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user files, resequence or rearrange records in files, and print data files. The optional printer is recommended for the spread sheet analysis program group.

The *Math/Problem Solver Library* includes a comprehensive set of numerical analysis routines. There are 37 programs in the APL library and 44 programs in the BASIC library, but essentially the same capabilities are provided with each library. The facilities provided can be broadly grouped into calculus, including integration, differentiation, and solution of ordinary differential equations; linear equations and matrix analysis, including eigenproblems, lease squares solutions, linear programming, and solution of linear equations; approximations to functions and zeroes of functions, including several interpolation and approximation methods, function smoothing, minimums and maximums of tabulated functions, etc.; and evaluations of advanced mathematical functions such as the Gamma function, Bessel and modified Bessel functions, elliptic integrals and functions, orthogonal polynomials, etc.

The *STAT/Problem Solver Library* includes 40 (APL) or 41 (BASIC) routines for the analysis of numerical data through commonly used statistical techniques. The routines can be broadly grouped into elementary statistics, including histogram, cross-tabulation, moment, tally, and Chi-square and T test; regression and correlation analysis, including simple, stepwise, multiple, and polynomial regression; multivariate analysis, including discriminant analysis, canonical correlation, and factor analysis; analysis of variance; time series analysis, including moving average, seasonal and cyclical analysis, auto and cross covariance and correlation, and triple exponential smoothing, nonparametric statistics; and biostatistics, including survival rate and profit analysis. Four routines in the library provide capabilities to enter and display/print, correct, modify, generate, or smooth data.

The *Print Plot/Problem Solver Library* includes a series of modules that provide a wide range of plotting capabilities and can utilize data received from a BASIC program, from an APL program, or directly from a keyboard. With the addition of a 6301 Serial I/O Adapter, the 5100 can utilize an absolute vector plotter or a storage display terminal. The program provides the capability for generating line graphs, bar charts, histograms, point plotting, and others. The user specifies metric or inch plotting, the size and location of the graph within the plot limits, the location of the origin within the graph, the X and Y values at the origin, horizontal and vertical scaling factors (either linear or logarithmic), automatic axes, automatic grids, horizontal and vertical dot density, special symbols, and any data files that are used in conjunction with program-generated and keyboard data. The platen is reversible so that the paper can be moved backward as well as forward.

The *Dental Office Management System* was designed by a practicing dentist to avoid an increase in personnel due to increased paperwork. This comprehensive system prints out a list of the dentist's scheduled patients along with the patients' account balances, produces insurance forms while the patient is present, separates patient charges from insurance charges, maintains a payment record for each third party, produces aged trail balances for both patients and third parties, calculates patient budget plans, and prints recall notices when scheduled. The system is capable of handling up to 30 patients per day, and produces a financial activity summary at the end of each day. The minimum configuration that will support the system consists of a 64K processor, one 5106 auxiliary tape unit, and one 5103-1 printer. The programs are written in the BASIC language.

Computing for an Accounting Practice: Client Accounting, Time Management was written by a small CPA firm to provide write-up services for clients, as well as to provide a tool to manage the firm's practice. Besides write-up work, the system produces balance sheets and income statements with supporting schedules, statements of changes in financial position, trial balances, general ledgers, client billing worksheets, and employee productivity summaries. The minimum configuration that will support the system consists of a 32K processor and a 5103 printer. The programs are written in the BASIC language.

The *Travel Agency Accounting System* was designed to manage the cash flow of funds within a travel agency. The major areas handled by the system include sales and refunds, profit and loss statements, balance sheet accounting, journal entries, bank balance records, disbursement journal accounting, commercial invoicing, weekly ATC reporting, employee productivity, employee payroll, and airline ticket and itinerary writing. Month-end reports include a sales journal of receipts and invoices, a refund journal, a disbursements journal, an open transactions journal, a cash receipts report, and an accounts receivable journal for the agency's commercial accounts. The system can handle from one to six offices, up to 50 employees in all offices combined, up to 50 commercial accounts per office, and up to 250 cash and 150 credit card sales per office per week. The minimum configuration that will support the system consists of a 32K processor, a 5103 printer, and a 5106 auxiliary tape unit. The programs are written in the BASIC language.

The *Mortgage Closing and Property Settlement System* prepares the documents commonly required by mortgage lenders, title companies, and settlement attorneys for the transfer and settlement of real property. Automatic calculations include principal and interest payment, maturity date of a loan, annual percentage rate, mortgage insurance premium, daily interest, state and local transfer tax, escrow reserves, and recordation fee. The system produces a host of forms that include customized HUD settlement statements, federal truth in lending forms, instruction letters, and closing settlement documents. The system can handle up to 300 active cases or loans in the minimum configuration, depending on certain variables. The minimum configuration that will support the system consists of a 32K processor and a 5103 printer. The throughput can be increased by using a processor with a larger memory capacity. The programs are written in APL.

APL GRAPHPAK is a set of APL functions which provide interactive graphics support for devices which attach to the Serial I/O Adapter (6301) on a 5110 processor. A total of 62 functions provide capabilities ranging from fundamental graphic support through high-level graphics applications. The functions are grouped into the following component workspaces: fundamental graphic support, curve plotting, curve fitting, contour plotting, descriptive geometry, and auxiliary labeling. The system supports absolute vector plotter controllers with BCD vector encoding (Gould Brush 511, HP 7202A, HP 7203), microprocessor-controlled incremental plotters (Houston Instrument PTC-5/DP-1, Tektronix 4662, Zeta Research 230), and absolute vector storage display terminals (Tektronix 4013, Tektronix 4015, Tektronix 40XX). The selection of a graphic device is the sole responsibility of the user. The minimum configuration that will support the system consists of a 32K processor, a 6301 serial I/O adapter, and a plotter.

The *APL Coordinate Geometry System (COGO)* is designed to solve civil engineering geometry problems that involve right-of-way, highway, bridge, and interchange design, construction layouts, and general land surveys. COGO is composed of 65 functions organized into 11 groups. These functions provide for points, lines, circular arcs, transitional spirals, areas, and parabolic curves. The results are shown on the IBM 5110 display screen. If a 5103 printer is attached to the processor, input data, calculated results, and plots can be printed. COGO calculations can also be displayed or plotted

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by using the GRAPHPAK package. The minimum configuration that will support the system consists of a 32K processor and a 5103 printer (if printed output is desired).

The *APL Econometric Planning Language* is an interactive program that works with economic variables and provides for data analysis and transformation, tabular and graphic display, parameter estimation, model solution, and file handling. Examples of the use of the system include estimating advertising effectiveness, analysis and estimation of potential demand, financial planning, projection of economic indicators, and the study of economic theories. The minimum configuration that will support the system consists of a 64K processor (64K) and a 5103 printer.

PRICING

POLICY: The 5110 Portable Computer is available for purchase or through a Purchase Pilot Test Plan. A separate maintenance contract is available. No installation assistance is provided with this product; the customer sets up the system from step-by-step instructions packaged with the unit. The warranty period extends from the date of shipment from the plant for a total of 10 days plus 3 months.

The Purchase Pilot Test Plan provides a Contract Period of three months' use for about 15 percent of the purchase price. This price includes maintenance, and is payable in three equal monthly installments. The plan applies to all models and processor options of the 5110 and to the 5103 Printers and 5106 Auxiliary Tape Unit as well. One additional period of three months can be contracted for. Conversion to purchase can be made at any time, with credit for up to 70 percent of the Test Plan payments. In effect, a three-month trial would raise the price of the 5110 hardware by 4.5 percent. A two-period (six-month) trial would up the hardware price by 9 percent. Purchase prices of the 5110 are protected during the contract period. Obviously, this plan is designed to stir interest in prospective users who are unable to see an immediate pay-off for the 5110 in their operations and are unwilling to risk the full purchase price on a "maybe" basis.

A separately priced set of magnetic tape cartridges furnishes instructions in the BASIC ($225) or APL ($295) programming language. Two source-code data cartridges and a user's guide accompany each program library and include instructional material. The program libraries are furnished for a one-time license fee. The user is expected to maintain duplicate, back-up copies of the data cartridges.

The standard 10 percent educational discount applies to the basic computer and peripherals.

MINIMUM BASIC SYSTEM: Consists of BASIC 5110 Model B11, which includes integral CRT display, magnetic tape cartridge drive, and 16,384 bytes of main storage. About 12,000 bytes of main storage are available to the user. The BASIC interpreter is included. The purchase price of this system is $9,875, and the monthly maintenance cost is $60.

MINIMUM BUSINESS-ORIENTED SYSTEM: Consists of BASIC 5110 Model B12, which includes integral CRT display, magnetic tape cartridge, and 32,768 bytes of main memory, plus the optional 5103-11 printer. About 28,400 bytes of main memory is available to the user. The BASIC interpreter is included. The purchase price is $14,250, and the monthly maintenance cost is $97.

LARGE SCIENTIFIC SYSTEM: Consists of APL 5100 Model A14, which includes integral CRT display, magnetic tape cartridge, and 65,536 bytes of main memory, plus the 5114 diskette unit with dual drives (2.4 megabytes), 5103-11 printer, and 5106 auxiliary tape unit. About 58,800 bytes of main memory is available to the user. The APL interpreter is included. The purchase price is $25,500, and the monthly maintenance cost is $158.50.■

EQUIPMENT PRICES

		Purchase	Monthly Maint.	3-Month Contract Period Charge
PROCESSORS AND MAIN MEMORY				
5110 Model 1	Portable Computer; includes 1024-character display, magnetic tape cartridge drive, ROS for language processor, and main memory as detailed below:			
	APL Language Interpreter—			
A11	With 16,384 bytes of main memory	10,875	60.00	1,635
A12	With 32,768 bytes of main memory	12,050	65.00	1,905
A13	With 49,152 bytes of main memory	13,225	70.00	2,175
A14	With 65,536 bytes of main memory	14,400	75.00	2,445
	BASIC Language Interpreter—			
B11	With 16,384 bytes of main memory	9,875	60.00	1,485
B12	With 32,768 bytes of main memory	11,050	65.00	1,755
B13	With 49,152 bytes of main memory	12,225	70.00	2,025
B14	With 65,536 bytes of main memory	13,400	75.00	2,295
	APL and BASIC Language Interpreters—			
C11	With 16,384 bytes of main memory	11,875	65.00	1,785
C12	With 32,768 bytes of main memory	13,050	70.00	2,055
C13	With 49,152 bytes of main memory	14,225	75.00	2,325
C14	With 65,536 bytes of main memory	15,400	80.00	2,595
5110 Model 2	Portable Computer; includes 1024-character display, ROS for language processor, and main memory as detailed below:			
	APL Language Interpreter—			
A21	With 16,384 bytes of main memory	9,475	45.00	1,425
A22	With 32,768 bytes of main memory	10,650	50.00	1,695
A23	With 49,152 bytes of main memory	11,825	55.00	1,965
A24	With 65,536 bytes of main memory	13,000	60.00	2,235

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EQUIPMENT PRICES

		Purchase	Monthly Maint.	3-Month Contract Period Charge
PROCESSORS AND MAIN MEMORY (Continued)				
	BASIC Language Interpreter—			
B21	With 16,384 bytes of main memory	8,475	45.00	1,275
B22	With 32,768 bytes of main memory	9,650	50.00	1,545
B23	With 49,152 bytes of main memory	10,825	55.00	1,815
B24	With 65,536 bytes of main memory	12,000	60.00	2,085
	APL and BASIC Language Interpreters—			
C21	With 16,384 bytes of main memory	10,475	50.00	1,575
C22	With 32,768 bytes of main memory	11,650	55.00	1,845
C23	With 49,152 bytes of main memory	12,825	60.00	2,115
C24	With 65,536 bytes of main memory	14,000	65.00	2,385
PROCESSOR UPGRADE OPTIONS				
—	Models A21 through C24 can be field-upgraded to Model 1's to provide for the inboard tape cartridge unit and the attachment of the 5106 Auxiliary Tape Cartridge unit. Other models can be upgraded for additional memory and to combine BASIC and APL. Prices for field upgrades range from $1,000 to $7,650.	—	—	—
MASS STORAGE				
5114	Diskette Unit with one 1.2-megabyte drive	4,150	25.00	630
3240	Second 1.2-megabyte diskette drive	1,900	15.00	285
OPTIONS				
1250	Audible Alarm	50	NC	9
1524	Expansion Feature; required for Communications Adapter	300	7.00	45
1525	Communications Adapter	600	11.50	90
1600	Channel Terminator	200	1.00	30
2074	Bisynchronous Communications	2,000	11.50	300
3200	Diskette Sort Feature	400	2.00	60
3701	EIA/CCITT Interface	430	4.50	66
5500	1200-BPS Integrated Modem, non-switched	660	5.00	99
5501	1200-BPS Integrated Modem, switched	880	7.00	132
5508	1200-BPS Integrated Modem, switched back-up	1,015	10.00	153
5650	DDS Adapter	840	5.00	126
5651	DDS Adapter	840	5.00	126
5825	Parallel I/O Adapter	700	17.50	105
6301	Serial I/O Adapter	700	17.50	105
1501	Carrying Case, soft	125	NC	—
MAGNETIC TAPE DRIVES				
5106	Auxiliary Tape Unit	1,850	11.50	279
	Tape Cartridges, per package of five	100	—	—
PRINTERS				
5103-11	Printer, 80 cps	3,200	32	480
5103-12	Printer, 120 cps	3,700	39	555
—	Upgrade option, from 80 to 120 cps	500	—	—

SOFTWARE PRICES

		License Fee
UTILITY PROGRAMS		
5721	Problem Solver Libraries—	
-XM3	Business Analysis, BASIC	$500.00
	User's Guide	19.00
-XM1	MATH, BASIC	500.00
	User's Guide	23.00
-XM2	MATH, APL	500.00
	User's Guide	17.50
-XA1	STAT, BASIC	500.00
	User's Guide	22.50
-XA2	STAT, APL	500.00
	User's Guide	22.50
-DC1	Print Plot, BASIC	500.00
-DC2	Print Plot, APL	500.00
5798-NFX	APL GRAPHPAK	400.00

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SOFTWARE PRICES

ACCOUNTING PROGRAMS		Monthly Charge*
5796-NJC	Dental Office Management System	$150
-NJD	Computing for an Accounting Practice	120
-NKA	Travel Agency Accounting System	200
-NKB	Mortgage Closing and Property Settlement	80
5798-NGA	APL Coordinate Geometry System	176
-NHY	APL Econometric Planning Language	280

*Applies for 12 months only.