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## Model 960 Computer Full Duplex TTY/EIA Module User's Manual

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## PREFACE

This manual presents information concerning the Texas Instruments Full Duplex, TTY/EIA Interface Module (Part Number 961642) as it applies to the Communications Register Unit (CRU) of either the Model 960A or the Model 960B Computer. The information includes installation, operation, theory, and checkout of the module and is arranged in the following sections:

- I. Description and Installation - This section contains a brief overview of module operation and operational characteristics, plus the steps required to connect it within the computer system.
- II. Operating Instructions - This section describes the programming restrictions that must be observed when using the module, and also includes some sample coding for service subroutines.
- III. Unit Specification - This section is omitted from this manual. Refer to the applicable peripheral device user's manual for description of the units standardly connected to the module (see related publications below).
- IV. Interface and Module Specifications - This section describes the interface of the module with the computer and with the peripheral device attached to it, as well as the theory of operation for the module itself.
- V. Maintenance - This section outlines troubleshooting concepts for finding malfunctions in the system that uses the module.
- VI. Drawings - This section includes logic diagrams, assembly drawings and parts lists for the module, interface cable and test kit.
- VII. Logic Implementation List - Since a logic diagram is supplied in Section VI, the logic implementation list for the module is not included.
- VIII. Performance Demonstration Test - This section includes description of two software tests that check the operation of the two external interfaces of the module.
- Index The index provides an alphabetical listing of major concepts and phrases and their location within the manual.



In addition to this manual, the following manuals should be available to the user of the TTY/EIA module for reference and supplementary information:

<b>Title</b>	<b>Part Number</b>
<i>Model 960 Computer Communications Register Unit Manual</i>	966313-9701
<i>Model 960 Computer Assembly Language Programmer's Reference Manual</i>	942779-9701
<i>Model 960 Computer Terminal User's Guide Model 33 ASR Data Terminal</i>	942778-9701
<i>Model 960 Computer Terminal User's Guide Model 733 ASR/KSR Data Terminal</i>	942775-9701
<i>Model 960 Computer Terminal User's Guide Model 743 KSR Data Terminal</i>	947976-9701
<i>Model 960 Computer Terminal User's Guide Model 912 Video Display Terminal</i>	942776-9701
<i>Model 960 Computer Installation Procedure</i>	942767-9701
<i>Interface Between Data Terminal Equipment and Data Communication Equipment Employing Serial Binary Data Interchange (EIA-RS-232-C)</i>	—

In addition to these manuals, the user should also have access to the vendor-supplied manual(s) for the equipment interfaced to the TTY/EIA module.



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## SECTION I

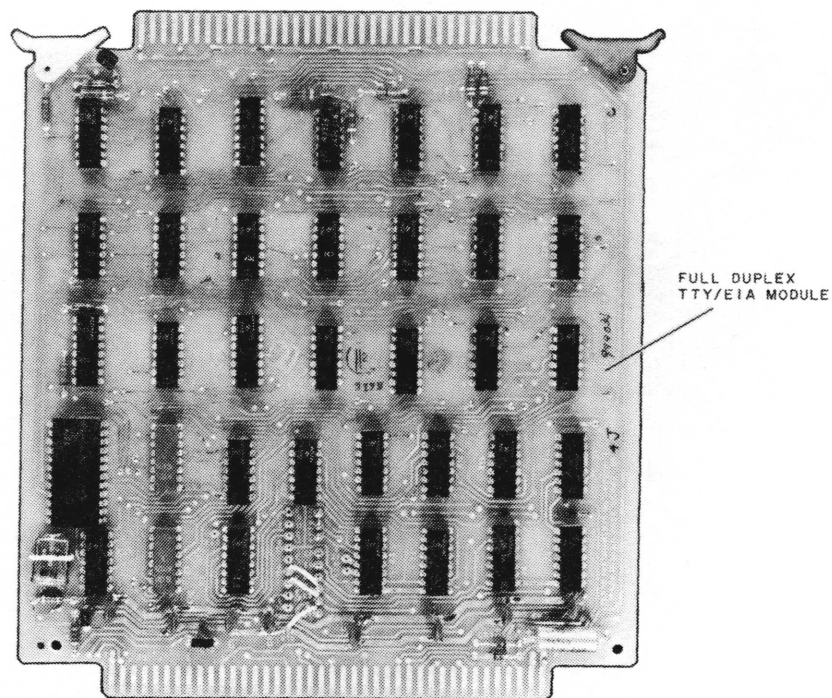
## DESCRIPTION AND INSTALLATION

## 1.1 GENERAL

The Full Duplex, Teletypewriter/Electronic Industries Association (TTY/EIA) Interface module (figure 1-1) provides a communication path for Texas Instruments Series 960 Computers to peripheral devices that operate through an interface that conforms to EIA Standard RS-232-C. The TTY/EIA module can be wired in 11 standard variations to account for transmit and receive rates ranging from 110 to 9600 baud, and code formats of 10 or 11 bits. The module may also be wired for TTY current loop interfaces. Typical devices that interface through this module include: data sets for telephone line data transmission, video display terminals, and teleprinter terminals. The module operates through the Communications Register Unit (CRU) of the Model 960 Computer.

## 1.2 EQUIPMENT OVERVIEW

Refer to figure 1-2 for a simplified diagram of the TTY/EIA module. The TTY/EIA module consists of transmit logic and receive logic, both of which can be exercised simultaneously to accommodate the full duplex mode of operation. Timing on the TTY/EIA module centers around



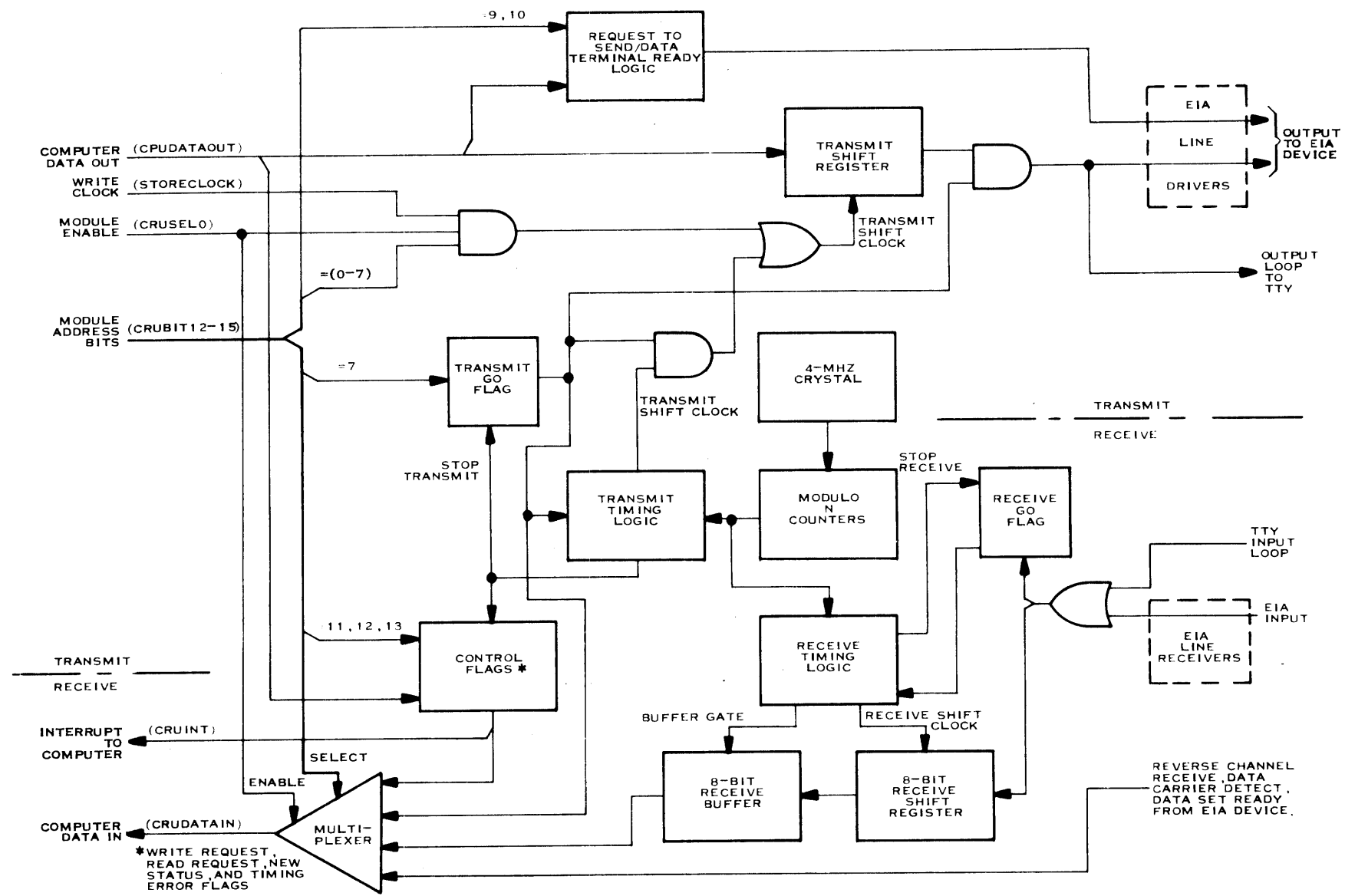
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Figure 1-1. Full Duplex TTY/EIA Module





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Figure 1-2. Simplified Full Duplex TTY/EIA Module Diagram

1-2

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operation of a 4-MHz oscillator and a group of counters that provide a variable divide network necessary for developing the desired transmit/receive frequency. Prior to transmission, the "Request to Send" and "Data Terminal Ready" flags are set by the I/O service routine to establish communications with an EIA type data terminal. The "Data Set Ready" line is then checked to ensure the data terminal is ready for communications.

**1.2.1 TRANSMIT MODE.** In the transmit mode, the computer transfers serial data into an output shift register with a write clock that is also supplied by the computer. Address bits and a module enable allow the shifting process to continue until an 8-bit character has been loaded in the shift register. When a full character has been received from the computer, both the "Transmit Go" flag and the ninth bit (start bit) of the shift register are set. Setting the "Transmit Go" flag enables development of a transmit shift clock whose frequency is determined by the oscillator/counter network. The transmit shift clock serially transfers the start bit, the 8-bit character, and either one or two stop bits to the attached data terminal. The "Write Request" flag is set to indicate that the character has been output to the data terminal and the TTY/EIA module is ready for another transmission cycle.

**1.2.2 RECEIVE MODE.** In the receive mode, the data terminal holds either the TTY or EIA input in a Marking condition (logic 1) until a Spacing condition (logic 0) indicates a new character is about to be input to the TTY/EIA module. The Spacing condition sets the "Receive Go" flag, which in turn enables the development of a receive shift clock whose frequency is determined by the oscillator/counter network. The receive shift clock gates the serial TTY/EIA input data into an 8-bit shift register until a full character has been received. The shift register character is transferred in parallel to a buffer register and applied to a multiplexer for reading by the computer. The "Read Request" flag is set to indicate that the buffer register holds a character. The computer then enters a service routine that supplies the necessary module enable and address bits to read the character.

**1.2.3 INTERRUPT RESPONSE.** An interrupt line from the TTY/EIA module informs the computer when the "Write Request" or "Read Request" flags are set, or when a transition occurs in the "Data Set Ready" or "Data Carrier Detect" signals from the data terminal. All four of these signals are applied to the multiplexer and can be read by the computer to determine the source of the interrupt. The computer instruction repertoire includes single (SETB and BBNE) and multiple (LDCR and STCR) bit instructions that can be used to control operation of the TTY/EIA module. The SETB instruction sets and clears the addressed control flip-flop; the BBNE instruction tests the addressed input status line. The LDCR instruction serially transfers an 8-bit character from memory to the module transmit shift register and the STCR instruction reads an 8-bit character from the module receive buffer into the computer memory, one bit at a time.

**1.2.4 CHARACTER FORMAT.** The TTY/EIA module transmits and receives 10 or 11 bit format code as illustrated in figure 1-3. Eight data bits are provided by either the computer program or the associated terminal. The terminal also supplies with its input data a Start bit and either one or two Stop bits; the terminal requires these Start and Stop bits in data output to it. Therefore, the TTY/EIA module removes these bits from input before transferring the data to the computer, and adds these bits to output data before transferring the data to the terminal. The Start and Stop bits synchronize the receiving circuitry with the remote transmitter with each character transmitted. Thus, characters may be transmitted in blocks or in random character patterns. Jumper wires on the TTY/EIA module determine whether the module generates and accepts 10 or 11 bit format code.

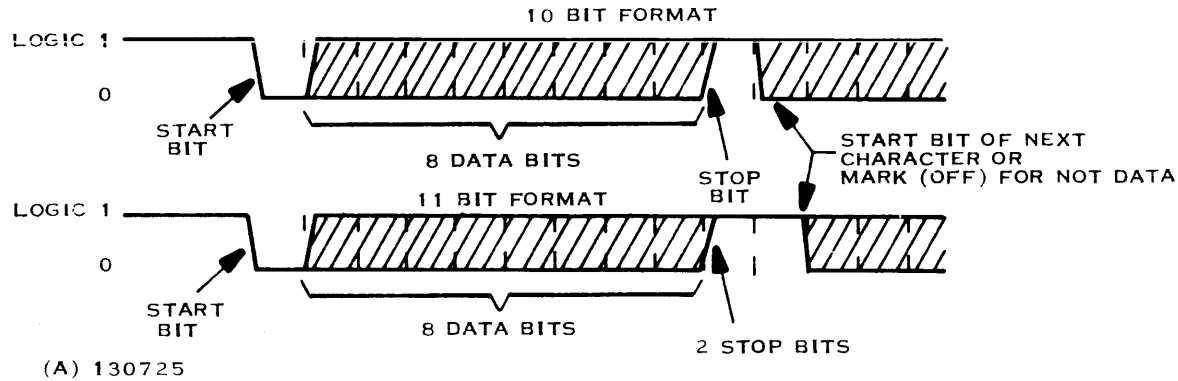


Figure 1-3. Asynchronous (START/STOP) Data Transmission Formats

### 1.3 PHYSICAL CHARACTERISTICS

The interface logic is implemented on a single-connector circuit board that plugs into any Communications Register Unit (CRU) connector location in the computer or CRU expansion chassis. The circuit board is a double-sided, printed wiring board that is 7.00 inches wide and 7.91 inches high. The single connector along the bottom edge is an 80-contact, printed conductor connector with the even-numbered contacts on the component side of the board. No provision is made to guarantee that the circuit board is inserted in the proper orientation. However, when inserted into the chassis, the colored ejector tab on the top edge of the card should be on the right side (viewed from the front) of the computer chassis; when inserted into an expansion chassis the colored tab should be on the top of the chassis. The connector along the top edge is a 72-contact, printed conductor connector that accepts a cable from the peripheral device.

### 1.4 ELECTRICAL CHARACTERISTICS

The Full Duplex TTY/EIA Module power requirements and interface logic levels are listed in table 1-1.

### 1.5 INSTALLATION

The TTY/EIA module may be installed in any CRU location. These locations are:

- Standard Internal Ports (computer chassis locations EF0, EF1, EF2 and EF3)
- Internal Expansion Ports (computer chassis locations EF4 through EFF)
- External Expansion Ports (expansion chassis locations)

Figure 1-4 illustrates the connections required to operate the module in any of these locations. Table 1-2 lists the part numbers for interface cables that may be required. The following paragraphs explain restrictions that must be allowed for when installing the module, plus a detailed procedure to perform the installation.

**1.5.1 LOCATION.** The location of the module within the computer chassis or within an expansion chassis determines the CRU base address that the module recognizes. Therefore, before selecting a chassis location for the module, determine the address that the software handling routine expects the module to recognize. This address varies with specific applications.



Table 1-1. Full Duplex TTY/EIA Module Electrical Characteristics

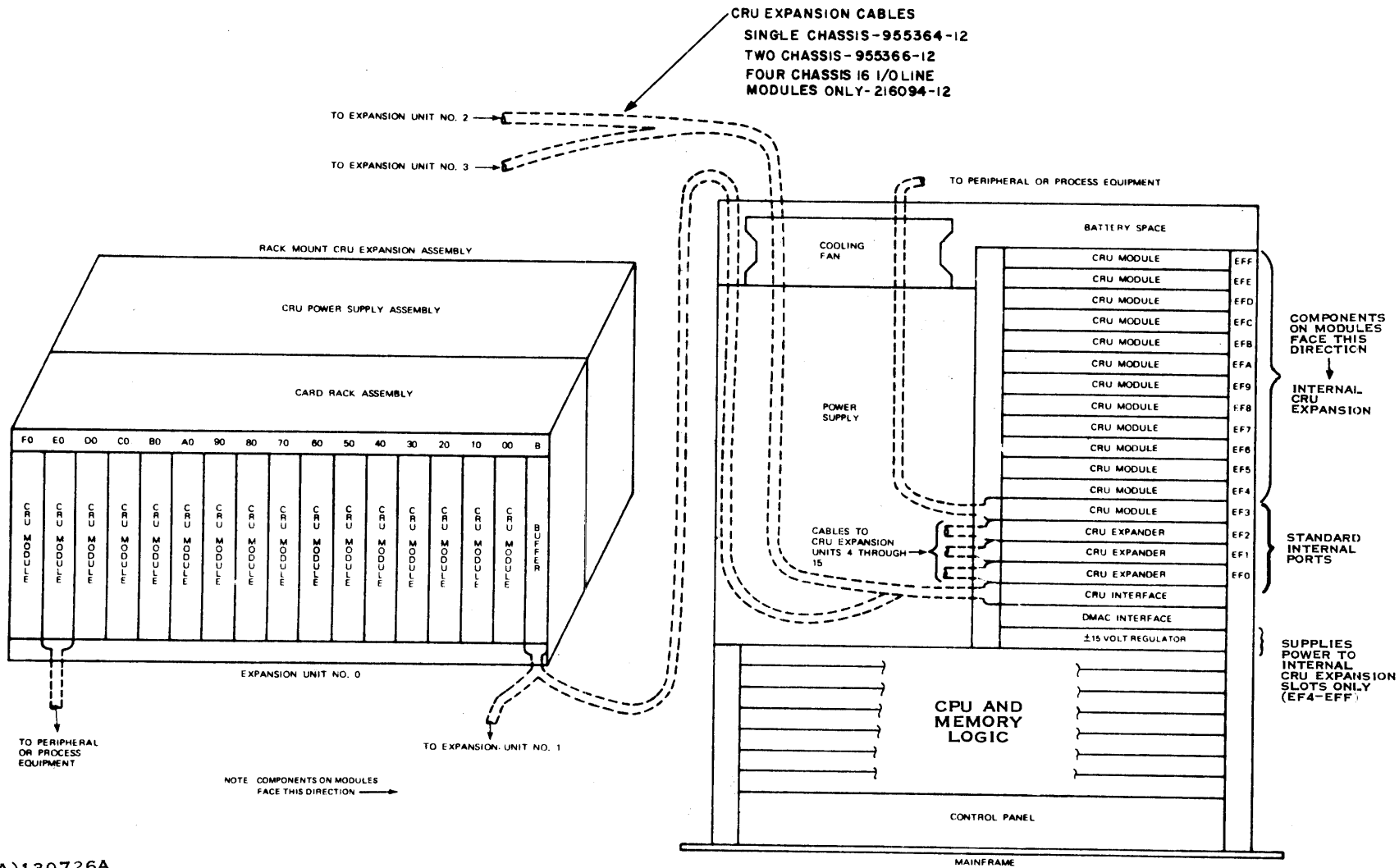
Specification	Requirement
Peripheral Inputs	(EIA Data) -3V to -25V = Logic 1 (Marking) 3V to 25V = Logic 0 (Spacing)
	(EIA Control) 3V to 25V = Logic 1 (on) -3V to -25V = Logic 0 (off)
	(TTY) Short Circuit = Logic 1 Open Circuit = Logic 0
Module Outputs	(EIA Data) -5V to -11V = Logic 1 5V to 11V = Logic 0
	(EIA Control) 5V to 11V = Logic 1 -5V to -11V = Logic 0
	(TTY) 20ma Current Loop = Logic 1 Open Circuit = Logic 0
Power (from computer or expansion chassis)	+5 Vdc at .88A
Transmission Rates Available	EIA Interface { $\pm 15$ Vdc at +5 40ma -5 20ma
10-bit Format	150, 300, 600, 1200, 2400, 4800 and 9600 baud
11-bit Format	110 and 1760 baud
Reverse Channel Option	1200 and 1760 baud

**1.5.2 EIA VOLTAGES.** If the module is to operate as an EIA interface, the chassis location must supply the module with  $\pm 15$  volts dc. The four standard CRU chassis locations (EF0 through EF3) are permanently wired to supply this voltage. If the module is installed in one of the internal expansion locations, a  $\pm 15$  volt dc Regulator module (TI Part Number 226855-0001) must also be installed in the computer chassis to supply the required voltage. If the module is installed in an expansion chassis, the chassis power supply must furnish the  $\pm 15$  volts dc. Expansion chassis 966556-0002 must, therefore, be used for EIA applications of the module.

**1.5.3 JUMPER WIRE CONFIGURATION.** A set of soldered jumper wires in the bottom center of the circuit board determine the operating baud rate and the code format for the module. Table 1-3 lists the available combinations of baud rate and code format, together with the jumper wire configuration for each combination. Before installing any TTY/EIA module, examine the jumper configuration on the circuit board and compare it with the table to ensure that the module corresponds to the desired baud rate and format. The selected baud rate must agree with the baud rate of the peripheral device connected to the module, and must not exceed the operating frequency of any modem connected between the module and the peripheral device.



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Figure 1-4. CRU Mechanical Configurations

**Table 1-2. TTY/EIA Module Interface Cables**

<b>Device Connected to</b>	<b>Cable Part Number</b>
Standard EIA Data Set (type 103 or 202)	240810-30
33 ASR Model 5JE Teleprinter	240811-30
733 ASR/KSR Data Terminal	943765-0001
743 KSR Data Terminal	943819-0001
912 Video Display Terminal	966627-30
733 KSR Current Loop Teleprinter	966658-30

**1.5.4 INSTALLATION PROCEDURE.** After defining a location for the module, checking the jumper wire configuration and ensuring that required voltages are available for the module, perform the following steps to install the module in the desired location:

1. Set the ON/OFF (Power) switch on the power supply to the OFF position.
2. Plug the module into the selected chassis location with the component side of the board facing the front of the computer chassis or facing the buffer board in an expansion chassis.

#### **NOTE**

Custom cables may be assembled for non-standard peripheral devices by ordering cable connector and cover, Part Number 217081-0001, for cables 3/8 inch or less, or connector and cover, Part Number 217081-0002, for cables 1/2 inch or less. These connectors mate with the 72-pin edge connector on the outside edge of the module.

3. Connect the cable connector to the plated conductor connector on the outside edge of the module. Ensure that the cable dresses toward the center of the computer or downward in an expansion chassis.
4. Connect the other end of the interface cable to the desired peripheral device.
5. Set the ON/OFF (Power) switch on the power supply to the ON position.
6. Perform the Performance Demonstration Test (PDT) for the TTY/EIA module as described in Section VIII of this manual.



Table 1-3. TTY/EIA Module Jumper Configurations

Description (Baud Rate, Code Format)	Module Part Number	Baud Rate Jumpers		Receive/Transmit Code Jumpers		Receive Disable Jumper
110 (11-Bit Code)	961642-0005	E8 to E12	E5 to E14	E16 to E17	E15 to E4	E1 to E19
150 (10-Bit Code)	0002	E11	E6	E2	E3	E19
300 (10-Bit Code)	0001	E10	E6	E2	E3	E19
600 (10-Bit Code)	0009	E20	E6	E2	E3	E19
1200 (10-Bit Code)	0003	E9	E6	E2	E3	E19
1200 202 Data Set w/Reverse Channel	0007	E9	E6	E2	E3	E18
1760 202 Data Set w/Reverse Channel	0008	E13	E14	E17	E4	E18
1760 (11-Bit Code)	0006	E13	E14	E17	E4	E19
2400 (10-Bit Code)	0004	E7	E6	E2	E3	E19
4800 (10-Bit Code)	0010	E21	E6	E2	E3	E19
9600 (10-Bit Code)	961642-0011	E8 to E22	E5 to E6	E16 to E2	E15 to E3	E1 to E19



## SECTION II

## OPERATING INSTRUCTIONS

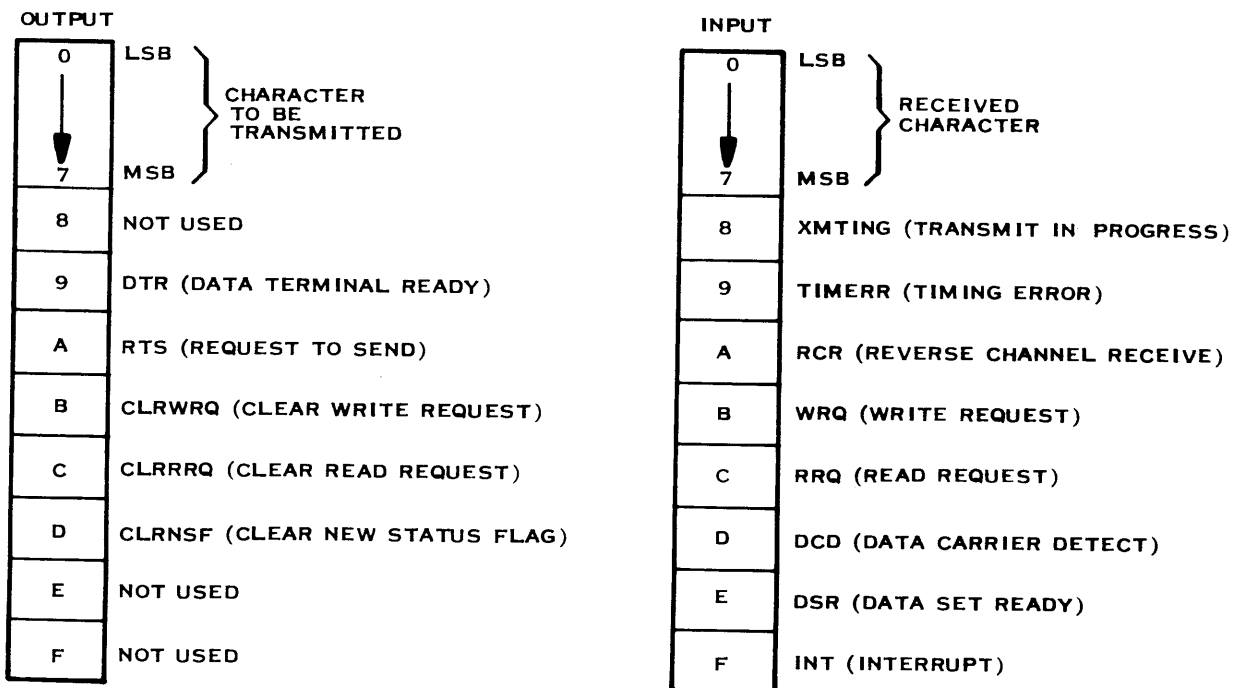
## 2.1 GENERAL

Operation of the Full Duplex TTY/EIA Module consists entirely of the programming required to perform the necessary interface functions with the attached data terminal. The service routines implemented to handle this type of interface use the SETB, BBNE, XBNE, TSBX, LDCR, and STCR instructions of the computer instruction repertoire. All of these instructions require the use of an effective CRU address that addresses bit zero of the TTY/EIA module under consideration. Due to the fact that the TTY/EIA module can be plugged into any of the available CRU chassis locations and the locations are wired for pre-established addresses, the base address becomes a variable that depends on the hardware configuration.

The only consideration other than programming that affects TTY/EIA module operation, is the selection of the proper module configuration to match the transfer/receive rate and code format of the attached data terminal. Refer to Section I of this manual for the details of the various module configurations.

## 2.2 PROGRAMMING

The interface between the computer and the TTY/EIA module consists of 16 addressable I/O bits. The output bits can be divided into two groups of eight, as shown in figure 2-1. The first eight bits make up the character to be sent to the data terminal and the last eight bits are



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Figure 2-1. Full Duplex TTY/EIA Module Addressable Input/Output Lines





partially used for control purposes. The first eight bits of input make up the character being received from the data terminal and the last eight bits provide the computer with status data. Tables 2-1 and 2-2 describe the output command bits and input status bits, respectively.

The I/O routines written to handle communications with the data terminals attached to the TTY/EIA module vary with each device type. This is due to the difference in the controls accepted and status returned by the data terminals. Generally, the I/O routine must first establish communications with the data terminal and then proceed to read/write data on a character-by-character basis. At the same time, the routine must be watching for irregular status indicators and be capable of handling interrupts.

**2.2.1 INTERRUPTS.** An interrupt is a signal that informs the computer that the module requires attention. The interrupt line for the TTY/EIA module is input bit  $F_{16}$ . This bit sets whenever one of three conditions occurs:

- Write Request (input bit  $B_{16}$ ) - When the module has completed transmission of a character and requires a new character from the computer, it sets input bit B and generates an interrupt on input bit F. This interrupt is reset by a CPU output to bit B (Clear Write Request).
- Read Request (input bit  $C_{16}$ ) - One half bit time after the module receives an input character and loads it into the Receive Buffer, it sets input bit C and generates an interrupt on input bit F. This interrupt is reset by a CPU output to bit C (Clear Read Request).
- New Status Flag - Whenever a state transition occurs in either Data Carrier Detect (input bit D) or Data Set Ready (input bit E), the module generates an interrupt on input bit F. Table 2-3 lists the status changes that set the New Status Flag. This interrupt is reset by a CPU output to bit D (Clear New Status Flag).

**Table 2-1. Full Duplex TTY/EIA Module Output Command Lines**

Signal	Description
Data Terminal Ready	Enables data terminal operation (not used with teletypewriters).
Request to Send	Places data terminal in transmit mode (not used with teletypewriters).
Clear Write Request	Clears Write Request flag on module to prepare for another character write (transmit).
Clear Read Request	Clears Read Request flag on module to prepare for another character read (receive).
Clear New Status Flag	Clears New Status flag on module to enable new interrupts.

**Table 2-2. Full Duplex TTY/EIA Module Input Status Lines**

<b>Signal</b>	<b>Description</b>
Transmit In-Progress	Module is currently transmitting to a data terminal.
Timing Error	Indicates data in receive buffer may be in error because two or more characters have been loaded in the buffer and no read operation has been performed by the computer.
Reverse Channel Receive	Indicates reverse channel receive status of 202 type dataset (not used by teletypewriter).
Write Request	Write Request flag set to indicate a character has been sent to the data terminal.
Read Request	Read Request flag set to indicate a character has been received from the data terminal and is ready to be read by the computer.
Data Carrier Detect	Indicates carrier is detected at the data terminal (not used by teletypewriter).
Data Set Ready	Indicates data terminal is ready to communicate (not used by teletypewriter).
Interrupt	Module interrupt set when the Write or Read Request flags are set or when a transition occurs in the Data Set Ready or Data Carrier Detect signals.

These interrupts cannot be masked on the module; however, the CPU can ignore them by masking CRU interrupts in the CPU Status Register. If interrupts are not masked, a CRU interrupt causes the CPU to branch to memory location 94<sub>16</sub>. This location normally contains a Store Status and Branch (SSB) instruction. This instruction saves the contents of the CPU Program Counter (PC) or Event Counter (EC) and stores the CPU status that existed before the interrupt occurred.

When an interrupt occurs, the servicing program determines which module generated the interrupt by interrogating bit F<sub>16</sub> (Interrupt) of all modules corresponding to the interrupt level until it finds an active interrupt bit. The program then examines input bits B (Write Request), C (Read Request), D (Data Carrier Detect) and E (Data Set Ready) of that module to determine the condition that caused the interrupt. It then branches to a sub-routine that services that condition. That sub-routine must clear the interrupt condition by generating an output (either a 1 or a 0) to the applicable address bit before enabling CRU interrupts in the CPU Status Register.



Table 2-3. Status Transitions Affecting New Status Flag

CRU Output Bit D	CRU Input Bits (EIA Status)		New Status Flag
	E (DSR)	D (DCD)	
0	0 to 1	0	1
0	1	1 to 0	1
0	X	0 to 1	1
0	1 to 0	X	1
pulse	X	X	0

X = Either 1 or 0

## 2.2.2 TIMING CONSIDERATIONS

### NOTE

The time interval between characters for a particular format and baud rate is given by the number of bits per character (including Start and Stop bits) divided by the baud rate. The reciprocal of this character time is the character rate.

When data is being transferred to the CPU, a timing error can occur if the program does not store a received character into memory before a new character is received. When such an overrun occurs, CRU input bit 9 (TIMERR) from the TTY/EIA module sets to flag the condition. This bit clears automatically when the Read Request interrupt is reset.

### NOTE

The interval between bits (bit time) is the reciprocal of the baud rate.

Timing is not critical when data is being transferred from the CPU. However, efficient use of the communication line requires that the next character to be transmitted be presented to the interface within one bit time following the Write Request interrupt.

**2.2.3 OUTPUT OPERATION.** A character is output from the computer to the module using an 8-bit Load CR (LDCR) instruction of the form:

LDCR (0,8),CHAR

This instruction results in an 8-bit transfer from memory location CHAR to the current CRU base address starting with bit 0 and incremented through bit 7. Figure 2-2 illustrates this transfer. Initiating this sequence starts data transmission from the TTY/EIA module when the entire 8-bit character is present in the module. The data is sent serially on the communication line.

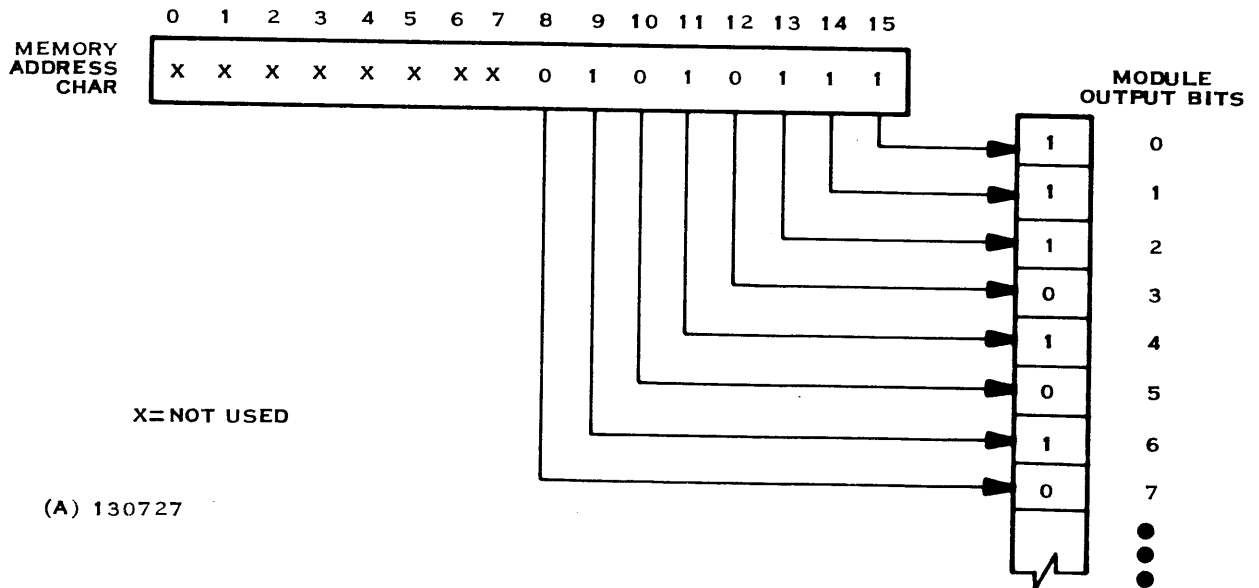


Figure 2-2. Output Character Transfer

During the transfer operation, CRU bit 8 (Transmit in Progress) remains true; it resets when the character has been completely transmitted and Write Request (bit B) has been set. A new character output to the module must not be started until Transmit in Progress drops and Write Request sets. Outputs to clear interrupt flags (Output bits B, C and D) do not transmit data; the addressed interrupt bits reset independent of the output data lines.

**2.2.4 INPUT OPERATION.** A character is input to the computer from the module using an 8-bit Store CR (STCR) instruction of the form:

STCR (0,8),CHAR

This instruction results in an 8-bit transfer from the current CRU base address (bits 0 through 7) to memory location CHAR. When the data is stored in memory, the most significant bit of the transfer is extended as a sign bit. Figure 2-3 illustrates this transfer. The Store CR operation usually occurs after the module has notified the program that data is ready for transfer by setting the Read Request (bit C) and the Interrupt (bit F). The program must then transfer the data and reset the interrupt before the next character arrives from the input device and is transferred into the module buffer register. Failure to respond within this time constraint results in a data overrun error, and sets the Timing Error input bit (bit 9).

**2.2.5 ERROR DETECTION.** All data error detection, except data overrun conditions, is the responsibility of the data handling program. If one of the eight bits from the module represents a parity bit, the program must check the input data character against that bit. Similarly, if the device connected to the TTY/EIA module requires a parity bit, the program must generate that bit. Cyclical redundancy characters to maintain the integrity of a data stream, if used, must also be generated and checked by the program. Module input bit 9 (Timing Error) indicates a data overrun condition.

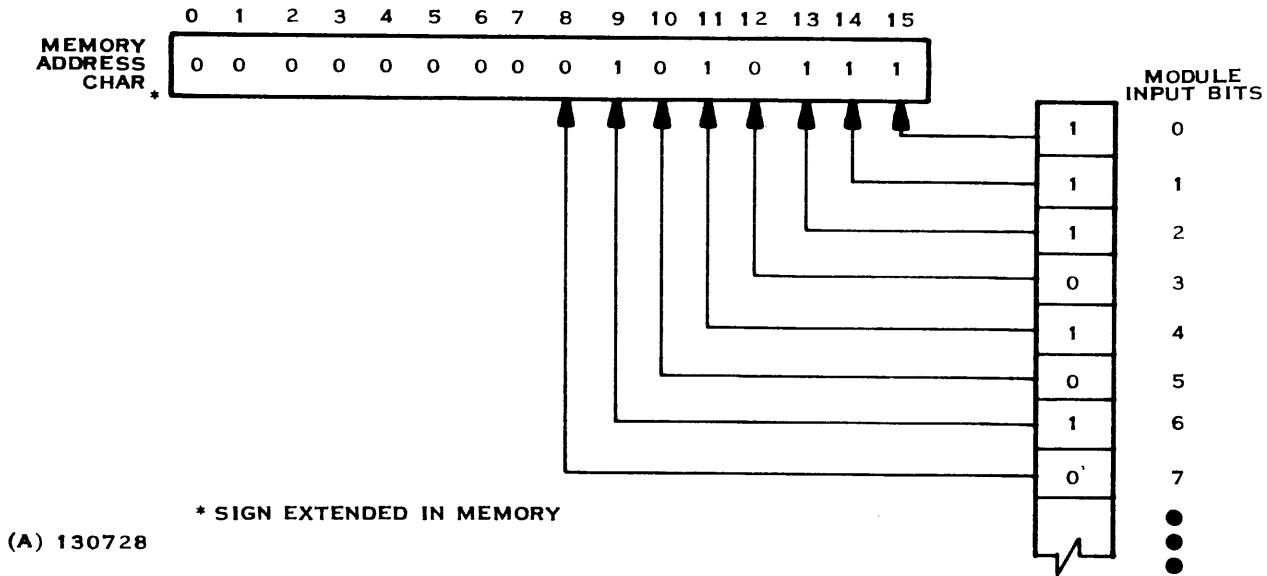


Figure 2-3. Input Character Transfer

2.2.6 SAMPLE PROGRAM SEQUENCES. This paragraph contains sample program sequences to illustrate the fundamental mechanics required for input and output operations. These examples assume that the CRU interrupt is masked in the CPU Status Register and that the Procedure and CRU Base Address Registers have been previously established. Actual routines are more efficient by controlling these low speed input/output operations with interrupts.

2.2.6.1 Echo Character. Figure 2-4 illustrates an instruction sequence that reads any character that is typed on the keyboard of a 33 ASR teleprinter or a Texas Instruments Silent 700® series teleprinter and echoes that character to the printer of that device. This sequence runs in supervisor mode.

2.2.6.2 Output Character String. Figure 2-5 illustrates an instruction sequence that outputs a character string to the TTY/EIA module.

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0001 0000          DBASE DSEG          DATA SEGMENT
0002 0000 0F00    CRUADR DATA X'0F00'  CRU ADDRESS OF TTY/EIA MODULE
0003 0001 0000    CTEMP DATA 0        CHARACTER TEMP
0004 0002          END
0005 0002          PBASE PSEG          PROCEDURE SEGMENT
0006 0002 7C000004 ENTRY LDS 3+2        MASK INTERRUPTS
0007 0004 0000    DATA 3+2
0008 0005 0100    DATA X'0101'
0009 0006 44040000 LA 4,0BASE          SET BASE REGISTERS
0010 0008 44050002 LA 5,PBASE
0011 000A 44070000 L 7,CRUADR
0012 000C 74030010 BL 3,INPUT
0013 000E 7002000C H 3-2
0014
0015 0010          INPUT EQU 3          KEYBOARD INPUT HANDLER
0016
0017
0018
0019
0020
0021
0022
0023
0024
0025
0026
0027
0028 0010 34090000 SETB 9,1          SET DTR = KSR/ASR 733/743 REQUIRED
0029 0012 340A0000 SETB 10,1         SET RTS = KSR/ASR 733/743 REQUIRED
0030 0014 000B3000 LDCR (11,3),0     CLEAR WRQ,RRQ, AND NSP
0031 0016 300C0014 BBNE 12,1,3       WAIT FOR READ REQUEST FROM KEYBOARD
0032 0018 2C0D0001 STCR (0,0),CTEMP  READ CHARACTER AND STORE AT CTEMP
0033 001A 080E0001 LDCR (0,0),CTEMP  ECHO CHARACTER TO PRINTER
0034 001C 300F001A BBNE 11,1,3       WAIT FOR WRQ GENERATED BY ECHO
0035 001E 000B3000 LDCR (11,3),0     CLEAR WRQ,RRQ, AND NSP
0036 0020 72020002 B 2,3            RETURN TO CALLING PROGRAM
0037 0022          END ENTRY+2

```

0000 ERRORS : LENGTH = 0022

Figure 2-4. Echo Character Sample Routine



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```

0001 0000          DBASE DSEG          DATA SEGMENT
0002 0000 0F00    CRUADR DATA X'0F00'  CRU ADDRESS OF TTY/EIA MODULE
0003 0001 0000    CTMP  DATA 0        CHARACTER TEMP
0004 0002 0000    MSGPTR DATA 0        MESSAGE POINTER
0005 0003 4040    MSG01 DATA C'HI'    MESSAGE 1
0006 0002        CC01  EQU 3-MSG01+2   MESSAGE 1 CHARACTER COUNT
0007 0004        END

0008 0004          PBASE PSEG          PROCEDURE SEGMENT
0009 0004 7C000006 ENTRY  LDS 3+2      MASK INTERRUPTS
0010 0006 0000    DATA 3+2
0011 0007 0100    DATA X'0100'
0012 0008 44040000 LA 4,0BASE      SET BASE REGISTERS
0013 000A 44050004 LA 5,PHASE
0014 000C 44070000 L 7,CRUADR
0015 000E 74030014 BL 3,PRINT     PRINT MESSAGE 1
0016 0010 0003    DATA MSG01
0017 0011 0002    DATA CC01
0018 0012 70020012 B 3          HALT
0019
0020 0014          PRINT EQU 3        PRINT CHARACTER STRING
0021
0022 * *
0023 * * ON ENTRY: REGISTER 3 = RETURN LINK
0024 * * REGISTER 4 = DSEG ADDRESS (DATA BASE)
0025 * * REGISTER 5 = PSEG ADDRESS (PROCEDURE BASE)
0026 * * REGISTER 7 = CRU ADDRESS OF TTY/EIA MODULE
0027 * * MSGPTR & CTMP = 2 WORDS OF MEMORY IN THE DSEG
0028 * * CALLING SEQUENCE:
0029 * * BL 3,PRINT PRINT MESSAGE XX
0030 * * DATA MSGXX MESSAGE ADDRESS
0031 * * DATA CCXX MESSAGE CHARACTER COUNT
0032
0032 0014 34000000 SETB 0,1      SET DTR (KSR/ASR 733/743 REQUIRED)
0033 0016 340A0000 SETB 10,1     SET RTS (KSR/ASR 733/743 REQUIRED)
0034 0018 00003000 LOCR (11,3),0  CLEAR WRQ,RRQ, AND NSP
0035 001A 46310003 L 1,3,3      PUT CHARACTER COUNT IN REGISTER 1
0036 001C 14027002 MOV (2,3),MSGPTR PUT MESSAGE ADDRESS IN LOC MSGPTR
0037 001E 45000022 P1 L 0,+MSGPTR  GET TWO CHARACTERS FROM MESSAGE
0038 0020 40000001 ST 0,CTMP    STORE AT CHARACTER TEMP
0039 0022 20020001 AMI MSGPTR,1 INCREMENT MESSAGE POINTER
0040 0024 4400FFFE LA 0,-2     SET REG 0 TO LOOP FOR 2 CHARACTERS
0041 0026 00000001 P2 MRR 0,CTMP  POSITION CHARACTER TO BE TRANSMIT
0042 0028 00000001 LOCR (0,0),CTMP SEND CHARACTER TO PRINTER
0043 002A 30000026 BBNE 11,1,3  WAIT FOR WRQ FROM INTERFACE MODULE
0044 002C 34000000 SETB 11,0   CLEAR WRITE REQUEST
0045 002E 44021ED6 LA 2,7894   DELAY 25 MSEC MORE FOR MECH PRINTER
0046 0030 0C2F0030 ARB -1,3,2  (KSR/ASR 733/743 REQUIRED)
0047 0032 50010001 SA 1,1     DECREMENT CHARACTER COUNT
0048 0034 E2000004 BC 11,4,3  RETURN TO CALLING PROGRAM IF DONE
0049 0036 0C010026 ARB 1,P2,0  ELSE SEND NEXT CHARACTER FROM CTMP
0050 0038 7002001E R P1       OR GET NEXT TWO CHARS OF STRING
0051 003A        END ENTRY+2

```

0000 ERRORS : LENGTH = 003A

Figure 2-5. Output Character String Sample Routine



**SECTION III**  
**UNIT SPECIFICATION**

Specifications for peripheral devices interfaced with the TTY/EIA module are described in the device user manuals referenced in the Preface to this manual.





## SECTION IV

### INTERFACE AND MODULE SPECIFICATIONS

#### 4.1 GENERAL

This section describes the theory of operation for the TTY/EIA module, and defines the hardware and software interfaces required to use the module within a 960 computer system. Section I of this manual contains a general description of the module. It should be read before this section to familiarize the reader with basic module operation. The detailed description in this section is accompanied by block diagrams that provide a strong link to the engineering logic diagrams contained in Section VI of this manual.

#### 4.2 HARDWARE INTERFACES

The module interfaces with the Communications Register Unit of the computer and with either a current loop terminal or a device operating with an EIA Standard RS-232-C interface. Figure 4-1 illustrates the signals involved in each of these interfaces. Tables 4-1 and 4-2 define the signals in these interfaces. Refer to the *Model 960 Computer Communications Register Unit Manual* for a complete description of that interface. The following paragraphs describe the operation of the two peripheral device interfaces implemented on the TTY/EIA module.

**4.2.1 CURRENT LOOP INTERFACE.** The current loop interface operates with a Model 33 ASR Teletypewriter, with a Texas Instruments Model 730, Model 733, or Model 743 Data Terminal or with equivalent equipment using a current loop interface. Figure 4-2 illustrates the transmit and receive circuits that implement this interface on the TTY/EIA module. To use this interface, the cable to the external equipment must make the following jumper connections between module pins:

- TTYRCVOUT-(P2-34) to TTYRCVIN- (P2-22)
- EIARCVIN (P2-21) to +5 vdc (P2-20)

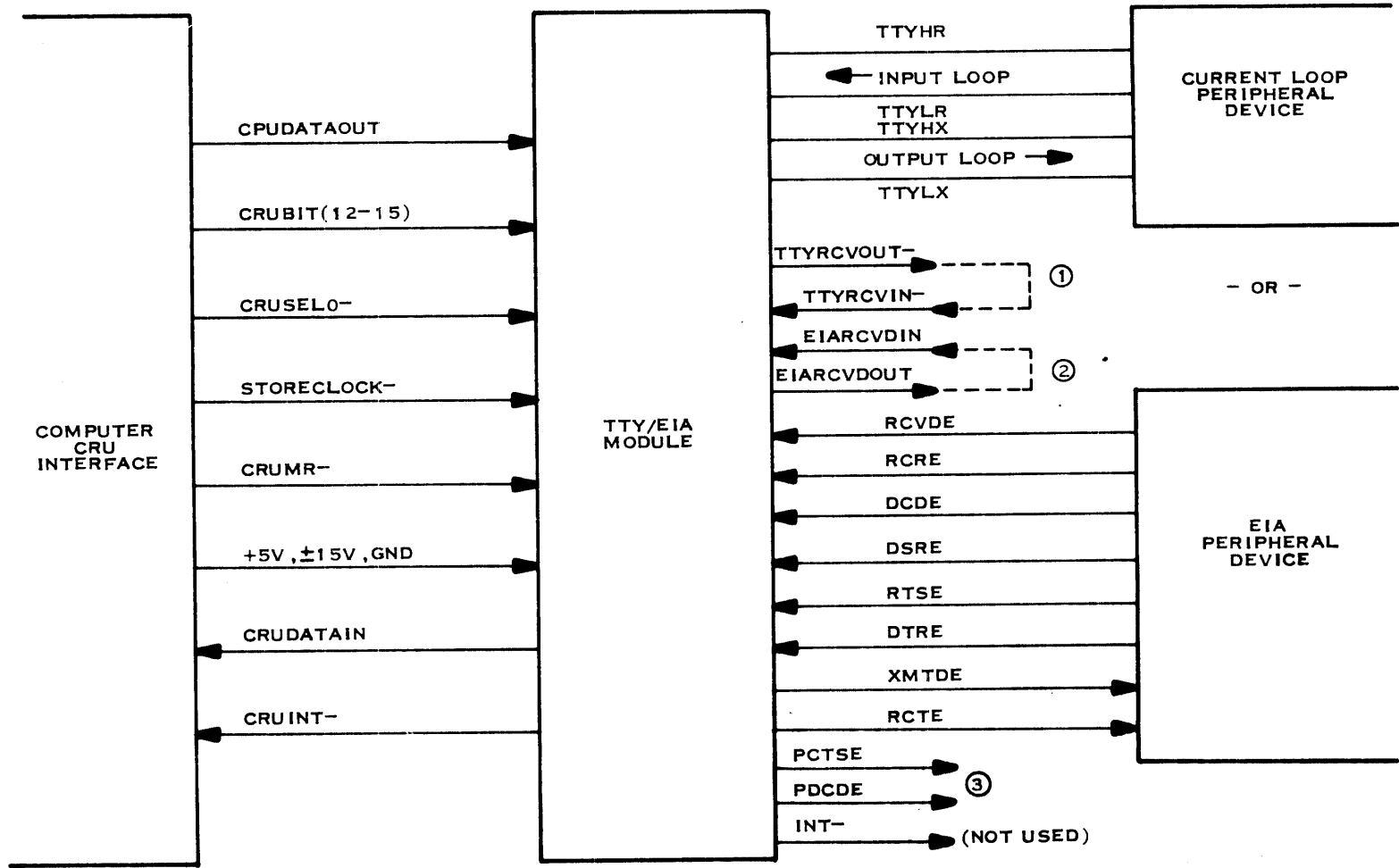
The transmitter wire pair (TTYHX and TTYLX) drives a constant current relay with approximately 20 milliamps of current. The receiver wire pair (TTYHR and TTYLR) is usually switched by a dry contact relay or an optically isolated switch in the external device.

**4.2.2 EIA INTERFACE.** The EIA interface operates with Texas Instruments Model 720, Model 733, Model 743, and Model 912 data terminals, with modems such as Bell Models 103 and 202 data sets, or with equivalent equipment conforming to EIA Standard RS-232-C. Figure 4-3 illustrates the transmit and receive circuits of the EIA interface. To use this interface the cable to the external equipment must make the following jumper connections between module pins:

- EIARCVDOUT (P2-1) to EIARCVDIN (P2-21)
- TTYRCVIN- (P2-22) to Ground (P2-36)



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- NOTES:
- ① EXTERNAL CONNECTION FOR CURRENT LOOP OPERATION
  - ② EXTERNAL CONNECTION FOR EIA OPERATION
  - ③ PULLUP VOLTAGE CONNECTIONS,
  - ④ MODULE CAN BE USED IN ONLY ONE MODE (EIA OR CURRENT LOOP) AT A TIME

(A)130731

Figure 4-1. TTY/EIA Interface Signals



Table 4-1. TTY/EIA Module - Computer Interface Signal Pin Assignments

	Signal	Description	TTY/EIA Module Pins (P1)
Computer Outputs	CPUDATAOUT	Serial Data	16
	CRUBIT12	CRU Bit Address Select Lines	42
	CRUBIT13		40
	CRUBIT14		38
	CRUBIT15		34
	CRUMR-	Master Reset	76
	CRUSELO-	Module Select (Lines 0-15)	48
	STORECLOCK-	Write Clock	22
	+5V	VCC	77, 78
	+15V	EIA Voltage	53, 54
	-15V	EIA Voltage	55,56
	GND	Logic Ground	1, 2, 79, 80
GND	±15 Volt Return	57, 58	
Computer Inputs	CRUDATAIN	Serial Data	60
	CRUINT-	CRU Interrupt	66

In addition if the equipment is not a data set, the following jumper connections must be installed:

- PCTSE (P2-5) to DSRE (P2-31)
- PDCDE (P2-6) to DCDE (P2-30)

These jumper connections are installed in cables ordered from Texas Instruments for interfacing the module with specified equipment. The following paragraphs describe the input and output signals of the EIA interface. Refer to the module characteristics in Section I of this manual for electrical specifications for the interface.



Table 4-2. TTY/EIA Module - Data Terminal Interface Signal Pin Assignments

	Signal Mnemonic	Pin No.	Description
Data	TTYHR	33	20 ma receive source
	TTYLR	35	20 ma receive return
	TTYHX	23	20 ma transmit source
	TTYLX	16	20 ma transmit return
	TTYRCVOUT-	34	TTL output of 20 ma receiver
	TTYRCVIN-	22	Jumper to TTYRCVOUT- for 20 ma operation or Jumper to GROUND for EIA operation
	EIARCVDOUT	$\bar{L}$	TTL output of EIA receiver
	EIARCVDIN	21	Jumper to EIARCVDOUT for EIA operation or Jumper to +5V for 20 ma operation
	RCVDE	29	Received Data - EIA level input
	XMTDE	27	Transmitted Data - EIA level output
Control	RCRE	32	Reverse Channel Receive - EIA level input
	RCTE	26	Reverse Channel Transmit - EIA level output
	DCDE	30	Data Carrier Detect - EIA level input
	DSRE	31	Data Set Ready - EIA level input
	RTSE	28	Request to Send - EIA level output
	DTRE	25	Data Terminal Ready - EIA output
	PCTSE	5	Pseudo Clear to Send (Pull up) Jumper to DSRE when not connected to data set
	PDCDE	6	Pseudo Data Carrier Detect (Pull up) Jumper to DCDE when not connected to data set



Table 4-2. TTY/EIA Module - Data Terminal Interface Signal Pin Assignments (Continued)

	Signal Mnemonic	Pin No.	Description
Control (Continued)	INT-	24	CPU Interrupt - TTL level output
Power & GND	+5V	20	CPU Logic Voltage (VCC)
	GROUND	A,Z,B,R, 1,36	Digital Ground

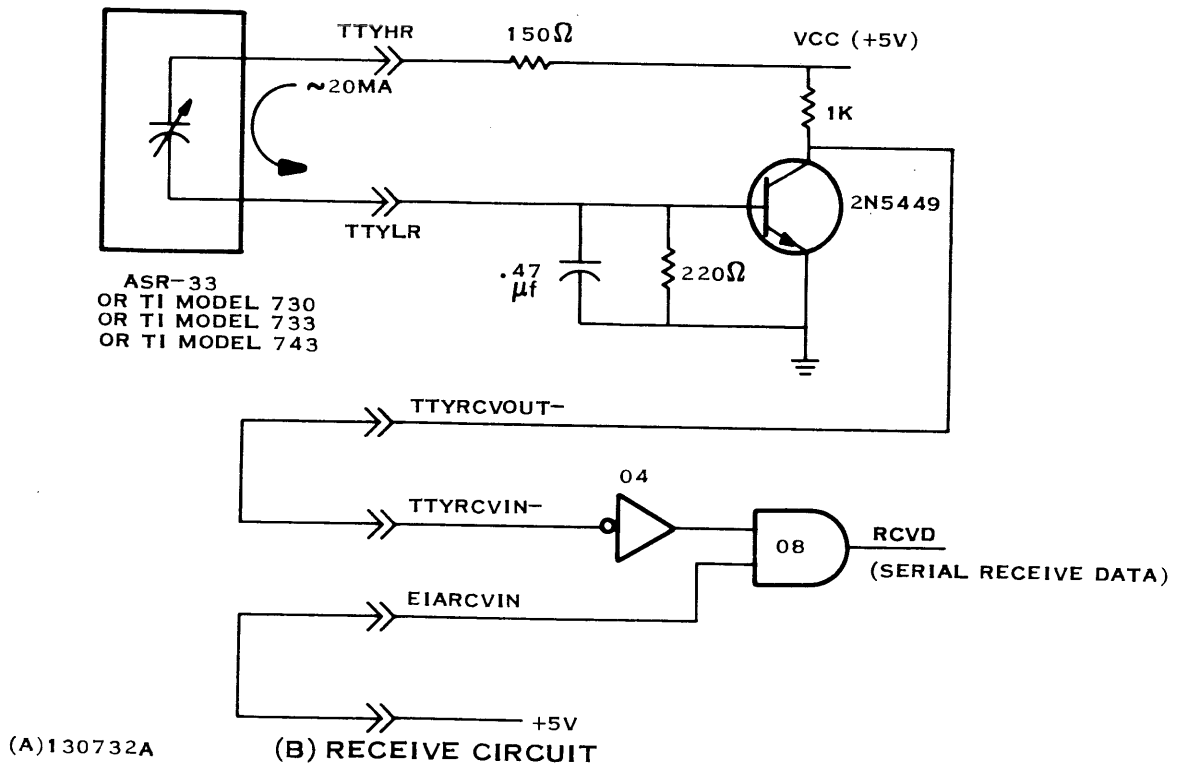
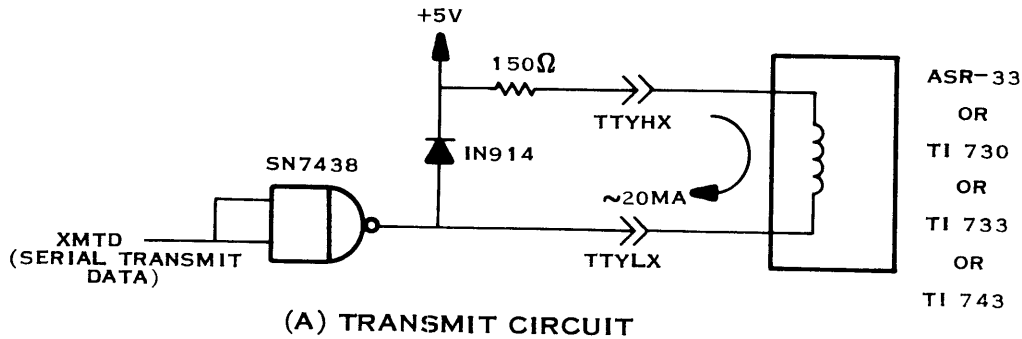
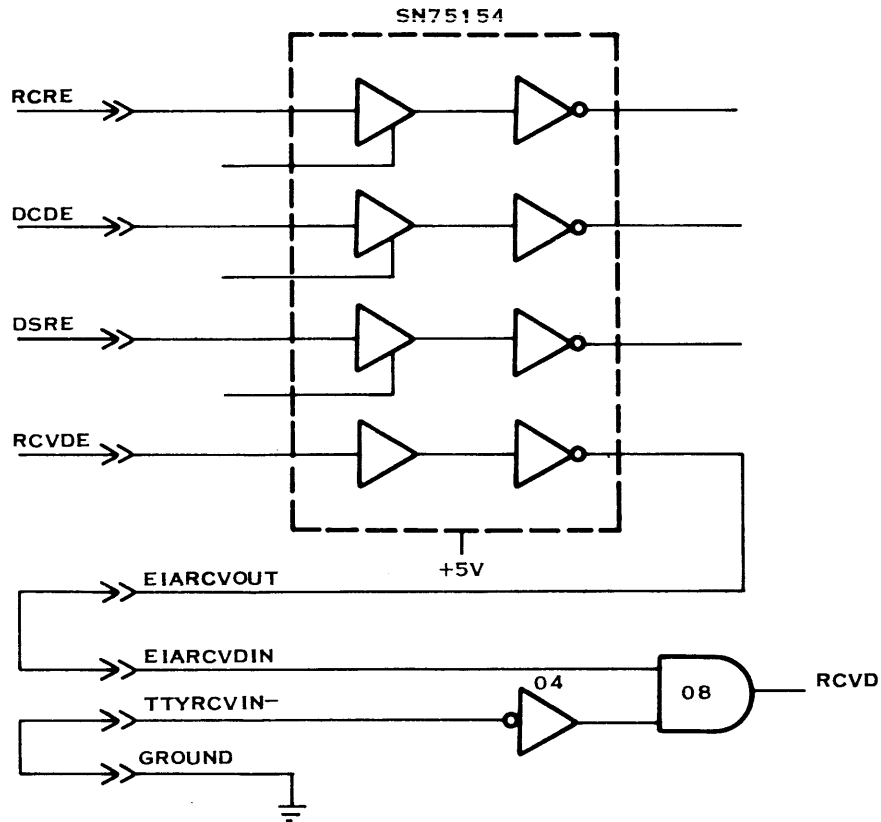
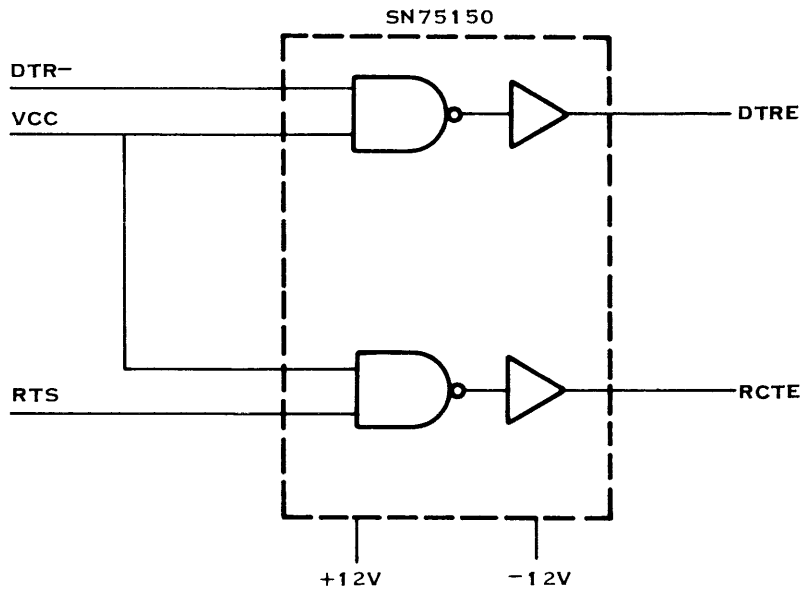


Figure 4-2. Current Loop Interface Circuits



(A) QUAD EIA RECEIVER  
RECEIVE SECTION JUMPED FOR EIA OPERATION



(B) DUAL EIA TRANSMITTER

(A)130733

Figure 4-3. EIA Interface Receiver/Transmitter Circuits



**4.2.2.1 Received Data (RCVDE).** This signal from the external device represents serial data. The external device must hold this signal in the binary 1 condition (Marking) when data is not being transferred.

**4.2.2.2 Transmitted Data (XMTDE).** This signal from the module represents serial data. This line is held in the binary 1 condition (Marking) when not transmitting.

**4.2.2.3 Reverse Channel Receive (RCRE).** This signal provides a secondary input control line from the external device. It may be used to acknowledge accurate transmission, or to interrupt the data flow in the primary channel. This signal is transferred to the computer through CRU input bit A (Reverse Channel Receive). It is normally used only with the Model 202 data set (with the reverse channel option installed), and indicates that the remote device is ready to receive new data. The reverse channel option applies only to 2-wire, half-duplex configurations.

**4.2.2.4 Reverse Channel Transmit (RCTE).** This signal provides a secondary output control line from the module. It may be used to acknowledge accurate transmission, or to interrupt the data flow in the primary channel. Turning off the Request to Send signal turns on this signal. This signal is normally used only with the Model 202 data set (with the reverse channel option installed). The reverse channel option applies only to 2-wire, half-duplex configurations.

**4.2.2.5 Data Carrier Detect (DCDE).** When on, this signal from the external device indicates that the data being sent to the device meets threshold criteria for level detection. The module forwards this signal to the computer through CRU input bit D (Data Carrier Detect). This signal conforms to the EIA signal called Received Line Signal Detector.

**4.2.2.6 Data Set Ready (DSRE).** When on, this signal from the external device indicates that it is ready to receive or transmit data. The module forwards this signal to the computer through CRU input bit E. (Data Set Ready).

**4.2.2.7 Request to Send (RTSE).** When on, this signal from the module indicates that the module is ready to transmit data to the external equipment.

**4.2.2.8 Data Terminal Ready (DTRE).** When on, this signal from the module indicates that it has power on and is ready to transfer data. This line permits a data set to connect to the communication channel. When off, this signal prevents a modem with an auto-answer feature from answering a call.

### **4.3 TTY/EIA MODULE OUTPUT AND INTERRUPT LOGIC (TRANSMIT MODE)**

Figure 4-4 provides a detailed functional block diagram of the module output and interrupt logic. The logic gates in the diagram are purely functional. Each one represents a combination of logic gates on the actual logic diagram in Section VI of this manual. The following paragraphs describe the transmit mode operation of the module with reference to this block diagram.

**4.3.1 PREPARATION TO TRANSMIT.** Prior to any character transmission, a typical I/O routine uses the SETB instruction to develop the DTRE and RTSE signals. The SETB instruction that develops DTRE puts a logic 1 on the CPUDATAOUT line, puts an address of  $1001_2$  on the CRUBIT12-15 lines, and develops a module enable (CRUSELO-) and write clock (STORECLOCK-). This action clears the "Data Terminal Ready" flip-flop, which in turn generates an EIA control logic 1 on the DTRE line (via the EIA line driver). A similar procedure is involved in generating a logic 1 on the RTSE line, except that the address on the CRUBIT12-15 lines is  $1010_2$  so the "Request to Send" flip-flop is cleared. In addition to developing the DTRE and RTSE signals, initialization procedures of a typical I/O routine also



include clearing the “Write Request”, “Read Request”, and “New Status” flags. A single LDCR instruction that contains the proper address is all that is needed to supply the required write gate and module enable for the clearing operation.

**4.3.2 DATA TRANSFER.** When the I/O routine determines the attached data terminal is ready to accept a character, it executes a LDCR instruction to transfer an 8-bit character from computer memory to an 8-bit shift register on the TTY/EIA module. The LDCR instruction directs the computer to do the following: feed eight bits of data serially into the TTY/EIA module over the CPUDATAOUT line, accompany each data bit with a write clock (STORECLOCK-) and an address (CRUBIT12-15) that increments by one for each successive bit, and develop the CRUSELO- signal to enable operation of the TTY/EIA module output logic. The XMTGO- signal from the reset “Transmit Go” flip-flop enables each data bit to the transmit shift register and permits the shifting operation by passing the write clock to the clock input of the transmit shift register. As the last character bit (eighth bit) is shifted into the register, the SETGO- signal sets the “Transmit Go” flip-flop and generates a START bit in the ninth bit of the transmit shift register. The newly developed XMTGO signal enables the transmit shift clock generator and the transmit bit counter and gates the transmit shift clock (XSCLK) to the transmit shift register. As the transmit shift register feeds the start bit and character bits to the attached data terminal, logic 1's are fed into the shift register input port. When the transmit bit counter indicates that the 10 or 11 bit code has been output (includes one START bit, eight character bits, and one or two STOP bits depending on the jumper configuration selected), the STPXCK- signal resets the “Transmit Go” flip-flop which in turn disables the transmit shift clock generator. At the same time, the “Write Request” flag sets to indicate the TTY/EIA module is ready to accept the next character from the computer.

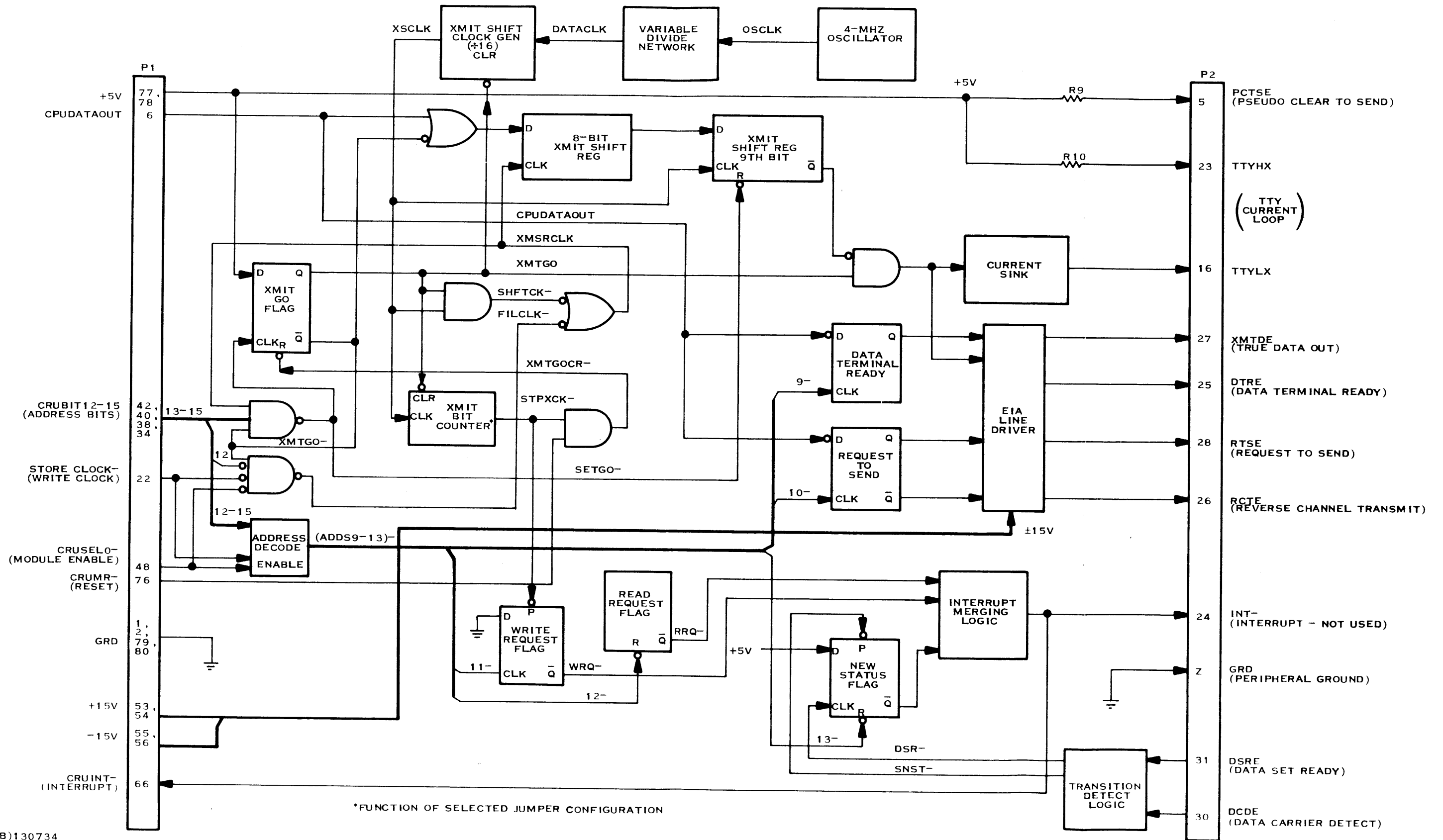
**4.3.3 INTERRUPT LOGIC.** The interrupt logic on the TTY/EIA module monitors the “Write Request”, “Read Request”, and “New Status” flags for a set condition. The computer uses this interrupt mechanism to control the starting and stopping of the applicable I/O routines to efficiently use computer operating time. The “Write Request” interrupt indicates a new character can be transmitted to the data terminal. The “Read Request” interrupt indicates the TTY/EIA module holds a character from the data terminal to be read by the computer. The “New Status” interrupt indicates a logic level transition in the “Data Set Ready” or “Data Carrier Detect” signals.

#### **4.4 TTY/EIA MODULE INPUT LOGIC (RECEIVE MODE)**

Refer to figure 4-5 for a detailed functional block diagram of the TTY/EIA module input logic. The TTY receive logic centers around operation of a switch that aids in converting TTY current loop conditions to TTY logic levels. For the EIA case, a line receiver performs the logic level conversions. In either case, a jumper is added in connector P2 so the converted logic levels are fed back into the TTY/EIA module input logic.

**4.4.1 OPERATION.** For both TTY and EIA type data terminals, the receiving data input to the TTY/EIA module is normally held at a logic 1, or Marking condition. A logic 0, or Spacing condition, activates the receive shift clock generator and the receive bit counter via the RCVEN signal. If the input logic 0 remains for one-half bit time, or until the first RSCLKA clock is developed, the “Receive Go” flag is set to initiate the receive operation. The resulting RCVGO-signal maintains operation of the receive shift clock generator and the receive bit counter so the receive shift clock (RSCLK) is generated. The RSCLK signal clocks serially received input data into the 8-bit receive shift register. The ninth shift clock (receive bit counter =  $1000_2$ ) is used to develop the LDBR- signal, which gates the fully loaded 8-bit receive shift register data into the receive buffer. At the beginning of the tenth or eleventh shift clock (determined by the selected jumper configuration), the RSTOPA- or RSTOPB- signal, respectively, resets the “Receive Go” flag. This action terminates the receive operation by disabling the receive shift clock generator





(B)130734

Figure 4-4. TTY/EIA Module Output and Interrupt Logic

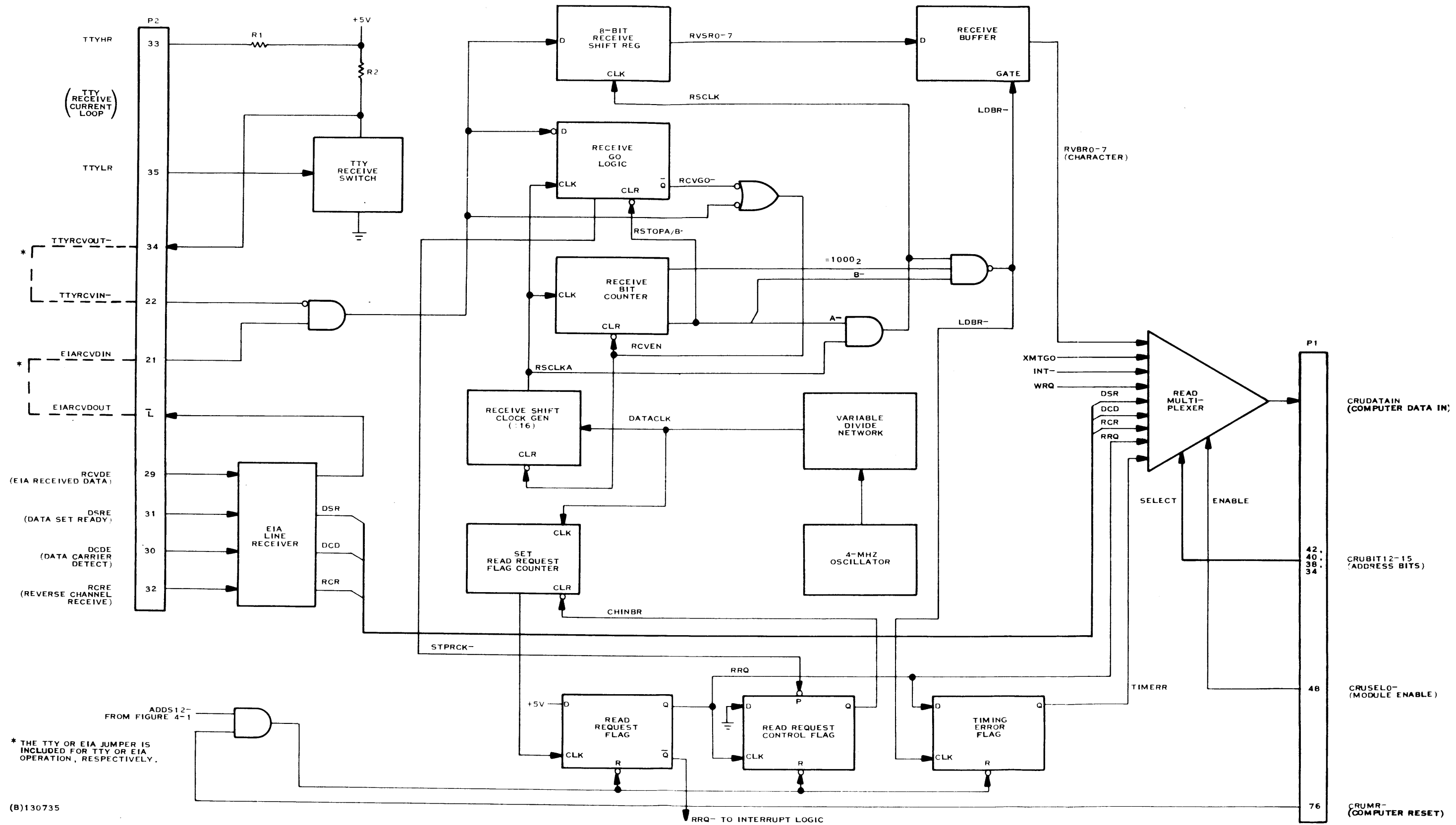


Figure 4-5. TTY/EIA Module Input Logic



and receive bit counter. At the same time, the "Read Request Control" flag (CHINBR) is set to enable the read request flag counter. One clock later, the read request flag counter sets the "Read Request" flag to indicate a new character is in the receive buffer. The set "Read Request" flag can be used to interrupt the computer so the proper I/O service routine is executed. If the "Read Request" flag remains set and another receive buffer gate (LDBR-) occurs, the "Timing Error" flag is set to indicate two or more characters have been received on top of each other in the receive buffer.

**4.4.2 SERVICE ROUTINE.** A typical I/O service routine executes a STCR instruction to serially read the character in the receive buffer via the read multiplexer. The other status data input to the read multiplexer is typically examined on a bit-by-bit basis with BBNE instructions. Refer to the Section II discussion of an input operation for the input format associated with the address bits used in performing the read operations.

#### **4.5 SOFTWARE INTERFACE**

All CRU instructions apply to data transfer and control of the TTY/EIA module. These instructions are: LDCR, STCR, BBNE, SETB, TSBX and XBNE. Refer to the *Model 960 Computer Assembly Language Programmer's Reference Manual* for a description of the format and use of these instructions. Section II of this manual provides examples of the use of some of these instructions with the module.



## SECTION V

### MAINTENANCE

#### 5.1 GENERAL

This section references software tests that check the operation of the module interface, and provides an outline for isolating system faults during troubleshooting. Because the module has no moving parts, it requires no preventive maintenance other than ensuring that cooling air flow is not impeded by excessive dust and dirt.

#### 5.2 PERFORMANCE DEMONSTRATION TESTS (PDT)

Several performance demonstration tests are available to exercise the peripheral interfaces of the TTY/EIA module. Section VIII of this manual describes a test that examines the EIA interface without depending on an attached, properly functioning, peripheral device. This test requires a test connector that feeds the interface output signals back to the input signals. A second PDT, called TTY/PDT (Part Number 944720), exercises the TTY current loop peripheral interfaces and also the Texas Instruments Model 730 teleprinter. Listings and description of this PDT are found in the *Model 960 Computer Terminal User's Guide Model 33 ASR Data Terminal* referenced in the Preface to this manual. A third PDT, PDT733 (Part Number 969726-9901), tests the module when it is connected to a Texas Instruments Model 733 ASR or KSR or 743 KSR data terminal. Listings and description of this PDT are found in the *Model 960 Computer Terminal User's Guide Model 733 ASR/KSR Data Terminal* or the *Model 960 Computer Terminal User's Guide Model 743 KSR Data Terminal*.

A fourth PDT, PDT912 (Part Number 976542-9901) tests the module when it is connected to a Texas Instruments Model 912 video display terminal. Listings and descriptions of this PDT are found in the *Model 960 Computer Terminal User's Guide Model 912 Video Display Terminal* referenced in the Preface to this manual.

#### 5.3 TROUBLESHOOTING PROCEDURE

If a malfunction occurs in the system that used the TTY/EIA module, the following checks will help determine the location of the failure. When faulty component is found, repair or replace it as required.

1. Ensure that all system baud rates have been selected correctly and are compatible with each other. Refer to the baud selection information in Section II of this manual.
2. Ensure that all cables are correctly installed and are firmly mated in their respective connectors.
3. Perform offline checks of the peripheral devices to ensure that they are operating properly.
4. Perform the applicable performance demonstration test (see Section VIII of this manual) to check operation of the module interface being used.

#### CAUTION

Do not remove any module from the chassis without first turning system power off. Failure to turn off power may damage interface circuits or power supply.



5. Turn off system power, remove the module from the chassis, turn on system power and perform the following voltage checks to ensure that the module is receiving proper power:

**NOTE**

When making the following voltage checks use module pins 57 or 58 as ground reference for  $\pm 15$  Vdc, and pin 1, 2, 79 or 80 as ground reference for +5 Vdc.

- Pins 53 and 54 should supply  $+15 \pm 1$  vdc with a maximum noise envelope of 300 millivolts peak-to-peak, and a maximum ripple of 50 millivolts peak-to-peak.
- Pins 55 and 56 should supply  $-15 \pm 1$  vdc with a maximum noise envelope of 300 millivolts peak-to-peak, and a maximum ripple of 50 millivolts peak-to-peak.
- Pins 77 and 78 should supply  $+5 \pm 0.2$  vdc with a maximum noise envelope of 100 millivolts peak-to-peak.

**CAUTION**

Do not insert any module into the chassis without first turning system power off. Failure to turn off power may damage interface circuits or power supply.

6. Turn off system power, replace the module into the chassis, and return system power.

**SECTION VI****DRAWINGS**

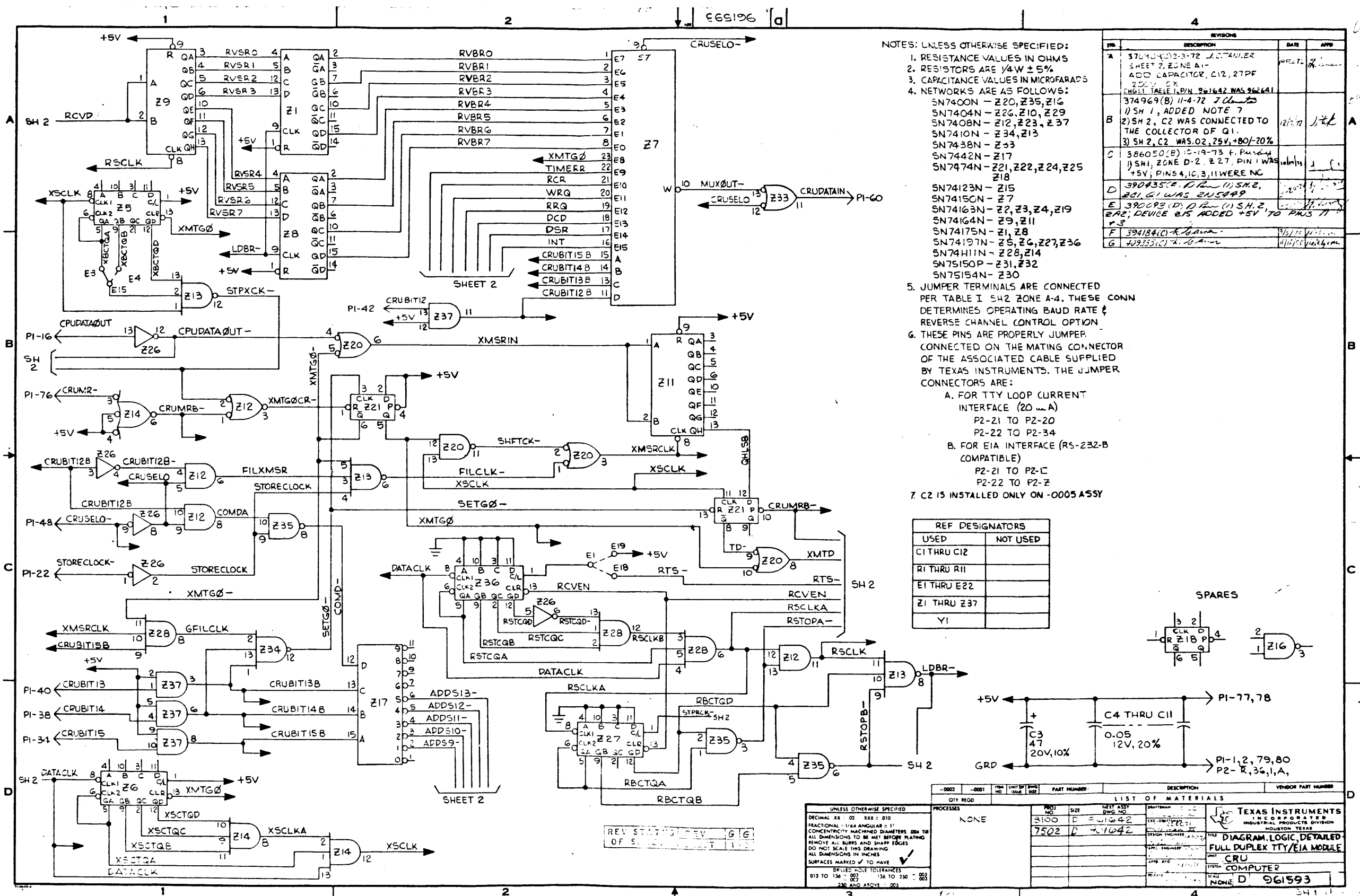
The electrical drawings, assembly drawings, and parts lists that are required by maintenance personnel to properly service and maintain the Full Duplex TTY/EIA Module are included in this section.

The parts lists, assembly drawings, and electrical drawings for the 960A and 960B computers are contained in the following manuals:

	<u>960A</u>	<u>960B</u>
Parts Lists and Assembly Drawings	226750-9707	942773-9704
Electrical Drawings	226750-9708	942773-9705

A drawing and parts list index appears below. This index lists the electrical drawing, assembly drawing, and parts list (LM).

<u>Description</u>	<u>Drawing</u>	<u>Page</u>
Schematic (Logic Diagram)	961593	6-3/6-4
Assembly	961642	6-7/6-8
Universal EIA Cable	240808	6-73/6-74
733 ASR/KSR Data Set Cable	943765	6-77/6-78
EIA Test Kit	966304	6-83
EIACKF Test Connector	240812	6-85/6-86

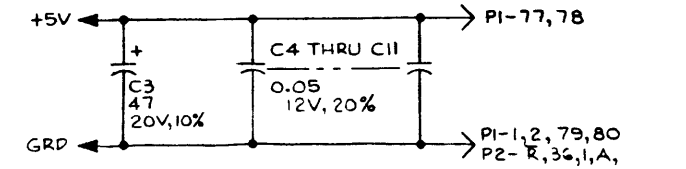
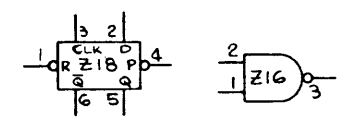


NOTES: UNLESS OTHERWISE SPECIFIED:

1. RESISTANCE VALUES IN OHMS
2. RESISTORS ARE 1/4W ± 5%
3. CAPACITANCE VALUES IN MICROFARADS
4. NETWORKS ARE AS FOLLOWS:  
 SN7400N - Z20, Z35, Z16  
 SN7404N - Z26, Z10, Z29  
 SN7408N - Z12, Z23, Z37  
 SN7410N - Z34, Z13  
 SN7438N - Z33  
 SN7442N - Z17  
 SN7474N - Z21, Z22, Z24, Z25  
 Z18  
 SN74123N - Z15  
 SN74150N - Z7  
 SN74163N - Z2, Z3, Z4, Z19  
 SN74164N - Z9, Z11  
 SN74175N - Z1, Z8  
 SN74197N - Z5, Z6, Z27, Z36  
 SN74111N - Z28, Z14  
 SN75150P - Z31, Z32  
 SN75154N - Z30
5. JUMPER TERMINALS ARE CONNECTED PER TABLE I SH2 ZONE A-4. THESE CONN DETERMINES OPERATING BAUD RATE & REVERSE CHANNEL CONTROL OPTION
6. THESE PINS ARE PROPERLY JUMPER CONNECTED ON THE MATING CONNECTOR OF THE ASSOCIATED CABLE SUPPLIED BY TEXAS INSTRUMENTS. THE JUMPER CONNECTORS ARE:  
 A. FOR TTY LOOP CURRENT INTERFACE (20 mA)  
 P2-21 TO P2-20  
 P2-22 TO P2-34  
 B. FOR EIA INTERFACE (RS-232-B COMPATIBLE)  
 P2-21 TO P2-C  
 P2-22 TO P2-Z
7. C2 IS INSTALLED ONLY ON -0005 ASSY

REF DESIGNATORS	
USED	NOT USED
C1 THRU C12	
R1 THRU R11	
E1 THRU E22	
Z1 THRU Z37	
Y1	

SPARES



REVISIONS			
REV	DESCRIPTION	DATE	APP
A	37494(0) 2-3-72 J.C. TAILER SHEET 2, ZONE A1- ADD CAPACITOR, C12, 27PF	2/3/72	J.C. TAILER
B	37496(9) 11-4-72 J.C. TAILER 1) SH 1, ADDED NOTE 7 2) SH 2, C2 WAS CONNECTED TO THE COLLECTOR OF Q1.	11/4/72	J.C. TAILER
C	386050(B) 10-19-73 F. Purdy 1) SH 1, ZONE D-2, Z27, PIN 1 WAS +5V; PINS 4, 10, 3, 11 WERE NC	10/19/73	F. Purdy
D	390435(C) 10-19-73 F. Purdy 2) SH 1, ZONE D-2, Z27, PIN 1 WAS +5V; PINS 4, 10, 3, 11 WERE NC	10/19/73	F. Purdy
E	390693(D) 10-19-73 F. Purdy 2) SH 2, C2 WAS CONNECTED TO THE COLLECTOR OF Q1.	10/19/73	F. Purdy
F	394184(C) K. G. Gamm	9/5/75	K. G. Gamm
G	409355(C) K. G. Gamm	11/1/75	K. G. Gamm

UNLESS OTHERWISE SPECIFIED:		PROCESS		PART NUMBER		DESCRIPTION		VENDOR PART NUMBER	
DECIMAL	FRACTIONAL	FINISH	PLATING	QTY REQD	PROJ NO	SIZE	LIST ASSY	DRWING NO	DATE
013 TO 136 - .003	136 TO 250 - .005			NONE	3100	D	7502	42	11/10/72

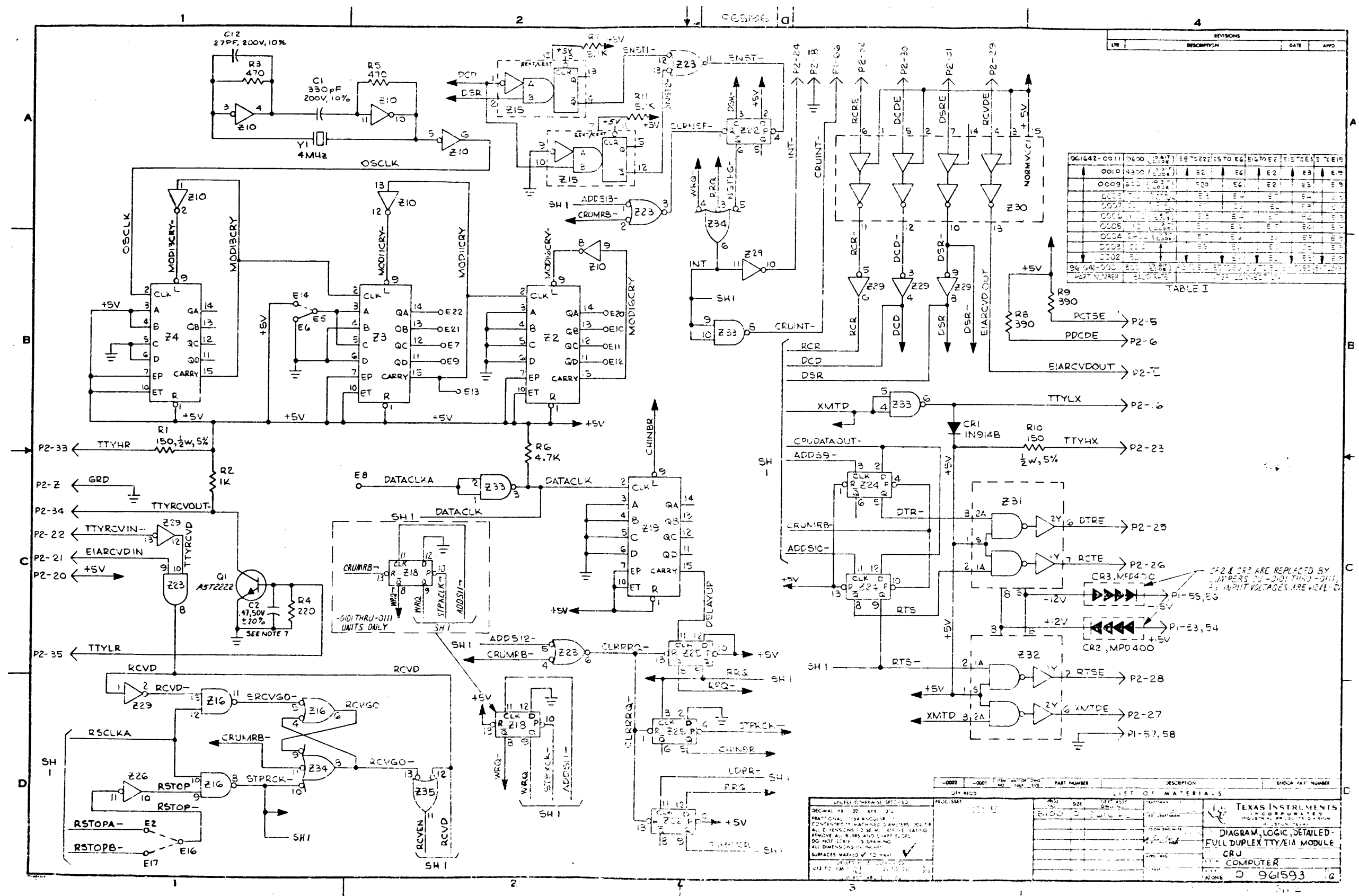
TEXAS INSTRUMENTS INCORPORATED INDUSTRIAL PRODUCTS DIVISION HOUSTON, TEXAS

DIAGRAM LOGIC, DETAILED FULL DUPLEX TTY/EIA MODULE

CRU COMPUTER

SCALE: NONE

REV 06



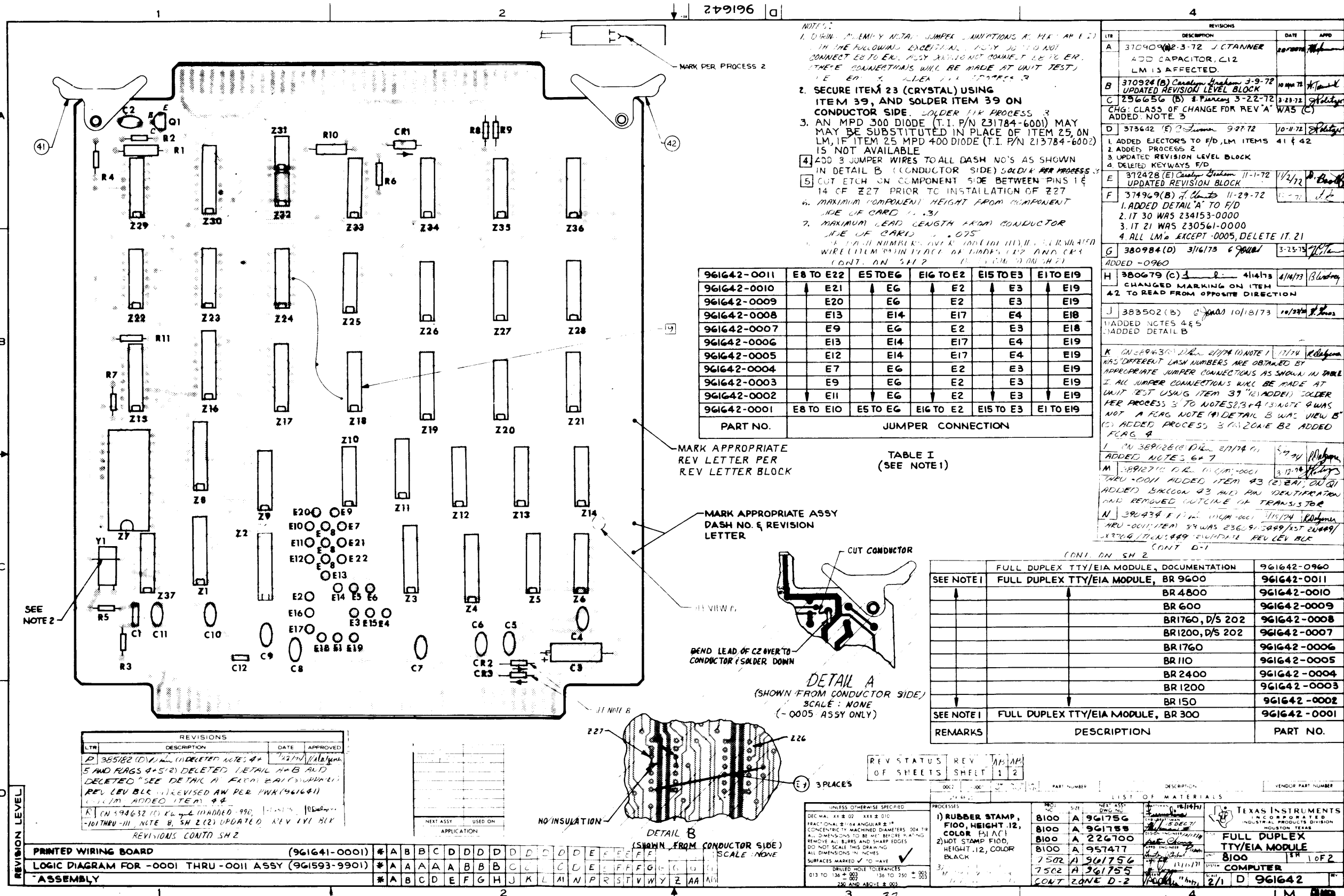
LTR	DESCRIPTION	DATE	APPD
961642-0011	1600 (10/67)	EG	EG
0010	4300 (10/67)	E2	E2
0009	4300 (10/67)	E2	E2
0008	4300 (10/67)	E2	E2
0007	4300 (10/67)	E2	E2
0006	4300 (10/67)	E2	E2
0005	4300 (10/67)	E2	E2
0004	4300 (10/67)	E2	E2
0003	4300 (10/67)	E2	E2
0002	4300 (10/67)	E2	E2
961642-0001	1600 (10/67)	E2	E2
0001	4300 (10/67)	E2	E2

TABLE I

IF Z24, Z25 ARE REPLACED BY JUMPERS TO -DIG THRU -0011, 23 INPUT VOLTAGES ARE NOT 0.

UNLESS OTHERWISE SPECIFIED	PROCESS	PART NUMBER	DESCRIPTION		ENDER PART NUMBER
			QTY REQD	DESCRIPTION	
DECIMAL 1/32 20 00					
FRACTIONAL 1/32 20 00					
FRACTIONAL 1/32 20 00					
ALL DIMENSIONS TO BE USED UNLESS NOTED					
REMOVE ALL BURS AND SHARP EDGES					
DO NOT GRIND - IS GRAIN NO					
ALL DIMENSIONS IN INCH					
SURFACES MARKED ✓ TO HAV					
UNLESS OTHERWISE SPECIFIED					
ALL TO UNLESS OTHERWISE SPECIFIED					

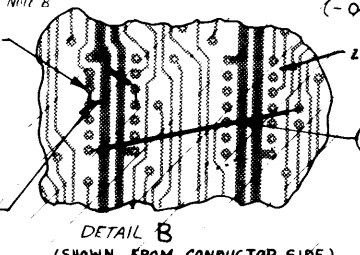
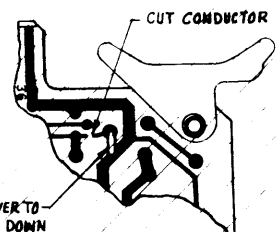




NOTES:  
 1. DURING ASSEMBLY NOTE JUMPER CONNECTIONS AS PER PROCESS 2 WITH THE FOLLOWING EXCEPTION: ONLY DO NOT CONNECT E8 TO E9. MOST JUMPER NOT CONNECT E8 TO E9. (THESE CONNECTIONS WILL BE MADE AT UNIT TEST) SEE E9, CR11, CR23, CR33.  
 2. SECURE ITEM 23 (CRYSTAL) USING ITEM 39, AND SOLDER ITEM 39 ON CONDUCTOR SIDE. SOLDER PER PROCESS 3.  
 3. AN MPD 300 DIODE (T.I. P/N 231784-6001) MAY BE SUBSTITUTED IN PLACE OF ITEM 25, ON LM, IF ITEM 25 MPD 400 DIODE (T.I. P/N 213784-6002) IS NOT AVAILABLE.  
 4. ADD 3 JUMPER WIRES TO ALL DASH NOS AS SHOWN IN DETAIL B (CONDUCTOR SIDE) SOLDER PER PROCESS 3.  
 5. CUT ETCH ON COMPONENT SIDE BETWEEN PINS 1 & 14 OF Z27 PRIOR TO INSTALLATION OF Z27.  
 6. MAXIMUM COMPONENT HEIGHT FROM COMPONENT SIDE OF CARD IS .31.  
 7. MAXIMUM LEAD LENGTH FROM CONDUCTOR SIDE OF CARD IS .075.  
 8. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS INDICATED OTHERWISE IN PLACE OF DIMENSIONS AND CR'S (CONT. ON SH 2)

961642-0011	E8 TO E22	E5 TO E6	E10 TO E2	E15 TO E3	E10 TO E19
961642-0010	E21	E6	E2	E3	E19
961642-0009	E20	E6	E2	E3	E19
961642-0008	E13	E14	E17	E4	E18
961642-0007	E9	E6	E2	E3	E18
961642-0006	E13	E14	E17	E4	E19
961642-0005	E12	E14	E17	E4	E19
961642-0004	E7	E6	E2	E3	E19
961642-0003	E9	E6	E2	E3	E19
961642-0002	E11	E6	E2	E3	E19
961642-0001	E8 TO E10	E5 TO E6	E10 TO E2	E15 TO E3	E10 TO E19

TABLE I (SEE NOTE 1)



REVISIONS	DESCRIPTION	DATE	APPROVED
A	370409 (B) 2-3-72 JCTANNER	2/3/72	[Signature]
B	370524 (B) 3-9-72	3/9/72	[Signature]
C	256656 (B) 3-22-72	3/22/72	[Signature]
D	373642 (E) 3-22-72	3/22/72	[Signature]
E	372428 (E) 11-1-72	11/1/72	[Signature]
F	374969 (B) 11-29-72	11/29/72	[Signature]
G	380984 (D) 3/16/73	3/16/73	[Signature]
H	380679 (C) 4/14/73	4/14/73	[Signature]
J	383502 (B) 10/18/73	10/18/73	[Signature]
K	384434 (D) 11/14/73	11/14/73	[Signature]
L	389280 (D) 2/17/74	2/17/74	[Signature]
M	389270 (D) 3/12/74	3/12/74	[Signature]
N	390434 (E) 11/15/74	11/15/74	[Signature]

REVISIONS	DESCRIPTION	DATE	APPROVED
P	385182 (D) 11/14/74	11/14/74	[Signature]
R	394632 (D) 4/2/75	4/2/75	[Signature]

REVISION LEVEL	DESCRIPTION
1	PRINTED WIRING BOARD (961641-0001)
2	LOGIC DIAGRAM FOR -0001 THRU -0011 ASSY (961593-9901)
3	ASSEMBLY

REVISION LEVEL	DESCRIPTION
1	PRINTED WIRING BOARD (961641-0001)
2	LOGIC DIAGRAM FOR -0001 THRU -0011 ASSY (961593-9901)
3	ASSEMBLY

REV STATUS	REV	AP	AP
OF SHEETS	1	1	2

UNLESS OTHERWISE SPECIFIED	PROCESS	REV	AP	AP
DECIMAL: XXX ± .02 XXX ± .010	1) RUBBER STAMP, F100, HEIGHT .12, COLOR P1 (A)			
FRACTIONAL: .25 ANGULAR ± .15	2) HOT STAMP F100, HEIGHT .12, COLOR BLACK			
ALL DIMENSIONS TO BE MET BEFORE PLATING				
REMOVE ALL BURRS AND SHARP EDGES				
DO NOT SCALE THIS DRAWING				
ALL DIMENSIONS IN INCHES				
SURFACES MARKED ✓ TO HAVE				
DRAFTER TOLERANCES				
013 TO .34 ± .003				
.34 TO .38 ± .003				
.38 TO .49 ± .003				
.49 AND ABOVE ± .005				



REVISIONS			
ZONE	LTR	DESCRIPTION	DATE
AP		413320 (C) E10... CHANGED THE BOARD CUT THE... VCC BUSS...	
AB		ON 427255 (D) L.T.H.M. DELETED ITEM 43 (2) PROCESS 3 CALK WAS YELLOW (3) PROCESS 3 WAS F127, METHOD 1 ONLY (4) UPDATED REVISION LEVEL BLOCK.	8-17-77

REVISIONS			
ZONE	LTR	DESCRIPTION	DATE
Q		...	
I		...	
U		...	
V		...	
W		...	
Y		...	
Z		...	

SEENOTE 8	FULL DUPLEX EIA MODULE, 990, BR 9600	961642-0990
	BR 4800	-0110
	BR 600	-0109
	BR1760, D/S 202	-0108
	BR1200, D/S 202	-0107
	BR1760	-0106
	BR110	-0105
	BR 2400	-0104
	BR1200	-0103
	BR150	-0102
SEE NOTE 8	FULL DUPLEX EIA MODULE, 990, BR 300	961642-0101

SEENOTE 8	FULL DUPLEX EIA MODULE, 990, BR 9600	961642-0111
	BR 4800	-0110
	BR 600	-0109
	BR1760, D/S 202	-0108
	BR1200, D/S 202	-0107
	BR1760	-0106
	BR110	-0105
	BR 2400	-0104
	BR1200	-0103
	BR150	-0102
SEE NOTE 8	FULL DUPLEX EIA MODULE, 990, BR 300	961642-0101

PART NO.	JUMPER CONNECTION
961642-0111	E8 TO E22
0110	E21
0109	E20
0108	E13
0107	E9
0106	E13
0105	E12
0104	E7
0103	E9
0102	E11
961642-0101	E8 TO E10
	E5 TO E6
	E16 TO E2
	E15 TO E3
	E1 TO E19

TABLE I

LIT CONDUCTOR  
Z14

VIEW C  
SCALE: NONE  
(SEE NOTE 11)

SIZE	CODE IDENT NO	DRAWING NO
D	96214	961642
SCALE 2/1	REV A0	SHEET 2



**TEXAS INSTRUMENTS**  
INCORPORATED

DATE 06/24/76

**LIST of MATERIAL**

PAGE 1 of

PART NUMBER  
**LM 961642-0000** REV  
**AA**

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0001	00001.000	EA		961641-0001	PWB, FULL DUPLEX TTY/EIA MODULE	
0002	00003.000	EA		222222-7400	NETWORK SN7400N	-SN7400N
0002A					Z16 Z20 Z35	
0003	00003.000	EA		222222-7404	NETWORK SN7404N	
0003A					Z10 Z26 Z29	
0004	00003.000	EA		222222-7408	NETWORK-SN7408N	
0004A					Z12 Z23 Z37	
0005	00002.000	EA		222222-7410	NETWORK SN7410N	-SN7410N
0005A					Z13 Z34	
0006	00001.000	EA		222222-7438	NETWORK SN7438N	
0006A					Z33	
0007	00001.000	EA		222222-7442	NETWORK-SN7442N	
0007A					Z17	
0008	00005.000	EA		222222-7474	NETWORK SN7474N	-SN7474N
0008A					Z18 Z21 Z22 Z24 Z25	
0009	00001.000	EA		222222-7123	NETWORK SN74123N	
0009A					Z15	
0010	00001.000	EA		222222-7150	NETWORK SN74150N	
0010A					Z7	
0011	00004.000	EA		222222-7163	NETWORK SN74163N	

6-11

DRAFTSMAN	DATE	CRD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
		<i>R. Williams</i>	<i>6/24/76</i>			FULL DUPLEX EIA MOD, 990
APPD.-MFG.	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						8100
					PART NUMBER <b>LM 961642-0000</b> REV <b>AA</b>	



**TEXAS INSTRUMENTS**  
INCORPORATED

DATE 06/29/77

**LIST OF MATERIAL**

PAGE 2 of

PART NUMBER	REV
<b>LM0961042-0000</b>	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0011A					Z2 Z3 Z4 Z19	
0012	00002.000	EA		0222222-7164	NETWORK SN74164N	TI- -SN74164N
0012A					Z9 Z11	
0013	00002.000	EA		0222222-7175	NETWORK SN74175N	
0013A					Z1 Z8	
0014	00004.000	EA		0222222-7197	NETWORK SN74197N	
0014A					Z5 Z6 Z27 Z36	
0015	00002.000	EA		0240000-7411	NETWORK-SN74H11N	
0015A					Z14 Z28	
0016	00002.000	EA		0537948-0001	NETWORK SN75150P	TI -SN75150P
0016A					Z31 Z32	
0017	00001.000	EA		0537947-0001	NETWORK SN75154N	TI -SN75154N
0017A					Z30	
0018	00001.000	EA		0972924-0015	CAP FIX TANT SOLID 47 MFD 10 % 20 VOLT	QPL -M39003/1-2295
0018A					C3	
0019	00008.000	EA		0230590-9000	CAP .05 MF 12 V 20. % CER TRANSCAP	ERI -5635-000-V5F05
0019A					C4 THRU C11	
0022	00001.000	EA		0972929-0388	CAP FIX CERAMIC 330 PF 10 % 200 V	QPL -M39014/01-1388
0022A					C1	
0023	00001.000	EA		0418801-0004	CRYSTAL,QUARTZ 4.000 MHZ HC-18/U	QPL - CR-64/U

DRAFTSMAN	DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX EIA MOD, 990
APPD. -MFG.	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.

PART NUMBER	REV
<b>LM0961642-0000</b>	AB

TI 13849

Change 1

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Digital Systems Division

Change 1

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Digital Systems Division



**TEXAS INSTRUMENTS**  
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DATE 06/29/77

**LIST OF MATERIAL**

PAGE 3 of

PART NUMBER	REV
LM0961642-0000	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0023A					Y1		
0024	00001.000	EA		0972932-0001	DIODE, 1N914B SWITCHING 75V PIV 75MA 4NS	TI - 1N914B	
0024A					CR1		
0026	00002.000	EA		0972946-0057	RES FIX 470 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0026A					R3 R5		
0027	00002.000	EA		0972946-0055	RES FIX 390 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0027A					R8 R9		
0028	00002.000	EA		0972947-0045	RES FIX 150 OHM 5 % .5 W CARBON FILM	ROH - K-50	
0028A					R1 R10		
0029	00001.000	EA		0972946-0065	RES FIX 1.0K OHM 5 % .25 W CARBON FILM	ROH - K-25	
0029A					R2		
0030	00001.000	EA		0972946-0049	RES FIX 220 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0030A					R4		
0031	00001.000	EA		0972946-0081	RES FIX 4.7K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0031A					R6		
0032	00002.000	EA		0972946-0082	RES FIX 5.1K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0032A					R7 R11		
0033	00001.000	EA		0972057-0001	TRANSISTOR-A5T2222 NPN SILICON	TI- -A5T2222	
0033A					Q1		
0034	00001.000	EA		0961593-9901	DIAG.LOG.DET.FULL DUPLEX TTY/EIA MODULE		
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX EIA MOD, 990
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						LM0961642-0000	AB



**TEXAS INSTRUMENTS**  
INCORPORATED

DATE 06/29/77

**LIST OF MATERIAL**

PAGE 4 of

PART NUMBER	REV
<b>LM0961642-0000</b>	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0035	00001.000	EA		0961667-9901	SPEC.FULL DUPLEX TTY/EIA MODULE		
0036	00001.000	EA		0961675-9901	TEST PROCEDURE FULL DUPLEX TTY/EIA MOD.		
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16878/4	
0040	00001.000	EA		0972929-0369	CAP FIX CERAMIC 27.0 PF 10 X 200 V	QPL -M39014/01-1369	
0040A					C12		
0041	00001.000	EA		0533887-0001	EJECTOR,PCB,NGN-LOCKING,WHITE	SCA -S-202 WHITE	
0042	00001.000	EA		0533887-0009	EJECTOR,PCB,NGN-LOCKING,GREEN	SCA -S-202 GREEN	
0045	00024.000	EA		0083694-0003	TERMINAL TURRET TYPE	USE - 2010B	
0045A					E1 THRU E22		
DRAFTSMAN		DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX EIA MOD, 990
APPD -MFG		DATE	APPD PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						<b>LM0961642-0000</b>	AB

11 13849

Change 1

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Digital Systems Division

Change 1

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Digital Systems Division



**TEXAS INSTRUMENTS**  
INCORPORATED

DATE 06/29/77

**LIST OF MATERIAL**

PAGE 1 of

PART NUMBER	REV
LM0961642-0001	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0001	00001.000	EA		0961641-0001	PWB, FULL DUPLEX TTY/EIA MODULE		
0002	00003.000	EA		0222222-7400	NETWORK SN7400N	-SN7400N	
0002A					Z16, Z20, Z35		
0003	00003.000	EA		0222222-7404	NETWORK SN7404N		
0003A					Z10, Z26, Z29		
0004	00003.000	EA		0222222-7408	NETWORK-SN7408N		
0004A					Z12, Z23, Z37		
0005	00002.000	EA		0222222-7410	NETWORK SN7410N	-SN7410N	
0005A					Z13, Z34		
0006	00001.000	EA		0222222-7438	NETWORK SN7438N		
0006A					Z33		
0007	00001.000	EA		0222222-7442	NETWORK-SN7442N		
0007A					Z17		
0008	00005.000	EA		0222222-7474	NETWORK SN7474N	-SN7474N	
0008A					Z18, Z21, Z22, Z24, Z25		
0009	00001.000	EA		0222222-7123	NETWORK SN74123N		
0009A					Z15		
0010	00001.000	EA		0222222-7150	NETWORK SN74150N		
0010A					Z7		
0011	00004.000	EA		0222222-7163	NETWORK SN74163N		
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
APPD.-MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						FULL DUPLEX TTY/EIA MODULE, BR 300	
						PART NUMBER	REV
						LM0961642-0001	AB



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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0011A					Z2,Z3,Z4,Z19		
0012	00002.000	EA		0222222-7164	NETWORK SN74164N	TI- -SN74164N	
0012A					Z9,Z11		
0013	00002.000	EA		0222222-7175	NETWORK SN74175N		
0013A					Z1,Z8		
0014	00004.000	EA		0222222-7197	NETWORK SN74197N		
0014A					Z5,Z6,Z27,Z36		
0015	00002.000	EA		0240000-7411	NETWORK-SN74H11N		
0015A					Z14,Z28		
0016	00002.000	EA		0537948-0001	NETWORK SN75150P	TI -SN75150P	
0016A					Z31,Z32		
0017	00001.000	EA		0537947-0001	NETWORK SN75154N	TI -SN75154N	
0017A					Z30		
0018	00001.000	EA		0972924-0015	CAP FIX TANT SOLID 47 MFD 10 % 20 VOLT	QPL -M39003/1-2295	
0018A					C3		
0019	00008.000	EA		0230590-9000	CAP .05 MF 12 V 20. % CER TRANSCAP	ERI -5E35-000-Y5F05	
0019A					C4 THRU C11		
0022	00001.000	EA		0972929-0388	CAP FIX CERAMIC 330 PF 10 % 200 V	QPL -M39014/01-1388	
0022A					C1		
0023	00001.000	EA		0418801-0004	CRYSTAL,QUARTZ 4.000 MHZ HC-18/U	QPL - CR-64/U	
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE,BK 300
APPD. MFG		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						LM0961642-0001	AB

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PART NUMBER	REV
LM0961642-0001	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER				
0023A					Y1					
0024	00001.000	EA		0972932-0001	DIODE, 1N914B SWITCHING 75V PIV 75MA 4NS	TI - IN914B				
0024A					CR1					
0025	00002.000	EA		0231784-6002	DIODE- 4 PELLET, SILICON, MULTI	GE -MPD400				
0025A					CR2, CR3					
0026	00002.000	EA		0972946-0057	RES FIX 470 OHM 5 % .25 W CARBON FILM	ROH - R-25				
0026A					R3, R5					
0027	00002.000	EA		0972946-0055	RES FIX 390 OHM 5 % .25 W CARBON FILM	ROH - R-25				
0027A					R8, R9					
0028	00002.000	EA		0972947-0045	RES FIX 150 OHM 5% .5 W CARBON FILM	ROH - R-50				
0028A					R10, R1					
0029	00001.000	EA		0972946-0065	RES FIX 1.0K OHM 5% .25 W CARBON FILM	ROH - R-25				
0029A					R2					
0030	00001.000	EA		0972946-0049	RES FIX 220 OHM 5 % .25 W CARBON FILM	ROH - R-25				
0030A					R4					
0031	00001.000	EA		0972946-0081	RES FIX 4.7K OHM 5 % .25 W CARBON FILM	ROH - R-25				
0031A					R6					
0032	00002.000	EA		0972946-0082	RES FIX 5.1K OHM 5 % .25 W CARBON FILM	ROH - R-25				
0032A					R7, R11					
0033	00001.000	EA		0972057-0J01	TRANSISTOR-A5T2222 NPN SILICON	TI- -A5T2222				
DRAFTSMAN		DATE	CKD. DRAFTSMAN		DATE	DESIGN ENGINEER		DATE	TITLE	
									FULL DUPLEX TTY/EIA MODULE, BR 300	
APPD. MFG.		DATE	APPD. PROJECT ENGINEER		DATE	RELEASED		DATE	PROJECT NO.	
									PART NUMBER	REV
									LM0961642-0001	AB



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PART NUMBER	REV
LM0961642-0001	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0033A					Q1		
0034	REF	EA		0961553-9901	DIAG.LOG.DET.FULL DUPLEX TTY/EIA MODULE		
0035	REF	EA		0961667-9901	SPEC.FULL DUPLEX TTY/EIA MODULE		
0036	REF	EA		0961675-9901	TEST PROCEDURE FULL DUPLEX TTY/EIA MOD.		
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16876/4	
0040	00001.000	EA		0972929-0369	CAP FIX CERAMIC 27.0 PF 10 X 200 V	QPL -M39014/01-1369	
0040A					C12		
0041	00001.000	EA		0533887-0001	EJECTOR,PCB,NON-LOCKING,WHITE	SCA -S-202 WHITE	
0042	00001.000	EA		0533887-0009	EJECTOR,PCB,NON-LOCKING,GREEN	SCA -S-202 GREEN	
0045	00024.000	EA		0083694-0003	TERMINAL TURRET TYPE	USE - 2010B	
0045A					E1 THRU E22		
DRAFTSMAN		DATE	CRD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BR 300
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						LM0961642-0001	AB

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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0001	0001.000	EA		0961641-0001	PWB, FULL DUPLEX TTY/EIA MODULE	
0002	0003.000	EA		0222222-7400	NETWORK SN7400N	-SN7400N
0002A					Z16, Z20, Z35	
0003	0003.000	EA		0222222-7404	NETWORK SN7404N	
0003A					Z10, Z26, Z29	
0004	0003.000	EA		0222222-7408	NETWORK-SN7408N	
0004A					Z12, Z23, Z37	
0005	0002.000	EA		0222222-7410	NETWORK SN7410N	-SN7410N
0005A					Z13, Z34	
0006	0001.000	EA		0222222-7438	NETWORK SN7438N	
0006A					Z33	
0007	0001.000	EA		0222222-7442	NETWORK-SN7442N	
0007A					Z17	
0008	0005.000	EA		0222222-7474	NETWORK SN7474N	-SN7474N
0008A					Z18, Z21, Z22, Z24, Z25	
0009	0001.000	EA		0222222-7123	NETWORK SN74123N	
0009A					Z15	
0010	0001.000	EA		0222222-7150	NETWORK SN74150N	
0010A					Z7	
0011	0004.000	EA		0222222-7163	NETWORK SN74163N	
DRAFTSMAN	DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX TTY/EIA MODULE, BR 150
APPD. MFG.	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER
						<b>LM0961642-0002</b>
						REV
						<b>AB</b>





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PART NUMBER	REV
<b>LM</b> J961642-0002	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0011A					Z2,Z3,Z4,Z19	
0012	00002.000	EA		0222222-7164	NETWORK SN74164N	TI- -SN74164N
0012A					Z9,Z11	
0013	00002.000	EA		0222222-7175	NETWORK SN74175N	
0013A					Z1,Z8	
0014	00004.000	EA		0222222-7197	NETWORK SN74197N	
0014A					Z5,Z6,Z27,Z36	
0015	00002.000	EA		0240000-7411	NETWORK-SN74H11N	
0015A					Z14,Z28	
0016	00002.000	EA		0537948-0001	NETWORK SN75150P	TI -SN75150P
0016A					Z31,Z32	
0017	00001.000	EA		0537947-0001	NETWORK SN75154N	TI -SN75154N
0017A					Z30	
0018	00001.000	EA		0972924-0015	CAP FIX TANT SOLID 47 MFD 10 % 20 VOLT	QPL -M39003/1-2295
0018A					C3	
0019	00008.000	EA		0230590-9000	CAP .05 MF 12 V 20. % CER TRANSCAP	ERI -5635-000-Y5F05
0019A					C4 THRU C11	
0022	00001.000	EA		0972929-0388	CAP FIX CERAMIC 330 PF 10 % 200 V	QPL -M39014/01-1388
0022A					C1	
0023	00001.000	EA		0418801-0004	CRYSTAL,QUARTZ 4.000 MHZ HC-18/U	QPL - CR-64/U
DRAFTSMAN	DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX TTY/EIA MODULE, BR 150
APPD-MFG	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER
						<b>LM</b> J961642-0002
						REV
						AB

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PART NUMBER	REV
<b>LM0961642-0002</b>	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0023A					Y1		
0024	0001.000	EA		0972932-0001	DIODE, IN914B SWITCHING 75V PIV 75MA 4NS	TI - IN914B	
0024A					CR1		
0025	0002.000	EA		0231784-6002	DIODE- 4 PELLET, SILICON, MULTI	GE -MPD400	
0025A					CR2,CR3		
0026	0002.000	EA		0972946-0057	RES FIX 470 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0026A					R3,R5		
0027	0002.000	EA		0972946-0055	RES FIX 390 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0027A					R8,R9		
0028	0002.000	EA		0972947-0045	RES FIX 150 OHM 5% .5 W CARBON FILM	ROH - R-50	
0028A					R10,R1		
0029	0001.000	EA		0972946-0065	RES FIX 1.0K OHM 5% .25 W CARBON FILM	ROH - R-25	
0029A					R2		
0030	0001.000	EA		0972946-0049	RES FIX 220 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0030A					R4		
0031	0001.000	EA		0972946-0081	RES FIX 4.7K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0031A					R6		
0032	0002.000	EA		0972946-0082	RES FIX 5.1K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0032A					R7,R11		
0033	0001.000	EA		0972057-0001	TRANSISTOR-A5T222 NPN SILICON	TI- -A5T222	
DRAFTSMAN		DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BK 150
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						<b>LM0961642-0002</b>	AB



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PART NUMBER	REV
<b>LM0961642-0002</b>	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0033A					Q1		
0034	REF	EA		0961593-9901	DIAG.LOG.DET.FULL DUPLEX TTY/EIA MODULE		
0035	REF	EA		0961667-9901	SPEC.FULL DUPLEX TTY/EIA MODULE		
0036	REF	EA		0961675-9901	TEST PROCEDURE FULL DUPLEX TTY/EIA MOD.		
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-14878/4	
0040	00001.000	EA		0972929-0369	CAP FIX CERAMIC 27.0 PF 10 X 200 V	QPL -M39014/01-1369	
0040A					C12		
0041	00001.000	EA		0533887-0001	EJECTOR,PCB,NCN-LOCKING,WHITE	SCA -S-202 WHITE	
0042	00001.000	EA		0533887-0009	EJECTOR,PCB,NCN-LOCKING,GREEN	SCA -S-202 GREEN	
0045	00024.000	EA		0083694-0003	TERMINAL TURRET TYPE	USE - 2010B	
0045A					E1 THRU E22		
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BR 150
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						<b>LM0961642-0002</b>	AB

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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0001	00001.000	EA		0961641-0001	PWB, FULL DUPLEX TTY/EIA MODULE		
0002	00003.000	EA		0222222-7400	NETWORK SN7400N	-SN7400N	
0002A					Z16, Z20, Z35		
0003	00003.000	EA		0222222-7404	NETWORK SN7404N		
0003A					Z10, Z26, Z29		
0004	00003.000	EA		0222222-7408	NETWORK-SN7408N		
0004A					Z12, Z23, Z37		
0005	00002.000	EA		0222222-7410	NETWORK SN7410N	-SN7410N	
0005A					Z13, Z34		
0006	00001.000	EA		0222222-7438	NETWORK SN7438N		
0006A					Z33		
0007	00001.000	EA		0222222-7442	NETWORK-SN7442N		
0007A					Z17		
0008	00005.000	EA		0222222-7474	NETWORK SN7474N	-SN7474N	
0008A					Z18, Z21, Z22, Z24, Z25		
0009	00001.000	EA		0222222-7123	NETWORK SN74123N		
0009A					Z15		
0010	00001.000	EA		0222222-7150	NETWORK SN74150N		
0010A					Z7		
0011	00004.000	EA		0222222-7163	NETWORK SN74163N		
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BR 1200
APPD. -MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						LM0961642-0003	AB



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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0011A					Z2,Z3,Z4,Z19		
0012	00002.000	EA		0222222-7164	NETWORK SN74164N	TI- -SN74164N	
0012A					Z9,Z11		
0013	00002.000	EA		0222222-7175	NETWORK SN74175N		
0013A					Z1,Z8		
0014	00004.000	EA		0222222-7197	NETWORK SN74197N		
0014A					Z5,Z6,Z27,Z36		
0015	00002.000	EA		0240000-7411	NETWORK-SN74H11N		
0015A					Z14,Z28		
0016	00002.000	EA		0537948-0001	NETWORK SN75150P	TI -SN75150P	
0016A					Z31,Z32		
0017	00001.000	EA		0537947-0001	NETWORK SN75154N	TI -SN75154N	
0017A					Z30		
0018	00001.000	EA		0972924-0015	CAP FIX TANT SOLID 47 MFD 10 % 20 VOLT	QPL -M39003/1-2295	
0018A					C3		
0019	00008.000	EA		0230590-9000	CAP .05 MF 12 V 20. % CER TRANSCAP	EKI -5635-000-Y5FU5	
0019A					C4 THRU C11		
0022	00001.000	EA		0972929-0388	CAP FIX CERAMIC 330 PF 10 % 200 V	QPL -M39014/01-1388	
0022A					C1		
0023	00001.000	EA		0418801-0004	CRYSTAL,QUARTZ 4.000 MHZ HC-18/U	QPL - CR-64/U	
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BR 1200
APPD. MFG		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						LM0961642-0003	AB

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PART NUMBER	REV
LM0961642-0003	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0023A					Y1		
0024	00001.000	EA		0972932-0001	DIODE, 1N914B SWITCHING 75V PIV 75MA 4NS	TI - 1N914B	
0024A					CR1		
0025	00002.000	EA		0231784-6002	DIODE- 4 PELLET, SILICON, MULTI	GE -MPL400	
0025A					CR2,CR3		
0026	00002.000	EA		0972946-0057	RES FIX 470 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0026A					R3,R5		
0027	00002.000	EA		0972946-0055	RES FIX 390 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0027A					R8,R9		
0028	00002.000	EA		0972947-0045	RES FIX 150 OHM 5 % .5 W CARBON FILM	ROH - R-50	
0028A					R10,R1		
0029	00001.000	EA		0972946-0065	RES FIX 1.0K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0029A					R2		
0030	00001.000	EA		0972946-0049	RES FIX 220 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0030A					R4		
0031	00001.000	EA		0972946-0081	RES FIX 4.7K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0031A					R6		
0032	00002.000	EA		0972946-0082	RES FIX 5.1K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0032A					R7,R11		
0033	00001.000	EA		0972057-0001	TRANSISTOR-A5T2222 NPN SILICON	TI- -A5T2222	
DRAFTSMAN		DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BK 1200
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						LM0961642-0003	AB





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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0033A					Q1		
0034	REF	EA		0961593-9901	DIAG.LOG.DET.FULL DUPLEX TTY/EIA MODULE		
0035	REF	EA		0961667-9901	SPEC.FULL DUPLEX TTY/EIA MODULE		
0036	REF	EA		0961675-9901	TEST PROCEDURE FULL DUPLEX TTY/EIA MOD.		
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16878/	
0040	00001.000	EA		0972929-0369	CAP FIX CERAMIC 27.0 PF 10 % 200 V	QPL -M39014/01-1369	
0040A					C12		
0041	00001.000	EA		0533887-0001	EJECTOR,PCB,NGN-LOCKING,WHITE	SCA -S-202 WHITE	
0042	00001.000	EA		0533887-0009	EJECTOR,PCB,NGN-LOCKING,GREEN	SCA -S-202 GREEN	
0045	00024.000	EA		0083654-0003	TERMINAL TURRET TYPE	USE - 2010B	
0045A					E1 THRU E22		
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE,BK 1200
APPD. -MFG		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						<b>LM0901642-0003</b>	AB

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PART NUMBER	REV
<b>LM0901642-0004</b>	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER		
0001	00001.000	EA		0901641-0001	PWB, FULL DUPLEX TTY/EIA MODULE			
0002	00003.000	EA		0222222-7400	NETWORK SN7400N	-SN7400N		
0002A					Z16, Z20, Z35			
0003	00003.000	EA		0222222-7404	NETWORK SN7404N			
0003A					Z10, Z26, Z29			
0004	00003.000	EA		0222222-7408	NETWORK-SN7408N			
0004A					Z12, Z23, Z37			
0005	00002.000	EA		0222222-7410	NETWORK SN7410N	-SN7410N		
0005A					Z13, Z34			
0006	00001.000	EA		0222222-7438	NETWORK SN7438N			
0006A					Z33			
0007	00001.000	EA		0222222-7442	NETWORK-SN7442N			
0007A					Z17			
0008	00005.000	EA		0222222-7474	NETWORK SN7474N	-SN7474N		
0008A					Z18, Z21, Z22, Z24, Z25			
0009	00001.000	EA		0222222-7123	NETWORK SN74123N			
0009A					Z15			
0010	00001.000	EA		0222222-7150	NETWORK SN74150N			
0010A					Z7			
0011	00004.000	EA		0222222-7163	NETWORK SN74163N			
DRAFTSMAN		DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE	
							FULL DUPLEX TTY/EIA MODULE, BR 2400	
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.	
							PART NUMBER	REV
							<b>LM0901642-0004</b>	AB





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PART NUMBER	REV
<b>LM0961642-00C4</b>	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0011A					22,23,24,219		
0012	00002.000	EA		0222222-7164	NETWORK SN74164N	TI- -SN74164N	
0012A					29,211		
0013	00002.000	EA		0222222-7175	NETWORK SN74175N		
0013A					21,28		
0014	00004.000	EA		0222222-7197	NETWORK SN74197N		
0014A					25,26,227,236		
0015	00002.000	EA		0240000-7411	NETWORK-SN74H11N		
0015A					214,228		
0016	00002.000	EA		0537948-0001	NETWORK SN75150P	TI -SN75150P	
0016A					231,232		
0017	00001.000	EA		0537947-0001	NETWORK SN75154N	TI -SN75154N	
0017A					230		
0018	00001.000	EA		0972924-0015	CAP FIX TANT SOLID 47 MFD 10 % 20 VOLT	WPL -M39003/1-2295	
0018A					C3		
0019	00008.000	EA		0230550-9000	CAP .05 MF 12 V 20. % CER TRANSCAP	ERI -5635-000-Y5FG5	
0019A					C4 THRU C11		
0022	00001.000	EA		0972929-0388	CAP FIX CERAMIC 330 PF 10 % 200 V	WPL -M39014/01-1388	
0022A					C1		
0023	00001.000	EA		0418801-0004	CRYSTAL,QUARTZ 4.000 MHZ HC-18/U	WPL - CR-64/U	
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
					FULL DUPLEX TTY/EIA MODULE, BR 2400		
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						<b>LM0961642-00C4</b>	AB

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PART NUMBER	REV
LM0961642-0004	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0023A					Y1		
0024	00001.000	EA		0972932-0J01	DIODE, 1N914B SWITCHING 75V PIV 75MA 4NS	TI - 1N914B	
0024A					CR1		
0025	00002.000	EA		0231784-6J02	DIODE- 4 PELLET, SILICON, MULTI	GE -MPD400	
0025A					CR2,CR3		
0026	00002.000	EA		0972946-0057	RES FIX 470 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0026A					R3,R5		
0027	00002.000	EA		0972946-0055	RES FIX 390 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0027A					R8,R9		
0028	00002.000	EA		0972947-0045	RES FIX 150 OHM 5% .5 W CARBON FILM	ROH - R-50	
0028A					R10,R1		
0029	00001.000	EA		0972946-0065	RES FIX 1.0K OHM 5% .25 W CARBON FILM	ROH - R-25	
0029A					R2		
0030	00001.000	EA		0972946-0049	RES FIX 220 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0030A					R4		
0031	00001.000	EA		0972946-0081	RES FIX 4.7K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0031A					R6		
0032	00002.000	EA		0972946-0082	RES FIX 5.1K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0032A					R7,R11		
0033	00001.000	EA		0972057-0001	TRANSISTOR-A5T2222 NPN SILICON	TI- -A5T2222	
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BK 2400
APPD.-MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						LM0961642-0004	AB



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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0033A					Q1		
0034	REF	EA		0961593-9901	DIAG.LOG.DET.FULL DUPLEX TTY/EIA MODULE		
0035	REF	EA		0961667-9901	SPEC.FULL DUPLEX TTY/EIA MODULE		
0036	REF	EA		0961675-9901	TEST PROCEDURE FULL DUPLEX TTY/EIA MOD.		
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16878/	
0040	00001.000	EA		0972929-0369	CAP FIX CERAMIC 27.0 PF 10 % 200 V	QPL -M39014/01-1369	
0040A					C12		
0041	00001.000	EA		0533887-0001	EJECTOR,PCB,NON-LOCKING,WHITE	SCA -S-202 WHITE	
0042	00001.000	EA		0533887-0009	EJECTOR,PCB,NON-LOCKING,GREEN	SCA -S-202 GREEN	
0045	00024.000	EA		0083654-0003	TERMINAL TURRET TYPE	USE - 20106	
0045A					E1 THRU E22		
DRAFTSMAN		DATE	CRD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BR 2400
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						<b>LM0961642-0004</b>	AB

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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0001	00001.000	EA		0961641-0001	PWB, FULL DUPLEX TTY/EIA MODULE		
0002	00003.000	EA		0222222-7400	NETWORK SN7400N	-SN7400N	
0002A					Z16, Z20, Z35		
0003	00003.000	EA		0222222-7404	NETWORK SN7404N		
0003A					Z10, Z26, Z29		
0004	00003.000	EA		0222222-7408	NETWORK-SN7408N		
0004A					Z12, Z23, Z37		
0005	00002.000	EA		0222222-7410	NETWORK SN7410N	-SN7410N	
0005A					Z13, Z34		
0006	00001.000	EA		0222222-7438	NETWORK SN7438N		
0006A					Z33		
0007	00001.000	EA		0222222-7442	NETWORK-SN7442N		
0007A					Z17		
0008	00005.000	EA		0222222-7474	NETWORK SN7474N	-SN7474N	
0008A					Z18, Z21, Z22, Z24, Z25		
0009	00001.000	EA		0222222-7123	NETWORK SN74123N		
0009A					Z15		
0010	00001.000	EA		0222222-7150	NETWORK SN74150N		
0010A					Z7		
0011	00004.000	EA		0222222-7163	NETWORK SN74163N		
DRAFTSMAN		DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BR 110
APPD -MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0011A					Z2, Z3, Z4, Z19		
0012	00002.000	EA		0222222-7164	NETWORK SN74164N	TI - SN74164N	
0012A					Z9, Z11		
0013	00002.000	EA		0222222-7175	NETWORK SN74175N		
0013A					Z1, Z8		
0014	00004.000	EA		0222222-7197	NETWORK SN74197N		
0014A					Z5, Z6, Z27, Z36		
0015	00002.000	EA		0240000-7411	NETWORK-SN74H11N		
0015A					Z14, Z28		
0016	00002.000	EA		0537948-0001	NETWORK SN75150P	TI - SN75150P	
0016A					Z31, Z32		
0017	00001.000	EA		0537947-0001	NETWORK SN75154N	TI - SN75154N	
0017A					Z30		
0018	00001.000	EA		0972924-0015	CAP FIX TANT SCLID 47 MFD 10 % 20 VOLT	QPL -M39003/1-2295	
0018A					C3		
0019	00008.000	EA		0230590-9000	CAP .05 MF 12 V 20. % CER TRANSCAP	ERI -5635-600-V5F05	
0019A					C4 THRU C11		
0021	00001.000	EA		0535937-0025	CAP, FIX, CERAMIC .47 MF 50V 20%	ERI - 8131-C5G651-	
0021A					C2		
0022	00001.000	EA		0972929-0388	CAP FIX CERAMIC 330 PF 10 % 200 V	QPL -M39014/01-1388	
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BK 110
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						LM0901642-0005	AB

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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0022A					C1		
0023	00001.000	EA		0418801-0004	CRYSTAL, QUARTZ 4.000 MHZ HC-18/U	QPL - CR-64/U	
0023A					Y1		
0024	00001.000	EA		J972932-0001	DIODE, 1N914B SWITCHING 75V PIV 75MA 4NS	TI - 1N914B	
0024A					CR1		
0025	00002.000	EA		0231784-6002	DIODE- 4 PELLETT, SILICON, MULTI	GE -MPD400	
0025A					CR2, CR3		
0026	00002.000	EA		0972946-0057	RES FIX 470 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0026A					R3, R5		
0027	00002.000	EA		J972946-0055	RES FIX 390 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0027A					R8, R9		
0028	00002.000	EA		J972947-0045	RES FIX 150 OHM 5% .5 W CARBON FILM	RUH - R-50	
0028A					R10, R1		
0029	00001.000	EA		J972946-0065	RES FIX 1.0K OHM 5% .25 W CARBON FILM	RUH - R-25	
0029A					R2		
0030	00001.000	EA		0972946-0049	RES FIX 220 OHM 5 % .25 W CARBON FILM	ROH - K-25	
0030A					R4		
0031	00001.000	EA		0972946-0081	RES FIX 4.7K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0031A					R6		
0032	00002.000	EA		0972946-0082	RES FIX 5.1K OHM 5 % .25 W CARBON FILM	RUH - K-25	
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BR 110
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						<b>LM</b> 0961642-0005	AB



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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0032A					R7,R11		
0033	00001.000	EA		J972057-0001	TRANSISTOR-A5T2222 NPN SILICON	TI- -A5T2222	
0033A					Q1		
0034	REF	EA		0961593-9901	DIAG.LOG.DET.FULL DUPLEX TTY/EIA MODULE		
0035	REF	EA		0961667-9901	SPEC.FULL DUPLEX TTY/EIA MODULE		
0036	REF	EA		0961675-9901	TEST PROCEDURE FULL DUPLEX TTY/EIA MOD.		
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16878/4	
0040	00001.000	EA		0972929-0369	CAP FIX CERAMIC 27.0 PF 10 % 200 V	QPL -M39C14/01-1369	
0040A					C12		
0041	00001.000	EA		0533887-0001	EJECTOR,PCB,NCN-LOCKING,WHITE	SCA -S-202 WHITE	
0042	00001.000	EA		0533887-0009	EJECTOR,PCB,NCN-LOCKING,GREEN	SCA -S-202 GREEN	
0045	00024.000	EA		0083694-0003	TERMINAL TURRET TYPE	USE - 2010B	
0045A					E1 THRU E22		
DRAFTSMAN		DATE	CRD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BR 110
APPD. MFG		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						LMJ961642-0005	AB

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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0001	00001.000	EA		0961641-0001	PWB, FULL DUPLEX TTY/EIA MODULE	
0002	00003.000	EA		0222222-7400	NETWORK SN7400N	-SN7400N
0002A					Z16, Z20, Z35	
0003	00003.000	EA		0222222-7404	NETWORK SN7404N	
0003A					Z10, Z26, Z29	
0004	00003.000	EA		0222222-7408	NETWORK-SN7408N	
0004A					Z12, Z23, Z37	
0005	00002.000	EA		0222222-7410	NETWORK SN7410N	-SN7410N
0005A					Z13, Z34	
0006	00001.000	EA		0222222-7438	NETWORK SN7438N	
0006A					Z33	
0007	00001.000	EA		0222222-7442	NETWORK-SN7442N	
0007A					Z17	
0008	00005.000	EA		0222222-7474	NETWORK SN7474N	-SN7474N
0008A					Z18, Z21, Z22, Z24, Z25	
0009	00001.000	EA		0222222-7123	NETWORK SN74123N	
0009A					Z15	
0010	00001.000	EA		0222222-7150	NETWORK SN74150N	
0010A					Z7	
0011	00004.000	EA		0222222-7163	NETWORK SN74163N	

DRAFTSMAN	DATE	CHKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX TTY/EIA MODULE, BR 1760
APPD. -MFG.	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.

PART NUMBER	REV
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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0011A					Z2,Z3,Z4,Z19	
0012	00002.000	EA		0222222-7164	NETWORK SN74164N	TI- -SN74164N
0012A					Z9,Z11	
0013	00002.000	EA		0222222-7175	NETWORK SN74175N	
0013A					Z1,Z8	
0014	00004.000	EA		0222222-7197	NETWORK SN74197N	
0014A					Z5,Z6,Z27,Z30	
0015	00002.000	EA		0240000-7411	NETWORK-SN74H11N	
0015A					Z14,Z28	
0016	00002.000	EA		0537948-0001	NETWORK SN7515JP	TI -SN75150P
0016A					Z31,Z32	
0017	00001.000	EA		0537947-0001	NETWORK SN75154N	TI -SN75154N
0017A					Z30	
0018	00001.000	EA		0972924-0015	CAP FIX TANT SOLID 47 MFD 10 % 20 VOLT	QPL -M39003/1-2295
0018A					C3	
0019	00008.000	EA		0230590-9000	CAP .05 MF 12 V 20. % CER TRANSCAP	ERI -5635-000-Y5F05
0019A					C4 THRU C11	
0022	00001.000	EA		0972929-0388	CAP FIX CERAMIC 330 PF 10 % 200 V	QPL -M39014/01-1388
0022A					C1	
0023	00001.000	EA		0418801-0004	CRYSTAL,QUARTZ 4.000 MHZ HC-18/U	QPL - CR-64/U
DRAFTSMAN	DATE	CHKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX TTY/EIA MODULE,BK 1760
APPD. MFG.	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER
						LM0961642-0006
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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0023A					Y1		
0024	00001.000	EA		0972932-0001	DIODE, IN914B SWITCHING 75V PIV 75MA 4NS	TI - IN914B	
0024A					CR1		
0025	03002.000	EA		0231784-6002	DIODE- 4 PELLET, SILICON, MULTI	GE -MPD400	
0025A					CR2,CR3		
0026	00002.000	EA		0972946-0057	RES FIX 470 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0026A					R3,R5		
0027	00002.000	EA		0972946-0055	RES FIX 390 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0027A					R8,R9		
0028	00002.000	EA		0972947-0045	RES FIX 150 OHM 5% .5 W CARBON FILM	ROH - R-50	
0028A					R10,R1		
0029	03001.000	EA		0972946-0065	RES FIX 1.0K OHM 5% .25 W CARBON FILM	ROH - R-25	
0029A					R2		
0030	00001.000	EA		0972946-0049	RES FIX 220 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0030A					R4		
0031	00001.000	EA		0972946-0081	RES FIX 4.7K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0031A					R6		
0032	00002.000	EA		0972946-0082	RES FIX 5.1K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0032A					R7,R11		
0033	00001.000	EA		0972057-0001	TRANSISTOR-A5T2222 NPN SILICON	TI- -A5T2222	
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BK 1760
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						LM0901642-0006	AB

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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0033A					Q1	
0034	REF	EA		0961593-9901	DIAG.LOG.DET.FULL DUPLEX TTY/EIA MODULE	
0035	REF	EA		0961667-9901	SPEC.FULL DUPLEX TTY/EIA MODULE	
0036	REF	EA		0961675-9901	TEST PROCEDURE FULL DUPLEX TTY/EIA MOD.	
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16878/4
0040	00001.000	EA		0972929-0369	CAP FIX CERAMIC 27.0 PF 10 X 200 V	QPL -M39014/01-1369
0040A					C12	
0041	00001.000	EA		0533887-0J01	EJECTOR,PCB,NCN-LOCKING,WHITE	SCA -S-202 WHITE
0042	00001.000	EA		0533887-0009	EJECTOR,PCB,NCN-LOCKING,GREEN	SCA -S-202 GREEN
0045	00024.000	EA		0083694-0003	TERMINAL TURRET TYPE	USE - 2010B
0045A					E1 THRU E22	

DRAFTSMAN	DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX TTY/EIA MODULE, BR 1760
APPD. MFG.	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.

PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0001	00001.000	EA		0961641-0001	PWB, FULL DUPLEX TTY/EIA MODULE		
0002	00003.000	EA		0222222-7400	NETWORK SN7400N	-SN7400N	
0002A					Z16, Z20, Z35		
0003	00003.000	EA		0222222-7404	NETWORK SN7404N		
0003A					Z10, Z26, Z29		
0004	00003.000	EA		0222222-7408	NETWORK-SN7408N		
0004A					Z12, Z23, Z37		
0005	00002.000	EA		0222222-7410	NETWORK SN7410N	-SN7410N	
0005A					Z13, Z34		
0006	00001.000	EA		0222222-7433	NETWORK SN7438N		
0006A					Z33		
0007	00001.000	EA		0222222-7442	NETWORK-SN7442N		
0007A					Z17		
0008	00005.000	EA		0222222-7474	NETWORK SN7474N	-SN7474N	
0008A					Z18, Z21, Z22, Z24, Z25		
0009	00001.000	EA		0222222-7123	NETWORK SN74123N		
0009A					Z15		
0010	00001.000	EA		0222222-7150	NETWORK SN74150N		
0010A					Z7		
0011	00004.000	EA		0222222-7163	NETWORK SN74163N		
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						FULL DUPLEX TTY/EIA MODULE, BK1200, D/S202	
						PART NUMBER	REV
						<b>LM0961642-0007</b>	AB



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PART NUMBER	REV
<b>LM0961642-0007</b>	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0011A					22,23,24,219		
0012	00002.000	EA		0222222-7164	NETWORK SN74164N	TI- -SN74164N	
0012A					29,211		
0013	00002.000	EA		0222222-7175	NETWORK SN74175N		
0013A					21,28		
0014	00004.000	EA		0222222-7197	NETWORK SN74197N		
0014A					25,26,227,236		
0015	00002.000	EA		0240000-7411	NETWORK-SN74H11N		
0015A					214,228		
0016	00002.000	EA		0537948-0001	NETWORK SN75150P	TI -SN75150P	
0016A					231,232		
0017	00001.000	EA		0537947-0001	NETWORK SN75154N	TI -SN75154N	
0017A					230		
0018	00001.000	EA		0972924-0015	CAP FIX TANT SOLID 47 MFD 10 % 20 VOLT	QPL -M39003/1-2295	
0018A					C3		
0019	00008.000	EA		0230590-9000	CAP .05 MF 12 V 20. % CER TRANSCAP	ERI -5635-000-Y5F05	
0019A					C4 THRU C11		
0022	00001.000	EA		0972929-0388	CAP FIX CERAMIC 330 PF 10 % 200 V	QPL -M39014/01-1380	
0022A					C1		
0023	00001.000	EA		0418801-0004	CRYSTAL,QUARTZ 4.000 MHZ HC-18/U	QPL - CR-64/U	
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE,BK1200,D/S202
APPD. MFG		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						<b>LM0961642-0007</b>	AB

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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0023A					Y1		
0024	00001.000	EA		0972932-0001	DIODE,1N914B SWITCHING 75V PIV 75MA 4NS	TI - 1N914B	
0024A					CR1		
0025	00002.000	EA		0231784-6002	DIODE- 4 PELLET, SILICON,MULTI	GE -MPD400	
0025A					CR2,CR3		
0026	00002.000	EA		0972946-0057	RES FIX 470 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0026A					R3,R5		
0027	00002.000	EA		0972946-0055	RES FIX 390 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0027A					R8,R9		
0028	00002.000	EA		0972947-0045	RES FIX 150 OHM 5% .5 W CARBON FILM	ROH - R-50	
0028A					R10,R1		
0029	00001.000	EA		0972946-0065	RES FIX 1.0K OHM 5% .25 W CARBON FILM	ROH - R-25	
0029A					R2		
0030	00001.000	EA		0972946-0049	RES FIX 220 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0030A					R4		
0031	00001.000	EA		0972946-0081	RES FIX 4.7K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0031A					R6		
0032	00002.000	EA		0972946-0082	RES FIX 5.1K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0032A					R7,R11		
0033	00001.000	EA		0972057-0001	TRANSISTOR-A5T2222 NPN SILICON	TI- -A5T2222	
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
					FULL DUPLEX TTY/EIA MODULE,BR1200,D/S202		
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						LM0961642-0007	AB



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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0033A					Q1		
0034	REF	EA		0961593-9901	DIAG.LOG.DET.FULL DUPLEX TTY/EIA MODULE		
0035	REF	EA		0961667-9901	SPEC.FULL DUPLEX TTY/EIA MODULE		
0036	REF	EA		0961675-9901	TEST PROCEDURE FULL DUPLEX TTY/EIA MOD.		
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLCN,WHITE	QPL - MIL-W-16678/4	
0040	00001.000	EA		0972929-0369	CAP FIX CERAMIC 27.0 PF 10 % 200 V	QPL - M39014/01-1369	
0040A					C12		
0041	00001.000	EA		0533887-0001	EJECTOR,PCB,NON-LOCKING,WHITE	SCA -S-202 WHITE	
0042	00001.000	EA		0533887-0009	EJECTOR,PCB,NON-LOCKING,GREEN	SCA -S-202 GREEN	
0045	00024.000	EA		0083694-0003	TERMINAL TURRET TYPE	USE - 2010B	
0045A					E1 THRU E22		
DRAFTSMAN		DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE,BR1200,D/S202
APPD -MFG		DATE	APPD PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						LM0961642-0007	AB

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<b>LM0961642-0008</b>	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0001	00001.000	EA		0961641-0001	PWB, FULL DUPLEX TTY/EIA MODULE		
0002	00003.000	EA		0222222-7400	NETWORK SN7400N	-SN7400N	
0002A					Z16, Z20, Z35		
0003	00003.000	EA		0222222-7404	NETWORK SN7404N		
0003A					Z10, Z26, Z29		
0004	00003.000	EA		0222222-7408	NETWORK-SN7408N		
0004A					Z12, Z23, Z37		
0005	00002.000	EA		0222222-7410	NETWORK SN7410N	-SN7410N	
0005A					Z13, Z34		
0006	00001.000	EA		0222222-7438	NETWORK SN7438N		
0006A					Z33		
0007	00001.000	EA		0222222-7442	NETWORK-SN7442N		
0007A					Z17		
0008	00005.000	EA		0222222-7474	NETWORK SN7474N	-SN7474N	
0008A					Z18, Z21, Z22, Z24, Z25		
0009	00001.000	EA		0222222-7123	NETWORK SN74123N		
0009A					Z15		
0010	00001.000	EA		0222222-7150	NETWORK SN74150N		
0010A					Z7		
0011	00004.000	EA		0222222-7163	NETWORK SN74163N		
DRAFTSMAN		DATE	CKD DRAFTSMAN	DATE	DESM ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BR1760, D/S202
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0011A					Z2,Z3,Z4,Z19		
0012	00002.000	EA		0222222-7164	NETWORK SN74164N	TI- -SN74164N	
0012A					Z9,Z11		
0013	00002.000	EA		0222222-7175	NETWORK SN74175N		
0013A					Z1,Z8		
0014	00004.000	EA		0222222-7197	NETWORK SN74197N		
0014A					Z5,Z6,Z27,Z36		
0015	00002.000	EA		0240000-7411	NETWORK-SN74H11N		
0015A					Z14,Z28		
0016	00002.000	EA		0537948-0001	NETWORK SN75150P	TI -SN75150P	
0016A					Z31,Z32		
0017	00001.000	EA		0537947-0001	NETWORK SN75154N	TI -SN75154N	
0017A					Z30		
0018	00001.000	EA		0972924-0015	CAP FIX TANT SOLID 47 MFD 10 % 20 VOLT	QPL -M39003/1-2295	
0018A					C3		
0019	00008.000	EA		0230590-9000	CAP .05 MF 12 V 20. % CER TRANSCAP	ERI -5835-000-Y5F05	
0019A					C4 THRU C11		
0022	00001.000	EA		0972929-0388	CAP FIX CERAMIC 330 PF 10 % 200 V	QPL -M39014/01-1388	
0022A					C1		
0023	00001.000	EA		0418801-0004	CRYSTAL,QUARTZ 4.000 MHZ HC-18/U	QPL - CK-64/U	
DRAFTSMAN		DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
APPD-MFG		DATE	APPD PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						FULL DUPLEX TTY/EIA MODULE,BR1760,D/S202	
						PART NUMBER <b>LM0961642-00C8</b> REV AB	

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PART NUMBER  
**LM0961642-0008** REV  
AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0023A					Y1		
0024	00001.000	EA		0972932-0001	DIODE,1N914B SWITCHING 75V PIV 75MA 4NS	TI - 1N914B	
0024A					CR1		
0025	00002.000	EA		0231784-6002	DIODE- 4 PELLET, SILICON,MULTI	GE -MPD400	
0025A					CR2,CR3		
0026	00002.000	EA		0972946-0057	RES FIX 470 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0026A					R3,R5		
0027	00002.000	EA		0972946-0055	RES FIX 390 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0027A					R8,R9		
0028	00002.000	EA		0972947-0045	RES FIX 150 OHM 5% .5 W CARBON FILM	ROH - R-50	
0028A					R10,R1		
0029	00001.000	EA		0972946-0065	RES FIX 1.0K OHM 5% .25 W CARBON FILM	ROH - R-25	
0029A					R2		
0030	00001.000	EA		0972946-0049	RES FIX 220 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0030A					R4		
0031	00001.000	EA		0972946-0081	RES FIX 4.7K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0031A					R6		
0032	00002.000	EA		0972946-0082	RES FIX 5.1K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0032A					R7,R11		
0033	00001.000	EA		0972057-0001	TRANSISTOR-A5T2222 NPN SILICON	TI- -A5T2222	
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE,BR1700,D/S202
APPD.-MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						<b>LM0961642-0008</b>	AB

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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0033A					Q1		
0034	REF	EA		0961593-9901	DIAG.LOG.DET.FULL DUPLEX TTY/EIA MODULE		
0035	REF	EA		0961667-9901	SPEC.FULL DUPLEX TTY/EIA MODULE		
0036	REF	EA		0961675-9901	TEST PROCEDURE FULL DUPLEX TTY/EIA MCD.		
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLCN,WHITE	QPL - MIL-W-16878/4	
0040	00001.000	EA		0972929-0369	CAP FIX CERAMIC 27.0 PF 10 X 200 V	QPL -M39014/01-1369	
0040A					C12		
0041	00001.000	EA		0533887-0001	EJECTOR,PCB,NCN-LOCKING,WHITE	SCA -S-202 WHITE	
0042	00001.000	EA		0533887-0009	EJECTOR,PCB,NCN-LOCKING,GREEN	SCA -S-202 GREEN	
0045	00024.000	EA		0083694-0003	TERMINAL TURRET TYPE	USE - 2010B	
0045A					E1 THRU E22		
DRAFTSMAN		DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE,BR1760,D/S202
APPD MFG		DATE	APPD PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						<b>LM0961642-008</b>	<b>AB</b>

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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0001	00001.000	EA		0961641-0001	PWB, FULL DUPLEX TTY/EIA MODULE		
0002	00003.000	EA		0222222-7400	NETWORK SN7400N	-SN7400N	
0002A					Z16, Z20, Z35		
0003	00003.000	EA		0222222-7404	NETWORK SN7404N		
0003A					Z10, Z26, Z29		
0004	00003.000	EA		0222222-7408	NETWORK-SN7408N		
0004A					Z12, Z23, Z37		
0005	00002.000	EA		0222222-7410	NETWORK SN7410N	-SN7410N	
0005A					Z13, Z34		
0006	00001.000	EA		0222222-7438	NETWORK SN7438N		
0006A					Z33		
0007	00001.000	EA		0222222-7442	NETWORK-SN7442N		
0007A					Z17		
0008	00005.000	EA		0222222-7474	NETWORK SN7474N	-SN7474N	
0008A					Z18, Z21, Z22, Z24, Z25		
0009	00001.000	EA		0222222-7123	NETWORK SN74123N		
0009A					Z15		
0010	00001.000	EA		0222222-7150	NETWORK SN74150N		
0010A					Z7		
0011	00004.000	EA		0222222-7163	NETWORK SN74163N		
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BR 600
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						<b>LM</b> 0961642-0009	AB





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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0011A					22,23,24,219		
0012	00002.000	EA		0222222-7164	NETWORK SN74164N	TI- -SN74164N	
0012A					29,211		
0013	00002.000	EA		0222222-7175	NETWORK SN74175N		
0013A					21,28		
0014	00004.000	EA		0222222-7197	NETWORK SN74197N		
0014A					25,26,227,236		
0015	00002.000	EA		0240000-7411	NETWORK-SN74H11N		
0015A					214,228		
0016	00002.000	EA		0537948-0001	NETWORK SN75150P	TI -SN75150P	
0016A					231,232		
0017	00001.000	EA		0537947-0001	NETWORK SN75154N	TI -SN75154N	
0017A					230		
0018	00001.000	EA		0972924-0015	CAP FIX TANT SOLID 47 MFD 10 % 20 VOLT	QPL -M39003/1-2295	
0018A					C3		
0019	00008.000	EA		0230590-9000	CAP .05 MF 12 V 20. % CER TRANSCAP	ERI -5635-000-Y5F03	
0019A					C4 THRU C11		
0022	00001.000	EA		0972929-0388	CAP FIX CERAMIC 330 PF 10 % 200 V	QPL -M39014/01-1388	
0022A					C1		
0023	00001.000	EA		0418801-0004	CRYSTAL,QUARTZ 4.000 MHZ HC-18/U	QPL - CR-64/U	
DRAFTSMAN		DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BR 600
APPD -MFG		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						LM0961642-0009	AB

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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0023A					Y1		
0024	00001.000	EA		0972932-0001	DIODE, 1N914B SWITCHING 75V PIV 75MA 4NS	TI - IN914B	
0024A					CR1		
0025	00002.000	EA		0231784-0002	DIODE- 4 PELLETT, SILICON, MULTI	GE -MPD400	
0025A					CR2, CR3		
0026	00002.000	EA		0972946-0057	RES FIX 470 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0026A					R3, R5		
0027	00002.000	EA		0972946-0055	RES FIX 390 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0027A					R8, R9		
0028	00002.000	EA		0972947-0045	RES FIX 150 OHM 5% .5 W CARBON FILM	ROH - R-50	
0028A					R10, R1		
0029	00001.000	EA		0972946-0065	RES FIX 1.0K OHM 5% .25 W CARBON FILM	ROH - R-25	
0029A					R2		
0030	00001.000	EA		0972946-0049	RES FIX 220 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0030A					R4		
0031	00001.000	EA		0972946-0081	RES FIX 4.7K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0031A					R6		
0032	00002.000	EA		0972946-0082	RES FIX 5.1K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0032A					R7, R11		
0033	00001.000	EA		0972057-0001	TRANSISTOR-A5T2222 NPN SILICON	TI- -A5T2222	
DRAFTSMAN		DATE	CRD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
APPD. MFG		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						FULL DUPLEX TTY/EIA MODULE, BR 600	
						PART NUMBER	REV
						LM J961642-0009	AB

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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0033A					Q1		
0034	REF	EA		0961593-9901	DIAG.LOG.DET.FULL DUPLEX TTY/EIA MODULE		
0035	REF	EA		0961667-9901	SPEC.FULL DUPLEX TTY/EIA MODULE		
0036	REF	EA		0961675-9901	TEST PROCEDURE FULL DUPLEX TTY/EIA MCD.		
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLCN,WHITE	QPL - MIL-W-16878/4	
0040	00001.000	EA		0972929-0369	CAP FIX CERAMIC 27.0 PF 10 % 200 V	QPL -M39014/01-1369	
0040A					C12		
0041	00001.000	EA		0533887-0001	EJECTOR,PCB,NCN-LOCKING,WHITE	SCA -S-202 WHITE	
0042	00001.000	EA		0533887-0009	EJECTOR,PCB,NCN-LOCKING,GREEN	SCA -S-202 GREEN	
0045	00024.000	EA		0083694-0003	TERMINAL TURRET TYPE	USE - 2010B	
0045A					E1 THRU E22		
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE,BK 600
APPD. MFG		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						LM0961642-0009	AB

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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0001	00001.000	EA		0961641-0001	PWB, FULL DUPLEX TTY/EIA MODULE		
0002	00003.000	EA		0222222-7400	NETWORK SN7400N	-SN7400N	
0002A					Z16, Z20, Z35		
0003	00003.000	EA		0222222-7404	NETWORK SN7404N		
0003A					Z10, Z26, Z29		
0004	00003.000	EA		0222222-7408	NETWORK-SN7408N		
0004A					Z12, Z23, Z37		
0005	00002.000	EA		0222222-7410	NETWORK SN7410N	-SN7410N	
0005A					Z13, Z34		
0006	00001.000	EA		0222222-7438	NETWORK SN7438N		
0006A					Z33		
0007	00001.000	EA		0222222-7442	NETWORK-SN7442N		
0007A					Z17		
0008	00005.000	EA		0222222-7474	NETWORK SN7474N	-SN7474N	
0008A					Z18, Z21, Z22, Z24, Z25		
0009	00001.000	EA		0222222-7123	NETWORK SN74123N		
0009A					Z15		
0010	00001.000	EA		0222222-7150	NETWORK SN74150N		
0010A					Z7		
0011	00004.000	EA		0222222-7163	NETWORK SN74163N		
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BK 4800
APPD. MFG		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO
						PART NUMBER	REV
						<b>LM</b> 0901642-0010	AB

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PART NUMBER	REV
LM0961642-0010	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0011A					Z2,Z3,Z4,Z19		
0012	00002.000	EA		0222222-7164	NETWORK SN74164N	TI- -SN74164N	
0012A					Z9,Z11		
0013	00002.000	EA		0222222-7175	NETWORK SN74175N		
0013A					Z1,Z8		
0014	00004.000	EA		0222222-7197	NETWORK SN74197N		
0014A					Z5,Z6,Z27,Z36		
0015	00002.000	EA		0240000-7411	NETWORK-SN74H11N		
0015A					Z14,Z28		
0016	00002.000	EA		0537948-0001	NETWORK SN75150P	TI -SN75150P	
0016A					Z31,Z32		
0017	00001.000	EA		0537947-0001	NETWORK SN75154N	TI -SN75154N	
0017A					Z30		
0018	00001.000	EA		0972924-0015	CAP FIX TANT SCLID 47 MFD 10 % 20 VOLT	QPL -M39003/1-2295	
0018A					C3		
0019	00008.000	EA		0230550-9000	CAP .05 MF 12 V 20. % CER TRANSCAP	ERI -5635-000-Y5F05	
0019A					C4 THRU C11		
0022	00001.000	EA		0972929-0388	CAP FIX CERAMIC 330 PF 10 % 200 V	QPL -M39014/01-1588	
0022A					C1		
0023	00001.000	EA		0418801-0004	CRYSTAL,QUARTZ 4.000 MHZ HC-18/U	QPL - CR-647U	
DRAFTSMAN		DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BR 4800
APPD -MFG		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0023A					Y1		
0024	00001.000	EA		0972932-0001	DIODE, 1N914B SWITCHING 75V PIV 75MA 4NS	TI - 1N914B	
0024A					CR1		
0025	00002.000	EA		0231784-6002	DIODE- 4 PELLET, SILICON, MULTI	GE -MPD400	
0025A					CR2, CR3		
0026	00002.000	EA		0972946-0057	RES FIX 470 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0026A					R3, R5		
0027	00002.000	EA		0972946-0055	RES FIX 390 OHM 5 % .25 W CARBON FILM	ROH - K-25	
0027A					R8, R9		
0028	00002.000	EA		0972947-0045	RES FIX 150 OHM 5% .5 W CARBON FILM	ROH - R-50	
0028A					R10, R1		
0029	00001.000	EA		0972946-0065	RES FIX 1.0K OHM 5% .25 W CARBON FILM	ROH - K-25	
0029A					R2		
0030	00001.000	EA		0972946-0049	RES FIX 220 OHM 5 % .25 W CARBON FILM	ROH - K-25	
0030A					R4		
0031	00001.000	EA		0972946-0081	RES FIX 4.7K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0031A					R6		
0032	00002.000	EA		0972946-0082	RES FIX 5.1K OHM 5 % .25 W CARBON FILM	ROH - K-25	
0032A					R7, R11		
0033	00001.000	EA		0972057-0001	TRANSISTOR-A5T2222 NPN SILICON	TI- -A5T2222	
DRAFTSMAN		DATE	CRD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BK 4800
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0033A					Q1		
0034	REF	EA		0961593-9901	DIAG.LOG.DET.FULL DUPLEX TTY/EIA MODULE		
0035	REF	EA		0961667-9901	SPEC.FULL DUPLEX TTY/EIA MODULE		
0036	REF	EA		0961675-9901	TEST PROCEDURE FULL DUPLEX TTY/EIA MCD.		
0039	AR	FT		0457313-J006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16876/4	
0040	00001.000	EA		0972929-0369	CAP FIX CERAMIC 27.0 PF 10 % 200 V	QPL - M39014/01-1369	
0040A					C12		
0041	00001.000	EA		0533887-0001	EJECTOR,PCB,NCN-LOCKING,WHITE	SCA -S-202 WHITE	
0042	00001.000	EA		0533887-0009	EJECTOR,PCB,NCN-LOCKING,GREEN	SCA -S-202 GREEN	
0045	00024.000	EA		0083694-0003	TERMINAL TURRET TYPE	USE - 2010B	
0045A					E1 THRU E22		
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							<b>FULL DUPLEX TTY/EIA MODULE, BR 4800</b>
APPD. MFG		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0001	00001.000	EA		0961641-0001	PMB, FULL DUPLEX TTY/EIA MODULE	
0002	00003.000	EA		0222222-7400	NETWORK SN7400N	-SN7400N
0002A					Z16, Z20, Z35	
0003	00003.000	EA		0222222-7404	NETWORK SN7404N	
0003A					Z10, Z26, Z29	
0004	00003.000	EA		0222222-7408	NETWORK-SN7408N	
0004A					Z12, Z23, Z37	
0005	00002.000	EA		0222222-7410	NETWORK SN7410N	-SN7410N
0005A					Z13, Z34	
0006	00001.000	EA		0222222-7438	NETWORK SN7438N	
0006A					Z33	
0007	00001.000	EA		0222222-7442	NETWORK-SN7442N	
0007A					Z17	
0008	00005.000	EA		0222222-7474	NETWORK SN7474N	-SN7474N
0008A					Z18, Z21, Z22, Z24, Z25	
0009	00001.000	EA		0222222-7123	NETWORK SN74123N	
0009A					Z15	
0010	00001.000	EA		0222222-7150	NETWORK SN74150N	
0010A					Z7	
0011	00004.000	EA		0222222-7163	NETWORK SN74163N	

DRAFTSMAN	DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						<b>FULL DUPLEX TTY/EIA MODULE, BR 9600</b>
APPD. MFG.	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.

PART NUMBER	REV
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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0011A					Z2, Z3, Z4, Z19		
0012	00002.000	EA		0222222-7164	NETWORK SN74164N	TI- -SN74164N	
0012A					Z9, Z11		
0013	00002.000	EA		0222222-7175	NETWORK SN74175N		
0013A					Z1, Z8		
0014	00004.000	EA		0222222-7197	NETWORK SN74197N		
0014A					Z5, Z6, Z27, Z36		
0015	00002.000	EA		0240000-7411	NETWORK-SN74H11N		
0015A					Z14, Z28		
0016	00002.000	EA		0537948-0001	NETWORK SN75150P	TI -SN75150P	
0016A					Z31, Z32		
0017	00001.000	EA		0537947-0001	NETWORK SN75154N	TI -SN75154N	
0017A					Z30		
0018	00001.000	EA		0972924-0015	CAP FIX TANT SOLID 47 MFD 10 % 20 VOLT	QPL -M3900371-2295	
0018A					C3		
0019	00008.000	EA		0230590-9000	CAP .05 MF 12 V 20. % CER TRANSCAP	ERI -5235-000-Y5F05	
0019A					C4 THRU C11		
0022	00001.000	EA		0972929-0388	CAP FIX CERAMIC 330 PF 10 % 200 V	QPL -M39014701-1588	
0022A					C1		
0023	00001.000	EA		0418801-0004	CRYSTAL, QUARTZ 4.000 MHZ HC-18/U	QPL - CR-04/U	
DRAFTSMAN		DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BR 9600
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0023A					Y1		
0024	00001.000	EA		0972932-0001	DIODE, 1N914B SWITCHING 75V PIV 75MA 4NS	TI - 1N914B	
0024A					CR1		
0025	00002.000	EA		0231784-6002	DIODE- 4 PELLET, SILICCN, MULTI	GE -MPD400	
0025A					CR2,CR3		
0026	00002.000	EA		0972946-0057	RES FIX 470 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0026A					R3,R5		
0027	00002.000	EA		0972946-0055	RES FIX 390 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0027A					R8,R9		
0028	00002.000	EA		0972947-0045	RES FIX 150 OHM 5% .5 W CARBON FILM	ROH - R-50	
0028A					R10,R1		
0029	00001.000	EA		0972946-0065	RES FIX 1.0K OHM 5% .25 W CARBON FILM	ROH - R-25	
0029A					R2		
0030	00001.000	EA		0972946-0049	RES FIX 220 OHM 5 % .25 W CARBON FILM	ROH - R-25	
0030A					R4		
0031	00001.000	EA		0972946-0081	RES FIX 4.7K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0031A					R6		
0032	00002.000	EA		0972946-0082	RES FIX 5.1K OHM 5 % .25 W CARBON FILM	ROH - R-25	
0032A					R7,R11		
0033	00001.000	EA		0972057-0001	TRANSISTOR-A5T2222 NPN SILICCN	TI- -A5T2222	
DRAFTSMAN		DATE	CRD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
APPD. MFG		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						FULL DUPLEX TTY/EIA MODULE, BR 9600	
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0033A					Q1		
0034	REF	EA		0961593-9901	DIAG.LOG.DET.FULL DUPLEX TTY/EIA MODULE		
0035	REF	EA		0961667-9901	SPEC.FULL DUPLEX TTY/EIA MODULE		
0036	REF	EA		0961675-9901	TEST PROCEDURE FULL DUPLEX TTY/EIA MOD.		
0039	AK	FT		0457313-J006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16878/4	
0040	00001.000	EA		0972929-J369	CAP FIX CERAMIC 27.0 PF 10 % 200 V	QPL -M39014/01-1369	
0040A					C12		
0041	00001.000	EA		0533887-0001	EJECTOR,PCB,NCN-LOCKING,WHITE	SCA -S-202 WHITE	
0042	00001.000	EA		0533887-0009	EJECTOR,PCB,NCN-LOCKING,GREEN	SCA -S-202 GREEN	
0045	00024.000	EA		0083694-0003	TERMINAL TURRET TYPE	USE - 2010B	
0045A					E1 THRU E22		
DRAFTSMAN		DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							FULL DUPLEX TTY/EIA MODULE, BR 9600
APPD -MFG		DATE	APPD PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
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PART NUMBER	REV
LM0961642-0101	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0001	0001.000	EA		0961642-0000	FULL DUPLEX EIA MOD, 990	
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLCN,WHITE	QPL - MIL-W-16878/

DRAFTSMAN	DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX EIA MOD, 990, BR300
APPD. MFG	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.

PART NUMBER	REV
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PART NUMBER	REV
<b>LM0961642-0102</b>	<b>AB</b>

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0001	0J001.000	EA		0961642-0000	FULL DUPLEX EIA MOD, 990	
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16878/

DRAFTSMAN	DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX EIA MOD, 990, BK150
APPD. MFG	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.

PART NUMBER	REV
<b>LM0961642-0102</b>	<b>AB</b>

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<b>LM0901642-0103</b>	<b>AB</b>

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0001	00001.000	EA		0961642-0000	FULL DUPLEX EIA MOD, 990	
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLCN,WHITE	QPL - MIL-W-16878/

DRAFTSMAN	DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX EIA MODULE, BR 1200
APPD. MFG.	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.

PART NUMBER	REV
<b>LM0961642-0103</b>	<b>AB</b>

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PART NUMBER	REV
<b>LM0961642-0104</b>	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0001	00001.000	EA		0961642-0000	FULL DUPLEX EIA MOD, 990	
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16878/

DRAFTSMAN	DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX EIA MOD, 990, BK2400
APPD MFG.	DATE	APPD PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.

PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0031	00001.000	EA		0961642-0000	FULL DUPLEX EIA MOD, 990		
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16876/4	
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
APPD. MFG		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						LM0961642-0105	AB

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PART NUMBER	REV
<b>LMJ961642-0106</b>	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0001	00001.000	EA		0961642-0C00	FULL DUPLEX EIA MOD, 990	
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16878/4

DRAFTSMAN	DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX EIA MOD, 990, BR1760
APPD. MFG.	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.

PART NUMBER	REV
<b>LM0961642-0106</b>	AB

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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0031	0001.000	EA		0961642-0000	FULL DUPLEX EIA MCD, 990	
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16878/4

DRAFTSMAN	DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX EIA MCD, 990, BR1200,D/S202
APPD. MFG.	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.

PART NUMBER	REV
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PART NUMBER	REV
<b>LM0961642-0108</b>	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0001	00001.000	EA		0961642-0000	FULL DUPLEX EIA MOD, 990	
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16876/

DRAFTSMAN	DATE	CRD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX EIA MOD, 990, BR1760,D/S202
APPD MFG	DATE	APPD PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO

PART NUMBER	REV
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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0031	0001.000	EA		0961642-0000	FULL DUPLEX EIA MOD, 990	
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16878/4

DRAFTSMAN	DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX EIA MOD, 990, BR6J0
APPD. MFG.	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.

PART NUMBER	REV
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PART NUMBER	REV
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0001	CCC01.000	EA		0961642-0000	FULL DUPLEX EIA MOD, 990	
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID,TEFLON,WHITE	QPL - MIL-W-16876/

DRAFTSMAN	DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX EIA MOD, 990, BK4800
APPD MFG	DATE	APPD PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.

PART NUMBER	REV
<b>LM0961642-0110</b>	AB

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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0001	00001.000	EA		0961642-0000	FULL DUPLEX EIA MOD, 990	
0039	AR	FT		0457313-0006	WIRE 24 AWG SOLID, TEFLON, WHITE	QPL - MIL-W-16878/4

DRAFTSMAN	DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX EIA MOD, 990, BR9600
APPD. MFG.	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.

<b>LM</b> 0961642-0111	PART NUMBER	REV
		AB





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PART NUMBER	REV
LM0901042-0960	AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0001	0001.000	EA		0966375-9701	MANUAL, CRU FULL DUPLEX COMM. MODULE 96JA	

DRAFTSMAN	DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						FULL DUPLEX TTY/EIA MODULE-DOCUMENTATION.
APPD MFG	DATE	APPD PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO

PART NUMBER	REV
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LM0901042-0990 AB

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0001	CCC01.000	EA		0943454-9701	990 CRU FULL DUPLEX TTY/EIA UM		
DRAFTSMAN		DATE	CKD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
APPD. MFG		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO
						FULL DUPLEX EIA MOD, 990, DOCUMENTATION	
						LM0901042-0990 AB	

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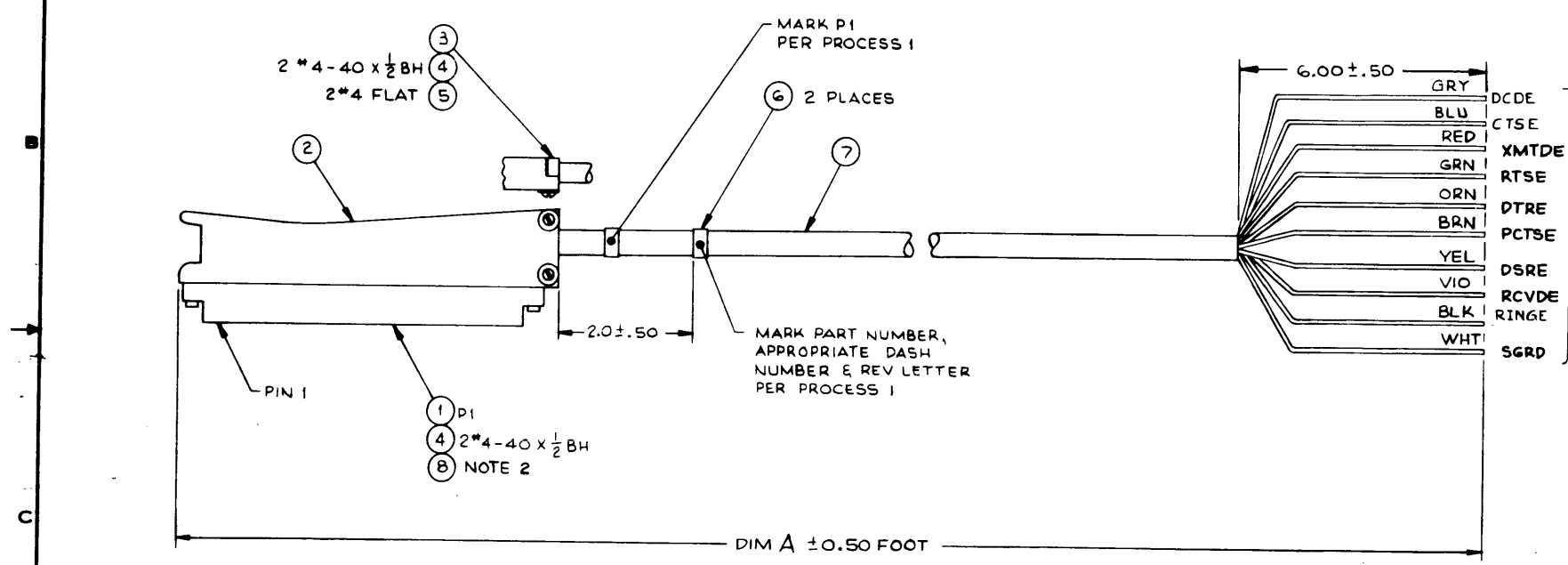


WIRE NO.	DESCRIPTION	TOTAL LENGTH	SIGNATURE	COMPONENT CONNECTION FOR START STATION	COMPONENT CONNECTION FOR FINISH STATION	REMARKS	N/A ITEM NO.
1	RED	AR	XMTDE	PI - 27		NOTE 3	7
2	GRN		RTSE	28			7
3	ORN		DTRE	25			7
4	BRN		PCTSE	5			7
5	YEL		DSRE	31			7
6	VIO		RCVDE	29			7
7	BLK		RINGE	18			7
8	WHT		SGRD	19		NOTE 3	7
9	BLU		CTSE	19		NOTE 3	7
10	GRY		DCDE	30			7
11	22AWG, TFE, WHT		XMTD -	F	PI - H		9
12	22AWG, IPC, WHT		EIARC/VOLT/ EIARC/VIN	L	PI - 21		9
13	22AWG, IPC, WHT	AR	GRD/TYRCVIN -	PI - Z	PI - 22		9
14	22AWG, TFE, WHT	AR	XMTD	PI - D	PI - E		9

NOTES:

- ~~1. LOCK ENDS OF SPARE WIRES & INSERT ENDS INTO CABLE INSULATION (2 WIRES - BOTH ENDS)~~
2. INSTALL ITEM 8 BETWEEN CONTACT POSITIONS 8 & 9.
3. TAG END OF WIRE WITH APPROPRIATE SIGNATURE.
4. REEVE SOLDERED TERMINATIONS IN CARD EDGE 36 POSITION CONNECTORS. USE .50 INCH PER TERMINATION RE SLEEVING (ITEM 11) PROVIDED.

REV	DESCRIPTION	DATE	APP'D
A	376881E1A, Order 5-15-73 (1) P/N OF ITEM 9 WAS 236525-0009 (2) WIRE 10 WAS GRD - A, WIRE 9 AND 10 WAS SPARE (3) WIRE 11 WAS DCDE / DCDE, PI-6, PI-30 (4) ADDED WIRE 4 (5) ADDED WIRE 9 AND 10 TO PICTORIAL (6) DELETED NOTE 1 AND CHG OUT TO F/D (7) DESCRIPTION OF WIRE 12 + 13 WHS --- TFE ---	5-15-73	J. L. B.
B	3/16 P/B (D) R.D. 2 Yrs (1) ADDED ITEM 10 TO L/M	4/27/74	J. L. B.
C	4/11/74 (C) 2 Yrs (1) W/ 0030 LM (1) W/ 1 WAS 230250-0070	10/2/75	J. L. B.
D	(1) W/ 4 390 (C) C. LONGMANS (1) ADDED NOTE 4 TO F/D (2) ADDED ITEM 11 TO L.M.	8-16-77	J. L. B.



240808 - XXXX  
BASIC PART NO.  
DIM A IN FEET

QTY REQD	ISSUE	UNIT OF MEAS	SIZE	PART NUMBER	DESCRIPTION	VENOR PART NUMBER
					1. HOT STAMP, FIOC, HEIGHT .12, COLOR BLACK	
			8100	A	226700	
			1502	A	960700	
			7503		960700	

UNLESS OTHERWISE SPECIFIED:
DECIMAL XX - 02 XXX - 010
FRACTIONAL - 1/64 ANGULAR = 1:
CONCENTRICITY MACHINED DIAMETERS .004 TIR
ALL DIMENSIONS TO BE MET BEFORE PLATING
REMOVE ALL BURRS AND SHARP EDGES
DO NOT SCALE THIS DRAWING
ALL DIMENSIONS IN INCHES
SURFACES MARKED ✓ TO HAVE
DRILLED HOLE TOLERANCES
013 TO 134 - .003 136 TO 250 - .005
250 AND ABOVE - .001

QTY REQD	ISSUE	UNIT OF MEAS	SIZE	PART NUMBER	DESCRIPTION	VENOR PART NUMBER
					TEXAS INSTRUMENTS INCORPORATED INDUSTRIAL PRODUCTS DIVISION HOUSTON, TEXAS	
					UNIVERSAL EIA TERMINAL CABLE	
					8100	
					COMPUTER	
					D 240808	



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PAGE 1 of

PART NUMBER  
**LM02408C8-0030** REV  
**D**

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0001	00001.000	EA		0231447-0800	CONNECTOR PC 36 PIN	VIK -2VH-36/1CN-5	
0001A					P1		
0002	00001.000	EA		0214080-0001	CONNECTOR-COVER		
0003	00001.000	EA		0214081-0001	CLAMP		
0004	00004.000	EA		0972988-0017	SCREW 4-40 X .500 PAN HEAD CRES		
0005	00002.000	EA		0416622-0011	WASHER #4 FLAT	QPL - AN960C4L	
0006	00002.000	EA		0418201-0060	STRAP, MARKER, ADJUSTABLE, PLASTIC	QPL-MS-3368-1-9B	
0007	00031.000	FT		0972444-0001	CABLE, 10COND 22AWG UL LISTED		
0008	00001.000	EA		0539908-0001	CONNECTOR KEY POLARIZING PLASTIC	VIK -091-0034-000	
0009	AR	FT		0538347-3999	WIRE HOOKUP B-22 AWG 19 STR WHITE	JUD - HH0115	
0010	REF	EA		0973585-9901	UNIT TEST PROCEDURE		
0011	00002.500	FT		0410499-0010	INSULATION SLEEVING, TEFLON #14 NATURAL	QPL -81349	
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
			<i>R. Hedrick</i>	6-15-77			UNIVERSAL EIA TERMINAL CABLE
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
							5100 8181 8190 7502 7504
						PART NUMBER	REV
						<b>LM02408C8-0030</b>	<b>D</b>

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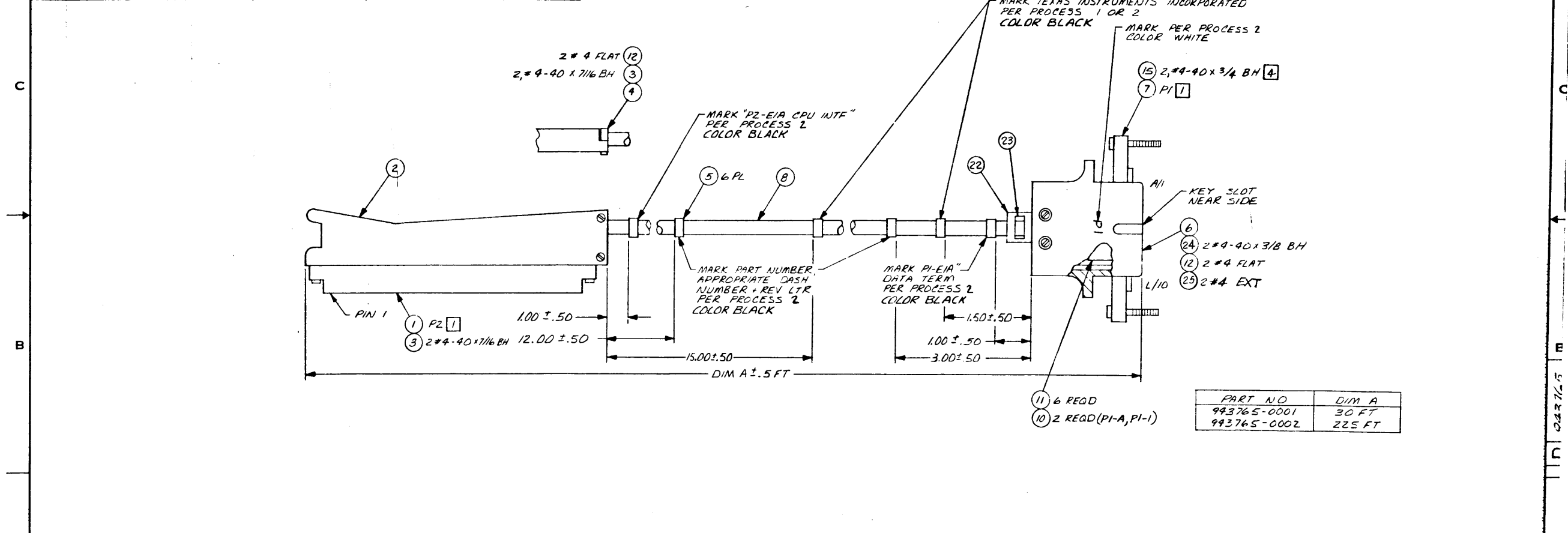




WIRE NO.	DESCRIPTION	TOTAL LENGTH	START STATION	FINISH STATION	COMPONENT CONNECTION FOR START STATION	COMPONENT CONNECTION FOR FINISH STATION	REMARKS	PL ITEM NO.
1	RED	AR			PZ-27	PI-10	XMTD/RVDE	8
2	BLK				PZ-2	PI-3	SGRD	8
3	GRN				PZ-28	PI-K	RTSE+DCDE	8
4	BLK				PZ-8	PI-3	SGRD	8
5	ORN				PZ-25	PI-9	DTRE+DSRE	8
6	BLK				PZ-1	PI-3	SGRD	8
7	BRN				PZ-5	PI-8	RTSE+CTSE	8
8	BLK				PZ-A	PI-3	SGRD	8
9	YEL				PZ-31	PI-6	DSRE+DTRE	8
10	BLK				PZ-36	PI-3	SGRD	8
11	BLU				PZ-29	PI-H	RVDE+XMTD	8
12	BLK				PZ-R	PI-3	SGRD	8
13	NO 22	WHT			PZ-5	PZ-19	RTSE+CTSE	9
14					PZ-6	PZ-30	RTSE+DCDE	9
15					PZ-L	PZ-21	RVDE/LA+RVDE/IN	9
16					PZ-22	PZ-2	RVDE/IN*(GND)	9
17	NO 22	WHT	AR		PZ-H	PZ-F	XMTD/A+XMTD	9
18	NO 22	WHT	AR		PZ-E	PZ-D	XMTD/A+XMTD	9

- NOTES:
- DISCARD HARDWARE IF SUPPLIED BY VENDOR
  - QA PERSONNEL ARE TO REEXAMINE THE ITEM TO BE IN HOLD ITEM 19 WHEN REQUIRED BY WORK ORDER
  - CONNECT ALL SGRD WIRES TO PI-7 BUS BAR AND INSULATE WITH ITEM 19.
  - PLACE TWO SCREWS (ITEM 15) IN BAG (ITEM 21) AND ATTACH TO CABLE. SCREWS ARE USED WHEN MOUNTING CONNECTOR (PI) TO MATING CONNECTOR.
  - SLEEVE SOLDERED TERMINATIONS ON CARD EDGE 3/16 POSITION CONNECTORS. USE .50 INCH PER TERMINATION OF SLEEVING (ITEM 26) PROVIDED

ZONE	LTR	DESCRIPTION	DATE	APPROVED
A		CN392218(C) G. Gans (1) REVISED LM; PICTORIAL; AND BALLOON CALLOUTS	9/21/76	[Signature]
B		CN417991(B) G. Gans (1) DELETED NOTE 2 (2) DELETED BALLOON 14 AND REVISED PICTORIAL (3) REVISED LM - 1 & 2	9-28-76	[Signature]
C		CN421928 (D) R. P. Gans (1) CN LM-14-2 ASSY ADDED ITEM 25 (2) DELETED ITEM 17 IN LM & F/D	1-22-77	[Signature]
D		CN424390 (C) G. WILLIAMS (1) ADDED NOTE 5 (2) ADDED LM ITEM 26 AND 27	8-16-77	[Signature]



PART NO	DIM A
993765-0001	30 FT
993765-0002	225 FT

QTY REQD	ITEM NO	CODE IDENT	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	PROCUREMENT SPECIFICATION
1	1		993765-0001	CABLE ASSY, EIA DATA TERMINAL	
1	2		993765-0002		

UNLESS OTHERWISE SPECIFIED

- REMOVE ALL BURRS AND SHARP EDGES
- CONCENTRICITY MACHINED
- DIAMETERS .010 P/R
- DIMENSIONAL LIMITS APPLY BEFORE FINISH PROCESSING
- IDENTIFYING NUMBERS SHOWN IN PARENTHESES FOR REFERENCE ONLY
- INTERPRET DRAWING IN ACCORDANCE WITH MIL-STD-100

HOLE TOLERANCE

0.125 - .004	1.250 - .005	.250 - .005
1.250 - .005	.250 - .005	.250 - .005
.250 - .005	.250 - .010	.250 - .005
.250 - .005	.250 - .005	.250 - .005

UNLESS OTHERWISE SPECIFIED

- DIMENSIONS ARE IN INCHES
- TOLERANCES
- ANGLES ±1
- 3 PLACE DECIMALS ±0.001
- 2 PLACE DECIMALS ±0.02

TEXAS INSTRUMENTS INCORPORATED Equipment Group Dallas, Texas

D 96214 993765

- PROCESSES:
- MARK PER F-100, METHOD II, CLASS I, HEIGHT .075
  - MARK PER F-100, METHOD III, CLASS 10, COLOR AS NOTED, TYPE 6
  - 3 SOLDER PER F-127, METHOD 1



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<b>LM</b> 0943765-0001	PART NUMBER	REV
		U

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0001	00001.000	EA		0231447-J800	CONNECTOR PC 36 PIN	VIK -2VH-36/1CN-5	
0001A					P2		
0002	00001.000	EA		0214060-0001	CONNECTOR-COVER		
0003	00004.000	EA		0972988-0016	SCREW 4-40 X .438 PAN HEAD CRCS		
0004	00001.000	EA		0214081-0001	CLAMP		
0005	00006.000	EA		0418201-0060	STRAP, MARKER, ADJUSTABLE, PLASTIC	GPL-MS-3368-1-9B	
0006	00001.000	EA		0960914-0001	HOOD, I/O CONNECTOR 10 PIN		
0007	00001.000	EA		0232118-0075	HOUSING CONN. PC 10 DUAL POS PHENOLIC	AMP -582963-2	
0007A					P1		
0008	00031.000	FT		0800563-0106	CABLE, 22 AWG PVC 6 PAIRS UNSHIELD		
0009	AR	FT		0538347-3959	WIRE HOOKUP B-22 AWG 19 STR WHITE	JUC - HH0115	
0010	00002.000	EA		0235411-0050	SPRING RETAINING 42973-3	AMP -42973-3	
0011	00006.000	EA		0231553-0010	CONTACT LEAF 42717-3	AMP -42717-3	
0012	00004.000	EA		0416622-0011	WASHER #4 FLAT	QPL - AN960C4L	
0013	REF	EA		0946857-9901	TEST PROC, UNIT, OMNI, ELECTRICAL		
0015	00002.000	EA		0972988-0019	SCREW 4-40 X .750 PAN HEAD CRCS		
0019	AR	FT		0417177-0006	INSULATION SLEEVING, ELECT-HEAT SHRINK	KAC -	
0020	AR	FT		0411400-0018	WIRE, BARE TINNED, 18AWG, COPPER BUS	IWP -18-630	
0021	00001.000	EA		0532997-0012	BAG, POLYETHYLENE, HEAT SEALED		
0022	00001.000	EA		0981301-0001	CABLE BRACKET		
DRAFTSMAN		DATE	CHKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
			<i>R. [Signature]</i>	6-15-77			CABLE ASSY, EIA DATA TERMINAL
APPD. -MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
							7502
						PART NUMBER	REV
						<b>LM</b> 0943765-0001	U

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<b>LM</b> J943765-0001	REV D
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PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0023	00001.000	EA		0418212-0010	STRAP, TIEDOWN, ADJUSTABLE, PLASTIC	QPL - MS3307-1-9
0024	00002.000	EA		0972988-0015	SCREW 4-40 X .375 PAN HEAD CRES	
0025	00002.000	EA		0411101-0057	LOCKWASHER # 4 EXTERNAL TOOTH CRES	QPL - MS35335-57
0026	00002.500	FT		0410499-0010	INSULATION SLEEVING, TEFLON #14 NATURAL	QPL - 81349
0027	00000.167	FT		0410499-0011	INSULATION SLEEVING, TEFLON #12 NATURAL	

DRAFTSMAN	DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						CABLE ASSY, EIA DATA TERMINAL
APPD. MFG.	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.

<b>LM</b> J943765-0001	REV L
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PART NUMBER REV  
**LM** J943765-0002 0

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER	
0001	00001.000	EA		023147-0800	CONNECTOR PC 36 PIN	VIK -2VH-36/1CN-5	
0001A					P2		
0002	00001.000	EA		0214080-0001	CONNECTOR-COVER		
0003	00004.000	EA		0972988-0010	SCREW 4-40 X .438 PAN HEAD CRCS		
0004	00001.000	EA		0214081-0001	CLAMP		
0005	00006.000	EA		0418201-0000	STRAP, MARKER, ADJUSTABLE, PLASTIC	QPL-MS-3308-1-9b	
0006	00001.000	EA		0903914-0001	HOOD, I/O CONNECTOR 10 PIN		
0007	00001.000	EA		0232118-0075	HOUSING CONN. PC 10 DUAL POS PHENOLIC	AMP -582963-2	
0007A					P1		
0008	00227.000	FT		0800563-0100	CABLE, 22 AWG PVC 6 PAIRS UNSHIELD		
0009	AR	FT		0538347-3859	WIRE HOOKUP B-22 AWG 19 STR WHITE	JUL - HF0115	
0010	00002.000	EA		0235411-0050	SPRING RETAINING 42973-3	AMP -42973-3	
0011	00007.000	EA		0231553-0010	CONTACT LEAF 42717-3	AMP -42717-3	
0012	00002.000	EA		0410022-0011	WASHER #4 FLAT	QPL - AN96004L	
0013	REF	EA		0946857-9901	TEST PROC, UNIT, CMNI, ELECTRICAL		
0015	00002.000	EA		0972988-0019	SCREW 4-40 X .750 PAN HEAD CRCS		
0019	AR	FT		0417177-0000	INSULATION SLEEVING, ELECT-HEAT SHRINK	KAC -	
0020	AR	FT		0411400-0018	WIRE, BARE TINNED, 18AWG, COPPER BUS	IWP -18-030	
0021	00001.000	EA		0532957-0012	BAG, POLYETHYLENE, FEAT SEALED		
0022	00001.000	EA		0981301-0001	CABLE BRACKET		
DRAFTSMAN		DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
							CABLE ASSY, EIA DATA TERMINAL
APPD. MFG.		DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						PART NUMBER	REV
						<b>LM</b> J943765-0002	0

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PART NUMBER	REV
LM0943705-0002	0

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0023	00001.000	EA		0418212-0010	STRAP, TIEDOWN, ADJUSTABLE, PLASTIC	QPL - MS3367-1-9
0024	00002.000	EA		0972988-0015	SCREW 4-40 X .375 PAN HEAD CRCS	
0025	00002.000	EA		0411101-0057	LOCKWASHER # 4 EXTERNAL TOOTH CRCS	QPL - MS35335-57
0026	00002.500	FT		0410499-0010	INSULATION SLEEVING, TEFLON #14 NATURAL	QPL - 81349
0027	00000.167	FT		0410499-0011	INSULATION SLEEVING, TEFLON #12 NATURAL	

DRAFTSMAN	DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
						CABLE ASSY, EIA DATA TERMINAL
APPD. MFG	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.

PART NUMBER	REV
LM0943705-0002	0

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**LIST OF MATERIAL**

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PART NUMBER	REV
<b>LM 966304-0001</b>	<b>A</b>

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0001	0001.000	EA		240812-0001	CONNECTOR TEST-EIA CKF	
0002	REF	EA		966375-9701	MANUAL, CRU FULL DUPLEX COMM. MODULE 960A	
0003	REF	EA		962654-0001	CDD, EIACKE, FDPLX EIA TEST-PDT960A	
0004	REF	EA		962665-0001	PTD, PTHAN, FDPLX TTY PT DSR-PSM960A	-PSM960A

DRAFTSMAN	DATE	CD DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
<i>R. Williams</i>	8-1-73	<i>Paulie. Adams</i>	7/24			TEST KIT, FULL DUPLEX/EIA MODULE
APPD-MFG.	DATE	APPD PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
				<i>[Signature]</i>	8-1-73	B100
						FILED
						LM 966304-0001
						REV A

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WIRE NO.	DESCRIPTION	LENGTH	SIGNATURE	START	FINISH	REMARKS	LM ITEM NO.	REVISIONS				
								ZONE	LTR	DESCRIPTION	DATE	APPROVED
1	#24 IPVC WHITE	AR	TTYRCVIN/6RD	PI-22	PI-2		4	NOTES: 1. SLEEVE SOLDERED TERMINATIONS ON CARD EDGE 36 POSITION CONNECTORS. USE 50 INCH PER TERMINATION OF SLEEVING (ITEM 8) PROVIDED.	A	374001 D R. Cantli 6-13-72	10/17/72	<i>[Signature]</i>
2	#24 IPVC WHITE	AR	EIARCYDIN/EIARCYDOUT	PI-21	PI-L		4		B	378902 (E) 8-17-73 <i>Chuck Alabaz</i>	8/17/73	<i>[Signature]</i>
3	#24 IPVC WHITE	AR	DTRE/DSRE	PI-25	PI-31		4			1. REDRAWN WITH CHANGES. 2. ON LM: ADDED ITEMS, ITEM 3, ITEM 4, ITEM 6, & ITEM 7. 3. DELETED LM ON F/D GENERATED COMPUTER LM. 4. ADDED PROCESS 1.		
4	#24 IPVC WHITE	AR	RCTE/RCRE	PI-26	PI-32		4					
5	#24 IPVC WHITE	AR	XMTDE/RCYDE	PI-27	PI-29		4					
6	#24 IPVC WHITE	AR	RTSE/DCDE	PI-28	PI-30		4					
								C	(N) 824390 (C) 1. To Hk (1) ADDED NOTE 1 (2) ADDED ITEM B.	8-12-77	<i>[Signature]</i>	

PROCESSES:

1. RUBBER STAMP PER F-100, HEIGHT .12, COLOR BLACK

-2		-1		ITEM NO.	CODE IDENT	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	PROCUREMENT SPECIFICATION
QTY REQD								
PARTS LIST								
UNLESS OTHERWISE SPECIFIED				UNLESS OTHERWISE SPECIFIED				DWN <i>R. Cantli</i> 6-13-72 CHK <i>D. Heath Jr</i> 6-14-72 ENGR <i>[Signature]</i> 6/13/72 QA <i>[Signature]</i> 10-4-72 APVD <i>[Signature]</i> 2/18/76 CONTR NO DESIGN ACTIVITY RELEASE <i>[Signature]</i> 10/16/72
REMOVE ALL BURRS AND SHARP EDGES CONCENTRICITY MACHINED DIAMETERS .010 FIR DIMENSIONAL LIMITS APPLY BEFORE FINISH PROCESSING IDENTIFYING NUMBERS SHOWN IN PARENTHESES FOR REFERENCE ONLY INTERPRET DRAWING IN ACCORDANCE WITH MIL STD 100				DIMENSIONS ARE IN INCHES TOLERANCES: ANGLES ± 1° 3 PLACE DECIMALS ± .010 2 PLACE DECIMALS ± .02				 <b>CONNECTOR TEST-EIACKF</b>
HOLE TOLERANCE .013 + .004 THRU .126 + .005 THRU .250 + .006 THRU .500 + .008 THRU 1.000 .001 - .001 THRU .250 - .001 THRU .500 - .001 THRU 1.000 - .001 THRU 2.000 - .001				MATERIAL: 961675 1502 966304 8960 961675 8100 NEXT ASSY USED ON APPLICATION				SIZE CODE IDENT NO DRAWING NO <b>C 96214 240812</b>
SCALE NONE								SHEET

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INCORPORATED

DATE 06/14/77

LIST OF MATERIAL

PAGE 1 of

PART NUMBER	REV
LM0240812-0001	C

PRINT ITEM NUMBER	QUANTITY PER ASSEMBLY	UNIT OF ISSUE	DWG. SIZE	PART NUMBER	DESCRIPTION	VENDOR PART NUMBER
0001	00001.000	EA		0231447-0800	CONNECTOR PC 36 PIN	VIK - 2VH-36/ICN-5
0001A					P1	
0002	00002.000	EA		0972988-0017	SCREW 4-40 X .500 PAN HEAD CRES	
0003	00001.000	EA		0214080-0001	CONNECTOR-COVER	
0004	AK	FT		0538347-2999	WIRE HOOKUP B-24 AWG 19 STR WHITE	JUD - HH0112
0005	00001.000	EA		0214081-0001	CLAMP	
0006	00002.000	EA		0972988-0016	SCREW 4-40 X .438 PAN HEAD CRES	
0007	00002.000	EA		0416622-0011	WASHER #4 FLAT	QPL - AN960C4L
0008	00002.500	FT		0410499-0010	INSULATION SLEEVING,TEFLON #14 NATURAL	QPL - 81349

DRAFTSMAN	DATE	CKD. DRAFTSMAN	DATE	DESIGN ENGINEER	DATE	TITLE
		<i>R. [Signature]</i>	6-15-77			CONNECTOR TEST-EIA CKF
APPD. MFG	DATE	APPD. PROJECT ENGINEER	DATE	RELEASED	DATE	PROJECT NO.
						8100

PART NUMBER	REV
LM0240812-0001	C





**SECTION VII**  
**LOGIC IMPLEMENTATION LIST**

(NOT APPLICABLE)



## SECTION VIII

### PERFORMANCE DEMONSTRATION TEST

#### 8.1 INTRODUCTION

The Full Duplex Module is tested by executing the EIA Interface Module Test (EIACKF). This test along with the related implementation instructions are included in the following paragraphs.

#### NOTE

All numbers in text are hexadecimal (base 16) numbers.

#### 8.2 CRU EIA TEST

The Full-Duplex CRU EIA Interface Module Test is called EIACKF. It is used to check the operational integrity of the Full-Duplex TTY/EIA Interface Module for EIA interfaces. No external input/output device is required for the test. An EIACKF test connector is plugged onto the top edge of the TTY/EIA module being tested. The connector must be wired into a closed loop so that signals transmitted on the output lines are fed directly into the receive lines. The Data Terminal Ready line must be connected to the Data Set Ready line. The Request to Send line must be connected to the Data Carrier Detect line. Execution of this routine assumes that the reliability of the instruction set and the CPU have been confirmed.

**8.2.1 RELATED MATERIAL.** The source deck, object deck and object tape are included in the related material and are listed as follows:

- EIACKF Source Deck (TI Part No. 962653-2201)
- EIACKF Object Deck (TI Part No. 962653-1201)
- EIACKF Object Tape (TI Part No. 962653-1101)

**8.2.2 EQUIPMENT CONFIGURATION.** The system configuration is as follows:

- A Model 960 Computer with at least 4096 words of memory.
- Full-Duplex TTY/EIA Interface Module installed in CRU location X'F30' with the EIACKF test connector attached. ■
- Either a card reader, a paper tape reader or a 733 ASR terminal and the appropriate CRU interface are required to load the object program.
- Test Kit, TI 966304.

**8.2.3 DATA STRUCTURE.** Data blocks are an integral part of the loaded program and do not require reinitialization during execution. Repeated executions from initial loading may also be accomplished without further action on data blocks.



**8.2.4 PROGRAM STRUCTURE.** The EIACKF program flow chart is shown in figure 8-1. EIACKF is a single procedure segment. Normal execution accomplishes the following functions:

1. The status register is loaded for supervisor mode execution, preindexing, and masking of all interrupts.
2. Data base, procedure base, CRU base, and flag base registers are set for proper program execution. The CRU interrupt trap is set up.
3. All output and interrupt lines are cleared. The interface receive signals are input from the CRU to verify that the status of the lines is correct.
4. The data terminal ready line is turned on and the input line status is checked.
5. The new status flag is cleared and the request-to-send line is turned on. A check is then made to insure the TTY/EIA interface card will interrupt the CPU. After verifying that the status of the input lines is correct, the new status flag is again cleared and the request-to-send line is turned off. A check of the status of the input lines is also made here. A check is then made to insure the TTY/EIA interface module will not interrupt the CPU.
6. All possible bit configurations (0000 to 00FF) are transmitted to and then input from the module. Each time a character is output and received, the input character is checked to be sure that it is the same as the character which was transmitted.
7. The bit pattern  $33_{16}$  is transmitted and received 50 times. The received character is verified each time.
8. This step is the same as step 7 except the bit pattern FF is transmitted.
9. This step is the same as step 7 except the bit pattern  $55_{16}$  is transmitted.
10. A character is transmitted continuously five times, clearing only the write request flag and ignoring the read request line. The timing error signal is checked to verify that it is on.
11. Control is returned to the loader if no errors have occurred.
12. Any test failure causes the program to halt, with the relative halt address displayed in Instruction Register B. Cause of failure can be located by comparison of this address with the location counter on the assembly listing (962653-9902).

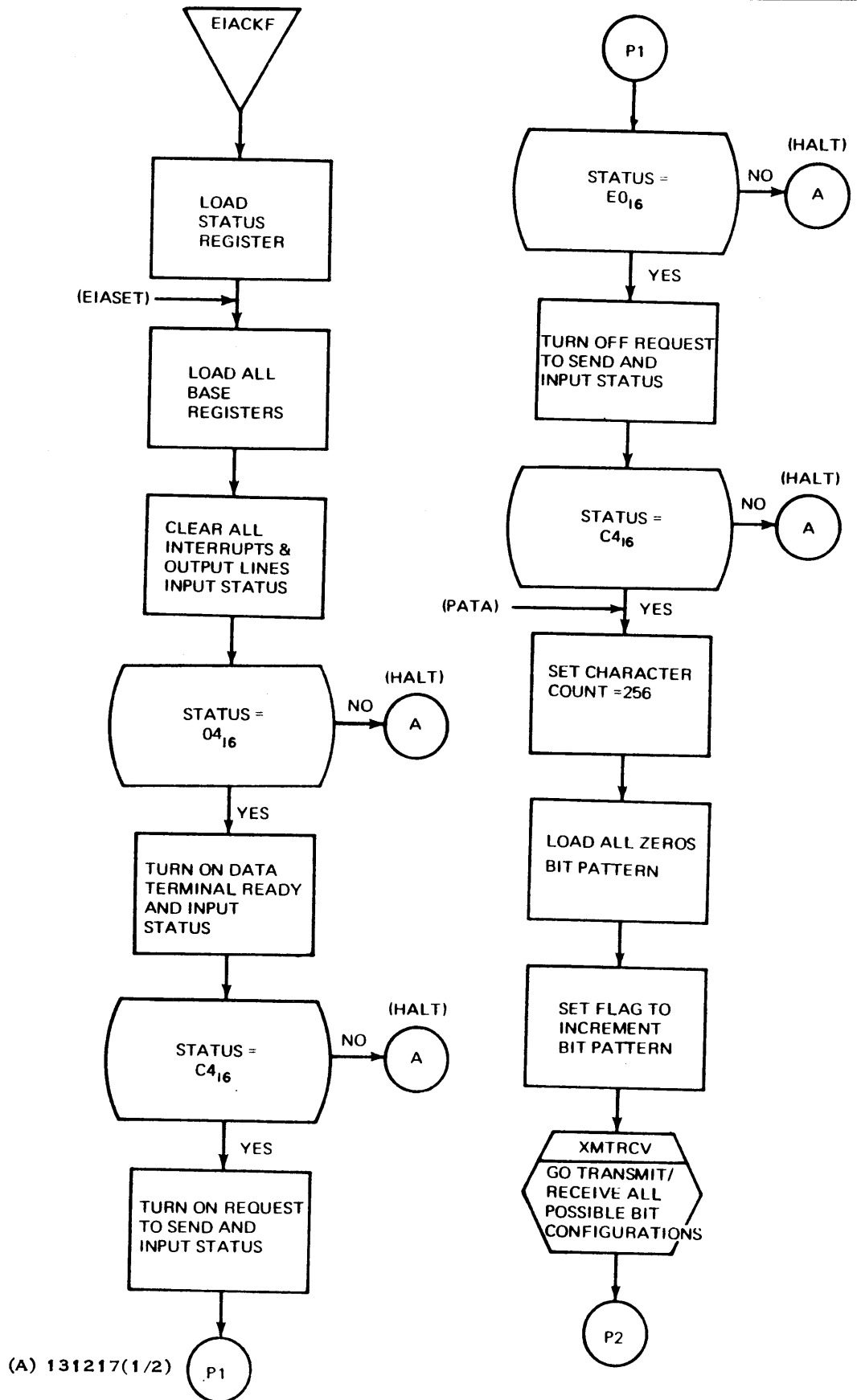
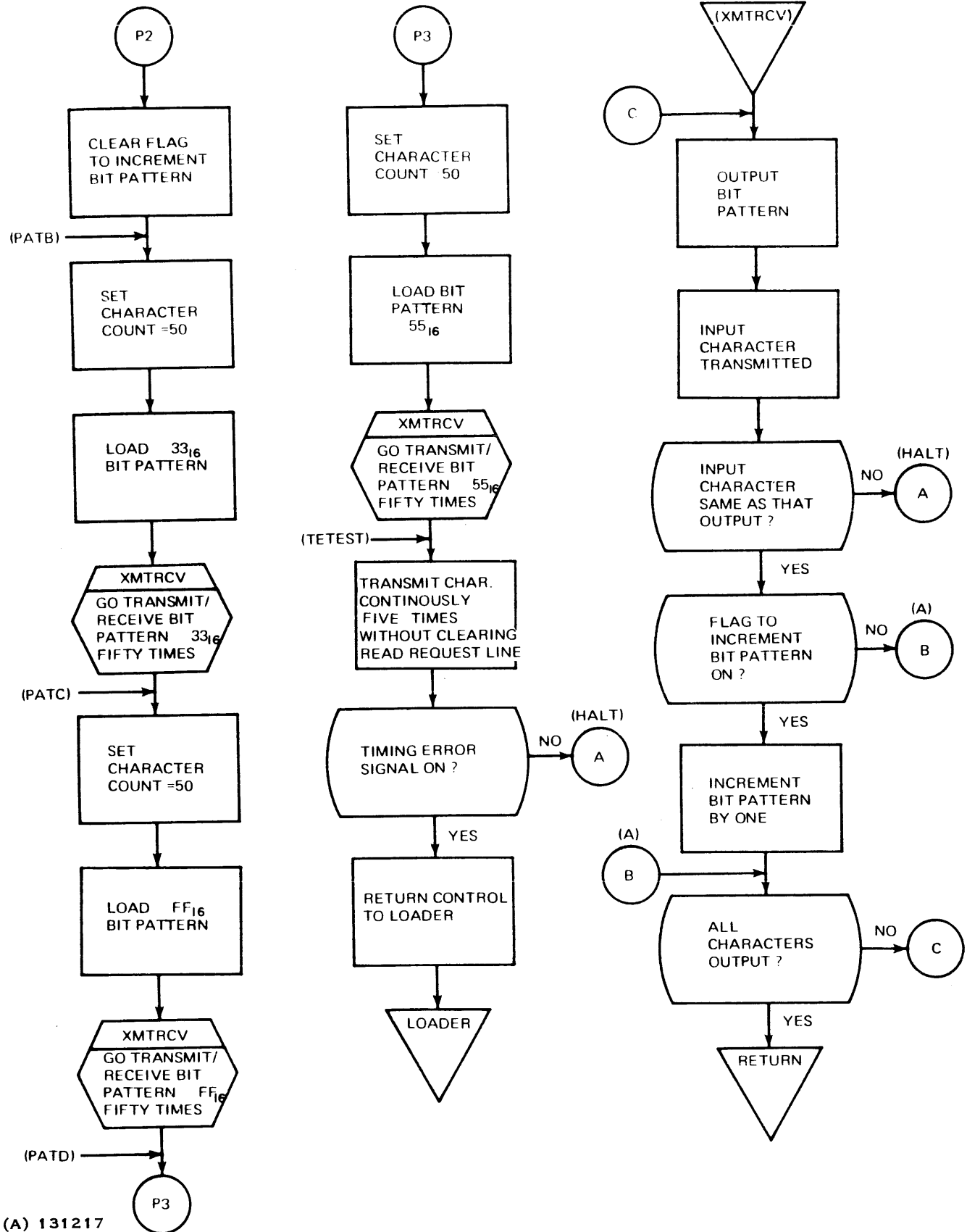


Figure 8-1. EIACKF Flowchart (Sheet 1 of 2)



(A) 131217

Figure 8-1. EIACKF Flowchart (Sheet 2 of 2)



**8.2.5 SUPPORT PROGRAMS.** The bootstrap loader is required to load the object program into memory. The EIACKF program is listed in table 8-1.

**8.2.6 INPUTS.** The only input is the EIACKF object program for loading.

**8.2.7 RESTRICTIONS.**

1. The CRU location of the EIA Full-Duplex module is assumed to be X'F30'. This can be changed manually by altering memory cell EIACRU (load bias +4) before execution.
2. Program operates with all CPU interrupts masked, except for the CRU interrupt test.

**8.2.8 LOADING PROCEDURES**

**NOTE**

The following procedure assumes that the correct peripheral device bootstrap loader is already in computer memory. Refer to *Model 960 Computer Installation Procedure* for instructions to place the loader in memory.

1. Place the EIACKF object program in the input device.
2. To load the program beginning at memory address 00B0, select HALT and RESET, load the Status Register with 01C0, and select RUN and START. To load at a specific address, set Supervisor Register Zero (memory address 0080) to the specific location and set the Program Counter (PC) to memory address 0002 before selecting START.
3. Execution begins immediately if the object program is followed by a slash-asterisk (/\*) record. Otherwise, the loader waits for the next object input record, and the PC must be set manually to start execution.

**8.2.9 OPERATING PROCEDURES**

1. To execute the loaded program, set the PC to the EIACKF first word address, load the Status Register with 01C0, and select RUN and START.
2. Upon completion, the program returns control to the loader if no errors have occurred.
3. Any errors result in a branch relative to register 5 with the location of the failure in the IB Register.





- 4. Any one of the three parts of the test where bit patterns 33, FF, and 55 (hexadecimal) are transmitted and received may be repeated continuously by inserting 7082 into the program memory cell labeled RPPATB, RPPATC, or RPPATD, respectively, and restarting the program. To restore the program to normal execution, insert 7007 into the cell altered. Inserting 7082 creates an unconditional Branch instruction; whereas inserting 7007 causes a no operation (NOP) to be performed.
  
- 5. The program may be restarted by resetting the PC to the EIACKF first word address, and loading the Status Register with 01C0. Then, select RUN and press START.



Table 8-1. Full-Duplex EIACKF Checkout

TEXAS INSTRUMENTS  
INCORPORATED  
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DOCUMENT NUMBER REVISION  
962653-9902 \*B

SAL063 75L2  
14:40:35 AUG. 11, 1977

PAGE 0002

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0001  MARD  EIACKF PSEG
0002  *
0003  * TITLE=EIACKF, FULL DUPLEX ETA=PD1960
0004  * AUTHOR=UNKNOWN
0005  * REVISION=*B 08/01/77 STEPHEN MURPHY
0006  * *MODIFIED PROGRAM TO CHECK FOR CRU INTERRUPT THEREFORE
0007  * *ALL OTHER INTERRUPTING MODULES MUST BE REMOVED IN ORDER
0008  * *FOR THIS PRT TO RUN CORRECTLY. IT HAS BEEN FURTHER
0009  * *MODIFIED BY REMOVING ALL BRANCH AND LINKS TO ERRORH
0010  * *AND REPLACING THEM WITH BRANCHES TO $,RELATIVE TO
0011  * *REGISTER 5. FOR FURTHER INFORMATION CHECK THE 960 CRU
0012  * *PATS MANUAL.
0013  * COMPUTER=960 WITH AT LEAST 4K OF MEMORY.
0014  * ABSTRACT=SFE 960 CRU PATS MANUAL #955374-9701
0015  * CALL=STAND-ALONE, ENTRY POINT IS LOAD POINT
0016  * STATISTICS=PROGRAM ASSUMES TTY/EIA CARD IS IN SLOT 0F30
0017  * *PROGRAM ASSUMES DTR TIED TO DSR AND RTS TIED TO DCD
0018  *
0019  MORG  LOADER EQU 0
0020  *
0021  *
0022  *
0023  MORG 70000002  LDS EIACST
0024  MORG MORG EIACST DATA EIASET,X'100'
0025  *
0026  *
0027  *
0028  * STORAGE/CONSTANTS
0029  *
0030  0004 0F30  EIACRU DATA X'0F30'  INTERFACE CRU LOCATION
0031  *
0032  0005 1250  INTLIM DATA X'1250'  4 MS INTERRUPT TIME LIMIT
0033  *
0034  0006 754F  INTLMI DATA X'754F'  200 MS INTERRUPT TIME LIMIT
0035  *
0036  0007 0000  OUTDAT DATA 0  DATA STORAGE
0037  *
0038  0008 0000  TCHAK DATA 0  DATA STORAGE
0039  *
0040  0009 0000  RCHAK DATA 0  DATA STORAGE
0041  *
0042  000A 0000  STATUS DATA 0  STORE STATUS
0043  *
0044  000B 0000  ZERO DATA 0  ZERO
0045  *
0046  000C 0000  FLAG DATA 0  FLAG WORD
0047  *
0048  000D 0033  PATR DATA X'33'  HJT PATTERN R
0049  *

```



Table 8-1. Full-Duplex EIACKF Checkout (Continued)

TEXAS INSTRUMENTS  
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SAL964 VSL2  
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0050	000F	00FF	PATC	DATA X'FF'	BIT PATTERN C
0051			*		
0052	000F	0055	PATD	DATA X'55'	BIT PATTERN D
0053			*		
0054				PAGE	



Table 8-1. Full-Duplex EIACKF Checkout (Continued)

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0055 *
0056 *
0057 *
0058 *
0059 *
0060 0010 44840000 EIASET LA D,EIACKF SET DSEG BASE REGISTER
0061 0012 44850000 LA B,EIACKF SET PSEG BASE REGISTER
0062 0014 44070004 L C,EIACRH SET PSEG BASE REGISTER
0063 0016 4486000C LA F,FLAG SET FLAG BASE REGISTER
0064 0018 1400040C MOV ZERO,FLAG INITIALIZE FLAG WORD
0065 *
0066 *
0067 *
0068 *
0069 *
0070 *
0071 *
0072 001A 448672A2 LA 0,X'72A2'
0073 001C 44860004 ST 0,X'0004'
0074 001E 44860008 LA 0,X'0008'
0075 0020 44860005 ST 0,X'0005'
0076 *
0077 *
0078 *
0079 *
0080 *
0081 *
0082 *
0083 *
0084 *
0085 *
0086 *
0087 *
0088 *
0089 *
0090 *
0091 *
0092 *
0093 *
0094 *
0095 *
0096 *
0097 *
0098 *
0099 *
0100 *
0101 *
0102 0032 34090000 SFTB DTR,ON TURN ON DATA TERMINAL READY
0103 0034 44000005 L A,INTLIM LOAD INTERRUPT WAIT LIMIT
0104 0036 3001003C RANE INT,OFF,S+6 CHECK INTERRUPT SENSE

```



Table 8-1. Full-Duplex EIACKF Checkout (Continued)

TEXAS INSTRUMENTS  
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M105	003E	000F003E	ARR	-1,3-2,A	INTERRUPT WAIT
M106	003A	7202003A	R	03,5	TIME EXCEEDED
M107			*		
M108	003C	2006003A	STCR	RSIGN,STATUS	INPUT STATUS
M109	003E	448000FF	LA	A,X'FFF'	LOAD MASK REGISTER
M110	0040	5800000A	N	A,STATUS	MASK OFF LEADING BITS
M111	0042	4800000A	ST	A,STATUS	SAVE RECEIVED STATUS
M112	0044	1C0A00C4	CMI	STATUS,X'1C4'	CHECK FOR CORRECT STATUS
M113	0046	70070000	NOF		
M114	004F	72020048	R	03,5	INCORRECT STATUS
M115			*		
M116			*	TURN ON REQUEST TO SEND	
M117				*****	
M118			*		
M119	004A	34000000	SETH	CLRNSE,OFF	CLEAR NEW STATUS FLAG
M120	004C	340A0000	SETH	RTS,ON	TURN ON REQUEST TO SEND
M121	004F	44000005	L	A,INTLIM	LOAD INTERRUPT WAIT LIMIT
M122	0050	300F0056	0BNE	INT,OFF,S+6	CHECK INTERRUPT SENSE
M123	0052	000F0050	ARR	-1,3-2,A	INTERRUPT WAIT
M124	005A	72020054	R	03,5	TIME EXCEEDED
M125				*****	
M126			*	CHECK FOR CRU INTERRUPT	
M127				*****	
M128	0056	74820058	HL	2,LUSTAT	
M129	0058	7C00005A	LDSTAT	LDS TRAP1	
M130	005A	005C	TRAP1	DATA STOP,X'100'	
	005B	0100			
M131	005C	7202005C	STOP	R	03,5
M132			*		
M133			*		
M134			*		
M135	005E	2006003A	STCR	RSIGN,STATUS	INPUT STATUS
M136	0060	448000FF	LA	A,X'FFF'	LOAD MASK REGISTER
M137	0062	5800000A	N	A,STATUS	MASK OFF LEADING BITS
M138	0064	4800000A	ST	A,STATUS	SAVE RECEIVED STATUS
M139	0066	1C0A00C4	CMI	STATUS,X'1C4'	CHECK FOR CORRECT STATUS
M140	006F	70070000	NOF		
M141	006A	7202005A	R	03,5	INCORRECT STATUS
M142			*		
M143			*	TURN OFF REQUEST TO SEND	
M144				*****	
M145			*		
M146	0060	34000000	SETH	CLRNSE,OFF	CLEAR NEW STATUS FLAG
M147	006E	340A0000	SETH	RTS,OFF	TURN OFF REQUEST TO SEND
M148	0070	44000005	L	A,INTLIM	LOAD INTERRUPT WAIT LIMIT
M149	0072	300F0056	0BNE	INT,OFF,S+6	CHECK INTERRUPT SENSE
M150	0074	000F0050	ARR	-1,3-2,A	INTERRUPT WAIT
M151	007F	72020076	R	03,5	TIME EXCEEDED
M152			*		
M153	0078	2006003A	STCR	RSIGN,STATUS	INPUT STATUS



Table 8-1. Full-Duplex EIACKF Checkout (Continued)

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0154 007A 448000FF LA A,X'FFF' LOAD MASK REGISTER
0155 007C 5800000A N A,STATUS MASK OFF LEADING BITS
0156 007E 4880000A ST A,STATUS SAVE RECEIVED STATUS
0157 0080 1C0A00C4 CMI STATUS,X'04' CHECK FOR CORRECT STATUS
0158 0082 70070000 NOP
0159 0084 72020034 B #S,5 INCORRECT STATUS
0160 *
0161 0086 34000000 SETB CLRNSF,OFF CLEAR NEW STATUS FLAG
0162 *
0163 *
0164 *****
0165 * CHECK FOR CRU INTERRUPT
0166 *
0167 *
0168 0088 7482003A HL 2,LSSTAT
0169 008A 7C00003C LSSTAT LDS TRAP2
0170 008C 000F TRAP2 DATA GO,X'180'
008E 0180
0171 008F 70820002 GO B S+4
0172 0090 72020006 B #S,5 GOT CRU INTERRUPT=CRUINT BAD
0173 0092 7C000034 LDS INTMSK
0174 0094 0096 INTMSK DATA S+2,X'01C0'
0098 01C0
0175 *
0176 *
0177 *
0178 *
0179 *
0180 * PATTERN A =
0181 * TRANSMIT/RECEIVE ALL POSSIBLE BIT CONFIGURATIONS
0182 *****
0183 0096 448100FF LA E,255 SET CHARACTER COUNT
0184 0098 88001800 SETF (0,1),1 SET FLAG FOR PATTERN A
0185 009A 14080407 MOV ZERO,OUTDAT INITIALIZE BIT PATTERN
0186 009C 7482003A HL X,XMTRCV GO TRANSMIT
0187 009E 88001800 SETF (0,1),0 CLEAR FLAG FOR PATTERN A
0188 *
0189 *
0190 *
0191 * PATTERN B =
0192 * TRANSMIT/RECEIVE 50 TIMES BIT PATTERN X'33'
0193 *****
0194 *
0195 00A0 44810031 TPATB LA E,49 SET CHARACTER COUNT
0196 00A2 14080407 MOV PATB,OUTDAT SET BIT PATTERN
0197 00A4 7482003A HL X,XMTRCV GO TRANSMIT
0198 *
0199 *
0200 * TO REPEAT THE ABOVE TEST, STORE X'7082'
0201 * IN LOCATION RPPATB.

```



Table 8-1. Full-Duplex EIACKF Checkout (Continued)

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M202 *
M203 M0AF 7007 RPPATH DATA X'7007',TPATB
      M0A7 40A0
M204 *
M205 *
M206 *
M207 * PATTERN C =
M208 * TRANSMIT/RECEIVE 50 TIMES BIT PATTERN X'FF'
M209 *****
M210 *
M211 M0AF 44810031 TPATC LA E,40 SET CHARACTER COUNT
M212 M0AA 140FB407 MOV PATC,OUTDAT SET BIT PATTERN
M213 M0AC 748200BA HL X,XMTRCV GO TRANSMIT
M214 *
M215 *
M216 * TO REPEAT THE ABOVE TEST, STORE X'7002'
M217 * IN LOCATION RPPATC
M218 *
M219 M0AE 7007 RPPATC DATA X'7007',TPATC
      M0AF 00A0
M220 *
M221 *
M222 *
M223 * PATTERN D =
M224 * TRANSMIT/RECEIVE 50 TIMES BIT PATTERN X'55'
M225 *****
M226 *
M227 M0BF 44810031 TPATD LA E,40 SET CHARACTER COUNT
M228 M0B2 140FB407 MOV PATD,OUTDAT SET BIT PATTERN
M229 M0B4 748200BA HL X,XMTRCV GO TRANSMIT
M230 *
M231 *
M232 * TO REPEAT THE ABOVE TEST, STORE X'7002'
M233 * IN LOCATION RPPATD
M234 *
M235 M0B6 7007 RPPATD DATA X'7007',TPATD
      M0B7 10B0
M236 *
M237 *
M238 *
M239 M0B8 74820100 B TETEST GO TO TIMING ERROR TEST
M240 *
M241 *
M242 *
M243 *****
M244 * TRANSMIT CHARACTER PATTERN
M245 * RECEIVE CHARACTER PATTERN
M246 * COMPARE
M247 *****
M248 *

```



Table 8-1. Full-Duplex EIACKF Checkout (Continued)

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Address	Op Code	Op Name	Op Description	Comment
0240	000A	08008007	XMTRCV LDCR	TOAT,OUTDAT OUTPUT FIRST CHARACTER
0250	000C	1407B408	MOV	OUTDAT,TCHAR SAVE TRANSMITTED CHARACTER
0251	000F	840010C2	BFNE	(0,1),1,S+4 BRANCH, IF NOT PATTERN A
0252	000A	2007A001	AMI	OUTDAT,1 INCREMENT BIT PATTERN
0253	0002	44000016	L	A,INTLIM1 LOAD INTERRUPT WAIT LIMIT
0254	0004	300000CA	BFNE	INT,OFF,S+6 CHECK INTERRUPT SENSE
0255	000A	0C0000C4	ARR	-1,S-2,A INTERRUPT WAIT
0256	0008	720200C8	B	0S,5 TIME EXCEEDED
0257			*	
0258	000A	300000D8	BFNE	WRQ,OFF,S+6 CHECK WRITE REQUEST
0259	000C	0C0000CA	ARR	-1,S-2,A DELAY WAIT
0260	000E	720200CE	B	0S,5 TIME EXCEEDED
0261			*	
0262	000A	34000000	SETB	CLRWRQ,OFF CLEAR WRITE REQUEST
0263	0002	0C000008	ARR	-1,S+6,E CHECK FOR PATTERN COMPLETE
0264	000A	80000000	SETF	(0,0),1 COMPLETE, SET FLAG
0265	000A	7002000A	B	S+4 CONTINUE
0266			*	
0267	0008	08008007	LDCR	TOAT,OUTDAT NOT COMPLETE, OUTPUT CHARACTER
0268			*	
0269	000A	44000016	L	A,INTLIM LOAD INTERRUPT WAIT LIMIT
0270	000C	300000E2	BFNE	INT,OFF,S+6 CHECK INTERRUPT SENSE
0271	000E	0C00000C	ARR	-1,S-2,A INTERRUPT WAIT
0272	0008	720200E8	B	0S,5 TIME EXCEEDED
0273			*	
0274	000E	300000E8	BFNE	WRQ,OFF,S+6 CHECK WRITE REQUEST
0275	000A	0C0000E2	ARR	-1,S-2,A DELAY WAIT
0276	000A	720200E6	B	0S,5 TIME EXCEEDED
0277			*	
0278	000A	34000000	SETB	CLRWRQ,OFF CLEAR READ REQUEST
0279	000A	20000000	STCR	RDAT,RCHAR INPUT CHARACTER
0280	000C	448000FF	LA	A,X'FFFF' LOAD MASK REGISTER
0281	000E	58000000	N	A,RCHAR MASK OFF LEADING BITS
0282	000F	48000000	ST	A,RCHAR SAVE RECEIVED CHARACTER
0283	0002	10000040	CM	TCHAR,RCHAR INPUT CHAR SAME AS THAT OUTPUT?
0284	000A	70070000	NOP	NO,
0285	000A	720200F6	B	0S,5 DATA DID NOT COMPARE EQUAL
0286			*	
0287	000A	34000000	SETB	CLRNSF,OFF CLEAR NEW STATUS FLAG
0288	000A	8400009C	BFNE	(0,0),1,XMTRCV+2 PATTERN COMPLETE?
0289	000C	80000000	SETF	(0,0),0 YES, CLEAR FLAG AND
0290	000F	72A20002	B	2,X RETURN
0291			*	
0292			*	
0293			*	
0294			*	*****
0295			*	TIMING ERROR TEST
0296			*	*****
0297			*	
0298	0100	44810004	TEST LA	E,4 SET CHARACTER COUNT





Table 8-1. Full-Duplex EIACKF Checkout (Continued)

TEXAS INSTRUMENTS  
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0299	0102	44000006	L	A,INTLIM	LOAD INTERRUPT WAIT LIMIT
0300	0104	48000007	LOCK	IOAT,OUTDAT	OUTPUT CHARACTER
0301	0106	34000100	BBNE	INT,OFF,S+6	CHECK INTERRUPT SENSE
0302	0108	40000106	ARR	-1,S-2,A	WAIT FOR INTERRUPT
0303	010A	7202010A	H	0S,5	TIME EXCEEDED
0304			*		
0305	010C	34000912	BBNE	XMINPG,ON,S+6	CHECK TRANSMIT IN PROGRESS
0306	010E	0000010C	ARR	-1,S-2,A	DELAY WAIT
0307	0110	72020110	H	0S,5	TIME EXCEEDED
0308			*		
0309	0112	34000000	SETB	CLRWRQ,OFF	CLEAR WRITE REQUEST
0310	0114	40100102	ARR	-1,TETEST+2,E	TRANSMITTED 5 TIMES
0311	0116	3000011A	BBNE	TIMERR,OFF,S+4	YES, CHECK TIMERR SIGNAL
0312	0118	72020118	H	0S,5	ERROR IF NOT ON
0313			*		
0314	011A	44000005	L	A,INTLIM	LOAD DELAY WAIT
0315	011C	0000011C	ARR	-1,S,A	DELAY
0316	011E	00000300	LOCK	CLINTS,ZEPO	CLEAR INTERRUPTS
0317			*		
0318	0120	70820000	H	LOADER	RETURN POINT
0319			*		
0320			*		
0321			*		
0322				PAGE	



Table 8-1. Full-Duplex EIACKF Checkout (Continued)

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0323	0001	ON	EQ0	1
0324	0000	OFF	EQ0	0
0325	0000	A	EQ0	0
0326	0001	E	EQ0	1
0327	0002	X	EQ0	2
0328	0003	L	EQ0	3
0329	0004	D	EQ0	4
0330	0005	B	EQ0	5
0331	0006	F	EQ0	6
0332	0007	C	EQ0	7
0333	0122		END	



Table 8-1. Full-Duplex EIACKF Checkout (Continued)

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0331	0000	MODULE	HSEFG	0
0335	0008	TDAT	CON	0,8
0336	0008	RDAT	CON	0,8
0337	0008	TSIGN	CON	8,8
0338	0008	RSIGN	CON	8,8
0339	0081	XMINPG	CON	8
0340	0091	DTR	CON	9
0341	0091	TIPERR	CON	9
0342	00A1	RTS	CON	X'A'
0343	00B3	CLINTS	CON	X'B',3
0344	00B1	CLRWRQ	CON	X'B'
0345	00B1	WRQ	CON	X'B'
0346	00C1	CLRRQ	CON	X'C'
0347	00C1	RRQ	CON	X'C'
0348	00D1	CLRNSF	CON	X'D'
0349	00F1	INT	CON	X'F'
0350	0122	END	EIACKF	

0000 ERRORS : LENGTH = 0122



**APPENDIX A**



**APPENDIX A**  
**CHARACTER SET**

The USASCII characters are listed in table A-1. The table includes the USASCII code for each character, represented as a hexadecimal value and as a decimal value. The table also shows the corresponding Hollerith code.



Table A-1. Character Set

USASCII Hexadecimal Value	Decimal Value	Function	Hollerith Code
00	0	Null	12-0-1-8-9
01	1	Start Heading	12-1-9
02	2	Start Text	12-2-9
03	3	End Text	12-3-9
04	4	End Transmission	7-9
05	5	Enquiry	0-5-8-9
06	6	Acknowledge	0-6-8-9
07	7	Bell	0-7-8-9
08	8	Backspace	11-6-9
09	9	Horizontal Tab	12-5-9
0A	10	Line Feed	0-5-9
0B	11	Vertical Tab	12-3-8-9
0C	12	Form Feed	12-4-8-9
0D	13	Carriage Return	12-5-8-9
0E	14	Shift Out	12-6-8-9
0F	15	Shift In	12-7-8-9
10	16	Data Link Escape	12-11-1-8-9
11	17	Device Control 1	11-1-9
12	18	Device Control 2	11-2-9
13	19	Device Control 3	11-3-9
14	20	Device Control 4	4-8-9
15	21	Negative Acknowledge	5-8-9
16	22	Synchronous Idle	2-9
17	23	End Transmission Block	0-6-9
18	24	Cancel	11-8-9
19	25	End Medium	11-1-8-9
1A	26	Substitute	7-8-9
1B	27	Escape	0-7-9
1C	28	File Separator	11-4-8-9
1D	29	Group Separator	11-5-8-9
1E	30	Record Separator	11-6-8-9
1F	31	Unit Separator	11-7-8-9
20	32	Space	Blank
21	33	!	11-8-2
22	34	”	8-7
23	35	#	8-3
24	36	\$	11-8-3
25	37	%	0-8-4
26	38	&	12
27	39	'	8-5
28	40	(	12-8-5
29	41	)	11-8-5
2A	42	*	11-8-4
2B	43	+	12-8-6
2C	44	,	0-8-3
2D	45	-	11
2E	46	.	12-8-3



Table A-1. Character Set (Continued)

USASCII Hexadecimal Value	Decimal Value	Function	Hollerith Code
2F	47	/	0-1
30	48	0	0
31	49	1	1
32	50	2	2
33	51	3	3
34	52	4	4
35	53	5	5
36	54	6	6
37	55	7	7
38	56	8	8
39	57	9	9
3A	58	:	8-2
3B	59	;	11-8-6
3C	60	<	12-8-4
3D	61	=	8-6
3E	62	>	0-8-6
3F	63	?	0-8-7
40	64	@	8-4
41	65	A	12-1
42	66	B	12-1
43	67	C	12-3
44	68	D	12-4
45	69	E	12-5
46	70	F	12-6
47	71	G	12-7
48	72	H	12-8
49	73	I	12-9
4A	74	J	11-1
4B	75	K	11-2
4C	76	L	11-3
4D	77	M	11-4
4E	78	N	11-5
4F	79	O	11-6
50	80	P	11-7
51	81	Q	11-8
52	82	R	11-9
53	83	S	0-2
54	84	T	0-3
55	85	U	0-4
56	86	V	0-5
57	87	W	0-6
58	88	X	0-7
59	89	Y	0-8
5A	90	Z	0-9



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**ALPHABETICAL INDEX**





## ALPHABETICAL INDEX

### INTRODUCTION

The following index lists key words and concepts from the subject material of the manual together with the area(s) in the manual that supply major coverage of the listed concept. The numbers along the right side of the listing reference the following manual areas:

- Sections - References to Sections of the manual appear as "Section x" with the symbol x representing any numeric quantity.
- Appendixes - References to Appendixes of the manual appear as "Appendix y" with the symbol y representing any capital letter.
- Paragraphs - References to paragraphs of the manual appear as a series of alphanumeric or numeric characters punctuated with decimal points. Only the first character of the string may be a letter; all subsequent characters are numbers. The first character refers to the section or appendix of the manual in which the paragraph is found.
- Tables - References to tables in the manual are represented by the capital letter T followed immediately by another alphanumeric character (representing the section or appendix of the manual containing the table). The second character is followed by a dash (-) and a number:

Tx-yy

- Figures - References to figures in the manual are represented by the capital letter F followed immediately by another alphanumeric character (representing the section or appendix of the manual containing the figure). The second character is followed by a dash (-) and a number:

Fx-yy

- Other entries in the Index - References to other entries in the index are preceded by the word "See" followed by the referenced entry.



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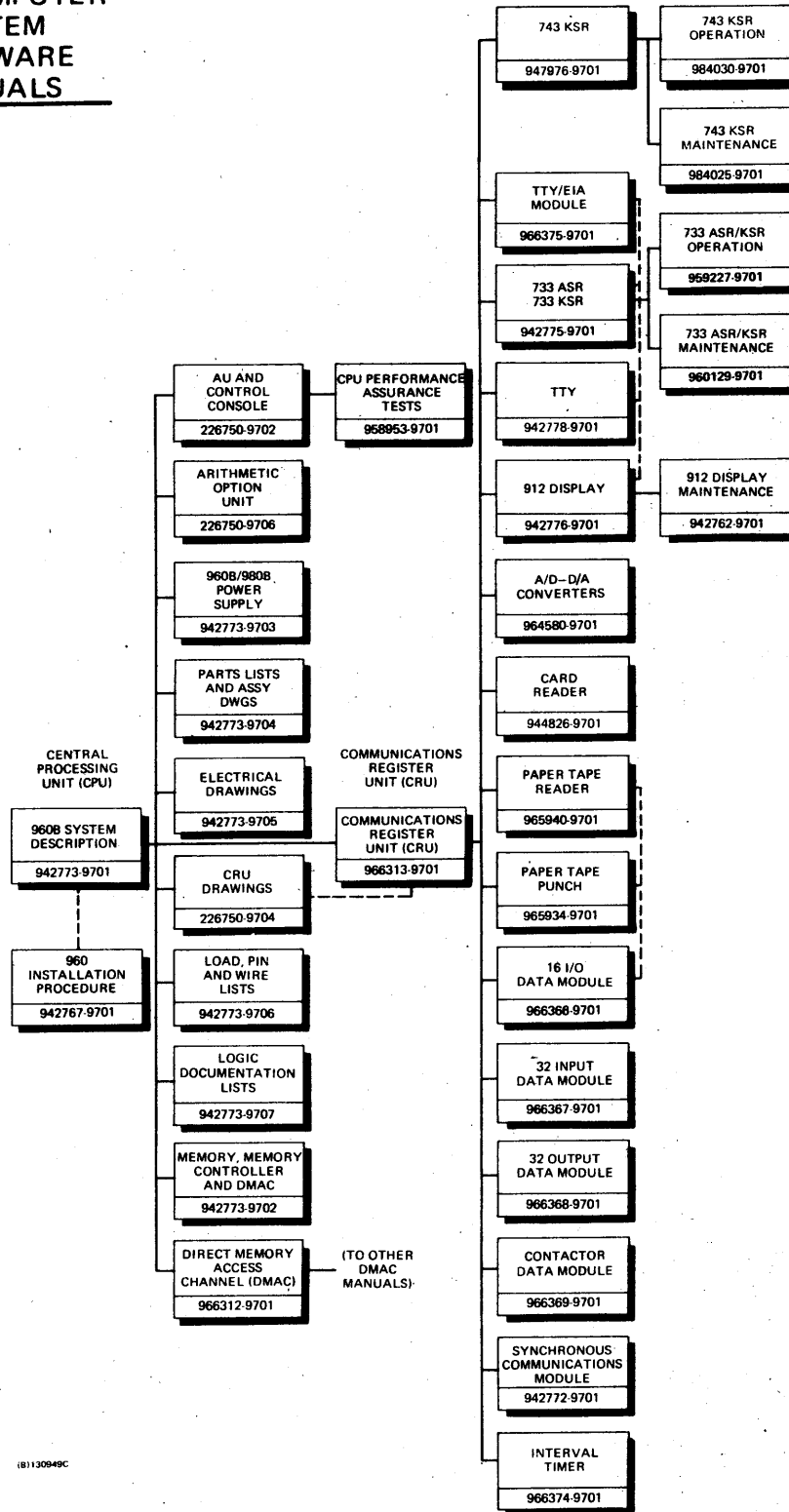
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