulation Adapter allows the 3270-PC Personal Computer to emulate the functions of an IBM 3278 Display Station Model 2 or an IBM 3279 Color Display Station Model 2A or S2A. The adapter can support file transfer with a host, and enables concurrent host-controlled 3270 and Personal Computer sessions. The Emulation Adapter unit is priced at $905, with delivery as of April 1984.

The Personal Computer Attachment for the 3279 Color Display Station allows the IBM 5150 Personal Computer to be attached to a 3279 Color Display Station, enabling both host processor and personal computer applications. The attachment is composed of two separate components that can be purchased together or individually: the 3279 Personal Computer Adapter, priced at $1,100, and the Personal Computer 3279 Attachment Option, priced at $850. A December 1983 delivery date is scheduled.□

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IBM 3270 Information Display System

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The new products announced by IBM include: the 3178 Display Station; the 3290 Information Panel Display; four new 3274 Control Unit models (41A, 41C, 41D, and 61C); the 3299 Terminal Multiplexer; and the IBM 3270 Personal Computer Attachment.

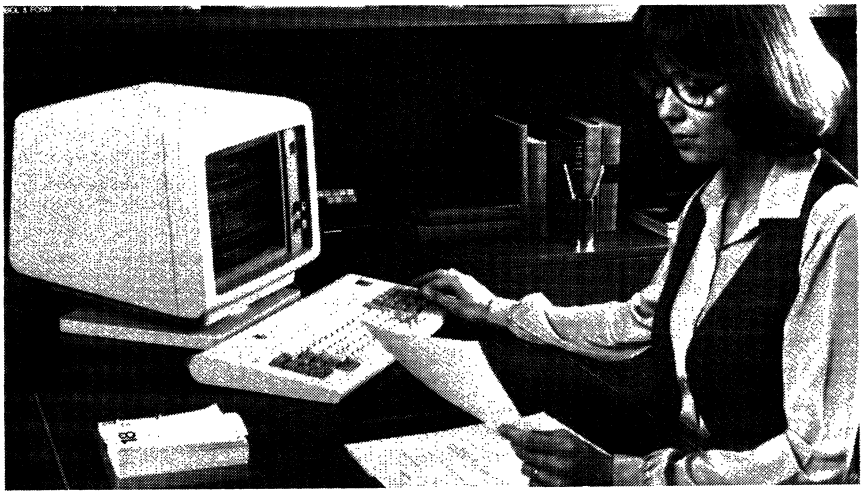
The 3178 is an ergonomically-improved version of the 3278 Model 2 Display Station, the most popular 3270 display model. The 3178 features modular construction, combining three separate machine elements: video, logic, and keyboard. The unit is physically smaller than the 3278, and has a 12-inch display screen, which can be tilted and swivelled. The 3178 is plug-compatible with the 3278 Model 2 for base functions; its purchase price, however, is significantly less. In addition, IBM has announced major price reductions for 3178 volume buyers. A 40 percent discount is available for purchases of 3,000 or more units.

The 3290 Information Panel currently has no competition from the independent vendors. The 3290 is a large screen (10.7 by 13.4 inches), flat gas plasma panel display station

The most significant family in the display terminal market. The 3270 family consists of controllers, display stations (color and monochrome), and printers, for use in stand-alone or cluster configurations in remote or local environments. The 3270 family is also the most widely emulated display system in the industry.

The 3270 family has recently been enhanced with new models and features. Established members of the family include: the 3274 Control Unit Models 21A, 21B, 21C, 21D, 31A, 31C, 31D, & 51C; 3276 Control Unit Display Station Models 1, 2, 3, 4, 11, 12, 13, & 14; 3278 Display Station Models 1 through 5; 3279 Color Display Station Models S2A, S2B, S3G, 2X, & 3X; 3287 Printer Models 1, 2, 1C, & 2C; and 3289 Printer Models 1 & 2. New additions to the family include: 3274 Control Unit Models 41A, 41C, 41D, & 61C; 3178 Display Station Models C1 & C2; 3290 Information Panel; and 3299 Terminal Multiplexer. IBM has also added a personal computer attachment option for the 3278, and reduced purchase prices on most existing models.

Purchase prices for the 3274 Control Units range from $5,430 to $18,500. The 3278 Display Station ranges from $2,060 to $3,070. The new 3178 Display Station is available for purchase only, and is priced from $1,660 to $1,720. Reductions for quantity purchases are available. Standard monthly maintenance is available for the established components and some of the newer ones. New annual maintenance plans are available for the newer components (except the new 3274 models).



The IBM 3178 Display Station is functionally compatible with the popular 3278 Model 2 display. The 3178 features a modular design that results in the keyboard/display having a smaller footprint and less weight than the 3278, since the logic module can be bracket-mounted on the wall or under the desktop. The display screen measures 12 inches (as opposed to the 14-inch screen of the 3278), displays 1,920 characters, and is equipped with tilt capability of up to 20° and swivel capability of 180°. The 3178 is offered for purchase only, with a 40 percent price reduction available for purchases of 3,000 or more units.

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IBM 3270 Information Display System

TABLE 1: IBM 3274 CONTROL UNIT SPECIFICATIONS

	21A	21B	21C	21D	31A	31C	31D	41A	41C	41D	51C	61C
Mode	Local	Local	Remote	Local	Local	Remote	Local	Local	Remote	Local	Remote	Remote
Protocol(s) supported	SNA	Chan.	SNA/BSC	Chan.APL	SNA	SNA/BSC	Chan.APL	SNA	SNA/BSC	Chan.APL	SNA/BSC	SNA/BSC
Minimum ports	8	8	8	8	8	8	8	32	32	32	12	16
Maximum ports	32	32	32	32	32	32	32	32	32	32	12	16
Control storage	64K	64K	64K	64K	128K	128K	128K	192K	192K	192K	64K/128K	192K
Devices supported (category)	A/B	A/B	A/B	A/B	A/B	A/B	A/B	A	A	A	A/B	A

TABLE 2: ATTACHABLE DEVICES

Category A	Category B
3178 Models C1, C2	3277 Models 1*, 2*
3278 Models 1, 2, 3, 4, 5	3284 Models 1*, 2*
3279 Models S2A, S2B, S3G, 2X, 3X	3286 Models 1*, 2*
3287 Models 1, 2, 1C, 2C	3287 Models 1, 2
3289 Models 1, 2	3288 Model 2*
3290 Model 1**	

**No longer available*
***Does not attach to 3274 Models 21A, 21B, 21C, 21D*

with a screen capacity of 9,920 characters. Designed for use in program development, report retrieval, and data base/data communications applications, the 3290's screen can be divided into up to 16 partitions to provide access to different applications or data bases simultaneously. The screen is made up of a sealed "sandwich" of two flat glass plates, approximately 1/70th of an inch apart. The space between the glass is filled with neon/argon gas; as electrical charges are selectively applied to a wire grid, the gas glows to display orange-on-black images. The 3290 can be attached to the 3274 Control Unit in the same way as all other 3270 terminals.

The new 3274 Control Unit models (41A, 41C, 41D, and 61C) provide increased functionality at a lower price than the existing models they are intended to replace (31A, 31D, 31C, and 51C; these models will continue to be marketed to accommodate older terminal models not supported on the new models). The new models incorporate 192K of control storage, double-sided diskette capability, and 32 terminal ports. Support for second generation displays and printers is provided in addition to support for the new products. Also supported is the 3299 Terminal Multiplexer. The 3299 functions as a coaxial cable eliminator; it connects to a 3274 Control Unit via a single cable, and can support up to eight terminals via shorter cables, which fan out from the 3299 to each device. The 3299 also doubles (to two miles) the distance permitted between the control unit and the terminal.

The IBM 3270 Personal Computer Attachment allows the 3278 Display Station to function as an IBM Personal Computer display. The attachment consists of two components: the Personal Computer Adapter, which is field-installed by IBM personnel; and the Personal Computer Attachment Option, which is installed by the customer. When equipped with the Personal Computer Attachment, the 3278 display and keyboard become common to both the host processor and the IBM Personal Computer processor.

CHARACTERISTICS

VENDOR: International Business Machines Corp., Information Systems Group, National Accounts Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914)-696-1900.

DATE OF ANNOUNCEMENT: 3724, 3276, 3278, 3287, 3289,—May 1977; 3279, 3287-1C/2C, 3274-51C—October 1979; 3274-21A/B/C/D & -31A/B/D—early 1982; 3274-41A/C/D & -61C, 3178, 3290—March 1983.

DATE OF FIRST DELIVERY: Usually within one year of announcement.

SERVICED BY: International Business Machines.

CONFIGURATION

The 3270 family of display/keyboard stations and printers can be configured as a local or remote cluster or as a stand-alone station. There are now three generations of components (first generation components are no longer marketed) with a limited degree of mixing permitted within the same sub-system; complete compatibility for communications and applications program support can be achieved with the new components, if desired. Tables 1 and 2 present the overall configurational possibilities. Specific prerequisites are detailed in the discussions of individual components.

TRANSMISSION SPECIFICATIONS

3274 Models 21C, 31C, 41C, 51C, and 61C operate in half-duplex point-to-point, or in half- or full-duplex multipoint, using BSC or SDLC protocols, at speeds of 1200/600 (51C only), 2000, 2400/1200, 4800/2400, 7200/3600, and 9600/4800 bits per second on non-switched facilities. Multipoint and point-to-point communications at speeds up to 19,200 bits per second and point-to-point speeds up to 56K bits per second are also possible where facilities are available.

The 3276 operates in half-duplex point-to-point, or in half- or full-duplex multipoint at speeds of 1200, 2000, 2400, 4800, 7200, or 9600 (SNA/SDLC only) bits per second on non-switched facilities. Also, 3276 Models 11, 12, 13 and 14 operate in half-duplex point-to-point on the public switched telephone network at speeds of 1200 or 4800 bits per second, and on public switched data networks at speeds of 2400, 4800, or 9600 bits per second. Models 11 through 14 also operate in half-duplex at 9600 bits per second over a direct attached loop, and at 2400, 4800, or 9600 bits per second over a data link attached loop.

HOST COMPUTER SOFTWARE SUPPORT

A 3270 subsystem is supported for local and remote operation by IBM System/360, System/370, 4300 Series, 8100, 30XX, Series/1, and System 3 computer systems. Remote

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The first generation of 3270 components was introduced by IBM in 1972, and consisted of: the 3271 Control Unit; 3272 Control Unit; 3275 Stand-Alone Display Station; 3277 Cluster Display Station; 3284 Matrix Printer; 3286 Matrix Printer; and 3288 Belt Printer. In an announcement that became effective November 16, 1982, IBM has withdrawn the first generation of 3270 products from marketing. The above-mentioned models are no longer marketed by IBM, although it will continue to support existing units. The plug-compatible market for these components is expected to remain quite active for at least another two to three years.

The second generation of 3270 components was unveiled in 1977, and included: the 3274 Control Unit; 3276 Control Unit Display Staiton; 3278 Cluster Display Station; 3287 Matrix Printer; and the 3289 Belt Printer. IBM has now replaced the original 3274 Control Unit models with Models 3274-21 and -31. These control units contain an improved storage technology, and support extended color, extended highlighting, and presentation graphics functions.

In October 1979, IBM made another major addition to the 3270 family with the introduction of the 3279 Color Display Station. Although the 3279 was not the first color display on the market, it was seen by many industry observers as IBM's acknowledgement that color displays were a legitmate part of a general-purpose system, and not just an unnecessary extravagance. Along with the 3279, IBM unveiled color versions of the 3287 Printer, as well as a new 3274 Control Unit Model 51C, and enhancements to several existing models.

COMPETITIVE POSITION

As was mentioned previously in this report, the members of the IBM 3270 Information Display System and their competitors comprise the single largest subset of the alphanumeric display terminal market. Studies conducted by various market research firms put the current installed base of 3270-type terminals at around one million units. Of that installed base, approximately half of those are IBM terminals; the rest are 3270-compatible models from independent manufacturers. IBM's major competitors in this market include: Raytheon, Telex, Harris, Teletype, ITT Courier, Lee Data, Racal-Milgo, Memorex, and MDS Trivex, among others. It should be interesting to see how these vendors respond to IBM's latest round of 3270 product offerings and price reductions.

ADVANTAGES AND RESTRICTIONS

The reliability of IBM's equipment and the dependability and consistency of their maintenance service has always presented a problem to those vendors who manufacture IBM-compatible equipment. One need only note the recent Chapter 11 proceedings begun by Magnuson, a maker of IBM plug-compatible mainframes who were unable to turn a profit despite the critical acclaim accorded to their systems by users. The 3270 market had been less risky up to now; lower prices, improved price/performance, and shorter lead times for delivery have allowed several com-

terminals are supported by BTAM, TCAM, VTAM, RPG Telecommunications, BSCA Multiline/Multipoint, and Communications Control Program depending on computer system and operating system. The 3274-based local clusters are supported on mainframe configurations under 3272 mode or under VTAM. In general, all new models and configurations of the 3270 can be supported under previous 3270 programming. If Display Exception Monitoring Facility (DEMF) software is installed on the host computer, network support for problem determination/isolation is available to terminals operating in BSC mode. In addition, 3270 display printer components, as well as 3276 clusters, are used with higher-level systems such as the IBM 8100 and 3790.

DEVICE CONTROL

The 3270 System operates under the control of the program stored at the remote computer. Under program control, the 3270 can execute any of four types of commands: read, write, control, and sense.

Read commands initiate transfer of the contents of a device buffer, modified fields within the buffer, buffer addresses or data of fields specified by the selector pen, or the single-byte Attention Identification (AID) code generated by a Program Function or Program Access key. The 3270 responds to two read commands, Read Buffer and Read Modified. The selector pen is not supported by the 3178 or 3290 displays.

Read Buffer initiates transfer of the contents of the addressed device buffer from the initial or current cursor address.

Read Modified initiates one of three operator-initiated functions: Read Modified, Short Read, or Test Request. Read Modified initiates the transfer of all fields modified by the keyboard within the device buffer. The fields are transferred in sequence beginning with the first modified field; all nulls are suppressed. However, when completion of a key-modified field is signaled by a selector pen operation, a resulting Read Modified operation will transfer only the address of the modified field. Short Read initiates transfer of the single byte AID Code generated by a Program Attention key. Test Request Read performs the same operation as Read Modified; however, a hardware-generated heading precedes the data. Nulls are suppressed as in Read Modified. Only the special heading is transferred if data has not been keyed.

Write commands condition the display or printer to receive a computer message. Two write commands—Write and Erase/Write—load, format, and selectively erase device buffer data, and can also initiate device operations such as starting the printer, resetting the keyboard, and sounding the audible alarm. Both commands are the same except that Erase/Write erases the entire contents of the device buffer before fresh data is written (beginning at the initial buffer address) and Write modifies existing buffer data.

Control commands initiate control unit and/or device operations. There are three control commands: Copy, Select, and Erase All Unprotected. Copy, executed by a remote control unit only, transfers buffer data from one device to another. Select, executed by a 3274 in 3277 mode only, transfers buffer data from the selected device to the controller. Erase All Unprotected initializes the addressed device, erasing all unprotected buffer locations and repositioning the cursor to the initial position of the first unprotected field.

A local 3274 cluster operating under VTAM looks like a remote control unit.

Program control by data field provides a flexible formating capability. A field, identified by an attribute control code

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TABLE A. USER RATINGS OF 3270 CONTROLLERS

Model	Number of User Responses	Average # of Displays**	Average # of Printers**	Weighted Averages*					
				Overall Performance	Ease of Operation	Reliability of Controller	Reliability of Peripherals	Maintenance Service	Technical Support
3274	80	49.7	8	3.4	3.2	3.4	3.4	3.2	3.0
3276	9	12.3	2.8	3.3	3.1	3.4	3.3	3.0	2.6
3271/3272/ unspecified	61	62.8	14.6	3.4	3.3	3.3	3.3	3.2	2.8

*Weighted Average is based on assigning a weight of 4 to each user rating of Excellent, 3 to Good, 2 to Fair, and 1 to Poor.
**Average number per system.

TABLE B. USER RATINGS OF 3270 DISPLAYS

Model	Number of User Responses	Number of Displays Installed	Weighted Averages*					
			Overall Performance	Ease of Operation	Display Clarity	Keyboard Feel & Usability	Hardware Reliability	Maintenance Support
3275	7	231	3.0	3.3	3.1	3.3	3.0	3.0
3276	16	682	3.4	3.4	3.4	3.4	3.4	3.5
3277	35	3,100	3.3	3.4	3.2	3.4	3.4	3.2
3278	141	28,332	3.6	3.4	3.4	3.4	3.6	3.3
3279	32	10,034	3.7	3.7	3.5	3.6	3.7	3.5
3270, unspecified	36	12,124	3.4	3.2	3.3	3.3	3.4	3.2

*Weighted Average is based on assigning a weight of 4 to each user rating of Excellent, 3 to Good, 2 to Fair, and 1 to Poor.

TABLE C. USER RATING OF 3270 PRINTERS

Model	Number of User Responses	Number of Printers Installed	Weighted Averages*				
			Overall Performance	Ease of Operation	Print Quality	Noise Level	Hardware Reliability
3284	4	15	3.3	2.8	3.0	3.0	2.5
3286	6	275	3.0	3.0	3.0	2.6	2.7
3287	55	2,226	3.0	3.0	2.9	2.6	3.0

*Weighted Average is based on assigning a weight of 4 to each user rating of Excellent, 3 to Good, 2 to Fair, and 1 to Poor.

petitors to carve out a healthy market share. However, IBM's recent price reductions (existing models of the 3274, 3276, 3279, and 3287 were all reduced in price), as well as their new product introductions, should put increased pressure on the independents.

USER REACTION

During June, July, and August of 1982, Datapro conducted an extensive Terminal Users' Survey in conjuction with *Data Communications* magazine. A questionnaire was designed and produced by Datapro and mailed to approximately 10,000 addresses selected at random from a cross-section of *Data Communications'* U.S. end-user subscriber base. The users were asked to rate all types of terminal equipment, including clustered and stand-alone displays, intelligent, smart, and dumb displays, and teleprinters. A large number of responses on the IBM 3270 Information Display System were received, yielding ratings on controllers, display stations, and printers. These ratings are summarized in Tables A, B, and C.

(nondisplayed) in the initial character position, can possess any one of several characteristics. The attribute control code can specify a protected or unprotected field (for fixed format operation), beam intensity of brightness (off, normal, or bright), alphanumeric or numeric (automatic shift) input, auto lock or skip, tab stop, or light pen selection.

The Program Tab feature automatically writes successive data fields into successive unprotected data fields defined by a fixed format.

Character Addressing permits a message to be written beginning at any screen location. Addressing can be interspersed with data throughout a message received from the computer. Character Addressing also permits the selective modification of attribute control codes.

Operator controls are provided for cursor control, editing, and program functions.

Cursor controls position the cursor up, down, left, or right, step-by-step or repetitively if the key is held depressed. The cursor can also be backspaced one character position, moved to the beginning of the next line or beginning of the next unprotected data field, tabbed to the beginning of the next unprotected data field, and backtabbed to the beginning of the previous unprotected field.

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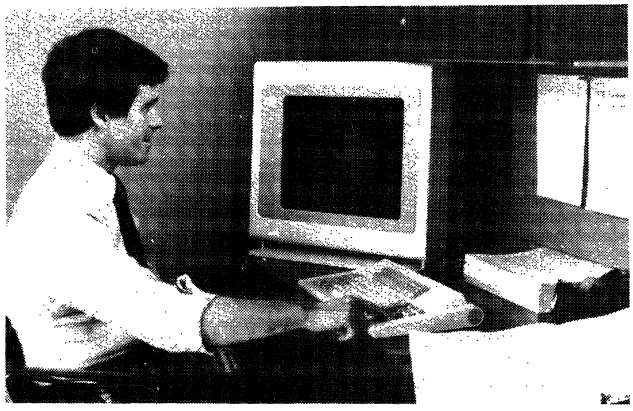
In addition to the ratings, the users were asked whether or not they would recommend their 3270 equipment to other users with similar applications. Of the 150 users who responded to the controller portion, 112 answered that they would recommend their controllers, six answered that they would not, and the remainder were undecided or did not answer the question. Of the 267 users who reported on the displays, 216 answered positively, 10 negatively, and the remainder were undecided or did not respond. This question was not tallied for the printer users.□

Edit controls permit data to be inserted in or deleted from text, character-by-character. Following data is automatically expanded or contracted.

Program Function keys are used to initiate program functions or identify data that can be transmitted with an accompanying program function code.

The 3276, 3178 and 3278 have two added controls: Cursor Home key and Cursor Select key. The Cursor Home key returns the cursor to the first non-protected character position. The Cursor Select key causes a selection operation similar to a light pen operation; a light pen (Selector Pen) is optional in addition to this control. A Print key is included on 3276/3178/3278 display/keyboards when attached to a 3274 Control Unit; this key causes the displayed data to be transferred to a printer for immediate printing without requiring a host computer command; normal print commands can also be executed. The standard cursor is an underscore. On a 3178 or 3278 display connected to a 3274 controller, the cursor can be standard or reverse video underscore, blinking or non-blinking as selected by the operator.

An Entry Assist capability is available on the 3274 (equipped with Configuration Support D) for the 3178, 3278, and 3279 displays. Entry Assist allows the operator to enter and edit textual material such as letters, memos, reports, source programs, etc. Entry Assist capabilities are available when the operator enters Document mode. Capabilities available in this mode include: tabbing, screen margins, wordwrap, word/character delete, and end-of-line warning.



The new 3290 is a flat gas panel display station. The 3290 features a screen capacity of 9,920 characters, displayed in orange on a dark background. The terminal's multiple display screen capability allows for concurrent viewing of four 3278 Model 2 screens. Combinations of alphanumeric data and high-resolution graphic images may be displayed simultaneously.

When equipped with the personal computer option, the 3278 display can operate in two modes: host compute and personal compute. These modes provide for concurrent operation of a host program and a Personal Computer program. The user can switch between modes, in order to decide whether it is the host program or personal computer program which receives keystrokes and has its output displayed.

Readers capable of accepting a credit-card size plastic card with up to 40 characters encoded on a magnetic tape stripe can be connected to all models of displays except the 3178 and 3290. The reader for the 3276 and 3278 displays will accept previously coded cards if the normal end of form control character (not the Hex C optional character) is supported.

COMPONENTS

3274-21A, -21B, -21C, -21D, -31A, -31C, AND -31D CONTROL UNITS: provide control of a local or remote cluster of up to 32 displays or printers. Models -21A, -21B, -21C, and -21D contain 64K bytes of storage; Models -31A, -31C, and -31D contain 128K bytes of storage. The units are upward compatible with and supercede predecessor 3274 Models 1A, 1B, 1C, and 1D. They support enhanced storage technology and extended color, extended highlighting, and presentation graphics functions not available on the older models. Models -21A and -31A support a local cluster operating in SNA mode under VTAM, and are upward compatible with the 3274-1A. Model -21B supports a local cluster operating in 3272 compatible mode, and supercedes the 3274-1B. Models -21C and -31C support a remote cluster operating under BSC or SDLC protocol, and are upward-compatible with the 3274-1C. Models -21D and -31D are upward-compatible with Models -21B and -31B respectively, and combine local attachment in 3272-compatible mode with an APL/Text control function; the -21D and -31D supercede the 3274-1D.

Operating functions are controlled by feature and systems diskettes customized at installation, using a diskette drive integral with the controller. The 3274-21C/-31C is conditioned for BSC or SDLC operation by loading a program into the controller using interchangeable diskettes.

All models support mixing of the older 3277/3284/3286/3288 (Category B) devices on the same controller with the new 3278/3287/3289 (Category A) devices. The basic controllers each accommodate up to eight of the newer components. One Type A Terminal Adapter is required for each additional group of eight of the new devices. Alternatively, up to four Type B Terminal Adapters, each accommodating up to four 3277/3284/3286/3287/3288 Category B devices, can be installed. A single controller can accommodate a cluster of up to 32 terminals, comprised of groups of 8 Category A devices and groups of 4 Category B devices; however, no more than 16 (i.e., 4 groups) of the 32 terminals can be Category B devices. A minimum of one 3278 display and keyboard is required. The 3287 printer can be attached to either Type A or Type B adapters. A 3278 Model 5 display cannot be attached to a 3274-21B/31B Control Unit.

Control Storage Expansion is required to install Type B Terminal Adapters in the 3274-21A/C and -31A/C; these features are not required to install Type B Adapters in the 3274-21B/D and -31B/D.

The 3274-21C and -31C require the External Modem Interface Feature and either the Common Communications Adapter or the High Performance Communications Adapter. The latter is required if any Type B Terminal Adapters are installed and a transmission speed of 9600 bps is used; otherwise the CCA is adequate for all transmission combinations.

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Dataphone Digital Service is available on Models 21C and 31C via both point-to-point and multipoint adapters. Models 21C and 31C can also be equipped with an Encrypt/Decrypt device which codes and decodes messages using the Federal Data Encryption Standard algorithm.

The APL/Text feature, available on all models except 21B, permits display (on an adapted 3278) or printing (on an adapted 3287) of an expanded 222-character set, including the standard EBCDIC and APL characters plus 37 text-specific characters and 10 graphics plot characters. The Text Print feature, available with all models except 21B, permits printing on the 3289 of a 125-character set (93 EBCDIC characters plus the 32-character Text Character set) and character underscore and overprint capabilities.

Enhancements to the 3274 support attachment of the 3279 Color Display Station and 3287 Models 1C and 2C Color Printers. Any 3274 except Model 21B can now be specified with one of three no-charge Configuration Support packages (A, B, or C); Model 21B is always equipped with Configuration Support A. Configuration Support A provides support for most 3270 functions, including base color mode; Support B adds the ability to attach 3278-5 printers, and to perform specific SNA-related functions; Support C includes all Support A and B functions plus certain other functions, including extended color mode, extended highlighting, and programmed symbol set support.

3274-41A, -41C and -41D CONTROL UNITS: New control unit models which are intended to replace existing 3274 Models -31A, -31C, and -31D respectively. Models -31A, -31C, and -31D will remain available to support Category B terminal adapter features. The new 3274 models provide increased functional capability with 192K of control storage and a double-sided diskette drive. The new controllers provide attachment for only Category A devices. These devices can be directly attached to the control unit, eliminating the need for terminal adapters. A new Configuration Support package (D) is specified with the 3274-41A, -41C, and -41D. Configuration Support D provides all currently supported functions available under Configuration Support A, B, and C, plus the new Entry Assist function.

3274-51C CONTROL UNIT: Provides control of a remote cluster of up to twelve displays and printers operating under BSC or SDLC protocol. The basic controller accommodates up to eight 3278/3279/3287/3289 (Category A) devices. Four additional 3277/3284/3286/3287/3288 (Category B) devices can be attached via the Terminal Adapter Type B (#7801). Except for the number of devices supported, the Model 51C offers equivalent and compatible functions and features to a 3274 Model 1C. In addition it provides certain features not available using SDLC via a data link or a direct or data link attached loop (this feature provides support for Category A devices only); a 1200 bps integrated modem; and a switched network communications capability. The 3274 Model 51C is also upward compatible with the 3276 Control Unit Display Station, except that it provides the Printer Authorization Matrix used on other 3274's instead of the Default matrix used on the 3276.

In June 1982, IBM designated 3274 Control Unit Models 21C, 31A, 31C, 31D, and 51C as standard model configurations. This designation provides the customer with ease of configuration, a simplified ordering process, and potentially faster delivery times when ordering one of these models.

3274-61C CONTROL UNIT: A new control unit which is intended to replace the existing 3274 Model 51C (with Extended Function Store feature #1800). The 3274-51C will remain available to support Category B terminal adapter features. The 3274-61C provides 192K of control storage, a double-sided diskette, and support for up to 16 Category A devices.

A new Configuration Support package (D) is specified with the 3274-61C. Configuration Support D provides all currently supported functions available under Configuration Support A, B, and C, plus the new Entry Assist function. The 3274-61C provides support for only Category A devices. These devices can be directly attached to the control unit, eliminating the need for terminal adapters.

3299 TERMINAL MULTIPLEXER: A coaxial cable eliminator for use with all 3274 control unit models except 3274-51C. The 3299 is connected to a 3274 control unit via a single coaxial cable of up to 4920 feet (1500 meters) in length and can support up to eight Category A devices (Category B devices not supported) via cables (maximum length 4920 feet each) from the 3299 to each device. On the 3274-41X, up to four 3299's can be supported; attachment of the cable on the controller end requires 3274 Specify Option #9901. The 3274-61C supports one 3299, which also requires #9901. The 3274-21X and -31X support up to three 3299's, which require RPQ options 8K1155 and 8K1156 on the controller.

3276 CONTROL UNIT DISPLAY STATION: A controller for small remote clusters; it also includes an integrated display that is functionally equivalent to a Model 3278 Display Station. The 3276 can accommodate up to seven additional displays and printers.

A total of eight models provide combinations of four display capacities and BSC or SDLC operations.

Model 1—960 character display; BSC transmission.
Model 2—1920 character display; BSC transmission.
Model 3—2560 character display; BSC transmission.
Model 4—3440 character display; BSC transmission.
Model 11—960 character display; SDLC transmission.
Model 12—1920 character display; SDLC transmission.
Model 13—2560 character display; SDLC transmission.
Model 14—3440 character display; SDLC transmission.

The BSC models (-1/2/3/4) can accommodate any mix of up to seven additional 3278 displays and 3287 and 3289 printers. The added 3278 display cannot have a larger display capacity than the basic 3276 integrated display. However, the SDLC/BSC Switch feature permits alternate protocol operation and also permits intermixing any size display on any "BSC" 3276 model. The SDLC models (-11/12/13/14) can accommodate any display size mix. The display screen measures 14 inches (diagonally).

The basic 3276 controller (any model) can accommodate two devices. A Terminal Adapter is required for each additional two devices. Models 11, 12, 13, and 14 can be equipped with an Encrypt/Decrypt device which codes and decodes messages using the Federal Data Encryption Standard algorithm.

The 3276 requires an External Modem Interface or an Integrated Modem (1200 bps.) Five integrated modem features are available for operation over switched or non-switched facilities, providing basic transmission linkage plus optional network backup and manual or auto answer capabilities. Either external or internal modem operation requires a Communications Feature.

Dataphone Digital Service is available on all models via both point-to-point and multipoint adapters. APL/Text functions similar to those provided by the 3274 Control Unit can be implemented by equipping the 3276 with APL/Text Control and Extended Function Base features.

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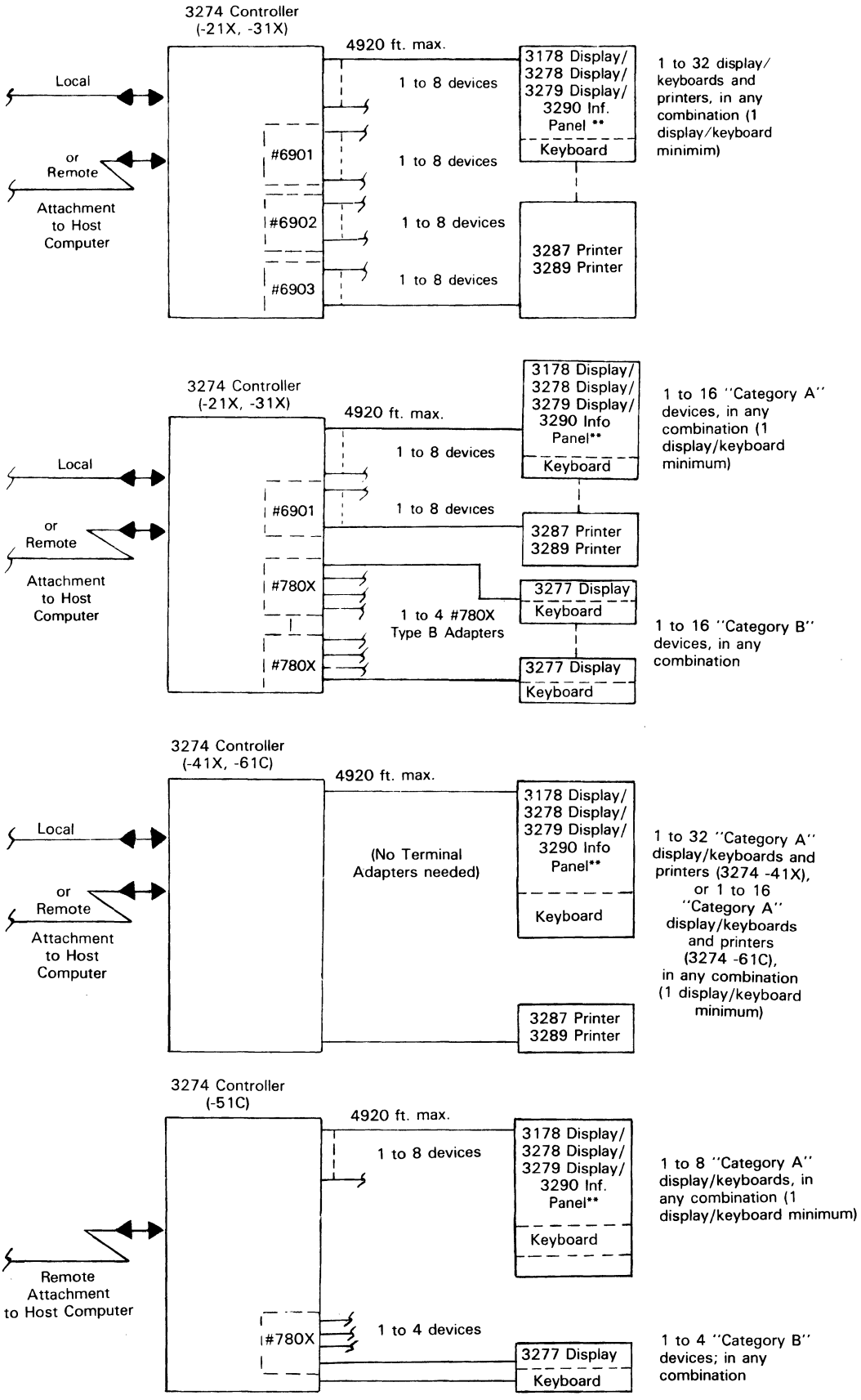
IBM 3270 Information Display System

3270 Configurations*



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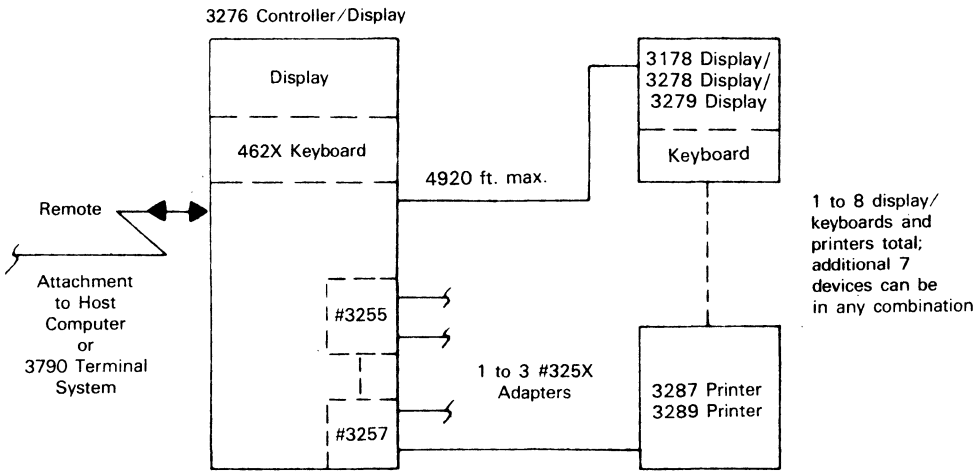

*See text for communications, display, keyboard, and printer models, characteristics, and options.
**The 3290 utilizes one physical terminal port and up to five addresses; up to 31 3290s may be attached, depending on application and 3274 model.

A Color Display Attachment feature (#19540) provides the 3276 with support for an attached 3279 Display Station operating in base color mode. This feature requires the previously available Extended Function Base feature (#1068), and does not support operation of a 3279-2B or -3B in extended color mode. (The Color Display Attachment is not required for color printing via a 3287 Model 1C or 2C Color Printer.) Another 3276 enhancement removes the mutually exclusive restriction between the Extended Function Base feature (#1068) and the Encrypt/Decrypt feature (#3680). An audible alarm and security keylock are standard features.

3278 CLUSTER DISPLAY STATION: Five models are available, distinguished by the display capacity. Model 1 displays 12 lines of 80 characters each (960 characters total); Model 2 displays 24 lines of 80 characters each (1920 total); Model 3 displays 32 lines of 80 characters each (2560 total); Model 4 displays 43 lines of 80 characters (3440 total); Model 5 permits operator selection of display arrangements of 24 lines of 80 characters (1920 total) or 27 lines of 132 characters (3564 total). The display screen measures 14 inches (diagonally).

A character set of 94 characters, including upper and lower case alphabetics, numeric, and special symbols, is displayed. When connected to a 3274, the 3278 can incorporate the APL/Text feature; the Character Set Extension feature and a 4626 or 4629 keyboard are required. A monocase switch provides 3277 compatibility. Each character for Models 1, 2, and 3 is formed by a 7 x 14 matrix; for Models 4 and 5 a 9 x 12 matrix is used. Extended highlighting and symbol set functions (monochromatic only) have been added to Models 2, 3, and 4. A Switch Control Unit permits a 3278 Display to be switched between two controllers.

The 3278 uses the 462X series, 4640, 4651, or 4652 keyboards. The displays can be equipped with a keyboard, numeric lock, address lock, selector light pen, magnetic slot reader, and magnetic hand scanner, as options. The audible alarm and security keylock, which were previously available as options, are now standard in the base configuration.

IBM 3270 PERSONAL COMPUTER ATTACHMENT: Available for use with the 3278 Display Station (all models). The personal computer option consists of two components: the IBM 3278 Personal Computer Adapter (field-installed by IBM), and the IBM Personal Computer 3278 Attachment Option (installed by the user). This option allows common use of the 3278 display and keyboard with any Personal Computer processor unit; no Personal Computer display or keyboard is required.

3178 CLUSTER DISPLAY STATION: Functionally equivalent to the 3278 Model 2 for base functions. Two models of the 3178 are available, differing only in the keyboard included. Model C1 includes a 75-key Data Entry keyboard; Model C2 includes an 87-key Typewriter keyboard. Both models contain a 12-inch (diagonally measured) display screen with a display capacity of 1,920 characters, arranged in 24 lines of 80 characters each. The 3178 is modularly constructed, consisting of three separate machine elements: video, logic, and keyboard. The video pedestal provides the display with 20° of tilt and 180° of swivel. The keyboard provides adjustments for 6° and 12° of inclination. The 3178 provides a smaller footprint than that of the 3278, since the logic module can be bracket-mounted on a wall or under a table top.

An audible alarm, keyboard numeric lock, and security keylock are standard on the 3178. The 3178 does not support the following 3278 optional features: magnetic reader control, selector light pen, programmed symbols, APL/Text, and extended character set adapter.

3279 COLOR DISPLAY STATION: Five models are currently available, three of which (Models S2A, S2B, and S3G) have been designated standard models, and two of which (Models 2X and 3X) may be used to order customer configurations. These new models replace the previous 3279 Models 2A, 2B, 3A, and 3B. Standard models are designed to provide the customer with easier configurations, a simplified ordering process, and potentially faster delivery times.

The standard models have no optional features other than the selected keyboard. They represent the most popular configurations of the Model 2A, 2B, and 3B. Model S2A supports base color mode, and provides a 1920-character screen capacity; Model S2B supports extended color mode, and provides a 1920-character screen capacity plus extended highlighting and APL. Model S3G supports extended color mode, and provides a 2560-character screen capacity plus extended highlighting, APL, and programmed symbols. Base color mode supports the use of four colors (red, green, bule, and white) as substitutes for existing protect and intensify field attributes. Extended color mode includes the features of the base color mode, provides three additional colors (yellow, pink, and turquoise), and permits field char-

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acter addressing of color highlighting as an independent attribute. On Models S2B and S3G, extended highlighting consists of the use of reverse video, blinking, and underscoring. Model S3G provides storage of up to six 190-character programmed symbol sets containing user-defined shapes and symbols for use in graphic display representations.

Model 2X can be used to order special configurations equivalent to previous Models 2A, and 2B. All Model 2X configurations contain a 1920-character screen capacity. Models 3X can be used to order special configurations equivalent to Models 3A and 3B. All Model 3X configurations contain a 2560-character screen capacity. The Extended Function feature, when added to Model 2X or 3X, provides extended color, extended highlighting, and the APL/Text character set.

A 3279 display operating in base color mode can be attached to any Model 3274 Control Unit with any of the Configuation Support packages (A, B, or C) or to a 3276 Control Unit Display Station that supports the 3279's screen capacity and is equipped with the Extended Function Base (#1068) and the Color Display Attachment (#1950) features. A 3279 display utilizing extended color, extended highlighting, or programmed symbols can be attached only to a 3274 Models 1A, 1C, 1D, or 51C with Configuration Support C.

3290 INFORMATION PANEL: A large capacity, flat gas plasma panel display. The viewing area, measuring 10.7 by 13.4 inches, can accommodate up to 9,920 characters (62 rows by 160 columns) utilizing 5-by-8 dot matrix characters, or up to 5,300 characters (50 rows by 106 columns) utilizing a 7-by-9 dot matrix. The display image is formed by lighting cells under the control of display logic, and appears as orange characters on a black background. The display image is uniform at every point of the viewing area. The 3290 can display high-resolution graphics as well as alphanumeric data.

The 3290 provides a multiple display screen capability which allows concurrent viewing of the following: four 3278/3279 Model 2 screens; two 3278/3279 Model 3 screens; two 3278 Model 4 screens; or two 3278 Model 5 screens. The 3290 can also be configured to display a full page computer printout (62 rows by 132 columns), two horizontal screens of up to 31 rows by 160 columns, or two vertical screens of up to 62 rows by 80 columns. Up to 16 separately manageable partitions may be designated. Screen management facilities govern multiple interactive screens and multiple copy screens. A 24K-character buffer can be vertically scrolled. The 3290 is data stream compatible with all currently available 3270 displays.

The 3290 Model 1 is comprised of the display panel, power logic unit, and a keyboard. Two keyboard styles are available: Data/Typewriter (#4730) and APL (#4731). A numeric keypad and a programmed function keypad are optionally available on both keyboard models. The display panel features a tilt adjustment of up to 5° forward and up to 15° backward. An audible alarm and security keylock are standard. In addition to its availability as the standard Model 1, the separate components of the 3290 (display panel, power logic unit, and keyboards) may be purchased separately.

462X KEYBOARDS: For use with 3278 displays and 3276 controller/displays. A total of eight models are available with various combinations of layouts, data codes, and program function keys. A complete listing of models and basic characteristics is provided in the price list. All data entry layouts include a separate group of 120 program function keys. All typewriter models include 12 program function keys that are activated by an alternate shift mode. Two models include an additional 12 keys for a total of 24 program function keys; two models include text-oriented characters for use with APL/Text features. All models, except the latter four, have 75 keys. The four expanded typewriter layouts have 87 keys. A Numeric Lock feature is available.

4640/4651/4652 KEYBOARDS: For use with 3278 displays or 3279 color displays. The 4640 is an 87-key EBCDIC typewriter overlay keyboard; the 4651 is an 87-key EBCDIC attribute select typewriter keyboard; the 4652 is an 87-key EBCDIC attribute select typewriter/APL keyboard. All three models include keytop annotations for color, extended highlighting, and programmed symbol sets.

4730/4731 KEYBOARDS: For use with the 3290 Information Panel. The 4730 is a Data/Typewriter-style keyboard which contains 24 Program Function Keys, located in two rows across the top of the keyboard. Overlays are provided for the Program Function keys to identify the functions associated with each key. The 4731 contains a data/typewriter layout such as the 4730, plus modified keytops to allow the entry of 81 APL specific characters. An APL on/off key permits the keyboard to be switched from basic EBCDIC typewriter mode to APL mode. Both typewriter styles are cable-attached to the 3290 and feature adjustable keyboard slope.

3287-1 AND -2 MATRIX PRINTERS: This printer can be used with the older (3271/3272) as well as newer (3274/3276) cluster controllers. Model 1 operates at 80 cps; Model 2 operates at 120 cps. Both models achieve these speeds through bidirectional printing. Both print 10 characters per inch, 6 or 8 lines per inch, and 132 positions across the page. Separate attachment features are required for connection to a 3274/3276 controller. When connected to a 3274, the 3287 can incorporate the APL/Text feature; an Extended Character Set Adapter and a 3274 Attachment feature are required. A special feature, Extended Print Buffer, is required for operation with 2560, 3440, and 3564 character displays. Character formation is 4 of 7 x 8. A programmed symbol set support feature (monochromatic only) is available. A Variable Width Forms Tractor option, as well as Friction Feed Paper Handling option, is available. An audible alarm is a no-cost feature for signaling a forms-out condition; the alarm can also be sounded via a host computer command.

3287-1C and -2C MATRIX PRINTERS: Two color models that vary only in their rated print speeds: Model 1C prints at a maximum of 80 characters per second and Model 2C at 120 characters per second, when printing bidirectionally with a single color per line. Four colors (red, green, blue, and black) are provided via a multi-color ribbon. Print positions 1 through 120 can be printed in any color, but positions 121 through 132 can only be printed in black. As with the 3279 Display, two levels of color usage are supported. Basic color mode printing is standard on both models and substitutes color for existing protect and intensify field attributes. Extended color mode requires the previously available Extended Character Set Adapter (#3610) and permits user specification of color as an independent character or field attribute. When seven-color displayed data is transferred to a four-color printer, extended colors (pink, yellow, and turquoise) are printed in black. Extended highlighting permits underscoring of printed data, but blinking and reverse video attributes are ignored. Storage for two, four, or six programmed symbol sets, including a four-color business graphics set, is also supported and requires two previously available options, the Extended Character Set Adapter (#3610) and the Extended Print Buffer (#3880). Except for color printing, functions and features of the Model 1C and 2C are equivalent to the 3287 Models 1 and 2, respectively.

The 3287 Models 1C and 2C can be attached to any model of the 3274 Control Unit with a Category A terminal port, and

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to any 3276 Control Unit Display Station (features #1068 and #1950 are not required). Unlike 3287 Models 1 and 2, they cannot be attached to a 3271 or 3272 Control Unit. When operating with extended color, extended highlighting, and preprogrammed symbol sets, Models 1C and 2C can be attached only to a 3274 Model 1A, 1C, 1D, or 51C with configuration Support C.

In June 1982, IBM designated 3287 Models 1, 2, and 2C as standard model configurations. This designation provides the customer with ease of configuration, a simplified ordering process, and potentially faster delivery times when ordering one of these models.

3289 BELT PRINTER: A higher-speed printer for use with 3274 and 3276 clusters. The printer is available in two models that differ only in print speed. Model 1 operates at 155 lines per minutes with a 48-character set (both EBCDIC and ASCII are available); performance is reduced to 120 and 80 lines per minute, respectively, when a 64- or 94- character set is used via interchangeable belts. Models 2 operates at a peak speed of 400 lines per minute with a 48-character set, 300 lines per minute with a 64-character set, and 230 lines per minute with 94-character set. When connected to a 3274, the 3289 can incorporate the Text Print feature; an Extended Character Set Adapter is required. Data is printed at 10 characters per inch and 6 or 8 lines per inch; 132 print positions are provided. An audible Alarm feature (extra-cost) sounds when end of forms is reached or when activated by the host computer.

PRICING

All 3270 components, old and new, are available under the terms of IBM's Rental or Lease Agreement (LRA) or for purchase. LRA includes prime shift maintenance; a separate contract is available for purchased units. All new components are user installed via IBM's new Customer Set-up Policy.

LRA was announced for general application in April 1977. Basically, this arrangement provides for month-to-month rental or for a two-year lease with penalties for early termination (including model downgrades and feature termination). The lease can be extended indefinitely, one year at a time. The monthly charges for the lease arrangement are generally 15 percent lower than the month-to-month arrangement. The prime shift maintenance period is for any consecutive nine hours between 7 AM and 6 PM, Monday through Friday. (The maintenance charges given in the accompanying price list are for prime shift maintenance for purchased equipment and also serve as the basis for calculating extended charges for rented or leased equipment.) Extended period maintenance is available up to 24 hours per day, 7 days per week.

The termination charge for the lease arrangement is the lower of 5 months' charges or 25 (5 percent for the 3286 printer) percent of the remaining value of the lease. (For periods of fewer than 20 months, the 25 percent charge will be lower than the 5 month charge.)

All 3270 (except the 3178 and 3290) components are in maintenance category A, except the 3278 Control Unit Display Station, which is in category D. These categories determine the schedule of extended maintenance charges. The two schedules differ for extended Monday through Friday maintenance, but are the same for Saturday and Sunday maintenance. The premium for extended maintenance is expressed in the table below as a percentage of the basic maintenance charges, which are listed in the accompanying price list.

The 3178 and 3290 are covered under IBM Exchange/Repair Amendment to existing IBM Rent/Lease, Purchase and Maintenance Agreements. Maintenance is offered, for an annual charge, at four service levels: Customer Carry-in Repair; Customer Carry-in Exchange; Customer On-site Exchange; and IBM On-site Exchange.

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Cluster Controllers				
	3274 Model 21A; local, SNA mode	$765	$651	$15,800	$76.00
	3274 Model 21B; local, 3272 mode	765	651	15,800	78.50
	3274 Model 21C; remote; requires 3701	537	457	11,100	58.50
	3274 Model 21D; local, 3272 mode	765	651	15,800	83.50
	3274 Model 31A; local, SNA mode	899	765	18,500	95.00
	3274 Model 31C; remote; requires 3701	671	571	13,800	77.00
	3274 Model 31D; local, 3272 mode	899	765	18,500	103.00
	3274 Model 51C; remote; requires 3701	248	211	6,035	39.50
	Terminal Adapters (for Models -21X, -31X, and -51C only)—				
6901	Type A1; devices 9 through 16	47	40	1,020	2.00
6902	Type A2; devices 17 through 24	47	40	1,020	2.00
6903	Type A3; devices 25 through 32	47	40	1,020	2.00
7801	Type B; requires 5550	53	45	1,095	4.00
7802	Type B1; devices 1 through 4	53	45	1,095	4.00
7803	Type B2; devices 5 through 8	47	40	923	2.50
7804	Type B3; devices 9 through 12	47	40	923	2.50
7805	Type B4; devices 13 through 16	47	40	923	2.50
1801	Control Storage Expansion	46	39	880	4.00

*Includes prime-shift maintenance.

**Maintenance plans available include: (A) Customer Carry-in Repair, annual charge; (B) Customer Carry-in Exchange, annual charge; (C) Customer On-site Exchange, annual charge; (D) IBM On-site Exchange, annual charge (during warranty period). In some cases, these plans are offered in addition to standard monthly maintenance.

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acter addressing of color highlighting as an independent attribute. On Models S2B and S3G, extended highlighting consists of the use of reverse video, blinking, and underscoring. Model S3G provides storage of up to six 190-character programmed symbol sets containing user-defined shapes and symbols for use in graphic display representations.

Model 2X can be used to order special configurations equivalent to previous Models 2A, and 2B. All Model 2X configurations contain a 1920-character screen capacity. Models 3X can be used to order special configurations equivalent to Models 3A and 3B. All Model 3X configurations contain a 2560-character screen capacity. The Extended Function feature, when added to Model 2X or 3X, provides extended color, extended highlighting, and the APL/Text character set.

A 3279 display operating in base color mode can be attached to any Model 3274 Control Unit with any of the Configuation Support packages (A, B, or C) or to a 3276 Control Unit Display Station that supports the 3279's screen capacity and is equipped with the Extended Function Base (#1068) and the Color Display Attachment (#1950) features. A 3279 display utilizing extended color, extended highlighting, or programmed symbols can be attached only to a 3274 Models 1A, 1C, 1D, or 51C with Configuration Support C.

3290 INFORMATION PANEL: A large capacity, flat gas plasma panel display. The viewing area, measuring 10.7 by 13.4 inches, can accommodate up to 9,920 characters (62 rows by 160 columns) utilizing 5-by-8 dot matrix characters, or up to 5,300 characters (50 rows by 106 columns) utilizing a 7-by-9 dot matrix. The display image is formed by lighting cells under the control of display logic, and appears as orange characters on a black background. The display image is uniform at every point of the viewing area. The 3290 can display high-resolution graphics as well as alphanumeric data.

The 3290 provides a multiple display screen capability which allows concurrent viewing of the following: four 3278/3279 Model 2 screens; two 3278/3279 Model 3 screens; two 3278 Model 4 screens; or two 3278 Model 5 screens. The 3290 can also be configured to display a full page computer printout (62 rows by 132 columns), two horizontal screens of up to 31 rows by 160 columns, or two vertical screens of up to 62 rows by 80 columns. Up to 16 separately manageable partitions may be designated. Screen management facilities govern multiple interactive screens and multiple copy screens. A 24K-character buffer can be vertically scrolled. The 3290 is data stream compatible with all currently available 3270 displays.

The 3290 Model 1 is comprised of the display panel, power logic unit, and a keyboard. Two keyboard styles are available: Data/Typewriter (#4730) and APL (#4731). A numeric keypad and a programmed function keypad are optionally available on both keyboard models. The display panel features a tilt adjustment of up to 5° forward and up to 15° backward. An audible alarm and security keylock are standard. In addition to its availability as the standard Model 1, the separate components of the 3290 (display panel, power logic unit, and keyboards) may be purchased separately.

462X KEYBOARDS: For use with 3278 displays and 3276 controller/displays. A total of eight models are available with various combinations of layouts, data codes, and program function keys. A complete listing of models and basic characteristics is provided in the price list. All data entry layouts include a separate group of 120 program function keys. All typewriter models include 12 program function keys that are activated by an alternate shift mode. Two models include an additional 12 keys for a total of 24 program function keys; two models include text-oriented characters for use with APL/Text features. All models, except the latter four, have 75 keys. The four expanded typewriter layouts have 87 keys. A Numeric Lock feature is available.

4640/4651/4652 KEYBOARDS: For use with 3278 displays or 3279 color displays. The 4640 is an 87-key EBCDIC typewriter overlay keyboard; the 4651 is an 87-key EBCDIC attribute select typewriter keyboard; the 4652 is an 87-key EBCDIC attribute select typewriter/APL keyboard. All three models include keytop annotations for color, extended highlighting, and programmed symbol sets.

4730/4731 KEYBOARDS: For use with the 3290 Information Panel. The 4730 is a Data/Typewriter-style keyboard which contains 24 Program Function Keys, located in two rows across the top of the keyboard. Overlays are provided for the Program Function keys to identify the functions associated with each key. The 4731 contains a data/typewriter layout such as the 4730, plus modified keytops to allow the entry of 81 APL specific characters. An APL on/off key permits the keyboard to be switched from basic EBCDIC typewriter mode to APL mode. Both typewriter styles are cable-attached to the 3290 and feature adjustable keyboard slope.

3287-1 AND -2 MATRIX PRINTERS: This printer can be used with the older (3271/3272) as well as newer (3274/3276) cluster controllers. Model 1 operates at 80 cps; Model 2 operates at 120 cps. Both models achieve these speeds through bidirectional printing. Both print 10 characters per inch, 6 or 8 lines per inch, and 132 positions across the page. Separate attachment features are required for connection to a 3274/3276 controller. When connected to a 3274, the 3287 can incorporate the APL/Text feature; an Extended Character Set Adapter and a 3274 Attachment feature are required. A special feature, Extended Print Buffer, is required for operation with 2560, 3440, and 3564 character displays. Character formation is 4 of 7 x 8. A programmed symbol set support feature (monochromatic only) is available. A Variable Width Forms Tractor option, as well as Friction Feed Paper Handling option, is available. An audible alarm is a no-cost feature for signaling a forms-out condition; the alarm can also be sounded via a host computer command.

3287-1C and -2C MATRIX PRINTERS: Two color models that vary only in their rated print speeds: Model 1C prints at a maximum of 80 characters per second and Model 2C at 120 characters per second, when printing bidirectionally with a single color per line. Four colors (red, green, blue, and black) are provided via a multi-color ribbon. Print positions 1 through 120 can be printed in any color, but positions 121 through 132 can only be printed in black. As with the 3279 Display, two levels of color usage are supported. Basic color mode printing is standard on both models and substitutes color for existing protect and intensify field attributes. Extended color mode requires the previously available Extended Character Set Adapter (#3610) and permits user specification of color as an independent character or field attribute. When seven-color displayed data is transferred to a four-color printer, extended colors (pink, yellow, and turquoise) are printed in black. Extended highlighting permits underscoring of printed data, but blinking and reverse video attributes are ignored. Storage for two, four, or six programmed symbol sets, including a four-color business graphics set, is also supported and requires two previously available options, the Extended Character Set Adapter (#3610) and the Extended Print Buffer (#3880). Except for color printing, functions and features of the Model 1C and 2C are equivalent to the 3287 Models 1 and 2, respectively.

The 3287 Models 1C and 2C can be attached to any model of the 3274 Control Unit with a Category A terminal port, and

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to any 3276 Control Unit Display Station (features #1068 and #1950 are not required). Unlike 3287 Models 1 and 2, they cannot be attached to a 3271 or 3272 Control Unit. When operating with extended color, extended highlighting, and preprogrammed symbol sets, Models 1C and 2C can be attached only to a 3274 Model 1A, 1C, 1D, or 51C with configuration Support C.

In June 1982, IBM designated 3287 Models 1, 2, and 2C as standard model configurations. This designation provides the customer with ease of configuration, a simplified ordering process, and potentially faster delivery times when ordering one of these models.

3289 BELT PRINTER: A higher-speed printer for use with 3274 and 3276 clusters. The printer is available in two models that differ only in print speed. Model 1 operates at 155 lines per minutes with a 48-character set (both EBCDIC and ASCII are available); performance is reduced to 120 and 80 lines per minute, respectively, when a 64- or 94- character set is used via interchangeable belts. Models 2 operates at a peak speed of 400 lines per minute with a 48-character set, 300 lines per minute with a 64-character set, and 230 lines per minute with 94-character set. When connected to a 3274, the 3289 can incorporate the Text Print feature; an Extended Character Set Adapter is required. Data is printed at 10 characters per inch and 6 or 8 lines per inch; 132 print positions are provided. An audible Alarm feature (extra-cost) sounds when end of forms is reached or when activated by the host computer.

PRICING

All 3270 components, old and new, are available under the terms of IBM's Rental or Lease Agreement (LRA) or for purchase. LRA includes prime shift maintenance; a separate contract is available for purchased units. All new components are user installed via IBM's new Customer Set-up Policy.

LRA was announced for general application in April 1977. Basically, this arrangement provides for month-to-month rental or for a two-year lease with penalties for early termination (including model downgrades and feature termination). The lease can be extended indefinitely, one year at a time. The monthly charges for the lease arrangement are generally 15 percent lower than the month-to-month arrangement. The prime shift maintenance period is for any consecutive nine hours between 7 AM and 6 PM, Monday through Friday. (The maintenance charges given in the accompanying price list are for prime shift maintenance for purchased equipment and also serve as the basis for calculating extended charges for rented or leased equipment.) Extended period maintenance is available up to 24 hours per day, 7 days per week.

The termination charge for the lease arrangement is the lower of 5 months' charges or 25 (5 percent for the 3286 printer) percent of the remaining value of the lease. (For periods of fewer than 20 months, the 25 percent charge will be lower than the 5 month charge.)

All 3270 (except the 3178 and 3290) components are in maintenance category A, except the 3278 Control Unit Display Station, which is in category D. These categories determine the schedule of extended maintenance charges. The two schedules differ for extended Monday through Friday maintenance, but are the same for Saturday and Sunday maintenance. The premium for extended maintenance is expressed in the table below as a percentage of the basic maintenance charges, which are listed in the accompanying price list.

The 3178 and 3290 are covered under IBM Exchange/Repair Amendment to existing IBM Rent/Lease, Purchase and Maintenance Agreements. Maintenance is offered, for an annual charge, at four service levels: Customer Carry-in Repair; Customer Carry-in Exchange; Customer On-site Exchange; and IBM On-site Exchange.

		Monthly Charges*			
	Cluster Controllers	Rental	Lease	Purchase	Monthly Maint.
	3274 Model 21A; local, SNA mode	$709	$603	$15,800	$110.00
	3274 Model 21B; local, 3272 mode	709	603	15,800	114.00
	3274 Model 21C; remote; requires 3701	498	424	11,100	84.50
	3274 Model 21D; local, 3272 mode	709	603	15,800	121.00
	3274 Model 31A; local, SNA mode	833	709	18,500	136.50
	3274 Model 31C; remote; requires 3701	622	529	13,800	111.00
	3274 Model 31D; local, 3272 mode	833	709	18,500	147.50
	3274 Model 51C; remote; requires 3701	230	196	5,430	57.50
	Terminal Adapters (for Models -21X, -31X, and -51C only)				
6901	Type A1; devices 9 through 16	43	37	1,020	2.50
6902	Type A2; devices 17 through 24	43	37	1,020	2.50
6903	Type A3; devices 25 through 32	43	37	1,020	2.50
7801	Type B; requires 5550	51	43	1,095	5.50
7802	Type B1; devices 1 through 4	53	45	1,095	5.50
7803	Type B2; devices 5 through 8	43	37	923	3.00
7804	Type B3; devices 9 through 12	43	37	923	3.00
7805	Type B4; devices 13 through 16	43	37	923	3.00
1801	Control Storage Expansion	42	36	880	6.00
3701	External Modem Interface; requires 6302 or 6303	15	13	337	4.50
6302	Common Communications Adapter; SDLC or BSC; up to 9600 bps with Type A only Terminal Adapters and up to 7200 bps with Type B or mix; –21C, –31C, –41C, or –51C only	13	11	365	2.50
6303	High Performance Communications Adapter; SDLC or BSC; 9600 bps with Type B Terminal Adapters or mix; -21C, -31C, or -51C only	47	40	1,010	12.50

**Includes prime-shift maintenance.*
***Maintenance plans available include: (A) Customer Carry-in Repair, annual charge; (B) Customer Carry-in Exchange, annual charge; (C) Customer On-site Exchange, annual charge; (D) IBM On-site Exchange, annual charge (during warranty period). In some cases, these plans are offered in addition to standard monthly maintenance.*

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
3274	Model 41A; local, SNA mode	946	806	18,230	58.00
3274	Model 41C; remote; requires 3701	718	611	13,840	40.00
3274	Model 41D; local, 3272 mode	946	806	18,230	58.00
3274	Model 61C; remote; requires 3701	382	326	7,600	27.00
3701	External Modem Interface; requires 6302 or 6303	16	14	337	3.00
6302	Common Communications Adapter; w/o Business Machine Clock	14	12	365	2.00
6303	High Performance Communications Adapter	51	43	1,010	8.50
8801	Waterproof Power Connector	NC	NC	NC	NC
3680	Encrypt/Decrypt	80	68	1,780	2.00
5650	Dataphone Digital Service; point-to-point or multi-point	33	28	840	1.50
5655	X.21 Adapter; non-switched networks	31	26	800	1.50
5656	X.21 Adapter; switched networks	36	31	884	2.00
4850	Loop Adapter; for 8100 system attachment; requires 6303	38	32	797	3.00
3299	Terminal Multiplexer	—	—	1,175	—
	Controller/Display Stations				
	3276 Model 1; 960 char., BSC	257	219	5,380	34.00
	3276 Model 2; 1920 char., BSC	264	225	5,535	35.00
	3276 Model 3; 2560 char., BSC	268	228	5,680	36.00
	3276 Model 4; 3440 char., BSC	280	238	5,830	36.50
	3276 Model 11; 960 char., SDLC	257	219	5,380	30.50
	3276 Model 12; 1920 char., SDLC	264	225	5,535	31.00
	3276 Model 13; 2560 char., SDLC	268	228	5,680	31.50
	3276 Model 14; 3440 char., SDLC	280	238	5,830	32.00
3255	Terminal Adapter No. 1; devices 3 and 4	21	18	530	1.50
3256	Terminal Adapter No. 2; devices 5 and 6	21	18	589	1.50
3257	Terminal Adapter No. 3; devices 7 and 8	21	18	530	1.50
3701	External Modem Interface; requires 6301 or 6302	16	14	337	3.00
3680	Encrypt/Decrypt; 3276-11, -12, -13, -14 only	75	64	1,600	2.00
	1200 bps Integrated Modems—				
5500	Non-switched; requires 6301	27	23	535	5.50
5501	Switched, Auto Answer; requires 6301	35	30	714	2.50
5502	Switched, Manual Answer; requires 6301	27	23	535	3.00
5507	Non-switched with Switched Backup; requires 6301	39	33	766	5.50
5508	Non-switched with Switched Backup; Auto Answer; requires 6301	42	36	855	3.00
5650	Dataphone Digital Service; point-to-point	33	28	840	1.50
5651	Dataphone Digital Service; multipoint	33	28	840	1.50
6301	Communications Feature with clock	22	19	543	2.50
6302	Communications Feature without clock	14	12	365	2.00
6315	SDLC/BSC Switch; 3276-1, -2, -3, -4 only	29	25	682	3.00
1067	APL/Text Control; requires 1068	42	36	950	1.00
1950	Color Display Attachment; not available for 3276-1; requires 1068	35	30	758	0.50
	Cluster Display Stations				
	3278 Model 1; 960 char.	88	75	2,060	10.00
	3278 Model 2; 1920 char.	92	78	2,185	10.00
	3278 Model 3; 2560 char.	109	93	2,525	11.50
	3278 Model 4; 3440 char.	111	95	2,650	12.50
	3278 Model 5; 3564 char.	130	111	3,070	14.00
	3178 Model C1; 1920 char., w/75-key Data Entry keyboard	—	—	1,660	**
	3178 Model C2; 1920 char., w/87-key Typewriter keyboard	—	—	1,720	**
	3178 Machine Elements—				
	75-Key Data Entry Keyboard	—	—	360	—
	87-Key Typewriter Keyboard	—	—	420	—
	Video Element	—	—	350	—
	Logic Element	—	—	950	—
	3290 Model 1 Information Panel	315	—	7,100	30.00
	3290 Machine Elements—				
4730	Data/Typewriter Keyboard	22	—	440	6.50
4731	APL Keyboard	22	—	440	6.50
1503	3-foot Keyboard Cable	3	—	60	30.00
1506	6-foot Keyboard Cable	4	—	75	30.00
3210	Display Panel	160	—	3,600	10.00
	Power Logic Element	130	—	3,000	30.00

*Includes prime-shift maintenance.

**Maintenance plans available include: (A) Customer Carry-in Repair, annual charge; (B) Customer Carry-in Exchange, annual charge; (C) Customer On-site Exchange, annual charge; (D) IBM On-site Exchange, annual charge (during warranty period). In some cases, these plans are offered in addition to standard monthly maintenance.

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IBM 3270 Information Display System

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Color Display Stations				
	3279 Model S2A; base color; 1920 char.	150	128	3,510	20.50
	3279 Model S2B; extended color; 1920 char.	165	140	3,880	22.50
	3279 Model S3G; extended color; 2560 char.	231	197	6,105	27.50
	3279 Model 2X; base/extended color; 1920 char.	154	131	3,595	20.50
	3279 Model 3X; base/extended color; 2560 char.	168	143	4,440	21.00
3850	Extended Function (Model 2X or 3X)	14	12	420	2.00
	Keyboards				
	For 3276/3278—				
4621	75-Key EBCDIC Typewriter	18	15	463	2.00
4622	75-Key EBCDIC Data Entry	18	15	463	3.00
4623	75-Key EBCDIC Data Entry, keypunch layout	18	15	463	3.00
4624	75-Key ASCII Typewriter	18	15	463	2.00
4626	87-Key EBCDIC Typewriter/Text	22	19	632	2.50
4627	87-Key EBCDIC Typewriter	22	19	632	2.50
4628	87-Key ASCII Typewriter	22	19	632	2.50
4629	87-Key EBCDIC Typewriter/Text	22	19	632	2.50
	For 3278/3279—				
4640	87-Key EBCDIC Typewriter Overlay	22	19	632	2.50
4651	87-Key EBCDIC Attribute Select Typewriter	22	19	632	2.50
4652	87-Key EBCDIC Attribute Select Typewriter/APL	22	19	632	2.50
	3276/3278 Display Station Options				
1009	Address Keylock; 3276 only	625	—	56	—
3620	Character Set Extension	24	19	644	3.50
6360	Selector Light Pen	19	16	548	0.50
4999	Magnetic Reader Control	15	13	379	4.50
	3278 Display Station Options				
5315/5316	3270 Personal Computer Attachment	—	—	1,700	—
	3278/3279 Display Station Options				
5790	Programmed Symbols (PS)	33	28	948	3.50
8750	Video Output (3279 Model 3X only)	22	19	702	1.00
	3290 Information Panel Options				
4830	Numeric Keypad	12	—	250	4.50
4831	Program Function Keypad	12	—	250	4.50
	Printers				
	3287 Model 1; 80 cps	257	219	4,830	37.50
	3287 Model 2; 160 cps	314	267	5,150	46.50
1066	Data Analysis-APL; 3287 only	15	13	297	NC
1120	APL/Text	6	5	165	0.50
3610	Extended Character Set Adapter	20	17	429	3.00
3880	Extended Print Buffer	7	6	198	0.50
8330	3271/3272 Attachment	46	39	860	2.50
8331	3274/3276 Attachment	6	5	165	0.50
8700	Variable Width Forms Tractor	6	5	151	0.50
4110	Friction Feed Paper Handling	6	5	151	0.50
	3287 Model 1C; color printing; 80 cps	318	271	5,210	42.50
	3287 Model 2C; color printing; 120 cps	374	318	5,530	51.50
	Programmed Symbols—				
5781	PS-2; storage for first two symbol sets; requires 3610 and 2880	39	33	826	4.50
5782	PS-4; storage for additional four symbol sets; requires 5781	33	28	662	3.00
5783	PS-4A; storage for four symbol sets; including one set with multi-color addressing; requires 3610 and 3880; for 3287-1C and -2C only	71	60	1,485	13.00
	3289 Model 1; 155 lpm	531	452	8,830	121.00
	3289 Model 2; 400 lpm	805	685	13,140	205.00
1090	Audible Alarm	6	5	192	NC
1130	Text Print	7	6	231	NC
4450	Form Stand; all models except 3289	—	—	565	—

*Includes prime-shift maintenance.

**Maintenance plans available include: (A) Customer Carry-in Repair, annual charge; (B) Customer Carry-in Exchange, annual charge; (C) Customer On-site Exchange, annual charge; (D) IBM On-site Exchange, annual charge (during warranty period). In some cases, these plans are offered in addition to standard monthly maintenance.■

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IBM 3270 Information Display System

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
8801	Watertight Power Connector; -21A/B/D and -31A/D	NC	NC	NC	NC
3680	Encrypt/Decrypt; -1C, 3274-21C, -31C, -51C only	74	68	1,780	2.50
5650	Dataphone Digital Service; point-to-point; -21C, -31C or -51C only	31	26	840	2.00
5651	Dataphone Digital Service; multipoint; -21C, -31C, or -51C only	31	26	840	2.00
4850	Loop Adapter; for 8100 System attachment; requires 6303; -51C only	35	30	797	4.00
3274	Model 41A; local, SNA mode	946	806	18,230	58.00
3274	Model 41C; remote; requires 3701	718	611	13,840	40.00
3274	Model 41D; local, 3272 mode	946	806	18,230	58.00
3274	Model 61C; remote; requires 3701	382	326	7,600	27.00
3701	External Modem Interface; requires 6302 or 6303	16	14	374	3.00
6302	Common Communications Adapter; w/o Business Machine Clock; -41C or -61C only	14	12	405	2.00
6303	High Performance Communications Adapter; -41C or -61C only	53	43	1,120	8.50
8801	Waterproof Power Connector; -41A or -41D only	NC	NC	NC	NC
3680	Encrypt/Decrypt; -41C or -61C only	80	68	1,980	2.00
5650	Dataphone Digital Service; point-to-point or multi-point; -41C or -61C only	33	28	840	1.50
5655	X.21 Adapter; non-switched networks; -41C or -61C only	31	26	800	1.50
5656	X.21 Adapter; switched networks; -41C or -61C only	36	31	982	2.00
4850	Loop Adapter; for 8100 system attachment; requires 6303; -61C only	38	32	895	3.00
3299	Terminal Multiplexer	—	—	1,175	—
	Controller/Display Stations				
	3276 Model 1; 960 char., BSC	239	203	5,380	37.00
	3276 Model 2; 1920 char., BSC	246	209	5,535	38.00
	3276 Model 3; 2560 char., BSC	249	212	5,680	39.00
	3276 Model 4; 3440 char., BSC	260	221	5,830	39.50
	3276 Model 11; 960 char., SDLC	239	208	5,380	33.00
	3276 Model 12; 1920 char., SDLC	246	203	5,535	33.50
	3276 Model 13; 2560 char., SDLC	249	212	5,680	34.50
	3276 Model 14; 3440 char., SDLC	260	221	5,830	35.00
3255	Terminal Adapter No. 1; devices 3 and 4	20	17	530	1.50
3256	Terminal Adapter No. 2; devices 5 and 6	20	17	530	1.50
3257	Terminal Adapter No. 3; devices 7 and 8	20	17	530	1.50
3701	External Modem Interface; requires 6301 or 6302	15	13	337	4.00
3680	Encrypt/Decrypt; 3276-11, -12, -13, -14 only	69	59	1,600	2.50
	1200 bps Integrated Modems—				
5500	Non-switched; requires 6301	25	21	535	5.50
5501	Switched, Auto Answer; requires 6301	35	30	714	3.00
5502	Switched, Manual Answer; requires 6301	25	21	535	4.00
5507	Non-switched with Switched Backup; requires 6301	36	31	766	7.50
5508	Non-switched with Switched Backup; Auto Answer; requires 6301	39	33	855	4.00
5650	Dataphone Digital Service; point-to-point	31	26	840	2.00
5651	Dataphone Digital Service; multipoint	31	26	840	2.00
6301	Communications Feature with clock	21	18	543	3.00
6302	Communications Feature without Clock	13	11	365	2.50
6315	SDLC/BSC Switch; 3276-1, -2, -3, -4 only	27	23	682	3.00
1067	APL/Text Control; requires 1068	39	33	950	0.50
1950	Color Display Attachment; not available for 3276-1; requires 1068	33	28	758	0.50
	Cluster Display Stations				
	3278 Model 1; 960 char.	81	69	2,060	13.00
	3278 Model 2; 1920 char.	85	72	2,185	13.50
	3278 Model 3; 2560 char.	101	86	2,525	15.00
	3278 Model 4; 3440 char.	103	88	2,650	16.50
	3278 Model 5; 3564 char.	121	103	3,070	18.50
3178	Model C1; 1920 char., w/75-key Data Entry keyboard	—	—	1,660	**
3178	Model C2; 1920 char., w/87-key Typewriter keyboard	—	—	1,720	**
	3178 Machine Elements—				
	75-Key Data Entry Keyboard	—	—	360	—
	87-Key Typewriter Keyboard	—	—	420	—
	Video Element	—	—	350	—
	Logic Element	—	—	950	—
	3290 Model 1 Information Panel	315	—	7,100	30.00
	3290 Machine Elements—				
4730	Data/Typewriter Keyboard	22	—	440	**
4731	APL Keyboard	22	—	440	**
1503	3-foot Keyboard Cable	3	—	60	—
1506	6-foot Keyboard Cable	4	—	75	—

**Includes prime-shift maintenance.*
***Maintenance plans available include: (A) Customer Carry-in Repair, annual charge; (B) Customer Carry-in Exchange, annual charge; (C) Customer On-site Exchange, annual charge; (D) IBM On-site Exchange, annual charge (during warranty period). In some cases, these plans are offered in addition to standard monthly maintenance.*

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IBM 3270 Information Display System

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
3210	Display Panel	160	—	3,600	—
	Power Logic Element	130	—	3,000	**
9181	Switch Control Unit; 3278 only	—	—	168	—
	Color Display Stations				
	3279 Model S2A; base color; 1920 char.	140	119	3,510	25.50
	3279 Model S2B; extended color; 1920 char.	153	130	3,880	28.00
	3279 Model S3G; extended color; 2560 char.	216	183	6,105	34.50
	3279 Model 2X; base/extended color; 1920 char.	143	122	3,595	25.50
	3279 Model 3X; base/extended color; 2560 char.	156	133	4,440	26.50
3850	Extended Function (Model 2X or 3X)	13	11	420	2.50
	Keyboards				
	For 3276/3278—				
4621	75-Key EBCDIC Typewriter	16	14	463	2.50
4622	75-Key EBCDIC Data Entry	16	14	463	3.50
4623	75-Key EBCDIC Data Entry, keypunch layout	16	14	463	3.50
4624	75-Key ASCII Typewriter	16	14	463	2.50
4626	87-Key EBCDIC Typewriter/Text; 3278 only	21	18	632	3.50
4627	87-Key EBCDIC Typewriter; 3278/3274 only	21	18	632	3.00
4628	87-Key ASCII Typewriter; 3278/3274 only	21	18	632	3.00
4629	87-Key EBCDIC Typewriter/Text; 3278 only	21	18	632	3.50
	For 3278/3279—				
4640	87-Key EBCDIC Typewriter Overlay	21	18	632	3.50
4651	87-Key EBCDIC Attribute Select Typewriter	21	18	632	3.50
4652	87-Key EBCDIC Attribute Select Typewriter/APL	21	18	632	3.50
	3276/3278 Display Station Options				
1009	Address Keylock; 3276 only	—	—	56	—
1120	APL/Text; 3278 only	13	11	336	0.50
3620	Character Set Extension	24	21	644	3.00
6360	Selector Light Pen	19	16	548	0.50
4999	Magnetic Reader Control	14	12	379	4.50
	Magnetic Slot Reader (Part No. 4123500)	—	—	286	—
	Magnetic Hand Scanner (Part No. 4123495)	—	—	286	—
	3278 Display Station Options				
5315/5316	3270 Personal Computer Attachment	—	—	1,700	—
	3278/3279 Display Station Options				
5790	Programmed Symbols (PS)	33	28	948	3.50
8750	Video Output (3279 Model 3X only)	21	18	702	1.50
	3290 Information Panel Options				
4830	Numeric Keypad	12	—	250	**
4831	Program Function Keypad	12	—	250	**
	Printers				
	3287 Model 1; 80 cps	239	203	4,830	41.50
	3287 Model 2; 160 cps	291	248	5,150	51.50
1066	Data Analysis-APL; 3287 only	14	12	297	NC
1120	APL/Text	6	5	165	0.50
3610	Extended Character Set Adapter	19	16	429	3.50
3880	Extended Print Buffer	7	6	198	0.50
8330	3271/3272 Attachment	42	36	860	3.00
8331	3274/3276 Attachment	6	5	165	0.50
8700	Variable Width Forms Tractor	6	5	151	0.50
4110	Friction Feed Paper Handling	6	5	151	0.50
	3287 Model 1C; color printing; 80 cps	295	251	5,210	47.00
	3287 Model 2C; color printing; 120 cps	347	295	5,530	57.00

**Includes prime-shift maintenance.*
***Maintenance plans available include: (A) Customer Carry-in Repair, annual charge; (B) Customer Carry-in Exchange, annual charge; (C) Customer On-site Exchange, annual charge; (D) IBM On-site Exchange, annual charge (during warranty period). In some cases, these plans are offered in addition to standard monthly maintenance.*

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IBM 3270 Information Display System

Monthly Charges*

		Rental	Lease	Purchase	Monthly Maint.
	Programmed Symbols				
5781	PS-2; storage for first two symbol sets; requires 3610 and 2880	39	33	826	4.50
5782	PS-4; storage for additional four symbol sets; requires 5781	33	28	662	3.00
5783	PS-4A; storage for four symbol sets; including one set with multi-color addressing; requires 3610 and 3880; for 3287-1C and -2C only	71	60	1,485	13.00
	3289 Model 1; 155 lpm	531	452	8,830	121.00
	3289 Model 2; 400 lpm	805	685	13,140	205.00
1090	Audible Alarm	6	5	192	NC
1130	Text Print	7	6	231	NC
4450	Form Stand; all models except 3289	—	—	565	—

**Includes prime-shift maintenance.*
***Maintenance plans available include: (A) Customer Carry-in Repair, annual charge; (B) Customer Carry-in Exchange, annual charge; (C) Customer On-site Exchange, annual charge; (D) IBM On-site Exchange, annual charge (during warranty period). In some cases, these plans are offered in addition to standard monthly maintenance.*■

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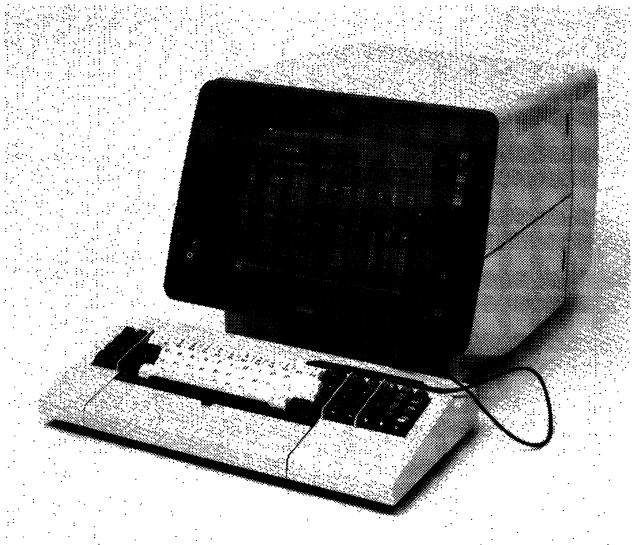
IBM 3270 Information Display System

MANAGEMENT SUMMARY

Of the vast number of alphanumeric display terminal models currently available, those which comprise the IBM 3270 Information Display System are the most significant. Various market studies put the current installed base of 3270-type terminals at around a million, making it the largest single segment of the terminal market. Of that installed base, approximately half of those are IBM terminals; the rest are 3270-compatible models from independent vendors such as ITT Courier, Harris, Lee Data, MDS Trivex, Memorex, Racal-Milgo, Raytheon, Teletype, and Telex. Growth in this market continues, as new vendors enter with 3270-compatible products, and established vendors enhance their offerings.

The first generation of 3270 components was introduced by IBM in 1972, and consisted of: the 3271 Control Unit; 3272 Control Unit; 3275 Stand-Alone Display Station; 3277 Cluster Display Station; 3284 Matrix Printer; 3286 Matrix Printer; and 3288 Belt Printer. In an announcement that became effective November 16, 1982, IBM has withdrawn the first generation of 3270 products from marketing. The above-mentioned models are no longer marketed by IBM, although it will continue to support existing units. The plug-compatible market for these components is expected to remain quite active for at least another two to three years.

The second generation of 3270 components was unveiled in 1977, and included: the 3274 Control Unit; 3276 ➢



The 3279 Color Display station was introduced by IBM in 1979. Five models are currently available, providing a choice of screen arrangements (1920- or 2560-character capacities), and two color modes. Base color mode provides four colors (red, green, blue, and white), while extended color mode provides the base colors plus three additional colors (yellow, pink, and turquoise).

The most widely emulated display terminal family on the market today. The 3270 Information Display System components include controllers, display stations, and printers, for use in stand-alone or cluster configurations in remote or local environments.

Family members include: the 3274 Control Unit; 3276 Control Unit Display; 3278 Cluster Display; 3279 Color Display; and 3287 and 3289 Printers. Cluster systems can accommodate up to 32 displays and/or printers. Both BSC and SDLC protocol compatibility are available with all models. The 3270 display stations offer a variety of screen capacities and keyboard styles.

A sample cluster configuration consisting of a 3274 Model 51C controller, 16 3278 Model 2 displays, and four 3287 Model 2 printers is priced at approximately $2,445 per month on a two-year lease, including maintenance.

CHARACTERISTICS

VENDOR: International Business Machines Corp., Information Systems Group, National Accounts Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.

DATE OF ANNOUNCEMENT: 3274/3276/3278/3287/3289—May 1977; 3279/3287-1C, -2C/3274-51C—October 1979; 3274-21A/B/C/D & -31A/B/D—early 1982.

DATE OF FIRST DELIVERY: Usually within one year of announcement.

SERVICED BY: International Business Machines.

CONFIGURATION

The 3270 family of display/keyboard stations and printers can be configured as a local or remote cluster or as a stand-alone station. There are two generations of components (first generation components are no longer marketed) with a limited degree of mixing permitted within the same subsystem; complete compatibility for communications and applications program support can be achieved with the new components, if desired. The accompanying table presents the overall configurational possibilities. Specific prerequisites are detailed in the discussions of individual components.

TRANSMISSION SPECIFICATIONS

3274 Models 21C, 31C, and 51C operate in half-duplex point-to-point, or in half- or full-duplex multipoint, using BSC or SDLC protocols, at speeds of 1200/600 (51C only), 2000, 2400/1200, 4800/2400, 7200/3600, and 9600/4800 bits per second on non-switched facilities. Multipoint and point- ➢

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IBM 3270 FAMILY COMPONENTS AND SUBSYSTEMS

Controller	Mode	Integrated Display	Maximum Devices	Components Supported: Displays	Keyboards	Printers
3274-21A/B/D & -31A/D	Local	—	32**	3277*/8/9	463X*/462X	3284*/6*/7/8*/9
3274-21C/-31C	Remote	—	32**	3277*/8/9	463X*/462X	3284*/6*/7/8*/9
3274-51C	Remote	—	12	3277*/8/9	4640/4651/2	3284*/6*/7/8*/9
3276	Remote	1	8	3278/9	462X	3287/9

*Withdrawn from market.
**Supports up to 32 new style (Category A) or 16 "new style" plus 16 "old style" (Category B) display/keyboards and printers. Category A devices include 3278 displays and 3287/9 printers. Category B devices include 3277 displays and 3284/6/7/8 printers. (The new 3287 printers appear in both categories.)

Control Unit Display Station; 3278 Cluster Display Station; 3287 Matrix Printer; and the 3289 Belt Printer. IBM has now replaced the original 3274 Control Unit models with Models 3274-21 and -31. These newer control units contain a new storage technology, and support extended color, extended highlighting, and presentation graphics functions.

In October 1979, IBM made another major addition to the 3270 family with the introduction of the 3279 Color Display Station. Although the 3279 was not the first color display on the market, it was seen by many industry observers as IBM's acknowledgement that color displays were a legitmate part of a general-purpose system, and not just an unnecessary extravagance. Along with the 3279, IBM unveiled color versions of the 3287 Printer, as well as a new 3274 Control Unit Model 51C, and enhancements to several existing models.

IBM makes the 3270 components available under its Customer Set-Up (CSU) plan, in which the customer installs the equipment without the aid of IBM personnel. Installation is expected to be able to be accomplished on the "same day as delivery," with rental or lease charges beginning the next working day (unless there is a problem with the equipment). Internal test and check features are standard on all components so that the user can diagnose most problems without involving IBM. Movement of equipment is also permitted under this agreement, and if use of a piece of equipment is discontinued the customer must pack it up and put it on the loading dock for pickup.

USER REACTION

During June, July, and August of 1982, Datapro conducted an extensive Terminal Users' Survey in conjunction with *Data Communications* magazine. A questionnaire was designed and produced by Datapro and mailed to approximately 10,000 addresses selected at random from a cross-section of *Data Communications'* U.S. end-user subscriber base. The users were asked to rate all types of terminal equipment, including clustered and stand-alone displays, intelligent, smart, and dumb displays, and teleprinters. A large number of responses on the IBM 3270 Information Display System were received, yielding ratings on controllers, display stations, and printers. These ratings are summarized in Tables 1, 2, and 3.

to-point communications at speeds up to 19,200 bits per second and point-to-point communications at speeds up to 56K bits per second are also possible where facilities are available.

The 3276 operates in half-duplex point-to-point, or in half- or full-duplex multipoint at speeds of 1200, 2000, 2400, 4800, 7200, or 9600 (SNA/SDLC only) bits per second on non-switched facilities. Also, 3276 Models 11, 12, 13 and 14 operate in half-duplex point-to-point on the public switched telephone network at speeds of 1200 or 4800 bits per second, and on public switched data networks at speeds of 2400, 4800, or 9600 bits per second. Models 11 through 14 also operate in half-duplex at 9600 bits per second over a direct attached loop, and at 2400, 4800, or 9600 bits per second over a data link attached loop.

HOST COMPUTER SOFTWARE SUPPORT

A 3270 subsystem is supported for local and remote operation by IBM System/360, System/370, 4300 Series, 8100, 30XX, Series/1, and System/3 computer systems. Remote terminals are supported by BTAM, TCAM, VTAM, RPG Telecommunications, BSCA Multiline/ Multipoint, and Communications Control Program depending on computer system and operating system. The 3274-based local clusters are supported on mainframe configurations under 3272 mode or under VTAM. In general, all new models and configurations of the 3270 can be supported under previous 3270 programming. If Display Exception Monitoring Facility (DEMF) software is installed on the host computer, network support for problem determination/isolation is available to terminals operating in BSC mode. In addition, 3270 display printer components, as well as 3276/3278 clusters, are used with higher-level systems such as the IBM 8100 and 3790.

DEVICE CONTROL

The 3270 System operates under the control of the program stored at the remote computer. Under program control, the 3270 can execute any of four types of commands: read, write, control, and sense.

Read commands initiate transfer of the contents of a device buffer, modified fields within the buffer, buffer addresses or data of fields specified by the selector pen, or the single-byte Attention Identification (AID) code generated by a Program Function or Program Access key. The 3270 responds to two read commands, Read Buffer and Read Modified.

Read Buffer initiates transfer of the contents of the addressed device buffer from the initial or current cursor address.

Read Modified initiates one of three operator-initiated functions: Read Modified, Short Read, or Test Request. Read Modified initiates the transfer of all fields modified by the keyboard within the device buffer. The fields are transferred in sequence beginning with the first modified

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IBM 3270 Information Display System

TABLE 1. USER RATINGS OF 3270 CONTROLLERS

Model	Number of User Responses	Average # of Displays**	Average # of Printers**	Weighted Averages*					
				Overall Performance	Ease of Operation	Reliability of Controller	Reliability of Peripherals	Maintenance Service	Technical Support
3274	80	49.7	8	3.4	3.2	3.4	3.4	3.2	3.0
3276	9	12.3	2.8	3.3	3.1	3.4	3.3	3.0	2.6
3271/3272/ unspecified	61	62.8	14.6	3.4	3.3	3.3	3.3	3.2	2.8

*Weighted Average is based on assigning a weight of 4 to each user rating of Excellent, 3 to Good, 2 to Fair, and 1 to Poor.
**Average number per system.

TABLE 2. USER RATINGS OF 3270 DISPLAYS

Model	Number of User Responses	Number of Displays Installed	Weighted Averages*					
			Overall Performance	Ease of Operation	Display Clarity	Keyboard Feel & Usability	Hardware Reliability	Maintenance Support
3275	7	231	3.0	3.3	3.1	3.3	3.0	3.0
3276	16	682	3.4	3.4	3.4	3.4	3.4	3.5
3277	35	3,100	3.3	3.4	3.2	3.4	3.4	3.2
3278	141	28,332	3.6	3.4	3.4	3.4	3.6	3.3
3279	32	10,034	3.7	3.7	3.5	3.6	3.7	3.5
3270, unspecified	36	12,124	3.4	3.2	3.3	3.3	3.4	3.2

*Weighted Average is based on assigning a weight of 4 to each user rating of Excellent, 3 to Good, 2 to Fair, and 1 to Poor.

TABLE 3. USER RATING OF 3270 PRINTERS

Model	Number of User Responses	Number of Printers Installed	Weighted Averages*				
			Overall Performance	Ease of Operation	Print Quality	Noise Level	Hardware Reliability
3284	4	15	3.3	2.8	3.0	3.0	2.5
3286	6	275	3.0	3.0	3.0	2.6	2.7
3287	55	2,226	3.0	3.0	2.9	2.6	3.0

*Weighted Average is based on assigning a weight of 4 to each user rating of Excellent, 3 to Good, 2 to Fair, and 1 to Poor.

In addition to the ratings, the users were asked whether or not they would recommend their 3270 equipment to other users with similar applications. Of the 150 users who responded to the controller portion, 112 answered that they would recommend their controllers, six answered that they would not, and the remainder were undecided or did not answer the question. Of the 267 users who reported on the displays, 216 answered positively, 10 negatively, and the remainder were undecided or did not respond. This question was not tallied for the printer users.□

field; all nulls are suppressed. However, when completion of a key-modified field is signaled by a selector pen operation, a resulting Read Modified operation will transfer only the address of the modified field. Short Read initiates transfer of the single byte AID Code generated by a Program Attention key. Test Request Read performs the same operation as Read Modified; however, a hardware-generated heading precedes the data. Nulls are suppressed as in Read Modified. Only the special heading is transferred if data has not been keyed.

Write commands condition the display or printer to receive a computer message. Two write commands—Write and Erase/Write—load, format, and selectively erase device buffer data, and can also initiate device operations such as starting the printer, resetting the keyboard, and sounding the audible alarm. Both commands are the same except that Erase/Write erases the entire contents of the device buffer before fresh data is written (beginning at the initial buffer address) and Write modifies existing buffer data.

Control commands initiate control unit and/or device operations. There are three control commands: Copy, Select, and Erase All Unprotected. Copy, executed by a remote control unit only, transfers buffer data from one device to another. Select, executed by a 3274 in 3277 mode only, transfers buffer data from the selected device to the controller. Erase All Unprotected initializes the addressed device, erasing all unprotected buffer locations and repositioning the cursor to the initial position of the first unprotected field.

A local 3274 cluster operating under VTAM looks like a remote control unit.

Program control by data field provides a flexible formatting capability. A field, identified by an attribute control code (nondisplayed) in the initial character position, can possess any one of several characteristics. The attribute control code can specify a protected or unprotected field (for fixed format operation), beam intensity of brightness (off, normal, or

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bright), alphanumeric or numeric (automatic shift) input, auto lock or skip, tab stop, or light pen selection.

The Program Tab feature automatically writes successive data fields into successive unprotected data fields defined by a fixed format.

Character Addressing permits a message to be written beginning at any screen location. Addressing can be interspersed with data throughout a message received from the computer. Character Addressing also permits the selective modification of attribute control codes.

Operator controls are provided for cursor control, editing, and program functions.

Cursor controls position the cursor up, down, left, or right, step-by-step or repetitively if the key is held depressed. The cursor can also be backspaced one character position, moved to the beginning of the next line or beginning of the next unprotected data field, tabbed to the beginning of the next unprotected data field, and backtabbed to the beginning of the previous unprotected field.

Edit controls permit data to be inserted in or deleted from text, character-by-character. Following data is automatically expanded or contracted.

Program Function keys are used to initiate program functions or identify data that can be transmitted with an accompanying program function code.

The 3276 and 3278 have two added controls: Cursor Home key and Cursor Select key. The Cursor Home key returns the cursor to the first non-protected character position. The Cursor Select key causes a selection operation similar to a light pen operation; a light pen (Selector Pen) is optional in addition to this control. A Print key is included on 3276/3278 display/keyboards when attached to a 3274 Control Unit; this key causes the displayed data to be transferred to a printer for immediate printing without requiring a host computer command; normal print commands can also be executed. The standard cursor is an underscore. On a 3278 display connected to a 3274 controller, the cursor can be standard or reverse video underscore, blinking or non-blinking as selected by the operator.

Readers capable of accepting a credit-card size plastic card with up to 40 characters encoded on a magnetic tape stripe can be connected to all models of displays. The reader for the new displays (3276 and 3278) will accept previously coded cards if the normal end of form control character (not the Hex C optional character).

COMPONENTS

3274-21A, -21B, -21C, -21D, -31A, -31C, AND -31D CONTROL UNITS: Provide control of a local or remote cluster of up to 32 displays or printers. Models -21A, -21B, -21C, and -21D contain 64K bytes of storage; Models -31A, -31C, and -31D contain 128K bytes of storage. The units are upward compatible with and supercede predecessor 3274 Models 1A, 1B, 1C, and 1D. They support enhanced storage technology and extended color, extended highlighting, and presentation graphics functions not available on the older models. Models -21A and -31A support a local cluster operating in SNA mode under VTAM, and are upward compatible with the 3274-1A. Model -21B supports a local cluster operating in 3272 compatible mode, and supercedes the 3274-1B. Models -21C and -31C support a remote cluster operating under BSC or SDLC protocol, and are upward-compatible with the 3274-1C. Models -21D and -31D are upward-compatible with Models -21B and -31B respectively, and combine local attachment in 3272-compatible mode with an APL/Text control function; the -21D and -31D supercede the 3274-1D.

Operating functions are controlled by feature and systems diskettes customized at installation, using a diskette drive integral with the controller. The 3274-21C/-31C is conditioned for BSC or SDLC operation by loading a program into the controller using interchangeable diskettes.

All models support mixing of the older 3277/3284/3286/3288 (Category B) devices on the same controller with the new 3278/3287/3289 (Category A) devices. The basic controllers each accommodate up to eight of the newer components. One Type A Terminal Adapter is required for each additional group of eight of the new devices. Alternatively, up to four Type B Terminal Adapters, each accommodating up to four 3277/3284/3286/3287/3288 Category B devices, can be installed. A single controller can accommodate a cluster of up to 32 terminals, comprised of groups of 8 Category A devices and groups of 4 Category B devices; however, no more than 16 (i.e., 4 groups) of the 32 terminals can be Category B devices. A minimum of one 3278 display and keyboard is required. The 3287 printer can be attached to either Type A or Type B adapters. A 3278 Model 5 display cannot be attached to a 3274-21B/-31B Control Unit.

Control Storage Expansion is required to install Type B Terminal Adapters in the 3274-21A/C and -31A/C; these features are not required to install Type B Adapters in the 3274-21B/D and -31B/D.

The 3274-21C and -31C require the External Modem Interface Feature and either the Common Communications Adapter or the High Performance Communications Adapter. The latter is required if any Type B Terminal Adapters are installed and a transmission speed of 9600 bps is used; otherwise the CCA is adequate for all transmission combinations.

Dataphone Digital Service is available on Models 21C and 31C via both point-to-point and multipoint adapters. Models 21C and 31C can also be equipped with an Encrypt/Decrypt device which codes and decodes messages using the Federal Data Encryption Standard algorithm.

The APL/Text feature, available on all models except 21B, permits display (on an adapted 3278) or printing (on an adapted 3287) of an expanded 222-character set, including the standard EBCDIC and APL characters plus 37 text-specific characters and 10 graphics plot characters. The Text Print feature, available with all models except 21B, permits printing on the 3289 of a 125-character set (93 EBCDIC characters plus the 32-character Text Character set) and character underscore and overprint capabilities.

Enhancements to the 3274 support attachment of the 3279 Color Display Station and 3287 Models 1C and 2C Color Printers. Any 3274 except Model 21B can now be specified with one of three no-charge Configuration Support packages (A, B, or C); Model 21B is always equipped with Configuration Support A. Configuration Support A provides support for most 3270 functions, including base color mode; Support B adds the ability to attach 3278-5 printers, and to perform specific SNA-related functions; Support C includes all Support A and B functions plus certain other functions, including extended color mode, extended highlighting, and programmed symbol set support.

3274-51C CONTROL UNIT: Provides control of a remote cluster of up to twelve displays and printers operating under BSC or SDLC protocol. The basic controller accommodates up to eight 3278/3279/3287/3289 (Category A) devices. Four additional 3277/3284/3286/3287/3288 (Category B) devices can be attached via the Terminal Adapter Type B

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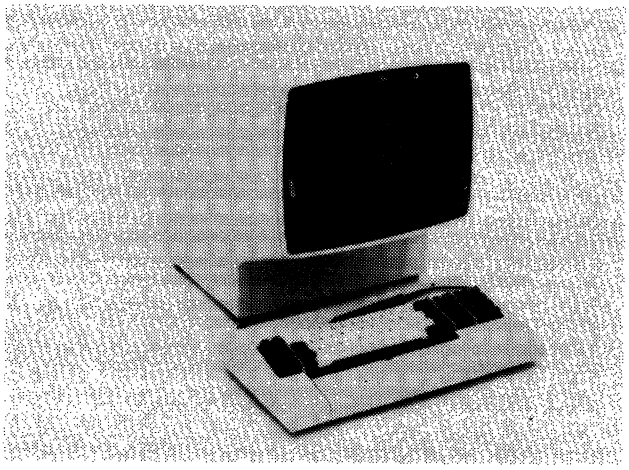

The 3278 Display Station was introduced in 1977 as a member of the second generation of 3270 components. The 3278 is used in cluster configurations in conjunction with the 3274 Control Unit. A variety of screen capacities are available, ranging in size from 960 characters to 3564 characters. A choice of keyboard styles is also available to the buyer, all of which are detachable.

(#7801). Except for the number of devices supported, the Model 51C offers equivalent and compatible functions and features to a 3274 Model 1C. In addition it provides certain features not available on the Model 1C: 8100 System attachment using SDLC via a data link or a direct or data link attached loop (this feature provides support for Category A devices only); a 1200 bps integrated modem; and a switched network communications capability. The 3274 Model 51C is also upward compatible with the 3276 Control Unit Display Station, except that it provides the Printer Authorization Matrix used on other 3274's instead of the Default matrix used on the 3276.

In June 1982, IBM designated 3274 Control Unit Models 21C, 31A, 31C, 31D, and 51C as standard model configurations. This designation provides the customer with ease of configuration, a simplified ordering process, and potentially faster delivery times when ordering one of these models.

3276 CONTROL UNIT DISPLAY STATION: A controller for small remote clusters; it also includes an integrated display that is functionally equivalent to a Model 3278 Display Station. The 3276 can accommodate up to seven additional displays and printers.

A total of eight models provide combinations of four display capacities and BSC or SDLC operations.

Model 1—960 character display; BSC transmission.
Model 2—1920 character display; BSC transmission.
Model 3—2560 character display; BSC transmission.
Model 4—3440 character display; BSC transmission.
Model 11—960 character display; SDLC transmission.
Model 12—1920 character display; SDLC transmission.
Model 13—2560 character display; SDLC transmission.
Model 14—3440 character display; SDLC transmission.

The BSC models (-1/2/3/4) can accommodate any mix of up to seven additional 3278 displays and 3287 and 3289 printers. The added 3278 display cannot have a larger display capacity than the basic 3276 integrated display. However, the SDLC/BSC Switch feature permits alternate protocol operation and also permits intermixing any size display on any "BSC" 3276 model. The SDLC models (-11/12/13/14) can accommodate and display size mix. The display screen measures 14 inches (diagonally).

The basic 3276 controller (any model) can accommodate two devices. A Terminal Adapter is required for each additional two devices. Models 11, 12, 13, and 14 can be equipped with an Encrypt/Decrypt device which codes and decodes messages using the Federal Data Encryption Standard algorithm.

The 3276 requires an External Modem Interface or an Integrated Modem (1200 bps.) Five integrated modem features are available for operation over switched or non-switched facilities, providing basic transmission linkage plus optional network backup and manual or auto answer capabilities. Either external or internal modem operation requires a Communications Feature.

Dataphone Digital Service is available on all models via both point-to-point and multipoint adapters. APL/Text functions similar to those provided by the 3274 Control Unit can be implemented by equipping the 3276 with APL/Text Control and Extended Function Base features.

A Color Display Attachment feature (#1950) provides the 3276 with support for an attached 3279 Display Station operating in base color mode. This feature requires the previously available Extended Function Base feature (#1068), and does not support operation of a 3279-2B or -3B in extended color mode. (The Color Display Attachment is not required for color printing via a 3287 Model 1C or 2C Color Printer.) Another 3276 enhancement removes the mutually exclusive restriction between the Extended Function Base feature (#1068) and the Encrypt/Decrypt feature (#3680). An audible alarm and security keylock are standard features.

3278 CLUSTER DISPLAY STATION: Five models are available, distinguished by the display capacity. Model 1 displays 12 lines of 80 characters each (960 characters total); Model 2 displays 24 lines of 80 characters each (1920 total); Model 3 displays 32 lines of 80 characters each (2560 total); Model 4 displays 43 lines of 80 characters (3440 total); Model 5 permits operator selection of display arrangements of 24 lines of 80 characters (1920 total) or 27 lines of 132 characters (3564 total). The display screen measures 14 inches (diagonally).

A character set of 94 characters, including upper and lower case alphabetics, numeric, and special symbols is displayed. When connected to a 3274, the 3278 can incorporate the APL/Text feature; the Character Set Extension feature and a 4626 or 4629 keyboard are required. A monocase switch provides 3277 compatibility. Each character for Models 1, 2, and 3 is formed by a 7 x 14 matrix; for Models 4 and 5, a 9 x 12 matrix is used. Extended highlighting and symbol set functions (monochromatic only) have been added to Models 2, 3, and 4. A Switch Control Unit permits a 3278 Display to be switched between two controllers.

The 3278 uses the 462X series, 4640, 4651, or 4652 keyboards. The displays can be equipped with a keyboard, numeric lock, address lock, selector light pen, magnetic slot reader, and magnetic hand scanner, as options. The audible alarm and security keylock, which were previously available as options, are now standard in the base configuration.

3279 COLOR DISPLAY STATION: Five models, are currently available, three of which (Models S2A, S2B, and S3G) have been designated standard models, and two of which (Models 2X and 3X) may be used to order customer configurations. These new models replace the previous 3279 Models 2A, 2B, 3A, and 3B. Standard models are designed to provide the customer with easier configurations, a simplified ordering process, and potentially faster delivery times.

The standard models have no optional features other than the selected keyboard. They represent the most popular

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configurations of the Model 2A, 2B, and 3B. Model S2A supports base color mode, and provides a 1920-character screen capacity; Model S2B supports extended color mode, and provides a 1920-character screen capacity plus extended highlighting and APL. Model S3G supports extended color mode, and provides a 2560-character screen capacity plus extended highlighting, APL, and programmed symbols. Base color mode supports the use of four colors (red, green, blue, and white) as substitutes for existing protect and intensify field attributes. Extended color mode includes the features of the base color mode, provides three additional colors (yellow, pink, and turquoise), and permits field character addressing of color highlighting as an independent attribute. On Models S2B and S3G, extended highlighting consists of the use of reverse video, blinking, and underscoring. Model S3G provides storage of up to six 190-character programmed symbol sets containing user-defined shapes and symbols for use in graphic display representations.

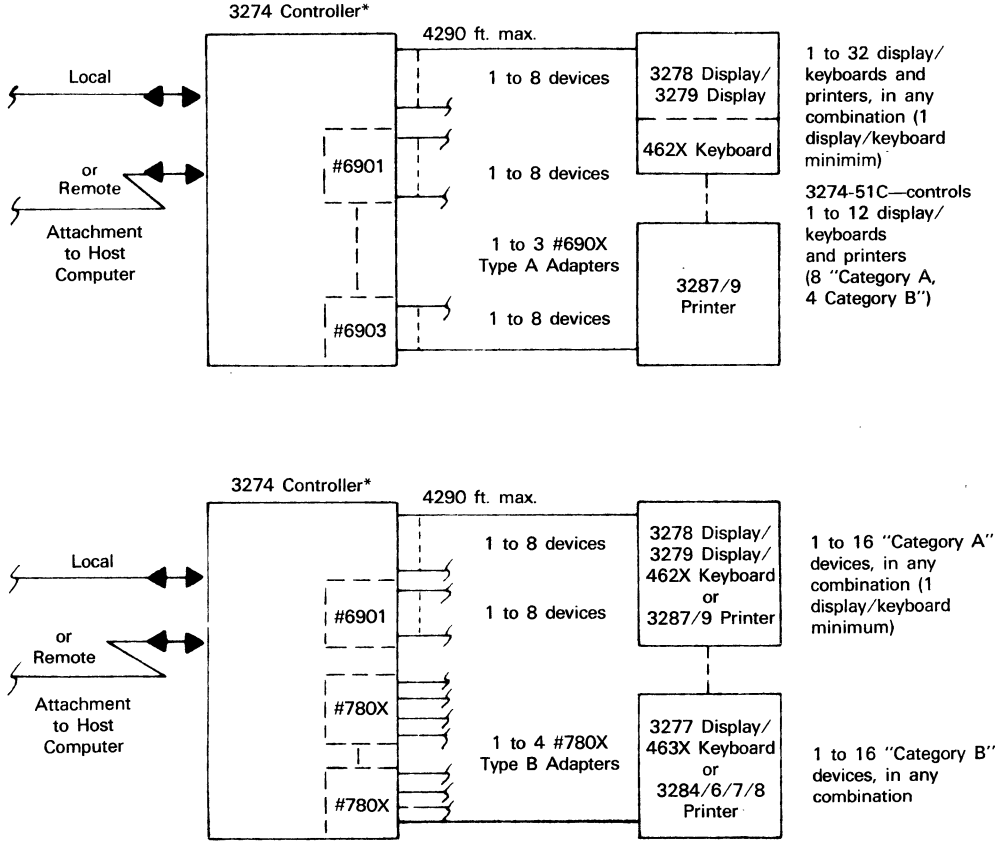
Model 2X can be used to order special configurations equivalent to previous Models 2A, and 2B. All Model 2X configurations contain a 1920-character screen capacity. Model 3X can be used to order special configurations equivalent to Models 3A and 3B. All Model 3X configurations contain a 2560-character screen capacity. The Extended Function feature, when added to Model 2X or 3X, provides extended color, extended highlighting, and the APL/Text character set.

A 3279 display operating in base color mode can be attached to any Model 3274 Control Unit with any of the Configuration Support packages (A, B, or C) or to a 3276 Control Unit Display Station that supports the 3279's screen capacity and is equipped with the Extended Function Base (#1068) and the Color Display Attachment (#1950) features. A 3279 display utilizing extended color, extended highlighting, or programmed symbols can be attached only to a 3274 Model 1A, 1C, 1D, or 51C with Configuration Support C.

462X KEYBOARDS: For use with 3278 displays and 3276 controller/displays. A total of eight models are available with various combinations of layouts, data codes, and program function keys. A complete listing of models and basic characteristics is provided in the price list. All data entry layouts include a separate group of 120 program function keys. All typewriter models include 12 program function keys that are activated by an alternate shift mode. Two models include an additional 12 keys for a total of 24 program function keys; two models include text-oriented characters for use with APL/Text features. All models, except the latter four, have 75 keys. The four expanded typewriter layouts have 87 keys. A Numeric Lock feature is available.

4640/4651/4652 KEYBOARDS: For use with 3278 displays or 3279 color displays. The 4640 is an 87-key EBCDIC typewriter overlay keyboard; the 4651 is an 87-key EBCDIC attribute select typewriter keyboard; the 4652 is an 87-key EBCDIC attribute select typewriter/APL keyboard. All three models include keytop annotations for color, extended highlighting, and programmed symbol sets.

3287-1 AND -2 MATRIX PRINTERS: This printer can be used with the older (3271/3272) as well as newer (3274/3276) cluster controllers. Model 1 operates at 80 cps; Model 2 operates at 120 cps. Both models achieve these speeds through bidirectional printing. Both print 10 characters per inch, 6 or 8 lines per inch, and 132 positions across the page. Separate attachment features are required for connection to



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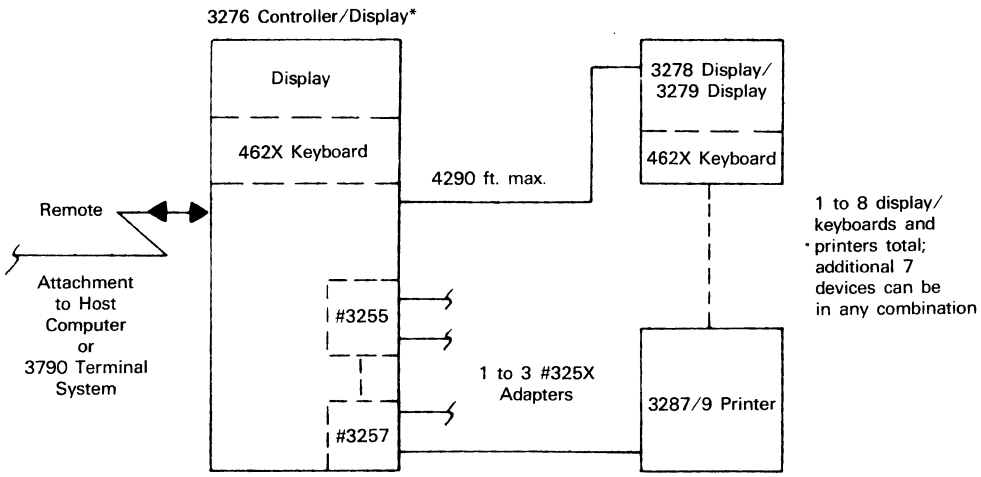

*See text for communications, display, keyboard, and printer models, characteristics, and options.

a 3274/3276 controller. When connected to a 3274, the 3287 can incorporate the APL/Text feature; an Extended Character Set Adapter and a 3274 Attachment feature are required. A special feature, Extended Print Buffer, is required for operation with 2560, 3440, and 3564 character displays. Character formation is 4 of 7 x 8. A programmed symbol set support feature (monochromatic only) is available. A Variable Width Forms Tractor option, as well as Friction Feed Paper Handling option, is available. An audible alarm is a no-cost feature for signaling a forms-out condition; the alarm can also be sounded via a host computer command.

3287-1C and -2C MATRIX PRINTERS: Two color models that vary only in their rated print speeds: Model 1C prints at a maximum of 80 characters per second and Model 2C at 120 characters per second, when printing bidirectionally with a single color per line. Four colors (red, green, blue, and black) are provided via a multi-color ribbon. Print positions 1 through 120 can be printed in any color, but positions 121 through 132 can only be printed in black. As with the 3279 Display, two levels of color usage are supported. Basic color mode printing is standard on both models and substitutes color for existing protect and intensify field attributes. Extended color mode requires the previously available Extended Character Set Adapter (#3610) and permits user specification of color as an independent character or field attribute. When seven-color displayed data is transferred to a four-color printer, extended colors (pink, yellow, and turquoise) are printed in black. Extended highlighting permits underscoring of printed data, but blinking and reverse video attributes are ignored. Storage for two, four, or six programmed symbol sets, including a four-color business graphics set, is also supported and requires two previously available options, the Extended Character Set Adapter (#3610) and the Extended Print Buffer (#3880). Except for color printing, functions and features of the Model 1C and 2C are equivalent to the 3287 Models 1 and 2, respectively.

The 3287 Models 1C and 2C can be attached to any model of the 3274 Control Unit with a Category A terminal port, and to any 3276 Control Unit Display Station (features #1068 and #1950 are not required). Unlike 3287 Models 1 and 2, they cannot be attached to a 3271 or 3272 Control Unit. When operating with extended color, extended highlighting, and preprogrammed symbol sets, Models 1C and 2C can be attached only to a 3274 Model 1A, 1C, 1D, or 51C with Configuration Support C.

In June 1982, IBM designated 3287 Models 1, 2, and 2C as standard model configurations. This designation provides the customer with ease of configuration, a simplified ordering process, and potentially faster delivery times when ordering one of these models.

3289 BELT PRINTER: A higher-speed printer for use with 3274 and 3276 clusters. The printer is available in two models that differ only in print speed. Model 1 operates at 155 lines per minute with a 48-character set (both EBCDIC and ASCII are available); performance is reduced to 120 and 80 lines per minute, respectively, when a 64- or 94- character set is used via interchangeable belts. Model 2 operates at a peak speed of 400 lines per minute with a 48-character set, 300 lines per minute with a 64-character set, and 230 lines per minute with 94-character set. When connected to a 3274, the 3289 can incorporate the Text Print feature; an Extended Character Set Adapter is required. Data is printed at 10 characters per inch and 6 or 8 lines per inch; 132 print positions are provided. An Audible Alarm feature (extra-cost) sounds when end of forms is reached or when activated by the host computer.

PRICING

All 3270 components, old and new, are available under the terms of IBM's Rental or Lease Agreement (LRA) or for purchase. LRA includes prime shift maintenance; a separate contract is available for purchased units. All new components are user installed via IBM's new Customer Set-Up Policy.

LRA was announced for general application in April 1977. Basically, this arrangement provides for month-to-month rental or for a two-year lease with penalties for early termination (including model downgrades and feature termination). The lease can be extended indefinitely, one year at a time. The monthly charges for the lease arrangement are generally 15 percent lower than the month-to-month arrangement. The prime shift maintenance period is for any consecutive nine hours between 7 AM and 6 PM, Monday through Friday. (The maintenance charges given in the accompanying price list are for prime shift maintenance for purchased equipment and also serves as the basis for calculating extended charges for rented or leased equipment.) Extended period maintenance is available up to 24 hours per day, 7 days per week.

The termination charge for the lease arrangement is the lower of 5 months' charges or 25 (5 percent for the 3286 printer) percent of the remaining value of the lease. (For periods of fewer than 20 months, the 25 percent charge will be lower than the 5 month charge.)

All 3270 components are in maintenance category A, except the 3278 Control Unit Display Station, which is in category

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D. These categories determine the schedule of extended maintenance charges. The two schedules differ for extended Monday through Friday maintenance, but are the same for Saturday and Sunday maintenance. The premium for extended maintenance is expressed in the table below as a percentage of the basic maintenance charges, which are listed in the accompanying price list.

	Consecutive Hours				
	9*	12	16	20	24
Monday-Friday—					
Category A	10%	14%	18%	22%	26%
Category D	10	12	14	16	18
Saturday	4	5	7	8	9
Sunday	5	7	9	11	12

*For periods outside the basic 7 AM to 6 PM prime shift.

The lease arrangement also guarantees a maximum rate of increases for extended leasing periods. The rate for all 3270 components is five percent per year beginning in the second year of the lease.

All 3270 components are classed under rental category B (unlimited usage) and warranty category B (three months). Purchases credits can be accured up to a maximum of 55 percent.

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Cluster Controllers				
	3274 Model 21A; local, SNA mode	$709	$603	$17,560	$110.00
	3274 Model 21B; local, 3272 mode	709	603	17,560	114.00
	3274 Model 21C; remote; requires 3701	498	424	12,340	84.50
	3274 Model 21D; local, 3272 mode	709	603	17,560	121.00
	3274 Model 31A; local, SNA mode	833	709	20,570	136.50
	3274 Model 31C; remote; requires 3701	622	529	15,350	111.00
	3274 Model 31D; local, 3272 mode	833	709	20,570	147.50
	3274 Model 51C; remote; requires 3701	230	196	6,035	57.50
	Terminal Adapters—				
6901	Type A1; devices 9 through 16	43	37	1,135	2.50
6902	Type A2; devices 17 through 24	43	37	1,135	2.50
6903	Type A3; devices 25 through 32	43	37	1,135	2.50
7801	Type B; requires 5550	51	43	1,215	5.50
7802	Type B1; devices 1 through 4	53	45	1,215	5.50
7803	Type B2; devices 5 through 8	43	37	1,025	3.00
7804	Type B3; devices 9 through 12	43	37	1,025	3.00
7805	Type B4; devices 13 through 16	43	37	1,025	3.00
1801	Control Storage Expansion	42	36	985	6.00
3701	External Modem Interface; requires 6301, 6302, 6303	15	13	374	4.50
6302	Common Communications Adapter; SDLC or BSC; up to 9600 bps with Type A only Terminal Adapters and up to 7200 bps with Type B or mix; 3274-21C, -31C, or -51C only	13	11	405	2.50
6303	High Performance Communications Adapter; SDLC or BSC; 9600 bps with Type B Terminal Adapters or mix; 3274-21C, -31C, or -51C only	47	40	1,120	12.50
8801	Watertight Power Connector; 3274-21A/B/D and -31A/D	NC	NC	NC	NC
3680	Encrypt/Decrypt; 3274-1C, 3274-21C, -31C, -51C only	74	68	1,980	2.50
5650	Dataphone Digital Service; point-to-point; 3274-21C, -31C or -51C only	31	26	840	2.00
5651	Dataphone Digital Service; multipoint; 3274-21C, -31C, or 51C only	31	26	840	2.00
4850	Loop Adapter; for 8100 System attachment; requires 6303 and Configuration Support C	35	30	885	4.00
	Controller/Display Stations				
	3276 Model 1; 960 char., BSC	239	203	5,980	37.00
	3276 Model 2; 1920 char., BSC	246	209	6,150	38.00
	3276 Model 3; 2560 char., BSC	249	212	6,315	39.00
	3276 Model 4; 3440 char., BSC	260	221	6,480	39.50
	3276 Model 11; 960 char., SDLC	239	208	5,980	33.00
	3276 Model 12; 1920 char., SDLC	246	203	6,150	33.50
	3276 Model 13; 2560 char., SDLC	249	212	6,315	34.50
	3276 Model 14; 3440 char., SDLC	260	221	6,480	35.00
3255	Terminal Adapter No. 1; devices 3 and 4	20	17	589	1.50
3256	Terminal Adapter No. 2; devices 5and 6	20	17	589	1.50
3257	Terminal Adapter No. 3; devices 7 and 8	20	17	589	1.50
3701	External Modem Interface; requires 6301 or 6302	15	13	374	4.00
3680	Encrypt/Decrypt; 3276-11, -12, -13, -14 only	69	59	1,600	2.50

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		Monthly Charges*			
	Controller/Display Stations (continued)	Rental	Lease	Purchase	Monthly Maint.
	1200 bps Integrated Modems—				
5500	Non-switched; requires 6301	$ 25	$ 21	$ 625	$ 5.50
5501	Switched, Auto Answer; requires 6301	35	30	786	3.00
5502	Switched, Manual Answer; requires 6301	25	21	625	4.00
5507	Non-switched with Switched Backup; requires 6301	36	31	851	7.50
5508	Non-switched with Switched Backup; Auto Answer; requires 6301	39	33	950	4.00
5650	Dataphone Digital Service; point-to point	31	26	840	2.00
5651	Dataphone Digital Service; multipoint	31	26	840	2.00
6301	Communications Feature with clock	21	18	603	3.00
6302	Communications Feature without Clock	13	11	405	2.50
6315	SDLC/BSC Switch; 3276-1, -2, -3, -4 only	27	23	758	3.00
1067	APL/Text Control; requires 1068	39	33	1,055	0.50
1950	Color Display Attachment; not available for 3276-1; requires 1068	33	28	842	0.50
	Cluster Display Stations				
	3278 Model 1; 960 char.	81	69	2,060	13.00
	3278 Model 2; 1920 char.	85	72	2,185	13.50
	3278 Model 3; 2560 char.	101	86	2,525	15.00
	3278 Model 4; 3440 char.	103	88	2,650	16.50
	3278 Model 5; 3564 char.	121	103	3,070	18.50
9181	Switch Control Unit; 3278 only	—	—	168	—
	Color Display Stations				
	3279 Model S2A; base color; 1920 char.	140	119	3,955	25.50
	3279 Model S2B; extended color; 1920 char.	153	130	4,375	28.00
	3279 Model S3G; extended color; 2560 char.	216	183	6,105	34.50
	3279 Model 2X; base/extended color; 1920 char.	143	122	4,055	25.50
	3279 Model 3X; base/extended color; 2560 char.	156	133	4,440	26.50
3850	Extended Function (Model 2X or 3X)	13	11	420	2.50
	Keyboards				
	For 3276/3278—				
4621	75-Key EBCDIC Typewriter	16	14	463	2.50
4622	75-Key EBCDIC Data Entry	16	14	463	3.50
4623	75-Key EBCDIC Data Entry; keypunch layout	16	14	463	3.50
4624	75-Key ASCII Typewriter	16	14	463	2.50
4626	87-key EBCDIC Typewriter/Text; 3278 only	21	18	632	3.50
4627	87-Key EBCDIC Typewriter; 3278/3274 only	21	18	632	3.00
4628	87-Key ASCII Typewriter; 3278/3274 only	21	18	632	3.00
4629	87-Key EBCDIC Typewriter/Text; 3278 only	21	18	632	3.50
	For 3278/3279—				
4640	87-key EBCDIC Typewriter Overlay	21	18	632	3.50
4651	87-Key EBCDIC Attribute Select Typewriter	21	18	632	3.50
4652	87-Key EBCDIC Attribute Select Typewriter/APL	21	18	632	3.50
	3276/3278 Display Station Options				
1009	Address Keylock; 3276 only	—	—	62	—
1120	APL/Text; 3278 only	13	11	336	0.50
3620	Character Set Extenstion	24	21	644	3.00
6360	Selector Light Pen	19	16	548	0.50
4999	Magnetic Reader Control	14	12	379	4.50
	Magnetic Slot Reader (Part No. 4123500)	—	—	286	—
	Magnetic Hand Scanner (Part No. 4123495)	—	—	286	—
	3278/3279 Display Station Options				
5790	Programmed Symbols (PS)	33	28	948	3.50
8750	Video Output (Model 3X only)	21	18	702	1.50
	Printers				
	3287 Model 1; 80 cps	239	203	5,365	41.50
	3287 Model 2; 160 cps	291	248	5,750	51.50
1066	Data Analysis-APL; 3287 only	14	12	330	NC
1120	APL/Text	6	5	183	0.50
3610	Extended Character Set Adapter	19	16	477	3.50
3880	Extended Print Buffer	7	6	220	0.50

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
Printers (continued)					
8330	3271/3272 Attachment	$ 42	$ 36	$ 955	$ 3.00
8331	3274/3276 Attachment	6	5	183	0.50
8700	Variable Width Forms Tractor	6	5	168	0.50
4110	Friction Feed Paper Handling	6	5	168	0.50
	3287 Model 1C; color printing; 80 cps	295	251	5,790	47.00
	3287 Model 2C; color printing; 120 cps	347	295	6,145	57.00
	Programmed Symbols				
5781	PS-2; storage for first two symbol sets; requires 3610 and 2880	39	33	918	4.50
5782	PS-4; storage for additional four symbol sets; requires 5781	33	28	735	3.00
5783	PS-4A; storage for four symbol sets; including one set with multi-color addressing; requires 3610 and 3880; for 3287-1C and -2C only	71	60	1,650	13.00
	3289 Model 1; 155 lpm	531	452	8,830	121.00
	3289 Model 2; 400 lpm	805	685	13,140	205.00
1090	Audible Alarm	6	5	192	NC
1130	Text Print	7	6	231	NC
4450	Form Stand; all models except 3289	—	—	565	—

*Includes prime-shift maintenance.■

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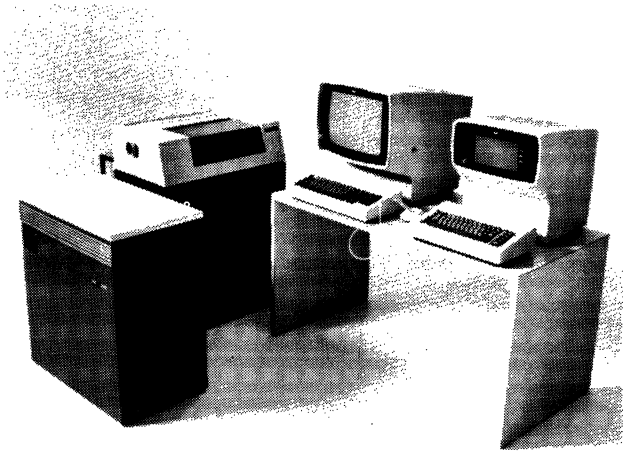

A family of controllers, displays/keyboards, and printers available for stand-alone or cluster configurations in remote or local environments.

Clusters can accommodate up to 32 displays and printers. Transmission rates for remote mode systems range from 1200 to 9600 bps; BSC or SDLC protocols are available on all models, and some models accommodate both. Color displays and printers have now been added to the family.

Control unit specifications may not only permit display or printing of EBCDIC or ASCII character sets, but with new optional features allow for the larger APL character set, text-specific characters, and graphic plot characters.

The cost for a small-cluster configuration consisting of a 3276 controller/display plus seven 1920-character display stations is about $797 per month, or $681 per month with a two-year lease, including maintenance.

The cost for a larger-cluster configuration consisting of a 3274 Control Unit plus 32 1920-character displays is about $2,916 per month, or $2,491 per month with a two-year lease, including maintenance.

In either configuration, replacement of a display with an 80-cps bidirectional matrix printer adds about $105 per month, or $89 per month with a two-year lease, to the cost.

MANAGEMENT SUMMARY

The IBM 3270 family remains highly significant among communications terminal product lines. The first generation of devices (the 3271/3272 control units, 3275 display station, 3277 display, and 3284/3286/3288 printers) was introduced in 1972. In 1977, the product line was radically overhauled, resulting in the announcement of a second generation of components (the 3274 control unit, 3276 control/display, 3278 display, and 3278/3289 printers) that offers increased capabilities at prices much lower than comparable older models. Along with that announcement came major price reductions on the older equipment.

The 1977 announcement boosted the 3270 family into a favorable position in the highly competitive terminal marketplace, and it has maintained that position. In late 1979, color displays and printers were added to the family.

One concept that allows IBM to hold the line in terms of prices is its Customer Set-Up (CSU) plan, applicable to all the newer components. Under this plan, the customer installs the equipment himself. IBM expects the installation to be a "same-day-as-delivery" possibility, because rental or lease charges start the working day after delivery, without having any IBM personnel look at the equipment. If there is a problem, charges do not start until the equipment is fixed. Movement of equipment is also permitted under this agreement, and if the customer wants to discontinue using any component, he must pack it up himself and put it on the loading dock for pick-up. Internal test and check features have been installed on all components so that the user can diagnose most problems himself.

Since 1972 IBM has continually added new features to existing 3270 equipment, as well as new models to the family. The most recent additions were announced in October 1979, when color was added to the line. The 3279 Color Display Station is available in four models

CHARACTERISTICS

VENDOR: International Business Machines Corp., Data Processing Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.

DATE OF ANNOUNCEMENT: 3271/3272/3277 (BSC)—1972; 3271/3277 (SDLC)—third quarter 1974; 3274/3276/3278—May 1977; 3274-ID—July 1978; 3279/3287-1C, -2C/3274-51C—October 1979.

DATE OF FIRST DELIVERY: 3271/3272/3277 (BSC)—1972; 3271/3277 (SDLC)—third quarter 1974. Other models usually delivered within one year of announcement.

SERVICED BY: International Business Machines.

CONFIGURATION

The 3270 family of display/keyboard stations and printers can be configured as a local or remote cluster or as a stand-alone station. There are two generations of components with

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IBM 3270 FAMILY COMPONENTS AND SUBSYSTEMS

Controller	Mode	Integrated Display	Maximum Devices	Components Supported Displays	Keyboards	Printers
3271	Remote	—	32	3277	463X	3284/6/7/8
3272	Local	—	32	3277	463X	3284/6/7/8
3274	Remote/Local	—	32*	3277/8/9	463X/462X	3284/6/7/8/9
3274-51C	Remote	—	12	3277/8/9	4640/4651/2	3284/6/7/8/9
3275	Remote	1	2**	—	463X	3284-3
3276	Remote	1	8	3278/9	462X	3287/9

*Supports up to 32 new style (Category A) or 16 "new style" plus 16 "old style" (Category B) display/keyboards and printers. Category A devices include 3278 displays and 3287/9 printers. Category B devices include 3277 displays and 3284/6/7/8 printers. (The new 3287 printers appear in both categories.)

**One printer in addition to the integrated display.

which provide for two levels of color usage in each of two screen capacities, 1920 characters or 2560 characters. Two color printers were also announced, the 3287-1C (which prints at 80 characters per second), and the 3287-2C (which prints at 120 cps).

Included in the 1979 announcement was a new control unit, the 3274-51C. This new unit offers equivalent and compatible functions and features to a 3274 Model 1C, except that it provides control of a remote cluster of up to 12 displays and printers operating under BSC or SDLC protocol. The Model 1C provides control of up to 32 devices.

Also included in the announcement were enhancements to the following units: the 3274 Control Unit, 3276 Control Unit Display Station, 3278-2, -3, and -4 Display Stations, and 3287-1 and -2 Printers.

Display Exception Monitoring Facilities (DEMF) software on the host computer provides network support for problem determination and isolation to 3270-family terminals operating in the BSC mode.

In June 1980, IBM reduced the purchase prices on many components, while increasing the monthly maintenance charge. Later that same month, monthly rental and lease charges were also increased.

An indication of the 3270's success is the number of competitive units that emulate it. It is the most emulated display in history.

USER REACTION

In Datapro's 1980 survey of alphanumeric display terminal users, responses were received from 195 users of IBM 3270 family terminals. Broken down by model numbers, 12 respondents were using 3275's, 19 were using 3276's, 70 were using 3277's, and 85 were using 3278's. The remaining nine respondents were using unspecified members of the 3270 family. The total number of displays reported on was 7,643. The ratings obtained from these users are as follows:

a limited degree of mixing permitted within the same subsystem; complete compatibility for communications and applications program support can be achieved with the new components, if desired. The accompanying table presents the overall configurational possibilities. Specific prerequisites are detailed in the discussions of individual components.

TRANSMISSION SPECIFICATIONS

All controllers capable of remote operation can be arranged for BSC or SDLC operation through model selection (3271, 3275, and 3276), alternate operation mode (3274), or switch selection (optional on 3276).

For BSC operation, the 3271-1/2 and 3275-2 controllers permit half-duplex data transmission at 1200, 2000, or 2400 bps over a half-duplex facility; over a full-duplex facility, a transmission speed of 4800 or 7200 bps is also supported. In addition, the 3275-2 can be configured to transmit at 600 or 1200 bps over a switched facility (public telephone network). An integrated 1200 bps modem for operation over non-switched or switched lines is optional for the 3275-2. The 3274-1C and 3276-1/2/3/4 controllers permit half-duplex data transmission at 2000, 2400, 4800, or 7200 bps over a half- or full-duplex facility. In addition, the 3276-1/2/3/4 can operate at 1200/600, 2400/1200, or 4800/2400 bps over a switched facility. A 1200 bps integrated modem is available for the 3276 controller.

For SDLC operation, the 3271-11/12 and 3275-12 permit half-duplex operation over a half-duplex facility at 1200, 2000, or 2400 bps; over a full-duplex facility, half- or full duplex data transmission at 1200, 2000, 2400, 4800, 7200, or 9600 bps is supported. A 1200 bps modem is available for the 3275-12. The 3274-1C supports half-duplex operation over a half- or full-duplex facility at 2000, 2400, 4800, 7200, or 9600 bps; the 3276-11/12/13/14 add 1200 bps operation. The SDLC models of the 3276 also support switched network operation at 1200/600, 2400/1200, or 4800/2400 bps. A 1200 bps integrated modem is available for the 3276.

Multipoint operation with a 3270 display subsystem acting as a tributary station is supported for all combinations of protocols and modes.

HOST COMPUTER SOFTWARE SUPPORT

A 3270 subsystem is supported for local and remote operation by IBM System/360, System/370, and System/3 computer systems. Remote terminals are supported by BTAM, TCAM, VTAM, RPG Telecommunications, BSCA Multiline/Multipoint, and Communications Control Program depending on computer system and operating system. The 3274-based local clusters are supported on System/370 configurations under 3272 mode or under VTAM. In general, all new models and configurations of the 3270 can be supported under previous 3270 programming. If Display Exception

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	Excellent	Good	Fair	Poor	WA*
Overall performance	112	81	2	0	3.6
Ease of operation	70	110	15	0	3.3
Display clarity	81	100	14	0	3.3
Keyboard feel & usability	79	94	18	3	3.3
Hardware reliability	108	79	8	0	3.5
Maintenance service	71	101	20	2	3.2
Software & technical support	63	95	29	6	3.1

*Weighted Average on a scale of 4.0 for Excellent.

In this survey the IBM displays scored higher ratings than other vendors' displays on all characteristics except ease of operation and display clarity, for which the ratings were equal.

The most common applications mentioned by the IBM 3270 users were interactive data entry (168 responses), program development (139 responses), and as a system console (92 responses). Clustered station configurations (123 responses) slightly outnumbered single station configurations (103 responses).□

Monitoring Facility (DEMF) software is installed on the host computer, network support for problem determination/isolation is available to terminals operating in BSC mode. In addition, 3270 display and printer components, as well as 3276/3278 clusters, are used with higher-level systems such as the IBM 8100 and 3790.

DEVICE CONTROL

The 3270 System operates under the control of the program stored at the remote computer. Under program control, the 3270 can execute any of four types of commands: read, write, control, and sense.

Read commands initiate transfer of the contents of a device buffer, modified fields within the buffer, buffer addresses or data of fields specified by the selector pen, or the single-byte Attention Identification (AID) code generated by a Program Function or Program Access key. The 3270 responds to two read commands, Read Buffer and Read Modified.

Read Buffer initiates transfer of the contents of the addressed device buffer from the initial or current cursor address.

Read Modified initiates one of three operator-initiated functions: Read Modified, Short Read, or Test Request. Read Modified initiates the transfer of all fields modified by the keyboard within the device buffer. The fields are transferred in sequence beginning with the first modified field; all nulls are suppressed. However, when completion of a key-modified field is signaled by a selector pen operation, a resulting Read Modified operation will transfer only the address of the modified field. Short Read initiates transfer of the single byte AID Code generated by a Program Attention key. Test Request Read performs the same operation as Read Modified; however, a hardware-generated heading precedes the data. Nulls are suppressed as in Read Modified. Only the special heading is transferred if data has not been keyed.

Write commands condition the display or printer to receive a computer message. Two write commands—Write and Erase/Write—load, format, and selectively erase device buffer data, and can also initiate device operations such as starting the printer, resetting the keyboard, and sounding the audible alarm. Both commands are the same except that Erase/Write erases the entire contents of the device buffer before fresh data is written (beginning at the initial buffer address) and Write modifies existing buffer data.

Control commands initiate control unit and/or device operations. There are four control commands: Copy, Select, Erase All Unprotected, and No Operation. Copy, executed by a remote control unit only, transfers buffer data from one device to another. Select, executed by a 3272 Control Unit (or 3274 in 3277 mode) only, transfers buffer data from the selected device to the controller. Erase All Unprotected initializes the addressed device, erasing all unprotected buffer locations and repositioning the cursor to the initial position of the first unprotected field. No Operation, executed by the 3272 Control Unit only, performs no functional operation in the 3272, but can retrieve pending status.

The Sense command, executed by the 3272 Control Unit only, initiates the transfer of a single sense byte from the 3272. The sense byte defines error conditions that have occurred within the subsystem.

A local 3274 cluster operating under VTAM looks like a remote control unit.

Program control by data field provides a flexible formatting capability. A field, identified by an attribute control code (nondisplayed) in the initial character position, can possess any one of several characteristics. The attribute control code can specify a protected or unprotected field (for fixed format operation), beam intensity of brightness (off, normal, or bright), alphanumeric or numeric (automatic shift) input, auto lock or skip, tab stop, or light pen selection.

The Program Tab feature automatically writes successive data fields into successive unprotected data fields defined by a fixed format.

Character Addressing permits a message to be written beginning at any screen location. Addressing can be interspersed with data throughout a message received from the computer. Character Addressing also permits the selective modification of attribute control codes.

Operator controls are provided for cursor control, editing, and program functions.

Cursor controls position the cursor up, down, left, or right, step-by-step or repetitively if the key is held depressed. The cursor can also be backspaced one character position, moved to the beginning of the next line or beginning of the next unprotected data field, tab to the beginning of the next unprotected data field, and backtab to the beginning of the previous unprotected data field.

Edit controls permit data to be inserted in or deleted from text, character by character. Following data is automatically expanded or contracted.

Program Function keys are used to initiate program functions or identify data that can be transmitted with an accompanying program function code.

The 3276 and 3278 have two added controls: Cursor Home key and Cursor Select key. The Cursor Home key returns the cursor to the first non-protected character position. The Cursor Select key causes a selection operation similar to a light pen operation; a light pen (Selector Pen) is optional in addition to this control. A Print key is included on 3276/3278 display/keyboards when attached to a 3274 Control Unit; this key causes the displayed data to be transferred to a printer for immediate printing without requiring a host computer command; normal print commands can also be executed. The standard cursor is an underscore. On a 3278 display connected to a 3274 controller, the cursor can be standard or reverse video underscore, blinking or non-blinking as selected by the operator.

Readers capable of accepting a credit-card size plastic with up to 40 characters encoded on a magnetic tape stripe can be connected to all models of displays. The reader for the new displays (3276 and 3278) will accept previously coded cards if

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the normal end of form control character (not the Hex C optional character).

COMPONENTS

3271 CONTROL UNIT: Four models provide control of up to 32 display/keyboards and printers that operate as a remote terminal cluster. The four models provide support for all combinations of BSC/SDLC operation and 480/1920 character displays, as follows:

Model 1—480 character displays only; BSC transmission.
Model 2 —480 and 1920 character displays; BSC transmission.
Model 11—480 character displays only; SDLC transmission.
Model 12—480 and 1920 character displays; SDLC transmission.

The first device connected to a 3271-2 or -11 controller must be a 1920 character 3277 display. Model 2 displays and 3284-2 and 3286-2 printers (1920 characters) cannot be connected to a Model 1 or 11 controller. The 3288-2 can be connected to a 3271-2 and -12 controller only. Within these restrictions any combination of up to 32 displays and 3284/3286/3287/3288 printers is permitted. Up to four devices can be connected to the basic controller. A Device Adapter is required for each additional group of four devices.

The 3271-11 and -12 will support ASCII transmission code in place of EBCDIC with an extra cost option; this is a no-cost option for the 3271-1 and -2. The Data Analysis—APL feature permits handling an expanded character set of 120 characters on the 3271-2 and -12; this feature does not provide dual case display, but the capability to store and transfer the expanded set. The Copy Buffer Transfer feature permits direct transfer of data from the buffer of one device to the buffer of another device (under host computer command) attached to a 3271-1 or -2 controller; the 3271-11 and -12 include this capability as standard. The 3271-1 and -2 require an extra-cost option for transmission speeds above 2400 bps; the 3271-11 and -12 controllers do not.

3272 CONTROL UNIT: Two models provide control of up to 32 display/keyboards and printers that operate as a local display cluster. Model 1 supports 480 character displays; Model 2 supports 480 or 1920 character displays.

The first device installed on a 3272-2 must be a 1920 character display. Model 2 displays and 3284-2 and 3286-2 printers (1920 characters) cannot be connected to a Model 1 controller. The 3288-2 printer can be connected to a 3272-2 controller only. Within these restrictions any combination of up to 32 displays and 3284/3286/3287/3288 printers is permitted. Up to four devices can be connected to the basic controller. A Device Adapter is required for each additional group of four devices.

The Data Analysis—APL feature permits handling an expanded character set of 120 characters; this feature does not provide dual case display, but the capability to store and transfer the expanded set.

The 3272 connects to the byte multiplexer of an IBM 3031, 3032, or 3033 processor, or the basic multiplexer, block multiplexer, or selector channel of an IBM System/360 Model 25 through 195 or System/370 Model 115 through 168. Data is transferred at up to 650,000 characters per second between the computer system and the 3272 local cluster.

3274 CONTROL UNIT: Four models provide control of a local or remote cluster of up to 32 display/keyboards and printers. Model 1A supports a local cluster operating in SNA mode under VTAM. Model 1B supports a local cluster operating in 3272 compatible mode. Model 1C supports a remote cluster operating under BSC or SDLC protocol. Model 1D is functionally upward-compatible with Model 1B, combining local attachment in 3272-compatible mode with an APL/Text control function.

Operating functions are controlled by feature and systems diskettes customized at installation, using a diskette drive integral with the controller. The 3274-1C is conditioned for BSC or SDLC operation by loading a program into the controller using interchangeable diskettes.

All four models support mixing of the older 3277/3284/3286/3288 (Category B) devices on the same controller with the new 3278/3287/3289 (Category A) devices. The basic controllers each accommodate up to eight of the newer components. One Type A Terminal Adapter is required for each additional group of eight of the new devices. Alternatively, up to four Type B Terminal Adapters, each accommodating up to four 3277/3284/3286/3287/3288 Category B devices, can be installed. A single controller can accommodate a cluster of up to 32 terminals, comprised of groups of 8 Category A devices and groups of 4 Category B devices; however, no more than 16 (i.e., 4 groups) of the 32 terminals can be Category B devices. A minimum of one 3278 display and keyboard is required. The new 3287 printer can be attached to either Type A or Type B adapters. A 3278 Model 5 display cannot be attached to a 3274-1B Control Unit.

Special features are required to install Type B Terminal Adapters in the 3274-1A and 1C (Extended Function Store-16K and Control Storage Expansion); these features are not required to install Type B Adapters in the 3274-1B or 3274-1D.

The 3274-1C requires the External Modem Interface Feature and either the Common Communications Adapter or the High Performance Communications Adapter. The latter is required if any Type B Terminal Adapters are installed *and* a transmission speed of 9600 bps is used; otherwise the CCA is adequate for all transmission combinations.

Dataphone Digital Service is available on Model 1C via both point-to-point and multipoint adapters. Model 1C can also be equipped with an Encrypt/Decrypt device which codes and decodes messages using the Federal Data Encryption Standard algorithm.

The APL/Text feature, available on all models except 1B, permits display (on an adapted 3278) or printing (on an adapted 3287) of an expanded 222-character set, including the standard EBCDIC and APL characters plus 37 text-specific characters and 10 graphic plot characters. The Text Print feature, available with all models except 1B, permits printing on the 3289 of a 125-character set (93 EBCDIC characters plus the 32-character Text Character set) and character underscore and overprint capabilities.

Enhancements to the 3274 support attachment of the 3279 Color Display Station and 3287 Models 1C and 2C Color Printers. Any 3274 except Model 1B can now be specified with one of three no-charge Configuration Support packages (A, B, or C); Model 1B is always equipped with Configuration Support A. Configuration Support A provides support for most 3270 functions, including base color mode; Support B adds the ability to attach 3287-5 printers, and to perform specific SNA-related functions; Support C includes all Support A and B functions plus certain other functions, including extended color mode, extended highlighting, and programmed symbol set support. Two additional Extended Function Store features permit expansion of control storage in 32K-byte increments to support the new enhancements.

3274-51C CONTROL UNIT: Provides control of a remote cluster of up to twelve displays and printers operating under BSC or SDLC protocol. The basic controller accommo-

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dates up to eight 3278/3279/3287/3289 (Category A) devices. Four additional 3277/3284/3286/3287/3288 (Category B) devices can be attached via the Terminal Adapter Type B (#7801). Except for the number of devices supported, the Model 51C offers equivalent and compatible functions and features to a 3274 Model 1C. In addition it provides certain features not available on the Model 1C: 8100 System attachment using SDLC via a data link or a direct or data link attached loop (this feature provides support for Category A devices only); a 1200 bps integrated modem; and a switched network communications capability. The 3274 Model 51C is also upward-compatible with the 3276 Control Unit Display Station, except that it provides the Printer Authorization Matrix used on other 3274's instead of the Default Matrix used on the 3276.

3274-21A, -21B, -21C, -21D, -31A, -31C, AND -31D CONTROL UNITS: New models containing a new storage technology, and also providing new functions for users with applications utilizing extended color, extended highlighting, and presentation graphics. The new models are functionally compatible with existing models 3274-1A, -1B, -1C, and -1D. Models -21A, -21B, -21C, and -21D contain 64K bytes of storage, and are comparably configured with Models -1A, -1B, -1C, and -1D. Models -31A, -31C, and -31D contain 128K bytes of storage, and are comparably configured with Models -1A, -1C, and -1D. Both model groups can control up to 32 devices.

3275 DISPLAY STATION: A stand-alone unit available in two models corresponding to protocol and display capacity:

Model 2—1920 character display; BSC transmission.
Model 12—1920 character display; SDLC transmission.

With an extra-cost feature, the 3275-12 will support ASCII in place of EBCDIC; this is a no-cost option for the 3275-2.

The 3275-2 requires an extra-cost option for transmission speeds over 2400 bps; this is a standard feature with the 3275-12. A 1200-bps modem for operation over non-switched facilities is available for all 3275 models. The 3275-2 can be equipped with an extra-cost Dial feature for operation over the public telephone network; an integrated 1200-bps modem with Auto-Answer is also optional.

One 3284-3 bufferless printer can be attached to any model 3275.

The 3275 uses the 463X series keyboards.

3276 CONTROL UNIT DISPLAY STATION: A controller for small remote clusters; it also includes an integrated display. The 3276 can accommodate up to seven additional displays and printers.

A total of eight models provide combinations of four display capacities and BSC or SDLC operation.

Model 1—960 character display; BSC transmission.
Model 2—1920 character display; BSC transmission.
Model 3—2560 character display; BSC transmission.
Model 4—3440 character display; BSC transmission.
Model 11—960 character display; SDLC transmission.
Model 12—1920 character display; SDLC transmission.
Model 13—2560 character display; SDLC transmission.
Model 14—3440 character display; SDLC transmission.

The BSC models (-1/2/3/4) can accommodate any mix of up to seven additional 3278 displays and 3287 and 3289 printers. The added 3278 display cannot have a larger display capacity than the basic 3276 integrated display. However, the SDLC/BSC Switch feature permits alternate protocol operation and also permits intermixing any size display on any "BSC" 3276 model. The SDLC models (-11/12/13/14) can accommodate any display size mix.

The basic 3276 controller (any model) can accommodate two devices. A Terminal Adapter is required for each additional two devices.

Models 11, 12, 13, and 14 can be equipped with an Encrypt/Decrypt device which codes and decodes messages using the Federal Data Encryption Standard algorithm.

The 3276 requires an External Modem Interface or an Integrated Modem (1200 bps). Five integrated modem features are available for operation over switched or non-switched facilities, providing basic transmission linkage plus optional network backup and manual or auto answer capabilities. Either external or internal modem operation requires a Communications Feature.

Dataphone Digital Service is available on all models via both point-to-point and multipoint adapters.

APL/Text functions similar to those provided by the 3274 Control Unit can be implemented by equipping the 3276 with APL/Text Control and Extended Function Base features.

A Color Display Attachment feature (#1950) provides the 3276 with support for an attached 3279 Display Station operating in base color mode. This feature requires the previously available Extended Function Base feature (#1068), and does not support operation of a 3279-2B or -3B in extended color mode. (The Color Display Attachment is not required for color printing via a 3287 Model 1C or 2C Color Printer.) Another 3276 enhancement removes the mutually exclusive restriction between the Extended Function Base feature (#1068) and the Encrypt/Decrypt feature (#3680).

3275/3277 DISPLAY: Via a 14-inch (diagonal measurement) CRT. Display screen arrangement is dependent on the model display station. Model 1 display screens are arranged in 12 lines of 40 characters each, totaling 480 character positions. Model 2 and 12 display screens are arranged in 24 lines of 80 characters each, totaling 1920 character positions.

A character set of 64 characters (either ASCII or EBCDIC is available), including upper-case alphabetics, numerics, and special symbols, is displayed in green against a dark background. The Data Analysis—APL Feature (available on Model 2 only) allows for an expanded character set of 120 characters (93 input/output, 27 output only), including upper and lower case alphabetics. Each character is formed by a 7-by-9 dot matrix.

These displays use the 463X series keyboards. The displays can be equipped with an Audible Alarm, Keyboard Numeric Lock, Security Keylock, Selector Light Pen, and Operator Identification Card Reader.

3276/3278 DISPLAY: Five models are available, distinguished by the display capacity. Model 1 displays 12 lines of 80 characters each (960 characters total); Model 2 displays 24 lines of 80 characters each (1920 total); Model 3 displays 32 lines of 80 characters each (2560 total); Model 4 displays 43 lines of 80 characters (3440 total); Model 5 (3278 only) permits operator selection of display arrangements of 24 lines of 80 characters (1920 total) or 27 lines of 132 characters (3564 total). The display characteristics of the 3276 Models 11, 12, 13, and 14 are identical to Models 1, 2, 3, and 4, respectively.

A character set of 94 characters, including upper and lower case alphabetics, numeric, and special symbols is displayed.

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When connected to a 3274, the 3278 can incorporate the APL/Test feature; an Extended Character Set Adapter and a 4626 or 4629 keyboard are required. A monocase switch provides 3277 compatibility. Each character for Models 1, 2, and 3 is formed by a 7 x 14 matrix; for Models 4 and 5, a 9 x 12 matrix is used. Extended highlighting and symbol set functions (monochromatic only) have been added to Models 2, 3, and 4.

A Switch Control Unit permits a 3278 Display to be switched between two controllers.

These displays use the 462X series, 4640, 4651, or 4652 keyboards. The displays can be equipped with Audible Alarm, Keyboard Numeric Lock, Address Lock, Security Keylock, Selector Light Pen, Magnetic Slot Reader, and Magnetic Hand Scanner.

3279 COLOR DISPLAY STATION: Available in four models which provide for two levels of color usage in each of two screen capacities: Model 2A provides base color mode and a 1920-character screen; Model 3A, base color mode and a 2560-character screen; Model 2B, extended color mode and a 1920-character screen; Model 3B, extended color mode and a 2560-character screen. Base color mode supports the use of four colors (red, green, blue, and white) as substitutes for existing protect and intensify field attributes. Extended color mode includes the features of the base color mode, provides three additional colors (yellow, pink, and turquoise), and permits field character addressing of color highlighting as an independent attribute. In addition Models 2B and 3B support extended highlighting using reverse video, blinking, and underscoring, and provide storage of up to six 190-character programmed symbol sets containing user-defined shapes and symbols for use in graphic display representations. Three 87-key keyboards (4640, 4651, and 4652) are offered for use with Models 2B and 3B and include keytop annotations for color, extended highlighting, and programmed symbol sets. Except for these features, Models 2A and 3A offer equivalent and compatible functions to the 3276/3278 display units; Models 2B and 3B, to the 3278 when featured to use the extended 3270 data stream or APL Text.

A 3279 display operating in base color mode can be attached to any Model 3274 Control Unit with any of the Configuration Support packages (A, B, or C) or to a 3276 Control Unit Display Station that supports the 3279's screen capacity and is equipped with the Extended Function Base (#1068) and the Color Display Attachment (#1950) features. A 3279 display utilizing extended color, extended highlighting, or programmed symbols can be attached only to a 3274 Model 1A, 1C, 1D, or 51C with Configuration Support C. Details on the new 3274 and 3276 enhancements are provided later in this announcement.

463X KEYBOARDS: For use with 3277 displays and 3275 display stations. A total of 10 models are available with various combinations of layouts, data codes, and program function keys. A complete listing of the models and basic characteristics is contained in the price list. The typewriter keyboards carry the numerics in a row across the top of the keyboard just like an office typewriter. The data entry and data entry keypunch layout keyboards have the numerics arranged to permit one-hand numeric data entry. The keypunch layout duplicates the layout of an IBM keypunch, which has related special characters, such as left and right parenthesis, in unrelated positions on the keyboard. The other data entry layout groups related symbols in adjacent key positions. The operator console layout duplicates the layout of an IBM 1052 Model 7 operator console. Keyboards without program function keys have a total of 66 keys; the 78-key units include 12 program function keys, which are defined by the application program in the host computer. A Numeric Lock feature restricts keyboard operation to numeric input only (or duplication of numeric data); the keyboard automatically locks if anything other than numeric data, including minus and period, is keyed.

462X KEYBOARDS: For use with 3278 displays and 3276 controller/displays. A total of eight models are available with various combinations of layouts, data codes, and program function keys. A complete listing of models and basic characteristics is provided in the price list. The typewriter, data entry, and data entry keypunch layout arrangements are similar, but not identical, with the corresponding 463X layouts discussed above. All data entry layouts include a separate group of 10 program function keys. All typewriter models include 12 program function keys that are activated by an alternate shift mode. Two models include an additional 12 keys for a total of 24 program function keys; two models include text-oriented characters for use with APL/Test features. All models, except the latter four, have 75 keys. The four expanded typewriter layouts have 87 keys. A Numeric Lock feature is available.

4640/4651/4652 KEYBOARDS: For use with 3278 displays or 3279 color displays. The 4640 is an 87-key EBCDIC typewriter overlay keyboard; the 4651 is an 87-key EBCDIC attribute select typewriter keyboard; the 4652 is an 87-key EBCDIC attribute select typewriter/APL keyboard. All three models include keytop annotations for color, extended highlighting, and programmed symbol sets.

3284 MAXTRIX PRINTER: A 40-cps printer used with 3271, 3272, and 3274 clusters and 3275 stand-alone display stations. There are three models, defined by buffer capacity: Model 1 — 480 character buffer; Model 2 — 1920 character buffer; and Model 3 — no buffer. The 3284-1 can be used with any model 3271 or 3272. The 3284-2 can only be used with the 1920 character models of the 3271 or 3272. The 3284-3 can be used only with the 3275 (any model). The printer can be specified for a print width of 120, 126, or 132 columns; each option requires a different width form. The Data Analysis—APL feature provides dual case EBCDIC, APL, and TN print train characters; this feature is available only with the 3284-2. Characters are formed within a 7x7 matrix (7x8 with the Data Analysis—APL feature); however, only four columns are used for any one symbol. All models print 10 characters per inch and 6 lines per inch.

3286 MATRIX PRINTER: A 66-cps printer used with 3271, 3272, and 3274 clusters. Two models are available; except for operational speed, their characteristics are similar to those of the 3284-1 and -2, including configurational limitations. The Data Analysis—APL feature is available for the 3286-2.

3287-1 AND -2 MATRIX PRINTERS: This printer can be used with the older (3271/3272) as well as newer (3274/3276) cluster controllers. Model 1 operates at 80 cps; Model 2 operates at 120 cps. Both models achieve these speeds through bidirectional printing. Both print 10 characters per inch, 6 or 8 lines per inch, and 132 positions across the page. Separate attachment features are required for connection to a 3271/3272 or 3274/3276 controller. When connected to a 3271 or 3272, the 3287 can incorporate the Data Analysis—APL feature for compatibility; dual case printing can be specified for all arrangements. When connected to a 3274, the 3287 can incorporate the APL/Text feature; an Extended Character Set Adapter and a 3274 Attachment feature are required. A special feature, Extended Print Buffer, is required for operation with 2560, 3440, and 3564 character displays. Character formation is 4 of 7 x 8, in a manner similar to the 3284 and 3286 printers. A programmed symbol set support feature (monochromatic only)

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dates up to eight 3278/3279/3287/3289 (Category A) devices. Four additional 3277/3284/3286/3287/3288 (Category B) devices can be attached via the Terminal Adapter Type B (#7801). Except for the number of devices supported, the Model 51C offers equivalent and compatible functions and features to a 3274 Model 1C. In addition it provides certain features not available on the Model 1C: 8100 System attachment using SDLC via a data link or a direct or data link attached loop (this feature provides support for Category A devices only); a 1200 bps integrated modem; and a switched network communications capability. The 3274 Model 51C is also upward-compatible with the 3276 Control Unit Display Station, except that it provides the Printer Authorization Matrix used on other 3274's instead of the Default Matrix used on the 3276.

3275 DISPLAY STATION: A stand-alone unit available in two models corresponding to protocol and display capacity:

Model 2—1920 character display; BSC transmission.
Model 12—1920 character display; SDLC transmission.

With an extra-cost feature, the 3275-12 will support ASCII in place of EBCDIC; this is a no-cost option for the 3275-2.

The 3275-2 requires an extra-cost option for transmission speeds over 2400 bps; this is a standard feature with the 3275-12. A 1200-bps modem for operation over non-switched facilities is available for all 3275 models. The 3275-2 can be equipped with an extra-cost Dial feature for operation over the public telephone network; an integrated 1200-bps modem with Auto-Answer is also optional.

One 3284-3 bufferless printer can be attached to any model 3275.

The 3275 uses the 463X series keyboards.

3276 CONTROL UNIT DISPLAY STATION: A controller for small remote clusters; it also includes an integrated display. The 3276 can accommodate up to seven additional displays and printers.

A total of eight models provide combinations of four display capacities and BSC or SDLC operation.

Model 1—960 character display; BSC transmission.
Model 2—1920 character display; BSC transmission.
Model 3—2560 character display; BSC transmission.
Model 4—3440 character display; BSC transmission.
Model 11—960 character display; SDLC transmission.
Model 12—1920 character display; SDLC transmission.
Model 13—2560 character display; SDLC transmission.
Model 14—3440 character display; SDLC transmission.

The BSC models (-1/2/3/4) can accommodate any mix of up to seven additional 3278 displays and 3287 and 3289 printers. The added 3278 display cannot have a larger display capacity than the basic 3276 integrated display. However, the SDLC/BSC Switch feature permits alternate protocol operation and also permits intermixing any size display on any "BSC" 3276 model. The SDLC models (-11/12/13/14) can accommodate any display size mix.

The basic 3276 controller (any model) can accommodate two devices. A Terminal Adapter is required for each additional two devices.

Models 11, 12, 13, and 14 can be equipped with an Encrypt/Decrypt device which codes and decodes messages using the Federal Data Encryption Standard algorithm.

The 3276 requires an External Modem Interface or an Integrated Modem (1200 bps). Five integrated modem features are available for operation over switched or non-switched facilities, providing basic transmission linkage plus optional network backup and manual or auto answer capabilities. Either external or internal modem operation requires a Communications Feature.

Dataphone Digital Service is available on all models via both point-to-point and multipoint adapters.

APL/Text functions similar to those provided by the 3274 Control Unit can be implemented by equipping the 3276 with APL/Text Control and Extended Function Base features.

A Color Display Attachment feature (#1950) provides the 3276 with support for an attached 3279 Display Station operating in base color mode. This feature requires the previously available Extended Function Base feature (#1068), and does not support operation of a 3279-2B or -3B in extended color mode. (The Color Display Attachment is not required for color printing via a 3287 Model 1C or 2C Color Printer.) Another 3276 enhancement removes the mutually exclusive restriction between the Extended Function Base feature (#1068) and the Encrypt/Decrypt feature (#3680).

3275/3277 DISPLAY: Via a 14-inch (diagonal measurement) CRT. Display screen arrangement is dependent on the model display station. Model 1 display screens are arranged in 12 lines of 40 characters each, totaling 480 character positions. Model 2 and 12 display screens are arranged in 24 lines of 80 characters each, totaling 1920 character positions.

A character set of 64 characters (either ASCII or EBCDIC is available), including upper-case alphabetics, numerics, and special symbols, is displayed in green against a dark background. The Data Analysis—APL Feature (available on Model 2 only) allows for an expanded character set of 120 characters (93 input/output, 27 output only), including upper and lower case alphabetics. Each character is formed by a 7-by-9 dot matrix.

These displays use the 463X series keyboards. The displays can be equipped with an Audible Alarm, Keyboard Numeric Lock, Security Keylock, Selector Light Pen, and Operator Identification Card Reader.

3276/3278 DISPLAY: Five models are available, distinguished by the display capacity. Model 1 displays 12 lines of 80 characters each (960 characters total); Model 2 displays 24 lines of 80 characters each (1920 total); Model 3 displays 32 lines of 80 characters each (2560 total); Model 4 displays 43 lines of 80 characters (3440 total); Model 5 (3278 only) permits operator selection of display arrangements of 24 lines of 80 characters (1920 total) or 27 lines of 132 characters (3564 total). The display characteristics of the 3276 Models 11, 12, 13, and 14 are identical to Models 1, 2, 3, and 4, respectively.

A character set of 94 characters, including upper and lower case alphabetics, numeric, and special symbols is displayed. When connected to a 3274, the 3278 can incorporate the APL/Test feature; an Extended Character Set Adapter and a 4626 or 4629 keyboard are required. A monocase switch provides 3277 compatibility. Each character for Models 1, 2, and 3 is formed by a 7 x 14 matrix; for Models 4 and 5, a 9 x 12 matrix is used. Extended highlighting and symbol set functions (monochromatic only) have been added to Models 2, 3, and 4.

A Switch Control Unit permits a 3278 Display to be switched between two controllers.

These displays use the 462X series, 4640, 4651, or 4652 keyboards. The displays can be equipped with Audible Alarm,

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Keyboard Numeric Lock, Address Lock, Security Keylock, Selector Light Pen, Magnetic Slot Reader, and Magnetic Hand Scanner.

3279 COLOR DISPLAY STATION: Available in four models which provide for two levels of color usage in each of two screen capacities: Model 2A provides base color mode and a 1920-character screen; Model 3A, base color mode and a 2560-character screen; Model 2B, extended color mode and a 1920-character screen; Model 3B, extended color mode and a 2560-character screen. Base color mode supports the use of four colors (red, green, blue, and white) as substitutes for existing protect and intensify field attributes. Extended color mode includes the features of the base color mode, provides three additional colors (yellow, pink, and turquoise), and permits field character addressing of color highlighting as an independent attribute. In addition Models 2B and 3B support extended highlighting using reverse video, blinking, and underscoring, and provide storage of up to six 190-character programmed symbol sets containing user-defined shapes and symbols for use in graphic display representations. Three 87-key keyboards (4640, 4651, and 4652) are offered for use with Models 2B and 3B and include keytop annotations for color, extended highlighting, and programmed symbol sets. Except for these features, Models 2A and 3A offer equivalent and compatible functions to the 3276/3278 display units; Models 2B and 3B, to the 3278 when featured to use the extended 3270 data stream or APL Text.

A 3279 display operating in base color mode can be attached to any Model 3274 Control Unit with any of the Configuration Support packages (A, B, or C) or to a 3276 Control Unit Display Station that supports the 3279's screen capacity and is equipped with the Extended Function Base (#1068) and the Color Display Attachment (#1950) features. A 3279 display utilizing extended color, extended highlighting, or programmed symbols can be attached only to a 3274 Model 1A, 1C, 1D, or 51C with Configuration Support C. Details on the new 3274 and 3276 enhancements are provided later in this announcement.

463X KEYBOARDS: For use with 3277 displays and 3275 display stations. A total of 10 models are available with various combinations of layouts, data codes, and program function keys. A complete listing of the models and basic characteristics is contained in the price list. The typewriter keyboards carry the numerics in a row across the top of the keyboard just like an office typewriter. The data entry and data entry keypunch layout keyboards have the numerics arranged to permit one-hand numeric data entry. The keypunch layout duplicates the layout of an IBM keypunch, which has related special characters, such as left and right parenthesis, in unrelated positions on the keyboard. The other data entry layout groups related symbols in adjacent key positions. The operator console layout duplicates the layout of an IBM 1052 Model 7 operator console. Keyboards without program function keys have a total of 66 keys; the 78-key units include 12 program function keys, which are defined by the application program in the host computer. A Numeric Lock feature restricts keyboard operation to numeric input only (or duplication of numeric data); the keyboard automatically locks if anything other than numeric data, including minus and period, is keyed.

462X KEYBOARDS: For use with 3278 displays and 3276 controller/displays. A total of eight models are available with various combinations of layouts, data codes, and program function keys. A complete listing of models and basic characteristics is provided in the price list. The typewriter, data entry, and data entry keypunch layout arrangements are similar, but not identical, with the corresponding 463X layouts discussed above. All data entry layouts include a separate group of 10 program function keys. All typewriter models include 12 program function keys that are activated by an alternate shift mode. Two models include an additional 12 keys for a total of 24 program function keys; two models include text-oriented characters for use with APL/Test features. All models, except the latter four, have 75 keys. The four expanded typewriter layouts have 87 keys. A Numeric Lock feature is available.

4640/4651/4652 KEYBOARDS: For use with 3278 displays or 3279 color displays. The 4640 is an 87-key EBCDIC typewriter overlay keyboard; the 4651 is an 87-key EBCDIC attribute select typewriter keyboard; the 4652 is an 87-key EBCDIC attribute select typewriter/APL keyboard. All three models include keytop annotations for color, extended highlighting, and programmed symbol sets.

3284 MAXTRIX PRINTER: A 40-cps printer used with 3271, 3272, and 3274 clusters and 3275 stand-alone display stations. There are three models, defined by buffer capacity: Model 1 — 480 character buffer; Model 2 — 1920 character buffer; and Model 3 — no buffer. The 3284-1 can be used with any model 3271 or 3272. The 3284-2 can only be used with the 1920 character models of the 3271 or 3272. The 3284-3 can be used only with the 3275 (any model). The printer can be specified for a print width of 120, 126, or 132 columns; each option requires a different width form. The Data Analysis—APL feature provides dual case EBCDIC, APL, and TN print train characters; this feature is available only with the 3284-2. Characters are formed within a 7x7 matrix (7x8 with the Data Analysis—APL feature); however, only four columns are used for any one symbol. All models print 10 characters per inch and 6 lines per inch.

3286 MATRIX PRINTER: A 66-cps printer used with 3271, 3272, and 3274 clusters. Two models are available; except for operational speed, their characteristics are similar to those of the 3284-1 and -2, including configurational limitations. The Data Analysis—APL feature is available for the 3286-2.

3287-1 AND -2 MATRIX PRINTERS: This printer can be used with the older (3271/3272) as well as newer (3274/3276) cluster controllers. Model 1 operates at 80 cps; Model 2 operates at 120 cps. Both models achieve these speeds through bidirectional printing. Both print 10 characters per inch, 6 or 8 lines per inch, and 132 positions across the page. Separate attachment features are required for connection to a 3271/3272 or 3274/3276 controller. When connected to a 3271 or 3272, the 3287 can incorporate the Data Analysis—APL feature for compatibility; dual case printing can be specified for all arrangements. When connected to a 3274, the 3287 can incorporate the APL/Text feature; an Extended Character Set Adapter and a 3274 Attachment feature are required. A special feature, Extended Print Buffer, is required for operation with 2560, 3440, and 3564 character displays. Character formation is 4 of 7 x 8, in a manner similar to the 3284 and 3286 printers. A programmed symbol set support feature (monochromatic only) is available. A Variable Width Forms Tractor option, as well as a Friction Feed Paper Handling option, is available. An audible alarm is a no-cost feature for signaling a forms-out condition; the alarm can also be sounded via a host computer command.

3287-1C AND -2C MATRIX PRINTERS: Available in two color models that vary only in their rated print speeds: Model 1C prints at a maximum of 80 characters per second and Model 2C at 120 characters per second, when printing bi-directionally with a single color per line. Four colors (red, green, blue, and black) are provided via a multi-color ribbon. Print positions 1 through 120 can be printed in any color, but positions 121 through 132 can only be printed in black. As with the 3279 Display, two levels of color usage are supported. Basic color mode printing is standard on

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Addendum

Model 4—3440 character display; BSC transmission.
Model 11—960 character display; SDLC transmission.
Model 12—1920 character display; SDLC transmission.
Model 13—2560 character display; SDLC transmission.
Model 14—3440 character display; SDLC transmission.

The BSC models (-1/2/3/4) can accommodate any mix of up to seven additional 3278 displays and 3287 and 3289 printers. The added 3278 display cannot have a larger display capacity than the basic 3276 integrated display. However, the SDLC/BSC Switch feature permits alternate protocol operation and also permits intermixing any size display on any "BSC" 3276 model. The SDLC models (-11/12/13/14) can accommodate any display size mix.

The basic 3276 controller (any model) can accommodate two devices. A Terminal Adapter is required for each additional two devices.

Models 11, 12, 13, and 14 can be equipped with an Encrypt/Decrypt device which codes and decodes messages using the Federal Data Encryption Standard algorithm.

The 3276 requires an External Modem Interface or an Integrated Modem (1200 bps). Five integrated modem features are available for operation over switched or non-switched facilities, providing basic transmission linkage plus optional network backup and manual or auto answer capabilities. Either external or internal modem operation requires a Communications Feature.

Dataphone Digital Service is available on all models via both point-to-point and multipoint adapters.

APL/Text functions similar to those provided by the 3274 Control Unit can be implemented by equipping the 3276 with APL/Text Control and Extended Function Base features.

3275/3277 DISPLAY: Via a 14-inch (diagonal measurement) CRT. Display screen arrangement is dependent on the model display station. Model 1 display screens are arranged in 12 lines of 40 characters each, totaling 480 character positions. Model 2 and 12 display screens are arranged in 24 lines of 80 characters each, totaling 1920 character positions.

A character set of 64 characters (either ASCII or EBCDIC is available), including upper-case alphabetics, numerics, and special symbols, is displayed in green against a dark background. The Data Analysis—APL Feature (available on Model 2 only) allows for an expanded character set of 120 characters (93 input/output, 27 output only), including upper and lower case alphabetics. Each character is formed by a 7-by-9 dot matrix.

These displays use the 463X series keyboards. The displays can be equipped with an Audible Alarm, Keyboard Numeric Lock, Security Keylock, Selector Light Pen, and Operator Identification Card Reader.

3276/3278 DISPLAY: Five models are available, distinguished by the display capacity. Model 1 displays 12 lines of 80 characters each (960 characters total); Model 2 displays 24 lines of 80 characters each (1920 total); Model 3 displays 32 lines of 80 characters each (2560 total); Model 4 displays 43 lines of 80 characters (3440 total); Model 5 (3278 only) permits operator selection of display arrangements of 24 lines of 80 characters (1920 total) or 27 lines of 132 characters (3564 total). The display characteristics of the 3276 Models 11, 12, 13, and 14 are identical to Models 1, 2, 3, and 4, respectively.

A character set of 94 characters, including upper and lower case alphabetics, numeric, and special symbols is displayed. When connected to a 3274, the 3278 can incorporate the APL/Test feature; an Extended Character Set Adapter and a 4626 or 4629 keyboard are required. A monocase switch provides 3277 compatibility. Each character for Models 1, 2, and 3 is formed by a 7 x 14 matrix; for Models 4 and 5, a 9 x 12 matrix is used.

A Switch Control Unit permits a 3278 Display to be switched between two controllers.

These displays use the 462X series keyboards. The displays can be equipped with Audible Alarm, Keyboard Numeric Lock, Address Lock, Security Keylock, Selector Light Pen, Magnetic Slot Reader, and Magnetic Hand Scanner.

463X KEYBOARDS: For use with 3277 displays and 3275 display stations. A total of 10 models are available with various combinations of layouts, data codes, and program function keys. A complete listing of the models and basic characteristics is contained in the price list. The typewriter keyboards carry the numerics in a row across the top of the keyboard just like an office typewriter. The data entry and data entry keypunch layout keyboards have the numerics arranged to permit one-hand numeric data entry. The keypunch layout duplicates the layout of an IBM keypunch, which has related special characters, such as left and right parenthesis, in unrelated positions on the keyboard. The other data entry layout groups related symbols in adjacent key positions. The operator console layout duplicates the layout of an IBM 1052 Model 7 operator console. Keyboards without program function keys have a total of 66 keys; the 78-key units include 12 program function keys, which are defined by the application program in the host computer. A Numeric Lock feature restricts keyboard operation to numeric input only (or duplication of numeric data); the keyboard automatically locks if anything other than numeric data, including minus and period, is keyed.

462X KEYBOARDS: For use with 3278 displays and 3276 controller/displays. A total of eight models are available with various combinations of layouts, data codes, and program function keys. A complete listing of models and basic characteristics is provided in the price list. The typewriter, data entry, and data entry keypunch layout arrangements are similar, but not identical, with the corresponding 463X layouts discussed above. All data entry layouts include a separate group of 10 program function keys. All typewriter models include 12 program function keys that are activated by an alternate shift mode. Two models include an additional 12 keys for a total of 24 program function keys; two models include text-oriented characters for use with APL/Test features. All models, except the latter four, have 75 keys. The four expanded typewriter layouts have 87 keys. A Numeric Lock feature is available.

3284 MAXTRIX PRINTER: A 40-cps printer used with 3271, 3272, and 3274 clusters and 3275 stand-alone display stations. There are three models, defined by buffer capacity: Model 1 — 480 character buffer; Model 2 — 1920 character buffer; and Model 3 — no buffer. The 3284-1 can be used with any model 3271 or 3272. The 3284-2 can only be used with the 1920 character models of the 3271 or 3272. The 3284-3 can be used only with the 3275 (any model). The printer can be specified for a print width of 120, 126, or 132 columns; each option requires a different width form. The Data Analysis—APL feature provides dual case EBCDIC, APL, and TN print train characters; this feature is available only with the 3284-2. Characters are formed within a 7x7 matrix (7x8 with the Data Analysis—APL feature); however, only four columns are used for any one symbol. All models print 10 characters per inch and 6 lines per inch.

3286 MATRIX PRINTER: A 66-cps printer used with 3271, 3272, and 3274 clusters. Two models are available; except for operational speed, their characteristics are similar to those of the 3284-1 and -2, including configurational limitations. The Data Analysis—APL feature is available for the 3286-2.

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3287 MATRIX PRINTER: This printer can be used with the older (3271/3272) as well as newer (3274/3276) cluster controllers. Model 1 operates at 80 cps; Model 2 operates at 120 cps. Both models achieve these speeds through bidirectional printing. Both print 10 characters per inch, 6 or 8 lines per inch, and 132 positions across the page. Separate attachment features are required for connection to a 3271/3272 or 3274/3276 controller. When connected to a 3271 or 3272, the 3287 can incorporate the Data Analysis—APL feature for compatibility; dual case printing can be specified for all arrangements. When connected to a 3274, the 3287 can incorporate the APL/Text feature; an Extended Character Set Adapter and a 3274 Attachment feature are required. A special feature, Extended Print Buffer, is required for operation with 2560, 3440, and 3564 character displays. Character formation is 4 of 7 x 8, in a manner similar to the 3284 and 3286 printers. A Variable Width Forms Tractor option, as well as a Friction Feed Paper Handling option, is available. An audible alarm is a no-cost feature for signaling a forms-out condition; the alarm can also be sounded via a host computer command.

3288-2 BELT PRINTER: For use with 1920-character 3271, 3272, and 3274 clusters. The basic printer operates at 120 lines per minute with a 64-character set. With the optional Text Printer feature, the printer can also print the TN/T11 120-character set, which includes lower case alphabetics and provides for overprint and underscore capabilities, at an operational speed of 80 lines per minute. The 64- and 120-character set print belts are interchangeable. The 3288-2 prints 10 characters per inch and 6 lines per inch; print width is 132 positions. The Text Print option provides a 120 character set (TN/T11) and overprint capability.

3289 BELT PRINTER: A new higher-speed printer for use with 3274 and 3276 clusters. The printer is available in two models that differ only in print speed. Model 1 operates at 155 lines per minute with a 48-character set (both EBCDIC and ASCII are available); performance is reduced to 120 and 80 lines per minute, respectively, when a 64 or 94 character set is used via interchangeable belts. Model 2 operates at a peak speed of 400 lines per minute with a 48-character set, 300 lines per minute with a 64-character set, and 230 lines per minute with a 94-character set. When connected to a 3274, the 3289 can incorporate the Text Print feature; an Extended Character Set Adapter is required. Data is printed at 10 characters per inch and 6 or 8 lines per inch; 132 print positions are provided. An Audible Alarm feature (extra-cost) sounds when end of forms is reached or when activated by the host computer.

PRICING

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LRA was announced for general application in April 1977. Basically, this arrangement provides for month-to-month rental or for a two-year lease with penalties for early termination (including model downgrades and feature termination). The lease can be extended indefinitely, one year at a time. The monthly charges for the lease arrangement are generally 15 percent lower than the month-to-month arrangement. The prime shift maintenance period is for any consecutive nine hours between 7 AM and 6 PM, Monday through Friday. (The maintenance charges given in the accompanying price list are for prime shift maintenance for purchased equipment and also serve as the basis for calculating extended charges for rented or leased equipment.) Extended period maintenance is available up to 24 hours per day, 7 days per week.

The termination charge for the lease arrangement is the lower of 5 months' charges or 25 (5 percent for the 3286 printer) percent of the remaining value of the lease. (For periods of fewer than 20 months, the 25 percent charge will be lower than the 5 month charge.)

All 3270 components are in maintenance category A, except the 3278 Control Unit Display Station and the 3288 Printer, which are in category D. These categories determine the schedule of extended maintenance charges. The two schedules differ for extended Monday through Friday maintenance, but are the same for Saturday and Sunday maintenance. The premium for extended maintenance is expressed in the table below as a percentage of the basic maintenance charges, which are listed in the accompanying price list.

	Consecutive Hours				
	9*	12	16	20	24
Monday-Friday—					
Category A	10%	14%	18%	22%	26%
Category D	10	12	14	16	18
Saturday	4	5	7	8	9
Sunday	5	7	9	11	12

*For periods outside the basic 7 AM to 6 PM prime shift.

The lease arrangement also guarantees a maximum rate of increases for extended leasing periods. The rate for all 3270 components is five percent per year beginning in the second year of the lease, except for the 3288 printer, which has an upper limit rate of zero percent.

All 3270 components are classed under rental category B (unlimited usage) and warranty category B (three months). Purchase credits can be accrued up to a maximum of 60 percent for the older 3270 components (3271/3272/3275/3277/3284/3286/3288) and up to 55 percent for the newer components (3274/3276/3278/3287/3289).

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Cluster Controllers				
	3271 Model 1; remote, 480 char., BSC	$162	$138	$ 3,315	$ 20.00
	3271 Model 2; remote, 1920 char., BSC	177	151	3,670	22.00
	3271 Model 11; remote, 480 char., SDLC	235	200	4,510	49.00
	3271 Model 12; remote, 1920 char., SDLC	250	213	4,865	52.00
1066	Data Analysis—APL; 3271-2, -12 only	43	37	441	1.50
1200	ASCII Transmission Code; 3271-11, -12 only	8	7	201	0.50
1550	Copy-Buffer Transfer; 3271-1, -2 only	NC	NC	NC	NC
3250	Device Adapter; accommodates four devices	53	45	546	0.50
7820	1200 bps Transmission Speed	NC	NC	NC	NC
7821	4800/7200 bps Transmission Speed; 3271-1, -2 only	4	3	102	0.50
	3272 Model 1; local, 480 char.	187	159	3,830	20.00
	3272 Model 2; local, 1920 char.	202	172	4,180	44.50

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is available. A Variable Width Forms Tractor option, as well as a Friction Feed Paper Handling option, is available. An audible alarm is a no-cost feature for signaling a forms-out condition; the alarm can also be sounded via a host computer command.

3287-1C AND -2C MATRIX PRINTERS: Available in two color models that vary only in their rated print speeds: Model 1C prints at a maximum of 80 characters per second and Model 2C at 120 characters per second, when printing bi-directionally with a single color per line. Four colors (red, green, blue, and black) are provided via a multi-color ribbon. Print positions 1 through 120 can be printed in any color, but positions 121 through 132 can only be printed in black. As with the 3279 Display, two levels of color usage are supported. Basic color mode printing is standard on both models and substitutes color for existing protect and intensify field attributes. Extended color mode requires the previously available Extended Character Set Adapter (#3610) and permits user specification of color as an independent character or field attribute. When seven-color displayed data is transferred to a four-color printer, extended colors (pink, yellow, and turquoise) are printed in black. Extended highlighting permits underscoring of printed data, but blinking and reverse video attributes are ignored. Storage for two, four, or six programmed symbol sets, including a four-color business graphics set, is also supported and requires two previously available options, the Extended Character Set Adapter (#3610) and the Extended Print Buffer (#3880). Except for color printing, functions and features of the Model 1C and 2C are equivalent to the 3287 Models 1 and 2, respectively.

The 3287 Models 1C and 2C can be attached to any model of the 3274 Control Unit with a Category A terminal port, and to any 3276 Control Unit Display Station (features #1068 and #1950 are not required). Unlike 3287 Models 1 and 2, they cannot be attached to a 3271 or 3272 Control Unit. When operating with extended color, extended highlighting, and preprogrammed symbol sets, Models 1C and 2C can be attached only to a 3274-Model 1A, 1C, 1D, or 51C with Configuration Support C.

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*For periods outside the basic 7 AM to 6 PM prime shift.

The lease arrangement also guarantees a maximum rate of increases for extended leasing periods. The rate for all 3270 components is five percent per year beginning in the second year of the lease, except for the 3288 printer, which has an upper limit rate of zero percent.

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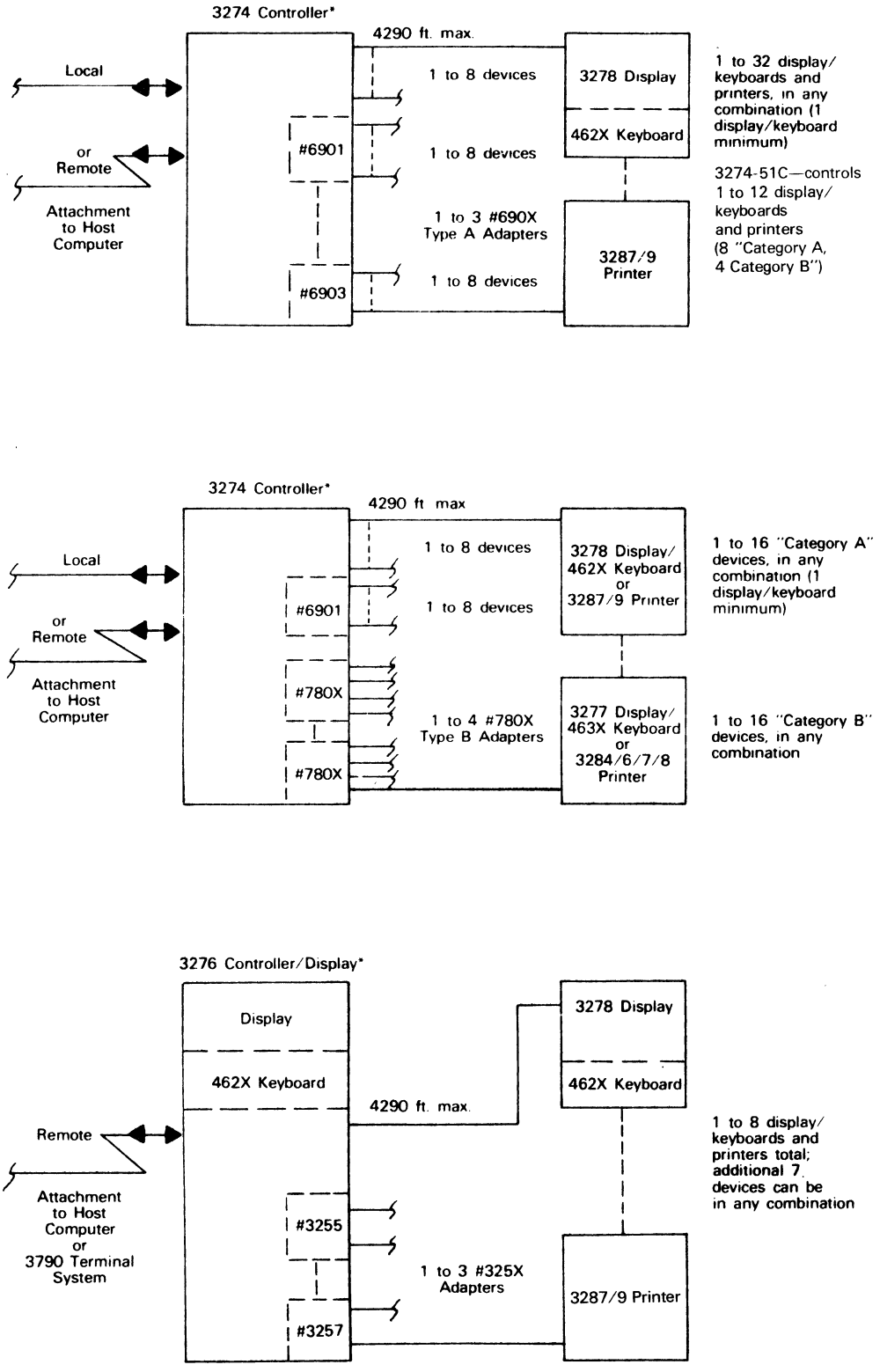

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		Monthly Charges*			
	Cluster Controllers	Rental	Lease	Purchase	Monthly Maint.
	3271 Model 1; remote, 480 char., BSC	$193	$164	$2,820	$31.50
	3271 Model 2; remote, 1920 char., BSC	210	179	3,120	34.50
	3271 Model 11; remote, 480 char., SDLC	281	239	3,835	77.00
	3271 Model 12; remote, 1920 char., SDLC	298	254	4,135	81.50
1066	Data Analysis—APL; 3271-2, -12 only	51	43	375	2.00
1200	ASCII Transmission Code; 3271-11, -12 only	8	7	171	1.00
1550	Copy-Buffer Transfer; 3271-1, -2 only	NC	NC	NC	NC
3250	Device Adapter; accommodates four devices	61	52	464	1.00
7820	1200 bps Transmission Speed	NC	NC	NC	NC

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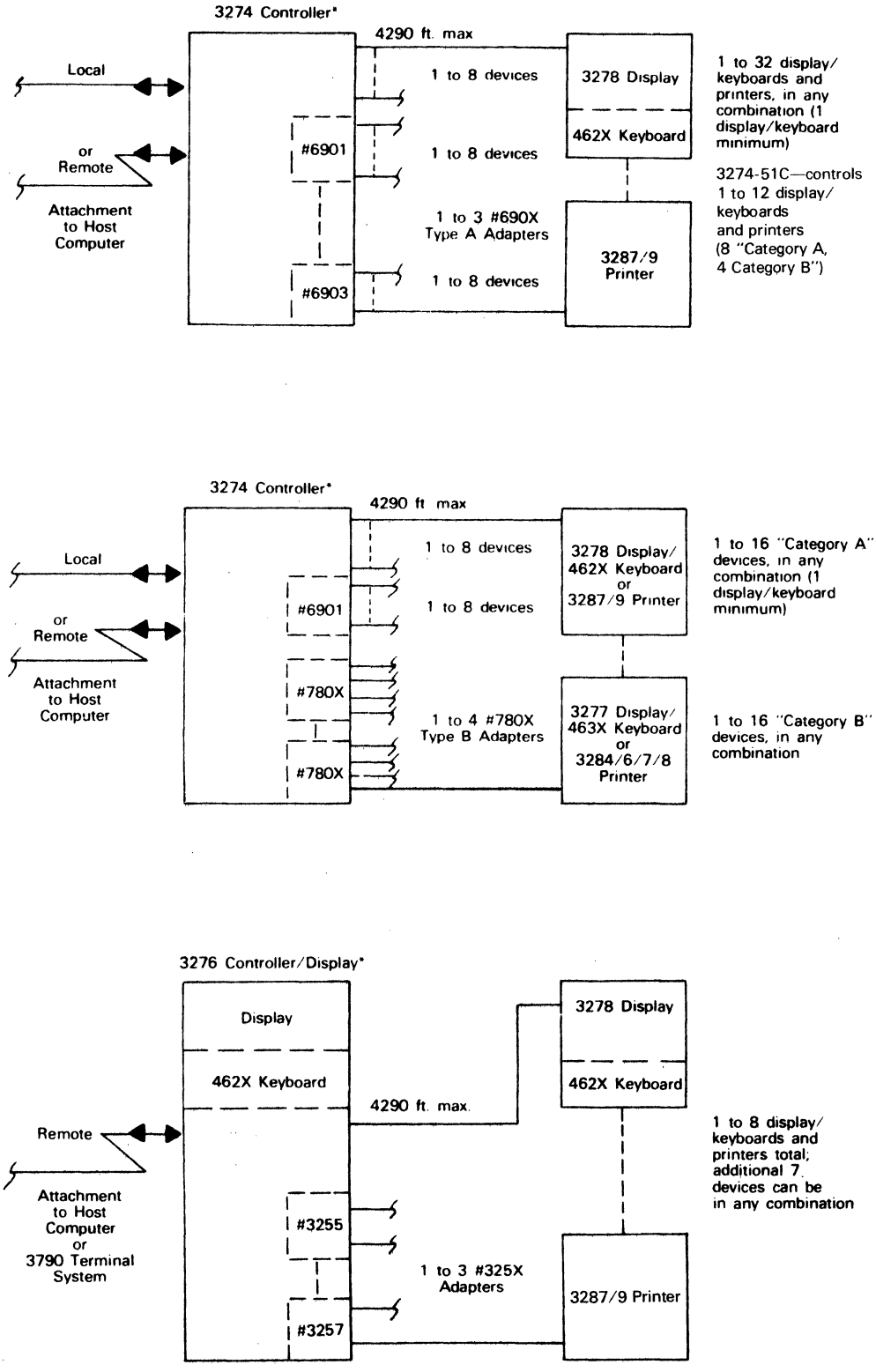

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Saturday	4	5	7	8	9
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*For periods outside the basic 7 AM to 6 PM prime shift.

The lease arrangement also guarantees a maximum rate of increases for extended leasing periods. The rate for all 3270 components is five percent per year beginning in the second year of the lease, except for the 3288 printer, which has an upper limit rate of zero percent.

All 3270 components are classed under rental category B (unlimited usage) and warranty category B (three months). Purchase credits can be accrued up to a maximum of 60 percent for the older 3270 components (3271/3272/3275/3277/3284/3286/3288) and up to 55 percent for the newer components (3274/3276/3278/3287/3289).

		Monthly Charges*			
	Cluster Controllers	Rental	Lease	Purchase	Monthly Maint.
	3271 Model 1; remote, 480 char., BSC	$181	$154	$ 2,820	$ 27.50
	3271 Model 2; remote, 1920 char., BSC	197	168	3,120	30.00
	3271 Model 11; remote, 480 char., SDLC	263	224	3,835	67.00
	3271 Model 12; remote, 1920 char., SDLC	280	238	4,135	71.00
1066	Data Analysis—APL; 3271-2, -12 only	47	40	375	1.50
1200	ASCII Transmission Code; 3271-11, -12 only	8	7	171	0.50
1550	Copy-Buffer Transfer; 3271-1, -2 only	NC	NC	NC	NC
3250	Device Adapter; accommodates four devices	58	49	464	0.50
7820	1200 bps Transmission Speed	NC	NC	NC	NC

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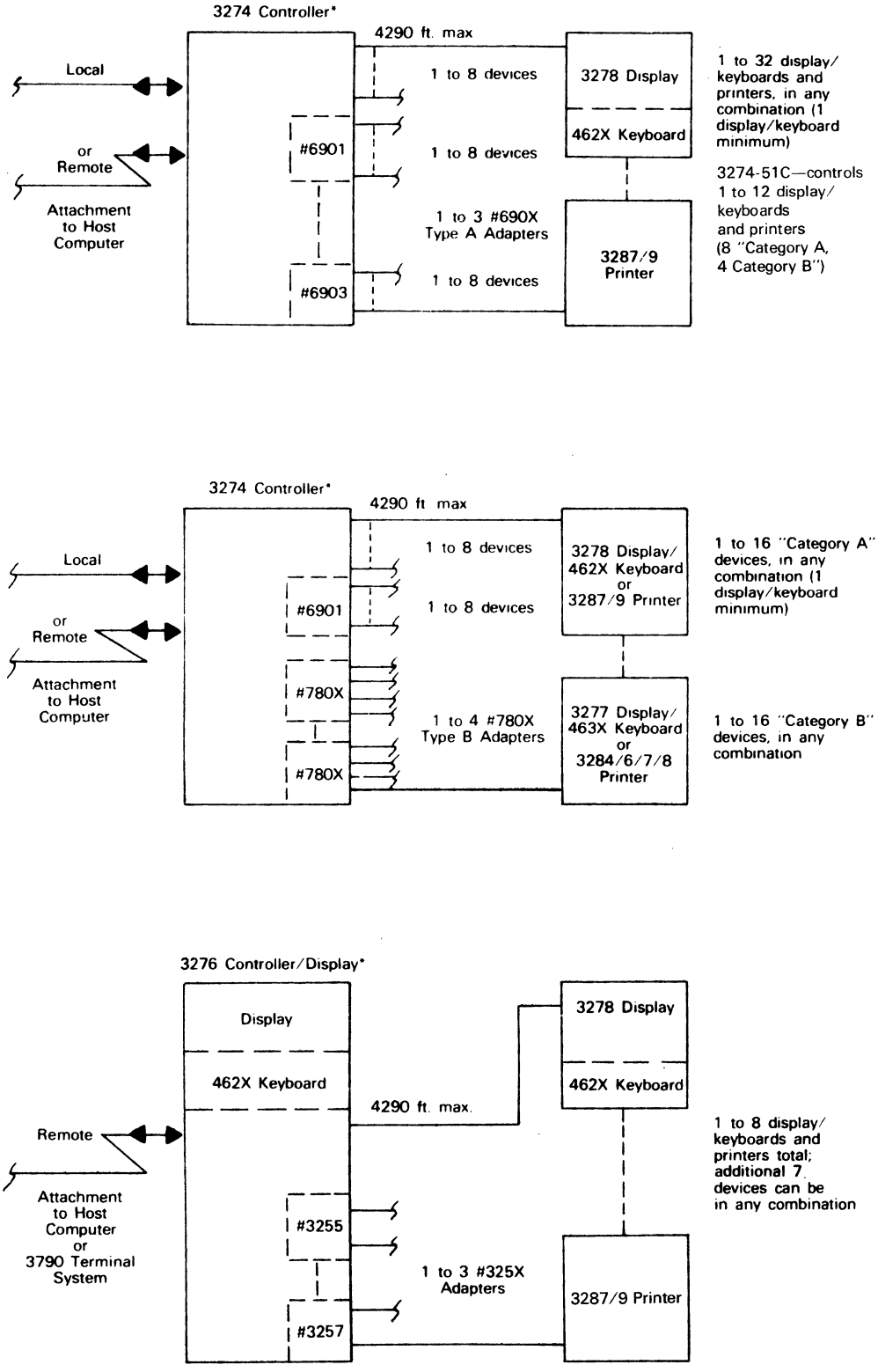

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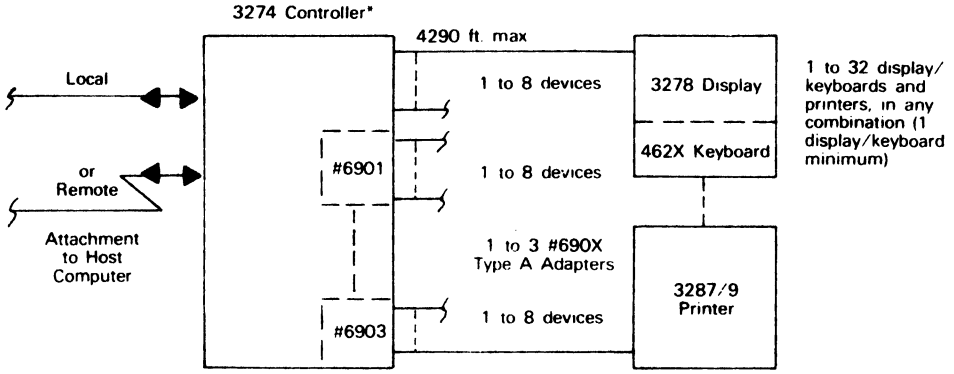

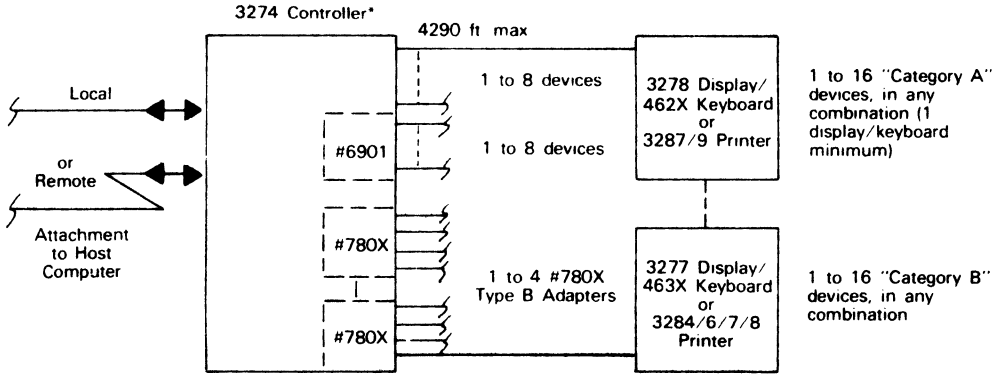

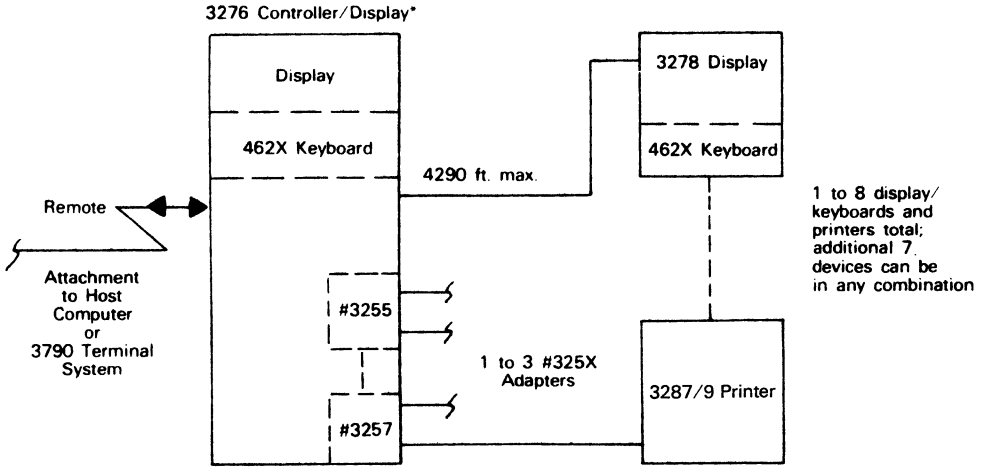

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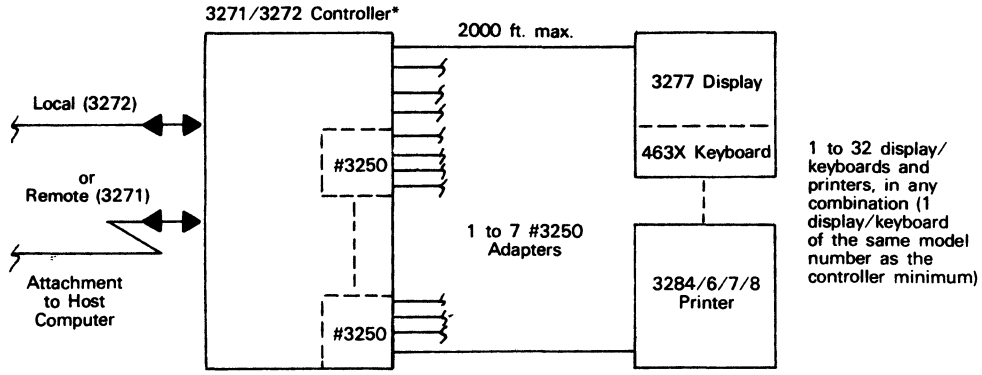

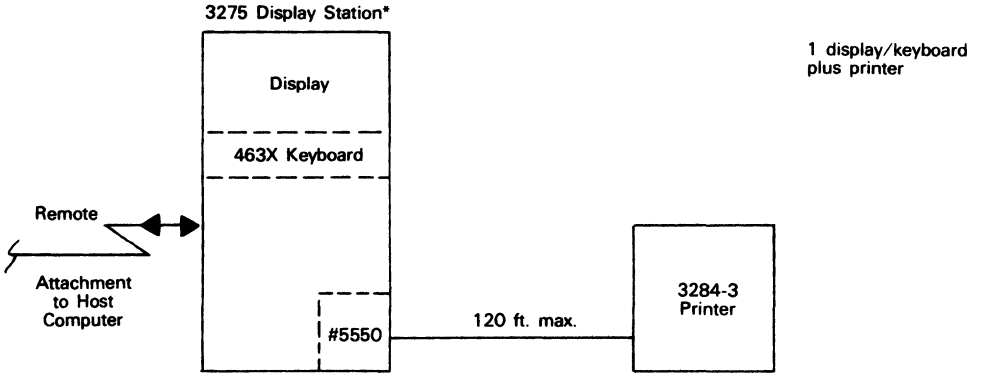

*See text for communications, display, keyboard, and printer models, characteristics, and options.

3277 Display — 480 or 1920 characters
3278 Display — 960, 1920, 2560, or 3440 characters.

3284 Printer — 40 char./sec.
3286 Printer — 66 char./sec.
3287 Printer — 80 or 160 char./sec.
3288 Printer — 120 lines/min.
3289 Printer — 155 or 400 lines/min.

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Cluster Controllers (Continued)				
1066	Data Analysis—APL; 3272-2 only	43	37	441	2.50
3250	Device Adapter; accommodates four devices	53	45	546	0.50
	3274 Model 1A; local, SNA mode	513	437	18,770	87.00
	3274 Model 1B; local, 3272 mode	513	437	18,770	91.00
	3274 Model 1C; remote; requires 3701	361	307	13,190	73.50
	3274 Model 1D; local, 3272 mode	513	437	18,770	96.50
	Terminal Adapters—				
6901	Type A1; devices 9 through 16	33	28	1,215	2.50
6902	Type A2; devices 17 through 24	33	28	1,215	2.50
6903	Type A3; devices 25 through 32	33	28	1,215	2.50
7802	Type B1; devices 1 through 4	39	33	1,300	5.00
7803	Type B2; devices 5 through 8	33	28	1,100	3.00
7804	Type B3; devices 9 through 12	33	28	1,100	3.00
7805	Type B4; devices 13 through 16	33	28	1,100	3.00

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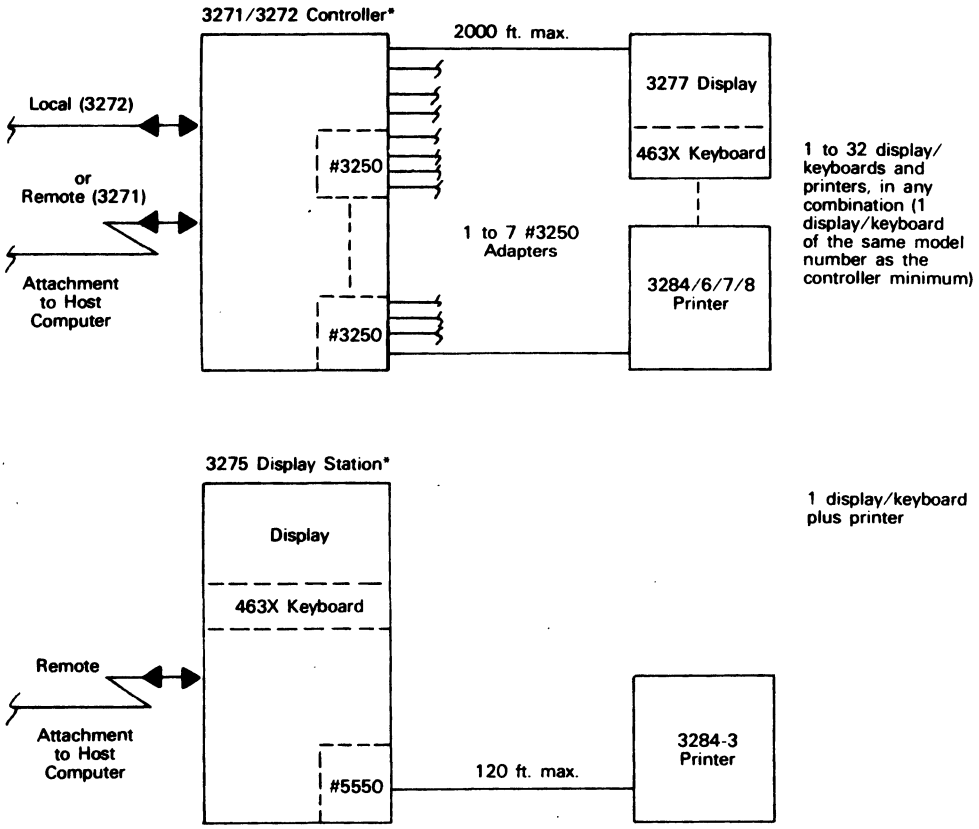

*See text for communications, display, keyboard, and printer models, characteristics, and options.

3277 Display	—	480 or 1920 characters
3278 Display	—	960, 1920, 2560, or 3440 characters.
3284 Printer	—	40 char./sec.
3286 Printer	—	66 char./sec.
3287 Printer	—	80 or 160 char./sec.
3288 Printer	—	120 lines/min.
3289 Printer	—	155 or 400 lines/min.

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Cluster Controllers				
	3271 Model 1; remote, 480 char., BSC	$222	$189	$2,820	$41.50
	3271 Model 2; remote, 1920 char., BSC	241	205	3,120	45.50
	3271 Model 11; remote, 480 char., SDLC	323	275	3,835	101.00
	3271 Model 12; remote, 1920 char., SDLC	323	292	4,135	107.00
1066	Data Analysis—APL; 3271-2, -12 only	59	50	375	3.00
1200	ASCII Transmission Code; 3271-11, -12 only	9	8	171	2.00
1550	Copy-Buffer Transfer; 3271-1, -2 only	NC	NC	NC	NC
3250	Device Adapter; accommodates four devices	71	60	464	2.00
7820	1200 bps Transmission Speed	NC	NC	NC	NC
7821	4800/7200 bps Transmission Speed; 3271-1, -2 only	4	3	87	2.00
	3272 Model 1; local, 480 char.	255	217	3,255	39.50
	3272 Model 2; local, 1920 char.	277	236	3,555	88.50
1066	Data Analysis—APL; 3272-2 only	59	50	375	3.00
3250	Device Adapter; accommodates four devices	71	60	464	2.00
	3274 Model 1A; local, SNA mode	709	603	17,560	110.00
	3274 Model 1B; local, 3272 mode	709	603	17,560	114.00
	3274 Model 1C; remote; requires 3701	498	424	12,340	84.50
	3274 Model 1D; local, 3272 mode	709	603	17,560	121.00
	3274 Model 51C; remote; requires 3701	230	196	6,035	57.50

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	3274 Model 21A; local, SNA mode	$709	$603	$17,560	$110.00
	3274 Model 21B; local, 3272 mode	709	603	17,560	114.00
	3274 Model 21C; remote; requires 3701	498	424	12,340	84.50
	3274 Model 21D; local, 3272 mode	709	603	17,560	121.00
	3274 Model 31A; local, SNA mode	833	709	20,570	136.50
	3274 Model 31C; remote; requires 3701	622	529	15,350	111.00
	3274 Model 31D; local, 3272 mode	833	709	20,570	147.50
	Terminal Adapters—				
6901	Type A1; devices 9 through 16	43	37	1,135	2.50
6902	Type A2; devices 17 through 24	43	37	1,135	2.50
6903	Type A3; devices 25 through 32	43	37	1,135	2.50
7801	Type B; requires 5550	51	43	1,215	5.50
7802	Type B1; devices 1 through 4	53	45	1,215	5.50
7803	Type B2; devices 5 through 8	43	37	1,025	3.00
7804	Type B3; devices 9 through 12	43	37	1,025	3.00
7805	Type B4; devices 13 through 16	43	37	1,025	3.00
3622	Extended Function Store—16K; Type C1; 3274-1A, -1C, -1D only; requires 1801	68	58	1,170	12.00
3623	Extended Function Store—32K; Type C2; 3274-1A, -1C, -1D only; requires 1801	88	75	1,560	15.00
3625	Extended Function Store—16K; Type C3; 3274-1A, -1C, -1D only; requires 1801	68	58	1,170	12.00
3627	Extended Function Store—16K; Type D1; 3274-1A, -1C, -1D only; requires 1801	68	58	1,170	12.00
3628	Extended Function Store—32K; Type D2; 3274-1A, -1C, -1D only; requires 3622 or 3623	88	75	1,560	17.00
1801	Control Storage Expansion	42	36	985	6.00
1802	Control Storage Expansion	42	36	985	6.00
3701	External Modem Interface; requires 6301, 6302 or 6303	15	13	374	4.50
6301	Common Communications Adapter with Business Machine Clock; SDLC or BSC; 1200 bps	21	18	603	3.00
6302	Common Communications Adapter; SDLC or BSC; up to 9600 bps with Type A only Terminal Adapters and up to 7200 bps with Type B or mix	13	11	405	2.50
6303	High Performance Communications Adapter; SDLC or BSC; 9600 bps with Type B Terminal Adapters or mix	47	40	1,120	12.50
8801	Watertight Power Connector; 3274-1A or -1B only	NC	NC	NC	NC
3680	Encrypt/Decrypt; 3274-1C, 3274-51C only	74	68	1,980	2.50
5650	Dataphone Digital Service; point-to-point; 3274-1C and 3274-51C only	31	26	840	2.00
5651	Dataphone Digital Service; multipoint; 3274-1C and 3274-51C only	31	26	840	2.00
4850	Loop Adapter; for 8100 System attachment; requires 6303 and Configuration Support C	35	30	885	4.00
	Integrated Modem; 1200 bps; requires 6301 and Configuration Support C				
5500	Non-switched	25	21	625	5.50
5501	Switched; auto answer	35	30	786	3.00
5502	Switched; manual answer	25	21	625	4.50
5507	Non-switched; switched network back-up; manual answer	36	31	851	8.00
5508	Non-switched; switched network back-up; auto answer	39	33	950	4.50
	Controller/Display Stations				
	3276 Model 1; 960 char., BSC	239	203	5,980	37.00
	3276 Model 2; 1920 char., BSC	246	209	6,150	38.00
	3276 Model 3; 2560 char., BSC	249	212	6,315	39.00
	3276 Model 4; 3440 char., BSC	260	221	6,480	39.50
	3276 Model 11; 960 char., SDLC	239	208	5,980	33.00
	3276 Model 12; 1920 char., SDLC	246	203	6,150	33.50
	3276 Model 13; 2560 char., SDLC	249	212	6,315	34.50
	3276 Model 14; 3440 char., SDLC	260	221	6,480	35.00
3255	Terminal Adapter No. 1; devices 3 and 4	20	17	589	1.50
3256	Terminal Adapter No. 2; devices 5 and 6	20	17	589	1.50
3257	Terminal Adapter No. 3; devices 7 and 8	20	17	589	1.50
3701	External Modem Interface; requires 6301 or 6302	15	13	374	4.00
3680	Encrypt/Decrypt; 3276-11, -12, -13, -14 only	69	59	1,600	2.50
	1200 bps Integrated Modems—				
5500	Non-switched; requires 6301	25	21	625	5.50
5501	Switched, Auto Answer; requires 6301	35	30	786	3.00
5502	Switched, Manual Answer; requires 6301	25	21	625	4.00

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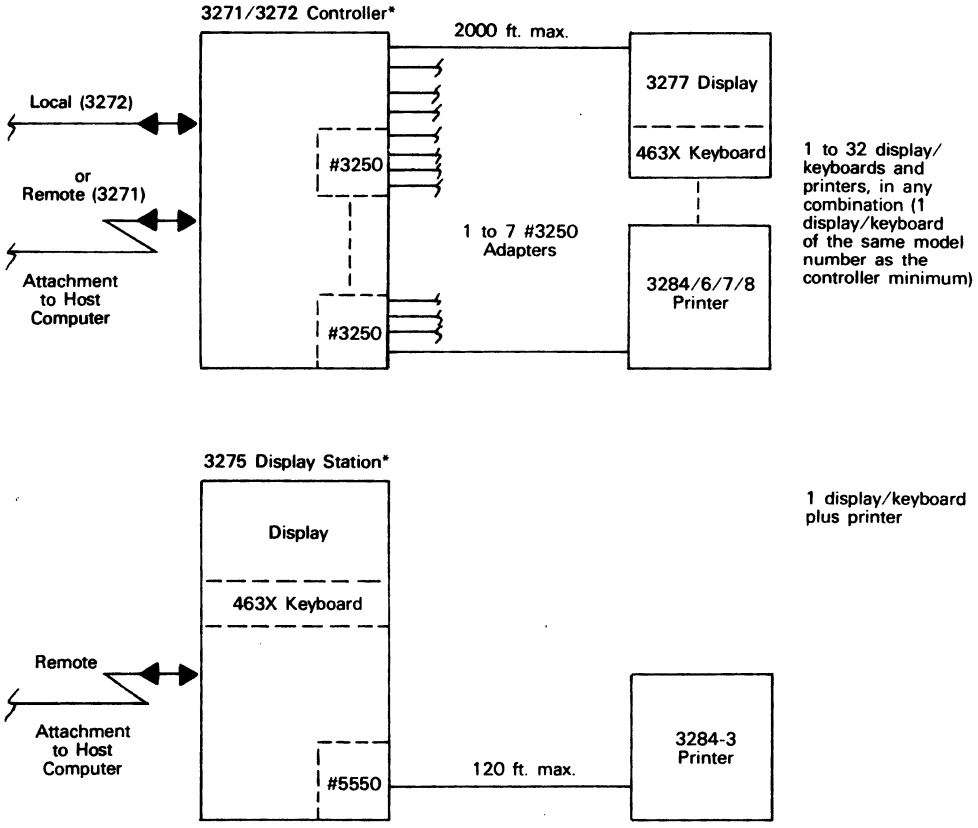

*See text for communications, display, keyboard, and printer models, characteristics, and options.

3277 Display	—	480 or 1920 characters
3278 Display	—	960, 1920, 2560, or 3440 characters.
3284 Printer	—	40 char./sec.
3286 Printer	—	66 char./sec.
3287 Printer	—	80 or 160 char./sec.
3288 Printer	—	120 lines/min.
3289 Printer	—	155 or 400 lines/min.

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Cluster Controllers				
	3271 Model 1; remote, 480 char., BSC	$206	$175	$2,820	$36.00
	3271 Model 2; remote, 1920 char., BSC	224	191	3,120	39.50
	3271 Model 11; remote, 480 char., SDLC	300	255	3,835	88.50
	3271 Model 12; remote, 1920 char., SDLC	318	271	4,135	93.50
1066	Data Analysis—APL; 3271-2, -12 only	—	—	375	2.00
1200	ASCII Transmission Code; 3271-11, -12 only	8	7	171	1.00
1550	Copy-Buffer Transfer; 3271-1, -2 only	NC	NC	NC	NC
3250	Device Adapter; accommodates four devices	66	56	464	1.50
7820	1200 bps Transmission Speed	NC	NC	NC	NC
7821	4800/7200 bps Transmission Speed; 3271-1, -2 only	4	3	87	1.50
	3272 Model 1; local, 480 char.	237	202	3,255	36.00
	3272 Model 2; local, 1920 char.	257	219	3,555	80.50
1066	Data Analysis—APL; 3272-2 only	54	46	375	2.50
3250	Device Adapter; accommodates four devices	66	56	464	1.50
	3274 Model 1A; local, SNA mode	657	559	16,890	110.00
	3274 Model 1B; local, 3272 mode	657	559	16,890	114.00
	3274 Model 1C; remote; requires 3701	462	393	11,870	84.50
	3274 Model 1D; local, 3272 mode	657	559	16,890	121.00
	3274 Model 51C; remote; requires 3701	214	182	5,805	57.50
	3274 Model 21A; local, SNA mode	657	559	16,890	110.00
	3274 Model 21B; local, 3272 mode	657	559	16,890	114.00

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	3274 Model 21C; remote; requires 3701	462	393	11,870	84.50
	3274 Model 21D; local, 3272 mode	657	559	16,890	121.00
	3274 Model 31A; local, SNA mode	772	657	19,790	136.50
	3274 Model 31C; remote; requires 3701	576	491	14,770	111.00
	3274 Model 31D; local, 3272 mode	772	657	19,790	147.50
	Terminal Adapters—				
6901	Type A1; devices 9 through 16	40	34	1,095	2.50
6902	Type A2; devices 17 through 24	40	34	1,095	2.50
6903	Type A3; devices 25 through 32	40	34	1,095	2.50
7801	Type B; requires 5550	47	40	1,170	5.50
7802	Type B1; devices 1 through 4	49	42	1,170	5.50
7803	Type B2; devices 5 through 8	40	34	990	3.00
7804	Type B3; devices 9 through 12	40	34	990	3.00
7805	Type B4; devices 13 through 16	40	34	990	3.00
3622	Extended Function Store—16K; Type C1; 3274-1A, -1C, -1D only; requires 1801	63	54	1,170	12.00
3623	Extended Function Store—32K; Type C2; 3274-1A, -1C, -1D only; requires 1801	81	69	1,560	15.00
3625	Extended Function Store—16K; Type C3; 3274-1A, -1C, -1D only; requires 1801	63	54	1,170	12.00
3627	Extended Function Store—16K; Type D1; 3274-1A, -1C, -1D only; requires 1801	63	54	1,170	12.00
3628	Extended Function Store—32K; Type D2; 3274-1A, -1C, -1D only; requires 3622 or 3623	81	69	1,560	17.00
1801	Control Storage Expansion	39	33	950	6.00
1802	Control Storage Expansion	39	33	950	6.00
3701	External Modem Interface; requires 6301, 6302 or 6303	14	12	360	4.50
6301	Common Communications Adapter with Business Machine Clock; SDLC or BSC; 1200 bps	21	18	603	3.00
6302	Common Communications Adapter; SDLC or BSC; up to 9600 bps with Type A only Terminal Adapters and up to 7200 bps with Type B or mix	13	11	405	2.50
6303	High Performance Communications Adapter; SDLC or BSC; 9600 bps with Type B Terminal Adapters or mix	43	37	1,080	12.50
8801	Watertight Power Connector; 3274-1A or -1B only	NC	NC	NC	NC
3680	Encrypt/Decrypt; 3274-1C, 3274-51C only	74	63	2,115	2.50
5650	Dataphone Digital Service; point-to-point; 3274-1C and 3274-51C only	31	26	840	2.00
5651	Dataphone Digital Service; multipoint; 3274-1C and 3274-51C only	—	—	840	2.00
4850	Loop Adapter; for 8100 System attachment; requires 6303 and Configuration Support C	33	28	851	4.00
	Integrated Modem; 1200 bps; requires 6301 and Configuration Support C				
5500	Non-switched	22	19	601	5.50
5501	Switched; auto answer	33	28	756	3.00
5502	Switched; manual answer	22	19	601	4.50
5507	Non-switched; switched network back-up; manual answer	34	29	819	8.00
5508	Non-switched; switched network back-up; auto answer	36	31	914	4.50
	Controller/Display Stations				
	3276 Model 1; 960 char., BSC	222	189	5,750	37.00
	3276 Model 2; 1920 char., BSC	228	194	5,915	38.00
	3276 Model 3; 2560 char., BSC	231	197	6,075	39.00
	3276 Model 4; 3440 char., BSC	241	205	6,235	39.50
	3276 Model 11; 960 char., SDLC	222	189	5,750	33.00
	3276 Model 12; 1920 char., SDLC	228	194	5,915	33.50
	3276 Model 13; 2560 char., SDLC	231	197	6,075	34.50
	3276 Model 14; 3440 char., SDLC	241	205	6,235	35.00
3255	Terminal Adapter No. 1; devices 3 and 4	19	16	567	1.50
3256	Terminal Adapter No. 2; devices 5 and 6	19	16	567	1.50
3257	Terminal Adapter No. 3; devices 7 and 8	19	16	567	1.50
3701	External Modem Interface; requires 6301 or 6302	14	12	360	4.00
3680	Encrypt/Decrypt; 3276-11, -12, -13, -14 only	65	55	1,540	2.50
	1200 bps Integrated Modems—				
5500	Non-switched; requires 6301	22	19	601	5.50
5501	Switched, Auto Answer; requires 6301	33	28	756	3.00
5502	Switched, Manual Answer; requires 6301	22	19	601	4.00
5507	Non-switched with Switched Backup; requires 6301	34	29	819	7.50
5508	Non-switched with Switched Backup, Auto Answer; requires 6301	36	31	914	4.00
5650	Dataphone Digital Service; point-to-point	31	26	840	2.00
5651	Dataphone Digital Service; multipoint	31	26	840	2.00
6301	Communications Feature with Clock	21	18	603	3.00
6302	Communications Feature without Clock	13	11	405	2.50

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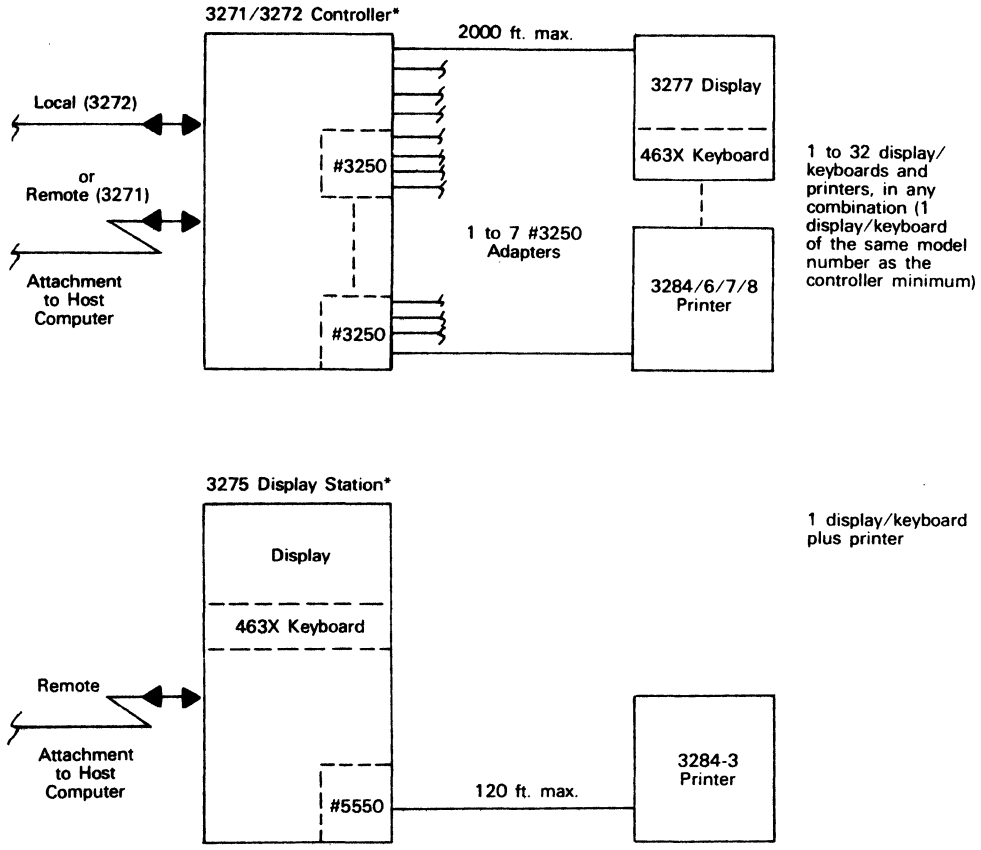

*See text for communications, display, keyboard, and printer models, characteristics, and options.

3277 Display — 480 or 1920 characters
3278 Display — 960, 1920, 2560, or 3440 characters.

3284 Printer — 40 char./sec.
3286 Printer — 66 char./sec.
3287 Printer — 80 or 160 char./sec.
3288 Printer — 120 lines/min.
3289 Printer — 155 or 400 lines/min.

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
7821	4800/7200 bps Transmission Speed; 3271-1, -2 only	4	3	87	1.00
	3272 Model 1; local, 480 char.	223	190	3,255	31.50
	3272 Model 2; local, 1920 char.	241	205	3,555	70.00
1066	Data Analysis—APL; 3272-2 only	51	43	375	2.00
3250	Device Adapter; accommodates four devices	61	52	464	1.00
	3274 Model 1A; local, SNA mode	615	523	18,770	110.00
	3274 Model 1B; local, 3272 mode	615	523	18,770	114.00
	3274 Model 1C; remote; requires 3701	432	368	13,190	84.50
	3274 Model 1D; local, 3272 mode	615	523	18,770	121.00
	3274 Model 51C; remote; requires 3701	201	171	6,450	57.50
	Terminal Adapters—				
6901	Type A1; devices 9 through 16	38	32	1,215	2.50
6902	Type A2; devices 17 through 24	38	32	1,215	2.50
6903	Type A3; devices 25 through 32	38	32	1,215	2.50
7801	Type B; requires 5550	43	37	1,300	5.50
7802	Type B1; devices 1 through 4	46	39	1,300	5.50
7803	Type B2; devices 5 through 8	38	32	1,100	3.00
7804	Type B3; devices 9 through 12	38	32	1,100	3.00
7805	Type B4; devices 13 through 16	38	32	1,100	3.00

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
3622	Extended Function Store—16K; Type C1; 3274-1A, -1C, -1D only; requires 1801	63	54	1,170	12.00
3623	Extended Function Store—32K; Type C2; 3274-1A, -1C, -1D only; requires 1801	81	69	1,560	15.00
3625	Extended Function Store—16K; Type C3; 3274-1A, -1C, -1D only; requires 1801	63	54	1,170	12.00
3627	Extended Function Store—16K; Type D1; 3274-1A, -1C, -1D only; requires 1801	63	54	1,170	12.00
3628	Extended Function Store—32K; Type D2; 3274-1A, -1C, -1D only; requires 3622 or 3623	81	69	1,560	17.00
1801	Control Storage Expansion	36	31	1,055	6.00
1802	Control Storage Expansion	36	31	1,055	6.00
3701	External Modem Interface; requires 6301, 6302 or 6303	13	11	400	4.50
6301	Common Communications Adapter with Business Machine Clock; SDLC or BSC; 1200 bps	20	17	670	3.00
6302	Common Communications Adapter; SDLC or BSC; up to 9600 bps with Type A only Terminal Adapters and up to 7200 bps with Type B or mix	12	10	450	2.50
6303	High Performance Communications Adapter; SDLC or BSC; 9600 bps with Type B Terminal Adapters or mix	41	35	1,200	12.50
8801	Watertight Power Connector; 3274-1A or -1B only	NC	NC	NC	NC
3680	Encrypt/Decrypt; 3274-1C, 3274-51C only	74	63	2,115	2.50
5650	Dataphone Digital Service; point-to-point; 3274-1C and 3274-51C only	28	24	840	2.00
5651	Dataphone Digital Service; multipoint; 3274-1C and 3274-51C only	28	24	840	2.00
4850	Loop Adapter; for 8100 System attachment; requires 6303 and Configuration Support C	31	26	945	4.00
	Integrated Modem; 1200 bps; requires 6301 and Configuration Support C				
5500	Non-switched	21	18	668	5.50
5501	Switched; auto answer	31	26	840	3.00
5502	Switched; manual answer	21	18	668	4.50
5507	Non-switched; switched network back-up; manual answer	32	27	910	8.00
5508	Non-switched; switched network back-up; auto answer	34	29	1,015	4.50
	Controller/Display Stations				
	3276 Model 1; 960 char., BSC	208	177	6,390	37.00
	3276 Model 2; 1920 char., BSC	214	182	6,570	38.00
	3276 Model 3; 2560 char., BSC	217	185	6,750	39.00
	3276 Model 4; 3440 char., BSC	226	192	6,930	39.50
	3276 Model 11; 960 char., SDLC	208	177	6,390	33.00
	3276 Model 12; 1920 char., SDLC	214	182	6,570	33.50
	3276 Model 13; 2560 char., SDLC	217	185	6,750	34.50
	3276 Model 14; 3440 char., SDLC	226	192	6,930	35.00
3255	Terminal Adapter No. 1; devices 3 and 4	18	15	630	1.50
3256	Terminal Adapter No. 2; devices 5 and 6	18	15	630	1.50
3257	Terminal Adapter No. 3; devices 7 and 8	18	15	630	1.50
3701	External Modem Interface; requires 6301 or 6302	13	11	400	4.00
3680	Encrypt/Decrypt; 3276-11, -12, -13, -14 only	60	51	1,710	2.50
	1200 bps Integrated Modems—				
5500	Non-switched; requires 6301	21	18	668	5.50
5501	Switched, Auto Answer; requires 6301	31	26	840	3.00
5502	Switched, Manual Answer; requires 6301	21	18	668	4.00
5507	Non-switched with Switched Backup; requires 6301	32	27	910	7.50
5508	Non-switched with Switched Backup, Auto Answer; requires 6301	34	29	1,015	4.00
5650	Dataphone Digital Service; point-to-point	28	24	840	2.00
5651	Dataphone Digital Service; multipoint	28	24	840	2.00
6301	Communications Feature with Clock	20	17	670	3.00
6302	Communications Feature without Clock	12	10	450	2.50
6315	SDLC/BSC Switch; 3276-1, -2, -3, -4 only	24	20	810	3.00
1067	APL/Text Control; requires 1068	34	29	1,125	0.50
1950	Color Display Attachment; not available for 3276-1; requires 1068	28	24	900	0.50
	Stand-Alone Display Stations				
	3275 Model 2; 1920 char., BSC	167	142	2,820	38.00
	3275 Model 12; 1920 char., SDLC	230	196	3,835	74.00
1200	ASCII Transmission Code; 3275-12 only	8	7	171	1.00
3440	Dial; 600 or 1200 bps over dial network; 3275-2 only	8	7	196	1.50
5500	Integrated Modem; 1200 bps	18	15	535	3.50
5501	Integrated Modem; 1200 bps with Auto Answer; 3275-2 only	24	20	714	5.00

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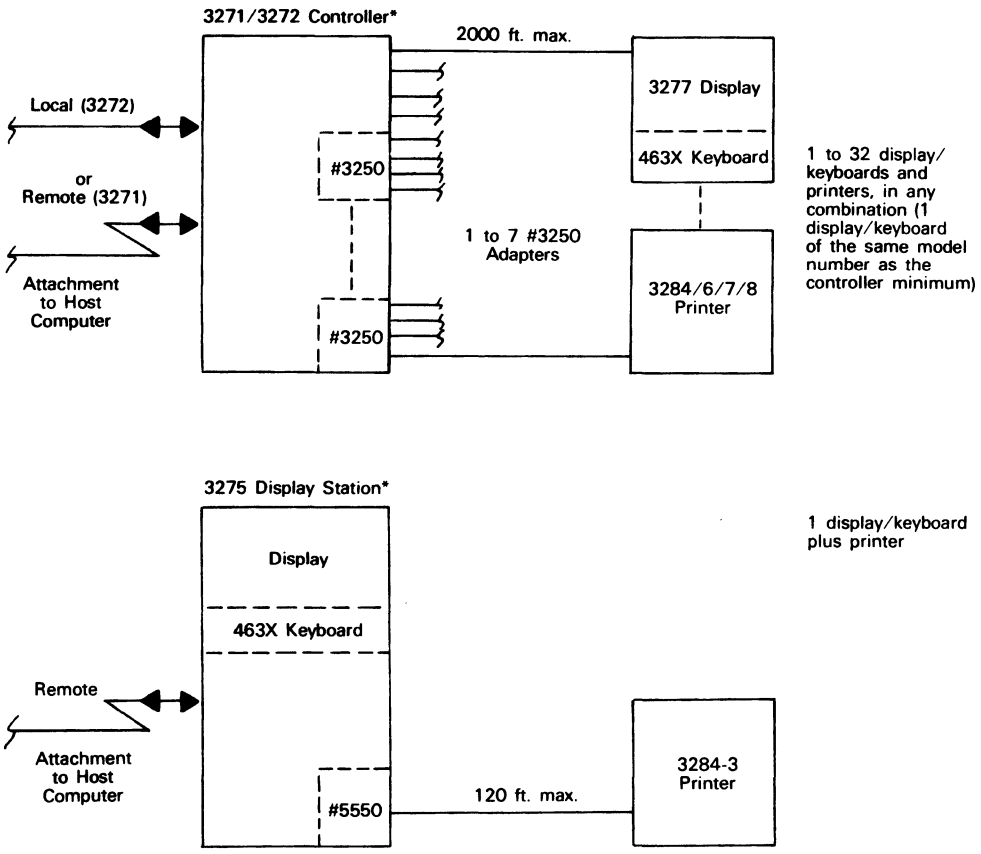

*See text for communications, display, keyboard, and printer models, characteristics, and options.

3277 Display — 480 or 1920 characters
3278 Display — 960, 1920, 2560, or 3440 characters.

3284 Printer — 40 char./sec.
3286 Printer — 66 char./sec.
3287 Printer — 80 or 160 char./sec.
3288 Printer — 120 lines/min.
3289 Printer — 155 or 400 lines/min.

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
7821	4800/7200 bps Transmission Speed; 3271-1, -2 only	4	3	87	0.50
	3272 Model 1; local, 480 char.	209	178	3,255	27.50
	3272 Model 2; local, 1920 char.	226	192	3,555	61.00
1066	Data Analysis—APL; 3272-2 only	47	40	375	1.50
3250	Device Adapter; accommodates four devices	58	49	464	0.50
	3274 Model 1A; local, SNA mode	575	489	18,770	110.00
	3274 Model 1B; local, 3272 mode	575	489	18,770	114.00
	3274 Model 1C; remote; requires 3701	404	344	13,190	84.50
	3274 Model 1D; local, 3272 mode	575	489	18,770	121.00
	3274 Model 51C; remote; requires 3701	188	160	6,450	57.50
	Terminal Adapters—				
6901	Type A1; devices 9 through 16	35	30	1,215	2.50
6902	Type A2; devices 17 through 24	35	30	1,215	2.50
6903	Type A3; devices 25 through 32	35	30	1,215	2.50
7801	Type B; requires 5550	41	35	1,300	5.50
7802	Type B1; devices 1 through 4	42	36	1,300	5.50
7803	Type B2; devices 5 through 8	35	30	1,100	3.00
7804	Type B3; devices 9 through 12	35	30	1,100	3.00
7805	Type B4; devices 13 through 16	35	30	1,100	3.00

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IBM 3270 Information Display System

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
3622	Extended Function Store—16K; Type C1; 3274-1A, -1C, -1D only; requires 1801	63	54	1,170	12.00
3623	Extended Function Store—32K; Type C2; 3274-1A, -1C, -1D only; requires 1801	79	67	1,560	15.00
3625	Extended Function Store—16K; Type C3; 3274-1A, -1C, -1D only; requires 1801	63	54	1,170	12.00
3627	Extended Function Store—16K; Type D1; 3274-1A, -1C, -1D only; requires 1801	63	54	1,170	12.00
3628	Extended Function Store—32K; Type D2; 3274-1A, -1C, -1D only; requires 3622 or 3623	81	69	1,560	17.00
1801	Control Storage Expansion	34	29	1,055	6.00
1802	Control Storage Expansion	34	29	1,055	6.00
3701	External Modem Interface; requires 6301, 6302 or 6303	12	10	400	4.50
6301	Common Communications Adapter with Business Machine Clock; SDLC or BSC; 1200 bps	20	17	670	3.00
6302	Common Communications Adapter; SDLC or BSC; up to 9600 bps with Type A only Terminal Adapters and up to 7200 bps with Type B or mix	12	10	450	2.50
6303	High Performance Communications Adapter; SDLC or BSC; 9600 bps with Type B Terminal Adapters or mix	39	33	1,200	12.50
8801	Watertight Power Connector; 3274-1A or -1B only	NC	NC	NC	NC
3680	Encrypt/Decrypt; 3274-1C, 3274-51C only	69	59	2,115	2.50
5650	Dataphone Digital Service; point-to-point; 3274-1C and 3274-51C only	26	22	840	2.00
5651	Dataphone Digital Service; multipoint; 3274-1C and 3274-51C only	26	22	840	2.00
4850	Loop Adapter; for 8100 System attachment; requires 6303 and Configuration Support C	28	24	945	4.00
	Integrated Modem; 1200 bps; requires 6301 and Configuration Support C				
5500	Non-switched	20	17	668	5.50
5501	Switched; auto answer	28	24	840	3.00
5502	Switched; manual answer	20	17	668	4.50
5507	Non-switched; switched network back-up; manual answer	29	25	910	8.00
5508	Non-switched; switched network back-up; auto answer	32	27	1,015	4.50
	Controller/Display Stations				
	3276 Model 1; 960 char., BSC	195	166	6,390	37.00
	3276 Model 2; 1920 char., BSC	201	171	6,570	38.00
	3276 Model 3; 2560 char., BSC	204	174	6,750	39.00
	3276 Model 4; 3440 char., BSC	212	180	6,930	39.50
	3276 Model 11; 960 char., SDLC	195	166	6,390	33.00
	3276 Model 12; 1920 char., SDLC	201	171	6,570	33.50
	3276 Model 13; 2560 char., SDLC	204	174	6,750	34.50
	3276 Model 14; 3440 char., SDLC	212	180	6,930	35.00
3255	Terminal Adapter No. 1; devices 3 and 4	16	14	630	1.50
3256	Terminal Adapter No. 2; devices 5 and 6	16	14	630	1.50
3257	Terminal Adapter No. 3; devices 7 and 8	16	14	630	1.50
3701	External Modem Interface; requires 6301 or 6302	12	10	400	4.00
3680	Encrypt/Decrypt; 3276-11, -12, -13, -14 only	56	48	1,710	2.50
	1200 bps Integrated Modems—				
5500	Non-switched; requires 6301	20	17	668	5.50
5501	Switched, Auto Answer; requires 6301	28	24	840	3.00
5502	Switched, Manual Answer; requires 6301	20	17	668	4.00
5507	Non-switched with Switched Backup; requires 6301	29	25	910	7.50
5508	Non-switched with Switched Backup, Auto Answer; requires 6301	32	27	1,015	4.00
5650	Dataphone Digital Service; point-to-point	26	22	840	2.00
5651	Dataphone Digital Service; multipoint	26	22	840	2.00
6301	Communications Feature with Clock	20	17	670	3.00
6302	Communications Feature without Clock	12	10	450	2.50
6315	SDLC/BSC Switch; 3276-1, -2, -3, -4 only	22	19	810	3.00
1067	APL/Text Control; requires 1068	32	27	1,125	0.50
1950	Color Display Attachment; not available for 3276-1; requires 1068	26	22	900	0.50
	Stand-Alone Display Stations				
	3275 Model 2; 1920 char., BSC	157	134	2,820	33.00
	3275 Model 12; 1920 char., SDLC	216	184	3,835	64.50
1200	ASCII Transmission Code; 3275-12 only	8	7	171	0.50
3440	Dial; 600 or 1200 bps over dial network; 3275-2 only	8	7	196	1.00
5500	Integrated Modem; 1200 bps	16	14	535	3.00
5501	Integrated Modem; 1200 bps with Auto Answer; 3275-2 only	22	19	714	4.50

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IBM 3270 Information Display System

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
3622	Extended Function Store—16K; Type C1; 3274-1A, -1C, -1D only; requires 1801	60	51	1,170	10.50
3625	Extended Function Store—16K; Type C3; 3274-1A, -1C, -1D only; requires 1801	60	51	1,170	10.50
3627	Extended Function Store—16K; Type D1; 3274-1A, -1C, -1D only; requires 1801	60	51	1,170	10.50
1801	Control Storage Expansion	32	27	1,055	5.50
3701	External Modem Interface; requires 6302 or 6303	12	10	400	4.00
6302	Common Communications Adapter; SDLC or BSC; up to 9600 bps with Type A only Terminal Adapters and up to 7200 bps with Type B or mix	12	10	450	2.50
6303	High Performance Communications Adapter; SDLC or BSC; 9600 bps with Type B Terminal Adapters or mix	36	31	1,200	11.00
8801	Watertight Power Connector; 3274-1A or -1B only	NC	NC	NC	NC
3680	Encrypt/Decrypt; 3274-1C only	63	54	2,115	2.50
5650	Dataphone Digital Service; point-to-point; 3274-1C only	24	20	840	2.00
5651	Dataphone Digital Service; multipoint; 3274-IC only	24	20	840	2.00
	Controller/Display Stations				
	3276 Model 1; 960 char. BSC	175	149	6,390	33.50
	3276 Model 2; 1920 char., BSC	180	153	6,570	34.50
	3276 Model 3; 2560 char., BSC	184	157	6,750	35.50
	3276 Model 4; 3440 char., BSC	189	161	6,930	36.00
	3276 Model 11; 960 char., SDLC	175	149	6,390	29.00
	3276 Model 12; 1920 char., SDLC	180	153	6,570	29.50
	3276 Model 13; 2560 char., SDLC	184	157	6,750	30.00
	3276 Model 14; 3440 char., SDLC	189	161	6,930	30.50
3255	Terminal Adapter No. 1; devices 3 and 4	16	14	630	1.50
3256	Terminal Adapter No. 2; devices 5 and 6	16	14	630	1.50
3257	Terminal Adapter No. 3; devices 7 and 8	16	14	630	1.50
3701	External Modem Interface; requires 6301 or 6302	12	10	400	4.00
3680	Encrypt/Decrypt; 3276-11, -12, -13, -14 only	51	43	1,710	2.50
	1200 bps Integrated Modems—				
5500	Non-switched; requires 6301	19	16	668	5.00
5501	Switched, Auto Answer; requires 6301	26	22	840	3.00
5502	Switched, Manual Answer; requires 6301	19	16	668	4.00
5507	Non-switched with Switched Backup; requires 6301	27	23	910	7.00
5508	Non-switched with Switched Backup, Auto Answer; requires 6301	29	25	1,015	4.00
5650	Dataphone Digital Service; point-to-point	24	20	840	2.00
5651	Dataphone Digital Service; multipoint	24	20	840	2.00
6301	Communications Feature with Clock	19	16	670	3.00
6302	Communications Feature without clock	12	10	450	2.50
6315	SDLC/BSC Switch; 3276-1, -2, -3, -4 only	21	18	810	3.00
1067	APL/Text Control; requires 1068	29	26	1,125	0.50
1068	Extended Function Base	6	5	225	0.50
	Stand-Alone Display Stations				
3275	3275 Model 2; 1920 char., BSC	142	121	3,315	24.00
	3275 Model 12; 1920 char., SDLC	194	165	4,510	56.50
1200	ASCII Transmission Code; 3275-12 only	8	7	201	0.50
3440	Dial; 600 or 1200 bps over dial network; 3275-2 only	8	7	230	1.00
5500	Integrated Modem; 1200 bps	16	14	535	3.00
5501	Integrated Modem; 1200 bps with Auto Answer; 3275-2 only	21	18	714	4.00
5550	Printer Adapter; one max.	NC	NC	NC	NC
7820	1200 bps Transmission Speed	NC	NC	NC	NC
7821	4800/7200 bps Transmission Speed; 3275-2 only	4	3	102	0.50
	Cluster Display Stations				
	3277 Model 1; 480 char.	74	63	1,730	9.00
	3277 Model 2; 1920 char.	108	92	2,240	20.00
1066	Data Analysis—APL; 3277-2 only	26	22	353	1.00
	3278 Model 1; 960 char.	60	51	2,205	12.00
	3278 Model 2; 1920 char.	63	54	2,340	12.50
	3278 Model 3; 2560 char.	74	63	2,700	14.00
	3278 Model 4; 3440 char.	76	65	2,835	15.00
	3278 Model 5; 3564 char.	89	76	3,285	17.00
1720	Switch Control Unit; 3278 only	5	4	180	NC

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IBM 3270 Information Display System

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Keyboards				
	For 3275/3277—				
4630	66-Key EBCDIC Typewriter	13	11	364	5.00**
4631	66-Key EBCDIC Data Entry	13	11	364	6.00**
4632	78-Key Operator Console	33	28	707	14.50**
4633	78-Key EBCDIC Typewriter	29	25	609	8.50**
4634	66-Key ASCII Typewriter	13	11	364	5.00**
4635	78-Key ASCII Typewriter	29	25	609	8.50**
4636	66-Key EBCDIC Data Entry; Keypunch layout	15	13	366	6.00**
4637	66-Key EBCDIC APL/Typewriter 3277-2 only; requires 1066	27	23	565	5.50
4638	78-Key EBCDIC APL/Typewriter; 3277-2 only; requires 1066	41	35	875	9.50
4639	78-Key Text; 3277-2 only; requires 1066	41	35	875	8.50
	For 3276/3278—				
4621	75-Key EBCDIC Typewriter	13	11	495	2.50
4622	75-Key EBCDIC Data Entry	13	11	495	3.50
4623	75-Key EBCDIC Data Entry; keypunch layout	13	11	495	3.50
4624	75-Key ASCII Typewriter	13	11	495	2.50
4626	87-Key EBCDIC Typewriter/Text; 3278 only	18	15	675	3.50
4627	87-Key EBCDIC Typewriter; 3278/3274 only	18	15	675	3.00
4628	87-Key ASCII Typewriter; 3278/3274 only	18	15	675	3.00
4629	87-Key EBCDIC Typewriter/Text; 3278 only	18	15	675	3.50
	3275/3277 Display Station Options				
1090	Audible Alarm	4	3	102	0.50
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC
6350	Selector Light Pen	25	21	510	1.50
4600	Operator Identification Card Reader	13	11	306	4.00
	3276/3278 Display Station Options				
1009	Address Keylock; 3276 only	60 SUC	60 SUC	60	NC
1090	Audible Alarm	2	2	90	NC
1120	APL/Text; 3278 only	9	8	360	0.50
3610	Extended Character Set Adapter; 3278 only	11	9	405	2.50
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC
6350/6351	Selector Light Pen	15	13	585	0.50
4999	Magnetic Reader Control	11	9	405	4.50
	Magnetic Slot Reader (Part No. 4123500)	—	—	275	—
	Magnetic Hand Scanner (Part No. 4123495)	—	—	275	—
	Printers				
	3284 Model 1; 40 cps, 480 char. buffer; 3272 only	148	126	2,980	51.50
	3284 Model 2; 40 cps, 1920 char. buffer; 3271-2, -12, 3272-2 only	157	134	3,345	51.50
	3284 Model 3; 40 cps, bufferless; 3275 only	128	109	2,850	27.50
1066	Data Analysis—APL; 3284-2 only	43	37	970	2.00
	3286 Model 1; 66-cps; 480 char. buffer; 3271; 3272 only	177	151	3,985	54.00
	3286 Model 2; 66 cps, 1920-char. buffer; 3271-2, -12, 3272-2 only	187	159	4,415	54.00
1066	Data Analysis—APL; 3286-2 only	43	37	970	2.00
	3287 Model 1; 80 cps	175	149	5,680	49.00
	3287 Model 2; 160 cps	213	181	6,055	60.50
1066	Data Analysis—APL; 3287 only	11	9	315	NC
1120	APL/Text	6	5	175	0.50
3610	Extended Character Set Adapter	15	13	455	4.00
3880	Extended Print Buffer	7	6	210	0.50
8330	3271/3272 Attachment	32	27	910	3.50
8331	3274/3276 Attachment	6	5	175	0.50
8700	Variable Width Forms Tractor	6	5	160	0.50
4110	Friction Feed Paper Handling	6	5	160	0.50
	3288 Model 2; 120 lpm; 3271-2, -12, 3272-2 only	403	343	7,440	91.00
7880	Text Print	46	39	984	1.00
	3289 Model 1; 155 lpm	385	328	8,900	105.00
	3289 Model 2; 400 lpm	583	496	13,250	179.00
1090	Audible Alarm	6	5	175	NC
1130	Text Print	7	6	210	NC
4450	Form Stand; all models except 3289	—	—	54	—

*Includes prime-shift maintenance.
**Monthly maintenance prices for 3277. For 3275, add $1.00 for 4630, 4631, 4634, and 4636, $1.50 for 4633 and 4635, and $2.50 for 4632 keyboards.■

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IBM 3270 Information Display System

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
5507	Non-switched with Switched Backup; requires 6301	$36	$31	$851	$7.50
5508	Non-switched with Switched Backup, Auto Answer; requires 6301	39	33	950	4.00
5650	Dataphone Digital Service; point-to-point	31	26	840	2.00
5651	Dataphone Digital Service; multipoint	31	26	840	2.00
6301	Communications Feature with Clock	21	18	603	3.00
6302	Communications Feature without Clock	13	11	405	2.50
6315	SDLC/BSC Switch; 3276-1, -2, -3, -4 only	27	23	758	3.00
1067	APL/Text Control; requires 1068	39	33	1,055	0.50
1950	Color Display Attachment; not available for 3276-1; requires 1068	33	28	842	0.50
	Stand-Alone Display Stations				
	3275 Model 2; 1920 char., BSC	190	162	2,820	42.00
	3275 Model 12; 1920 char., SDLC	264	225	3,835	81.50
1200	ASCII Transmission Code; 3275-12 only	9	8	171	2.00
3440	Dial; 600 or 1200 bps over dial network; 3275-2 only	9	8	196	2.50
5500	Integrated Modem; 1200 bps	20	17	535	4.50
5501	Integrated Modem; 1200 bps with Auto Answer; 3275-2 only	27	23	714	6.00
5550	Printer Adapter; one max.	NC	NC	NC	NC
7820	1200 bps Transmission Speed	NC	NC	NC	NC
7821	4800/7200 bps Transmission Speed; 3275-2 only	4	3	87	2.00
	3279 Model 2A; base color; 1920 char.	140	119	3,955	25.50
	3279 Model 2B; extended color; 1920 char.	153	130	4,375	28.00
	3279 Model 3A; base color; 2560 char.	153	130	4,340	26.50
	3279 Model 3B; extended color; 2560 char.	167	142	4,760	29.00
	Cluster Display Stations				
	3277 Model 1; 480 char.	101	86	1,470	10.50
	3277 Model 2; 1920 char.	146	124	1,905	22.00
1066	Data Analysis—APL; 3277-2 only	35	30	300	1.50
	3278 Model 1; 960 char.	81	69	2,060	13.00
	3278 Model 2; 1920 char.	85	72	2,185	13.50
	3278 Model 3; 2560 char.	101	86	2,525	15.00
	3278 Model 4; 3440 char.	103	88	2,650	16.50
	3278 Model 5; 3564 char.	121	103	3,070	18.50
1720	Switch Control Unit; 3278 only	5	4	168	NC
	Keyboards				
	For 3275/3277—				
4630	66-Key EBCDIC Typewriter	16	14	309	5.50
4631	66-Key EBCDIC Data Entry	16	14	309	6.50
4632	78-Key Operator Console	43	37	601	16.00
4633	78-Key EBCDIC Typewriter	39	33	518	9.00
4634	66-Key ASCII Typewriter	16	14	309	5.50
4635	78-Key ASCII Typewriter	39	33	518	9.00
4636	66-Key EBCDIC Data Entry; keypunch layout	19	16	311	7.00
4637	66-Key EBCDIC APL/Typewriter; 3277-2 only; requires 1066	36	31	480	6.00
4638	78-Key EBCDIC APL/Typewriter; 3277-2 only; requires 1066	56	48	744	10.00
4639	78-Key Text; 3277-2 only; requires 1066	56	48	744	9.00
	For 3276/3278—				
4621	75-Key EBCDIC Typewriter	16	14	463	2.50
4622	75-Key EBCDIC Data Entry	16	14	463	3.50
4623	75-Key EBCDIC Data Entry; keypunch layout	16	14	463	3.50
4624	75-Key ASCII Typewriter	16	14	463	2.50
4626	87-Key EBCDIC Typewriter/Text; 3278 only	21	18	632	3.50
4627	87-Key EBCDIC Typewriter; 3278/3274 only	21	18	632	3.00
4628	87-Key ASCII Typewriter; 3278/3274 only	21	18	632	3.00
4629	87-Key EBCDIC Typewriter/Text; 3278 only	21	18	632	3.50
	For 3278/3279—				
4640	87-Key EBCDIC Typewriter Overlay	21	18	632	3.50
4651	87-Key EBCDIC Attribute Select Typewriter	21	18	632	3.50
4652	87-Key EBCDIC Attribute Select Typewriter/APL	21	18	632	3.50
	3275/3277 Display Station Options				
1090	Audible Alarm	4	3	87	1.00
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC
6350	Selector Light Pen	34	29	434	2.50
4600	Operator Identification Card Reader	16	14	260	4.00

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	3276/3278 Display Station Options				
1009	Address Keylock; 3276 only	$62 SUC	$62 SUC	$62	NC
1090	Audible Alarm	2	2	84	NC
1120	APL/Text; 3278 only	13	11	336	$0.50
3610	Extended Character Set Adapter; 3278 only	13	11	365	2.50
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC
6350/ 6351	Selector Light Pen	19	16	548	0.50
4999	Magnetic Reader Control	14	12	379	4.50
	Magnetic Slot Reader (Part No. 4123500)	—	—	286	—
	Magnetic Hand Scanner (Part No. 4123495)	—	—	286	—
	3278/3279 Display Station Options				
	Programmed Symbols				
5781	PS-2; storage for first two symbol sets	18	15	505	1.50
	PS-4; storage for additional four symbol sets; requires 5781; for 3279 only	39	26	842	4.00
5782	PS-4; storage for additional four symbol sets; requires 5781; for 3278 only	19	16	548	2.00
	Printers				
	3284 Model 1; 40 cps, 480 char. buffer; 3272 only	200	170	2,535	82.50
	3284 Model 2; 40 cps, 1920 char. buffer; 3271-2, -12, 3272-2 only	215	183	2,845	82.50
	3284 Model 3; 40 cps, bufferless; 3275 only	172	146	2,425	43.50
1066	Data Analysis—APL; 3284-2 only	59	50	825	3.00
	3286 Model 1; 66 cps; 480 char. buffer; 3271; 3272 only	241	205	3,385	98.50
	3286 Model 2; 66 cps; 1920 char. buffer; 3271-2, -12, 3272-2 only	255	217	3,755	98.50
1066	Data Analysis—APL; 3286-2 only	59	50	825	3.00
	3287 Model 1; 80 cps	239	203	5,365	41.50
	3287 Model 2; 160 cps	291	248	5,750	51.50
1066	Data Analysis—APL; 3287 only	14	12	330	NC
1120	APL/Text	6	5	183	0.50
3610	Extended Character Set Adapter	19	16	477	3.50
3880	Extended Print Buffer	7	6	220	0.50
8330	3271/3272 Attachment	42	36	955	3.00
8331	3274/3276 Attachment	6	5	183	0.50
8700	Variable Width Forms Tractor	6	5	168	0.50
4110	Friction Feed Paper Handling	6	5	168	0.50
	3287 Model 1C; color printing; 80 cps	295	251	5,790	47.00
	3287 Model 2C; color printing; 120 cps	347	295	6,145	57.00
	Programmed Symbols				
5781	PS-2; storage for first two symbol sets; requires 3610 and 2880	39	33	918	4.50
5782	PS-4; storage for additional four symbol sets; requires 5781	33	28	735	3.00
5783	PS-4A; storage for four symbol sets; including one set with multi-color addressing; requires 3610 and 3880; for 3287-1C and -2C only	71	60	1,650	13.00
	3288 Model 2; 120 lpm; 3271-2, -12, 3272-only	557	479	6,325	120.00
7880	Text Print	61	52	836	2.00
	3289 Model 1; 155 lpm	531	452	8,830	121.00
	3289 Model 2; 400 lpm	805	685	13,140	205.00
1090	Audible Alarm	6	5	192	NC
1130	Text Print	7	6	231	NC
4450	Form Stand; all models except 3289	—	—	56	—

*Includes prime-shift maintenance.■

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IBM 3270 Information Display System

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
6315	SDLC/BSC Switch; 3276-1, -2, -3, -4 only	25	21	729	3.00
1067	APL/Text Control; requires 1068	36	31	1,015	0.50
1950	Color Display Attachment; not available for 3276-1; requires 1068	31	26	810	0.50
	Stand-Alone Display Stations				
	3275 Model 2; 1920 char., BSC	177	151	2,820	40.00
	3275 Model 12; 1920 char., SDLC	246	209	3,835	77.50
1200	ASCII Transmission Code; 3275-12 only	8	7	171	1.50
3440	Dial; 600 or 1200 bps over dial network; 3275-2 only	8	7	196	2.00
5500	Integrated Modem; 1200 bps	19	16	535	4.00
5501	Integrated Modem; 1200 bps with Auto Answer; 3275-2 only	25	21	714	5.50
5550	Printer Adapter; one max.	NC	NC	NC	NC
7820	1200 bps Transmission Speed	NC	NC	NC	NC
7821	4800/7200 bps Transmission Speed; 3275-2 only	4	3	87	1.50
	3279 Model 2A; base color; 1920 char.	130	111	3,805	25.50
	3279 Model 2B; extended color; 1920 char.	142	121	4,210	28.00
	3279 Model 3A; base color; 2560 char.	142	121	4,175	26.50
	3279 Model 3B; extended color; 2560 char.	155	132	4,580	29.00
	Cluster Display Stations				
	3277 Model 1; 480 char.	94	80	1,470	10.50
	3277 Model 2; 1920 char.	136	116	1,905	22.00
1066	Data Analysis—APL; 3277-2 only	33	28	300	1.50
	3278 Model 1; 960 char.	75	64	1,985	13.00
	3278 Model 2; 1920 char.	79	67	2,105	13.50
	3278 Model 3; 2560 char.	94	80	2,430	15.00
	3278 Model 4; 3440 char.	96	82	2,550	16.50
	3278 Model 5; 3564 char.	113	96	2,955	18.50
1720	Switch Control Unit; 3278 only	5	4	180	NC
	Keyboards				
	For 3275/3277—				
4630	66-Key EBCDIC Typewriter	15	13	309	5.50
4631	66-Key EBCDIC Data Entry	15	13	309	6.50
4632	78-Key Operator Console	40	34	601	16.00
4633	78-Key EBCDIC Typewriter	36	31	518	9.00
4634	66-Key ASCII Typewriter	15	13	309	5.50
4635	78-Key ASCII Typewriter	36	31	518	9.00
4636	66-Key EBCDIC Data Entry; keypunch layout	18	15	311	6.50
4637	66-Key EBCDIC APL/Typewriter; 3277-2 only; requires 1066	34	29	480	6.00
4638	78-Key EBCDIC APL/Typewriter; 3277-2 only; requires 1066	52	44	744	10.00
4639	78-Key Text; 3277-2 only; requires 1066	52	44	744	9.00
	For 3276/3278—				
4621	75-Key EBCDIC Typewriter	15	13	446	2.50
4622	75-Key EBCDIC Data Entry	15	13	446	3.50
4623	75-Key EBCDIC Data Entry; keypunch layout	15	13	446	3.50
4624	75-Key ASCII Typewriter	15	13	446	2.50
4626	87-Key EBCDIC Typewriter/Text; 3278 only	20	17	608	3.50
4627	87-Key EBCDIC Typewriter; 3278/3274 only	20	17	608	3.00
4628	87-Key ASCII Typewriter; 3278/3274 only	20	17	608	3.00
4629	87-Key EBCDIC Typewriter/Text; 3278 only	20	17	608	3.50
	For 3278/3279—				
4640	87-Key EBCDIC Typewriter Overlay	20	17	608	3.50
4651	87-Key EBCDIC Attribute Select Typewriter	20	17	608	3.50
4652	87-Key EBCDIC Attribute Select Typewriter/APL	20	17	608	3.50
	3275/3277 Display Station Options				
1090	Audible Alarm	4	3	87	1.00
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
6350	Selector Light Pen	32	27	434	2.00
4600	Operator Identification Card Reader	15	13	260	4.00
	3276/3278 Display Station Options				
1009	Address Keylock; 3276 only	63 SUC	63 SUC	60	NC
1090	Audible Alarm	2	2	90	NC
1120	APL/Text; 3278 only	12	10	324	0.50
3610	Extended Character Set Adapter; 3278 only	13	11	365	2.50
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC
6350/ 6351	Selector Light Pen	18	15	527	0.50
4999	Magnetic Reader Control	13	11	365	4.50
	Magnetic Slot Reader (Part No. 4123500)	—	—	275	—
	Magnetic Hand Scanner (Part No. 4123495)	—	—	275	—
	3278/3279 Display Station Options				
	Programmed Symbols				
5781	PS-2; storage for first two symbol sets	16	14	486	1.50
5782	PS-4; storage for additional four symbol sets; requires 5781; for 3279 only	28	24	810	4.00
5782	PS-4; storage for additional four symbol sets; requires 5781; for 3278 only	18	15	527	2.00
	Printers				
	3284 Model 1; 40 cps, 480 char. buffer; 3272 only	186	158	2,535	75.00
	3284 Model 2; 40 cps, 1920 char. buffer; 3271-2, -12, 3272-2 only	200	170	2,845	75.00
	3284 Model 3; 40 cps, bufferless; 3275 only	160	136	2,425	39.50
1066	Data Analysis—APL; 3284-2 only	54	46	825	3.00
	3286 Model 1; 66 cps; 480 char. buffer; 3271; 3272 only	224	191	3,385	89.50
	3286 Model 2; 66 cps; 1920 char. buffer; 3271-2, -12, 3272-2 only	237	202	3,755	89.50
1066	Data Analysis—APL; 3286-2 only	54	46	825	3.00
	3287 Model 1; 80 cps	222	189	5,960	41.50
	3287 Model 2; 160 cps	270	230	6,355	51.50
1066	Data Analysis—APL; 3287 only	13	11	330	NC
1120	APL/Text	6	5	183	0.50
3610	Extended Character Set Adapter	18	15	477	3.50
3880	Extended Print Buffer	7	6	220	0.50
8330	3271/3272 Attachment	39	33	955	3.00
8331	3274/3276 Attachment	6	5	183	0.50
8700	Variable Width Forms Tractor	6	5	168	0.50
4110	Friction Feed Paper Handling	6	5	168	0.50
	3287 Model 1C; color printing; 80 cps	274	233	6,430	47.00
	3287 Model 2C; color printing; 120 cps	322	274	6,825	57.00
	Programmed Symbols				
5781	PS-2; storage for first two symbol sets; requires 3610 and 2880	36	31	918	4.50
5782	PS-4; storage for additional four symbol sets; requires 5781	31	26	735	3.00
5783	PS-4A; storage for four symbol sets; including one set with multi-color addressing; requires 3610 and 3880; for 3287-1C and -2C only	66	56	1,650	13.00
	3288 Model 2; 120 lpm; 3271-2, -12, 3272-only	516	439	6,325	120.00
7880	Text Print	56	48	836	2.00
	3289 Model 1; 155 lpm	492	419	9,810	121.00
	3289 Model 2; 400 lpm	746	635	14,600	205.00
1090	Audible Alarm	6	5	192	NC
1130	Text Print	7	6	231	NC
4450	Form Stand; all models except 3289	—	—	54	—

*Includes prime-shift maintenance.■

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
5550	Printer Adapter; one max.	NC	NC	NC	NC
7820	1200 bps Transmission Speed	NC	NC	NC	NC
7821	4800/7200 bps Transmission Speed; 3275-2 only	4	3	87	1.00
	3279 Model 2A; base color; 1920 char.	122	104	3,805	25.50
	3279 Model 2B; extended color; 1920 char.	134	114	4,210	28.00
	3279 Model 3A; base color; 2560 char.	134	114	4,175	26.50
	3279 Model 3B; extended color; 2560 char.	146	124	4,580	29.00
	Cluster Display Stations				
	3277 Model 1; 480 char.	88	75	1,470	10.00
	3277 Model 2; 1920 char.	128	109	1,905	21.00
1066	Data Analysis—APL; 3277-2 only	31	26	300	1.00
	3278 Model 1; 960 char.	71	60	2,205	13.00
	3278 Model 2; 1920 char.	74	63	2,340	13.50
	3278 Model 3; 2560 char.	88	75	2,700	15.00
	3278 Model 4; 3440 char.	90	77	2,835	16.50
	3278 Model 5; 3564 char.	106	90	3,285	18.50
1720	Switch Control Unit; 3278 only	5	4	180	NC
	Keyboards				
	For 3275/3277—				
4630	66-Key EBCDIC Typewriter	14	12	309	5.00
4631	66-Key EBCDIC Data Entry	14	12	309	6.00
4632	78-Key Operator Console	38	32	601	15.00
4633	78-Key EBCDIC Typewriter	34	29	518	8.50
4634	66-Key ASCII Typewriter	14	12	309	5.00
4635	78-Key ASCII Typewriter	34	29	518	8.50
4636	66-Key EBCDIC Data Entry; keypunch layout	16	14	311	6.00
4637	66-Key EBCDIC APL/Typewriter; 3277-2 only; requires 1066	32	27	480	5.50
4638	78-Key EBCDIC APL/Typewriter; 3277-2 only; requires 1066	48	41	744	9.50
4639	78-Key Text; 3277-2 only; requires 1066	48	41	744	8.50
	For 3276/3278—				
4621	75-Key EBCDIC Typewriter	14	12	495	2.50
4622	75-Key EBCDIC Data Entry	14	12	495	3.50
4623	75-Key EBCDIC Data Entry; keypunch layout	14	12	495	3.50
4624	75-Key ASCII Typewriter	14	12	495	2.50
4626	87-Key EBCDIC Typewriter/Text; 3278 only	19	16	675	3.50
4627	87-Key EBCDIC Typewriter; 3278/3274 only	19	16	675	3.00
4628	87-Key ASCII Typewriter; 3278/3274 only	19	16	675	3.00
4629	87-Key EBCDIC Typewriter/Text; 3278 only	19	16	675	3.50
	For 3278/3279—				
4640	87-Key EBCDIC Typewriter Overlay	19	16	675	3.50
4651	87-Key EBCDIC Attribute Select Typewriter	19	16	675	3.50
4652	87-Key EBCDIC Attribute Select Typewriter/APL	19	16	675	3.50
	3275/3277 Display Station Options				
1090	Audible Alarm	4	3	87	0.50
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC
6350	Selector Light Pen	29	25	434	1.50
4600	Operator Identification Card Reader	14	12	260	4.00
	3276/3278 Display Station Options				
1009	Address Keylock; 3276 only	63 SUC	63 SUC	60	NC
1090	Audible Alarm	2	2	90	NC
1120	APL/Text; 3278 only	11	9	360	0.50
3610	Extended Character Set Adapter; 3278 only	12	10	405	2.50
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC
6350/6351	Selector Light Pen	16	14	585	0.50
4999	Magnetic Reader Control	12	10	405	4.50
	Magnetic Slot Reader (Part No. 4123500)	—	—	275	—
	Magnetic Hand Scanner (Part No. 4123495)	—	—	275	—

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	3278/3279 Display Station Options				
	Programmed Symbols				
5781	PS-2; storage for first two symbol sets	15	13	540	1.50
5782	PS-4; storage for additional four symbol sets; requires 5781; for 3279 only	26	22	900	4.00
5782	PS-4; storage for additional four symbol sets; requires 5781; for 3278 only	16	14	585	2.00
	Printers				
	3284 Model 1; 40 cps, 480 char. buffer; 3272 only	174	148	2,535	65.00
	3284 Model 2; 40 cps, 1920 char. buffer; 3271-2, -12, 3272-2 only	187	159	2,845	65.00
	3284 Model 3; 40 cps, bufferless; 3275 only	150	128	2,425	34.50
1066	Data Analysis—APL; 3284-2 only	51	43		2.50
	3286 Model 1; 66 cps; 480 char. buffer; 3271; 3272 only	210	179	3,385	78.00
	3286 Model 2; 66 cps; 1920 char. buffer; 3271-2, -12, 3272-2 only	223	190	3,755	78.00
1066	Data Analysis—APL; 3286-2 only	51	43	825	2.50
	3287 Model 1; 80 cps	208	177	5,960	49.00
	3287 Model 2; 160 cps	253	215	6,355	60.50
1066	Data Analysis—APL; 3287 only	12	10	330	NC
1120	APL/Text	6	5	183	0.50
3610	Extended Character Set Adapter	16	14	477	4.00
3880	Extended Print Buffer	7	6	220	0.50
8330	3271/3272 Attachment	36	31	955	3.50
8331	3274/3276 Attachment	6	5	183	0.50
8700	Variable Width Forms Tractor	6	5	168	0.50
4110	Friction Feed Paper Handling	6	5	168	0.50
	3287 Model 1C; color printing; 80 cps	257	219	6,430	55.50
	3287 Model 2C; color printing; 120 cps	302	257	6,825	67.00
	Programmed Symbols				
5781	PS-2; storage for first two symbol sets; requires 3610 and 2880	34	29	918	5.50
5782	PS-4; storage for additional four symbol sets; requires 5781	28	24	735	3.50
5783	PS-4A; storage for four symbol sets; including one set with multi-color addressing; requires 3610 and 3880; for 3287-1C and -2C only	61	52	1,650	15.00
	3288 Model 2; 120 lpm; 3271-2, -12, 3272-only	483	411	6,325	115.00
7880	Text Print	53	45	836	1.50
	3289 Model 1; 155 lpm	461	392	9,810	121.00
	3289 Model 2; 400 lpm	698	594	14,600	205.00
1090	Audible Alarm	6	5	192	NC
1130	Text Print	7	6	231	NC
4450	Form Stand; all models except 3289	—	—	54	—

*Includes prime-shift maintenance.■

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
5550	Printer Adapter; one max.	NC	NC	NC	NC
7820	1200 bps Transmission Speed	NC	NC	NC	NC
7821	4800/7200 bps Transmission Speed; 3275-2 only	4	3	87	0.50
	3279 Model 2A; base color; 1920 char.	115	98	3,805	25.50
	3279 Model 2B; extended color; 1920 char.	126	107	4,210	28.00
	3279 Model 3A; base color; 2560 char.	126	107	4,175	26.50
	3279 Model 3B; extended color; 2560 char.	137	116	4,580	29.00
	Cluster Display Stations				
	3277 Model 1; 480 char.	82	70	1,470	10.00
	3277 Model 2; 1920 char.	120	102	1,905	21.00
1066	Data Analysis—APL; 3277-2 only	28	24	300	1.00
	3278 Model 1; 960 char.	66	56	2,205	13.00
	3278 Model 2; 1920 char.	69	59	2,340	13.50
	3278 Model 3; 2560 char.	82	70	2,700	15.00
	3278 Model 4; 3440 char.	85	72	2,835	16.50
	3278 Model 5; 3564 char.	99	84	3,285	18.50
1720	Switch Control Unit; 3278 only	5	4	180	NC
	Keyboards				
	For 3275/3277—				
4630	66-Key EBCDIC Typewriter	13	11	309	5.00
4631	66-Key EBCDIC Data Entry	13	11	309	6.00
4632	78-Key Operator Console	35	30	601	15.00
4633	78-Key EBCDIC Typewriter	32	27	518	8.50
4634	66-Key ASCII Typewriter	13	11	309	5.00
4635	78-Key ASCII Typewriter	32	27	518	8.50
4636	66-Key EBCDIC Data Entry; keypunch layout	15	13	311	6.00
4637	66-Key EBCDIC APL/Typewriter; 3277-2 only; requires 1066	28	24	480	5.50
4638	78-Key EBCDIC APL/Typewriter; 3277-2 only; requires 1066	43	37	744	9.50
4639	78-Key Text; 3277-2 only; requires 1066	43	37	744	8.50
	For 3276/3278—				
4621	75-Key EBCDIC Typewriter	13	11	495	2.50
4622	75-Key EBCDIC Data Entry	13	11	495	3.50
4623	75-Key EBCDIC Data Entry; keypunch layout	13	11	495	3.50
4624	75-Key ASCII Typewriter	13	11	495	2.50
4626	87-Key EBCDIC Typewriter/Text; 3278 only	18	15	675	3.50
4627	87-Key EBCDIC Typewriter; 3278/3274 only	18	15	675	3.00
4628	87-Key ASCII Typewriter; 3278/3274 only	18	15	675	3.00
4629	87-Key EBCDIC Typewriter/Text; 3278 only	18	15	675	3.50
	For 3278/3279—				
4640	87-Key EBCDIC Typewriter Overlay	18	15	675	3.50
4651	87-Key EBCDIC Attribute Select Typewriter	18	15	675	3.50
4652	87-Key EBCDIC Attribute Select Typewriter/APL	18	15	675	3.50
	3275/3277 Display Station Options				
1090	Audible Alarm	4	3	87	0.50
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC
6350	Selector Light Pen	27	23	434	1.50
4600	Operator Identification Card Reader	13	11	260	4.50
	3276/3278 Display Station Options				
1009	Address Keylock; 3276 only	63 SUC	63 SUC	60	NC
1090	Audible Alarm	2	2	90	NC
1120	APL/Text; 3278 only	9	8	360	0.50
3610	Extended Character Set Adapter; 3278 only	11	9	405	2.50
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC
6350/6351	Selector Light Pen	15	13	585	0.50
4999	Magnetic Reader Control	11	9	405	4.50
	Magnetic Slot Reader (Part No. 4123500)	—	—	275	—
	Magnetic Hand Scanner (Part No. 4123495)	—	—	275	—

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	3278/3279 Display Station Options				
	Programmed Symbols				
5781	PS-2; storage for first two symbol sets	14	12	540	1.50
5782	PS-4; storage for additional four symbol sets; requires 5781; for 3279 only	25	21	900	4.00
5782	PS-4; storage for additional four symbol sets; requires 5781; for 3278 only	15	13	585	2.00
	Printers				
	3284 Model 1; 40 cps, 480 char. buffer; 3272 only	163	139	2,535	56.50
	3284 Model 2; 40 cps, 1920 char. buffer; 3271-2, -12, 3272-2 only	175	149	2,845	56.50
	3284 Model 3; 40 cps, bufferless; 3275 only	142	121	2,425	30.00
1066	Data Analysis—APL; 3284-2 only	46	39	970	2.00
	3286 Model 1; 66 cps; 480 char. buffer; 3271; 3272 only	197	168	3,385	68.00
	3286 Model 2; 66 cps; 1920 char. buffer; 3271-2, -12, 3272-2 only	209	178	3,755	68.00
1066	Data Analysis—APL; 3286-2 only	47	40	825	2.00
	3287 Model 1; 80 cps	195	166	5,960	49.00
	3287 Model 2; 160 cps	237	202	6,355	60.50
1066	Data Analysis—APL; 3287 only	11	9	330	NC
1120	APL/Text	6	5	183	0.50
3610	Extended Character Set Adapter	15	13	477	4.00
3880	Extended Print Buffer	7	6	220	0.50
8330	3271/3272 Attachment	34	29	955	3.50
8331	3274/3276 Attachment	6	5	183	0.50
8700	Variable Width Forms Tractor	6	5	168	0.50
4110	Friction Feed Paper Handling	6	5	168	0.50
	3287 Model 1C; color printing; 80 cps	241	205	6,430	55.50
	3287 Model 2C; color printing; 120 cps	283	241	6,825	67.00
	Programmed Symbols				
5781	PS-2; storage for first two symbol sets; requires 3610 and 2880	32	27	918	5.50
5782	PS-4; storage for additional four symbol sets; requires 5781	26	22	735	3.50
5783	PS-4A; storage for four symbol sets; including one set with multi-color addressing; requires 3610 and 3880; for 3287-1C and -2C only	58	49	1,650	15.00
	3288 Model 2; 120 lpm; 3271-2, -12, 3272-only	452	385	6,325	105.00
7880	Text Print	49	42	836	1.00
	3289 Model 1; 155 lpm	431	367	9,810	121.00
	3289 Model 2; 400 lpm	653	556	14,600	205.00
1090	Audible Alarm	6	5	192	NC
1130	Text Print	7	6	231	NC
4450	Form Stand; all models except 3289	—	—	54	—

*Includes prime-shift maintenance.■

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IBM 3270 Information Display System
New Product Announcement

On October 2, 1979 IBM announced the following new products:

- Model 3279 Color Display Station,
- Model 3287-1C and -2C Color Printers, and
- Model 3274-51C Control Unit;

plus enhancements to the 3274 Control Unit; 3276 Control Unit Display Station; 3278-2, -3, and -4 Display Stations; and 3287-1 and -2 Printers.

The 3279 Color Display Station is available in four models which provide for two levels of color usage in each of two screen capacities: Model 2A provides base color mode and a 1920-character screen; Model 3A, base color mode and a 2560-character screen; Model 2B, extended color mode and a 1920-character screen; Model 3B, extended color mode and a 2560-character screen. Base color mode supports the use of four colors (red, green, blue, and white) as substitutes for existing protect and intensify field attributes. Extended color mode includes the features of the base color mode, provides three additional colors (yellow, pink, and turquoise), and permits field character addressing of color highlighting as an independent attribute. In addition Models 2B and 3B support extended highlighting using reverse video, blinking, and underscoring, and provide storage of up to six 190-character programmed symbol sets containing user-defined shapes and symbols for use in graphic display representations. Three new 87-key keyboards are offered for use with Models 2B and 3B and include keytop annotations for color, extended highlighting, and programmed symbol sets. Except for these features, Models 2A and 3A offer equivalent and compatible functions to the 3276 3278 display units; Models 2B and 3B, to the 3278 when featured to use the extended 3270 data stream or APL Text.

A 3279 display operating in base color mode can be attached to any Model 3274 Control Unit with any of the new Configuration Support packages (A, B, or C) or to a 3276 Control Unit Display Station that supports the 3279's screen capacity and is equipped with the Extended Function Base (#1068) and the new Color Display Attachment (#1950) features. A 3279 display utilizing extended color, extended highlighting, or programmed symbols can be attached only to a 3274 Model 1A, 1C, 1D, or 51C with Configuration Support C. Details on the new 3274 and 3276 enhancements are provided later in this announcement.

The 3287 Printer is now available in two color models that vary only in their rated print speeds: Model 1C prints at a maximum of 80 characters per second and Model 2C at 120 characters per second, when printing bi-directionally with a single color per line. Four colors (red, green, blue, and black) are provided via a multi-color ribbon. Print positions 1 through 120 can be printed in any color, but positions 121 through 132 can only be printed in black. As with the 3279 Display, two levels of color usage are supported. Basic color mode printing is standard on both models and substitutes color for existing protect and intensify field attributes. Extended color mode requires the previously available Extended Character Set Adapter (#3610) and permits user specification of color as an independent character or field attribute. When seven-color displayed data is transferred to a four-color printer, extended colors (pink, yellow, and turquoise) are printed in black. Extended highlighting permits underscoring of printed data, but blinking and reverse video attributes are ignored. Storage for two, four, or six programmed symbol sets, including a four-color business graphics set, is also supported and requires two previously available options, the Extended Character Set Adapter (#3610) and the Extended Print Buffer (#3880). Except for color printing, functions and features of the Model 1C and 2C are equivalent to the 3287 Models 1 and 2 respectively.

The 3287 Models 1C and 2C can be attached to any model of the 3274 Control Unit with a Category A terminal port, and to any 3276 Control Unit Display Station (features #1068 and #1950 are not required). Unlike 3287 Models 1 and 2, they cannot be attached to a 3271 or 3272 Control Unit. When operating with extended color, extended highlighting, and preprogrammed symbol sets, Models 1C and 2C can be attached only to a 3274-Model 1A, 1C, 1D, or 51C with Configuration Support C.

The 3274-51C Control Unit provides control of a remote cluster of up to twelve displays and printers operating under BSC or SDLC protocol. The basic controller accommodates up to eight 3278/3279/3287 3289 (Category A) devices. Four additional 3277 3284/3286/3287 3288 (Category B) devices can be attached via the Terminal Adapter Type B (#7801). Except for the number of devices supported, the Model 51C offers equivalent and compatible functions and features to a 3274 Model 1C. In addition it provides certain features not available on the Model 1C: 8100 System attachment using SDLC via a data link or a direct or data link attached loop (this feature provides support for Category A devices only); a 1200 bps integrated modem; and a switched network communications capability. The 3274 Model 51C is also upward-compatible with the 3276 Control Unit/Display Station, except that it provides the Printer Authorization Matrix used on other 3274's instead of the Default Matrix used on the 3276.

Enhancements to the 3274 Control Unit support attachment of the 3279 Color Display Station and 3287 Models 1C and 2C Color Printers. Any 3274 except Model 1B can now be specified with one of three no-charge Configuration Support packages (A, B, or C); Model 1B is always equipped with Configuration Support A. Configuration Support A provides support for most 3270 functions, including base color mode; Support B adds the ability to attach 3287-5 printers, and to perform specific SNA-related functions; Support C includes all Support A and B functions plus certain other functions, including extended color mode, extended highlighting, and programmed symbol set support. Two additional Extended Function Store features permit expansion of control storage in 32K-byte increments to support the new enhancements.

A new Color Display Attachment feature (#1950) provides the 3276 Control Unit/Display Station with support for an attached 3279 Display Station operating in base color mode. The new feature requires the previously available Extended Function Base feature (#1068), and does not support operation of a 3279-2B or -3B in extended color mode. (The Color Display Attachment is not required for color printing via a 3287 Model 1C or 2C Color Printer.) Another 3276 enhancement removes the mutually exclusive restriction between the Extended Function Base feature (#1068) and the Encrypt/Decrypt feature (#3680).

Enhancements to the 3278 Display Station extend to Models 2, 3, and 4 the extended highlighting and programmed symbol set functions (monochromatic only) similar to those described above for the 3279 Display Station. In addition the three new keyboards offered with the 3279 are also supported for attachment to the 3278.

Enhancements to the 3287 Printer extend to Models 1 and 2 the programmed symbol set support (monochromatic only) described above for the 3287-1C and -2C.

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New Product Announcement

		Monthly Rental	Charges* Lease	Purchase	Monthly Maint.
	3274 Cluster Controller				
3623	Extended Function Store—32K; Type C2; 3274-1A, -1C, -1D only; requires 1801	76	65	1,560	15.00
3628	Extended Function Store—32K; Type D2; 3274-1A, -1C, -1D only; requires 3622 or 3623	76	65	1,560	15.00
	3274 Model 51C; remote; requires 3701	176	150	6,450	50.00
7801	Terminal Adapter Type B, requires 5550	39	33	1,300	5.00
5550	Power Expansion	12	10	450	2.00
3630	Extended Function Store—32K; Type D1; requires 1802	32	27	975	9.00
3631	Extended Function Store—32K; Type D3; requires 3630; field-installation only	32	27	975	9.00
3632	Extended Function Store—64K; Type D2; requires 1802	63	54	1,950	18.00
1802	Control Storage Expansion	32	27	1,055	5.50
3701	External Modem Interface; requires 6301, 6302, or 6303	12	10	400	4.00
6301	Common Communications Adapter with Business Machine Clock; SDLC or BSC; 1200 bps	19	16	670	3.00
6302	Common Communications Adapter without Business Machine Clock; SDLC or BSC; up to 9600 bps with Type A only Terminal Adapters and up to 7200 bps with Type B or mix	12	10	450	2.50
6303	High Performance Communications Adapter; SDLC or BSC; 9600 bps with Type B Terminal Adapters or mix	36	30	1,200	11.00
3680	Encrypt/Decrypt	63	54	2,115	2.50
5650	Dataphone Digital Adapter; point-to-point; requires 6302 or 6303	24	20	840	2.00
5651	Dataphone Digital Adapter; multipoint; requires 6302 or 6303	24	20	840	2.00
4850	Loop Adapter; for 8100 System attachment; requires 6303 and Configuration Support C	26	22	945	3.50
	Integrated Modem; 1200 bps; requires 6301 and Configuration Support C				
5500	Non-switched	19	16	668	5.00
5501	Switched; auto answer	26	22	840	3.00
5502	Switched; manual answer	19	16	668	4.00
5507	Non-switched; switched network back-up; manual answer	27	23	910	7.00
5508	Non-switched; switched network back-up; auto answer	29	25	1,015	4.00
	3276 Controller/Display Station				
1950	Color Display Attachment; not available for 3276-1 requires 1068	24	20	900	0.50
	Stand-Alone Display Stations				
	3279 Model 2A; base color; 1920 char.	110	94	3,805	24.00
	3279 Model 2B; extended color; 1920 char.	121	103	4,210	26.50
	3279 Model 3A; base color; 2560 char.	121	103	4,175	25.00
	3279 Model 3B; extended color; 2560 char.	132	112	4,580	27.50
	3278/3279 Keyboards				
4640	87-Key EBCDIC Typewriter Overlay	18	15	675	3.50
4651	87-Key EBCDIC Attribute Select Typewriter	18	15	675	3.50
4652	87-Key EBCDIC Attribute Select Typewriter/APL	18	15	675	3.50
	3278/3279 Display Station Options				
	Programmed Symbols				
5781	PS-2; storage for first two symbol sets	14	12	540	1.50
5782	PS-4; storage for additional four symbol sets; requires 5781; for 3279 only	24	20	900	4.00
5782	PS-4; storage for additional four symbol sets; requires 5781; for 3278 only	15	13	585	2.00
	Printers				
	3287 Model 1C; color printing; 80 cps	216	184	6,125	55.50
	3287 Model 2C; color printing; 120 cps	254	216	6,500	67.00
	Programmed Symbols				
5781	PS-2; storage for first two symbol sets; requires 3610 and 2880	29	25	875	5.50
5782	PS-4; storage for additional four symbol sets; requires 5781	24	20	700	3.50
5783	PS-4A; storage for four symbol sets; including one set with multi-color addressing; requires 3610 and 3880; for 3287-1C and -2C only	53	45	1,575	15.00

*Includes monthly maintenance.□

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PRODUCT DESCRIPTION

IBM has announced seven new models of the 3274 Control Unit. Models 21A, 21B, 21C, and 21D have 64K bytes of storage and are comparably configured and priced with the 3274 Models 1A, 1B, 1C, and 1D. Models 31A, 31C, and 31D have 128K bytes of storage; these models support all 3270 terminal features and feature combinations. (The Model 21 Control Units do not support all features). The Model 31 Control Units are priced lower than comparably configured 3274 Models 1A, 1C, and 1D. Both model groups can control up to 32 attached devices.

New functions available with the new 3274 Control Units include:

- a non-switched integrated modem capability at 2400, 4800, and 9600 bps for the Model 31C;
- a CCITT V.35 Interface feature providing support for communications line speeds up to 57.6K bps for SDLC and 9600 bps for BSC on Models 21C, 31C, and existing Models 1C and 51C.
- the DDS (Digital Data Service) Adapter feature capability is extended to support SDLC data transmission speeds up to 56K bps for Models 21C, 31C, and existing Models 1C and 51C.
- Models 21C and 31C are available with support for the SNA request for maintenance statistics (REQMS) command that is currently available with Models 1C and 51C. This support is also available in the SNA local control unit Models 21A, 31A, and the existing Model 1A.
- Outbound 3270 Structured Field allows a basic 3270 Write, Erase/Write, Erase/Write Alternate, Erase All Unprotected, or Copy (BSC only) command to be combined with a Write Structured Field function in a single transmission to terminals that support extended color, extended highlighting, and programmed symbols. This function is available with Models 31A, 31C, 31D, as well as Models 1A, 1C, and 1D.

PRODUCT ANNOUNCEMENT: New models of the IBM 3274 Control Unit: models 21A, 21B, 21C, 21D, 31A, 31C, and 31D. These models have a new storage technology, and provide new functions for users with applications utilizing extended color, extended highlighting, and presentation graphics.

ANNOUNCEMENT DATE: November 25, 1980 (New York).

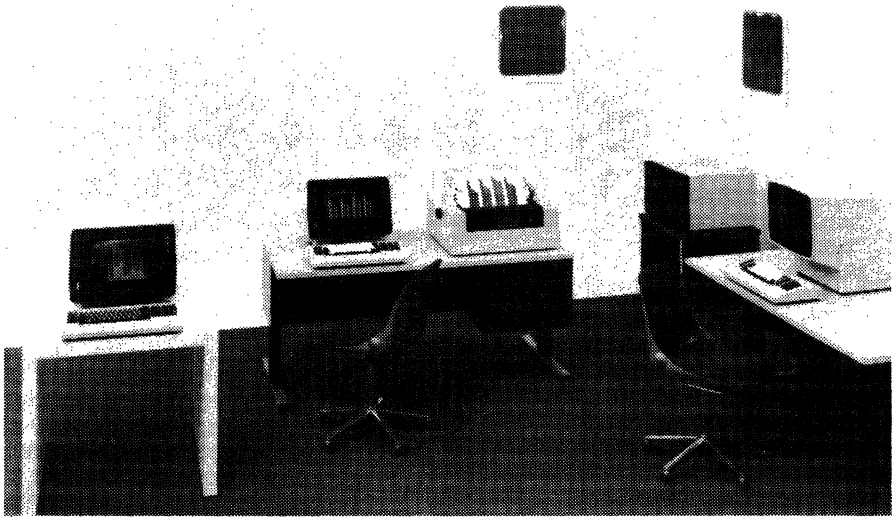
DELIVERY SCHEDULE: First customer shipment dates are planned for April and May 1981.

RELATIONSHIP TO CURRENT PRODUCT LINE: The 3274 Models 21A, 21B, 21C, 21D, 31A, 31C, and 31D are functionally compatible with the existing 3274 Models 1A, 1B, 1C, and 1D. The new models provide an identical appearance to both hardware and software components.

BASIC SPECIFICATIONS

VENDOR: International Business Machines Corporation, Data Processing Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.

MODELS: 3274 Control Unit Models 21A, 21B, 21C, and 21D have 64K bytes of storage. These models do not support all of the terminal features or feature combinations of the 3270 Information Display System. 3274



A complete 3270 Information Display System is pictured here. The new models of the 3274 provide improved price/performance for users with applications using extended color, extended highlighting, and presentation graphics.

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Models 31A, 31C, and 31D have 128K bytes of storage. The Model 31 Control Units support all terminal features of the 3270 Information Display System.

COMPATIBILITY: 3274 Control Unit Models 21A, 21B, 21C, 21D, 31A, 31C, and 31D are functionally compatible with the currently existing 3274 Models 1A, 1B, 1C, and 1D. The new models provide an identical appearance with the existing models to software and hardware components of the 3270 System.

PRICING

	Rental	2-Year Lease	Purchase	Monthly Maint.
3274 Model 21A	$575	$489	$18,770	$110.00
3274 Model 21B	575	489	18,770	114.00
3274 Model 21C	404	344	13,190	84.50
3274 Model 21D	575	489	18,770	121.00
3274 Model 31A	676	575	21,775	136.50
3274 Model 31C	505	430	16,195	111.00
3274 Model 31D	676	575	21,775	147.50

*Includes prime-shift maintenance.■

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IBM 3270 Information Display System

A family of controllers, displays/keyboards, and printers available for stand-alone or cluster configurations in remote or local environments.

Clusters can accommodate up to 32 displays and printers. Transmission rates for remote mode systems range from 1200 to 9600 bps; BSC or SDLC protocols are available on all models, and some models accommodate both.

Control unit specifications may not only permit display or printing of EBCDIC or ASCII character sets, but with new optional features allow for the larger APL character set, text-specific characters, and graphic plot characters.

The cost for a small-cluster configuration consisting of a 3276 controller/display plus seven 1920-character display stations is about $797 per month, or $681 per month with a two-year lease, including maintenance.

The cost for a larger-cluster configuration consisting of a 3274 Control Unit plus 32 1920-character displays is about $2,916 per month, or $2,491 per month with a two-year lease, including maintenance.

In either configuration, replacement of a display with an 80-cps bidirectional matrix printer adds about $105 per month, or $89 per month with a two-year lease, to the cost.

MANAGEMENT SUMMARY

The IBM 3270 family remains highly significant among communications terminal product lines. The first generation of devices (the 3271/3272 control units, 3275 display station, 3277 display, and 3284/3286/3288 printers) was introduced in 1972. In 1977, the product line was radically overhauled, resulting in the announcement of a second generation of components (the 3274 control unit, 3276 control/display, 3278 display, and 3278/3289 printers) that offers increased capabilities at prices much lower than comparable older models. Along with that announcement came major price reductions on the older equipment.

The 1977 announcement boosted the 3270 family into a favorable position in the highly competitive terminal marketplace, and it has maintained that position.

One concept that allows IBM to hold the line in terms of prices is its Customer Set-Up (CSU) plan, applicable to all the newer components. Under this plan, the customer installs the equipment himself. IBM expects the installation to be a "same-day-as-delivery" possibility, because rental or lease charges start the working day after delivery, without having any IBM personnel look at the equipment. If there is a problem, charges do not start until the equipment is fixed. Movement of equipment is also permitted under this agreement, and if the customer wants to discontinue using any component, he must pack it up himself and put it on the loading dock for pick-up. Internal test and check features have been installed on all components so that the user can diagnose most problems himself.

Since 1972 IBM has continually added new features to existing 3270 equipment. The most recent additions include several new features enhancing the 3274 controller and the 3276 controller/display capabilities. These include the ability to accommodate Dataphone Digital Service and to code and decode messages under the Federal Data Encryption logic. New 3276 features increase its display and security capabilities, allow a wider choice of inte- ➢

CHARACTERISTICS

VENDOR: International Business Machines Corp., Data Processing Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.

DATE OF ANNOUNCEMENT: 3271/3272/3277 (BSC)—1972; 3271/3277 (SDLC)—third quarter 1974; 3274/3276/3278—May 1977; 3274-ID—July 1978.

DATE OF FIRST DELIVERY: 3271/3272/3277 (BSC)—1972; 3271/3277 (SDLC)—third quarter 1974; 3274-1C—March 1978; 3276-2, 3278-2, 3287—December 1977; other 3274/3276/3278/3289—February 1978 through August 1978; 3274-1D—May 1979.

SERVICED BY: International Business Machines.

CONFIGURATION

The 3270 family of display/keyboard stations and printers can be configured as a local or remote cluster or as a stand-alone station. There are two generations of components with ➢

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IBM 3270 FAMILY COMPONENTS AND SUBSYSTEMS

Controller	Mode	Integrated Display	Maximum Devices	Components Supported Displays	Keyboards	Printers
3271	Remote	—	32	3277	463X	3284/6/7/8
3272	Local	—	32	3277	463X	3284/6/7/8
3274	Remote/Local	—	32*	3277/8	463X/462X	3284/6/7/8/9
3275	Remote	1	2**	—	463X	3284-3
3276	Remote	1	8	3278	462X	3287/9

*Supports up to 32 new style (Category A) or 16 "new style" plus 16 "old style" (Category B) display/keyboards and printers. Category A devices include 3278 displays and 3287/9 printers. Category B devices include 3277 displays and 3284/6/7/8 printers. (The new 3287 printers appear in both categories.)

**One printer in addition to the integrated display.

grated modems, and permit attachment of the 3289 Belt Printer. New 3274 features add flexibility in the Extended Function Store (required for cluster support of the older terminal devices) and support the display or printing of the new APL/Text characters, (including the APL character set), text-specified characters, and graphic plot characters.

Display Exception Monitoring Facilities (DEMF) software on the host computer provides network support for problem determination and isolation to 3270-family terminals operating in the BSC mode.

Lease prices and maintenance rates on most components were increased during July 1979. Purchase prices were not affected.

An indication of the 3270's success is the number of competitive units that emulate it. It is the most emulated display in history.

USER REACTION

The 1978 Datapro survey of alphanumeric display terminal users produced 240 responses from users of IBM 3275, 3277, and unspecified 3270 terminals. These users had a total of 9006 displays. The expansion of the term "terminals" to include devices connected directly to a computer system was clearly identified in this survey. A total of 158 users (66 percent) indicated some use of locally connected displays. Of this group, over one-third (60 users) had no remote displays at all. The ratings provided by these 240 users are summarized in the following table.

	Excellent	Good	Fair	Poor	WA*
Overall performance	115	118	3	2	3.5
Ease of operation	95	138	2	1	3.4
Display clarity	68	137	25	4	3.1
Keyboard feel and usability	111	111	13	0	3.4
Hardware reliability	124	94	16	2	3.4
Maintenance service	112	96	25	3	3.3
Software and technical support	63	120	37	5	3.1

*Weighted Average on a scale of 4.0 for Excellent.

a limited degree of mixing permitted within the same subsystem; complete compatibility for communications and applications program support can be achieved with the new components, if desired. The accompanying table presents the overall configurational possibilities. Specific prerequisites are detailed in the discussions of individual components.

TRANSMISSION SPECIFICATIONS

All controllers capable of remote operation can be arranged for BSC or SDLC operation through model selection (3271, 3275, and 3276), alternate operation mode (3274), or switch selection (optional on 3276).

For BSC operation, the 3271-1/2 and 3275-2 controllers permit half-duplex data transmission at 1200, 2000, or 2400 bps over a half-duplex facility; over a full-duplex facility, a transmission speed of 4800 or 7200 bps is also supported. In addition, the 3275-2 can be configured to transmit at 600 or 1200 bps over a switched facility (public telephone network). An integrated 1200 bps modem for operation over non-switched or switched lines is optional for the 3275-2. The 3274-1C and 3276-1/2/3/4 controllers permit half-duplex data transmission at 2000, 2400, 4800, or 7200 bps over a half- or full-duplex facility. In addition, the 3276-1/2/3/4 can operate at 1200/600, 2400/1200, or 4800/2400 bps over a switched facility. A 1200 bps integrated modem is available for the 3276 controller.

For SDLC operation, the 3271-11/12 and 3275-12 permit half-duplex operation over a half-duplex facility at 1200, 2000, or 2400 bps; over a full-duplex facility, half- or full duplex data transmission at 1200, 2000, 2400, 4800, 7200, or 9600 bps is supported. A 1200 bps modem is available for the 3275-12. The 3274-1C supports half-duplex operation over a half- or full-duplex facility at 2000, 2400, 4800, 7200, or 9600 bps; the 3276-11/12/13/14 add 1200 bps operation. The SDLC models of the 3276 also support switched network operation at 1200/600, 2400/1200, or 4800/2400 bps. A 1200 bps integrated modem is available for the 3276.

Multipoint operation with a 3270 display subsystem acting as a tributary station is supported for all combinations of protocols and modes.

HOST COMPUTER SOFTWARE SUPPORT

A 3270 subsystem is supported for local and remote operation by IBM System/360, System/370, and System/3 computer systems. Remote terminals are supported by BTAM, TCAM, VTAM, RPG Telecommunications, BSCA Multiline/Multipoint, and Communications Control Program depending on computer system and operating system. The 3274-based local clusters are supported on System/370 configurations under 3272 mode or under VTAM. In general, all new models and configurations of the 3270 can be supported under previous 3270 programming. If Display Exception

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In this survey the IBM displays scored higher ratings than other vendors' displays on all characteristics except display clarity, where the average rating for all non-IBM displays was 3.3. Reliability and strong vendor support were specifically mentioned as strengths of the 3270 displays by 75 and 78 percent of the users, respectively.

On the negative side, high cost was mentioned as a disadvantage by 62 percent of users, while 20 percent mentioned non-programmability as a disadvantage. (The lower prices of the new 3270 components should make the users much happier about pricing.)□

Monitoring Facility (DEMF) software is installed on the host computer, network support for problem determination/isolation is available to terminals operating in BSC mode. In addition, 3270 display and printer components, as well as 3276/3278 clusters, are used with higher-level systems such as the IBM 8100 and 3790.

DEVICE CONTROL

The 3270 System operates under the control of the program stored at the remote computer. Under program control, the 3270 can execute any of four types of commands: read, write, control, and sense.

Read commands initiate transfer of the contents of a device buffer, modified fields within the buffer, buffer addresses or data of fields specified by the selector pen, or the single-byte Attention Identification (AID) code generated by a Program Function or Program Access key. The 3270 responds to two read commands, Read Buffer and Read Modified.

Read Buffer initiates transfer of the contents of the addressed device buffer from the initial or current cursor address.

Read Modified initiates one of three operator-initiated functions: Read Modified, Short Read, or Test Request. Read Modified initiates the transfer of all fields modified by the keyboard within the device buffer. The fields are transferred in sequence beginning with the first modified field; all nulls are suppressed. However, when completion of a key-modified field is signaled by a selector pen operation, a resulting Read Modified operation will transfer only the address of the modified field. Short Read initiates transfer of the single byte AID Code generated by a Program Attention key. Test Request Read performs the same operation as Read Modified; however, a hardware-generated heading precedes the data. Nulls are suppressed as in Read Modified. Only the special heading is transferred if data has not been keyed.

Write commands condition the display or printer to receive a computer message. Two write commands—Write and Erase/Write—load, format, and selectively erase device buffer data, and can also initiate device operations such as starting the printer, resetting the keyboard, and sounding the audible alarm. Both commands are the same except that Erase/Write erases the entire contents of the device buffer before fresh data is written (beginning at the initial buffer address) and Write modifies existing buffer data.

Control commands initiate control unit and/or device operations. There are four control commands: Copy, Select, Erase All Unprotected, and No Operation. Copy, executed by a remote control unit only, transfers buffer data from one device to another. Select, executed by a 3272 Control Unit (or 3274 in 3277 mode) only, transfers buffer data from the selected device to the controller. Erase All Unprotected initializes the addressed device, erasing all unprotected buffer locations and repositioning the cursor to the initial position of the first unprotected field. No Operation, executed by the 3272 Control Unit only, performs no functional operation in the 3272, but can retrieve pending status.

The Sense command, executed by the 3272 Control Unit only, initiates the transfer of a single sense byte from the 3272. The sense byte defines error conditions that have occurred within the subsystem.

A local 3274 cluster operating under VTAM looks like a remote control unit.

Program control by data field provides a flexible formatting capability. A field, identified by an attribute control code (nondisplayed) in the initial character position, can possess any one of several characteristics. The attribute control code can specify a protected or unprotected field (for fixed format operation), beam intensity of brightness (off, normal, or bright), alphanumeric or numeric (automatic shift) input, auto lock or skip, tab stop, or light pen selection.

The Program Tab feature automatically writes successive data fields into successive unprotected data fields defined by a fixed format.

Character Addressing permits a message to be written beginning at any screen location. Addressing can be interspersed with data throughout a message received from the computer. Character Addressing also permits the selective modification of attribute control codes.

Operator controls are provided for cursor control, editing, and program functions.

Cursor controls position the cursor up, down, left, or right, step-by-step or repetitively if the key is held depressed. The cursor can also be backspaced one character position, moved to the beginning of the next line or beginning of the next unprotected data field, tab to the beginning of the next unprotected data field, and backtab to the beginning of the previous unprotected data field.

Edit controls permit data to be inserted in or deleted from text, character by character. Following data is automatically expanded or contracted.

Program Function keys are used to initiate program functions or identify data that can be transmitted with an accompanying program function code.

The 3276 and 3278 have two added controls: Cursor Home key and Cursor Select key. The Cursor Home key returns the cursor to the first non-protected character position. The Cursor Select key causes a selection operation similar to a light pen operation; a light pen (Selector Pen) is optional in addition to this control. A Print key is included on 3276/3278 display/keyboards when attached to a 3274 Control Unit; this key causes the displayed data to be transferred to a printer for immediate printing without requiring a host computer command; normal print commands can also be executed. The standard cursor is an underscore. On a 3278 display connected to a 3274 controller, the cursor can be standard or reverse video underscore, blinking or non-blinking as selected by the operator.

Readers capable of accepting a credit-card size plastic with up to 40 characters encoded on a magnetic tape stripe can be connected to all models of displays. The reader for the new displays (3276 and 3278) will accept previously coded cards if the normal end of form control character (not the Hex C optional character).

COMPONENTS

3271 CONTROL UNIT: Four models provide control of up to 32 display/keyboards and printers that operate as a remote terminal cluster. The four models provide support for all combinations of BSC/SDLC operation and 480/1920 character displays, as follows:

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Model 1—480 character displays only; BSC transmission.
Model 2 —480 and 1920 character displays; BSC transmission.
Model 11—480 character displays only; SDLC transmission.
Model 12—480 and 1920 character displays; SDLC transmission.

The first device connected to a 3271-2 or -11 controller must be a 1920 character 3277 display. Model 2 displays and 3284-2 and 3286-2 printers (1920 characters) cannot be connected to a Model 1 or 11 controller. The 3288-2 can be connected to a 3271-2 and -12 controller only. Within these restrictions any combination of up to 32 displays and 3284/3286/3287/3288 printers is permitted. Up to four devices can be connected to the basic controller. A Device Adapter is required for each additional group of four devices.

The 3271-11 and -12 will support ASCII transmission code in place of EBCDIC with an extra cost option; this is a no-cost option for the 3271-1 and -2. The Data Analysis—APL feature permits handling an expanded character set of 120 characters on the 3271-2 and -12; this feature does not provide dual case display, but the capability to store and transfer the expanded set. The Copy Buffer Transfer feature permits direct transfer of data from the buffer of one device to the buffer of another device (under host computer command) attached to a 3271-1 or -2 controller; the 3271-11 and -12 include this capability as standard. The 3271-1 and -2 require an extra-cost option for transmission speeds above 2400 bps; the 3271-11 and -12 controllers do not.

3272 CONTROL UNIT: Two models provide control of up to 32 display/keyboards and printers that operate as a local display cluster. Model 1 supports 480 character displays; Model 2 supports 480 or 1920 character displays.

The first device installed on a 3272-2 must be a 1920 character display. Model 2 displays and 3284-2 and 3286-2 printers (1920 characters) cannot be connected to a Model 1 controller. The 3288-2 printer can be connected to a 3272-2 controller only. Within these restrictions any combination of up to 32 displays and 3284/3286/3287/3288 printers is permitted. Up to four devices can be connected to the basic controller. A Device Adapter is required for each additional group of four devices.

The Data Analysis—APL feature permits handling an expanded character set of 120 characters; this feature does not provide dual case display, but the capability to store and transfer the expanded set.

The 3272 connects to the byte multiplexer of an IBM 3031, 3032, or 3033 processor, or the basic multiplexer, block multiplexer, or selector channel of an IBM System/360 Model 25 through 195 or System/370 Model 115 through 168. Data is transferred at up to 650,000 characters per second between the computer system and the 3272 local cluster.

3274 CONTROL UNIT: Four models provide control of a local or remote cluster of up to 32 display/keyboards and printers. Model 1A supports a local cluster operating in SNA mode under VTAM. Model 1B supports a local cluster operating in 3272 compatible mode. Model 1C supports a remote cluster operating under BSC or SDLC protocol. Model 1D is functionally upward-compatible with Model 1B, combining local attachment in 3272-compatible mode with an APL/Text control function.

Operating functions are controlled by feature and systems diskettes customized at installation, using a diskette drive integral with the controller. The 3274-1C is conditioned for BSC or SDLC operation by loading a program into the controller using interchangeable diskettes.

All four models support mixing of the older 3277/3284/3286/3288 (Category B) devices on the same controller with the new 3278/3287/3289 (Category A) devices. The basic controllers each accommodate up to eight of the newer components. One Type A Terminal Adapter is required for each additional group of eight of the new devices. Alternatively, up to four Type B Terminal Adapters, each accommodating up to four 3277/3284/3286/3287/3288 Category B devices, can be installed. A single controller can accommodate a cluster of up to 32 terminals, comprised of groups of 8 Category A devices and groups of 4 Category B devices; however, no more than 16 (i.e., 4 groups) of the 32 terminals can be Category B devices. A minimum of one 3278 display and keyboard is required. The new 3287 printer can be attached to either Type A or Type B adapters. A 3278 Model 5 display cannot be attached to a 3274-1B Control Unit.

Special features are required to install Type B Terminal Adapters in the 3274-1A and 1C (Extended Function Store-16K and Control Storage Expansion); these features are not required to install Type B Adapters in the 3274-1B or 3274-1D.

The 3274-1C requires the External Modem Interface Feature and either the Common Communications Adapter or the High Performance Communications Adapter. The latter is required if any Type B Terminal Adapters are installed *and* a transmission speed of 9600 bps is used; otherwise the CCA is adequate for all transmission combinations.

Dataphone Digital Service is available on Model 1C via both point-to-point and multipoint adapters. Model 1C can also be equipped with an Encrypt/Decrypt device which codes and decodes messages using the Federal Data Encryption Standard algorithm.

The APL/Text feature, available on all models except 1B, permits display (on an adapted 3278) or printing (on an adapted 3287) of an expanded 222-character set, including the standard EBCDIC and APL characters plus 37 text-specific characters and 10 graphic plot characters. The Text Print feature, available with all models except 1B, permits printing on the 3289 of a 125-character set (93 EBCDIC characters plus the 32-character Text Character set) and character underscore and overprint capabilities.

3275 DISPLAY STATION: A stand-alone unit available in two models corresponding to protocol and display capacity:

Model 2—1920 character display; BSC transmission.
Model 12—1920 character display; SDLC transmission.

With an extra-cost feature, the 3275-12 will support ASCII in place of EBCDIC; this is a no-cost option for the 3275-2.

The 3275-2 requires an extra-cost option for transmission speeds over 2400 bps; this is a standard feature with the 3275-12. A 1200-bps modem for operation over non-switched facilities is available for all 3275 models. The 3275-2 can be equipped with an extra-cost Dial feature for operation over the public telephone network; an integrated 1200-bps modem with Auto-Answer is also optional.

One 3284-3 bufferless printer can be attached to any model 3275.

The 3275 uses the 463X series keyboards.

3276 CONTROL UNIT DISPLAY STATION: A controller for small remote clusters; it also includes an integrated display. The 3276 can accommodate up to seven additional displays and printers.

A total of eight models provide combinations of four display capacities and BSC or SDLC operation.

Model 1—960 character display; BSC transmission.
Model 2—1920 character display; BSC transmission.
Model 3—2560 character display; BSC transmission.

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Model 4—3440 character display; BSC transmission.
Model 11—960 character display; SDLC transmission.
Model 12—1920 character display; SDLC transmission.
Model 13—2560 character display; SDLC transmission.
Model 14—3440 character display; SDLC transmission.

The BSC models (-1/2/3/4) can accommodate any mix of up to seven additional 3278 displays and 3287 and 3289 printers. The added 3278 display cannot have a larger display capacity than the basic 3276 integrated display. However, the SDLC/BSC Switch feature permits alternate protocol operation and also permits intermixing any size display on any "BSC" 3276 model. The SDLC models (-11/12/13/14) can accommodate any display size mix.

The basic 3276 controller (any model) can accommodate two devices. A Terminal Adapter is required for each additional two devices.

Models 11, 12, 13, and 14 can be equipped with an Encrypt/Decrypt device which codes and decodes messages using the Federal Data Encryption Standard algorithm.

The 3276 requires an External Modem Interface or an Integrated Modem (1200 bps). Five integrated modem features are available for operation over switched or non-switched facilities, providing basic transmission linkage plus optional network backup and manual or auto answer capabilities. Either external or internal modem operation requires a Communications Feature.

Dataphone Digital Service is available on all models via both point-to-point and multipoint adapters.

APL/Text functions similar to those provided by the 3274 Control Unit can be implemented by equipping the 3276 with APL/Text Control and Extended Function Base features.

3275/3277 DISPLAY: Via a 14-inch (diagonal measurement) CRT. Display screen arrangement is dependent on the model display station. Model 1 display screens are arranged in 12 lines of 40 characters each, totaling 480 character positions. Model 2 and 12 display screens are arranged in 24 lines of 80 characters each, totaling 1920 character positions.

A character set of 64 characters (either ASCII or EBCDIC is available), including upper-case alphabetics, numerics, and special symbols, is displayed in green against a dark background. The Data Analysis—APL Feature (available on Model 2 only) allows for an expanded character set of 120 characters (93 input/output, 27 output only), including upper and lower case alphabetics. Each character is formed by a 7-by-9 dot matrix.

These displays use the 463X series keyboards. The displays can be equipped with an Audible Alarm, Keyboard Numeric Lock, Security Keylock, Selector Light Pen, and Operator Identification Card Reader.

3276/3278 DISPLAY: Five models are available, distinguished by the display capacity. Model 1 displays 12 lines of 80 characters each (960 characters total); Model 2 displays 24 lines of 80 characters each (1920 total); Model 3 displays 32 lines of 80 characters each (2560 total); Model 4 displays 43 lines of 80 characters (3440 total); Model 5 (3278 only) permits operator selection of display arrangements of 24 lines of 80 characters (1920 total) or 27 lines of 132 characters (3564 total). The display characteristics of the 3276 Models 11, 12, 13, and 14 are identical to Models 1, 2, 3, and 4, respectively.

A character set of 94 characters, including upper and lower case alphabetics, numeric, and special symbols is displayed. When connected to a 3274, the 3278 can incorporate the APL/Test feature; an Extended Character Set Adapter and a 4626 or 4629 keyboard are required. A monocase switch provides 3277 compatibility. Each character for Models 1, 2, and 3 is formed by a 7 x 14 matrix; for Models 4 and 5, a 9 x 12 matrix is used.

A Switch Control Unit permits a 3278 Display to be switched between two controllers.

These displays use the 462X series keyboards. The displays can be equipped with Audible Alarm, Keyboard Numeric Lock, Address Lock, Security Keylock, Selector Light Pen, Magnetic Slot Reader, and Magnetic Hand Scanner.

463X KEYBOARDS: For use with 3277 displays and 3275 display stations. A total of 10 models are available with various combinations of layouts, data codes, and program function keys. A complete listing of the models and basic characteristics is contained in the price list. The typewriter keyboards carry the numerics in a row across the top of the keyboard just like an office typewriter. The data entry and data entry keypunch layout keyboards have the numerics arranged to permit one-hand numeric data entry. The keypunch layout duplicates the layout of an IBM keypunch, which has related special characters, such as left and right parenthesis, in unrelated positions on the keyboard. The other data entry layout groups related symbols in adjacent key positions. The operator console layout duplicates the layout of an IBM 1052 Model 7 operator console. Keyboards without program function keys have a total of 66 keys; the 78-key units include 12 program function keys, which are defined by the application program in the host computer. A Numeric Lock feature restricts keyboard operation to numeric input only (or duplication of numeric data); the keyboard automatically locks if anything other than numeric data, including minus and period, is keyed.

462X KEYBOARDS: For use with 3278 displays and 3276 controller/displays. A total of eight models are available with various combinations of layouts, data codes, and program function keys. A complete listing of models and basic characteristics is provided in the price list. The typewriter, data entry, and data entry keypunch layout arrangements are similar, but not identical, with the corresponding 463X layouts discussed above. All data entry layouts include a separate group of 10 program function keys. All typewriter models include 12 program function keys that are activated by an alternate shift mode. Two models include an additional 12 keys for a total of 24 program function keys; two models include text-oriented characters for use with APL/Test features. All models, except the latter four, have 75 keys. The four expanded typewriter layouts have 87 keys. A Numeric Lock feature is available.

3284 MAXTRIX PRINTER: A 40-cps printer used with 3271, 3272, and 3274 clusters and 3275 stand-alone display stations. There are three models, defined by buffer capacity: Model 1 — 480 character buffer; Model 2 — 1920 character buffer; and Model 3 — no buffer. The 3284-1 can be used with any model 3271 or 3272. The 3284-2 can only be used with the 1920 character models of the 3271 or 3272. The 3284-3 can be used only with the 3275 (any model). The printer can be specified for a print width of 120, 126, or 132 columns; each option requires a different width form. The Data Analysis—APL feature provides dual case EBCDIC, APL, and TN print train characters; this feature is available only with the 3284-2. Characters are formed within a 7x7 matrix (7x8 with the Data Analysis—APL feature); however, only four columns are used for any one symbol. All models print 10 characters per inch and 6 lines per inch.

3286 MATRIX PRINTER: A 66-cps printer used with 3271, 3272, and 3274 clusters. Two models are available; except for operational speed, their characteristics are similar to those of the 3284-1 and -2, including configurational limitations. The Data Analysis—APL feature is available for the 3286-2.

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3287 MATRIX PRINTER: This printer can be used with the older (3271/3272) as well as newer (3274/3276) cluster controllers. Model 1 operates at 80 cps; Model 2 operates at 120 cps. Both models achieve these speeds through bidirectional printing. Both print 10 characters per inch, 6 or 8 lines per inch, and 132 positions across the page. Separate attachment features are required for connection to a 3271/3272 or 3274/3276 controller. When connected to a 3271 or 3272, the 3287 can incorporate the Data Analysis—APL feature for compatibility; dual case printing can be specified for all arrangements. When connected to a 3274, the 3287 can incorporate the APL/Text feature; an Extended Character Set Adapter and a 3274 Attachment feature are required. A special feature, Extended Print Buffer, is required for operation with 2560, 3440, and 3564 character displays. Character formation is 4 of 7 x 8, in a manner similar to the 3284 and 3286 printers. A Variable Width Forms Tractor option, as well as a Friction Feed Paper Handling option, is available. An audible alarm is a no-cost feature for signaling a forms-out condition; the alarm can also be sounded via a host computer command.

3288-2 BELT PRINTER: For use with 1920-character 3271, 3272, and 3274 clusters. The basic printer operates at 120 lines per minute with a 64-character set. With the optional Text Printer feature, the printer can also print the TN/T11 120-character set, which includes lower case alphabetics and provides for overprint and underscore capabilities, at an operational speed of 80 lines per minute. The 64- and 120-character set print belts are interchangeable. The 3288-2 prints 10 characters per inch and 6 lines per inch; print width is 132 positions. The Text Print option provides a 120 character set (TN/T11) and overprint capability.

3289 BELT PRINTER: A new higher-speed printer for use with 3274 and 3276 clusters. The printer is available in two models that differ only in print speed. Model 1 operates at 155 lines per minute with a 48-character set (both EBCDIC and ASCII are available); performance is reduced to 120 and 80 lines per minute, respectively, when a 64 or 94 character set is used via interchangeable belts. Model 2 operates at a peak speed of 400 lines per minute with a 48-character set, 300 lines per minute with a 64-character set, and 230 lines per minute with a 94-character set. When connected to a 3274, the 3289 can incorporate the Text Print feature; an Extended Character Set Adapter is required. Data is printed at 10 characters per inch and 6 or 8 lines per inch; 132 print positions are provided. An Audible Alarm feature (extra-cost) sounds when end of forms is reached or when activated by the host computer.

PRICING

All 3270 components, old and new, are available under the terms of IBM's Rental or Lease Agreement (LRA) or for purchase. LRA includes prime shift maintenance; a separate contract is available for purchased units. All new components are user installed via IBM's new Customer Set-Up policy.

LRA was announced for general application in April 1977. Basically, this arrangement provides for month-to-month rental or for a two-year lease with penalties for early termination (including model downgrades and feature termination). The lease can be extended indefinitely, one year at a time. The monthly charges for the lease arrangement are generally 15 percent lower than the month-to-month arrangement. The prime shift maintenance period is for any consecutive nine hours between 7 AM and 6 PM, Monday through Friday. (The maintenance charges given in the accompanying price list are for prime shift maintenance for purchased equipment and also serve as the basis for calculating extended charges for rented or leased equipment.) Extended period maintenance is available up to 24 hours per day, 7 days per week.

The termination charge for the lease arrangement is the lower of 5 months' charges or 25 (5 percent for the 3286 printer) percent of the remaining value of the lease. (For periods of fewer than 20 months, the 25 percent charge will be lower than the 5 month charge.)

All 3270 components are in maintenance category A, except the 3278 Control Unit Display Station and the 3288 Printer, which are in category D. These categories determine the schedule of extended maintenance charges. The two schedules differ for extended Monday through Friday maintenance, but are the same for Saturday and Sunday maintenance. The premium for extended maintenance is expressed in the table below as a percentage of the basic maintenance charges, which are listed in the accompanying price list.

	Consecutive Hours				
	9*	12	16	20	24
Monday-Friday—					
Category A	10%	14%	18%	22%	26%
Category D	10	12	14	16	18
Saturday	4	5	7	8	9
Sunday	5	7	9	11	12

*For periods outside the basic 7 AM to 6 PM prime shift.

The lease arrangement also guarantees a maximum rate of increases for extended leasing periods. The rate for all 3270 components is five percent per year beginning in the second year of the lease, except for the 3288 printer, which has an upper limit rate of zero percent.

All 3270 components are classed under rental category B (unlimited usage) and warranty category B (three months). Purchase credits can be accrued up to a maximum of 60 percent for the older 3270 components (3271/3272/3275/3277/3284/3286/3288) and up to 55 percent for the newer components (3274/3276/3278/3287/3289).

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Cluster Controllers				
	3271 Model 1; remote, 480 char., BSC	$162	$138	$ 4,735	$ 20.00
	3271 Model 2; remote, 1920 char., BSC	177	151	5,240	22.00
	3271 Model 11; remote, 480 char., SDLC	235	200	6,440	49.00
	3271 Model 12; remote, 1920 char., SDLC	250	213	6,945	52.00
1066	Data Analysis—APL; 3271-2, -12 only	43	37	630	1.50
1200	ASCII Transmission Code; 3271-11, -12 only	8	7	286	0.50
1550	Copy-Buffer Transfer; 3271-1, -2 only	NC	NC	NC	NC
3250	Device Adapter; accommodates four devices	53	45	779	0.50
7820	1200 bps Transmission Speed	NC	NC	NC	NC
7821	4800/7200 bps Transmission Speed; 3271-1, -2 only	4	3	145	0.50
	3272 Model 1; local, 480 char.	187	159	5,465	20.00
	3272 Model 2; local, 1920 char.	202	172	5,970	44.50

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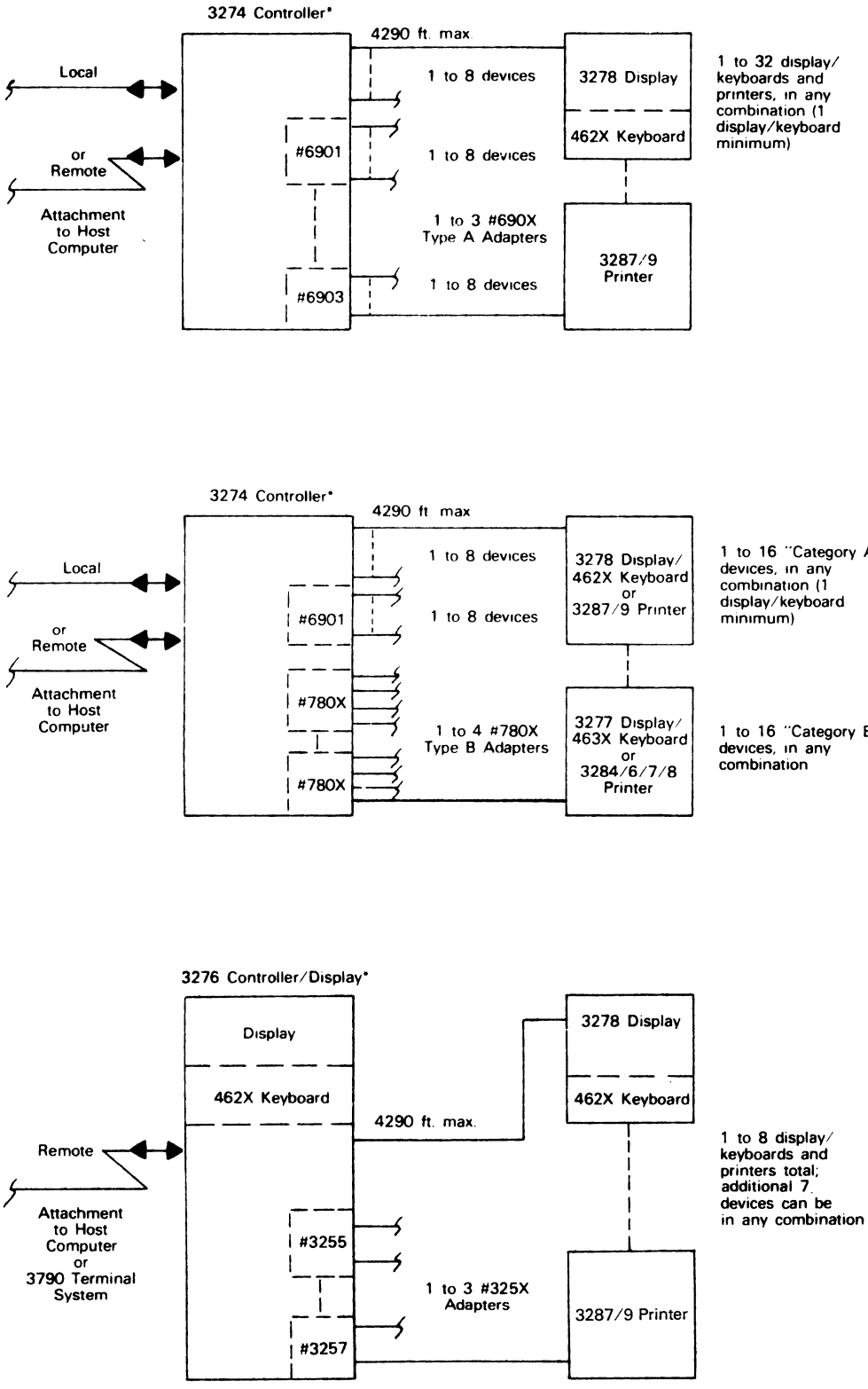

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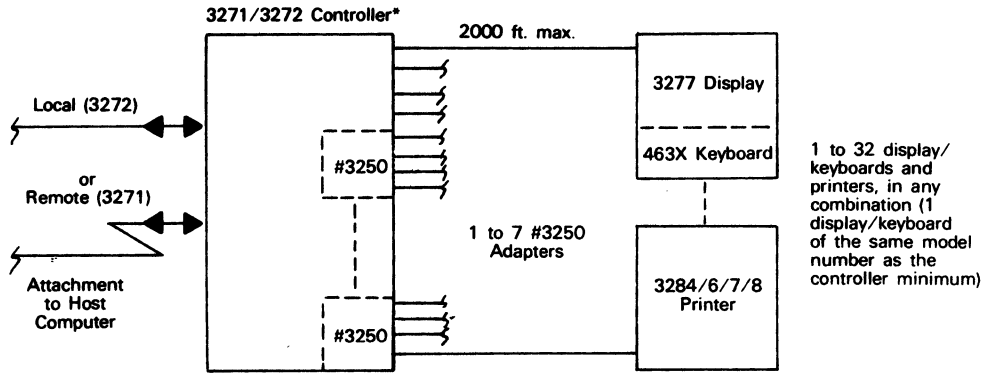

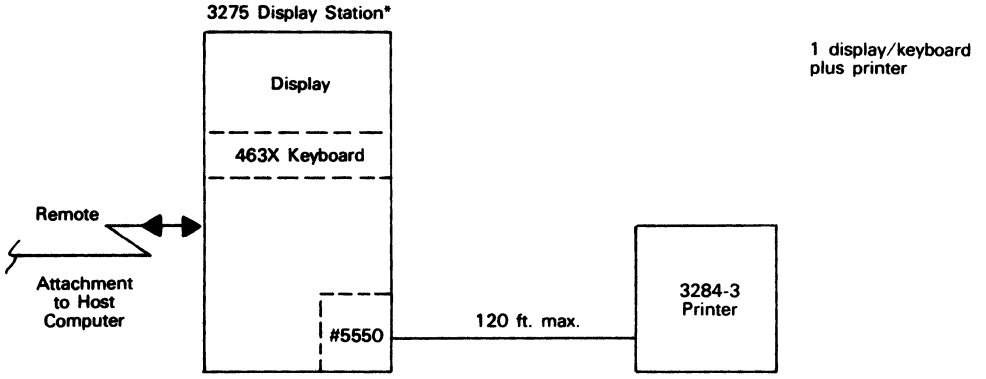

*See text for communications, display, keyboard, and printer models, characteristics, and options.

3277 Display — 480 or 1920 characters
3278 Display — 960, 1920, 2560, or 3440 characters.

3284 Printer — 40 char./sec.
3286 Printer — 66 char./sec.
3287 Printer — 80 or 160 char./sec.
3288 Printer — 120 lines/min.
3289 Printer — 155 or 400 lines/min.

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Cluster Controllers (Continued)				
1066	Data Analysis—APL; 3272-2 only	43	37	630	2.50
3250	Device Adapter; accommodates four devices	53	45	779	0.50
	3274 Model 1A; local, SNA mode	513	437	18,770	87.00
	3274 Model 1B; local, 3272 mode	513	437	18,770	91.00
	3274 Model 1C; remote; requires 3701	361	307	13,190	73.50
	3274 Model 1D; local, 3272 mode	513	437	18,770	96.50
	Terminal Adapters—				
6901	Type A1; devices 9 through 16	33	28	1,215	2.50
6902	Type A2; devices 17 through 24	33	28	1,215	2.50
6903	Type A3; devices 25 through 32	33	28	1,215	2.50
7802	Type B1; devices 1 through 4	39	33	1,300	5.00
7803	Type B2; devices 5 through 8	33	28	1,100	3.00
7804	Type B3; devices 9 through 12	33	28	1,100	3.00
7805	Type B4; devices 13 through 16	33	28	1,100	3.00

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
3622	Extended Function Store—16K; Type C1; 3274-1A, -1C, -1D only; requires 1801	60	51	1,170	10.50
3625	Extended Function Store—16K; Type C3; 3274-1A, -1C, -1D only; requires 1801	60	51	1,170	10.50
3627	Extended Function Store—16K; Type D1; 3274-1A, -1C, -1D only; requires 1801	60	51	1,170	10.50
1801	Control Storage Expansion	32	27	1,055	5.50
3701	External Modem Interface; requires 6302 or 6303	12	10	400	4.00
6302	Common Communications Adapter; SDLC or BSC; up to 9600 bps with Type A only Terminal Adapters and up to 7200 bps with Type B or mix	12	10	450	2.50
6303	High Performance Communications Adapter; SDLC or BSC; 9600 bps with Type B Terminal Adapters or mix	36	31	1,200	11.00
8801	Watertight Power Connector; 3274-1A or -1B only	NC	NC	NC	NC
3680	Encrypt/Decrypt; 3274-1C only	63	54	2,115	2.50
5650	Dataphone Digital Service; point-to-point; 3274-1C only	24	20	840	2.00
5651	Dataphone Digital Service; multipoint; 3274-IC only	24	20	840	2.00
	Controller/Display Stations				
	3276 Model 1; 960 char. BSC	175	149	6,390	33.50
	3276 Model 2; 1920 char., BSC	180	153	6,570	34.50
	3276 Model 3; 2560 char., BSC	184	157	6,750	35.50
	3276 Model 4; 3440 char., BSC	189	161	6,930	36.00
	3276 Model 11; 960 char., SDLC	175	149	6,390	29.00
	3276 Model 12; 1920 char., SDLC	180	153	6,570	29.50
	3276 Model 13; 2560 char., SDLC	184	157	6,750	30.00
	3276 Model 14; 3440 char., SDLC	189	161	6,930	30.50
3255	Terminal Adapter No. 1; devices 3 and 4	16	14	630	1.50
3256	Terminal Adapter No. 2; devices 5 and 6	16	14	630	1.50
3257	Terminal Adapter No. 3; devices 7 and 8	16	14	630	1.50
3701	External Modem Interface; requires 6301 or 6302	12	10	400	4.00
3680	Encrypt/Decrypt; 3276-11, -12, -13, -14 only	51	43	1,710	2.50
	1200 bps Integrated Modems—				
5500	Non-switched; requires 6301	19	16	668	5.00
5501	Switched, Auto Answer; requires 6301	26	22	840	3.00
5502	Switched, Manual Answer; requires 6301	19	16	668	4.00
5507	Non-switched with Switched Backup; requires 6301	27	23	910	7.00
5508	Non-switched with Switched Backup, Auto Answer; requires 6301	29	25	1,015	4.00
5650	Dataphone Digital Service; point-to-point	24	20	840	2.00
5651	Dataphone Digital Service; multipoint	24	20	840	2.00
6301	Communications Feature with Clock	19	16	670	3.00
6302	Communications Feature without clock	12	10	450	2.50
6315	SDLC/BSC Switch; 3276-1, -2, -3, -4 only	21	18	810	3.00
1067	APL/Text Control; requires 1068	29	26	1,125	0.50
1068	Extended Function Base	6	5	225	0.50
	Stand-Alone Display Stations				
3275	3275 Model 2; 1920 char., BSC	142	121	4,735	24.00
	3275 Model 12; 1920 char., SDLC	194	165	6,440	56.50
1200	ASCII Transmission Code; 3275-12 only	8	7	286	0.50
3440	Dial; 600 or 1200 bps over dial network; 3275-2 only	8	7	328	1.00
5500	Integrated Modem; 1200 bps	16	14	535	3.00
5501	Integrated Modem; 1200 bps with Auto Answer; 3275-2 only	21	18	714	4.00
5550	Printer Adapter; one max.	NC	NC	NC	NC
7820	1200 bps Transmission Speed	NC	NC	NC	NC
7821	4800/7200 bps Transmission Speed; 3275-2 only	4	3	145	0.50
	Cluster Display Stations				
	3277 Model 1; 480 char.	74	63	2,470	9.00
	3277 Model 2; 1920 char.	108	92	3,200	20.00
1066	Data Analysis—APL; 3277-2 only	26	22	504	1.00
	3278 Model 1; 960 char.	60	51	2,205	12.00
	3278 Model 2; 1920 char.	63	54	2,340	12.50
	3278 Model 3; 2560 char.	74	63	2,700	14.00
	3278 Model 4; 3440 char.	76	65	2,835	15.00
	3278 Model 5; 3564 char.	89	76	3,285	17.00
1720	Switch Control Unit; 3278 only	5	4	180	NC

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Keyboards				
	For 3275/3277—				
4630	66-Key EBCDIC Typewriter	13	11	520	5.00**
4631	66-Key EBCDIC Data Entry	13	11	520	6.00**
4632	78-Key Operator Console	33	28	1,010	14.50**
4633	78-Key EBCDIC Typewriter	29	25	869	8.50**
4634	66-Key ASCII Typewriter	13	11	520	5.00**
4635	78-Key ASCII Typewriter	29	25	869	8.50**
4636	66-Key EBCDIC Data Entry; Keypunch layout	15	13	522	6.00**
4637	66-Key EBCDIC APL/Typewriter 3277-2 only; requires 1066	27	23	807	5.50
4638	78-Key EBCDIC APL/Typewriter; 3277-2 only; requires 1066	41	35	1,250	9.50
4639	78-Key Text; 3277-2 only; requires 1066	41	35	1,250	8.50
	For 3276/3278—				
4621	75-Key EBCDIC Typewriter	13	11	495	2.50
4622	75-Key EBCDIC Data Entry	13	11	495	3.50
4623	75-Key EBCDIC Data Entry; keypunch layout	13	11	495	3.50
4624	75-Key ASCII Typewriter	13	11	495	2.50
4626	87-Key EBCDIC Typewriter/Text; 3278 only	18	15	675	3.50
4627	87-Key EBCDIC Typewriter; 3278/3274 only	18	15	675	3.00
4628	87-Key ASCII Typewriter; 3278/3274 only	18	15	675	3.00
4629	87-Key EBCDIC Typewriter/Text; 3278 only	18	15	675	3.50
	3275/3277 Display Station Options				
1090	Audible Alarm	4	3	145	0.50
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC
6350	Selector Light Pen	25	21	728	1.50
4600	Operator Identification Card Reader	13	11	437	4.00
	3276/3278 Display Station Options				
1009	Address Keylock; 3276 only	60 SUC	60 SUC	60	NC
1090	Audible Alarm	2	2	90	NC
1120	APL/Text; 3278 only	9	8	360	0.50
3610	Extended Character Set Adapter; 3278 only	11	9	405	2.50
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC
6350/6351	Selector Light Pen	15	13	585	0.50
4999	Magnetic Reader Control	11	9	405	4.50
	Magnetic Slot Reader (Part No. 4123500)	—	—	275	—
	Magnetic Hand Scanner (Part No. 4123495)	—	—	275	—
	Printers				
	3284 Model 1; 40 cps, 480 char. buffer; 3272 only	148	126	4,255	51.50
	3284 Model 2; 40 cps, 1920 char. buffer; 3271-2, -12, 3272-2 only	157	134	4,775	51.50
	3284 Model 3; 40 cps, bufferless; 3275 only	128	109	4,070	27.50
1066	Data Analysis—APL; 3284-2 only	43	37	1,385	2.00
	3286 Model 1; 66-cps; 480 char. buffer; 3271; 3272 only	177	151	5,690	54.00
	3286 Model 2; 66 cps, 1920-char. buffer; 3271-2, -12, 3272-2 only	187	159	6,305	54.00
1066	Data Analysis—APL; 3286-2 only	43	37	1,385	2.00
	3287 Model 1; 80 cps	175	149	5,680	49.00
	3287 Model 2; 160 cps	213	181	6,055	60.50
1066	Data Analysis—APL; 3287 only	11	9	315	NC
1120	APL/Text	6	5	175	0.50
3610	Extended Character Set Adapter	15	13	455	4.00
3880	Extended Print Buffer	7	6	210	0.50
8330	3271/3272 Attachment	32	27	910	3.50
8331	3274/3276 Attachment	6	5	175	0.50
8700	Variable Width Forms Tractor	6	5	160	0.50
4110	Friction Feed Paper Handling	6	5	160	0.50
	3288 Model 2; 120 lpm; 3271-2, -12, 3272-2 only	403	343	10,625	91.00
7880	Text Print	46	39	1,405	1.00
	3289 Model 1; 155 lpm	385	328	8,900	105.00
	3289 Model 2; 400 lpm	583	496	13,250	179.00
1090	Audible Alarm	6	5	175	NC
1130	Text Print	7	6	210	NC
4450	Form Stand; all models except 3289	—	—	54	—

*Includes prime-shift maintenance.
**Monthly maintenance prices for 3277. For 3275, add $1.00 for 4630, 4631, 4634, and 4636, $1.50 for 4633 and 4635, and $2.50 for 4632 keyboards.■

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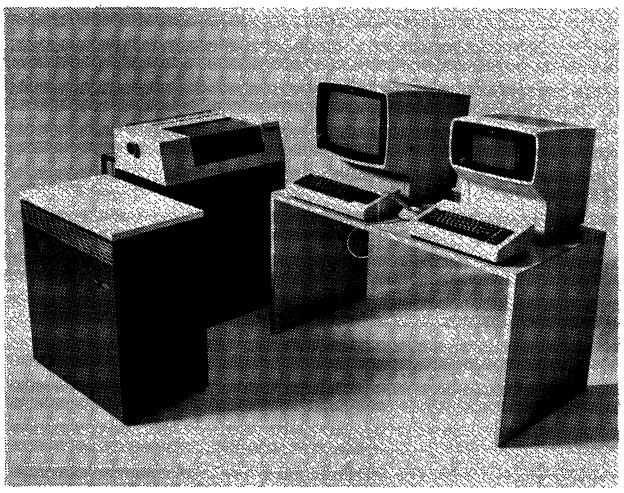
IBM 3270 Information Display System



A family of controllers, displays/keyboards, and printers available for stand-alone or cluster configurations in remote or local environments.

Clusters can accommodate up to 32 displays and printers. Transmission rates for remote mode systems range from 1200 to 9600 bps; BSC or SDLC protocols are available on all models, and some models accommodate both.

Control unit specifications may not only permit display or printing of EBCDIC or ASCII character sets, but with new optional features allow for the larger APL character set, text-specific characters, and graphic plot characters.

The cost for a small-cluster configuration consisting of a 3276 controller/display plus seven 1920-character display stations is about $775 per month, or $660 per month with a two-year lease, including maintenance.

The cost for a larger-cluster configuration consisting of a 3274 Control Unit plus 32 1920-character displays is about $2832 per month, or $2410 per month with a two-year lease, including maintenance.

In either configuration, replacement of a display with an 80-cps bidirectional matrix printer adds about $99 per month, or $84 per month with a two-year lease, to the cost.

MANAGEMENT SUMMARY

The IBM 3270 family remains highly significant among communications terminal product lines. The first generation of devices (the 3271/3272 control units, 3275 display station, 3277 display, and 3284/3286/3288 printers) was introduced in 1972. In 1977, the product line was radically overhauled, resulting in the announcement of a second generation of components (the 3274 control unit, 3276 control/display, 3278 display, and 3278/3289 printers) that offers increased capabilities at prices much lower than comparable older models. Along with that announcement came major price reductions on the older equipment.

The 1977 announcement boosted the 3270 family into a favorable position in the highly competitive terminal marketplace, and it has maintained that position.

One concept that allows IBM to hold the line in terms of prices is its Customer Set-Up (CSU) plan, applicable to all the newer components. Under this plan, the customer installs the equipment himself. IBM expects the installation to be a "same-day-as-delivery" possibility, because rental or lease charges start the working day after delivery, without having any IBM personnel look at the equipment. If there is a problem, charges do not start until the equipment is fixed. Movement of equipment is also permitted under this agreement, and if the customer wants to discontinue using any component, he must pack it up himself and put it on the loading dock for pick-up. Internal test and check features have been installed on all components so that the user can diagnose most problems himself.

Since 1972 IBM has continually added new features to existing 3270 equipment. The most recent additions include several new features enhancing the 3274 controller and the 3276 controller/display capabilities. These include the ability to accommodate Dataphone Digital Service and to code and decode messages under the Federal Data Encryption logic. New 3276 features increase its display and security capabilities, allow a wider choice of inte- ➢

CHARACTERISTICS

VENDOR: International Business Machines Corp., Data Processing Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.

DATE OF ANNOUNCEMENT: 3271/3272/3277 (BSC)—1972; 3271/3277 (SDLC)—third quarter 1974; 3274/3276/3278—May 1977; 3274-ID—July 1978.

DATE OF FIRST DELIVERY: 3271/3272/3277 (BSC)—1972; 3271/3277 (SDLC)—third quarter 1974; 3274-1C—March 1978; 3276-2, 3278-2, 3287—December 1977; other 3274/3276/3278/3289—February 1978 through August 1978; 3274-1D—May 1979.

SERVICED BY: International Business Machines.

CONFIGURATION

The 3270 family of display/keyboard stations and printers can be configured as a local or remote cluster or as a stand-alone station. There are two generations of components with ➢

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IBM 3270 FAMILY COMPONENTS AND SUBSYSTEMS

Controller	Mode	Integrated Display	Maximum Devices	Components Supported: Displays	Keyboards	Printers
3271	Remote	—	32	3277	463X	3284/6/7/8
3272	Local	—	32	3277	463X	3284/6/7/8
3274	Remote/Local	—	32*	3277/8	463X/462X	3284/6/7/8/9
3275	Remote	1	2**	—	463X	3284-3
3276	Remote	1	8	3278	462X	3287/9

*Supports up to 32 new style (Category A) or 16 "new style" plus 16 "old style" (Category B) display/keyboards and printers. Category A devices include 3278 displays and 3287/9 printers. Category B devices include 3277 displays and 3284/6/7/8 printers. (The new 3287 printers appear in both categories.)

**One printer in addition to the integrated display.

grated modems, and permit attachment of the 3289 Belt Printer. New 3274 features add flexibility in the Extended Function Store (required for cluster support of the older terminal devices) and support the display or printing of the new APL/Text characters, (including the APL character set), text-specified characters, and graphic plot characters.

Display Exception Monitoring Facilities (DEMF) software on the host computer provides network support for problem determination and isolation to 3270-family terminals operating in the BSC mode.

For the most part, prices have remained stable since the major 1977 announcements. The only significant change has been purchase price decrease on the 3289 Belt Printer (rental, lease, and maintenance prices did not change): Model 1 was reduced from $11,110 to $8,900; Model 2, from $16,560 to $13,250. Price fluctuations (mostly decreases) also took place on the Data Analysis-APL features in most models, and on the Extended Function Store features for the 3274 controller.

USER REACTION

The 1978 Datapro survey of alphanumeric display terminal users produced 240 responses from users of IBM 3275, 3277, and unspecified 3270 terminals. These users had a total of 9006 displays. The expansion of the term "terminals" to include devices connected directly to a computer system was clearly identified in this survey. A total of 158 users (66 percent) indicated some use of locally connected displays. Of this group, over one-third (60 users) had no remote displays at all. The ratings provided by these 240 users are summarized in the following table.

	Excellent	Good	Fair	Poor	WA*
Overall performance	115	118	3	2	3.5
Ease of operation	95	138	2	1	3.4
Display clarity	68	137	25	4	3.1
Keyboard feel and usability	111	111	13	0	3.4
Hardware reliability	124	94	16	2	3.4
Maintenance service	112	96	25	3	3.3
Software and technical support	63	120	37	5	3.1

*Weighted Average on a scale of 4.0 for Excellent.

a limited degree of mixing permitted within the same subsystem; complete compatibility for communications and applications program support can be achieved with the new components, if desired. The accompanying table presents the overall configurational possibilities. Specific prerequisites are detailed in the discussions of individual components.

TRANSMISSION SPECIFICATIONS

All controllers capable of remote operation can be arranged for BSC or SDLC operation through model selection (3271, 3275, and 3276), alternate operation mode (3274), or switch selection (optional on 3276).

For BSC operation, the 3271-1/2 and 3275-2 controllers permit half-duplex data transmission at 1200, 2000, or 2400 bps over a half-duplex facility; over a full-duplex facility, a transmission speed of 4800 or 7200 bps is also supported. In addition, the 3275-2 can be configured to transmit at 600 or 1200 bps over a switched facility (public telephone network). An integrated 1200 bps modem for operation over non-switched or switched lines is optional for the 3275-2. The 3274-1C and 3276-1/2/3/4 controllers permit half-duplex data transmission at 2000, 2400, 4800, or 7200 bps over a half- or full-duplex facility. In addition, the 3276-1/2/3/4 can operate at 1200/600, 2400/1200, or 4800/2400 bps over a switched facility. A 1200 bps integrated modem is available for the 3276 controller.

For SDLC operation, the 3271-11/12 and 3275-12 permit half-duplex operation over a half-duplex facility at 1200, 2000, or 2400 bps; over a full-duplex facility, half- or full duplex data transmission at 1200, 2000, 2400, 4800, 7200, or 9600 bps is supported. A 1200 bps modem is available for the 3275-12. The 3274-1C supports half-duplex operation over a half- or full-duplex facility at 2000, 2400, 4800, 7200, or 9600 bps; the 3276-11/12/13/14 add 1200 bps operation. The SDLC models of the 3276 also support switched network operation at 1200/600, 2400/1200, or 4800/2400 bps. A 1200 bps integrated modem is available for the 3276.

Multipoint operation with a 3270 display subsystem acting as a tributary station is supported for all combinations of protocols and modes.

HOST COMPUTER SOFTWARE SUPPORT

A 3270 subsystem is supported for local and remote operation by IBM System/360, System/370, and System/3 computer systems. Remote terminals are supported by BTAM, TCAM, VTAM, RPG Telecommunications, BSCA Multiline/Multipoint, and Communications Control Program depending on computer system and operating system. The 3274-based local clusters are supported on System/370 configurations under 3272 mode or under VTAM. In general, all new models and configurations of the 3270 can be supported under previous 3270 programming. If Display Exception

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In this survey the IBM displays scored higher ratings than other vendors' displays on all characteristics except display clarity, where the average rating for all non-IBM displays was 3.3. Reliability and strong vendor support were specifically mentioned as strengths of the 3270 displays by 75 and 78 percent of the users, respectively.

On the negative side, high cost was mentioned as a disadvantage by 62 percent of users, while 20 percent mentioned non-programmability as a disadvantage. (The lower prices of the new 3270 components should make the users much happier about pricing.)□

Monitoring Facility (DEMF) software is installed on the host computer, network support for problem determination/isolation is available to terminals operating in BSC mode. In addition, 3270 display and printer components, as well as 3276/3278 clusters, are used with higher-level systems such as the IBM 8100 and 3790.

DEVICE CONTROL

The 3270 System operates under the control of the program stored at the remote computer. Under program control, the 3270 can execute any of four types of commands: read, write, control, and sense.

Read commands initiate transfer of the contents of a device buffer, modified fields within the buffer, buffer addresses or data of fields specified by the selector pen, or the single-byte Attention Identification (AID) code generated by a Program Function or Program Access key. The 3270 responds to two read commands, Read Buffer and Read Modified.

Read Buffer initiates transfer of the contents of the addressed device buffer from the initial or current cursor address.

Read Modified initiates one of three operator-initiated functions: Read Modified, Short Read, or Test Request. Read Modified initiates the transfer of all fields modified by the keyboard within the device buffer. The fields are transferred in sequence beginning with the first modified field; all nulls are suppressed. However, when completion of a key-modified field is signaled by a selector pen operation, a resulting Read Modified operation will transfer only the address of the modified field. Short Read initiates transfer of the single byte AID Code generated by a Program Attention key. Test Request Read performs the same operation as Read Modified; however, a hardware-generated heading precedes the data. Nulls are suppressed as in Read Modified. Only the special heading is transferred if data has not been keyed.

Write commands condition the display or printer to receive a computer message. Two write commands—Write and Erase/Write—load, format, and selectively erase device buffer data, and can also initiate device operations such as starting the printer, resetting the keyboard, and sounding the audible alarm. Both commands are the same except that Erase/Write erases the entire contents of the device buffer before fresh data is written (beginning at the initial buffer address) and Write modifies existing buffer data.

Control commands initiate control unit and/or device operations. There are four control commands: Copy, Select, Erase All Unprotected, and No Operation. Copy, executed by a remote control unit only, transfers buffer data from one device to another. Select, executed by a 3272 Control Unit (or 3274 in 3277 mode) only, transfers buffer data from the selected device to the controller. Erase All Unprotected initializes the addressed device, erasing all unprotected buffer locations and repositioning the cursor to the initial position of the first unprotected field. No Operation, executed by the 3272 Control Unit only, performs no functional operation in the 3272, but can retrieve pending status.

The Sense command, executed by the 3272 Control Unit only, initiates the transfer of a single sense byte from the 3272. The sense byte defines error conditions that have occurred within the subsystem.

A local 3274 cluster operating under VTAM looks like a remote control unit.

Program control by data field provides a flexible formatting capability. A field, identified by an attribute control code (nondisplayed) in the initial character position, can possess any one of several characteristics. The attribute control code can specify a protected or unprotected field (for fixed format operation), beam intensity of brightness (off, normal, or bright), alphanumeric or numeric (automatic shift) input, auto lock or skip, tab stop, or light pen selection.

The Program Tab feature automatically writes successive data fields into successive unprotected data fields defined by a fixed format.

Character Addressing permits a message to be written beginning at any screen location. Addressing can be interspersed with data throughout a message received from the computer. Character Addressing also permits the selective modification of attribute control codes.

Operator controls are provided for cursor control, editing, and program functions.

Cursor controls position the cursor up, down, left, or right, step-by-step or repetitively if the key is held depressed. The cursor can also be backspaced one character position, moved to the beginning of the next line or beginning of the next unprotected data field, tab to the beginning of the next unprotected data field, and backtab to the beginning of the previous unprotected data field.

Edit controls permit data to be inserted in or deleted from text, character by character. Following data is automatically expanded or contracted.

Program Function keys are used to initiate program functions or identify data that can be transmitted with an accompanying program function code.

The 3276 and 3278 have two added controls: Cursor Home key and Cursor Select key. The Cursor Home key returns the cursor to the first non-protected character position. The Cursor Select key causes a selection operation similar to a light pen operation; a light pen (Selector Pen) is optional in addition to this control. A Print key is included on 3276/3278 display/keyboards when attached to a 3274 Control Unit; this key causes the displayed data to be transferred to a printer for immediate printing without requiring a host computer command; normal print commands can also be executed. The standard cursor is an underscore. On a 3278 display connected to a 3274 controller, the cursor can be standard or reverse video underscore, blinking or non-blinking as selected by the operator.

Readers capable of accepting a credit-card size plastic with up to 40 characters encoded on a magnetic tape stripe can be connected to all models of displays. The reader for the new displays (3276 and 3278) will accept previously coded cards if the normal end of form control character (not the Hex C optional character).

COMPONENTS

3271 CONTROL UNIT: Four models provide control of up to 32 display/keyboards and printers that operate as a remote terminal cluster. The four models provide support for all combinations of BSC/SDLC operation and 480/1920 character displays, as follows:

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Model 1—480 character displays only; BSC transmission.
Model 2 —480 and 1920 character displays; BSC transmission.
Model 11—480 character displays only; SDLC transmission.
Model 12—480 and 1920 character displays; SDLC transmission.

The first device connected to a 3271-2 or -11 controller must be a 1920 character 3277 display. Model 2 displays and 3284-2 and 3286-2 printers (1920 characters) cannot be connected to a Model 1 or 11 controller. The 3288-2 can be connected to a 3271-2 and -12 controller only. Within these restrictions any combination of up to 32 displays and 3284/3286/3287/3288 printers is permitted. Up to four devices can be connected to the basic controller. A Device Adapter is required for each additional group of four devices.

The 3271-11 and -12 will support ASCII transmission code in place of EBCDIC with an extra cost option; this is a no-cost option for the 3271-1 and -2. The Data Analysis—APL feature permits handling an expanded character set of 120 characters on the 3271-2 and -12; this feature does not provide dual case display, but the capability to store and transfer the expanded set. The Copy Buffer Transfer feature permits direct transfer of data from the buffer of one device to the buffer of another device (under host computer command) attached to a 3271-1 or -2 controller; the 3271-11 and -12 include this capability as standard. The 3271-1 and -2 require an extra-cost option for transmission speeds above 2400 bps; the 3271-11 and -12 controllers do not.

3272 CONTROL UNIT: Two models provide control of up to 32 display/keyboards and printers that operate as a local display cluster. Model 1 supports 480 character displays; Model 2 supports 480 or 1920 character displays.

The first device installed on a 3272-2 must be a 1920 character display. Model 2 displays and 3284-2 and 3286-2 printers (1920 characters) cannot be connected to a Model 1 controller. The 3288-2 printer can be connected to a 3272-2 controller only. Within these restrictions any combination of up to 32 displays and 3284/3286/3287/3288 printers is permitted. Up to four devices can be connected to the basic controller. A Device Adapter is required for each additional group of four devices.

The Data Analysis—APL feature permits handling an expanded character set of 120 characters; this feature does not provide dual case display, but the capability to store and transfer the expanded set.

The 3272 connects to the byte multiplexer of an IBM 3031, 3032, or 3033 processor, or the basic multiplexer, block multiplexer, or selector channel of an IBM System/360 Model 25 through 195 or System/370 Model 115 through 168. Data is transferred at up to 650,000 characters per second between the computer system and the 3272 local cluster.

3274 CONTROL UNIT: Four models provide control of a local or remote cluster of up to 32 display/keyboards and printers. Model 1A supports a local cluster operating in SNA mode under VTAM. Model 1B supports a local cluster operating in 3272 compatible mode. Model 1C supports a remote cluster operating under BSC or SDLC protocol. Model 1D is functionally upward-compatible with Model 1B, combining local attachment in 3272-compatible mode with an APL/Text control function.

Operating functions are controlled by feature and systems diskettes customized at installation, using a diskette drive integral with the controller. The 3274-1C is conditioned for BSC or SDLC operation by loading a program into the controller using interchangeable diskettes.

All four models support mixing of the older 3277/3284/3286/3288 (Category B) devices on the same controller with the new 3278/3287/3289 (Category A) devices. The basic controllers each accommodate up to eight of the newer components. One Type A Terminal Adapter is required for each additional group of eight of the new devices. Alternatively, up to four Type B Terminal Adapters, each accommodating up to four 3277/3284/3286/3287/3288 Category B devices, can be installed. A single controller can accommodate a cluster of up to 32 terminals, comprised of groups of 8 Category A devices and groups of 4 Category B devices; however, no more than 16 (i.e., 4 groups) of the 32 terminals can be Category B devices. A minimum of one 3278 display and keyboard is required. The new 3287 printer can be attached to either Type A or Type B adapters.

Special features are required to install Type B Terminal Adapters in the 3274-1A and 1C (Extended Function Store-16K and Control Storage Expansion); these features are not required to install Type B Adapters in the 3274-1B or 3274-1D.

The 3274-1C requires the External Modem Interface Feature and either the Common Communications Adapter or the High Performance Communications Adapter. The latter is required if any Type B Terminal Adapters are installed *and* a transmission speed of 9600 bps is used; otherwise the CCA is adequate for all transmission combinations.

Dataphone Digital Service is available on Model 1C via both point-to-point and multipoint adapters. Model 1C can also be equipped with an Encrypt/Decrypt device which codes and decodes messages using the Federal Data Encryption Standard algorithm.

The APL/Text feature, available on all models except 1B, permits display (on an adapted 3278) or printing (on an adapted 3287) of an expanded 222-character set, including the standard EBCDIC and APL characters plus 37 text-specific characters and 10 graphic plot characters. The Text Print feature, available with all models except 1B, permits printing on the 3289 of a 125-character set (93 EBCDIC characters plus the 32-character Text Character set) and character underscore and overprint capabilities.

3275 DISPLAY STATION: A stand-alone unit available in two models corresponding to protocol and display capacity:

Model 2—1920 character display; BSC transmission.
Model 12—1920 character display; SDLC transmission.

With an extra-cost feature, the 3275-12 will support ASCII in place of EBCDIC; this is a no-cost option for the 3275-2.

The 3275-2 requires an extra-cost option for transmission speeds over 2400 bps; this is a standard feature with the 3275-12. A 1200-bps modem for operation over non-switched facilities is available for all 3275 models. The 3275-2 can be equipped with an extra-cost Dial feature for operation over the public telephone network; an integrated 1200-bps modem with Auto-Answer is also optional.

One 3284-3 bufferless printer can be attached to any model 3275.

The 3275 uses the 463X series keyboards.

3276 CONTROL UNIT DISPLAY STATION: A controller for small remote clusters; it also includes an integrated display. The 3276 can accommodate up to seven additional displays and printers.

A total of eight models provide combinations of four display capacities and BSC or SDLC operation.

Model 1—960 character display; BSC transmission.
Model 2—1920 character display; BSC transmission.
Model 3—2560 character display; BSC transmission.

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Model 4—3440 character display; BSC transmission.
Model 11—960 character display; SDLC transmission.
Model 12—1920 character display; SDLC transmission.
Model 13—2560 character display; SDLC transmission.
Model 14—3440 character display; SDLC transmission.

The BSC models (-1/2/3/4) can accommodate any mix of up to seven additional 3278 displays and 3287 and 3289 printers. The added 3278 display cannot have a larger display capacity than the basic 3276 integrated display. However, the SDLC/BSC Switch feature permits alternate protocol operation and also permits intermixing any size display on any "BSC" 3276 model. The SDLC models (-11/12/13/14) can accommodate any display size mix.

The basic 3276 controller (any model) can accommodate two devices. A Terminal Adapter is required for each additional two devices.

Models 11, 12, 13, and 14 can be equipped with an Encrypt/Decrypt device which codes and decodes messages using the Federal Data Encryption Standard algorithm.

The 3276 requires an External Modem Interface or an Integrated Modem (1200 bps). Five integrated modem features are available for operation over switched or non-switched facilities, providing basic transmission linkage plus optional network backup and manual or auto answer capabilities. Either external or internal modem operation requires a Communications Feature.

Dataphone Digital Service is available on all models via both point-to-point and multipoint adapters.

3275/3277 DISPLAY: Via a 14-inch (diagonal measurement) CRT. Display screen arrangement is dependent on the model display station. Model 1 display screens are arranged in 12 lines of 40 characters each, totaling 480 character positions. Model 2 and 12 display screens are arranged in 24 lines of 80 characters each, totaling 1920 character positions.

A character set of 64 characters (either ASCII or EBCDIC is available), including upper-case alphabetics, numerics, and special symbols, is displayed in green against a dark background. The Data Analysis—APL Feature (available on Model 2 only) allows for an expanded character set of 120 characters (93 input/output, 27 output only), including upper and lower case alphabetics. Each character is formed by a 7-by-9 dot matrix.

These displays use the 463X series keyboards. The displays can be equipped with an Audible Alarm, Keyboard Numeric Lock, Security Keylock, Selector Light Pen, and Operator Identification Card Reader.

3276/3278 DISPLAY: Four models are available, distinguished by the display capacity. Model 1 displays 12 lines of 80 characters each (960 characters total); Model 2 displays 24 lines of 80 characters each (1920 total); Model 3 displays 32 lines of 80 characters each (2560 total); Model 4 displays 43 lines of 80 characters (3440 total). The display characteristics of the 3276 Models 11, 12, 13, and 14 are identical to Models 1, 2, 3, and 4, respectively.

A character set of 94 characters, including upper and lower case alphabetics, numeric, and special symbols is displayed. When connected to a 3274, the 3278 can incorporate the APL/Test feature; an Extended Character Set Adapter and a 4626 or 4629 keyboard are required. A monocase switch provides 3277 compatibility. Each character for Models 1, 2, and 3 is formed by a 7x14 matrix; for the Model 4, a 7x11 matrix is used.

A Switch Control Unit permits a 3278 Display to be switched between two controllers.

These displays use the 462X series keyboards. The displays can be equipped with Audible Alarm, Keyboard Numeric Lock, Address Lock, Security Keylock, Selector Light Pen, and Magnetic Slot Reader.

463X KEYBOARDS: For use with 3277 displays and 3275 display stations. A total of 10 models are available with various combinations of layouts, data codes, and program function keys. A complete listing of the models and basic characteristics is contained in the price list. The typewriter keyboards carry the numerics in a row across the top of the keyboard just like an office typewriter. The data entry and data entry keypunch layout keyboards have the numerics arranged to permit one-hand numeric data entry. The keypunch layout duplicates the layout of an IBM keypunch, which has related special characters, such as left and right parenthesis, in unrelated positions on the keyboard. The other data entry layout groups related symbols in adjacent key positions. The operator console layout duplicates the layout of an IBM 1052 Model 7 operator console. Keyboards without program function keys have a total of 66 keys; the 78-key units include 12 program function keys, which are defined by the application program in the host computer. A Numeric Lock feature restricts keyboard operation to numeric input only (or duplication of numeric data); the keyboard automatically locks if anything other than numeric data, including minus and period, is keyed.

462X KEYBOARDS: For use with 3278 displays and 3276 controller/displays. A total of eight models are available with various combinations of layouts, data codes, and program function keys. A complete listing of models and basic characteristics is provided in the price list. The typewriter, data entry, and data entry keypunch layout arrangements are similar, but not identical, with the corresponding 463X layouts discussed above. All data entry layouts include a separate group of 10 program function keys. All typewriter models include 12 program function keys that are activated by an alternate shift mode. Two models include an additional 12 keys for a total of 24 program function keys; two models include text-oriented characters for use with APL/Test features. All models, except the latter four, have 75 keys. The four expanded typewriter layouts have 87 keys. A Numeric Lock feature is available.

3284 MAXTRIX PRINTER: A 40-cps printer used with 3271, 3272, and 3274 clusters and 3275 stand-alone display stations. There are three models, defined by buffer capacity: Model 1 — 480 character buffer; Model 2 — 1920 character buffer; and Model 3 — no buffer. The 3284-1 can be used with any model 3271 or 3272. The 3284-2 can only be used with the 1920 character models of the 3271 or 3272. The 3284-3 can be used only with the 3275 (any model). The printer can be specified for a print width of 120, 126, or 132 columns; each option requires a different width form. The Data Analysis—APL feature provides dual case EBCDIC, APL, and TN print train characters; this feature is available only with the 3284-2. Characters are formed within a 7x7 matrix (7x8 with the Data Analysis—APL feature); however, only four columns are used for any one symbol. All models print 10 characters per inch and 6 lines per inch.

3286 MATRIX PRINTER: A 66-cps printer used with 3271, 3272, and 3274 clusters. Two models are available; except for operational speed, their characteristics are similar to those of the 3284-1 and -2, including configurational limitations. The Data Analysis—APL feature is available for the 3286-2.

3287 MATRIX PRINTER: This printer can be used with the older (3271/3272) as well as newer (3274/3276) cluster controllers. Model 1 operates at 80 cps; Model 2 operates at 120 cps. Both models achieve these speeds through bidirectional printing. Both print 10 characters per inch, 6 or 8 lines per inch, and 132 positions across the page. Separate attachment features are required for connection to a 3271/3272 or 3274/

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3276 controller. When connected to a 3271 or 3272, the 3287 can incorporate the Data Analysis—APL feature for compatibility; dual case printing can be specified for all arrangements. When connected to a 3274, the 3287 can incorporate the APL/Text feature; an Extended Character Set Adapter and a 3274 Attachment feature are required. A special feature, Extended Print Buffer, is required for operation with 2560 and 3440 character displays. Character formation is 4 of 7x8, in a manner similar to the 3284 and 3286 printers. A Variable Width Forms Tractor option, as well as a Friction Feed Paper Handling option, is available. An audible alarm is a no-cost feature for signaling a forms-out condition; the alarm can also be sounded via a host computer command.

3288-2 BELT PRINTER: For use with 1920-character 3271, 3272, and 3274 clusters. The basic printer operates at 120 lines per minute with a 64-character set. With the optional Text Printer feature, the printer can also print the TN/T11 120-character set, which includes lower case alphabetics and provides for overprint and underscore capabilities, at an operational speed of 80 lines per minute. The 64- and 120-character set print belts are interchangeable. The 3288-2 prints 10 characters per inch and 6 lines per inch; print width is 132 positions. The Text Print option provides a 120 character set (TN/T11) and overprint capability.

3289 BELT PRINTER: A new higher-speed printer for use with 3274 and 3276 clusters. The printer is available in two models that differ only in print speed. Model 1 operates at 155 lines per minute with a 48-character set (both EBCDIC and ASCII are available); performance is reduced to 120 and 80 lines per minute, respectively, when a 64 or 94 character set is used via interchangeable belts. Model 2 operates at a peak speed of 400 lines per minute with a 48-character set, 300 lines per minute with a 64-character set, and 230 lines per minute with a 94-character set. When connected to a 3274, the 3289 can incorporate the Text Print feature; an Extended Character Set Adapter is required. Data is printed at 10 characters per inch and 6 or 8 lines per inch; 132 print positions are provided. An Audible Alarm feature (extra-cost) sounds when end of forms is reached or when activated by the host computer.

PRICING

All 3270 components, old and new, are available under the terms of IBM's Rental or Lease Agreement (LRA) or for purchase. LRA includes prime shift maintenance; a separate contract is available for purchased units. All new components are user installed via IBM's new Customer Set-Up policy.

LRA was announced for general application in April 1977. Basically, this arrangement provides for month-to-month rental or for a two-year lease with penalties for early termination (including model downgrades and feature termination). The lease can be extended indefinitely, one year at a time. The monthly charges for the lease arrangement are generally 15 percent lower than the month-to-month arrangement. The prime shift maintenance period is for any consecutive nine hours between 7 AM and 6 PM, Monday through Friday. (The maintenance charges given in the accompanying price list are for prime shift maintenance for purchased equipment and also serve as the basis for calculating extended charges for rented or leased equipment.) Extended period maintenance is available up to 24 hours per day, 7 days per week.

The termination charge for the lease arrangement is the lower of 5 months' charges or 25 (5 percent for the 3286 printer) percent of the remaining value of the lease. (For periods of fewer than 20 months, the 25 percent charge will be lower than the 5 month charge.)

All 3270 components are in maintenance category A, except the 3278 Control Unit Display Station and the 3288 Printer, which are in category D. These categories determine the schedule of extended maintenance charges. The two schedules differ for extended Monday through Friday maintenance, but are the same for Saturday and Sunday maintenance. The premium for extended maintenance is expressed in the table below as a percentage of the basic maintenance charges, which are listed in the accompanying price list.

	Consecutive Hours				
	9*	12	16	20	24
Monday-Friday—					
Category A	10%	14%	18%	22%	26%
Category D	10	12	14	16	18
Saturday	4	5	7	8	9
Sunday	5	7	9	11	12

*For periods outside the basic 7 AM to 6 PM prime shift.

The lease arrangement also guarantees a maximum rate of increases for extended leasing periods. The rate for all 3270 components is five percent per year beginning in the second year of the lease, except for the 3288 printer, which has an upper limit rate of zero percent.

All 3270 components are classed under rental category B (unlimited usage) and warranty category B (three months). Purchase credits can be accrued up to a maximum of 60 percent for the older 3270 components (3271/3272/3275/3277/3284/3286/3288) and up to 55 percent for the newer components (3274/3276/3278/3287/3289).

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Cluster Controllers				
	3271 Model 1; remote, 480 char., BSC	$155	$132	$ 4,735	$17.50
	3271 Model 2; remote, 1920 char., BSC	169	144	5,240	19.50
	3271 Model 11; remote, 480 char., SDLC	224	191	6,440	46.50
	3271 Model 12; remote, 1920 char., SDLC	239	203	6,945	49.50
1066	Data Analysis—APL; 3271-2, -12 only	42	36	630	1.50
1200	ASCII Transmission Code; 3271-11, -12 only	8	7	286	0.50
1550	Copy-Buffer Transfer; 3271-1, -2 only	NC	NC	NC	NC
3250	Device Adapter; accommodates four devices	51	43	779	0.50
7820	1200 bps Transmission Speed	NC	NC	NC	NC
7821	4800/7200 bps Transmission Speed; 3271-1, -2 only	4	3	145	0.50
	3272 Model 1; local, 480 char.	179	152	5,465	17.50
	3272 Model 2; local, 1920 char.	193	164	5,970	39.00
1066	Data Analysis—APL; 3272-2 only	42	36	630	2.50
3250	Device Adapter; accommodates four devices	51	43	779	0.50

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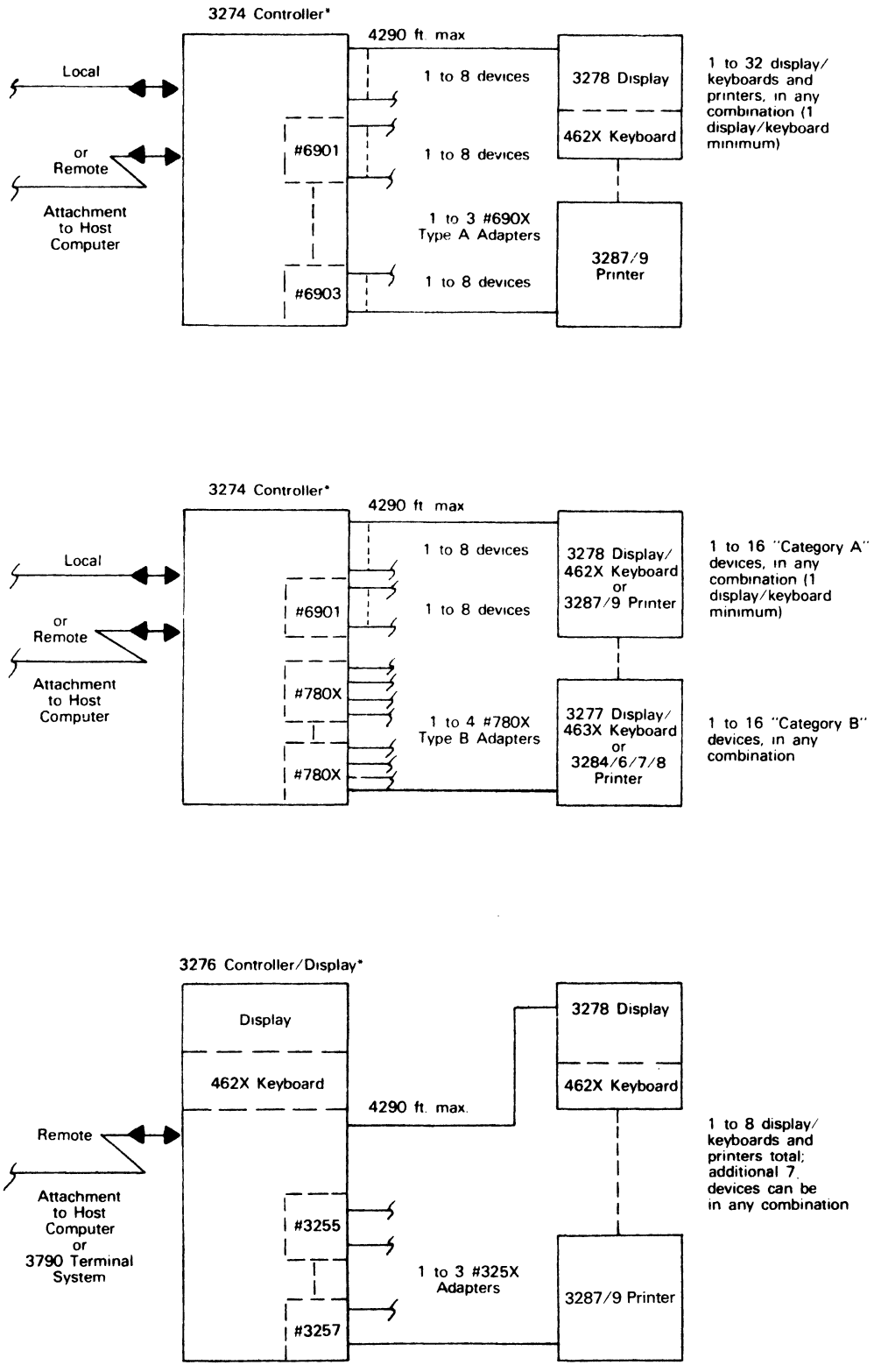

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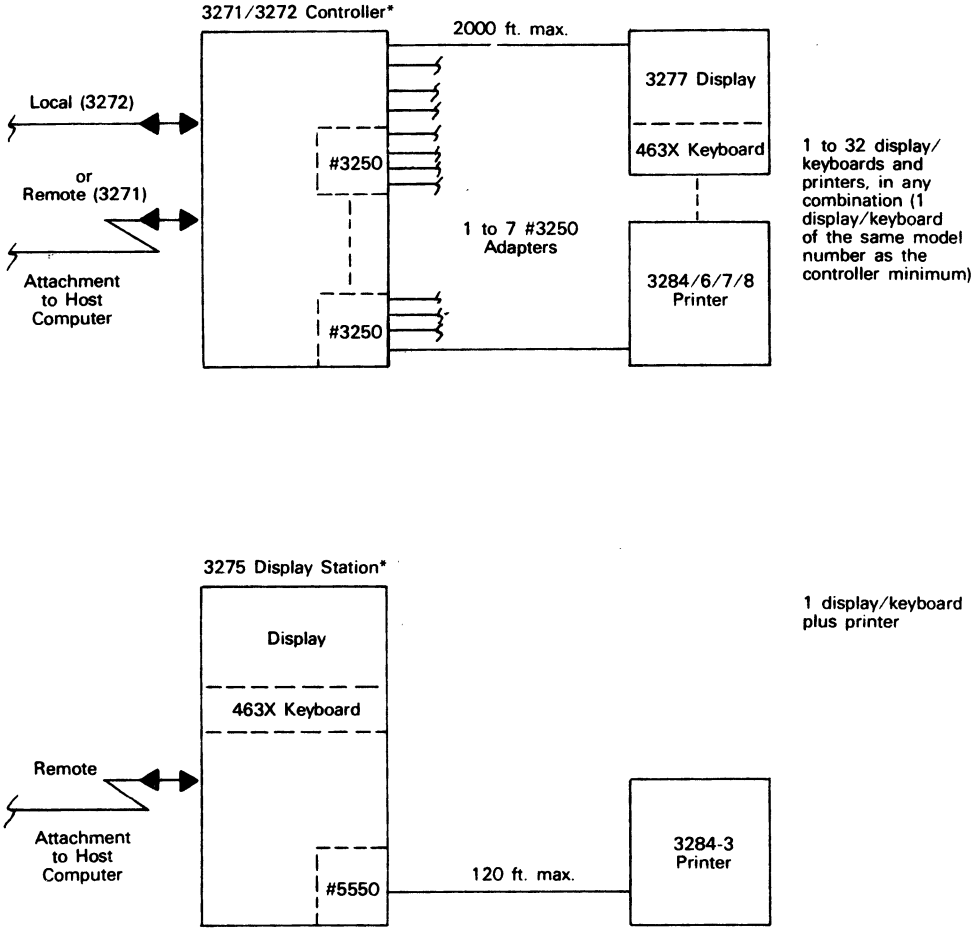

*See text for communications, display, keyboard, and printer models, characteristics, and options.

3277 Display — 480 or 1920 characters
3278 Display — 960, 1920, 2560, or 3440 characters.

3284 Printer — 40 char./sec.
3286 Printer — 66 char./sec.
3287 Printer — 80 or 160 char./sec.
3288 Printer — 120 lines/min.
3289 Printer — 155 or 400 lines/min.

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Cluster Controllers (Continued)				
	3274 Model 1A; local, SNA mode	490	417	18,770	83.00
	3274 Model 1B; local, 3272 mode	490	417	18,770	87.00
	3274 Model 1C; remote; requires 3701	344	293	13,190	70.00
	3274 Model 1D; local, 3272 mode	490	417	18,770	92.00
	Terminal Adapters—				
6901	Type A1; devices 9 through 16	32	27	1,215	2.50
6902	Type A2; devices 17 through 24	32	27	1,215	2.50
6903	Type A3; devices 25 through 32	32	27	1,215	2.50
7802	Type B1; devices 1 through 4	38	32	1,300	5.00
7803	Type B2; devices 5 through 8	32	27	1,100	3.00
7804	Type B3; devices 9 through 12	32	27	1,100	3.00
7805	Type B4; devices 13 through 16	32	27	1,100	3.00

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
3622	Extended Function Store—16K; Type C1; 3274-1A, -1C, -1D only; requires 1801	58	49	1,170	10.00
3625	Extended Function Store—16K; Type C3; 3274-1A, -1C, -1D only; requires 1801	58	49	1,170	10.00
3627	Extended Function Store—16K; Type D1; 3274-1A, -1C, -1D only; requires 1801	58	49	1,170	10.00
1801	Control Storage Expansion	31	26	1,055	5.50
3701	External Modem Interface; requires 6302 or 6303	12	10	400	4.00
6302	Common Communications Adapter; SDLC or BSC; up to 9600 bps with Type A only Terminal Adapters and up to 7200 bps with Type B or mix	12	10	450	2.50
6303	High Performance Communications Adapter; SDLC or BSC; 9600 bps with Type B Terminal Adapters or mix	35	30	1,200	10.50
8801	Watertight Power Connector; 3274-1A or -1B only	NC	NC	NC	NC
3680	Encrypt/Decrypt; 3274-1C only	61	52	2,115	2.50
5650	Dataphone Digital Service; point-to-point; 3274-1C only	24	20	840	2.00
5651	Dataphone Digital Service; multipoint; 3274-IC only	24	20	840	2.00
	Controller/Display Stations				
	3276 Model 1; 960 char. BSC	167	142	6,390	32.00
	3276 Model 2; 1920 char., BSC	172	146	6,570	33.00
	3276 Model 3; 2560 char., BSC	176	150	6,750	34.00
	3276 Model 4; 3440 char., BSC	181	154	6,930	34.50
	3276 Model 11; 960 char., SDLC	167	142	6,390	28.00
	3276 Model 12; 1920 char., SDLC	172	146	6,570	28.50
	3276 Model 13; 2560 char., SDLC	176	150	6,750	29.00
	3276 Model 14; 3440 char., SDLC	181	154	6,930	29.50
3255	Terminal Adapter No. 1; devices 3 and 4	16	14	630	1.50
3256	Terminal Adapter No. 2; devices 5 and 6	16	14	630	1.50
3257	Terminal Adapter No. 3; devices 7 and 8	16	14	630	1.50
3701	External Modem Interface; requires 6301 or 6302	12	10	400	4.00
3680	Encrypt/Decrypt; 3276-11, -12, -13, -14 only	49	42	1,710	2.50
	1200 bps Integrated Modems—				
5500	Non-switched; requires 6301	19	16	668	5.00
5501	Switched, Auto Answer; requires 6301	25	21	840	3.00
5502	Switched, Manual Answer; requires 6301	19	16	668	4.00
5507	Non-switched with Switched Backup; requires 6301	26	22	910	7.00
5508	Non-switched with Switched Backup, Auto Answer; requires 6301	29	25	1,015	4.00
5650	Dataphone Digital Service; point-to-point	24	20	840	2.00
5651	Dataphone Digital Service; multipoint	24	20	840	2.00
6301	Communications Feature with Clock	19	16	670	3.00
6302	Communications Feature without clock	12	10	450	2.50
6315	SDLC/BSC Switch; 3276-1, -2, -3, -4, only	21	18	810	3.00
	Stand-Alone Display Stations				
3275	3275 Model 2; 1920 char., BSC	136	116	4,735	21.00
	3275 Model 12; 1920 char., SDLC	186	158	6,440	53.00
1200	ASCII Transmission Code; 3275-12 only	8	7	286	0.50
3440	Dial; 600 or 1200 bps over dial network; 3275-2 only	8	7	328	1.00
5500	Integrated Modem; 1200 bps	16	14	535	3.00
5501	Integrated Modem; 1200 bps with Auto Answer; 3275-2 only	21	18	714	3.50
5550	Printer Adapter; one max.	NC	NC	NC	NC
7820	1200 bps Transmission Speed	NC	NC	NC	NC
7821	4800/7200 bps Transmission Speed; 3275-2 only	4	3	145	0.50
	Cluster Display Stations				
	3277 Model 1; 480 char.	71	60	2,470	9.00
	3277 Model 2; 1920 char.	103	88	3,200	19.50
1066	Data Analysis—APL; 3277-2 only	25	21	504	1.00
	3278 Model 1; 960 char.	58	49	2,205	11.50
	3278 Model 2; 1920 char.	61	52	2,340	12.00
	3278 Model 3; 2560 char.	71	60	2,700	13.50
	3278 Model 4; 3440 char.	74	63	2,835	14.50
1720	Switch Control Unit; 3278 only	5	4	180	NC

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		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Keyboards				
	For 3275/3277—				
4630	66-Key EBCDIC Typewriter	13	11	520	5.00**
4631	66-Key EBCDIC Data Entry	13	11	520	6.00**
4632	78-Key Operator Console	32	27	1,010	14.00**
4633	78-Key EBCDIC Typewriter	28	24	869	8.50**
4634	66-Key ASCII Typewriter	13	11	520	5.00**
4635	78-Key ASCII Typewriter	28	24	869	8.50**
4636	66-Key EBCDIC Data Entry; Keypunch layout	15	13	522	6.00**
4637	66-Key EBCDIC APL/Typewriter 3277-2 only; requires 1066	26	22	807	5.50
4638	78-Key EBCDIC APL/Typewriter; 3277-2 only; requires 1066	40	34	1,250	9.50
4639	78-Key Text; 3277-2 only; requires 1066	40	34	1,250	8.50
	For 3276/3278—				
4621	75-Key EBCDIC Typewriter	13	11	495	2.50
4622	75-Key EBCDIC Data Entry	13	11	495	3.50
4623	75-Key EBCDIC Data Entry; keypunch layout	13	11	495	3.50
4624	75-Key ASCII Typewriter	13	11	495	2.50
4626	87-Key EBCDIC Typewriter/Text; 3278 only	18	15	675	3.50
4627	87-Key EBCDIC Typewriter; 3278/3274 only	18	15	675	3.00
4628	87-Key ASCII Typewriter; 3278/3274 only	18	15	675	3.00
4629	87-Key EBCDIC Typewriter/Text; 3278 only	18	15	675	3.50
	3275/3277 Display Station Options				
1090	Audible Alarm	4	3	145	0.50
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC
6350	Selector Light Pen	24	20	728	1.50
4600	Operator Identification Card Reader	13	11	437	3.50
	3276/3278 Display Station Options				
1009	Address Keylock; 3276 only	60 SUC	60 SUC	60	NC
1090	Audible Alarm	2	2	90	NC
1120	APL/Text; 3278 only	9	8	360	0.50
3610	Extended Character Set Adapter; 3278 only	11	9	405	2.50
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC
6350	Selector Light Pen	15	13	585	0.50
4999	Magnetic Reader Control	11	9	405	4.50
	Magnetic Slot Reader (Part No. 41 23500)	—	—	275	—
	Printers				
	3284 Model 1; 40 cps, 480 char. buffer; 3272 only	141	120	4,255	45.00
	3284 Model 2; 40 cps, 1920 char. buffer; 3271-2, -12, 3272-2 only	150	128	4,775	45.00
	3284 Model 3; 40 cps, bufferless; 3275 only	122	104	4,070	24.00
1066	Data Analysis—APL; 3284-2 only	42	36	1,385	2.00
	3286 Model 1; 66-cps; 480 char. buffer; 3271; 3272 only	169	144	5,690	47.00
	3286 Model 2; 66 cps, 1920-char. buffer; 3271-2, -12, 3272-2 only	179	152	6,305	47.00
1066	Data Analysis—APL; 3286-2 only	42	36	1,385	2.00
	3287 Model 1; 80 cps	167	142	5,680	47.00
	3287 Model 2; 160 cps	203	173	6,055	58.00
1066	Data Analysis—APL; 3287 only	11	9	315	NC
1120	APL/Text	6	5	175	0.50
3610	Extended Character Set Adapter	15	13	455	4.00
3880	Extended Print Buffer	7	6	210	0.50
8330	3271/3272 Attachment	31	26	910	3.50
8331	3274/3276 Attachment	6	5	175	0.50
8700	Variable Width Forms Tractor	6	5	160	0.50
4110	Friction Feed Paper Handling	6	5	160	0.50
	3288 Model 2; 120 lpm; 3271-2, -12, 3272-2 only	384	327	10,625	91.00
7880	Text Print	45	38	1,405	1.00
	3289 Model 1; 155 lpm	368	313	8,900	105.00
	3289 Model 2; 400 lpm	556	473	13,250	179.00
1090	Audible Alarm	6	5	175	NC
1130	Text Print	7	6	210	NC
4450	Form Stand; all models except 3289	—	—	54	—

*Includes prime-shift maintenance.
**Monthly maintenance prices for 3277. For 3275, add $0.50 for all keyboards except 4623; add $1.00 for 4632 keyboard.■

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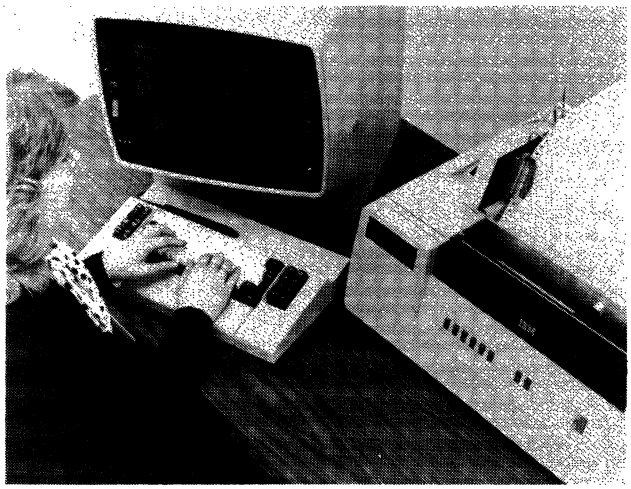

If you did not notice the different keyboard, you might mistake this IBM 3278-3 display for one of the company's older 3277 models—until you started counting display lines. In the display above, a total of 2560 characters, arranged in 32 rows of 80 characters each, can be displayed; upper and lower case alphabetics can be displayed. Other models can display 760, 1920, or 3440 characters. At the right is the new 3287 printer, a bidirectional matrix unit that can print up to 80 or 120 characters per second depending on model.

MANAGEMENT SUMMARY

IBM radically overhauled its display terminal offerings on May 18, 1977 with major announcements that included:

- Major price cuts on existing 3270 components (up to 29 percent); and
- New controllers, displays, and printers at even lower prices (up to 53 percent below existing prices) with more capability than existing components.
- Customer installation of new devices.

All 3270 components, old and new, are available on a two-year lease, in addition to month-to-month rental, under IBM's new Lease Rental Agreement (LRA). While this accounts for a portion of the drastic price reductions, the basic month-to-month charges are also substantially below previous IBM display terminal price levels.

The components announced include:

- 3274 controller for a remote or local cluster of up to 32 displays and printers.
- 3276 controller/display for a small remote cluster of 1 to 8 displays and printers.
- 3278 displays with display capacity of 960, 1920, 2560, and 3440 characters.

A family of controllers, displays, and printers for implementing remote or local display subsystems with 1 to 32 displays and printers.

BSC or SDLC protocols are supported at speeds up to 9600 bps. Display capacities of up to 3440 characters are available.

An eight display configuration with 1920 character displays built around the new 3276 controller/display costs about $775 per month or $660 per month (two-year lease), including maintenance.

A fully expanded 32 display remote cluster with 1920 character displays costs about $2,832 per month or $2,410 per month (two-year lease), including maintenance.

Display/keyboards can be replaced in the above configurations with the new 3287-1 80 cps, bidirectional matrix printer for a differential of about $99 per month or $84 per month (two-year lease).

The new 3270 components are compatible with the old ones and effectively replace them.

CHARACTERISTICS

VENDOR: International Business Machines Corp., Data Processing Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.

DATE OF ANNOUNCEMENT: 3271/3272/3277 (BSC)—1972; 3271/3277 (SDLC)—third quarter 1974; 3274/3276/3278—May 1977.

DATE OF FIRST DELIVERY: 3271/3272/3277 (BSC)—1972; 3271/3277 (SDLC)—third quarter 1974; 3274-1C—March 1978; 3276-2, 3278-2, 3287—December 1977; other 3274/3276/3278/3289—February 1978 through August 1978.

SERVICED BY: International Business Machines.

CONFIGURATION

The 3270 family of display/keyboard stations and printers can be configured as a local or remote cluster or as a stand-alone station. There are two generations of components with a limited degree of mixing permitted within the same subsystem; complete compatibility for communications and applications program support can be achieved with the new components, if desired. The accompanying table presents the overall configurational possibilities. Specific prerequisites are detailed in the discussions of individual components.

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IBM 3270 FAMILY COMPONENTS AND SUBSYSTEMS

Controller	Mode	Integrated Display	Maximum Devices	Components Supported		
				Displays	Keyboards	Printers
3271	Remote	—	32	3277	463X	3284/6/7/8
3272	Local	—	32	3277	463X	3284/6/7/8
3274	Remote/Local	—	32*	3277/8	463X/462X	3284/6/7/8/9
3275	Remote	1	2**	—	463X	3284-3
3276	Remote	1	8	3278	462X	3287

*Supports 32 new style (Category A) or 16 "new style" plus 16 "old style" (Category B) display/keyboards and printers. Category A devices include 3278 displays and 3287/9 printers. Category B devices include 3277 displays and 3284/6/7/8 printers. (The new 3287 printers appear in both categories.)

**One printer in addition to the integrated display.

- 3287 matrix printer that prints bidirectionally at up to 80 or 120 characters per second.

- 3289 belt printer that prints at up to 155 or 400 lines per minute.

The new 3278 units can display 94 symbols including upper and lower case alphabetics. They also include a Cursor Select key function that permits a light pen selection operation using the cursor. A Selector Light Pen is continued as an option. New, improved keyboards are also offered with the new displays.

While the new components are noteworthy themselves, the big news is the reduced cost of implementing display subsystems. With deliveries beginning in December 1977 for the 1920 character models of the 3276 controller, 3278 displays, and 3287 printers and extending through August 1978, the new components offer compatibility with existing arrangements and new capabilities for future expansion. The new components effectively replace existing components.

A comprehensive comparison of old and new prices is beyond the scope of this report. We will examine two configurations to give you the feel of the effect of the new announcements.

For an existing 32 display 3271/3277 remote cluster, the immediate price reduction for a month-to-month rental agreement is about 17 percent. By taking advantage of the two-year lease, you can bring the overall reduction to about 29 percent. Purchase prices have been reduced about 14 percent, but maintenance charges are a trifle higher.

To implement a 32 device remote cluster using the new 3274 controller and 3278 displays will cost about 44 percent less (month-to-month) or 53 percent less (two-year lease) compared to the old 3270 prices. Compared to the new prices for the older 3270 components, the savings are about 33 percent for either a month-to-month or two-year lease arrangement. Purchase prices of the new system are about 27 percent below the new purchase prices of the older 3270 components. Maintenance charges have been dropped about 30 percent.

The net results are that you get an immediate price reduction of 17 percent if you presently rent 3270 equip-

TRANSMISSION SPECIFICATIONS

All controllers capable of remote operation can be arranged for BSC or SDLC operation through model selection (3271, 3275, and 3276), alternate operation mode (3274), or switch selection (optional on 3276).

For BSC operation, the 3271-1/2 and 3275-1/2 controllers permit half-duplex data transmission at 1200, 2000, or 2400 bps over a half-duplex facility; over a full-duplex facility, a transmission speed of 4800 or 7200 bps is also supported. In addition, the 3275-1/2 can be configured to transmit at 600 or 1200 bps over a switched facility (public telephone network). An integrated 1200 bps modem for operation over non-switched or switched lines is optional for the 3275-1/2. The 3274-1C and 3276-1/2/3/4 controllers permit half-duplex data transmission at 2000, 2400, 4800, or 7200 bps over a half- or full-duplex facility. In addition, the 3276-1/2/3/4 can operate at 1200/600, 2400/1200, or 4800/2400 bps over a switched facility. A 1200 bps integrated modem is available for the 3276 controller.

For SDLC operation, the 3271-11/12 and 3275-11/12 permit half-duplex operation over a half-duplex facility at 1200, 2000, or 2400 bps; over a full-duplex facility, half- or full duplex data transmission at 1200, 2000, 2400, 4800, 7200, or 9600 bps is supported. A 1200 bps modem is available for the 3275-11/12. The 3274-1C supports half-duplex operation over a half- or full-duplex facility at 2000, 2400, 4800, 7200, or 9600 bps; the 3276-11/12/13/14 add 1200 bps operation. The SDLC models of the 3276 also support switched network operation at 1200/600, 2400/1200, or 4800/2400 bps. A 1200 bps integrated modem is available for the 3276.

Multipoint operation with a 3270 display subsystem acting as a tributary station is supported for all combinations of line discipline and modes.

HOST COMPUTER SOFTWARE SUPPORT

A 3270 subsystem is supported for local and remote operation by IBM System/360, System/370, and System/3 computer systems. Remote terminals are supported by BTAM, TCAM, VTAM, RPG Telecommunications, BSCA Multiline/Multipoint, and Communications Control Program depending on computer system and operating system. (See appropriate reports in Processors section, Volume 1). The new 3274 based local clusters are supported on System/370 configurations under 3272 mode or under VTAM. In general, all new models and configurations of the 3270 can be supported under previous 3270 programming. New features such as expanded display capacity, Cursor Select, etc. will require some adaptation of existing applications programming. The new printers support SNA format control characters or 3270 Data Stream compatibility format control characters.

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ment without your having to do anything. Further cost savings can be achieved by converting present 3270 equipment to a two-year lease or by acquiring the newer equipment.

The reduction in purchase prices for the older equipment may also change your mind about purchasing existing equipment that is on rental.

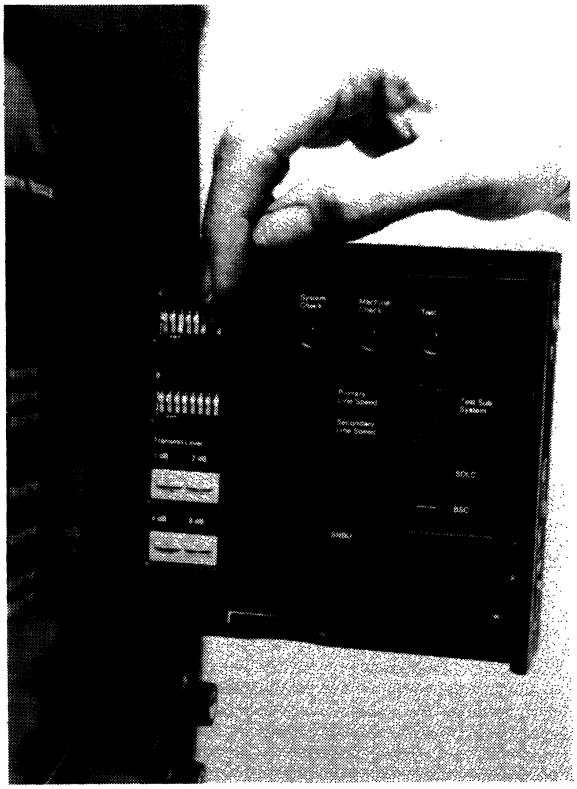
Determining your lowest cost alternative is complicated. For example, you may want to take advantage of the lower prices available with the two-year lease on existing 3270 components while waiting for delivery of new components. The penalty charges associated with early termination of the two-year agreement may change your mind. You would have to keep the older equipment on lease for about 20 months before the lower monthly charges would offset the penalty charges.

For small clusters of up to eight devices, the new 3276 controller/display must be considered. The same order of cost advantage can be achieved by replacing a 3271/3277 cluster with a 3276/3278 cluster that was observed in our first example. Specifically, the savings are 44 percent (month-to-month) and 52 percent (two-year lease) compared to the old 3270 prices; compared to new prices for the 3271/3277 components, the price advantage is about 33 percent. The small cluster 3276 based arrangement is about 19 percent less expensive per month than a small cluster configuration using the new 3274 controller.

In single station configurations, the 3276 controller/display costs more than an equivalent size 3275 BSC terminal and less than the SDLC version.

The price comparisons given do not take into account any benefit of increased display capacity or other enhancements available with the new equipment. Nor do they take into account costs if old and new components are mixed in the same subsystem, which is permitted with the 3274 cluster controller. Further complicating price comparisons are printers. The new 3287 80 and 120 cps matrix printers will probably be the most widely used with the new 3270 systems. While the cost for both models is less than the older prices for the 3286 66 cps printers, cost savings equivalent to the controller/display components are not available. Here, you trade lower prices for increased performance.

When IBM introduced the 5100 portable computer in September 1975, one novel feature (for IBM) was that you unpacked the box and "installed" the equipment yourself. IBM has expanded that concept to terminal equipment with the Customer Set-Up (CSU) plan. All of the new 3270 components (3274 controller, 3276 controller display, 3278 display, and 3278/3289 printers) are subject to this policy. It is not a customer option; you must install them yourself. To accomplish this, connections have been simplified, and internal test and check out features have been added. IBM expects the installation to be a "same-day-as-delivery" possibility, because



The features for self-installation are illustrated by the close-up of the 3276 controller display station above. The panel is located at the right side of the integrated display unit and allows the user to check out the system.

DEVICE CONTROL

The 3270 System operates under the control of the program stored at the remote computer. Under program control, the 3270 can execute any of four types of commands: read, write, control, and sense.

Read commands initiate transfer of the contents of a device buffer, modified fields within the buffer, buffer addresses or data of fields specified by the selector pen, or the single-byte Attention Identification (AID) code generated by a Program Function or Program Access key. The 3270 responds to two read commands, Read Buffer and Read Modified.

Read Buffer initiates transfer of the contents of the addressed device buffer from the initial or current cursor address.

Read Modified initiates one of three operator-initiated functions: Read Modified, Short Read, or Test Request.

Read. Read Modified initiates the transfer of all fields modified by the keyboard within the device buffer. The fields are transferred in sequence beginning with the first modified field; all nulls are suppressed. However, when completion of a key-modified field is signaled by a selector pen operation, a resulting Read Modified operation will transfer only the address of the modified field. Short Read initiates transfer of the single byte AID Code generated by a Program Attention key. Test Request Read performs the same operation as Read Modified; however, a hardware-generated heading precedes the data. Nulls are suppressed as in Read Modified. Only the special heading is transferred if data has not been keyed.

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rental or lease charges start the working day after delivery, without having any IBM personnel look at the equipment. If there is a problem with the equipment, charges do not start until the equipment is fixed. Movement of equipment is also permitted under this agreement, and if you discontinue equipment, then you pack it up and put it out on your delivery dock. The same test procedures supplemented by additional diagnostic facilities permit the user to diagnose problems in operational use.

USER REACTION

In Datapro's 1977 survey of alphanumeric display terminal users, 280 users reported on their experience with a total of 8072 IBM 3270 display units, including more than 700 of the 3275 stand-alone units. Their ratings, which follow, indicate a high degree of satisfaction with all aspects of the 3270 and represent slight improvements compared to the results of our 1976 survey.

	Excellent	Good	Fair	Poor	WA*
Overall performance	164	113	3	0	3.6
Ease of operation	145	130	5	0	3.5
Display clarity	121	133	25	1	3.3
Keyboard feel & usability	141	136	3	0	3.5
Hardware reliability	156	117	6	1	3.5
Maintenance service	130	113	31	5	3.3
Software & technical support	89	133	49	4	3.1

*Weighted Average on a scale of 4.0 for Excellent.

The key advantages of the IBM 3270 system, as unanimously cited by the responding users, were reliability and strong vendor support. Flexibility and applicability were also cited as advantages, but to a much lesser degree. Excessive cost was the major complaint of most. Other disadvantages cited by some users were inflexibility, performance limitations, and lack of programmability. A few users also commented on the large physical size of the display units, lack of features such as highlighting, and screen glare as disadvantages. One user complained bitterly about the IBM printers. "They just seem to fall apart." Despite those complaints, many of which are undoubtedly valid, user satisfaction with the IBM 3270 and the associated IBM service and support well outranked that of the independent display terminal vendors as a group.

About 34 percent of the responding 3270 users said they were operating with stand-alone units, while 48 percent said they had clustered units. About 66 percent of the respondents were using formatted data entry procedures, while 31 percent reported free-form data entry. Extensive editing was being performed by 60 percent of the respondents, while little or no editing was reported by 19 percent. □

Write commands condition the display or printer to receive a computer message. Two write commands—Write and Erase/Write—load, format, and selectively erase device buffer data, and can also initiate device operations such as starting the printer, resetting the keyboard, and sounding the audible alarm. Both commands are the same except that Erase/Write erases the entire contents of the device buffer before fresh data is written (beginning at the initial buffer address) and Write modifies existing buffer data.

Control commands initiate control unit and/or device operations. There are four control commands: Copy, Select, Erase All Unprotected, and No Operation. Copy, executed by a remote control unit only, transfers buffer data from one device to another. Select, executed by a 3272 Control Unit (or 3274 in 3277 mode) only, transfers buffer data from the selected device to the controller. Erase All Unprotected initializes the addressed device, erasing all unprotected buffer locations and repositioning the cursor to the initial position of the first unprotected field. No Operation, executed by the 3272 Control Unit only, performs no functional operation in the 3272, but can retrieve pending status.

The Sense command, executed by the 3272 Control Unit only, initiates the transfer of a single sense byte from the 3272. The sense byte defines error conditions that have occurred within the subsystem.

A local 3274 cluster operating under VTAM looks like a remote control unit.

Program control by data field provides a flexible formatting capability. A field, identified by an attribute control code (nondisplayed) in the initial character position, can possess any one of several characteristics. The attribute control code can specify a protected or unprotected field (for fixed format operation), beam intensity of brightness (off, normal, or bright), alphanumeric or numeric (automatic shift) input, auto lock or skip, tab stop, or light pen selection.

The Program Tab feature automatically writes successive data fields into successive unprotected data fields defined by a fixed format.

Character Addressing permits a message to be written beginning at any screen location. Addressing can be interspersed with data throughout a message received from the computer. Character Addressing also permits the selective modification of attribute control codes.

Operator controls are provided for cursor control, editing, and program functions.

Cursor controls position the cursor up, down, left, or right, step-by-step or repetitively if the key is held depressed. The cursor can also be backspaced one character position, moved to the beginning of the next line or beginning of the next unprotected data field, tab to the beginning of the next unprotected data field, and backtab to the beginning of the previous unprotected data field.

Edit controls permit data to be inserted in or deleted from text, character by character. Following data is automatically expanded or contracted.

Program Function keys are used to initiate program functions or identify data that can be transmitted with an accompanying program function code.

The 3276 and 3278 have two added controls: Cursor Home key and Cursor Select key. The Cursor Home key returns the cursor to the first non-protected character position. The Cursor Select key causes a selection operation similar to a light pen operation; a light pen (Selector Pen) is optional in addition to this control. A Print key is included on a 3278 display/keyboard when attached to a 3274 Control Unit; this key causes the displayed data to be transferred to a printer for immediate printing without requiring a host computer command; normal print commands can also be executed.

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The standard cursor is an underscore. On a 3278 display connected to a 3274 controller, the cursor can be standard or reverse video underscore, blinking or non-blinking as selected by the operator.

Readers capable of accepting a credit-card size plastic with up to 40 characters encoded on a magnetic tape stripe can be connected to all models of displays. The reader for the new displays (3276 and 3278) will accept previously coded cards if the normal end of form control character (not the Hex C optional character).

COMPONENTS

3271 CONTROL UNIT: Four models provide control of up to 32 display/keyboards and printers that operate as a remote terminal cluster. The four models provide support for all combinations of BSC/SDLC operation and 480/1920 character displays, as follows:

Model 1—480 character displays only; BSC transmission.
Model 2—480 and 1920 character displays; BSC transmission.
Model 11—480 character displays only; SDLC transmission.
Model 12—480 and 1920 character displays; SDLC transmission.

The first device connected to a 3271-2 or -11 controller must be a 1920 character 3277 display. Model 2 displays and 3284-2 printers (1920 characters) cannot be connected to a Model 1 or 11 controller. The 3288-2 can be connected to a 3271-2 and -12 controller only. Within these restrictions any combination of up to 32 displays and 3284/3286/3287/3288 printers is permitted. Up to four devices can be connected to the basic controller. A Device Adapter is required for each additional group of four devices.

The 3271-11 and -12 will support ASCII transmission code in place of EBCDIC with an extra cost option; this is a no-cost option for the 3271-1 and -2. The Data Analysis—APL feature permits handling an expanded character set of 120 characters on the 3271-2 and -12; this feature does not provide dual case display, but the capability to store and transfer the expanded set. The Copy Buffer Transfer feature permits direct transfer of data from the buffer of one device to the buffer of another device (under host computer command) attached to a 3271-1 or -2 controller; the 3271-11 and -12 include this capability as standard. The 3271-1 and -2 require an extra-cost option for transmission speeds above 2400 bps; the 3271-11 and -12 controllers do not.

3272 CONTROL UNIT: Two models provide control of up to 32 display/keyboards and printers that operate as a local display cluster. Model 1 supports 480 character displays; Model 2 supports 480 or 1920 character displays.

The first device installed on a 3272-2 must be a 1920 character display. Model 2 displays and 3286-2 printers (1920 characters) cannot be connected to a Model 1 controller. The 3288-2 printer can be connected to a 3272-2 controller only. Within these restrictions any combination of up to 32 displays and 3284/3286/3287/3288 printers is permitted. Up to four devices can be connected to the basic controller. A Device Adapter is required for each additional group of four devices.

The Data Analysis—APL feature permits handling an expanded character set of 120 characters; this feature does not provide dual case display, but the capability to store and transfer the expanded set.

The 3272 connects to the byte multiplexor, block multiplexor, or selector channel of an IBM System/360 Model 25 through 195 or System/370 Model 115 through 195. Data is transferred at up to 650,000 characters per second between the computer system and the 3272 local cluster.

3274 CONTROL UNIT: Three models provide control of a local or remote cluster of up to 32 display/keyboards and printers. Model 1A supports a local cluster operating in SNA mode under VTAM. Model 1B supports a local cluster operating in 3272 compatible mode. Model 1C supports a remote cluster operating under BSC or SDLC protocol.

The 3274-1C is conditioned for BSC or SDLC operation by loading a different program into the controller via a built-in diskette drive.

All three models support mixing of the older 3277/3284/3286/3288 (Category B) devices on the same controller with the new 3278/3287/3289 (Category A) devices. The basic controllers each accommodate up to eight of the newer components. One Type A Terminal Adapter is required for each additional group of eight of the new devices. Alternatively, up to four Type B Terminal Adapters, each accommodating up to four 3277/3284/3286/3287/3288 devices, can be installed. If any Type B Adapters are installed, only one Type A Adapter can be installed. Thus up to 16 old style and 16 new style devices can be accommodated on the same controller. A minimum of one 3278 display and keyboard is required. The new 3287 printer can be attached to either Type A or Type B adapters.

Special features are required to install Type B Terminal Adapters in the 3274-1A and 1C (Extended Function Store-16K and Control Storage Expansion); these features are not required to install Type B Adapters in the 3274-1B.

The 3274-1C requires the External Modem Interface Feature and either the Common Communications Adapter or the High Performance Communications Adapter. The latter is required if any Type B Terminal Adapters are installed *and* a transmission speed of 9600 bps is used; otherwise the CCA is adequate for all transmission combinations.

3275 DISPLAY STATION: A stand-alone unit available in four models corresponding to protocol and display capacity:

→Model 1—480 character display; BSC transmission.
Model 2—1920 character display; BSC transmission.
→Model 11—480 character display; SDLC transmission.
Model 12—1920 character display; SDLC transmission.

With an extra-cost feature, the 3275-11 or -12 will support ASCII in place of EBCDIC; this is a no-cost option for the 3275-1 -2. The 3275-1 and -2 requires an extra cost option for transmission speeds over 2400 bps; this is a standard feature with the 3275-11 and -12. A 1200 bps modem for operation over non-switched facilities is available for all 3275 models. The 3275-1 and -2 can be equipped with an extra-cost Dial feature for operation over the public telephone network; an integrated 1200 bps modem with Auto-Answer is also optional.

One 3284-3 bufferless printer can be attached to any model 3275.

The 3275 uses the 463X series keyboards.

3276 CONTROL UNIT DISPLAY STATION: A controller for small remote clusters; it also includes an integrated display. The 3276 can accommodate up to seven additional displays and printers.

A total of eight models provide combinations of four display capacities and BSC or SDLC operation.

Model 1—960 character display; BSC transmission.
Model 2—1920 character display; BSC transmission.

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Model 3—2560 character display; BSC transmission.
Model 4—3440 character display; BSC transmission.
Model 11—960 character display; SDLC transmission.
Model 12—1920 character display; SDLC transmission.
Model 13—2560 character display; SDLC transmission.
Model 14—3440 character display; SDLC transmission.

The BSC models can accommodate any mix of up to seven additional 3278 displays and 3287 printers. The added 3278 display cannot have a larger display capacity than the basic 3276 integrated display. However, the SDLC/BSC Switch feature permits alternate protocol operation and also permits intermixing any size displays on any "BSC" 3276 model (-1/2/3/4). The SDLC models (-11/12/13/14) can accommodate any display size mix.

The basic 3276 controller (any model) can accommodate two devices. A Terminal Adapter is required for each additional two devices.

The 3276 requires an External Modem Interface or an Integrated Modem (1200 bps). Three integrated modem features are available for operation over a non-switched facility with or without switched backup and for operation over a switched facility with manual answer. Either external or internal modem operation requires a Communications Feature.

3275/3277 DISPLAY: Via a 14-inch (diagonal measurement) CRT. Display screen arrangement is dependent on the model display station. Model 1 display screens are arranged in 12 lines of 40 characters each, totaling 480 character positions. Model 2 display screens are arranged in 24 lines of 80 characters each, totaling 1920 character positions.

A character set of 64 ASCII characters, including upper-case alphabetics, numerics, and special symbols, is displayed in green against a dark background. Each character is formed by a 7-by-9 dot matrix.

These displays use the 463X series keyboards. The displays can be equipped with an Audible Alarm, Security Keylock, Selector Light Pen, and Operator Identification Card Reader.

3276/3278 DISPLAY: Four models are available, distinguished by the display capacity. Model 1 displays 12 lines of 80 characters each (960 characters total); Model 2 displays 24 lines of 80 characters each (1920 total); Model 3 displays 32 lines of 80 characters each (2560 total); Model 4 displays 43 lines of 80 characters (3440 total). The display characteristics of the 3276 Models 11, 12, 13, and 14 are identical to Models 1, 2, 3, and 4, respectively.

A character set of 94 characters, including upper and lower case alphabetics, numeric, and special symbols is displayed. A monocase switch provides 3277 compatibility. Each character for Models 1, 2, and 3 is formed by a 7x14 matrix; for the Model 4, a 7x9 matrix is used.

A Switch Control Unit permits a 3278 Display to be switched between two controllers.

These displays use the 462X series keyboards. The displays can be equipped with Audible Alarm, Security Keylock, Selector Light Pen, and Magnetic Slot Reader.

463X KEYBOARDS: For use with 3277 displays and 3275 display stations. A total of 10 models are available with various combinations of layouts, data codes, and program function keys. A complete listing of the models and basic characteristics is contained in the price list. The typewriter keyboards carry the numerics in a row across the top of the keyboard just like an office typewriter. The data entry and data entry keypunch layout keyboards have the numerics arranged to permit one-hand numeric data entry. The keypunch layout duplicates the layout of an IBM keypunch, which has related special characters, such as left and right parenthesis, in unrelated positions on the keyboard. The other data entry layout groups related symbols in adjacent key positions. The operator console layout duplicates the layout of an IBM 1052 Model 7 operator console. Keyboards without program function keys have a total of 66 keys; the 78-key units include 12 program function keys, which are defined by the application program in the host computer. A Numeric Lock feature restricts keyboard operation to numeric input only (or duplication of numeric data); the keyboard automatically locks if anything other than numeric data, including minus and period, is keyed.

462X KEYBOARDS: For use with 3278 displays and 3276 controller/displays. A total of six models are available with various combinations of layouts, data codes, and program function keys. A complete listing of models and basic characteristics is provided in the price list. The typewriter, data entry, and data entry keypunch layout arrangements are similar, but not identical, with the corresponding 463X layouts discussed above. All data entry layouts include a separate group of 10 program function keys. All typewriter models include 12 program function keys that are activated by an alternate shift mode; two models include an additional 12 keys for a total of 24 program function keys. All models, except the latter two, have 75 keys. The two expanded typewriter layouts have 87 keys. A Numeric Lock feature is available.

3284 MATRIX PRINTER: A 40 cps printer used with remote 3271/3277 clusters, local 3272/3277 clusters, and 3275 stand-alone display stations. There are three models defined by buffer capacity: Model 1 — 480 character buffer; Model 2 — 1920 character buffer; and Model 3 — no buffer. The 3284-1 can be used with any model 3271 or 3272. The 3284-2 can only be used with the 1920 character models of the 3271 or 3272. The 3284-3 can be used only with the 3275 (any model). The printer can be specified for a print width of 120, 126, or 132 columns; each option requires a different width form. The Data Analysis—APL feature provides dual case EBCDIC, APL, and TN print train characters; this feature is available only with the 3284-2. Characters are formed within a 7x7 matrix (7x8 with the Data Analysis—APL feature); however, only four columns are used for any one symbol. All models print 10 characters per inch and 6 lines per inch.

3286 MATRIX PRINTER: A 66 cps printer used with remote 3271/3277 clusters and local 3272/3277 clusters. Except for operational speed, the characteristics of the 3286 are similar to the 3284-1 and -2, including configurational limitations. The Data Analysis—APL feature is also available for the 3286-2.

3287 MATRIX PRINTER: A new printer that can be used with the older (3271/3272) as well as newer (3274/3276) cluster controllers. Model 1 operates at 80 cps; Model 2 operates at 120 cps. Both models achieve these speeds through bidirectional printing. Both print 10 characters per inch, 6 or 8 lines per inch, and 132 positions across the page. Separate attachment features are required for connection to a 3271/3272 or 3274/3276 controller. When connected to a 3271 or 3272, the 3287 can incorporate the Data Analysis—APL feature for compatibility; dual case printing can be specified for all arrangements. A special feature, Extended Print Buffer, is required for operation with 2560 and 3440 character displays. Character formation is 4 of 7x8, in a manner similar to the 3284 and 3286 printers. A Variable Width Forms Tractor option is available. An audible alarm is a no-cost feature for signaling a forms-out condition; the alarm can also be sounded via a host computer command.

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3288-2 BELT PRINTER: For use with 1920 character 3271 and 3272 clusters. The printer operates at 120 lines per minute with a 64 character set and at 80 lines per minute with a 120 character set that includes lower case alphabetics. The 3288-2 prints 10 characters per inch and 6 lines per inch; print width is 132 positions. The Text Print option provides a 120 character set (TN/T11) and overprint capability.

3289 BELT PRINTER: A new higher speed printer for use with 3274 based local and remote clusters. The printer is available in two models that differ only in print speed. Model 1 operates at 155 lines per minute with a 48 character set; performance is reduced to 120 and 80 lines per minute, respectively, when a 64 or 94 character set is used via interchangeable belts. Model 2 operates at a peak speed of 400 lines per minute with a 48 character set, 300 lines per minute with a 64 character set, and 230 lines per minute with a 94 character set. Data is printed at 10 characters per inch and 6 or 8 lines per inch; 132 print positions are provided. An Audible Alarm feature (extra-cost) sounds when end of forms is reached or when activated by the host computer.

PRICING

All 3270 components, old and new, are available under the terms of IBM's Rental or Lease Agreement (LRA) or for purchase. LRA includes prime shift maintenance; a separate contract is available for purchased units. All new components are user installed via IBM's new Customer Set-Up policy.

LRA was announced for general application in April 1977. Basically, this arrangement provides for month-to-month rental or for a two-year lease with penalties for early termination (including model downgrades and feature termination). The lease can be extended indefinitely, one year at a time. The monthly charges for the lease arrangement are generally 15 percent lower than the month-to-month arrangement. The prime shift maintenance period is for any consecutive nine hours between 7 AM and 6 PM, Monday through Friday. (The maintenance charges given in the accompanying price list are for prime shift maintenance for purchased equipment and also serve as the basis for calculating extended charges for rented or leased equipment.) Extended period maintenance is available up to 24 hours per day, 7 days per week.

The termination charge for the lease arrangement is the lower of 5 months charges or 25 percent of the remaining value of the lease. (For periods of fewer than 20 months, the 25 percent charge will be lower than the 5 month charge.)

All 3270 components are in maintenance category A, except the 3278 Control Unit Display Station and the 3288 Printer, which are in category D. These categories determine the schedule of extended maintenance charges. The two schedules differ for extended Monday through Friday maintenance, but are the same for Saturday and Sunday maintenance. The premium for extended maintenance is expressed in the table below as a percentage of the basic maintenance charges, which are listed in the accompanying price list.

	Consecutive Hours				
	9*	12	16	20	24
Monday-Friday—					
Category A	10%	14%	18%	22%	26%
Category D	10	12	14	16	18
Saturday	4	5	7	8	9
Sunday	5	7	9	11	12

*For periods outside the basic 7 AM to 6 PM prime shift.

The lease arrangement also guarantees a maximum rate of increases for extended leasing periods. The rate for all 3270 components is five percent per year beginning in the second year of the lease.

All 3270 components are classed under rental category B (unlimited usage) and warranty category B (three months). Purchase credits can be accrued up to a maximum of 60 percent for the older 3270 components (3271/3272/3275/3277/3284/3286/3288) and up to 55 percent for the newer components (3274/3276/3278/3287/3289).

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Cluster Controllers				
	3271 Model 1; remote, 480 char., BSC	$155	$132	$ 4,735	16.00
	3271 Model 2; remote, 1920 char., BSC	169	144	5,240	18.00
	3271 Model 11; remote, 480 char., SDLC	224	191	6,440	42.50
	3271 Model 12; remote, 1920 char., SDLC	239	203	6,945	45.00
1066	Data Analysis—APL; 3271-2, -12 only	42	36	630	2.50
1200	ASCII Transmission Code; 3271-11, -12 only	8	7	286	0.50
1550	Copy-Buffer Transfer; 3271-1, -2 only	NC	NC	NC	NC
3250	Device Adapter; accommodates four devices	51	43	779	0.50
7820	1200 bps Transmission Speed	NC	NC	NC	NC
7821	4800/7200 bps Transmission Speed; 3271-1, -2 only	4	3	145	0.50
	3272 Model 1; local, 480 char	71	60	2,470	16.000
	3272 Model 2; local, 1920 char.	103	88	3,200	18.000
1066	Data Analysis—APL; 3272-2 only	42	36	630	2.50
3250	Device Adapter; accommodates four devices	51	43	779	0.50
	3274 Model 1A; local, SNA mode	490	417	18,770	83.00
	3274 Model 1B; local, 3272 mode	490	417	18,770	87.00
	3274 Model 1C; remote; requires 3701	344	293	13,190	70.00

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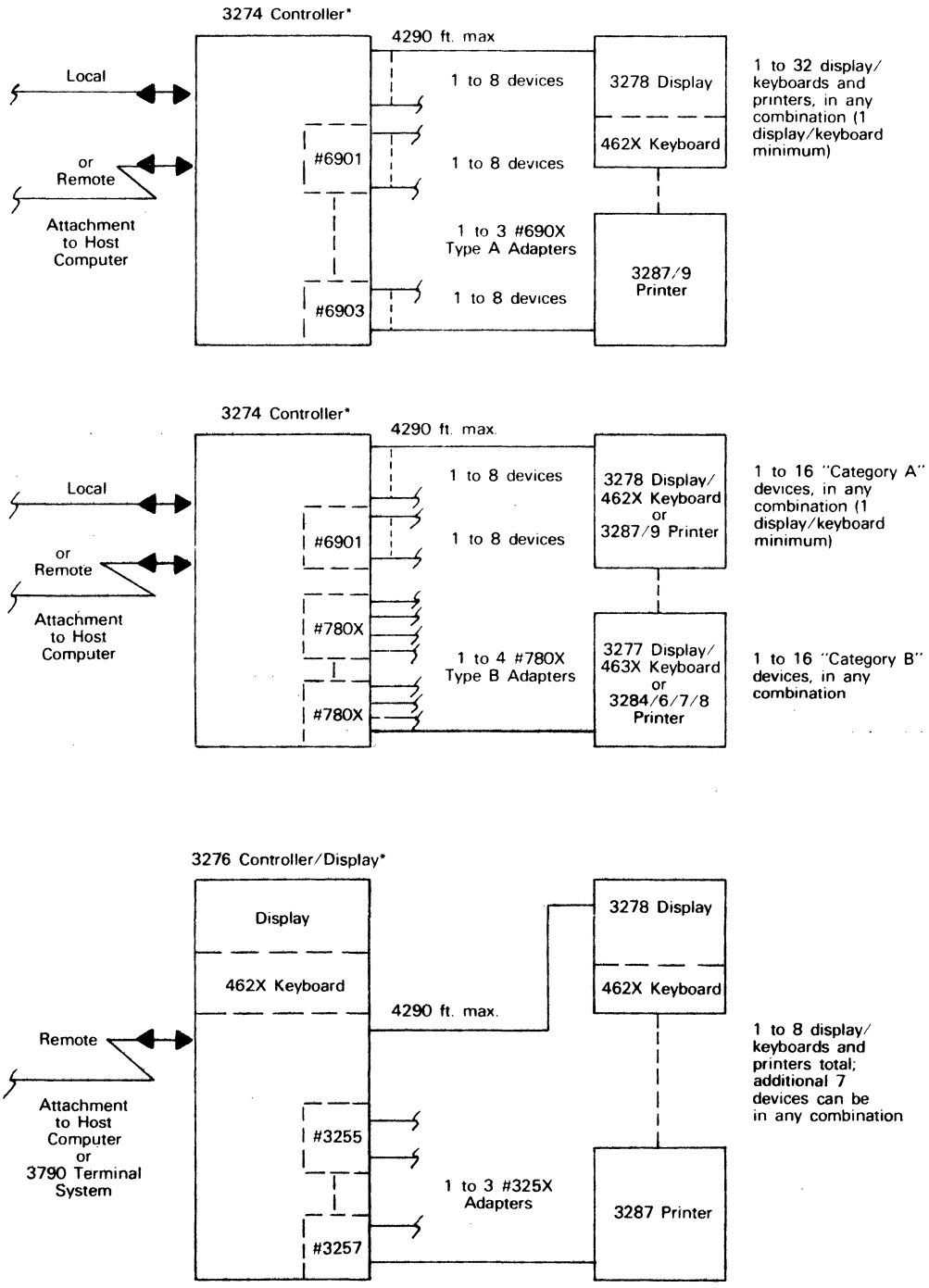

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LRA was announced for general application in April 1977. Basically, this arrangement provides for month-to-month rental or for a two-year lease with penalties for early termination (including model downgrades and feature termination). The lease can be extended indefinitely, one year at a time. The monthly charges for the lease arrangement are generally 15 percent lower than the month-to-month arrangement. The prime shift maintenance period is for any consecutive nine hours between 7 AM and 6 PM, Monday through Friday. (The maintenance charges given in the accompanying price list are for prime shift maintenance for purchased equipment and also serve as the basis for calculating extended charges for rented or leased equipment.) Extended period maintenance is available up to 24 hours per day, 7 days per week.

The termination charge for the lease arrangement is the lower of 5 months charges or 25 percent of the remaining value of the lease. (For periods of fewer than 20 months, the 25 percent charge will be lower than the 5 month charge.)

All 3270 components are in maintenance category A, except the 3278 Control Unit Display Station and the 3288 Printer, which are in category D. These categories determine the schedule of extended maintenance charges. The two schedules differ for extended Monday through Friday maintenance, but are the same for Saturday and Sunday maintenance. The premium for extended maintenance is expressed in the table below as a percentage of the basic maintenance charges, which are listed in the accompanying price list.

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Sunday	5	7	9	11	12

*For periods outside the basic 7 AM to 6 PM prime shift.

The lease arrangement also guarantees a maximum rate of increases for extended leasing periods. The rate for all 3270 components is five percent per year beginning in the second year of the lease.

All 3270 components are classed under rental category B (unlimited usage) and warranty category B (three months). Purchase credits can be accrued up to a maximum of 60 percent for the older 3270 components (3271/3272/3275/3277/3284/3286/3288) and up to 55 percent for the newer components (3274/3276/3278/3287/3289).

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Cluster Controllers				
	3271 Model 1; remote, 480 char., BSC	$155	$132	$ 4,735	16.00
	3271 Model 2; remote, 1920 char., BSC	169	144	5,240	18.00
	3271 Model 11; remote, 480 char., SDLC	224	191	6,440	42.50
	3271 Model 12; remote, 1920 char., SDLC	239	203	6,945	45.00
1066	Data Analysis—APL; 3271-2, -12 only	42	36	630	2.50
1200	ASCII Transmission Code; 3271-11, -12 only	8	7	286	0.50
1550	Copy-Buffer Transfer; 3271-1, -2 only	NC	NC	NC	NC
3250	Device Adapter; accommodates four devices	51	43	779	0.50
7820	1200 bps Transmission Speed	NC	NC	NC	NC
7821	4800/7200 bps Transmission Speed; 3271-1, -2 only	4	3	145	0.50
	3272 Model 1; local, 480 char.				
	3272 Model 2; local, 1920 char.				
1066	Data Analysis—APL; 3272-2 only	42	36	630	2.50
3250	Device Adapter; accommodates four devices	51	43	779	0.50
	3274 Model 1A; local, SNA mode	490	417	18,770	83.00
	3274 Model 1B; local, 3272 mode	490	417	18,770	87.00
	3274 Model 1C; remote; requires 3701	344	293	13,190	70.00

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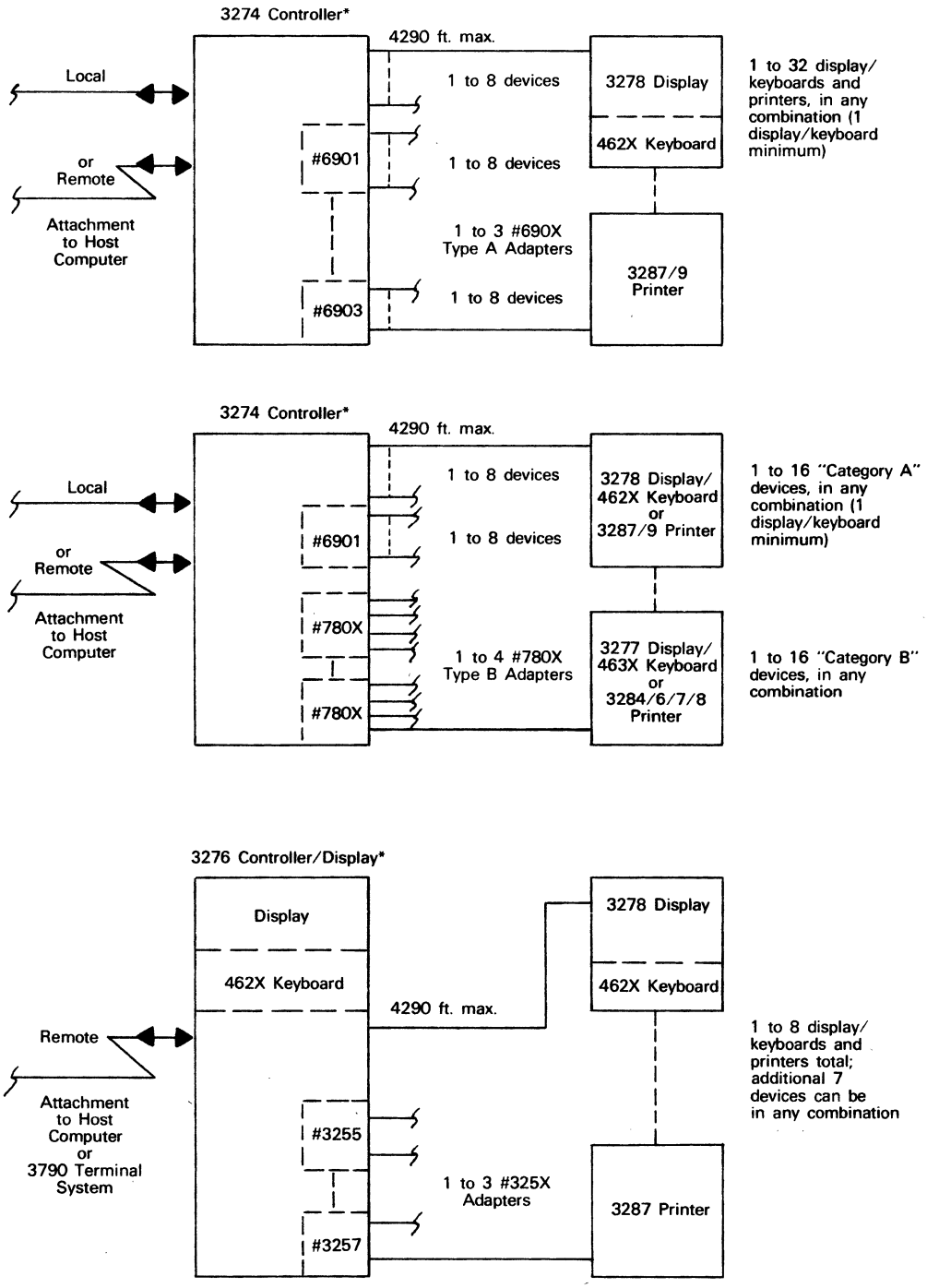
IBM 3270 Information Display System



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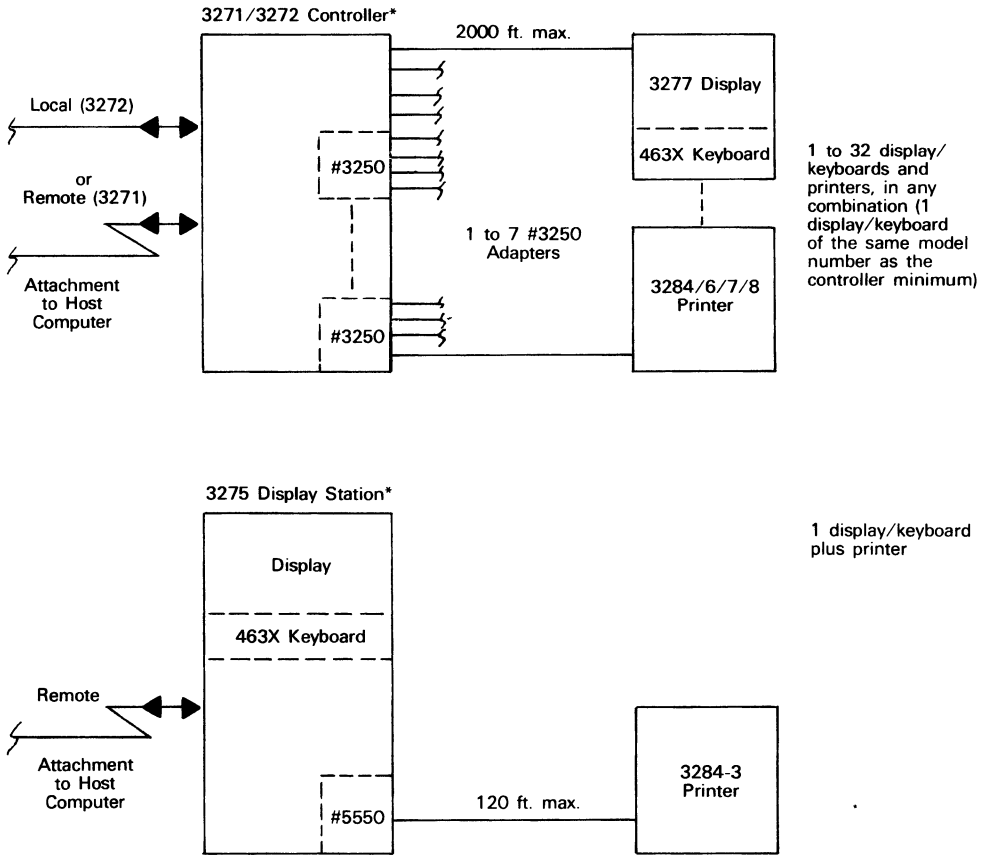
IBM 3270 Information Display System



*See text for communications, display, keyboard, and printer models, characteristics, and options.

3277 Display	—	480 or 1920 characters
3278 Display	—	960, 1920, 2560, or 3440 characters.
3284 Printer	—	40 char./sec.
3286 Printer	—	66 char./sec.
3287 Printer	—	80 or 160 char./sec.
3288 Printer	—	120 lines/min.
3289 Printer	—	155 or 400 lines/min.

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IBM 3270 Information Display System

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
	Terminal Adapters—				
6901	Type A1; devices 9 through 16	32	27	1,215	2.50
6902	Type A2; devices 17 through 24	32	27	1,215	2.50
6903	Type A3; devices 25 through 32	32	27	1,215	2.50
7802	Type B1; devices 1 through 4	38	32	1,300	5.00
7803	Type B2; devices 5 through 8	32	27	1,100	3.00
7804	Type B3; devices 9 through 12	32	27	1,100	3.00
7805	Type B4; devices 13 through 16	32	27	1,100	3.00
3622	Extended Function Store—16K; 3274-1A, -1C only; requires 1801	88	75	1,800	10.00
1801	Control Storage Expansion	31	26	1,055	5.50
3701	External Modem Interface; requires 6302 or 6303	12	10	400	4.00
6302	Common Communications Adapter; SDLC or BSC; up to 9600 bps with Type A only Terminal Adapters and up to 7200 bps with Type B or mix	12	10	450	2.50
6303	High Performance Communications Adapter; SDLC or BSC; 9600 bps with Type B Terminal Adapters or mix	35	30	1,200	10.50
8801	Watertight Power Connector; 3274-1A or 1B only	NC	NC	NC	NC
	Controller/Display Stations				
	3276 Model 1; 960 char. BSC	167	142	6,390	32.00
	3276 Model 2; 1920 char., BSC	172	146	6,570	33.00
	3276 Model 3; 2560 char., BSC	176	150	6,750	34.00
	3276 Model 4; 3440 char., BSC	181	154	6,930	34.50
	3276 Model 11; 960 char., SDLC	167	142	6,390	28.00
	3276 Model 12; 1920 char., SDLC	172	146	6,570	28.50
	3276 Model 13; 2560 char., SDLC	176	150	6,750	29.00
	3276 Model 14; 3440 char., SDLC	181	154	6,930	29.50
3255	Terminal Adapter No. 1; devices 3 and 4	16	14	630	1.50
3256	Terminal Adapter No. 2; devices 5 and 6	16	14	630	1.50
3257	Terminal Adapter No. 3; devices 7 and 8	16	14	630	1.50
3701	External Modem Interface; requires 6301 or 6302	12	10	400	4.00
	1200 bps Integrated Modems—				
5500	Non-switched; requires 6301	19	16	668	5.00
5502	Switched, Manual Answer; requires 6301	19	16	668	4.00
5507	Non-switched with Switched Backup; requires 6301	26	22	910	7.00
6301	Communications Feature with Clock	19	16	670	3.00
6302	Communications Feature without clock	12	10	450	2.50
6315	SDLC/BSC Switch; 3276-1, -2, -3, -4 only	21	18	810	3.00
	Stand-Alone Display Stations				
	3275 Model 1; 480 char., BSC	113	96	4,005	13.50
	3275 Model 2; 1920 char., BSC	136	116	4,735	19.50
	3275 Model 11; 480 char., SDLC	165	140	5,710	41.00
	3275 Model 12; 1920 char., SDLC	186	158	6,440	48.50
1200	ASCII Transmission Code; 3275-11, -12 only	8	7	286	0.50
3440	Dial; 600 or 1200 bps over dial network; 3275-1, -2 only	8	7	328	1.00
5500	Integrated Modem; 1200 bps	16	14	535	3.00
5501	Integrated Modem; 1200 bps with Auto Answer; 3275-1, -2 only	21	18	714	3.50
5550	Printer Adapter; one max.	NC	NC	NC	NC
7820	1200 bps Transmission Speed	NC	NC	NC	NC
7821	4800/7200 bps Transmission Speed; 3275-1, -2 only	4	3	145	0.50
	Cluster Display Stations				
	3277 Model 1; 480 char.	71	60	2,470	9.00
	3277 Model 2; 1920 char.	103	88	3,200	19.50

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IBM 3270 Information Display System

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
1066	Data Analysis—APL; 3277-2 only	42	36	630	2.50
	3278 Model 1; 960 char.	58	49	2,205	11.50
	3278 Model 2; 1920 char.	61	52	2,340	12.00
	3278 Model 3; 2560 char.	71	60	2,700	13.50
	3278 Model 4; 3440 char.	74	63	2,835	14.50
1720	Switch Control Unit	5	4	180	NC
	Keyboards				
	For 3275/3277—				
4630	66 Key EBCDIC Typewriter	13	11	520	5.00
4631	66 Key EBCDIC Data Entry	13	11	520	6.00
4632	78 Key Operator Console	32	27	1,010	14.00
4633	78 Key EBCDIC Typewriter	28	24	869	8.50
4634	66 Key ASCII Typewriter	13	11	520	5.00
4635	78 Key ASCII Typewriter	28	24	869	8.50
4636	66 Key EBCDIC Data Entry; keypunch layout	15	13	522	6.00
4637	66 Key EBCDIC APL/Typewriter; 3277-2 only; requires 1066	26	22	807	5.50
4638	78 Key EBCDIC APL/Typewriter; 3277-2 only; requires 1066	40	34	1,250	9.50
4638	78 Key Text; 3277-2 only; requires 1066	40	34	1,250	8.50
	For 3276/3278—				
4621	75 Key EBCDIC Typewriter	13	11	495	2.50
4622	75 Key EDBCDIC Data Entry	13	11	495	3.50
4623	75 Key EBCDIC Data Entry; keypunch layout	13	11	495	3.50
4624	75 Key ASCII Typewriter	13	11	495	2.50
4627	87 Key EBCDIC Typewriter; 3278/3274 only	18	15	675	3.00
4628	87 Key ASCII Typewriter; 3278/3274 only	18	15	675	3.00
	3275/3277 Display Station Options				
1090	Audible Alarm	4	3	145	0.50
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC
6350	Selector Light Pen	24	20	728	1.50
4600	Operator Identification Card Reader	13	11	437	3.50
	3276/3278 Display Station Options				
1090	Audible Alarm	2	2	90	NC
4690	Keyboard Numeric Lock	NC	NC	NC	NC
6340	Security Keylock	35 SUC	35 SUC	35	NC
6350	Selector Light Pen	15	13	585	0.50
4999	Magnetic Reader Control	11	9	405	4.50
	Magnetic Slot Reader (Part No. 4123500)	—	—	275	—
	Printers				
	3284 Model 1; 40 cps, 480 char. buffer; 3271, 3272 only	141	120	4,255	41.00
	3284 Model 2; 40 cps, 1920 char. buffer; 3271-2, -12, 3272-2 only	150	128	4,775	41.00
1066	Data Analysis—APL; 3284-2 only	42	36	630	2.50
	3284 Model 3; 40 cps, bufferless; 3275 only	122	104	4,070	22.00
	3286 Model 1; 66 cps; 480 char. buffer; 3271, 3272 only	169	144	5,690	43.00
	3286 Model 2; 66 cps, 1920 char. buffer; 3271-2, -12, 3272-2 only	179	152	6,305	43.00
1066	Data Analysis—APL; 3286-2 only	42	36	630	2.50
	3287 Model 1; 80 cps	167	142	5,680	47
	3287 Model 2; 160 cps	203	173	6,055	58

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IBM 3270 Information Display System

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
1066	Data Analysis—APL	11	9	315	NC
3880	Extended Print Buffer	7	6	210	0.50
8330	3271/3272 Attachment	31	26	910	3.50
8331	3274/3276 Attachment	6	5	175	0.50
8700	Variable Width Forms Tractor	6	5	160	0.50
	3288 Model 2; 120 lpm; 3271-2, -12, 3272-2 only	384	327	10,625	87.00
7880	Text Print	45	38	1,405	1.00
	3289 Model 1; 155 lpm	368	313	11,110	105
	3289 Model 2; 400 lpm	556	473	16,560	179
1090	Audible Alarm	6	5	175	NC
4450	Form Stand; all models except 3289	—	—	54	—

*Includes prime shift maintenance.■

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IBM 3270 Information Display System

New Product Announcement

On October 13, 1977, IBM announced new functions and features for its 3270 new family of components including:

- New functions and features for the 3276, including attachment of the 3289 Line Printer.
- Double-speed Typamatic cursor on the 3278 Display Stations.
- New no-cost features for 3287 Printer.
- Buffer reprint on the 3287 and 3289 Line Printer.

The 3276 Control Unit Display Station is now available with the following functions, which were previously available on 3278 Display Stations attached to a 3274 Control Unit:

- Print/Ident Key (standard)—provides operator-initiated printed copy of displayed data without the intervention of the host processor via a print command.
- Operator Selectable Alternate Cursor (standard)—provides an underscore or reverse image cursor in blink or non-blink mode.
- Additional Program Function keys (optional)—provides up to 12 additional program function keys on optional 87-key EBCDIC and ASCII typewriter-style keyboards.
- 3289 Line Printer Attachment (standard)—permits 3289 line printer to be included in the mix of up to seven displays and/or printers that can be attached.
- Systems Printer Communications (standard)—allows PA1, PA2, and Cancel Print in SNA Character String mode for any attached printers.
- Address Keylock (optional)—provides improvement of control unit address protection.
- Local Attachment (standard)—permits modemless connection of a 3276 to a 3704 or 3705 controller at distances up to 100 feet and at a speed of 1200 bps.
- 1200 bps Integrated Modem (optional)—two models provide for switched operation over the dial network or for non-switched operation with dial network backup; both modem features include auto answer.
- Double-Speed Cursor (standard)—included for the integral 3276 Display Station and attached 3278 Display Stations.

The Double-Speed Cursor is now also standard on 3278 Display Stations attached to a 3274 Control Unit.

The 3287 Line Printer is now available with the following no-cost options: Audible Alarm, switch selected 6- or 8-lines-per-inch printing; Mono or Dual Case printing when attached to a 3271 or 3272 Control Unit; and Blower for high temperature environments (above 90° F). The Variable Width Forms Tractor, Paper Handling feature handles forms 3 to 8 inches wide in place of the standard 3 to 15 inch paper width. Cancel Print, Program Attention 1, and Program Attention 2 switches are supported in SCS mode (SNA character string) by the 3276 Control Unit Display Station as previously announced for the 3274 Control Unit. The restriction that some user-written 3284 and 3286 programs required insertion of New Line orders (if the rightmost print location occurs before position 132) is removed, which provides host compatibility with Margin Stop Variable and the fixed margin stop on the 3284 and 3286 printers.

The 3287 and 3289 Printers are now available with Buffer Reprint. This no-cost feature is designed to overcome forms problems, such as end-of-forms, that occur during printing. The Buffer Reprint feature prints the complete contents of the print buffer at operator command and is available for 3270 compatibility print mode (non SCS).

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IBM 3270 Information Display System

New Product Announcement

		Monthly Charges* Rental	Lease	Purchase	Monthly Maint.
4627	87 Key EBCDIC Typewriter; includes 12 additional program function keys	$18	$15	$ 675	$3
4628	87 Key ASCII Typewriter; includes 12 additional program function keys	18	15	675	3
1009	Address Keylock 1200-bps	60 SUC	60 SUC	60	NC
5501	Integrated Modem; switched with auto answer	25	21	840	3
5508	Integrated Modem; non-switched with switched network backup; auto answer	29	25	1,015	4

*Includes prime-shift maintenance.

SUC—Single Use Charge.□

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IBM 3270 Information Display System

MANAGEMENT SUMMARY

The 3270 Information Display System is destined to play a significant part in IBM's current and future data communications market. Introduced prior to IBM's September 1974 announcement of System Network Architecture (SNA) and it's formal blessing and support of complex data communications arrangements, the 3270 System was marketed as a replacement of the older IBM 2260 and 2265 display terminals. However, with the announcement of SNA, IBM disclosed that the 3270 would be available with either the older Binary Synchronous Control (BSC) or the new (SDLC) Synchronous Data Link Control protocol capability.

At the September unveiling of a new family of communications terminals, IBM also announced that some of its other newer terminals, as well as those to be introduced in the future, fall into a newly created category that IBM refers to as "Advanced Function for Communication." This new category encompasses both general- and special-purpose communications terminals bonded by a common communications architecture called SNA. SDLC, recently introduced as an advanced form of communications discipline for improved transmission efficiency, is a key element of IBM's new communications architecture. With the introduction of two new SDLC-compatible components for the IBM 3270 Information Display System–a remote controller for clustered configurations and a stand-alone terminal–IBM included the 3270 in its support of the Advanced Function concept.

The 3270 system, by virtue of its capabilities and inherent sophistication, obsoleted IBM's earlier 2260 and 2265 CRT display terminals and has essentially replaced them.

The 3270 features:

- Transmission speeds of up to 900 characters per second (7200 bps).
- Display sizes of 480 or 1920 characters.
- Printers operating at 40 or 66 characters per second or 120 lines per minute.
- Very flexible configurations of up to 32 devices per controller, local or remote operation, multistation or single station, multiple printers.
- Separate buffer for each display, and printer/screen capacity remains constant for large configurations.

The 3270 includes many features pioneered by the independent producers of CRT terminals: functions such as protected formats for fill-in-the-blanks applications ➢

A local or remote display system consisting of 1 to 32 keyboard/displays and printers, in any combination.

BSC or SDLC protocol is offered for remote systems at transmission speeds of up to 4800 bps.

Monthly rental for a typical four-display, remote BSC compatible system with 480-character displays is approximately $652 per month, including maintenance.

An expanded eight-display, remote SDLC compatible system with 1920-character displays rents for approximately $1,593 per month, including maintenance.

The stand-alone display is a 3275. Cluster systems use 3277 displays. Either is available with a display size of up to 1920 characters.

CHARACTERISTICS

VENDOR: International Business Machines Corp., Data Processing Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.

DATE OF ANNOUNCEMENT: 3270 (BSC)—first quarter 1972; 3270 (SDLC)—third quarter 1974.

DATE OF FIRST DELIVERY: 3270 (BSC)–second quarter 1972; 3270 (SDLC)–fourth quarter 1974.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: International Business Machines Corp.

CONFIGURATION

The IBM 3270 Information Display System is designed to operate in a local environment as a multi-station, computer peripheral subsystem or in a remote environment as a single-station or a multi-station communications terminal.

Local operation requires the 3272 Control Unit, which attaches to an IBM System/360 computer, Models 25 through 195, or an IBM System/370 computer, Models 115 through 195, via a Selector, Multiplexer, or Block Multiplexer channel. The maximum data transfer rate for local operation is 800,000 char/second. Remote operation in a multi-station arrangement requires the 3271 Control Unit.

Four models of control units provide buffering for 480 or 1920 characters. Two display station and printer models provide screen and print-buffer capacities that correspond to the buffer capacities of the control units. Three ➢

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IBM 3270 Information Display System

and program function keys, as well as condensation of the data transmitted by blank suppression, repeated character elimination, and tab control. A light pen can even be included for "finger-pointing" data entry.

USER REACTION

In Datapro's 1977 survey of alphanumeric display terminal users, 280 users reported on their experience with a total of 8072 IBM 3270 display units, including more than 700 of the 3275 stand-alone units. Their ratings, which follow, indicate a high degree of satisfaction with all aspects of the 3270 and represent slight improvements compared to the results of our 1976 survey.

	Excellent	Good	Fair	Poor	WA*
Overall performance	164	113	3	0	3.6
Ease of operation	145	130	5	0	3.5
Display clarity	121	133	25	1	3.3
Keyboard feel & usability	141	136	3	0	3.5
Hardware reliability	156	117	6	1	3.5
Maintenance service	130	113	31	5	3.3
Software & technical support	89	133	49	4	3.1

*Weighted Average on a scale of 4.0 for Excellent.

The key advantages of the IBM 3270 system, as unanimously cited by the responding users, were reliability and strong vendor support. Flexibility and applicability were also cited as advantages, but to a much lesser degree. Excessive cost was the major complaint of most. Other disadvantages cited by some users were inflexibility, performance limitations, and lack of programmability. A few users also commented on the large physical size of the display units, lack of features such as highlighting, and screen glare as disadvantages. One user complained bitterly about the IBM printers. "They just seem to fall apart." Despite those complaints, many of which are undoubtedly valid, user satisfaction with the IBM 3270 and the associated IBM service and support well outranked that of the independent display terminal vendors as a group.

About 34 percent of the responding 3270 users said they were operating with stand-alone units, while 48 percent said they had clustered units. About 66 percent of the respondents were using formatted data entry procedures, while 31 percent reported free-form data entry. Extensive editing was being performed by 60 percent of the respondents, while little or no editing was reported by 19 percent.□

printers are provided, with rated speeds of 40 and 66 characters/second, and 120 lines/minute; the printers can be mixed on the same control unit. Displays and printers with large and small buffers can be intermixed on a control including the large buffer.

Remote operation in a single-station environment requires the 3275 Display Station, a stand-alone unit with integral control and buffering. The 3275 is also available in four models that provide buffer and screen capacities of 480 and 1920 characters. A 40-character/second bufferless printer can be attached to the 3275 Display Station.

TRANSMISSION SPECIFICATIONS

Transmission is synchronous, half- or full-duplex. The 3271 Controller and 3275 Terminal Models 11 and 12 are compatible with Synchronous Data Link Control (SDLC), IBM's latest line discipline for communications networks. All other models are compatible with the earlier IBM Binary Synchronous Communications discipline. Full-duplex terminal operation is restricted to the SDLC terminal. Transmission speed can be specified as 1200, 2000, or 2400 bits/second for the basic units; transmission at 4800 or 7200 bits/second requires an optional feature. Either 8-level EBCDIC or ASCII (with parity) can be specified. IBM, common carrier, or independent modems can be used to interface the 3270 with a voice-band communications facility.

Transmission characteristics of the SDLC terminals are compatible with the IBM 3704 and 3705 Communications Controllers only. Transmission characteristics of the BSC terminals are compatible with the IBM 3704, 3705, 2701 Data Adapter Unit, 2703 Transmission Control, 2712 Remote Multiplexer, and Integrated Communications Attachment (ICA), each equipped for Binary Synchronous transmission. The 3270 is designed to communicate with the System/360 Model 25 and System/370 Models 115, 125, and 135 via the ICA, and with the System/360 Models 25 through 195 and System/370 Models 115 through 195 via the 3704, 3705, 2701, or 2703 line controller.

SDLC-compatible versions of the 3270 can operate in a multipoint arrangement with other IBM SDLC devices such as the 3767, 3770, 3790, 3650 (Retail Store System), 3660 (Supermarket System), and 3600 (Finance Communication System).

BSC-compatible versions of the 3270 can operate in a multipoint arrangement with other IBM Binary Synchronous (BSC) devices such as the 2715, 2770, 2780, 3271, 3275, and 3780, and with appropriately equipped IBM 1130, 1800, System/360 Model 20, and System/3 computers.

SOFTWARE SUPPORT: The 3270 System is supported by BTAM under DOS, DOS/VS, OS, and OS/VS2; by TCAM under OS; and by VTAM under DOS/VS, OS/VS1, and OS/VS2. Display console support for a 3270 System operating in a local environment is provided by DIDOCS (Device Independent Display Operator Console Support) or SDS (Status Display Support) under OS (MFT or MVT). Program products available for use with the IBM 3270 include VIDEO/370, DATA/360, IMS, IQF, CICS, and TSO.

VIDEO/370 is designed for on-line data entry and verification in a local or remote environment; it requires the use of one of the following access methods: BDAM, BSAM (DAM or SAM in DOS), or BTAM.

DATA/360 is designed for on-line data entry and verification in a local environment only via 3272/3277 Model 1 display stations operating in 2260 mode. DATA/360 operates under OS or DOS, is written in Assembler Language, and incorporates ISAM, SAM, and BTAM for DOS or BDAM, GAM, and QSAM for OS. DATA/360 does not support function keys or dual intensity and may not support protected fields.

DEVICE CONTROL

The 3270 System operates under the control of the program stored at the remote computer. Under program control, the 3270 can execute any of four types of commands: read, write, control, and sense.

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IBM 3270 Information Display System

Read commands initiate transfer of the contents of a device buffer, modified fields within the buffer, buffer addresses or data of fields specified by the selector pen, or the single-byte Attention Identification (AID) code generated by a Program Function or Program Access key. The 3270 responds to two read commands, Read Buffer and Read Modified.

Read Buffer initiates transfer of the contents of the addressed device buffer from the initial or current cursor address.

Read Modified initiates one of three operator-initiated functions: Read Modified, Short Read, or Test Request.

Read. Read Modified initiates the transfer of all fields modified by the keyboard within the device buffer. The fields are transferred in sequence beginning with the first modified field; all nulls are suppressed. However, when completion of a key-modified field is signaled by a selector pen operation, a resulting Read Modified operation will transfer only the address of the modified field. Short Read initiates transfer of the single byte AID Code generated by a Program Attention key. Test Request Read performs the same operation as Read Modified; however, a hardware-generated heading precedes the data. Nulls are suppressed as in Read Modified. Only the special heading is transferred if data has not been keyed.

Write commands condition the display or printer to receive a computer message. Two write commands–Write and Erase/Write–load, format, and selectively erase device buffer data, and can also initiate device operations such as starting the printer, resetting the keyboard, and sounding the audible alarm. Both commands are the same except that Erase/Write erases the entire contents of the device buffer before fresh data is written (beginning at the initial buffer address) and Write modifies existing buffer data.

Control commands initiate control unit and/or device operations. There are four control commands: Copy, Select, Erase All Unprotected, and No Operation. Copy, executed by a 3271 Control Unit only, transfers buffer data from one device to another. Select, executed by a 3272 Control Unit only, transfers buffer data from the selected device to the controller. Erase All Unprotected initializes the addressed device, erasing all unprotected buffer locations and repositioning the cursor to the initial position of the first unprotected field. No Operation, executed by the 3272 Control Unit only, performs no functional operation in the 3272, but can retrieve pending status.

The Sense command, executed by the 3272 Control Unit only, initiates the transfer of a single sense byte from the 3272. The sense byte defines error conditions that have occurred within the subsystem.

Program control by data field provides a flexible formatting capability. A field, identified by an attribute control code (nondisplayed) in the initial character position, can possess any one of several characteristics. The attribute control code can specify a protected or unprotected field (for fixed format operation), beam intensity or brightness (off, normal, or bright), alphameric or numeric (automatic shift) input, auto lock or skip, tab stop, or light pen selection.

The Program Tab feature automatically writes successive data fields into successive unprotected data fields defined by a fixed format.

Character Addressing permits a message to be written beginning at any screen location. Addressing can be interspersed with data throughout a message received from the computer. Character Addressing also permits the selective modification of attribute control codes.

Operator controls are provided for cursor control, editing, and program functions.

Cursor controls position the cursor up, down, left, or right, step-by-step or repetitively if the key is held depressed. The cursor can also be backspaced one character position, moved to the beginning of the next line or beginning of the next unprotected data field, tab to the beginning of the next unprotected data field, and backtab to the beginning of the previous unprotected data field.

Edit controls permit data to be inserted in or deleted from text, character by character. Following data is automatically expanded or contracted.

Program Function keys are used to initiate program functions or identify data that can be transmitted with an accompanying program function code.

COMPONENTS

CRT DISPLAY: Via a 14-inch (diagonal measurement) CRT. Display screen arrangement is dependent on the model display station. Model 1 display screens are arranged in 12 lines of 40 characters each, totaling 480 character positions. Model 2 display screens are arranged in 24 lines of 80 characters each, totaling 1920 character positions.

A character set of 64 ASCII characters, including upper-case alphabetics, numerics, and special symbols, is displayed in green against a dark background. Each character is formed by a 7-by-9 dot matrix.

KEYBOARD: Three keyboard styles are available: typewriter, data entry, and operator console. Keyboard variations include 66- and 78-key versions. The 78-key version of the typewriter keyboard includes 12 Program Function keys. The data entry keyboard provides an IBM 29 Card Punch-style layout and contains 66 keys, including 5 Program Function keys. The operator console keyboard provides an IBM 1052 Model 7-style layout and contains 78 keys, including 12 Program Function keys. Program Function keys are defined by the application program.

The Selector Pen option permits the display operator to select any of several data fields in a displayed text.

The Numeric Lock feature restricts keyboard operation to numeric input only (or duplication of numeric data); the keyboard automatically locks if anything other than numeric data is keyed.

PRINTED OUTPUT: Three models are available, including two serial impact printers rated at 40 (3284) or 66 (3286) characters/second, respectively, and a line printer rated at 120 lines/minute (3288).

The 3284 and 3286 serial printers are available in three and two models (Models 1 and 2), respectively. In each case, Model 1 includes a 480-character buffer; Model 2, a 1920-character buffer; and Model 3 is bufferless and shares the display buffer of the 3275 Display Station (all models). A forms stand is optional. Both serial printers are available with 120, 126, or 132 print positions and accommodate pin-fed, six-part continuous forms from 3 to 14 inches (in 1/6-inch increments) in length. The character set can be specified as 64 ASCII or EBCDIC symbols. Each character is formed by a 4-by-7 dot matrix.

The 120-lpm line printer (3288-2) provides 132 print positions at 10 characters/inch and accommodates pin-fed, six-part continuous forms from 3.5 to 15 inches wide via adjustable tractors. The character set can be specified as ASCII or EBCDIC and includes 64 symbols. Vertical spacing is fixed at 6 lines/inch. The 3288-2 Printer is software-supported as a 3286-2 Printer and is restricted to use on a 3271-2 or -12 or a 3272-2 Control Unit.

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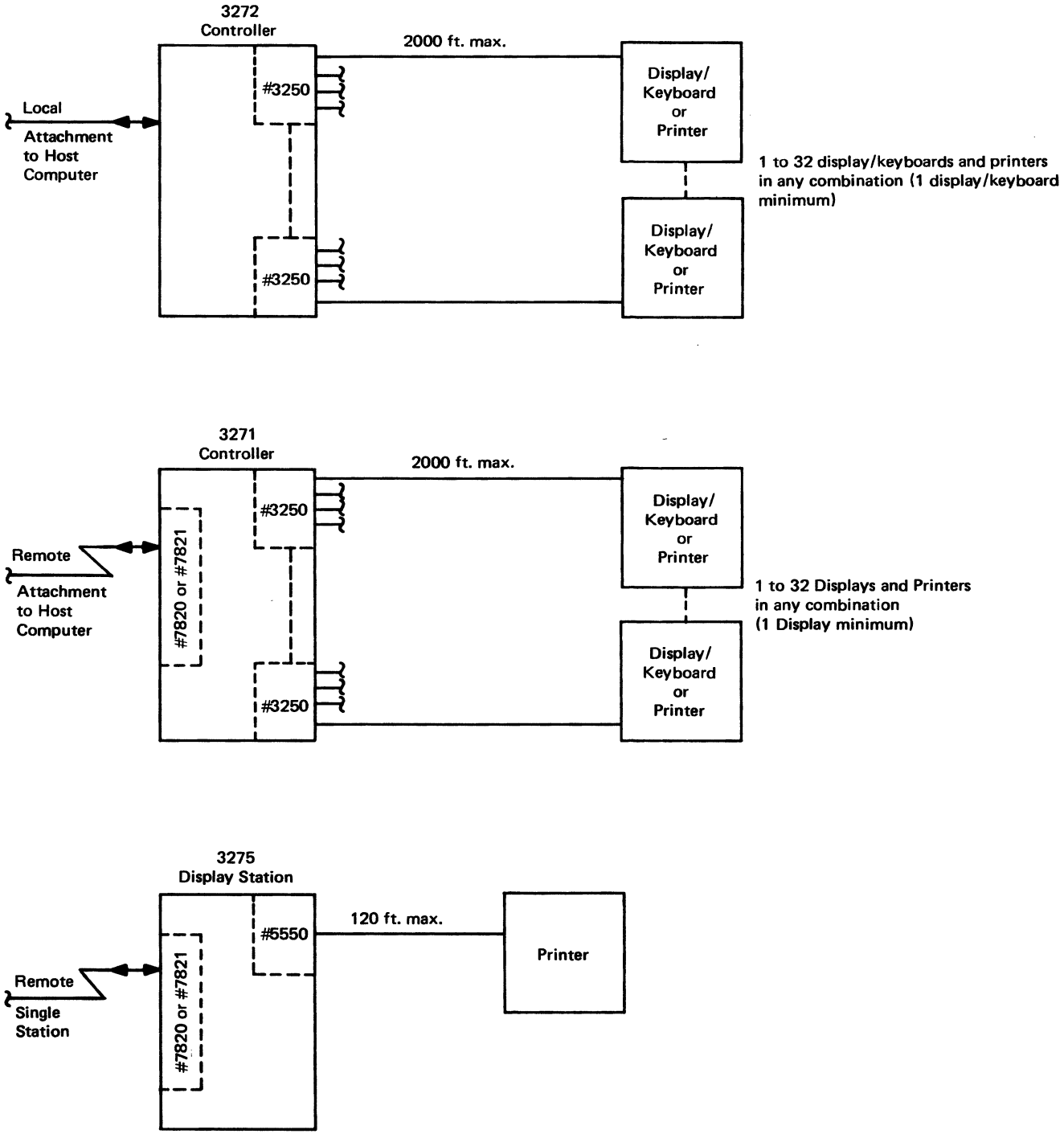
IBM 3270 Information Display System

IBM 3270 CONFIGURATION



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IBM 3270 Information Display System

TYPICAL IBM 3270 REMOTE SYSTEM CONFIGURATIONS*

Number of Displays	Average Cost per Display	Display Capacity	Monthly Rental	Purchase	Monthly Maintenance
4	$163/mo.	480 char.	$ 652	$ 21,535	$ 84.50
8	148	480	1,181	38,362	155.00
16	140	480	2,239	72,016	296.00
32	136	480	4,355	139,324	578.00
4	206	1920	825	25,620	128.50
8	189	1920	1,510	45,927	241.00
16	180	1920	2,880	86,541	466.00
32	176	1920	5,620	167,766	916.00

*Each configuration provides BSC compatibility and includes a 3271-1 or 3271-2 Control Unit and 78-key keyboards; equivalent configurations with SDLC compatibility range from $21/month to $2.63/month more per display for configurations of 4 to 32 displays, respectively.

► PRICING

The IBM 3270 system is available for purchase or on a month-to-month lease which includes maintenance. A separate maintenance contract is available for purchased equipment. Typical configuration prices are shown in the accompanying table. Component pricing is as follows:

		Monthly Rental*	Purchase	Monthly Maint.
Cluster Controllers				
3271 Model 1; remote, 480 char., BSC		$184	$ 5,635	$14.00
3271 Model 2; remote, 1920 char., BSC		201	6,240	16.00
3271 Model 11; remote, 480 char., SDLC		268	7,665	37.00
3271 Model 12; remote, 1920 char., SDLC		284	8,270	39.50
3272 Model 1; local, 480 char.		213	6,505	14.00
3272 Model 2; local, 1920 char.		230	7,105	31.00
#1066	Data Analysis – APL; accommodates APL and TN train characters; 3271-2, -12, and 3272-2 only	50	750	2.50
#1200	ASCII Transmission Code; 3271-11, -12 only	10	340	0.50
#1550	Copy-buffer transfer device	NC	NC	NC
#3250	Device Adapter-one for every four units attached	61	927	0.50
#7820	Transmission Speed @ 1200 bps (3271-1 & 2 only)	NC	NC	NC
#7821	Transmission Speed @ 4800/7200 bps (3271-1 & 2 only)	5	173	0.50
Cluster Display Stations				
3277 Model 1; 480 chars.		84	2,940	9.00
3277 Model 2; 1920 chars.		123	3,810	19.50
Stand-Alone Display Stations				
3275 Model 1; 480 char., BSC		134	4,770	12.00
3275 Model 2; 1920 char., BSC		162	5,635	17.00
3275 Model 11; 480 char., SDLC		195	6,800	36.00
3275 Model 12; 1920 char., SDLC		222	7,665	42.50
#1200	ASCII Transmission Code; Model 11 & 12 only	10	340	0.50
#3440	Dial; 600/1200 bps over dial network	10	390	1.00
#5500	Integrated Modem; 1200 bps	16	535	3.00
#5501	Integrated Modem; 1200 bps with Auto Answer	21	714	3.50
#5550	Printer Adapter-one maximum	NC	NC	NC
#7820	Transmission Speed; 1200 bps	NC	NC	NC
#7821	Transmission Speed; 4800/7200 bps	5	173	0.50
Display Station Options				
Keyboards–				
#4630	66 Key EBCDIC Typewriter	16	520	5.00
#4631	66 Key EBCDIC Data Entry	16	520	6.00
#4632	78 Key Operator Console	38	1,205	14.00
#4633	78 Key EBCDIC Typewriter	33	1,035	8.50
#4634	66 Key ASCII Typewriter	16	520	5.00
#4635	78 Key ASCII Typewriter	33	1,035	8.50

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IBM 3270 Information Display System

Display Station Options (Continued)	Monthly Rental*	Purchase	Monthly Maint.
Keyboards—(Continued)			
#4636 66 Key EBCDIC Data Entry; keypunch layout	$18	$622	$6.00
#6437 66 Key EBCDIC APL/Typewriter; 3277 only	31	961	5.50
#4638 78 Key EBCDIC APL/Typewriter; 3277 only	48	1,490	9.50
#4639 78 Key Text	48	1,490	8.50
#4690 Keyboard Numeric Lock	NC	NC	NC
#1090 Audible Alarm	5	173	0.50
#4600 Operator Ident. Card Reader	16	520	3.50
#6340 Security Keylock	35 SUC	35 SU	NC
#6350 Selector Light Pen	28	867	1.50
Printers			
3284 Model 1; 40 cps, 480 char. buffer; (3271, 3272 only)	168	5,065	37.50
3284 Model 2; 40 cps, 1920 char. buffer; 3271-2, -12 and 3272-2 only	179	5,685	37.50
3284 Model 3; 40 cps, bufferless; 3275 only	145	4,845	20.00
3286 Model 1; 66 cps, 480 char. buffer; 3271, 3272 only	201	6,775	37.50
3286 Model 2; 66 cps, 1920 char. buffer; 3271-2, -12, and 3272-2 only	213	7,505	37.50
3288 Model 2; 120 lpm, bufferless; 3271-2, -12, and 3272-2 only	427	12,500	87.00
Form Stand; all models	—	54	—

NC—No charge.
SUC—Single use charge.
*Includes maintenance.■

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IBM 3270 Information Display System

MANAGEMENT SUMMARY

The 3270 Information Display System is destined to play a significant part in IBM's current and future data communications market. Introduced prior to IBM's September 1974 announcement of System Network Architecture (SNA) and it's formal blessing and support of complex data communications arrangements, the 3270 System was marketed as a replacement of the older IBM 2260 and 2265 display terminals. However, with the announcement of SNA, IBM disclosed that the 3270 would be available with either the older Binary Synchronous Control (BSC) or the new (SDLC) Synchronous Data Link Control protocol capability.

At the September unveiling of a new family of communications terminals, IBM also announced that some of its other newer terminals, as well as those to be introduced in the future, fall into a newly created category that IBM refers to as "Advanced Function for Communication." This new category encompasses both general- and special-purpose communications terminals bonded by a common communications architecture called SNA. SDLC, recently introduced as an advanced form of communications discipline for improved transmission efficiency, is a key element of IBM's new communications architecture. With the introduction of two new SDLC-compatible components for the IBM 3270 Information Display System–a remote controller for clustered configurations and a stand-alone terminal–IBM included the 3270 in its support of the Advanced Function concept.

The 3270 system, by virtue of its capabilities and inherent sophistication, obsoleted IBM's earlier 2260 and 2265 CRT display terminals and has essentially replaced them.

The 3270 features:

- Transmission speeds of up to 900 characters per second (7200 bps).
- Display sizes of 480 or 1920 characters.
- Printers operating at 40 or 66 characters per second or 120 lines per minute.
- Very flexible configurations of up to 32 devices per controller, local or remote operation, multistation or single station, multiple printers.
- Separate buffer for each display, and printer/screen capacity remains constant for large configurations.

The 3270 includes many features pioneered by the independent producers of CRT terminals: functions such as protected formats for fill-in-the-blanks applications ➢

A local or remote display system consisting of 1 to 32 keyboard/displays and printers, in any combination.

BSC or SDLC protocol is offered for remote systems at transmission speeds of up to 4800 bps.

Monthly rental for a typical four-display, remote BSC compatible system is approximately $650 per month, including maintenance.

An expanded eight-display, remote SDLC compatible system rents for approximately $1,250 per month, including maintenance.

The stand-alone display is a 3275. Cluster systems use 3277 displays. Either is available with a display size of up to 1920 characters.

CHARACTERISTICS

VENDOR: International Business Machines Corp., Data Processing Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.

DATA OF ANNOUNCEMENT: 3270 (BSC)–first quarter 1972; 3270 (SDLC)–third quarter 1974.

DATE OF FIRST DELIVERY: 3270 (BSC)–second quarter 1972; 3270 (SDLC)–fourth quarter 1974.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: International Business Machines Corp.

CONFIGURATION

The IBM 3270 Information Display System is designed to operate in a local environment as a multi-station, computer peripheral subsystem or in a remote environment as a single-station or a multi-station communications terminal.

Local operation requires the 3272 Control Unit, which attaches to an IBM System/360 computer, Models 25 through 195, or an IBM System/370 computer, Models 115 through 195, via a Selector, Multiplexer, or Block Multiplexer channel. The maximum data transfer rate for local operation is 800,000 char/second. Remote operation in a multi-station arrangement requires the 3271 Control Unit.

Four models of control units provide buffering for 480 or 1920 characters. Two display station and printer models provide screen and print-buffer capacities that correspond to the buffer capacities of the control units. Three ➢

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IBM 3270 Information Display System

and program function keys, as well as condensation of the data transmitted by blank suppression, repeated character elimination, and tab control. A light pen can even be included for "finger-pointing" data entry.

USER REACTION

In Datapro's 1975 survey of alphanumeric display terminal users, 217 users reported on their experience with a total of 6,477 IBM 3270 display units, including more than 300 of the 3275 Stand-Alone units. Their ratings, which follow, indicate a high degree of satisfaction with all aspects of the 3270 except the associated software and technical support.

	Excellent	Good	Fair	Poor	WA*
Overall performance	113	95	6	0	3.5
Ease of operation	93	112	10	0	3.4
Hardware reliability	110	89	15	0	3.4
Maintenance service	87	106	19	2	3.3
Software & technical support	38	105	57	8	2.8

*Weighted Average on a scale of 4.0 for Excellent.

The key advantages of the IBM 3270 system, as cited by the responding users, were reliability, ease of use, screen clarity, format capability, large screen size, and IBM support, including the widespread availability of parts and service. One user summed it all up with his comment, "It's IBM."

Excessive cost was the major complaint of many. Several users commented that the software support needs improvement, and a few said the software was more complicated than necessary. One user noted the difficulty in converting from 2260's to 3270's. Several users also commented on the large size of the display units as "too bulky" and "awkward." Also, several users noted that the 3270 terminal's lack of intelligence was a disadvantage, inasmuch as they cannot be programmed. Scattered negative comments mentioned serial printer problems, serial print speed (too slow), some screen glare, no line insert/delete function, no Home key on the 3275, slow access time, and no self-test features. Despite these complaints, many of which are undoubtedly quite valid, user satisfaction with the IBM 3270 and the associated IBM service and support outranked that of the independent CRT suppliers as a group.

About 26 percent of the responding 3270 users said they were operating with stand-alone units, while 71 percent said they had clustered units. About 70 percent of the respondents were using formatted data entry procedures, while 25 percent reported free-form data entry. Extensive editing was being performed by 55 percent of the respondents, while little or no editing was reported by 19 percent.□

printers are provided, with rated speeds of 40 and 66 characters/second, and 120 lines/minute; the printers can be mixed on the same control unit. Displays and printers with large and small buffers can be intermixed on a control including the large buffer.

Remote operation in a single-station environment requires the 3275 Display Station, a stand-alone unit with integral control and buffering. The 3275 is also available in four models that provide buffer and screen capacities of 480 and 1920 characters. A 40-character/second bufferless printer can be attached to the 3275 Display Station.

TRANSMISSION SPECIFICATIONS

Transmission is synchronous, half- or full-duplex. The 3271 Controller and 3275 Terminal Models 11 and 12 are compatible with Synchronous Data Link Control (SDLC), IBM's latest line discipline for communications networks. All other models are compatible with the earlier IBM Binary Synchronous Communications discipline. Full-duplex terminal operation is restricted to the SDLC terminal. Transmission speed can be specified as 1200, 2000, or 2400 bits/second for the basic units; transmission at 4800 or 7200 bits/second requires an optional feature. Either 8-level EBCDIC or ASCII (with parity) can be specified. IBM, common carrier, or independent modems can be used to interface the 3270 with a voice-band communications facility.

Transmission characteristics of the SDLC terminals are compatible with the IBM 3704 and 3705 Communications Controllers only. Transmission characteristics of the BSC terminals are compatible with the IBM 3704, 3705, 2701 Data Adapter Unit, 2703 Transmission Control, 2712 Remote Multiplexer, and Integrated Communications Attachment (ICA), each equipped for Binary Synchronous transmission. The 3270 is designed to communicate with the System/360 Model 25 and System/370 Models 115, 125, and 135 via the ICA, and with the System/360 Models 25 through 195 and System/370 Models 115 through 195 via the 3704, 3705, 2701, or 2703 line controller.

SDLC-compatible versions of the 3270 can operate in a multipoint arrangement with other IBM SDLC devices such as the 3767, 3770, 3790, 3650 (Retail Store System), 3660 (Supermarket System), and 3600 (Finance Communication System).

BSC-compatible versions of the 3270 can operate in a multipoint arrangement with other IBM Binary Synchronous (BSC) devices such as the 2715, 2770, 2780, 3271, 3275, and 3780, and with appropriately equipped IBM 1130, 1800, System/360 Model 20, and System/3 computers.

SOFTWARE SUPPORT: The 3270 System is supported by BTAM under DOS, DOS/VS, OS, and OS/VS2; by TCAM under OS; and by VTAM under DOS/VS, OS/VS1, and OS/VS2. Display console support for a 3270 System operating in a local environment is provided by DIDOCS (Device Independent Display Operator Console Support) or SDS (Status Display Support) under OS (MFT or MVT). Program products available for use with the IBM 3270 include VIDEO/370, DATA/360, IMS, IQF, CICS, and TSO.

VIDEO/370 is designed for on-line data entry and verification in a local or remote environment; it requires the use of one of the following access methods: BDAM, BSAM (DAM or SAM in DOS), or BTAM.

DATA/360 is designed for on-line data entry and verification in a local environment only via 3272/3277 Model 1 display stations operating in 2260 mode. DATA/360 operates under OS or DOS, is written in Assembler Language, and incorporates ISAM, SAM, and BTAM for DOS or BDAM, GAM, and QSAM for OS. DATA/360 does not support function keys or dual intensity and may not support protected fields.

DEVICE CONTROL

The 3270 System operates under the control of the program stored at the remote computer. Under program control, the 3270 can execute any of four types of commands: read, write, control, and sense.

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IBM 3270 Information Display System

Read commands initiate transfer of the contents of a device buffer, modified fields within the buffer, buffer addresses or data of fields specified by the selector pen, or the single-byte Attention Identification (AID) code generated by a Program Function or Program Access key. The 3270 responds to two read commands, Read Buffer and Read Modified.

Read Buffer initiates transfer of the contents of the addressed device buffer from the initial or current cursor address.

Read Modified initiates one of three operator-initiated functions: Read Modified, Short Read, or Test Request.

Read. Read Modified initiates the transfer of all fields modified by the keyboard within the device buffer. The fields are transferred in sequence beginning with the first modified field; all nulls are suppressed. However, when completion of a key-modified field is signaled by a selector pen operation, a resulting Read Modified operation will transfer only the address of the modified field. Short Read initiates transfer of the single byte AID Code generated by a Program Attention key. Test Request Read performs the same operation as Read Modified; however, a hardware-generated heading precedes the data. Nulls are suppressed as in Read Modified. Only the special heading is transferred if data has not been keyed.

Write commands condition the display or printer to receive a computer message. Two write commands–Write and Erase/Write–load, format, and selectively erase device buffer data, and can also initiate device operations such as starting the printer, resetting the keyboard, and sounding the audible alarm. Both commands are the same except that Erase/Write erases the entire contents of the device buffer before fresh data is written (beginning at the initial buffer address) and Write modifies existing buffer data.

Control commands initiate control unit and/or device operations. There are four control commands: Copy, Select, Erase All Unprotected, and No Operation. Copy, executed by a 3271 Control Unit only, transfers buffer data from one device to another. Select, executed by a 3272 Control Unit only, transfers buffer data from the selected device to the controller. Erase All Unprotected initializes the addressed device, erasing all unprotected buffer locations and repositioning the cursor to the initial position of the first unprotected field. No Operation, executed by the 3272 Control Unit only, performs no functional operation in the 3272, but can retrieve pending status.

The Sense command, executed by the 3272 Control Unit only, initiates the transfer of a single sense byte from the 3272. The sense byte defines error conditions that have occurred within the subsystem.

Program control by data field provides a flexible formatting capability. A field, identified by an attribute control code (nondisplayed) in the initial character position, can possess any one of several characteristics. The attribute control code can specify a protected or unprotected field (for fixed format operation), beam intensity or brightness (off, normal, or bright), alphameric or numeric (automatic shift) input, auto lock or skip, tab stop, or light pen selection.

The Program Tab feature automatically writes successive data fields into successive unprotected data fields defined by a fixed format.

Character Addressing permits a message to be written beginning at any screen location. Addressing can be interspersed with data throughout a message received from the computer. Character Addressing also permits the selective modification of attribute control codes.

Operator controls are provided for cursor control, editing, and program functions.

Cursor controls position the cursor up, down, left, or right, step-by-step or repetitively if the key is held depressed. The cursor can also be backspaced one character position, moved to the beginning of the next line or beginning of the next unprotected data field, tab to the beginning of the next unprotected data field, and backtab to the beginning of the previous unprotected data field.

Edit controls permit data to be inserted in or deleted from text, character by character. Following data is automatically expanded or contracted.

Program Function keys are used to initiate program functions or identify data that can be transmitted with an accompanying program function code.

COMPONENTS

CRT DISPLAY: Via a 14-inch (diagonal measurement) CRT. Display screen arrangement is dependent on the model display station. Model 1 display screens are arranged in 12 lines of 40 characters each, totaling 480 character positions. Model 2 display screens are arranged in 24 lines of 80 characters each, totaling 1920 character positions.

A character set of 64 ASCII characters, including uppercase alphabetics, numerics, and special symbols, is displayed in green against a dark background. Each character is formed by a 7-by-9 dot matrix.

KEYBOARD: Three keyboard styles are available: typewriter, data entry, and operator console. Keyboard variations include 66- and 78-key versions. The 78-key version of the typewriter keyboard includes 12 Program Function keys. The data entry keyboard provides an IBM 29 Card Punch-style layout and contains 66 keys, including 5 Program Function keys. The operator console keyboard provides an IBM 1052 Model 7-style layout and contains 78 keys, including 12 Program Function keys. Program Function keys are defined by the application program.

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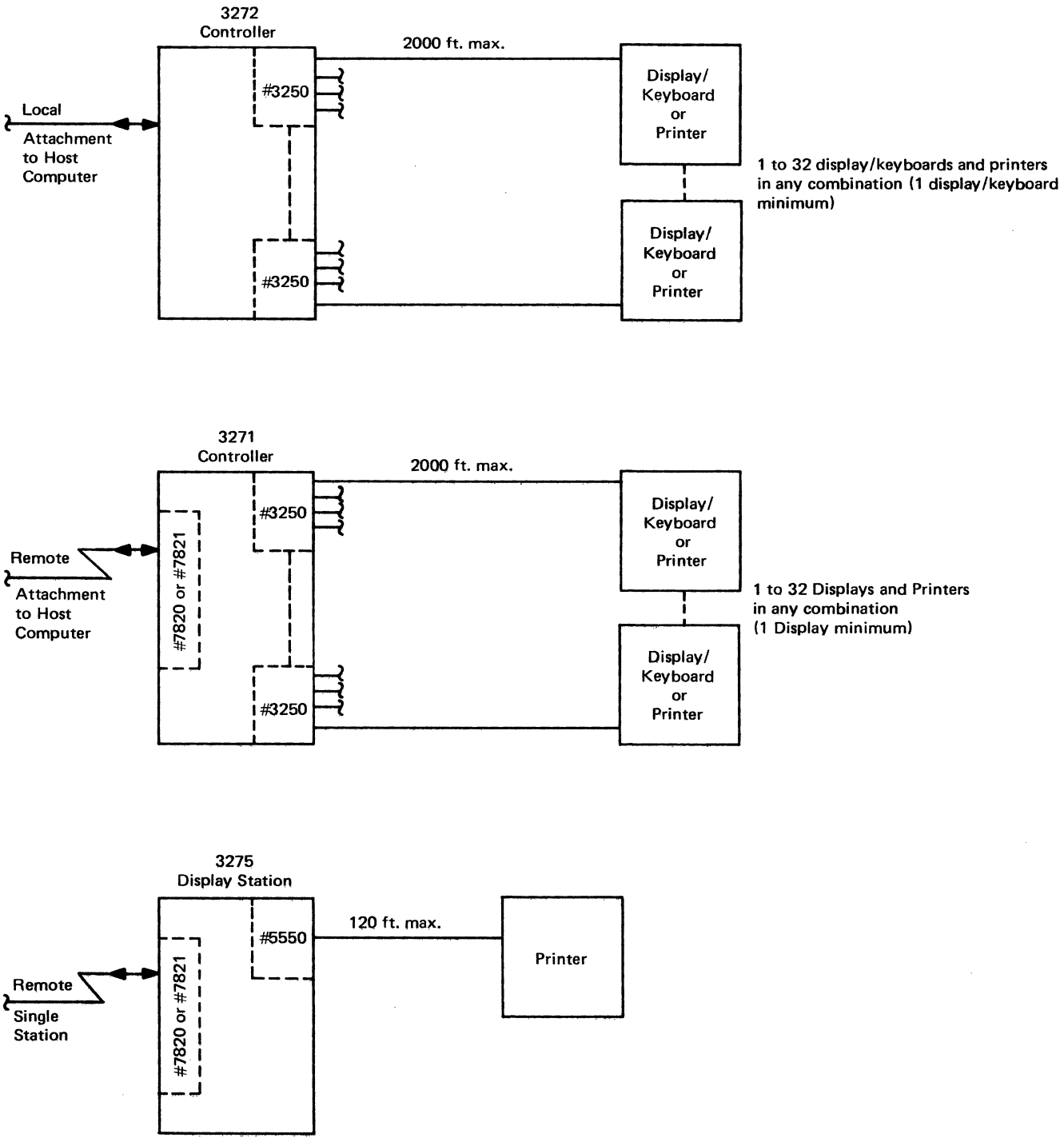
IBM 3270 Information Display System

IBM 3270 CONFIGURATION



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8	189	1920	1,510	45,927	214.50
16	180	1920	2,880	86,541	415.50
32	176	1920	5,620	167,766	817.50

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3272 Model 2; local, 1920 char.	230	7,105	27.00
#1066 Data Analysis – APL; accommodates APL and TN train characters; 3271-2, -12, and 3272-2 only	50	750	1.50
#1200 ASCII Transmission Code; 3271-11, -12 only	10	340	0.50
#1550 Copy-buffer transfer device	NC	NC	NC
#3250 Device Adapter-one for every four units attached	61	927	0.50
#7820 Transmission Speed @ 1200 bps (3271-1 & 2 only)	NC	NC	NC
#7821 Transmission Speed @ 4800/7200 bps (3271-1 & 2 only)	5	173	0.50
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3275 Model 11; 480 char., SDLC	195	6,800	31.50
3275 Model 12; 1920 char., SDLC	222	7,665	37.00
#1200 ASCII Transmission Code; Model 11 & 12 only	10	340	0.50
#3440 Dial; 600/1200 bps over dial network	10	390	1.00
#5500 Integrated Modem; 1200 bps	16	535	2.50
#5501 Integrated Modem; 1200 bps with Auto Answer	21	714	3.00
#5550 Printer Adapter-one maximum	NC	NC	NC
#7820 Transmission Speed; 1200 bps	NC	NC	NC
#7821 Transmission Speed; 4800/7200 bps	5	173	0.50
Display Station Options			
Keyboards–			
#4630 66 Key EBCDIC Typewriter	16	520	4.50
#4631 66 Key EBCDIC Data Entry	16	520	5.50
#4632 78 Key Operator Console	38	1,205	12.50
#4633 78 Key EBCDIC Typewriter	33	1,035	7.50
#4634 66 Key ASCII Typewriter	16	520	4.50
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IBM 3270 Information Display System

Display Station Options (Continued)	Monthly Rental*	Purchase	Monthly Maint.
Keyboards—(Continued)			
#4636 66 Key EBCDIC Data Entry; keypunch layout	$18	$622	$5.50
#6437 66 Key EBCDIC APL/Typewriter; 3277 only	31	961	5.00
#4638 78 Key EBCDIC APL/Typewriter; 3277 only	48	1,490	8.50
#4690 Keyboard Numeric Lock	NC	NC	NC
#1090 Audible Alarm	5	173	0.50
#4600 Operator Ident. Card Reader	16	520	3.00
#6340 Security Keylock	35 SUC	35 SUC	NC
#6350 Selector Light Pen	28	867	1.50
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3286 Model 1; 66 cps, 480 char. buffer; 3271, 3272 only	201	6,775	33.00
3286 Model 2; 66 cps, 1920 char. buffer; 3271-2, -12, and 3272-2 only	213	7,505	33.00
3288 Model 2; 120 lpm, bufferless; 3271-2, -12, and 3272-2 only	427	12,500	87.00
Form Stand; all models	—	54	—

NC—No charge.
SUC—Single use charge.
*Includes maintenance.■

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IBM 5250 Display System Family

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Product Summary

Editor's Note

IBM's latest offerings for midrange display systems include the InfoWindow 3476 and 3477 families of displays and the 5394 Remote Control Unit. IBM no longer markets the 3196 and 3197 display terminals.

Description

IBM displays, printers, and PS/2s can connect directly to a local AS/400 or System/3X host, or communicate with a remote host via a 5394 Remote Control Unit. IBM's 5208 ASCII-5250 Link and 5209 3270-5250 Link Protocol Converters provide host access to ASCII and 3270 devices.

Strengths

The InfoWindow displays offer higher resolution, smaller footprints, and more comfortable keyboards—at a lower price than previous IBM displays.

Limitations

The 5394 Remote Control Unit accommodates only 16 devices and one synchronous host. IDEAssociate's IDEA Concert 394 supports up to 42 devices, and connections to multiple synchronous midrange, synchronous mainframe, and asynchronous hosts. I-O Corporation's Model 8394 Controller supports up to 40 devices.

Competition

Displays: Decision Data Computer Corporation, Memorex Telex, Intelligent Information Systems, IDEAssociates, and I-O Corporation.
Workstation Controllers: IDEAssociates and I-O Corp.

Vendor

International Business Machines Corporation (IBM)
Old Orchard Road
Armonk, New York 10504
Contact your local IBM representative.

Price

Base prices for InfoWindow displays range from $1,020 to $1,665. Prices for the 5394 Remote Control Unit models vary from $3,785 to $4,865. See the Pricing section for the prices of other products.

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Analysis

Product Strategy

In June 1988, IBM introduced the AS/400, a more powerful replacement for IBM's System/3X line of midrange processors. The quick popularity of the AS/400 served as a shot in the arm for both IBM and vendors of 5250-compatible display system products. Determined to maintain its lead in the increasingly competitive display system market, IBM introduced the InfoWindow display family in the second and third quarters of 1989. The InfoWindow 3476 and 3477 displays have smaller footprints than previous IBM models. Keys are spaced closer together on the InfoWindow keyboards, making typing more comfortable. These displays also provide higher resolution while consuming less power. Best of all, IBM has made these new products available at more competitive prices. The Model 3476 sells for as low as $1,020. Entry-level prices for other InfoWindow models range from $1,330 to $1,645.

The price/performance combination offered by these new display terminals poses a major challenge to vendors of IBM-compatible equipment. A fall-out has already begun, leading some to suspect that eventually, only a handful of the most powerful IBM competitors will remain.

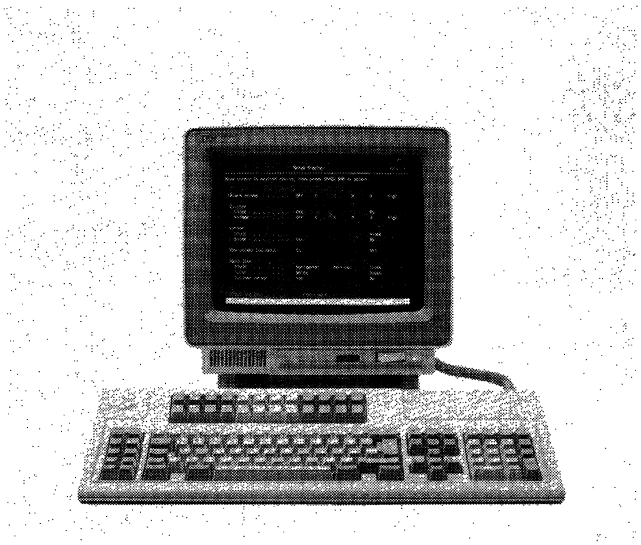
To support communications between the AS/400 and remote devices, IBM also introduced the 5394 Remote Control Unit. The 5394 supports up to 16 displays and/or personal computer workstations—twice the number supported by its predecessor, the 5294. The 5394 also provides CCITT X.21 interfaces as standard equipment for two of its models, and supports up to 64K bps data transmission speed.

Other products that enhance the IBM midrange display system include the Model 5208 ASCII-5250 Link Protocol Converter, which allows ASCII devices to communicate with an IBM System/3X or AS/400 host; the 5209 3270-5250 Link Protocol Converter, which gives 3270 devices access to both System/370 and midrange host environments; and the ROLMbridge 5250 Link Protocol Converter, which provides midrange host access to ASCII devices attached to a ROLM CBX multiplexing switching system. Together, these components carry communications beyond the simple display terminal by supporting interoperability between IBM systems, file sharing, and distributed processing.

Competitive Position

Steadily declining prices for PCs and diskless workstations that can emulate display terminals, has weakened the display terminal market. For now, however, the favorable price/performance offered by displays keeps them in demand. The sheer size of the installed base of display terminals, workstation controllers, and protocol converters also buoys the market.

A spokesperson for IBM estimates that the vendor controls over 80 percent of the midrange system display market. IBM's major competitors include Decision Data Computer Corporation, Memorex Telex, Intelligent Information Systems, I-O Corporation, and IDEAssociates. All five of these vendors market displays that compete in features with IBM's 3196 and 3197 display families (which are no longer actively marketed). Table 1



The InfoWindow 3477 Model FC provides seven-color presentation; three screen arrangements; and features such as 1,500 keystroke record/play capability, a ruler, a setup mode, and a printer port.

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Table 1. Characteristics of the IBM 3197 Model C and Compatible Displays

Product	IBM 3197 Model C	Decision Data 3497-41	IDEAssociates 177C	Intelligent Information Systems IS-397C	I-O Corp. 2477C	Memorex Telex 1197 C2/F2
Screen Size (inches)	14	14	14	14	14	14
No. of Colors	7	7	7	7	7	4 (red, green, blue, and white)
Screen Arrangement(s)	• 24 lines by 80 characters • Split screen mode	• 24 lines by 80 columns	• 26 lines by 80 columns • 29 lines by 132 columns • Split screen mode	• 24 lines by 80 columns • 27 lines by 132 columns • Split screen mode	• 24 lines by 80 columns • 27 lines by 80 columns • Split screen mode	• 24 lines by 80 columns • 27 lines by 80 columns • Split screen mode
Printer Port	Yes	Yes	Yes	Yes	Yes	Yes
Record/Play Capability	Yes	Yes	Yes	Yes	Yes	Yes
Setup Mode	Yes	Yes	Yes	Yes	Yes	Yes
Ruler	No	No	No	Yes	Yes	Yes
Auto Dim	Yes	Yes	No	—	Yes	Yes
Other Features	• Dual sessions • Enhanced diagnostics	• Dual sessions • IBM 3197 Model C and 5292 emulation • Interactive displays allow selection of printer options • 200-keystroke keyboard buffering	• Support for four sessions • Automatic station identification • International keyboard support • Menu-driven printer customization utility	• Dual sessions • 140-character typeahead buffer • Provides help sessions: a user's guide and an error message directory • Includes an alarm clock, a four-function calculator, a telephone directory, and a message diary	• Dual sessions • IBM 5219/4214 printer emulation for ASCII printers • Help screens • Selection of multiple languages on set-up screen • 125-keystroke typeahead buffer	• Dual sessions • Choice of five keyboards • Printer customization capability • Support for a magnetic card reader
Price ($)	1,665 (before its withdrawal in May 1990)	1,625	1,595	1,890	1,595	1,5765

compares the features of IBM 3197 Model C-compatible displays offered by each of these vendors.

In addition to marketing display terminals, I-O Corporation and IDEAssociates offer workstation controllers designed to replace IBM's 5394 Remote Control Unit. I-O's 8394 Controller manages up to 40 display stations or printers, and also supports PC file transfer. IDEA Concert 394 is part of a new family of controllers offered by IDEAssociates and IDEA Courier that support communications across System/370, AS/400, System/3X, and Digital Equipment VAX environments. IDEA Concert connects to as many as six hosts and supports up to 42 displays, printers, and personal computers emulating displays.

IBM has introduced InfoWindow displays for both midrange and mainframe systems, and the repercussions in the 3270 arena are already apparent; some vendors have met IBM head-on, while others have withdrawn from the race. IDEA's movement into the world of multivendor networking is one strategy that several other vendors may take in order to stay competitive with IBM. Memorex Telex, already the leading manufacturer of IBM plug-compatible equipment, signed an agreement in April 1990 to acquire the entire 3270-compatible product line of AT&T. Memorex Telex is also developing a new line of display products that will rival the InfoWindow models. Lee Data,

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Company Profile
IBM Corporation

Corporate Headquarters
Old Orchard Road
Armonk, NY 10504

In Canada
IBM Canada Ltd.,
Markham
3500 Steeles Avenue E.
Markham, ON L3R 2Z1
(416) 474-2111

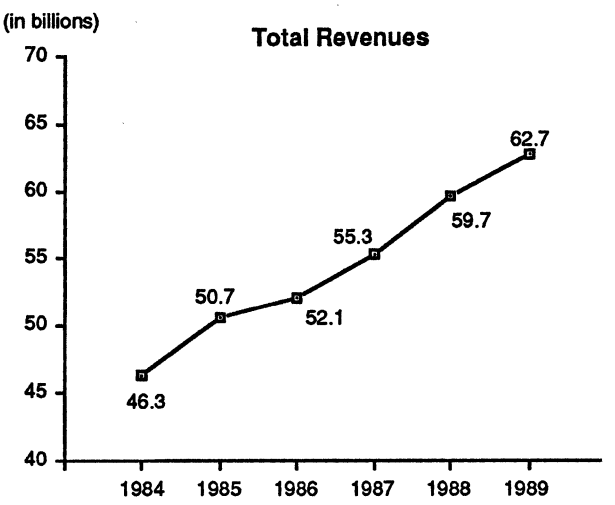
Offices located in other cities throughout Canada

Officers
Chairman/CEO: John Akers
Vice Chairman: Jack D. Kuehler
Sr. VP/Gen. Mgr.: Terry Lautenbach

Company Background
Year Founded: 1914
No. Employees: 400,000 worldwide
COPICS Installed Base: 1,500 worldwide COPICS customers, 450 U.S. customers (estimated).

IBM is one of the oldest manufacturers of computing equipment in the world. It started out in Poughkeepsie, NY as a small company manufacturing clocks for industrial use and later introduced punched card equipment for business accounting functions. According to *Business Week* and *Fortune*, IBM is among the top five industrial corporations by sales volume. It has dominated the mainframe market for over 30 years and has a strong hold on other industry sectors.

Financial Results 1984-1989



Business Overview
IBM designs, manufactures, markets, and services mainframe computer systems and associated peripherals; minicomputer systems and peripherals, microcomputer/personal computer systems; computer system software; data communication controllers and terminals; other communication products such as modems, voice response systems, and voice messaging systems; local area network communications products; and office typewriters. In addition, IBM provides specialized

another unsuccessful competitor in the 3270 market, recently sold its entire line of 3270 display products to Intelligent Information Systems.

The demand for midrange system display products will remain strong, at least for the near future. If trends in this market follow those in the 3270 arena, however, the number of vendors competing against IBM will be considerably less.

Decision Points

The reliability of IBM's equipment and the dependability of its onsite service have always contributed to the vendor's competitive edge.

With the InfoWindow displays, IBM is now setting new standards for ergonomics, performance, and price. The InfoWindow displays have more comfortable keyboards, higher resolution, and built-in support for both twinaxial and twisted pair wire connections. They also include convenience features such as printer ports, easy-to-use setup menus, rulers, and 1,500-keystroke record/play capability.

The limitations, however, of 16 attached devices and one host interface for the 5394 Remote Control Unit provide an opportunity for other vendors to out-perform IBM. IDEAssociates has already capitalized on this limitation, offering up to 42 device ports, and six host connections across 3270, 5250, and Digital VAX environments, with its IDEA Concert 394.

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products and services such as communications carrier and limited time-sharing services; the IBM Information Network, a communications facility with remote storage and computing services; OEM manufacturing of terminals, disk drives, and other products; maintenance service and system supplies; and financial services through its IBM Credit Corp. subsidiary.

Since it introduced its PC line of microcomputers, IBM has had several earning periods where the growth of the company was much less than anticipated. This reflects the competitive nature of this small system market. To compete more effectively in this market, IBM has greatly expanded its software, as well as hardware, efforts and has entered into agreements with several independent software suppliers to provide tools for its entire line of computer products.

For the second time in its history, IBM has confirmed a reduction in its work force. According to a recent announcement, approximately 10,000 people will either take early retirement or accept termination incentives. It was also announced that IBM will take a fourth-quarter write-off of $2.3 billion as a restructuring charge.

Financial Profile

Operations results for 1989 showed that net profits fell 35 percent to $3.76 billion, or $6.47 per share. Revenues, however, increased 5.1 percent to $62.7 billion over 1988. Fourth-quarter earnings fell 75 percent to $591 million, or $1.04 per share, due to the $2.3 billion restructuring charge.

Management Statement

Moving more resources close to customers is a cornerstone of IBM's transformation in the computer industry. To that end, in 1988 IBM undertook the most significant restructuring of its business in more than 30 years, establishing seven lines of business and a new organization—IBM United States. This restructuring continued through 1989 and will continue to be dynamic in order to consistently meet the needs of its customers.

IBM notes that it is managing for the long term and, with the steps it has taken and continues to take, it remains confident about the future of its business.

To help its customers stay competitive, IBM announced its Computer-Integrated Manufacturing (CIM) Architecture. IBM claims its CIM Architecture gives customers a comprehensive strategy to help them integrate information in a consistent manner across the entire enterprise. It addresses the integration challenge in an environment characterized by a variety of computer system technologies, operating systems, and applications. The CIM Architecture focuses on the storage of shared information, its delivery throughout networks, and its presentation to a variety of devices and users. IBM says CIM functions will be implemented for its Systems Application Architecture operating environments and its Advanced Interactive Executive operating environments.

Characteristics

Models: 5394 Remote Control Unit; 5299 Terminal Multiconnector and Twinax to Twisted Pair Adapter (TTPA); InfoWindow 3476 Model EA and EG Displays; InfoWindow 3477 Model FA, FC, FD, and FG Displays; 5208 Model 1 ASCII-5250 Link Protocol Converter; 5209 Model 1 3270-5250 Link Protocol Converter; and ROLMbridge 5250 Link Protocol Converter.

Date Announced: 5394 Remote Control Unit—June 1988; 5299 Terminal Multiconnector and Twinax to Twisted Pair Adapter (TTPA)— October 1987; InfoWindow 3476 Displays—June 1989; InfoWindow 3477 Displays—September 1989; 5208 Model 1 ASCII-5250 Link Protocol Converter—June 1987; 5209 Model 1 3270-5250 Link Protocol Converter—October 1987; ROLMbridge 5250 Link Protocol Converter—June 1986

Date Released: 5394 Remote Control Unit—January 1989; InfoWindow 3476 Displays—June 1989; InfoWindow 3477 Displays—September 1989; older models—usually within six months of announcement.

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Table 2. IBM Display Terminals for Midrange Systems

Models	InfoWindow 3476 Models EA and EG	InfoWindow 3477 Models FA and FG	InfoWindow 3477 Model FC	InfoWindow 3477 Model FD
Screen Color(s)	EA: monochrome amber EG: monochrome green	FA: monochrome amber FG: monochrome green	Seven-color presentation	Monochrome green
Screen Size (inches)	14	14	14	15
Ergonomics	Tilt-and-swivel pedestal, low-profile keyboard	Tilt-and-swivel pedestal, low-profile keyboard	Tilt-and-swivel pedestal, low-profile keyboard	Tilt-and-swivel pedestal, low-profile keyboard
Keyboard(s)	Choice of a 102-key IBM enhanced keyboard or a 122-key typewriter or data entry keyboard	Choice of a 102-key IBM enhanced keyboard or a 122-key typewriter keyboard	Choice of a 102-key IBM enhanced keyboard or a 122-key typewriter keyboard	Choice of a 102-key IBM enhanced keyboard or a 122-key typewriter keyboard
Screen Capacity	1,920 (24 lines by 80 columns)	• 1,920 (24 lines by 80 columns) • 3,360 (split screen—24/18 lines by 80 columns) • 3,564 (27 lines by 80 columns)	• 1,920 (24 lines by 80 columns) • 3,360 (split screen—24/18 lines by 80 columns) • 3,564 (27 lines by 80 columns)	• 1,920 (24 lines by 80 columns) • 3,360 (split screen—24/18 lines by 80 columns) • 3,564 (27 lines by 80 columns)
Resolution (pixels)	402 x 720	508 x 1,180	508 x 1,188	532 x 1,200
Important Features	• Printer port • Support for twinaxial and twisted-pair wire connections • 1,500-keystroke record/play capability • Auto dim • Setup mode	• Printer port • Split screen mode • Support for twinaxial and twisted-pair wire connections • 1,500-keystroke record/play capability • Auto dim • Ruler feature • Setup mode	• Printer port • Split screen mode • Support for twinaxial and twisted-pair wire connections • 1,500-keystroke record/play capability • Auto dim • Ruler feature • Setup mode	• Printer port • Split screen mode • Support for twinaxial and twisted-pair wire connections • 1,500-keystroke record/play capability • Auto dim • Ruler feature • Setup mode

System Components

5394 Remote Control Unit

The 5394 models 1A, 1B, 2A, and 2B manage communications between a System/3X or AS/400 host, and up to 16 printers, display terminals, and personal computers running the Remote 5250 Emulation Program. All models come with three standard ports, each of which can support multiple addressable devices using either the 5299 Terminal Multiconnector, the IBM Cabling System, or Cable-Thru with twinaxial cables. As shown below, each model comes with either an RS-232-D or CCITT X.21 host interface, and is expandable to a maximum of either four or 16 devices.

5394 Model	Maximum No. of Devices	Host Interface
1A	4	RS-232-D
1B	16	RS-232-D
2A	4	CCITT X.21
2B	16	CCITT X.21

5299 Terminal Multiconnector and Twinax to Twisted Pair Adapter (TTPA)

The 5299 Terminal Multiconnector provides a twinax-to-twisted pair wire interface for attachment of up to seven 5250-type display terminals, personal computers, and printers to the 5394 Remote Control Unit. The 5299 has 10 six-pin modular telephone connectors: seven for device attachment, one for connection to the host, and two for problem determination procedures.

Displays

For midrange systems, IBM markets the new InfoWindow 3476 and 3477 display terminals. AS/400 and System/38 hosts support direct connection of displays; remote device communications is supported by the 5394 Remote Control Unit. All InfoWindow displays support access to up to two concurrent full-screen sessions; the 3477 models also support a split screen mode, for the viewing of two sessions simultaneously. Table 2 summarizes other features of the InfoWindow displays.

Protocol Converters

The 5208 Model 1 ASCII-5250 Link Protocol Converter provides 5250 emulation for up to seven local or remote asynchronous displays, personal computers emulating asynchronous displays, and ASCII printers. The 5208 provides one twinaxial interface to an IBM AS/400 host, a System/3X processor, or a 5394 Remote Control Unit; six serial device ports; and one IBM parallel printer port. Asynchronous displays supported by the 5208 include the following:

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- IBM 3101-23
- IBM 3151
- IBM 3161
- IBM 3162
- IBM 3163
- IBM 3164
- ADDS Viewpoint A2
- DEC VT100/220
- Esprit II
- Lear Seigler ADM Terminals
- TeleVideo Models 905, 910, 925, 950, and 955
- Wyse Models WY30 and WY50

The 5208 supports user-modifiable keyboard, character, and attribute mappings, and automatic speed and parity recognition.

The 5209 Model 1 3270-5250 Link Protocol Converter allows up to seven local or remote IBM 3270 displays, printers, and personal computers emulating 3270 displays to communicate with an IBM midrange host, either directly or via the 5394 Remote Control Unit. The 5209 also supports one connection to a 3X74 communications controller, allowing users to "hot key" between one 3270 session and one midrange host session. Users can also interactively assign and reassign printers to either host system. The hosts see printer activation and deactivation as power-on and power-off conditions.

The ROLMbridge 5250 Link Protocol Converter is a card that installs into the cabinet of the ROLM CBX multiplexing switching system, providing a communications link to an IBM midrange host for asynchronous display terminals, printers, and personal computers attached to the ROLMbridge unit. Up to two cards, each accommodating seven asynchronous devices, may be installed into the ROLM CBX. When personal computers are attached, the ROLMbridge card allows complete access to specialized host applications, such as virtual disk storage and local printing. PC users can "hot key" between local processing and the host.

Transmission Specifications

The 5394 Remote Control Unit provides either an RS-232-D or a CCITT X.21 host interface, and three standard twinaxial device ports. Communications between the 5394 and a midrange host are supported in SNA/SDLC (half duplex) or X.25 (duplex) modes. Transmission speeds of 64K bps are supported over leased lines. Over switched facilities, speeds up to 19.2K bps are supported, line conditions permitting.

The 5208 Model 1 ASCII-5250 Link Protocol Converter provides six serial RS-232-C/RS-422-A interfaces for communications with local or remote devices, one IBM parallel printer device port, and one twinaxial interface. Data transmission rates up to 19.2K bps are supported for attached displays.

The 5209 Model 1 3270-5250 Link Protocol Converter provides seven dual-purpose interfaces allowing the attachment of either coaxial cable or the IBM Cabling System; one twinaxial connection to an IBM midrange host; and one coaxial connection to a 3X74 communications controller.

The ROLMbridge 5250 Link Protocol Converter is a ROLM CBX-resident card with one twinaxial interface and seven twisted-pair wire interfaces for asynchronous devices. Up to two cards may be installed to accommodate a maximum of 14 asynchronous devices. The ROLMbridge 5250 supports data transmission speeds up to 19.2K bps.

Pricing

This section lists the purchase prices and annual onsite maintenance charges for the products covered in this report.

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Equipment Prices

		Purch. Price ($)	Annual Maint. ($)
5394 Remote Control Unit			
Model 1A	RS-232-D interface; up to 4 device connections	3,785	259
Model 1B	RS-232-D interface; up to 16 device connections	4,775	259
Model 2A	CCITT X.21 interface; up to 4 device connections	3,890	259
Model 2B	CCITT X.21 interface; up to 16 device connections	4,865	259
5394 Option:	5299 Terminal Connector and Twinax to Twisted Pair Adapter (TTPA)	901	25
Protocol Converters			
5208 Model 1	ASCII-5250 Link Protocol Converter	3,730	298
5209 Model 1	3270-5250 Link Protocol Converter	6,335	430
ROLMbridge 5250	Link Protocol Converter	225	*(1)*
Display Terminals			
3476	Model EA and EG Monochrome Displays	1,020	65
3477	Model FA and FG Monochrome Displays	1,330	65
3477	Model FC Color Display	1,665	80
3477	Model FD Monochrome Display	1,535	65

(1) Information not available. ■

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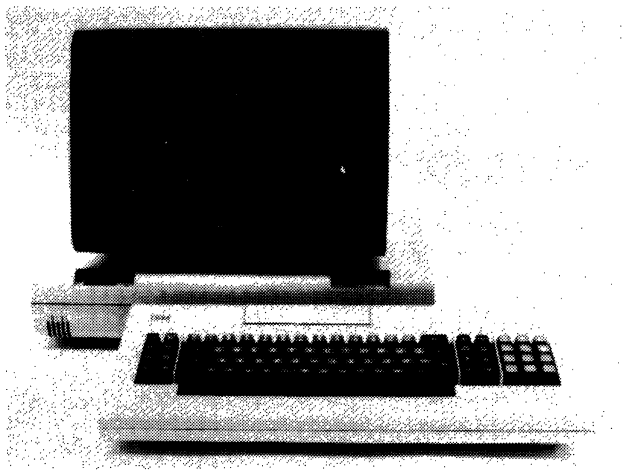
IBM 3101 Display Terminal



The 3101 design provides a number of human engineering features, including a tilt-and-swivel monitor with a concave contrast-enhancing screen filter, a movable keyboard with textured reduced-glare keytops, and 7-by-14 matrix character formation for easy viewing. The display screen measures 12 inches (diagonally), and can display 1,920 characters in a 24-line by 80-character format.

IBM's ASCII display terminal.

Two versions are available; a basic conversational terminal and an enhanced editing/formatting terminal. Standard features include a 1920-character display, an IBM Selectric keyboard with numeric pad and 8 program functions keys, and support for asynchronous communications at speeds up to 9600 bps. A choice of RS-232-C, RS-422A, and 20 mA current loop communications interfacing is provided.

The 3101 is available for purchase only. Prices range from $1,405 to $1,650, depending on level of capability and type of interfacing selected. Quantity discounts are offered for orders of 25 or more units

MANAGEMENT SUMMARY

Introduced in 1979, the IBM 3101 Display Terminal was significant for two reasons: 1) it was the first ASCII terminal offered by IBM, putting the company in a new marketplace that was dominated by independent vendors such as Applied Digital Data Systems and Lear Siegler; and 2), the 3101 was made available for purchase only, with quantity discounts for high-volume purchases and a new maintenance/repair plan that required the user to isolate the problem and mail the faulty component to an IBM Service Center. This second feature marked a trend in the way IBM would market many of its new products, most notably the Personal Computer. As for the first point of significance, the 3101 has not had the impact on the ASCII terminal market that many of the independents feared. Although fairly successful, the 3101 has not claimed a large share of the market.

The 3101 features a modular design composed of three workstation elements: the video, logic, and keyboard elements. The video element is mounted on the logic element, and can be tilted or swiveled by the operator. The keyboard is attached to the logic element via a cable, and is movable. (This modular design has been incorporated into succeeding generations of IBM displays, such as the 3178). Two model groups of the 3101 are offered: basic conversational terminals that provide character-by-character transmission (Models 10, 12, and 13), and fully-featured editing/formatting terminals that provide switch-selectable character and block mode transmission (Models 20, 22, and 23). The only difference among the models within each model group is the communications interfacing; depending on the model, RS-232-C, RS-422-A, and/or 20 mA current loop interfac- ➢

CHARACTERISTICS

VENDOR: International Business Machines Corp., Data Processing Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.

DATA OF ANNOUNCEMENT: October 1979.

DATE OF FIRST DELIVERY: Models 10 and 12—November 1979; Model 13—January 1980; Models 20, 22, and 23—March 1980.

SERVICED BY: IBM.

CONFIGURATION

The 3101 is a Teletype-compatible ASCII terminal that consists of a tilt-and-swivel monitor with a 12-inch 1920-character screen; a detached full-ASCII Selectric keyboard with numeric pad, control keys, and 8 program function keys; and a logic unit. It is available in two model groups: Models 10, 12, and 13 are basic conversational terminals that support character-by-character transmission only; Models 20, 22, and 23 are fully-featured editing/formatting terminals that provide swith-selectable character and block transmission. Within each model group, the three models differ only in the type of communications interfacing provided: Models 10 and 20 have an RS-232-C interface only; Models 12 and 22 provide both an RS-232-C and a 20 mA current loop interface; Models 13 and 23 have both an RS-232-C and the newer RS-422-A interface.

All models are equipped with an auxilary RS-232-C interface port for peripheral I/O devices. IBM provides the Model 3102 Printer for attachment to the terminal via a 10-foot cable.

TRANSMISSION SPECIFICATIONS

The 3101 communicates point-to-point only over switched or non-switched facilities. Transmission is asynchronous, half- ➢

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IBM 3101 Display Terminal

ing is provided. All models feature a 12-inch display with a 1,920-character screen capacity, arranged in 24 lines of 80 characters each.

IBM also provides the 3102 Printer for use with the 3101 Display Terminal. The 3102 is a receive-only thermal printer with a maximum print speed of 40 cps. The 3102 attaches to the 3101 through the auxiliary interface on the 3101.

COMPETITIVE POSITION

IBM's announcement of the 3101, in October 1979, was met with apprehension by some of the independent vendors in the ASCII terminal market. IBM has traditionally had the ability to enter a market late and capture a large market share simply by being IBM (witness the success of IBM's PC). The ASCII terminal market has, however, proven to be an exception. Although it is still a presence, IBM's 3101 has failed to gain the acceptance currently enjoyed by similar terminals marketed by the leaders in this market, namely TeleVideo, Lear Siegler, ADDS, and a few others.

ADVANTAGES AND RESTRICTIONS

A major advantage enjoyed by the 3101 is that, like any IBM product, it carries the IBM label. IBM's long-enjoyed and well-earned reputation for reliability and service assures most of their products of ready acceptance by IBM's huge base of loyal customers. However, the 3101 is somewhat expensive, which may explain why it has not been a rousing success. The $1,405-to-$1,430 price range for the conversational versions (Models 10, 12, and 13) is considerably higher than that of comparable models offered by competitors; the average price of a conversational model manufactured by the independents is currently in the $600-to-$700 area, and still falling. Also, considering the relative simplicity of these products, maintenance service, a major IBM strength, is not such a strong consideration in this market.

USER REACTION

In Datapro's 1982 survey of alphanumeric display terminal users, responses were received from 14 users of the IBM 3101 Display Terminal. These users represented an installed base of 1,446 units. The users were asked to rate their terminals in a number of areas. The following table summarizes the ratings given to the IBM 3101 by these users.

	Excellent	Good	Fair	Poor	WA*
Overall performance	8	4	2	0	3.4
Ease of operation	6	4	2	2	3.0
Display clarity	8	6	0	0	3.6
Keyboard feel & usability	7	5	1	1	3.3
Hardware reliability	7	6	1	0	3.4
Maintenance service/ technical support	6	4	2	2	3.0

*Weighted Average based on a scale of 4.0 for Excellent.

or full-duplex at switch-selectable rates of 110, 150, 200, 300, 600, 1200, 1800, 2400, 4800, and 9600 bps. Full-duplex operation is supported by Models 20, 22, and 23 only. The 10- or 11-unit, 8-level ASCII code is used. Communications options such as half-duplex/full-duplex, stop bits, and parity bits are switch-selectable. Interfacing provided depends on the Model selected: Models 10 and 20 provide an RS-232-C interface only; Models 12 and 22, both an RS-232-C and a 20 mA current loop interface; and Models 13 and 23, both an RS-232-C and an RS-422-A interface. Although a modem cable can be ordered with the 3101 (Models 10 and 20), IBM provides no modems to which the 3101 can connect.

HOST COMPUTER SOFTWARE SUPPORT

The 3101 can communicate with a variety of IBM and non-IBM hosts, including a System/370 or 4300 Processor via a 3704/3705 Communications Controller or an IBM 2701 Data Adapter Unit; an 8100 System; and a Series/1 computer. Operation in Teletype-compatible mode is supported by most of the current IBM system support programs, including BTAM, BTAM-ES, VTAM, ACF/VTAM, TCAM, ACF/TCAM, CICS/VS (with BTAM, ACF/VTAM, or ACF/TCAM via NTO), TSO/TCAM, TSO/ACF/VTAM/NTO, VSPC, VM/370, and DPPX/BASE. Full-function mode operation is supported by BTAM, BTAM-ES, ACF/VTAM R2/R3 with NTO, ACF/TCAM V2 R1/R2/R3, VSPC, CM/370-CMS, and DPPX/BASE.

DEVICE CONTROL

All models permit operator-selection of Teletype 33/35 emulation or full-function mode. Full-function mode enables full cursor controls; character-by-character transmission; erasure to the end of a line or to the end of the screen; erasure of input only; screen clear; automatic scroll (may be disabled); cursor insertion; buffer and addressing; horizontal tab set/reset and tab forward; keyboard lock/unlock; Transparent Mode (i.e. display of 33 ASCII control codes); and Read commands for the customer set-up switch, cursor position, and status. Eight program function keys are provided for storage of user-defined program function sequences.

Models 20, 22, and 23 provide additional functions not available on Models 10, 12, and 13. These include block transmission; character and line insertion/deletion; designation of protected, blinking, high-low intensity, non-display, and modified transmit field attributes via the Program Mode; erasure to the end of a field; a backtab; and a Read Buffer command. Block transmission permits the entry, accumulation, and editing of up to 1920 characters (a full screen) of data prior to transmission.

Printer controls on Models 10, 11, and 12 are limited to operator's turning the printer on/off locally using the 3101's AUX key. Models 20, 21, and 22 also support local and remote commands for printing a specified line, page, or message.

COMPONENTS

3101 DISPLAY: A 12-inch monitor with a screen capacity of 1920 characters arranged in 24 lines of 80 characters. Data is displayed as green characters on a dark background (normal video), or as dark characters on a green background (reverse video). A 25th line is provided for display of machine status messages. A 64-character (upper case only) or 95-character (upper and lower case) ASCII character set is selectable by the operator. Transparent Mode permits the display of the 33 ASCII control characters. Characters are formed using a 7-by-14 dot matrix in a 9-by-16 dot field. A blinking or solid block cursor can be switch-selected. Con-

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IBM 3101 Display Terminal

When asked whether they would recommend the 3101 to other users, 13 of the respondents answered that they would; the remaining user was undecided. □

trast and brightness controls and an audible alarm are standard.

KEYBOARD: A detachable 87-key IBM Selectric keyboard that includes full cursor controls and 12-key numeric pad with 8 embedded program function keys. The keyboard generates the full 128 ASCII set. Most keys are typamatic.

3102 PRINTER: A 40-cps non-impact receive-only thermal serial printer. Features include a 95-character ASCII character set, 5-by-7 dot matrix printing, friction feed, a 1968-character buffer, and 80-character line width, and self-diagnostics. Horizontal and vertical spacing are 10 characters per inch and 6 lines per inch respectively. The 3102 utilizes 8½-inch thermal paper available commercially or through IBM.

PRICING

Models 3101 and 3102 are available for purchase only. A quantity discount is provided on purchases scheduled over an 18-month period. The 3101 discount is 7.5 percent for 25 to 49 units, 15 percent for 50 to 99 units, and 20 percent 100 or more units; the 3102 discount is 7.5 for 25 or more units. A 10 percent discount is offered to educational institutions when the quantity discount is less than 10 percent. A 3-month warranty applies; an annual maintenance contract is available following expiration of the warranty. The units are designed for customer setup and maintainability; if an equipment failure occurs, a Problem Analysis and Resolution Guide instructs the customer in isolation and replacement of the failing part. IBM provides spare parts for all customer-replaceable components and shipping packages for returning parts to IBM for service. Maintenance and repairs are performed only at the nearest IBM Repair Center.

	Purchase Price	Annual Maint. Charge	Machine Element Replacement Charge	Repair Ctr. T&M Minimum Charge*
3101 Display Terminal				
Model 10	$1,405	$70	$180	$64
Model 10 w/Modem Cable	1,470	70	180	64
Model 12	1,430	70	180	64
Model 13	1,430	70	180	64
Model 20	1,625	80	190	64
Model 20 w/Modem Cable	1,690	80	190	64
Model 22	1,650	80	190	64
Model 23	1,650	80	190	64
3102 Printer	1,345	130	—	64

*Time & material minimum charge per element.■

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IBM 3101 Display Terminal

MANAGEMENT SUMMARY

The Model 3101 Display Terminal and its companion, the Model 3102 Printer, are IBM's first entrants into the ASCII terminal marketplace. The Model 3101 is significant in two ways: (1) the offering of an ASCII terminal puts IBM into a highly competitive marketplace that up until now has been exclusively held by the independents; and (2) the product is available for purchase only, with quantity discounts provided for high volume, and maintenance/repair service performed only at IBM Service Centers, to which the customer must mail the faulty part, after isolating and removing it himself. This represents a radical departure from IBM's traditional marketing approach.

IBM has designed the 3101 to compete head-to-head with the current archetypes of the ASCII terminal market, such as the ADDS Regent line, Lear Siegler ADM products and Hazeltine 1400 and 1500 terminals. Two model groups of 3101 terminals are offered: basic conversational terminals that provide character-by-character transmission (Models 10, 12 and 13) and fully-featured editing/formatting terminals that provide switch-selectable character and block transmission (Models 20, 22, and 23). The only difference among the models within a model group is the communications interfacing: depending on the model, RS-232-C, RS-422A, and/or 20 mA current loop interfacing is provided.

The units are designed for customer setup and maintainability. No regularly scheduled preventative maintenance is required. If an equipment failure occurs, a Problem Analysis and Resolution Guide instructs the customer in isolation of the problem by scanning error indicators, performing off-line tests, and checking other ➢

The 3101 design provides a number of human engineering features, including a tilt-and-swivel monitor with a concave contrast-enhancing screen filter, a movable keyboard with textured reduced-glare keytops, and 7-by-14 dot matrix character formation for easy viewing.

IBM's ASCII display terminal.

Two versions are available: a basic conversational terminal and an enhanced editing/formatting terminal. Standard features include a 1920-character display, an IBM Selectric keyboard with numeric pad and 8 program functions keys, and support for asynchronous communications at speeds up to 9600 bps. A choice of RS-232-C, RS-422A, and 20 mA current loop communications interfacing is provided.

The 3101 is available for purchase only. Prices range from $1,355 to $1,590, depending on level of capability and type of interfacing selected. Quantity discounts are offered for orders of 25 or more units.

CHARACTERISTICS

VENDOR: International Business Machines Corp., Data Processing Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.

DATA OF ANNOUNCEMENT: October 1979.

DATE OF FIRST DELIVERY: Models 10 and 12, November 1979; Model 13, January 1980; Models 20, 22, and 23, March 1980.

SERVICED BY: IBM.

CONFIGURATION

The 3101 is a Teletype-compatible ASCII terminal that consists of a tilt-and-swivel monitor with a 12-inch 1920-character screen; a detached full-ASCII Selectric keyboard with numeric pad, control keys, and 8 program function keys; and a logic unit. It is available in two model groups: Models 10, 12, and 13 are basic conversational terminals that support character-by-character transmission only; Models 20, 22, and 23 are fully-featured editing/formatting terminals that provide switch-selectable character and block transmission. Within each model group, the three models differ only in the type of communications interfacing provided: Models 10 and 20 have an RS-232-C interface only; Models 12 and 22 provide both an RS-232-C and a 20 mA current loop interface; Models 13 and 23 have both an RS-232-C and the newer RS-422A interface.

All models are equipped with an auxiliary RS-232C interface port for peripheral I/O devices. IBM provides the Model 3102 Printer for attachment to the terminal via a 10-foot cable.

TRANSMISSION SPECIFICATIONS

The 3101 communicates point-to-point only over switched or non-switched facilities. Transmission is asynchronous, half- or full-duplex at switch-selectable rates of 110, 150, 200, 300, 600, 1200, 1800, 2400, 4800, and 9600 bps. Full-duplex operation is supported by Models 20, 22 and 23 only. The ➢

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IBM 3101 Display Terminal

visual indications, and in replacement of the failing part. IBM offers for purchase spare parts for all major components. Parts requiring maintenance or repair must be shipped to the nearest IBM Service Center.

USER REACTION

Datapro's December 1980 survey of alphanumeric display terminal users yielded responses from four users of the IBM 3101, who reported on 522 units. All of the terminals had been installed for at least one year. The ratings are as follows:

	Excellent	Good	Fair	Poor	WA*
Overall Performance	1	3	0	0	3.3
Ease of Operation	0	3	1	0	2.8
Display Clarity	3	1	0	0	3.8
Keyboard Feel & Usability	2	1	1	0	3.3
Hardware Reliability	2	2	0	0	3.5
Maintenance Service	1	1	0	0	**
Technical Support	1	0	2	0	2.7

*Weighted Average based on a scale of 4.0 for Excellent.
**Weighted Average invalid for less than three responses.

Two users declined to rate the maintenance service, since the terminals are not covered by a maintenance contract (problems with the terminals are isolated by the user, who then ships the defective part to the nearest IBM service center for replacement). This "user-fixability" was hailed by one user as a product strength. All of the users contacted felt their 3101s were performing well. "Easy to operate" and "very attractive display" were used to describe the unit. Another user felt the terminal's transparency feature, which allowed him to see the actual control codes on the screen, was excellent.

Mixed reactions were received on the subject of the product's keyboard. Two of the users felt the keyboard was well set up, and had a good feel to it. However, two problems were mentioned. One user described a "very serious" problem he was having a conjunction with high-speed data entry. According to this user, when one of his operators struck two keys at once, both keys would register with the computer, but only the first key struck would show up on the screen. This resulted in the operator not knowing when a mistake was made, and was enough of a drawback for the user to indicate he would not recommend the terminal to others. Another user cited the absence of a "cap lock" feature which made it very inconvenient to program in upper and lower case.

One user stated that there was a glare problem with the screen, and that the shield sold to combat this problem reflected light as badly as the screen. He also felt, however, that the terminal screen provided good contrast.□

10- or 11-unit, 8-level ASCII code is used. Communications options such as half-duplex/full-duplex, stop bits, and parity bits are switch-selectable. Interfacing provided depends on the Model selected: models 10 and 20 provide an RS-232-C interface only; Models 12 and 22, both an RS-232-C and a 20 mA current loop interface; and Models 13 and 23, both an RS-232-C and an RS-422A interface. Although a modem cable can be ordered with the 3101 (Models 10 and 20), IBM provides no modems to which the 3101 can connect.

HOST COMPUTER SOFTWARE SUPPORT

The 3101 can communicate with a variety of IBM and non-IBM hosts, including a System/370 or 4300 Processor via a 3704/3705 Communications Controller or an IBM 2701 Data Adapter Unit; an 8100 System; and a Series/1 computer. Operation in Teletype-compatible mode is supported by most of the current IBM system support programs, including BTAM, BTAM-ES, VTAM, ACF/VTAM, TCAM, ACF/TCAM, CICS/VS (with BTAM, ACF/VTAM, or ACF/TCAM via NTO), TSO/TCAM, TSO/ACF/VTAM/NTO, VSPC, VM/370, and DPPX/BASE. Full-function mode operation is supported by BTAM, BTAM-ES, ACF/VTAM R2/R3 with NTO, ACF/TCAM V2 R1/R2/R3, VSPC, VM/370-CMS, and DPPX/BASE.

DEVICE CONTROL

All models permit operator-selection of Teletype 33/35 emulation or full-function mode. Full-function mode enables full cursor controls; character-by-character transmission; erasure to the end of a line or to the end of the screen; erasure of input only; screen clear; automatic scroll (may be disabled); cursor insertion; buffer and addressing; horizontal tab set/reset and tab forward; keyboard lock/unlock; Transparent Mode (i.e. display of 33 ASCII control codes); and Read commands for the customer set-up switch, cursor position, and status. Eight program function keys are provided for storage of user-defined program function sequences.

Models 20, 22 and 23 provide additional functions not available on Models 10, 12 and 13. These include block transmission; character and line insertion/deletion; designation of protected, blinking, high-low intensity, non-display, and modified transmit field attributes via the Program Mode; erasure to the end of a field; a backtab; and a Read Buffer command. Block transmission permits the entry, accumulation, and editing of up to 1920 characters (a full screen) of data prior to transmission.

Printer controls on Models 10, 11, and 12 are limited to operator's turning the printer on/off locally using the 3101's AUX key. Models 20, 21, and 22 also support local and remote commands for printing a specified line, page, or message.

COMPONENTS

3101 DISPLAY: A 12-inch monitor with a screen capacity of 1920 characters arranged in 24 lines of 80 characters. Data is displayed as green characters on a dark background (normal video), or as dark characters on a green background (reverse video). A 25th line is provided for display of machine status messages. A 64-character (upper case only) or 95-character (upper and lower case) ASCII character set is selectable by the operator. Transparent Mode permits the display of the 33 ASCII control characters. Characters are formed using a 7-by-14 dot matrix in a 9-by-16 dot field. A blinking or solid block cursor can be switch-selected. Contrast and brightness controls and an audible alarm are standard.

KEYBOARD: A detachable 87-key IBM Selectric keyboard that includes full cursor controls and a 12-key numeric pad with 8 embedded program function keys. The keyboard generates the full 128 ASCII set. Most keys are typamatic.

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IBM 3101 Display Terminal

3102 PRINTER: A 40-cps non-impact receive-only thermal serial printer. Features include a 95-character ASCII character set, 5-by-7 dot matrix printing, friction feed, a 1968-character buffer, and 80-character line width, and self-diagnostics. Horizontal and vertical spacing are 10 characters per inch and 6 lines per inch respectively. The 3102 utilizes 8½-inch thermal paper available commercially or through IBM.

PRICING

Models 3101 and 3102 are available for purchase only. A quantity discount is provided on purchases scheduled over an 18-month period. The 3101 discount is 7.5 percent for 25 to 49 units, 15 percent for 50 to 99 units, and 20 percent for 100 or more units; the 3102 discount is 7.5 percent for 25 or more units. A 10 percent discount is offered to educational institutions when the quantity discount is less than 10 percent. A 3-month warranty applies; an annual maintenance contract is available following expiration of the warranty. The units are designed for customer setup and maintainability; if an equipment failure occurs, a Problem Analysis and Resolution Guide instructs the customer in isolation and replacement of the failing part. IBM provides spare parts for all customer-replaceable components and shipping packages for returning parts to IBM for service. Maintenance and repairs are performed only at the nearest IBM Repair Center.

		Purchase Price	Annual Maint. Charge
3101	Display Terminal		
	Model 10	$1,355	$ 70
	Model 10 w/Modem Cable	1,420	70
	Model 12	1,380	70
	Model 13	1,380	70
	Model 20	1,565	80
	Model 20 w/Modem Cable	1,630	80
	Model 22	1,590	80
	Model 23	1,590	80
3102	Printer	1,295	130
	Modem Cable	65	—

Component Spares	Purchase Price	
	Component*	Shipping Package
Video Element	$315	$ 7.50
Logic Element, Model 10	660	14.00
Logic Element, Models 12 & 13	685	14.00
Logic Element, Model 20	860	14.00
Logic Element, Model 22 & 23	885	14.00
Keyboard Element	320	24.00
Multiple Element Shipping Package	—	2.50
Entire Display Shipping Package	—	48.00
Thermal Print Head	42.50	—

*Includes 3-month warranty.■

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IBM 3101 Display Terminal

New Product Announcement

On April 2, 1980, IBM announced the following operating capabilities available with the 3101 Display Terminal:

- When operating as a Teletype Model ASR 33/35 teletypewriter substitute, the 3101 is supported on both non-switched and switched lines at speeds up to 1200 bps with ACF/NCP/VS or with the Partitioned Emulation Program Extended Features Programming RPQ.

  The Network Control Program (NCP) Release 2.1 enhancements applicable to the 3101 when the 3101 is operating as a Model ASR 33/35 substitute include: 1) CPT-TWX 33/35 operation on non-switched lines. Previously, operation was limited to switched lines; and 2) CPT-TWX 33/35 operation at speeds up to 1200 bps on switched and non-switched lines. Previously operation was limited to 600 bps.

- IMS/VS supports the 3101 on switched lines via BTAM when the 3101 is operating as a Model ASR 33/35 teletypewriter substitute with a 3704 or 3705 under the Emulation program.

- The 3101 can be attached directly (without a modem) to a 3704 or 3705 using the EIA RS-232-C interface via Line Set Type 1C, up to a distance of 40 feet.

All of the above mentioned capabilities are not immediately available. The planned availability schedules for those features not yet available is as follows:

- November 1980—Access method support available includes ACF/TCAM V2 R3 (with or without NTO) and ACR/VTAM R3 (with NTO).

- May 1981—ACF/NCP/VS Release 3. This product requires SSP for ACF/NCP/VS Release 3. NTO support for ACF/NCP/VS Release 3 is via NTO Release 2 which is planned for availability February 1981.

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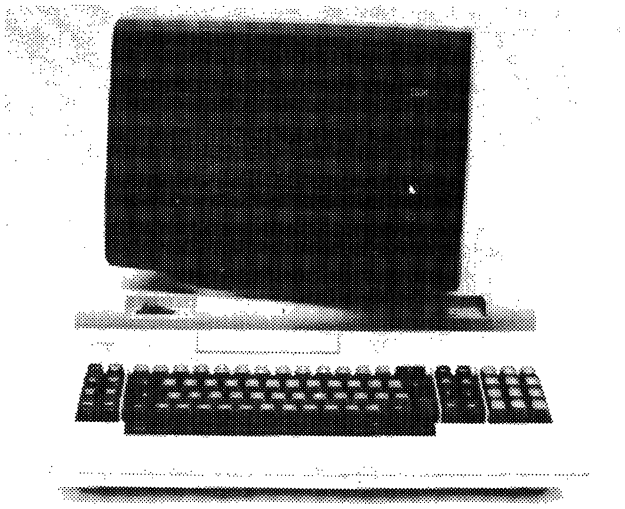
IBM 3101 Display Terminal



The 3101 design provides a number of human engineering features, including a tilt-and-swivel monitor with a concave contrast-enhancing screen filter, a movable keyboard with textured reduced-glare keytops, and 7-by-14 dot matrix character formation for easy viewing.

IBM's first Teletype-compatible ASCII terminal.

Two versions are available: a basic conversational terminal and an enhanced editing/formatting terminal. Standard features include a 1920-character display, an IBM Selectric keyboard with number pad and 8 program functions keys, and support for asynchronous communications at speeds up to 9600 bps. A choice of RS-232C, RS-422A, and 20 mA current loop communications interfacing is provided.

The 3101 is available for purchase only. Prices range from $1,295 to $1,520 depending on level of capability and type of interfacing selected. Quantity discounts are offered for orders of 25 or more units.

MANAGEMENT SUMMARY

The Model 3101 Display Terminal and its companion, the Model 3102 Printer, are IBM's first entrants into the ASCII terminal marketplace. The Model 3101 is significant in two ways: (1) the offering of an ASCII terminal puts IBM into a highly competitive marketplace that up until now has been exclusively held by the independents; and (2) the product is available for purchase only, with quantity discounts provided for high volume, and maintenance/repair service performed only at IBM Service Centers, to which the customer must mail the faulty part, after isolating and removing it himself. This represents a radical departure from IBM's traditional marketing approach.

IBM has designed the 3101 to compete head-to-head with the current archetypes of the ASCII terminal market, such as the ADDS Regent line, Lear Siegler ADM products and Hazeltine 1400 and 1500 terminals. Two model groups of 3101 terminals are offered: basic conversational terminals that provide character-by-character transmission (Models 10, 12 and 13) and fully-featured editing/formatting terminals that provide switch-selectable character and block transmission (Models 20, 22, and 23). The only difference among the models within a model group is the communications interfacing: depending on the model, RS-232C, RS-422A, and/or 20 mA current loop interfacing is provided.

The units are designed for customer setup and maintainability. No regularly scheduled preventative maintenance is required. If an equipment failure occurs, a Problem Analysis and Resolution Guide instructs the customer in isolation of the problem by scanning error

CHARACTERISTICS

VENDOR: International Business Machines Corp., Data Processing Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.

DATE OF ANNOUNCEMENT: October 1979.

DATE OF FIRST DELIVERY: Models 10 and 12, November 1979; Model 13, January 1980; Models 20, 22, and 23, March 1980.

SERVICED BY: IBM.

CONFIGURATION

The 3101 is a Teletype-compatible ASCII terminal that consists of a tilt-and-swivel monitor with a 12-inch 1920-character screen; a detached full-ASCII Selectric keyboard with numeric pad, control keys, and 8 program function keys; and a logic unit. It is available in two model groups: Models 10, 12, and 13 are basic conversational terminals that support character-by-character transmission only; Models 20, 22, and 23 are fully-featured editing/formatting terminals that provide switch-selectable character and block transmission. Within each model group, the three models differ only in the type of communications interfacing provided: Models 10 and 20 have an RS-232C interface only; Models 12 and 22 provide both an RS-232C and a 20 mA current loop interface; Models 13 and 23 have both an RS-232C and the newer RS-422A interface.

All models are equipped with an auxiliary RS-232C interface port for peripheral I/O devices. IBM provides the Model 3102 Printer for attachment to the terminal via a 10-foot cable.

TRANSMISSION SPECIFICATIONS

The 3101 communicates point-to-point only over switched or non-switched facilities. Transmission is asynchronous, half- or full-duplex at switch-selectable rates of 110, 150, 200, 300, 600, 1200, 1800, 2400, 4800, and 9600 bps. Full-duplex operation is supported by Models 20, 22 and 23 only. The

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IBM 3101 Display Terminal

indicators, performing off-line tests, and checking other visual indications, and in replacement of the failing part. IBM offers for purchase spare parts for all major components. Parts requiring maintenance or repair must be shipped to the nearest IBM Service Center; IBM field service is limited to problem analysis and part replacement, using the same documentation as that supplied to the customer and customer-supplied spares, and is billed on an hourly (per call) basis.□

10- or 11-unit, 8-level ASCII code is used. Communications options such as half-duplex/full-duplex, stop bits, and parity bits are switch-selectable. Interfacing provided depends on the Model selected: Models 10 and 20 provide an RS-232C interface only; Models 12 and 22, both an RS-232C and a 20 mA current loop interface; and Models 13 and 23, both an RS-232C and an RS-422A interface. Although a modem cable can be ordered with the 3101, IBM provides no modems to which the 3101 can connect.

HOST COMPUTER SOFTWARE SUPPORT

The 3101 can communicate with a variety of IBM and non-IBM hosts, including a System/370 or 4300 Processor via a 3704/3705 Communications Controller or an IBM 2701 Data Adapter Unit; an 8100 System; and a Series/1 computer. Operation in Teletype-compatible mode is supported by most of the current IBM system support programs, including BTAM, BTAM-ES, VTAM, ACF/VTAM, TCAM, ACF/TCAM, CICS/VS (with BTAM, ACF/VTAM, or ACF/TCAM via NTO), TSO/TCAM, TSO/ACF/VTAM/NTO, VSPC, VM/370, and DPPX/BASE. Full-function mode operation is supported by BTAM, BTAM-ES, ACF/VTAM R2/R3 with NTO, ACF/TCAM V2 R1/R2/R3, VSPC, VM/370-CMS, and DPPX/BASE.

DEVICE CONTROL

All models permit operator-selection of Teletype 33/35 emulation or full-function mode. Full-function mode enables full cursor controls; character-by-character transmission; erasure to the end of a line or to the end of the screen; erasure of input only; screen clear; automatic scroll (may be disabled); cursor insertion; buffer addressing; horizontal tab set/reset and tab forward; keyboard lock/unlock; Transparent Mode (i.e. display of 33 ASCII control codes); and Read commands for the customer set-up switch, cursor position, and status. Eight program function keys are provided for storage of user-defined program function sequences.

Models 20, 22, and 23 provide additional functions not available on Models 10, 12 and 13. These include block transmission; character and line insertion/deletion; designation of protected, blinking, high-low intensity, non-display, and modified transmit field attributes via the Program Mode; erasure to the end of a field; a backtab; and a Read Buffer command. Block transmission permits the entry, accumulation, and editing of up to 1920 characters (a full screen) of data prior to transmission.

Printer controls on Models 10, 11, and 12 are limited to operator's turning the printer on/off locally using the 3101's AUX key. Models 20, 21, and 22 also support local and remote commands for printing a specified line, page, or message.

COMPONENTS

3101 DISPLAY: A 12-inch monitor with a screen capacity of 1920 characters arranged in 24 lines of 80 characters. Data is displayed as green characters on a dark background (normal video), or as dark characters on a green background (reverse video). A 25th line is provided for display of machine status messages. A 64-character (upper case only) or 95-character (upper and lower case) ASCII character set is selectable by the operator. Transparent Mode permits the display of the 33 ASCII control characters. Characters are formed using a 7-by-14 dot matrix in a 9-by-16 dot field. A blinking or solid block cursor can be switch-selected. Contrast and brightness controls and an audible alarm are standard.

KEYBOARD: A detachable 87-key IBM Selectric keyboard that includes full cursor controls and a 12-key numeric pad with 8 embedded program function keys. The keyboard generates the full 128 ASCII set. Most keys are typamatic.

3102 PRINTER: A 40-cps non-impact receive-only thermal serial printer. Features include a 95-character ASCII character set, 5-by-7 dot matrix printing, friction feed, a 1968-character buffer, an 80-character line width, and self-diagnostics. Horizontal and vertical spacing are 10 characters per inch and 6 lines per inch respectively. The 3102 utilizes 8½-inch thermal paper available commercially or through IBM.

PRICING

Models 3101 and 3102 are available for purchase only. A quantity discount is provided on purchases scheduled over an 18-month period. The 3101 discount is 7.5 percent for 25 to 49 units, 15 percent for 50 to 99 units, and 20 percent for 100 or more units; the 3102 discount is 7.5 percent for 25 or more units. A 10 percent discount is offered to educational institutions when the quantity discount is less than 10 percent. A 3-month warranty applies; an annual maintenance contract is available following expiration of the warranty. The units are designed for customer setup and maintainability; if an equipment failure occurs, a Problem Analysis and Resolution Guide instructs the customer in isolation and replacement of the failing part. IBM provides spare parts for all customer-replaceable components and shipping packages for returning parts to IBM for service. Maintenance and repairs are performed only at the nearest IBM Repair Center; on-site IBM field service is limited to problem analysis using the same documentation available to the customer and part replacement with a customer-supplied spare, and is billed on an hourly (per call) basis.

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IBM 3101 Display Terminal

		Purchase Price	Annual Maint. Charge
3101	Display Terminal		
	Model 10	$1,295	$ 70
	Model 12	1,320	70
	Model 13	1,320	70
	Model 20	1,495	80
	Model 22	1,520	80
	Model 23	1,520	80
3102	Printer	1,295	130
	Modem Cable	65	—

Component Spares	Purchase Price	
	Component*	Shipping Package
Video Element	$ 315	$ 7.50
Logic Element, Model 10	660	14.00
Logic Element, Models 12 & 13	685	14.00
Logic Element, Model 20	860	14.00
Logic Element, Model 22 & 23	885	14.00
Keyboard Element	320	24.00
Multiple Element Shipping Package	—	2.50
Entire Display Shipping Package	—	48.00
Thermal Print Head	42.50	—

*Includes 3-month warranty.■

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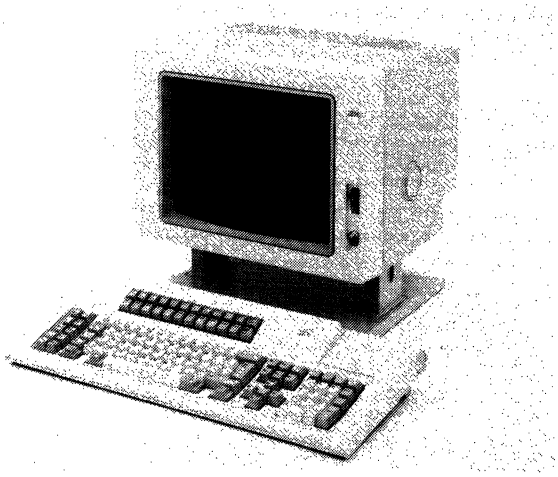
IBM 5250 Information Display System



The 3180 Model 2 Display Station is a functional equivalent to the older 5251 Model 11 and 5291 Model 1 displays. The 3180 includes a 15-inch display that can be tilted, swiveled, and adjusted for height; the unit's keyboard is detachable, and features a low-profile design. The 3180 was IBM's first display terminal supported by both the System/370 (3180 Model 1) and System/36 and System/38 (3180 Model 2) processor families. The recently introduced 3179 Model 2 Color Display Station provides the same support.

MANAGEMENT SUMMARY

UPDATE: *New additions to the 5250 product line, since the last version of this report, include the 3179 Color Display Station Model 2, 3196 Display Station Models A10, B10, A20, and B20, and 4245 Printer Models T12 and T20. The 3196 Display Stations carry the lowest price ($1,295) ever offered by IBM for display terminals in this product family. We have also provided updated pricing in this version of the report.*

IBM's 5250 Information Display System is a family of display stations, remote controllers, and printers, designed for interactive data entry and inquiry applications. Originally announced for use with the System/34, the 5250 components can now also be used with the System/36, System/38, and Series/1. Some of the older components, including the 5251 Display Station Models 1 and 2, 5291 Display Station Model 1, and the 5252 Dual Display Station, have been dropped from the product line. A new generation of display stations, including color models, has been added, as has a remote control unit, the 5294.

The components that currently make up the 5250 Information Display System include: the 5251 Display Station Models 11, 12, and 999; 5291 Display Station Model 2; 5292 Color Display Station Models 1 and 2; 3179 Color Display Station Model 2 (200 and 220); 3180 Display Station Model 2 (210, 215, and 220); 3196 Display Station Models A10, B10, A20, and B20; 5294 Remote Control Unit Model 1; 4245 Printer Models T12 and T20; 5219 Printer Models D01 and D02; 5224 Printer Models 1 and 2; ➢

The 5250 Information Display System is a family of components for use with IBM's System/34, System/36, System/38, and Series/1. The family consists of a number of display stations (monochrome and color), a remote control unit, and several printer models.

MODELS: 5251 Display Station Models 11, 12, and 999; 5291 Display Station Model 2; 5292 Color Display Station Models 1 and 2; 3179 Color Display Station Model 2; 3180 Display Station Model 2; 3196 Display Station Models A10, B10, A20, and B20; 5294 Remote Control Unit Model 1; 4245 Printer Models T12 and T20; 5219 Printer Models D01 and D02; 5224 Printer Models 1 and 2; 5225 Printer Models 1, 2, 3, and 4; 5256 Printer Models 1, 2, and 3.
DISPLAY: All display stations, except the 3179 and 3180, feature a 12-inch screen with a 1,920-character capacity. The 3179 features a 14-inch display, while the 3180 contains a 15-inch display and selectable 1,920-/3,564-character screen capacities. 3179 Model 2 and 5292 Models 1 and 2 feature a color display; graphics capabilities are available on 5292 Model 2. The 5292 displays are tiltable; tilt/swivel adjustments are available on the 5291 Model 2. The 3179 Model 2, 3180 Model 2, and 3196 Models A10, B10, A20, and B20 include tilt, swivel, and height adjustments.
KEYBOARD: All displays feature a detachable, typewriter-style keyboard. A choice of three keyboard versions are available for the 5251 Models 11, 12, and 999. The 5291, 5292, 3179, 3180, and 3196 displays feature a low-profile, adjustable keyboard.
COMPETITION: Decision Data, Memorex, and General Business Technology. A number of vendors supply terminals that emulate IBM 5250 terminals when used with a protocol converter.
PRICE: Display station prices range from $1,295 to $6,995.

CHARACTERISTICS

VENDOR: International Business Machines Corporation (IBM), Old Orchard Road, Armonk, NY 10504. Contact your local IBM representative.

DATE OF ANNOUNCEMENT: April 1977.

DATE OF FIRST DELIVERY: January 1978. ➤

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5225 Printer Models 1, 2, 3, and 4; and 5256 Printer Models 1, 2, and 3.

The 5251 Display Station Models 11 and 12 are original members of the 5250 family. The 5251 Model 12 is designed for remote communications with the System/34, System/36, and System/38 in SDLC mode. Up to four or eight additional workstations may be attached to the Model 12 using the Cluster or Dual Cluster features. The 5251 Model 11 can be attached directly to a System/34, System/36, System/38, or Series/1. Model 999 is a customized version of the Model 11, designed for ease of order entry.

The second generation 5291 and 5292 Display Stations are plug-compatible replacements for the 5251 Model 11. The 5291 contains all of the features of the 5251 Model 11; it adds Cable Thru and an adjustable audible alarm as standard features, and incorporates a new, ergonomically improved display design that includes a tilt/swivel display and a low-profile, detachable keyboard. The 5292 Models 1 and 2 are color displays. Model 1 is an alphanumeric model that displays seven colors: red, green, turquoise, yellow, pink, blue, and white. Model 2 provides graphics as well as alphanumeric capabilities. Business graphics can be displayed in eight colors: black plus seven colors from a palette of 512. The 5292 display features the same design improvements as the 5291; however, it cannot be attached to the Series/1.

The 3180 Display Station was IBM's first terminal that crossed over between the 3270 and 5250 product lines. Model 1 provides emulation of the 3278 display station, while Model 2 is the 5251 emulator. The 3180 provides a 15-inch screen, with tilt, swivel, and elevate capabilities. IBM has introduced a second terminal, the 3179 Model 2, that bridges the 5250 and 3270 lines. The 3179 Model 2 is plug-compatible with the 5292 Model 1 color display. It is functionally equivalent to the 3180 Model 2, with the following exceptions: seven-color display capability; a 14-inch screen; and an 80-column screen capacity only. The older 3179 Model 1 is compatible with the IBM 3279 and operates as part of the 3270 Information Display System.

The newest member of the 5250 display station line is the 3196 Display Station. The 3196 carries the lowest price tag of any terminal in the product line—$1,295. Four models of the 3196 are available, providing a choice of keyboards and either local connection to the System/36 and System/38, or remote attachment to the 5294 controller.

IBM also offers the IBM PC 5250 Emulation Program, a software program that allows the IBM Personal Computer or PC XT to be attached to a System/34, System/36, System/38, or 5294 control unit while emulating a 5251 Model 12 Display Station. An emulation adapter is required. A new capability added by IBM allows the use of an IBM PC, Portable PC, PC XT, or PC AT as the system console for the System/36. The PCs must be configured with either the Enhanced Display Station Adapter and the Enhanced 5250 Emulation Program, or with the Display Station Emulation Adapter and the 5250 Emulation Program.

NUMBER DELIVERED TO DATE: Approximately 1,000,000 terminals (including older models).

SERVICED BY: IBM.

CONFIGURATION

The 5250 Information Display System is a family of display stations, control units, and printers for use with the IBM System/34, System/36, System/38, and Series/1 computer systems. The following paragraphs list the components that make up the 5250 family and the rules that govern 5250 configurations:

***5251 Display Station Model 11*—features a 1,920-character screen capacity, and attaches directly to the System/34, System/36, System/38, Series/1, 5294 Remote Control Unit, or 5251 Models 2 (no longer available) and 12. It also serves as the system console for the System/34.**

***5251 Display Station Model 999*—identical features as those found on the 5251 Model 11, except that Cable Thru is standard.**

***5251 Display Station Model 12*—features a 1,920-character screen capacity, and provides remote communications capability with the System/34, System/36, and System/38 in SNA/SDLC mode. Model 12 is not supported on the Series/1. Up to eight additional workstations can be attached optionally to the Model 12 in a cluster arrangement, using the Cluster or Dual Cluster features. The 5251 Model 12 provides for the attachment of the following workstations: 5251 Display Station Models 11 and 999; 5291 Display Station Models 1 (no longer available) and 2; 5292 Color Display Station Models 1 and 2; 5219 Printer Models D01 and D02; 5224 Printer Models 1 and 2; 5225 Printer Models 1, 2, 3, and 4; 5256 Printer Models 1, 2, and 3; 5150 Personal Computer (with 5250 Emulation Program) and 5160 PC XT (with 5250 Emulation Program).**

***5291 Display Station Model 2*—has a 1,920-character screen capacity, and attaches directly to the System/34, System/36, System/38, 5294 Remote Control Unit, or 5251 Models 2 (no longer available) and 12. It can also serve as the system console for System/34 and System/36. The 5291 is a replacement for the 5251 Model 11, and supersedes the 5291 Model 1. It features an improved terminal design similar to that found on the 3180.**

***5292 Color Display Station Model 1*—has a 1,920-character screen capacity and can display seven colors: red, green, turquoise, yellow, pink, blue, and white. The 5292 Model 1 attaches directly to the System/34, System/36, System/38, 5294 Control Unit, or 5251 Models 2 (no longer available) and 12. It can also serve as the system console for the System/34 and System/36.**

***5292 Color Display Station Model 2*—has a 1,920-character screen capacity, supports business graphics, and can display eight colors (black plus seven others from a palette of 512). The 5292 Model 2 attaches directly to the System/34, System/36, System/38, 5294 Remote Control Unit, or 5251 Models 2 (no longer available) and 12. (When attached to the System/38, the 5292 Model 2 does not operate in graphics mode, but rather as a 5292 Model 1.) It can also serve as the system console for the System/34 and System/36.**

***3179 Color Display Station Model 2*—has a 1,920-character screen capacity, and can display seven colors (red, green, blue, white, yellow, turquoise, and pink. The 3179 Model 2**

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COMPETITIVE POSITION

IBM's competition in the 5250 emulation market is somewhat limited; a study by International Data Corporation (Framingham, MA) showed that IBM held a 96 percent share of the 5250-type terminal market at the end of 1983. Decision Data Corporation is IBM's chief competition in the System/34, System/36, and System/38 workstation market, offering the 3751-11, 3761-01, and 3791-01 display stations, as well as a variety of printers, as replacements for the 5250 components. Decision Data has also introduced a multifunction computing workstation, the 5021-01, for use as part of a 5250 configuration. Memorex, another manufacturer of IBM-compatible products, offers the 2051-11 Display Station, a replacement for the 5251-11, and the 2191, a replacement for the 5291 Model 2. General Business Technology also supplies a terminal with IBM 5250 family emulation. Of the other vendors in the terminal industry, a few manufacture displays that emulate the 5251 display station when coupled with a protocol converter.

ADVANTAGES AND RESTRICTIONS

IBM has made the 5250 Information Display System more attractive with the addition of the new display station models, which provide improved terminal design (3179 Model 2, 3180 Model 2, 3196, and 5291 Model 2) as well as color and graphics (5292). Another important addition to the family is the Personal Computer emulation program, which enables the PC and PC XT to be added to 5250 workstation clusters. IBM has also provided for the use of the IBM PC, Portable PC, PC XT, or PC AT as the system console for the System/36.

With the addition of the low-priced 3196 Display Station ($1,295), IBM continues its downward trend in pricing for its display terminal products. The price of the 3196 should quickly make it one of IBM's most popular display stations.

Traditionally, this workstation family for IBM's minicomputer line (System/34, System/36, System/38, Series/1) has been largely overshadowed by the 3270 product line for mainframes. However, the addition of the System/36, plus recent enhancements to the 5250 family, have breathed new life into this market. In the protocol conversion and micro-to-mainframe emulation markets, 5251 compatibility is growing in popularity, and should signal continuing growth in the 5250 product line.

USER REACTION

In Datapro's 1986 LAN/Terminal Users Survey, conducted in conjunction with *Data Communications* magazine, a total of 40 responses were received from users of IBM 5250 Information Display System display terminals. Of these users, 7 were using the 5251 Display Station (Models 11 and 12), with a total of 148 installed units; 7 other users reported on the 5291 Display Station (Models 1 and 2), with 173 units installed. There were also responses from 15 users of the 3180 Display Station; however, most of these users did not specify which model they were using. There-

attaches directly to the System/36, System/38, 5294 Remote Control Unit, and 5251 Model 12. It is available in two standard models. Model 200 contains a 122-key typewriter keyboard; Model 220 is equipped with the 102-key IBM Enhanced Keyboard. The 3179 Model 2 is a replacement for the 5292 Model 1; it includes IBM's newest ergonomic terminal design.

3180 Display Station Model 2—has a selectable 1,920- or 3,564-character screen display, and attaches directly to the System/36, System/38, 5294 Remote Control Unit, and 5251 Model 12. The 3180 Model 2 is a replacement for the 5251 Model 11 and 5291 Models 1 and 2; it includes IBM's newest ergonomic terminal design. The 3180 Model 2 is available in three standard models. Model 210 contains a typewriter-style keyboard, while Model 220 contains a data entry keyboard; Model 215 is for use in conjunction with the FAST START/36 offering.

3196 Display Station Models A10 and B10—have a 1,920-character screen capacity, and attach directly to the System/36 and System/38, or to the 5294 Remote Control Unit. The 3196 is compatible with the 5291 Model 2; it contains a compact, ergonomic design. Model A10 displays characters in green phosphor, while Model B10 displays characters in amber-gold phosphor. Both models include a 122-key typewriter keyboard.

3196 Display Station Models A20 and B20—have a 1,920-character screen capacity, and attach directly to the System/36 and System/38; these models do not provide for attachment to the 5294 Remote Control Unit. The 3196 is compatible with the 5291 Model 2; it contains a compact, ergonomic design. Model A20 displays characters in green phosphor, while Model B20 displays characters in amber-gold phosphor. Both models include a 102-key IBM Enhanced Keyboard.

5294 Remote Control Unit—a control unit that provides for the attachment of up to four workstations when connected to the System/36 or System/38. Up to eight workstations are supported with the optional Extended Cluster Feature. The 5294 provides for the attachment of the following workstations: 5251 Display Station Models 11 and 999; 5291 Display Station Models 1 (no longer available) and 2; 5292 Color Display Station Models 1 and 2; 3179 Color Display Station Model 2 (200 only); 3180 Display Station Model 2; 3196 Display Station Models A10 and B10; 5219 Printer Models D01 and D02; 5224 Printer Models 1 and 2; 5225 Printer Models 1, 2, 3, and 4; 5256 Printer Models 1, 2, and 3; 5150 Personal Computer (with 5250 Emulation Program) and 5160 PC XT (with 5250 Emulation Program).

4245 Printer—is available in two models: Model T12 provides a maximum print speed of 1,200 lpm; Model T20 provides a maximum print speed of 2,000 lpm. Both models attach directly to the System/36 and System/38.

5219 Printer—is available in two models: Model D01 features a maximum print speed of 40 cps; Model D02 features a maximum print speed of 60 cps. Both models attach directly to the System/34, System/36, System/38, Series/1, 5294 Remote Control Unit, and the 5251 Models 2 (no longer available) and 12.

5224 Printer—is available in two models: Model 1 features maximum print speeds of 140 lpm at 10 cpi and 95 lpm at 15 cpi; Model 2 features maximum print speeds of 240 lpm at 10 cpi and 170 lpm at 15 cpi. Both models attach directly to the System/34, System/36, System/38, 5294 Remote Control Unit, and 5251 Models 2 (no longer available) and 12.

5225 Line Printer—is available in four models: Model 1 features maximum print speeds of 280 lpm (10 cpi) or 195 lpm (15 cpi); Model 2 operates at maximum speeds of 400

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fore, we will not include the 3180 ratings in this report. For the 3180 user ratings, see Report C25-010-901, *User Ratings of Display Terminals and IVDTs.*

These users were asked to rate their display stations in seven specific categories. Their ratings are summarized in the following tables.

5251 Models 11 and 12:

	Excellent	Good	Fair	Poor	WA*
Ease of operation	1	6	0	0	3.1
Display clarity	2	3	2	0	3.0
Keyboard feel & usability	1	6	0	0	3.1
Ergonomic features	0	0	4	3	1.6
Hardware reliability	2	4	1	0	3.1
Maintenance service/ technical support	4	3	0	0	3.6
Overall performance	0	7	0	0	3.0

*Weighted Average based on a scale of 4.0 for Excellent.

5291 Models 1 and 2:

	Excellent	Good	Fair	Poor	WA*
Ease of operation	4	3	0	0	3.6
Display clarity	3	3	1	0	3.3
Keyboard feel & usability	3	4	0	0	3.4
Ergonomic features	3	1	3	0	3.0
Hardware reliability	5	2	0	0	3.7
Maintenance service/ technical support	6	1	0	0	3.9
Overall performance	4	3	0	0	3.6

*Weighted Average based on a scale of 4.0 for Excellent.

Note that the ratings are somewhat similar, except in the area of ergonomics, in which the newer 5291 obtained significantly higher ratings. Obviously, IBM's move toward improved ergonomic design in their terminal products has not escaped the users' notice. When asked whether or not they would recommend the IBM 5250 display stations to other users, 3 of the 5251 Model 11 and 12 users answered that they would, while 2 answered that they would not (presumably because newer generation equipment is now available). Of the 5291 Model 1 and 2 users, 4 stated that they would recommend their terminals, while none answered negatively. □

lpm (10 cpi) or 290 lpm (15 cpi); Model 3 operates at maximum print speeds of 490 lpm (10 cpi) or 355 lpm (15 cpi); Model 4 features maximum print speeds of 560 lpm (10 cpi) or 420 lpm (15 cpi). All models attach directly to the System/34, System/36, System/38, Series/1, 5294 Control Unit, and 5251 Models 2 (no longer available) and 12.

***5256 Printer*—is available in three models: Model 1 features a maximum print speed of 40 cps; Model 2 features a maximum print speed of 80 cps; Model 3 features a maximum print speed of 120 cps. All models attach directly to the System/34, System/38, Series/1, 5294 Remote Control Unit, 5251 Models 2 (no longer available) and 12, and the 5280 Distributed Data System.**

The 5251 Display Station Models 1 and 2, 5291 Display Station Model 1, and the 5252 Dual Display Station Model 1 are no longer available from IBM. They are mentioned in the Configuration and Transmission Specifications sections of this report to assist users who already have these devices installed.

TRANSMISSION SPECIFICATIONS

5251 Model 12 can communicate with the System/34, System/36, or System/38 operating in SNA/SDLC mode only. Transmission is half-duplex over nonswitched (leased) point-to-point or multipoint lines at speeds up to 9600 bps, and on switched (dial) point-to-point lines at speeds up to 4800 bps. Model 12 is not supported on the Series/1. A 1200, 2400, or 4800 bps Integrated Modem, EIA Interface, or DDS Adapter is required.

The 5294 Remote Control Unit can communicate with the System/36 and System/38 operating under SNA/SDLC. The standard EIA feature allows half-duplex transmission at speeds of 2400, 4800, or 9600 bps over switched and nonswitched facilities, including X.21 facilities attached via an X.21 bis interface. In addition, several communications enhancements are available with the 5294. Transmission speed via a Digital Data Service (DDS) communications facility can be 2400, 4800, 9600, and up to 56K bps on nonswitched point-to-point and multipoint connections. The IBM 5294 X.21 Adapter Feature provides enhanced transmission speeds to remote workstations, allowing 2400 bps to 48K bps transmission speeds for use on nonswitched point-to-point and multipoint facilities with attachment via the X.21 interface. The X.25 feature for the 5294 provides the capability to attach to data transmission services which comply with Recommendation X.25 of CCITT. The X.25 feature provides support for attachment to an X.25 packet switched network through either an X.21 Adapter Feature or an EIA RS-232-C interface. Transmission may be at speeds of 2400, 4800, 9600, or 48K bps with the X.21 Adapter Feature.

The 5251 Models 1, 11, and 999, 5252, 5291 Models 1 and 2, 5292 Models 1 and 2, 3179 Model 2, 3180 Model 2, 5219 Models D01 and D02, 5224 Models 1 and 2, 5225 Models 1, 2, 3, and 4, and 5256 Models 1, 2, and 3 can attach directly to the 5251 Models 2 and 12, 5294, System/34, System/36, System/38, or Series/1 (the 5291 Model 2, 3179 Model 2, 3180 Model 2, and 5292 Models 1 and 2 do not attach to the Series/1; the 3179 Model 2 and 3180 Model 2 do not attach to the System/34; the 5251 Model 1 and 5252 do not attach to the System/36). Multiple workstations may be attached through the 5251 Cluster or Dual Cluster features, or the Cable Thru feature (not available for 5251 Model 12).

The System/34 provides a system console port, three additional local ports, and four ports for remote communications links. One 5251 Display Station Model 1, 11, or 999, 5252 Dual Display Station, 5291 Display Station Model 1 or 2, or 5292 Color Display Station Model 1 or 2 is required as the system console. Up to seven additional workstations (5251 Models 1, 11 or 999, 5252, 5291 Models 1 or 2, 5292 Models 1 or 2, 5219 Models D01 or D02, 5224 Models 1 or 2, 5225 Models 1, 2, 3, or 4, 5256 Models 1, 2, or 3, 5150 Personal Computer with 5250 Emulation Program, or 5160 PC XT with 5250 Emulation Program) may be locally attached to the remaining three local ports; the Cable Thru feature allows multiple workstations to be attached to a single port. Up to 16 workstations may be attached to the three local workstation ports when an optional System/34 processor feature #4901, Workstation Control Expansion B is in place. Up to seven workstations may be attached to one cable when using the Cable Thru feature. Up to 64 remote standalone terminals or cluster workstations can be supported over point-to-point or multipoint lines to the communications ports. (The 5252 counts as two workstations.)

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On the System/36, up to six workstations, including the system console, can be attached via twinaxial cable. One 3179 Color Display Station Model 2, 3180 Display Station Model 2, 3196 Display Station Models A10, B10, A20, or B20, 5251 Display Station Model 11 or 999, 5291 Display Station Model 1 or 2, 5292 Color Display Station Model 1 or 2, or 5150 Personal Computer, 5155 Portable Personal Computer, 5160 Personal Computer XT, or 5170 Personal Computer AT (with the 5250 Emulation Program or Enhanced 5250 Emulation Program, and the Display Station Emulation Adapter or the Enhanced Display Station Emulation Adapter) is required as the system console. Up to six additional workstations (3179 Model 2, 3180 Model 2, 3196 Models A10, B10, A20, or B20, 5251 Models 11 or 999, 5291 Models 1 or 2, 5292 Models 1 or 2, 4245 Models T12 or T20, 5219 Models D01 or D02, 5224 Models 1 or 2, 5225 Models 1, 2, 3, or 4, 5256 Models 1, 2, or 3, 5150 Personal Computer with 5250 Emulation Program, 5155 Portable Personal Computer with 5250 Emulation Program, or 5160 PC XT with 5250 Emulation Program) may be locally attached to the System/36; up to 36 workstations can be attached when configured with the Workstation Controller Expansion feature #4900. Up to seven workstations can be attached to a single cable with the Cable Thru feature. When an IBM PC, Portable PC, PC XT, or PC AT is used as a system console, the following printers are supported as a system printer when attached to the PC: IBM 4201 Proprinter, 5201 Quietwriter, 5182 Color Printer, and 5216 Wheelprinter.

On the System/38, up to 80 local workstations (5251 Models 1 or 11, 5291 Model 1, 5292 Models 1 or 2, 5252, 3179 Model 2, 3180 Model 2, 3196 Models A10, B10, A20, or B20, 4245 Models T12 or T20, 5219 Models D01 or D02, 5224 Models 1 or 2, 5225 Models 1, 2, 3, or 4, 5256 Models 1, 2, or 3) can be supported by configuring various combinations of System/38 Workstation Controller features, expansion options, workstation ports, and terminal Cable Thru features. In addition, the System/38 supports up to eight remote communications ports, for connection of terminals or cluster workstations. The maximum number of remote terminals that can be supported by the System/38 varies with processor size, mode of terminal operation, traffic volume, and other factors.

The Series/1 accommodates up to 256 local and remote workstations, which can be connected to the processor through a local I/O attachment feature on a remote communications line. Up to eight workstations (5251 Models 1 or 11, 5291 Model, 5252, 5256 Models 1, 2, or 3) are supported by each local I/O attachment feature. The Cable Thru feature allows a second workstation to be attached to a single cable. The Series/1 supports up to 96 point-to-point or multipoint communications lines, through which remote standalone terminals and workstation clusters may be connected to the system.

The 5251 Models 1, 11, or 999, 5291 Models 1 or 2, 5292 Models 1 or 2, 5252, 5219 Models D01 or D02, 5224 Models 1 and 2, 5225 Models 1, 2, 3, and 4, and 5256 Models 1, 2, or 3 can be attached to the 5251 Models 2 and 12 in a cluster arrangement through the Cluster or Dual Cluster features. The Cluster feature allows the attachment of up to four workstations; the Dual Cluster feature allows the attachment of up to eight workstations. Cable Thru is a standard feature on all currently available models. The IBM 5150 Personal Computer and 5160 PC XT with the 5250 Emulation Program may be attached to the 5251 Model 12.

The 5251 Models 11 and 999, 5291 Model 2, 5292 Models 1 or 2, 3179 Model 2, 3180 Model 2, 3196 Models A10 or B10, 5219 Models D01 or D02, 5224 Models 1 or 2, 5224 Models 1, 2, or 3, 5256 Models 1, 2, or 3, 5150 PC (with 5250 Emulation Program), or 5160 PC XT (with 5250 Emulation Program) may be attached to a 5294 Remote Control Station. Four workstations may be attached as standard; up to eight workstations may be attached to the 5294 using the Extended Cluster Feature and one communications line.

DEVICE CONTROL

Visual attributes, available on a field basis, include high intensity, nondisplay (security), blink, underscore, column separator, and reverse image. The operator can also reverse the image of the entire screen. Individual fields can be designated and edited independently. Fields can be designated as alphanumeric, alpha only, signed numeric, field exit required, right adjust, mandatory entry, mandatory fill, bypass, auto enter, dup enable, monocase, and self-check Modulus 10 and 11 (self-check is optional on 5251 Model 12).

Display indicators are included on all display station models to inform the operator of the terminal's operational status. Indicators are available for the following modes: System Available (data can be entered from keyboard); Input Inhibited (data cannot be entered from keyboard); Message Waiting (message has been sent from system); Keyboard Shift; and Insert Mode.

The cursor appears as a high-intensity underscore, and can be positioned anywhere on the screen either manually by the operator through the keyboard, or automatically by the system program.

The optional Expanded Function feature on the 5251 provides control for a magnetic stripe reader and a selector light pen. The feature also provides a Copy Function (for the direct transfer and printing of a screen image from the Model 2 or 12, or an attached Model 1 or 11 or 5252 to a printer attached to the Model 2 or 12), and a Self-Check feature (providing Modulus 10 and 11 checking to assure that all digits have been keyed correctly).

The 5292 Model 2 provides graphics as well as alphanumeric capabilities. In Graphics Mode, the 5292 Model 2 can display bar charts, pie charts, line graphs, and surface graphs. The All Points Addressable (APA) capability provides access to 480 addressable points (horizontal) by 288 points (vertical). Color selection (black plus seven colors from a palette of 512) is a function of host system graphics support.

The 5294 Remote Control Unit supports the new data type "digits only" input field. The digits only data type accepts the entry of digits, but not special characters, into numeric data fields.

COMPONENTS

5294 REMOTE CONTROL UNIT: Provides for the remote connection of four workstations; up to eight workstations may be connected with the Extended Cluster Feature.

5251 MODEL 12 CONTROL UNIT: Up to eight additional workstations can be attached optionally to the Model 12 in a cluster arrangement, using the Cluster or Dual Cluster features.

5251 MODELS 11, 12, and 999 DISPLAY UNIT: Models 11, 12, and 999 provide a 12-inch (diagonal) screen with a 1,920-character capacity, arranged in 24 lines of 80 characters each. Characters are displayed in white. The standard character set includes 96 characters, including 52 upper-/lowercase alphabetic, 10 numeric, and 34 special. A 188-character Multinational Character Set is standard. Characters are formed in an 8-by-16 dot matrix. Cable Thru is optional (standard on Model 999), as is a security keylock. A magnetic stripe reader and selector light pen are supported.

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5291 MODEL 2 DISPLAY UNIT: Model 2 includes a 12-inch (diagonal) screen with a 1,920-character capacity arranged in 24 lines of 80 characters each. Green phosphor characters are standard on the 5291. A 96-character set is standard, including 52 upper-/lowercase alphabetic, 10 numeric, and 34 special. Characters are formed within an 8-by-9 dot matrix. The display can be tilted or swiveled. Standard features include an adjustable audible alarm, Cable Thru, and row/column indicator.

5292 MODELS 1 and 2 DISPLAY UNIT: Models 1 and 2 provide a 12-inch (diagonal) display screen with a 1,920-character capacity, arranged in 24 lines of 80 characters each. The 5292 Model 1 can display seven colors: red, green, turquoise, yellow, pink, blue, and white. The 5292 Model 2 can display black plus seven additional colors selectable from a palette of 512, plus graphics. The standard character set has 96 characters, including 52 upper-/lowercase alphabetic, 10 numeric, and 34 special. Characters are formed within a 9-by-12 dot matrix. The display features a tilt adjustment. Standard features include an adjustable audible alarm, Cable Thru, and row/column indicator.

3179 MODEL 2 DISPLAY UNIT: Model 2 features a 14-inch (diagonal) display screen with a display capacity of 1,920-characters, arranged in 24 lines of 80 characters each. A 25th message line is available. Seven colors are displayable: red, blue, green, white, yellow, turquoise, and pink. Characters are formed via a 7-by-14 dot matrix. The standard character set includes 94 characters; a multinational character set is also available. The display contains tilt (20 degrees), swivel (360 degrees), and height (5 inches) adjustments. Standard features of the 3179 Model 2 include an adjustable audible alarm, security keylock, Cable Thru, row/column indicator, and automatic CRT dimming. (The 3179 Model 1 is designed for use with the IBM 3270 Information Display System; for more information, see Report C25-491-101.)

3180 MODEL 2 DISPLAY UNIT: Model 2 features a 15-inch (diagonal) display screen with selectable display capacities of 1,920-characters (arranged in 24 lines of 80 characters each) or 3,564 characters (27 lines of 132 characters each). A 25th message line is available. Characters are displayed in green, and formed via a 9-by-14 dot matrix. The standard character set includes 94 characters; a multinational character set is also available. The display contains tilt (20 degrees), swivel (360 degrees), and height (5 inches) adjustments. Standard features of the 3180 Model 2 include an adjustable audible alarm, security keylock, Cable Thru, row/column indicator, and automatic CRT dimming. (The 3180 Model 1 is designed for use with the IBM 3270 Information Display System; for more information, see Report C25-491-101.)

3196 MODELS A10, B10, A20, and B20 DISPLAY UNIT: All models feature a 12-inch (diagonal) display screen with a 1,920-character capacity, arranged in 24 lines of 80 characters each. An operator information area is available. Characters are displayed in green phosphor on Models A10 and A20, and in amber-gold phosphor on Models B10 and B20. Characters are displayed on the screen via a presentation of 720-by-384 picture elements. The standard character set contains 94 characters. The display contains tilt (19.4 inches) and swivel (plus or minus 90 degrees) adjustments. Standard features of all 3196 models include an adjustable audible alarm, security keylock, auto-dim, and 1,500-keystroke record/play capability.

5251 KEYBOARDS: Three keyboard styles are available for use with the 5251 displays:

- 4600—an 83-key, typewriter-style EBCDIC keyboard with 49 alphanumeric keys, 24 control keys, and a 10-key numeric pad;
- 4601—a 66-key, data entry-style keyboard with 36 alphanumeric keys, 23 control keys, and 7 blank keys;
- 4602—a 66-key, data entry-style keyboard with proof arrangement, including 36 alphanumeric keys, 23 control keys, and 7 blank keys (numeric keys are arranged similarly to those on an adding machine).

Keyboard styles 4601 and 4602 are not supported when the 5251 is attached directly or remotely to the System/34 or Series/1. All keyboards are detachable.

5291/5292 KEYBOARDS: All 5291 and 5292 models feature an 83-key, typewriter-style EBCDIC keyboard with a low-profile design. The keyboard is detachable, has a slope adjustment (5°, 10°, 15°, or 20°), and incorporates an operator palm rest. A numeric pad and 24 command functions are included.

3180 KEYBOARDS: Two keyboard styles are available for use with the 3180 Model 2 display:

- 4600—a 122-key, typewriter-style EBCDIC keyboard consisting of alphanumeric and control keys, and a numeric pad; the keyboard is detachable, and features a low-profile design that includes a slope adjustment;
- 4601—a 122-key, data entry-style keyboard consisting of alphanumeric, control, and blank keys; the keyboard is detachable, and features a low-profile design with slope adjustment.

3179/3196 KEYBOARDS: Two keyboard styles are available for the 3179 and 3196 displays:

- 122-key typewriter-style keyboard (3179 Model 200, 3196 Models A10 and B10) consisting of alphanumeric and control keys, plus 24 functions; the keyboard is detachable, and features a low-profile design with slope adjustment.
- 102-key IBM Enhanced keyboard (3179 Model 220, 3196 Models A20 and B20); this keyboard is arranged in four sections: typing, numeric pad, cursor/screen controls, and function keys (24 functions in two shifts). The keyboard is detachable, and features a low-profile design with slope adjustment.

4245 PRINTER: A line printer available in two models: Model T12 features a maximum print speed of 1,200 lpm; Model T20 features a maximum print speed of 2,000 lpm. Standard features include 132 print positions, vertical spacing of 6 or 8 lpi, horizontal spacing of 10 cpi, Cable Thru, and support for OCR printing applications. A variety of ribbons and and print bands are available.

5219 PRINTER: A bidirectional, correspondence-quality printwheel printer available in two models: Model D01 features a maximum burst print speed of 40 cps; Model D02 features a maximum burst print speed of 60 cps. A variety of 96-character print wheels are available for use with the 5219. Horizontal character spacing is 10 cpi; vertical spacing is selectable at 6 or 8 lpi. Pinfed continuous forms are accepted.

5224 PRINTER: A tabletop impact matrix line printer available in two models: Model 1 features maximum print speeds of 140 lpm with horizontal spacing of 10 cpi, and 95 lpm with horizontal spacing of 15 cpi; Model 2 features maximum print speeds of 240 lpm with horizontal spacing of 10 cpi, and 170 lpm with horizontal spacing of 15 cpi. Characters are formed within an 8-by-7 character matrix. Maximum line lengths are 132 characters at 10 cpi and 198 characters at 15 cpi. Three character sets are available; upper-/lowercase characters are standard on all three. Ver-

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tical spacing of 6 or 8 lpi is selectable. Up to four-part forms may be used. An adjustable alarm and Cable Thru are standard.

5225 PRINTER: An impact matrix line printer available in four models: Model 1 features maximum print speeds of 280 lpm with horizontal spacing of 15 cpi, and 195 lpm with horizontal spacing of 10 cpi; Model 2 features maximum print speeds of 400 lpm at 15 cpi, and 290 lpm at 10 cpi; Model 3 features maximum print speeds of 490 lpm at 15 cpi, and 355 lpm at 10 cpi; Model 4 features maximum print speeds of 560 lpm at 15 cpi, and 420 lpm at 10 cpi. Characters are formed within an 8-by-7 character matrix. Maximum line lengths are 132 characters at 10 cpi and 198 characters at 15 cpi. A variety of character sets are available; upper-/lowercase characters are provided on all character sets. Vertical spacing of 6 or 8 lpi is selectable. A forms tractor provides for the feeding of punched continuous forms.

5256 PRINTER: A bidirectional, serial matrix printer available in three models: Model 1 features a maximum print speed of 40 cps; Model 2 features a maximum print speed of 80 cps; Model 3 features a maximum print speed of 120 cps. Dual 256-byte buffers are standard, with full buffer formatting capabilities. A 96-character set (upper-/lowercase) is standard. Horizontal character spacing is 10 cpi; vertical spacing is selectable at 6 or 8 lpi. Characters are formed by eight vertical wire printing dots in up to four of seven possible horizontal positions. Continuous forms are advanced by a variable width forms tractor. The 188-character Multinational Character set is optional, as is a forms stand.

For information on the IBM Personal Computer family, see DATAPRO REPORTS ON MICROCOMPUTERS, an information service dedicated to the microcomputer industry.

PRICING

Previously, all 5250 Information Display System components were available under the terms of IBM's Lease or Rental Agreement (LRA), or for purchase. Currently, most of the 5250 components are available for purchase only. All new components are installed under IBM's Customer Set-Up (CSU) arrangement. Maintenance for the 5250 components is available on an annual basis or on a monthly basis. Four annual maintenance plans are available: IBM On-site Exchange, Customer On-site Exchange, Customer Carry-in Exchange, and IBM Carry-in Repair. Prices are provided for IBM On-site Exchange. Volume discounts are available for all models. A three-month warranty (from date of initial installation) is standard.

EQUIPMENT PRICES

		Purchase Price ($)	Monthly Maint. ($)
5251 DISPLAY STATIONS			
5251-11	Display Station Model 11 (keyboard required)	2,135	20.00
5251-12	Display Station Model 12 (keyboard required)	3,040	44.00
5251-999	Display Station Model 999 (keyboard required)	2,500	24.50
5251 KEYBOARDS			
4600	83-key EBCDIC Typewriter	265	3.00
4601	66-key EBCDIC Data Entry	265	3.00
4602	66-key EBCDIC Data Entry w/Proof Arrangement	265	3.00
5251 OPTIONS			
2550	Cluster feature (5251 Model 12 only)	1,139	11.50
2551	Dual Cluster feature (5251 Model 12 only)	2,278	22.50
2680	Cable Thru feature (5251 Model 11 only)	100	1.00
3600	Expanded Function feature	225	1.50
3701	EIA Interface	447	3.00
4703	Internal Clock	218	1.00
5500	1200 bps Integrated Modem, nonswitched	686	5.00
5502	1200 bps Integrated Modem, switched	686	5.00
5640	2400 bps Integrated Modem, nonswitched	2,130	26.00
5641	2400 bps Integrated Modem, switched	2,350	27.50
5740	4800 bps Integrated Modem, nonswitched	3,710	38.50
5741	4800 bps Integrated Modem, switched	3,900	41.00
5650	DDS Adapter, point-to-point	873	4.00
5651	DDS Adapter, multipoint	873	4.00
4910	Magnetic Stripe Reader	318	2.50
6300	Selector Light Pen	570	7.50
4655	Keylock	42	—
4905	Multinational Character Set	58	1.00

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		Purchase Price ($)	Annual Maint.* ($)
3179/3180/3196/5291/5292 DISPLAY STATIONS			
3179-2	Color Display Station Model 2 (200 or 220), w/keyboard	2,195	94
3180-2	Display Station Model 2, w/keyboard	2,195	115
3196	Display Station Models A10, A20, B10, or B20, w/keyboard	1,295	55
5291-2	Display Station Model 2, w/keyboard	1,550	115
5292-1	Color Display Station Model 1, w/keyboard	4,950	423
5292-2	Color Display Station Model 2, w/keyboard	6,995	513
CONTROL UNIT			
5294-1	Remote Control Unit Model 1	2,650	291
2550	Extended Cluster feature	835	6
3600	Extended Function feature	105	—
3610	Feature Adapter Card	210	—
3701	EIA Interface	300	6
5650	DDS Adapter, Point-to-Point	800	13
5651	DDS Adapter, Multipoint	800	13
5655	X.21 Adapter	350	6
5680	X.25 Support	260	6

		Purchase Price ($)	Monthly Maint. ($)
PRINTERS			
5219-D01	Printer Model D01	4,880	59
5219-D02	Printer Model D02	5,250	64
5224-1	Printer Model 1	5,755	53
5224-2	Printer Model 2	6,550	62
5225-1	Printer Model 1	9,660	119
5225-2	Printer Model 2	11,160	167
5225-3	Printer Model 3	12,400	206
5225-4	Printer Model 4	13,560	246
5256-1	Printer Model 1	2,800	53
5256-2	Printer Model 2	2,930	58
5256-3	Printer Model 3	3,060	66
2680	Cable Thru feature (5225 & 5256 only)	119	2

**IBM On-site Exchange; other annual maintenance plans available include: Customer On-site Exchange, Customer Carry-in Exchange, and IBM Carry-in Repair.* ■

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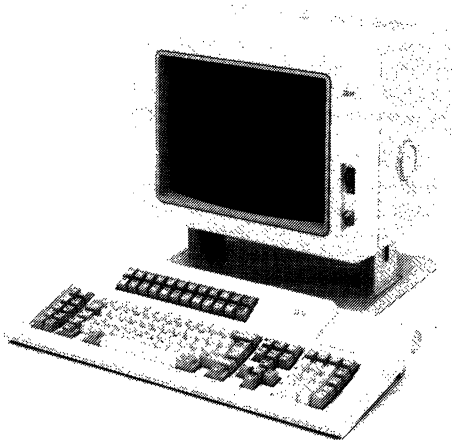

The 3180 Model 2 Display Station is a functional equivalent to the older 5251 Model 11 and 5291 Model 1 displays. The 3180 includes a 15-inch display that can be tilted, swiveled, and adjusted for height; the unit's keyboard is detachable, and features a low-profile design. The 3180 is IBM's first display terminal that is supported by both the System/370 (3180 Model 1) and System/36 and System/38 (3180 Model 2) processor families.

MANAGEMENT SUMMARY

UPDATE: *Since we last published this report, IBM has added several new products to the 5250 Information System product line. Most prominent of these are: the 3180 Model 2 Display Station, IBM's first display model that can be part of both the 5250 and 3270 (3180 Model 1) product lines; the 5294 Remote Control Unit, the first dedicated controller in the 5250 family; the 5291 Model 2 Display Station, an ergonomically redesigned version of the 5291 Model 1; and attachment capabilities for the 5224 and 5225 printer families.*

IBM's 5250 Information Display System is a family of workstations, including display stations and printers, designed for interactive data entry and inquiry applications. Originally announced for use with the System/34, the 5250 components can now also be used with the System/36, System/38, and Series/1. Some of the older components, including the 5251 Display Station Models 1 and 2, 5291 Display Station Model 1, and the 5252 Dual Display Station, have been dropped from the product line. A new generation of display stations, including color models, has been added, as has a new remote control unit, the 5294. In addition, IBM has introduced a software package that provides the IBM Personal Computer and PC XT with 5250 emulation.

The 5250 Information Display System is a family of components for use with IBM's System/34, System/36, System/38, and Series/1. The family consists of a number of display station and printer models. Recent additions to the family include color, graphics, a new display enclosure style, and a remote control unit.

MODELS: 5251 Display Station Models 11, 12, and 999; 5291 Display Station Model 2; 5292 Color Display Station Models 1 and 2; 3180 Display Station Model 2; 5294 Remote Control Unit Model 1; 5219 Printer Models D01 and D02; 5224 Printer Models 1 and 2; 5225 Printer Models 1, 2, 3, and 4; 5256 Printer Models 1, 2, and 3.
DISPLAY: All display stations, except the 3180, feature a 12-inch screen with a 1,920-character capacity. The 3180 contains a 15-inch display. 5292 Models 1 and 2 feature a color display; graphics is available on Model 2. The 5292 displays are tiltable; tilt/swivel adjustments are available on the 5291 Model 2. The 3180 Model 2 includes tilt, swivel, and height adjustments.
KEYBOARD: All displays feature a detachable, typewriter-style keyboard. A choice of three keyboard versions are available for the 5251 Models 11, 12, and 999. The 5291, 5292, and 3180 displays feature a low-profile, adjustable keyboard.
COMPETITION: Decision Data and Memorex. Control Concepts and Protocol Computers provide terminals that emulate 5250 terminals when used with a protocol converter.
PRICE: Display station prices range from $1,850 to $6,995.

CHARACTERISTICS

VENDOR: International Business Machines Corporation (IBM), Old Orchard Road, Armonk, NY 10504. Contact your local IBM representative.

DATE OF ANNOUNCEMENT: April 1977.

DATE OF FIRST DELIVERY: January 1978.

NUMBER DELIVERED TO DATE: Approximately 1,000,000 terminals (including older models).

SERVICED BY: IBM.

CONFIGURATION

The 5250 Information Display System is a family of display stations, control units, and printers for use with the IBM

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The components that currently make up the 5250 Information Display System include: the 5251 Display Station Models 2 and 12; 5291 Display Station Model 2; 5292 Color Display Station Models 1 and 2; 3180 Display Station Model 2; 5294 Remote Control Unit; 5219 Printer Models D01 and D02; 5224 Printer Models 1 and 2; 5225 Printer Models 1, 2, 3, and 4; and 5256 Printer Models 1, 2, and 3.

The 5251 Display Station Models 11 and 12 are original members of the 5250 family. The 5251 Model 12 is designed for remote communications with the System/34, System/36, and System/38 in SDLC mode. Up to four or eight additional workstations may be attached to the Model 12 using the Cluster or Dual Cluster features. The 5251 Model 11 can be attached directly to a System/34, System/36, System/38, or Series/1.

The second generation 5291 and 5292 Display Stations are plug-compatible replacements for the 5251 Model 11. The 5291 contains all of the features of the 5251 Model 11; it adds Cable Thru and an adjustable audible alarm as standard features, and incorporates a new ergonomically improved display design that includes a tilt/swivel display and a low-profile, detachable keyboard. The 5292 Models 1 and 2 are color displays. Model 1 is an alphanumeric model that displays seven colors: red, green, turquoise, yellow, pink, blue, and white. Model 2 provides graphics as well as alphanumeric capabilities. Business graphics can be displayed in eight colors: black plus seven colors from a palette of 512. The 5292 display features the same design improvements as the 5291; however, it cannot be attached to the Series/1.

The 3180 Display Station is IBM's first terminal that crosses over between the 3270 and 5250 product lines. Model 1 provides emulation of the 3278 display station, while Model 2 is the 5251 emulator. The 3180 provides a 15-inch screen, with tilt, swivel, and elevate capabilities.

The IBM PC 5250 Emulation Program is a software program that allows the IBM Personal Computer or PC XT to be attached to a System/34, System/36, System/38, or 5294 control unit while emulating a 5251 Model 12 Display Station. An emulation adapter is required.

COMPETITIVE POSITION

IBM's competition in the 5250 emulation market is somewhat limited; a study by International Data Corporation (Framingham, MA) showed that IBM held a 96 percent share of the 5250-type terminal market at the end of 1983. Decision Data Corporation is IBM's chief competition in the System/34, System/36, System/38 workstation market, offering the 3751-11, 3761-01, and 3791-01 display stations, as well as a variety of printers, as replacements for the 5250 components. Decision Data has also introduced a multifunction computing workstation, the 5021-01, for use as part of a 5250 configuration. Memorex, another manufacturer of IBM-compatible products, offers the 2051-11 Display Station, a replacement for the 5251-11. Of the

System/34, System/36, System/38, and Series/1 computer systems. The following paragraphs list the components that make up the 5250 family and the rules that govern 5250 configurations:

***5251 Display Station Model 11*—features a 1,920-character screen capacity, and attaches directly to the System/34, System/36, System/38, Series/1, 5294 Remote Control Unit, or 5251 Models 2 (no longer available) and 12. It also serves as the system console for the System/34.**

***5251 Display Station Model 999*—identical features as those found on the 5251 Model 11, except that Cable Thru is standard.**

***5251 Display Station Model 12*—features a 1,920-character screen capacity, and provides remote communications capability with the System/34, System/36, and System/38 in SNA/SDLC mode. Model 12 is not supported on the Series/1. Up to eight additional workstations can be attached optionally to the Model 12 in a cluster arrangement, using the Cluster or Dual Cluster features. The 5251 Model 12 provides for the attachment of the following workstations: 5251 Display Station Models 11 and 999; 5291 Display Station Models 1 (no longer available) and 2; 5292 Color Display Station Models 1 and 2; 5219 Printer Models D01 and D02; 5224 Printer Models 1 and 2; 5225 Printer Models 1, 2, 3, and 4; 5256 Printer Models 1, 2, and 3; 5150 Personal Computer (with 5251 Emulation Feature); and 5160 PC XT (with 5251 Emulation Feature).**

***5291 Display Station Model 2*—has a 1,920-character screen capacity, and attaches directly to the System/34, System/36, System/38, 5294 Remote Control Unit, or 5251 Models 2 (no longer available) and 12. It can also serve as the system console for System/34 and System/36. The 5291 is a replacement for the 5251 Model 11, and supersedes the 5291 Model 1. It features an improved terminal design similar to that found on the 3180.**

***5292 Color Display Station Model 1*—has a 1,920-character screen capacity and can display seven colors: red, green, turquoise, yellow, pink, blue, and white. The 5292 Model 1 attaches directly to the System/34, System/36, System/38, 5294 Control Unit, or 5251 Models 2 (no longer available) and 12. It can also serve as the system console for the System/34 and System/36.**

***5292 Color Display Station Model 2*—has a 1,920-character screen capacity, supports business graphics, and can display eight colors (black plus seven others from a palette of 512). The 5292 Model 2 attaches directly to the System/34, System/36, System/38, 5294 Remote Control Unit, or 5251 Models 2 (no longer available) and 12. (When attached to the System/38, the 5292 Model 2 does not operate in graphics mode, but rather as a 5292 Model 1.) It can also serve as the system console for the System/34 and System/36.**

***3180 Display Station Model 2*—has a 1,920-character screen display, and attaches directly to the System/36, System/38, 5294 Remote Control Unit, and 5251 Model 12. The 3180 Model 2 is a replacement for the 5251 Model 11 and 5291 Models 1 and 2; it includes IBM's newest ergonomic terminal design.**

***5294 Remote Control Unit*—a control unit that provides for the attachment of up to four workstations when connected to the System/36 or System/38. Up to eight workstations are supported with the optional Extended Cluster Feature. The 5294 provides for the attachment of the following workstations: 5251 Display Station Models 11 and 999; 5291 Display Station Models 1 (no longer available) and 2; 5292 Color Display Station Models 1 and 2; 5219 Printer Models**

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other vendors in the terminal industry, Control Concepts (CC-5251) and Protocol Computers (PCI 51) manufacture displays that emulate the 5251 display station when coupled with a protocol converter.

ADVANTAGES AND RESTRICTIONS

IBM has made the 5250 Information Display System more attractive with the addition of the new display station models, which provide improved terminal design (3180 Model 2 and 5291 Model 2) as well as color and graphics (5292). Another important addition to the family is the Personal Computer emulation program, which enables the PC and PC XT to be added to 5250 workstation clusters.

Traditionally, this workstation family for IBM's minicomputer line (System/34, System/36, System/38, Series/1) has been largely overshadowed by the 3270 product line for mainframes. However, the addition of the System/36 plus recent enhancements to the 5250 family have breathed new life into this market. In the protocol conversion and micro-to-mainframe emulation markets, 5251 compatibility is growing in popularity, and should signal continuing growth in the 5250 product line.

USER REACTION

In Datapro's 1985 Terminal Users Survey, conducted in conjunction with *Data Communications* magazine, a total of 40 responses were received from users of IBM 5250 Information Display System display terminals. Of these users, 20 were using the 5251 Display Station (Models 11 and 12), with a total of 745 installed units; 20 other users reported on the 5291 Display Station (Models 1 and 2), with 622 units installed. There were also responses from 38 users of the 3180 Display Station; however, most of these users did not specify which model they were using. Therefore, we will not include the 3180 ratings in this report. For the 3180 user ratings, see Report C25-010-901, *User Ratings of Terminals.*

These users were asked to rate their display stations in seven specific categories. Their ratings are summarized in the following tables.

5251 Models 11 and 12:

	Excellent	Good	Fair	Poor	WA*
Overall performance	9	9	1	1	3.3
Ease of operation	7	8	4	1	3.1
Display clarity	5	9	5	1	2.9
Keyboard feel & usability	1	15	4	0	2.9
Ergonomics	1	2	11	6	1.9
Hardware reliability	13	5	2	0	3.6
Maintenance service/ technical support	13	6	1	0	3.6

*Weighted Average based on a scale of 4.0 for Excellent.

D01 and D02; 5224 Printer Models 1 and 2; 5225 Printer Models 1, 2, 3, and 4; 5256 Printer Models 1, 2, and 3; 5150 Personal Computer (with 5251 Emulation Feature); and 5160 PC XT (with 5251 Emulation Feature).

***5219 Printer*—is available in two models: Model D01 features a maximum print speed of 40 cps; Model D02 features a maximum print speed of 60 cps. Both models attach directly to the System/34, System/36, System/38, Series/1, 5294 Remote Control Unit, and the 5251 Models 2 (no longer available) and 12.**

***5224 Printer*—is available in two models: Model 1 features maximum print speeds of 140 lpm at 10 cpi and 95 lpm at 15 cpi; Model 2 features maximum print speeds of 240 lpm at 10 cpi and 170 lpm at 15 cpi. Both models attach directly to the System/34, System/36, System/38, 5294 Remote Control Unit, and 5251 Models 2 (no longer available) and 12.**

***5225 Line Printer*—is available in four models: Model 1 features maximum print speeds of 280 lpm (10 cpi) or 195 lpm (15 cpi); Model 2 operates at maximum speeds of 400 lpm (10 cpi) or 290 lpm (15 cpi); Model 3 operates at maximum print speeds of 490 lpm (10 cpi) or 355 lpm (15 cpi); Model 4 features maximum print speeds of 560 lpm (10 cpi) or 420 lpm (15 cpi). All models attach directly to the System/34, System/36, System/38, Series/1, 5294 Control Unit, and 5251 Models 2 (no longer available) and 12.**

***5256 Printer*—is available in three models: Model 1 features a maximum print speed of 40 cps; Model 2 features a maximum print speed of 80 cps; Model 3 features a maximum print speed of 120 cps. All models attach directly to the System/34, System/38, Series/1, 5294 Remote Control Unit, 5251 Models 2 and 12, and the 5280 Distributed Data System.**

The 5251 Display Station Models 1 and 2, 5291 Display Station Model 1, and the 5252 Dual Display Station Model 1 are no longer available from IBM. They are mentioned in the Configuration and Transmission Specifications sections of this report to assist users who already have these devices installed.

TRANSMISSION SPECIFICATIONS

5251 Model 12 can communicate with the System/34, System/36, or System/38 operating in SNA/SDLC mode only. Transmission is half-duplex over nonswitched (leased) point-to-point or multipoint lines at speeds up to 9600 bps, and on switched (dial) point-to-point lines at speeds up to 4800 bps. Model 12 is not supported on the Series/1. A 1200, 2400, or 4800 bps Integrated Modem, EIA Interface, or DDS Adapter is required.

The 5294 Remote Control Unit can communicate with the System/36 and System/38 operating under SNA/SDLC. The standard EIA feature allows half-duplex transmission at speeds of 2400, 4800, or 9600 bps over switched and nonswitched facilities, including X.21 facilities attached via an X.21 bis interface. In addition, several communications enhancements are available with the 5294. Transmission speed via a Digital Data Service (DDS) communications facility can be 2400, 4800, 9600, and up to 56K bps on nonswitched point-to-point and multipoint connections. The IBM 5294 X.21 Adapter Feature provides enhanced transmission speeds to remote workstations, allowing 2400 bps to 48K bps transmission speeds for use on nonswitched point-to-point and multipoint facilities with attachment via the X.21 interface. The X.25 feature for the 5294 provides the capability to attach to data transmission services which comply with Recommendation X.25 of CCITT. The X.25 feature provides support for attachment to an X.25 packet switched network through either an X.21 Adapter Feature or

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5291 Models 1 and 2:

	Excellent	Good	Fair	Poor	WA*
Overall performance	12	6	1	1	3.5
Ease of operation	10	8	1	1	3.4
Display clarity	12	5	2	1	3.4
Keyboard feel & usability	10	9	1	0	3.5
Ergonomics	10	6	4	0	3.3
Hardware reliability	11	7	2	0	3.5
Maintenance service/ technical support	13	4	1	2	3.4

*Weighted Average based on a scale of 4.0 for Excellent.

Note that the ratings are similar, except in the areas of display clarity, keyboard feel/usability, and ergonomics, in which the newer 5291 obtained significantly higher ratings. Obviously, IBM's move toward improved ergonomic design in their terminal products has not escaped the users' notice.

Eight of the respondents using the 5251 Model 12 reported that they were using the unit as a workstation controller also. With an installed base of 57 units, these users were asked to rate their 5251 Model 12s in seven specific categories relating to their workstation controlling capabilities. Their ratings are summarized in the following table.

5251 Model 12:

	Excellent	Good	Fair	Poor	WA*
Overall performance	4	2	1	1	3.1
Ease of installation	3	4	1	0	3.3
Ease of operation	4	2	2	0	3.3
Ease of expansion	3	1	3	1	2.8
Reliability of controller	4	2	1	1	3.1
Reliability of peripherals	3	4	1	0	3.3
Maintenance service/ technical support	4	2	1	1	3.1

*Weighted Average based on a scale of 4.0 for Excellent.

Datapro also received six responses covering the new 5294 Remote Control Unit, with an installed base of 12 units. The following table provides ratings for the 5294.

5294 Remote Control Unit:

	Excellent	Good	Fair	Poor	WA*
Overall performance	3	3	0	0	3.5
Ease of installation	3	2	1	0	3.2
Ease of operation	2	4	0	0	3.3
Ease of expansion	2	4	0	0	3.3
Reliability of controller	4	2	0	0	3.7
Reliability of peripherals	3	3	0	0	3.5
Maintenance service/ technical support	4	0	2	0	3.3

*Weighted Average based on a scale of 4.0 for Excellent.

When asked whether or not they would recommend the IBM 5250 display stations to other users, 12 of the 5251 Model 11 and 12 users answered that they would, while 8 answered that they would not (presumably because newer

an EIA RS-232-C interface. Transmission may be at speeds of 2400, 4800, 9600, or 48K bps with the X.21 Adapter Feature.

The 5251 Models 1, 11, and 999, 5252, 5291 Models 1 and 2, 5292 Models 1 and 2, 3180 Model 2, 5219 Models D01 and D02, 5224 Models 1 and 2, 5225 Models 1, 2, 3, and 4, and 5256 Models 1, 2, and 3 can attach directly to the 5251 Models 2 and 12, 5294, System/34, System/36, System/38, or Series/1 (the 5291 Model 2, 3180 Model 2, and 5292 Models 1 and 2 do not attach to the Series/1; the 3180 Model 2 does not attach to the System/34; the 5251 Model 1 and 5252 do not attach to the System/36). Multiple workstations may be attached through the 5251 Cluster or Dual Cluster features, or the Cable Thru feature (not available for 5251 Model 12).

The System/34 provides a system console port, three additional local ports, and four ports for remote communications links. One 5251 Display Station Model 1, 11, or 999, 5252 Dual Display Station, 5291 Display Station Model 1 or 2, or 5292 Color Display Station Model 1 or 2 is required as the system console. Up to seven additional workstations (5251 Models 1, 11 or 999, 5252, 5291 Models 1 or 2, 5292 Models 1 or 2, 5219 Models D01 or D02, 5224 Models 1 or 2, 5225 Models 1, 2, 3, or 4, 5256 Models 1, 2, or 3, 5150 Personal Computer with 5251 Emulation Feature, or 5160 PC XT with 5251 Emulation Feature) may be locally attached to the remaining three local ports; the Cable Thru feature allows multiple workstations to be attached to a single port. Up to 16 workstations may be attached to the three local workstation ports when an optional System/34 processor feature #4901, Workstation Control Expansion B is in place. Up to seven workstations may be attached to one cable when using the Cable Thru feature. Up to 64 remote standalone terminals or cluster workstations can be supported over point-to-point or multipoint lines to the communications ports. (The 5252 counts as two workstations.)

On the System/36, up to six workstations, including the system console, can be attached via twinaxial cable. One 3180 Display Station Model 2, 5251 Display Station Model 11 or 999, 5291 Display Station Model 1 or 2, or 5292 Color Display Station Model 1 or 2 is required as the system console. Up to six additional workstations (3180 Model 2, 5251 Models 11 or 999, 5291 Models 1 or 2, 5292 Models 1 or 2, 5219 Models D01 or D02, 5224 Models 1 or 2, 5225 Models 1, 2, 3, or 4, 5256 Models 1, 2, or 3, 5150 Personal Computer with 5251 Emulation Feature, or 5160 PC XT with 5251 Emulation Feature) may be locally attached to the System/36; up to 36 workstations can be attached when configured with the Workstation Controller Expansion feature #4900. Up to seven workstations can be attached to a single cable with the Cable Thru feature.

On the System/38, up to 80 local workstations (5251 Models 1 or 11, 5291 Model 1, 5292 Models 1 or 2, 5252, 5219 Models D01 or D02, 5256 Models 1, 2, or 3) can be supported by configuring various combinations of System/38 Workstation Controller features, expansion options, workstation ports, and terminal Cable Thru features. In addition, the System/38 supports up to eight remote communications ports, for connection of terminals or cluster workstations. The maximum number of remote terminals that can be supported by the System/38 varies with processor size, mode of terminal operation, traffic volume, and other factors.

The Series/1 accommodates up to 256 local and remote workstations, which can be connected to the processor through a local I/O attachment feature on a remote communications line. Up to eight workstations (5251 Models 1 or 11, 5291 Model, 5252, 5256 Models 1, 2, or 3) are supported by each local I/O attachment feature. The Cable Thru

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IBM 5250 Information Display System

generation equipment is now available). Of the 5291 Model 1 and 2 users, 18 stated that they would recommend their terminals, while only one user answered negatively. For the controllers, the responses were evenly split for the 5251 Model 12 (3 yes, 3 no); however, all six 5294 users responded that they would recommend the 5294 to other users. □

feature allows a second workstation to be attached to a single cable. The Series/1 supports up to 96 point-to-point or multipoint communications lines, through which remote standalone terminals and workstation clusters may be connected to the system.

The 5251 Models 1, 11, or 999, 5291 Models 1 or 2, 5292 Models 1 or 2, 5252, 3180 Model 2, 5219 Models D01 or D02, 5224 Models 1 and 2, 5225 Models 1, 2, 3, and 4, and 5256 Models 1, 2, or 3 can be attached to the 5251 Models 2 and 12 in a cluster arrangement through the Cluster or Dual Cluster features. The Cluster feature allows the attachment of up to four workstations; the Dual Cluster feature allows the attachment of up to eight workstations. Cable Thru is a standard feature on all currently available models. The IBM 5150 Personal Computer and 5160 PC XT with the 5251 Emulation Feature may be attached to the 5251 Model 12.

The 5251 Models 11 and 999, 5291 Model 2, 5292 Models 1 or 2, 5219 Models D01 or D02, 5224 Models 1 or 2, 5224 Models 1, 2, or 3, 5256 Models 1, 2, or 3, 5150 PC (with 5251 Emulation Feature), or 5160 PC XT (with 5251 Emulation Feature) may be attached to a 5294 Remote Control Station. Four workstations may be attached as standard; up to eight workstations may be attached to the 5294 using the Extended Cluster Feature and one communications line.

DEVICE CONTROL

Visual attributes, available on a field basis, include high intensity, nondisplay (security), blink, underscore, column separator, and reverse image. The operator can also reverse the image of the entire screen. Individual fields can be designated and edited independently. Fields can be designated as alphanumeric, alpha only, signed numeric, field exit required, right adjust, mandatory entry, mandatory fill, bypass, auto enter, dup enable, monocase, and self-check Modulus 10 and 11 (self-check is optional on 5251 Model 12).

Display indicators are included on all display station models to inform the operator of the terminal's operational status. Indicators are available for the following modes: System Available (data can be entered from keyboard); Input Inhibited (data cannot be entered from keyboard); Message Waiting (message has been sent from system); Keyboard Shift; and Insert Mode.

The cursor appears as a high-intensity underscore, and can be positioned anywhere on the screen either manually by the operator through the keyboard, or automatically by the system program.

The optional Expanded Function feature on the 5251 provides control for a magnetic stripe reader and a selector light pen. The feature also provides a Copy Function (for the direct transfer and printing of a screen image from the Model 2 or 12, or an attached Model 1 or 11 or 5252 to a printer attached to the Model 2 or 12), and a Self-Check feature (providing Modulus 10 and 11 checking to assure that all digits have been keyed correctly).

The 5292 Model 2 provides graphics as well as alphanumeric capabilities. In Graphics Mode, the 5292 Model 2 can display bar charts, pie charts, line graphs, and surface graphs. The All Points Addressable (APA) capability provides access to 480 addressable points (horizontal) by 288 points (vertical). Color selection (black plus seven colors from a palette of 512) is a function of host system graphics support.

The 5294 Remote Control Unit supports the new data type "digits only" input field. The digits only data type accepts the entry of digits, but not special characters, into numeric data fields.

COMPONENTS

5294 REMOTE CONTROL UNIT: Provides for the remote connection of four workstations; up to eight workstations may be connected with the Extended Cluster Feature.

5251 MODEL 12 CONTROL UNIT: Up to eight additional workstations can be attached optionally to the Model 12 in a cluster arrangement, using the Cluster or Dual Cluster features.

5251 MODELS 11, 12, and 999 DISPLAY UNIT: Models 11, 12, and 999 provide a 12-inch (diagonal) screen with a 1,920-character capacity, arranged in 24 lines of 80 characters each. Characters are displayed in white. The standard character set includes 96 characters, including 52 upper-/lowercase alphabetic, 10 numeric, and 34 special. An 188-character Multinational Character Set is standard. Characters are formed in an 8-by-16 dot matrix. Cable Thru is standard, and a security keylock is optional. A magnetic stripe reader and selector light pen are supported.

5291 MODEL 2 DISPLAY UNIT: Model 2 includes a 12-inch (diagonal) screen with a 1,920-character capacity arranged in 24 lines of 80 characters each. Green phosphor characters are standard on the 5291. A 96-character set is standard, including 52 upper-/lowercase alphabetic, 10 numeric, and 34 special. Characters are formed within an 8-by-9 dot matrix. The display can be tilted or swiveled. Standard features include an adjustable audible alarm, Cable Thru, and row/column indicator.

5292 MODELS 1 and 2 DISPLAY UNIT: Models 1 and 2 provide a 12-inch (diagonal) display screen with a 1,920-character capacity, arranged in 24 lines of 80 characters each. The 5292 Model 1 can display seven colors: red, green, turquoise, yellow, pink, blue, and white. The 5292 Model 2 can display black plus seven additional colors selectable from a palette of 512, plus graphics. The standard character set has 96 characters, including 52 upper-/lowercase alphabetic, 10 numeric, and 34 special. Characters are formed within a 9-by-12 dot matrix. The display features a tilt adjustment. Standard features include an adjustable audible alarm, Cable Thru, and row/column indicator.

3180 MODEL 2 DISPLAY UNIT: Model 2 features a 15-inch (diagonal) display screen with a 1,920-character display capacity arranged in 24 lines of 80 characters each. A 25th message line is available. Characters are displayed in green, and formed via a 9-by-14 dot matrix. The standard character set includes 94 characters; a multinational character set is also available. The display contains tilt (20 degrees), swivel (360 degrees), and height (5 inches) adjustments. Standard features of the 3180 Model 2 include: adjustable audible alarm, security keylock, Cable Thru, row/column indicator, and automatic CRT dimming. (The 3180 Model 1 is designed for use with the IBM 3270 Information Display System; for more information, see Report C25-491-101.)

5251 KEYBOARDS: Three keyboard styles are available for use with the 5251 displays:

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- 4600—an 83-key, typewriter-style EBCDIC keyboard with 49 alphanumeric keys, 24 control keys, and a 10-key numeric pad;
- 4601—a 66-key, data entry-style keyboard with 36 alphanumeric keys, 23 control keys, and 7 blank keys;
- 4602—a 66-key, data entry-style keyboard with proof arrangement, including 36 alphanumeric keys, 23 control keys, and 7 blank keys (numeric keys are arranged similarly to those on an adding machine).

Keyboard styles 4601 and 4602 are not supported when the 5251 is attached directly or remotely to the System/34 or Series/1. All keyboards are detachable.

5291/5292 KEYBOARDS: All 5291 and 5292 models feature an 83-key, typewriter-style EBCDIC keyboard with a low-profile design. The keyboard is detachable, has a slope adjustment (5°, 10°, 15°, or 20°), and incorporates an operator palm rest. A numeric pad and 24 command functions are included.

3180 KEYBOARDS: Two keyboard styles are available for use with the 3180 Model 2 display:

- 4600—a 122-key, typewriter-style EBCDIC keyboard consisting of alphanumeric and control keys, and a numeric pad; the keyboard is detachable, and features a low-profile design that includes a slope adjustment;
- 4601—a 122-key, data entry-style keyboard consisting of alphanumeric, control, and blank keys; the keyboard is detachable, and features a low-profile design with slope adjustment.

5219 PRINTER: A bidirectional, correspondence quality print wheel printer available in two models: Model D01 features a maximum burst print speed of 40 cps; Model D02 features a maximum burst print speed of 60 cps. A variety of 96-character print wheels are available for use with the 5219. Horizontal character spacing is 10 cpi; vertical spacing is selectable at 6 or 8 lpi. Pinfed continuous forms are accepted.

5224 PRINTER: A tabletop impact matrix line printer available in two models: Model 1 features maximum print speeds of 140 lpm with horizontal spacing of 10 cpi, and 95 lpm with horizontal spacing of 15 cpi; Model 2 features maximum print speeds of 240 lpm with horizontal spacing of 10 cpi, and 170 lpm with horizontal spacing of 15 cpi. Characters are formed within an 8-by-7 character matrix. Maximum line lengths are 132 characters at 10 cpi and 198 characters at 15 cpi. Three character sets are available; upper-/lowercase characters are standard on all three. Vertical spacing of 6 or 8 lpi is selectable. Up to four-part forms may be used. An adjustable alarm and Cable Thru are standard.

5225 PRINTER: An impact matrix line printer available in four models: Model 1 features maximum print speeds of 280 lpm with horizontal spacing of 15 cpi, and 195 lpm with horizontal spacing of 10 cpi; Model 2 features maximum print speeds of 400 lpm at 15 cpi, and 290 lpm at 10 cpi; Model 3 features maximum print speeds of 490 lpm at 15 cpi, and 355 lpm at 10 cpi; Model 4 features maximum print speeds of 560 lpm at 15 cpi, and 420 lpm at 10 cpi. Characters are formed within an 8-by-7 character matrix. Maximum line lengths are 132 characters at 10 cpi and 198 characters at 15 cpi. A variety of character sets are available; upper-/lowercase characters are provided on all character sets. Vertical spacing of 6 or 8 lpi is selectable. A forms tractor provides for the feeding of punched continuous forms.

5256 PRINTER: A bidirectional, serial matrix printer available in three models: Model 1 features a maximum print speed of 40 cps; Model 2 features a maximum print speed of 80 cps; Model 3 features a maximum print speed of 120 cps. Dual 256-byte buffers are standard, with full buffer formatting capabilities. A 96-character set (upper-/lowercase) is standard. Horizontal character spacing is 10 cpi; vertical spacing is selectable at 6 or 8 lpi. Characters are formed by eight vertical wire printing dots in up to four of seven possible horizontal positions. Continuous forms are advanced by a variable width forms tractor. The 188-character Multinational Character set is optional, as is a forms stand.

PRICING

Previously, all 5250 Information Display System components were available under the terms of IBM's Lease or Rental Agreement (LRA), or for purchase. The newer 5250 components are available for purchase only. LRA includes prime-shift maintenance (the prime-shift maintenance period is for any consecutive nine hours between 7 a.m. and 6 p.m., Monday through Friday); a separate maintenance contract is available for purchased units. All new components are installed under IBM's Customer Set-Up (CSU) arrangement. Maintenance for the new components is available on an annual basis only. Volume discounts are available for all models. A three-month warranty (from date of initial installation) is standard.

EQUIPMENT PRICES

		Monthly Charges*			
		Rental ($)	Lease ($)	Purchase Price ($)	Monthly Maint. ($)
5251 DISPLAY STATIONS					
5251-11	Display Station Model 11 (keyboard required)	144	123	2,135	18.50
5251-12	Display Station Model 12 (keyboard required)	229	195	3,040	40.00
5251-999	Display Station Model 999 (keyboard required)	167	142	2,500	22.50
5251 KEYBOARDS					
4600	83-key EBCDIC Typewriter	19	16	265	3.00
4601	66-key EBCDIC Data Entry	19	16	265	3.00
4602	66-key EBCDIC Data Entry w/Proof Arrangement	19	16	265	3.00

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EQUIPMENT PRICES

			Monthly Charges*			
			Rental ($)	Lease ($)	Purchase Price ($)	Monthly Maint. ($)
	5251 OPTIONS					
2550		Cluster feature (5251 Model 12 only)	78	66	1,139	10.50
2551		Dual Cluster feature (5251 Model 12 only)	154	131	2,278	20.50
2680		Cable Thru feature (5251 Model 11 only)	5	3	100	1.00
3600		Expanded Function feature	16	14	225	1.50
3701		EIA Interface	19	16	447	3.00
4703		Internal Clock	6	5	218	1.00
5500		1200 bps Integrated Modem, nonswitched	26	22	686	5.00
5502		1200 bps Integrated Modem, switched	26	22	686	5.00
5640		2400 bps Integrated Modem, nonswitched	103	88	2,130	24.00
5641		2400 bps Integrated Modem, switched	112	96	2,350	25.00
5740		4800 bps Integrated Modem, nonswitched	177	151	3,710	35.00
5741		4800 bps Integrated Modem, switched	188	160	3,900	37.50
5650		DDS Adapter, point-to-point	36	31	873	4.00
5651		DDS Adapter, multipoint	36	31	873	4.00
4910		Magnetic Stripe Reader	20	17	318	2.50
6300		Selector Light Pen	38	33	570	7.50
4655		Keylock	—	—	42	—
4905		Multinational Character Set	2	2	58	1.00

		Purchase ($)	Annual Maint. ($)
3180/5291/5292 DISPLAY STATIONS			
3180-2	Display Station Model 2, w/keyboard	2,195	*105.00
5291-2	Display Station Model 2, w/keyboard	1,850	105.00
5292-1	Color Display Station Model 1, w/keyboard	4,950	357.00
5292-2	Color Display Station Model 2, w/keyboard	6,995	432.00
CONTROL UNIT			
5294-1	Remote Control Unit Model 1	2,650	246.00
2550	Extended Cluster feature	835	6.00
3600	Extended Function feature	105	—
3610	Feature Adapter Card	210	—
3701	EIA Interface	300	6.00
5650	DDS Adapter, Point-to-Point	800	12.00
5651	DDS Adapter, Multipoint	800	12.00
5655	X.21 Adapter	350	6.00
5680	X.25 Support	260	6.00
PRINTERS			
5219-D01	Printer Model D01	5,420	54.00
5219-D02	Printer Model D02	5,835	58.50
5224-1	Printer Model 1	6,395	**48.00
5224-2	Printer Model 2	7,280	**57.00
5225-1	Printer Model 1	12,075	**109.00
5225-2	Printer Model 2	13,945	**152.00
5225-3	Printer Model 3	15,495	**188.00
5225-4	Printer Model 4	16,940	**224.00
5256-1	Printer Model 1	4,145	**49.00
5256-2	Printer Model 2	4,340	**53.00
5256-3	Printer Model 3	4,535	**60.00
2680	Cable Thru feature (5225 & 5256 only)	119	**2.00
PC ATTACHMENT FEATURES			
6092656	IBM Personal Computer 5250 Emulation Program	164	—
6072534	System/34, /36, and /38 5251 Emulation Adapter	600	—

**IBM On-site Exchange; other annual maintenance plans available include: Customer On-site Exchange, Customer Carry-in Exchange, and IBM Carry-in Repair.*
***Monthly prime-shift maintenance.* ■

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IBM 8775 Display Terminal

MANAGEMENT SUMMARY

IBM originally introduced the 8775 Display Terminal for use with the 8100 Information System. Subsequent enhancements to the terminal now allow for attachment to the 4331 processor (via the Multiuse Communications Loop) and the 4300 and S/370 via communications facilities. The 8775 is intended to meet both the general and special needs of users with its set of basic and optional features.

The 8775 is available in four models. Model 1 and 2 communicate with an 8100 system or a 4331 processor using Synchronous Data Link Control (SDLC) over either local loops or data-link attached loops. Models 11 and 12 communicate with an 8100 system via SNA/SDLC data link over communications facilities. Models 11 and 12 can also be attached to a 4331 processor via the Integrated Communications Adapter (ICA), or to 4300 and S/370 processors via a 3704/3705 Communications Controller using SDLC over either non-switched, non-switched with switched network backup, or public switched network.

Models 1 and 11 feature display capacities of 960, 1920, or 2560 characters. Models 2 and 12 feature the same display capacities as Models 1 and 11 plus a 3440 character screen capacity. A choice of seven keyboard styles is offered, including 75-key Typewriter Keyboard, 75-key Data Entry Keyboard, 75-key Data Entry Keyboard (with keypunch layout), 87-key EBCDIC Typewriter/APL Keyboard, 87-key EBCDIC Typewriter Keyboard, 87-key EBCDIC Typewriter Overlay Keyboard, and 87-key Typewriter/Text Entry and Edit Keyboard. All keyboards feature the EBCDIC character set. An optional selector light pen is also available.

Additional enhancements have provided support for the IBM 3287 Model 1, 2, 1C, and 2C Printers, or the IBM 7436 Model 1 RPQ Printer. Enhanced functions are available for ➢

A display terminal designed for use with the IBM 8100 Information System, or 4300, 4331, and S/370 processors.

Four models of the 8775 are available, with display screen capacities ranging from 960 to 3440 characters, all in the 80-column format. The display screen measures 12 inches (diagonally), and is tiltable. A choice of seven keyboards are available for use with the 8775, all of which are detachable. Additional features available include APL, highlighting, multiple partitions, scrolling, and programmed symbols.

Purchase prices for the 8775 range from $3,240 to $3,770. On a two-year lease, monthly charges range from $86 to $103, including maintenance.

CHARACTERISTICS

VENDOR: International Business Machines Corporation, Information Systems Group, National Accounts Division, 1133 Westchester Avenue, White Plains, NY 10604. Telephone (914) 696-1900.

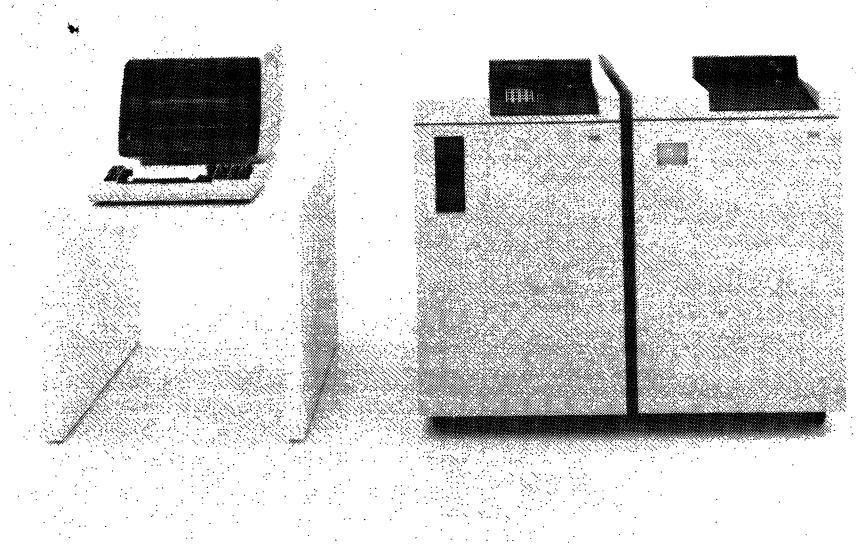
DATE OF ANNOUNCEMENT: October 1978.

DATE OF FIRST DELIVERY: November 1978.

SERVICED BY: IBM.

MODELS

The 8775 Display Terminal is available in four models. Model 1 and 2 can be attached to an IBM 8100 Information System or to an IBM 4331 processor. Models 11 and 12 can be attached to an 8100, 4300, or S/370 processor. ➢



The 8775 Display Terminal was designed for use with the IBM 8100 Information System (shown here); support for attachment to the 4300, 4331, and S/370 processors has also been implemented. The 8775 is available in four models, with display capacities ranging from 960 to 3440 characters. The user can configure the terminal with any of seven available keyboard styles, all of which are detachable.

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IBM 8775 Display Terminal

the 8775, including APL, extended highlighting, multiple partitions, scrolling, field validation, and enhanced magnetics (the capability to read magnetic-coded information from an alphanumeric character set).

The 8775 has an anti-reflective screen, with status information displayed on the bottom row of the screen, outside the data display area. Updating of the screen from the host is accomplished without refresh interrupt (i.e., no blinking). The operator may select one of several cursor modes.

Special features provide an audible alarm, business machine clocking, and an optional security keylock to prevent unauthorized display or modification of data.

USER REACTION

In the 1982 edition of Datapro's Terminal Users Survey, conducted in conjunction with *Data Communications* magazine, a total of 12 responses were received from users of the IBM 8775 Display Terminal. These users represented an installed base of 616 terminals. The ratings given to the 8775 by these users are summarized in the following table.

	Excellent	Good	Fair	Poor	WA*
Overall performance	4	8	0	0	3.3
Ease of operation	5	7	0	0	3.4
Display clarity	5	6	1	0	3.3
Keyboard feel & usability	4	7	1	0	3.3
Hardware reliability	6	6	0	0	3.5
Maintenance service/ technical support	3	8	1	0	3.2

*Weighted Average based on a scale of 4.0 for Excellent.

When asked whether or not they would recommend the 8775 to other users for similar applications, eight of the respondents answered that they would, two answered that they would not, and the remaining two did not respond.□

Display capacities for all models are 960, 1920, or 2560 characters in the 9 x 16 character matrix; Models 2 and 12 can also display 3440 characters in a 9 x 12 character matrix.

TRANSMISSION SPECIFICATIONS

8775 Models 1 and 2 are attached to user-owned loops. A direct loop to an 8100 system or a 4331 processor may operate at 34.8K bps, or 9600 bps (speed specified by customer at time of order). Models 1 and 2 can also be attached to an 8100 or 4331 via a data-link attached loop. SDLC link protocol is used.

Models 11 and 12 may communicate with an 8100 system over data link non-switched communications facilities or with a 4331 processor via its Integrated Communications Adapter. Communications with a 4300 or S/370 processor can be accomplished via 3704/3705 Communications Controllers over data link non-switched, non-switched with switched network backup, or public switched network communications facilities using SDLC.

Models 11 and 12 operate in half-duplex mode over non-switched facilities in 2 or 4 wire point-to-point or 4 wire multipoint configurations, at speeds of 1200/600, 2000, 2400/1200, 4800/2400, 7200/3600, and 9600 bps, or over switched facilities in 2 or 4 wire point-to-point configurations at speeds of 1200/600, 2400/1200, and 4800/2400 bps.

HOST COMPUTER SOFTWARE SUPPORT

Programming support for the 8775 used with the 8100 System is provided by the Distributed Processing Programming Executive Base licensed program; 3270 Data Stream Compatibility (DPPX/DSC) licensed program including APL support; and the Distributed Presentation Services (DPPX/DPS) licensed program.

The 8775 Models 1 and 2 base function only is supported for attachment to the 4331 processor via the loops under VSE/AF by ACF/VTAME and CICS/DOS/VS or under OS/VS1 by ACF/VTAM and CICS/OS/VS. Communication Network Management Problem Determination support is provided for Models 1 and 2 via NCCF/NPDA.

Models 11 and 12 base functions only are supported for attachment to 4300s via the Integrated Communications Adapter or S/370 processor via the 3704/3705 Communications Controllers with current NCP and ACF/NCP/VS products. This support is provided under VSE/AF by ACF/VTAM and ACF/VTAME with CICS/DOS/VS. OS/VS1 or OS/VS2 (MVS) support is provided by ACF/VTAM, ACF/TCAM, CICS/OS/VS, and IMS.

All models' downstream-loadable advanced functions are supported for attachment to the 4331 processor either via loops or via the Integrated Communications Adapter under VSE/AF by ACF/VTAME and CICS/DOS/VS.

DEVICE CONTROL

The operator may select one of several cursor modes. Cursor select keys include cursor move, tab, home key, back tab, insert, delete, and extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen). All alphanumeric, special symbol, and cursor move keys have typematic capability. Double speed cursor typematic is available, by simultaneously pressing the ALT key and a horizontal cursor positioning key. The cursor select function provides an alternative to the selector light pen function. Fields of data may be selected by positioning the cursor, then using the cursor select key.

The number of characters displayed is determined by the operator. All configurations include 62 alphanumeric and 32 special characters, and Space and Null characters. The 3270 Field Formatting capability permits individual fields of data on the screen to be program defined with various attributes such as normal/highlighted intensity, protected/unprotected, alphanumeric/numeric, displayable/non-displayable, and selector light pen detection allowed/disallowed.

The Enhanced Function feature provides the 8775 with the following capabilities:

- **Highlighting—a character or field can be highlighted via blinking, underlining, or reverse video;**
- **Field Validation—this function allows the application program to identify data fields as a mandatory-enter field, mandatory-fill field, or trigger field, in any combination;**
- **Multiple partitions—this feature enables the application program to divide the screen into up to eight independent partitions;**

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IBM 8775 Display Terminal

- APL—when used with the APL keyboard, this feature permits the entry of the space (blank) character, plus a 175-character set that includes 81 APL characters and 94 EBCDIC characters.

The Enhanced Function with Magnetics feature provides all of the capabilities mentioned above, plus support for magnetic stripe readers.

The PS-2 and PS-4 Programmed Symbols features provide access and storage for up to six sets of special character fonts or pictorial characters. The special symbols defined by the user can be represented on the keyboard utilizing overlays.

COMPONENTS

8775 DISPLAY: Measures 12 inches (diagonally). Models 1, 2, 11, and 12 all have display capacities of 960, 1920, and 2560 characters, utilizing the 80-column format, and displayed in the 9-by-16 character matrix size. Models 2 and 12 have an additional display capacity of 3440 characters in a 9-by-12 character matrix size. Status indicators are displayed on the bottom row of the screen, outside the data display area. The display console has a tilt adjustment and an anti-glare screen.

Models	Display Capacity	Lines/ Display	Columns/ Display
1, 2, 11, 12	960	12	80
1, 2, 11, 12	1920	24	80
1, 2, 11, 12	2560	32	80
2, 12	3440	43	80

4621 KEYBOARD: 75-key Typewriter Keyboard. The keyboard is detachable and includes 49 data keys and 26 control keys. 12 function keys are included in the top row of data keys through the use of an alternate shift key. The EBCDIC character set is generated.

4622 KEYBOARD: 75-key Data Entry Keyboard. The keyboard is detachable and includes 35 data keys, 10 program function keys, and 30 control keys. The EBCDIC character set is generated.

4623 KEYBOARD: 75-key Data Entry Keyboard, keypunch layout. The keyboard is detachable and includes 35 data keys, 10 program function keys, and 30 control keys. The keypunch layout allows for high volume data entry. The EBCDIC character set is generated.

4626 KEYBOARD: 87-key EBCDIC Typewriter/APL Keyboard. A detachable keyboard with modified keytops to allow entry of 81 APL characters in addition to the 94-character EBCDIC set. An APL On/Off key determines APL or EBCDIC mode. Includes 12 program function keys.

4627 KEYBOARD: 87-key EBCDIC Typewriter Keyboard. A detachable keyboard with 49 alphanumeric data keys, 26 control keys, and 12 program function keys (shiftable to 24). The 12 program function keys are included in the top row of the data keys and activated through the use of an alternate shift key.

4640 KEYBOARD: 87-key EBCDIC Typewriter Overlay Keyboard. Without Overlay, this keyboard is the same as the 4627 keyboard. Special keytops permit the use of customer annotated overlays. These overlays are used to show the symbols associated with the keys when one of the Programmed Symbols is selected. The desired Programmed Symbol is chosen by the operator through the use of the program function keys in upper case and the alternate shift on this keyboard. Six overlays are standard; additional overlays are optional.

4670 KEYBOARD: 87-key Typewriter/Text Entry and Edit Keyboard. The keyboard is detachable and contains all of the character and function keys of an 87-key EBCDIC Typewriter keyboard, plus additions for the entry and editing of text. The group of 12 program function keys to the right of the main key array contain special keytops to accommodate a special IBM-supplied reversible annotated overlay. One side of the overlay indicates the function key assignments for text applications; the reverse side indicates function key assignments for data applications.

PRICING

The 8775 Display Terminal is available for purchase, lease, or rental. Upgrades, from Model 1 to Model 2, or from Model 11 to Model 12, can be made at a charge of $680. A 3-month warranty applies; an annual maintenance contract is available following expiration of the warranty. The units are designed for customer setup and maintainability; if an equipment failure occurs, a Problem Analysis and Resolution Guide instructs the customer in isolation and replacement of the failing part. IBM provides spare parts for all customer-replaceable components and shipping packages for returning parts to IBM for service. Maintenance and repairs are performed only at the nearest IBM Repair Center; on-site IBM field service is limited to problem analysis using the same documentation available to the customer and part replacement with a customer-supplied spare, and is billed on an hourly (per call) basis.

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IBM 8775 Display Terminal

	Monthly Charges*			
	Rental	Lease	Purchase	Monthly Maint.
8775 Model 1	$101	$86	$3,240	$22.00
8775 Model 2	113	96	3,655	22.00
8775 Model 11	108	92	3,355	27.50
8775 Model 12	121	103	3,770	27.50
4621 Keyboard	16	14	463	2.00
4622 Keyboard	16	14	463	3.00
4623 Keyboard	16	14	463	3.00
4626 Keyboard	21	18	632	2.50
4627 Keyboard	21	18	632	2.50
4640 Keyboard	21	18	632	2.50
4670 Keyboard	21	18	632	3.50
Selector Light Pen	19	16	638	1.00
Audible Alarm	2	2	102	—
Business Machine Clock	6	5	256	1.50
Security Keylock**	37	SUC	37	—
Set Up Keylock**	69	SUC	69	—
CCITT V35 Interface (Models 11 and 12 only)	19	16	583	2.00
Extended Feature Storage	31	26	1,030	4.50
Enhanced Function (requires Feature Storage or Extended Feature Storage)	—	—	NC	—
Enhanced Function w/Magnetics (requires Extended Feature Storage)	—	—	NC	—
Programmed Symbols				
PS-2 (two 190-symbol sets)	6	5	245	1.50
PS-4 (four 190-symbol sets)	13	11	393	2.50

*Includes prime-shift maintenance.
**Field Installation not recommended.■

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IBM 8775 Display Terminal

MANAGEMENT SUMMARY

IBM originally introduced the 8775 Display Terminal for use with the 8100 Information System. Subsequent enhancements to the terminal now allow for attachment to the 4331 processor (via the Multiuse Communications Loop) and the 4300 and S/370 via communications facilities. The 8775 is intended to meet both the general and special needs of users with its set of basic and optional features.

The 8775 is currently available in four models. Model 1 and 2 communicate with an 8100 system or a 4331 processor using Synchronous Data Link Control (SDLC) over either local loops or data-link attached loops. Models 11 and 12 communicate with an 8100 system via SNA/SDLC data link over communications facilities. Models 11 and 12 can also be attached to a 4331 processor via the Integrated Communications Adapter (ICA), or to 4300 and S/370 processors via a 3704/3705 Communications Controller using SDLC over either non-switched, non-switched with switched network backup, or public switched network.

Models 1 and 11 feature display capacities of 960, 1920, or 2560 characters in a 9 x 16 character matrix size. Models 2 and 12 feature the same display capacities as Models 1 and 11 plus a 3440 character capacity in the 9 x 12 character matrix size. A choice of six keyboard styles is offered, including 75-key Typewriter Keyboard, 75-key Data Entry Keyboard, 75-key Data Entry Keyboard (with keypunch layout), 87-key EBCDIC Typewriter/APL Keyboard, 87-key EBCDIC Typewriter Keyboard, and the 87-key EBCDIC Typewriter Overlay Keyboard. All keyboards feature the EBCDIC character set. An optional selector light pen is also available.

A display terminal designed for operation with the 8100 Information System; support for attachment to the 4300, 4331, and S/370 has also been added.

The 8775 is available in four models, featuring screen capacities from 960 to 3440 characters. APL, extended highlighting, multiple partitions, scrolling, programmed symbols, and extended data entry capabilities are available. Special features provide an audible alarm, a security keylock, and a magnetic slot reader or hand scanner. A choice of six keyboards, and an optional selector light pen, provide input flexibility.

Purchase prices for the 8775 range from $2,975 to $3,455. The terminal is also available for rental or lease.

CHARACTERISTICS

VENDOR: International Business Machines Corporation, Data Processing Division, 1133 Westchester Avenue, White Plains, NY 10604. Telephone (914) 696-1900.

DATE OF ANNOUNCEMENT: October 1978.

DATE OF FIRST DELIVERY: November 1978.

SERVICED BY: IBM.

MODELS

The 8775 Display Terminal is available in four models. Model 1 and 2 can be attached to an IBM 8100 Information

IBM's 8775 Display Terminal was originally introduced for use with the 8100 Information System: support for attachment to the 4300, 4331, and S/370 processors has now been added. Four models are available, with a choice of four display capacities and six keyboard styles.

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IBM 8775 Display Terminal

Additional enhancements have provided support for the IBM 3287 Model 1, 2, 1C, and 2 C Printers, or the IBM 7436 Model 1 RPQ Printer. Enhanced functions are available for the 8775, including APL, extended highlighting, multiple partitions, scrolling, field validation, and enhanced magnetics (the capability to read magnetic-coded information from an alphanumeric character set).

The 8775 has an anti-reflective screen, with status information displayed on the bottom row of the screen, outside the data display area. Updating of the screen from the host is accomplished without refresh interrupt (i.e., no blinking). The operator may select one of several cursor modes.

Special features provide an audible alarm, business machine clocking, and an optional security keylock to prevent unauthorized display or modification of data.□

System or to an IBM 4331 processor. Models 11 and 12 can be attached to an 8100, 4300, or S/370 processor.

Display capacities for all models are 960, 1920, or 2560 characters in the 9 x 16 character matrix; Models 2 and 12 can also display 3440 characters in a 9 x 12 character matrix.

TRANSMISSION SPECIFICATIONS

8775 Models 1 and 2 are attached to user-owned loops. A direct loop to an 8100 system or a 4331 processor may operate at 34.8K bps, or 9600 bps (speed specified by customer at time of order). Models 1 and 2 can also be attached to an 8100 or 4331 via a data-link attached loop. SDLC link protocol is used.

Models 11 and 12 may communicate with an 8100 system over data link non-switched communications facilities or with a 4331 processor via its Integrated Communications Adapter. Communications with a 4300 or S/370 processor can be accomplished via 3704/3705 Communications Controllers over data link non-switched, non-switched with switched network backup, or public switched network communications facilities using SDLC.

Models 11 and 12 operate in half-duplex mode over non-switched facilities in 2 or 4 wire point-to-point or 4 wire multipoint configurations, at speeds of 1200/600, 2000, 2400/1200, 4800/2400, 7200/3600, and 9600 bps, or over switched facilities in 2 or 4 wire point-to-point configurations at speeds of 1200/600, 2400/1200, and 4800/2400 bps.

HOST COMPUTER SOFTWARE SUPPORT

Programming support for the 8775 used with the 8100 System is provided by the Distributed Processing Programming Executive Base licensed program; 3270 Data Stream Compatibility (DPPX/DSC) licensed program including APL support; and the Distributed Presentation Services (DPPX/DPS) licensed program.

The 8775 Models 1 and 2 base function only is supported for attachment to the 4331 processor via the loops under VSE/AF by ACF/VTAM and CICS/DOS/VS or under OS/VS1 by ACF/VTAM and CICS/OS/VS. Communication Network Management Problem Determination support is provided for Models 1 and 2 via NCCF/NPDA.

Models 11 and 12 base functions only are supported for attachment to 4300s via the Integrated Communications Adapter or S/370 processor via the 3704/3705 Communications Controllers with current NCP and ACF/NCP/VS products. This support is provided under VSE/AF by ACF/VTAM and VTAME with CICS/DOS/VS. OS/VS1 or OS/VS2 (MVS) support is provided by ACF/VTAM, ACF/TCAM, CICS/OS/VS, and IMS.

All models' downstream-loadable advanced functions are supported for attachment to the 4331 processor either via loops or via the Integrated Communications Adapter under VSE/AF by ACF/VTAME and CICS/DOS/VS.

DEVICE CONTROL

The operator may select one of several cursor modes. Cursor select keys include cursor move, tab, home key, back tab, insert, delete, and extended erase (erase to end-of-field, erase all keyboard input data, and erase entire screen). All alphanumeric, special symbol, and cursor move keys have typematic capability. Double speed cursor typematic is available, by simultaneously pressing the ALT key and a horizontal cursor positioning key. The cursor select function provides an alternative to the selector light pen function. Fields of data may be selected by positioning the cursor, then using the cursor select key.

The number of characters displayed is determined by the operator. All configurations include 62 alphanumeric and 32 special characters, and Space and Null characters. The 3270 Field Formatting capability permits individual fields of data on the screen to be program defined with various attributes such as normal/highlighted intensity, protected/unprotected, alphanumeric/numeric, displayable/non-displayable, and selector light pen detection allowed/disallowed.

COMPONENTS

8775 DISPLAY: Available in four models. Models 1, 2, 11, and 12 all have display capabilities of 960, 1920, and 2560 characters, utilitizing the 80-column format, and displayed in the 9 x 16 character matrix size. Also, Models 2 and 12 have an additional display capacity of 3440 characters in the 9 x 12 character matrix size. Status indicators are displayed on the bottom row of the screen, outside the data display area. The display console has a tilt adjustment and an anti-glare screen.

Highlighting is on a per character basis and can be blink, reverse video, or underlined. Up to eight partitions can be established; the operator can interact with each independently.

4621 KEYBOARD: 75-key Typewriter Keyboard. The keyboard is detachable and includes 49 data keys and 26 control keys. 12 function keys are included in the top row of data keys through the use of an alternate shift key. The EBCDIC character set is generated.

4622 KEYBOARD: 75-key Data Entry Keyboard. The keyboard is detachable and includes 35 data keys, 10 program function keys, and 30 control keys. The EBCDIC character set is generated.

4623 KEYBOARD: 75-key Data Entry Keyboard, keypunch layout. The keyboard is detachable and includes 35 data keys, 10 program function keys, and 30 control keys. The keypunch layout allows for high volume data entry. The EBCDIC character set is generated.

4626 KEYBOARD: 87-key EBCDIC Typewriter/APL Keyboard. A detachable keyboard with modified keytops to allow entry of 81 APL characters in addition to the 94-character EBCDIC set. An APL On/Off key determines APL or EBCDIC mode. Includes 12 program function keys.

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IBM 8775 Display Terminal

4627 KEYBOARD: 87-key EBCDIC Typewriter Keyboard. A detachable keyboard with 49 alphanumeric data keys, 26 control keys, and 12 program function keys (shiftable to 24). The 12 program function keys are included in the top row of the data keys and activated through the use of an alternate shift key.

4640 KEYBOARD: 87-key EBCDIC Typewriter Overlay Keyboard. Without Overlay, this keyboard is the same as the 4627 keyboard. Special keytops permit the use of customer annotated overlays. These overlays are used to show the symbols associated with the keys when one of the Programmed Symbols is selected. The desired Programmed Symbol is chosen by the operator through the use of the program function keys in upper case and the alternate shift on this keyboard. Six overlays are standard; additional overlays are optional.

PRICING

The 8775 Display Terminal is available for purchase, lease, or rental. Upgrades, from model 1 to Model 2, or from Model 11 to Model 12, can be made at a charge of $680. A 3-month warranty applies; an annual maintenance contract is available following expiration of the warranty. The units are designed for customer setup and maintainability; if an equipment failure occurs, a Problem Analysis and Resolution Guide instructs the customer in isolation and replacement of the failing part. IBM provides spare parts for all customer-replaceable components and shipping packages for returning parts to IBM for service. Maintenance and repairs are performed only at the nearest IBM Repair Center; on-site IBM field service is limited to problem analysis using the same documentation available to the customer and part replacement with a customer-supplied spare, and is billed on an hourly (per call) basis.

	Monthly Charges*			
	Rental	Lease	Purchase	Monthly Maint.
8775 Model 1	$82	$70	$2,975	$21.00
8775 Model 2	92	78	3,350	21.00
8775 Model 11	88	75	3,080	26.00
8775 Model 12	99	84	3,455	26.00
4621 Keyboard	13	11	519	2.50
4622 Keyboard	13	11	519	3.50
4623 Keyboard	13	11	519	3.50
4626 Keyboard	19	16	708	3.00
4627 Keyboard	19	16	708	3.00
4640 Keyboard	19	16	708	3.50
Selector Light Pen	15	13	614	0.50
Audible Alarm	2	2	94	—
Business Machine Clock	6	5	236	1.00
Security Keylock**	36	SUC	36	—
Set Up Keylock**	63	SUC	63	—
CCITT V35 Interface (Models 11 and 12 only)	15	13	535	2.00
Programmed Symbols				
PS-2 (two 190-symbol sets)	6	5	236	1.00
PS-4 (four 190-symbol sets)	9	8	378	2.00

*Includes prime-shift maintenance
**Field Installation not recommended.■

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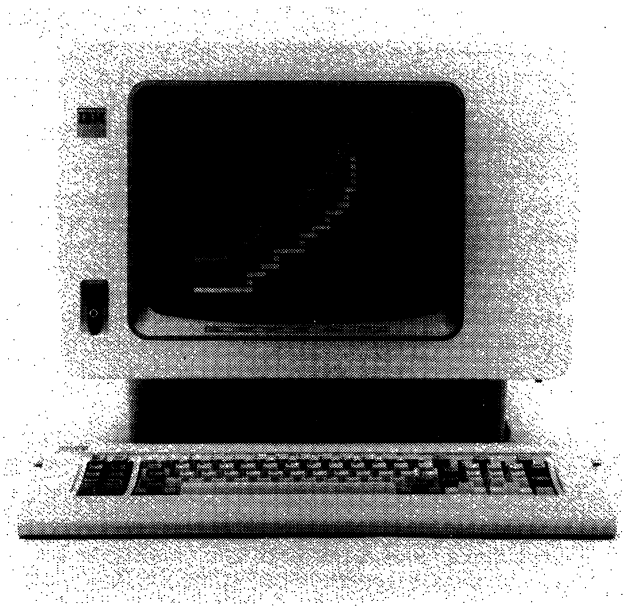
IBM 5250 Information Display System



The 5292 Color Display Station Model 1 can display seven colors: red, green, turquoise, yellow, pink, blue, and white. The 5292 has a 12-inch tiltable display and a low profile detachable keyboard. The display can be used with the System/34, System/38, and the new System/36.

The 5250 Information Display System is a family of components for use with IBM's System/34, System/36, System/38, and Series/1. The family consists of a number of display station and printer models. Recent additions to the family include color, graphics, and a new display enclosure style.

MODELS: 5251 Display Station Models 11 and 12; 5291 Display Station Model 1; 5292 Color Display Station Models 1 and 2; 5219 Printer Models D01 and D02; 5256 Printer Models 1, 2, and 3.
DISPLAY: All display stations feature a 12-inch screen with a 1920-character capacity. 5292 Models 1 and 2 feature a color display; graphics is available on Model 2. The 5291 and 5292 include tiltable displays.
KEYBOARD: All displays feature a detachable, typewriter-style keyboard. A choice of three keyboard versions are available for the 5251 Models 11 and 12. The 5291 and 5292 displays feature a low profile, adjustable keyboard.
COMPETITION: Decision Data Corporation.
PRICE: Display station prices range from $2,100 to $6,995.

MANAGEMENT SUMMARY

IBM's 5250 Information Display System is a family of workstations, including display stations and printers, designed for interactive data entry and inquiry applications. Originally announced for use with the System/34, the 5250 components can now also be used with the System/36, System/38, and Series/1. Some of the older components, including the 5251 Display Station Models 1 and 2, and the 5252 Dual Display Station, have been dropped from the product line. A new generation of display stations, including color models, has been added. In addition, IBM has introduced a software package that provides the IBM Personal Computer with 5250 emulation.

The components that currently make up the 5250 Information Display System include: the 5251 Display Station Models 2 and 12; 5291 Display Station Model 1; 5292 Color Display Station Models 1 and 2; 5219 Printer Models D01 and D02; and the 5256 Printer Models 1, 2, and 3.

The 5251 Display Station Models 11 and 12 are original members of the 5250 family. The 5251 Model 12 is designed for remote communications with the System/34, System/36, and System/38 in SDLC mode. Up to four or eight additional workstations (5251 Model 11, 5291, 5292 Models 1 and 2, 5219, 5256, or older 5251 and 5252 displays) may be attached to the Model 12 using the Cluster or Dual Cluster features. The 5251 Model 11 can be attached directly to a System/34, System/36, System/38, or Series/1.

CHARACTERISTICS

VENDOR: International Business Machines Corporation, Old Orchard Road, Armonk, NY 10504. Contact your local IBM representative.

DATE OF ANNOUNCEMENT: April 1977.

DATE OF FIRST DELIVERY: January 1978.

SERVICED BY: International Business Machines.

MODELS

The 5250 Information Display System consists of the following components:

***5251 Display Station Model 11*—features a 1920-character screen capacity, and attaches directly to the System/34, System/36, System/38, Series/1, or 5251 Models 2 and 12. It also serves as the system console for the System/34.**

***5251 Display Station Model 12*—features a 1920-character screen capacity, and provides remote communications capability with the System/34, System/36, and System/38 in SNA/SDLC mode. Model 12 is not supported on the Series/1. Up to eight additional workstations can be attached optionally to the Model 12 in a cluster arrangement, using the Cluster or Dual Cluster features.**

***5291 Display Station Model 1*—has a 1920-character screen capacity, and attaches directly to the System/34, System/36, System/38, Series/1, or 5251 Models 2 and 12. It can also serve as the system console for System/34 and**

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IBM 5250 Information Display System

The new 5291 and 5292 Display Stations are plug-compatible replacements for the 5251 Model 11. The 5291 contains all of the features of the 5251 Model 11; it adds Cable Thru and an adjustable audible alarm as standard features, and incorporates a new ergonomically improved display design that includes a tiltable display and a low profile, detachable keyboard. The 5292 Models 1 and 2 are color displays. Model 1 is an alphanumeric model that displays seven colors: red, green, turquoise, yellow, pink, blue, and white. Model 2 provides graphics as well as alphanumeric capabilities. Business graphics can be displayed in eight colors: black plus seven colors from a palette of 512. The 5292 display features the same design improvements as the 5291; however, it cannot be attached to the Series/1.

The 5291 is a bidirectional, correspondence quality print wheel printer for use with the System/34, System/36, System/38, and Series/1; it can also be attached to the 5251 Models 2 and 12 in cluster arrangements of up to four or eight workstations. Model D01 provides a maximum print speed of 40 cps, while Model D02 prints at a maximum speed of 60 cps.

The 5256 Printer is a bidirectional serial matrix printer for use with the Series/1, System/34, System/36, and System/38, as well as the 5280 Distributed Data System. The 5256 can be attached to the 5251 Models 2 and 12 in cluster arrangements of up to four or eight workstations. Model 1 provides a maximum print speed of 40 cps; Model 2, a maximum print speed of 80 cps; and Model 3, a maximum print speed of 120 cps.

The IBM PC 5250 Emulation Program is a software program that allows the IBM Personal Computer to be attached to a System/34, System/36, or System/38 while emulating a 5251 Model 12 Display Station. An emulation adapter is required.

COMPETITIVE POSITION

Decision Data Corporation is IBM's chief competition in the System/34, System/36, System/38 workstation market. Decision Data provides the 3751-11 and 3791-01 display stations, as well as a variety of printers, as replacements for the 5250 components. Of the other vendors in the terminal industry, Esprit Systems (Executive 10/51) and Protocol Computers (PCI 51) manufacture displays that emulate the 5251 display station when coupled with a protocol converter.

ADVANTAGES AND RESTRICTIONS

IBM has made the 5250 Information Display System more attractive with the addition of the new display station models, which provide improved terminal design as well as color and graphics (5292). Another important addition to the family is the Personal Computer emulation program, which enables the PC to be added to 5250 workstation clusters.

System/36. The 5291 is a replacement for the 5251 Model 11, and features an improved terminal design.

***5292 Color Display Station Model 1*—has a 1920-character screen capacity and can display seven colors: red, green, turquoise, yellow, pink, blue, and white. The 5292 Model 1 attaches directly to the System/34, System/36, System/38, or 5251 Models 2 and 12. It can also serve as the system console for the System/34 and System/36. The 5292 Model 1 features the same terminal design found on the 5291.**

***5292 Color Display Station Model 2*—has a 1920-character screen capacity, supports business graphics, and can display eight colors (black plus seven others from a palette of 512). The 5292 Model 2 attaches directly to the System/34, System/36, System/38, or 5251 Models 2 and 12. It can also serve as the system console for the System/34 and System/36. The 5292 Model 2 also features the terminal design found on the 5291 and 5292 Model 1.**

***5219 Printer*—is available in two models: Model D01 features a maximum print speed of 40 cps; Model D02 features a maximum print speed of 60 cps. All models attach directly to the System/34, System/36, System/38, Series/1, and the 5251 Models 2 and 12.**

***5256 Printer*—is available in three models: Model 1 features a maximum print speed of 40 cps; Model 2 features a maximum print speed of 80 cps; Model 3 features a maximum print speed of 120 cps. All models attach directly to the System/34, System/38, Series/1, 5251 Models 2 and 12, and the 5280 Distributed Data System.**

The 5251 Display Station Models 1 and 2, and the 5252 Dual Display Display Station Model 1 are no longer available from IBM.

TRANSMISSION SPECIFICATIONS

5251 Model 12 can communicate with the System/34, System/36, or System/38 operating in SNA/SDLC mode only. Transmission is half-duplex over nonswitched (leased) point-to-point or multipoint lines at speeds up to 9600 bps, and on switched (dial) point-to-point lines at speeds up to 4800 bps. Model 12 is not supported on the Series/1. A 1200, 2400, or 4800 bps Integrated Modem, EIA Interface, or DDS Adapter is required.

The 5251 Model 11, 5291 Model 1, 5292 Models 1 and 2, 5219 Models D01 and D02, and 5256 Models 1, 2, and 3 can attach directly to the 5251 Models 2 and 12, System/34, System/36, System/38, or Series/1 (the 5292 models do not attach to the Series/1). Multiple workstations may be attached through the 5251 Cluster or Dual Cluster features, or the Cable Thru feature (not available for 5251 Model 12).

The System/34 provides a system console port, three additional local ports, and four ports for remote communications links. One 5251 Display Station 11, 5291 Model 1, or 5292 Model 1 or 2 is required as the system console. Up to seven additional workstations (5251 Models 1 or 11, 5291 Model 1, 5292 Models 1 or 2, 5252, 5219 Models D01 or D02, 5256 Models 1, 2, or 3) may be attached to the remaining three local ports; the Cable Thru feature allows multiple workstations to be attached to a single port. Up to 15 workstations may be attached to the three local workstation ports when an optional System/34 processor feature #4901, Workstation Control Expansion B is in place. Up to seven workstations may be attached to one cable when using the Cable Thru feature. Up to 64 remote standalone terminals or cluster workstations can be supported over point-to-point or multipoint lines to the communications ports.

On the System/36, up to six workstations, including the system console, can be attached via twinaxial cable. Up to 30

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IBM 5250 Information Display System

USER REACTION

In Datapro's 1983 Terminal Users Survey, conducted in conjunction with *Data Communications* magazine, a total of 12 responses were received from users of IBM 5250 Information Display System terminals. Of these users, 10 were using the 5251 Display Station, with a total of 305 installed units; the remaining two users reported on the 5291 Display Station, with three units installed. These users were asked to rate their display stations in seven specific categories. Their ratings are summarized in the following table.

	Excellent	Good	Fair	Poor	WA*
Overall performance	2	8	0	0	3.2
Ease of operation	8	4	0	0	3.7
Display clarity	6	5	1	0	3.4
Keyboard feel & usability	4	5	3	0	3.1
Ergonomics	5	6	1	0	3.3
Hardware reliability	6	5	0	1	3.3
Maintenance service/ technical support	11	1	0	0	3.9

*Weighted Average based on a scale of 4.0 for Excellent.

When asked whether or not they would recommend the IBM 5250 display stations to other users, all 11 of the users who responded to that question answered that they would. □

workstations can be attached when configured with the Workstation Controller Expansion. Up to seven workstations can be attached to a single cable with the Cable Thru feature.

On the System/38, up to 80 local workstations (5251 Models 1 or 11, 5291 Model 1, 5292 Models 1 or 2, 5252, 5219 Models D01 or D02, 5256 Models 1, 2, or 3) can be supported by configuring various combinations of System/38 Workstation Controlled features, expansion options, workstation ports, and terminal Cable Thru features. In addition, the System/38 supports up to eight remote communications ports, for connection of terminals or cluster workstations. The maximum number of remote terminals that can be supported by the System/38 varies with processor size, mode of terminal operation, traffic volume, and other factors.

The Series/1 accommodates up to 256 local and remote workstations, which can be connected to the processor through a local I/O attachment feature on a remote communications line. Up to eight workstations (5251 Models 1 or 11, 5291 Model, 5252, 5256 Models 1, 2, or 3) are supported by each local I/O attachment feature. The Cable Thru feature allows a second workstation to be attached to a single cable. The Series/1 supports up to 96 point-to-point or multipoint communications lines, through which remote standalone terminals and workstation clusters may be connected to the system.

The 5251 Models 1 or 11, 5291 Model 1, 5292 Models 1 or 2, 5252, 5219 Models D01 or D02, and 5256 Models 1, 2, or 3 can be attached to the 5251 Models 2 and 12 in a cluster arrangement through the Cluster or Dual Cluster features. The Cluster feature allows the attachment of up to four workstations; the Dual Cluster feature allows the attachment of up to eight workstations. Cable Thru is a standard feature on the 5291 Model 1 and 5292 Models 1 and 2; it is optional on the 5251 Model 11.

DEVICE CONTROL

Visual attributes, available on a field basis, include high intensity, nondisplay (security), blink, underscore, column separator and reverse image. The operator can also reverse the image of the entire screen. Individual fields can be designated and edited independently. Fields can be designated as alphanumeric, alpha only, signed numeric, field exit required, right adjust, mandatory entry, mandatory fill, bypass, auto enter, dup enable, monocase, and self-check Modulus 10 and 11 (self-check is optional on 5251 Model 12).

Display indicators are included on all display station models to inform the operator of the terminal's operational status. Indicators are available for the following modes: System Available (data can be entered from keyboard); Input Inhibited (data cannot be entered from keyboard); Message Waiting (message has been sent from system); Keyboard Shift; and Insert Mode.

The cursor appears as a high-intensity underscore, and can be positioned anywhere on the screen either manually by the operator through the keyboard, or automatically by the system program.

The optional Expanded Function feature on the 5251 provides control for a magnetic stripe reader and a selector light pen. The feature also provides a Copy Function (for the direct transfer and printing of a screen image from the Model 2 or 12, or an attached Model 1 or 11 or 5252 to a printer attached to the Model 2 or 12), and a Self-Check feature (providing Modulus 10 and 11 checking to assure that all digits have been keyed correctly).

The 5292 Model 2 provides graphics as well as alphanumeric capabilities. In Graphics Mode, the 5292 Model 2 can display bar charts, pie charts, line graphs, and surface graphs. The All Points Addressable (APA) capability provides access to 480 addressable points (horizontal) by 288 points (vertical). Color selection (black plus seven colors from a palette of 512) is a function of host system graphics support.

COMPONENTS

5251 DISPLAY UNIT: Models 11 and 12 provide a 12-inch (diagonal) screen with a 1920-character capacity, arranged in 24 lines of 80 characters each. Characters are displayed in white. The standard character set includes 96 characters, including 52 upper/lower case alphabetic, 10 numeric, and 34 special. An 188-character Multinational Character Set is optional. Characters are formed in an 8-by-16 dot matrix. An audible alarm is standard, to alert the operator to special conditions. Other options include a keylock, magnetic stripe reader, and selector light pen.

5291/5292 DISPLAY UNIT: 5291 Model 1 and 5292 Models 1 and 2 provide a 12-inch (diagonal) display screen with a 1920-character capacity, arranged in 24 lines of 80 characters each. A 25th line is included for the display of terminal status. Green phosphor characters are standard on the 5291. The 5292 Model 1 can display seven colors: red, green, turquoise, yellow, pink, blue, and white. The 5292 Model 2 can display black plus seven additional colors selectable from a palette of 512. The standard character set has 96 characters, including 52 upper/lower case alphabetic, 10 numeric, and 34 special. The display features a tilt adjustment (0°, 5°, or 10°).

5251 KEYBOARDS: Three keyboard styles are available for use with the 5251 displays:

- **4600—an 83-key, typewriter-style EBCDIC keyboard with 49 alphanumeric keys, 24 control keys, and a 10-key numeric pad;**

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IBM 5250 Information Display System

- 4601—a 66-key, data entry-style keyboard with 36 alphanumeric keys, 23 control keys, and 7 blank keys;
- 4602—a 66-key, data entry-style keyboard with proof arrangement, including 36 alphanumeric keys, 23 control keys, and 7 blank keys (numeric keys are arranged similarly to those on an adding machine).

Keyboard styles 4601 and 4602 are not supported when the 5251 is attached directly or remotely to the System/34 or Series/1. All keyboards are detachable.

5291/5292 KEYBOARDS: All 5291 and 5292 models features an 83-key, typewriter-style EBCDIC keyboard with a low profile design. The keyboard is detachable, has a slope adjustment (5°, 10°, 15°, or 20°), and incorporates an operator palm rest. A numeric pad and 24 command functions are included.

5219 PRINTER: A bidirectional, correspondence quality print wheel printer available in two models: Model D01 features a maximum burst print speed of 40 cps; Model D02 features a maximum burst print speed of 60 cps. A variety of 96-character print wheel are available for use with the 5219. Horizontal character spacing is 10 cpi; vertical spacing is selectable at 6 or 8 lpi. Pin-fed continuous forms are accepted.

5256 PRINTER: A bidirectional, serial matrix printer available in three models: Model 1 features a maximum print speed of 40 cps; Model 2 features a maximum print speed of 80 cps; Model 3 features a maximum print speed of 120 cps. Dual 256-byte buffers are standard, with full buffer formatting capabilities. A 96-character set (upper/lower case) is standard. Horizontal character spacing is 10 cpi; vertical spacing is selectable at 6 or 8 lpi. Characters are formed by eight vertical wire printing dots in up to four of seven possible horizontal positions. Continuous forms are advanced by a variable width forms tractor. The 188-character Multinational Character set is optional, as is a forms stand.

PRICING

5250 Information Display System components are available under the terms of IBM's Lease or Rental Agreement (LRA), or for purchase. LRA includes prime-shift maintenance; a separate maintenance contract is available for purchased units. All new components are installed under IBM's Customer Set-Up (CSU) arrangement. Lease and Rental plans are not available for the 5291, 5292, and 5219. Volume discounts are available for these models.

LRA provides for month-to-month rental or for a term lease, with penalties for early termination. The lease term is 24 months; it can be extended indefinitely, one year at a time. The prime-shift maintenance period is for any consecutive nine hours between 7 AM and 6 PM, Monday through Friday.

5250 components are in maintenance category D; this category determines the schedule of extended maintenance charges. The premium for extended maintenance is expressed in the table below as a percentage of the basic maintenance charges, which are listed in the accompanying price list.

	Consecutive Hours				
Category D—	9*	12	16	20	24
Monday-Friday	10%	12%	14%	16%	18%
Saturday	4	5	7	8	9
Sunday	5	7	9	11	12

*Also applies for periods outside the basic 7 AM to 6 PM prime shift.

EQUIPMENT PRICES

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
DISPLAY STATIONS					
5251	Display Station Model 11 (keyboard required)	$144	$123	$2,135	$ 18.50
5251	Display Station Model 12 (keyboard required)	229	195	3,040	40.00
2550	Cluster feature (5251 Model 12 only)	78	66	1,139	10.50
2551	Dual Cluster feature (5251 Model 12 only)	154	131	2,278	20.50
2680	Cable Thru feature (5251 Model 11 only)	5	3	100	1.00
3600	Expanded Function	16	14	225	1.50
3701	EIA Interface	19	16	447	3.00
4703	Internal Clock	6	5	218	1.00
5500	1200 bps Integrated Modem, nonswitched	26	22	686	5.00
5502	1200 bps Integrated Modem, switched	26	22	686	5.00
5640	2400 bps Integrated Modem, nonswitched	103	88	2,130	24.00
5641	2400 bps Integrated Modem, switched	112	96	2,350	25.00
5740	4800 bps Integrated Modem, nonswitched	177	151	3,710	35.00
5741	4800 bps Integrated Modem, switched	188	160	3,900	37.50
5650	DDS Adapter, point-to-point	36	31	873	4.00
5651	DDS Adapter, multipoint	36	31	873	4.00
4910	Magnetic Stripe Reader	20	17	318	2.50
6300	Selector Light Pen	38	33	570	7.50
5291	Display Station Model 1, w/keyboard	—	—	2,100	**230.00
5292	Color Display Station Model 1, w/keyboard	—	—	4,950	**420.00
5292	Color Display Station Model 2, w/keyboard	—	—	6,995	**492.00
2550	Cluster feature	73	62	1,139	10.50
2551	Dual Cluster feature	144	123	2,278	20.50

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EQUIPMENT PRICES

		Monthly Charges*			
		Rental	Lease	Purchase	Monthly Maint.
KEYBOARDS (5251 only)					
4600	83-key EBCDIC Typewriter	19	16	265	3.00
4601	66-key EBCDIC Data Entry	19	16	265	3.00
4602	66-key EBCDIC Data Entry w/Proof Arrangement	19	16	265	3.00
4655	Keylock	—	—	42	—
4905	Multinational Character Set	2	2	58	1.00
PRINTERS					
5219	Printer Model D01	—	—	5,420	54.00
5219	Printer Model D02	—	—	5,835	58.00
5256	Printer Model 1	239	204	4,145	45.50
5256	Printer Model 2	272	231	4,340	49.50
5256	Printer Model 3	295	251	4,535	56.00
2680	Cable Thru feature (5256 only)	4	3	119	2.00
PC ATTACHMENT FEATURES					
6092651	IBM Personal Computer 5250 Emulation Program	—	—	164	—
6072534	System/34, /36, and /38 5251 Emulation Adapter	—	—	600	—

*Includes prime-shift maintenance.
**Annual maintenance. ■

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IBM 5250 Information Display System

MANAGEMENT SUMMARY

The 5250 Information Display System is a family of workstations, including display stations and printers, designed for interactive data entry and inquiry applications. Originally announced for use with the System/34, the 5250 System can now be used with the System/38 and Series/1 as well.

The 5250 System currently consists of: the 5251 Display Station, Models 1, 2, 11, and 12; the 5252 Dual Display Station, Model 1; and the 5256 Printer, Models 1, 2, and 3. The user can choose from among three keyboard styles available for both the 5251 and 5252. All display models feature a 12-inch (diagonally measured) display screen and a movable keyboard.

The 5251 Display Station Models 1 and 2 feature a 960-character screen capacity arranged in 12 lines of 80 characters each. The 5251 Models 11 and 12 feature a screen capacity of 1920 characters arranged in 24 lines of 80 characters. Models 1 and 11 can be attached to Models 2 and 12 in a cluster arrangement; they can also serve as the system console for the System/34.

Models 2 and 12 are designed for remote communications with the System/34 and System/38 in SNA/SDLC mode. Up to four or eight additional workstations (Models 5251-1 and -11, 5252, and 5256) can be attached to the Models 2 and 12 in a cluster arrangement as an optional feature, depending on the cluster feature selected. The cluster may contain any combination of Models 5251-1 and -11, 5252, and 5256 as workstations.

The 5252 Dual Display Station contains two independent display/keyboard units in a single cabinet. A screen

A family of display stations and printers for use with the IBM Series/1, System/34, and System/38.

Components of the 5250 System include: the 5251 Display Station, Models 1, 2, 11, and 12; the 5252 Dual Display Station; and the 5256 Printer, Models 1, 2, and 3. Standard features of the displays include a 12-inch (diagonal) display screen and a movable keyboard. The 5256 is a bidirectional serial matrix printer. The 5251 Models 1 and 11 are remote cluster or local stations; 5251 Models 2 and 12 are remote cluster controller/stations; the 5252 is a remote cluster or local dual station.

Purchase prices for the 5251 range from $2,350 to $3,580; the 5252 sells for $2,685; 5256 prices range from $4,605 to $5,035. Rental and lease terms are also available.

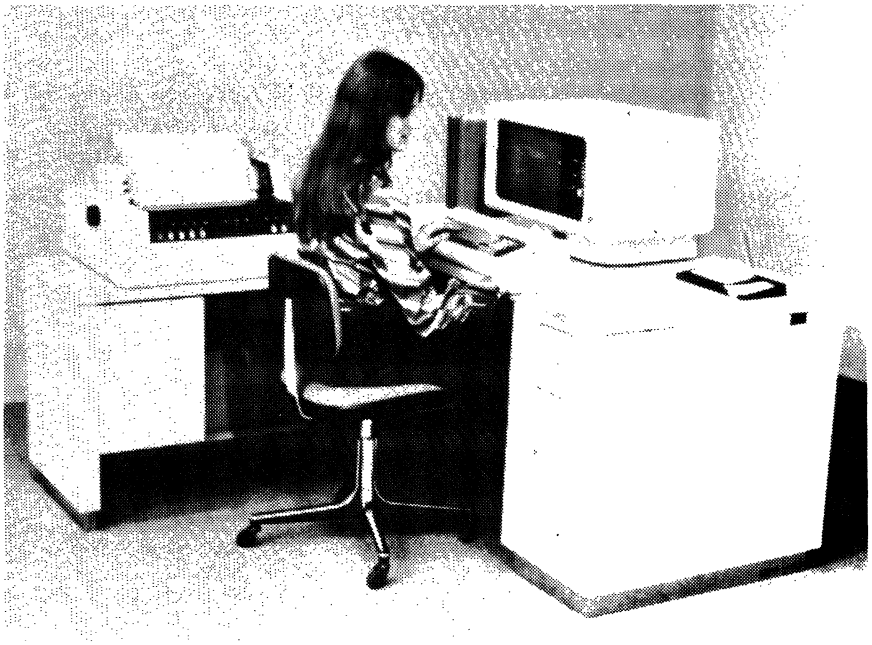
CHARACTERISTICS

VENDOR: International Business Machines Corporation, Information Systems Group, National Marketing Division, 4111 Northside Parkway, Atlanta, GA 30327. Telephone (404) 238-2000.

DATE OF ANNOUNCEMENT: April 1977.

DATE OF FIRST DELIVERY: January 1978.

SERVICED BY: IBM



The 5250 Information Display System is a family of workstations which can be used with the System/34, System/38, and Series/1. The 5251 Display Station Model 11, shown here, provides a screen capacity of 1920 characters and acts as the system console for the System/34. The 5256 Printer provides hard copy output.

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capacity of 960 characters in a 12-line by 80-character format is featured. The 5252 may be attached in a cluster arrangement to the 5251 Models 2 and 12 (in this arrangement, the 5252 represents two workstations); the 5252 may also be used as the system console for the System/34 (in this arrangement, one keyboard/display functions as the system console and the second keyboard/display operates as a workstation).

Visual attributes, on a field basis, are available on all display models. These include high intensity, non-display (security blank), blink, underscore, column separator, and reverse video. Reverse video can also be implemented for the entire screen. Field editing is available on all models. Fields can be designated as alphanumeric, alpha only, signed numeric, field exit required, right adjust, mandatory entry, mandatory fill, bypass, auto enter, dup enable, and monocase.

A choice of three keyboards is available for the 5251 and 5252 displays, including an 83-key typewriter-style keyboard, a 66-key data entry keyboard, and a 66-key data entry keyboard with proof arrangement. An audible alarm is standard. Optional features available for all display models include a security keylock, an 188-character Multinational Character Set, and a magnetic stripe reader. A selector light pen is optionally available for the 5251.

The 5256 Printer is a bidirectional serial matrix printer for use with Series/1, System/34, and System/38, as well as the 5280 Distributed Data System. Model 1 provides a maximum print speed of 40 cps; Model 2, a maximum print speed of 80 cps; and Model 3, a maximum print speed of 120 cps. The 5256 can be attached to the 5251 Models 2 and 12 in cluster arrangements of up to four or eight workstations.

The 5256 features a maximum print line of 132 print positions. Vertical spacing is selectable at six or eight lines per inch. Continuous forms are fed via a variable width forms tractor mechanism. An audible alarm is optional.

IBM provides a Cable Thru feature for use with the 5250 Information Display System components. Cable Thru provides the capability of connecting multiple 5251 Models 1 and 11, 5252s, and 5256s to a single twinax cable. Each unit connected to the cable, except the last, requires this feature.

USER REACTIONS

In Datapro's 1982 survey of alphanumeric display terminal users, responses were received from six users of the 5251 Display Station. The users reported on their experiences with an installed base of 75 terminals; all four models were represented. The ratings given by these users are summarized in the following table.

	Excellent	Good	Fair	Poor	WA*
Overall performance	4	2	0	0	3.7
Ease of operation	3	3	0	0	3.5
Display clarity	3	3	0	0	3.5
Keyboard feel and usability	2	4	0	0	3.3
Hardware reliability	4	2	0	0	3.7
Maintenance service	5	0	1	0	3.7
Technical support	5	0	1	0	3.7

* Weighted Average based on a scale of 4.0 for Excellent.

MODELS

The 5251 Display Station is available in four models:

Model 1 **features a 960-character screen capacity, and attaches directly to the System/34, System/38, Series/1, or 5251 Models 2 and 12. It also serves as the system console for the System/34.**

Model 2 **features a 960-character screen capacity, and provides remote communications capability with the System/34 and System/38 in SNA/SDLC mode. Model 2 is not supported on the Series/1. Up to eight additional workstations can be optionally attached to the Model 12 in a cluster arrangement.**

Model 11 **features a 1920-character screen capacity, and attaches directly to the System/34, System/38, Series/1, or 5251 Models 2 and 12. It also serves as the system console for the System/34.**

Model 12 **features a 1920-character screen capacity, and provides remote communications capability with the System/34 and System/38 in SNA/SDLC mode. Model 2 is not supported on the Series/1. Up to eight additional workstations can be optionally attached to the Model 12 in a cluster arrangement.**

The 5252 Dual Display Station Model 1 features two separate keyboard/displays located in the same cabinet, each of which functions as an independent workstation. The 5252 has a 960-character display capacity, and attaches directly to the System/34, System/38, Series/1, or 5251 Models 2 and 12. When serving as the system console for the System/34, the second keyboard/display functions as a separate workstation.

The 5256 Printer is available in three models: Model 1 features a maximum print speed of 40 cps; Model 2 features a maximum print speed of 80 cps; Model 3 features a maximum print speed of 120 cps. All models attach directly to the System/34, System/38, Series/1, 5251 Models 2 and 12, and the 5280 Distributed Data System.

TRANSMISSION SPECIFICATIONS

5251 Models 2 and 12 can communicate with a System/34 or System/38 operating in SNA/SDLC mode only. Transmission is in half-duplex mode on non-switched (leased) point-to-point or multipoint lines at speeds up to 9600 bps, and on switched (dial) point-to-point lines at speeds up to 4800 bps. Models 2 and 12 are not supported on the Series/1. A 1200, 2400, or 4800 bps Integrated Modem, EIA Interface, or DDS Adapter is required.

The 5251 Models 1 and 11, 5252 Model 1, and 5256 Models 1, 2, and 3 attach directly to the 5251 Models 2 and 12, System/34, System/38, or Series/1. Multiple workstations may be attached utilizing the 5251-2/-12 Cluster or Dual Cluster features, or the Cable Thru feature (5251 Models 1 and 11 only).

The System/34 provides a system console port, three additional local ports, and four ports for remote communications links. One 5251 Display Station Model 1 or 11, or one 5252 Dual Display Station is required as the system console. Up to seven additional workstations (5251 Models 1 or 11, 5252, 5256 Models 1, 2, or 3) may be attached to the remaining three local ports; the Cable Thru feature allows multiple workstations to be attached to a single port. A total of up to 15 workstations may be attached to the three local workstation ports when an optional System/34 processor feature #4901, Workstation Controller Expansion B is in place. The 5252 counts as two workstations. Up to seven workstations may be attached to one cable when utilizing the Cable Thru feature. Up to 64 remote standalone terminals or cluster workstations can be supported, and are connected via point-to-point or multipoint lines to the communications ports.

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IBM 5250 Information Display System

Five of the users reported that they were using the terminals in single station arrangements; one user reported a cluster arrangement. Five users stated that they were utilizing 5250 terminals as a system console. All six users reported that principal applications for the 5251s were data entry/interactive inquiry and program development. Four users cited the movable keyboard as a requirement in the selection of the terminal; three users also mentioned the 5251's local editing capabilities.

When asked if they would recommend the 5251 to other users with similar applications, all six users answered that they would. □

On the System/38, up to 80 local workstations (5251 Models 1 or 11, 5252, 5256 Models 1, 2, or 3) can be supported by configuring various combinations of System/38 Workstation Controller features, Expansion options, workstation ports, and terminal Cable Thru features. In addition, the System/38 supports up to eight remote communications ports, for connection of terminals or cluster workstations. The maximum number of remote terminals that can be supported by the System/38 varies, depending on processor size, mode of terminal operation, traffic volume, and other factors.

The Series/1 accommodates up to 256 local and remote workstations, which may be connected to the processor via a local I/O attachment feature on a remote communications line. Up to eight workstations (5251 Models 1 or 11, 5252, 5256 Models 1, 2, or 3) are supported by each local I/O attachment feature. The Cable Thru feature allows a second workstation to be attached to a single cable. The Series/1 supports up to 96 point-to-point or multipoint communications lines, through which remote standalone terminals and workstation clusters may be connected to the system.

The 5251 Models 1 or 11, 5252, and 5256 Models 1, 2, or 3 may be attached to the 5251 Models 2 and 12 in a cluster arrangement via the Cluster or Dual Cluster features. The Cluster feature allows for the attachment of up to four workstations; the Dual Cluster feature allows for the attachment of up to eight workstations.

DEVICE CONTROL

Visual attributes, available on a field basis, include high intensity, non-display (security), blink, underscore, column separator, and reverse image. The operator can also reverse the image of the entire screen. Individual fields can be designated and edited on an independent basis. Fields can be designated alphanumeric, alpha only, signed numeric, field exit required, right adjust, mandatory entry, mandatory fill, bypass, auto enter, dup enable, monocase, and self-check Modulus 10 and 11 (self-check is optional on 5251 Models 2 and 12).

Display indicators are included on all display station models to inform the operator of the terminal's operational status. Indicators are available for the following modes: System Available (data can be entered from keyboard); Input Inhibited (data cannot be entered from keyboard); Message Waiting (message has been sent from system); Keyboard Shift; and Insert Mode.

The cursor appears as a high intensity underscore, and can be positioned anywhere on the screen either manually by the operator using the keyboard, or automatically by the system program.

The optional Expanded Function feature on the 5251 provides control for a magnetic stripe reader and a selector light pen. The feature also provides a Copy Function (providing for the direct transfer and printing of a screen image from the Model 2 or 12, or an attached Model 1 or 11 or 5252 to a printer attached to the Model 2 or 12), and a Self-Check feature (providing Modulus 10 and 11 checking to assure that all digits have been correctly keyed).

COMPONENTS

5251 DISPLAY UNIT: Models 1 and 2 feature a 960-character screen capacity, arranged in 12 lines of 80 characters each. Models 11 and 12 provide a 1920-character screen capacity, arranged in 24 lines of 80 characters each. The standard character set includes 96 characters, including 52 upper/lower case alphabetic, 10 numeric, and 34 special. An 188-character Multinational Character Set is optional. Characters are formed utilizing an 8-by-16 dot matrix. An audible alarm is standard, to alert the operator to special conditions.

Other options include a keylock, magnetic stripe reader, and selector light pen.

5252 DISPLAY UNIT: Two separate displays integrated into the same console, each with a 960-character screen capacity arranged in 12 lines of 80 characters each. The standard character set includes 96 characters, including 52 upper/lower case alphabetic, 10 numeric, and 34 special. An 188-character Multinational Character set is optional. Characters are formed utilizing an 8-by-16 dot matrix. An audible alarm is standard. The dual workstations operate independently, and count as two workstations in cluster arrangements.

Other options include a keylock and magnetic stripe reader.

KEYBOARDS: Three keyboard styles are available for use with the 5251 and 5252 displays:

- 4600—an 83-key typewriter-style EBCDIC keyboard with 49 alphanumeric keys, 24 control keys, and a 10-key numeric pad;
- 4601—a 66-key data entry-style keyboard with 36 alphanumeric keys, 23 control keys, and 7 blank keys;
- 4602—a 66-key data entry-style keyboard with proof arrangement, including 36 alphanumeric keys, 23 control keys, and 7 blank keys (numeric keys are arranged similar to an adding machine).

Keyboard styles 4601 and 4602 are not supported when the 5251 is directly or remotely attached to the System/34 or Series/1, or when the 5252 is directly attached to the System/34 or Series/1. All keyboards are movable. The 5252 requires two keyboards.

5256 PRINTER: A bidirectional serial matrix printer available in three models: Model 1 features a maximum print speed of 40 cps; Model 2 features a maximum print speed of 80 cps; Model 3 features a maximum print speed of 120 cps. Dual 256-byte buffers are standard, with full buffer formatting capabilities. A 96-character set (upper/lower case) is standard. Horizontal character spacing is 10 cpi; vertical spacing is selectable at 6 or 8 lpi. Characters are formed by eight vertical wire printing dots in up to four of seven possible horizontal positions. Continuous forms are advanced via a variable width forms tractor.

The 188-character Multinational Character set is optional, as is a forms stand.

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IBM 5250 Information Display System

PRICING

All 5250 Information Display System components are available under the terms of IBM's Lease or Rental Agreement (LRA), or for purchase. LRA includes prime-shift maintenance; a separate maintenance contract is available for purchase units. All new components are installed under IBM's Customer Set-Up (CSU) arrangement.

LRA provides for month-to-month rental or for a term lease, with penalties for early termination. The lease term is 24 months; and can be extended indefinitely, one year at a time. The prime-shift maintenance period is for any consecutive nine hours between 7 AM and 6 PM, Monday through Friday.

All 5250 components are in maintenance category D; this category determines the schedule of extended maintenance charges. The premium for extended maintenance is expressed in the table below as a percentage of the basic maintenance charges, which are listed in the accompanying price list.

	Consecutive Hours				
Category D—	9*	12	16	20	24
Monday-Friday	10%	12%	14%	16%	18%
Saturday	4	5	7	8	9
Sunday	5	7	9	11	12

*Also applies for periods outside the basic 7 AM to 6 PM prime shift.

The lease arrangement also guarantees a maximum rate of increases for extending leasing periods. The rate for all components is five percent per year beginning in the second year of the lease.

All components are classed under warranty category B (three months) and rental category B (unlimited usage).

EQUIPMENT PRICES

		Monthly Charges* Rental	Lease	Purchase	Monthly Maint.
DISPLAY STATIONS					
5251	Display Station Model 1	$116	$ 99	$1,995	$19.50
5251	Display Station Model 2	192	163	2,910	41.50
5251	Display Station Model 11	125	107	2,135	20.50
5251	Display Station Model 12	200	170	3,040	44.50
2550	Cluster feature	67	57	1,139	11.50
2551	Dual Cluster feature	134	114	2,278	23.00
2680	Cable Thru feature	5	3	100	1.00
3600	Expanded Function	15	13	225	1.50
3701	EIA Interface	16	14	447	3.50
4703	Internal Clock	6	5	218	1.00
5500	1200 bps Integrated Modem, non-switched	22	19	686	5.50
5502	1200 bps Integrated Modem, switched	22	19	686	5.50
5640	2400 bps Integrated Modem, non-switched	90	77	2,130	26.50
5641	2400 bps Integrated Modem, switched	98	83	2,350	27.50
5740	4800 bps Integrated Modem, non-switched	155	132	3,710	39.00
5741	4800 bps Integrated Modem, switched	163	139	3,900	41.50
5650	DDS Adapter, point-to-point	32	27	873	4.50
5651	DDS Adapter, multipoint	32	27	873	4.50
4910	Magnetic Stripe Reader	16	14	374	2.50
6300	Selector Light Pen	34	29	570	8.50
3225	Display Screen Filter (Models 11 & 12)	—	—	41	—
3226	Display Screen Filter (Models 1 & 2)	—	—	41	—
5252	Dual Display Station Model I	134	114	2,280	23.00
2680	Cable Thru feature	5	3	100	1.00
4910	Magnetic Stripe Reader	18	15	318	2.50
KEYBOARDS					
4600	83-key EBCDIC Typewriter	16	14	265	3.50
4601	66-key EBCDIC Data Entry	16	14	265	3.50
4602	66-key EBCDIC Data Entry w/Proof Arrangement	16	14	265	3.50
4655	Keylock	—	—	42	—
4905	Multinational Character Set	2	2	58	1.00
PRINTERS					
5256	Printer Model 1	217	185	4,605	38.50
5256	Printer Model 2	247	210	4,820	42.00
5256	Printer Model 3	268	228	5,035	47.50
2680	Cable Thru feature	4	3	119	1.00

*Includes prime-shift maintenance.■

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IBM 5250 Information Display System

Five of the users reported that they were using the terminals in single station arrangements; one user reported a cluster arrangement. Five users stated that they were utilizing 5250 terminals as a system console. All six users reported that principal applications for the 5251s were data entry/interactive inquiry and program development. Four users cited the movable keyboard as a requirement in the selection of the terminal; three users also mentioned the 5251's local editing capabilities.

When asked if they would recommend the 5251 to other users with similar applications, all six users answered that they would. □

On the System/38, up to 80 local workstations (5251 Models 1 or 11, 5252, 5256 Models 1, 2, or 3) can be supported by configuring various combinations of System/38 Workstation Controller features, Expansion options, workstation ports, and terminal Cable Thru features. In addition, the System/38 supports up to eight remote communications ports, for connection of terminals or cluster workstations. The maximum number of remote terminals that can be supported by the System/38 varies, depending on processor size, mode of terminal operation, traffic volume, and other factors.

The Series/1 accommodates up to 256 local and remote workstations, which may be connected to the processor via a local I/O attachment feature on a remote communications line. Up to eight workstations (5251 Models 1 or 11, 5252, 5256 Models 1, 2, or 3) are supported by each local I/O attachment feature. The Cable Thru feature allows a second workstation to be attached to a single cable. The Series/1 supports up to 96 point-to-point or multipoint communications lines, through which remote standalone terminals and workstation clusters may be connected to the system.

The 5251 Models 1 or 11, 5252, and 5256 Models 1, 2, or 3 may be attached to the 5251 Models 2 and 12 in a cluster arrangement via the Cluster or Dual Cluster features. The Cluster feature allows for the attachment of up to four workstations; the Dual Cluster feature allows for the attachment of up to eight workstations.

DEVICE CONTROL

Visual attributes, available on a field basis, include high intensity, non-display (security), blink, underscore, column separator, and reverse image. The operator can also reverse the image of the entire screen. Individual fields can be designated and edited on an independent basis. Fields can be designated alphanumeric, alpha only, signed numeric, field exit required, right adjust, mandatory entry, mandatory fill, bypass, auto enter, dup enable, monocase, and self-check Modulus 10 and 11 (self-check is optional on 5251 Models 2 and 12).

Display indicators are included on all display station models to inform the operator of the terminal's operational status. Indicators are available for the following modes: System Available (data can be entered from keyboard); Input Inhibited (data cannot be entered from keyboard); Message Waiting (message has been sent from system); Keyboard Shift; and Insert Mode.

The cursor appears as a high intensity underscore, and can be positioned anywhere on the screen either manually by the operator using the keyboard, or automatically by the system program.

The optional Expanded Function feature on the 5251 provides control for a magnetic stripe reader and a selector light pen. The feature also provides a Copy Function (providing for the direct transfer and printing of a screen image from the Model 2 or 12, or an attached Model 1 or 11 or 5252 to a printer attached to the Model 2 or 12), and a Self-Check feature (providing Modulus 10 and 11 checking to assure that all digits have been correctly keyed).

COMPONENTS

5251 DISPLAY UNIT: Models 1 and 2 feature a 960-character screen capacity, arranged in 12 lines of 80 characters each. Models 11 and 12 provide a 1920-character screen capacity, arranged in 24 lines of 80 characters each. The standard character set includes 96 characters, including 52 upper/lower case alphabetic, 10 numeric, and 34 special. An 188-character Multinational Character Set is optional. Characters are formed utilizing an 8-by-16 dot matrix. An audible alarm is standard, to alert the operator to special conditions.

Other options include a keylock, magnetic stripe reader, and selector light pen.

5252 DISPLAY UNIT: Two separate displays integrated into the same console, each with a 960-character screen capacity arranged in 12 lines of 80 characters each. The standard character set includes 96 characters, including 52 upper/lower case alphabetic, 10 numeric, and 34 special. An 188-character Multinational Character set is optional. Characters are formed utilizing an 8-by-16 dot matrix. An audible alarm is standard. The dual workstations operate independently, and count as two workstations in cluster arrangements.

Other options include a keylock and magnetic stripe reader.

KEYBOARDS: Three keyboard styles are available for use with the 5251 and 5252 displays:

- 4600—an 83-key typewriter-style EBCDIC keyboard with 49 alphanumeric keys, 24 control keys, and a 10-key numeric pad;
- 4601—a 66-key data entry-style keyboard with 36 alphanumeric keys, 23 control keys, and 7 blank keys;
- 4602—a 66-key data entry-style keyboard with proof arrangement, including 36 alphanumeric keys, 23 control keys, and 7 blank keys (numeric keys are arranged similar to an adding machine).

Keyboard styles 4601 and 4602 are not supported when the 5251 is directly or remotely attached to the System/34 or Series/1, or when the 5252 is directly attached to the System/34 or Series/1. All keyboards are movable. The 5252 requires two keyboards.

5256 PRINTER: A bidirectional serial matrix printer available in three models: Model 1 features a maximum print speed of 40 cps; Model 2 features a maximum print speed of 80 cps; Model 3 features a maximum print speed of 120 cps. Dual 256-byte buffers are standard, with full buffer formatting capabilities. A 96-character set (upper/lower case) is standard. Horizontal character spacing is 10 cpi; vertical spacing is selectable at 6 or 8 lpi. Characters are formed by eight vertical wire printing dots in up to four of seven possible horizontal positions. Continuous forms are advanced via a variable width forms tractor.

The 188-character Multinational Character set is optional, as is a forms stand.

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IBM 5250 Information Display System

PRICING

All 5250 Information Display System components are available under the terms of IBM's Lease or Rental Agreement (LRA), or for purchase. LRA includes prime-shift maintenance; a separate maintenance contract is available for purchase units. All new components are installed under IBM's Customer Set-Up (CSU) arrangement.

LRA provides for month-to-month rental or for a term lease, with penalties for early termination. The lease term is 24 months; and can be extended indefinitely, one year at a time. The prime-shift maintenance period is for any consecutive nine hours between 7 AM and 6 PM, Monday through Friday.

All 5250 components are in maintenance category D; this category determines the schedule of extended maintenance charges. The premium for extended maintenance is expressed in the table below as a percentage of the basic maintenance charges, which are listed in the accompanying price list.

	Consecutive Hours				
Category D—	9*	12	16	20	24
Monday-Friday	10%	12%	14%	16%	18%
Saturday	4	5	7	8	9
Sunday	5	7	9	11	12

*Also applies for periods outside the basic 7 AM to 6 PM prime shift.

The lease arrangement also guarantees a maximum rate of increases for extending leasing periods. The rate for all components is five percent per year beginning in the second year of the lease.

All components are classed under warranty category B (three months) and rental category B (unlimited usage).

EQUIPMENT PRICES

		Monthly Charges* Rental	Lease	Purchase	Monthly Maint.
DISPLAY STATIONS					
5251	Display Station Model 1	$108	$ 92	$2,350	$19.50
5251	Display Station Model 2	177	151	3,425	41.50
5251	Display Station Model 11	116	99	2,515	20.50
5251	Display Station Model 12	184	157	3,580	44.50
2550	Cluster feature	62	53	1,340	11.50
2551	Dual Cluster feature	125	106	2,680	23.00
2680	Cable Thru feature	4	3	119	1.00
3600	Expanded Function	14	12	265	1.50
3701	EIA Interface	16	14	447	3.50
4703	Internal Clock	6	5	218	1.00
5500	1200 bps Integrated Modem, non-switched	22	19	686	5.50
5502	1200 bps Integrated Modem, switched	22	19	686	5.50
5640	2400 bps Integrated Modem, non-switched	90	77	2,130	26.50
5641	2400 bps Integrated Modem, switched	98	83	2,350	27.50
5740	4800 bps Integrated Modem, non-switched	155	132	3,710	39.00
5741	4800 bps Integrated Modem, switched	163	139	3,900	41.50
5650	DDS Adapter, point-to-point	32	27	873	4.50
5651	DDS Adapter, multipoint	32	27	873	4.50
4910	Magnetic Stripe Reader	16	14	374	2.50
6300	Selector Light Pen	32	27	670	8.50
3225	Display Screen Filter (Models 11 & 12)	—	—	41	—
3226	Display Screen Filter (Models 1 & 2)	—	—	41	—
5252	Dual Display Station Model I	125	106	2,685	23.00
2680	Cable Thru feature	4	3	119	1.00
4910	Magnetic Stripe Reader	16	14	374	2.50
KEYBOARDS					
4600	83-key EBCDIC Typewriter	15	13	312	3.50
4601	66-key EBCDIC Data Entry	15	13	312	3.50
4602	66-key EBCDIC Data Entry w/Proof Arrangement	15	13	312	3.50
4655	Keylock	—	—	42	—
4905	Multinational Character Set	2	2	68	1.00
PRINTERS					
5256	Printer Model 1	217	185	4,605	38.50
5256	Printer Model 2	247	210	4,820	42.00
5256	Printer Model 3	268	228	5,035	47.50
2680	Cable Thru feature	4	3	119	1.00

*Includes prime-shift maintenance.■

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IBM 3101 Display Terminal

The 3101 was IBM's first ASCII display terminal. The 3101 Model 13 is a character mode terminal, while the 3101 Model 23 can transmit in both character and block modes. Both models feature a 12-inch, 1,920-character display and a detachable keyboard.

The 3101 is IBM's initial ASCII display terminal offering. Two versions are currently available; a basic conversational terminal and an enhanced editing/formatting terminal. Both models provide switch-selectable RS-232-C and RS-422-A interfaces, plus an auxiliary RS-232-C interface.

MODELS: Model 13 and Model 23.
DISPLAY: Both models feature a 12-inch tilt/swivel display with a 1,920-character screen capacity.
KEYBOARD: Both models include a detached keyboard with an IBM Selectric-style key layout. Model 23's keyboard contains a new low-profile design.
COMPETITION: Wyse Technology, Applied Digital Data Systems (ADDS), Esprit Systems, TeleVideo Systems, ITT Qume, and several others.
PRICE: The Model 13 sells for $1,430; the Model 23 is priced at $1,650.

MANAGEMENT SUMMARY

UPDATE: *This report provides the latest information on IBM's ASCII terminal offering, the 3101. The 3101 is now offered in only two models, the Model 13 and Model 23; previously, several models were available, including Models 10, 12, 20, and 22. These models were withdrawn from marketing by IBM in August 1984. With the introduction of a new family of ASCII terminals, the 316X Series, IBM is now phasing out the 3101. No further enhancements to this product are anticipated.*

Introduced in 1979, the IBM 3101 Display Terminal was significant for two reasons: 1) it was the first ASCII terminal offered by IBM, putting the company in a new marketplace that was dominated by independent vendors such as Applied Digital Data Systems (ADDS) and Lear Siegler; and 2) the 3101 was made available for purchase only, with quantity discounts for high-volume purchases and a new maintenance/repair plan that required the user to isolate the problem and mail the faulty component to an IBM Service Center. This second feature marked a new trend in the way IBM would market many of its new products, including the Personal Computer and the next generation of 3270 terminals. As for the first point of significance, the 3101 never had the impact on the ASCII terminal market that many of the independents feared. Perhaps learning from the 3101 experience, IBM has introduced a new line of ASCII terminals, the 316X Series. These models offer a number of enhanced features and, more importantly, significantly lower prices than the 3101.

The 3101 features a modular design composed of three workstation elements: the video, logic, and keyboard elements. The video element is mounted on the logic element, and can be tilted or swiveled by the operator. The keyboard ➢

CHARACTERISTICS

VENDOR: International Business Machines Corporation (IBM), Old Orchard Road, Armonk, NY 10504. Contact your local IBM representative.

DATA OF ANNOUNCEMENT: October 1979.

DATE OF FIRST DELIVERY: Model 13—January 1980; Model 23—March 1980.

NUMBER DELIVERED TO DATE: Over 150,000.

SERVICED BY: IBM.

MODELS

The 3101 is a TTY-compatible ASCII terminal that consists of a tilt-and-swivel monitor with a 12-inch 1920-character screen; a detached full-ASCII IBM Selectric-type keyboard with numeric pad, control keys, and 8 program function keys; and a logic unit. It is available in the following two models:

- **Model 13—a character mode terminal with switch-selectable RS-232-C and RS-422-A interfaces.**
- **Model 23—a fully featured editing/formatting terminal that provides switch-selectable character and block transmission, as well as switch-selectable RS-232-C and RS-422-A interfaces; Model 23 also includes a keyboard with a low-profile design.**

TRANSMISSION SPECIFICATIONS

The 3101 communicates point-to-point only over switched or nonswitched facilities. Transmission is asynchronous, half- or full-duplex at switch-selectable rates of 110, 150, 200, 300, 600, 1200, 1800, 2400, 4800, and 9600 bps. Full-duplex ➢

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IBM 3101 Display Terminal

is attached to the logic element via a cable, and is movable. (This modular design has been incorporated into succeeding generations of IBM displays, such as the 3178, 3180, etc.) Two models are currently offered: Model 13, a basic conversational terminal that provides character mode transmission; and Model 23, a fully featured editing/formatting terminal that provides switch-selectable character and block mode transmission. Both models feature switch selection of either an RS-232-C or RS-422-A communications interface. Other features common to both models include a 12-inch (diagonal) display with a 1920-character screen capacity, green phosphor characters, and a detached keyboard. IBM has recently introduced a low-profile design keyboard for the Model 23.

COMPETITIVE POSITION

IBM's announcement of the 3101, in October 1979, was met with apprehension by some of the independent vendors in the ASCII terminal market. IBM has traditionally had the ability to enter a market late and capture a large market share simply by being IBM (witness the success of the IBM PC). The ASCII terminal market has, however, proven to be an exception. IBM's 3101 failed to gain the acceptance enjoyed by similar terminals marketed by the leaders in this market, including Wyse Technology, TeleVideo, ADDS, Esprit Systems, ITT Qume, and a number of others.

IBM made its second foray into the ASCII terminal market in 1985 with the introduction of the 316X Series. The 316X terminals provide many functions not found on the 3101 models, including emulation of popular terminals from the independent ASCII terminal vendors. They also include a more compact enclosure design. Most importantly, however, IBM has priced the 316X Series terminals competitively. Starting at $695 for the low-end 3161-11, the 316X pricing structure compares favorably to that of the leaders in this market. The 316X family will eventually obsolete the 3101.

ADVANTAGES AND RESTRICTIONS

A major advantage enjoyed by the 3101 is that, like any IBM product, it carries the IBM label. IBM's long-enjoyed and well-earned reputation for reliability and service assures most of their products of ready acceptance by IBM's huge base of loyal customers. However, the 3101 is considerably more expensive than most of the terminals it competes with, which goes a long way in explaining why it has not captured a larger share of the market. In the past few years, the ASCII display terminal market has become increasingly price-driven. For instance, ITT Qume Corporation became the first major manufacturer to break the $400 level for its low-end terminal offering in 1985. Contrast Qume's price tag for its QVT-101 ($395) with the price for IBM's conversational 3101 Model 13 ($1,430). Also, considering the relative simplicity of these products, maintenance service, a major IBM strength, is not such a strong consideration in this market.

operation is supported by Models 20, 22, and 23 only. The 10- or 11-unit, 7-bit ASCII code is used. Communications options such as half-/full-duplex, stop bits, and parity bits are switch-selectable.

All models provide a switch-selectable interface that meets EIA RS-422-A characteristics, as well as the standard EIA RS-232-C interface. When using the RS-232-C interface, the 3101 can communicate, through a modem, to a remote host processor at 110 to 1200 bps; it can also directly attach to a host processor (within 40 feet) with communications from 110 to 9600 bps. When the RS-422-A interface is used, the 3101 can communicate with a host processor, without a modem, up to a distance of 4,000 feet, at communications speeds from 110 to 9600 bps; shielded communications cable must be used. All models are additionally equipped with an auxiliary RS-232-C interface port for peripheral I/O devices.

A 10-foot 3101 modem cable is available for the attachment of a modem. IBM provides no modems for use with the 3101; PTT mandatory modems complying with CCITT Recommendations V.24, V.28, ISO Standard 2110, and either CCITT Recommendations V.21 or V.23 may be attached.

HOST COMPUTER SOFTWARE SUPPORT

The 3101 can communicate with a variety of IBM and non-IBM hosts, including a System/370 or 4300 Processor via a 3704/3705 Communications Controller or an IBM 2701 Data Adapter Unit; an 8100 System; and a Series/1 computer. Operation in TTY-compatible mode is supported by most of the current IBM system support programs, including BTAM, BTAM-ES, VTAM, ACF/VTAM, TCAM, ACF/TCAM, CICS/VS (with BTAM, ACF/VTAM, or ACF/TCAM via NTO), TSO/TCAM, TSO/ACF/VTAM/NTO, VSPC, VM/370, and DPPX/BASE. Full-function mode operation is supported by BTAM, BTAM-ES, ACF/VTAM R2/R3 with NTO, ACF/TCAM V2 R1/R2/R3, VSPC, CM/370-CMS, and DPPX/BASE.

DEVICE CONTROL

Both Models 13 and 23 provide the following features: cursor move, backspace, home, and extended erase (erase to end-of-line, erase all keyboard input data, erase entire screen, and erase to end-of-screen). Character transmission mode provides for transmission of data on a character-by-character basis as each key is depressed.

Model 23 provides the following additional features not found on the Model 13: insert line, delete line, insert character, delete character, and back tab. Using an attribute character, extended field handling is available, with fields designated as protected, blinking, high-low intensity, nondisplay, and modified transmit. Model 23 provides for both character and block mode transmission.

COMPONENTS

CRT DISPLAY UNIT: The 3101 includes 12-inch monitor with a screen capacity of 1920 characters arranged in 24 lines of 80 characters. A 25th line is provided for display of machine status messages. Characters are displayed in green phosphor on a dark background, and are formed using a 7-by-14 dot matrix in a 9-by-16 dot field. The 95-character ASCII set can be displayed; it includes 52 upper-/lowercase alphabetics, 10 numerics, and 32 special characters plus space. Transparent Mode permits the display of the 33 ASCII control characters. The monocase switch provides automatic conversion of lowercase to uppercase, thereby allowing for the display of a 64-character graphics set. A blinking or solid block cursor can be switch-selected. Contrast and brightness controls and an audible alarm are

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IBM 3101 Display Terminal

As mentioned earlier, IBM has moved to rectify these problems with the introduction of the lower-priced 316X Series of ASCII terminals. For more information on the 316X Series, see Report C25-491-701.

USER REACTION

In Datapro's 1986 Terminal Users Survey, conducted in conjunction with *Data Communications* magazine, a total of six responses were received from users of the IBM 3101 Display Terminal. These users reported on an installed base of 46 terminals. They were asked to rate their 3101s in seven specific categories. The following table summarizes their ratings.

	Excellent	Good	Fair	Poor	WA*
Ease of operation	1	4	1	0	3.0
Display clarity	2	3	1	0	3.2
Keyboard feel & usability	2	2	2	0	3.0
Ergonomics	1	2	1	2	2.3
Hardware reliability	2	4	0	0	3.3
Mfr.'s maintenance service/technical support	2	2	2	0	3.0
Overall performance	2	3	1	0	3.2

*Weighted Average on a scale of 4.0 for Excellent.

When asked whether or not they would recommend the 3101 Display Terminal to other users, three of the respondents answered that they would, while the other three answered that they would not (most likely due to the availability of IBM's second generation of ASCII terminals). □

standard. The video element can be tilted or swiveled by the operator to change the viewing angle.

KEYBOARD: The 3101 includes a detachable 87-key IBM Selectric-type keyboard. Model 13 features a keyboard with a high-profile design; Model 23 features a new keyboard with a low-profile design. The keyboard features full cursor controls, a 12-key numeric pad, 8 Program Function (PF) keys at alternate positions, and print keys. Separators are featured to help prevent accidental striking of control keys. All alphameric, special character, and cursor control keys have typamatic capability. The full 128-character ASCII set can be generated. The keyboard is cable-connected to the video element.

PRICING

The 3101 Display Terminal is available for purchase only. A quantity discount is provided on purchases scheduled over an 18-month period. A 3-month warranty applies; an annual maintenance contract is available following expiration of the warranty. Two maintenance plans are available: Customer Carry-In Repair and IBM On-Site Exchange.

The units are designed for customer setup and maintainability; if an equipment failure occurs, a Problem Analysis and Resolution Guide instructs the customer in isolation and replacement of the failing part. IBM provides spare parts for all customer-replaceable components and shipping packages for returning parts to IBM for service. Maintenance and repairs are performed only at the nearest IBM Repair Center.

EQUIPMENT PRICES

		Annual Charges	
	Purchase Price ($)	Cust. Carry-In Repair ($)	IBM On-Site Exchange ($)
Model 13 3101 Display Terminal	1,430	77	198
Model 23 3101 Display Terminal	1,650	88	209 ■

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IBM 3101 Display Terminal

MANAGEMENT SUMMARY

UPDATE: *This report provides the latest information on IBM's ASCII terminal offering, the 3101. Most significantly, the 3101 is now offered in only two models, the Model 13 and Model 23; previously, several models were available, including Models 10, 12, 20, and 22. These models were withdrawn from marketing by IBM in August 1984. (As this report was going to press, IBM announced two new ASCII terminals, the 316X Series. The company also announced that the 3101 Model 23 would be withdrawn from marketing in September 1985.)*

Introduced in 1979, the IBM 3101 Display Terminal was significant for two reasons: 1) it was the first ASCII terminal offered by IBM, putting the company in a new marketplace that was dominated by independent vendors such as Applied Digital Data Systems (ADDS) and Lear Siegler; and 2) the 3101 was made available for purchase only, with quantity discounts for high-volume purchases and a new maintenance/repair plan that required the user to isolate the problem and mail the faulty component to an IBM Service Center. This second feature marked a trend in the way IBM would market many of its new products, including the Personal Computer and the next generation of 3270 terminals. As for the first point of significance, the 3101 has not had the impact on the ASCII terminal market that many of the independents feared. To date, the 3101 has not claimed a large share of the market.

The 3101 features a modular design composed of three workstation elements: the video, logic, and keyboard elements. The video element is mounted on the logic element, and can be tilted or swiveled by the operator. The keyboard ➢

The 3101 design provides a number of human engineering features, including a tilt-and-swivel monitor with a concave contrast-enhancing screen filter, a movable keyboard with textured reduced-glare keytops, and 7-by-14 matrix character formation for easy viewing. The display screen measures 12 inches (diagonally), and can display 1920 characters in a 24-line by 80-character format.

The 3101 is IBM's ASCII display terminal. Two versions are available; a basic conversational terminal and an enhanced editing/formatting terminal. Both models provide switch-selectable RS-232-C and RS-422-A interfaces, plus an auxiliary RS-232-C interface.

MODELS: Model 13 and Model 23.
DISPLAY: Both models feature a 12-inch tilt/swivel display with a 1920-character screen capacity.
KEYBOARD: Both models include a detached keyboard with an IBM Selectric-style key layout. Model 23's keyboard contains a new low-profile design.
COMPETITION: Applied Digital Data Systems (ADDS), Esprit Systems, Lear Siegler, TeleVideo, Wyse Technology, and several others.
PRICE: The Model 13 sells for $1,430; the Model 23 is priced at $1,650.

CHARACTERISTICS

VENDOR: International Business Machines Corporation (IBM), Old Orchard Road, Armonk, NY 10504. Contact your local IBM representative.

DATA OF ANNOUNCEMENT: October 1979.

DATE OF FIRST DELIVERY: Model 13—January 1980; Model 23—March 1980.

NUMBER DELIVERED TO DATE: Approximately 155,000.

SERVICED BY: IBM.

MODELS

The 3101 is a TTY-compatible ASCII terminal that consists of a tilt-and-swivel monitor with a 12-inch 1920-character screen; a detached full-ASCII Selectric keyboard with numeric pad, control keys, and 8 program function keys; and a logic unit. It is available in the following two models:

- **Model 13—a character mode terminal with switch-selectable RS-232-C and RS-422-A interfaces.**
- **Model 23—a fully featured editing/formatting terminal that provides switch-selectable character and block transmission, as well as switch-selectable RS-232-C and RS-422-A interfaces; Model 23 also includes a keyboard with a low-profile design.**

TRANSMISSION SPECIFICATIONS

The 3101 communicates point-to-point only over switched or nonswitched facilities. Transmission is asynchronous, half- or full-duplex at switch-selectable rates of 110, 150, 200, 300, 600, 1200, 1800, 2400, 4800, and 9600 bps. Full-duplex ➢

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IBM 3101 Display Terminal

is attached to the logic element via a cable, and is movable. (This modular design has been incorporated into succeeding generations of IBM displays, such as the 3178, 3180, etc.) Two models are currently offered: Model 13, a basic conversational terminal that provides character mode transmission; and Model 23, a fully featured editing/formatting terminal that provides switch-selectable character and block mode transmission. Both models feature switch selection of either an RS-232-C or RS-422-A communications interface. Other features common to both models include a 12-inch (diagonal) display with a 1920-character screen capacity, green phosphor characters, and a detached keyboard. IBM has recently introduced a low-profile design keyboard for the Model 23.

COMPETITIVE POSITION

IBM's announcement of the 3101, in October 1979, was met with apprehension by some of the independent vendors in the ASCII terminal market. IBM has traditionally had the ability to enter a market late and capture a large market share simply by being IBM (witness the success of IBM's PC). The ASCII terminal market has, however, proven to be an exception. Although it is still a presence, IBM's 3101 has failed to gain the acceptance currently enjoyed by similar terminals marketed by the leaders in this market, namely Wyse Technology, TeleVideo, Lear Siegler, ADDS, Esprit Systems, and a number of others.

ADVANTAGES AND RESTRICTIONS

A major advantage enjoyed by the 3101 is that, like any IBM product, it carries the IBM label. IBM's long-enjoyed and well-earned reputation for reliability and service assures most of their products of ready acceptance by IBM's huge base of loyal customers. However, the 3101 is considerably more expensive than most of the terminals it competes with, which goes a long way in explaining why it has not captured a larger share of the market. In the past few years, the ASCII display terminal market has become incresingly price-driven. Qume Corporation recently became the first major manufacturer to break the $400 level for its low-end terminal offering. Contrast Qume's price tag for its QVT-101 ($399) with the price for IBM's conversational 3101 Model 13 ($1,430). Also, considering the relative simplicity of these products, maintenance service, a major IBM strength, is not such a strong consideration in this market.

USER REACTION

In Datapro's 1985 Terminal Users Survey, conducted in conjunction with *Data Communications* magazine, a total of six responses were received from users of the IBM 3101 Display Terminal. These users reported on an installed base of 244 terminals. They were asked to rate their 3101s in seven specific categories. The following table summarizes their ratings.

	Excellent	Good	Fair	Poor	WA*
Overall performance	0	6	0	0	3.0
Ease of operation	2	4	0	0	3.3

operation is supported by Models 20, 22, and 23 only. The 10- or 11-unit, 7-bit ASCII code is used. Communications options such as half-/full-duplex, stop bits, and parity bits are switch-selectable.

All models provide a switch-selectable interface that meets EIA RS-422-A characteristics, as well as the standard EIA RS-232-C interface. When using the RS-232-C interface, the 3101 can communicate, through a modem, to a remote host processor at 110 to 1200 bps; it can also directly attach to a host processor (within 40 feet) with communications from 110 to 9600 bps. When the RS-422-A interface is used, the 3101 can communicate with a host processor, without a modem, up to a distance of 4,000 feet, at communications speeds from 110 to 9600 bps; shielded communications cable must be used. All models are additionally equipped with an auxilary RS-232-C interface port for peripheral I/O devices.

A 10-foot 3101 modem cable is available for the attachment of a modem. IBM provides no modems for use with the 3101; PTT mandatory modems complying with CCITT Recommendations V.24, V.28, ISO Standard 2110, and either CCITT Recommendations V.21 or V.23 may be attached.

HOST COMPUTER SOFTWARE SUPPORT

The 3101 can communicate with a variety of IBM and non-IBM hosts, including a System/370 or 4300 Processor via a 3704/3705 Communications Controller or an IBM 2701 Data Adapter Unit; an 8100 System; and a Series/1 computer. Operation in TTY-compatible mode is supported by most of the current IBM system support programs, including BTAM, BTAM-ES, VTAM, ACF/VTAM, TCAM, ACF/TCAM, CICS/VS (with BTAM, ACF/VTAM, or ACF/TCAM via NTO), TSO/TCAM, TSO/ACF/VTAM/NTO, VSPC, VM/370, and DPPX/BASE. Full-function mode operation is supported by BTAM, BTAM-ES, ACF/VTAM R2/R3 with NTO, ACF/TCAM V2 R1/R2/R3, VSPC, CM/370-CMS, and DPPX/BASE.

DEVICE CONTROL

Both Models 13 and 23 provide the following features: cursor move, backspace, home, and extended erase (erase to end-of-line, erase all keyboard input data, erase entire screen, and erase to end-of-screen). Character transmission mode provides for transmission of data on a character-by-character basis as each key is depressed.

Model 23 provides the following additional features not found on the Model 13: insert line, delete line, insert character, delete character, and backtab. Using an attribute character, extended field handling is available, with fields designated as protected, blinking, high-low intensity, nondisplay, and modified transmit. Model 23 provides for both character and block mode transmission.

COMPONENTS

CRT DISPLAY UNIT: The 3101 includes 12-inch monitor with a screen capacity of 1920 characters arranged in 24 lines of 80 characters. A 25th line is provided for display of machine status messages. Characters are displayed in green phosphor on a dark background, and are formed using a 7-by-14 dot matrix in a 9-by-16 dot field. The 95-character ASCII set is displayable; it includes 52 upper-/lowercase alphabetics, 10 numerics, and 32 special characters plus space. Transparent Mode permits the display of the 33 ASCII control characters. The monocase switch provides automatic conversion of lowercase to uppercase, thereby allowing for the display of a 64-character graphics set. A blinking or solid block cursor can be switch-selected. Contrast and brightness controls and an audible alarm are standard. The video element can be tilted or swiveled by the operator to change the viewing angle.

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IBM 3101 Display Terminal

Display clarity	2	3	1	0	3.2
Keyboard feel & usability	1	4	1	0	3.0
Ergonomics	2	2	2	0	3.0
Hardware reliability	4	2	0	0	3.7
Mfr.'s maintenance service/technical support	3	3	0	0	3.5

*Weighted Average on a scale of 4.0 for Excellent.

When asked whether or not they would recommend the 3101 Display Terminal to other users, five of the respondents answered that they would; only one answered that they would not. □

KEYBOARD: The 3101 includes a detachable 87-key IBM Selectric keyboard. Model 13 features a keyboard with a high-profile design; Model 23 features a new keyboard with a low-profile design. The keyboard features full cursor controls, a 12-key numeric pad, 8 Program Function (PF) keys at alternate positions, and print keys. Separators are featured to help prevent accidental striking of control keys. All alphameric, special character, and cursor control keys have typamatic capability. The full 128-character ASCII set can be generated. The keyboard is cable-connected to the video element.

PRICING

The 3101 Display Terminal is available for purchase only. A quantity discount is provided on purchases scheduled over an 18-month period. A 3-month warranty applies; an annual maintenance contract is available following expiration of the warranty. Two maintenance plans are available: Customer Carry-In Repair and IBM On-Site Exchange.

The units are designed for customer setup and maintainability; if an equipment failure occurs, a Problem Analysis and Resolution Guide instructs the customer in isolation and replacement of the failing part. IBM provides spare parts for all customer-replaceable components and shipping packages for returning parts to IBM for service. Maintenance and repairs are performed only at the nearest IBM Repair Center.

EQUIPMENT PRICES

		Purchase Price ($)	Annual Charges: Cust. Carry-In Repair ($)	Annual Charges: IBM On-Site Exchange ($)
Model 13	3101 Display Terminal	1,430	70	180
Model 23	3101 Display Terminal	1,650	80	190 ■

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IBM 5291 and 5292 Display Stations

PRODUCT DESCRIPTION

IBM has unveiled two new terminals, which are members of the 5250 Information Display System. The 5291 Model 1 Display Station is a plug-compatible replacement for the older 5251 Model 11, the most popular model in the 5250 terminal product line. The 5291 Model 1 offers ergonomic design improvements over the 5251 Display Station. IBM also added color capability to the 5250 system with the introduction of the 5292 Color Display Station, a seven-color unit which is also plug-compatible with the 5251 Model 11.

RELATIONSHIP TO CURRENT PRODUCT LINE: Both new models are direct replacements for the 5251 Model 11, as mentioned previously.

The 5291 Model 1 attaches to the IBM System/34, System/38, and Series/1, and can be integrated into existing 5250 networks. The display screen of the 5291 features a 1920-character capacity (24 lines of 80 characters each), and can be tilted from -5 degrees to +20 degrees. The keyboard is detachable, features a low-profile design, and has a built-in palm rest and slope adjustment. The 5291 has a lighter, more compact design than the 5251. Cable-Thru and an operator-adjustable audible alarm are standard.

The 5292 Color Display Station is the first color unit in the 5250 product line. The 5292 can be attached to the IBM System/34 and System/38, and, like the 5291, can be integrated into existing 5250 networks. The 5292 features a

PRODUCTS ANNOUNCED: Two new members of the 5250 Information Display System—the 5291 Display Station and the 5292 Color Display Station. Both models are designed for use with the IBM System/34 or System/38.

ANNOUNCEMENT DATE: July 7, 1982.

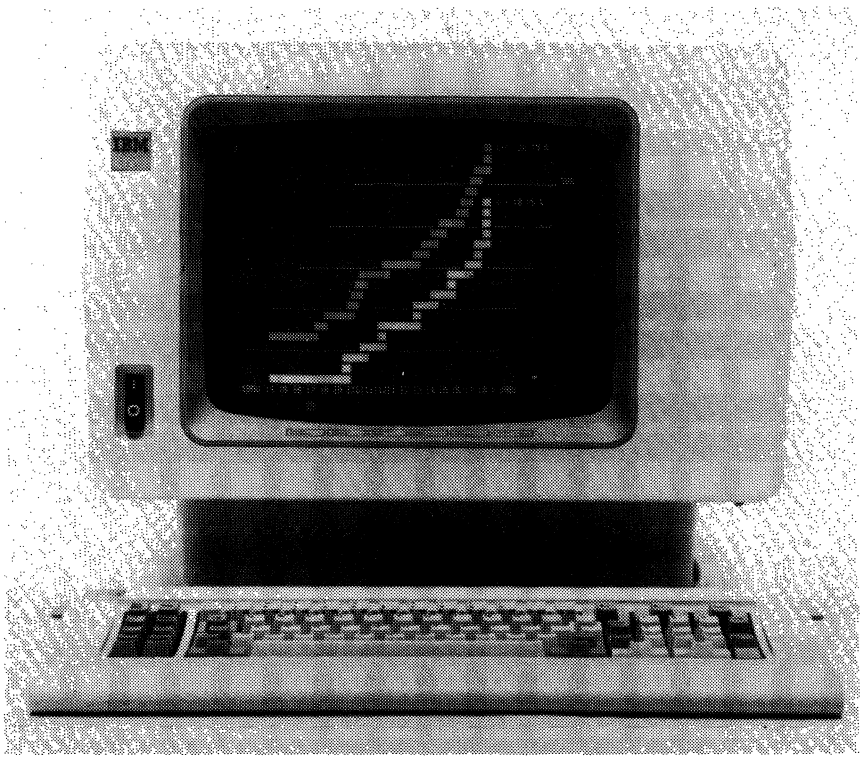
DELIVERY SCHEDULE: First customer shipments of the 5291 were scheduled to begin in July 1982. First customer shipments of the 5292 are scheduled to begin in September 1982.

BASIC SPECIFICATIONS

VENDOR: International Business Machines Corporation, Information Systems Group, 4111 Northside Parkway, Atlanta, GA 30327. Telephone (404) 238-2000.

CONFIGURATION: The 5291 Model 1 Display Station can be attached to an IBM System/34, System/38, Series/1, or 5251 Model 2 or 12 Display station. The 5291 is plug-compatible with the 5251 Model 11 Display Station with respect to both system interface and software support.

Standard features on the 5291 Model 1 include: Cable-Thru; operator-adjustable audible alarm; 24 command functions; and visual attributes including normal or bright intensity, underscore, non-display, blink, and reverse image. The 5291 contains a tiltable display screen, and a detachable keyboard with an adjustable slope. The 5291 does not support the magnetic stripe reader, selector light pen, or multinational character set.



The IBM 5292 Color Display Station adds color capability to the 5250 Information Display System. The 5292 features a 1920-character display capacity, and displays seven colors—red, green, turquoise, yellow, pink, blue, and white. The screen can be tilted (up to 10 degrees), and the keyboard is detachable.

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IBM 5291 and 5292 Display Stations

1920-character screen capacity (24 lines by 80 characters), and displays seven colors: red, green, turquoise, yellow, pink, blue, and white. The display has a 10-degree tilt capability. Like the 5291, the 5292 features a detachable, low-profile keyboard with a built-in palm rest and adjustable slope. Cable-Thru and an operator-adjustable audible alarm are standard features.□

The 5292 Color Display Station can be attached to a System/34, System/38, or 5251 Model 2 or 12 Display Station. The 5292 is plug-compatible with the 5251 Model 11 Display Station; the display of colors is achieved through the use of existing attribute codes and can be used without program modification. Default color functions will replace the attributes associated with each field as the formats are displayed. For the optimum use of the 5292's color capability, some changes to the programming support for 5251s may be recommended.

The 5292 displays seven colors: red, green, turquoise, yellow, pink, blue, and white. Standard features include: Cable-Thru; operator-adjustable audible alarm; 24 command functions; visual attributes including underscore, blink, and non-display; operator-selectable options including block or underscore cursor, cursor blink, cursor location, work station address display, display screen attribute codes, limit color, and set alarm volume; and self-test diagnostics. The 5292 contains a tiltable display screen, and a detachable keyboard with an adjustable slope.

PRICING

The 5291 Model 1 Display Station and the 5292 Color Display Station are available for purchase only. The 5291 is priced at $2,100 in single quantity, with an annual maintenance charge of $230. The 5292 is priced at $4,950 in single quantity; annual maintenance is $420. Volume Procurement Discounts are available according to the following schedule:

Quantity	% Discount
1-9	0%
10-19	6
20-49	9
50-99	12
100-up	15■

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IBM 316X Display Stations

MANAGEMENT SUMMARY

UPDATE: *This report is being updated to reflect the additions to the IBM 316X family of display stations. Also included is information on the new IBM 3161/3163 Feature Cartridges and the new Emulation Cartridges for the IBM 3161 as well as changes to the IBM maintenance agreement.*

IBM's 316X family of display terminals stiffened the competition in the general-purpose ASCII market. These low-cost, full function terminals show that IBM can compete with other vendors in this market by providing features and functionality at a competitive price. The first members of the family were the 3161 Models 11 and 12 and the 3163 Models 11 and 12. They were joined in February 1986 by the color 3164 Models 11 and 12. Most recently announced into the 316X family are the 3161 and 3163 Models 210 and 220. These new models feature a 12-inch monitor with amber-gold phosphor. The 210 Models feature an RS-232-C interface and the 220 Models offer RS-232-C/RS-422-A selectable interface. All features of the 3161 and 3163 Models 11 and 12 are available on these new models.

The IBM 3164 is a high-function display that offers the advanced capabilities of the 3163 ASCII Display Station in eight colors: red, white, yellow, green, blue, turquoise, pink, and black. The colors are fully programmable and can be used in any combination in foreground and background. Colors can be used with up to three viewports for displaying data from multiple sources. Line drawing characters and host loadable characters can be displayed in color to produce simple bar charts and special graphic symbols. This model features a 14-inch monitor with low-profile keyboard with tactile feedback. Having upward compati-

IBM has increased its 316X family of ASCII display stations by announcing the 3164 Color Display Station, which offers eight colors on a high-resolution 14-inch monitor, and two new cartridges for the IBM 3161 and 3163 ASCII Display Stations. Also recently added are the 3161 and 3163 Models 210 and 220, which feature a 12-inch monitor with amber-gold phosphor characters. In addition, new emulation cartridges for the IBM 3161 and changes to the maintenance agreement have been announced.

MODELS: 3161 Models 11, 12, 210, and 220; 3163 Models 11, 12, 210, and 220; and 3164 models 11 and 12.
DISPLAY: The 3161 and 3163 terminals include a 12-inch, tilt/swivel display with a 1,920-character screen capacity; the 3164 models include a 14-inch, tilt/swivel display with 1,920-character screen capacity.
KEYBOARD: The 316X terminals are equipped with a 102-key keyboard with a low-profile design. Tactile feedback, tilt adjustment, and 24 PF keys are included.
COMPETITION: Applied Digital Data Systems (ADDS), Esprit Systems, TeleVideo Systems, Wyse Technology, Digital Equipment Corporation, and several others.
PRICE: The 3161 Models 210 and 220 are priced at $695 and $774; the 3163 Models 210 and 220 sell for $895 and $974; the 3164 Models 11 and 12 sell for $1,295 and $1,374, all respectively.

The IBM 316X family of display stations are IBM's newest ASCII terminals. The 3161 and 3163 feature a compact modular design, including a 12-inch display, while the 3164 Color Display Station includes a 14-inch display. All displays feature tilt/swivel capability and a low-profile, movable keyboard. The 3163, shown here, contains enhanced features including smooth scrolling, split screen with partitioning and paging, and an optional Digital VT100/VT52 plug-in emulation cartridge.

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IBM 316X Display Stations

bility from the IBM 3161 and IBM 3163 display stations, the 3164 uses the same screen format of 24 lines by 80 columns, and a 25th line for operator information.

The entry-level 3161 provides the following features: menu setup, definable function keys, split screen, character and field attributes, a line drawing character set, and an auxiliary port. The 3161's keyboard contains 24 definable function keys. The 3163 contains all of the features found on the 3161, plus the following enhanced functions: smooth scrolling, split screen with paging and partitioning, double high/double wide characters on a line basis, advanced editing field attributes, host-loadable character set, and a redefinable keyboard. The 3164 contains menu setup, definable function keys, attributes in character and block modes, line drawing characters, and CRT saver. In native mode such advanced capabilities as smooth scrolling, viewports, pages, partitions, double high/double wide characters, host loadable characters, extended attributes, and block longitudinal redundancy checking are offered.

New cartridges for the IBM 3161 and 3163 ASCII Display Stations provide the additional read command feature on these models and TeleVideo 950 emulation on the 3163. Two additional new emulation cartridges for the 3161 are available which offer enhanced ASCII emulation. These are the TeleVideo 92X/91X Emulation Cartridge and the Extended ASCII Emulation Cartridge. The TeleVideo cartridge provides emulation of the following TeleVideo products: 910+, 912, 920, 925, and 925E. In addition, it offers 32 definable function keys, 3 program attention keys, mono/dual case selection, and 25th line. The Extended ASCII Emulation Cartridge provides emulation of the Lear Siegler ADM 3A, Lear Siegler ADM 5, Hazeltine 1500, ADDS Viewpoint A2, TeleVideo 910, and IBM 3101 Model 881. Other features available on this cartridge are 24 definable function keys, 3 program attention keys, pacing in the main port (X-ON/X-OFF), 25th line, mono/dual case selection, local print via print key, and return setup to factory default. All of these capabilities are available in all the ASCII emulation modes. The 3161 native mode is not available when the cartridge is inserted in the 3161.

COMPETITIVE POSITION

When IBM introduced its first ASCII terminal in 1979, there was a good deal of anxiety among the established ASCII terminal vendors. Having already established a dominant position in the 3270 terminal market, these vendors feared that IBM could become the dominant supplier of ASCII terminals. It never happened, for a variety of reasons, not the least of which was the 3101's high price tag. With the introduction of the 3161 and 3163 displays, IBM took another crack at this market. Apparently meeting with a warm reception, it has added new models to this family of terminals. As it was at the time of the initial introduction of the 3161 and 3163, the ASCII market continues to be in turmoil. The low-end price war, which began in 1981 with the unveiling of the ADDS Viewpoint at the then unheard of price of $650, has recently heated up even more. The introduction by ITT Qume of the $399 QVT-101, and now, even lower priced models by other

CHARACTERISTICS

VENDOR: International Business Machines Corporation (IBM), Old Orchard Road, Armonk, NY 10504. Contact your local IBM representative.

DATE OF ANNOUNCEMENT: 3161 and 3163 Models 11 and 12—June 1985; 3164 Models 11 and 12—February 1986; 3161 and 3163 Models 210 and 220—June 1986.

DATE OF FIRST DELIVERY: 3161 and 3163 Models 11 and 12—June 1985; 3164 Models 11 and 12—February 1986; 3161 and 3163 Models 210 and 220—June 1986.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: IBM.

MODELS

The 3161 and 3163 are ASCII display stations that include a 12-inch, tilt/swivel display and a low-profile keyboard. The following models are available:

- **3161 Model 11—features emulation of the ADDS Viewpoint, Lear Siegler ADM 3A and ADM 5, Hazeltine 1500, TeleVideo 910, and IBM 3101. An RS-232-C interface is included.**
- **3161 Model 12—contains all of the features of the 3161 Model 11, except that it includes an operator-selectable RS-232-C/RS-422-A interface.**
- **3161 Model 210—contains all of the features of the 3161 Model 11, except that it offers amber-gold phosphor.**
- **3161 Model 220—contains all of the features of the Model 12, except that it offers amber-gold phosphor.**
- **3163 Model 11—an advanced function terminal that emulates the IBM 3101, and the Digital VT100/VT52 (via a pluggable cartridge). An RS-232-C interface is included.**
- **3163 Model 12—contains all of the features of the 3163 Model 11, except that it includes an operator-selectable RS-232-C/RS-422-A interface.**
- **3163 Model 210—contains all of the features of the 3163 Model 11, except that it offers amber-gold phosphor.**
- **3163 Model 220—contains all of the features of the 3163 Model 12, except that it offers amber-gold phosphor.**

The 3164 ASCII Color Display Station includes a 14-inch, tilt/swivel display, eight foreground and background colors, and a low-profile keyboard. The following models are available.

- **3164 Model 11—features upward compatibility with the 3161 and 3163, and emulates the IBM 3101. An RS-232-C interface is included.**
- **3164 Model 12—contains all of the features of the 3164 Model 11, except that it includes an operator-selectable RS-232-C/RS-422-A interface.**

TRANSMISSION SPECIFICATIONS

The 316X display stations communicate asynchronously, in half- or full-duplex modes, at selectable transmission rates ranging from 50 to 19,200 bits per second. The 316X terminals can communicate with both IBM and non-IBM host computer systems. Transmission parameters (including RS-232-C or RS-422-A port selection of the 316X Models

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IBM 316X Display Stations

competitors, is forcing once well-known vendors into obscurity. Many established ASCII terminal vendors are struggling to maintain respectable profit margins as price levels continue to decline. In the past year, Wyse Technology has wrested the top spot from financially troubled TeleVideo Systems; meanwhile, Lear Siegler has plans to pull out of the market and sell its terminal business to Zentec Corp. Esprit Systems (formerly Hazeltine) has also encountered problems maintaining their market share. IBM's renewed presence in the ASCII display terminal market is proving to be an unfortunate presence for its competitors.

ADVANTAGES AND RESTRICTIONS

In a effort to gain market share, IBM has attacked on two different fronts. First, the prices of the 3161 and 3163 are competitive with comparable units now on the market. The 3161, with a single-unit price of $695, gives IBM their first truly low-end ASCII product. The $895 3163, with its set of enhanced features, competes with the independent vendors' high-end offerings. Second, IBM has provided emulation of several popular ASCII terminals, thus making the 316X terminals eligible for use with non-IBM computer systems. The 3161 provides emulation of terminals from ADDS, Lear Siegler, Esprit, and TeleVideo; the 3163, via its optional plug-in cartridge, puts IBM in the Digital-compatible market with its VT100/VT52 compatibility. These emulations are in addition to IBM 3101 emulation, which provides IBM's current base of 3101 users with a clear migration path. The combination of these two factors, along with the high degree of functionality available with the 316X terminals, and the introduction of a color display station, puts IBM in an excellent position to significantly increase its share of this market; a market that, despite its current problems, remains a huge and still growing one.

IBM's current pricing levels (although still somewhat higher than many of its competitors), combined with its record of reliability, service, and stability, can only prove to be advantageous to the company and the customer. On the other hand, the ASCII terminal industry has become almost a commodity market because of the low prices now in effect. Brand loyalty to IBM may not have an effect when terminals are available in the $200 and $300 range. As always, the users will decide whether IBM has the right products to carve out a larger market share. □

12 and 220) are chosen via the terminal's menu setup. The main communications port features inbound and outbound X-on/X-off pacing (inbound pacing is the default and is not selectable for the 3161), and echo, character, or block modes. It supports 7- or 8-bit word lengths, and no, odd, even, mark, and space for parity. The RS-232-C communications cable may be up to 40 feet long, and attachment may be direct or via a modem. The RS-422-A interface supports point-to-point direct coupling, with a maximum cable length of 4,000 feet.

All 316X family models include an RS-232-C auxiliary port. The RS-232-C auxiliary port on the 3161 and 3164 may be used to attach another asynchronous ASCII device, such as a printer. The auxiliary port on the 3163 and 3164 is bidirectional, allowing for the attachment of output (e.g., printer) and input (e.g., other ASCII terminals) devices. Transmission rates for the auxiliary port range from 50 to 19,200 bps, and are selectable independent of the main communications port.

DEVICE CONTROL

The 316X terminals utilize a setup mode to determine operating and transmission parameters. Pressing the SET-UP key on the keyboard provides a full-screen display of the current settings. Settings may be changed by advancing the cursor to the chosen field and pressing the space bar until the desired setting appears. Character or block mode transmission may be chosen from the setup menu; the terminal's operating mode may be chosen as well. The 3161 provides the following operating modes: native 3161; IBM 3101 Model 23; ADDS Viewpoint; Hazeltine 1500; Lear Siegler ADM 3A; Lear Siegler ADM 5; and TeleVideo 910. The 3163 provides IBM 3101 Model 23 emulation; an optional plug-in cartridge provides Digital VT100/VT52 operating mode. The IBM 3101 operating mode is also software-selectable for the 316X terminals.

All models provide the following visual attributes: underline, reverse video, nondisplay, blinking, and dual intensity. Three types of attributes are available: character, field, and line (line attributes are not available on the 3161). Character attributes can be used in both character and block transmission modes. A character attribute does not take up a screen or buffer position, and is in effect for all subsequent characters sent to the display until the next character attribute is sent. Field attributes provide control in a manner similar to that found on the 3270 family terminals; they may be used in block transmission mode only. Double high/double wide characters are provided on the 3163 and 3164 via a line attribute, which is in effect for one line of the screen.

The 3161 supports the ability of a host program to divide the screen (1,920 characters) into three horizontal screen areas (viewports). The host program may define the height of each area and send and receive data to and from each of them. This split screen capability allows the user to stay in one viewport or jump to another.

The 3163 and 3164 contain a 7,680-character buffer; since this is more data than can be displayed on the screen, each of the three split screen areas (viewports) displays a portion of the data buffer. The operator can pan across sections of the data from the buffer in this screen area.

The 316X terminals feature definable function keys. The 24 function keys (PF1 through PF 24) may have data "defined" to them by either the operator or the host program, to assist in entering frequently keyed information. Any function key can be set to a character string, and subsequent striking of that key will simulate the entering of that operator's character string. Each key may be set to a maximum of 32 characters on the 3161, and a maximum of 64 characters on the 3163 and 3164. The sum of all of the character strings can be a maximum of 128 characters on the 3161, and 256 bytes on the 3163 and 3164. All values are stored in nonvolatile memory.

The 3163 also provides the following advanced features: smooth scrolling, redefinable keyboard, host-loadable character set, advanced editing field attributes, and host access to indicator row.

The redefinable keyboard feature provides all single unit keys (except the keys in the typewriter input area) with the following functions: swap (exchange the locations of two function keys); copy (copy a function from one key to another); delete (delete a function from the keyboard); default (return the functions of all keys to the default); and check (check the key function).

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IBM 316X Display Stations

A user can also define his/her own special character or graphics symbols. Characters (up to 94) can be loaded to the host under program control, and accessed for display through programming or operator control. Advanced editing field attributes available on the 3163 and 3164 include: right justify with zero or blank fill; must-enter; must-fill; and auto-send. In addition, a host message may be written to an 80-character terminal buffer, and displayed on the 25th display line by operator or host control.

COMPONENTS

CRT DISPLAY UNIT: The 3161 and 3163 terminals feature 12-inch (diagonally measured) display screens, while the 3164 terminals feature 14-inch (diagonally measured) display screens. All models offer tilt/swivel capability. All models also feature a display capacity of 1,920 characters, arranged in 24 lines of 80 characters each. A 25th line is available as an indicator line. The standard ASCII character set is displayable, plus 24 line drawing characters. Characters are displayed in green phosphor on the 3161 and 3163 Models 11 and 12, and in amber-gold phosphor on the 210 and 220 models. Eight foreground and background colors are offered on the 3164. Characters on all models and graphics symbols on the 3164, are formed within an 8-by-16 dot matrix. Brightness and contrast control nobs are included on the display. Also included is a CRT Saver feature that blanks or dims the display after an operator-specified time (5, 10, or 15 minutes, or none).

The 316X terminals feature a modular construction consisting of the video unit, logic base, and keyboard. The logic base can accommodate the optional plug-in cartridges. The modular design provides the 316X with a compact footprint size.

KEYBOARD

The 316X terminals are equipped with a 102-key, low-profile design keyboard specifically designed for use with ASCII systems. The keyboard contains 24 definable program function (PF) keys and a numeric keypad. Tactile feedback is standard. The keyboard also contains a tilt adjustment and is connected to the logic base via a coiled cord.

PRICING

The 316X display stations are available for purchase only. Under the new warranty provisions, terminals installed by end users on or after June 16, 1986 have a three-year warranty. The type of warranty service continues to be Customer Carry-In Exchange (CCE). Customers desiring on-site warranty from IBM may select a warranty option for IBM On-Site Exchange (IOE). This option is valid for a three-year period concurrent with the duration of the warranty and is available at an additional charge from the IBM National Service Division (NSD). The Customer On-Site Exchange option is no longer available.

EQUIPMENT PRICES

			Annual Charges	
		Purchase Price ($)	IBM On-Site Exchange ($)	Customer On-Site Exchange ($)
3161 Model 11	Display Station w/keyboard (RS-232-C interface)	695	45	35
3161 Model 12	Display Station w/keyboard (RS-232-C/RS-422-A interface)	774	40	35
3161 Model 210	Display Station w/keyboard (RS-232-C interface)	695	45	20
3161 Model 220	Display Station w/keyboard (RS-232-C/RS-422-A interface)	774	40	20
3163 Model 11	Display Station w/keyboard (RS-232-C interface)	1,095	60	40
3163 Model 12	Display Station w/keyboard (RS-232-C/RS-422-A interface)	1,174	60	40
3163 Model 210	Display Station w/keyboard (RS-232-C interface)	895	60	40
3163 Model 220	Display Station w/keyboard (RS-232-C/RS-422-A interface)	974	60	40
3164 Model 11	Color Display Station (RS-232-C interface)	1,295	85	45
3164 Model 12	Color Display Station (RS-232-C/RS-422-A interface)	1,374	85	45
	Digital-VT100/VT52 Cartridge	50	—	—
	IBM 3161/3163 Feature Cartridges-TeleVideo and Addt'l Read	35	15	—
	Emulation Cartridges for IBM 3161-TeleVideo 92X/91X and ASCII Emulation	35	35	— ■

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IBM 3161 and 3163 Display Stations

MANAGEMENT SUMMARY

The introduction of the 316X family of display stations signals IBM's entry into the low-cost, general-purpose ASCII display market. IBM's previous ASCII display, the 3101, contained a price tag that prevented it from establishing IBM's usual dominant position. The new terminals, however, carry price tags that place them more in line with what is available from the other vendors in this market. In addition, for the first time, IBM is providing emulation of *other* vendors' products on the 316X terminals. The 3161, in its logic base, contains emulation of the ADDS Viewpoint, Hazeltine (now Esprit Systems) 1500, Lear Siegler ADM 3A and ADM 5, and TeleVideo 910, as well as emulation of the IBM 3101 Model 23. The 3163 features 3101 emulation in its base logic; an optional plug-in cartridge provides the terminal with DEC VT100/VT52 compatibility.

With the announcement of the 316X family, IBM stated that it was discontinuing the 3101 Model 23. In fact, the additional features contained on the 316X terminals, coupled with their 3101 Model 23 emulation modes, effectively obsoletes the older IBM terminal.

The entry-level 3161 provides the following features: menu setup, definable function keys, split screen, character and field attributes, a line drawing character set, and an auxiliary port. The 3161's keyboard contains 24 definable function keys. The 3163 contains all of the features found on the 3161, plus the following enhanced functions: smooth scrolling, split screen with paging and partitioning, double high/double wide characters on a line basis, advanced editing field attributes, host-loadable character set, and a redefinable keyboard.

The 316X terminals contain a modular design, consisting of a 12-inch tilt/swivel display, logic base, and low-profile

IBM has entered the low-cost general-purpose ASCII terminal market with the introduction of the 3161 and 3163 display stations. The 3161, an entry-level model, features a compact display design and emulation of five popular ASCII terminals, plus the IBM 3101. The 3163 is an advanced version of the 3161; it includes the option to plug in a cartridge that will provide it with DEC compatibility. The 316X terminals feature a modular, compact design and can communicate with both IBM and non-IBM computer systems.

MODELS: 3161 Models 11 and 12, 3163 Models 11 and 12.
DISPLAY: The 316X terminals include a 12-inch tilt/swivel display with a 1,920-character screen capacity.
KEYBOARD: The 316X terminals are equipped with a 102-key keyboard with a low-profile design. Tactile feedback, tilt adjustment, and 24 PF keys are included.
COMPETITION: Applied Digital Data Systems (ADDS), Esprit Systems, Lear Siegler, TeleVideo Systems, Wyse Technology, Digital Equipment Corporation (DEC), and several others.
PRICE: The 3161 Model 11 is priced at $695; the 3163 Model 11 sells for $1,095.

CHARACTERISTICS

VENDOR: International Business Machines Corporation (IBM), Old Orchard Road, Armonk, NY 10504. Contact your local IBM representative.

The IBM 316X family of display stations are IBM's newest ASCII terminals. The 3161 and 3163 feature a compact modular design, including a 12-inch tilt/swivel display and a low-profile, movable keyboard. The 3163, shown here, contains enhanced features including smooth scrolling, split screen with partitioning and paging, and an optional DEC VT100/VT52 plug-in emulation cartridge.

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IBM 3161 and 3163 Display Stations

detached keyboard. The 316X Models 11 contain an RS-232-C interface as its main communication port. The 316X Models 12 contain an operator-selectable RS-232-C/RS-422-A interface as the main port.

COMPETITIVE POSITION

When IBM introduced its first ASCII terminal, in 1979, there was a good deal of anxiety among the established ASCII terminal vendors. Having already established a dominant position in the 3270 terminal market, these vendors feared that IBM could become the dominant supplier of ASCII terminals. It never happened, for a variety of reasons, not the least of which was the 3101's high price tag. With the introduction of the 3161 and 3163 displays, IBM takes another crack at this market. Unlike 1979, IBM's introductions find the ASCII market in turmoil. The low-end price war, which began in 1981 with the introduction of the ADDS Viewpoint at the then unheard of price of $650, has recently heated up even more, due to the introduction by ITT-subsidiary Qume of the $399 QVT-101. Many established ASCII terminal vendors are struggling to maintain margins as price levels continue to plunge. In the past year, relative newcomer Wyse Technology has wrested the top spot from financially troubled TeleVideo Systems; meanwhile, traditional leaders such as Lear Siegler and Esprit Systems (formerly Hazeltine) have encountered problems maintaining their market share. Into this market, IBM adds a renewed (and dangerous) presence.

ADVANTAGES AND RESTRICTIONS

In an effort to gain market share, IBM has attacked on two different fronts. First, the prices of the 3161 and 3163 are competitive with comparable units now on the market. The 3161, with a single-unit price of $695, gives IBM their first truly low-end ASCII product. The $1,095 3163, with its set of enhanced features, competes with the independent vendors' high-end offerings. Second, IBM has provided emulation of several popular ASCII terminals, thus making the 316X terminals eligible for use with non-IBM computer systems. The 3161 provides emulation of terminals from ADDS, Lear Siegler, Esprit, and TeleVideo; the 3163, via its optional plug-in cartridge, puts IBM in the DEC-compatible market with its VT100/VT52 compatibility. These emulations are in addition to IBM 3101 emulation, which provides IBM's current base of 3101 users with a clear migration path. The combination of these two factors, along with the high degree of functionality available with the 316X terminals, puts IBM in an excellent position to significantly increase its share of this market; a market that, despite its current problems, remains a huge and still growing one.

The belief here is that these terminals are the first in a new family of ASCII displays. Future members will probably include color and graphics capabilities. Although IBM's current pricing levels are still somewhat higher than those offered by other vendors in this market, it can offset this with its record for reliability, service, and stability. On the

DATE OF ANNOUNCEMENT: June 1985.

DATE OF FIRST DELIVERY: June 1985.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: IBM.

MODELS

The 3161 and 3163 are ASCII display stations that include a 12-inch, tilt/swivel display and a low-profile keyboard. The following models are available:

- **3161 Model 11—features emulation of the ADDS Viewpoint, Lear Siegler ADM 3A and ADM 5, Hazeltine 1500, TeleVideo 910, and IBM 3101. An RS-232-C interface is included.**
- **3161 Model 12—contains all of the features of the 3161 Model 11, except that it includes an operator-selectable RS-232-C/RS-422-A interface.**
- **3163 Model 11—an advanced function terminal that emulates the IBM 3101, and the DEC VT100/VT52 (via a pluggable cartridge). An RS-232-C interface is included.**
- **3163 Model 12—contains all of the features of the 3163 Model 11, except that it includes an operator-selectable RS-232-C/RS-422-A interface.**

TRANSMISSION SPECIFICATIONS

The 316X display stations communicate asynchronously, in half- or full-duplex modes, at selectable transmission rates ranging from 50 to 19,200 bits per second. The 316X terminals can communicate with both IBM and non-IBM host computer systems. Transmission parameters (including RS-232-C or RS-422-A port selection of the 316X Model 12) are chosen via the terminals' menu setup. The main communications port features inbound and outbound X-on/X-off pacing (inbound pacing is the default and is not selectable for the 3161) and echo, character, or block modes. It supports 7- or 8-bit word lengths, and no, odd, even, mark, and space for parity. The RS-232-C communications cable may be up to 40 feet long, and attachment may be direct or via a modem. The RS-422-A interface supports point-to-point direct coupling, with a maximum cable length of 4,000 feet.

All 316X family models include an RS-232-C auxiliary port. The RS-232-C auxiliary port on the 3161 may be used to attach another asynchronous ASCII device, such as a printer. The auxiliary port on the 3163 is bidirectional, allowing for the attachment of output (e.g., printer) and input (e.g., other ASCII terminals) devices. Transmission rates for the auxiliary port range from 50 to 19,200 bps, and are selectable independent of the main communications port.

DEVICE CONTROL

The 316X terminals utilize a set-up mode to determine operating and transmission parameters. Pressing the SET-UP key on the keyboard provides a full-screen display of the current settings. Settings may be changed by advancing the cursor to the chosen field and pressing the space bar until the desired setting appears. Character or block mode transmission may be chosen from the set-up menu; the terminal's operating mode may be chosen as well. The 3161 provides the following operating modes: native 3161; IBM 3101 Model 23; ADDS Viewpoint; Hazeltine 1500; Lear Siegler ADM 3A; Lear Siegler ADM 5; and TeleVideo 910. The 3163 provides IBM 3101 Model 23 emulation; an optional

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IBM 3161 and 3163 Display Stations

other hand, the ASCII terminal industry has become almost a commodity market because of the low prices now in effect. Brand loyalty to IBM may not have an effect when terminals are available for $399. As always, the users will decide whether IBM has the right products to carve out a bigger market share. □

plug-in cartridge provides DEC VT100/VT52 operating mode. The IBM 3101 operating mode is also software-selectable for the 316X terminals.

All models provide the following visual attributes: underline, reverse video, nondisplay, blinking, and dual intensity. Three types of attributes are available: character, field, and line (line attributes are available on the 3163 only). Character attributes can be used in both character and block transmission modes. A character attribute does not take up a screen or buffer position, and is in effect for all subsequent characters sent to the display until the next character attribute is sent. Field attributes provide control in a manner similar to that found on the 3270 family terminals; they may be used in block transmission mode only. Double high/double wide characters are provided on the 3163 via a line attribute, which is in effect for one line of the screen.

The 3161 supports the ability of a host program to divide the screen (1,920 characters) into three horizontal screen areas (viewports). The host program may define the height of each area and send and receive data to and from each of them. This split screen capability allows the user to stay in one viewport or jump to another.

The 3163 contains a 7,680-character buffer; since this is more data than can be displayed on the screen, each of the three split screen areas (viewports) displays a portion of the data buffer. The operator can pan across sections of the data from the buffer in this screen area.

The 316X terminals feature definable function keys. The 24 function keys (PF1 through PF 24) may have data "defined" to them by either the operator or the host program, to assist in entering frequently keyed information. Any function key can be set to a character string, and subsequent striking of that key will simulate the entering of that operator's character string. Each key may be set to a maximum of 32 characters on the 3161, and a maximum of 64 characters on the 3163. The sum of all of the character strings can be a maximum of 128 characters on the 3161, and 256 bytes on the 3163. All values are stored in nonvolatile memory.

The 3163 also provides the following advanced features: smooth scrolling, redefinable keyboard, host-loadable character set, advanced editing field attributes, and host access to indicator row.

The redefinable keyboard feature provides all single unit keys (except the keys in the typewriter input area) with the following functions: swap (exchange the locations of two function keys); copy (copy a function from one key to another); delete (delete a function from the keyboard); default (return the functions of all keys to the default); and check (check the key function).

A user can also define his/her own special character or graphics symbols. Characters (up to 94) can be loaded to the host under program control, and accessed for display through programming or operator control. Advanced editing field attributes available on the 3163 include: right justify with zero or blank fill; must-enter; must-fill; and auto-send. In addition, a host message may be written to an 80-character terminal buffer, and displayed on the 25th display line by operator or host control.

COMPONENTS

CRT DISPLAY UNIT: The 316X terminals feature a 12-inch (diagonally measured) display screen with tilt/swivel capability. Both models feature a display capacity of 1,920 characters, arranged in 24 lines of 80 characters each. A 25th line is available as an indicator line. The standard ASCII character set is displayable, plus 24 line drawing characters. Characters are displayed in green phosphor, and formed within an 8-by-16 dot matrix. Brightness and contrast control nobs are included on the display. Also included is a CRT Saver feature, that blanks or dims the display after an operator-specified time (5, 10, or 15 minutes, or none).

The 316X terminals feature a modular construction consisting of the video unit, logic base, and keyboard. The logic base can accommodate the optional plug-in cartridge. The modular design provides the 316X with a compact footprint size.

KEYBOARD

The 316X terminals are equipped with a 102-key, low-profile design keyboard specifically designed for use with ASCII systems. The keyboard contains 24 definable program function (PF) keys and a numeric keypad. Tactile feedback is standard. The keyboard also contains a tilt adjustment, and is connected to the logic base via a coiled cord.

PRICING

The 316X display stations are available for purchase only, and are designated as customer setup (CSU) machines. A warranty period of three months is standard. For volume orders, the 3161, 3163, and 3101 displays are added to those products qualifying for the VPA (Volume Procurement Amendment) discount in Category I of the revised Information Display System VPA Exhibit. The quantity of 3161s and 3163s can be combined with quantities of 3101s for purposes of determining the Category I discount.

Customer Carry-In Exchange warranty service is provided with the purchase of the 316X display stations. IBM On-Site Exchange and Customer On-Site Exchange are available for the applicable Warranty Option Charge under the IBM Maintenance Agreement. For customers who are under warranty or maintenance agreements, customer setup (CSU) and customer problem and analysis resolution (CPAR) assistance is available. If the customer has difficulty in completing the CSU or CPAR procedures, the customer may call the Service/Exchange Communication Center (S/ECC), toll-free on (800) 428-2569, and request assistance.

EQUIPMENT PRICES

			Annual Charges	
		Purchase Price ($)	IBM On-Site Exchange ($)	Customer On-Site Exchange ($)
3161 Model 11	Display Station w/ keyboard (RS-232-C interface)	695	55	35
3161 Model 12	Display Station w/ keyboard (RS-232-C/ RS-422-A interface)	774	55	35

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IBM 3161 and 3163 Display Stations

		Purchase Price ($)	Annual Charges: IBM On-Site Exchange ($)	Annual Charges: Customer On-Site Exchange ($)
3163 Model 11	Display Station w/ keyboard (RS-232-C interface)	1,095	70	40
3163 Model 12	Display Station w/ keyboard (RS-232-C/ RS-422-A interface)	1,174	70	40
—	DEC VT100/VT52 Cartridge	50	—	— ■

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