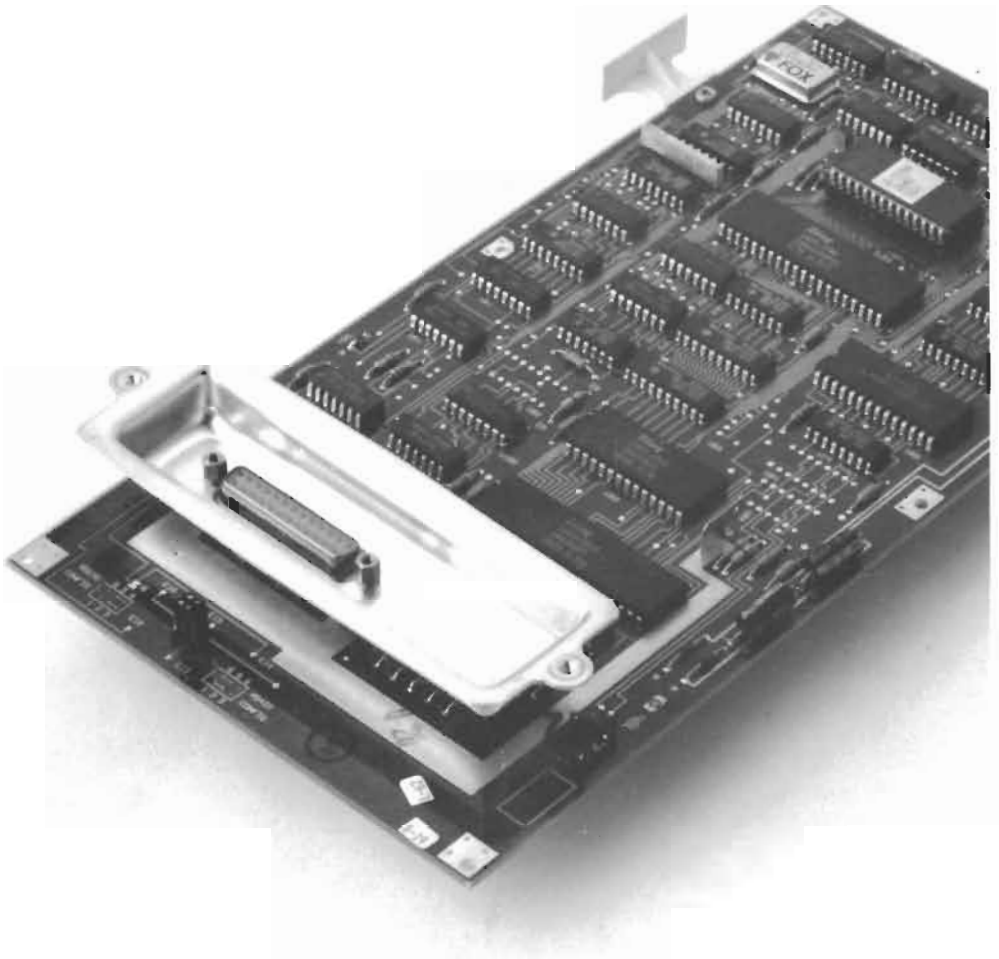
HEWLETT PACKARD

HP 26067 B
RS232/422
Serial Interface



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26067B SYSTEM INTERFACE

RS232/422 INTERFACE

(FOR HP 256X LINE PRINTERS)

PART NUMBER 26067-90921

HEWLETT PACKARD

Publication History

Changes in text to document updates subsequent to the initial release are supplied in manual update notices and/or complete revisions to the manual. The history of any changes to this edition of the manual is given below. The last update itemized reflects the machine configuration documented in the manual.

Any changed pages supplied in an update package are identified by an update number adjacent to the page number. Changed information is specifically identified by a vertical line (revision bar) on the outer margin of the page.

First Edition .....FEB 1988

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SECTION I.
GENERAL INFORMATION

1.1 INTRODUCTION

This manual provides general information, installation, and service information for the Hewlett-Packard 26067A serial interface (part no. 5062-1703).

1.2 GENERAL DESCRIPTION

The serial interface (5062-1703) enables a user to operate an HP256X Line Printer on a serial communications line using either RS-232C or RS-422A protocol (on a system which supports the specific printer). This interface provides point to point serial communications for full duplex asynchronous data transfer. The RS-422A mode allows a user to operate an HP 256X line printer on an HP 3000 system using an Advanced Terminal Processor (ATP).

The interface is designed to receive data at one of seven baud rates (300, 600, 1200, 2400, 4800, 9600, and 19,200). The single printed circuit assembly (PCA) is configurable for either RS-232C or RS-422A protocol. For various data stream protocol configurations in the RS-232 mode, see paragraph 2-7. Xon/Xoff protocol is used in the RS422 mode as the data stream protocol. For more information on configuration in the RS-422 mode, see paragraph 2-9.

The serial interface consists of a single printed circuit assembly (PCA), part number 5062-1703, which is installed into the printer backplane interface connector. The interface is available either as a factory configured option (Opt 050 for RS-422 or Opt 049 for RS-232) or as kit for field installation. The HP 26067A serial Interface Kit provides the Interface PCA (5062-1703) for field installation. The kit also includes this manual (part no. 26067-90921).

The interface connector is a standard RS-232 style, 25-pin, D-subminature socket type connector. (The RS-232 and RS-422 signals used by the interface are listed in tables 4-5 and 4-6 respectively)

1.3 SPECIFICATIONS

The serial interface is designed for operation in the HP256X Line Printer. Therefore the interface electrical specifications conform to the printer specifications. Printer specifications are provided in the HP 2563A Printer Operator's Manual (part no. 02563-90901) or the HP 2565/66A Printer Operator's Manual (part no. 02566-90901).

General specifications for the interface are listed in table 1-1.

Table 1-1. SPECIFICATIONS

```
* * * * * Electrical Characteristics * * * * *

POWER REQUIRED:   +12 Volts +/- 5%  @    50 mA  max.
                  -12 Volts +/- 5%  @    50 mA  max.
                  + 5 Volts +/- 5%  @  1500 mA  max.

                  All power is supplied by the printer through
                  the backplane connector to the interface PCA.

* * * * * Mechanical Characteristics * * * * *

SIZE:  10.67 cm (4.20 in.) by  27.7 cm (10.9 in.)

* * * * * Environmental Specifications * * * * *

OPERATING TEMP:  0 to 55 Degrees C (32 to 131 Degrees F)

OPERATING SURVIVAL: -20 to 65 Degrees C (-29 to 149 Degrees F)

RELATIVE HUMIDITY:  10% to 90% @ 40 Degrees C
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FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE
STATEMENT

****

The Federal Communications Commission (IN 47 CFR 15.818) has specified that the following notice be brought to the attention of the users of this product.

Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

****

This product must be used with a shielded I/O cable.

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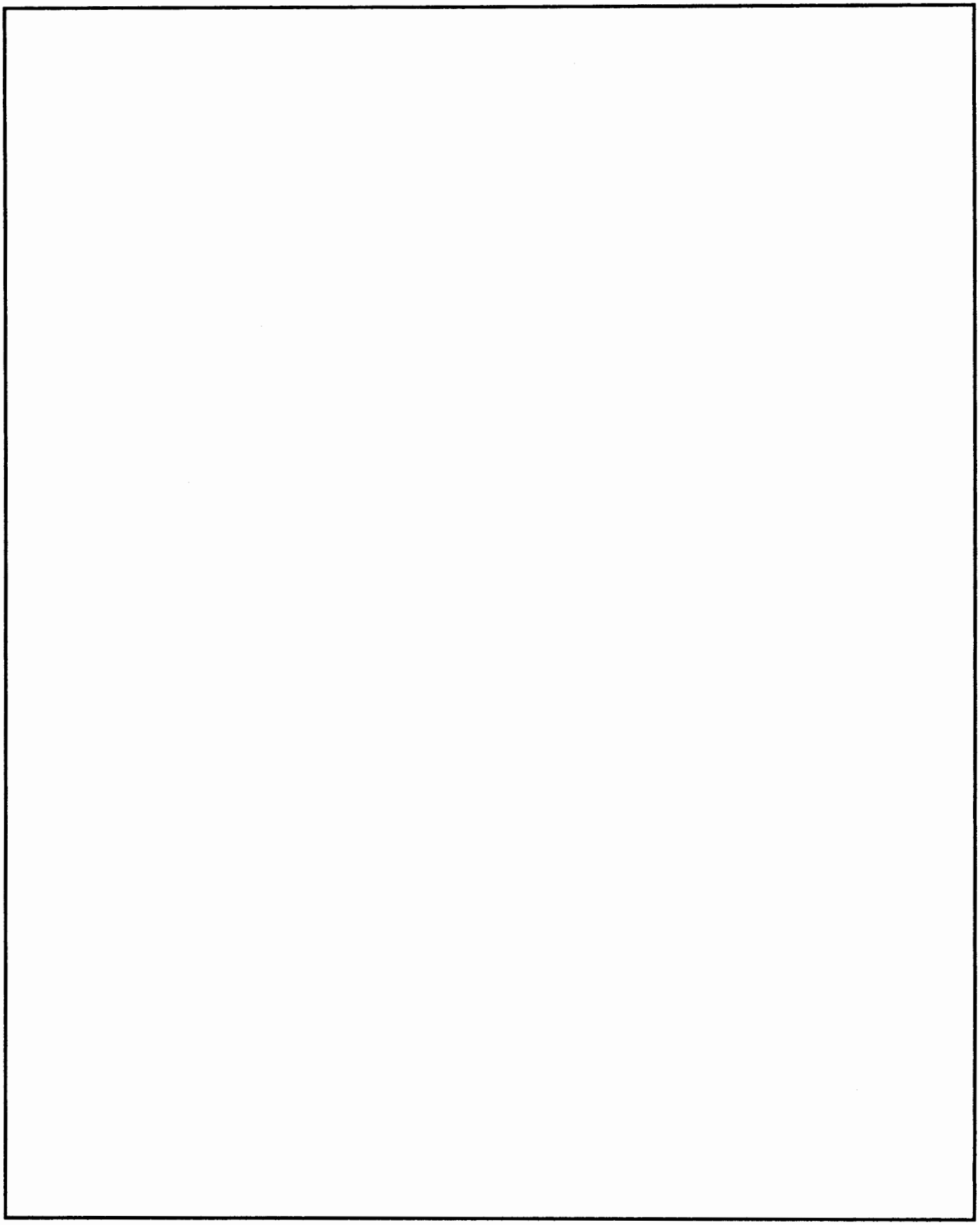

SECTION II. INSTALLATION AND CONFIGURATION

2.1 INTRODUCTION

This section provides unpacking information, installation instructions, and configuration information for the serial interface (part no. 5062-1703).

2.2 UNPACKING AND INSPECTION

Before unpacking, inspect the shipping container for signs of mishandling. If damage to the shipping carton is evident, write a notation on the freight bill before signing. The package should be inspected as soon as possible.

After unpacking, check the interface and accessories for damage (cracks, broken parts, etc.). If the interface and/or accessories are damaged or fail to meet the published specifications, notify the carrier and the nearest Hewlett-Packard Sales and Service Office immediately for a carrier's inspection report.

Retain the shipping container and the packing materials for the carrier's inspection. The Hewlett-Packard Sales and Service Office will arrange for the repair or replacement of the damaged part without waiting for any claims against the carrier to be settled.

2.3 INTERFACE INSTALLATION

Installation of the interface into the printer (see figure 2-1) consists of removing/opening the printer top cover/panel, inserting the interface into the printer backplane interface connector, and finally configuring the interface for system operation.

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WARNING

Since the installation of the interface requires the removal of the printer's protective covers, it is to be installed by a qualified Hewlett-Packard service representative.

Removal of the printer's protective covers by unqualified persons may result in serious personal injury.

Installation of the interface is described in the following steps (a #1 posidrive screwdriver is required):

a. Disconnect power to the printer by setting the Main Power switch, at the back of the printer to OFF (0).

b. Remove/open the printer cover/panel to gain access to the printer interface connector as directed in the appropriate HP256X line printer service manual (part no. 02563-90904 / 02566-90904).

c. Disconnect the I/O cable from the existing interface and remove the interface from the printer. In the HP 2565/66A printers, two screws must be removed from the interface connector shield which secures it to the frame; and, in the HP 256X printers, a ground wire must be disconnected.

d. Insert the new interface into the backplane interface connector (the connector towards the rear of the printer), making certain that the interface is securely seated.

e. Ground the interface to the printer:

   HP 256X Printer - Connect the I/O ground wire (from the printer) to the interface ground lug (see figure 2-1).

   HP 2565/66A Printer - Secure the interface PCA connector shield to the printer frame using the two screws removed in step c.

f. Replace/close the printer cover/panel.

g. Connect the system I/O cable to the printer interface connector.

h. Apply power to the printer by setting the Main Power Switch to ON (1).

i. Configure the interface (refer to section II, interface configuration, for configuration information).

j. Run the internal I/O self-test (refer to paragraph 4-4) to verify the operation of the interface. (The printer self-test, performed by pressing the TEST key, does not perform the I/O self-tests, to run the I/O self-tests they must be selected and run as a subtest from the operator control panel.)

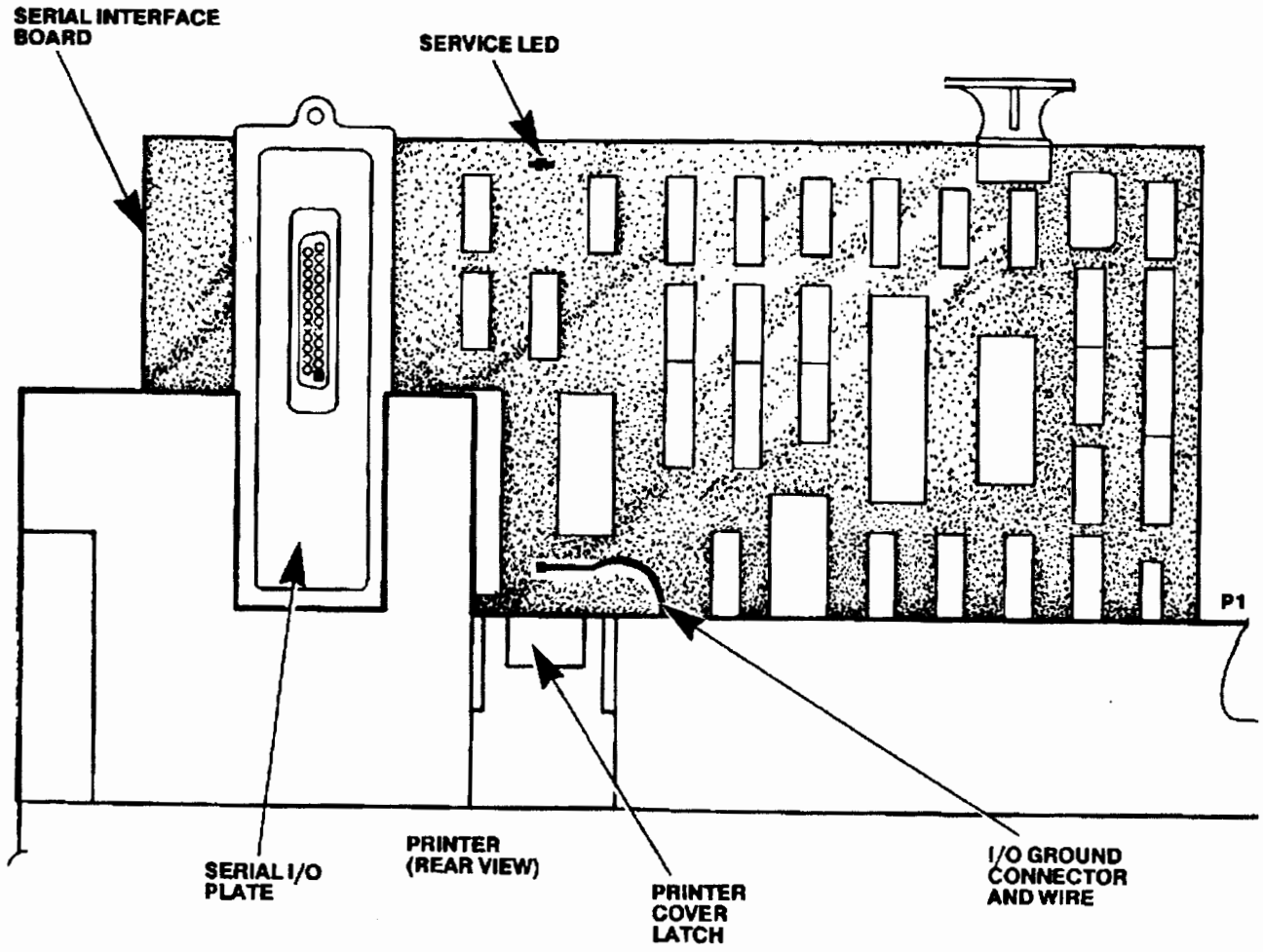

Figure 2-1. Interface Installation

2.4 INTERFACE CONFIGURATION

For the interface to communicate with the system, the interface must be configured to the system configuration. Configuration of the interface is accomplished by selecting and entering function and configuration numbers into the Operator Control Panel with the interface installed in the printer and power applied. Function and configuration numbers are entered into the HP256X printer Operator Control Panel in the same manner as other printer functions (refer to the HP256X Operator's Manual for printer configuration information). The interface uses four configuration bytes to configure the interface. The four configuration numbers are selected by means of the four function numbers (20, 21, 22, and 23) (The HP256X printer provides function numbers 20 through 29 for interface configuration but the serial interface only requires four configuration bytes for configuration.)

Each configuration byte identifies a group of functions for configuration. The configuration number for function number 22 in the RS-232-C hardware configuration, for example, configures the display "1" on the printer Operator Control Panel for inactive CF or CC RS-232 signal, and baud rate functions. The parameter values for each function are selected in the configuration byte by selecting the proper bit values. Figure 2-3 identifies the bit locations for the configuration byte functions for each of the four function numbers for the RS232 hardware configuration. Detailed descriptions for the function parameters bit values are described in paragraph 2-7 for this configuration. Figure 2-4 identifies the bit locations for the configuration byte functions for each of the four function numbers for the RS422 hardware configuration (Note that Xon/Xoff data stream protocol is used in the RS422 configuration). Detailed descriptions for the function parameters bit values are described in paragraph 2-9.

The configuration byte associated with each function number is an eight-bit binary number where the value of the bits determine the function parameters (see figure 2-3 or 2-4). To configure the interface for the system, select the function parameter bit (1 or 0) which matches the system configuration and set the bits as required for the configuration byte.

After the function parameter bit values have been determined for the byte, The byte is entered into the printer Operator Control panel. To enter the byte into the Operator Control Panel, the byte must be converted into a hexadecimal number for the printer. Convert the eight-bit binary number into a hexadecimal number and enter it into the printer. Figure 2-2 illustrates an example of a configuration byte conversion from the binary byte to the two-digit hexadecimal number.

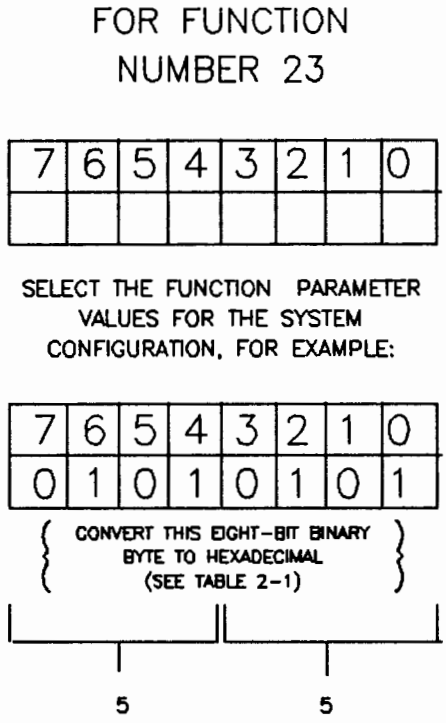

Figure 2-2. Example For Deriving Configuration Number

Table 2-1. BINARY TO HEXADECIMAL

BINARY	HEX	BINARY	HEX
0000	0	1000	8
0001	1	1001	9
0010	2	1010	A
0011	3	1011	B
0100	4	1100	C
0101	5	1101	D
0110	6	1110	E
0111	7	1111	F

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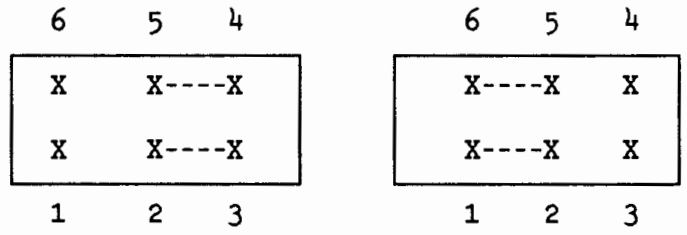
2.5 HARDWARE CONFIGURATION

The interface must be configured in hardware for either RS232 or RS422 operation. The PCA is configured by placing the jumpers provided across the correct pins on header P2 located near the 25 pin connector. The diagram below shows the two possible configurations.



RS232 CONFIGURATION RS422 CONFIGURATION

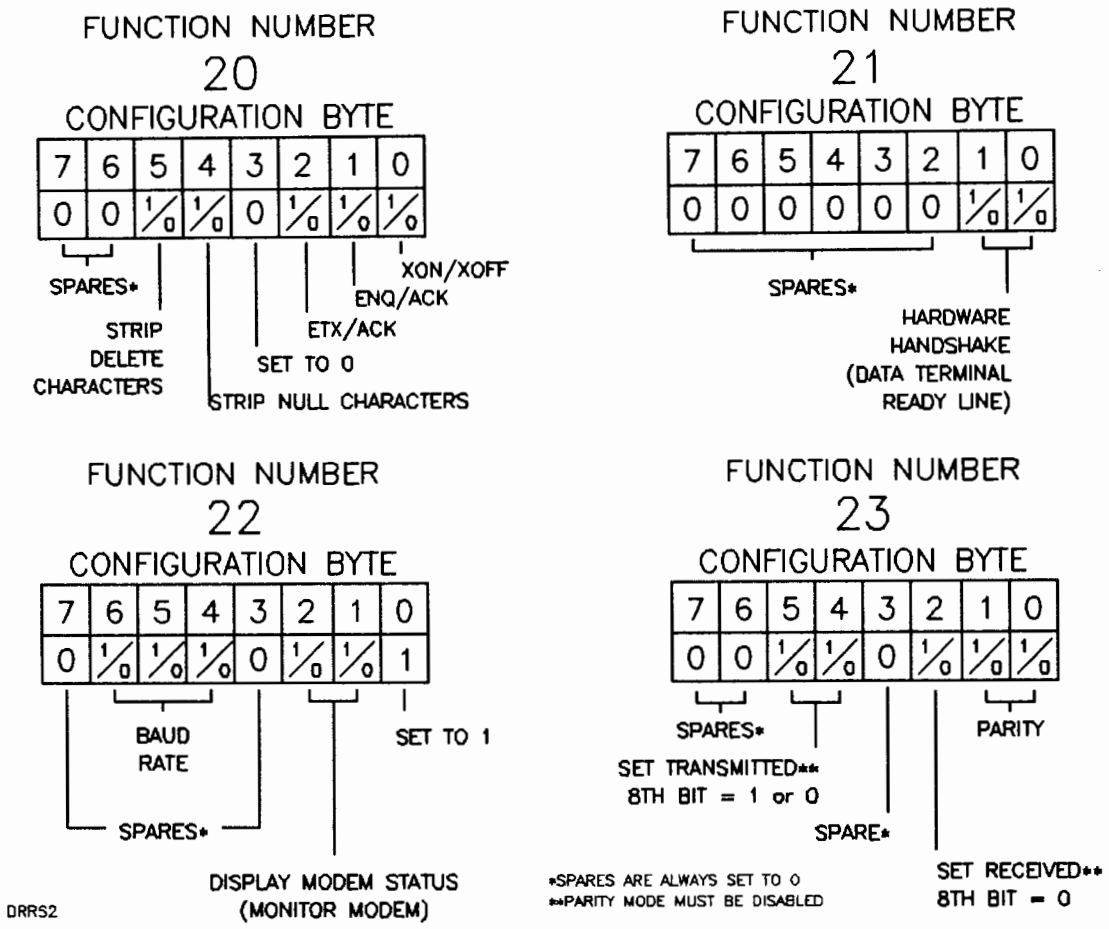


Figure 2-3. RS-232 Configuration Bytes

2.6 OPERATOR CONTROL PANEL INTERFACE CONFIGURATION

The serial interface is configured using the HP256X printer Operator Control Panel. To configure the interface for the desired function parameters, perform the following steps:

a. Press the [ON LINE] key on the Operator Control Panel to take the printer off-line (if the printer is on-line). Power should be applied to the printer.

b. Press and hold the [CONFIG.] key on the Operator Control Panel. This action displays the function number in the Operator Control Panel display.

c. Select the desired function number (20, 21, 22 or 23) on the Operator Control

interface is considered busy. In the busy condition the interface can not accept data from the computer and must indicate to the computer that it is busy by using one of three data stream handshake protocols (or the hardware handshake). Only one of the data stream handshakes can be used.

1. XON/XOFF (Bit 0)

   When bit 0 is set to 1, XON/XOFF handshake protocol is enabled by the interface. With XON/XOFF the interface will send an XON (DC1; 11 HEX) when it goes to the not busy condition and XOFF (DC3; 13 HEX) when it goes into the busy condition.

   When bit 0 is set to 0, XON/XOFF handshake is disabled.

2. ENQ/ACK (Bit 1)

   When bit 1 is set to 1, Enquiry(ENQ)/Acknowledge(ACK) handshake protocol is used. With ENQ/ACK handshake protocol the ASCII enquiry character (05 Hex) is sent to the interface by the computer before the computer sends a data block of characters. If the interface is busy it will not respond until it goes out of the busy condition, at which point it will sent the Acknowledge character (06 Hex) to inform the computer to send a 256-byte data block.

   When bit 0 is set to 0, ENQ/ACK handshake is disabled.

3. ETX/ACK (Bit 2)

   Bit 2 when set to 1, ETX/ACK handshake protocol is enabled. The ETX/ACK protocol is functionally the same as the ENQ/ACK protocol with the exception that the ENQ character is replaced with the ETX (03 Hex) character.

   When bit 2 is set to 0, ETX/ACK handshake is disabled.

4. Strip Null Characters (Bit 4)

   If bit 4 is set to 1, null characters (00 or 80 Hex) are stripped (removed) from the data stream by the interface; if bit 4 is set to 0 this feature is disabled and no action is taken on the null characters.

   Nulls are sometimes used for timing delays or other purposes. When the printer is in display functions mode, null characters will not be printed if null stripping is enabled.

5. Strip Delete Characters (Bit 5)

If bit 5 is set to 1, delete characters (7F or FF Hex) are stripped (removed) from the data stream; if bit 5 is set to 0 this feature is disabled and no action is taken on the delete characters.

Deletes are sometimes used for timing delays or other purposes. When the printer is in display functions, delete characters will not be printed if delete stripping is enabled.

b. Function Number 21

Function number 21 configures the interface for hardware handshake protocol.

The hardware handshake uses the Data Terminal Ready (CD) RS-232 signal line to indicate the interface busy condition. This mode of operation can be used if the printer is connected directly to the computer or another device (such as a terminal) and not to a modem.

The interface provides four ways of using the CD line to indicate interface busy/not busy condition. Bit 0 and bit 1 can be configured to enable the CD line for normal RS-232 operation, handshake busy operation, handshake inverted busy, or on-line/off-line operation (shown in table 2-2) as described below.

To select the desired function parameter, insert the parameter bits as shown in table 2-2.

Table 2-2. HARDWARE HANDSHAKE SELECTION

BITS 1 0	DESCRIPTION
0 0	Normal operation
0 1	CD line busy operation
1 0	CD Line Inverted Busy Operation
1 1	On-Line/Off-Line Operation

1. Normal Operation (Bit 0 & 1)

When both bit 0 and bit 1 are set to 0, the CD line is used for normal RS-232 operation of this line (for use with a modem or data set). (The line will be held high.)

2. Hardware CD Line Busy Operation (Bits 0 & 1)

When bit 0 is set to 1 and bit 1 is set to 0 the interface uses the CD line to indicate busy/not busy operation. When the interface is busy the CD line will be high and when the interface is not busy and can accept data, the CD line will be low.

3. Hardware CD Line Inverted Busy Operation (Bits 0 & 1)

When bit 0 is set to 0 and bit 1 is set to 1 the interface uses the CD line to indicate busy/not busy operation. When the interface is busy the CD line will be low and when the interface is not busy and can accept data, the CD line will be high. This is the usual hardware handshake configuration.

4. On-Line/Off-Line Operation (Bits 0 & 1)

When both bit 0 and bit 1 are set to 1 the CD line indicates on-line/off-line condition of the printer. When the CD line is high, the printer is on-line and when the CD line is low, the printer is off-line.

a. Function Number 22

Function number 22 configures the interface for display "1" (modem status) for active CC or CF signal and baud rate. These functions are described below.

1. Bit 0 always set to 1

2. Display Modem Status (Bits 1 & 2)

If the Display Modem Status function is enabled, then, when the Data Set Ready (CC) signal or the Carrier Detect (CF) signal becomes inactive, the printer operating status on the Operator Control Panel will switch from "0" to "1". When the signal becomes active again the printer status will return to "0". Only one signal line, either the CC or CF, can be selected at a time for the Display Mode Status mode. The bits used to enable this feature are listed in table 2-3, below.

Table 2-3. DISPLAY "0" FOR INACTIVE CC OR CF SIGNAL

BITS 2 1	DESCRIPTION
0 0	Disable Display Modem Status
0 1	Display "0" when the CC signal is active.
1 1	Display "0" when the CF signal is active.
1 0	Not Used, invalid selection

3. Baud Rate (Bits 4, 5, and 6)

Bits 4, 5, and 6 select the baud rate at which the interface operates. Table 2-4 lists the parameter values for the indicated baud rates.

Table 2-4. BAUD RATE SELECTION

Bit 6	Bit 5	Bit 4	Baud Rate
0	0	0	300
0	0	1	600
0	1	0	1200
0	1	1	2400
1	0	0	4800
1	0	1	9600
1	1	0	19200

d. Function Number 23

Function number 23 configures the interface for parity and for the selection of the received and/or transmitted eighth-bit to either 1 or 0.

1. Parity (Bit 0 & 1)

Bits 0 and 1 select the type of parity used by the interface. Parity can be selected for no parity, even, or odd parity. The bit values for these parity parameters are shown in table 2-5, below.

Table 2-5. PARITY SELECTION

BITS 1 0	DESCRIPTION
0 0	Disable parity
0 1	Enable even parity
1 1	Enable odd parity
1 0	Not Used;

2. Set Received 8th-Data Bit to 0 (Bit 2)

The interface can set the eighth-bit of each received data byte to 0. If bit 2 is set to 1, the interface sets the 8th-bit of each received data byte to 0; if bit 2 is set to 0, the 8th-bit is left as received.

3. Set Transmitted 8th-Data Bit to 1 or 0 (Bits 4 & 5)

The interface can set the 8th-bit of each transmitted byte to either a 1 or a 0, or transmit the byte unchanged. Table 2-6 identifies the bit settings for the 8th-bit selections.

The parity function must be disabled to set the transmitted 8th-bit to either 1 or 0.

Table 2-6. TRANSMITTED 8TH-BIT SELECTION

BITS 5 4	DESCRIPTION
0 0	TRANSMIT 8TH-BIT AS IS
0 1	SET TRANSMITTED 8TH-BIT = 0
1 0	SET TRANSMITTED 8TH-BIT = 1
1 1	INVALID SETTING; NOT USED

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2.8 TYPICAL RS232 CONFIGURATION

A typical configuration for the serial interface when operating the HP256X printer as a spooled printer on an HP 3000 system will generally look as shown below.

FUNCTION NUMBER	CONFIGURATION BYTE	
20	31	- Nulls and Deletes stripped, XON/XOFF protocol
21	00	- Normal Data Terminal Line operation (always = on)
22	51	- 9600 Baud Rate, CTS Signal line Ignored, Modem Status disabled
23	03	- Odd Parity

To verify the interface configuration values run the printer self-test (press the [TEST] key and then the [ENTER] key). The print-out generated by the self-test includes a listing of the interface configuration.

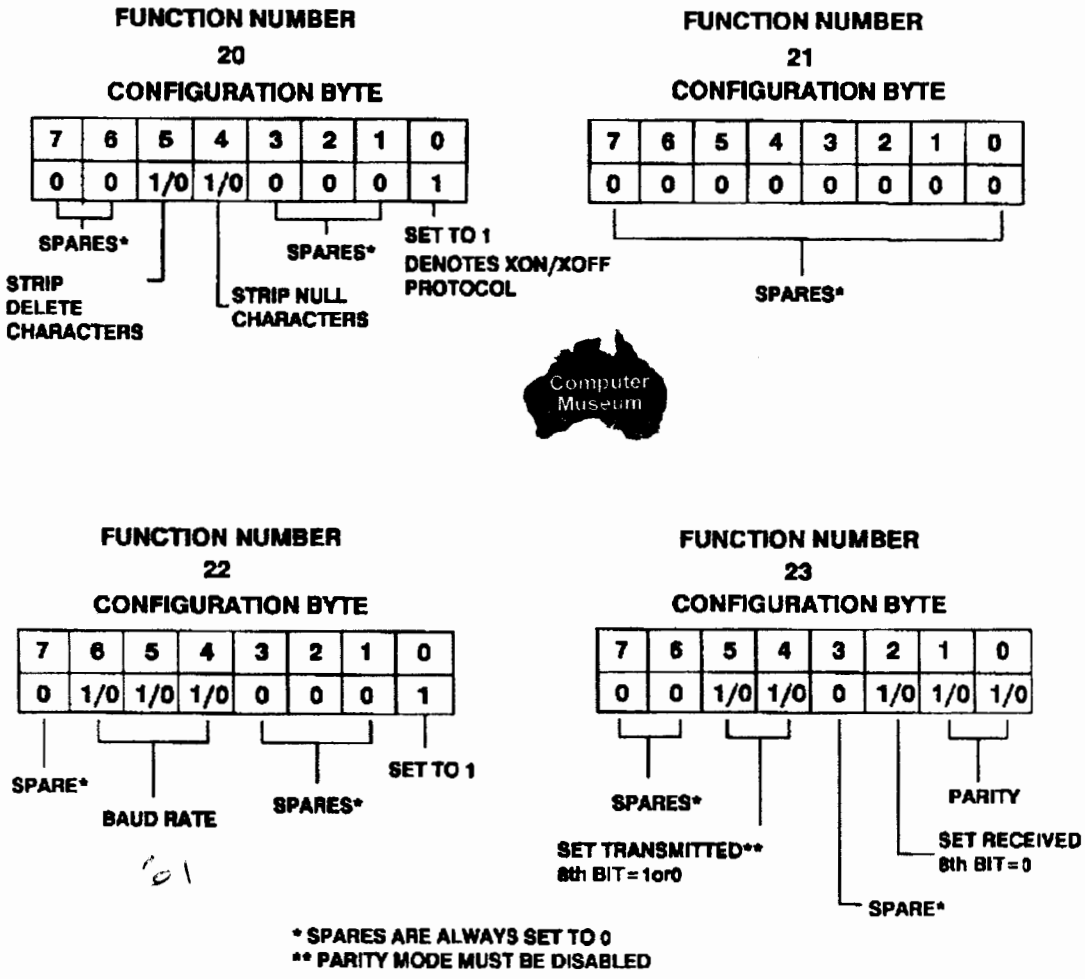

Figure 2-4. RS422 Configuration Bytes

2.9 RS-422 FUNCTION PARAMETER DESCRIPTIONS

Function Number 20

Function number 20 configures the interface for stripping null and or delete characters from the data stream. Null and delete characters, placed in the data stream for timing or other purposes, can generally be stripped from the data stream, if desired. It should be noted that even if display functions mode is enabled, these characters will be stripped and thus, not available for printing. When data is being transmitted using byte count escape sequences, the interface should be configured to allow null and delete characters to pass.

Strip Null Characters (bit 4)
If bit 4 of configuration byte 20 is set to a 1, null characters (00H or 80H) will be stripped from the data stream by the interface. If bit 4 is a 0, the feature is disabled and no action is taken on the null characters.

Strip Delete Characters (bit 5)
If bit 5 of configuration byte 20 is set to a 1, delete characters (7FH or FFH) are stripped from the data stream. If bit 5 is a 0, this feature is disabled.

NOTE

Nulls and Deletes are sometimes used for timing delays or other purposes. When the printer is in display funtions mode, Null or Delete characters will not be printed if Null or Delete stripping is enabled.

Function Number 21

All bits of configuration byte 21 should be set to 0.

Function Number 22

Baud rate (bits 6,5, and 4). The baud rate is configured as shown:

Table 2-7. Function 22 Baud Rate

Bit 6	Bit 5	Bit 4	Baud Rate
0	0	0	300
0	0	1	600
0	1	0	1200
0	1	1	2400
1	0	0	4800
1	0	1	9600
1	1	0	19200

Function Number 23

PARITY (bits 0 and 1)
The interface can be configured for no parity, even parity, or odd parity. Parity is configured according to the table below:

Table 2-8. Function 23 Parity

Bit 1	Bit 0	Parity
0	0	Disabled
0	1	Even
1	1	Odd
1	0	Not used

SET RECEIVED 8TH DATA BIT TO 0 (bit 2)
If bit 2 of configuration byte 23 is set to a 1, the interface will set the 8th bit of each received data byte to 0. If bit 2 is set to 0, the 8th bit is received as is.

SET TRANSMITTED 8TH DATA BIT TO 1 OR 0 (bit 5 and 4)
The interface can set the 8th bit of each transmitted byte to either a 0 or a 1 or transmit the byte unchanged. The parity function must be disabled to set the transmitted 8th data bit to either a 0 or a 1. The table below identifies the bit settings.

Table 2-9. Settings for transmitted 8th Data Bit

Bit 5	Bit 4	Description
0	0	Transmit 8th bit as is
0	1	Set transmitted 8th bit to 0
1	0	Set transmitted 8th bit to 1
1	1	Invalid setting, not used

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2.10 TYPICAL RS422 CONFIGURATION

A typical configuration for the serial interface PCA when operating the HP 256X printer as a spooled printer on an HP 3000 system will generally look as shown below.

FUNCTION NUMBER	CONFIGURATION BYTE FOR 7-BIT or 8-BIT DATA		
20	31	31	- XON/XOFF Protocol with Nulls and Deletes stripped
21	00	00	- Spare (No configuration values)
22	51	51	- 9600 Baud Rate
23	03	00	- Odd Parity/no parity

To verify the interface configuration values run the printer self-test(press the [TEST] key and then the [ENTER] key). The print-out generated by the self- test includes a listing of the interface configuration.

SECTION III.
MAINTENANCE

3.1 INTRODUCTION

This section provides troubleshooting information and parts replacement information for the serial interface.

3.2 TROUBLESHOOTING

Troubleshooting the interface PCA in the HP256X line printer is similar to HP terminals. When a problem occurs, define the problem, its frequency (whether intermittent or redundant), and the length of time the problem has been occurring. (It may be possible to correlate the onset of the problem with an event such as updating the system software or adding new hardware.)

To begin troubleshooting perform the printer I/O subtests for the interface to check both the interface and the cabling. Also observe the service LED located on the interface. This LED can be used to evaluate the operation of the interface (refer to paragraph 3-3).

3.3 I/O LED

When the printer is powered-up or reset it performs a power-up check sequence. During this sequence the printer initiates the interface internal I/O self-test (subtest 31) and, after the completion of the test, the interface communicates the results of the test to the printer processor. If the interface completes the internal self-test satisfactorily and communicates the results to the printer as required, the I/O LED will flash at a 1/2 Hz rate. If the interface passes its internal test but cannot communicate with the printer processor, the I/O LED will flash at a 5 Hz rate. This 5 Hz flash indicates that an error exists and this error is most likely something other than the interface (although it may be the interface). If the interface performs the communication satisfactorily but fails the internal I/O subtest the LED will remain either continuously on or off.

Table 3-1. SERVICE LED ERROR INDICATIONS

LED	ERROR DESCRIPTION
1/2 Hz FLASH	Interface operating correctly.
5 Hz FLASH	Passed I/O subtest but failed to communicate with printer processor (Printer or possibily the interface).
ON or OFF STEADY	Interface failed subtest (I/O RAM, ROM, or SIO/CTC circuitry failure likely).

3.4 I/O SELF-TEST DIAGNOSTIC

The I/O self-test diagnostic is resident in the interface I/O RAM memory and consists of three sections or subtests: the internal test (test number 31), the modem loopback test (test number 32), and the 25-pin loopback test (test number 33). Tests 32 & 33 are only used when the interface is configured for RS232 operation. To run these I/O self-tests each one must be selected and executed from the HP256X printer Operator Control Panel as a printer subtest.

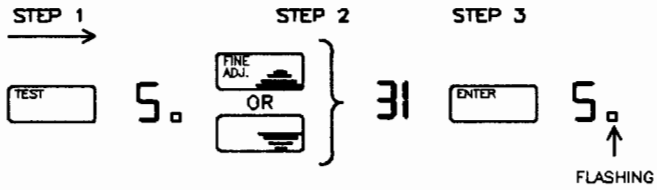
NOTE

The printer self-test (initiated by pressing the [TEST] key on the operator panel) does not execute the I/O self-test diagnostic. The I/O subtest must be individually selected and executed from the operator control panel.

If an I/O subtest is initiated and completes satisfactorily the printer displays the printer-ready status (0 is displayed in the operator display panel); if an error is detected the printer display flashes 50. The printer error code 50 indicates an interface error. Additional information as to the nature of the error can be obtained by pressing the [ENTER] key on the operator panel. Pressing the [ENTER] key displays the fail code number in the display. Fail codes, listed in table 3-2, identify the specific interface circuitry which has failed.

To run an I/O subtest for a single test execution or continuous (looping) execution, perform the following steps:

* To run a single serial I/O subtest:



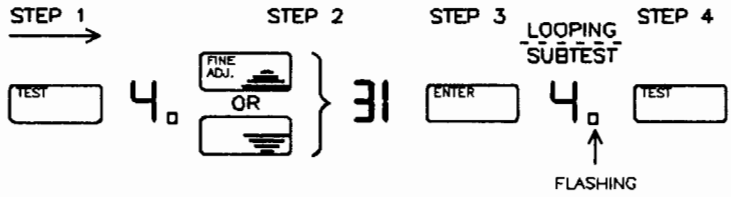
STEPS

1 - Press and hold the TEST key (less than 1 sec.) until a five appears in the Operator Control Panel display (when the TEST key is released the displayed 5 will switch back to 0).

2 - Select the serial I/O subtest number (31, 32, or 33) in the printer Operator Control Panel display.

3 - Press the ENTER key to run the subtest.

* To run the serial I/O subtest continuously (loop on test):



STEPS

1 - Press and hold the TEST key (approximately 5 sec) until a four appears in the Operator Control Panel display (a 5 will appear first and then switch to a four, then when the TEST key is released the 4 will switch back to a 0).

2 - Select the serial I/O subtest number (31, 32, or 33) in the printer Operator Control Panel display.

3 - Press the ENTER key to run the subtest.

4 - press the TEST key to terminate the continuous subtest.

Table 3-2. I/O SELF TEST FAIL CODES

ERROR NUMBER	ERROR DESCRIPTION
00	NO ERRORS DETECTED
01	RAM ERROR
02	ROM ERROR
03	SIO/CTC CIRCUITRY ERROR
04	MULTIPLE FAILURES

3.5 SUBTEST 31 (INTERNAL I/O)

The internal I/O subtest performs three routines which check the I/O RAM, I/O ROM, and SIO/CTC circuitry. If any one of these tests fail, a fail code can be accessed to identify which routine failed. If any two, or all three of the routines fail, a multiple-error fail code is provided. These fail codes for the subtest routines are listed in table 3-2.

After the internal subtest has completed, If no errors are detected, a zero is displayed in the printer Operator Control Panel. If an error is detected the printer I/O error number 50 will flash in the printer display.

If the interface is configured for RS-232-C operation, subtest 32 can be run, with the 25-pin loopback connector (part no. 02620-60062) connected directly to the interface connector to check the output control lines on the interface which are not checked by subtest 31.

3.6 SUBTEST 32 (MODEM LOOPBACK) RS-232 Configuration

Loopback test 32 allows the user to test control and data signal paths between the interface and a modem. The following signal lines are tested:

Transmitted Data to Received Data
Ready-To-Send to Clear-To-Send
(others as required for modem operation)

The modem loopback test can be performed either with the local or remote modem (see figure 3-1) placed in the loopback test mode.

a. THE LOCAL MODEM IS PUT IN THE DATA LOOPBACK TEST MODE (if the local modem has the capability for data loopback). Refer to the modem manual for instructions on how to place the modem into data loopback test mode. Once the local modem is set to loopback test mode, initiate the modem loopback test (self-test 32) from the printer Operator Control Panel of the HP256X line printer.

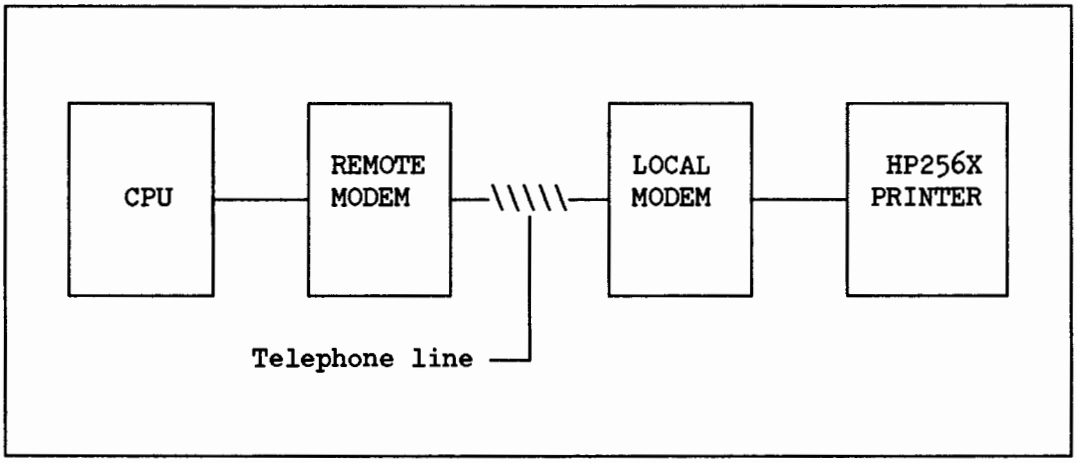


Figure 3-1. Modem Loopback Test 32

b. THE REMOTE MODEM IS PUT IN THE DATA LOOPBACK TEST MODE (if the remote modem is able to loopback data sent from the local modem). Refer to the modem manual for instructions on how to place the modem into data loopback test mode. Once the remote modem is set to loopback test mode, initiate the modem loopback test (subtest 32) from the printer Operator Control Panel of the HP HP256X line printer.

After the loopback test 32 is completed a zero is displayed in the Operator Control Panel display if no error was detected. If an error was detected the I/O error code (50) will appear, flashing, in the panel display. (A fail code of 3 will always be presented for a modem loopback test failure.)

A modem loopback test failure indicates that the interface, the cables, or a modem may have failed. The 25 pin loopback test should be run to determine if the interface has failed.

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3.7 SUBTEST 33 (25-PIN LOOPBACK) RS-232 CONFIGURATION

Test 33 allows the user to test the control and data signals in the signal path between the serial interface and the point where the loopback is accomplished. A 25-pin loopback connector (part no. 02620-60062), required for this test, is plugged into the CPU end of the serial I/O cable. This connector physically loops the output signal lines to the input signal lines.

The signal lines checked by self-test 33 are listed below:

```
Transmit Data  to  Receive Data
          RTS  to  CTS and Carrier Detect
          DTR  to  DSR
```

This test is initiated from the Operator Control Panel of the HP256X line printer. This test checks the I/O control lines and then transmits its entire character set at the configured baud rate.

If the test completes and no errors were detected, a zero will appear in the panel display. If an error is detected, testing will stop and the I/O error code (50) will appear, flashing, in the panel display. (A fail code of 3 is always presented for a 25-pin loopback test failure.)

NOTE

The 25-pin loopback plug (02620-60062) can be connected directly to the 25-pin connector on the back of the printer to test the control and data signal path on the interface PCA.

3.8 REPLACEMENT PARTS AND DIAGRAMS

The replacement parts, diagrams, and schematics are provided in tables and figures on the following pages.

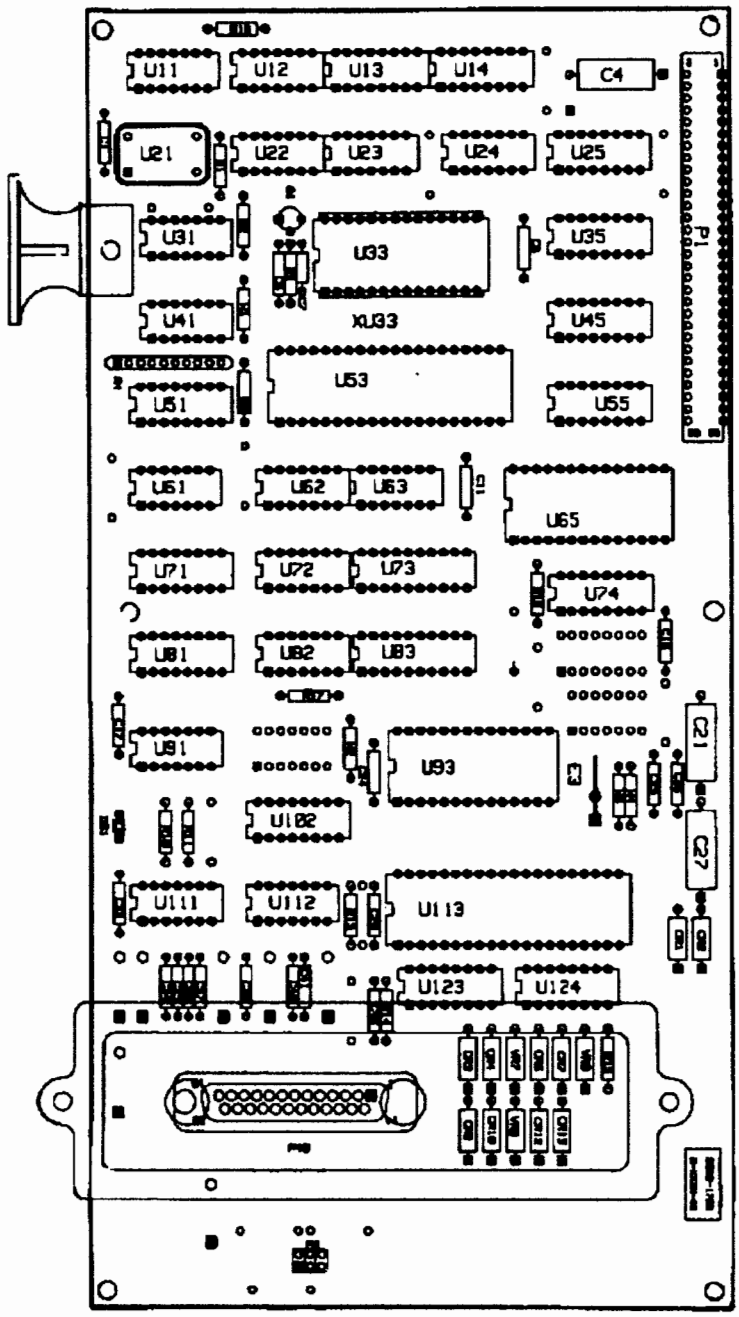

Figure 3-2. Serial Interface PCA (5062-1703), Parts Location

Table 3-3. RS232/RS422 I/O PCA (5062-1703) PARTS LIST

Ref. Designator	Description
C7	CAP:F 33PF 5% 100V
C34-37,39-41	CAP:330 PF
C1,6,8,11,16,17 ,24-26,28,33,46	CAP:.01UF 10% 100V
C4,21,27	C:F 22UF 25V AL
06	STANDOFF-RIVET
02	EXTR PC BD
03	SCR-MCH M3X8 LG
04	NUT:HEX
R11,13-15	R:F 2.15K 1% .125
R10	R:F 4.64K 1% .125
R1,2,5	R:F 21.5 1% .125W
R3	R:F 34.8K 1% .125
R16-18	R:F 1K 1% .125W F
VR8,9	V SUPPR:VR-15V
VR7	C SUPPR:VR-6.0V
XU33	SCKT:28PIN IC
08	CONN LOCK:SUB D
P40	CONN 25-PIN F
P2	CONN:HDR 3X2
E3	TAB-MALE PC
P1	CONN:SKT 2X30
09	CONN:SFT 1X2
R4	N:R9X2.2K 2% .125W
U21	OSC:XTAL CK
U65	IC HM6264 LP-15
U112	IC:MC1488L DRIVER
U82	IC:SN74S03N GATE
U11,31,61	IC:74S74N
U111	IC:MC1489AL RCVR
U12	IC:SN74LS02N
U71	IC:SN74LS175 F-F
U24,72,91	IC:SN74LS00N
U23	IC:SN74LS32N
U63	IC:SN74LS51N GAT
U25,81	IC:SN74LS138N
U102	IC:SN74LS153N
U22,62	IC:SN74LS14N
U13,14	IC:SN74LS279N

Table 3-3. RS232/RS422 I/O PCA PARTS LIST (Continued)

Ref. Designator	Description
U35,45,55,74	IC:SN74LS298N
U41	IC:SN74LS126AN
U73,83	IC:SN74LS245N
U123	IC:AM26LS32PC
U53	IC:Z80A-CPU-PS
U93	IC:Z80A-CTC-PS
U124	IC:AM26LS31PC
U113	IC:Z8470A DART
U51	IC:SN74ALS169AN
Q1	XSTR:PNP 2N3906
CR3,4,6,7,9,10 12,13	DIO:SW 200MA 80V
CR1,2	DIO:SW 1N4150
DS1	LED-LMP
W1-4	WIRE:22AWG JMP
05	LBL:IMPRINTABLE
07	PLATE:25P TYPE D
U33	PROM:SERIAL I/O
01	PCB:SERIAL I/O

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Table 3-4. INTERFACE BACKPLANE CONNECTOR (P10) SIGNAL CONNECTIONS

PIN	SIGNAL	PIN	SIGNAL
1	+5	2	+5
3	+5	4	+5
5	[-TURNAROUND]	6	NOT USED
7	+12	8	+12
9	-12		-12
11	GND	12	GND
13	GND	14	GND
15	[TCLOCK]	16	[-MLOAD]
17	[POSITION STRB]	18	[-NMI]
19	[DATA OUT]	20	[-LOAD]
21	[-IOREQS]	22	[-MEMREQS]
23	-RESET	24	-INT
25	[CLOCK 7 to 8 MHz]	26	-WAIT
27	-READ	28	-WRITE
29	A0	30	A1
31	A2	32	A3
33	A4	34	A5
35	A6	36	A7
37	A8	38	A9
39	A10	40	A11
41	A12	42	A13
43	A14	44	A15
45	S0	46	S1
47	S2	48	S3
49	D0	50	D1
51	D2	52	D3
53	D4	54	D5
55	D6	56	D7
57	-INTACK	58	-POLACK (See Note)
59	-IOREQSL (See Note)	60	-MEMREQSL (See Note)

Note: Pins 58,59,60 are slot dependent signals.

Table 3-5. INTERFACE CABLE CONNECTOR (P40) SIGNAL CONNECTIONS RS232 CONFIGURATION

PIN	SIGNAL
1	AA (Frame Ground)
2	BA (Transmit Data)
3	BB (Receive Data)
4	CA (Request-To-Send)
5	CB (Clear-To-Send)
6	CC (Data-Set-Ready)
7	AB (Signal Ground)
8	CF (Carrier Detect)
20	CD (Data Terminal Ready)

Table 3-6. INTERFACE CABLE CONNECTOR (P40) SIGNAL CONNECTIONS RS422 CONFIGURATION

PIN	SIGNAL
1	Shield Ground
3	Receive Data A
7	Signal Ground
9	Transmit Data A
10	Transmit Data B
18	Receive Data B

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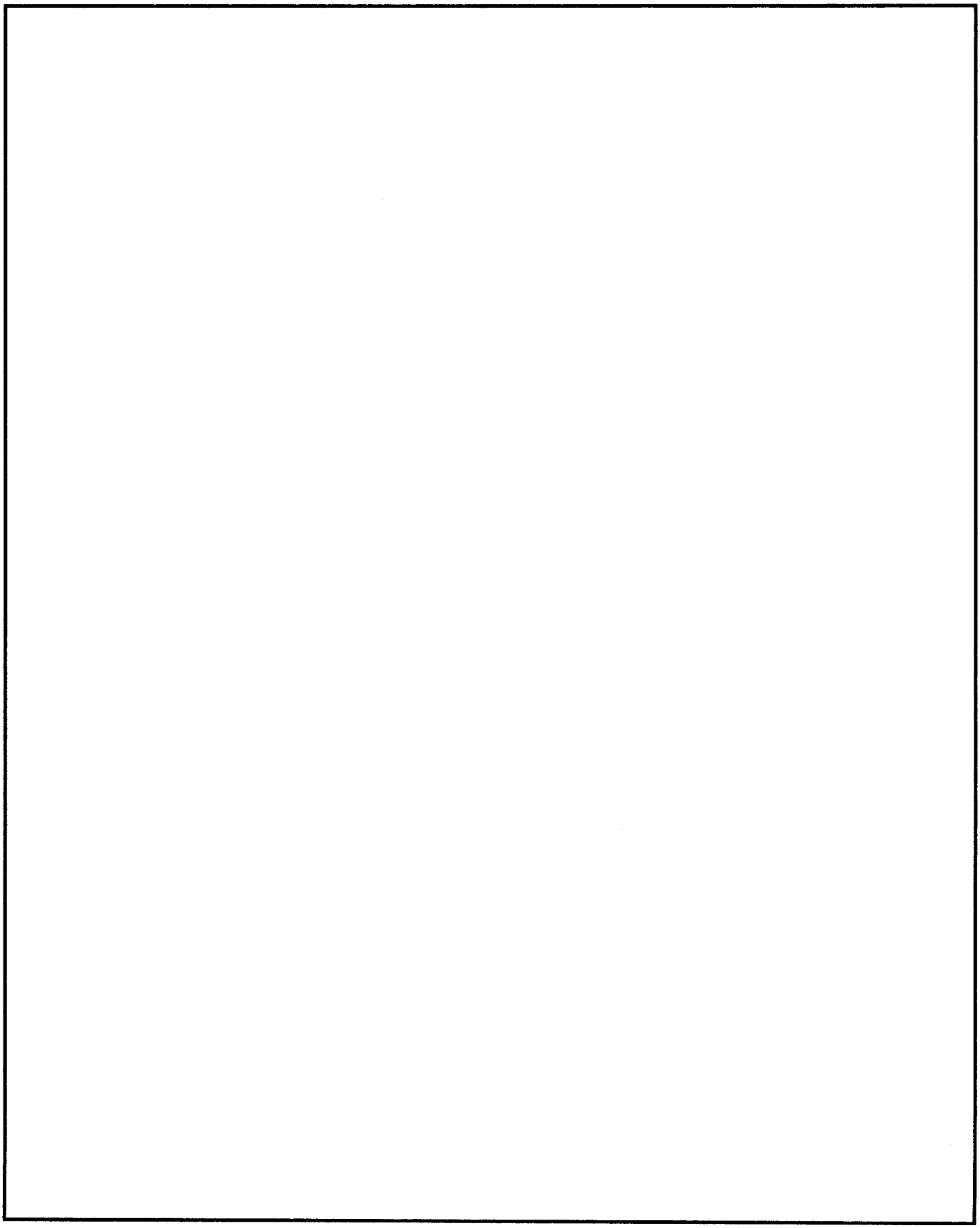


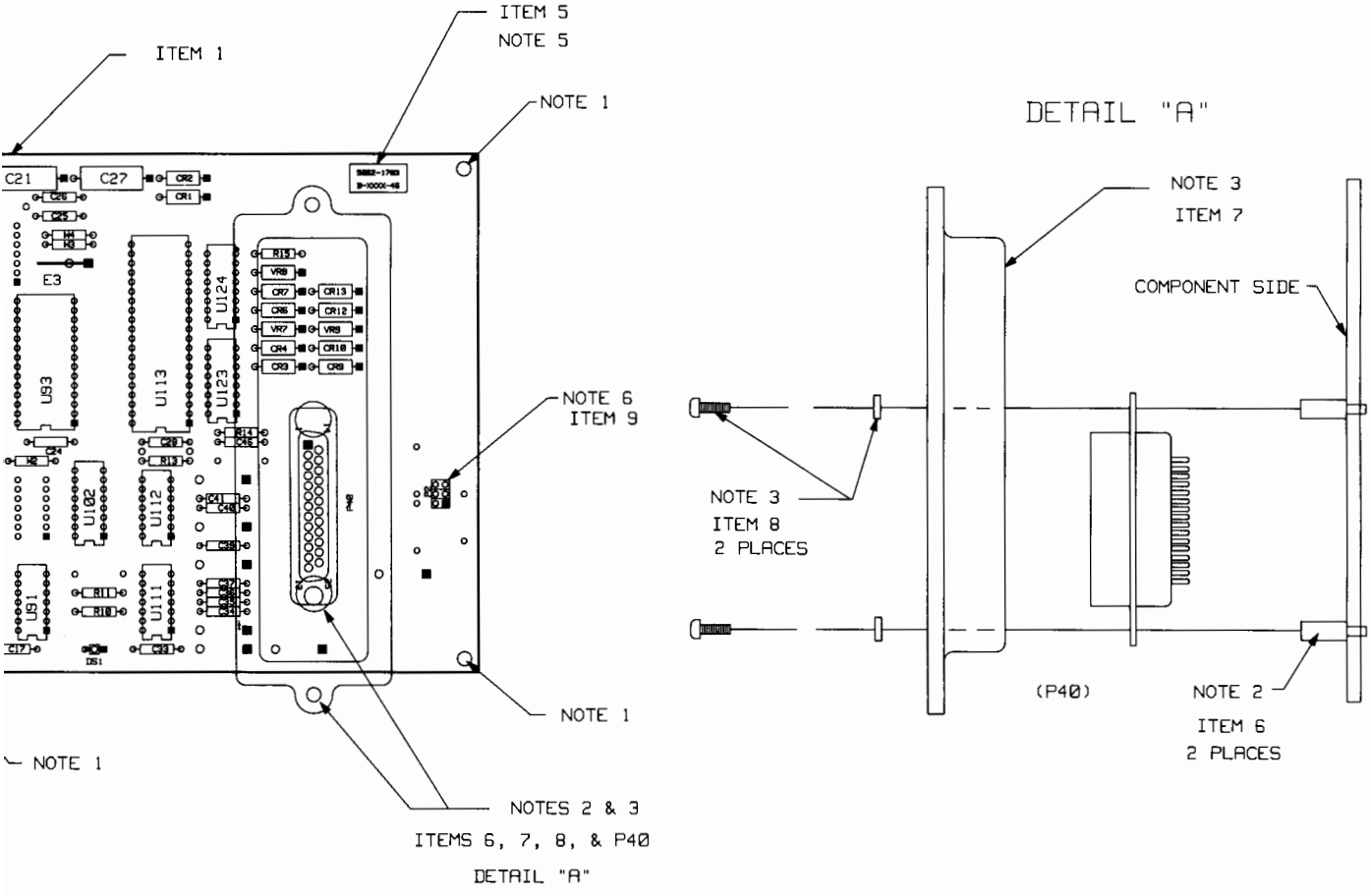
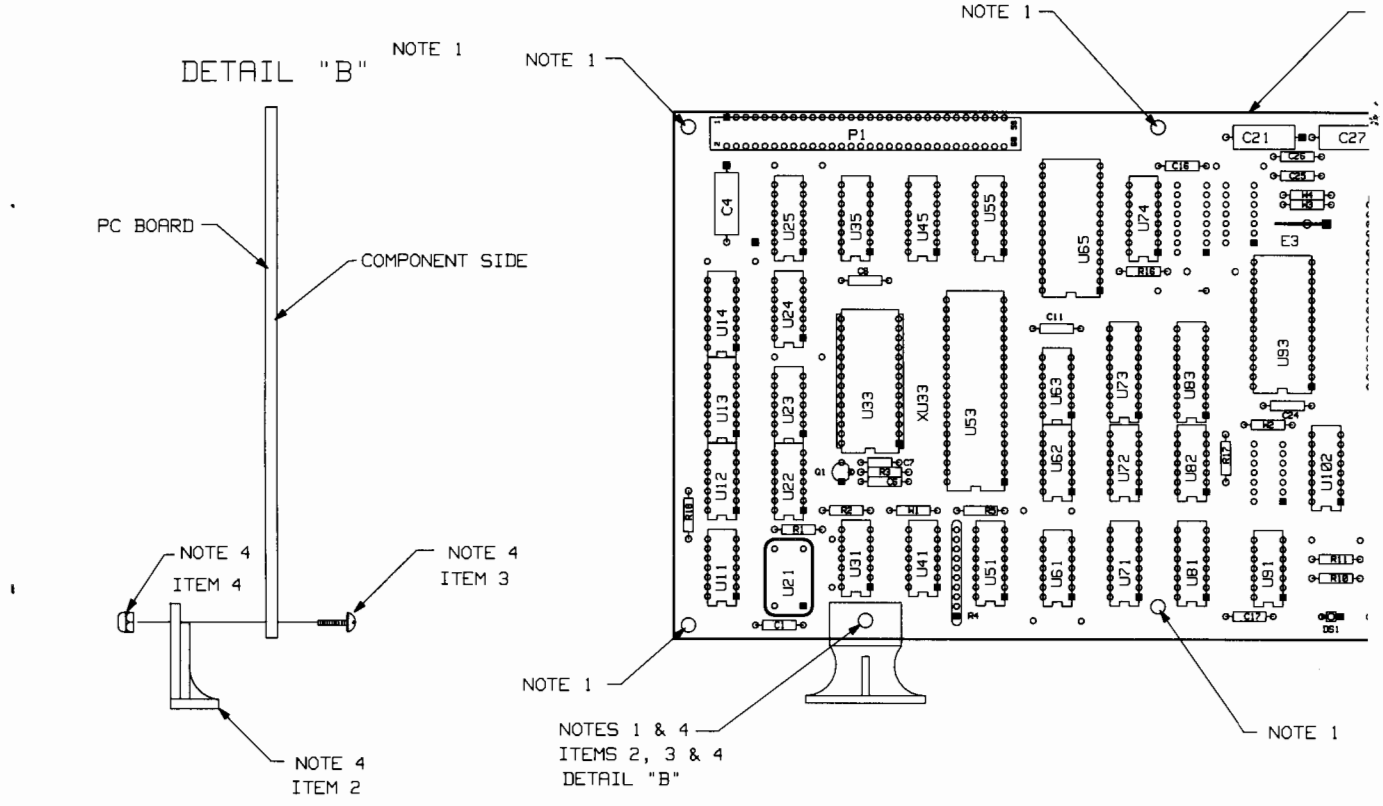


Figure 3-2
RS232/422 PCA(5062-1703)
COMPONENT LOCATION



NOTES:

1. MASK AS INDICATED PRIOR TO LOADING.
2. INSTALL IN RIVET OPERATION PRIOR TO SOLDERING.
3. LOAD PRIOR TO FLOW SOLDERING.
4. INSTALL IN TOUCH-UP.
5. PLACE SERIES/ASSEMBLY NUMBER (ITEM 5) AS SHOWN.
6. RS232 CONFIGURATION: JUMPER (ITEM 9) BETWEEN P2 (5) & P2 (4).
   STORE EXTRA JUMPER BETWEEN P2 (2) & P2 (3).
   RS422 CONFIGURATION: JUMPER (ITEM 9) BETWEEN P2 (6) & P2 (5)
   AND P2 (1) & P2 (2).

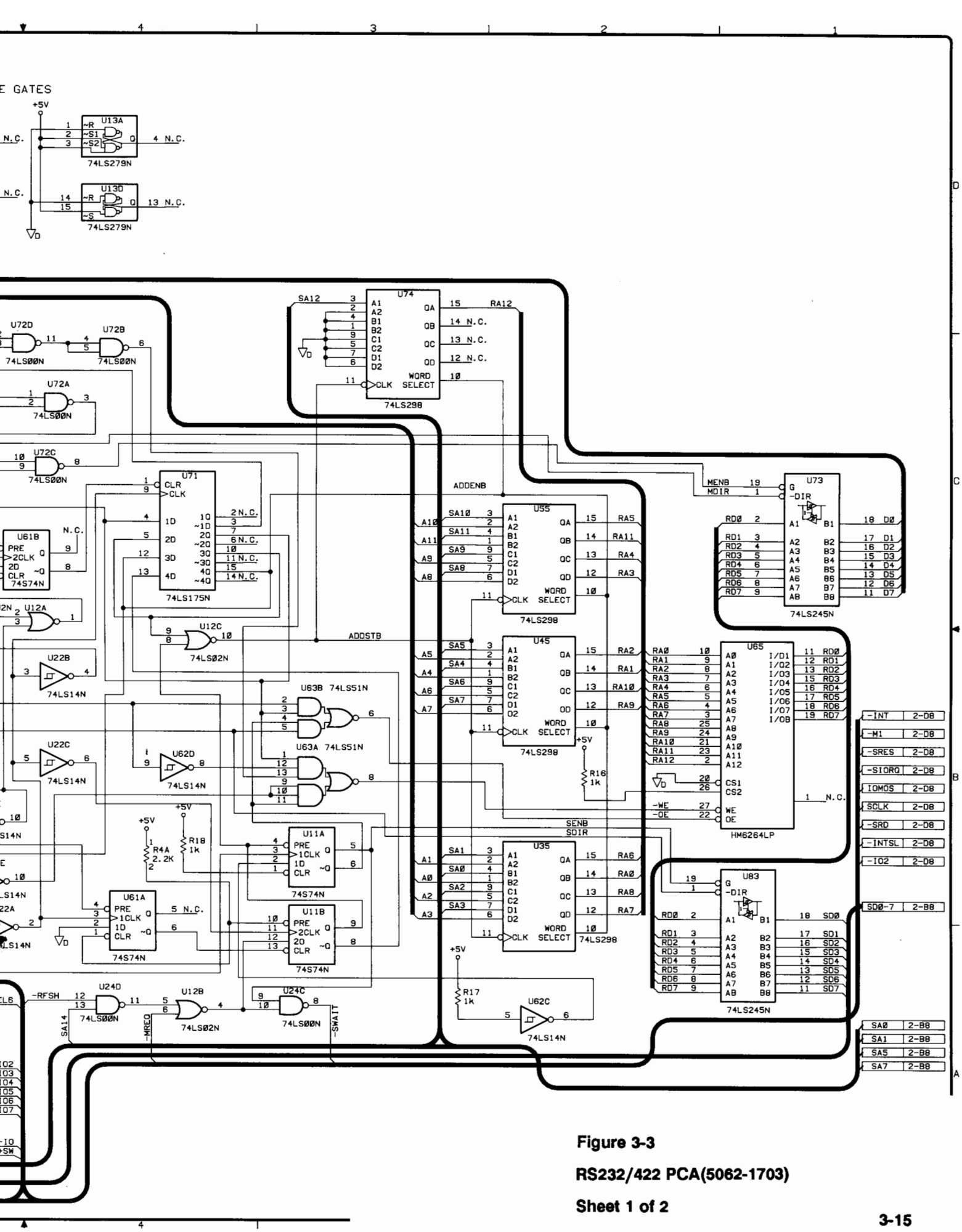


Figure 3-3

RS232/422 PCA(5062-1703)

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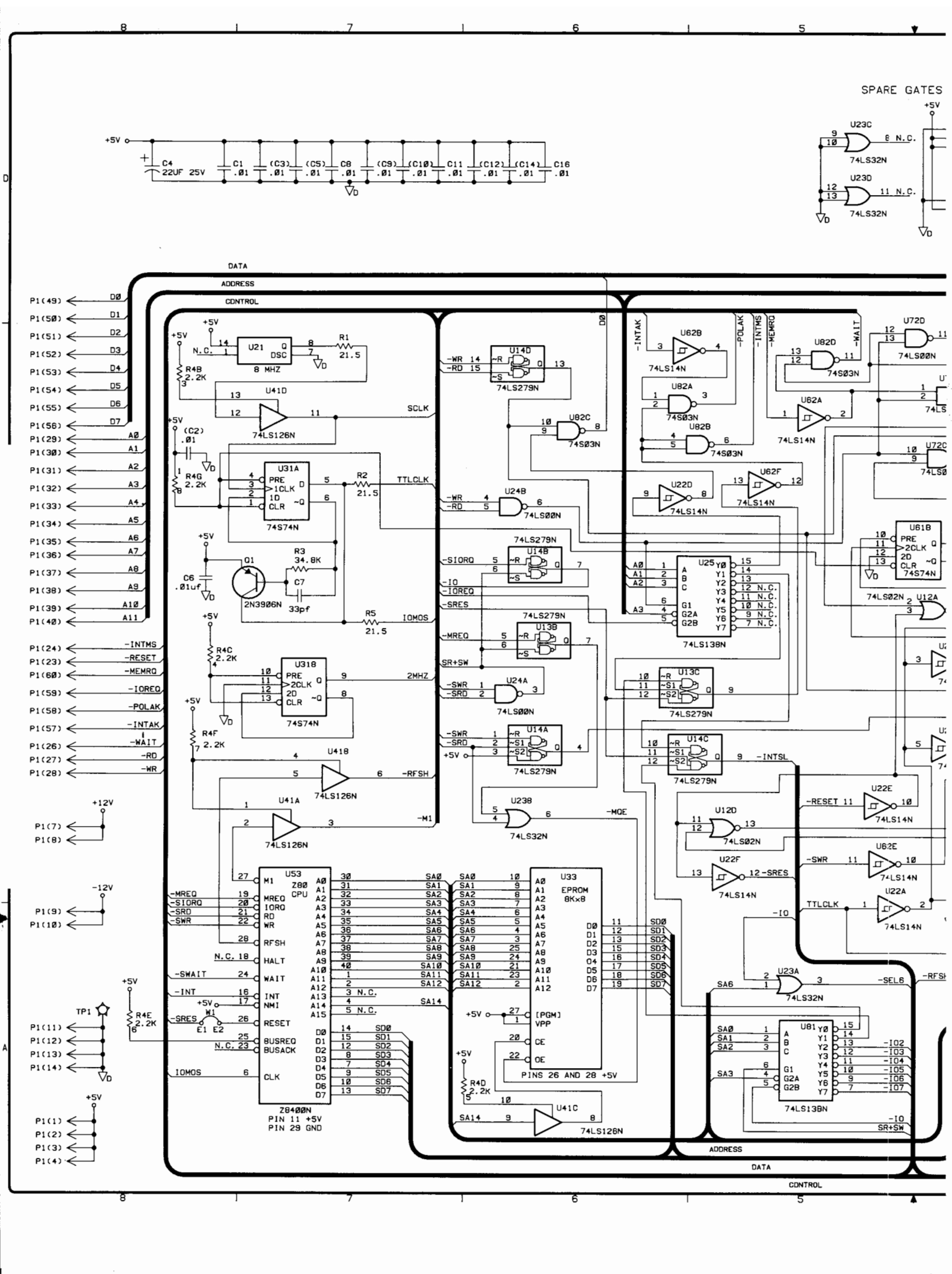

SPARE GATES
+5V
C4 22UF 25V
C1 .01
(C3) .01
(C5) .01
C8 .01
(C9) .01
(C10) .01
C11 .01
(C12) .01
(C14) .01
C16 .01
U23C
74LS32N
8 N.C.
U23D
74LS32N
11 N.C.
DATA
ADDRESS
CONTROL
P1(49) D0
P1(50) D1
P1(51) D2
P1(52) D3
P1(53) D4
P1(54) D5
P1(55) D6
P1(56) D7
P1(29) A0
P1(30) A1
P1(31) A2
P1(32) A3
P1(33) A4
P1(34) A5
P1(35) A6
P1(36) A7
P1(37) A8
P1(38) A9
P1(39) A10
P1(40) A11
P1(24) -INTMS
P1(23) -RESET
P1(60) -MEMRQ
P1(59) -IOREQ
P1(58) -POLAK
P1(57) -INTAK
P1(26) -WAIT
P1(27) -RD
P1(28) -WR
P1(7) +12V
P1(8)
P1(9) -12V
P1(10)
P1(11)
P1(12)
P1(13)
P1(14)
P1(1) +5V
P1(2)
P1(3)
P1(4)
U21 8 MHZ
R1 21.5
R4B 2.2K
U41D
74LS126N
SCLK
(C2) .01
R4G 2.2K
U31A
74S74N
R2 21.5
TTLCLK
R3 34.8K
C6 .01uf
Q1 2N3906N
C7 33pf
R5 21.5
IOMOS
R4C 2.2K
U31B
74S74N
2MHZ
R4F 2.2K
U41B
74LS126N
-RFSH
U41A
74LS126N
-M1
U53 Z80 CPU
Z8400N
PIN 11 +5V
PIN 29 GND
-MREQ
-SIORQ
-SRD
-SWR
RFSH
N.C. 18 HALT
-SWAIT WAIT
-INT INT
NMI
-SRES RESET
BUSREQ
N.C. 23 BUSACK
IOMOS CLK
R4E 2.2K
W1 E1 E2
TP1
U33 EPROM 8K×8
PINS 26 AND 28 +5V
R4D 2.2K
U41C
74LS126N
SA14
SA0 SA1 SA2 SA3 SA4 SA5 SA6 SA7 SA8 SA9 SA10 SA11 SA12 SA14
SD0 SD1 SD2 SD3 SD4 SD5 SD6 SD7
U14D
74LS279N
-WR -RD
U82C
74S03N
U24B
74LS00N
U14B
74LS279N
-SIORQ -IO -IOREQ -SRES
U13B
74LS279N
-MREQ SR+SW
U24A
74LS00N
-SWR -SRD
U14A
74LS279N
U23B
74LS32N
-MOE
U62B
74LS14N
-INTAK
U82A
74S03N
U82B
74S03N
-POLAK
U62A
74LS14N
-INTMS
-MEMRQ
U82D
74S03N
-WAIT
U72D
74LS00N
U62F
74LS14N
U22D
74LS14N
U25
74LS138N
A0 A1 A2 A3
G1 G2A G2B
Y0 Y1 Y2 Y3 Y4 Y5 Y6 Y7
N.C.
U61B
74S74N
74LS02N
U13C
74LS279N
U14C
74LS279N
-INTSL
U12D
74LS02N
U22E
74LS14N
-RESET
U62E
74LS14N
-SWR
U22F
74LS14N
-SRES
U22A
74LS14N
TTLCLK
-IO
U23A
74LS32N
SA6
-SEL6
U81
74LS138N
SA0 SA1 SA2 SA3
-IO2 -IO3 -IO4 -IO5 -IO6 -IO7
-IO
SR+SW
ADDRESS
DATA
CONTROL

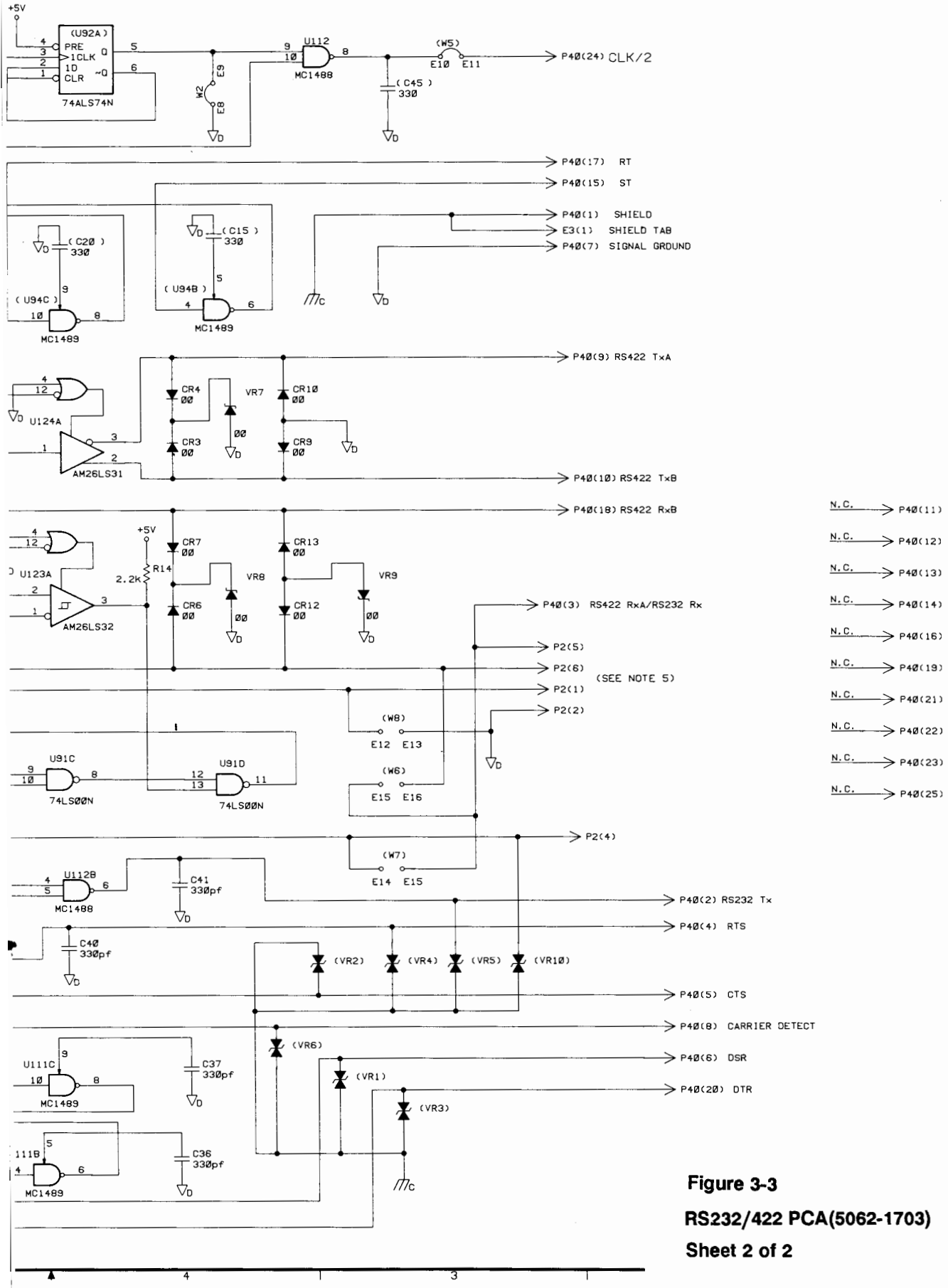
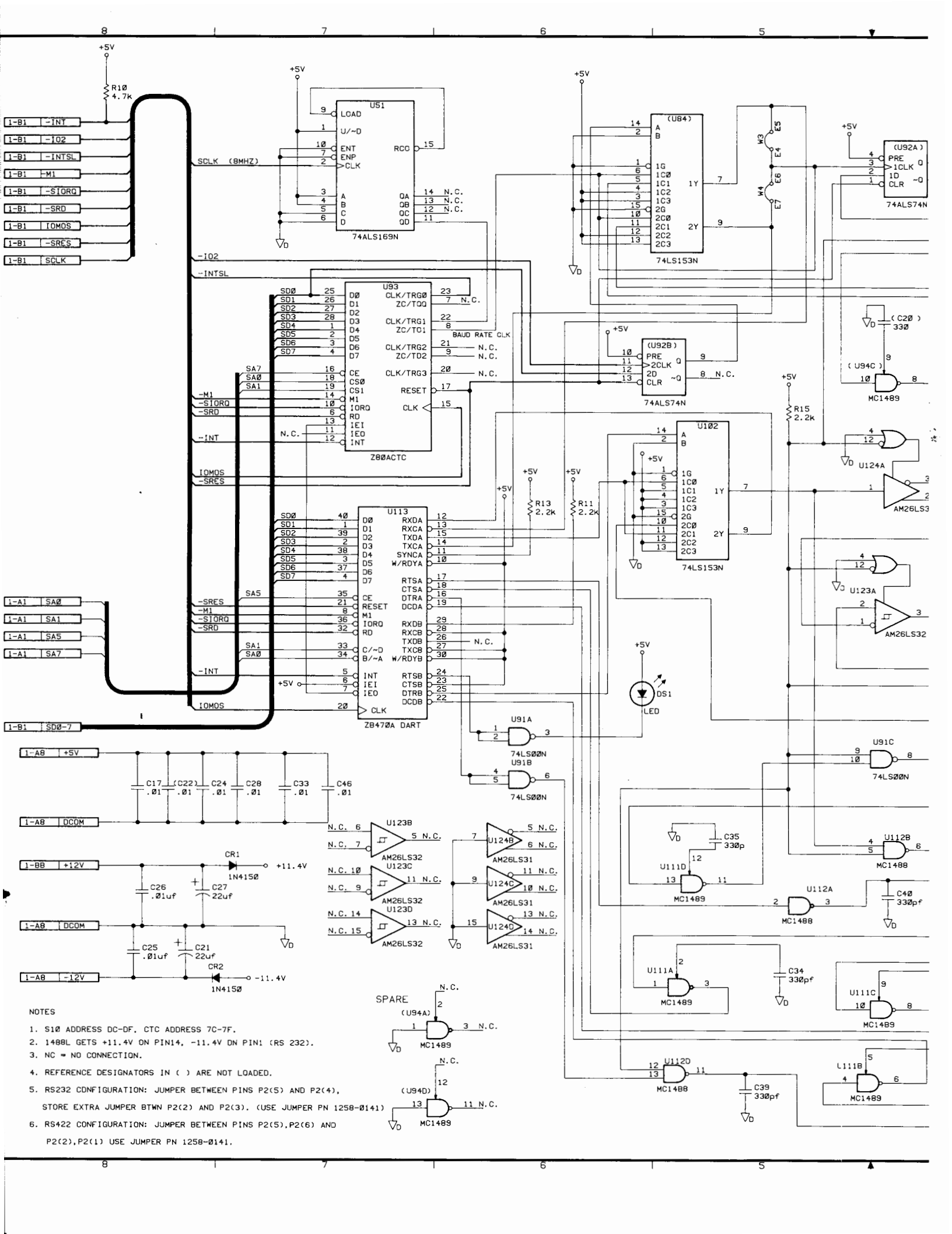


Figure 3-3

RS232/422 PCA(5062-1703)

Sheet 2 of 2


8
7
6
5
+5V
R10
4.7k
1-B1 -INT
1-B1 -IO2
1-B1 -INTSL
1-B1 -M1
1-B1 -SIORQ
1-B1 -SRD
1-B1 IOMOS
1-B1 -SRES
1-B1 SCLK
SCLK (8MHZ)
U51
LOAD
U/~D
ENT
ENP
CLK
RCO
A
B
C
D
QA
QB
QC
QD
74ALS169N
-IO2
-INTSL
U93
SD0
SD1
SD2
SD3
SD4
SD5
SD6
SD7
D0
D1
D2
D3
D4
D5
D6
D7
CLK/TRG0
ZC/TO0
CLK/TRG1
ZC/TO1
CLK/TRG2
ZC/TO2
CLK/TRG3
RESET
CLK
BAUD RATE CLK
N.C.
SA7
SA0
SA1
CE
CS0
CS1
M1
IORQ
RD
IEI
IEO
INT
-M1
-SIORQ
-SRD
-INT
Z80ACTC
IOMOS
-SRES
U113
RXDA
RXCA
TXDA
TXCA
SYNCA
W/RDYA
RTSA
CTSA
DTRA
DCDA
RXDB
RXCB
TXDB
TXCB
W/RDYB
RTSB
CTSB
DTRB
DCDB
SA5
C/~D
B/~A
Z8470A DART
1-B1 SD0-7
1-A1 SA0
1-A1 SA1
1-A1 SA5
1-A1 SA7
R13
2.2k
R11
2.2k
R15
2.2k
(U84)
1G
1C0
1C1
1C2
1C3
2G
2C0
2C1
2C2
2C3
1Y
2Y
74LS153N
U102
W3
W4
E5
E4
E6
E7
(U92A)
PRE
1CLK
1D
CLR
Q
~Q
74ALS74N
(U92B)
2CLK
2D
(C20)
330
(U94C)
MC1489
U124A
AM26LS32
U123A
U91A
74LS00N
U91B
U91C
DS1
LED
1-A8 +5V
C17
.01
(C22)
C24
C28
C33
C46
1-A8 DCOM
1-B8 +12V
CR1
1N4150
+11.4V
C26
.01uf
C27
22uf
C25
C21
CR2
1-A8 -12V
-11.4V
U123B
U123C
U123D
U124B
U124C
U124D
AM26LS31
C35
330p
U111D
MC1489
U112B
MC1488
U112A
C40
330pf
U111A
C34
U111C
U112D
C39
U111B
SPARE
(U94A)
(U94D)
NOTES
1. S10 ADDRESS DC-DF. CTC ADDRESS 7C-7F.
2. 1488L GETS +11.4V ON PIN14, -11.4V ON PIN1 (RS 232).
3. NC = NO CONNECTION.
4. REFERENCE DESIGNATORS IN ( ) ARE NOT LOADED.
5. RS232 CONFIGURATION: JUMPER BETWEEN PINS P2(5) AND P2(4),
STORE EXTRA JUMPER BTWN P2(2) AND P2(3). (USE JUMPER PN 1258-0141)
6. RS422 CONFIGURATION: JUMPER BETWEEN PINS P2(5),P2(6) AND
P2(2),P2(1) USE JUMPER PN 1258-0141.