

Radio Shack®

Service Manual

26-1150/26-1152


TRS-80 LINE PRINTER

Catalog Numbers

26-1150

and

26-1152

CUSTOM MANUFACTURED IN U.S.A. FOR RADIO SHACK  A DIVISION OF TANDY CORPORATION

NOTE

The purpose of this manual is twofold. It provides the owner with complete adjustment procedures and it provides Radio Shack Service Personnel with complete repair procedures.

If you are not technically inclined, do not attempt to repair your Printer. If you do, you'll void your warranty.

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SECTION 1 INTRODUCTION

This Service Manual describes two Line Printers (Catalog Numbers 26-1150 and 26-1152) that are manufactured for Radio Shack. The manual provides a general description of the units, followed by a more detailed theory of operation and spare parts information enabling field engineering personnel to service these printers. The manual is aimed at subassembly level maintenance.

For convenience, Operator's Manuals are published separately which describe all operator controls and functions. This Service Manual is subdivided into the following sections, each with its specific purpose.

SECTION 1 — INTRODUCTION, presents the scope and content of the manual and provides the reader with a general description of the printer.

SECTION 2 — THEORY OF OPERATION, provides a description of each functional operation in the printer, based on a subassembly level.

SECTION 3 — PRINTER ASSEMBLIES: REMOVAL/REPLACEMENT/ADJUSTMENT, contains a functional description, removal/replacement/adjustment and maintenance procedures for each replaceable subassembly in the printer.

SECTION 4 — MAINTENANCE, includes preventive maintenance and troubleshooting procedures, as well as schematic and wiring diagrams of the printer.

APPENDIX A —PARALLEL INTERFACE SPECIFICATIONS, contains detailed information describing the standard interface timing signals, connectors and other specifications.

APPENDIX B —SIGNAL GLOSSARY, provides a table of signal names, by mnemonic code, keyed to the Line Printer Electronics Board Schematic Diagram.

NOTES

The TRS-80 Line Printers are just two of a series of Line Printers. It is the intent of this manual to provide information only for the TRS-80 Line Printers. These printers are basically the same; the primary difference is in the type of paper feed assemblies. The 26-1150 printer has a pinch roller assembly and the 26-1152 has a tractor drive assembly. Where applicable, a procedure or description pertaining to either paper feed mechanism will be identified by Catalog Number.

Part Numbers refer to the Manufacturer's Part Number, which may be obtained directly from Radio Shack's National Parts Department.

1.1 GENERAL DESCRIPTION (Figure 1-1)

The printers shown in Figure 1-1 are 60 character-per-second, uni-directional impact printers with an effective throughput of 21 to 90 lines per minute at 10 characters per inch; and up to 132 columns of operator variable density (10 to 16.5 characters per inch). The pinch roller (26-1150) unit prints in 8 inch lengths on roll paper up to 9.8 inches (250 mm) wide, while the tractor drive model (26-1152) prints in 8 inch lengths on paper 12.1 inches (307 mm) wide.

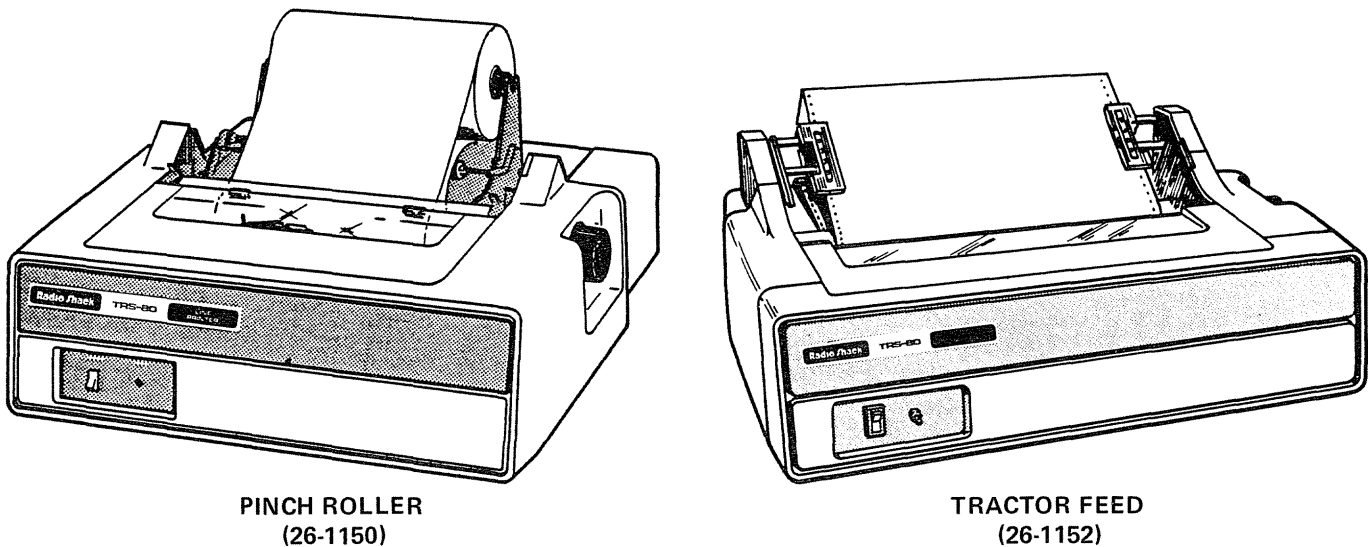


Figure 1-1. LINE PRINTERS

Characters are formed in a 5x7 dot matrix. In addition to the standard ASCII, a variety of character sets give great flexibility in character formation. The printer will accommodate up to 64 characters.

All the electronics, including logic driver circuits and power supplies, are contained on a single printed circuit board.

1.2 PRINTER OPERATION

The printer contains a line buffer which allows parallel data to be received at rates up to 75,000 characters per second. A basic block diagram of the printer is shown in Figure 1-2.

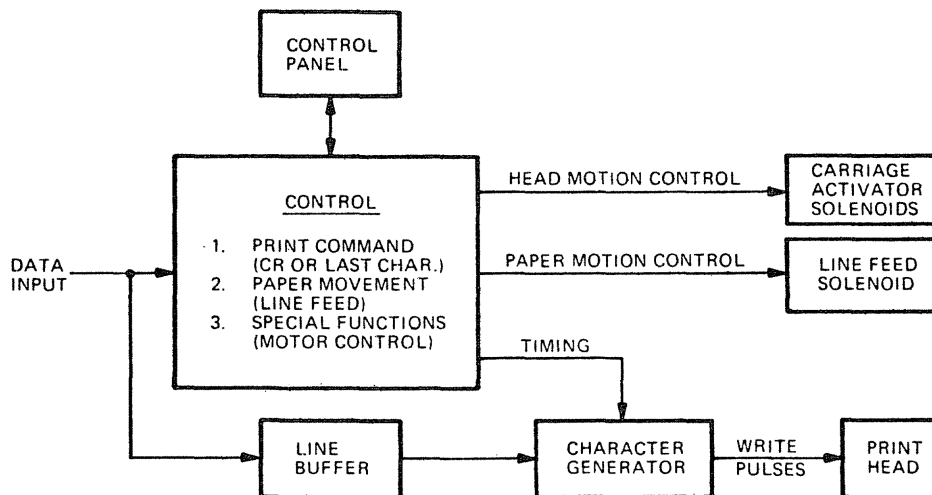


Figure 1-2. BASIC BLOCK DIAGRAM

Basically, all printer functions can be grouped into one of two categories: (1) character printing, and (2) paper motion.

1.2.1 CHARACTER PRINTING (Figure 1-3)

Line Printer characters are printed by selectively activating the seven print wires aligned in a vertical column in the print head. As the print head moves across the paper, the appropriate print wires are momentarily activated driving them against the ribbon, paper and platen to form the specified dot pattern.

The print commands to the seven print wires are developed by the read-only-memory (ROM). A variety of character sets is obtainable simply by changing the ROM. Each character within a ROM is addressed by a 7-bit character code and each column within a character is specified by timing signals internal to the printer.

As shown in Figure 1-3, the print head and ribbon cartridge are attached to the carriage assembly. By activating either of the two carriage solenoids, the carriage attaches to a continuously rotating band. Activating the forward carriage solenoid attaches the carriage to the upper half of the band and moves the print head in the forward (left to right) direction. Activating the reverse carriage solenoid, attaches the carriage to the lower half of the band and moves the head in the reverse direction.

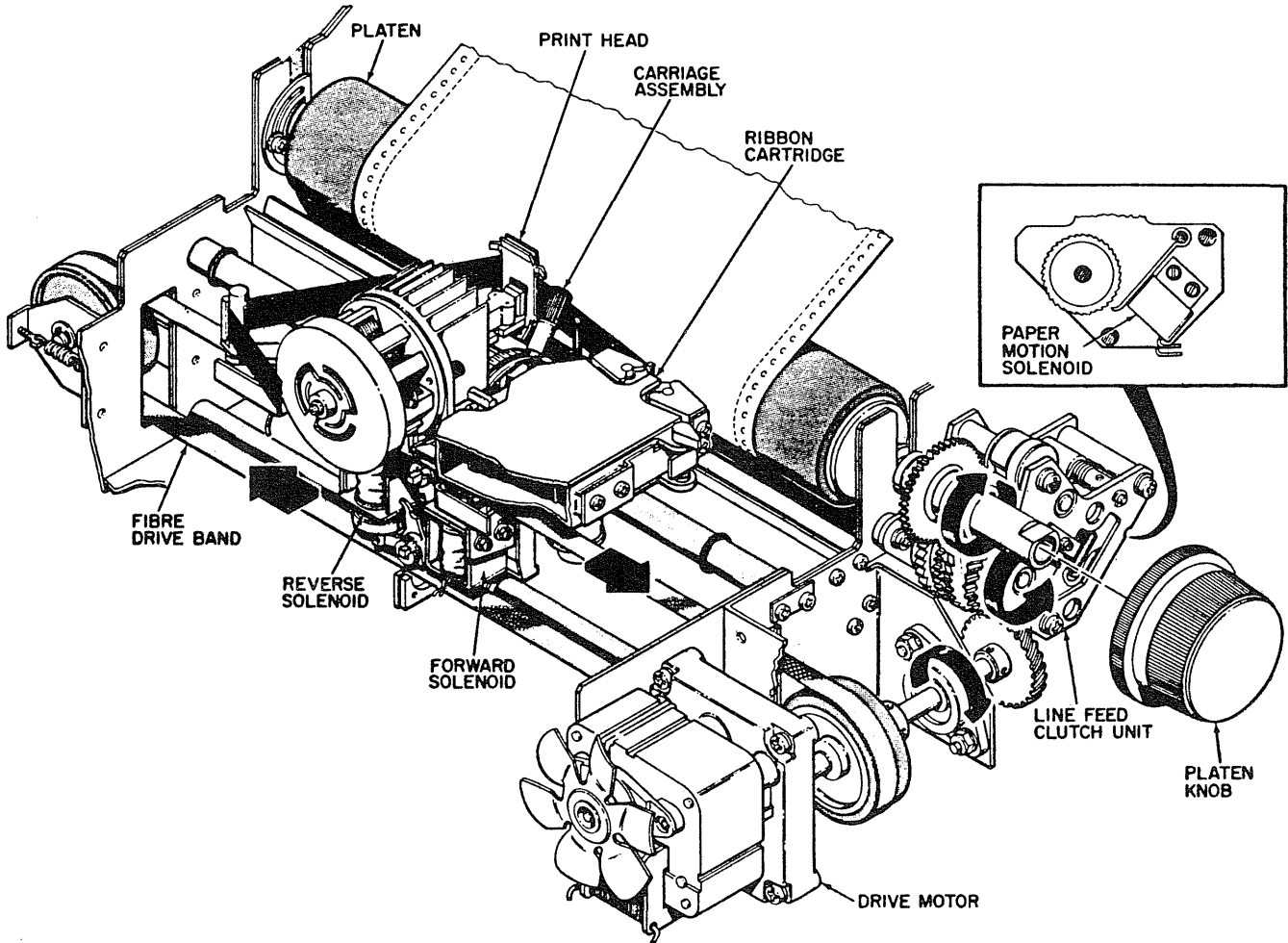


Figure 1-3. CHARACTER PRINTING/PAPER MOTION

1.2.2 PAPER MOTION

Paper can be moved manually by pushing in and rotating the platen knob, or automatically by performing a line feed operation.

As shown in Figure 1-3, power from the drive motor is applied via a line feed clutch to the platen and forms handling mechanism (pinch roller or tractor) drive gears. Paper is advanced one line by momentarily activating the paper motion solenoid in the line feed clutch, allowing the drive gears to turn and advance the paper by one line.

1.2.3 SPECIAL FUNCTIONS

In addition to printable character codes, the printer also recognizes four special control codes. Refer to subsection 2.4.2 for these control codes and the printer action performed upon receiving these codes.

1.3 SPECIFICATIONS SUMMARY

DATA INPUT

Data Format	7 bit ASCII parallel
Input Code	64 character ASCII
Data Rate	Up to 75,000 characters per second
Buffer	One-line character buffer (up to 132 characters)
Input Gating	Data Strobe is normally gated with acknowledge of previous character.

PRINTING

Printing Method	Impact, character-by-character, unidirectional
Dot Matrix	5x7
Print Format	10 to 16.5 characters per inch (operator adjustable)
Print Rate	60 characters per second at 10 cps 100 characters per second at 16.5 cps
Number of Copies	
26-1150	Prints original and one carbon copy
26-1152	Prints original and up to four carbon copies
Character Set	Standard 64 character ASCII. Optional 5x7, 64 character sets available

PAPER ADVANCE

Vertical Format	6 lines per inch
Paper Entry	Rear Paper Feed
Auto Line Feed	Automatic line feed on carriage return. Disable by option
Paper Feed	
26-1150	9.8 inches (250 mm) wide paper
26-1152	12.1 inches (307 mm) maximum width 10.2 inches (259 mm) maximum print width

CONTROLS/INDICATORS

Switches	Print and Power
Indicators	Power
Manual Controls	Forms Thickness, Paper Advance, Print Density

PHYSICAL/ENVIRONMENTAL/ELECTRICAL

Height	8 inches (203 mm)
Depth	19.5 inches (495 mm)
Width	19.8 inches (503 mm)
Weight	45 lbs (20 kg)
Temperature	
Operating	40° to 100°F (4.4° to 37.7°C)
Storage	-40° to 140°F (-40° to 60°C)
Humidity	
Operating	20% to 90% (No condensation)
Storage	5% to 90% (No condensation)
Input Voltage	60 Hz, 120 VAC

SECTION 2 THEORY OF OPERATION

2.1 INTRODUCTION

This section contains a description of each major function performed by the Line Printer electronics. This section is organized as follows:

- 2.2 Block Diagram Discussion
- 2.3 Initializing the Printer
- 2.4 Data Input
- 2.5 Character Printing
- 2.6 Carriage and Ribbon Movement
- 2.7 Paper Motion
- 2.8 Power Supplies

Each function is discussed at a subassembly level, supplemented with block diagrams showing signal flow between major subassemblies and the connector/pin locations of each signal. Figure 2-1 is a simplified block diagram of the overall printer electronics.

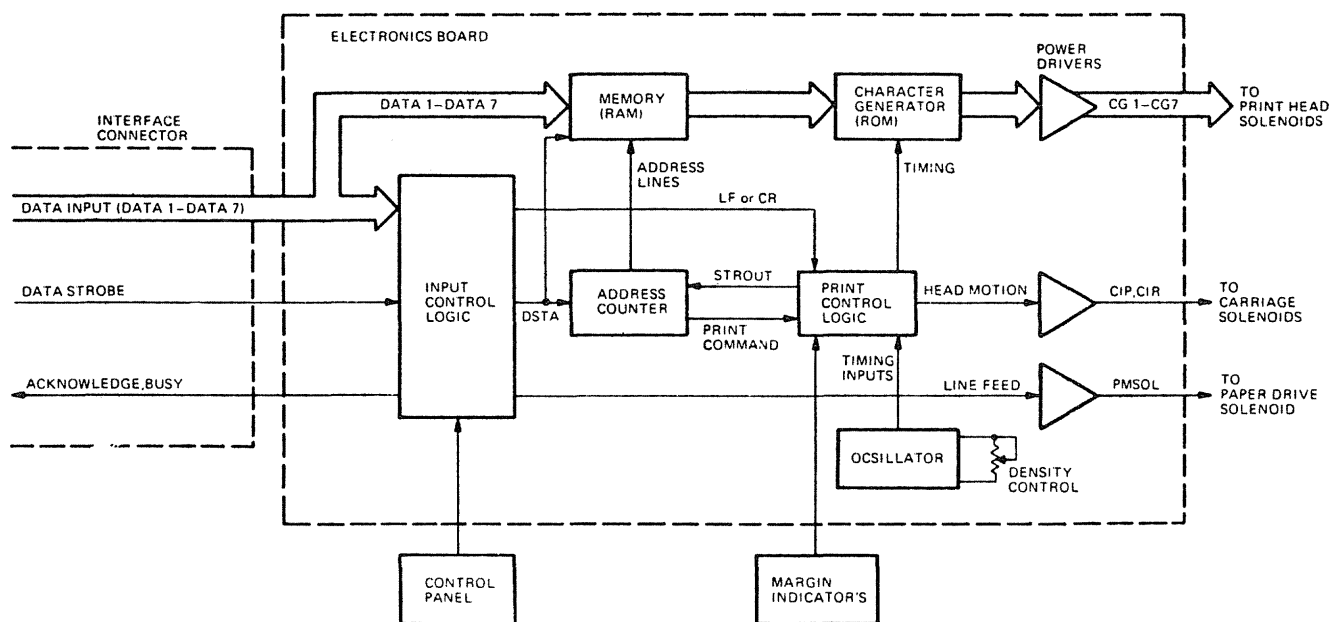


Figure 2-1. SIMPLIFIED BLOCK DIAGRAM, ELECTRONICS

NOTE

THE NOTATION (N) AFTER A SIGNAL MNEMONIC IS USED TO INDICATE THE "NOT" OR INVERSE FUNCTION OF THE SIGNAL. FOR EXAMPLE: CIP (N) IS THE NOT FUNCTION OF THE CIP SIGNAL. THE (N) NOTATION IS EQUIVALENT TO THE BAR APPEARING OVER A SIGNAL AS SHOWN ON THE SCHEMATIC.

2.2 BLOCK DIAGRAM DISCUSSION (Figure 2-1)

The unit is a unidirectional printer, whose print head moves to the right when printing and left when returning the carriage. The seven print wires in the print head are selectively activated to form the dot matrix pattern for the specified character. The print commands to the seven print wires are developed by the character generator which consists of a read-only-memory (ROM). Attached to the carriage assembly are the print head and ribbon cartridge. By activating either the forward or reverse carriage solenoid the carriage attaches to a continuously rotating fibre band. The forward solenoid is activated during the print cycle and the reverse solenoid is activated to return the carriage. Paper is advanced one line by momentarily activating the paper drive solenoid in the line feed clutch unit.

The Line Printer electronics is contained on one printed circuit board. As shown in Figure 2-1, printable data goes from left to right across the diagram to the print head, with control of this data coming from the input control logic and the print control logic. When the printer is first turned on, the printer logic is initialized and the printer is not print enabled. To receive data, the printer must then be enabled by depressing the PRINT rocker switch on the operator's panel.

If the printer is print enabled and not busy, the input data is loaded into the printer by the data strobe from the input device. The printer responds with an acknowledge pulse to acknowledge reception of the data. Printable data, after being inverted by the input gating, is loaded into the Random Access Memory (RAM), consisting of two 4-bit by 256 maximum character memories. The address counter generates the seven address inputs for the RAM.

Printable data will continue to be loaded until the memory is filled or a carriage return control code is received by the printer. In either case, the printer goes busy and starts the print cycle by activating the forward carriage solenoid (CIP). This attaches the carriage to the rotating band, moving the carriage from left to right across the page. The address counter is clocked (STROUT (N)) to address the appropriate location in memory for the character to be printed. The character is translated by the character generator (ROM), which generates the impulse signals to drive the head solenoids.

At the end of the printed line, the forward solenoid is deactivated and the reverse solenoid (CIR (N)) is activated to return the carriage to the left margin. The printer remains busy until the end of the print cycle. Also at the end of the line, the paper drive solenoid is momentarily activated, causing the paper to advance by one line.

When the carriage has returned to the left margin, the reverse solenoid is deactivated, the busy signal goes away, the acknowledge signal is generated, and the next line of data is taken in.

The left margin indicator (RTPSW) signals the logic when the carriage reaches the extreme left margin of the printer. As the carriage moves, the oscillator (ME1) provides the control for print timing.

2.3 INITIALIZING THE PRINTER (Figure 2-2)

Before the printer can accept data, it must be power primed, paper loaded and print enabled. The power prime operation initializes the printer logic to a ready state. The print enable operation, resets the busy line to the interface connector and makes the printer ready to receive data.

2.3.1 POWER PRIME

The power prime signal (PWRPRM (N)) is generated when the power switch is turned on. The (PWRPRM (N)) signal generates the (EOPPRM (N)) signal which clears the print control logic.

2.3.2 PRINT ENABLE

Before the printer can receive data, it must be enabled. This can be done by depressing the PRINT switch on the operator's panel.

2.3.3 PAPER EMPTY

With paper loaded in the printer and the printer is power primed and print enabled the printer can receive data. If paper is not loaded in the printer or a paper empty condition exists in the printer, the paper empty switch opens, causing a BUSY signal to the input device. A paper empty condition is detected in the printer by the paper empty switch located in the path of the paper.

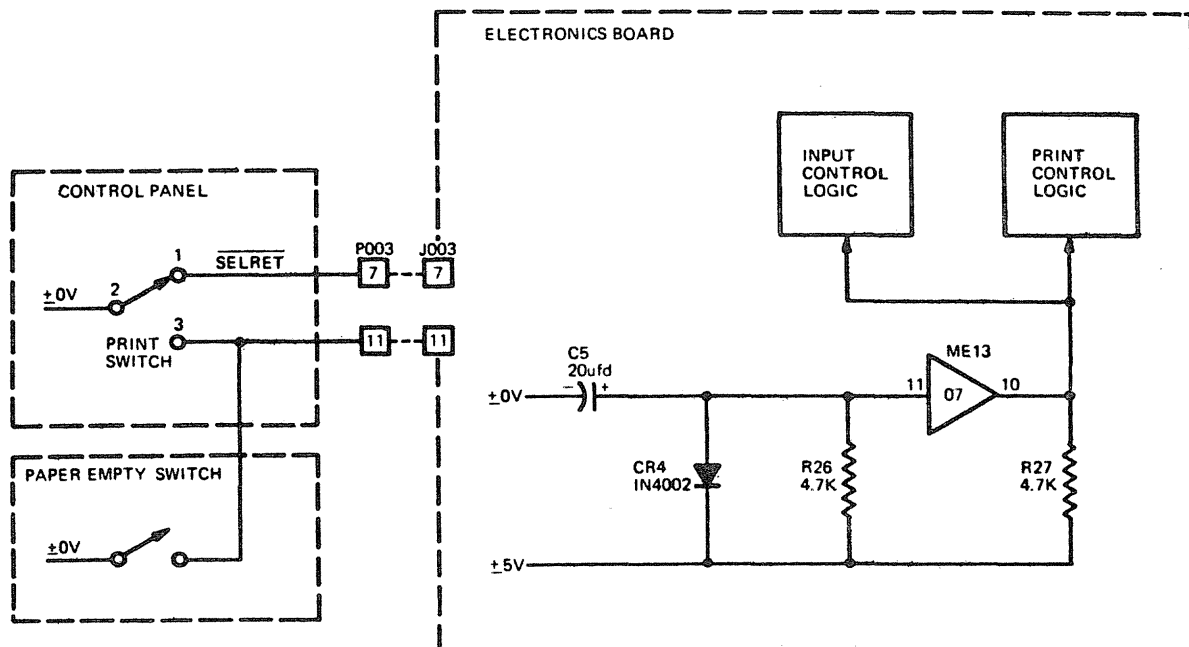


Figure 2-2. INITIALIZING THE PRINTER

2.4 DATA INPUT (Figure 2-3)

Inputs to the printer consist of seven standard parallel data lines (DATA 1-DATA 7) and an active low data strobe (DSTA (N)). The seven data lines represent the 7-bit USASCII code (refer to the operator's manual). The data strobe is used to synchronize the input data with the printer electronics.

In response to received data, the printer generates an active low acknowledge (ACK(N)) pulse to acknowledge reception of a character. If the received character caused the printer to perform some function such as paper movement, character printing, etc., the printer responds with a BUSY signal and does not acknowledge until termination of the busy condition.

2.4.1 DATA INPUT TIMING

In general, the data transfer sequence consists of the input device placing the appropriate code on the data lines to the printer and then generating a data strobe pulse. The printer responds with an acknowledge pulse, or if the received data caused a busy condition, the printer first activates the busy line for the duration of the busy condition and then responds with an acknowledge pulse.

Refer to Appendix A for the timing involved in transferring data, which does not cause a busy condition, and the timing involved in receiving any character, which causes a busy condition in the printer.

2.4.2 FUNCTION DECODER

In addition to monitoring the input data for the first printable character, the function decoder monitors the data for the four special control codes used in the printer, Line Feed/Carriage Return and Top of Form. The data lines are decoded and, if one of these control codes is detected, the following action occurs:

FUNCTION	CONTROL CODES (DECIMAL)	PRINTER ACTION
Line Feed/Carriage Return	10 or 13	Advances the paper one line and returns the print head to its home position.
Top of Form	11 or 12	Advances the paper to top of the next page (as defined by BASIC. See LEVEL II, BASIC Reference Manual, page 10/3).

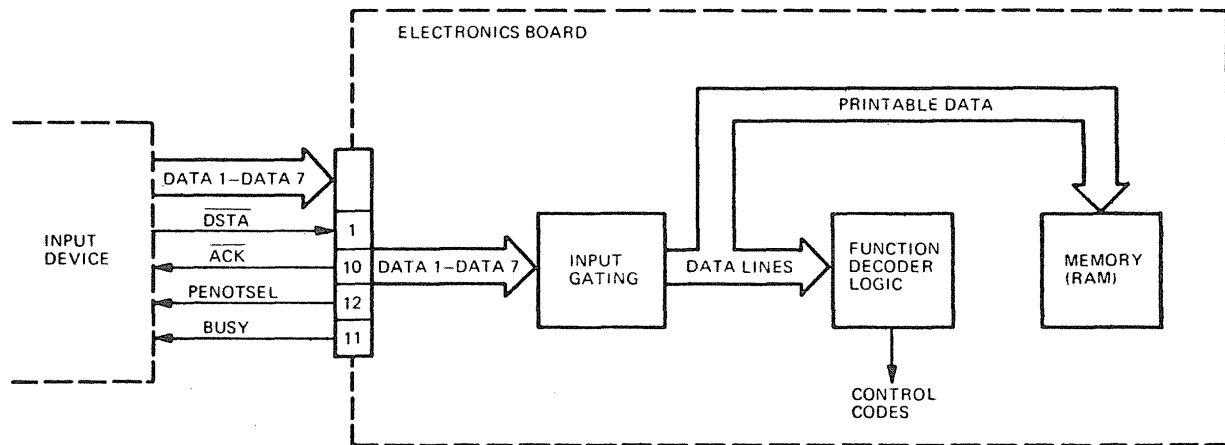


Figure 2-3. DATA INPUT

2.5 CHARACTER PRINTING (Figure 2-4)

When the memory is full (CARRY (N)) or a carriage return code (DCCR(N)) is detected in the input data, the print command (CIP) is generated causing the print head to move left to right across the page. The address counter is set to count up, then clocked to select via the eight address lines, the appropriate character location in the RAM. The read/write (R/W(N)) input to the RAM is held high during the print cycle. Conversely, the R/W(N) input is pulsed low during the data input cycle. The 7-bit character code, specifying the character, is sent to the ROM.

As the print head moves across the page, the timing inputs generated by ME7 and ME8, are used by the ROM to register the column of dots in the printed character.

The ROM, in response to the character code and timing signals, generates seven logic signals (CG1-CG7) which are amplified and sent to the seven solenoids in the print head. There the signals activate the solenoids driving the print wires which form the appropriate dot pattern for the addressed character and column.

The standard character line length is 132 characters. The end user has the option of varying the line length by adding jumper wires and making cuts on the printed circuit board. Refer to Section 3.17 Electronic Board Assembly for the procedure on changing the line length.

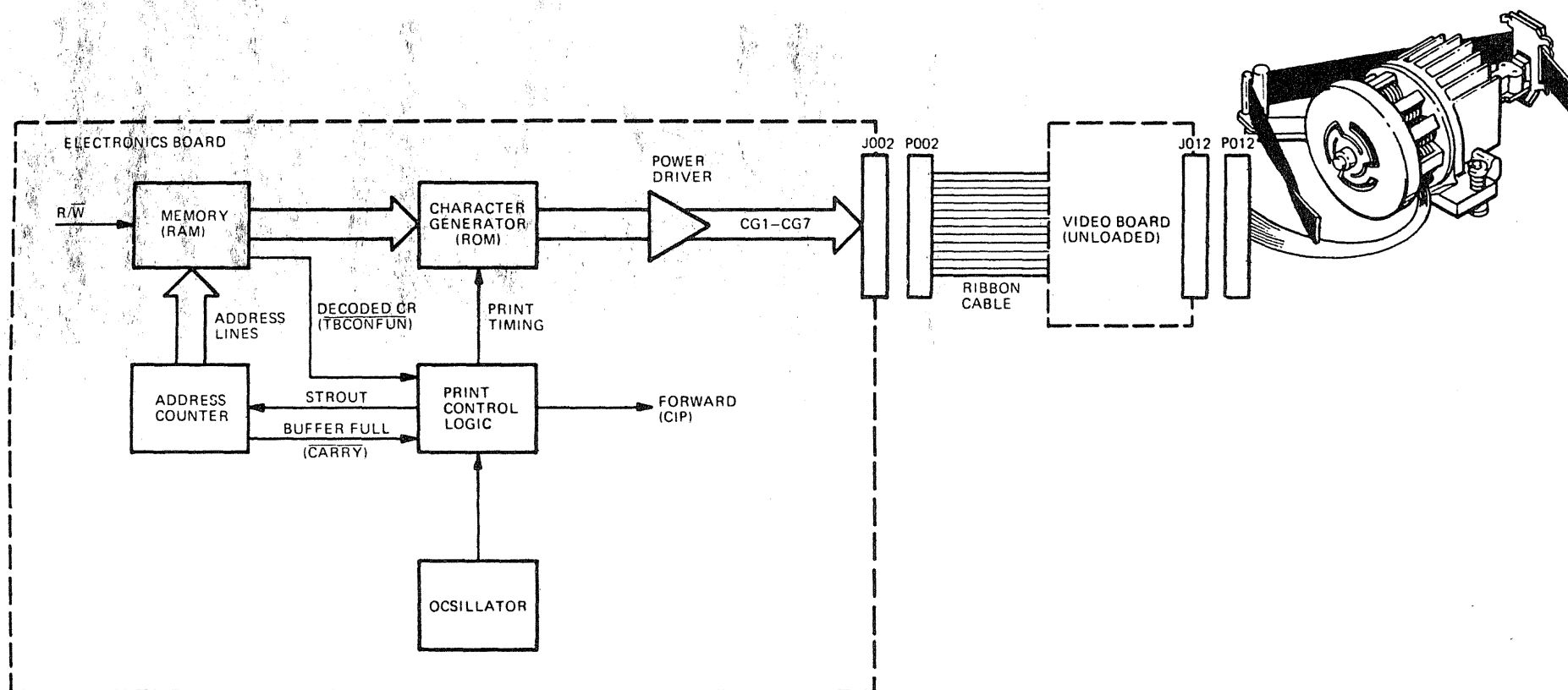


Figure 2-4. CHARACTER PRINTING

2.6 CARRIAGE AND RIBBON MOVEMENT (Figure 2-5)

Mounted on the carriage are the print head, ribbon cartridge and forward/reverse carriage solenoids. The carriage moves from left to right during the print operation and from right to left when returning to the start position. The ribbon is automatically advanced, during the forward and reverse movement of the carriage, making full use of the ribbon. All carriage movement is a result of the drive signals from the electronics board, causing the forward and reverse solenoids to seize the band.

2.6.1 LEFT AND RIGHT MARGIN INDICATORS

Located on the left side of the printer, is a light emitting diode (LED) and phototransistor device which indicates if the print head is in the start position. If the carriage is sitting at the left margin, the carriage arm extends into the slot in the device, preventing the LED from energizing the phototransistor. This generates a low ready to print (RTP) signal to the print control logic. When the carriage is to the right of the indicator, the arm is out of the slot, permitting light to energize the phototransistor and thus make RTPSW(N) high. Therefore, the RTPSW(N) is low when the carriage arm is in the indicator and high when the arm is out of the indicator.

The right margin indicator, located on the right side of the printer, is a LED and phototransistor device identical to the left margin indicator. When the carriage reaches the end of travel at the extreme right margin, the end of print (EOPSW) signal is generated, which in turn generates EOPSW(N) and is sent to the print control logic. The EOPSW(N) signal is low when the carriage arm is in the indicator and high when the carriage arm is out of the indicator.

2.6.2 CARRIAGE DRIVE

The carriage is moved by the drive motor, rotating fibre band and forward/reverse solenoids. The drive motor rotates at a constant speed rotating the fibre band clockwise. If the forward solenoid (CIP (N)), is energized, the solenoid seizes the top half of the band moving the carriage to the right. Energizing the reverse solenoid, (CIR (N)), attaches the carriage to the bottom half of the band, moving the carriage to the left.

2.6.3 CARRIAGE DRIVE SIGNALS

The signals for energizing the forward/reverse solenoids are generated by flipflop ME3. When the printer is ready to print the received line of data, the flip flop activates the forward drive signal CIP (N). The signal is amplified by the power driver, the output of which activates the forward solenoid. The forward solenoid remains active until a carriage return code is detected in the data at the end of a line or until the buffer full condition occurs at the end of a full line of data. Either of these two conditions causes the flip flop to deactivate the forward solenoid and activate the reverse solenoid signal CIR(N) to return the carriage to the left margin. CIR (N) is deactivated when the RTP switch is reached.

2.6.4 RIBBON DRIVE

The mobius loop ribbon is advanced during the forward and reverse movement of the carriage. The ribbon drive shaft rotates clockwise feeding the ribbon out of the back of the cartridge, around to the front of the print head and then back into the front of the cartridge. Movement of the ribbon drive shaft is the result of the two one-way slip clutches, one for forward movement and one for reverse movement. Two ribbon drive wires, upper and lower, are attached to the left and right sides of the printer and looped one-half turn around the upper and lower clutch. The drive wires are arranged such that when the carriage moves to the right, the top pulley is engaged and when moving to the left, the bottom pulley is engaged.

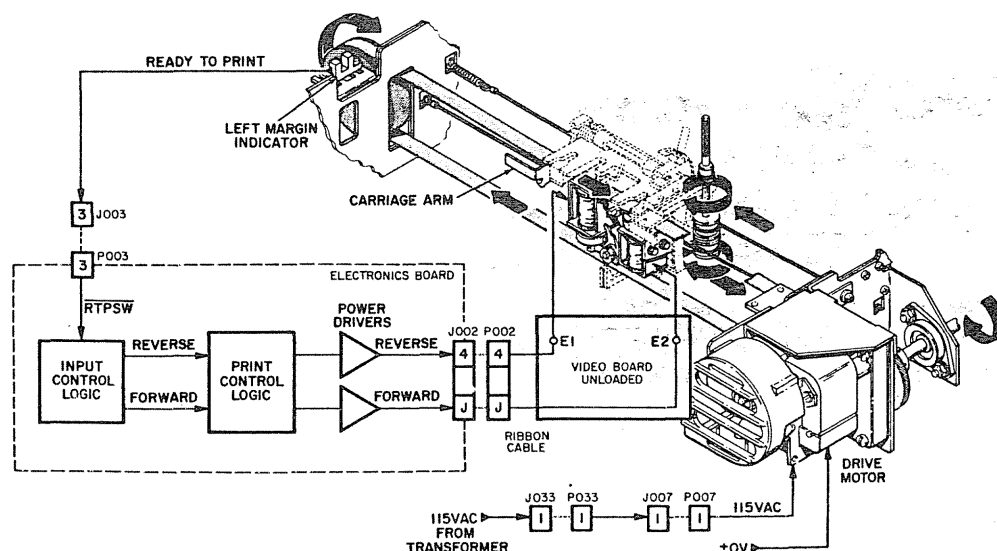


Figure 2-5. CARRIAGE AND RIBBON MOVEMENT

2.7 PAPER MOTION (Figure 2-6)

There are two methods of moving paper through the printer: 1) manually, by pushing in and rotating the platen knob in a clockwise direction and 2) remotely, by a decoded line feed function, which causes the paper to move one line.

The decoded line feed function causes the paper to advance by activating the paper movement solenoid in the line feed clutch unit. When energized, the solenoid allows the line feed clutch unit to rotate, driving the platen and paper feed mechanism.

For each single line feed operation, the solenoid is energized 11 milliseconds.

2.7.1 LINE FEED/CARRIAGE RETURN

A line feed/carriage return is generated by the following conditions:

1. Receiving a line feed/carriage return code (decimal 10 or 13).
2. The auto line feed function is enabled when a jumper wire is installed between E1 and E2 on the electronics board. To disable the auto line feed function, a jumper wire is installed between E1 and E3.

During a line feed/carriage return operation, the line feed solenoid is activated via the power driver (PMSOL(N)). Also the printer goes BUSY and cannot receive any input data for the duration of the line feed/carriage return operation.

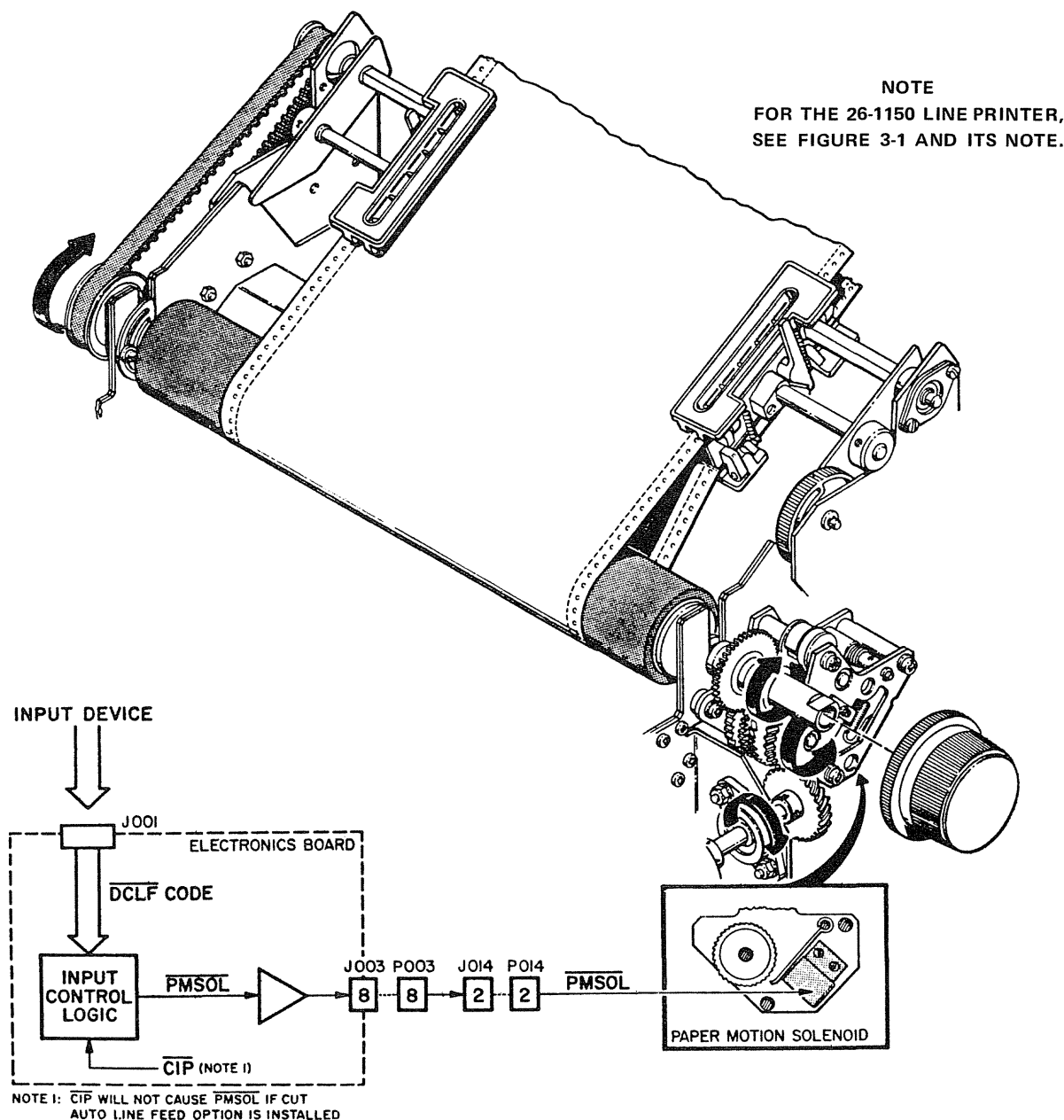


Figure 2-6. PAPER MOTION

2.8 POWER SUPPLIES

The standard power input to the printer is 115VAC, 60 Hz. For the 230VAC, 50 Hz option, a different drive motor assembly is used.

The power input is applied through a circuit breaker (S1) at the rear of the printer and then through a line filter to the multi-tap transformer (T1). From the transformer the main power goes to the logic board.

The secondary windings of the transformer develop the following voltages:

VOLTAGE	WINDING
12VAC	11-12
35VAC	13-14-15
27.5VAC	16-17

The 12VAC and 35VAC voltages are used as inputs to the +5VDC and -12VDC power supplies on the electronics board, where they are rectified, filtered and regulated. The 27.5VAC is used to generate the +35VDC unregulated output.

2.8.1 +5V REGULATOR (Figure 2-7)

The 12VAC output from the secondary winding of the transformer is rectified by the full-wave diode bridge located on the electronics board and filtered by C2 located in the cavity. The unregulated, filtered 15 VDC output of the bridge rectifier is fused and supplied to the power driver circuits. The 15VDC is also applied to the +5V regulator circuits which provide a regulated 5VDC output.

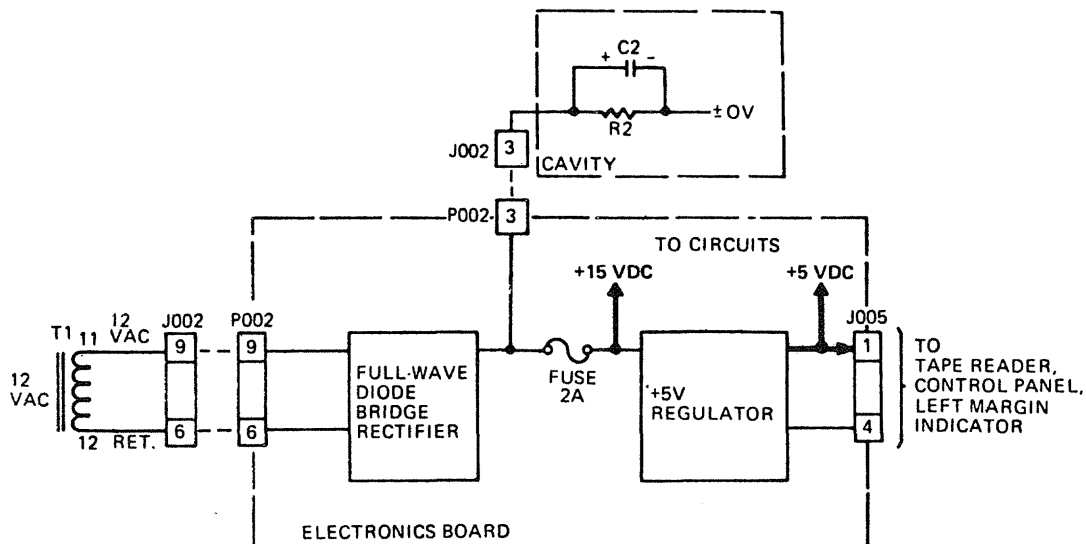


Figure 2-7. +5 VDC POWER SUPPLY

2.8.2 -12VDC REGULATOR (Figure 2-8)

The voltage generated by the 35VAC center-tapped secondary winding of the transformer is used as input to the -12VDC regulator. This input is rectified, filtered, and then regulated to maintain a constant -12VDC output.

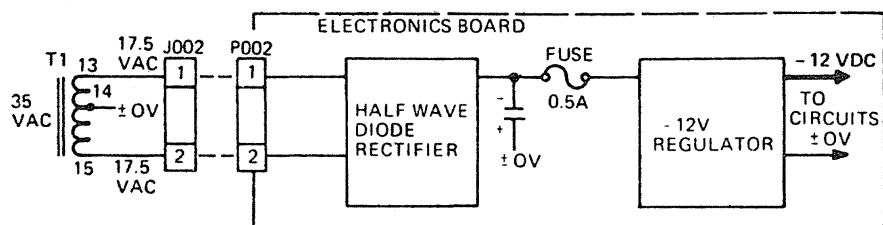


Figure 2-8. -12 VDC POWER SUPPLY

2.8.3 +35VDC POWER SUPPLY (Figure 2-9)

The 27.5VAC output from the transformer is rectified by a full-wave diode bridge and filtered by C1 to generate the +35VDC unregulated voltage applied through fuse 5ASB to the driver circuits and paper motion solenoid.

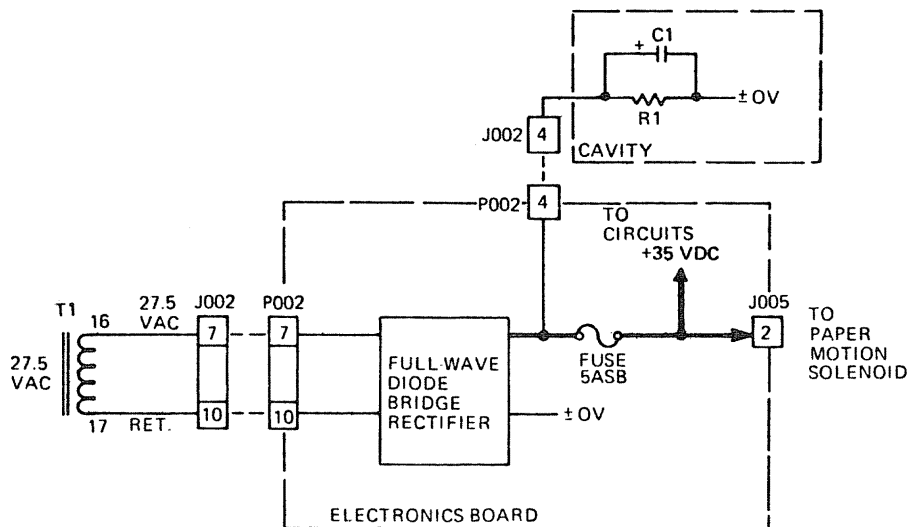


Figure 2-9. +35 VDC POWER SUPPLY

3.1 INTRODUCTION

This section describes the function, removal/replacement, adjustment and preventive maintenance procedures of the printer assemblies in the Line Printers. This section is aimed at subassembly level.

The section is organized as follows:

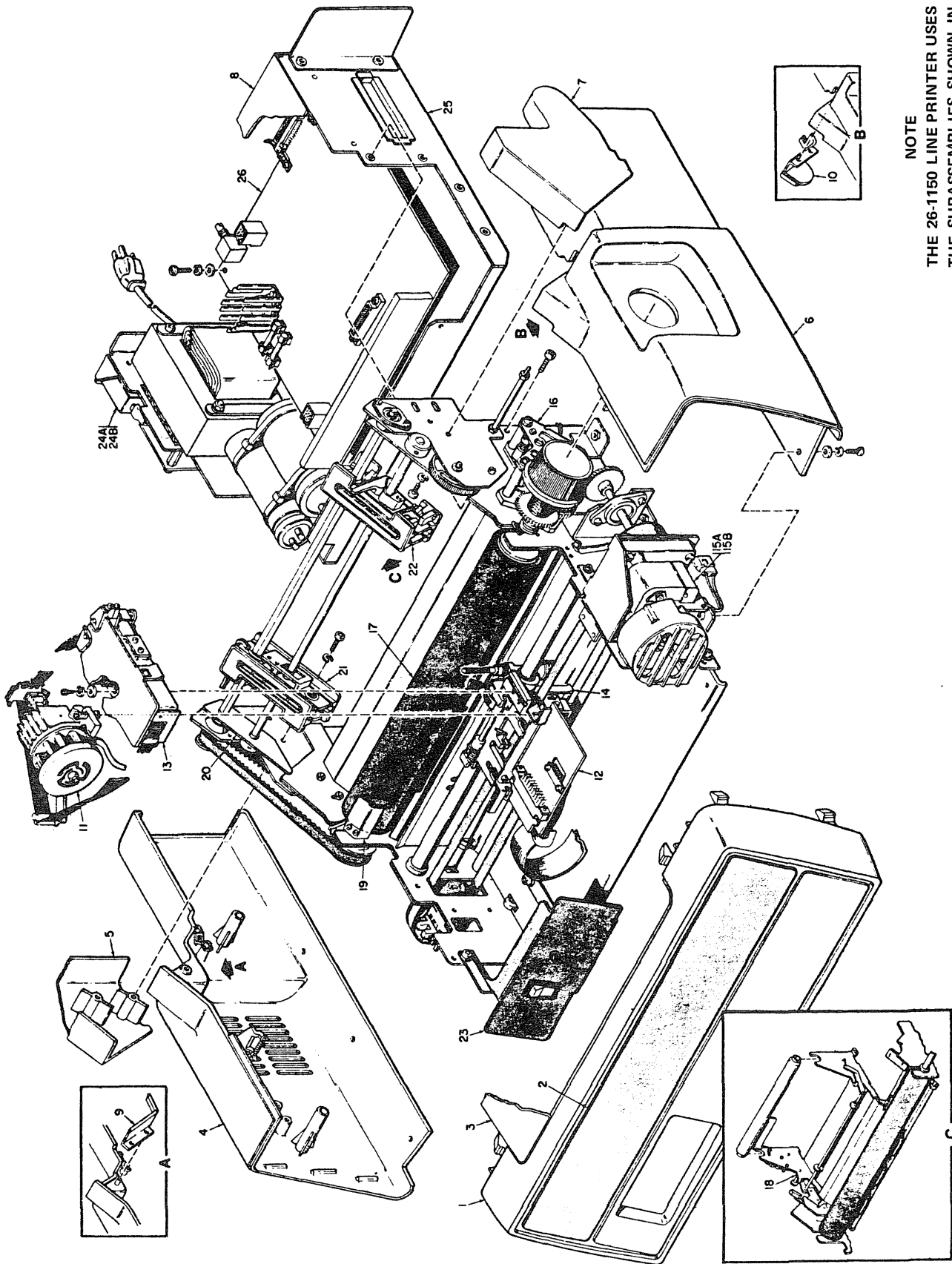
- Subsection:
- 3.2 Printer Subassemblies
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 - 3.17 Logic Board Assembly
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 - 3.19 Special Tools

3.2 PRINTER SUBASSEMBLIES (Figure 3-1)

Figure 3-1 illustrates and lists the major subassemblies used in the printers. Following this overall diagram is a brief functional description, removal/replacement/adjustment and preventive maintenance procedures for each individual assembly.;

NOTE

THE MAJORITY OF THESE SUBASSEMBLIES ARE PACKAGED IN KIT FORM. THE KIT CONTAINS THE SUBASSEMBLY AND NECESSARY HARDWARE TO MOUNT THE SUBASSEMBLY. IF NOT PACKAGED IN KIT FORM JUST THE SUBASSEMBLY IS ILLUSTRATED AND LISTED.



NOTE
THE 26-1150 LINE PRINTER USES
THE SUBASSEMBLIES SHOWN IN
INSERTS A, B AND C.

Figure 3-1. PRINTER SUBASSEMBLIES

LIST OF MATERIALS PRINTER SUBASSEMBLIES

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY
1	535139001-5070	Cover, Front	1
2	535146001-2001	Decorator Plate	1
3	535143001-2001	Cover, Top Clear	1
4	535645001-5070	Cover, Left	1
5	535136001-2070	Cover, Left, Tractor Drive (26-1152)	1
6	535644001-5070	Cover, Right	1
7	535137001-2070	Cover, Right, Tractor Drive (26-1152)	1
8	63780126-2002	Cover, Electronic Module	1
9	535067001-2070	Cover, Left, Pinch Roller (26-1150)	1
10	535068001-2070	Cover, Right, Pinch Roller (26-1150)	1
11	62001136-5002	Print Head Assembly	1
12	63779120-6001	Kit, Video Amplifier Assembly	1
13	63700289-6001	Kit, Ribbon Cartridge Assembly	1
14	63780155-6001	Kit, Carriage Assembly	1
15A	63780152-6001	Kit, Drive Motor Assembly, 60Hz	1
15B	63780152-6002	Kit, Drive Motor Assembly, 50 Hz	1
16	63700643-6003	Kit, Platen Drive Assembly	1
17	63780154-6001	Kit, Platen Assembly	1
18	535220001-6001	Kit, Pinch Roller Assembly (26-1150)	1
19	535121001-5001	Column Scale/Tear Bar Assembly, 10 CPI	1
20	63780153-6001	Kit, Tractor Drive Assembly (26-1152)	1
21	535502001-5001	Pin Feed Assembly, Left (26-1152)	1
22	535501001-5001	Pin Feed Assembly, Right (26-1152)	1
23	63779115-5001	Control Panel Assembly	1
24A	63703115-6001	Kit, Primary Voltage (100V - 120V)	1
24B	63703115-6002	Kit, Primary Voltage (200V - 240V)	1
25	63779103-5001	Electronic Module Assembly	1
26	63779119-6001	Kit, Logic Board Assembly	1
27	63780141-6001	Kit, Hardware	1
28	63701194-6001	Kit, Special Tools	1

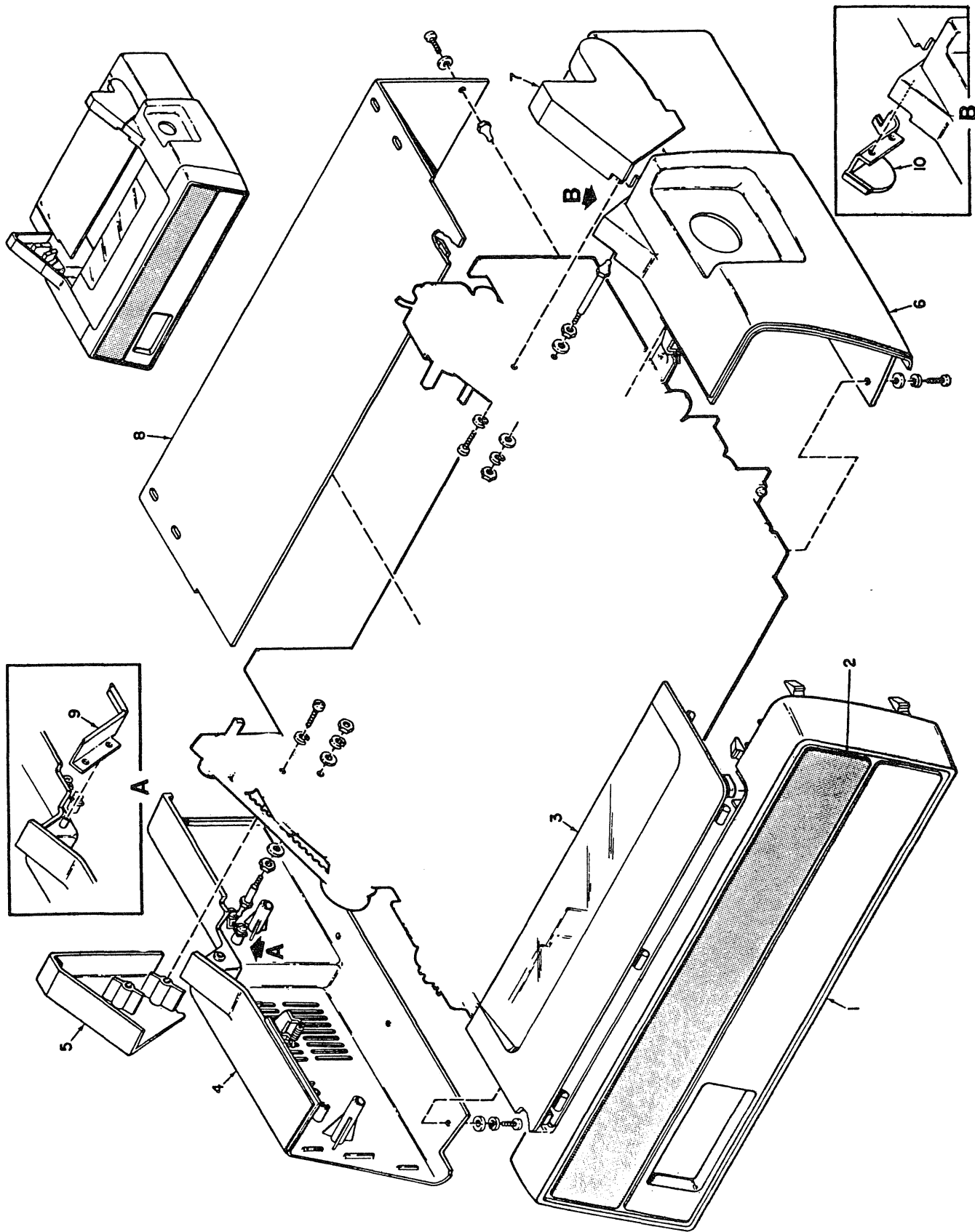


Figure 3-2. COVER ASSEMBLIES

3.3 COVER ASSEMBLIES (Figure 3-2)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY
	63780130-6070	Kit, Cover Assemblies, Pinch Roller NOTE: This kit includes items 1, 2, 3, 4, 6, 8, 9, and 10.	1
1	535139001-5070	Cover, Front	1
2	535146001-2001	Decorator Plate	1
3	535143001-2001	Cover, Top, Clear	1
4	535645001-5070	Cover, Left	1
5	535136001-2070	Cover, Left, Tractor Drive (26-1152)	1
6	535644001-5070	Cover, Right	1
7	535137001-2070	Cover, Right, Tractor Drive (26-1152)	1
8	63780126-2002	Cover, Electronic Module	1
9	535067001-2070	Cover, Left, Pinch Roller (26-1150)	1
10	535068001-2070	Cover, Right, Pinch Roller (26-1150)	1

A. FUNCTION

The one metal and eight plastic covers enclose the printer to minimize noise and protect the printer assembly.

B. REMOVAL/REPLACEMENT PROCEDURE

TOOLS REQUIRED: Phillips and Slotted Head Screwdrivers.

1. Cover, Front
 - a. Unsnap the six front cover clips from the left and right covers.
2. Decorator Plate
 - To remove the decorator plate, push out on the tabs from the inside of front cover.
3. Cover, Top, Clear
 - a. Lift the cover to release the tension on the clamping springs and remove the cover.
4. Cover, Left
 - a. Remove the three screws, lockwashers and flatwashers securing the left cover to the printer base.
5. Cover, Left, Tractor Drive (26-1152)
 - a. Remove the two screws and flatwashers mounting the left tractor drive cover to the left frame.
6. Cover, Left, Pinch Roller (26-1150)
 - a. Remove the left pinch roller cover from the two mounting pins on the left frame.
7. Cover, Electronic Module
 - a. Remove the two screws, lockwashers and flatwashers from the back of the printer and remove the cover.
8. Cover, Right, Tractor Drive (26-1152)
 - a. Remove the two screws and flatwashers mounting the right tractor drive cover to the right frame.
9. Cover, Right, Pinch Roller (26-1150)
 - a. Remove the right pinch roller cover from the two mounting pins on the right frame.
10. Cover, Right
 - a. Remove the three screws, lockwashers and flatwashers mounting the right cover to the printer base.

NOTE: ALL REMOVAL/REPLACEMENT PROCEDURES FOR THE REMAINING SUBASSEMBLIES ARE WRITTEN ASSUMING THAT THE COVERS HAVE BEEN REMOVED FROM THE PRINTER.

C. ADJUSTMENTS

1. Covers, Left and Right (4, 6)
 - a. As you mount the left (4) and right (6) covers to the printer base, be sure that the covers align with and snap into the standoffs on the left and right sides of the frame.

D. PREVENTIVE MAINTENANCE

1. Clean all cover assemblies with a mild detergent.

3.4 PRINT HEAD ASSEMBLY (Figure 3-2A)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY.
11	—	Print Head Assembly	—
1	62001136-5002	Print Head Assembly	1

A. FUNCTION

The standard print head assembly contains seven print wires. Since the print wires are not attached to the coil armatures the print head is commonly referred to as the "free flight head." As the head assembly moves across the print line, the seven print wires are selectively fired to graphically construct the characters in a dot matrix pattern.

B. REMOVAL/REPLACEMENT PROCEDURE

TOOLS REQUIRED: NONE

1. Remove the ribbon from the print head ribbon guides.
2. Remove the fingerboard P012 on the print head cable from connector J012 on the video amplifier.
3. Release clamping spring tension, on the left side of the carriage assembly by pulling spring up and over spring retainer.
4. Remove the print head by sliding off carriage assembly towards the front of the printer.

NOTE: RELEASING TENSION ON CLAMPING SPRING WILL ENABLE PRINT HEAD TO BE REMOVED. WHEN INSTALLING THE PRINT HEAD ASSEMBLY, ENSURE THE CLAMPING SPRING CATCHES THE LIP UNDERNEATH THE HEAD THEN PULL SPRING UP AND OVER SPRING RETAINER.

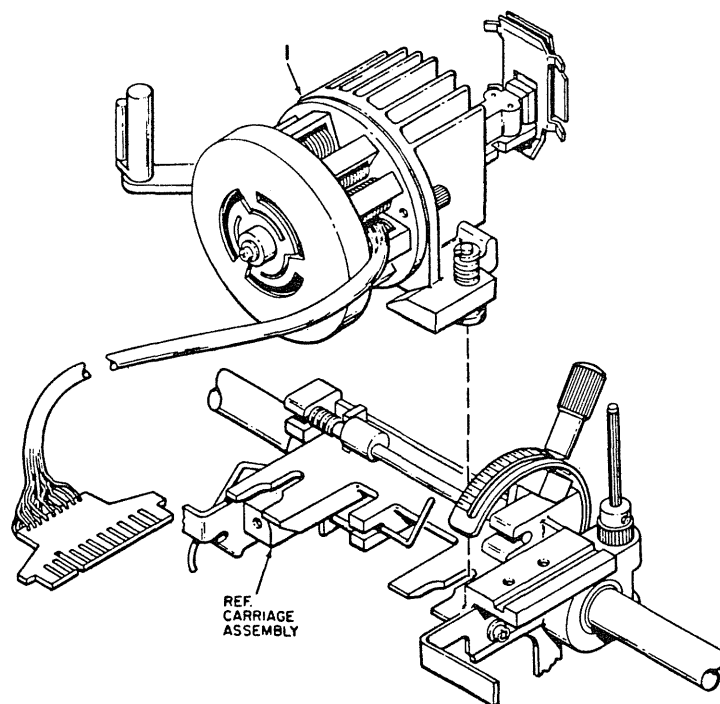


Figure 3-2A. PRINT HEAD ASSEMBLY

C. ADJUSTMENTS (Figure 3-3)

1. Print Head Penetration

- Loosen penetration control knob and hardware securing the head adjusting indicator.
- Move penetration control knob away from platen and as close as possible, but not contacting the print head.
- Lightly tighten indicator hardware.
- Insert a 0.177 mm (0.007 in.) feeler gauge between the print head and the platen. Move penetration control knob towards platen until 0.177 mm (0.007 in.) gap is met. Tighten penetration control knob.
- Holding penetration control knob, loosen hardware securing head adjusting indicator and position indicator against penetration control knob.
- Tighten head adjusting indicator hardware.
- Loosen penetration control knob and move back and forth.
- Retighten control knob against indicator and recheck for 0.177 mm (0.007 in.) gap.

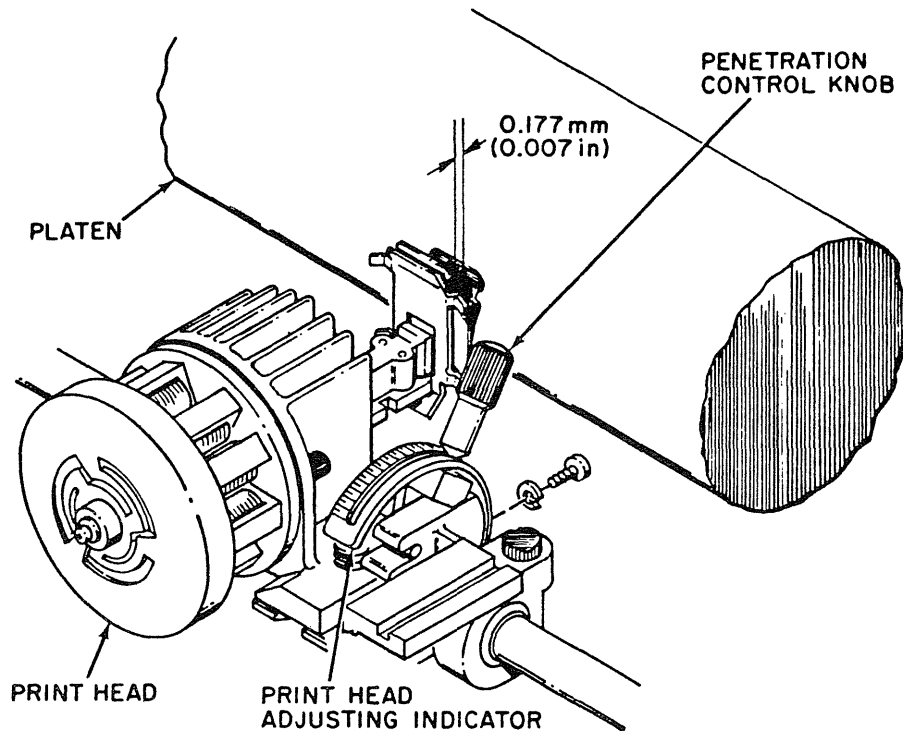


Figure 3-3. PENETRATION CONTROL ADJUSTMENT, PRINT HEAD ASSEMBLY

D. PREVENTIVE MAINTENANCE

- No maintenance is required on the print head assembly.

3.5 VIDEO AMPLIFIER ASSEMBLY (Figure 3-3A)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY.
12	63779120-6001	Kit, Video Amplifier Assembly Note: This kit includes items 1 through 4.	1
1	63703164-4007	P.C. Bd., Ass'y Video Amp, Unloaded	1
2	34000351-2019	Screw, M3 x 10 mm Lg., Pan Hd. Phillips	2
3	34000455-2004	Washer, Split Lock, M3	2
4	34000452-2004	Washer, Flat, M3	2

A. FUNCTION

The video amplifier in the line printer is an unloaded board (no components) with attached cable assembly. The video amplifier provides an electrical connection between the print head assembly and logic board assembly.

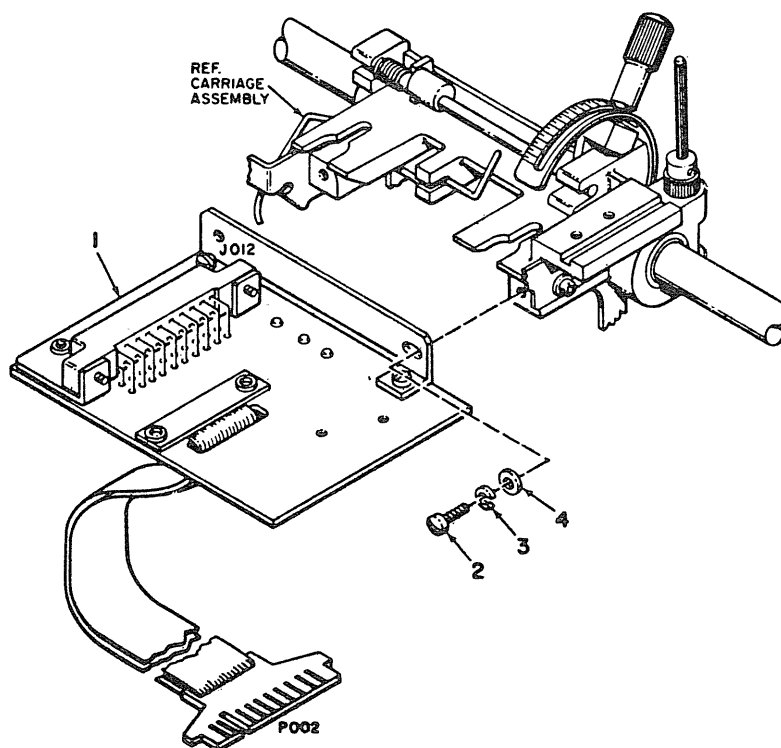


Figure 3-3A. KIT, VIDEO AMPLIFIER ASSEMBLY

B. REMOVAL/REPLACEMENT PROCEDURES

TOOLS REQUIRED: Phillips Head Screwdriver

1. Remove the print head cable fingerboard P012 from connector J012 on video amplifier.
2. Remove connector P004, on cable of video amplifier, from connector J004 on logic board.
3. Remove the four carriage solenoid wires attached to the bottom of the video amplifier.
4. Remove the two screws (2) lockwashers (3) and flatwashers (4) and remove the video amplifier from printer.

C. ADJUSTMENT

1. No adjustments are necessary on the video amplifier.

D. PREVENTIVE MAINTENANCE

1. No maintenance is necessary on the video amplifier.

3.6 RIBBON CARTRIDGE ASSEMBLY (Figure 3-3B)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY.
13	63700289-6001	Kit, Ribbon Cartridge Assembly Note: This kit includes items 1 through 4.	1
1	53502001-5001	Ribbon Cartridge Assembly	1
2	37740005-3001	Ribbon, Black	1
3	535482001-2001	Screw, M4 x 10 mm Lg. Pan Hd. Phillips	2
4	028040242-2001	Washer, Split Lock, M4	2

A. FUNCTION

The ribbon cartridge assembly mounts to the carriage and contains the print ribbon. The ribbon is advanced during the forward and reverse movement of the carriage by the ribbon drive shaft. The ribbon drive shaft rotates clockwise feeding the mobius loop ribbon out of the back of the cartridge, in the front of the print head, and back into the front of the cartridge. Movement of the ribbon drive shaft is the result of two one-way slip clutches, one for forward movement and one for reverse movement.

B. REMOVAL/REPLACEMENT PROCEDURE

TOOLS REQUIRED: Phillips Head Screwdriver

1. Remove the print ribbon (2) from the print head ribbon guides.
2. Remove two screws (3) and lockwashers (4) and lift cartridge (1) from printer.

C. ADJUSTMENTS

OPERATOR'S ADJUSTMENT

1. Refer to the OPERATOR'S MANUAL for removal/replacement and adjustment of print ribbon.

D. PREVENTIVE MAINTENANCE

1. Manually move the carriage assembly and verify proper ribbon tracking. Check ribbon rollers for proper meshing.

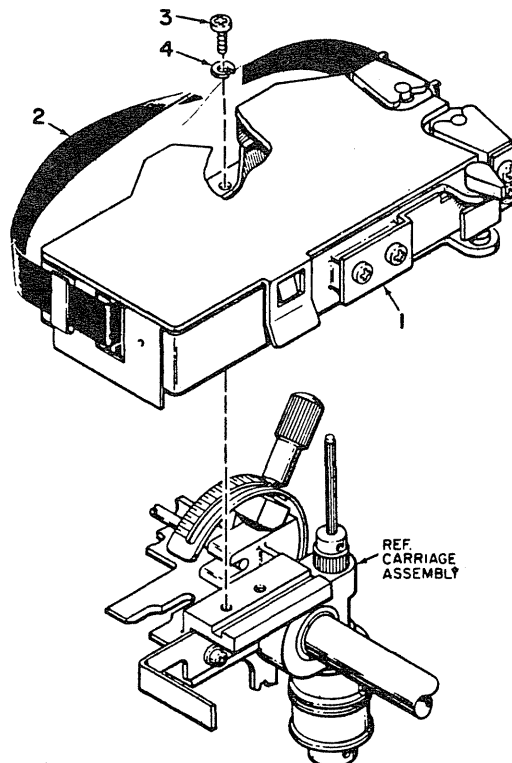


Figure 3-3B. KIT, RIBBON CARTRIDGE ASSEMBLY

3.7 CARRIAGE ASSEMBLY (Figure 3-4)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY.
14	—	Carriage Assembly	—
1	535340001-5001	Carriage Assembly	1

A. FUNCTION

The carriage assembly supports the print head, ribbon cartridge, video amplifier, and the ready to print (RTP) and end of print (EOP) actuator arms. The carriage is driven in either the left or right direction, as determined by the printer electronics.

B. REMOVAL/REPLACEMENT PROCEDURE

TOOLS REQUIRED: Slotted and Phillips Head Screwdrivers Snap Ring Tool

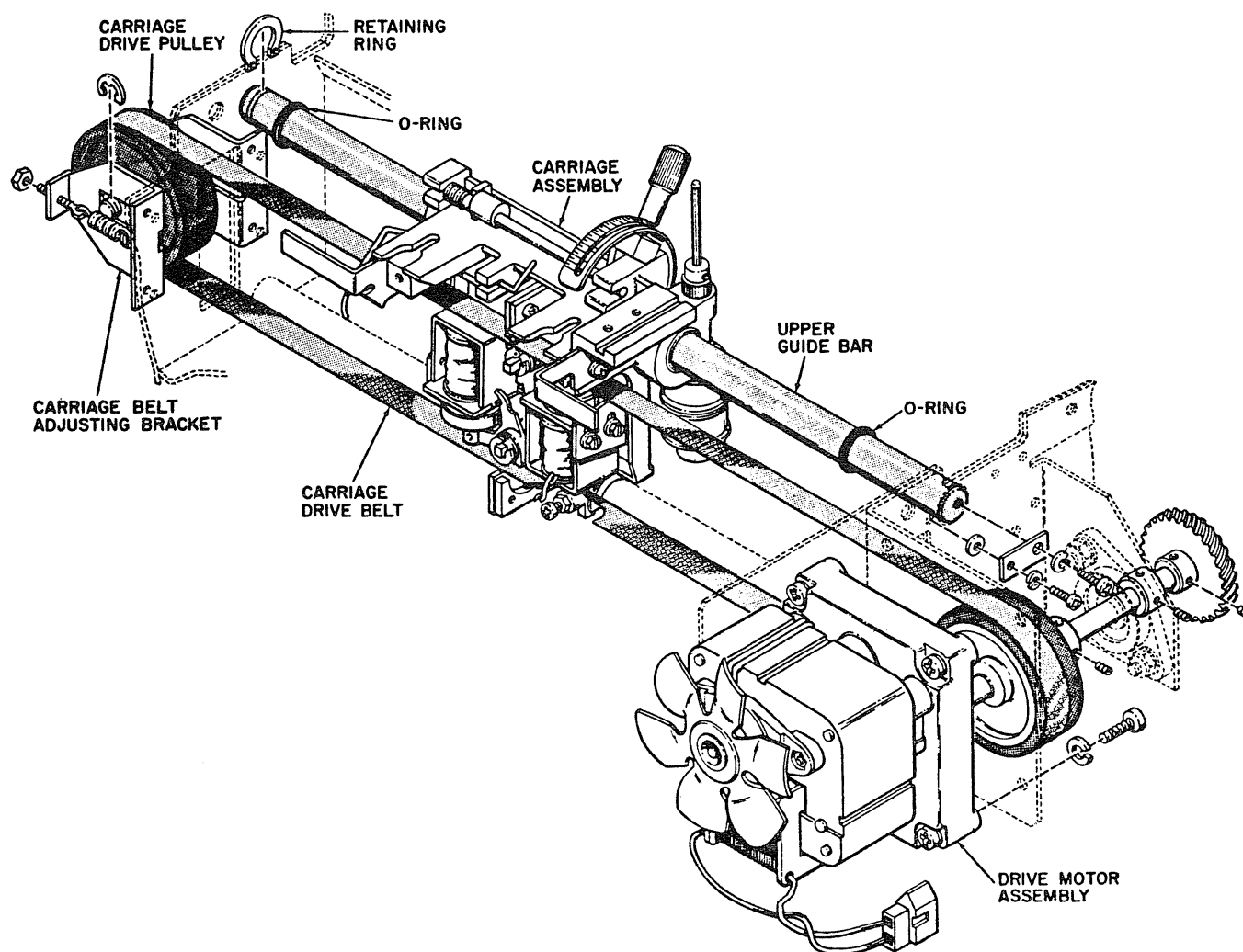


Figure 3-4. CARRIAGE ASSEMBLY, REMOVAL/REPLACEMENT

WARNING
TURN POWER OFF
BEFORE REMOVING CARRIAGE

1. Move the carriage assembly to the center of the printer.
2. Remove the ribbon cartridge assembly.
3. Remove the print head and video amplifier assemblies per paragraph 3.4.B and 3.5.B respectively.
4. Loosen the carriage drive belt by turning, counterclockwise the two adjusting screws on the idler pulley assembly.
NOTE: THE IDLER PULLEY ASSEMBLY IS LOCATED ON THE LEFT SIDE OF THE PRINTER.
5. Remove the retaining ring on the left end of the upper guide bar.
6. Remove the two screws mounting the upper guide bar to the right frame.
7. Loosen the locknut and screw attaching the bottom of the carriage to the bottom guide bar.
8. Remove the upper and lower ribbon drive monofilament from the ribbon drive shaft.
9. While supporting the carriage assembly, slide the upper guide bar to the right through the carriage assembly.
NOTE: RETAIN THE RUBBER O-RING REMOVED FROM THE LEFT END OF THE UPPER GUIDE BAR.
10. Remove the carriage assembly from the printer.

C. ADJUSTMENTS (Figure 3-5)

1. Adjust ready to print (RTP) actuator arm parallel to and 59 mm (2.3 inches) from the upper guide bar.
2. Adjust end of print (EOP) actuator arm parallel to and 54 mm (2.1 inches) from the upper guide bar.
3. Once the actuator arms have been adjusted, slowly move the carriage assembly from left to right ensuring the RTP and EOP actuator arms do not contact the RTP and EOP optical switches.

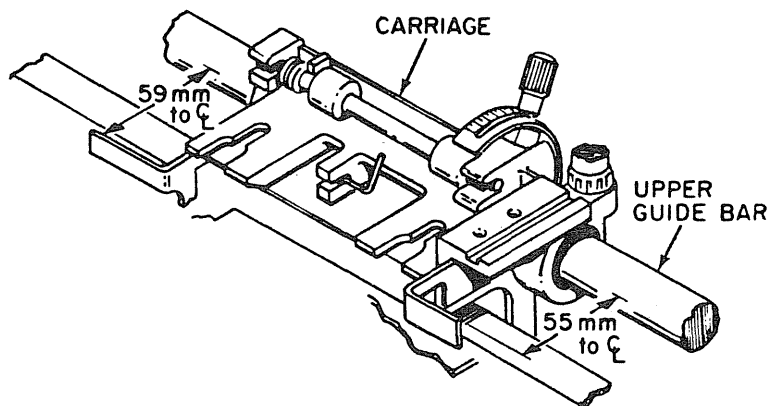


Figure 3-5. RTP AND EOP ACTUATOR ARM ADJUSTMENTS

D. PREVENTIVE MAINTENANCE

1. Wipe the upper and lower guide bar clean using a soft clean cloth.

3.8 DRIVE MOTOR ASSEMBLY (Figure 3-5A)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY.
15A	63780152-6001	Kit, Drive Motor Assembly, 60Hz NOTE: this kit includes items 1 and 3 through 13.	1
15B	63780152-6002	Kit, Drive Motor Assembly, 50Hz NOTE: This kit includes items 2 through 13.	1
1	63780152-5001	Drive Motor Assembly, 60Hz	1
2	63780152-5002	Drive Motor Assembly, 50Hz	1
3	535097001-2001	Fan Blade/Main Motor	1
4	535493001-2001	Bolt, M5 x 10 mm Lg., Hex Hd. Slotted	4
5	028050242-2001	Washer, Split Lock, M5	4
6	535141001-2001	Drive Pulley Assembly	1
7	525745001-2001	Set-Screw, M4 x 6 mm Lg.	2
8	535560001-2001	Drive Pulley Bearing Holder Unit	2
9	535544001-2001	Bolt, M4 x 8 mm Lg., Hex, Hd. Slotted	2
10	028040242-2001	Washer, Split Lock, M4	2
11	535539001-2001	Nut, Hex, M4	2
12	535547001-2001	Line Feed Clutch Drive Gear	1
13	525743001-2001	Set-screw, M4 x 4 mm Lg.	2

A. FUNCTION

The drive motor assembly moves the carriage in the left or right direction and transmits power to the platen drive assembly.

B. REMOVAL/REPLACEMENT PROCEDURE

TOOLS REQUIRED: M4 Hex Key, Phillips Screwdriver and M5 Nut Driver.

1. Loosen tension on main drive belt by turning two adjusting screws on idler pulley assembly counterclockwise.
2. Remove the two screws and flatwashers mounting the motor fan cover.
3. Disconnect two-pin connector P007 of the drive motor assembly from connector J007.
4. Loosen the set-screws (7, 13) mounting the line feed clutch drive gear (12), drive pulley bearing holder unit (8) and drive pulley assembly (6) to the drive motor shaft.
5. Remove four bolts (4) and lockwashers supporting the drive motor assembly (1, 2) and slide the shaft and motor out of the printer.

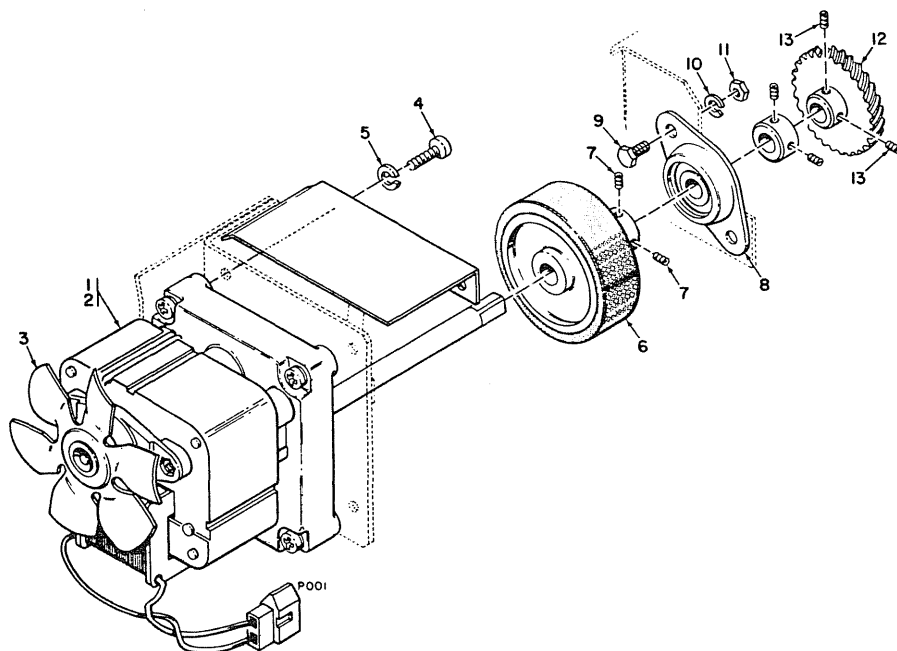


Figure 3-5A. KIT, DRIVE MOTOR ASSEMBLY, REMOVAL/REPLACEMENT

C. ADJUSTMENTS (Figure 3-6)

1. Using helical gear alignment tool A (63003455-3002) from special tool kit adjust the line feed clutch drive gear as follows:
 - a. Insert tool over line feed clutch drive gear and onto shaft of platen drive assembly.

NOTE: THIS WILL ALIGN CENTER OF LINE FEED CLUTCH DRIVE GEAR AND CENTER OF PLATEN DRIVE SHAFT.
2. Ensure the drive pulley assembly is centered in the opening of the frame.

D. PREVENTIVE MAINTENANCE

1. Ensure line feed clutch drive gear on end of drive motor shaft is perpendicular (centerline to centerline) to platen drive clutch.

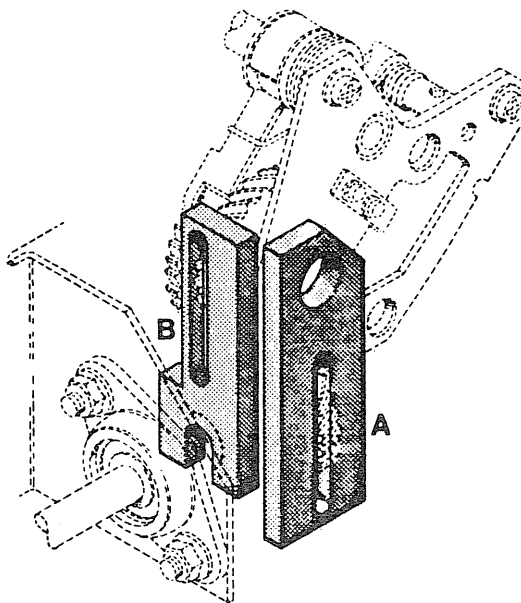


Figure 3-6. DRIVE MOTOR ASSEMBLY ADJUSTMENTS

3.9 PLATEN DRIVE ASSEMBLY (Figure 3-6A)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY.
16	63700643-6003	Kit, Platen Drive Assembly Note: This kit includes items 1, 2 and 3	1
1	63700643-5103	Platen Drive Assembly	1
2	535003001-2001	Screw, M4 x 14 mm Lg., Pan Hd. Phillips	3
3	028040242-2001	Washer, Split Lock, M4	3

A. FUNCTION

The platen drive assembly, on command from the logic, advances the paper by rotating the platen.

B. REMOVAL/REPLACEMENT PROCEDURE

TOOLS REQUIRED: Phillips Head Screwdriver

1. Disconnect two pin connector P014 of platen drive from connector J014.
2. Remove the three screws (2) and lockwashers (3) and remove the platen drive assembly from the right frame.

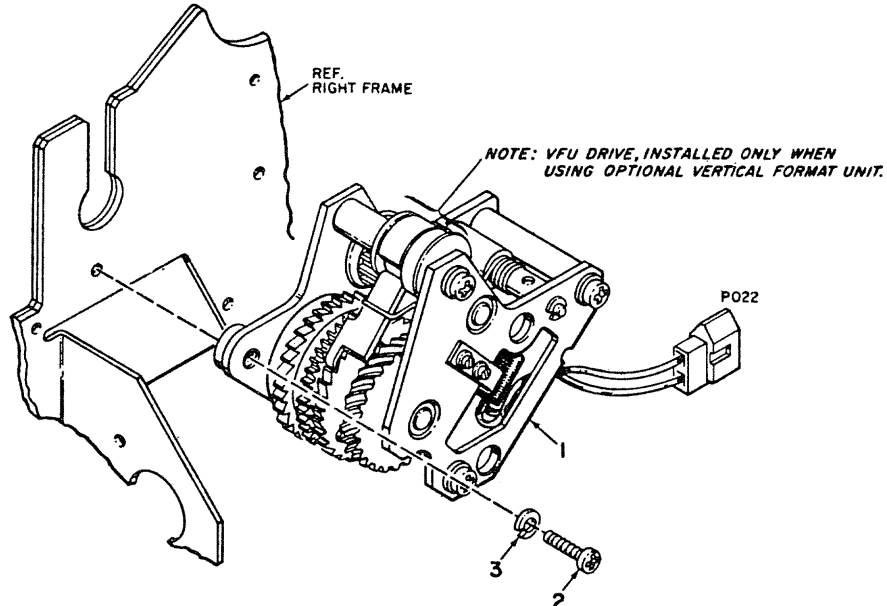


Figure 3-6A. KIT, PLATEN DRIVE ASSEMBLY

C. ADJUSTMENTS (Figure 3-7)

1. Armature to Releaser Gear Adjustment

- a. Loosen the two mounting screws that secure the platen drive assembly solenoid.
- b. Press the armature up against the platen drive releaser gear until a 0.004 to 0.006 inch (0.10 to 0.015 mm) gap exists between the releaser gear and the armature, then tighten the mounting screws.

2. Armature to Solenoid Adjustment

- a. Insert a 0.036 inch (0.91 mm) feeler gauge between the armature and the solenoid.
- b. Loosen the two set-screws that secure the armature stop arm.
- c. Move the stop arm until it contacts the armature, then tighten the set-screws.

3. Back Stopper Adjustment

- a. Turn the eccentric bushing to allow for a 0.004 to 0.012 inch (0.10 to 0.30 mm) clearance between the back stopper and the spur gear.

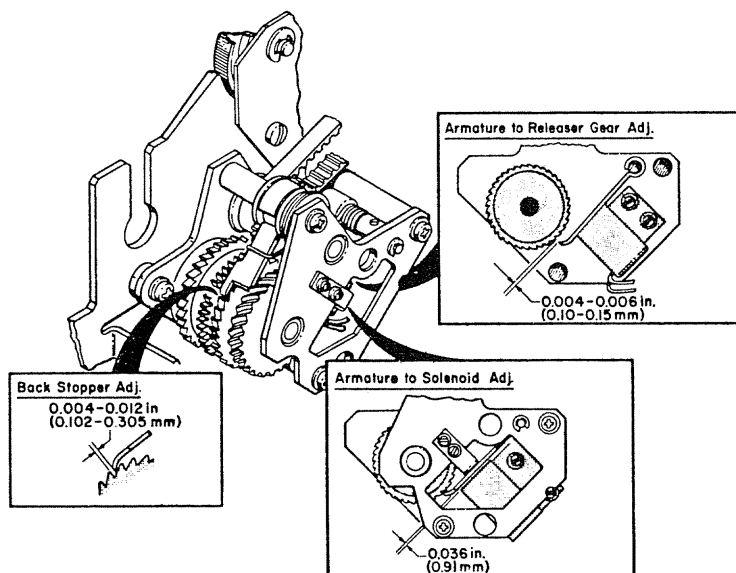


Figure 3-7. PLATEN DRIVE ASSEMBLY ADJUSTMENTS

4. Line Feed Clutch Helical Gear Adjustment (Figure 3-6)

- a. Place the helical gear alignment tool A(63003455-3001) on the drive motor shaft between the line feed clutch drive gear and the idle pulley stopper collar.
- b. The helical gear of the line feed unit should align into the slot on the tool. If not, loosen the drive pulley bearing holder unit and move the drive shaft until the gear snaps into the slot.
- c. Once the adjustment is completed, tighten the hardware.

D. PREVENTIVE MAINTENANCE

1. Verify the proper setting of the line feed clutch armature to the platen drive releaser gear.
2. Ensure that the printer is line feeding properly.
3. Lightly grease all gears in the line feed clutch unit.

3.10 PLATEN ASSEMBLY (Figure 3-7A)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY
17	63780154-5001	Kit, Platen Assembly Note: This kit contains items 1 through 17	1
1	535366001-5001	Platen Unit	1
2	535537001-2001	Bushing	1
3	535538000-2001	Spring Stopper Clip	2
4	535180000-2001	Bushing	1
5	535075001-5001	Pin Tractor Drive Pulley (26-1152)	1
6	525743001-2001	Set-Screw, M4 x 4 mm Lg. (26-1152)	3
7	535043001-2001	Spacer	1
8	525745001-2001	Set-Screw, M4 x 6 mm Lg.	4
9	535301001-2001	Paper Feed Pulley	1
10	535298001-2001	Paper Feed Coupler Sleeve Unit	1
11	535302001-2001	Spring	1
12	535303001-2001	Paper Feed Knob	1
13	535304001-2001	Paper Feed Coupler	1
14	525744001-2001	Set-Screw M4 x 5 mm Lg.	4
15	535305001-2001	Paper Feed Knob key	1
16	535306001-2001	Paper Feed Knob	1
17	535307001-2001	Paper Feed Knob Joint	1

A. FUNCTION

The platen assembly provides the hard surface for print head solenoid impact. The platen knob is on the right side of the platen assembly; it can be pushed in and rotated for manual paper movement.

B. REMOVAL/REPLACEMENT PROCEDURE

TOOLS REQUIRED: M4 Hex Key, Flat Blade Screwdriver

1. Remove the paper feed knob from the right side of the platen assembly.
2. Remove the two stop collar springs (3) from the ends of the platen assembly.
3. Remove the bolt and flatwasher mounting adjusting plate from the left end of the platen.
4. Slide the two brass bushings (2 and 4) towards the center of the printer and lift the platen assembly from the printer.

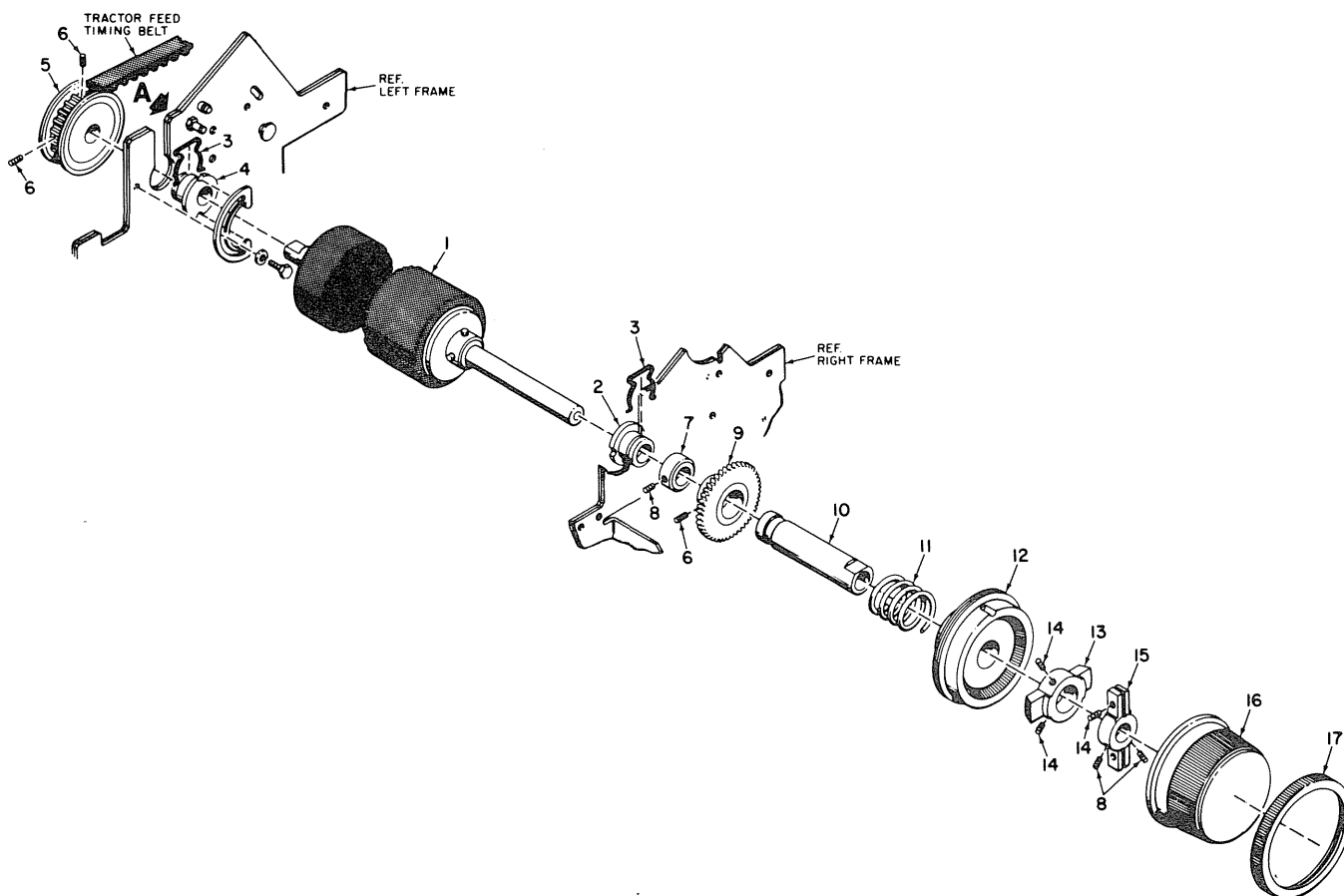


Figure 3-7A. KIT, PLATEN ASSEMBLY

C. ADJUSTMENTS (Figure 3-8)

The platen assembly must be parallel to the travel of the carriage, if not adjust as follows:

1. Operate printer and ensure print quality is uniform for the full 132 characters printed.
2. If print quality is not uniform, loosen bolt and rotate adjusting plate until platen assembly is parallel to the travel of the carriage.
3. Once adjusted, tighten mounting hardware.

D. PREVENTIVE MAINTENANCE

1. Clean platen using a mild detergent.

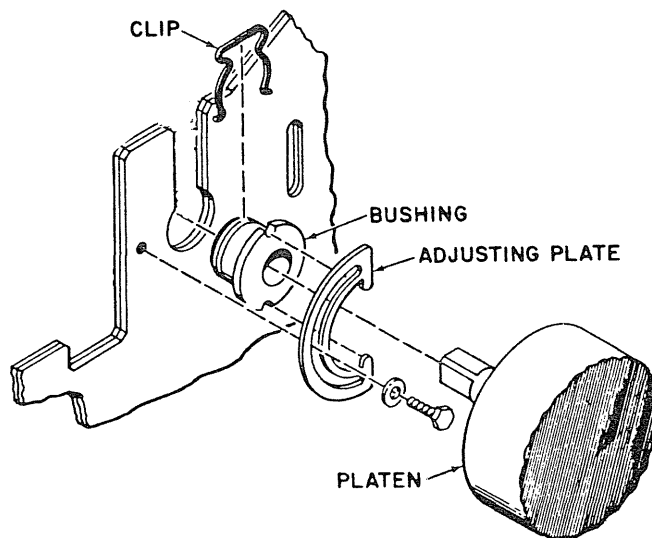


Figure 3-8. PLATEN ASSEMBLY ADJUSTMENT

3.11 PINCH ROLLER ASSEMBLY (26-1150 — Figure 3-8A)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY.
18	535220001-6001	Kit, Pinch Roller Assembly Note: This kit includes items 1 through 11.	1
1	525488001-5001	Paper Pan Assembly	1
2	535129001-5001	Pinch Roller Assembly	1
3	535286000-2001	Paper Roll Center Shaft	1
4	081022170-2001	O-Ring	2
5	535008001-2001	Screw, M4 x 8 mm Lg., Pan Hd. Phillips	3
6	028040242-2001	Washer, Split Lock, M4	3
7	535009001-2001	Washer, Flat, M4	1
8	535119001-2001	Friction Feed Pinch Cover	1
9	535581001-2001	Sub-Frame	1
10	535068001-2070	Cover Lid, Right	1
11	535067001-2070	Cover Lid, Left	1

A. FUNCTION

The pinch roller assembly is the standard paper drive unit in the printer. Paper movement is accomplished by pinching the paper between the platen assembly and rollers on the paper pan assembly and as the platen rotates, paper is moved. Mounted to the left frame of the pinch roller assembly is the paper empty switch.

B. REMOVAL/REPLACEMENT PROCEDURE

TOOLS REQUIRED: Spring Hook, Snap Ring Tool, Phillips Head Screwdriver

1. Remove the column scale/tear bar assembly per paragraph 3.12.B.
2. Remove the platen assembly per paragraph 3.10.B.
3. Remove the three screws (5) lockwashers (6) and flatwashers (7) and lift the pinch roller assembly from the printer.

C. ADJUSTMENTS

1. No adjustments are required on the pinch roller assembly.

OPERATOR'S ADJUSTMENT

2. Refer to the OPERATOR'S MANUAL for loading of paper into the pinch roller assembly.

D. PREVENTIVE MAINTENANCE

1. No maintenance is required on the pinch roller assembly.

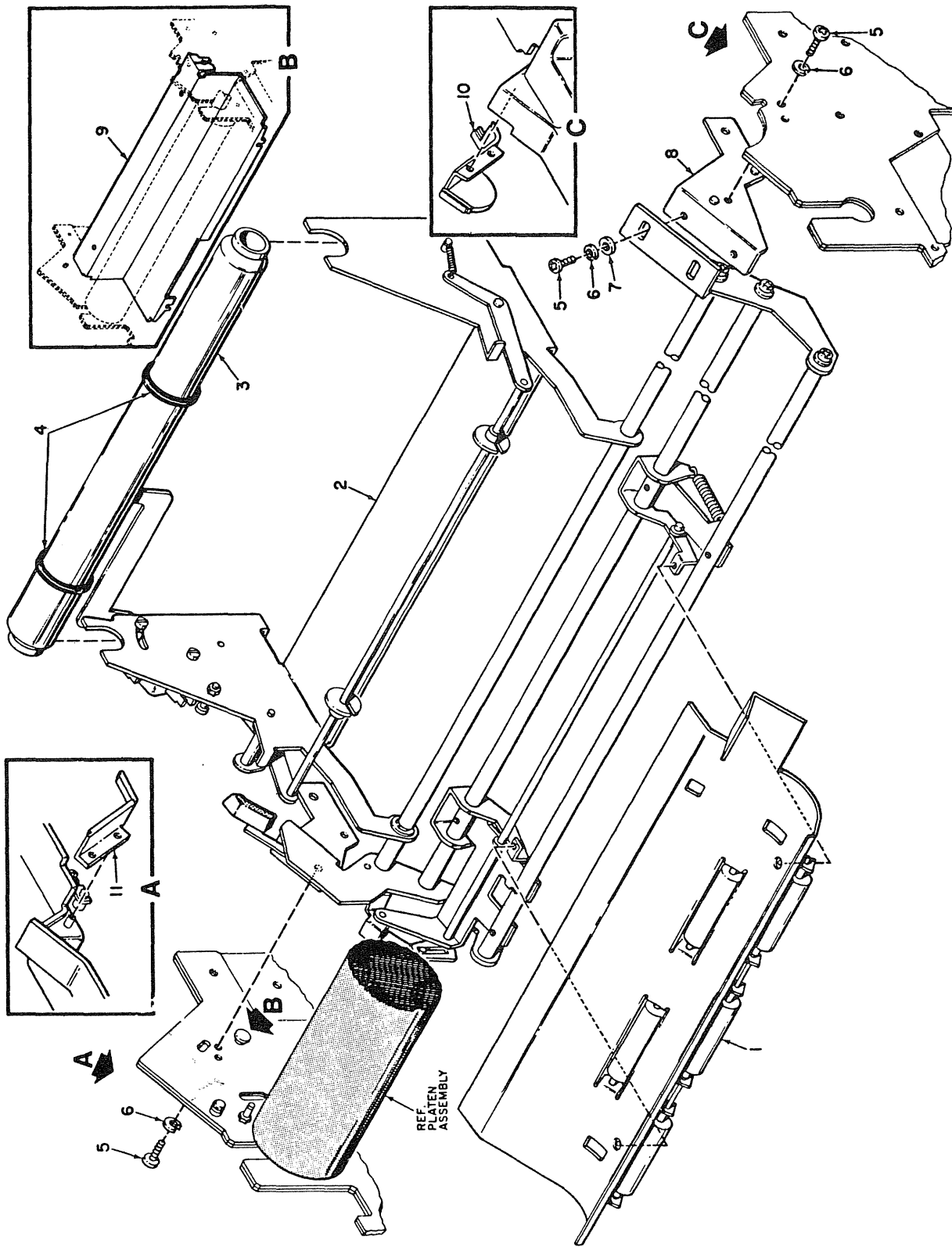


Figure 3-8A. KIT, PINCH ROLLER ASSEMBLY (26-1150)

3.12 COLUMN SCALE/TEAR BAR ASSEMBLY (Figure 3-8B)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY
19	---	Column Scale/Tear Bar Assembly	1
1	535121001-5001	Column Scale/Tear Bar Assembly 10 CPI	1

A. FUNCTION

The column scale/tear bar assembly allows the operator to view which character was printed last. The scale also serves as a tear bar, allowing the operator to tear forms cleanly from the printer.

B. REMOVAL/REPLACEMENT PROCEDURE

TOOLS REQUIRED: Spring Hook, Snap Ring Tool

1. Remove the two springs from the left and right ends of the column scale/tear bar.
2. Remove the snap ring from the left end of the column scale/tear bar and remove the assembly from the printer.

C. ADJUSTMENTS

1. No adjustments are required on the column scale/tear bar assembly.

D. PREVENTIVE MAINTENANCE

1. Clean the column scale/tear bar assembly with a mild detergent.

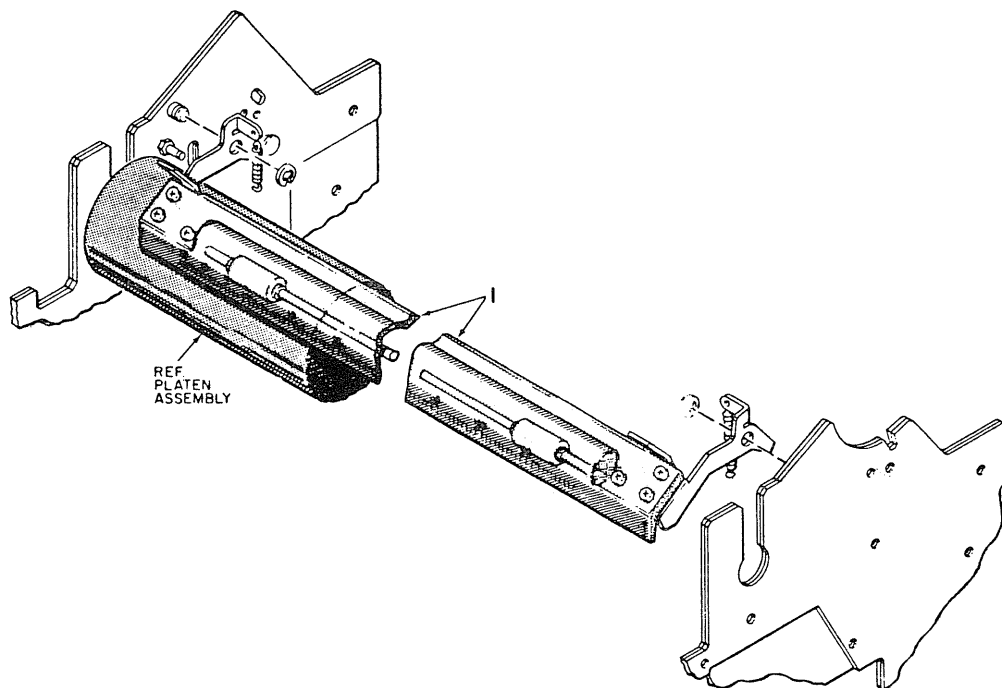


Figure 3-8B. COLUMN SCALE/TEAR BAR ASSEMBLY

3.13 TRACTOR DRIVE AND PIN FEED ASSEMBLIES (26-1152 — Figure 3-8C)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY
20	63780153-6001	Kit, Tractor Drive Assembly NOTE: This kit includes items 1 through 9.	1
21	535502001-5001	Pin Feed Tractor, Left	1
22	535501001-5001	Pin Feed Tractor, Right	1

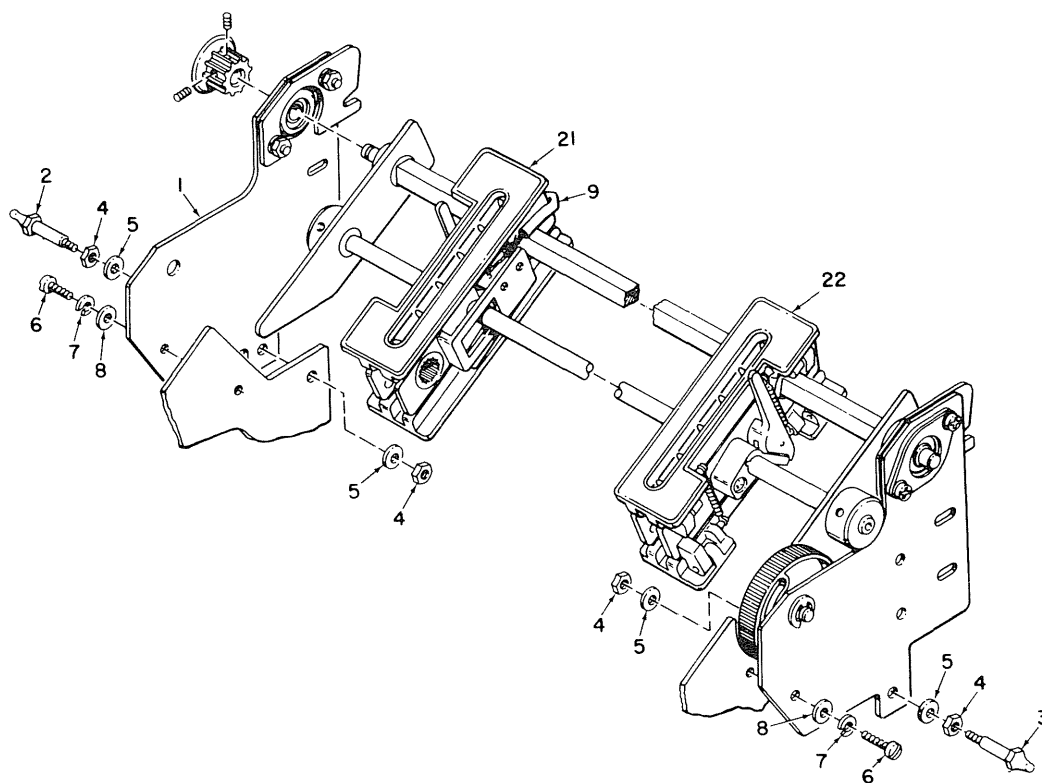


Figure 3-8C. TRACTOR DRIVE AND PIN FEED ASSEMBLY (26-1152)

1	535134001-5001	Tractor Feed Unit	1
2	535033001-2001	Stud Screw, Cover, Left	1
3	535031001-2001	Stud Screw, Cover, Right	1
4	535539001-2001	Nut, Hex, M4	4
5	535009001-2001	Washer, Flat, M4	4
6	34000351-2038	Screw, M4 x 10mm Lg., Pan Hd. Phillips	2
7	34000455-2006	Washer, Split Lock, M4	2
8	34000452-2006	Washer, Flat, M4	2
9	63701118-4001	Harness Ass'y., Paper Empty Switch	1

A. FUNCTION

The Tractor Drive assembly supports and guides fan fold, tractor fed paper using rear feed. The major components are two side frames, guide bars for driving and guiding the pin feed tractors and two pin feed tractors. The two pin feed tractors are horizontally adjustable to accept fan fold paper from 4.5 inches (114.3 mm) minimum to 9 inches (228.6 mm) maximum. There are 15 pins that project from the pin feed tractor, 5 of which always mesh with the paper. The left tractor unit also contains the paper empty switch.

B. REMOVAL/REPLACEMENT PROCEDURE

TOOLS REQUIRED: Phillips Head Screwdriver

1. Tractor Drive Assembly

- a. Disconnect the paper empty switch connector, J015, from connector P015.
- b. Remove the left (2) and right (3) stud screws, two flatwashers (5) and two nuts (4) that secure the tractor drive assembly to the tractor feed unit (1).
- c. Remove the two screws (6), lockwashers (7) and flatwashers (8) and remove the tractor drive assembly from the printer frame.

2. Pin Feed Tractors, Left and Right

- a. Remove the tractor drive assembly per paragraph 3.13.B.1.
- b. Loosen the set-screw mounting drive pulley on the left side of the tractor drive assembly and remove the pulley and side plate.
- c. Slide the left and right pin feed tractors off of the drive shaft and support bar of the tractor drive assembly.

C. ADJUSTMENTS

1. Tractor Drive Timing Belt Tension (Figure 3-8D)

- a. Adjust the tension of the drive belt so that when a load of 5 to 8 ounces (142 to 227 grams) is applied at the center of the belt, the belt deflection will be 0.25 inches (6.35 mm).

2. Paper Travel (Figure 3-8E)

- a. Using the eccentric knob on the right side of the tractor drive assembly, adjust the tractor units so that the plane of paper travel is tangent to the platen.

3. Operator's Adjustment

- a. Refer to the TRS-80 Line Printer Operator's Manual for instructions on loading paper into the tractor drive assembly.

D. PREVENTIVE MAINTENANCE

1. No maintenance is required on the tractor drive assembly or pin feed tractor units.

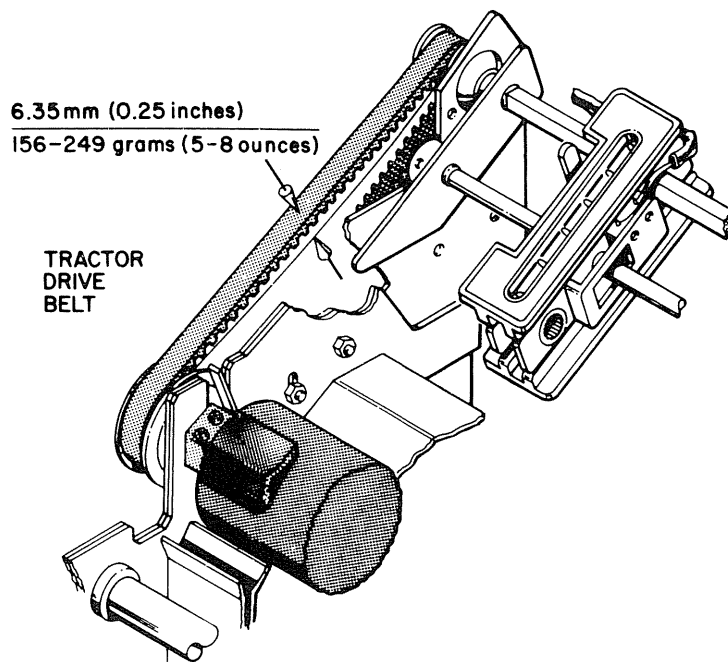


Figure 3-8D. TRACTOR DRIVE TIMING BELT TENSION (26-1152)

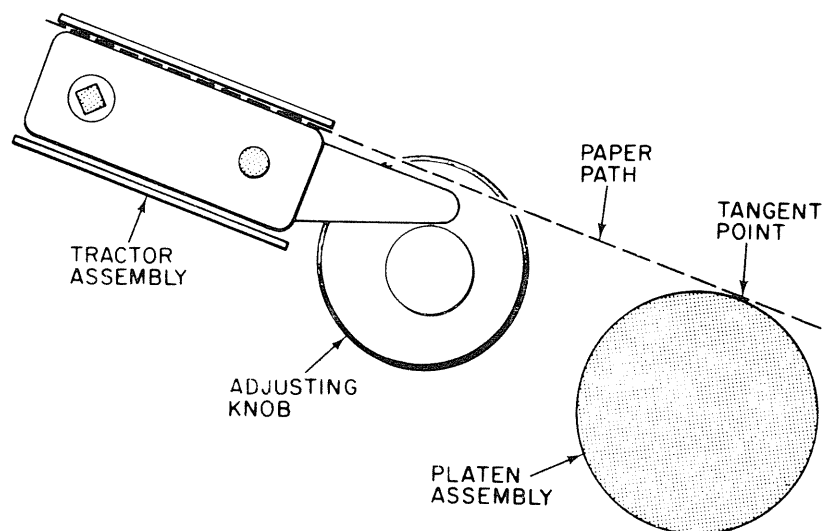


Figure 3-8E. PAPER TRAVEL ADJUSTMENT TRACTOR DRIVE ASSEMBLY (26-1152)

3.14 CONTROL PANEL ASSEMBLY (Figure 3-8F)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY
23	63779115-5001	Control Panel Assembly NOTE: This assembly includes items 1 through 3.	1
1	63779111-2001	Bracket, Control Panel	1
2	63771916-4001	LED Harness Assembly	1
3	39090009-1001	Switch, SPDT, Rocker	1

A. FUNCTION

For a detailed functional description of the control panel refer to the OPERATOR'S MANUAL.

B. REMOVAL/REPLACEMENT PROCEDURE

TOOLS REQUIRED: Phillips Head Screwdriver

1. Disconnect connector J021 from connector P021 on control panel.
2. Remove the four faston connectors from the print rocker switch.
3. Remove the three screws, lockwashers, and flatwashers mounting the control panel to the printer frame and remove the control panel.

C. ADJUSTMENTS

1. No adjustments are required on the control panel.

D. PREVENTIVE MAINTENANCE

1. No maintenance is required on the control panel.

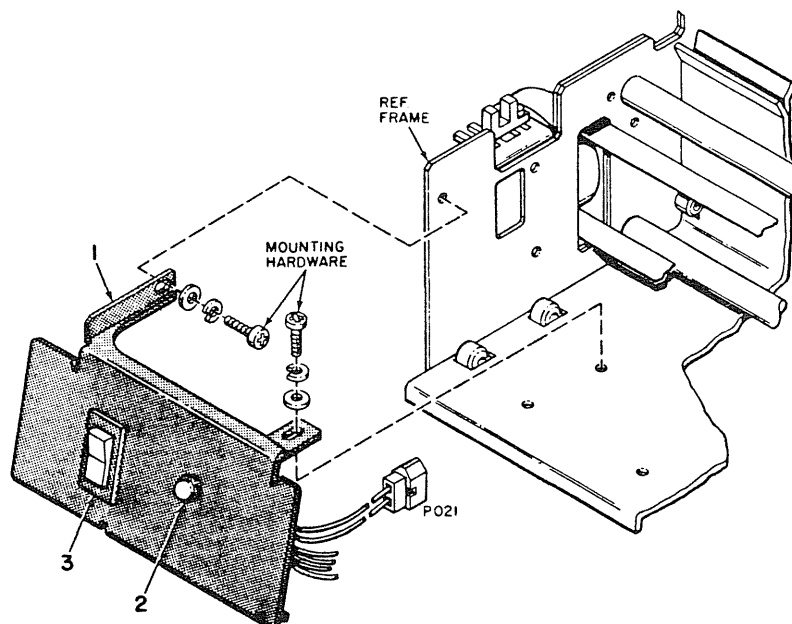


Figure 3-8F. CONTROL PANEL ASSEMBLY

3.15 PRIMARY VOLTAGE ASSEMBLIES (Figure 3-8G)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY.
24A	63703115-6001	Kit, Primary Voltage Assy., 100-120V Note: This kit includes items 1 and 3 through 15.	1
24B	63703115-6002	Kit, Primary Voltage Assy., 200-240V Note: This kit includes items 2 through 15.	1
1	63703116-5001	Power Bracket Assy., 115 VAC	1
2	63703116-5002	Power Bracket Assy., 230 VAC	1
3	34000351-2038	Screw, M4 x 10 mm Lg., Pan Hd. Phillips	2
4	34000455-2006	Washer, Split Lock, M4	2
5	34000452-2006	Washer, Flat, M4	2
6	63703144-5001	Line Filter Assembly	1

7	525674001-2001	Splice	1
8	34527125-2001	Screw, No. 6-32 x .38 Lg., Pan Hd. Phillips	3
9	34828005-2001	Washer, Split Lock, No. 6	3
10	34923105-2001	Washer, Flat, No. 6	3
11	34000351-2040	Screw, M4 x 16 mm Lg. Pan Hd. Phillips	1
12	34000451-2056	Washer, Split Lock, Ext. Tooth, M4	1
13	34000652-2006	Nut, Hex, M4	2
14	63761184-4001	Cable Assembly Adapter	1
15	63779114-4001	Jumper Wires, Transformer	2

A. FUNCTION

The power bracket assembly contains the ON/OFF switch and extending from bracket is the AC power cord. The line filter assembly filters transients generated by the ON/OFF switch or transformer.

B. REMOVAL/REPLACEMENT PROCEDURE

TOOLS REQUIRED: Phillips Head Screwdriver

1. Disconnect all wires from the power bracket assembly (1, 2) and line filter assembly (6).
2. Remove the two screws (3) lockwashers (4) and flatwashers (5) supporting the power bracket assembly to the electronic module.
3. Remove screw (11), two external tooth lockwashers (12) and nuts (13) connecting ground wire of AC power cord and remove the power bracket assembly.
4. Remove the three screws (8), lockwashers (9) and flatwashers (10) and remove the line filter assembly.

C. ADJUSTMENTS

1. No adjustments are required on the primary voltage kit.

D. PREVENTIVE MAINTENANCE

1. No maintenance is required on the primary voltage kit.

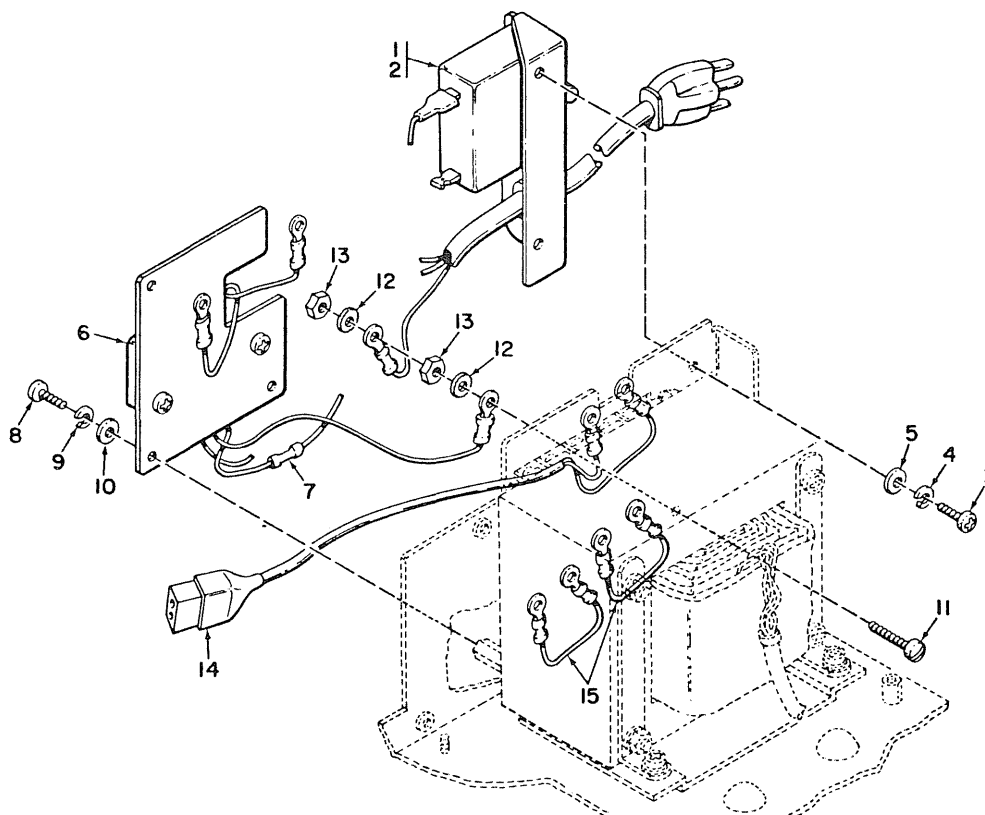


Figure 3-8G. KIT, PRIMARY VOLTAGE ASSEMBLY

3.16 ELECTRONIC MODULE ASSEMBLY (Figure 3-8H)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY.
25	63779103-5001	Electronic Module Assembly Note: This assembly includes items 1 through 14.	1
1	63780121-5001	Frame Assembly	1
2	36200018-2008	Mounting Bumper	4
3	63703153-2001	Board Standoff	2
4	36000000-0002	Grommet Strip	.2 ft.
5	63779108-4001	Transformer Assembly and Harness	1
6	34000351-2037	Screw, M4 x 8 mm Lg., Pan Hd. Phillips	2
7	34000455-2006	Washer, Split Lock, M4	2
8	34000452-2006	Washer, Flat, M4	2
9	34932007-2001	Washer, Flat, #8	2
10	34838007-2001	Washer, Split Lock, #8	2
11	34732007-2001	Nut, Hex, #8	2
12	22938000-1001	Capacitor, 9300 uf, 50V	1
13	22558001-1001	Capacitor, 550 uf, 25V	1
14	39690010-2009	Cable Strip	2

A. FUNCTION

The electronic module assembly houses the electronics in the printer. For a detailed functional description of the components (transformer, capacitors, etc.) in the module assembly, refer to Section 2, THEORY OF OPERATION.

B. REMOVAL/REPLACEMENT PROCEDURE

TOOLS REQUIRED: Phillips Head Screwdriver

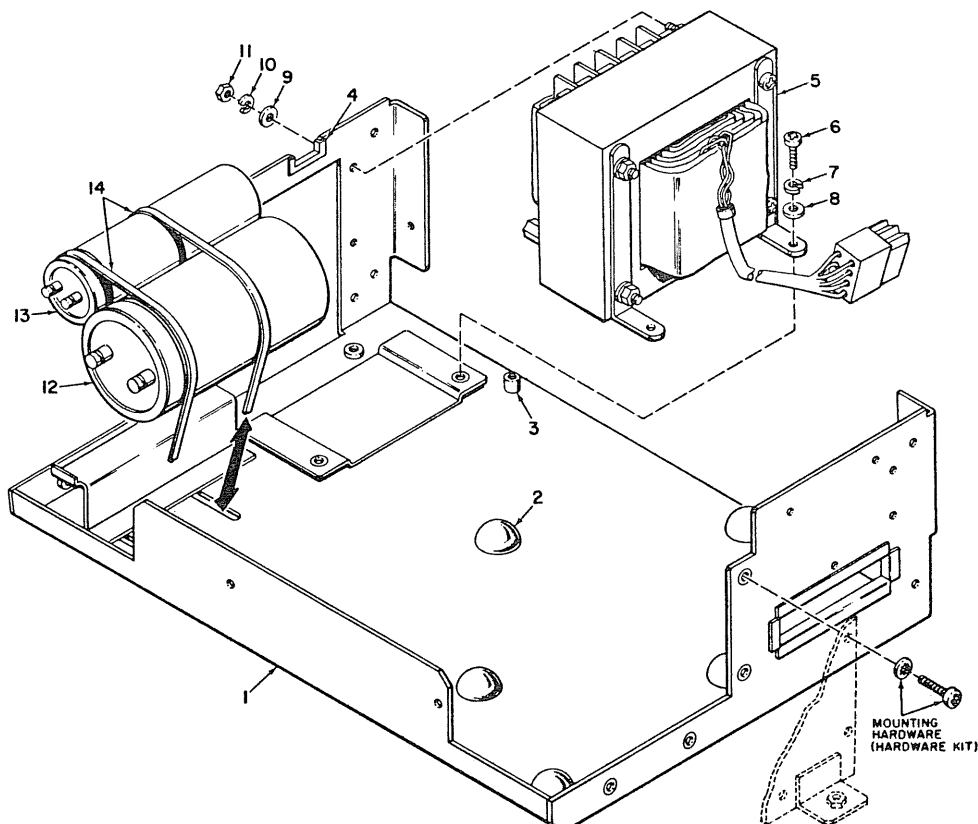


Figure 3-8H. ELECTRONIC MODULE ASSEMBLY

1. Disconnect all connectors from the components in the electronic module assembly.
2. Remove the four screws and internal lockwashers (total of eight) from right and left sides mounting the electronic module to printer frame.

C. ADJUSTMENTS

1. No adjustments are required on the electronic module assembly.

D. PREVENTIVE MAINTENANCE

1. No maintenance is required on the electronic module assembly.

3.17 LOGIC BOARD ASSEMBLY (Figure 3-8 I)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY.
26	63779119-6001	Kit, Logic Board Assembly Note: This kit includes items 1 through 7.	1
1	63779104-4001	P.C. Board Assy., Logic Pwr. Supply Bd.	1
—	63701250-6005	Kit, Logic Board Mtg. Hardware Note: This kit includes items 2 through 7.	1
2	34000351-2017	Screw, M3 x 6 mm Lg., Pan Hd. Phillips	2
3	34000455-2004	Washer, Split Lock, M3	2
4	34000452-2004	Washer, Flat, M3	2
5	34000352-2062	Screw, M4 x 14 mm Lg., Pan Hd. Slotted	2
6	34000455-2006	Washer, Split Lock, M4	2
7	34000019-2001	Washer, Flat, #6, Fibre	4

A. FUNCTION

For a detailed functional description of the logic board assembly, refer to Section 2, THEORY OF OPERATION.

B. REMOVAL/REPLACEMENT PROCEDURE

TOOLS REQUIRED: Phillips Head and Slotted Head Screwdrivers.

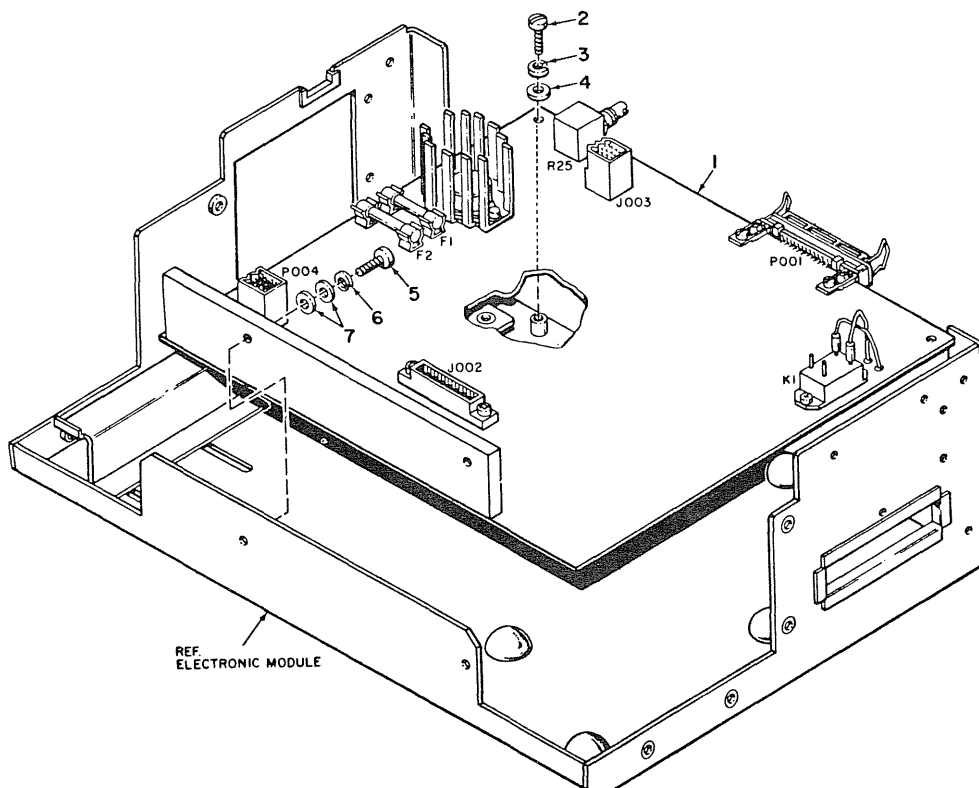


Figure 3-8 I. KIT, LOGIC BOARD ASSEMBLY

1. Remove the following connectors from the logic board:

CONNECTOR ON LOGIC BOARD

J001
J002
J003
P004

DISCONNECT FROM

OUTSIDE DEVICE
P002 OF VIDEO AMP CABLE
P003 OF SIGNAL HARNESS
J004 OF TRANSFORMER HARNESS

2. Remove the two screws (2), lockwashers (3), and flatwashers (4), mounting the rear of the logic board to the electronic module.
3. Remove the two screws (5), lockwashers (6), and four flatwashers (7), mounting the front of the logic board to the electronic module and remove the board from the printer.

C. ADJUSTMENTS (Figure 3-11)

1. Refer to the OPERATOR'S MANUAL for the adjustment of character densities.

2. Line Length

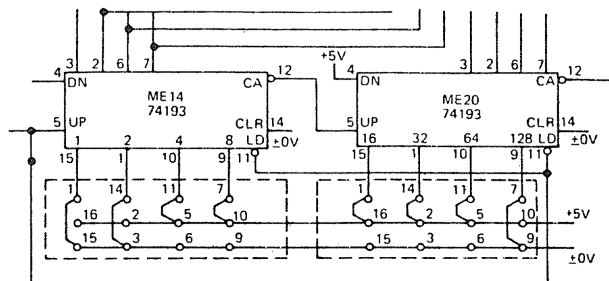
The printer has a 132-character buffer line length as standard. However, the line length can be varied by adding jumper wires and making cuts on the logic board. The start position of the RAM address counter is the method used to vary line length. The following example describes the procedure for setting the line length to 80 characters.

- a. ADDRESS SETTING = MAXIMUM LINE LENGTH MINUS DESIRED LINE LENGTH

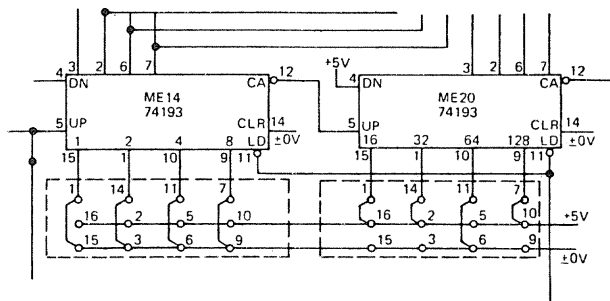
$$256 - 80 = 176$$

- b. Address setting is then broken down into a binary count. $176 = 128 + 32 + 16$

- c. The logic board is then cut and jumpered from the standard as shown in Figure 3-11B.



A. STANDARD 132 CHARACTER LINE LENGTH



B. EXAMPLE: 80 CHARACTER LINE LENGTH

Figure 3-11. LINE LENGTHS

D. PREVENTIVE MAINTENANCE

1. No maintenance is required on the logic board assembly.

3.18 HARDWARE KIT

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY.
29	63780141-6001	Kit, Hardware Note: This kit includes items 1 through 25.	1
1	34000360-2013	Set Screw, M3 x 3 mm Lg., Cup Point	2
2	34000360-2030	Set Screw, M4 x 6 mm Lg., Cup Point	2
3	34000352-2011	Screw, M2 x 6 mm Lg., Hd. Slotted	4
4	34000351-2017	Screw, M3 x 6 mm Lg., Hd. Phillips	4
5	34000351-2018	Screw, M3 x 8 mm Lg., Hd. Phillips	4
6	34000355-2010	Screw, M3 x 8 mm Lg., Soc. Hd.	4
7	34000351-2020	Screw, M3 x 12 mm Lg., Pan Hd. Phillips	4
8	34000351-2036	Screw, M4 x 6 mm Lg., Pan Hd. Phillips	4
9	34000351-2037	Screw, M4 x 8 mm Lg., Pan Hd. Phillips	4
10	34000351-2039	Screw, M4 x 12 mm Lg., Pan Hd. Phillips	4
11	535003001-2001	Screw, M4 x 14 mm Lg., Pan Hd. Phillips	4
12	34000351-2040	Screw, M4 x 16 mm Lg., Pan Hd. Phillips	4
13	535493001-2001	Bolt, M5 x 10 mm Lg.	4
14	535377001-2001	Bolt, M5 x 12 mm Lg.	4
15	34000452-2002	Washer, Flat, M2	4
16	34000452-2004	Washer, Flat, M3	4
17	34000452-2006	Washer, Flat, M4	4
18	34000455-2002	Washer, Split Lock, M2	4
19	34000455-2004	Washer, Split Lock, M3	4
20	028030242-2001	Washer, Split Lock, M3 (Black)	4
21	34000455-2006	Washer, Split Lock, M4	4
22	34000451-2056	Washer, Split Lock, M4, Ext. Tooth	4
23	34000455-2007	Washer, Split Lock, M5	4
24	028050242-2001	Washer, Split Lock, M5 (Block)	4
25	535571001-2001	Nut, Hex, M5	4

A. FUNCTION

A hardware kit containing spare hardware items (screws, washers and nuts) is orderable with the printer. The kit is based on those hardware pieces most commonly used in the printer.

3.19 SPECIAL TOOLS (Figure 3-12)3-12)

REFERENCE ASSEMBLY	PART NUMBER	DESCRIPTION	QTY.
30	63701194-6001	Kit, Special Tools Note: This kit includes items 1 and 2.	1
1	63003455-3001	Helical Gear Alignment Tool A	1
2	63003455-3002	Helical Gear Alignment Tool B	1

A. FUNCTION

The two special helical gear alignment tools are used for the adjustment of the line feed clutch drive gear and platen drive gear. Use of these two tools simplifies the adjustment of the gears.

NOTE: REFER TO SECTIONS 3.8, DRIVE MOTOR ASSEMBLY, AND 3.9, PLATEN ASSEMBLY, FOR ADJUSTMENTS USING THE TWO TOOLS.

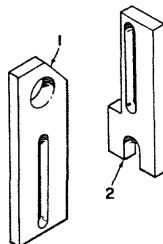


Figure 3-12. KIT, SPECIAL TOOLS

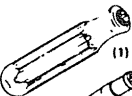
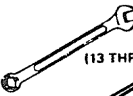


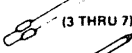
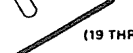

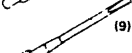



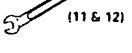






SECTION 4 MAINTENANCE

This section contains general information for maintenance of the printer. The information is grouped as follows:

- 4.1 Recommended Tools
- 4.2 Preventive Maintenance
- 4.3 Troubleshooting Guide
- 4.4 Engineering Drawings

4.1 RECOMMENDED TOOLS

The following tool kit provides all the necessary tools for removal/replacement of the printer subassemblies. A special tool kit (refer to Section 3.19) is also available.

MANUFACTURER'S TOOL KIT					
ITEM	DESCRIPTION	PART NUMBER	ITEM	DESCRIPTION	PART NUMBER
 (1)	1. Universal Handle	30600002 - 3001	 (13 THRU 16)	13. 8 mm Combination Open End, Box Wrench	30600002 - 3012
 (2)	2. Extension 4-Inch	30600002 - 3002	 (17 & 18)	14. 10 mm Combination Open End, Box Wrench	30600002 - 3013
 (3)	3. 4 mm Nut Driver	30600002 - 3003	 (19 THRU 24)	15. 17 mm Combination Open End, Box Wrench	30600002 - 3014
 (4)	4. 5.5 mm Nut Driver	30600002 - 3004		16. 19 mm Combination Open End, Box Wrench	30600002 - 3015
 (5)	5. 7 mm Nut Driver	30600002 - 3005		17. 3/32-Inch "T" Handle Hex Key	30600002 - 3016
 (6)	6. 8 mm Nut Driver	30600002 - 3006		18. 5/32-Inch "T" Handle Hex Key	30600002 - 3017
 (7)	7. 10 mm Nut Driver	30600002 - 3007		19. 1/16-Inch Hex Key	30600002 - 3025
 (8)	8. Philips Head Screwdriver	30600002 - 3009		20. .050-Inch Hex Key	30600002 - 3024
 (9)	9. Slotted Head Screwdriver	30600002 - 3008		21. 1.5 mm Hex Key	30600002 - 3020
 (10)	10. Needle Nose Plier	30600002 - 3010		22. 2.0 mm Hex Key	30600002 - 3019
 (11 & 12)	11. 5 x 5 mm Open End Wrench	30600002 - 3023		23. 2.5 mm Hex Key	30600002 - 3021
	12. 6 x 7 mm Open End Wrench	30600002 - 3011		24. 3.0 mm Hex Key	30600002 - 3022
			 (25)	25. Spanner Wrench	63003105 - 3001
			 (26 & 27)	26. 4 mm Snap Ring Holder	63002399 - 3018
			 (28)	27. 5 mm Snap Ring Holder	63002399 - 3019
				28. Spring Hook	63002399 - 3020
				29. Tool Pouch	30600002 - 3018
			 (29)		

4.2 PREVENTIVE MAINTENANCE (P.M.)

The recommended Preventive Maintenance (P.M.) schedule, if followed closely and accomplished at the intervals noted, will ensure maximum operating efficiency and maximum mean time between failures.

- A. FREQUENCY OF P.M. 6 MONTHS
- B. TIME REQUIRED 3/4 Hr. (Approximately)
- C. CLEANING MATERIALS MEDIUM BRISTLE CLEANING BRUSH, TWO SOFT CLEAN CLOTHS, MILD DETERGENT
- D. RECOMMENDED LUBRICANTS RHEOLUBE No. 723ms. Mfg. Spec. No. 30050070-0001
- E. RECOMMENDED TOOLS REFER TO SECTION 4.1 OF THE MAINTENANCE SECTION
- F. PREPARATION OBTAIN PRINT SAMPLE PRIOR TO BEGINNING P.M.. CLEAN PRINTER WITH VACUUM CLEANER, IF AVAILABLE.

PREVENTIVE MAINTENANCE REQUIRED

ASSEMBLY	ACTION
1. COVER ASSEMBLIES	1. CLEAN all cover assemblies using a mild detergent.
2. RIBBON CARTRIDGE	2. INSPECT ribbon cartridge for proper ribbon tracking. Check ribbon pinch rollers for proper meshing.
3. CARRIAGE ASSEMBLY	3. CLEAN upper and lower guide bars using a soft clean cloth.
4. DRIVE MOTOR	4. INSPECT line feed clutch drive gear to ensure it is perpendicular to the platen drive clutch.
5. PLATEN DRIVE	5. LUBRICATE all gears in the platen drive. INSPECT platen drive armature for proper setting to platen drive releaser gear.
6. PLATEN ASSEMBLY	6. CLEAN platen using a mild detergent.
7. COLUMN SCALE/TEAR BAR	7. CLEAN column scale/tear bar using a mild detergent.

4.3 TROUBLESHOOTING GUIDE

The following information is intended to aid service personnel in troubleshooting.

SYMPTOM	ACTION
1. Printer does not print with power switch in ON position.	1. Check power cord and line fuse at rear of printer; depress PRINT switch.
2. Printer does not print, but printer is PRINT ENABLED.	2. Ensure interface cable at rear of printer is secure.
3. Paper Skewing.	3. Position pin feed tractors (26-1152) and secure locking lever.
4. Ribbon tracking problems.	4. Ensure that ribbon is properly installed as described in Operator's Manual.
5. Poor print quality (e.g. smudging or light print).	5. Adjust head penetration as described in the Operator's Manual.

When servicing the printer for any reason, a brief inspection and verification of the printer areas described below may prevent potential failures in the future.

To perform this inspection, first remove the printer covers. Then, with power turned off, check the following areas:

1. Verify that the carriage guide bars are clean and free of caked-on-dirt.
2. Verify proper main drive belt tension.
3. Verify smooth, free carriage motion.
4. Check that the RTP and EOP switches are not loose.
5. Verify proper pin alignment on optional pin feed tractor.
6. Verify proper back stop pawl spring tension in the line feed clutch unit.
7. Verify smooth line feed clutch operation.

Detailed information on the operation, removal, replacement and adjustment of each functional assembly is contained in Sections 2 and 3 of this Manual.

4.4 ENGINEERING DRAWINGS

The following pages contain schematic, wiring and assembly diagrams for the printer. A list of these drawings is as follows:

FIGURE	DESCRIPTION	DRAWING NO.
4-1	Schematic Diagram, Electronics Board	63779105-9001
4-2	Schematic Diagram, Video Amplifier	63703165-9001
4-3	Wiring Diagram, Printer	63779102-9001
4-4	Primary Voltage, Wiring Diagram	63703115-9001
4-5	Assembly Diagram, Electronics Board	63779104-4001
4-6	Assembly Diagram, Video Amplifier	63703164-4007

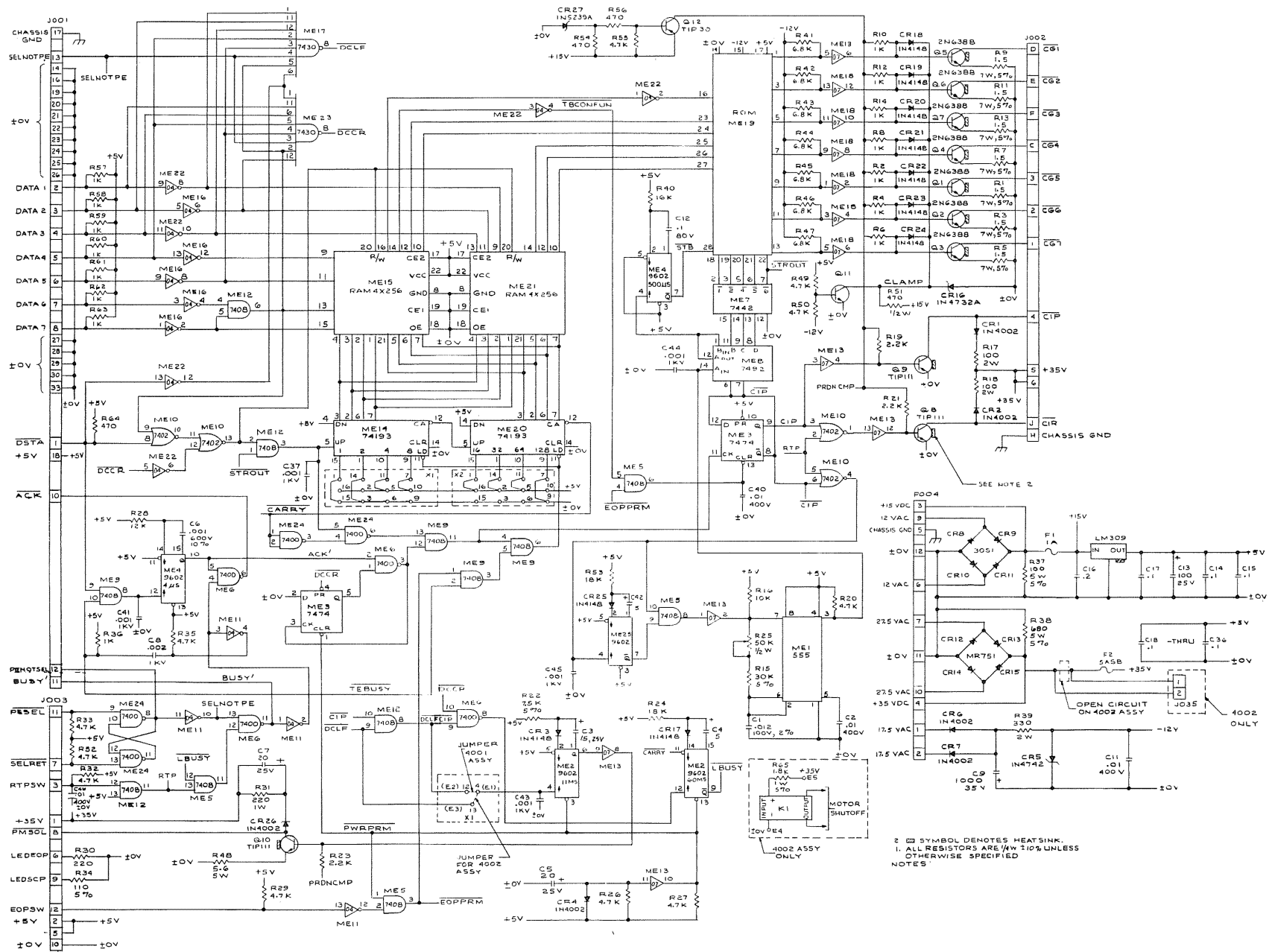


Figure 4-1. SCHEMATIC DIAGRAM, ELECTRONICS BOARD

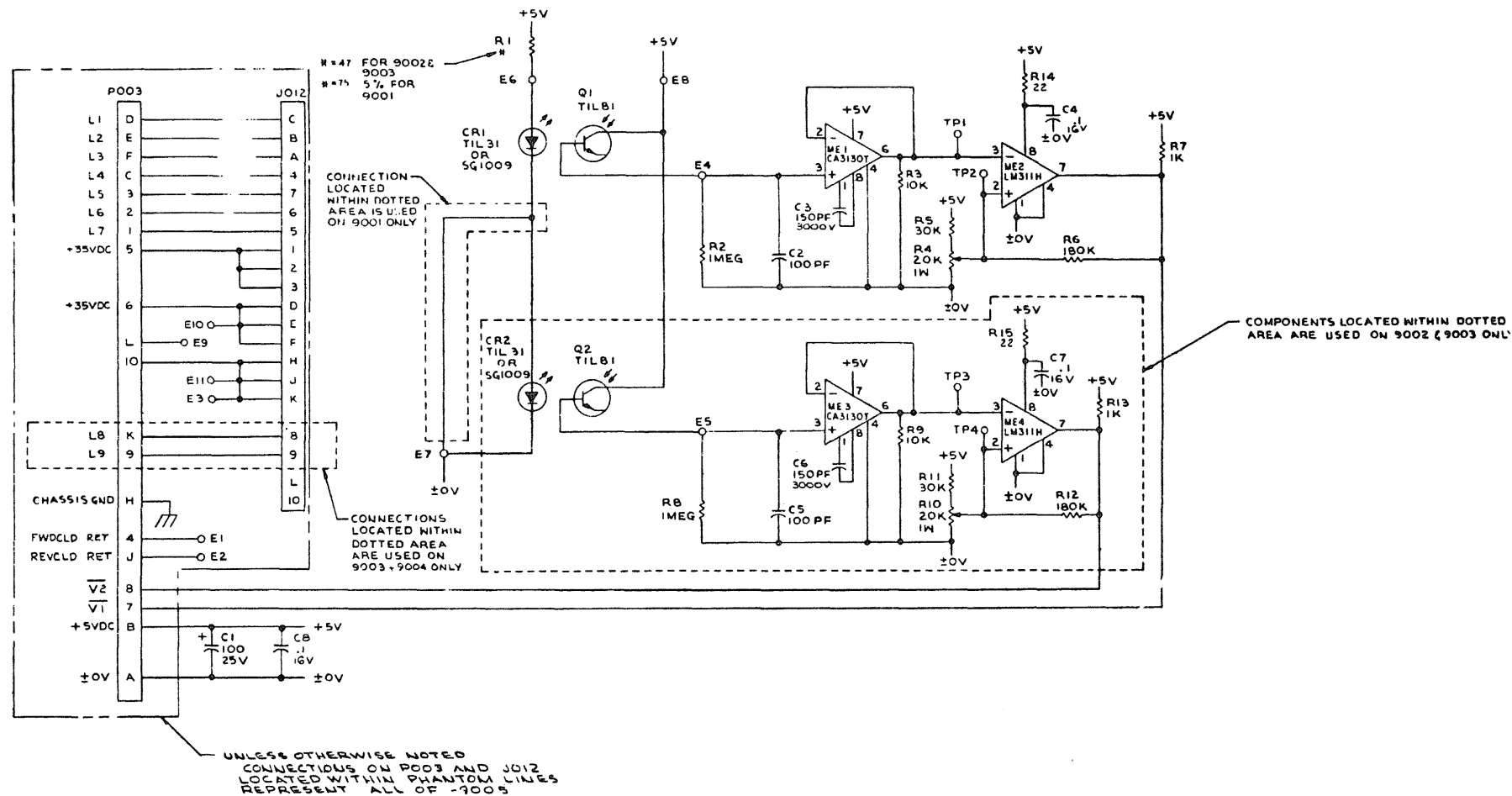


Figure 4-2. SCHEMATIC DIAGRAM, VIDEO AMPLIFIER

Figure 4-3. WIRING DIAGRAM, PRINTER

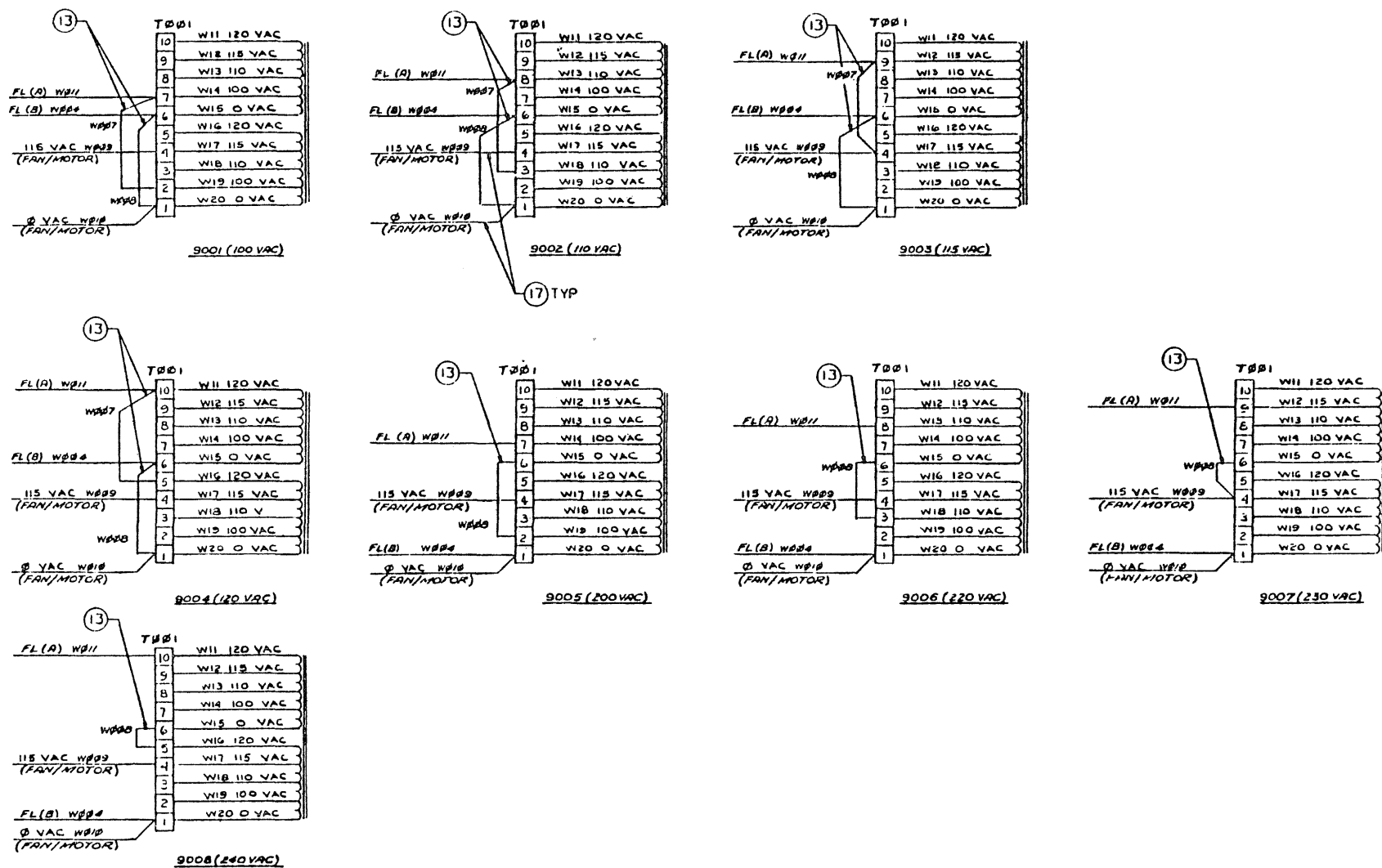


Figure 4-4. PRIMARY VOLTAGE, WIRING DIAGRAM

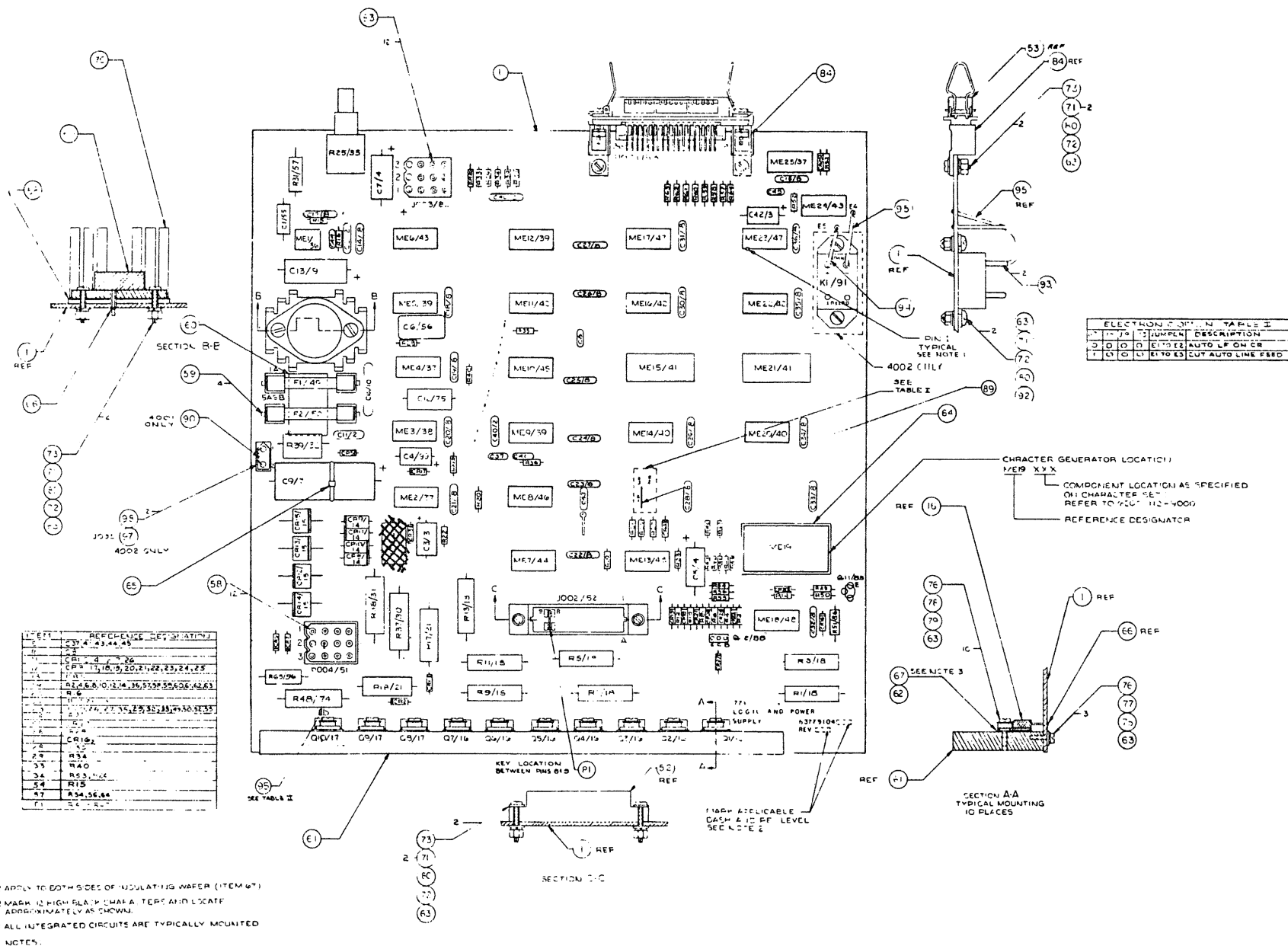


Figure 4-5. ASSEMBLY DIAGRAM, ELECTRONICS BOARD

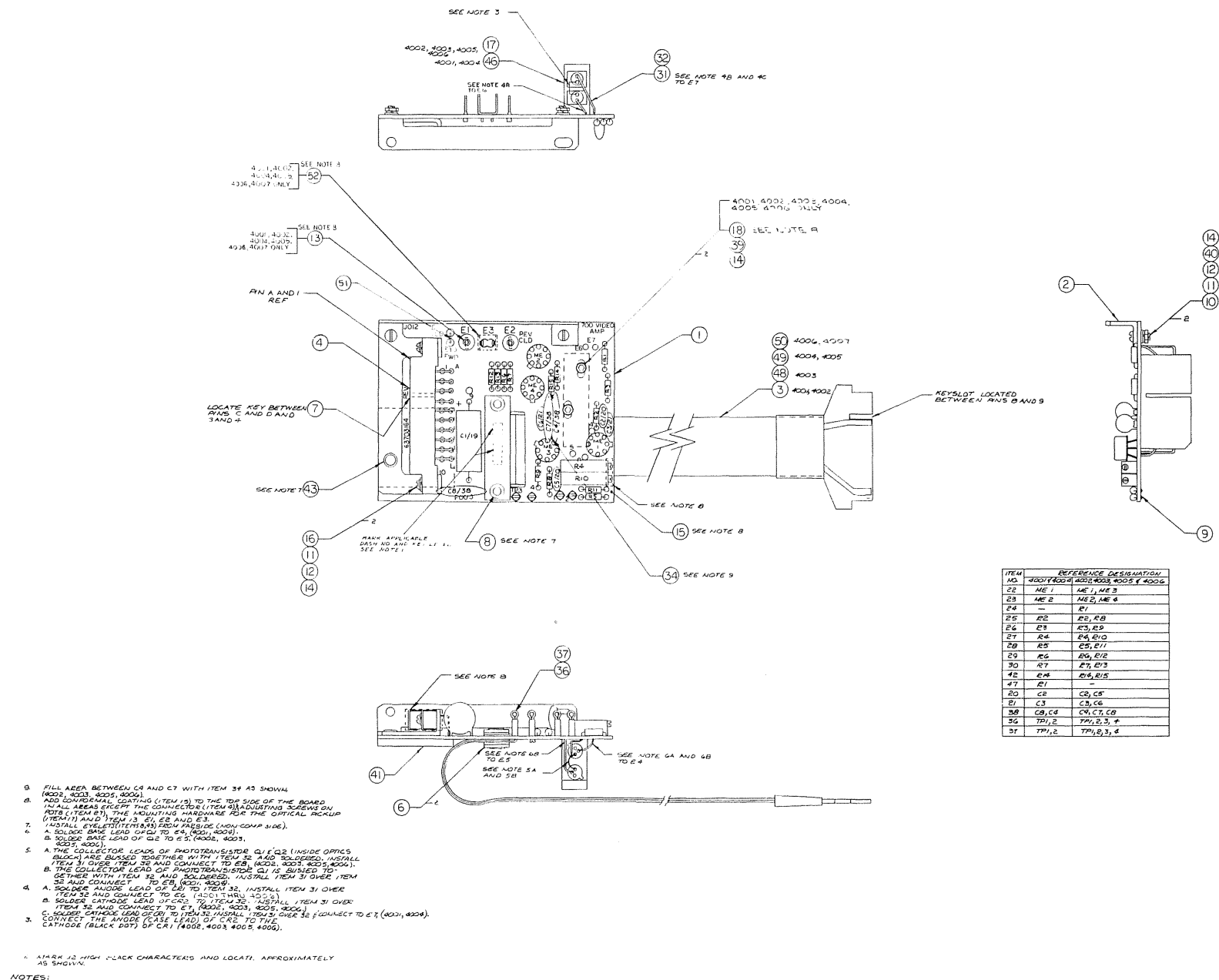


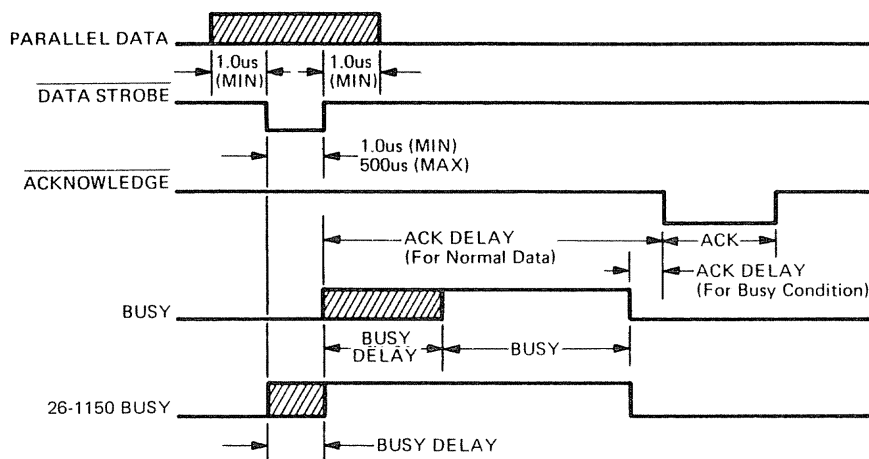
Figure 4-6. ASSEMBLY DIAGRAM, VIDEO AMPLIFIER

APPENDIX A

PARALLEL INTERFACE SPECIFICATIONS

All printers contain a common 7-bit parallel interface. An optional eighth bit is available, as required by the user. Detailed information describing the standard interface timing, signal descriptions, connectors and other specifications are contained in this appendix. The intent is to provide the user with the technical information required to interface directly to a standard printer, or if necessary to design a special interface to adapt the printer to a particular terminal.

INTERFACE TIMING



NORMAL DATA INPUT TIMING

ACK DELAY	2.5-10 usec.
ACK	2.5-5.0 usec.
BUSY DELAY	0-1.5 usec.
ACK DELAY	0-10 usec.
ACK	2.5-5.0 usec.
BUSY DURATION	
Line Feed	75-105 msec.
Vertical Tab (1-inch)	240-270 msec.
Form Feed (11-inches)	2.07-2.11 sec.
Delete	100-400 usec.
Bell	0
Select*	100-400 usec.
Deselect	Until printer is selected
Print Command	16.7 msec./character
(Return time—no-busy)	2.4 sec. (max.) 1.6 sec. (max.)

*No busy, if inhibit prime on select option is used.

STANDARD INTERFACE SIGNALS

SIGNAL NAME	INTERFACE CONNECTOR	SOURCE	DESCRIPTION
DATA STROBE	1, 19	INPUT DEVICE	A 1.0 usec pulse (min) used to clock the data from the processor to the printer logic.
DATA 1	2, 20	INPUT DEVICE	Input data levels. A high represents a binary ONE, a low represents a ZERO. All printable characters (i.e., codes having a ONE in DATA 6 or DATA 7), are used to specify special control functions. These codes are not stored in the buffer except when they specify special control functions. These codes are not stored in the buffer except when they specify a print command and are preceded by at least one printable character in that line.
DATA 2	3, 21	INPUT DEVICE	
DATA 3	4, 22	INPUT DEVICE	
DATA 4	5, 23	INPUT DEVICE	
DATA 5	6, 24	INPUT DEVICE	
DATA 6	7, 25	INPUT DEVICE	
DATA 7	8, 26	INPUT DEVICE	
ACKNLG	10, 27	PRINTER	Acknowledge pulse indicates the input of a character into memory or the end of a functional operation.
BUSY	11, 28	PRINTER	A level indicating that the printer cannot receive data. For conditions causing BUSY, refer to Busy Condition Timing Table.
PE OR NOT PRINT ENABLED	12	PRINTER	A level indicating that the printer is out of paper or printer is not ready to receive data.
PRINT ENABLED OR NOT PE	13	PRINTER	A level indicating that the printer is ready to receive data and not out of paper.
±0V	14	PRINTER	SIGNAL GROUND
±0V	16	PRINTER	SIGNAL GROUND
CHASSIS GROUND	17	PRINTER	Frame Ground
±5V	18	PRINTER	+5 VOLT power bus
±0V	33	PRINTER	SIGNAL GROUND

NOT USED 9, 15, 31, 32, 34, 35, 36

NOTE:

1. Second pin number indicates twisted pair return (±0V).

APPENDIX B

SIGNAL GLOSSARY ELECTRONIC BOARD

This signal listing is keyed directly to the printer schematic No. 6379105-9001. All signal mnemonics contained on this drawing are listed alphabetically with their source and destinations.

The notation (N) after a signal mnemonic is used to indicate the "not" or inverse function of the signal. For example, CIP (N) is the "not" function of the CIP signal. The (N) notation is equivalent to the bar appearing over a signal as shown on the schematic.

The following method is used to identify the signal source and destination locations: ME3-9 signifies element pin 9.

SIGNAL GLOSSARY

SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION
ACK(N)	Printer acknowledge pulse indicating the input completion of a character into memory or the end of a functional operation.	ME6-6	J001-10
BUSY	Printer busy status line to input device indicating that printer is not ready to receive data.	ME6-11	J001-11
CARRY(N)	Signal used to indicate reception of a full 132 character line of data and to generate print command.	ME2-11	ME24-1, 2 ME20-12
CG1(N)- CG7(N)	Signals used to energize the print head solenoids.	J002-	PRINT HEAD
CIP	Carriage in Print—Signal used to drive the print head forward.	ME3-9	ME10-3
CIP(N)	Inverse of CIP	J002-4	ME10-6, ME12-10
CIR(N)	Carriage in Reverse—Signal used to drive the print head in reverse.	J002-J	Forward Carriage Solenoid.
DATA 1- DATA 7	The seven data lines coming from the input via input connector to the printer.	J001-2 Thru	—
DCCR(N)	Decoded carriage return	ME23-8	ME22-5, ME6-10 ME3-4
DCLF(N)	Decoded line feed	ME17-8	ME12-9 ME2-4 E3
DSTA(N)	The data strobe signal from the interface connector used as an input clock.	J001-1	ME10-8 ME22-13 ME9-9
EOPPRM(N)	End of print prime signal used to clear print control logic.	ME5-3	ME5-4
EOPSW	End of print switch	J003-12	ME11-13
LBUSY(N)	An immediate 60 ms Busy condition caused by a CARRY(N) or DCLFCIP(N)	ME2-9	ME5-12
LEDEOP	Limits current to the light emitting diode in the EOP switch.	J003-6	LED in the EOP switch.

SIGNAL GLOSSARY

SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION
LEDSCP	Limits current to the LED's in the RTP switch and the POWER indicator on the control panel.	J003-9	LED's in the RTP switch and control panel.
PENOTSEL	Indicates a paper empty condition or not PRINT enabled.	ME24-8	J001-12 ME11-4 ME24-12
PESEL(N)	Same function as SELNOTPE but before the condition is latched.	J003-11	ME24-9
PMSOL(N)	Paper motion solenoid—used to activate line feed solenoid during a line feed operation.	J003-8	J003-1
PWPPRM(N)	Pulse generated by turning on power to the printer and used to initialize the printer electronics.	ME13-10	ME5-1
RTP	Ready to Print—indicates that the left-hand switch has been activated by the carriage actuator arm.	ME12-11	ME10-2, 5
SELNOTPE	Indicates PRINT enabled and not out of paper. (Inverse of PENOTSEL).	ME11-10	ME6-13 ME17-4 ME23-3
SELRET(N)	Reset for the PESEL(N) latch.	J003-7	ME24-13
STB(N)	Print strobe used to enable character address signals out of the character generator.	ME4-7	ME19-28
STROUT(N)	Signal that occurs between printed characters or spaces used to advance the memory address counter.	ME7-7	ME14-22 ME12-1
TBCONFUN(N)	The decoded carriage return control fuction bit that gets loaded into memory. Used to reset the CIP latch.	ME22-4	ME5-5
TEBUSY(N)	A short pulse on the trailing edge of BUSY signal used to generate an ACK(N) and reset the memory address to start location.	C8 + R36	ME9-10

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