

DOT MATRIX PRINTER OPTION

user manual

**RS-232C/CURRENT LOOP
INTERFACE TYPE 2**

EPSON

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INTRODUCTION

The RS-232C/Current Loop Serial Interface Type 2 (Cat. No. 8145) is an optional interface which is to be incorporated into EPSON dot matrix printers (FX, RX and MX series) for connection to any asynchronous data transmission systems with bit rates ranging from 75 to 9,600 BPS, under RS-232C or 20 mA neutral current loop interface conditions.

With the aid of a 2K-byte buffer memory incorporated in the optional interface circuit board, real-time entry of serial data is possible within the permissible bit rate range of the serial interface and within the capacity of the buffer memory without the need of a special handshaking operation.

SPECIFICATIONS

- (1) Synchronizing Method: Asynchronous
- (2) Bit Rate: 75, 110, 135, 150, 200, 300, 600, 1,200, 1,800, 2,400, 4,800, 9,600 (selectable by DIP switch)
- Note: The operation over 1,200 BPS under current loop mode does not keep correctly.
- (3) Word Length
- (a) Start bit: 1 bit
 - (b) Data bit: 7 or 8 bits (selectable by DIP switch)
 - (c) Parity bit: Odd, even or none (selectable by DIP switch)
 - (d) Stop bit: 1 bit or more (2 bits or more at 9,600 BPS)
- (4) Input Signal Polarity
- (a) With RS-232C: MARK=Logic "1" (-3V to-27V)
SPACE=Logic "0" (+3V to+27V)
 - (b) With Current Loop: MARK=Logic "1" (current ON)
SPACE=Logic "0" (current OFF)
- (5) Handshaking
- (a) With RS-232C
When the signal condition at pin No. 11 and pin No. 20 is:
MARK: Data transfer is disabled.
SPACE: Data transfer is enabled.
(The signal polarity can be inverted by the DIP switch.)
 - (b) With Current Loop
When the impedance between pin No. 17 and pin No. 24 is:
LOW (MARK): Data transfer is enabled.
HIGH (SPACE): Data transfer is disabled.
(The signal polarity can be inverted by the DIP switch.)
- (6) Buffer Memory: 2,048 bytes

CONDITION SETTING OF SERIAL INTERFACE BOARD

This serial interface (Cat. No. 8145) has 7 jumpers (J1 to J7), one 8-pin DIP switch (SW1-1 to SW1-8) and one 4-pin DIP switch (SW2-1 to SW2-4) to permit selection of various conditions. The function and factory-set condition of each jumper and DIP switch pin are as shown below.

1. Jumper Setting

Table 1 Setting of Jumpers

Jumper	Function				Factory-set condition
J1	ON: Pull up "DSR" and "DCD" to +12V via 4.7-ohm resistor.				ON
J2	ON	Input data: RS-232C level	OFF	Input data: Current loop level	ON
J3	OFF		ON		OFF
J4	ON: Pull up "TTY-TXD" to +12V via 470-ohm resistor.				OFF
J5	ON: Connect "TTY-TXD Return" to Signal Ground.				OFF
J6	ON: Pull up "TTY-RXD" to +12V via 470-ohm resistor.				OFF
J7	ON: Connect "TTY-RXD Return" to Signal Ground.				OFF

NOTES:

1. "ON" denotes the connection of the jumper, while "OFF" denotes the disconnection of the jumper.
2. The serial interface is factory-set to RS-232C level. To convert it to current loop level, cut the printed pattern between the through holes of J2 at the reverse side of the interface board and then connect J3 with a conductor. Never select both RS-232C level and current loop level at the same time, otherwise the printer will be damaged.

2. DIP Switch Setting

Table 2 Setting of DIP SW1

DIP SW Pin No.	Function	Factory-set condition
1-1	Bit rate selection (See Table 4.)	ON
1-2	Bit rate selection (See Table 4.)	ON
1-3	Bit rate selection (See Table 4.)	ON
1-4	Bit rate selection (See Table 4.)	OFF
1-5	Data entry ready flag control (See Table 5.)	ON
1-6	Data entry ready flag control (See Table 5.)	ON
1-7	ON: Parity check disabled. OFF: Parity check enabled.	OFF
1-8	ON: Even parity check OFF: Odd parity check	ON

NOTE:

Should a parity error occur, an asterisk (*) mark is printed in lieu of the error character.

Table 3 Setting of DIP SW2

DIP SW Pin No.	Function				Factory-set condition
2-1	ON: 7-bit word length OFF: 8-bit word length				ON
2-2	ON	In the state that serial data entry is disabled, Reverse Channel = MARK (RS-232C)	OFF	In the state that serial data entry is disabled, Reverse Channel = SPACE (RS-232C)	ON
2-3	OFF	TTY-TXD = MARK (Current Loop)	ON	TTY-TXD = SPACE (Current Loop)	OFF
2-4	ON: Reverse channel valid OFF: Reverse channel fixed				ON

NOTE:

If SW2-2 and SW2-3 are set to ON simultaneously, the printer may be damaged.

3. Bit Rate Selection

Table 4 Bit Rate Selection

BIT RATE (BPS)	DIP SW Pin			
	SW1-1	SW1-2	SW1-3	SW1-4
75	OFF	OFF	ON	ON
110	ON	ON	OFF	ON
135	OFF	ON	OFF	ON
150	ON	OFF	OFF	ON
200	OFF	OFF	OFF	ON
* 300	ON	ON	ON	OFF
600	OFF	ON	ON	OFF
1200	ON	OFF	ON	OFF
1800	OFF	OFF	ON	OFF
2400	ON	ON	OFF	OFF
4800	OFF	ON	OFF	OFF
9600	ON	OFF	OFF	OFF
Self-test	ON	ON	ON	ON

* The serial interface is factory-set to 300 BPS.

NOTE:

The printer will not function properly if operated at a baud rate of more than 1,200 bps in current loop mode.

4. Data Entry Ready Flag Control

When the vacant area for bytes in the buffer memory becomes 16, Reverse Channel (RS-232C) is set at "MARK" or TTY-TXD signal (current loop) becomes High impedance (SPACE), causing data entry to be disabled. Subsequently, the data within the buffer memory are transferred one after another to the printer. When the vacant area for bytes in the buffer memory reaches one of the preset values shown in Table 5, a flag is reset.

Table 5 Data Entry Ready Flag Control (Recovery Timing)

Flag reset (bytes)	SW1-5	SW1-6
152	ON	ON
288	OFF	ON
560	ON	OFF
1,936	OFF	OFF

NOTE:

Whenever the above DIP switch setting is changed, be sure to turn the power off.

INSTALLATION

1. Installing the Interface Board in FX Series Printer

To install the Serial Interface Board (Cat. No. 8145) in an FX Series printer, observe the following procedure.

- (1) Turn off the power switches of both the printer and the host computer.

NOTE:

Power should always be turned off when inserting or removing the interface board. Removal or insertion of the interface board with the power turned on could cause permanent damage to the board itself, as well as to the printer and the host computer.

- (2) Pull and remove the manual paper feed knob.
- (3) Remove the four screws shown in Fig. 1.

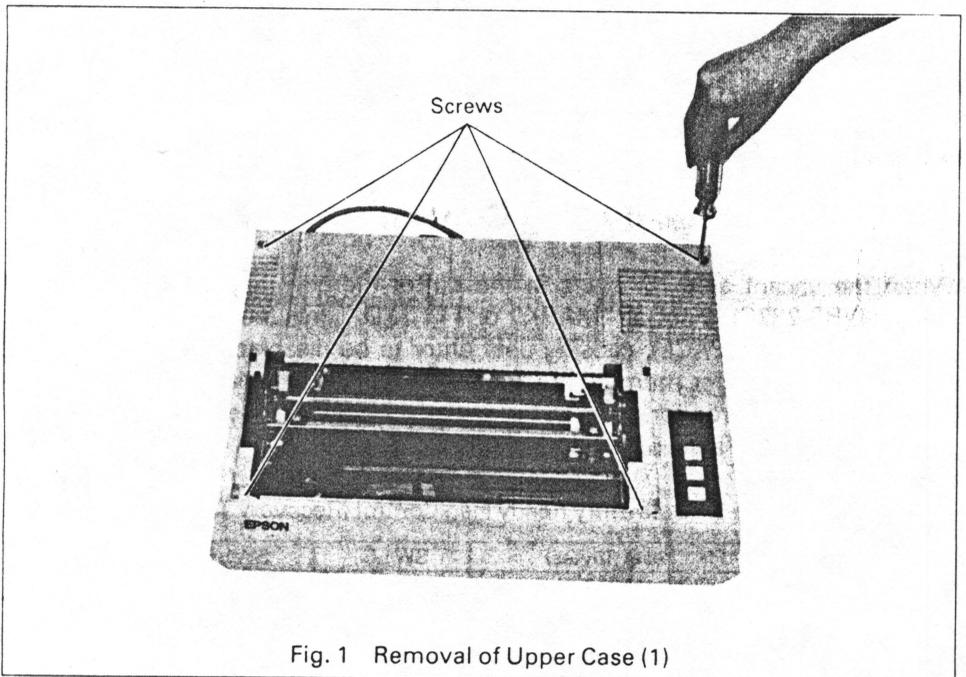
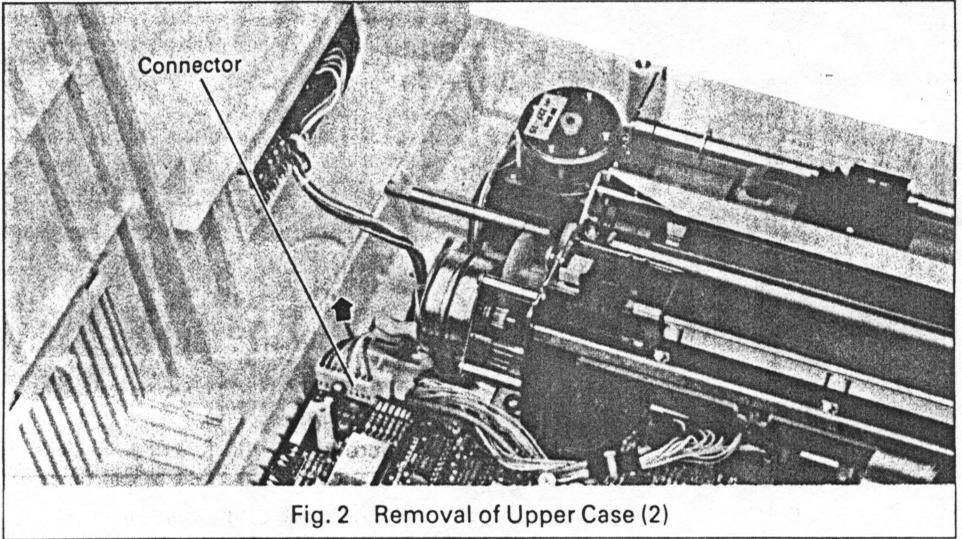
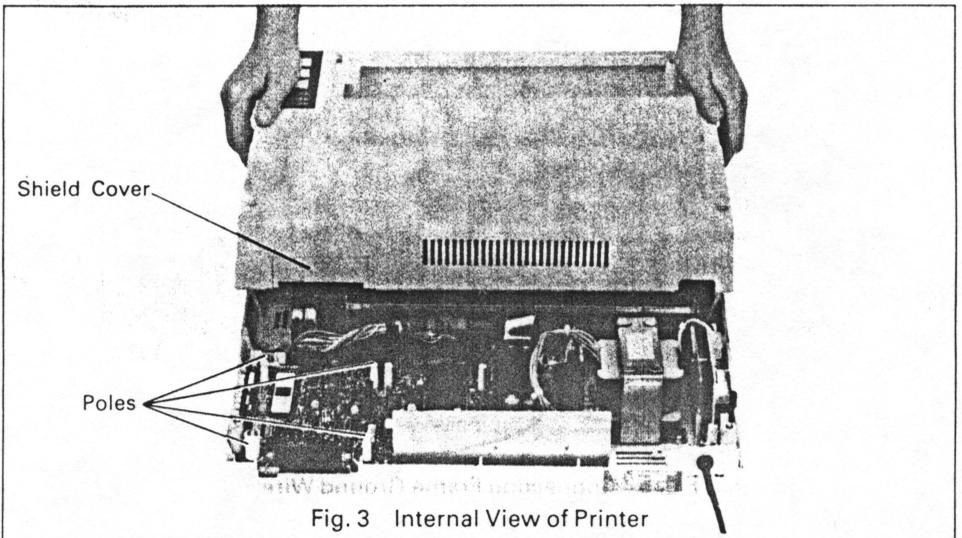


Fig. 1 Removal of Upper Case (1)

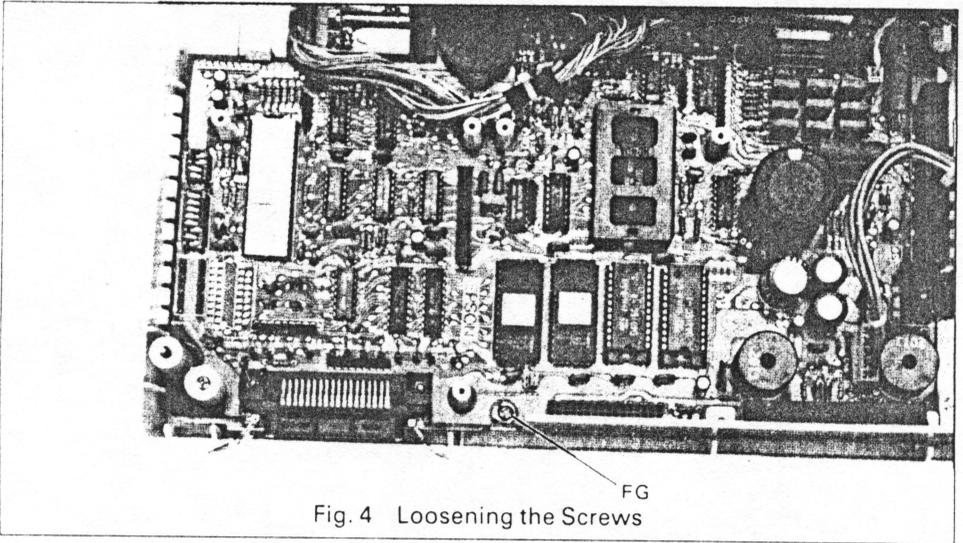
- (4) Lift the upper case of the printer, unplug the cable connector connecting the control panel and the control circuit board from the control circuit board. (See Fig. 2.)



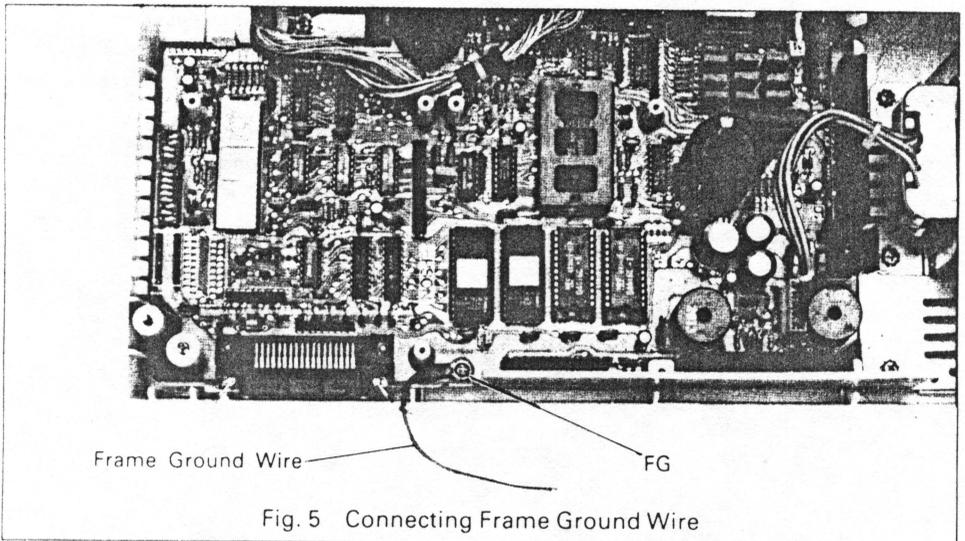
- (5) Remove the upper case and the shield cover. After the upper case has been removed, four poles are visible at the inner rear left of the printer. (See Fig. 3.)



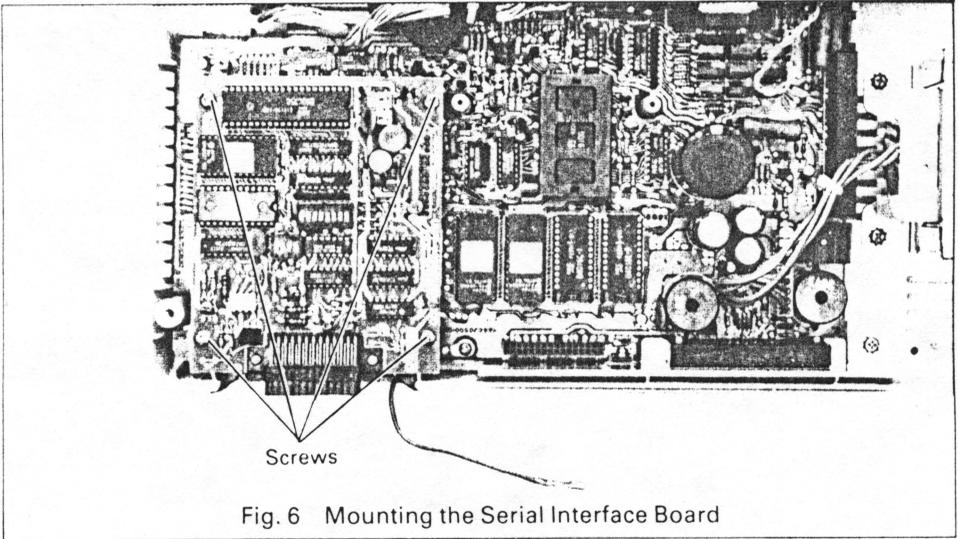
(6) Loosen the screw set in the FG (frame ground) pattern.



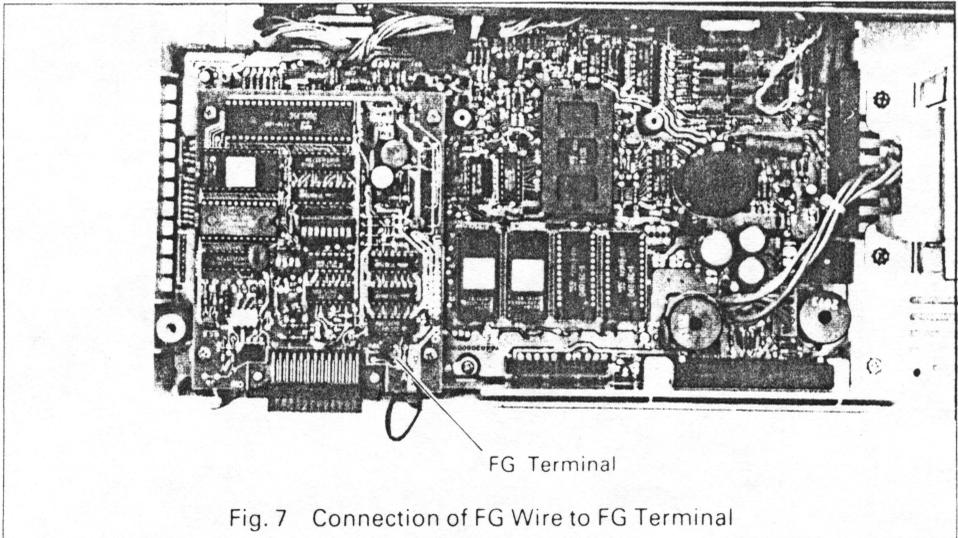
(7) Connect one end of the frame ground wire (Round Chip) contained in the shipping package of this interface as an accessory to the frame ground terminal. (See Fig. 5.)



- (8) Plug the connector of the Serial Interface Board (Cat. No. 8145) into the mating connector (CN2) on the control circuit board of the printer.
- (9) Secure the I/F Board on the four poles with the four mounting screws. (See Fig. 6.)



- (10) Connect the Frame Ground wire (FASTON chip) to the FG terminal (FASTON tab) of the Interface Board (Cat. No. 8145). (See Fig. 7.)



- (11) Replace the upper case.

Two types of FX Series printer are available. One type incorporates a SUMI Board for carriage control and the other type, a Slave CPU 8042 for this purpose. Both types are fully compatible. Observe the following procedures to install the Serial Interface Board in an FX Series printer incorporating a SUMI Board.

Remove the upper case and the shield cover in the same manner as the FX Series printer incorporating a Slave CPU 8042.

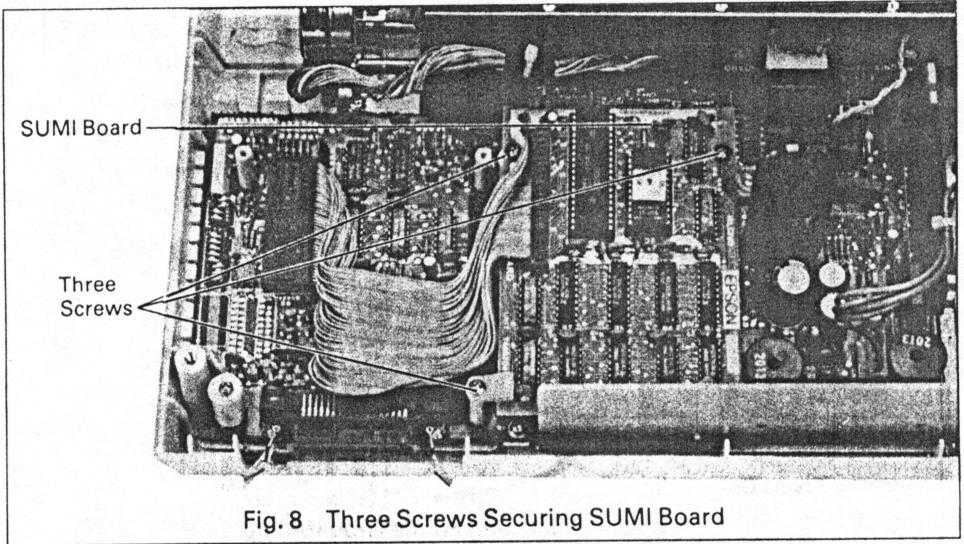
- (1) Turn off the power switches of both the printer and the host computer.

NOTE:

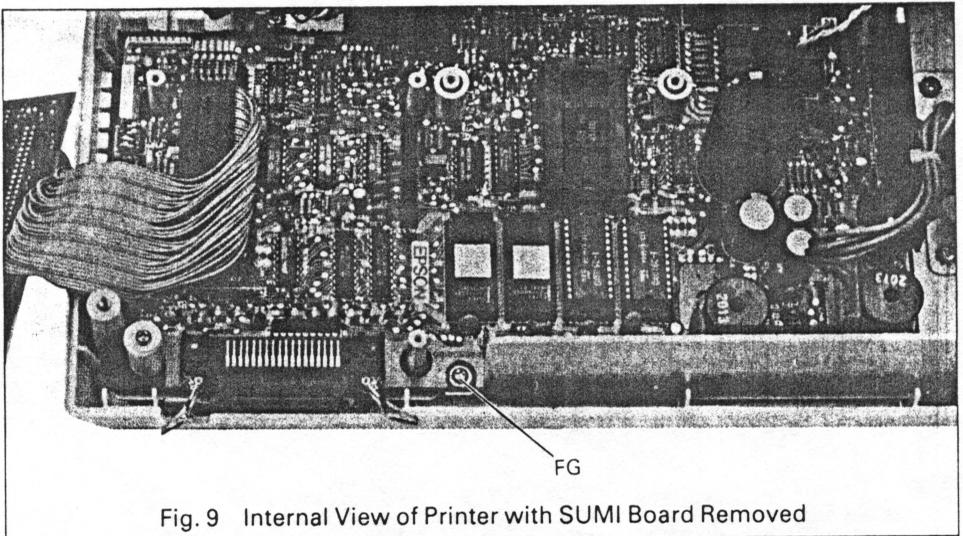
Power should always be turned off when inserting or removing the interface board. Removal or insertion of the interface board with the power turned on could cause permanent damage to the board itself, as well as to the printer and the host computer.

- (2) Pull and remove the manual paper feed knob.
- (3) Remove the four screws shown in Fig. 1.
- (4) Lift the upper case of the printer, unplug the cable connector connecting the control panel and the control circuit board from the control circuit board. (See Fig. 2.)
- (5) Remove the upper case and the shield cover. After the upper case has been removed, four poles are visible at the inner rear left of the printer. (See Fig. 3.)

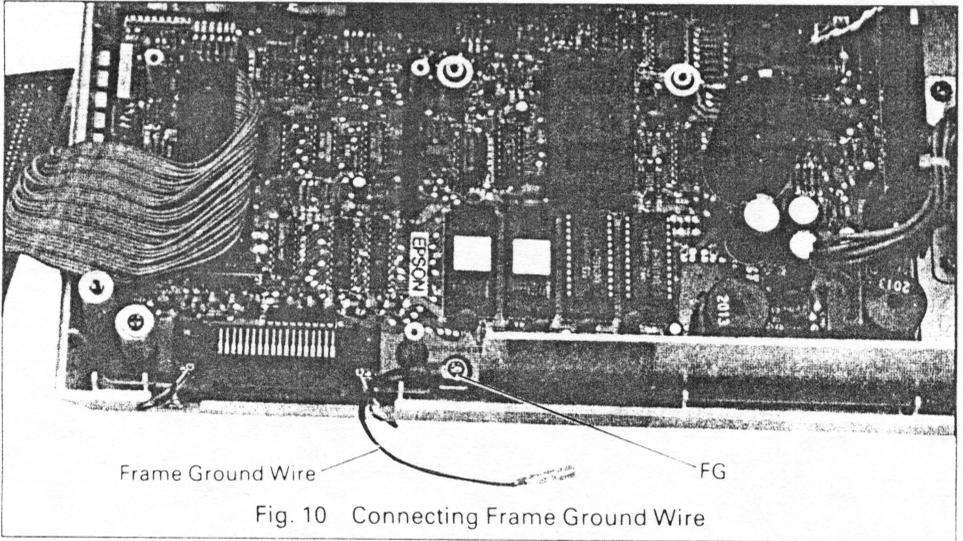
- (6) Remove the three screws securing the SUMI Board as shown in Fig. 8 and unplug the connector of SUMI Board into the mating connector (CN3) of the control circuit board.



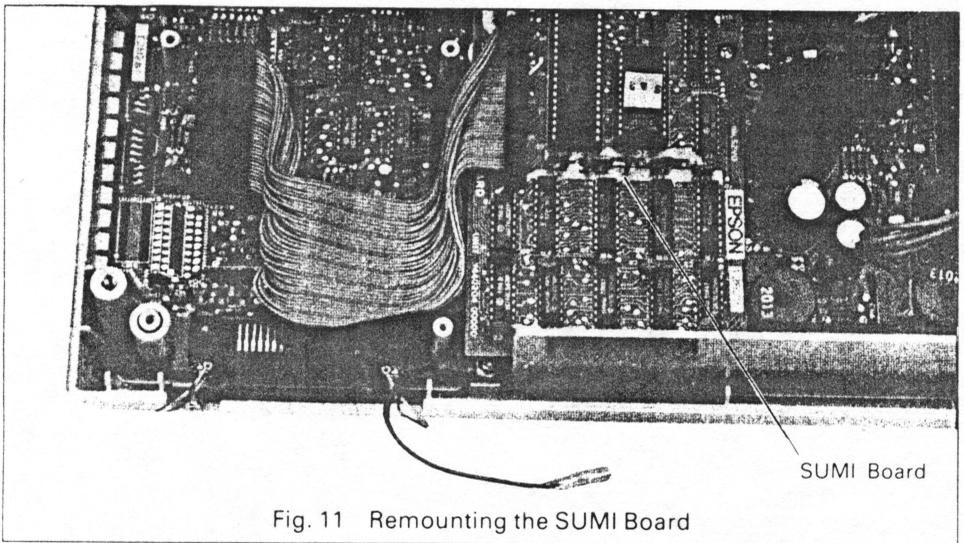
- (7) Loosen the screw set in the FG (frame ground) pattern.



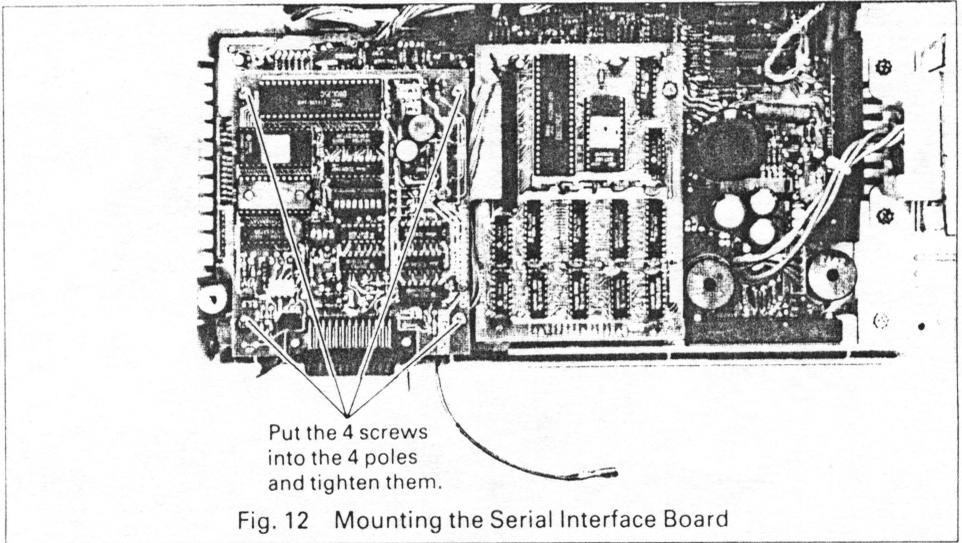
- (8) Connect one end of the frame ground wire (Round Chip) contained in the shipping package of this interface as an accessory to the Frame Ground terminal. (See Fig. 10.)



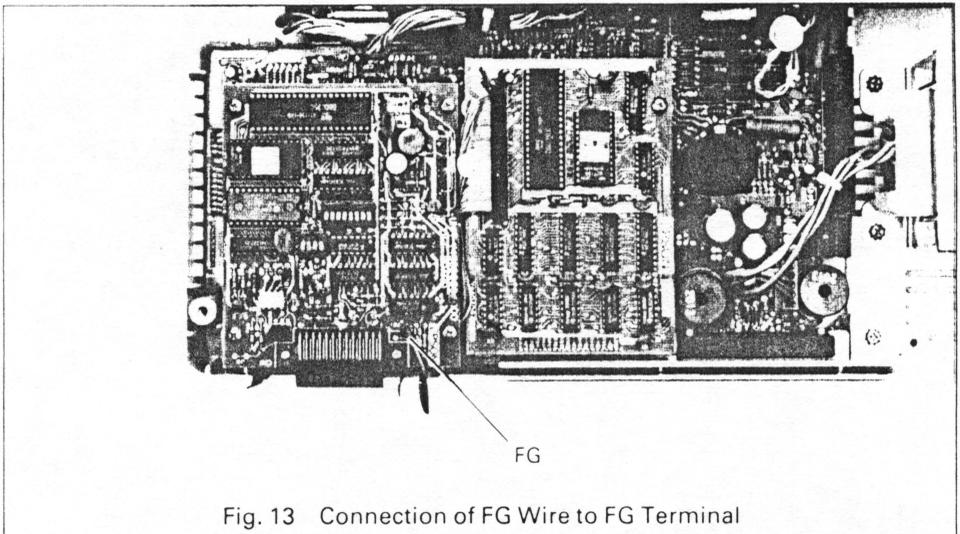
- (9) Remount the SUMI Board. (See Fig. 11.)



- (10) Plug the connector of the Serial Interface Board (Cat. No. 8145) into the mating connector (CN2) on the control circuit board of the printer.
- (11) Secure the I/F board on the four poles with the four mounting screws. (See Fig. 12.)



- (12) Connect the Frame Ground wire (FASTON chip) to the FG terminal (FASTON tab) of the Interface Board (Cat. No. 8145). (See Fig. 13.)



- (13) Replace the upper case.

2. Installing the Interface Board in RX Series Printer

To install the Serial Interface Board (Cat. No. 8145) in the RX Series printer, observe the following procedure.

- (1) Turn off the power switches of both the printer and the host computer.

NOTE:

Power should always be turned off when inserting or removing the interface board. Removal or insertion of the interface board with the power turned on could cause permanent damage to the board itself, as well as to the printer and the host computer.

- (2) Take off the upper case of the printer as follows. (Refer to the operation manual of the RX series printer for details.)
 - 1) Remove the two screws securing the upper case shown in Fig. 14.
 - 2) Pull and remove the manual paper feed knob and the connector at the front right corner of the upper case.

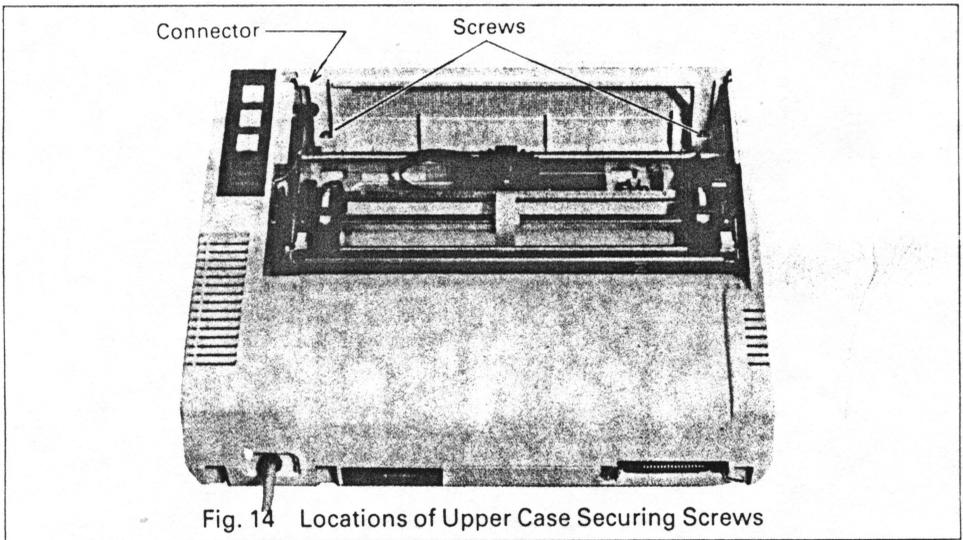
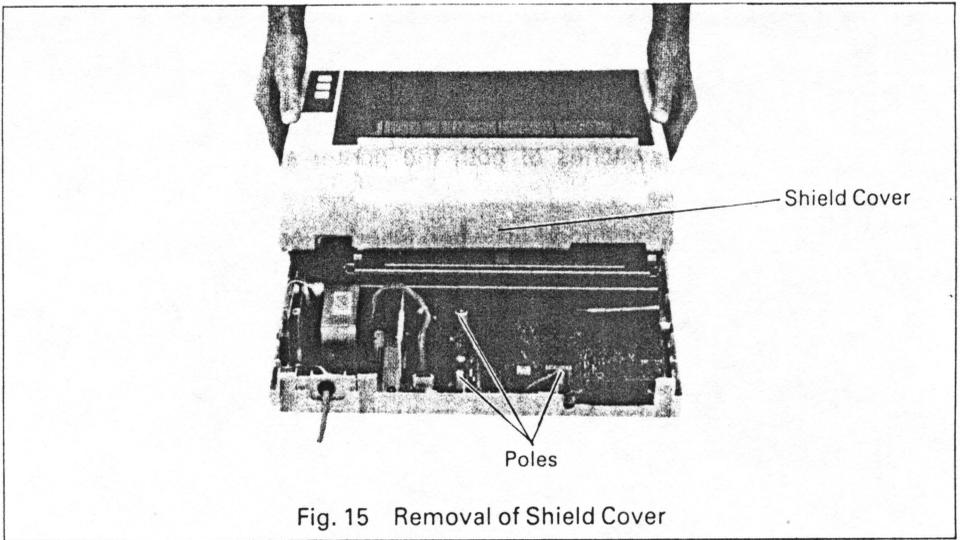


Fig. 14 Locations of Upper Case Securing Screws

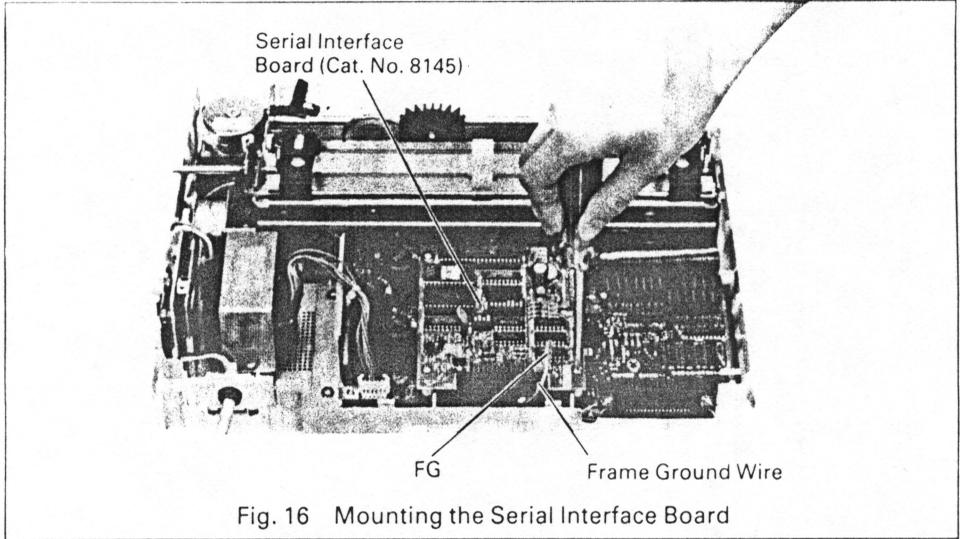
- 3) Take off the upper case and the shield cover. (See Fig. 15.)

NOTE:

The rear of the upper case (where the parallel interface connector is located) is secured with hooks instead of screws. Therefore, the upper case may be removed easily by lifting the case from its front. After the removal of the upper case, 3 poles are visible at the inner rear center of the printer.



- (3) Plug the connector of the Serial Interface Board (Cat. No. 8145) into the mating connector (CN3) on the control circuit board of the printer as shown in Fig. 16.
- (4) Secure the I/F board on the 3 poles with 3 mounting screws. (See Fig. 16.)



- (5) Disconnect the Frame Ground wire from the control circuit board and connect it to the FG terminal of the I/F board.
- (6) Replace the upper case.

3. Installing the Interface Board in MX Series Printer

To install the Serial Interface Board (Cat. No. 8145) in the MX Series printer, observe the following procedure.

- (1) Turn off the power switches of both the printer and the host computer.

NOTE:

Power should always be turned off when inserting or removing the interface board. Removal or insertion of the interface board with the power turned on could cause permanent damage to the board itself, as well as to the printer and the host computer.

- (2) Take off the upper case of the printer as follows. (Refer to the operation manual of the applicable MX Series printer for details.)
 - 1) Remove the 4 screws situated at the bottom of the lower case. (With the MX-100 printer, however, remove the five screws situated on the upper case.)
 - 2) Pull and remove the manual paper feed knob and the connector at the front right corner of the upper case.
 - 3) Take off the upper case and the shield cover.
After the removal of the upper case, four poles are visible at the inner rear center of the printer.

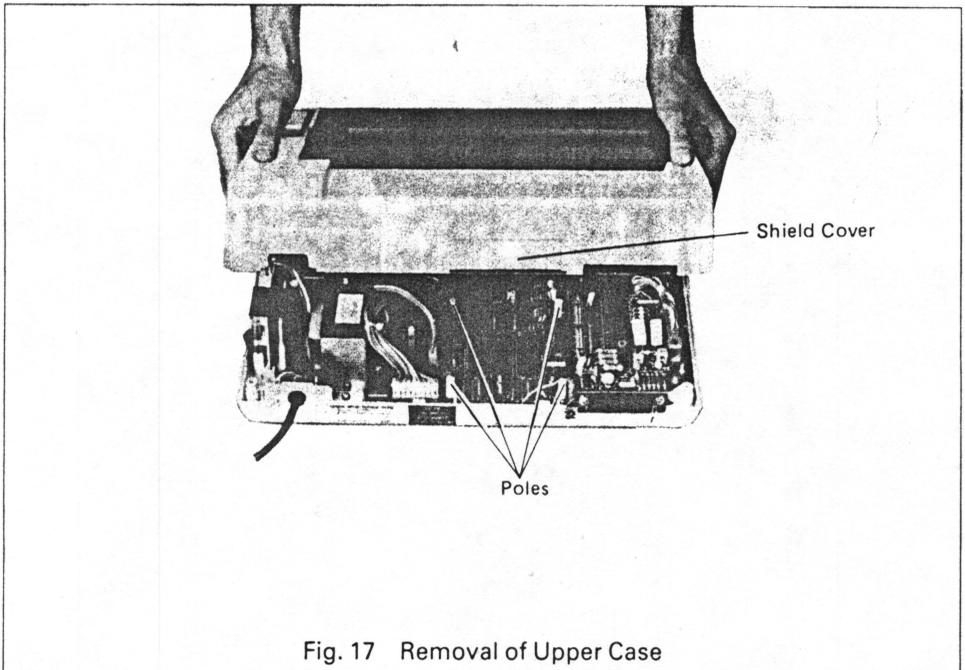
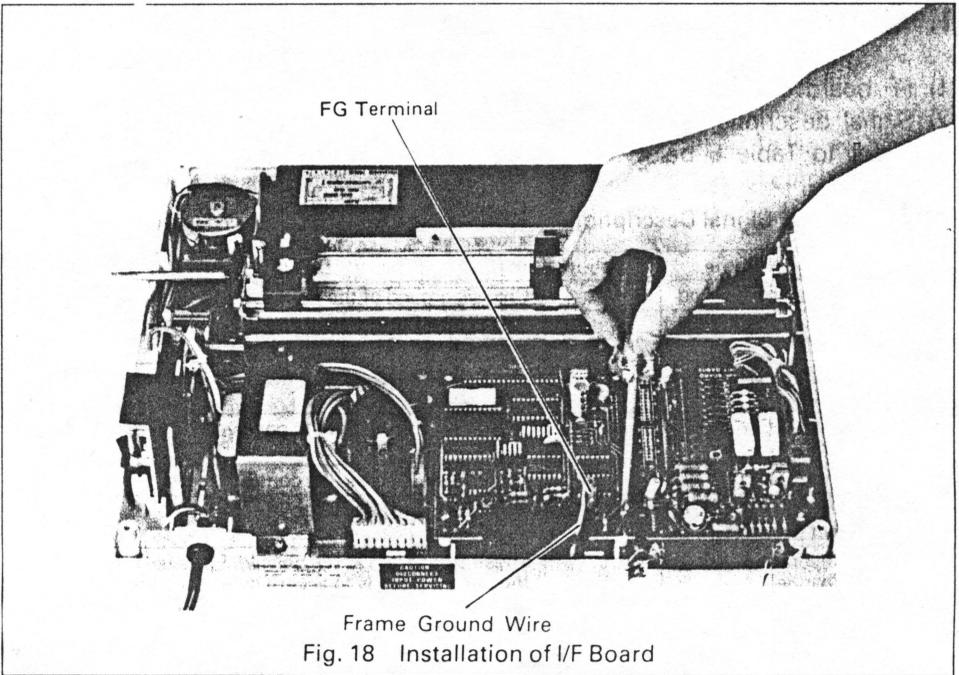


Fig. 17 Removal of Upper Case

- (3) Plug the I/F board connector into the mating connector on the control circuit board of the printer as shown in Fig. 18.



- (4) Put the 4 screws into the 4 poles and tighten them. (See Fig. 18.)
- (5) Disconnect the Frame Ground wire from the control circuit board and connect it to the terminal TP1 of the I/F board.
- (6) Push the connector in at the front right corner and put on the upper case and tighten 4 screws (or 5 screws for MX-100), then push the manual paper feed knob in.

HARDWARE DESCRIPTION

1. Connector and Signals

- (1) I/F board connector: EIA Standard 25-pin cannon type
 (2) Signal description and pin assignment:
 Refer to Table 6 below.

Table 6 Signal Description and Pin Assignment of I/F Board Connector

Pin No.	Signal Name	Direction	Description
1	Protective Ground		Chassis ground of the printer.
2	Transmitted Data (TXD)	Out	This signal is normally at "MARK."
3	Received Data (RXD)	In	Serial data input to the printer.
6	Data Set Ready (DSR)	In	This signal must be at the positive EIA level (SPACE) for the printer to receive data.
7	Signal Ground		Return path for data and control signals.
8	Data Carrier Detect (DCD)	In	This is the same signal as DSR at pin No. 6.
11	Reverse Channel (=2nd RTS)	Out	These signals are at the positive EIA level (SPACE) when the printer is ready to accept data entry, and at the negative EIA level (MARK) when the printer is not ready to accept data entry. • Operator can invert the polarity of these signals by the internal DIP switch.
20	Data Terminal Ready (DTR)	Out	
17	TTY-TXD	Out	Low impedance ("MARK") between Pin Nos. 17 and 24 when the printer is ready to accept data; High impedance ("SPACE") when the printer is busy. • Operator can invert the polarity of these signals by the internal DIP switch.
24	TTY-TXD Return		
25	TTY-RXD	In	Input data of serial current loop.
23	TTY-RXD Return		

NOTES:

- "Direction" is the direction of signal flow as viewed from the printer.
- All signals except TTY-TXD and TTY-RXD are based on EIA RS-232C level.
 (MARK = -3V to -27V, SPACE: +3V to +27V.)

2. Data Entry

- (1) This serial interface (Cat. No. 8145) incorporates a data buffer with a capacity of 2,048 bytes, so that data are stored in this buffer while being converted from serial to parallel data by the exclusive CPU of the interface and then transferred in sequence from the buffer to the CPU in the printer. In this manner, no apparent waiting time will occur at low data transfer rates, since the CPU in the serial interface can receive data even if the CPU in the printer is busy. At high transfer rates, however, the print speed cannot catch up with the speed of data entry, which may result in overflow of the buffer memory. Therefore, avoid so-called "free run" of serial data.
- (2) In this interface, Reverse Channel (=2nd RTS) in the RS-232C, or TTY-TXD signal in the Current Loop is provided as a status flag for prohibition of any data entry. Therefore, the host computer must sense these flags and perform data transfer. (In some systems, serial data transfer can be blocked by connecting these flag signals with the Clear To Send (CTS) or Data Set Ready (DSR) of the host computer.)
- (3) This serial interface sets a flag when the vacant area for bytes in the buffer memory becomes 16. The printer is capable of accepting a maximum of 16 words even after it is put in the Not Ready state for data entry.
- (4) As for the timing to reset a data entry disable flag, this serial interface is designed so that the flag can be reset when the vacant area for bytes in the buffer memory reaches 152, 288, 560 or 1,936 bytes while the data stored in the buffer memory are being transferred one after another to the printer. (See Table 5 and Fig. 19.)

- (5) The polarity of the flag can be changed using DIP switch pins SW2-2 and SW2-3. So set the DIP switch pins according to the specification of the host computer. (See Table 3.) In this case, be sure to set DIP switch pin SW2-4 to the ON position.

NOTE:

Never set SW2-2 and SW2-3 to ON simultaneously, or the printer may be damaged.

- (6) Fig. 19 shows the timing chart of serial data transfer.

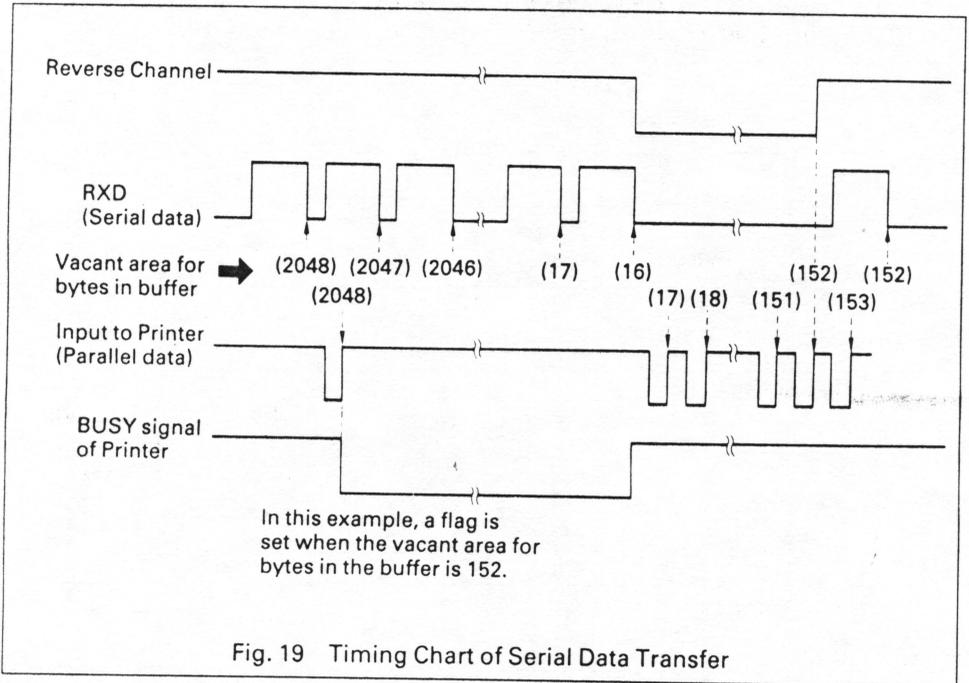


Fig. 19 Timing Chart of Serial Data Transfer

3. Serial Interface Circuits

(a) Recommended Line Driver and Line Receiver in the case of RS-232C interface.

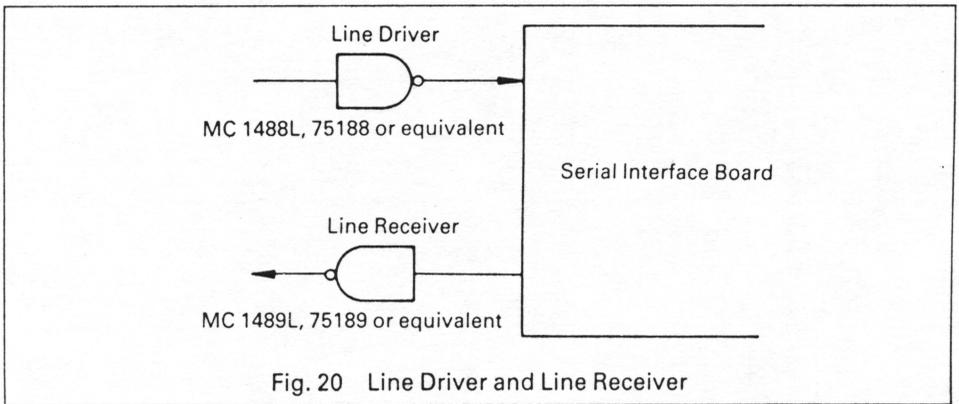


Fig. 20 Line Driver and Line Receiver

(b) Recommended Interface Circuit in the case of Current Loop Interface.

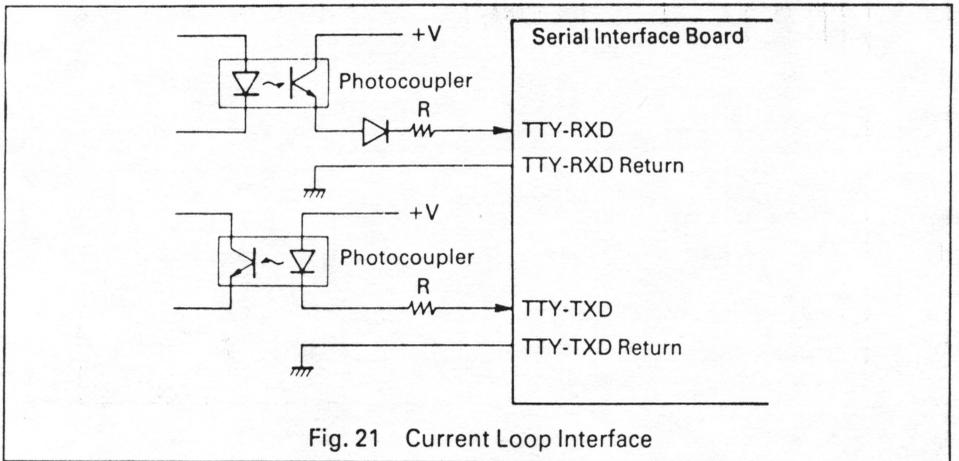


Fig. 21 Current Loop Interface

- * The value of "R" should be selected so that the loop current becomes 10 to 20 mA.
- * "+V" should be 3V to 24V.

NOTES:

1. In the case of a serial interface, undefined codes are also ignored.
2. When a parity error occurs, an asterisk (*) is printed in lieu of the error character.
3. Serial input data should be held at "MARK" in the normal state (i.e., the state that characters are not transferred.)

4. Location of Parts

Fig. 22 shows the component layout of the Serial Interface Board. (Cat. No. 8145).

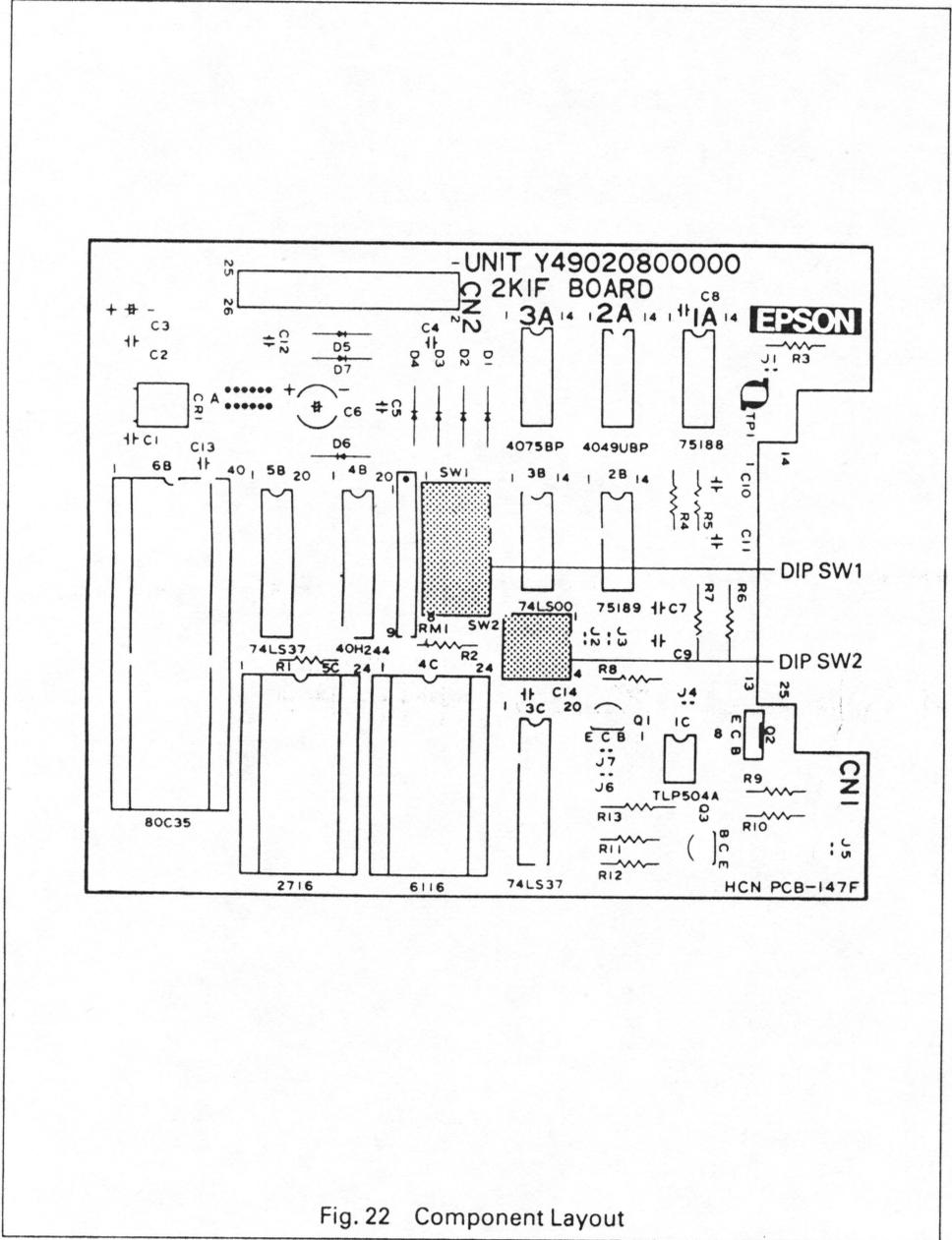


Fig. 22 Component Layout

SELF-TEST

The self-test function can be executed by setting all the DIP switch pins 1–1 through 1–4 to the “ON” position. During the self-test operation, the serial interface is tested and data are transferred to the printer (for incremental printing of all characters). However, note that when the power is turned on with all the 4 DIP switch pins left in the “ON” position, only the self-test function is executed and data entry is disabled.

NOTE:

Combinations of these 4 DIP switch pins permit selection of various bit rates, for which see Table 4.

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