

# SECTION 4

## M354 SERIAL INTERFACE OPTION

### 4.1 INTRODUCTION

The M354 Serial Interface Option (P/N 64004190-6001) is an easily installed interface kit, which makes the printer either RS232 or RS423 compatible in addition to its Centronics parallel interface.

Once installed, the serial and parallel interfaces are DIP switch selectable and/or control panel selectable with the LCD Option, described in Section 2. As for the parallel interface, the operating parameters for the serial interface are set using DIP switches, and are easily changed from the control panel when the printer has the LCD Option.

With the serial interface installed, the printer can accept serial, asynchronous data of 50 to 19,200 baud; provide the appropriate status signals to the "host" device; buffer up to 2K (4K optional) of printable data and/or control characters; and check the incoming data for parity, framing, and overrun errors. If any of these errors are detected, an "@" character is printed in place of the character received with an error(s).

This section contains installation instructions, programming notes, and setup information to configure and connect the interface. Supporting assembly and schematic diagrams are provided at the end of this section.

### 4.2 INSTALLATION INSTRUCTIONS

The serial interface kit consists of a memory chip, and a serial interface board assembly, which includes a cable assembly and a connector plate. Before the kit can be installed, as described in paragraph 4.3, the top cover, rear cover, and body cover must be removed; the mechanism tilted; and the blanking plate removed, as described in the following steps.

#### WARNING

Before removing the covers, ensure that the printer is disconnected from the ac outlet.

1. Remove the top cover. (Refer to Section 3, paragraph 3.2.1.)
2. Remove the rear cover. (Refer to Section 3, paragraph 3.2.2.)
3. Remove the body cover. (Refer to Section 3, paragraph 3.2.3.)
4. Tilt the printer mechanism. (Refer to Section 3, paragraph 3.2.4.)
5. Remove and save the two screws, and lock washers, fastening the blanking plate to the bracket assembly (Figure 4-1). The hardware is used to install the kit.

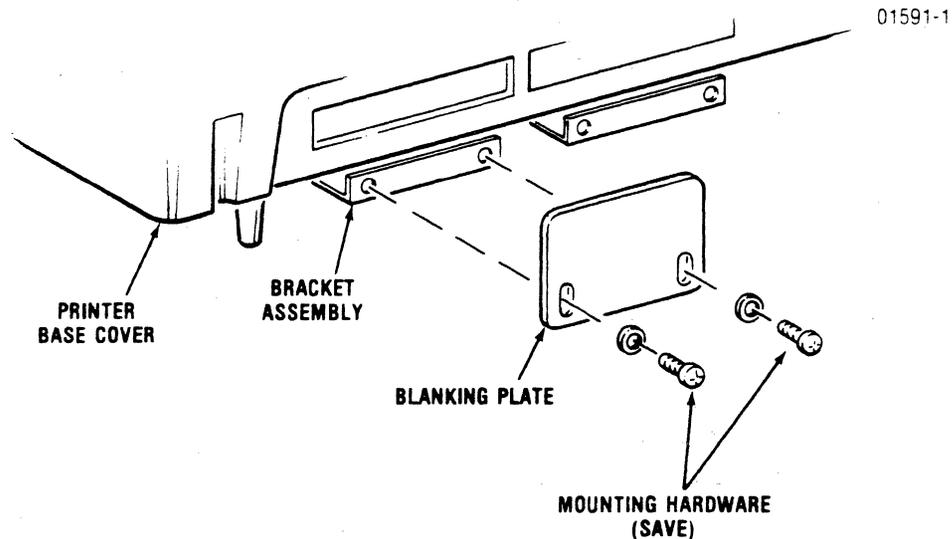


Figure 4-1 Removing the Blanking Plate

### 4.3 INSTALLING THE OPTION KIT

As shown in Figure 4-2, the M354 Serial Interface Option is a kit that consists of a 2K memory chip (8K Optional), an RS232/423 Interface PCB assembly with three self-locking standoffs, and a detachable ribbon cable/connector bracket assembly. The connector plate has a standard DB-25, EIA RS232, 25-pin socket connector (P501) that receives the external data transmission cable from the host device. For details on the pin assignment of connector P501, refer to paragraph 4.5.

To install the kit, refer to Figure 4-2, and proceed as follows:

#### CAUTION

In the following step, a static discharge could destroy the memory chip. Ground your body before handling the chip.

1. Locate the 2K x 8 static RAM chip in the kit. (The chip is on an anti-static pad.)
2. With a grounded "drain wire" in one hand to avoid a static discharge, carefully plug in the memory chip into socket U52 on the CPU Board with the chip, pin 1, in socket, pin 3, as shown in Figure 4-2.
3. Disconnect the ribbon-cable assembly from connector J502 on the interface PCB assembly.
4. Align the three standoffs and connector J102 of the PCB assembly with the three mounting holes and connector J002 on the CPU Board.

#### NOTE

When performing the next step, ensure capacitors C1 and C2, on the CPU Board, do not contact the interface board. If necessary, carefully push C1 and C2 over and away from the interface board until they clear.

5. Carefully press connector J102 into place while guiding the standoffs through the mounting holes in the CPU Board. Push down on the standoffs until they snap and lock into place.
6. From the rear of the printer, guide the ribbon-connector cable (P502) through the opening above the printer bracket assembly, and plug it into connector J502 on the interface PCB assembly.
7. Attach the connector plate to the bracket assembly using the saved hardware (two screws and lockwashers saved in Step 5, paragraph 4.2.).
8. Set up the printer and interface parameters using DIP switches S3 and S4 on the CPU Board, and DIP switch S1 on the interface PCB assembly. (Refer to paragraph 4.4 for a description of the selectable parameters.)

#### NOTE

Due to the location of S1, ensure that its switches are set before reassembling the printer in Step 9.

9. Reassemble the printer by performing the removal procedures (paragraph 3.2.1 through 3.2.4) in reverse order.

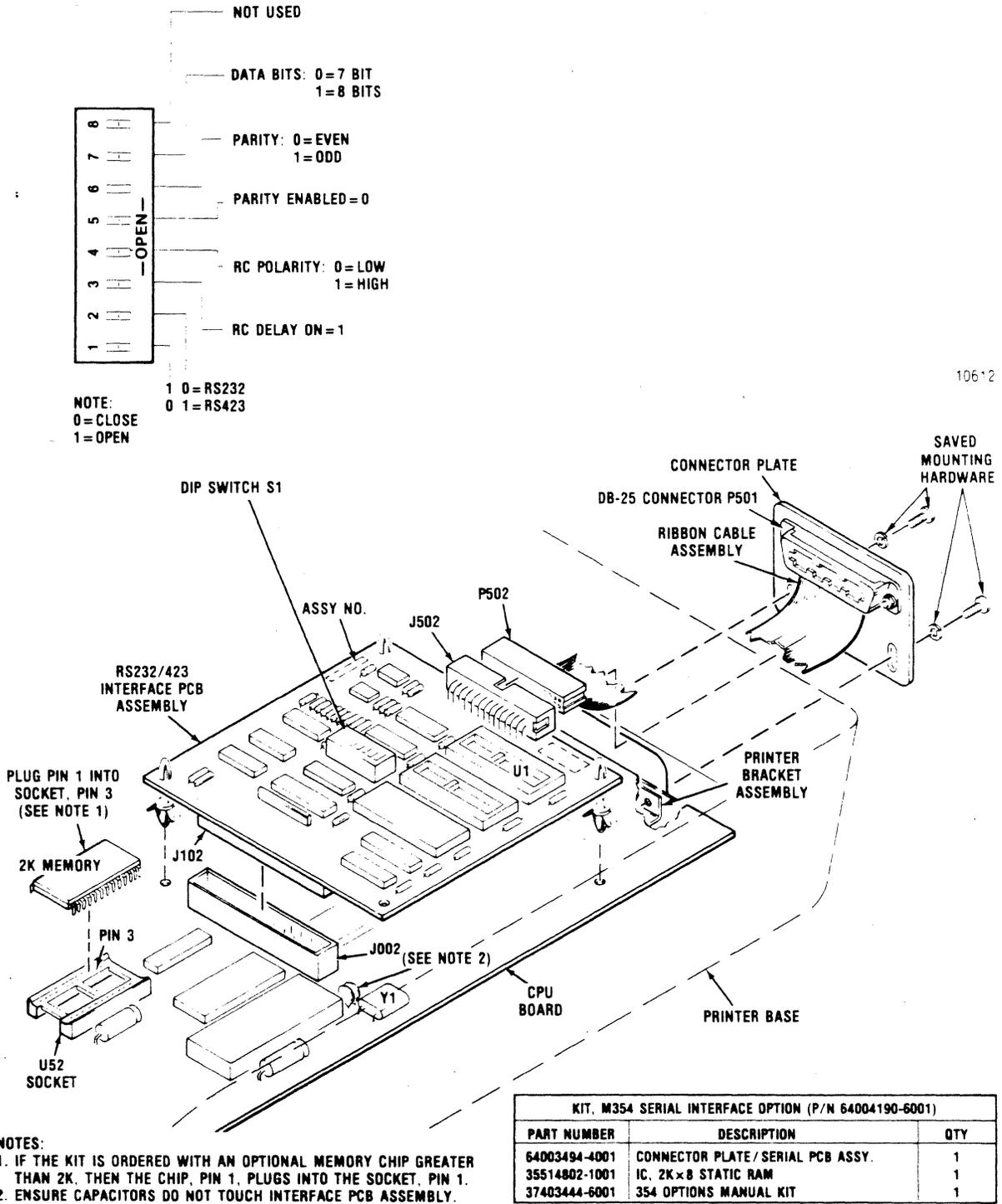


Figure 4-2 M354 Serial Interface Kit/Installation

**4.3.1 CHECKING THE OPERATION**—After installing the serial interface kit, perform the following

actions, note the results, and perform the suggested corrective action, if needed.

**Table 4-1 Initial Start Up and Operating Guide**

ACTION	RESULT	CORRECTIVE ACTION
1. Connect the printer to an ac outlet.		
2. Turn "on" the printer without connecting it to the host device, and observe the following note.  <b>NOTE</b> If the printer has Expansion Memory with E2-ROM, press SET UP MODE switch while turning "on" the printer. This loads all DIP switch settings into memory, erasing any particular parameters that were set on the LCD. Those will have to be reset, if necessary.	Control panel POWER and DSR indicators come "on."	If DSR indicator does not turn "on," and the printer has the LCD and E2-ROM, ensure the interface configuration is set for "SER" in the Set Up Mode. (See Section 2.)  If DSR indicator does not turn "on," turn "off" printer, then ensure S4-7/CPU Board is CLOSE.  If S4-7 is set to CLOSE, check the installation of serial interface board and its cable assembly. Ensure they are plugged in properly.  Repeat step 2, Action.  If DSR does not come "on," call the local Centronics service center.
3. Run a self-test printout, as described in the 354 Programmers Manual, to check the parameter setup.	Self-test printout generated, showing the current parameter setup.	If there is an error(s) in the setup, turn "off" the printer, set the appropriate switch(es), and repeat Actions 1, 2, and 3.
4. With the host and printer "off," connect a serial interface cable from the host device to the printer serial-input connector.		
5. Turn "on" both host and printer.	Printer POWER and DSR indicators come "on."	
6. Select the printer.	SELECT indicator comes "on" and printer is ready to receive data.	

**Table 4-1 Initial Start Up and Operating Guide (Cont.)**

ACTION	RESULT	CORRECTIVE ACTION
7. Send data to the printer.	<p>Data is printed.</p> <p>If a character transmission-error occurs, an "@" character is printed in its place.</p>	<p>If there is no printout, ensure S1-1 and S1-2, on the interface board, are set for RS232 or RS423 mode, according to the host device.</p> <p>If only "@" characters are printed, this could indicate that the baud rate, data word length, and/or parity is not set correctly. Ensure that they are set according to the host device.</p> <p>If there is random loss of information during transmission, the "handshaking" between printer and host may be incorrect. Ensure that the Buffer Status, Printer Status, Reverse Channel Polarity, and Reverse Channel Delay are set according to the host device.</p>

**4.3.2 PROGRAMMERS NOTE**—Information concerning printer status may be requested using the Serial Status, ASCII code sequence, DLE ENQ. The printer responds by sending a DLE status byte. The status byte indications are as follows:

BIT	STATE	PRINTER STATUS
0	HIGH (1)	Out of Paper
1	HIGH (1)	Deselected
2	HIGH (1)	Buffer Full
3	HIGH (1)	Parity Error Received
		Since Last Printer Status

## 4.4 SELECTING AND CONFIGURING THE INTERFACE

The Dual In-Line Package (DIP) switches S1, S3, and S4 are used to select and configure the serial interface. DIP switch S1 is located on the serial interface board as shown in Figure 4-2. DIP switches S3 and S4 are located on the CPU Board as shown in Appendix A.

All the switch settings that effect serial interface operation are listed in Table 4-2 by function. If the printer has the LCD Option, the S1, S3 and S4 switch settings serve as default settings, unless the printer has an Expansion Memory Option W/E2 ROM. In this case, the serial interface parameters set in the Set Up Mode are remembered when the printer is turned off and serve as the default settings.

**Table 4-2 Configuration Switch Settings**

**NOTE**

S1 is located on the serial interface board. S3 and S4 are on the CPU board.

FUNCTION	SWITCH SETTING	
<b>SERIAL OR PARALLEL MODE</b> Enables the Serial Interface Disables the Serial Interface	S4-7	CLOSE
	S4-7	OPEN
THE FOLLOWING SWITCH SETTINGS ARE EFFECTIVE ONLY WHEN SWITCH S4-7 IS IN THE CLOSE POSITION (S4-7 INDICATES DIP SWITCH S4, SWITCH #7).		
<b>SERIAL INTERFACE MODE</b> RS 232 RS 423 (2-Lines Only) NOTE: Setting both switches to the OPEN or CLOSE position will cause the loss of some or all data.	S1-1 S1-2 S1-1 S1-2	OPEN CLOSE CLOSE OPEN
<b>BAUD RATE</b> 50 to 19,200	See Appendix A for setting of DIP switch S3, switches #1, 2, 3, and 4 to select the baud rate.	
<b>DATA WORD FORMATTING</b> Word Length (bits): 7 8 Parity Check: No Parity (bit) Parity Check Selected Even Parity Odd Parity Refer to paragraph 4.4.1 for data format information.	S1-7 S1-7 S1-5 S1-5 S1-6 S1-6	CLOSE OPEN CLOSE OPEN CLOSE OPEN

**Table 4-2 Configuration Switch Settings (cont.)**

**NOTE**

S1 is located on the serial interface board. S3 and S4 are on the CPU board.

FUNCTION	SWITCH SETTINGS
<b>STATUS LINES</b>	
Buffer Status Line (Select: None, RC, DTR, or X-ON/X-OFF)	See Appendix A for a description of this function and the setting of DIP switch S4, switches #5 and 6, to select the Buffer Status Line.
Printer Status Line (Select: None, RC, DTR, or X-ON/X-OFF)	See Appendix A for a description of this function and the setting of DIP switch S4, switches #7 and 8, to select the Printer Status Line.
Reverse Channel Delay: Delay ON. This causes reverse channel transitions to only occur during the 1st stop bit of a character.	S1-3                      OPEN
Delay OFF. This causes the transitions to be asynchronous to the received data, and they may occur at any point of a received character.	S1-3                      CLOSE
Reverse Channel Polarity: Low, Mark (-V) state, when the buffer is full.	S1-4                      OPEN
High, Space (+ V) state, when the buffer is full.	S1-4                      CLOSE

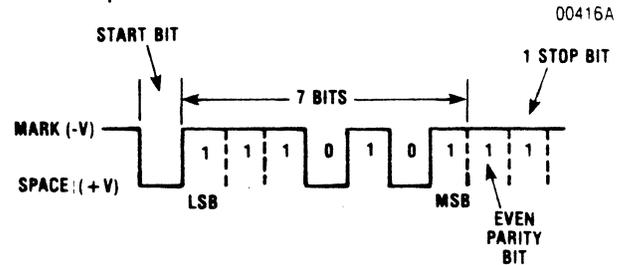
**4.4.1 DATA FORMAT**—The serial data received may consist of data words with 7 or 8 bits as determined by switch S1-7; a parity bit, if used, as determined by switch S1-5; and one or more stop bits. If Parity Check is selected (S1-5), then S1-6 is set to determine odd or even parity. These switches are factory preset for 7 data bits (S1-7, CLOSE) and no parity (S1-5, CLOSE).

When the printer is transmitting (X-ON/X-OFF) status, the format is the same except that two stop bits are used.

The baud rate is the speed the printer sends and receives data, and it is determined by setting DIP switches S3-1 through S3-4 on the CPU Board. The baud rate is factory preset for 9600 baud (S3-1, CLOSE; S3-2, OPEN; S3-3, OPEN; S3-4, OPEN). However, it can be DIP switch set from 50 to

19,200 baud, as indicated in Appendix A, or set from the control panel, if the printer has the LCD Option described in Section 2.

A description of all the switch settings are given in paragraph 4.4. Figure 4-3 defines the input/output line levels and illustrates the format for a data word with seven data bits, an even parity bit and one stop bit.



**Figure 4-3 Serial Data Word Format**

## 4.5 SERIAL INTERFACE CONNECTOR

In the following information, Figure 4-4 illustrates the end view of the 25-pin serial interface connector. Table 4-3 provides the pin assignments and a description of the data set and printer generated signals according to RS232 and RS423 signal designations. A standard Centronics RS232 serial interface cable (PN 39620033-6001) is available. It is a 10-foot cable terminated at both ends with a 25-pin (DB25) plug connector.

01592

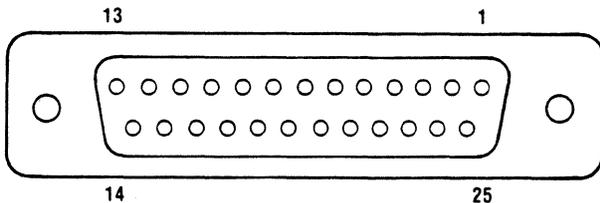


Figure 4-4 25-Pin Interface Connector  
(End View)

### 4.5.1 NOTES ON SYSTEM CONNECTION

1. When the interface is set to operate in the RS423 mode, there are separate ground lines for the printer transmitted and received signals. The DB25 Serial Connector (P501), pin 10, provides the return line for Received Data (pin 3), Clear to Send (pin 5), Data Set Ready (pin 6), and Carrier Detect (pin 8). The normal RS232 ground (pin 7) remains as the reference for outgoing signals, Transmitted Data (pin 2), Request to Send (pin 4), Reverse Channel (pin 11), and Data Terminal Ready (pin 20).
2. The transmission cable from the host device to the interface is customer supplied. The recommended maximum transmission cable length for baud rates up to 19,200 is 50 feet in the RS232 mode, and 1000 feet in the RS423 mode. If for any reason these limits are exceeded, it is contingent on testing and acceptance by the user.

Table 4-3 RS232/RS423 Interface Connection

PIN	DESIGNATION		SIGNAL SOURCE	FUNCTION
	RS232	RS423		
1	AA	—	PRINTER	Protective Ground.
2	BA	SD	PRINTER	Transmitted Data/Send Data: Depending on the setting of DIP switch S3/CPU Board, this line will send the X-ON and X-OFF codes to indicate the Buffer or Printer Status.
3	BB	RD	DATA SET	*Received Data: Receives serial data from the data set at RS232/RS423 voltage levels. See paragraph 4.4.1 for the format information.
4	CA	RS	PRINTER	Request to Send: This line is held in the Space (+V) state when operating in the X-ON/X-OFF mode. Otherwise, this line is held in the Mark (-V) state.
5	CB	CS	DATA SET	*Clear to Send: When set in the Space (+V) state, this line enables the printer to transmit the Buffer or Printer Status via the Transmitted Data/Send Data line. A Mark (-V) state disables the transmitter.
6	CC	DM	DATA SET	*Data Set Ready/Data Mode: When set in the Space (+V) state, this line allows the printer to receive data via the Receive Data line. A Mark (-V) state prevents it.

\*If this line is not connected (open circuit) or grounded, the interface recognizes the input as being in a Space (V+) state.

Table 4-3 RS232/RS423 Interface Connection (cont.)

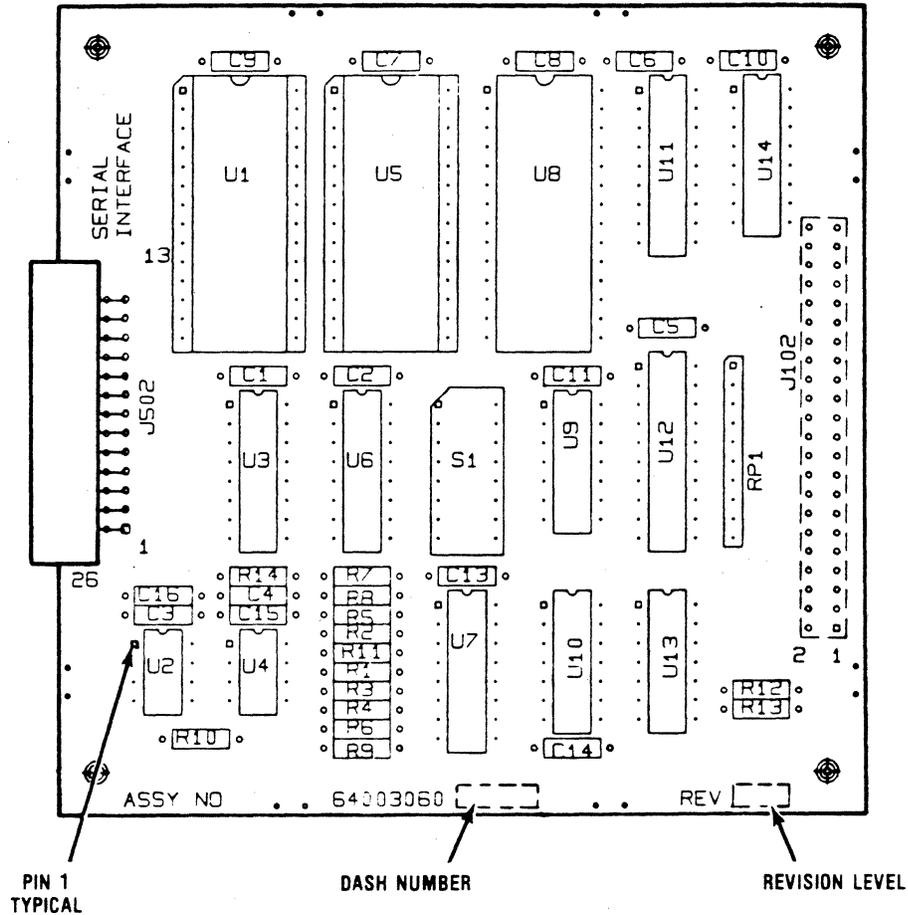
PIN	DESIGNATION		SIGNAL SOURCE	FUNCTION
	RS232	RS423		
7	AB	RC	PRINTER	<p>Signal Ground/Receiver Common: In the RS232 mode (S1-1 and S1-2, OPEN and CLOSE, respectively), this line provides the signal common for all lines.</p> <p>In the RS423 mode (S1-1 and S1-2, CLOSE and OPEN, respectively), this line is signal common for all printer-transmitted signals.</p>
8	CF	RR	DATA SET	<p>*Carrier Detect/Receiver Ready: A Space (+ V) state on this line allows the printer to accept data from the data set. A Mark (- V) state prevents it.</p>
10	-	SC	DATA SET	<p>Send Common: In the RS232 mode, this line is an open circuit.</p> <p>In the RS423 mode, this line is signal common for all host transmitted signals.</p>
11	SA	SSD	PRINTER	<p>Reverse Channel/Secondary Send Data: Used for indicating printer or buffer status to the data set when in the Reverse Channel mode. If DIP switch S1, switch #4, is open, this line is normally in a Mark (- V) state.</p> <p>If DIP switch S3/CPU Board is set to use this line for buffer status, then this line goes to a Space (+ V) state when the buffer is 256 characters from being full (buffer full). It remains in that state until there are only 256 characters left in the buffer, then the line returns to the Mark (- V) state (buffer empty).</p> <p>If DIP switch S3/CPU Board is set to use this line for printer status, then the line goes to a Space (+ V) state while the printer is selected, and the Mark (- V) state when the printer is deselected.</p> <p>The above described line functions are inverted if DIP switch S1, switch #4, is set to CLOSE.</p> <p style="text-align: center;"><b>NOTE:</b></p> <p>This line is held in the Mark(- V) state when operating in the X-ON/X-OFF mode for status.</p>
20	CD	TR	PRINTER	<p>Data Terminal Ready/Terminal Ready: If DIP switch S3/CPU Board is set to use this line for buffer or printer status, this line functions the same as the Reverse Channel line with normal polarity (not inverted). Otherwise, this line is held in the Mark (- V) state.</p>

## 4.6 COMPONENT LOCATION AND SCHEMATIC DRAWINGS

The following figures, 4-5 and 4-6, provide the sup-

porting drawings of the board electronics as troubleshooting aids for qualified service persons.

01593



NOTE:  
SOCKETS U1 AND U5 NOT USED.

Figure 4-5 Component Location, M354 Serial Interface Board (64003060-4000, Rev. B3)

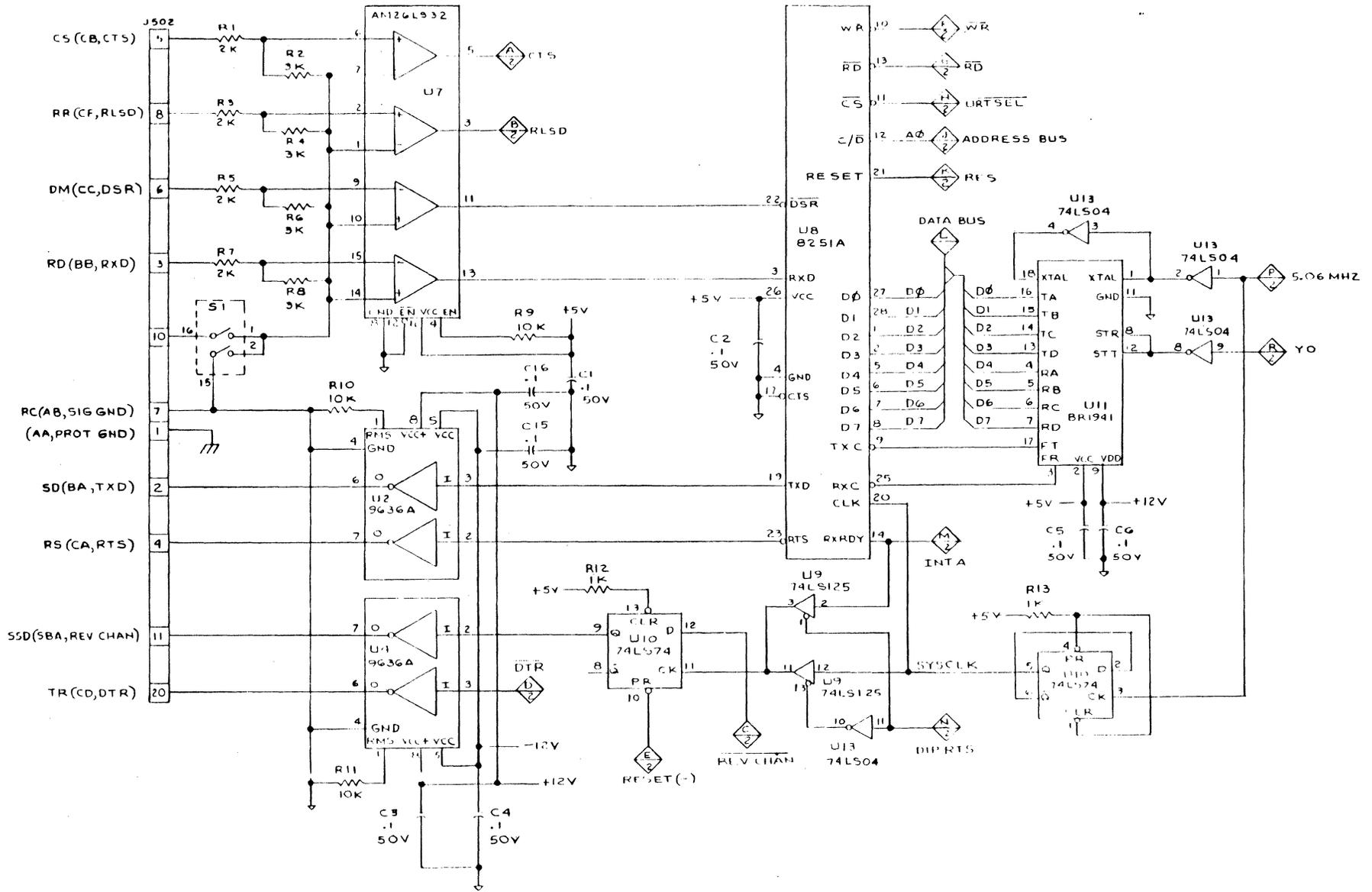


Figure 4-6 Schematic Diagram, Serial Interface Board (64003060-9001, Rev. B, Sheet 1 of 2)

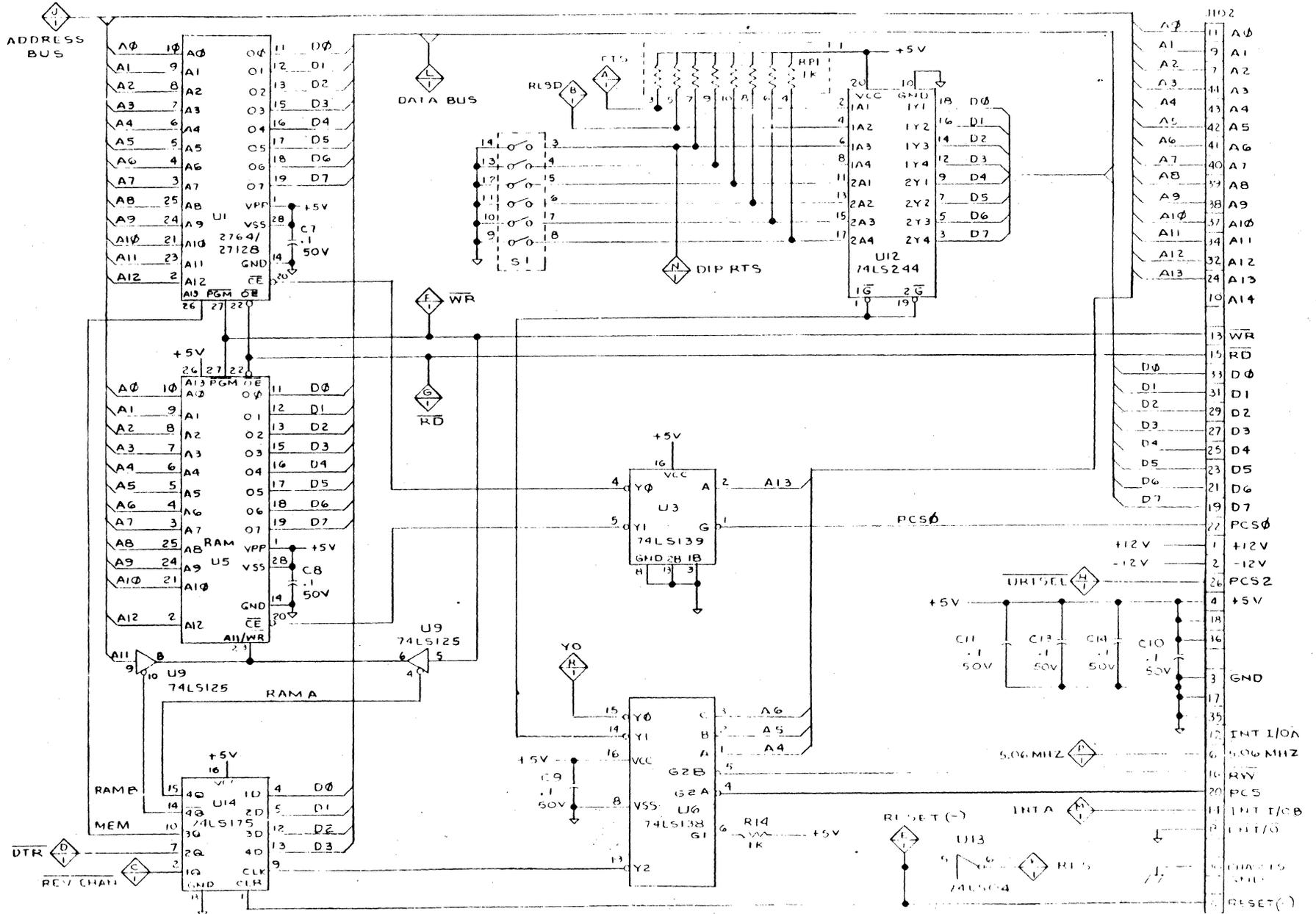


Figure 4-6 Schematic Diagram, Serial Interface Board (64003060-9001, Rev. B, Sheet 2 of 2)