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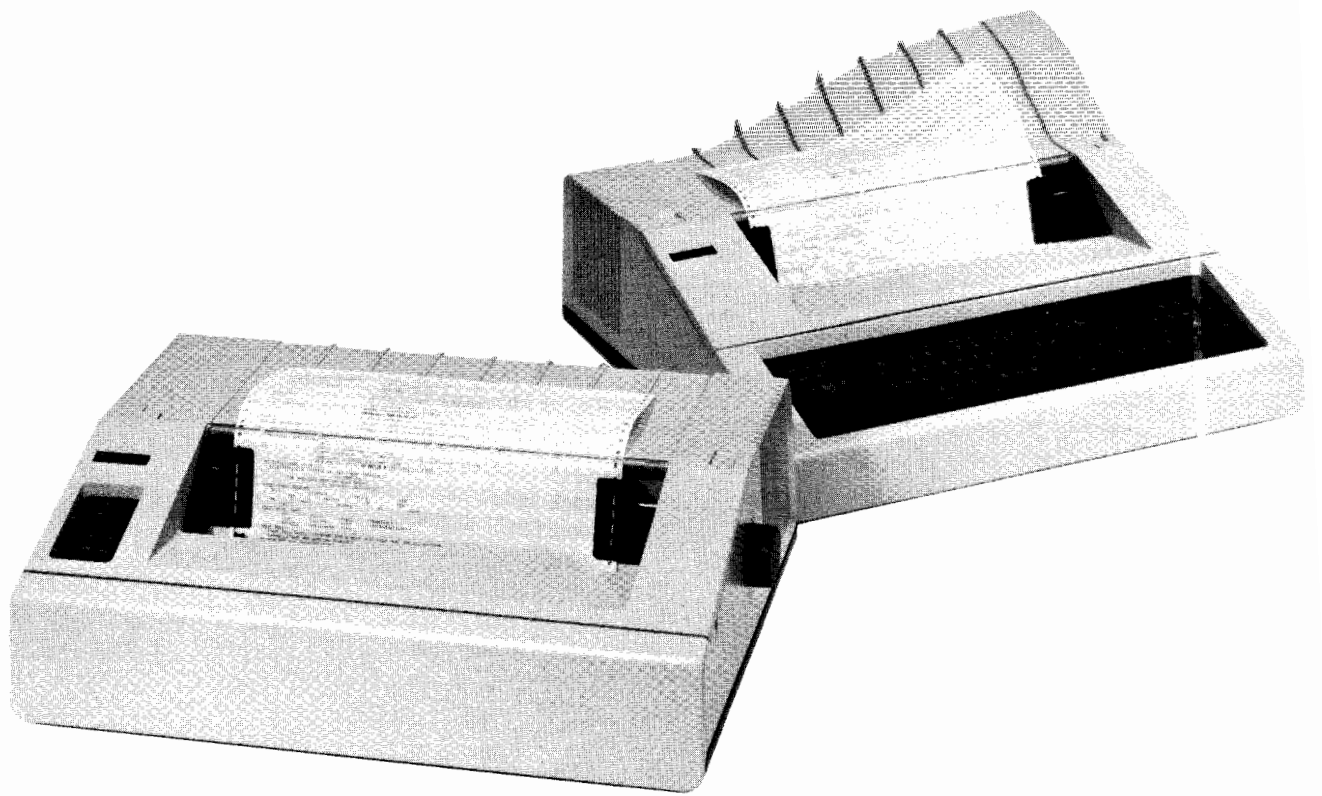


Figure 1-1. HP 2630 Family Printers and Terminals

SECTION I. GENERAL INFORMATION

1-1. INTRODUCTION

This manual provides theory of operation and servicing information for the HP 2630 family of printers and printing terminals (see figure 1-1). This manual is divided into the following sections:

- I. General Information
- II. Installation
- III. Functional Theory of Operation
- IV. Maintenance
- V. Replaceable Assemblies

1-2. IDENTIFICATION

Each unit has a plate attached next to the power module on the rear of the unit. The plate contains a model, serial, and option number. The combination of the option number(s) and the model number indicates the configuration of the unit.

The model number is an alphanumeric number (e.g. 2631B). The option number(s) lists factory installed options indicating various character sets, power supply requirements, or other options. The option number is a three-digit number (e.g. 015).

The serial number consists of a four number prefix, a letter and a five number suffix (0000A00000). The first four digits are used to indicate design changes. The letter in the fifth location designates the country in which the printer was manufactured ('A' indicates the United States). The five digit suffix is a sequential number which increments with each printer shipped by Hewlett-Packard.

Printed-circuit assemblies (PCA's) are identified by a part number and an alphanumeric code consisting of a letter, series code, and a division code stamped or etched on the assembly (e.g. A-1716-46). The letter identifies the version of the etched trace pattern on the unloaded printed circuit board. The four digit series code pertains to the electrical characteristics of the

loaded printed circuit assembly. The division code identifies the Hewlett-Packard division that manufactured the PCA.

1-3. SPECIFICATIONS

1-4. Safety Compliance

The HP 2630 family is listed by Underwriter's Laboratories, Inc. in the following categories with respective guide designations: Electronic Data Processing Equipment (EMRT), Teaching and Instruction Equipment (WYFW), Office Appliance and Business Equipment (QAOT).

The Canadian Standards Association has certified these units as Data Processing Equipment.

Finally, these units were designed to meet most European Safety and RFI/EMC standards for Electronic Data Processing equipment prior to 1 December 1979. Any questions concerning regulatory agency compliance should be directed to the local Hewlett-Packard Sales Office.

The specifications for the HP 2630 family printers and terminals are listed below.

PHYSICAL

Width:	640 mm (25.2 inches)
Depth:	
2631B/G:	470.4 mm (18.5 inches)
2635B:	595.4 mm (23.4 inches)
Height:	215.7 mm (8.5 inches)
Weight:	
2631B/G:	23 kg (51 pounds)
2635B:	26 kg (57 pounds)
Stand Assembly:	24 kg (53 pounds)

CLEARANCE

Front and Rear:	Adequate for operator access
Side:	76 mm (3 inches)

second in standard print modes; up to 45 characters per second in expanded print modes.

Line Feed Rate:
 1 LPI: 150 msec/line
 6 LPI: 30 msec/line
 8 LPI: 24 msec/line
 72 LPI: 8 msec/line

Form Feed Rate: 176.6 mm/sec (6.95 in/sec)

Print Speed:	SPEED	LENGTH	DENSITY
Line Length:			
Print Density:	180 cps	227 char.	16.7 epi
	180 cps	170 char.	12.5 epi
	180 cps	136 char.	10.0 epi
	180 cps	113 char.	8.33 epi
	45 cps	113 char.	8.33 epi
	45 cps	85 char.	6.25 epi
	45 cps	68 char.	5.0 epi
	45 cps	56 char.	4.16 epi

Copies: 1-6 (up to 0.43 mm [0.017 inches] pack thickness)

VERTICAL FORMAT CONTROL

Number of Channels:
 2631B/35B 16 computed.
 2631G: 8 computed.

ELECTRICAL CHARACTERISTICS

	INPUT (VAC)	RANGE (V)	FREQUENCY TOLERANCE
Voltage Source (Selectable)	100	88-110	48-66 Hz
	120	105-132	48-66 Hz
	220	194-242	48-66 Hz
	240	212-264	48-66 Hz

Power Cable Length: 1.8 metres (6 feet)

degrees F)

Non-Operating: -40 to 75 degrees C (-40 to 167 degrees F)

**Relative Humidity: 10% to 90% at 40 degrees C

**EXCLUDES PAPER — forms should be tried at high humidity for satisfactory feeding and handling, and at low humidity to determine if static buildup must be eliminated for proper stacking.

1-5. OPTIONS

The standard configuration of the HP 2630 family consists of a 136 column, 180 character-per-second unit strapped for 115 Vac, 60 Hz operation. Unless otherwise specified, the unit is provided with a power cord for use in the United States, a 128 USASCII character set, a 16-channel computed Vertical Format Control (VFC), and an RS232C interface.

Certain options for the units are field installable but are normally installed at the factory at the time of purchase. The factory installed elective options are listed below.

OPTION	DESCRIPTION
015	Strapped for 220 Vac, 48-66 Hz power source.
016	Strapped for 100 Vac, 48-66 Hz power source.
017	Strapped for 240 Vac, 48-66 Hz power source.
715	Add service documentation for applicable unit.

1-6. AVAILABLE SUPPLIES

The following accessories are supplied with each unit:
 Ribbon cartridge.

Print Head Cleaning Brush, HP part no. 8520-0015
 Hex Key, 2.5 mm x 91 mm, HP part no. 8710-1181
 2631B Operator's Manual, HP part no. 02631-90917

or

2631G Operator's Manual, HP part no. 02631-90909

or









2635B Operator's Manual, HP part no. 02635-90908

2630B Family Technical Reference Manual, HP part no. 02635-90918

or

2631G Technical Reference Manual, HP part no. 02631-90911.

Power cord option as shown below:

POWER CORD OPTION NUMBER	PLUG CONFIGURATION	V. RATING	REF. SPEC.
900		250V	BS 1363A
901		250V	NZSS 198/AS C112
902		250V	CEE7-VII
903*		125V	NEMA 5-15P
904		250V	NEMA 6-15P
905		250V	
906		250V	SEV 1011 1959 24507 Type 12
912		220V	DHCK 107

*FOR 250V, USE OPTION 904

2608-24

The supplies and accessories listed below can be ordered from the nearest HP Sales and Service Office:

Print Head, HP part no. 92154A

Ribbon cartridge. Package of three ribbon cartridges, HP part no. 92155A

Printer Pedestal with casters, model no. 26097A

Printer Pedestal with casters and paper tray, model no. 26097A-002.

Paper Basket, HP part no. 26093A (Cannot be used with printer pedestal)

Sound Abatement Cover, HP part no. 26090A

1-7. UNIT DIFFERENCES

Besides the identification plate attached to the rear of the unit (see paragraph 1-2), there are differences in the 2630 family products which are readily discernible by service personnel working inside the units. The 2631B and 2631G are both printers, while the 2635B is a printing terminal with a keyboard. The 2635B also has special function keys to aid the user. A complete description of the function keys is contained in the 2635B Operator's Manual. Differences between the units are described below.

The most obvious differences between the 2631B and 2631G are: the addition of a PROM PCA in the 2631G, which is located in the motherboard next to the control PCA; a three-position top plane connector is used in the 2631G to connect the interface, control, and PROM PCAs; and a raster logic PCA in the 2631G replaces the printer logic PCA used in 2631B and 2635B units.

For part numbers associated with these various assemblies, refer to the parts lists located in Section V of this manual.



SECTION II. INSTALLATION

2-1. INTRODUCTION

This section contains installation information and procedures for unpacking, inspection, damage claims, site selection, and reshipping.

2-2. SITE SELECTION

2-3. Environmental Requirements

The unit is designed for operation at sites that are not subjected to excessive shocks, vibration, or wide ranges of ambient temperature.

A basically clean, traffic free environment is the prime location to set up the unit. The area does not have to be air-conditioned, but the temperature and humidity should not exceed the ranges specified in Section I.

2-4. Physical Requirements

Since the primary paper feed is up through the center of the unit, it is preferable to use the stand designed for the unit; however, a sturdy table capable of holding 30 kg (66 lbs) will suffice. The paper feed from the rear of the unit may bend or separate long or multicopy forms because of the path through the printer.

The proper location of the unit will provide access to both the front and rear sections of the cabinet. A minimum of 76 mm (3 inches) is necessary on the sides. For operator convenience it is advantageous to have nothing higher than the unit for approximately one metre on each side.

Cooling is provided by a fan moving air from right to left as the unit is viewed from the front. Be sure to maintain the 76 mm (3 in.) side clearance for proper ventilation.

Power Requirements (265 VA maximum)

100 Vac	(88-110V)	48-66 Hz
120 Vac	(105-132V)	48-66 Hz
220 Vac	(194-242V)	48-66 Hz
240 Vac	(212-264V)	48-66 Hz

2-5 UNPACKING AND INSPECTION

If the shipping carton is damaged upon receipt, request that the carrier's agent be present when the unit is unpacked. Inspect the unit for damage (cracks, broken parts, etc.). If the unit is damaged and fails to meet specifications, notify the carrier and the nearest Hewlett-Packard Sales and Service Office immediately. Sales and Service Offices are listed at the back of this manual. Retain the shipping container and the packing material for the carrier's inspection. The Hewlett-Packard Sales and Service Office will arrange for the repair or replacement of the damaged unit.

WARNING

The unit weighs up to approximately 26 kg (57 lbs). Two persons are required to lift the unit from the shipping container.

When unpacking the unit, retain all packing materials and hardware for future use. Remove the unit from the shipping carton and the packing material. There are no retainers or packing material inside the printer.

After you have completed the unpacking of your unit, check all shipping documents and the identification tag on the back of the printer to ensure that the unit conforms to your purchase specifications.

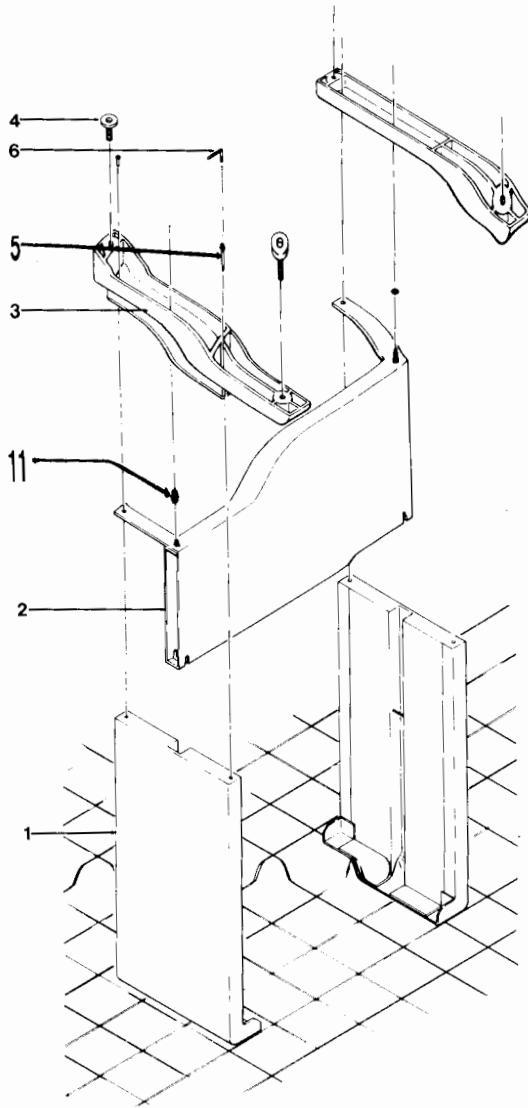
If for any reason, it becomes necessary to reship your unit, repack it in the original packing material and shipping carton.

2-6. INSTALLATION AND CHECKOUT

2-7. Stand Assembly

If you have ordered a stand, assemble it as shown in figure 2-1.

Position legs (item 1) upside down and insert skirt (item 2) with slot engaging pin. Attach foot (item 3) with M6 x 30 socket head screws (item 5) and M4 star washers (item 11), and secure with hex key supplied (item 6). Attach glides (or optional casters) (item 4) in four locations.



Turn assembly right side up and attach mounting arms (item 7) with M6 x 10 socket head screws (item 8) in four locations. Note that arms extend forward over feet. Attach printer (item 10) with M5 x 10 screws (item 9) from underside of printer.

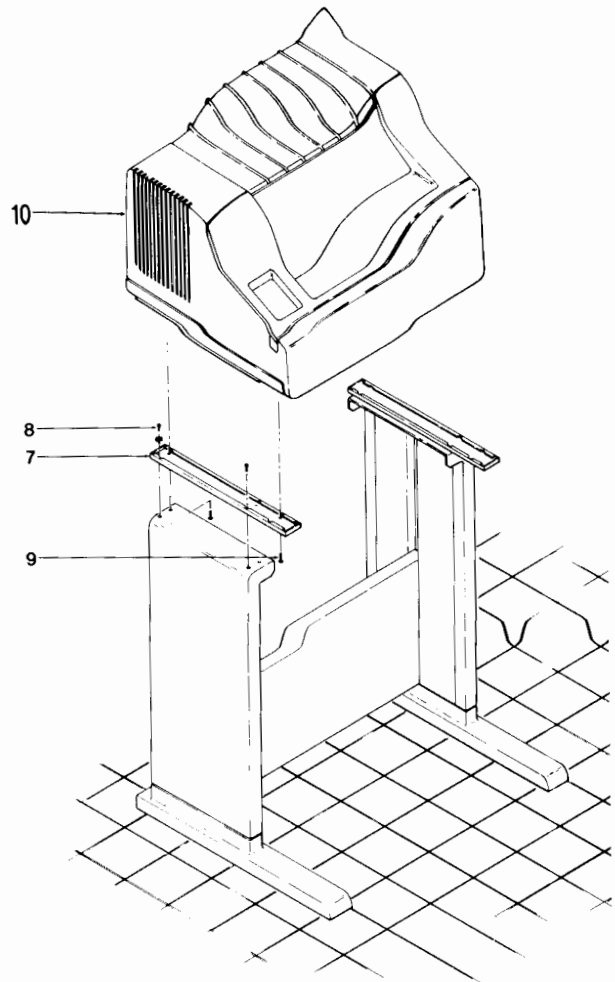


Figure 2-1. Stand Assembly

2-8. Configuring Power Options

The receptacle for the power cord also contains a fuse and a printed circuit card (figure 2-2). The card is used to select one of the four line voltages. The proper voltage selection is normally done at the factory, but changes are easily accomplished by changing the position of the printed circuit card. If it becomes necessary to change the input supply voltage, do the following:

- Remove the power cable if it is installed.
- Slide the cover over the fuse into the area of the power cable connection.
- Move the fuse release lever and remove the fuse.
- Use a pointed tool, such as a scribe, and remove the card by the small hole that is exposed near the outer edge.
- The card can be inserted in four ways as indicated by the voltage ranges; ie, 100, 120, 220, or 240. Select the proper voltage and

insert the card so the selected voltage can be read on the card as you stand at the rear of the unit.

- Reseat the fuse release lever and reinsert the proper fuse as indicated below:
 - For 100 or 120 Vac use a 2.5 A fuse.
- Slide the cover back over the fuse and card area; this exposes the cable connection.
- Plug the power cable into the unit.

2-9. Installation

Perform the following steps to install the unit:

- Ensure that the operating location provides sufficient clearance as specified in paragraph 2-4 of this manual.
- Set the main power switch on the rear panel to OFF.

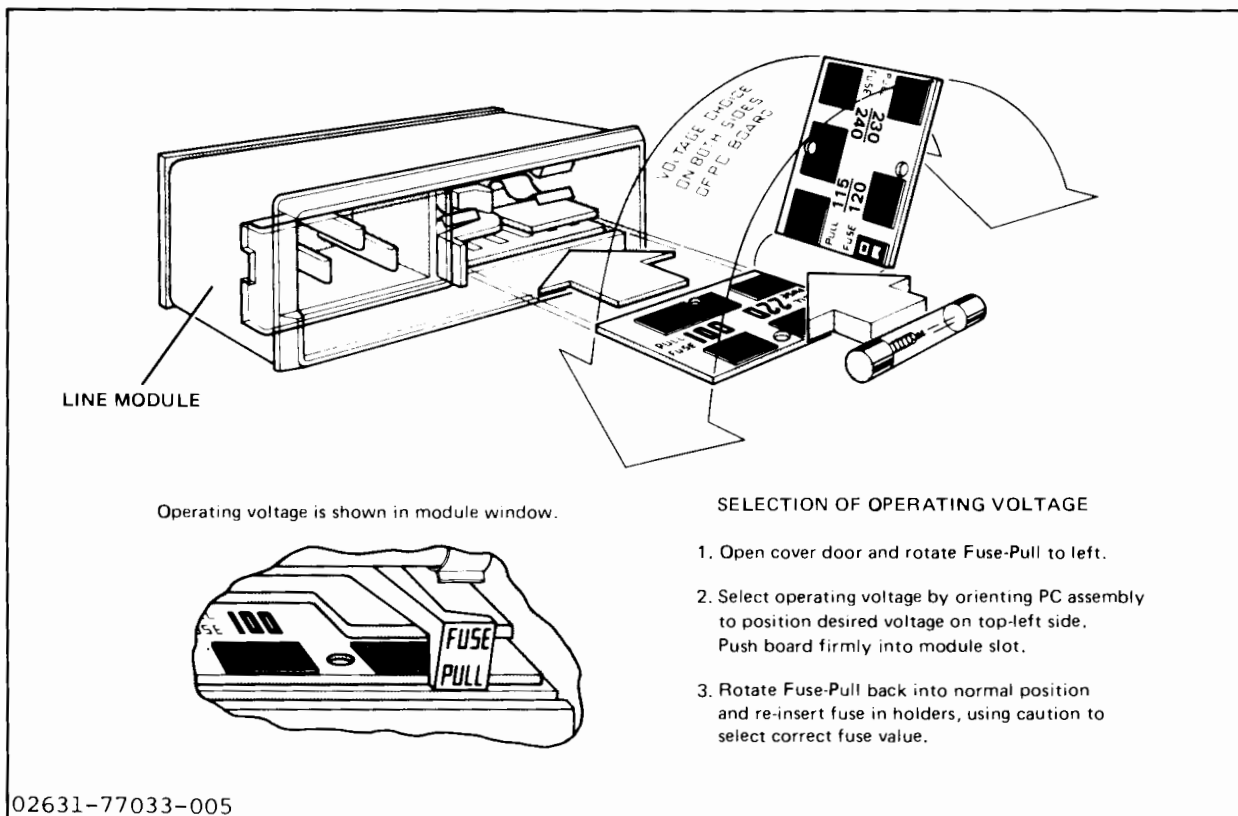


Figure 2-2. Power Module

- c. Connect the power cord to the unit and to the power source. Connect the interface cable to the unit and to the system interface.
- d. If the unit has been configured for HP-IB operation, a seven switch module is located on the rear of the unit. Five of these switches are used to set the system address of the unit. Address bits are set (1 high) when toggled to the closed position. One of the remaining switches is labeled SRQ EN. With SRQ EN in the ON position, the unit asserts the Service Request (SRQ) control line when it is ready for data or has data to send. The last switch is labeled LA (Listen Always). When in the ON position, the unit will listen for all data on the bus and act as a list device without action from the controller. Switch settings for address selection are discussed in more detail in the 2631G Technical Reference Manual and the 2630B Family Technical Reference Manual.
- e. Perform the self-test procedure as described in Section IV to verify off-line performance of the printer.

SECTION III. THEORY OF OPERATION

3-1. INTRODUCTION

This section of the manual provides information on the basic theory of operation of the unit. The theory is explained at a functional level to give an overview into the processes performed by the unit and the various areas responsible for each process. Block diagrams are used to support the theory. Figure 3-1 illustrates the block diagram for the unit as it is discussed in this section of the manual.

3-2. FUNCTIONAL OPERATION

3-3. Mechanical Assemblies

PRINT MECHANISM. This assembly consists of the print head, carriage, leadscrew, servo drive motor, and guide rails. The carriage rides on two guide rails, which maintain alignment and afford stability, and is moved from side to side by the motor driven leadscrew.

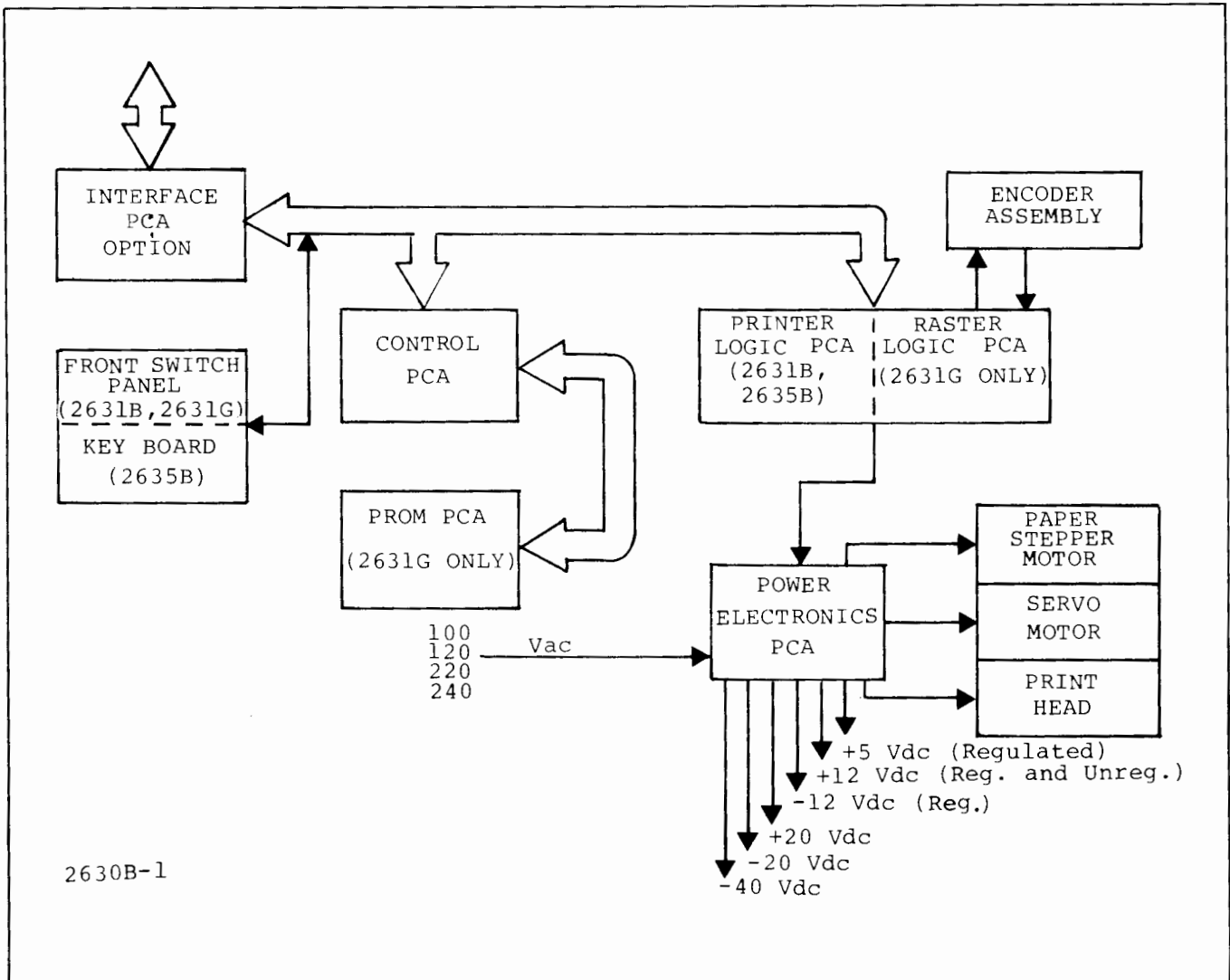


Figure 3-1. 2630 Family Block Diagram

nine coils, and a group of nine wires arranged in a vertical column. As the head moves back and forth across a page, the wires are triggered by the electronics to print dots in specified patterns to form the desired characters or graphics output.

PAPER DRIVE MECHANISM. A pair of belted tractors is used to pull edge-perforated forms through the unit. A knob attached to the paper drive shaft allows manual advancement of the paper. The stepper motor, which provides direct drive to the shaft, receives its drive signals from the power electronics PCA.

RIBBON ASSEMBLIES. The ribbon cartridge receives its drive from a cable which is wound around a clutch wheel and attached to the print head assembly. Each time the print head moves to the left, the ribbon is advanced.

3-4. Power Electronics PCA

The power electronics PCA functions as the DC power supply for the unit. Driver logic for the print head, paper stepper motor, and servo motor is located on this

board. Also included on this board is miscellaneous driver and detection logic for the speaker, optional character counter, and paper-out switch. Refer to Figure 3-2 for a block diagram of the circuits described below.

DC POWER SUPPLIES. Regulation and rectification of the DC voltage supplies for the unit are provided in this circuitry. Four unregulated supplies (+12V, +20V, -20V, and -40V) are used by the amplifier drive circuits. Three regulated supplies (+5V, +12V, and -12V) are used by the digital logic throughout the unit. These three regulated supplies each have an indicator lamp (located top, center on the power electronics PCA) which functions as a visual means of verifying that the regulated supplies are operating.

PRINT HEAD DRIVERS. Nine HAMMER FIRE input signals from the printer/raster logic PCA are passed through transistor power switches to provide drive pulses to the print head coils. The power switches are controlled by two additional signals from the printer/raster logic PCA; PRINT GO and DOT POS. When both signals are asserted, +12V is applied to the print head drivers for approximately 400 μ s (at TP2)

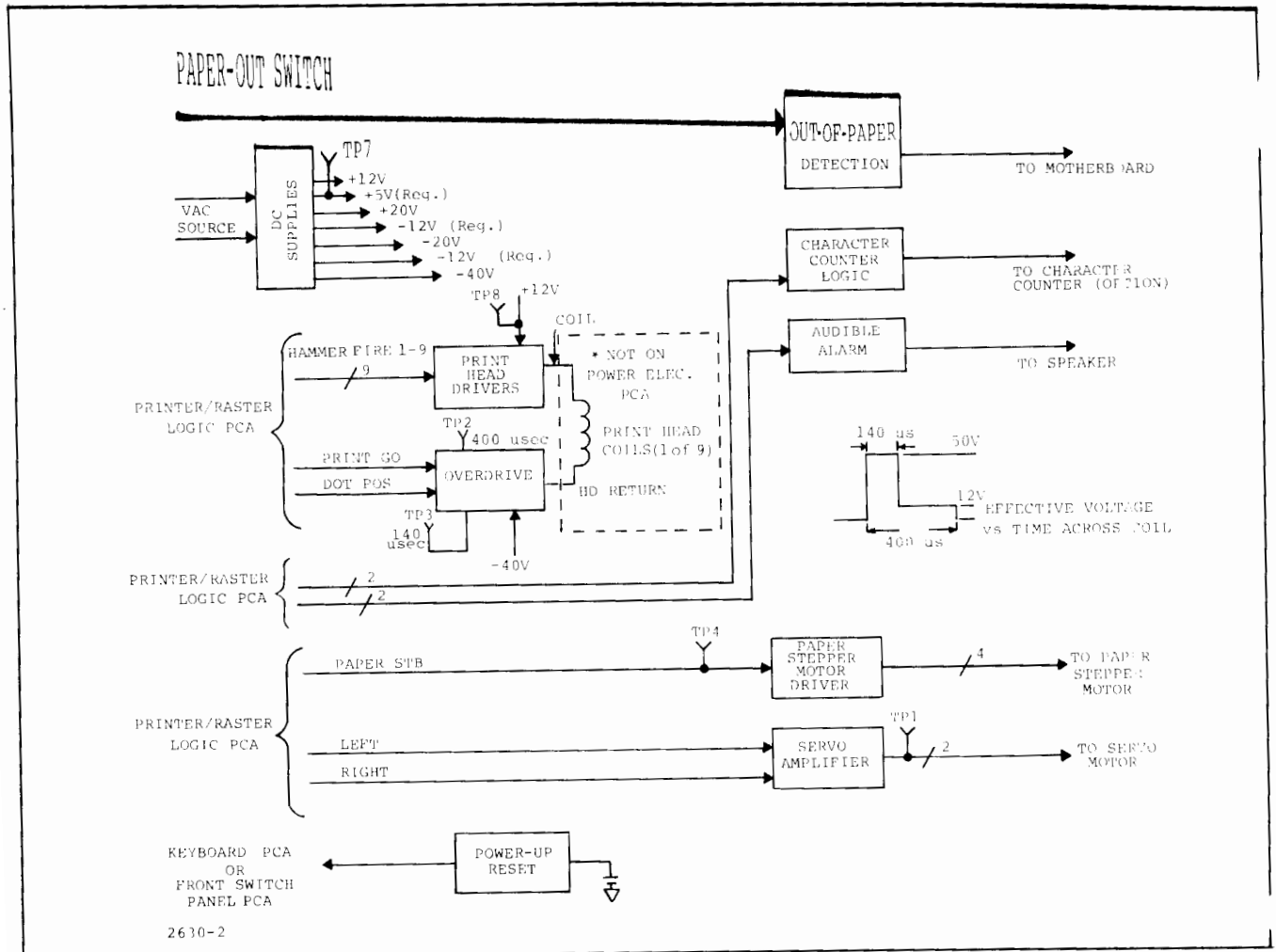


Figure 3-2. Power Electronics PCA Block Diagram

and a -40V "overdrive" pulse is applied to the lowside of the print head coils for about 140 μ s (at TP3). The "overdrive" pulse allows a faster rise time for the current through the coils, effectively accelerating more rapidly from a rest position during this first 140 μ s. After the "overdrive" pulse times out, the +12V is maintained across the coils for the remaining 260 μ s to continue acceleration of the print hammers. A protection circuit allows enabling of the print head drivers only when the +20V and +12V supplies are at their proper operating levels.

OUT-OF-PAPER DETECTION. The output of the paper-out switch is inverted on the power electronics PCA en route to the printer/raster logic PCA.

CHARACTER COUNTER OPTION. A one-shot, which is triggered every one thousand character counts by the processor (on the control PCA), pulses a transistor power switch to increment the optional mechanical counter.

AUDIBLE ALARM. This circuit activates the speaker by gating the BELL signal from the printer/raster logic PCA with a clock signal. The frequency of the clock causes an audible tone to be output by the speaker.

PAPER STEPPER MOTOR DRIVER. The PAPER STB (strobe) pulse from the printer/raster logic PCA controls a one-shot and a pair of flip-flops configured as a Gray code counter. As the PAPERSTB pulse (or series of pulses) is received, a one-shot causes a higher voltage to be applied to the stepper motor drive transistors during the time that paper is to be advanced. The Gray code counter controls the phasing on the drive transistors to "step" the motor windings in the proper sequence for paper advance. If PAPER STB is disabled, a +12V "holding" voltage on the driver transistors simulates a mechanical detent feeling on the paper advance knob.

SERVO AMPLIFIER. Drive signals from the servo logic ROM on the printer/raster logic PCA are amplified in this circuitry to provide left motion (+20V) or right motion (-20V) to the servo motor (left to right print head movement).

POWER-UP RESET. During a power-up condition, the capacitor (which was discharged by power-off) starts charging toward +5V. A sensing circuit on the control PCA detects when the charge on the capacitor reaches a given level and signals the processor that power-up reset has taken place.

3-5. Control PCA (2631B and 2635B)

The basic function of the control PCA is, as its name implies, to control various operations performed by the unit. This PCA provides paper control, servo motor control (print head motion), and data handling control up to, and including, printing. The various functional blocks are described below. Refer to Figure 3-3 for a block diagram of this theory.

OSCILLATOR CIRCUIT AND CLOCK DIVIDER. The crystal-oscillator provides pulses to the divider network, which consists of a serial string of counters. These counters generate the clocks used throughout the unit for timing.

RESET TIMING. During a power-on condition or a manual reset, this circuit will reset the microprocessor and generate a reset signal (NMSTRESET) used to bring the unit to its default conditions.

REAL TIME CLOCK. Interrupts are generated by the real time clock every two ms. This allows the processor to go through a subroutine which checks the status of various switches and logic.

CONTROL REGISTER BASE. Miscellaneous signals used for control throughout the unit are generated from this circuit.

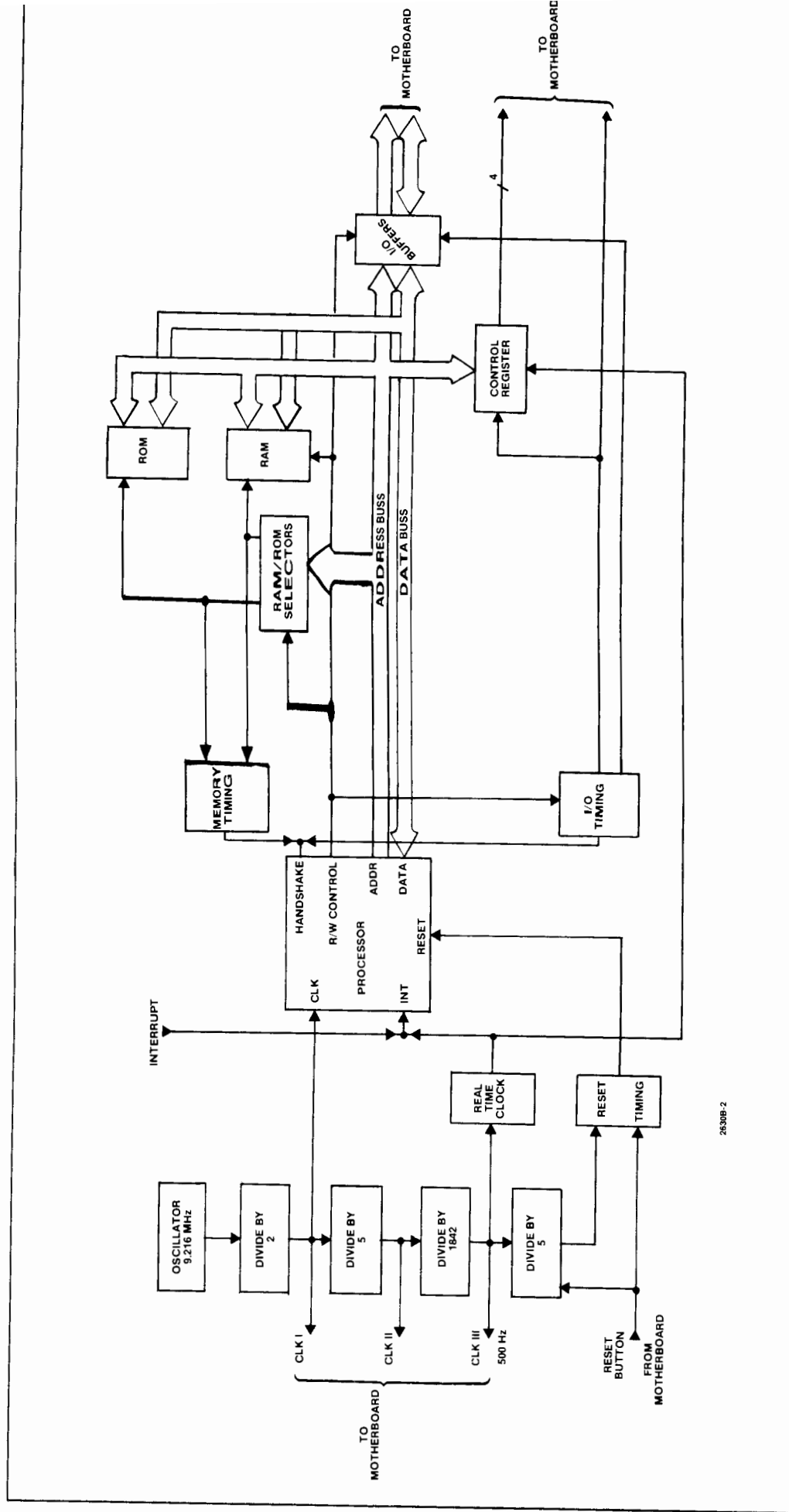
MEMORY TIMING. The memory timing circuit causes the processor to wait after RAM or ROM is selected until data is valid during a read operation or data is stored during a write operation.

I/O TIMING. The I/O timing circuit causes the processor to wait while I/O circuits either take data during a write operation or receive data during a read operation.

I/O BUFFERS. The data and address lines receive additional current drive for their output signals from the I/O buffers which are also inverted.

RAM/ROM SELECTOR. The selector logic selects either a group of RAM to write into or read from, or a group of ROM to read from.

RAM. Temporary storage of data, commands, status, and printable information is accomplished here. Lines of printable data are buffered in the RAM until the processor outputs the characters to be printed.



26306-2

Figure 3-3. 2631B/35B Control PCA Block Diagram

ROM. The ROM memory contains the control programs which are coded into the memory at the time of manufacture.

MICROPROCESSOR. The microprocessor (referred to throughout this manual as "processor") sends out commands through the I/O buffers to control the unit. It informs the unit which characters to print, when to print them, at which speed, and in which density mode. The line feed circuits are commanded when to line feed, and how many lines, by the processor. Status to the I/O interface PCA is maintained by the processor to tell the remote controller (CPU) when it is ready for information and the rate at which to send it. The keyboard, or front switch panel PCA, is monitored to keep updated status on modes selected by the operator. The I/O and RAM timing circuits on this board receive their clock pulses from the processor.

3-6. Control PCA (2631G)

The basic function of the control PCA is to control various operations performed by the unit. It provides paper control, servo motor control (print head motion), and data handling control up to, and including, printing. The various functional blocks are described below.

Refer to Figure 3-4 for a block diagram of the Control PCA.

OSCILLATOR CIRCUIT AND CLOCK DIVIDER. The crystal-oscillator provides pulses to the divider network, consisting of a serial string of counters, which generates the clocks used throughout the unit for timing.

PROCESSOR CLOCK DRIVER. The processor clock driver provides the clock used by the microprocessor. It also clocks the I/O and RAM timing circuits.

RESET FLIP-FLOP. During a power-on condition or a manual reset, this circuit will reset the microprocessor and generate a reset signal (NMSTRESET) used to bring the unit to its default conditions.

REAL TIME CLOCK. Interrupts are generated by the real time clock every 10 ms. This causes the processor to go through a subroutine which checks the status of various switches and logic.

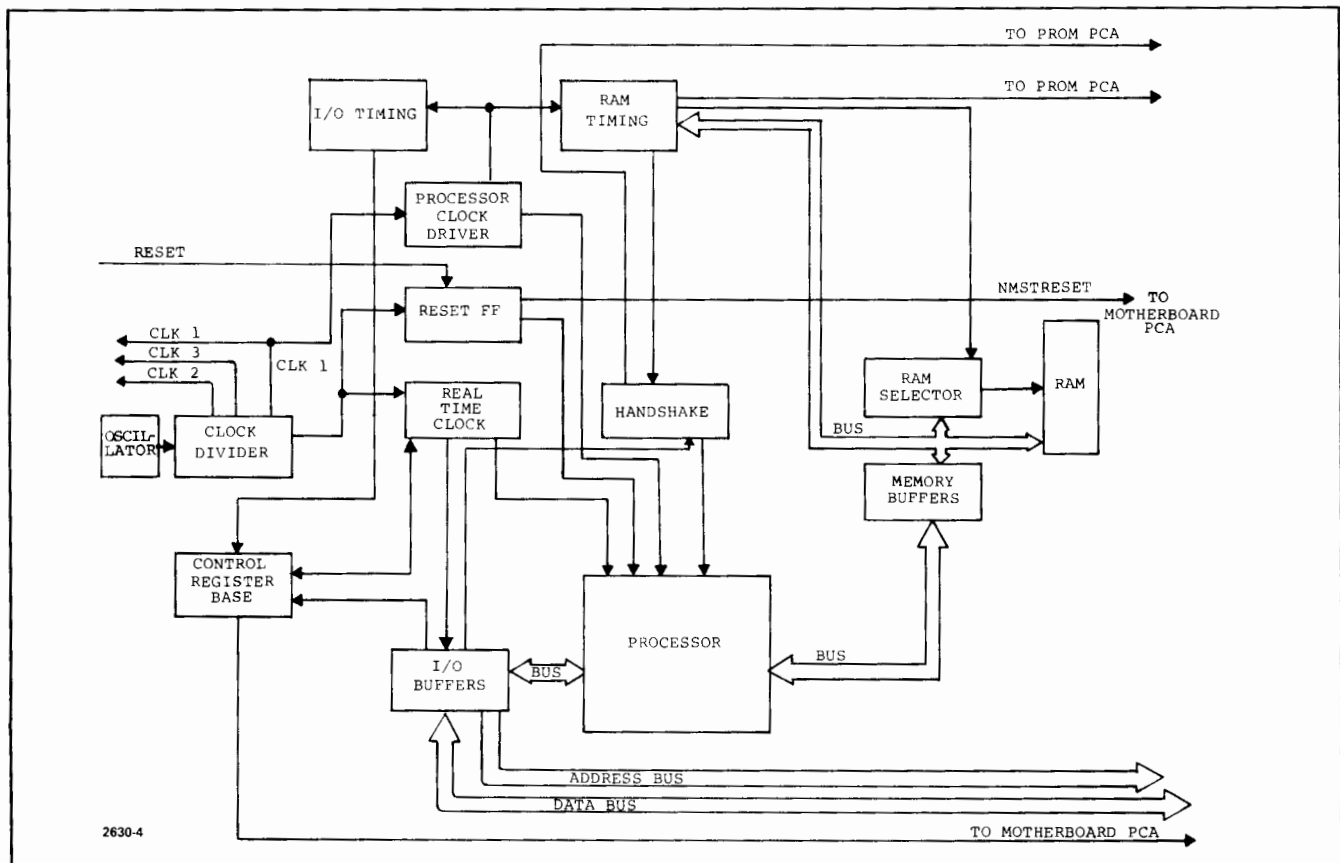


Figure 3-4. 2631G Control PCA Block Diagram

CONTROL REGISTER BASE. Miscellaneous signals used for control throughout the unit are generated from this circuit.

I/O TIMING. The NDTASTB (Data Strobe) and NIOEND (I/O End) signals are generated from this circuitry, providing control timing for input/output functions.

RAM TIMING. Due to the slower speed of memory access in RAM, the RAM timing logic is used to make the processor wait for the RAM data to be valid, thus giving the RAM sufficient time to read or write data.

HANDSHAKE. External memory (PROM and RAM) uses the handshake logic to transfer information with the control PCA at the speed of the external memory (self-handshake).

I/O BUFFERS. The data and address lines feed into the I/O buffers for conversion from TTL logic levels (+5V) to CMOS logic levels (+12V) and vice versa.

MEMORY BUFFERS. The action of the memory buffers is essentially identical to that of the I/O buffers. They are used strictly as level translators and power boosters for the transfer of information between the processor and the control PCA RAM.

RAM SELECTOR. The RAM selector logic selects which group of RAM we wish read from.

RAM. Temporary storage of data, commands, and printable information is accomplished here. Lines of printable data are buffered in the RAM until the processor outputs the characters to be printed.

MICROPROCESSOR. The microprocessor (referred to throughout this manual as "processor") sends out commands through the I/O buffers to control the unit. It informs the unit which characters to print, when to print them, at which speed, and in which mode (expanded, normal etc). The line feed circuits are commanded when to line feed and how many lines, by the processor. Status to the I/O interface PCA is maintained by the processor to tell the remote controller (CPU) when it is ready for information. The keyboard, or control panel PCA, is monitored to keep updated status on modes selected by the operator.

3-7. PROM PCA (2631G)

The PROM PCA provides the unit with an extended memory capability consisting of PROM memory and RAM memory (see Figure 3-5). The functional circuits are described in the following paragraphs.

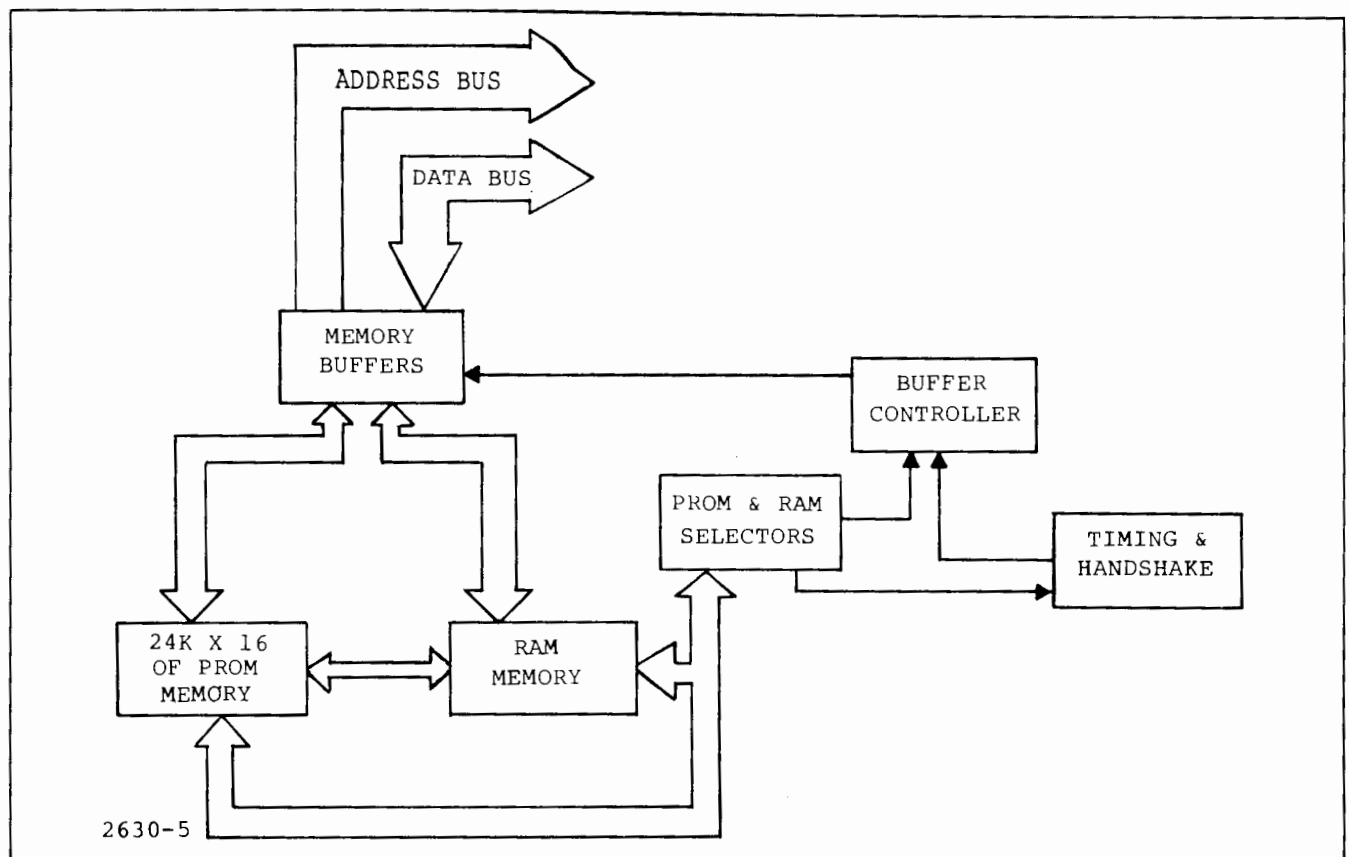


Figure 3-5. PROM PCA Block Diagram (2631G only)

MEMORY BUFFERS. These buffers convert the voltage levels from CMOS (+12V) to TTL (+5V) or vice versa, acting as level translators for the bus. The buffers for the address bus are unidirectional, while the data bus buffers are bidirectional, allowing RAM to be written into or PROM to be read.

PROM AND RAM. These circuits provide additional memory for use by the control PCA. In some cases, RAM will not be physically loaded on this board, and only portions of PROM will actually be installed, depending on selected options.

PROM AND RAM SELECTORS. As their name implies, these circuits select which group of memory circuits will write or read at a specified time.

BUFFER CONTROL. This circuit determines which direction and at what time the data portion of the memory buffer will be enabled.

TIMING AND HANDSHAKE. This logic works in conjunction with the memory handshake logic and I/O timing circuits on the control PCA to control information exchange between the PROM PCA and control PCA.

3-8. Printer Logic PCA (2631B and 2635B)

The printer logic PCA uses commands from the control PCA to initiate and control the various mechanical functions performed by the unit (i.e., printing, carriage control, paper motion). Interrupts and position information are fed back to the control PCA to be used in controlling the unit. Storage and buffering of the dot information output from the microprocessor are performed here in preparation for being output to the print head. The various functional blocks are described below (refer to Figure 3-6).

STROBE DECODER. Decoding of the register base bits (ADDR 0-7) and the register (ADDR 13-15), to which data is to be written or read, is performed in the strobe decoder. The DATA STROBE line synchronizes the data transfer between the decoder and the processor on the control PCA. This decoder generates all the strobes used elsewhere on this board.

PAPER ADVANCE SYNCHRONIZER. A PAPER ADV strobe from the strobe decoder sets a flip-flop, which is then toggled by a clock pulse from the control PCA, to generate a PAPER STB pulse to the power electronics PCA. This strobe drives the paper stepper circuitry.

CRASH STOP DETECTION. The crash stop detection logic is directly connected to the crash stop sensors via a cable. If the crash stop sensor is disconnected, or interrupted by the carriage, the CRASH signal interrupts the processor and the AT RIGHT or AT LEFT signal informs the processor which crash stop caused the interrupt. If, for instance, the LEFT CRASH SENSOR signal is enabled and the unit is commanded to go left, the go left signal is inhibited by the left crash stop signal.

CHARACTER GENERATION AND CONTROL REGISTERS. The character generation registers contain the character set(s) for printing. The control registers provide control and timing information for various functions in the printer.

Character Register. The character to be printed in the next cell is output from the processor onto the data bus. From the data bus, the character is latched into the character register by a strobe pulse. It is now ready to be printed.

Character Generators (ROM's). Characters to be printed are input to the character generators from the character register. The character information is then decoded by the ROM's into dot data. The control register enables one of the ROM's depending upon whether the primary or alternate character set has been selected to print. The dot data outputs then go to the power electronics PCA. This dot data appears at the print head as print head coil drive pulses.

Servo Register. The servo register is written into by the processor to control servo direction (right or left) and print rate (how fast in the commanded direction).

Control Register. Inputs from the processor enable this register to control functions such as: selection of the correct character generator ROM to code dot data for the hammers; enabling the auto-underline mode (ninth print coil); and, selection of the print mode (i.e., normal, expanded, or compressed).

Printer Interrupt Control. An interrupt will be sent to the processor by this logic circuit if a crash stop has been encountered by the print carriage or a cell boundary has been crossed.

ENCODER AND POSITION CIRCUITS. The encoder and position circuits keep track of the location of the print head and send that information to the processor.

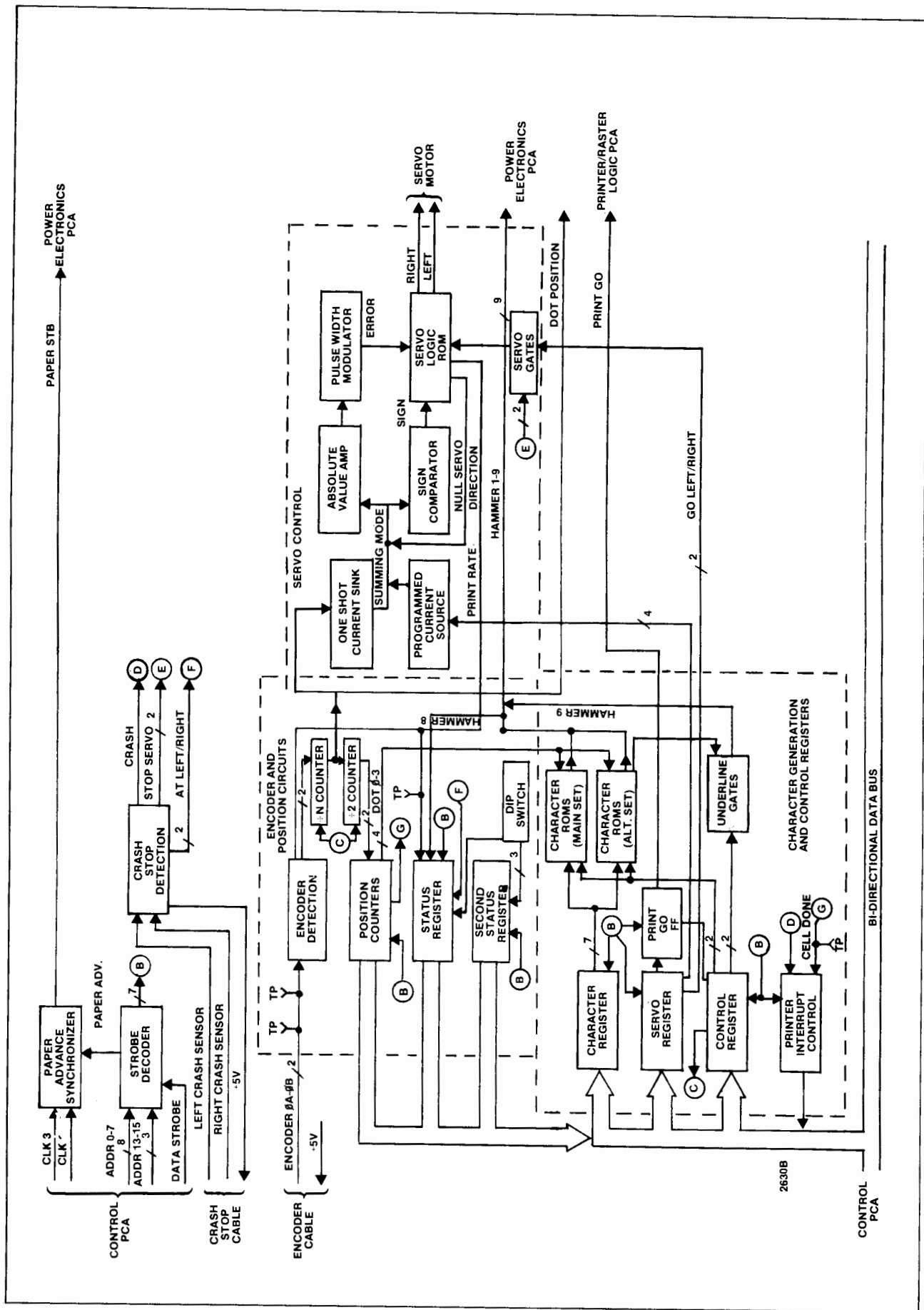


Figure 3-6. Printer Logic PCA Block Diagram

Encoder Detection. The output from the encoder disc consists of two square waves. The encoder detection circuit determines the velocity and direction of rotation of the encoder disc from the phase and frequency of the encoder output. The direction of the encoder disc's rotation corresponds to the direction of linear motion of the print head. The DIRECTION signal goes to the Servo Control. Position information in the form of up or down counts (500 pulses per revolution) goes to the divide by N Counter.

Divide by N and Divide by 2 Counters. The output from the encoder detection circuit is divided by a number to get the dot position. The print mode determines that number and the processor programs it to produce the correct dot spacing. The DOT POSITION signal goes to the Power Electronics PCA to tell it when to fire the hammers and to the Servo Control as feedback.

Position Counters. Output from the divide by 2 counter is used by the position counters. The counters are cascaded to provide head position information to the processor. The dot column position provides the address information to access the character dot patterns stored in the character ROMs. The "cell" position (a "cell" being 10 dot columns) or character position is used by the processor. When a "cell" boundary is crossed, an interrupt is sent to the processor.

Status Register. This eight-bit register is scanned by the processor when needed to determine the present status of various switches and functions of the unit. This register also reads HAMMER 8 to determine if CHARACTER ROMs are present and whether or not they are high density.

Second Status Register. This four-bit register is scanned when needed to determine the settings of the DIP Switches.

DIP Switches. Set by the operator to select paper length, escape sequence mode, and auxiliary self test routines.

SERVO CONTROL. The servo control circuits regulate the speed of the servo motor.

Programmed Current Source. The programmed current source consists of a decoder whose four Print Rate signal input lines are used to select a resistor in a divider network. The resulting voltage drop determines the speed of the servo via a summing node. If the voltage on the summing node exceeds a reference voltage, the servo motor is directed to go faster.

Conversely, if the voltage drops below the reference voltage, the servo motor is directed to slow down.

One-Shot. The one-shot uses the DOT POSITION signal to sink current from the summing node, via a transistor, as current is forced into the summing node by the programmed current source. The resulting difference in current levels becomes the error signals in the servo loop.

Sign Comparator. Error signals from the summing node are compared with a reference voltage to generate a SIGN signal which is used by the servo logic ROM to command the servo motor to speed up (if SIGN is +) or slow down (if SIGN is -).

Absolute Value Amp. The error signals are also used to create a magnitude of error voltage in the absolute value amp.

Pulse Width Modulator. The magnitude of error voltage is compared with a sawtooth waveform in the modulator to create the signal called ERROR.

Servo Logic ROM. The SIGN and ERROR signals are used by the servo logic ROM, together with commanded direction and present physical direction, to output signal commands to the servo motor. When there is no servo motion, the servo logic ROM generates a NULL SERVO signal which nullifies the servo loop described above. A provision is made in the firmware to inhibit the ROM if feedback from the encoder ceases. The Servo Gate also inhibits the ROM when the STOP SERVO signal is present.



3-9. Raster Logic PCA (2631G)

The raster logic PCA uses commands from the control PCA to initiate and control the various mechanical functions performed by the unit (i.e., printing, carriage control, paper motion). Interrupts and position information are fed back to the control PCA to be used in controlling the unit. Storage and buffering of the dot information output from the microprocessor is performed here in preparation for being output to the print head. The various functional blocks are described below (refer to Figure 3-7).

ADDRESS STROBE DECODER CIRCUITS. Decoding of the register base bits and the read/write (W/R) line is performed here. Use of the read/write line allows eight registers to be written into, and eight registers to be read from by the processor. This decoder generates all the strobes used elsewhere on the board.

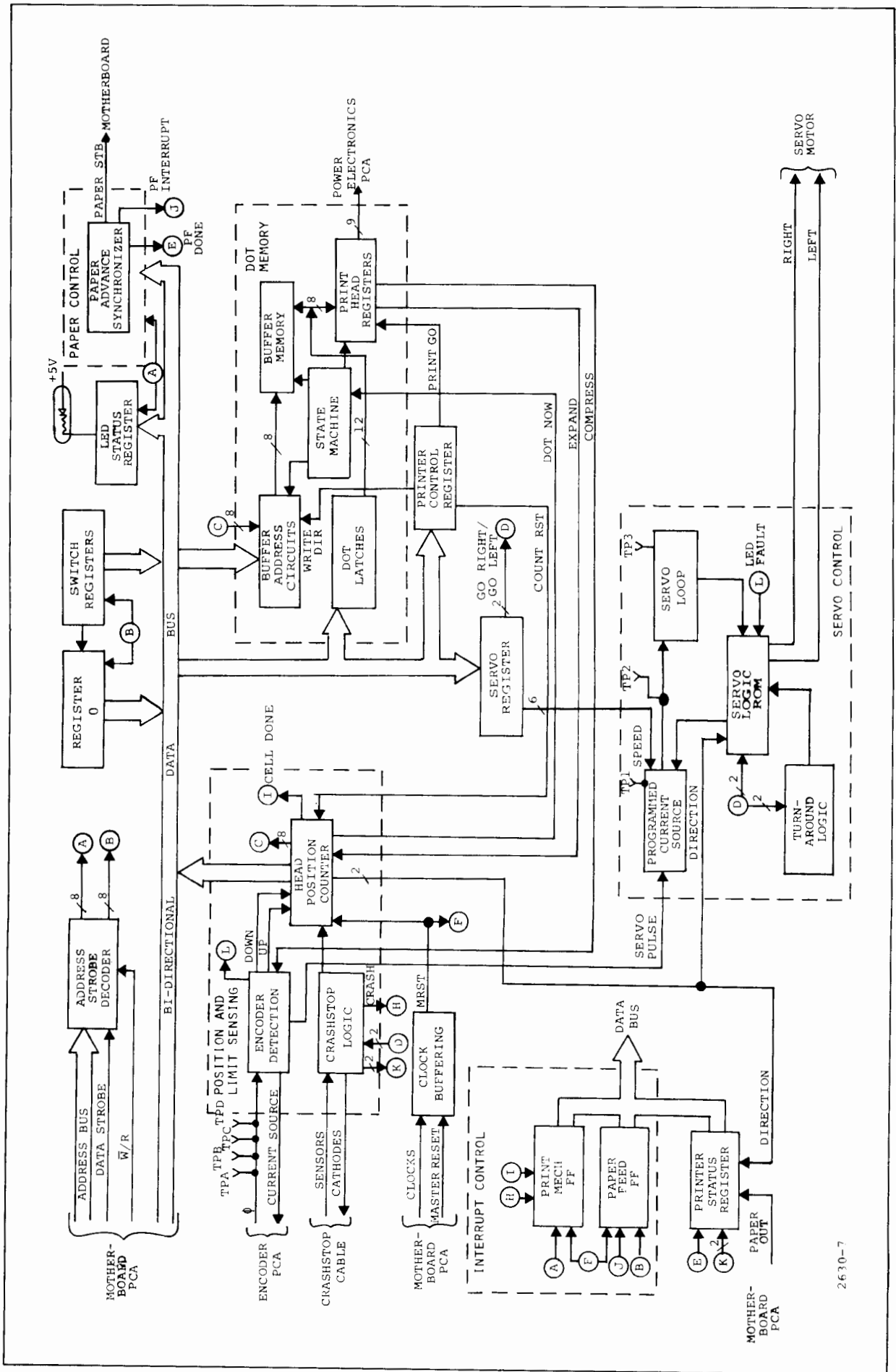


Figure 3-7. Raster Logic PCA Block Diagram (2631G)

SERVO REGISTER CIRCUIT. This circuit is written into by the processor to command servo speed and direction.

PRINTER CONTROL REGISTER CIRCUITS. Miscellaneous one-bit printer commands are output from these circuits to control functions throughout the unit (i.e., bell, character counter, head position reset, write direction, etc.).

PAPER CONTROL CIRCUITS. Two cascaded counters latch in an 8-bit word containing a value between 0 and 255. The counters down-count to zero, then interrupt the processor. During down-count, the paper advance system will step that number of counts (one step equals one dot row of advance). PF INTERRUPT signals the processor when the count is at zero. If more paper advance is required, the processor will rewrite the counters; otherwise, following a 14 millisecond delay, the PF DONE signal is asserted to allow printing.

POSITION AND LIMIT SENSING CIRCUITS. The encoder and limit sensing circuits keep track of the position of the print head and prevent it from over running the crash stops.

Encoder Detection. The encoder detection circuits are directly connected to the encoder assembly by a ribbon cable. A constant current source supplies the light emitting diodes (LED) on the encoder assembly. The input lines from the encoder consist of two tracks (two signals per track, which are 90° phase shifted). The encoder signals are multiplexed and the proper track for the desired print mode is selected through use of the COMPRESS line. If the COMPRESS line is disabled, the OC and OD track is used (100 slot track on the encoder disc); if COMPRESS is asserted, the OA and OB track is used (144 slot track on the encoder disc). The output of the multiplexer is input to a discriminator circuit which is used for servo control and up/down detection (head motion right-up count; head motion left-down count). The SERVO PULSE signal to the servo control logic is twice the frequency of the fast track of the encoder (OA and OB) or 288 pulses per encoder disc revolution. The UP and DOWN signals go to the head position counter circuits.

Head Position Counter Circuits. Outputs from the encoder detection circuits are used by the head position counter circuits, and to generate a DIRECTION signal used as a sign (+ or -) by other logic circuits. The counters within this circuitry are cascaded to provide information to the processor concerning the dot column position within a "cell", and the "cell" position across a line (a "cell" being 10 dot columns).

Crash Stop Logic. The crash stop logic is directly connected to the crash stop sensors via a cable. If the crash stop sensor is disconnected or interrupted by the carriage, the CRASH signal interrupts the processor and the AT RIGHT or AT LEFT signal informs the processor which crash stop caused the interrupt. If, for instance, the LEFT CRASH signal is enabled and the unit is commanded to GO LEFT, an invalid condition exists and SERVO STOP is asserted, which halts servo motion by clearing the servo register.

INTERRUPT CONTROL CIRCUITRY. This circuitry consists of two flip-flops (FF), one of which generates an interrupt to the processor when a cell boundary is crossed or a crash stop is encountered. The other FF interrupts the processor if the PF INTERRUPT signal is asserted.

PRINTER STATUS REGISTER CIRCUITS. Various status bits containing the mechanical state of the unit are read by the processor through this register. In addition, the state of two switches is passed to the processor via this register.

DOT MEMORY CIRCUITS. This portion of the raster logic PCA handles and buffers dot information generated by the processor for the print head. The circuits which comprise this portion of the PCA are as follows:

Buffer Address Circuits. This consists of a counter and a multiplexer. When the processor has dot information for printing, it first writes the "cell" address to the counter. This sets the counter to the cell address to be written into. Depending upon the state of the WRITE DIR signal, the counter either sets the "column" address to 0 or 9. The multiplexer selects either the address counter or the head position counter for the address of the buffer, depending whether the processor is writing data to, or the print head is reading data from, the buffer memory.

Buffer Memory. Dot patterns from the processor are buffered here along with their associated print mode bits. Capacity is 160 columns of dot data (16 cells).

Print Head Registers. These latches hold the present dot patterns being used by the print head and the print mode bits for the data. They are updated from the buffer memory with every DOT POSITION pulse.

Dot Latches. These registers are written into by the processor as a temporary stop for print head data before it is written to the buffer memory. Writing into these latches signals the state machine to move the dot

data into the buffer memory on the next available memory cycle.

State Machine. This state machine consists of two flip-flops, a ROM, and an eight-bit latch. The buffer memory control program is contained in the 32 x 8 ROM. The eight-bit latch holds the present instruction being performed by the machine and part of the address to the next instruction. The two flip-flops signal the machine when there is a pending read (update print head) or write (data from the processor) to be executed. The print head is always updated first if both are pending.

SERVO CONTROL CIRCUITS. The servo control circuits regulate the speed of the servo motor.

Programmed Current Source. The programmed current source consists of two decoders whose four SPEED signal input lines are used to select a resistor in a divider network. The resulting voltage drop determines the speed of the servo. If the voltage on the summing node exceeds a reference voltage, the servo motor is directed to go faster. Conversely, if the voltage drops below the reference voltage, the servo is directed to slow down.

Servo Loop. The servo loop uses the changes at the summing node to generate signals which indicate whether to speed up or slow down (SIGN) and how much change in speed (ERROR) is needed. These two signals are input to the servo logic ROM. A commanded stop condition of the servo will neutralize the servo loop.

Servo Logic ROM. Inputs from the servo loop, the commanded direction, and present physical direction of the servo are used by the servo logic ROM to output actual signal commands to the servo motor. A provision is made (via the LED FAULT line or by grounding TP4) to inhibit the ROM if feedback from the encoder ceases.

Turn-Around Logic. The turn-around logic provides two more inputs to the servo logic ROM. If a "hard turn-around" is required (servo moving in one direction is commanded to reverse its direction), this circuit nullifies the servo loop and causes the servo logic ROM to apply full power to the servo motor in the direction most recently commanded. As soon as motion in the new direction is sensed, the turn-around logic signals the servo logic ROM to remove full power from the servo motor and enable the servo loop to control the servo motor once again.

SWITCH REGISTER CIRCUITS. The switch register circuits contain the default conditions for the power-on sequence.

LED Status Register. This register receives data from the processor and controls a set of LED's located near the top edge of the raster logic PCA. During normal operation, LED 1 will blink at approximately a 1 Hz rate. If the SELF TEST switch is pressed the blinking ceases while self-test is performed. If self-test fails, the LED's will display a status error code from the self-test firmware assuming that the hardware is operating sufficiently to do a write into the LED status register. (Refer to self-test discussion in section IV of this manual for an explanation of the error codes).

Switch Registers. The switch registers are used to set up user-defined default conditions for the power-on sequence. The state of these registers is read into the processor during power-on. Refer to the 2631G Technical Reference Manual, for more information on these switch registers.

3-10. Encoder Assembly (2631B and 2635B)

Output pulses (square waves) from the encoder assembly are used by the printer logic PCA to determine position and character count information. This information is used by the processor and the control logic for the servo motor. The pulses are generated as described below.

Two light emitting diodes (LED's) provide a light source for two photo transistors. A disc which is physically positioned between the LED's and the phototransistors, contains slotted openings around its perimeter. Refer to Figure 3-8. As the print mechanism leadscrew drives the print head, the disc rotates causing the phototransistors to sense a "pulsed" light source from the LED's. The resulting output from the phototransistors is changed to square waves and sent to the printer logic PCA.

3-11. Encoder Assembly (2631G)

Output pulses from the encoder assembly are used by the raster logic PCA to determine position and character count information. This information is used by the processor and the control logic for the servo motor. The three functional assemblies are described below (refer to Figure 3-9).

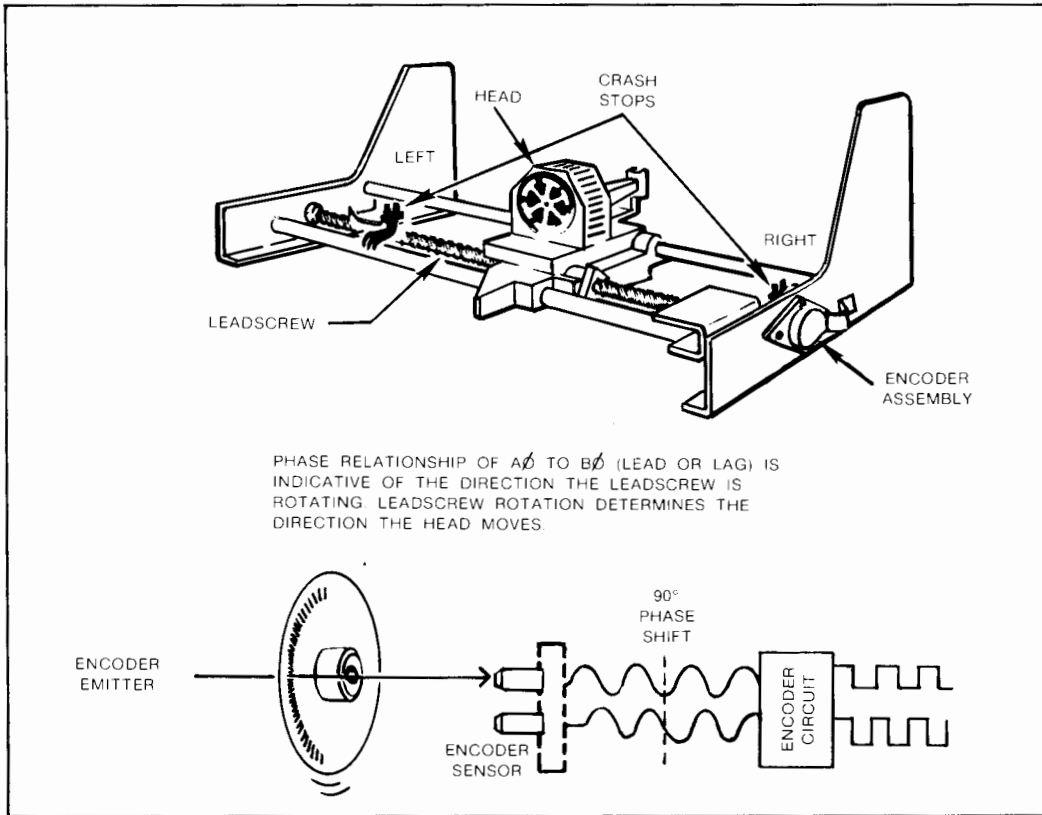


Figure 3-8. Encoder Assembly Functional Diagram for 2631B/35B.

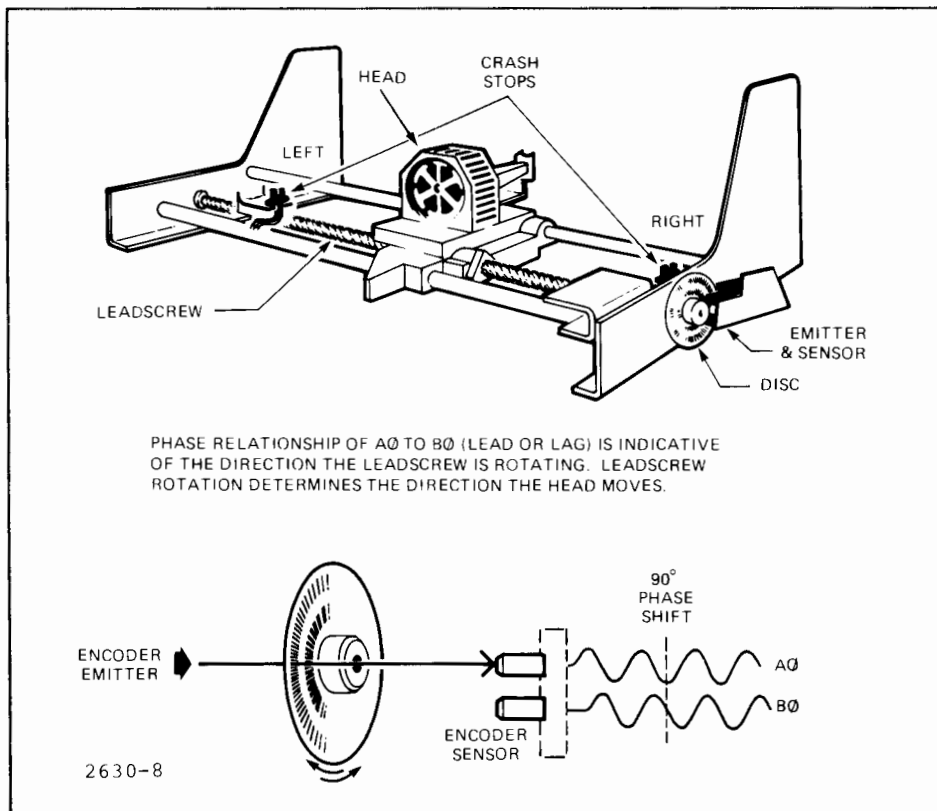


Figure 3-9. Encoder Assembly Functional Diagram (2631G only)

ENCODER EMITTER PCA. Four LED's (two for each encoder track) provide a light source for the encoder sensor PCA. The LED's receive their source current from the raster logic PCA.

ENCODER DISC. A disc mounted on the right end of the print mechanism leadscrew is used as a counting device to allow the logic to keep track of print head location at all times. Two rows (tracks) of slotted openings in the disc allow light pulses to be detected by the sensors. As the leadscrew rotates, the rate of light pulses indicate the speed of rotation; hence, the speed of the print head to the right or left.

ENCODER SENSOR PCA. The encoder sensor PCA detects the light pulses generated from the encoder emitter PCA through the encoder disc. These light pulses are then converted into electrical pulses and output to the printer logic or raster logic PCA

(depending upon the unit) for track selection and position computation.

3-12. Control Panel PCA

The control panel PCA is used only on printers (i.e., 2631B, 2631G). Refer to Figure 3-10 for a block diagram of this PCA. Operation of this PCA is as follows:

Three address lines from the control PCA are input to a decoder. Depending upon this address, selected lines are enabled within the PCA to write the status of the switches onto the data bus. After the processor has analyzed the status of these lines, some status signals are returned to the control panel PCA on the data bus. These signals from the processor are used to enable certain LED's on the control panel which visually indicate unit status.

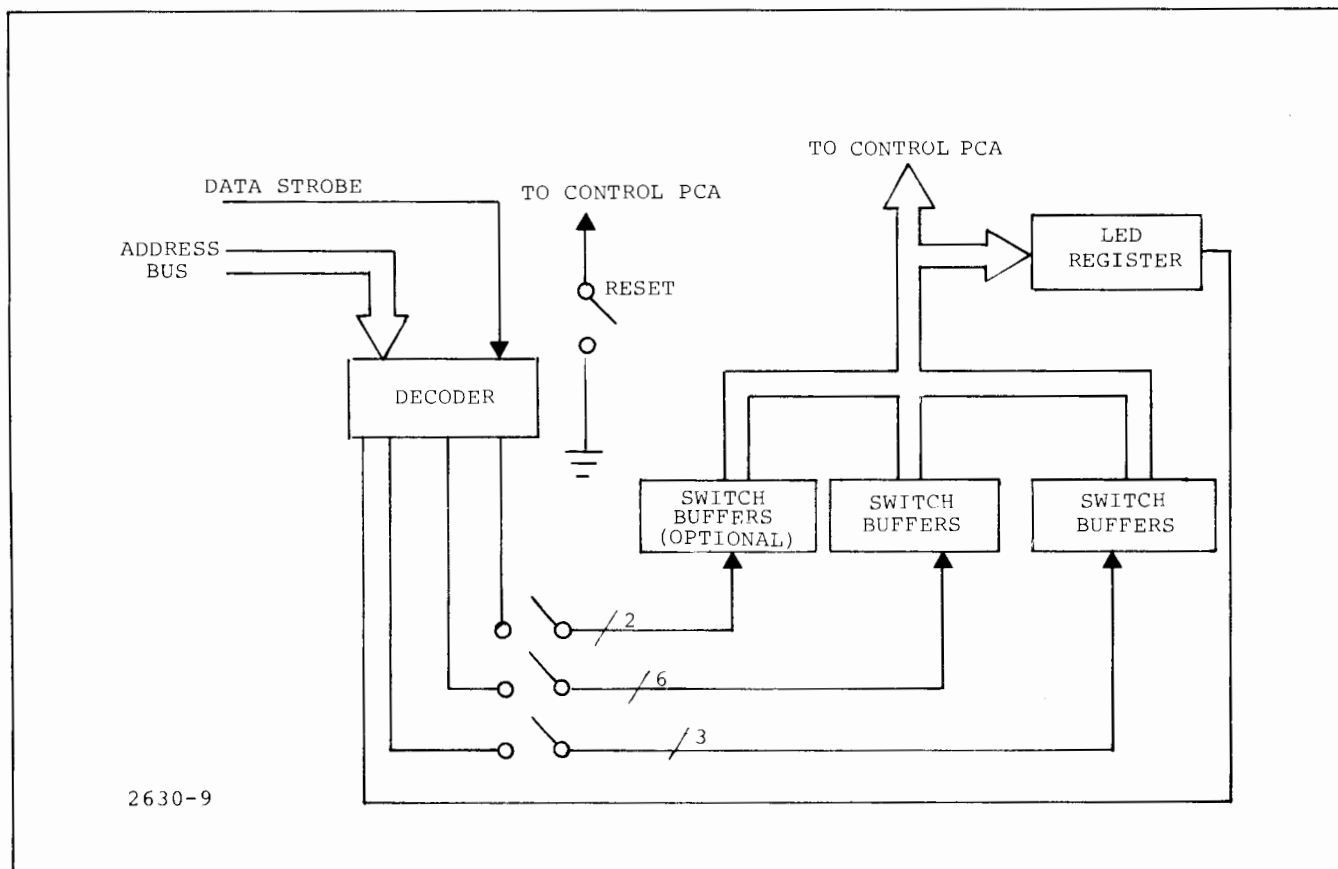


Figure 3-10. Control Panel PCA Block Diagram

3-13. Keyboard PCA (Local Mode)

The keyboard PCA is used only on the printing terminal. Refer to Figure 3-11 for a block diagram of this board. Operation is as follows.

The DATA STROBE line from the control PCA processor enables the decoder to use the address bus input to scan the key group matrix. If a key has been

pressed or a switch changed in the addressed key group, the corresponding pulse outputs a code on the data bus to the processor. The processor uses this code, and the address, to determine which character, or firmware configuration, it must act upon. After the processor has analyzed the status of the data bus lines, some status signals are returned to the keyboard via the data bus to enable certain LED's which visually indicate unit status.

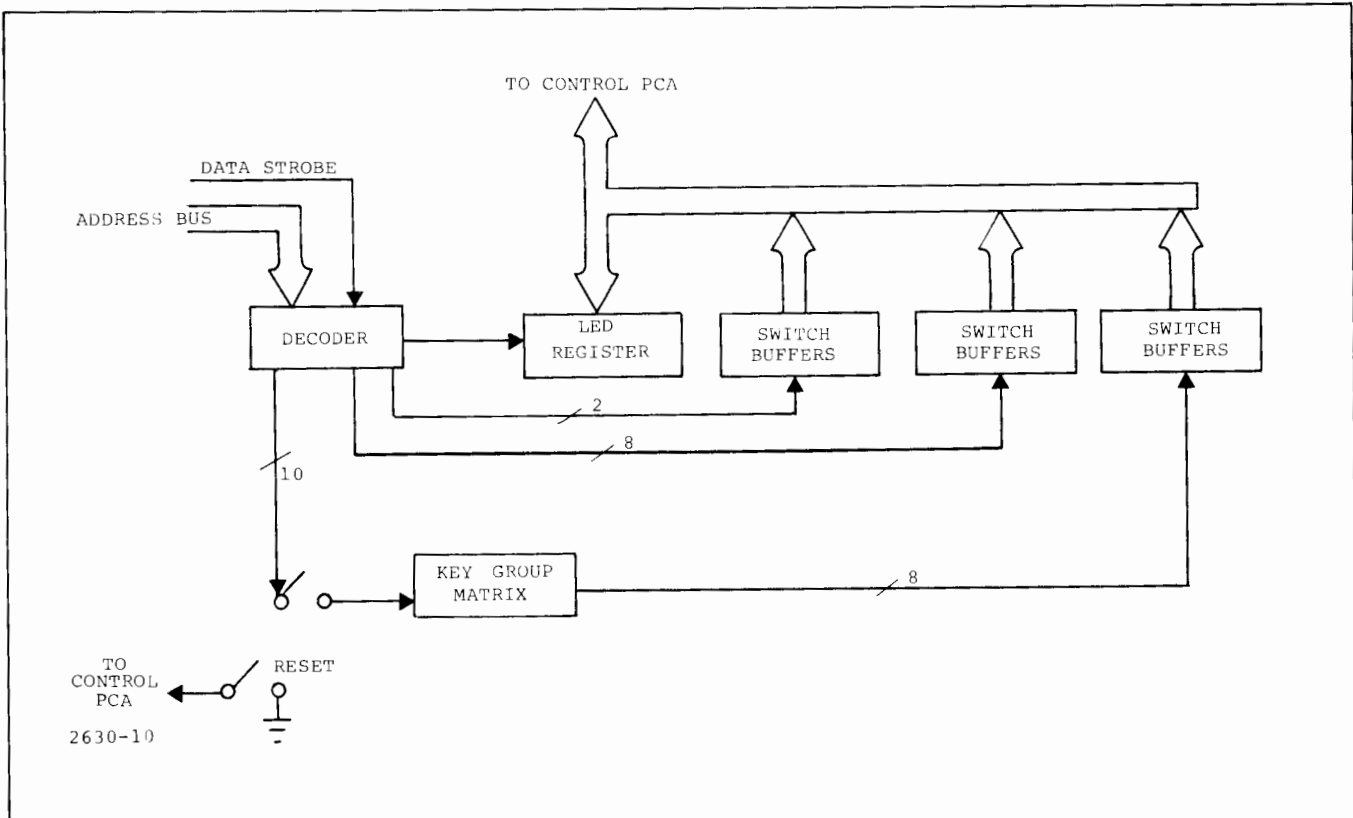


Figure 3-11. Keyboard PCA Block Diagram

3-14. Parallel I/O Interfaces

Parallel I/O interfaces receive data from the remote controller (i.e., CPU) in a parallel form; the number of parallel bits being dependent upon the type of interface which is installed. The logic levels must be converted to match the logic levels present on the processor's bidi-

rectional bus. General block diagrams for the two 8-bit parallel interfaces and the HP-IB parallel interface are shown in Figures 3-12 and 3-13. The functional blocks of the 8-bit parallel interface are discussed below, followed by a description of the differences in the HP-IB parallel interface.

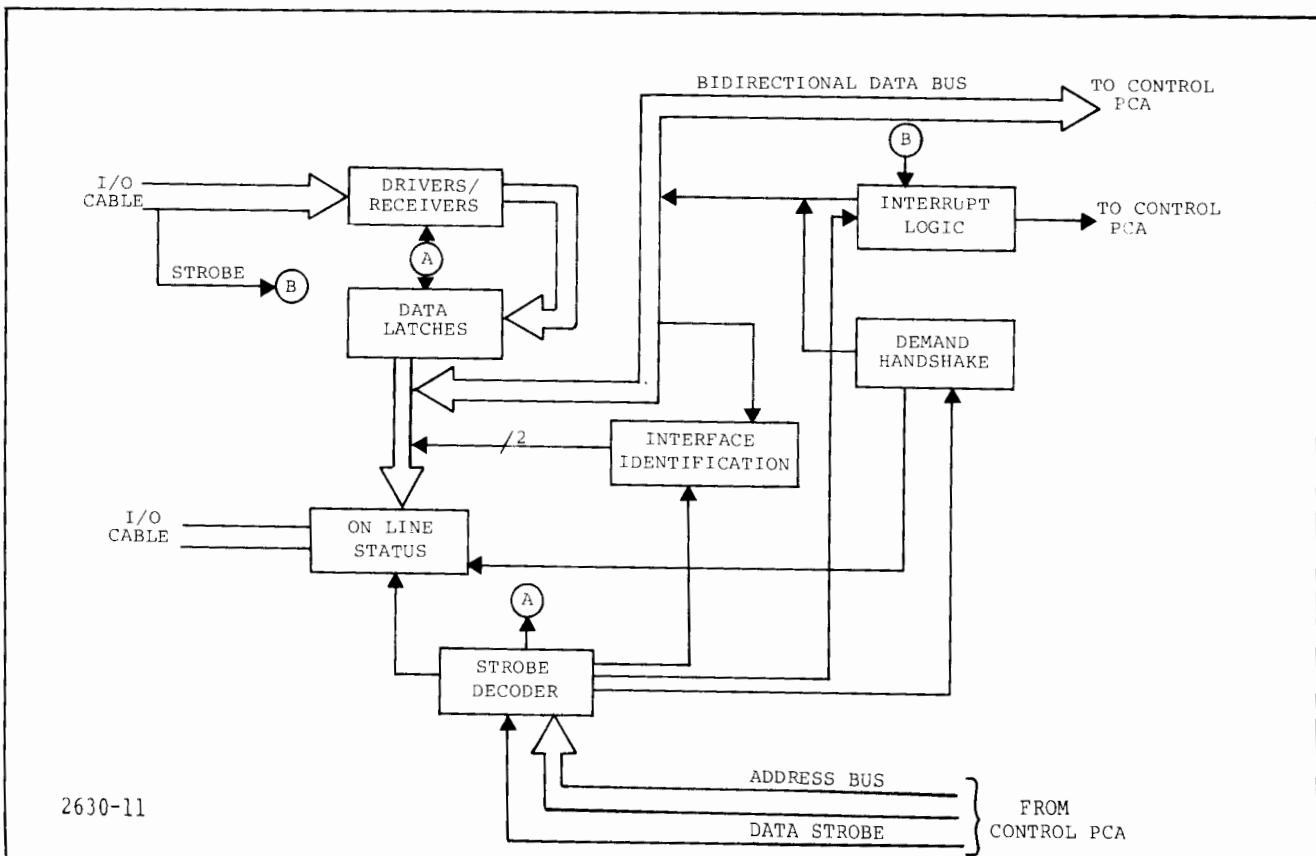


Figure 3-12. Eight-Bit Parallel Interface Block Diagram

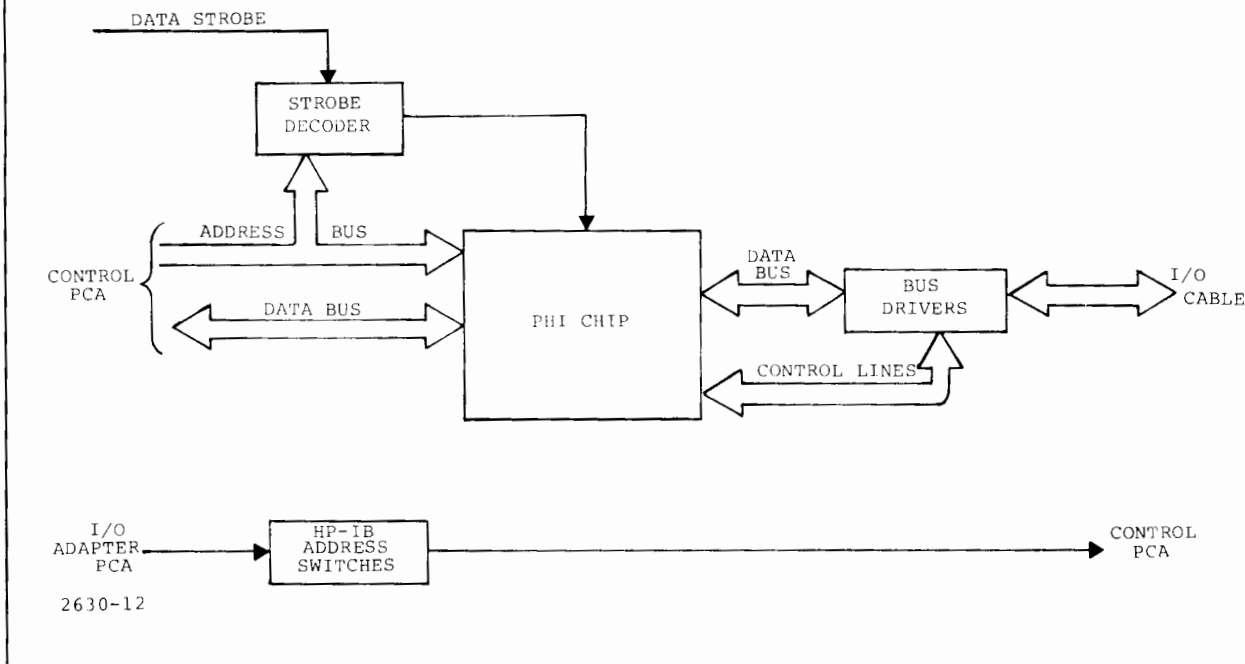


Figure 3-13. HP-IB Parallel Interface Block Diagram

EIGHT-BIT PARALLEL INTERFACES. The eight-bit parallel interface contains the circuitry that allows the printer to send and receive information from a remote controller.

Drivers/Receivers. Inputs from the external controlling device are converted by these circuits into compatible logic levels for the internal data bus.

On Line Status. This circuit consists of a flip-flop which outputs a signal to the controlling device as to the present status of the unit.

Data Latches. Information received by the interface is held in the data latches until an interrupt to the processor is acknowledged, and the processor has the information strobed onto the data bus. Once the information in the latches is on the data bus, the interface is able to receive another byte of information.

Strobe Decoder. The decoder receives its inputs from the processor by the address bus. A DATA STROBE signal from the processor enables this circuit which, in turn, outputs strobes to the other circuits on the PCA.

Interface Identification. An identifying bit is put onto the data bus by the processor; if this bit is returned to the processor (by way of the identification logic), the processor senses that it is talking to an 8-bit parallel interface. If the bit is not returned, either an HP-IB interface or one of the serial interfaces is installed and will be identified by other means.

Interrupt Logic. Whenever information is strobed into the data latches, an interrupt to request service from the processor is generated by this circuit and output to the processor. The interrupt will be cleared by the strobe decoder when commanded by the processor.

HP-IB PARALLEL INTERFACE. The strobe decoder and bus driver circuits on the HP-IB interface perform essentially the same as their respective circuits on the 8-bit parallel interfaces. Circuits not used by the other parallel interfaces are described below.

HP-IB Address Switches. Switches used for establishing the unit's system address are located on the rear panel. The system address is read onto the data bus through this circuitry. Besides the address information, the method by which the unit will respond to the controlling device is also determined by these switches.

PHI Chip. The PHI chip handles data on the bus as commanded by the processor. It receives (from the processor) device type, address, and identification information. It outputs data and commands to the processor, and status to the controlling device.

3-15. Serial I/O Interfaces

Serial I/O interfaces are used primarily to receive data from the remote controller (i.e., CPU) in a serial form, then convert the data into parallel form to transmit it over the internal bidirectional data bus. A general block diagram for all serial interfaces used in the 2630 family printers and terminals is shown in Figure 3-14. The blocks are described below.

NOTE

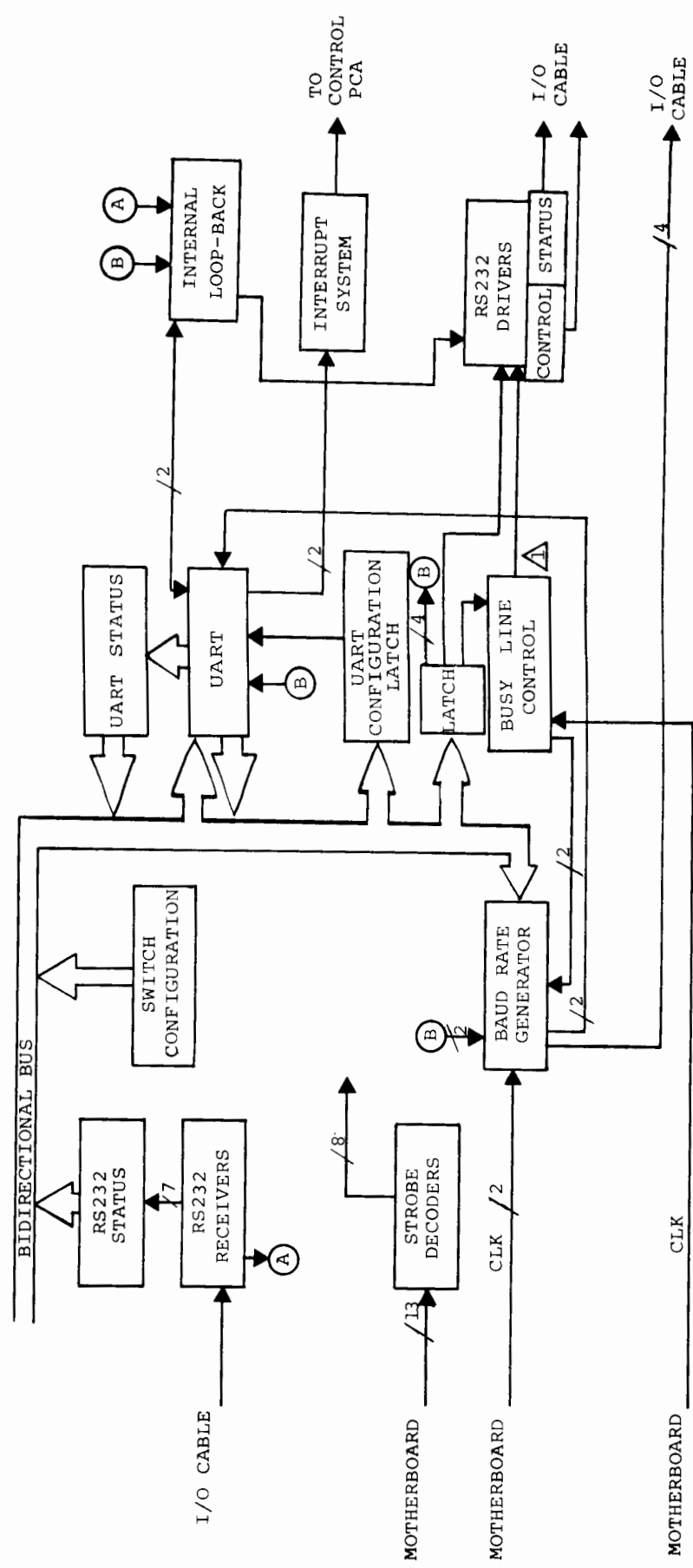
Some portions of the diagram may not be used in a given unit.

STROBE DECODERS. The strobe decoders receive inputs from the control PCA via the address lines. These inputs are decoded to be used as strobe pulses for logic throughout the interface PCA. The NDATA STROBE line enables the decoder logic. The NW/R (write/read) signal determines whether the strobe is a read or a write strobe.

RS232 RECEIVERS. Incoming data and commands from the controller are converted from RS232 logic levels to TTL logic levels, then put onto the bidirectional bus to be read by the processor on the control PCA.

SWITCH CONFIGURATION. DIP switches are available to set a desired configuration into the interface PCA. These switch settings are read by the processor to determine configuration. The information from these switches is used for controlling the firmware. Switch settings are discussed in further detail in the 2630B Family Technical Reference Manual.

BAUD RATE GENERATOR. A clock generated on the control PCA is divided in the baud rate generator to obtain 15 different baud rates. An external clock provides another baud rate in case the 15 internally generated baud rates are undesirable. Some interfaces allow transmitting and receiving at different baud rates simultaneously, providing a "split" speed operation. Selection of baud rates is controlled by the processor.



2630B-12

Figure 3-14. Serial Interface Block Diagram

LATCH. The latch chip holds the state of various control and status lines which are used by the interface PCA or returned to the controller via the I/O cable.

UART (UNIVERSAL ASYNCHRONOUS RECEIVER-TRANSMITTER). All transmitted and received data flows through the UART. It is here that serial-to-parallel, parallel-to-serial conversion takes place. Eight-bit parallel data on the processor bus must be serialized before being output on the I/O cable and vice versa. The UART can be divided into the following sections: common control section, transmitter, and receiver.

Common Control Section. This section determines word length (5 to 8 bits), parity, and the number of stop bits (1 or 2). Configuration of the common control section is determined by the UART configuration latch (see Figure 3-14) during power-on and when the parity switch is changed.

Transmitter Section. Eight-bit parallel data is received from the processor on the control PCA, serialized, and output to the internal loop-back circuit. The speed at which the data is transmitted to the internal loop-back is determined by the selected baud rate from the baud rate clock.

Receiver Section. Serial data is received from the internal loop-back circuit at the same baud rate as that of the device sending the data. Data, start, and stop bits are checked for receive errors, then the data is converted to parallel form and output to the processor via the bus.

UART STATUS. Various error and status flags are output to the processor via the bus through this circuit. The information is put onto the bus upon receipt of a read strobe from the strobe decoders.

BUSY LINE CONTROL. A portion of the RS232 drivers receives its control from this circuit. Switches allow configuration of this circuit for a variety of outputs on the CD and SCA lines, depending on the desired mode of operation.

INTERNAL LOOP-BACK. Besides the functions mentioned in the discussion on the UART circuit, the internal loop-back circuit also allows the UART to transmit to itself during a self-test mode. This is accomplished by switching between the RS232 receiver for input data. The received data and the transmit data are compared by the processor to check for errors. During self-test, the RS232 drivers are disabled to prevent the self-test pattern from being transmitted to an external device.

INTERRUPT SYSTEM. The I/O interrupt system will cause an interrupt to be output to the processor whenever the UART receives or transmits a character. After the processor identifies the interface PCA as the interrupting source, it will go into an I/O interrupt routine, then clear the interrupt so another character can be received or transmitted.

RS232 DRIVERS. Status and control information being output onto the I/O cable is converted from the TTL signal levels of the interface PCA to RS232 signal levels.

SECTION IV. MAINTENANCE

4-1. INTRODUCTION

This section of the manual provides servicing and troubleshooting information for the service personnel. Assembly/disassembly procedures are included for replaceable parts and a description of the self-test feature is also provided as an aid to troubleshooting. Figure 4-1 illustrates the main assemblies discussed in this section of the manual.

4-2. TOOLS REQUIRED

Long-nose pliers, HP part no. 8710-0003

Crosstip screwdriver, #1, HP part no. 8730-0020

Posidrive offset screwdriver, HP part no. 8710-0949

Flat blade screwdriver, HP part no. 8710-1029

Xcelite hex drivers, manufacturer part no. 99PS-41mm

Encoder Kit, HP part no. 02631-60245

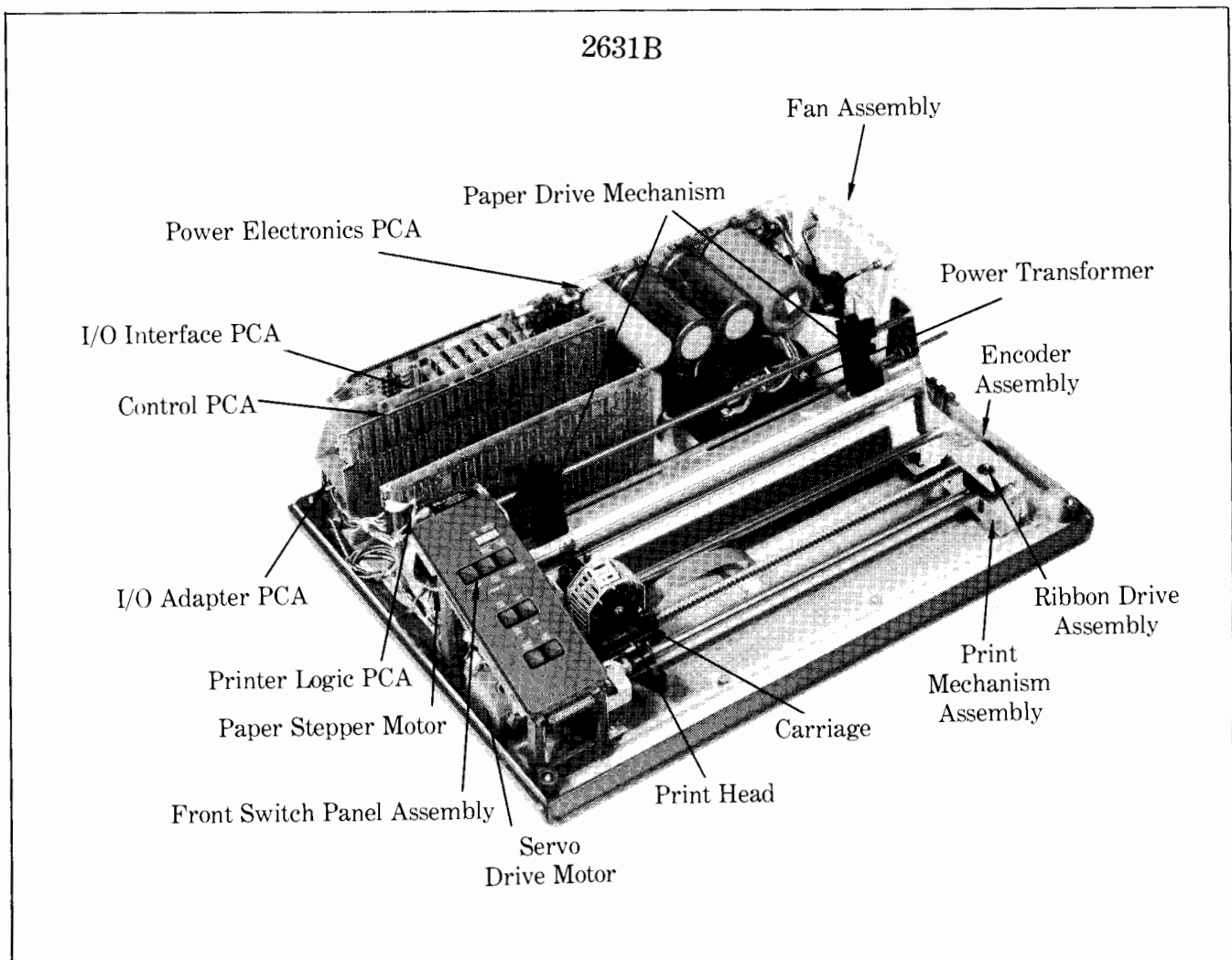


Figure 4-1. 2630 Family Main Assemblies

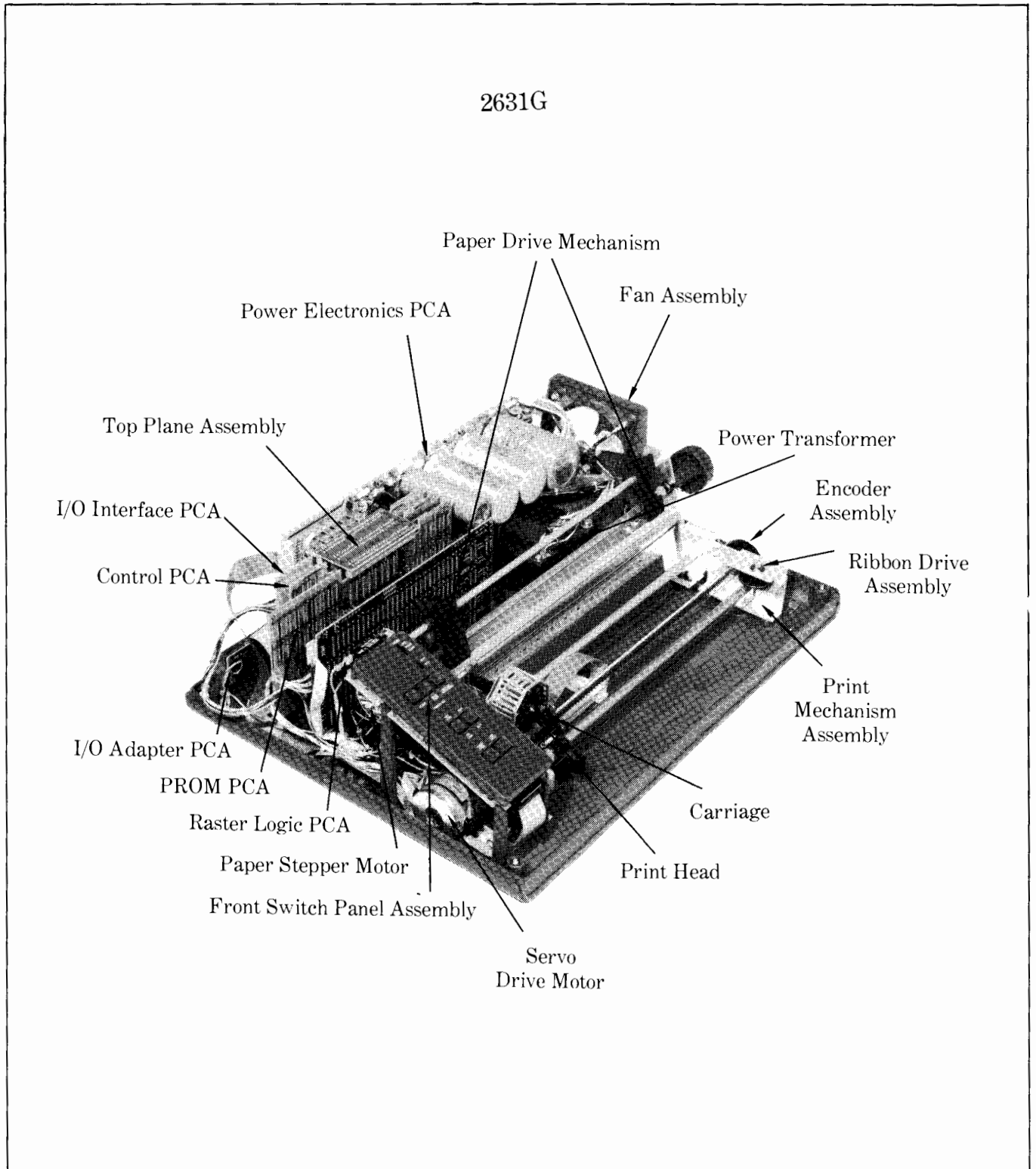


Figure 4-1. 2630 Family Main Assemblies (Cont'd)

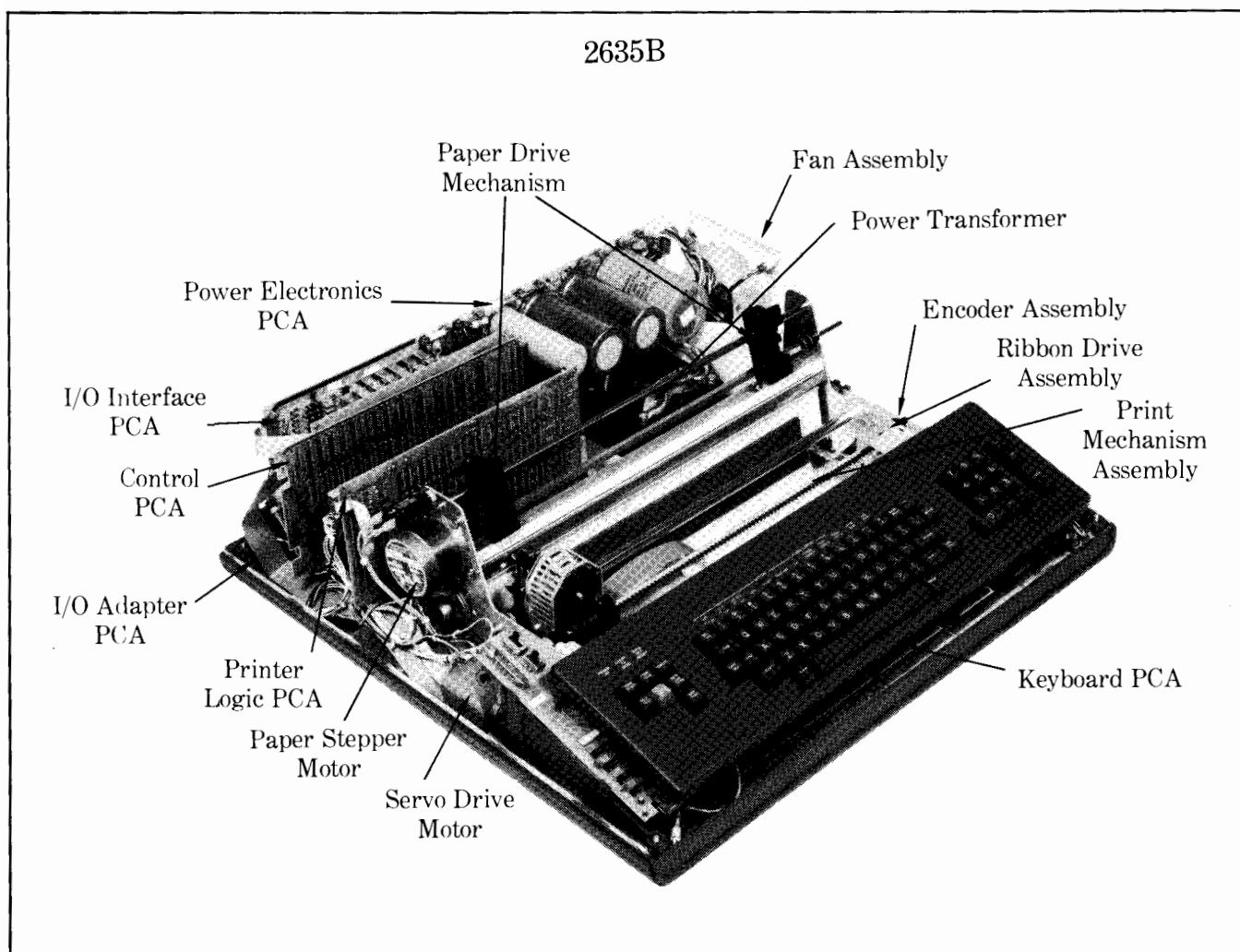


Figure 4-1. 2630 Family Main Assemblies (Cont'd)

Posidrive screwdriver, #1, HP part no. 8710-0899

Posidrive screwdriver, #2, HP part no. 8710-0900

Dual trace, 10 MHz oscilloscope, HP 1707B or equivalent

Digital voltmeter, HP 5306 or equivalent

4-3. PREVENTIVE MAINTENANCE

There is no scheduled preventive maintenance to be performed on these units. However, during the repair process of a normal failure, some maintenance functions and operator housekeeping not associated with the original failure may be required. Housekeeping

refers to such operator functions as cleaning the print head, changing the ribbon cartridge, or vacuuming paper and ribbon dust from exposed areas. These duties are discussed in the respective operator's manual for your unit.

4-4. ADJUSTMENT PROCEDURES

4-5. Encoder Assembly Alignment (2631G)

This procedure follows on the assumption that a new encoder assembly has been installed. To properly align the encoder assembly, a dual trace, 10 MHz oscilloscope is required. Perform the following steps:

- a. Set the main power switch to OFF.
- b. Disconnect the helix nut from the carriage to prevent rotation of the leadscrew from driving the print head into the crash stops. This can be accomplished by removing the three screws on the lower right side of the carriage. Next, move the carriage to the center of the print mechanism.
- c. Lightly tighten only the top screw of the encoder assembly; the leadscrew should turn freely without the encoder disc scraping the encoder assembly. Reconnect the leadscrew to the servo drive motor.
- d. While holding down the RESET switch, apply power to the unit. Release the RESET switch. The leadscrew should be driven counter-clockwise, when viewed from the right side of the print mechanism. If, upon release of the RESET switch, the leadscrew rotation appears to be too rapid, performing step "e" will correct this apparent runaway condition.
- e. Connect the channel A and channel B oscilloscope probes to test points A and B respectively on the printer/raster logic PCA. Set the oscilloscope to trigger on channel A and adjust potentiometer A on the encoder PCA for 50% duty cycle. Now set the oscilloscope to trigger on channel B and adjust potentiometer B for 50% duty cycle.
- f. Move the oscilloscope probes to test points C and D. Repeat step "e" for potentiometers C and D on the encoder PCA.
- g. Move the oscilloscope probes to test points A and B. Loosen the screw holding the encoder assembly and move the encoder inward as far as possible, then back it out slightly until the waveform in Figure 4-2 is observed (90 degree phase shift).
- h. Repeat steps "e" through "g" until no further adjustment is necessary.
- i. Move the oscilloscope probes to test points C and D again and verify a similar waveform to that shown in Figure 4-2. (The frequency of the waveform will vary from the waveform observed in step "g" but will still have a 90 degree phase shift.)
- j. Remove power from the unit.
- k. Tighten both encoder assembly mounting screws carefully to avoid disturbing the alignment. The measurements in steps "e" and "f" should be repeated to ensure that the alignment has not changed.
- l. Lower the print mechanism assembly back into place, replace the right side mounting screws, and tighten all mounting screws for the print mechanism assembly.

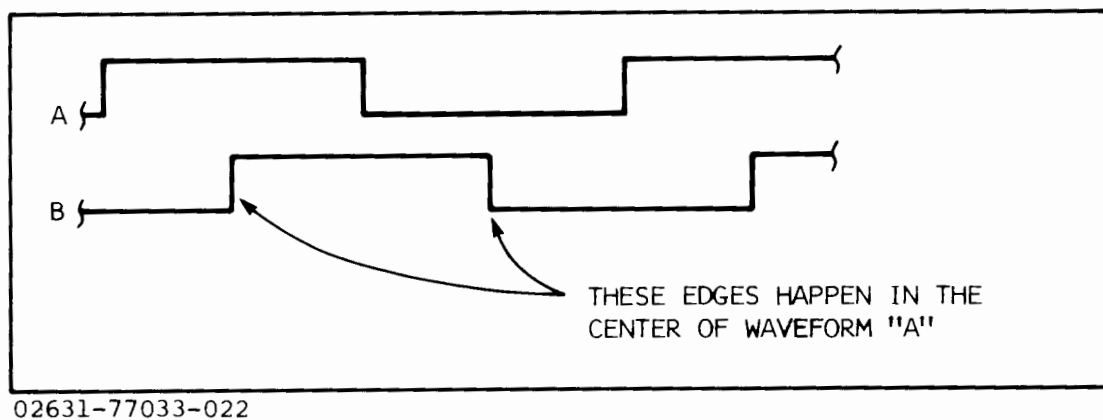


Figure 4-2. Encoder Waveform (2631G)

4-6. Paper Guide Adjustment

Needed adjustment to the paper guide may be indicated when the paper perforations are elongating or tearing, or if the paper guide begins rubbing against the ribbon guide. When adjustment to the paper guide is required, proceed as follows:

- a. Set the main power switch to OFF.
- b. Loosen the three print mechanism mounting screws; two on the left side (front and rear), and one on the right side (center).
- c. If your unit is a 2631B or 2631G, remove the control panel assembly.
- d. Release the two cable clamps which secure the print head ribbon to the base beneath the print mechanism, and remove the cable from the clamps.
- e. Without straining the cables at the left side of the print mechanism, bring the bottom of the print mechanism forward and up until the print mechanism can rest on its back.
- f. Slightly loosen the four screws (see Figure 4-3) which secure the forward paper guide to the print structures.
- g. Adjust the gap across the top of the paper guides between the forward and rear paper guides to 0.6 mm (0.024 in.).

- h. Carefully tighten the mounting screws of the forward paper guide while rechecking the gap at the right and left sides.
- i. Place the print mechanism upright and perform steps "a" through "d" in reverse order.

4-7. Print Speed Adjustment (2631G)

This adjustment allows the print speed to be adjusted to the specification listed in Table 1-1. Proceed as follows:

- a. Set the main power switch to OFF.
- b. Connect the channel A oscilloscope probe to test point C or D and ground on the printer logic PCA, then trigger the oscilloscope on channel A.
- c. Set the main power switch to ON.
- d. Press and release the SELF TEST switch.

NOTE

The unit must be in the NORMAL print mode and off-line. On the 2631G, pressing the SELF TEST switch twice will provide a continuous ripple print for this adjustment. Press RESET to end this ripple print mode.

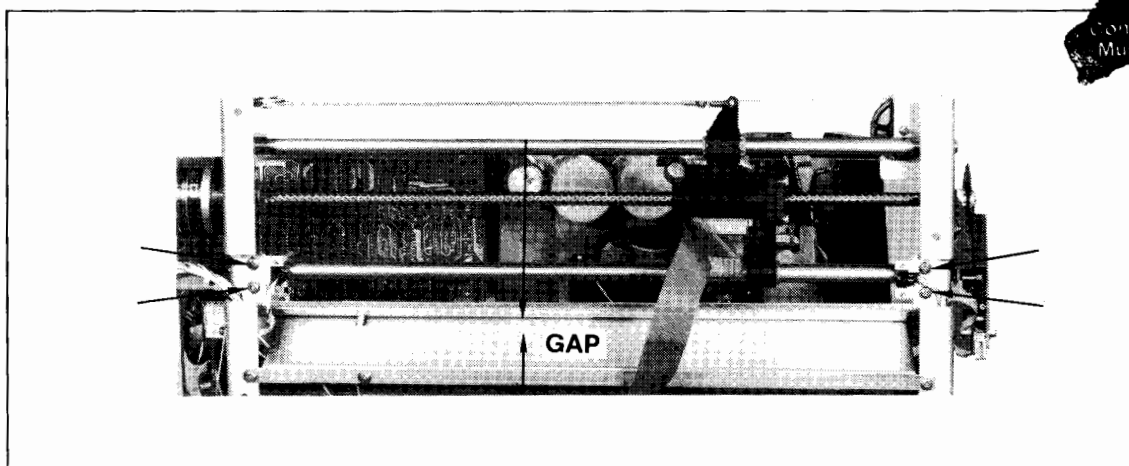


Figure 4-3. Paper Guide Adjustment

- e. Adjust R1 (labelled SPEED) on the printer logic/raster PCA for a cycle every $556 \mu\text{s}$ (1800 Hz) on the oscilloscope display. The trace on the display represents the print speed only while the unit is printing. During carriage return or skip modes, the trace is of no value for this adjustment.

CAUTION

Do not attempt to increase the print speed of the unit by adjusting R1 for a frequency in excess of 1800 Hz. Poor print quality or damage to the unit may result.

- f. Repeat steps “d” and “e” as many times as necessary to achieve a cycle every $556 \mu\text{s}$.
- g. Set the main power switch to OFF and disconnect the oscilloscope probe.

4-8. Print Speed Adjustment (2631B and 2635B)

The following procedure adjusts the print speed to within the tolerance listed in Table 1-1.

- a. Set the self test override switch, S1-2, on the printer logic PCA to the on position.
- b. Turn the printer on.
- c. On the 2631B, push the SELF TEST and LINE FEED keys down at the same time, then release them. On the 2635B, push the SELF TEST and 3 keys down at the same time, then release them.
- d. Adjust R1 (clockwise) on the printer logic PCA until the 6 LPI LED on the 2631B control panel or the DATA SET READY on the 2635B control panel comes on.
- e. Adjust R1 (counterclockwise) until the 6 LPI LED on the 2631B or the DATA SET READY LED on the 2635B just turns off.
- f. Turn the power off.
- g. Set the self test override switch, S1-2, to its off position.

4-9. Printer logic PCA (2631B and 2635B)

After a new printer logic PCA is installed in the unit, adjust the print speed.

4-10. Raster Logic PCA (2631G)

After a new raster logic PCA (in 2631G) is installed in the unit, align the Encoder Assembly. (Be sure to do this.)

CAUTION

Failure to perform this adjustment may result in damage to the unit.

4-11. REMOVAL AND REPLACEMENT PROCEDURES

The following procedures pertain mainly to the assemblies whose removal or replacement is not completely obvious.

WARNING

Hazardous voltages may be encountered while performing any of the following procedures. Ensure that the power cord is removed from the power source before attempting to remove or replace any internal assemblies.

4-12. Access Cover and Top Cover

The access cover can be removed from the unit by locating the recessed areas on both sides of the unit, raising the access cover to approximately a 60 degree angle, then lifting the cover away from the unit. Removal of the top cover can be accomplished as follows:

- a. Disconnect the power cord from the unit.
- b. Insert a flat blade screwdriver into the right side hinge opening (vacated by the access cover being removed) and loosen the two screws which secure the paper advance knob to the shaft.
- c. Slide the knob off the shaft.

- d. Gain access to the underside of the unit, then completely loosen the four captive screws at each corner of the base.
- e. Lift the top cover straight up until it is free of the unit.

To replace the top cover, reverse the above procedure. When replacing the paper advance knob, ensure that there is 1-2 mm clearance between the knob and the top cover.

4-13. Encoder Assembly (2631B and 2635B)

To remove the encoder assembly follow all the instructions listed below. Two special tools are needed for this procedure: an extraction tool and an installation tool. All the necessary tools and materials are included in the replacement kit.

- a. Set the main power switch to the OFF position.
- b. Completely loosen the two screws which secure the left side of the print mechanism assembly to the base. Then completely loosen the screw which secures the right side of the print mechanism to the base.
- c. Lift the right side of the print mechanism enough to allow easy access to the entire encoder assembly and mounting screws. Then support the print mechanism in that position.
- d. Locate the small indentation on the forward side of the encoder, then carefully pry the emitter plate away from the encoder body using a small flat-blade screwdriver. All sides of the emitter plate should be separated from the encoder body equally in small increments to avoid damage to the wire contacts at the cable side of the encoder assembly.
- e. Slip the extraction tool onto the code wheel (See Figure 4-4) so that the lip fits over the lip on the code wheel.
- f. Turn the screw of the extraction tool in a clockwise direction until the encoder disc is free of the leadscrew and the extraction tool and code wheel can be removed from the encoder body. If the code wheel is difficult to

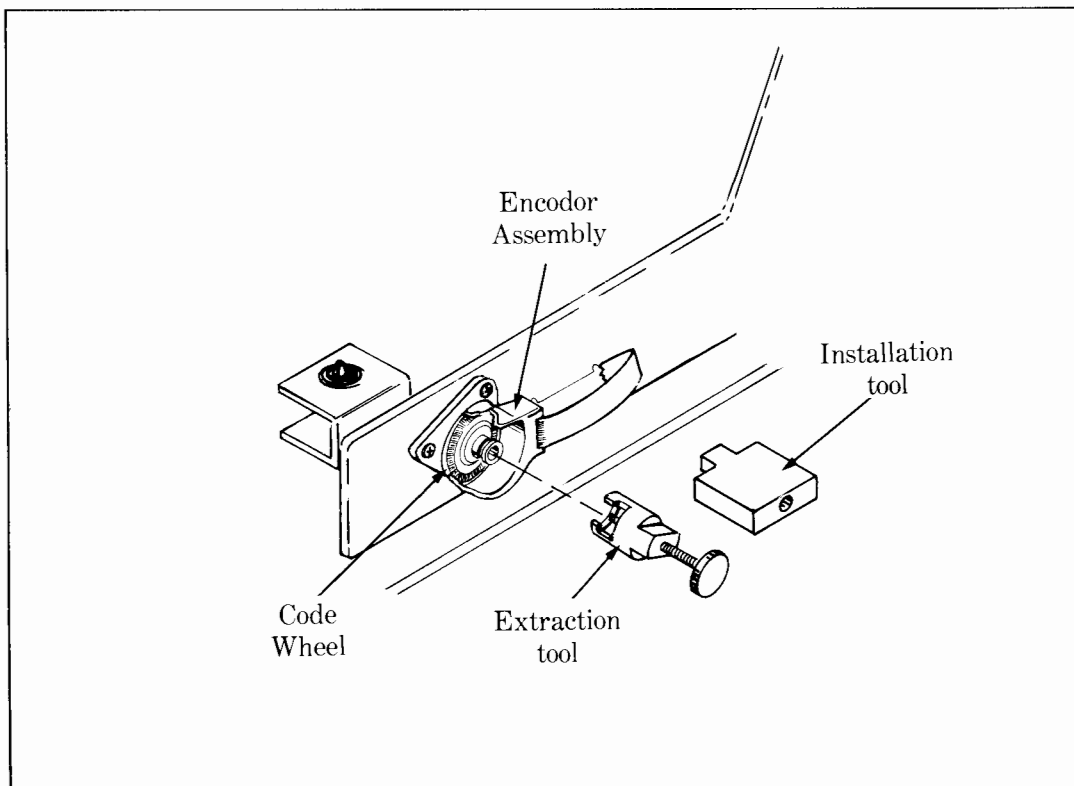


Figure 4-4. Encoder Installation (2631B and 2635B)

remove from the leadscrew, put a 9/64 inch hex key in the end of the extraction tool and hold the body of the tool with an adjustable wrench. Turn the hex key until the encoder disc is free of the leadscrew.

- g. Disconnect the encoder cable from the printer logic PCA.
- h. Remove the mounting screws from the encoder body and remove it from the unit.
- i. Remove the residual epoxy from the leadscrew using grit paper.

To install a new encoder assembly, follow all the instructions given below.

- a. Mount the encoder body onto the print structure with the ribbon cable toward the rear of the unit and place the cable in the cable clamps on the rear of the paper guide.
- b. Connect the encoder cable to the printer logic PCA.

CAUTION

The code wheel must be handled with extreme care to avoid damage to the wheel.

- c. Place the code wheel wide end down in the palm of your hand.
- d. Put the neck of the installation tool over the narrow end of the code wheel, then turn the tool and wheel over so that the code wheel rests on top of the installation tool.
- e. Set the installation tool with the code wheel in it down so that the code wheel is up.

NOTE

Since the epoxy has a short cure time, once you start the next step, mixing the epoxy, you have about two minutes to finish all the steps thru step h. This includes mixing the epoxy, putting it into the code wheel's hub, and putting the code wheel on the leadscrew.

- f. Mix equal bead lengths of epoxy from the tubes together on a clean piece of paper. Avoid getting the epoxy on your hands.
- g. Apply epoxy to the inside of the code wheel's hub making certain no epoxy gets on the disc.

CAUTION

Place the epoxy directly on the code wheel and not on the leadscrew. Epoxy can move from the leadscrew into the encoder housing and damage the encoder assembly.

- h. Locate the installation tool and code wheel on the end of the leadscrew shaft and push the wheel onto the shaft until the shoulders of the installation tool are fully in contact with the encoder body. Make sure the installation tool touches the encoder body and not the tabs on it.
- i. Mate the emitter plate wire contact with its connector in the encoder body and press the plate onto the encoder body.
- j. Mount the print mechanism in the base and tighten the mounting screws.
- k. Let the epoxy dry for at least 5 minutes.
- l. Restore power to the unit.

4-14. Encoder Assembly (2631G)

The encoder assembly includes the leadscrew, encoder disc, and encoder PCA.

Removal of the encoder assembly can be accomplished as follows:

- a. Set the main power switch to the OFF position.
- b. Loosen the two screws which secure the left side of the print mechanism assembly to the base, then loosen the screw which secures the right side of the print mechanism to the base.
- c. Disconnect the ribbon cable from the rear of the encoder PCA.

CAUTION

Care should be taken during removal of the encoder assembly to avoid bending or otherwise damaging the encoder disc.

- d. Using a hex driver, remove the encoder disc cover upper mounting screw. Lift the right side of the print mechanism assembly a sufficient amount to remove the encoder disc cover lower mounting screw and remove the cover.
- e. Remove the encoder assembly upper mounting screw.
- f. Remove the clamp holding the leadscrew in place.
- g. Loosen the 3 screws holding the leadscrew to the print head.
- h. Turn the leadscrew so it comes out with the encoder disc on it.

Install the encoder assembly as follows:

CAUTION

Applying power to the unit without the encoder being aligned will damage the unit. Ensure that one of the leads to the servo drive motor is disconnected from the motor.

- a. With the right side of the print mechanism slightly raised, slide the leadscrew toward the print mechanism thru the hole in the side of the print mechanism mounting bracket.
- b. Turn the leadscrew into the print head until the encoder disc is against the print mechanism mounting bracket. See Figure 4-5.
- c. Move the helix nut on the leadscrew until it is aligned with the print head.
- d. Tighten the 3 screws holding the helix nut to the print head.

- e. Install, but do not tighten, the mounting hardware in both the upper and lower mounting slots of the encoder assembly.
- f. Connect the encoder cable to the encoder assembly by matching the arrow on the cable connector to pin one on the encoder connector.
- g. Following the installation of an encoder assembly, the encoder alignment procedure **MUST BE PERFORMED** before using the unit.

4-15. Motherboard PCA

Prior to removal of the motherboard PCA, the control panel (in 2631B and 2631G units) or the keyboard (in 2635B units) must be removed from the unit. Proceed as follows:

- a. Set the main power switch to OFF.
- b. All printed-circuit assemblies which connect into the motherboard should be disconnected and removed.
- c. Slide the print head cable and control panel/keyboard cable out of the two clips which secure them to the base.

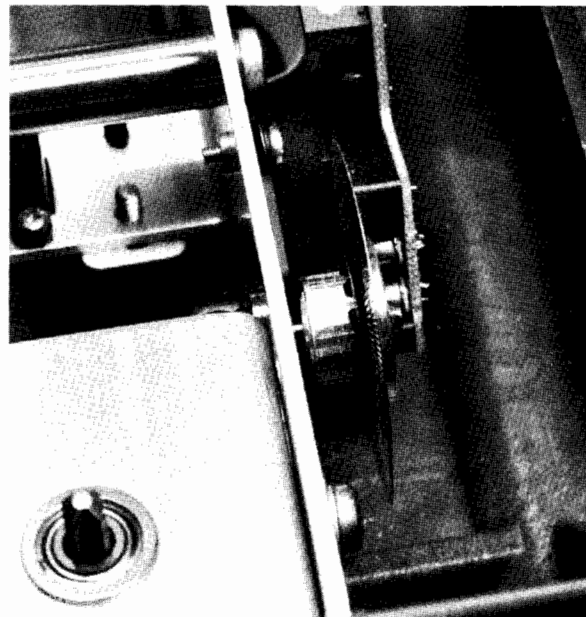


Figure 4-5. Encoder Assembly (2631G only)

- d. Remove the screw near the center of the motherboard.
- e. Lift the forward portion of the motherboard slightly and move the board toward the front of the unit until it is free of the holddown flanges.
- e. Slide the print head cable into the clip which secures the control panel/keyboard cable.
- f. Install the mounting screw in the hole near the center of the motherboard PCA and reinstall all PCA's previously removed.

Install the motherboard PCA as follows:

- a. Position the motherboard with the ribbon cable nearest the left rear side of the unit.
- b. Lower the rear side of the board into the unit and place the board under the holddown flanges.
- c. Carefully pull the board toward the rear of the unit until the forward side can drop into the notches molded into the base.
- d. Fold the ribbon cable (as shown in the left half of Figure 4-12) and route it through the two clips on the left side of the base assembly such that pin one of the cable connector is toward the outside of the unit when the cable connector is attached to the control panel/keyboard.

4-16. Top Plane Assembly (2631G)

The top plane assembly serves as an interconnecting device for the interface PCA, control PCA, and PROM PCA in the 2631G printer. Before these assemblies can be removed from the unit, the top plane assembly must be removed by gently pulling up, first on one side, then the other (see Figure 4-6), alternately until the board clears the edge connectors of all boards to which it attaches.

CAUTION

Pulling on the ends of the top plane assembly may damage the connectors on the assembly.

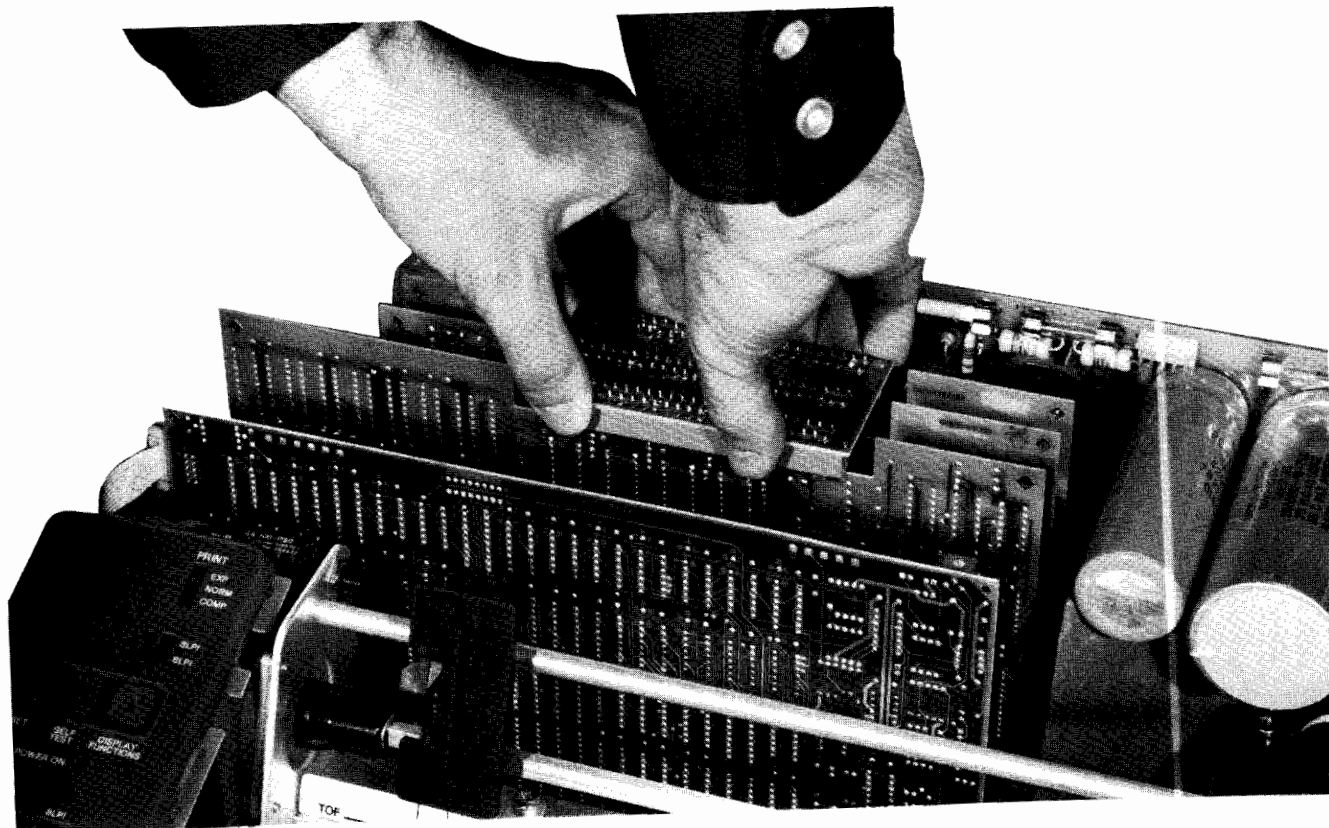


Figure 4-6. Top Plane Removal (2631G)

Ensure that all PCA's are firmly seated in the motherboard connector slots before replacing the top plane assembly. Align the top plane assembly with the PCA edge connectors such that it will fit flush with the top edges of the PCA's when it has been pushed fully onto the edge connectors. The pin numbers and any lettering on the connector should be readable from the front of the unit when the top plane is properly installed.

4-17. Fan Assembly

The fan assembly can be removed in the following manner:

- a. Disconnect the power cord from the unit, then remove the power electronics PCA.
- b. Loosen the two screws which secure the fan assembly to the fan support brackets (part of base assembly).
- c. Slide the fan outward from the unit until it is free of the mounting hardware.
- d. With the assembly supported to avoid strain on the wires, remove the hardware which secures the green/white fan ground wire to the LOAD side of the line filter (this requires the use of a 5.0 mm hex socket driver), and disconnect the fan wires from the power module.
- e. Lift the fan assembly from the unit.

To reinstall a fan assembly into the unit, perform these steps:

- a. Remove the fan mounting screws from the fan support brackets.
- b. Secure the green/white wire to the LOAD side of the line filter and push the fan power wires over the wire terminals labelled "J" and "K" on the power module.
- c. Rest one set of mounting hardware in the forward slot of the fan bracket, then carefully place the fan assembly into the unit so that the screw can be started into the support bracket. Do not tighten this screw.

- d. Place the remaining fan mounting hardware in the rearmost slot and start, but do not tighten, this screw.
- e. Push the fan assembly toward the center of the unit as far as it will go.
- f. Check the wires beneath and around the fan assembly to ensure that no wires will be pinched when the mounting screws are tightened, or that the wires do not interfere with the fan assembly being mounted far enough into the unit to allow the top cover to be replaced.
- g. Tighten both fan mounting screws.
- h. Reinstall the power electronics PCA into the unit, then connect the power cord to the unit.

4-18. Line Filter

Removal of the line filter can be accomplished as outlined below:

- a. Disconnect the power cord from the rear of the unit.
- b. Remove the power electronics PCA and the fan assembly from the unit.
- c. Disconnect the blue and brown wires at both ends of the line filter from the power module and line switch.
- d. With the 5.5 mm hex socket driver, remove the remaining nut which secures the LINE end of the line filter and lift the filter from the unit.

Installation of the line filter is as follows:

- a. Place the filter over the screw posts such that the LINE side of the filter is nearest the rear of the unit.
- b. Ensure that the lug with two brown wires from the power transformer and the green/white fan assembly ground wire is secured to the post on the LOAD end of the filter.

- c. At the LINE side of the filter, connect the brown wire to the top, outside lug of the line switch and the blue wire to the top inside lug of the line switch.
- d. Connect the wires on the LOAD side of the filter to the power module at pin "L" for the blue wire and pin "R" for the brown wire.
- e. Reinstall the fan assembly.
- f. Reinstall the power electronics PCA.
- e. Disconnect the wires on the power module leading to the transformer, and the two brown ground wires attached via a lug to the mounting screw on the LOAD side of the line filter.
- d. Remove the four transformer mounting screws and lift it from the unit.

When replacing the transformer, proceed as follows:

4-19. Transformer Assembly

Removal of the transformer assembly can be accomplished by the following procedure:

- a. Disconnect the power cord from the unit, then remove the power electronics PCA.
- b. Remove the fan assembly.
- a. Position the transformer in the unit with the group of black/striped wires toward the rear of the unit.
- b. Secure the two short wires from the transformer and the white/green wire from the print structure to the transformer frame with the left forward mounting screw (as viewed from the front of the unit).
- c. Secure both groups of wires on the transformer by the mounting screws on the right forward and right rear corners. Start all four screws

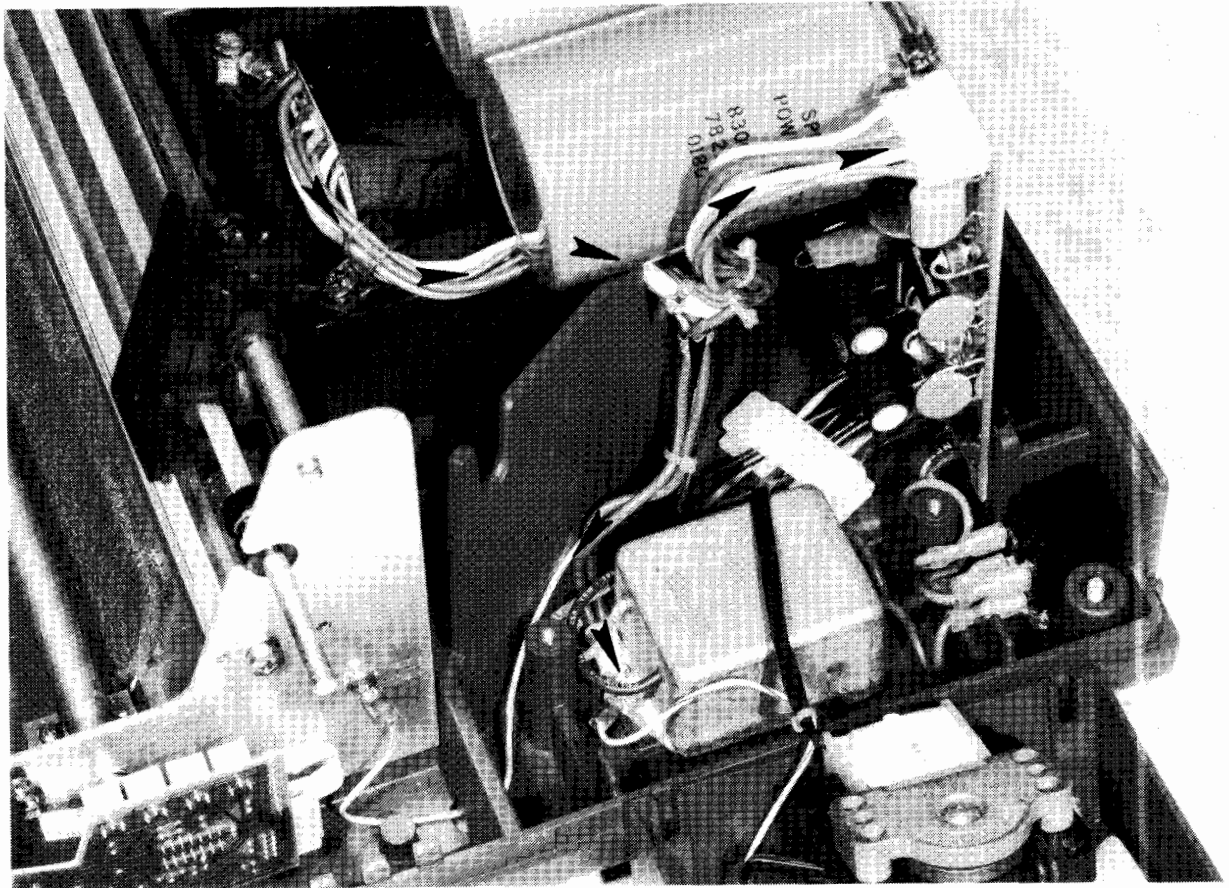


Figure 4-7. Transformer Cable Routing (for 2631G)

- and ensure that no wires are pinched by the cable clamps or screws as the screws are tightened.
- d. Route the transformer wires as shown in Figures 4-7 and 4-8.
 - e. Connect the lug with two brown wires to the mounting screw on the LOAD side of the line filter.
 - f. Connect the following wires from the transformer to the power module terminal pins:
 - g. Route the wires mentioned in step “f” through the clamp located on the base.
 - h. Reinstall the fan assembly.
 - i. Reinstall the power electronics PCA and reconnect the power cord to the unit.

WIRE	PIN
Blk/Org	A
Blk/Red	C
Blk/Yel	D
Blk/Grn	E
Black	F

4-20. Power ON/OFF Line Switch

When removal or replacement of the power switch is required, proceed as follows:

- a. Disconnect the power cord from the unit and remove the power electronics PCA.
- b. Remove the fan assembly.
- c. Disconnect the four wires attached to the switch by pulling the lugs free of their contacts.

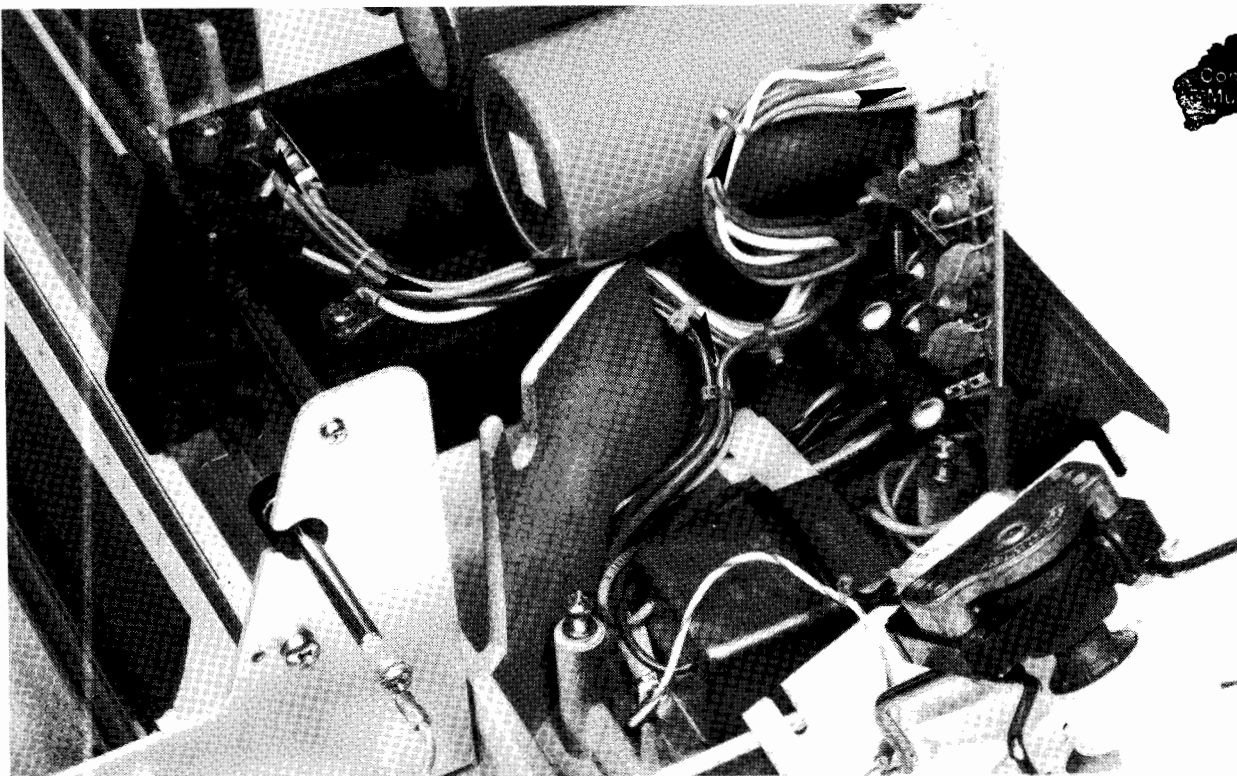


Figure 4-8. Transformer Cable Routing for 2631B and 2635B

- d. Press down on the two plastic flanges on top of the switch and, at the same time, push the top of the switch out from the rear of the unit as far as it will go.
- e. Using a flat blade screwdriver, insert the blade between the side of the switch and the case at the rear of the unit, being careful not to damage the paint or the case.
- f. Gently pry the switch, while pushing on the lugged side, until the switch is free of the unit.

To reinstall a power switch, proceed as follows:

- a. Position the switch such that the four spade lugs which are offset on the switch will be located nearer the bottom of the base.
- b. Push the switch into the opening on the rear of the base until the flanges lock into place and the switch is snug.
- c. Connect the wires from pins "S" and "P" of the power module to the outside and inside LOWER lugs of the switch, respectively, then connect the brown and blue wires from the LINE side of the line filter to the outside and inside UPPER lugs of the switch, respectively.
- d. Reinstall the fan assembly.
- e. Reinstall the power electronics PCA and connect the power cord.

4-21. Power Module

The power module can be removed in the following manner:

- a. Disconnect the power cord from the unit and remove the power electronics PCA.
- b. Remove the fan assembly.
- c. Remove the power ON/OFF line switch.
- d. Using a 5.5 mm hex socket driver, disconnect the power module ground wire from the post which secures it to the baseplate.
- e. Disconnect all wires from the wire terminals on the power module.

- f. Push in on the metal flange on one side of the module until that side of the module comes free.
- g. Repeat step "f" for the other side of the module and remove it from the unit.

Installation of the power module is as follows:

- a. Position the power module such that the power cord receptacle is nearest the opening for the power ON/OFF switch, then push the module into its opening on the base until the two winged flanges lock in place.
- b. Connect the wires to the power module as follows:

WIRE	FROM	TO POWER MODULE PIN
Purple	Transformer	A
Blk/Red	Transformer	C
Blk/Yel	Transformer	D
Blk/Grn	Transformer	E
Black	Transformer	F
Black	Fan	J
Black	Fan	K
Blue	Filter (LOAD side)	L
Blue	Line Switch	P
Brown	Filter (LOAD side)	R
Brown	Line Switch	S

- c. Secure the power module ground wire to the post located on the base near the opening for the power switch.
- d. Reinstall the power switch.
- e. Reinstall the fan assembly.
- f. Reinstall the power electronics PCA and connect the power cord.

4-22. Paper Tractors

The paper tractors can be removed in the following manner:

- a. Remove the screw at each end of the tractor guide shaft (round bar).
 - b. Push inward on the plastic bushing at the right side of the tractor shaft (square bar) until the bushing is clear of the print structure, then pull the shaft forward until it just clears the print structure.
 - c. Grasp the right side of the print structure at the top and flex it outward slightly until the tractor guide shaft can be pulled free.
 - d. Move both shafts toward the right side of the unit until the tractor assembly is clear of the unit.
 - e. Slide the spring and two metal bushings off the end of the square shaft.
 - f. Using long-nose pliers, remove the spring washers from the square shaft. The tractors can now slide off the shafts.
- a. Insert the round tractor guide shaft through the two upper holes of the paper tractors.
 - b. Snap the spring washer back into the groove on the square tractor shaft.
 - c. Slide the square-holed washer over the end of the shaft until it touches the spring washer.
 - d. Place the spring with two bushings over the end of the tractor shaft with the keyed bushing toward the end.
 - e. Lift the complete assembly with the round shaft on top. Place the flared end piece of the square shaft over the paper stepper motor shaft and insert the same end of the round shaft into the hole located just above the stepper motor in the print structure.
 - f. Flex the opposite end (right side) of the print structure outward just enough to place that end of the round shaft into the uppermost hole of the print structure.
 - g. Push inward on the plastic bushing and spring until the square shaft can be placed in its hole with the keyed bushing properly seated in the slotted hole.
 - h. Install the screws and washers in both ends of the round shaft.

Before installing the paper tractors on the square shaft, both tractors must be aligned to avoid paper skew during operation. See Figure 4-9 for proper alignment of the tractors. After aligning the tractors and placing them on the shaft, perform the following steps:

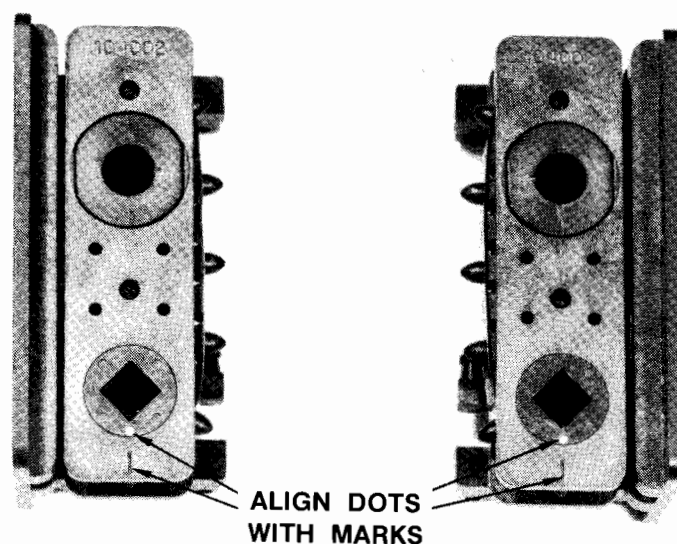


Figure 4-9. Tractor Alignment

4-23. Paper Stepper Motor

The paper stepper motor can be removed as follows:

- a. Set the main power switch to OFF.
- b. Disconnect the wire cable connector at the left center of the power electronics PCA.
- c. Disconnect the lug contacts from the speaker, circuit breaker, and servo drive motor.
- d. Completely loosen the three print mechanism mounting screws, then lift the print mechanism a sufficient amount to disconnect the two lug contacts from the paper-out switch. Pull these two wires out of the print mechanism.
- e. If your unit is a 2631B or 2631G, the paper stepper motor is mounted such that one of the three mounting screws is located behind a front switch panel support bracket (right rear bracket). To remove this screw, tilt the print mechanism toward the rear of the unit enough to allow access to the stepper motor mounting screw.
- f. Remove all stepper motor mounting screws and pull the motor from the unit.

When installing the stepper motor, position it with the wires pointed downward and proceed as follows:

- a. Position the square tractor shaft to enable the flared end piece to fit over the stepper motor drive shaft.
- b. Ensure that the spring-loaded bushing at the opposite end of the tractor shaft is still seated in the print structure. Push in on the stepper motor while aligning the holes for the mounting screws and seat the raised collar on the face of the stepper motor into the cutout in the print structure.
- c. Maintain inward pressure on the stepper motor until all mounting screws are tightened in place.
- d. Route the yellow and black wires on the stepper motor cable assembly through the opening between the servo motor and speaker, then between the print structure and paper guide. Attach the lug contacts to the paper-out switch (black lead to side contact, yellow lead to bottommost contact).

- e. Connect the pair of orange leads to the circuit breaker.
- f. Connect the brown and brown/white leads to the speaker (bell).
- g. Attach the orange and black leads to the servo motor with the orange lead on the rear contact.

NOTE

If, upon applying power to the unit, the print head carriage moves to the right side of the unit instead of the left side, reverse the orange and black leads connected in step “g”.

- h. Connect the wire cable connector to the power electronics PCA.

4-24. Servo Drive Motor

Removal of the servo motor can be accomplished as follows:

- a. Set the main power switch to OFF.
- b. Disconnect the leads from the servo motor.
- c. Manually push the print head carriage to the right side of the print mechanism.
- d. Using a 3 mm hex driver, loosen the cap screw on the collar which clamps the servo motor drive shaft to the leadscrew.
- e. Remove the four servo motor mounting screws, located on the inboard side of the print structure, and remove the motor from the unit.

When installing a servo motor, proceed as follows:

- a. Ensure that the metal collar is in place over the motor shaft.
- b. Carefully position the servo motor so that the shaft will slide over the end of the leadscrew with the lugs from the motor brushes pointing upward.
- c. Install and tighten the motor mounting hardware.
- d. Align the collar with the end of the motor shaft and position both the shaft and collar so that the slots in each are in line.

- e. Firmly push the leadscrew to the left to seat the flanged bearing and tighten the socket head cap screw on the collar.
- f. Connect the black lead to the forward lug, and the orange lead to the rear lug.
- g. Set the main power switch to ON. If the print head carriage does not drive toward the left, quickly set the power switch to OFF, reverse the servo motor leads, then restore power and ensure that the carriage now drives to the left.

4-25. Ribbon Drive Cable

If removal or replacement of the cable becomes necessary, it can be removed by grasping the cable spring and twisting it slightly while gently pressing the print carriage toward the left until the cable disengages the metal post on the carriage. This frees the cable to be removed from the unit. To replace the cable, proceed as follows:

- a. It may be necessary to use the spring from the old cable when rethreading the new cable onto the pulleys; if this is done, attach the spring to the end of the cable with the eyelet.
- b. Place the opposite end of the spring over the post at the top front (bottom front of 2635B) of the carriage (see Figure 4-10).
- c. Loop the cable one half turn behind then in front of the idler pulley at the left side of the print structure.
- d. Pull the cable across to the right side and loop the cable around the drive pulley 1.5 times with the second loop above the first loop (below the first loop in 2635B)
- e. Maintain slight tension on the cable and pull it toward the left. The cable will fit in a groove on the left side of the carriage with the ball fitting pushed into a recess in the bottom of the carriage (top of the carriage in 2635B units).

4-26. Crash Stop Cable Assembly

When removing the crash stops, proceed as follows:

CAUTION

Care should be taken during removal or replacement of the crash stop cable assembly to avoid marring or scratching the surface of the print carriage guide shaft located directly above the crash stops.

- a. Remove the print mechanism assembly.
- b. Remove the two screws on each crash stop which mount them to the print structure.
- c. Free the wires leading to the right side crash stop from the clamps on the rear paper guide and remove the cable assembly from the unit.

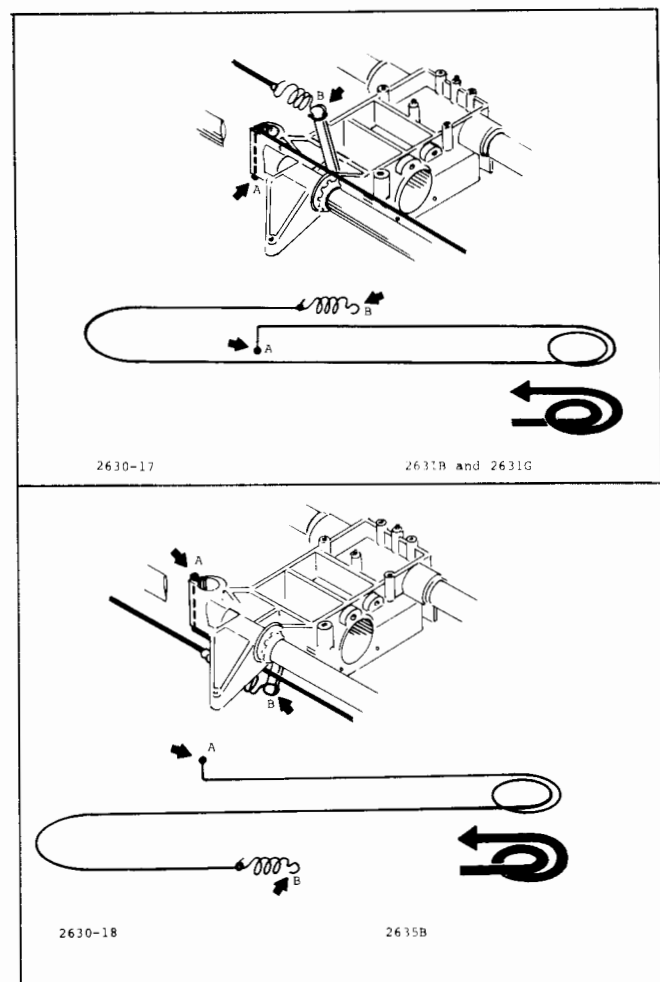


Figure 4-10 Ribbon Drive Cable Installation

To install the crash stop cable assembly, proceed as follows:

- a. Route the cable assembly through the opening in the print structure between the speaker and the servo motor. The crash stop with the shortest wires will attach to the mounting bracket on the left print structure.
- b. The crash stop with the long wires should be routed between the left print structure and the paper guide, behind the paper-out switch, through the cable clamps on the rear paper guide, then between the right print structure and the paper guides.
- c. After both crash stops have been secured to their respective mounting brackets, ensure that any excess length of wire from the crash stop cable does not extend between the paper guides on either end of the print mechanism.
- d. Reinstall the print mechanism.

4-27. Paper-Out Switch

When removing the paper-out switch, proceed as follows:

- a. Disconnect the power cord from the unit.
- b. Remove all printed-circuit boards, with the exception of the power electronics PCA, from the motherboard PCA.
- c. Loosen the lower mounting screw of the speaker, then remove the upper mounting screw and rotate the speaker toward the front of the unit as far as it will go.
- d. The two holes in the print structure, which have been exposed by moving the speaker, allow access to the two switch mounting screws. Remove these screws.
- e. Disconnect the two lug contacts from the switch and remove the switch.

To install the paper-out switch, proceed as follows:

- a. Connect the two lug contacts to the switch with the yellow lead connected to the lug marked "NC", and the black lead connected to the lug marked "COM".

- b. Position the switch on its mounting bracket, then install and tighten the two mounting screws.
- c. Loosen the screw which connects the paper-out switch bracket to the paper guide.
- d. Adjust the switch forward or backward until the switch will close (audible click) with the actuator arm protruding past the rear paper guide at least 1 mm (0.04 in.).
- e. Tighten the switch mounting bracket while ensuring that the switch adjustment does not change.
- f. Swing the speaker back into position and install the upper speaker mounting screw (ensure that the ground wire from the post at the left rear corner of the base is attached to this screw), then tighten both speaker mounting screws.
- g. Install the PCA's previously removed from the motherboard PCA.
- h. Reconnect the power cord to the unit.

4-28. Print Head

Removal of the print head can be accomplished as follows:

WARNING

If the unit has been in operation for more than five minutes, the print head may be hot.

- a. Set the power switch to OFF.
- b. Allow the unit to stand for at least 15 minutes (if it had previously been operating).
- c. Using the hex key supplied with the unit, loosen the screws which secure the head shield to the print head and lift the head shield off the print head (see Figure 4-11).
- d. Use the hex key to remove the print head mounting screws.
- e. Lift the head up (to disconnect the electrical plug-in), back, and up (as shown in Figure 4-11).

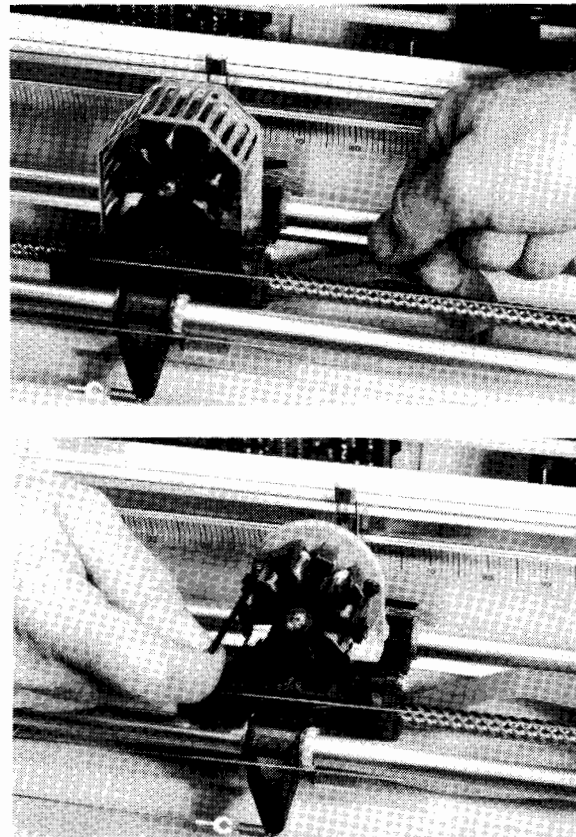
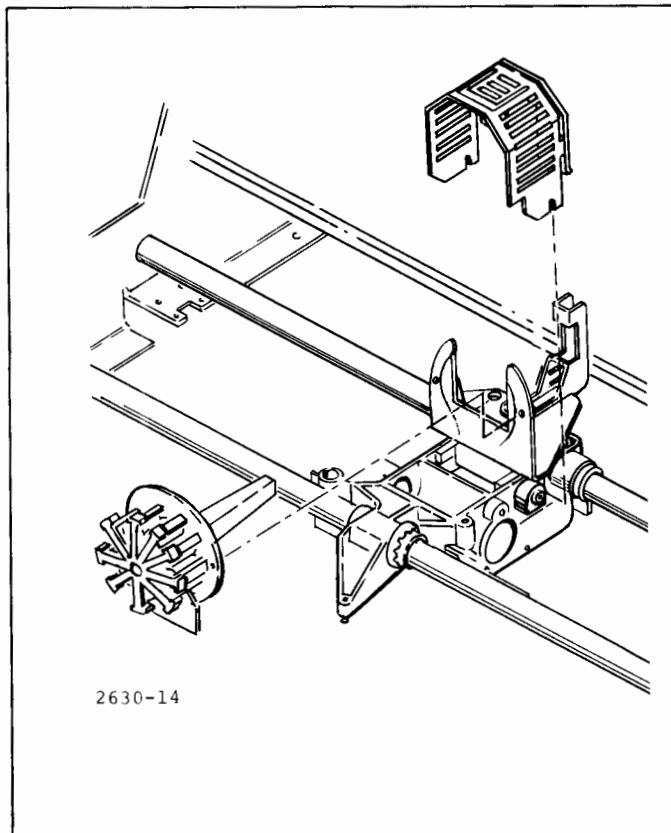


Figure 4-11 Print Head Removal

To replace the head, install the new assembly in the reverse order of the removal procedure. When installing the head shield, ensure that the top, center tab of the shield is bent downward a sufficient amount to avoid hitting the mounting screws on the access cover window and that the shield is fully seated on its mounting screws. To achieve sharp, intense print quality, adjustment of the print head may be needed after replacement and for varying thicknesses of paper and forms. Use the print head adjustment lever to move the print head either forward or back from the platen until satisfactory print quality is achieved. If replacement of the print head mounting bracket is necessary, proceed as follows:

- a. Disconnect the print head from the unit as described above.
- b. Remove the three screws which secure the mounting bracket to the carriage assembly.
- c. Carefully lift the mounting bracket straight up until it is completely clear of the guide pins which extend upward through the bracket.
- d. Place the new mounting bracket over the guide pins (ensure that the linkage on the underside of the bracket is aligned with the guide pin hole nearest the front of the unit).
- e. The washers on the mounting screws must be arranged such that the cupped washer is nearest the head of the screw and the concave surface faces the head of the screw. The flat washer has one surface which is more rounded and smooth than the other; this surface must face downward when the screw is installed.
- f. Install the three mounting screws and tighten until resistance is felt, then reverse the screws one half turn.
- g. Reinstall the print head in the reverse order of the removal procedure described previously.
- h. Wiggle the print head to ensure that there is no vertical movement at the tip of the print head; if there is movement, tighten the mounting

screws a sufficient amount to remove this movement (the mounting bracket must remain free enough to slide forward and back for print head adjustment).

- i. Remove the print head adjustment lever from the old mounting bracket, then place it over the eccentric at the center of the mounting bracket just installed. Move the lever to adjust the print head for a gap of 0.48 mm (0.019 in.) between the tip of the print head and the platen. While moving the adjustment lever, ensure that the carriage beneath the mounting bracket is not flexing inward or outward; if this occurs, the mounting bracket screws have been tightened too much and should be loosened slightly. Repeat steps "h" and "i" until this is corrected.
- j. After the gap is set properly, lift the adjustment lever off the eccentric, then replace it on the eccentric such that the lever is as near the

tip of the print head as possible. Install the C-ring over the adjustment lever to secure it to the eccentric.

- k. Run the self-test and check the print quality to ensure that the print head is properly adjusted.

4-29. Print Mechanism

To remove the print mechanism assembly, proceed as follows:

CAUTION

Under no circumstances should the platen or guide rails be loosened or removed from the print structure. A critical adjustment will be altered.

- a. Set the main power switch to OFF.

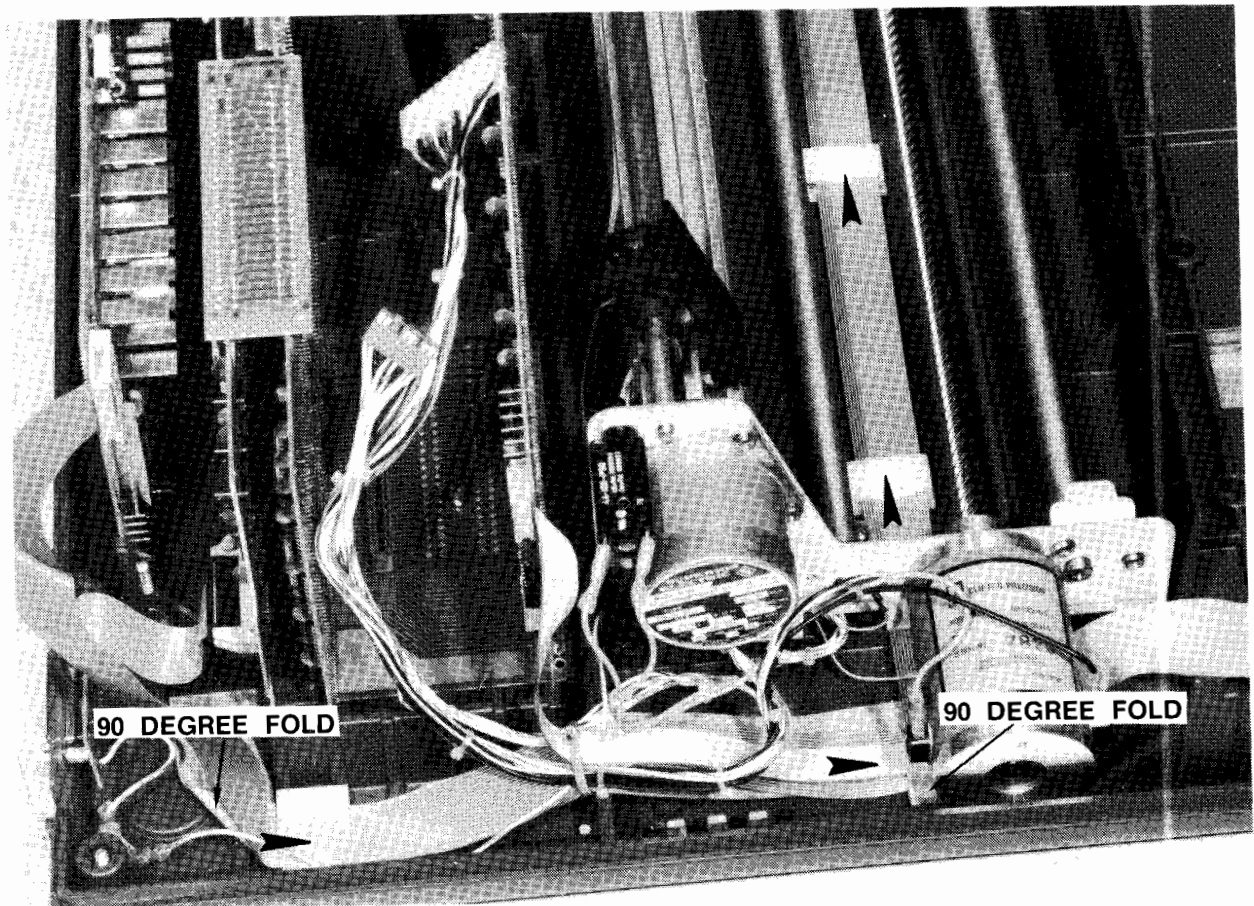


Figure 4-12. Cable Routing (2631G only)

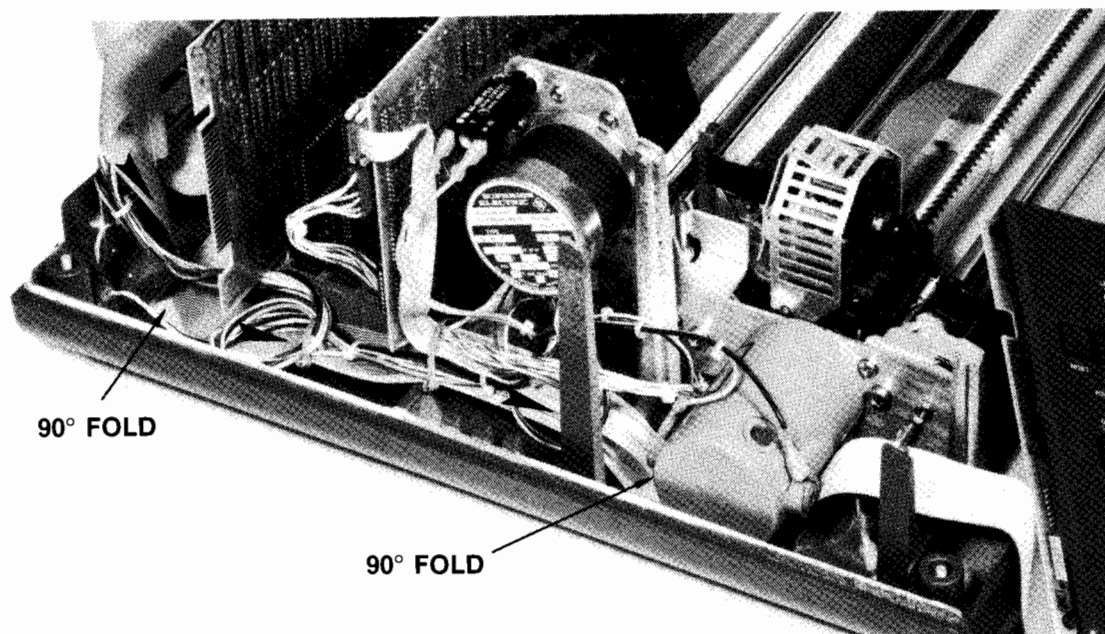


Figure 4-13 Cable Routing (2631B and 2635B)

- b. Remove the front switch panel assembly (on 2631B and 2631G units only).
- c. Disconnect two cables each from the power electronics PCA and printer logic PCA.
- d. Release the print head cable from the four cable clamps (two beneath the print carriage guide shafts and two on the left rear side of the base).
- e. Disconnect the grounding wires on the right rear and left rear sides of the print mechanism.
- f. Loosen the three screws which secure the print mechanism assembly to the base.
- g. Grasp the portion of the shaft which extends beyond the right side of the print mechanism and the paper stepper motor, then lift the print mechanism straight up until it is clear of the unit.

Installation of the print mechanism is the reverse of the above procedure. Refer to Figures 4-12 and 4-13 for proper routing of the print head ribbon cable through the four clamps.

4-30. SELF TEST AND PROBLEM DIAGNOSIS

The 2630B Family of Printer/Terminals contain self test routines that are designed to aid in problem diagnosis and repair. This section contains descriptions of the self tests and how to run them. Following the self test information is a table containing troubleshooting hints.

The following discussion on self test is separated into two parts. The first is about the 2631B/2635B self tests and the second is about the 2631G self tests. The standard self test can be invoked from the front panel or by using an escape sequence. For instructions regarding the use of escape sequences refer to the 2630B Family Reference Manual.

The self test feature is used to verify proper operation of the unit and as a diagnostic tool for service personnel to aid in problem location. The standard self tests are non-destructive to preprogrammed printer configurations (i.e. horizontal tabs, print modes, and VFC).

4-31. 2631B and 2635B Self Test

The self test routines in the 2631B/2635B consist of sub tests which can be invoked separately. A number of these sub tests is grouped together into a standard self

SUB TESTS. In addition to the standard self test, 13 additional sub tests are available. These are arranged into three groups that can be accessed only from the front panel. On the 2631B the keys on the front panel are used with the SELF TEST key to access the sub tests. The sub tests on the 2635B are accessed by using the numeric keys with the SELF TEST key.

On the 2631B the keys are defined as follows for use in accessing the sub tests:

ON LINE	= 0
6/8 LPI	= 1
FORM FEED	= 2
LINE FEED	= 3

To access a sub test, hold down the SELF TEST key while entering the correct code on the other keys. In the discussion about the sub tests, the following convention is observed:

S = Press SELF TEST key down and hold it down during the following key entry.

s = Release the SELF TEST key.

If you press more than two keys in succession, the 2631B and the 2635B will accept only the last two entries. For example, if you press 0,1,1,2,2, the printer/terminal will do subtest 2.2. If you attempt to access a nonexistent self-test, the printer/terminal responds with an audible tone—three beeps.

I/O Sub Tests. The I/O sub tests are defined for printers with a serial interface only. Refer to the 2630B Family Reference Manual for a discussion of the I/O sub tests.

Printing Sub Tests. The printing sub tests print various patterns and characters in specified sequences.

Normal Self Test Print Patterns. This is the printing part of the standard self test. Refer to Figure 4-14. This test is non-destructive to printer configurations.

To invoke the test S 2 s or S 0,2 s.

Ripple Print and H Pattern Test. The ripple print test prints a half upper page (30 lines) of ripple pattern. The H pattern test prints a half lower page of (30 lines) of upper case H. This test is non-destructive to printer configurations.

To invoke the test S 2,0 s.

30% Duty Exercise Test. The 30% duty exercise test prints for about 25 minutes at about a 30% print duty cycle. Paper is conserved by overprinting the same line 96 times before a line feed occurs. Then random servo motion is performed for about an hour and then the printing portion repeats itself. This test repeats until the RESET key is pressed or paper runs out. Therefore it is destructive to printer configurations.

To invoke the test S 2,2 s.

10% Duty Print Test. The 10% duty print test prints continuously at about a 10% duty cycle. Paper is conserved by reprinting the same line many times before a line feed. This test repeats until the RESET key is pressed or paper runs out. Therefore it is destructive to printer configurations.

To invoke the test S 2,3 s.



GENERAL DIAGNOSTICS.

Print Speed Adjustment Routine. The print speed adjustment routine is used to adjust the print speed of the printer. When invoked, the print head is driven between the left and right limit switches continuously. If the speed is too fast, the 6 LPI LED is on for the 2631B and the DATA SET READY LED is on for the 2635B. When the speed is too slow, the ON LINE LED is on. Both LED's are off when the speed is within the tolerance. The routine repeats until RESET is pressed and therefore it is destructive to printer configuration. Refer to the print speed adjustment procedure for details. (Note: the self test override switch on the printer logic PCA must be set to run this routine.)

To invoke the test S 3 s.

ROM Check Test. This is the ROM check test performed during the standard self test and at power on. This test is non-destructive to printer configurations.

To invoke the test S 3,0 s.

Stack Test. This is the stack test performed during the standard self test and at power on.

To invoke the test S 3,1 s.

Fast RAM Test. The fast RAM test checks all the RAM locations and then restores them. A tone sounds when the test is completed.

To invoke the test S 3,2 s.

High Speed Skip Test. The high speed skip test moves the print head at high speed until the RESET button is pushed. This test doesn't move paper or print anything.

To invoke the test S 2.1 s.

SELF TEST ERROR REPORTING. In the event that the self test fails, all LEDs on the unit will flash at about a 2 Hz rate to tell the operator of the failure. These same LEDs can also be used to display eight bit error codes to indicate which portion failed.

In the 2631B units the ON LINE, 6LPI, 8 LPI, and DISPLAY FUNCTIONS LEDs on the operator control panel are used to indicate failures. Once the LEDs start flashing they will flash until the FORM FEED, LINE FEED, or RESET Switch is pressed. If the FORM FEED switch is pressed, the first four bits of the eight bit error code are displayed via the LEDs. Pressing the LINE FEED switch displays the last four bits of the error code. Table 4-1 lists the indicators and error codes used on the 2631B/35B. Pressing the RESET switch will clear the error indication and return the unit to power-on default conditions. Any printer configuration information will be lost when RESET is pressed.

The 2635B uses the CLEAR TO SEND (CB) and DATA SET READY (CC) LEDs on the keyboard to flash failure indication. They will continue to flash until either the 1,2,3,4, or RESET key is pressed. These are the top numeric keys. If key 1 is pressed bits 0 and 1 of the eight bit error code are displayed on the CLEAR TO SEND and DATA SET READY LEDs, respectively. Pressing key 2 will display bits 2 and 3, key 3 will display bits 4 and 5 and key 4 will display bits 6 and 7. The error codes are listed in Table 4-1. Pressing RESET will clear the error indication and return the unit to the power-on default conditions. Printer configuration information will be lost when RESET is pressed.

Table 4-1 Error Indicators and Codes (2631B/35B).

Part A. To get error indicators for the 2635B:							
CB	CC	CB	CC	CB	CC	CB	CC
0	1	2	3	4	5	6	7
key 1		key 2		key 3		key 4	

Table 4-1. Error Indicators and Codes (2631B/35B) (cont'd)

Part B. To get error indicators for the 2631B:							
ONLINE	6LPI	8LPI	DISPLAY FUNCTIONS	ONLINE	6LPI	8LPI	DISPLAY FUNCTIONS
0	1	2	3	4	5	6	7
FORM FEED				LINE FEED			
Part C. Error Codes:							
ERROR TYPE		MOST SIGNIFICANT FOUR BITS		LEAST SIGNIFICANT FOUR BITS			
ROM Error		0001		ROM location code. See Fig. 4-15. Value from 0 to 7(hex).			
RAM Error		0001		RAM location code. See Fig. 4-15. Value from 8 to F (hex).			
Stack Error		0100		Not used			
Servo Position		0011		0 — head going to the left. 1 — head going to the right.			
HP-IB Error		1100		Not used.			

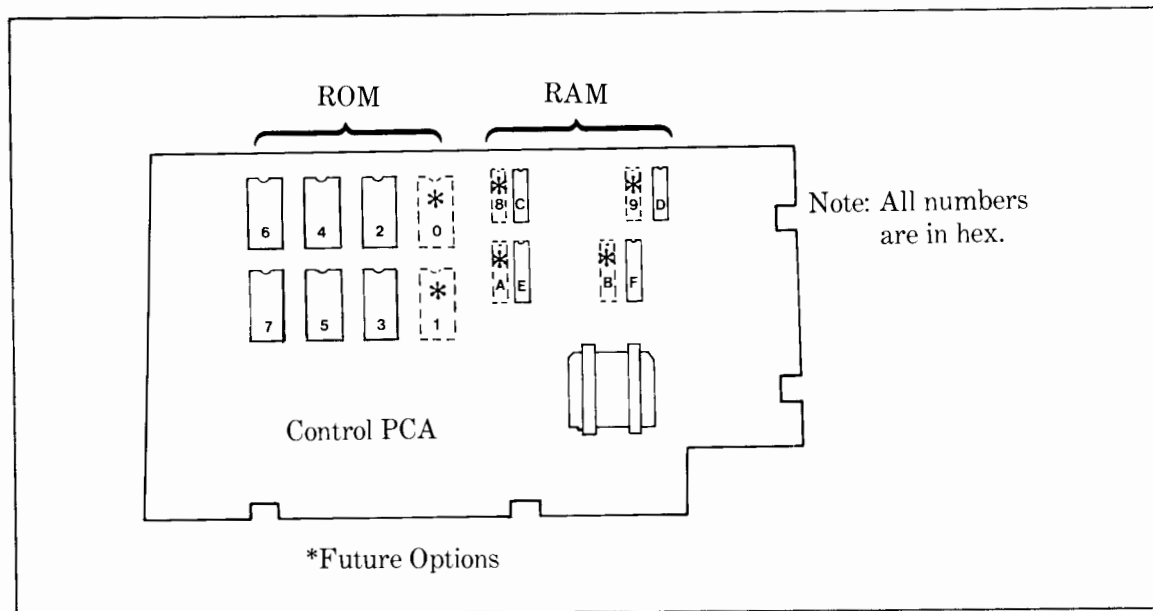


Figure 4-15. ROM and RAM locations on Control PCA.

4-32. Self-Test (2631G)

The TEST switch on the operator control panel initiates a routine which tests the unit to determine if it is in proper operating condition. To perform self-test from the operator control panel, press and release the TEST switch. When the switch is pressed, the following occurs:

- a. ROM's and RAM's are tested. A check sum is performed on the ROM's, but the character set is not tested. A test of the RAM's and the real-time clock is also run. An audible tone sounds if all tests function correctly.
- b. Servo movement is checked. If the carriage is not in the "home" position (column 1), the carriage will first drive to the left. From the "home" position the carriage will drive right to the right crash stop, then reverse and drive to the "home" position again. The unit checks to ensure that the servo drives the carriage from one side to the other within eight seconds. The following conditions must be satisfied to sound the tone a second time:
 1. Servo drive time not exceeded.
 2. Column count must be within bounds (column 1 at "home", columns 135-145 at right crash stop).
 3. Direction bit is correct.
- c. Test the I/O. The self-test program tests the I/O, dependent on which I/O option is installed.
- d. Immediately after the interface test has been completed, default conditions for the self-test are established, a check sum is performed on the character set ROM's, then the unit performs the printing test. The order of the printing test is: two lines at 6 lines per inch (LPI) with a character density of 10 characters per inch (CPI), two lines at 8 LPI with a character density of 10 CPI, three lines at 6 LPI with character densities of 14.4 CPI, 7.2 CPI, and 5 CPI, respectively, one line in the auto-underline mode, one line of the graphics display, one line each for all character sets installed in the unit, and one line of the display functions with the full primary character set (see Figure 4-16). The symbols displayed to the left of each character set line are the identify codes for each set.



Figure 4-16. 2631G Self-Test Printout

NOTE

If a secondary character set has not been selected or is not present, the second line of the printout will be blank.

- e. If the self-test routine was initiated from the operator control panel, the printer will remain off-line. If self-test was initiated remotely via a control code, the printer will remain on-line.

A continuous ripple print feature is also part of the printer's self-test function. It is accessed by pressing the TEST switch twice within 300 milliseconds. Once invoked, this test pattern will be repeated continuously and can only be terminated by pressing the RESET switch (pressing the RESET switch to terminate ripple print will cause programmable information to be lost and return the unit to power-on default conditions).

If the LINE FEED switch is pressed when the unit is printing the continuous ripple print portion of self-test, the unit will print on the same line 27 times before performing a line feed. Each toggling of the LINE FEED switch will toggle the overprint mode. The unit must be reset to cancel this operation.

One additional aid for the service personnel has been included on the 2631G. This aid consists of a row of LED's along the top edge of the raster logic PCA. Following a self-test failure, an error indication will be displayed on the row of LED's (provided that the hardware is operating sufficiently to display the error code). The error indications listed in Table 4-2. should be viewed from the front of the unit, and read from left to right. LED 1 (the leftmost LED) will always be blinking. A power-on reset or successful completion of another self-test will return the LED's to normal operation (LED 1 blinking, all others extinguished).

NOTE

The LED's on the raster logic PCA are NOT an all-inclusive visual diagnostic for self-test failures. Certain failures will also prevent the LED's from indicating error codes, depending upon which hardware has caused the self-test to be incomplete.

Table 4-2. Self-Test Error Indications (2631G).

LED Indication*	Failure
# 0 0 0 0 0 0 1	First Kword of ROM failed.
# 0 0 0 0 0 1 0	Second Kword of ROM failed.
# 0 0 0 0 0 1 1	Third Kword of ROM failed.
# 0 0 0 0 1 0 0	Fourth Kword of ROM failed.
# 0 0 0 0 1 0 1	Fifth Kword of ROM failed.
# 0 0 0 0 1 1 0	Sixth Kword of ROM failed.
# 0 0 0 0 1 1 1	Seventh Kword of ROM failed.
# 0 0 0 1 0 0 0	Eighth Kword of ROM failed.
# 0 0 1 0 0 0 1	First Kword of RAM failed (16 bits).
# 0 0 1 0 0 1 0	Second Kbyte of RAM failed (8 bits).
# 0 0 1 0 0 1 1	Third Kbyte of RAM failed (8 bits).
# 0 1 0 0 0 0 0	Real-Time Clock test failed.
# 0 1 1 0 0 0 0	Servo test failed.
# 1 0 0 0 0 0 0	I/O test failed.

*A “#” indicates a blinking lamp, a “1” indicates on, and a “0” indicates that the lamp is off.

Three LED's on the power electronics PCA serve as visual indicators of possible problems in the regulated supply voltage circuits. These LED's are located top center on the board. If any of the LED's are extinguished, the fuse for that particular supply voltage should be checked. A dim lamp may be an indication of circuitry problems. Refer to Table 4-3 for failure indications provided by the LED's.

4-33. Problem Diagnosis

Listed in Table 4-3 are some of the probable solutions for failures of the self-test or for fault indications by the LED's on the power electronics PCA. Other possible failures are also covered. Refer to the self-test paragraphs for descriptions of the checks performed by the various self-tests.

Table 4-3. Troubleshooting Hints

PROBLEM	POSSIBLE CAUSE
POWER ON indicator not illuminated	<ol style="list-style-type: none"> 1. Power cord not connected. 2. Line fuse in power module is bad. 3. No current from power outlet. 4. Indicator light is bad (fan will operate). 5. Control Panel or Keyboard cable is disconnected.
Print quality erratic, very light or smudged.	<ol style="list-style-type: none"> 1. Print head out of adjustment. 2. Ribbon cartridge needs replacing. 3. Print head needs cleaning. 4. Print head bracket on carriage assembly is loose. 5. Bent or improperly seated leadscrew.
Missing dots or ragged characters.	<ol style="list-style-type: none"> 1. Print head out of adjustment. 2. Print head needs cleaning. 3. Bad print head. 4. Printer/Raster Logic PCA is bad. 5. Servo speed too high. 6. Encoder out of adjustment (2631G).
Paper does not advance.	<ol style="list-style-type: none"> 1. Paper not properly loaded; check tractors and paper alignment. 2. Paper perforations damaged. 3. Paper is catching on box. 4. Bad paper drive circuitry (Printer/Raster Logic PCA, Power Electronics PCA, stepper motor). 5. Paper guide too tight. 6. Bad "O" ring paper drive clutch.
Paper tearing or separating on multi-part forms.	<ol style="list-style-type: none"> 1. Paper binding or dragging; check paper path. 2. Multi-part forms not entering unit through the bottom opening.

Table 4-3. Troubleshooting Hints (Cont'd)

PROBLEM	POSSIBLE CAUSE
Paper tearing or separating on multi-part forms (cont'd)	<ol style="list-style-type: none"> 3. Print head needs adjustment. 4. Paper guide too tight.
Circuit breaker trips.	<ol style="list-style-type: none"> 1. Print head movement obstructed (paper jammed, ribbon jammed). 2. Servo drive motor is bad. 3. Defective print structure or leadscrew (excessive friction on guide bars or leadscrew).
Fails ROM/RAM test of Self-Test.	<ol style="list-style-type: none"> 1. Control PCA is bad. 2. Memory information circuits on I/O Interface PCA bad. 3. Clock circuits on Printer Logic PCA bad. 4. Power electronics PCA is bad.
Fails I/O test or power-on routine portion of Self-Test.	<ol style="list-style-type: none"> 1. I/O Interface PCA bad. 2. Control PCA bad. 3. Power Electronics PCA bad.
Fails servo movement check of Self-Test.	<ol style="list-style-type: none"> 1. Circuit breaker tripped; reset and try again. 2. Printer/Raster Logic PCA bad. 3. Power Electronics PCA bad. 4. Control PCA bad. 5. Servo motor, leadscrew, guide rail or carriage may be bad or binding. 6. Encoder PCA bad. 7. Keyboard PCA is bad (terminals only).
Printing portion of Self-Test fails or is bad.	<ol style="list-style-type: none"> 1. Print head or associated fuses on Power Electronics PCA are bad. 2. Power Electronics PCA bad. 3. Printer/Raster Logic PCA bad. 4. Control PCA bad (2631G). 5. Encoder PCA bad or Encoder alignment needed. 6. I/O Interface PCA bad.

Table 4-3. Troubleshooting Hints (Cont'd)

PROBLEM	POSSIBLE CAUSE
+5 LED off or noticeably different intensity.	<ol style="list-style-type: none"> 1. Check fuses on Power Electronics PCA. 2. Check +5V source. 3. Replace Power Electronics PCA. 4. Check crimps in cables P10 and P16.
+12 LED off or noticeably different intensity.	<ol style="list-style-type: none"> 1. Check fuses on Power Electronics PCA. 2. Check +12V source. 3. Replace Power Electronics PCA. 4. Check crimps in cables P10 and P16.
-12 LED off or noticeably different intensity.	<ol style="list-style-type: none"> 1. Check fuses on Power Electronics PCA. 2. Check -12V source. 3. Replace Power Electronics PCA. 4. Check crimps in cables P10 and P16.
Power fuses open repeatably	<ol style="list-style-type: none"> 1. Print head coil is shorted (F1, F2). 2. Ribbon cable to head is bad. 3. Servo cable to head is bad. 4. Static enables SCR (CR10) and opens fuse (F1). (Only on certain Power Electronics PCAs in 2631G units).
Random dots missing in characters.	<ol style="list-style-type: none"> 1. Check encoder alignment in 2631G units. 2. Check servo speed adjustment. 3. Dirty print head. 4. Head-to-platen gap is too wide.
Random shifting of left margin in and out.	<ol style="list-style-type: none"> 1. If shift is by dot columns, check encoder alignment in 2631G units. 2. If shift is by complete characters, check encoder alignment and head location circuits (Printer/Raster Logic PCA and Control PCA). 3. Check crash stops. 4. Check for static problems.
Occasional stepping of left margin to the right.	<ol style="list-style-type: none"> 1. Static electricity from paper being stacked on floor. Stack paper in grounded catcher.

Section V. Replaceable Parts

5-1. INTRODUCTION

This section of the manual provides information on parts ordering and gives a breakdown on replaceable parts for standard configurations of the unit. Special product configurations or changes made since the printing of this manual are described by updating supplements supplied with this manual.

5-2. DESCRIPTION OF PARTS LIST

The parts lists contain three columns which furnish the following information for each replaceable part:

- a. REF. DES./INDEX NO. This column lists the reference designator or index number (callout number) which identifies each part in the appropriate illustrated parts breakdown (IPB). Asterisks are entered to the left of any entry which varies from the basic parts list or is changed in later versions of the unit. Entries are arranged alphanumerically.
- b. DESCRIPTION. This column gives the name and a brief description of the part.
- c. HP PART NO. This column lists the Hewlett-Packard part number for each part.

5-3. PARTS ORDERING PROCEDURE

To order parts from Hewlett-Packard, or to obtain further information about parts, address the order or inquiry to the nearest Hewlett-Packard Sales and Service Office. When ordering from Hewlett-Packard, give the following information on each part:

- a. Model and serial number.
- b. Hewlett-Packard part number.
- c. Description of the part.
- d. Circuit reference designator or index number, if applicable.
- e. If the part is installed on a PCA, give the series code of the PCA which is stamped or etched on the PCA.

2631B Top Level Assembly

REF. DES./ INDEX NO.	DESCRIPTION	HP PART NO.
1	SCR:M5 8X16 PAN	0515-0051
2	SCR:M5X10PAN	0515-0052
3	SCR:M5 8X60 LG	0515-0060
4	WELL-NUT Q-1032	0590-1077
5	SCR:6-19X5 PAN	0624-0400
6	SCR:M5 8X14.27	1390-0401
7	CBL RTNR	1400-0611
9	FUSE:2.5A SB	2110-0380
10	SW:PWR 15A UL	3101-2205
11	LABLE, REG.	7120-6846
12	LABLE, I.D.	7120-6847
13	SOUND INS:MN CVR	02631-00045
14	WSHR: LK 6 HEL	2190-0018
15	MOLDING - RUBBER	4320-0323
16	URTH FM STRP	0460-1315
17	BASE, PAINTED	02631-00040
18	SHIELD BASE	02631-00006
19	ASSY: CONTROL PNL STD OPT 051 or	02631-60203
19	ASSY: CONTROL PNL OPT 044,046,050,240	02631-60201
20	PCA:PWR ELEC	02631-60277
21	PCA: MOTHER BD	02631-60002
22	CVR:ACCESS PNTD	02631-00002
23	PCA:MC-5 CONTROL	02631-60224
24	PCA:PRNTR.LOGIC	02631-60225
25	PCA: FDX SER. I/O STD or	02631-60230
25	PCA: 8 BIT DIFF OPT 050 or	02631-60228
25	PCA: 8 BIT TTL OPT 044 or	02631-60227
25	PCA: HP-IB OPT 046	02631-60226
27	ADAPTER:RS-232 STD or	02631-60234
27	ADAPTER:264X BLADE TYPE OPT 051 or	02631-60235
27	ADAPTER:8 BIT DIFF OPT 050 or	02631-60017
27	ADAPTER:8 BIT TTL OPT 044 or	02631-60018
27	ADAPTER:HP-IB OPT 046	02631-60011
28	PWR TRANS ASSY	02631-60020
29	TOP COVER	02631-00041
30	ASSY:PRINT MECH	02631-60238
31	ASSY:RBN CRTG	02631-60060
32	WSHR #6	3050-0016
33	FAN ASSY	02631-60040
34	PWR MODULE ASSY	02631-60055
35	LINE FILTER ASSY	02631-60056
36	KNOB	0370-2573
37	BUMPER	4320-0303
38	WSHR:M5 FLAT	3050-0894
39	WSHR:M5 SPLIT	2190-0587
41	NUT: M3 HEX	0535-0004
43	WASHER-LOCK	2190-0597
45	CLIP MOLD FLAT	1400-0698
46	FOAM SPACER	4208-0193
47	PROM	02631-60329
48	PROM	02631-60330
49	PROM	02631-60331
50	SCR:M3X10 SHCS	0515-0112
51	SCR:M4X8MM	0515-0135
52	INLAY	0350-0151
58	LUG: DBL .187W	0360-1929
59	TERM:LUG CRIMP	0360-1938
64	PRINT HEAD ASSY	02631-60068
65	HD GD ASSY	02631-60097

Replaceable Parts

REF. DES./ INDEX NO.	DESCRIPTION	HP PART NO.
66	WINDOW	4040-1191
67	SND INS:ACC CVR	02631-00047
68	LABEL PM	7120-7095
69	SCR:4-20X.312	0624-0324
70	SCR:M3X25	0515-0065
71	TERM - SLG	0360-0683
73	NAME PLATE:2631B	02631-00084
74	CABLE CLAMP	1400-0294
75	LBL:SER.LEGEND	02631-00063
76	SPRING CONTACT	02631-00076
77	ASSY:ANTI-STATIC	02631-60273
80	LABEL-WARRANTY	7120-7029
	CLAMP:CBL .50DIA	1400-0294
	POWER CORD	8120-1378
	BRUSH:ACID	8520-0015
	SKT SCR KEY MTRC	8710-1181

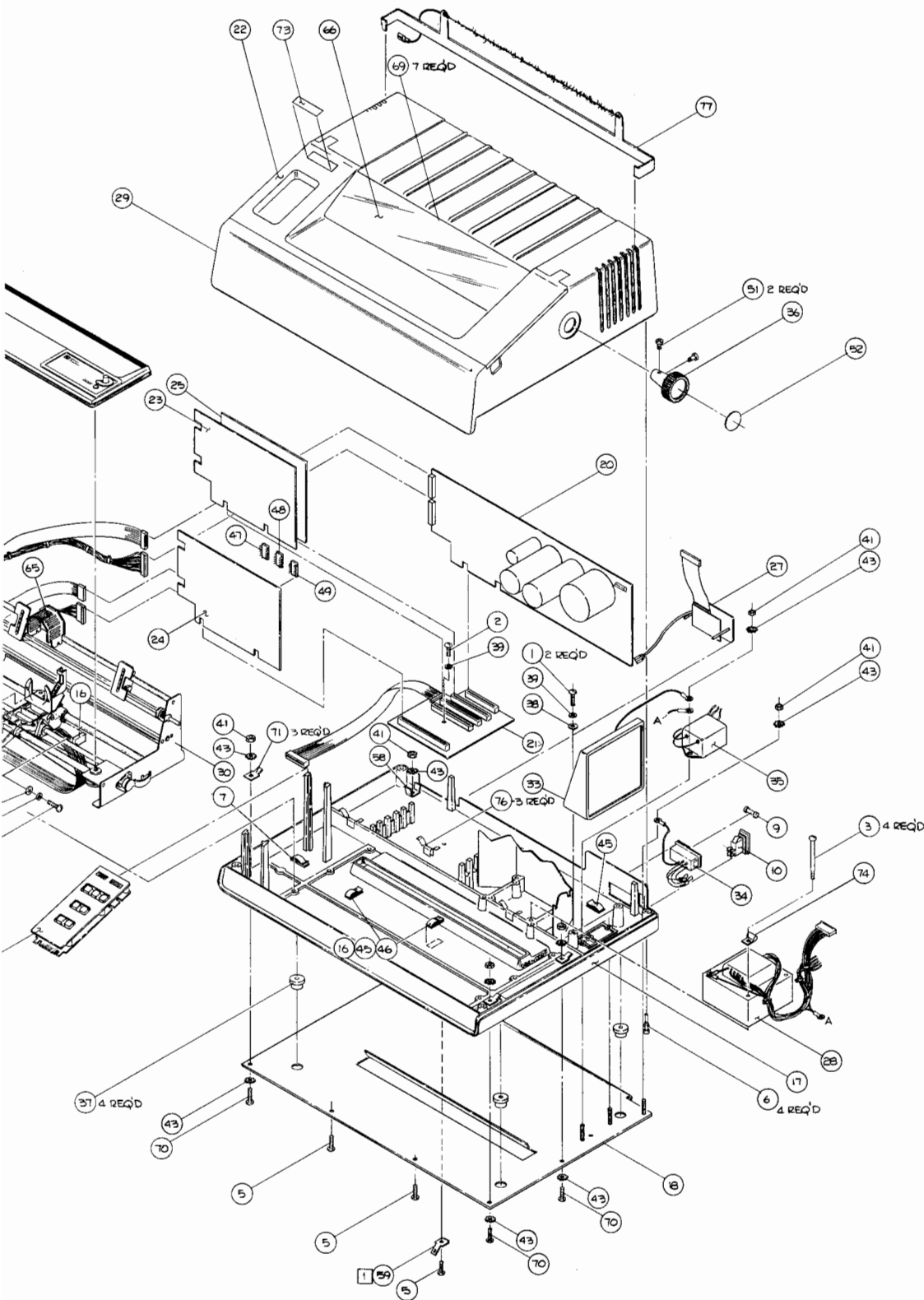
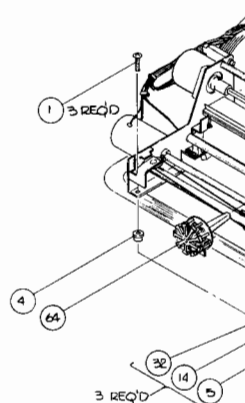
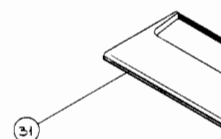


Figure 5-1. 2631B Top Level Assembly



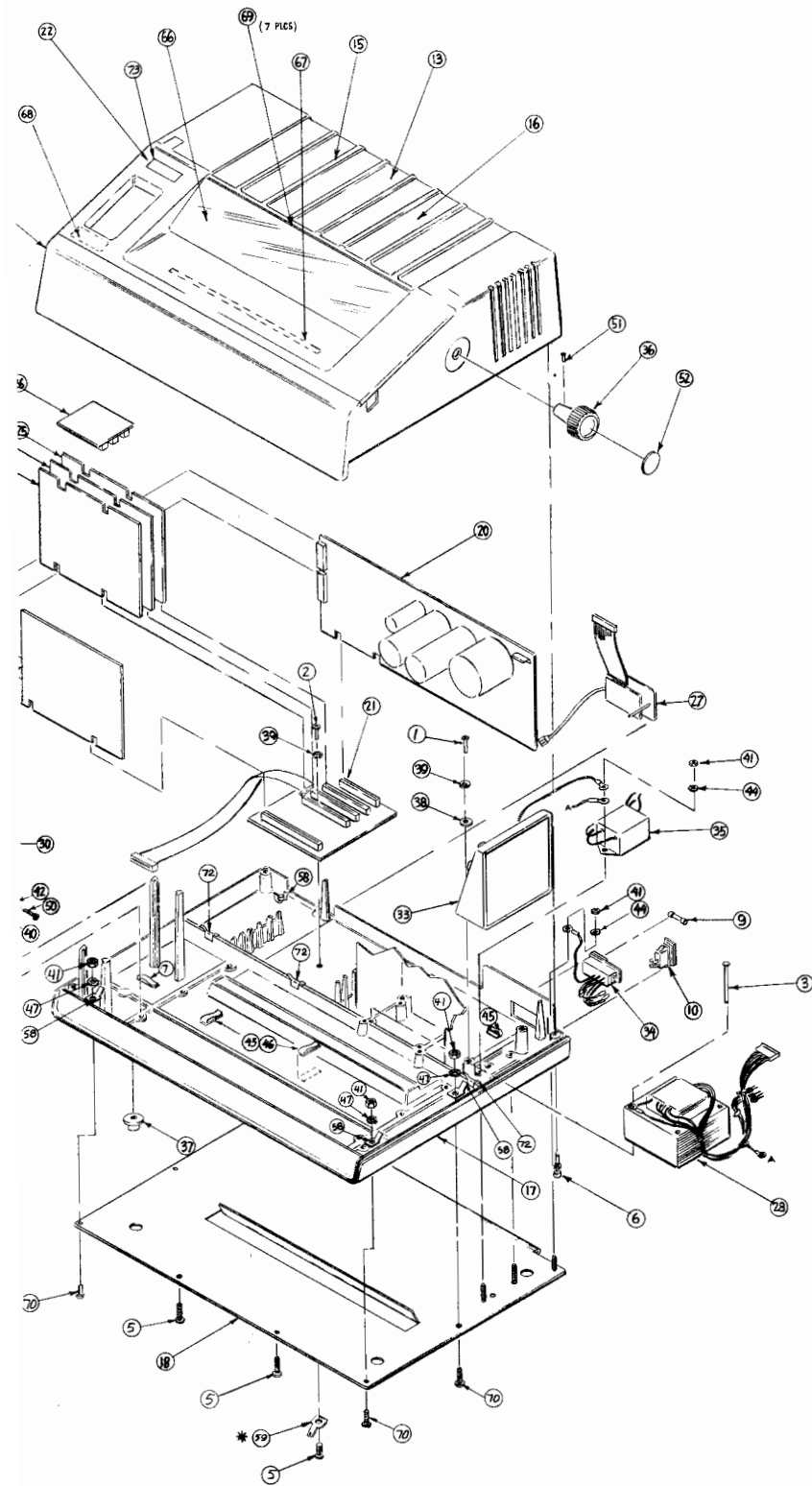
- NOTES:
- 1 ATTACH ITEM 59 FROM SHIELD SIDE USING ITEM 5 PLASTITE SCREW. CONNECTOR TAB MUST FACE REAR OF MACHINE. BEND TAB FROM ORIGINAL 45° ANGLE TO 30° ANGLE.
 - 2 REFER TO A-02631-901721 FOR APPLICATION PROCEDURE OF ITEMS 11, 12, 68, 72, 75, 80.
 - 3 REFER TO C-02631-90066-1 FOR INSTALLATION OF ITEMS 8, 13, 15, 16, 66, 67, 69 ON MAIN AND ACCESS COVER ASSEMBLIES.
 - 4 REFERENCE DESIGNATORS ARE COORDINATED WITH OTHER TOP LEVEL ASSY DRAWINGS.

Replaceable Parts

2631G Top Level Assembly Series 1935

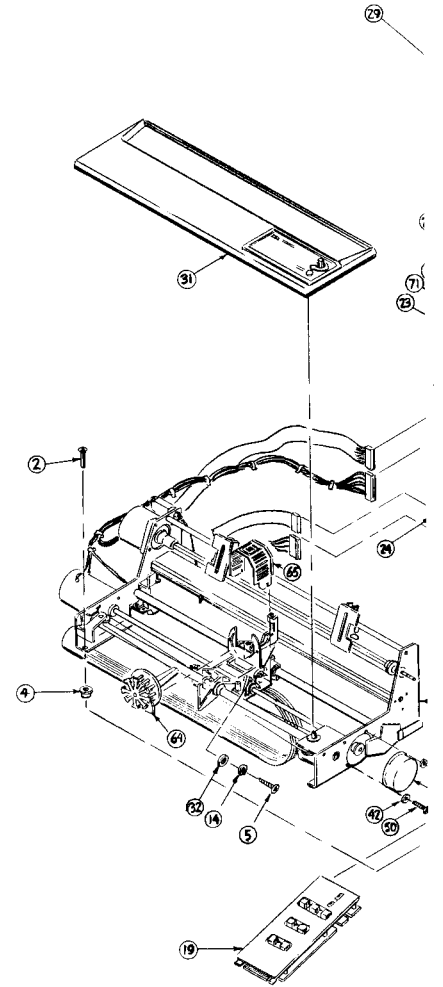
REF. DES./ INDEX NO.	DESCRIPTION	HP PART NO.
1	SCR:M5 8X16 PAN	0515-0051
2	SCR:M5X10PAN	0515-0052
3	SCR:M5 8X60 LG	0515-0060
4	WELL-NUT Q-1032	0590-1077
5	SCR:6-19X5 PAN	0624-0400
6	SCR:M5 8X14.27	1390-0401
7	CBL RTNR	1400-0611
9	FUSE:2.5A SB	2110-0380
10	SW:PWR 15A UL	3101-2205
11	TABLE, REG.	7120-6846
12	TABLE, I.D.	7120-6847
13	SOUND INS:MN CVR	02631-00045
14	WSHR:LK 6 HEL	2190-0018
15	MOLDING - RUBBER	4320-0323
16	URTH FM STRP	0460-1315
17	BASE, PAINTED	02631-00040
18	SHIELD BASE	02631-00006
19	CONTROL PANEL	02631-60087
20	PCA:PWR ELEC	02631-60001
21	PCA:MOTHER BD	02631-60236
22	CVR:ACCESS PNTD	02631-00002
23	PCA:MCC/CONTROL	02631-60089
24	PCA: PRNTR CONT	02631-60100
25	PCA: HPIB-G	02631-60145
26	PCA:3POS CNTL BS	02631-60014
27	PCA: HP-IB CONN	02631-60011
28	PWR TRANS ASSY	02631-60020
29	TOP COVER	02631-00041
30	GRAPHICS:PT MECH	02631-60147
31	ASSY: RBN CRTG	02631-60060
32	WSHR #6	3050-0016
33	FAN ASSY	02631-60040
34	PWR MODULE ASSY	02631-60055
35	LINE FILTER ASSY	02631-60056
36	KNOB	0370-2573
37	BUMPER	4320-0303
38	WSHR:M5 FLAT	3050-0894
39	WSHR:M5 SPLIT	2190-0587
40	CVR:ENCODER	02631-40006
41	NUT: M3 HEX	0535-0004
42	WSHR:M3 FLAT	3050-0891
43	WSHR:M3 LOCK	2190-0584
44	WSHR:LK 4 EXT	2190-0005
45	CLIP MOLD FLAT	1400-0698
46	FOAM SPACER	4208-0193
47	WASHER:LOCK #8	2190-0413
50	SCR:M3X10 SHCS	0515-0112
51	SCR:M4X8MM	0515-0135
52	INLAY	0350-0151

REF. DES./ INDEX NO.	DESCRIPTION	HP PART NO.
55	TERM:CRP LUG #8	0362-0413
56	LUG-CRP RED #6	0362-0452
57	WR18GWHT GRN	8150-1674
58	TERM - SLG	0360-0683
59	TERM:LUG CRIMP	0360-1938
64	PRINT HEAD	02631-60068
65	HD GD ASSY	02631-60097
66	WINDOW	4040-1191
67	SND INS:ACC CVR	02631-00047
68	LABEL-INFO	7120-7095
69	SCR:4-20X.312	0624-0324
70	SCR--M3X25	0515-0065
71	PCA: 24K PROM	02631-60102
72	SPRING CONTACT	02631-00076
73	LABEL	02631-00083
	TAPE-IND DBL SD	0460-1243
74	CLAMP:CBL .50DIA	1400-0294
	WINDOW	4040-1191
	LABEL-WARRANTY	7120-7029
	POWER CORD	8120-1378
	BRUSH:ACID	8520-0015
	SKT SCR KEY MTRC	8710-1181



*** NOTE:**
 ATTACH ITEM 59 FROM SHIELD SIDE
 USING THE SAME ITEM 5 PLASTITE SCREW
 THE CONNECTOR TAB MUST FACE THE REAR
 OF THE MACHINE. BEND TAB FROM ORIGINAL
 45° ANGLE TO 50°

Figure 5-2. 2631G Top Level Assembly Series 1935



Replaceable Parts

2635B Top Level Assembly

REF. DES./ INDEX NO.	DESCRIPTION	HP PART NO.
1	SCR:M5 8X16 PAN	0515-0051
2	SCR:M5X10PAN	0515-0052
3	SCR:M5 8X60 LG	0515-0060
4	WELL-NUT Q-1032	0590-1077
5	SCR:6-19X5 PAN	0624-0400
6	SCR:M5 8X14.27	1390-0401
7	CBL RTNR	1400-0611
9	FUSE:2.5A SB	2110-0380
10	SW:PWR 15A UL	3101-2205
11	LABEL REGULATORY	7120-8592
12	LABLE, I.D.	7120-6847
13	SOUND INS:MN CVR	02631-00045
14	WSHR:LK 6 HEL	2190-0018
15	MOLDING - RUBBER	4320-0323
16	URTH FM STRP	0460-1315
17	BASE, PAINTED	02635-00003
18	SHIELD BASE	02631-00006
20	PCA:PWR ELEC	02631-60277
21	PCA: MOTHER BD	02631-60002
22	ACCESS CVR	02635-00006
23	PCA:MC-5 CONTROL	02631-60224
24	PCA: PRNTR. LOGIC	02631-60225
25	PCA FDX SER.I/O	02631-60230
27	ADAPTER: RS232 STD or	02631-60234
27	ADAPTER:264X BLADE TYPE OPT 051	02631-60235
28	PWR TRANS ASSY	02631-60020
29	TOP COVER	02635-00007
30	ASSY:PRINT MECH	02635-60025
31	ASSY:RBN CRTG	02631-60060
32	WSHR #6	3050-0016
33	FAN ASSY	02631-60040
34	PWR MODULE ASSY	02631-60055
35	LINE FILTER ASSY	02631-60056
36	KNOB	0370-2573
37	BUMPER	4320-0303
38	WSHR:M5 FLAT	3050-0894
39	WSHR:M5 SPLIT	2190-0587
41	NUT: M3 HEX	0535-0004
43	WASHER-LOCK	2190-0597
45	CLIP MOLD FLAT	1400-0698
46	FOAM SPACER	4208-0193
47	PROM	02631-60329
48	PROM	02631-60330
49	PROM	02631-60331
50	SCR:M3X10 SHCS	0515-0112
51	SCR:M4X8MM	0515-0135
52	INLAY	0350-0151
53	KEYBOARD SHIELD	02635-00001
54	KYBD ASSY	02635-60033
55	PNL:SPECIAL CONT	02635-00019
58	LUG: DBL .187W	0360-1929
59	TERM:LUG CRIMP	0360-1938

REF. DES./ INDEX NO.	DESCRIPTION	HP PART NO.
64	PRINT HEAD ASSY	02631-60068
65	HD GD ASSY	02631-60097
66	WINDOW	4040-1191
67	SND INS:ACC CVR	02631-00047
68	LABEL PM	7120-7095
69	SCR:4-20X.312	0624-0324
70	SCR:M3X25	0515-0065
71	TERM - SLG	0360-0683
73	LBL:NAME PLATE	02635-00074
74	CLAMP:CBL .50DIA	1400-0294
76	SPRING CONTACT	02631-00076
78	GRND STRAP ASSY	02631-60241
79	CONFIG LABEL	02635-00028
80	LABEL-WARRANTY	7120-7029
	POWER CORD	8120-1378
	BRUSH:ACID	8520-0015
	SKT SCR KEY MTRC	8710-1181
	ASSY:ANTI-STATIC	02631-60273

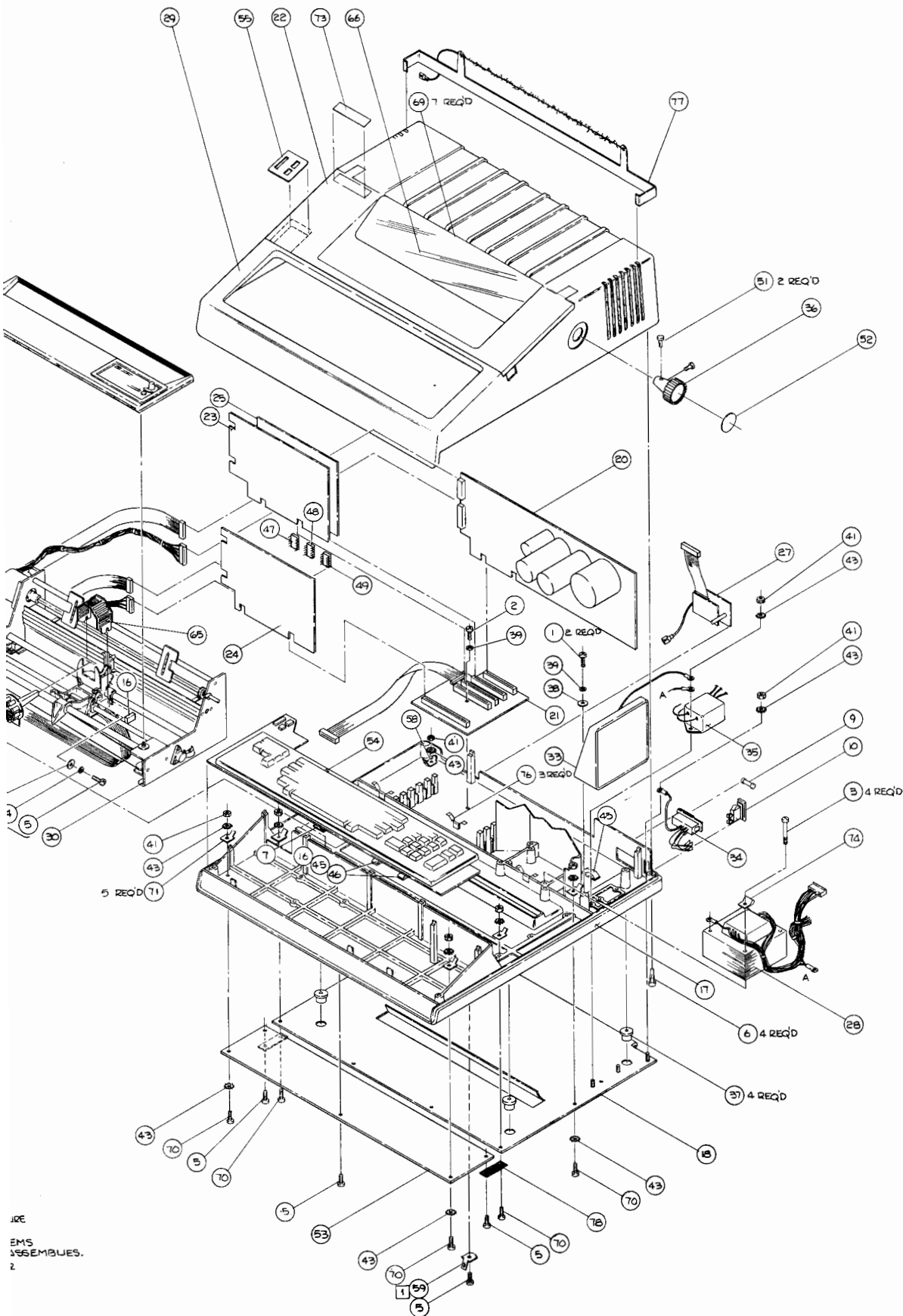
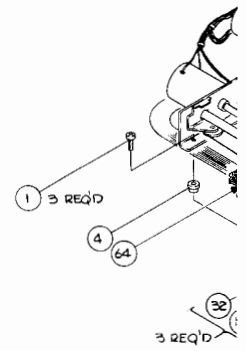
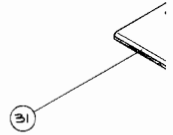


Figure 5-3. 2635B Top Level Assembly

10E
EMS
ASSEMBLIES.
2



NOTES:

1. ATTACH ITEM 59 FROM SHIELD SIDE USING ITEM 5 PLASTITE SCREW. CONNECTOR TABS MUST FACE THE REAR OF THE MACHINE. BEND TABS FROM ORIGINAL 45° TO 30°.
2. REFER TO A-02631-9012-1 FOR APPLICATION PROCED FOR ITEMS 11, 12, 68, 72, 79, 80.
3. REFER TO C-02631-90006-1 FOR INSTALLATION OF 11, 13, 15, 16, 66, 67, 69 ON MAIN AND ACCESS COVER.
4. REFERENCE DESIGNATORS ARE COORDINATED W/ OTHER TOP LEVEL ASSY DRAWINGS.

Replaceable Parts

02631-60238 Print Mechanism Assembly (2631B)

REF. DES./ INDEX NO.	DESCRIPTION	HP PART NO.
1	ADH:PRIT	0470-0415
2	ADHESIVE LOC 601	0470-0535
3	RING RET	0510-0083
4	RING:RET	0510-0091
5	CLAMP COLLAR	0510-0598
6	RING RET	0510-0906
7	WASHER-LOCK	2190-0597
8	SCR:M4X10PAN	0515-0053
9	SCR:M3X10PAN	0515-0054
10	SCR:M4X10PAN TAP	0515-0056
11	M3X16 PAN	0515-0064
12	WSHR:M3 FLAT	3050-0891
13	WSHR:M3 LOCK	2190-0584
14	WSHR:M4 FLAT	3050-0893
15	WSHR:M4 SPT LOCK	2190-0586
16	ADHESIVE LOC 290	0470-0532
17	ADHESIVE PRIMERN	0470-0932
18	SCR:M3X10PAN TAP	0515-0059
19	WSHR THRUST	0570-0612
22	EXTRUDE NEO CORD	4320-0327
26	BEARING BALL	1410-0632
27	BEARING BALL	1410-0633
28	SPRING EXT	1460-0002
29	SPRING	1460-1571
31	ADHESIVE	
32	PULLEY IDLER	1500-0491
33	ASSY:LEAD SCREW	1531-0118
34	SHFT.TRACTOR GDE	02631-20005
37	SHAFT. TRACTOR	02631-20004
39	CBL RBN DRV	1530-2029
40	MOTOR SERVO DC	3140-0594
41	CUP VERNIER CLCH	4040-1200
42	BUSH TRCTR KEY	4040-1202
43	BUSH TRCTR DRV	4040-1207
44	TRACTOR:PAIR	1530-0348
45	PPR GUIDE REAR	02631-00010
46	BRKT PPR OUT	02631-00013
47	GUIDE:FRNT PPR	02631-00014
48	BKT:LH RBN MNT	02631-00053
50	CRSHSTOP CBL ASSY	02631-60016
51	PRT STRUCT ASSY	02631-60027
53	STPR MOTOR ASSY	02631-60030
54	CAP EMITTER END	1000-0589
55	FLEX-CABLE	8120-2763
56	WHEEL:CODE	1000-0588
57	HD MTG ASSY	02631-60223
59	SW:MICRO SWTCH	3101-2222
60	SPEAKER	9160-0262

REF. DES./ INDEX NO.	DESCRIPTION	HP PART NO.
61	BRKT RBN GUIDE	02631-00028
62	CBL RTNR	1400-0611
63	BRKT:TOP OF FORM	02631-00034
64	SCR:M5X6 PAN	0515-0116
66	KEY POLARIZING	1251-3075
67	SCR:M3X10 SHCS	0515-0112
73	SND INS:PPR GDE	02631-00046
75	WSHR-SPRING #4	3050-0445
76	CIRCUIT BREAKER	3105-0094
82	SCR:4-20X.375 PL	0624-0314
84	ANCHOR SPRING	02631-00052
86	LBL:ID	7120-6260
87	WIRE ASSY	02631-60080
88	WASHER:LOCK #8	2190-0413
90	GRND STRAP ASSY	02631-60240
92	BRG NDL RLR	1410-1081
93	SHAFT,RIBN DRV	1530-0334
94	BRKT:RH RBN MNT	02631-00081
95	RBN DRV PULLY AS	02631-60251
96	CASE:ENCODER	1000-0587
97	PLATE ENCDR ADPT	02631-40013
98	SCR:M1.6X5	T-75055
99	ADH LOCTITE 420	0470-0972

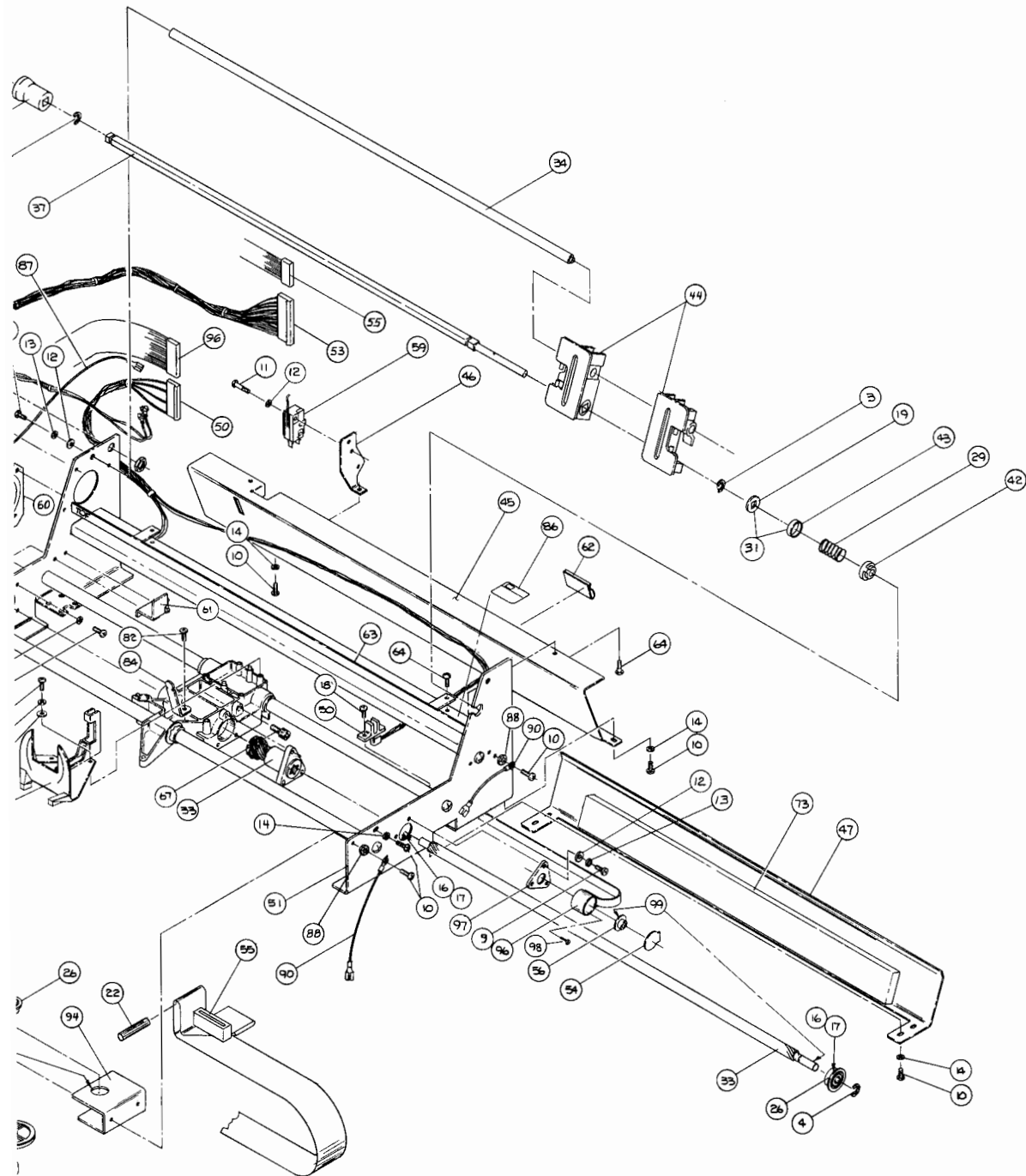
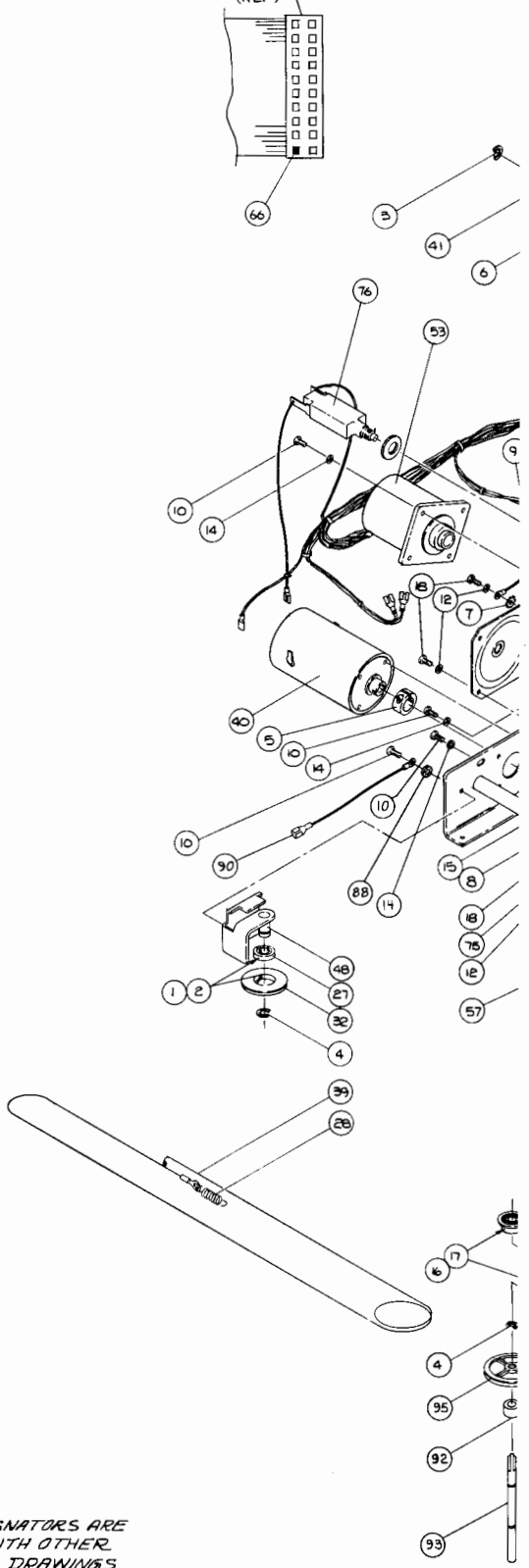


Figure 5-4. 02631-60238 Print Mechanism Assembly
(2631B)

ITEM 55
(REF)



NOTE:
REFERENCE DESIGNATORS ARE
COORDINATED WITH OTHER
PRINT MECHANISM DRAWINGS

Replaceable Parts

02631-60147 Print Mechanism Assembly (2631G) Series 1924

REF. DES./ INDEX NO.	DESCRIPTION	HP PART NO.
3	RING RET	0510-0083
4	RING:RET	0510-0091
5	CLAMP COLLAR	0510-0598
6	RING RET	0510-0906
7	WASHER-LOCK	2190-0597
8	SCR:M4X10PAN	0515-0053
9	SCR:M3X10PAN	0515-0054
10	SCR:M4X10PAN TAP	0515-0056
11	M3X16 PAN	0515-0064
12	WSHR:M3 FLAT	3050-0891
13	WSHR:M3 LOCK	2190-0584
14	WSHR:M4 FLAT	3050-0893
15	WSHR:M4 SPT LOCK	2190-0586
16	ADHESIVE LOC 290	0470-0532
17	ADHESIVE PRIMERN	0470-0932
18	SCR:M3X10PAN TAP	0515-0059
19	WSHR THRUST	0570-0612
22	EXTRUDE NEO CORD	4320-0327
25	TOLERANCE RING	1410-0631
26	BEARING BALL	1410-0632
27	BEARING BALL	1410-0633
28	SPRING EXT	1460-0002
29	SPRING	1460-1571
32	PULLEY IDLER	1500-0491
33	LEAD SCREW ASSY	1530-2013
34	SHFT.TRACTOR GDE	02631-20005
35	TRACTOR RH	1530-2018
36	TRACTOR LH	1530-2019
37	SHAFT. TRACTOR	02631-20004
39	CBL RBN DRV	1530-2029
40	MOTOR SERVO DC	3140-0594
41	CUP VERNIER CLCH	4040-1200
42	BUSH TRCTR KEY	4040-1202
43	BUSH TRCTR DRV	4040-1207
45	PPR GUIDE REAR	02631-00010
46	BRKT PPR OUT	02631-00013
47	GUIDE:FRNT PPR	02631-00014
48	BKT:LH RBN MNT	02631-00053
50	CRSHSTOP CBL ASY	02631-60016
51	PRT STRUCT ASSY	02631-60027
52	CABLE ASSEMBLY	8120-2762
53	STPR MOTOR ASSY	02631-60030
54	ENCDR DISC ASSY	02631-60162
55	FLEX-CABLE	8120-2763
56	PCA:ENCODER ASSY	02631-60163
57	HD MTG ASSY	02631-60223
59	SW:MICRO SWTCH	3101-2222
60	SPEAKER	9160-0262
61	BRKT RBN GUIDE	02631-00028
62	CBL RTNR	1400-0611

REF. DES./ INDEX NO.	DESCRIPTION	HP PART NO.
63	BRKT:TOP OF FORM	02631-00034
64	SCR:M5X6 PAN	0515-0116
66	KEY POLARIZING	1251-3075
67	SCR:M3X10 SHCS	0515-0112
73	SND INS:PPR GDE	02631-00046
75	WSHR-SPRING #4	3050-0445
76	CIRCUIT BREAKER	3105-0094
82	SCR:4-20X.375 PL	0624-0314
84	ANCHOR SPRING	02631-00052
86	LBL:ID	7120-6260
87	WIRE ASSY	02631-60080
88	WASHER:LOCK #8	2190-0413
91	GRND STRAP ASSY	02631-60240
92	BRG NDL RLR	1410-1081
93	SHAFT,RIBN DRV	1530-0334
94	BRKT:RH RBN MNT	02631-00081
95	RBN DRV PULLY AS	02631-60251

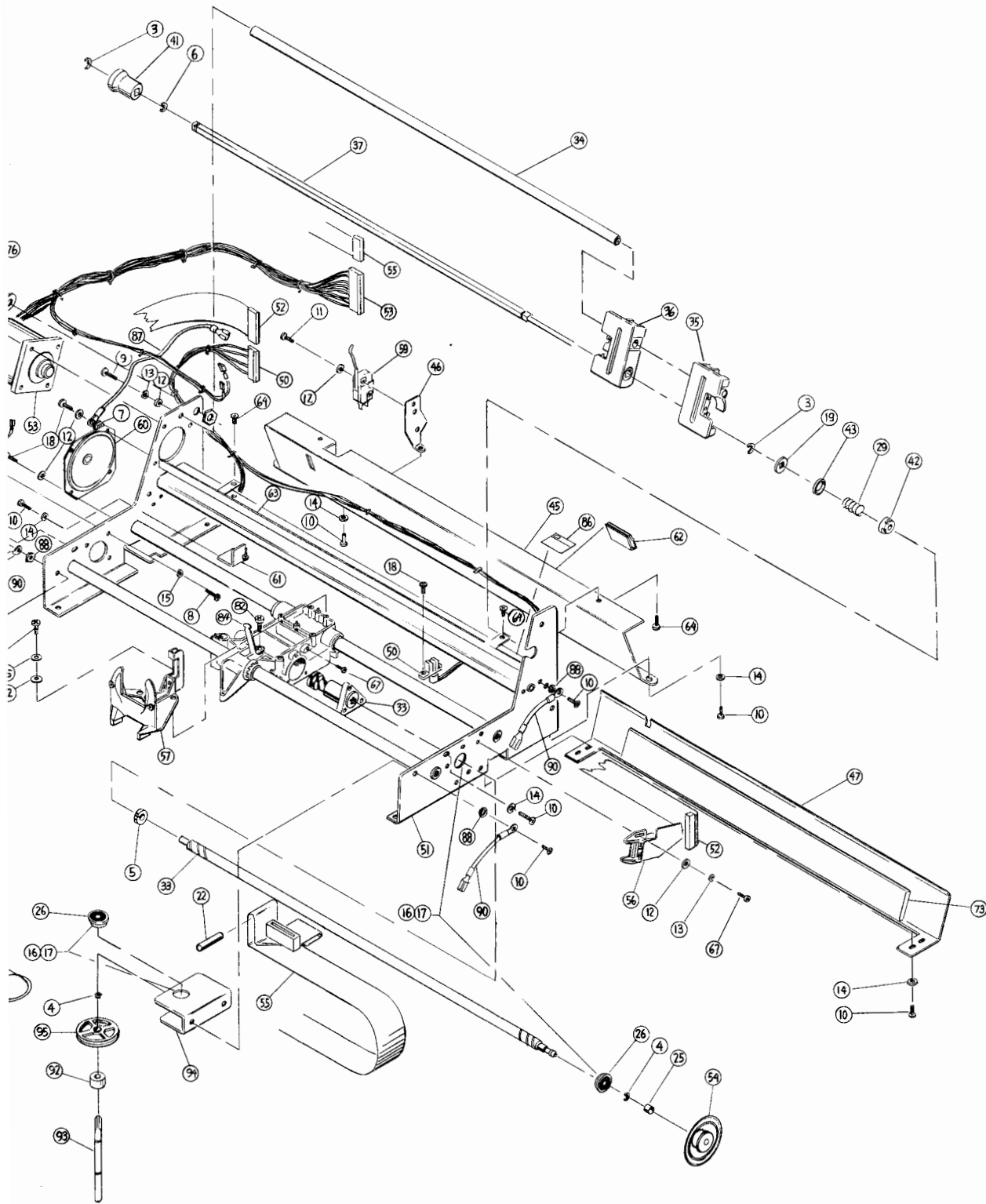
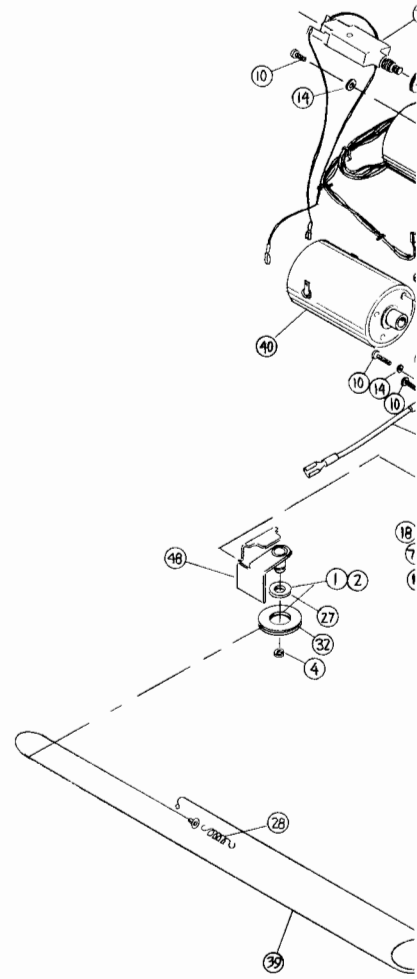
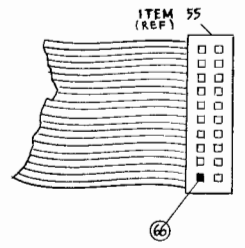


Figure 5-5. 02631-60147 Print Mechanism Assembly (2631G) Series 1924



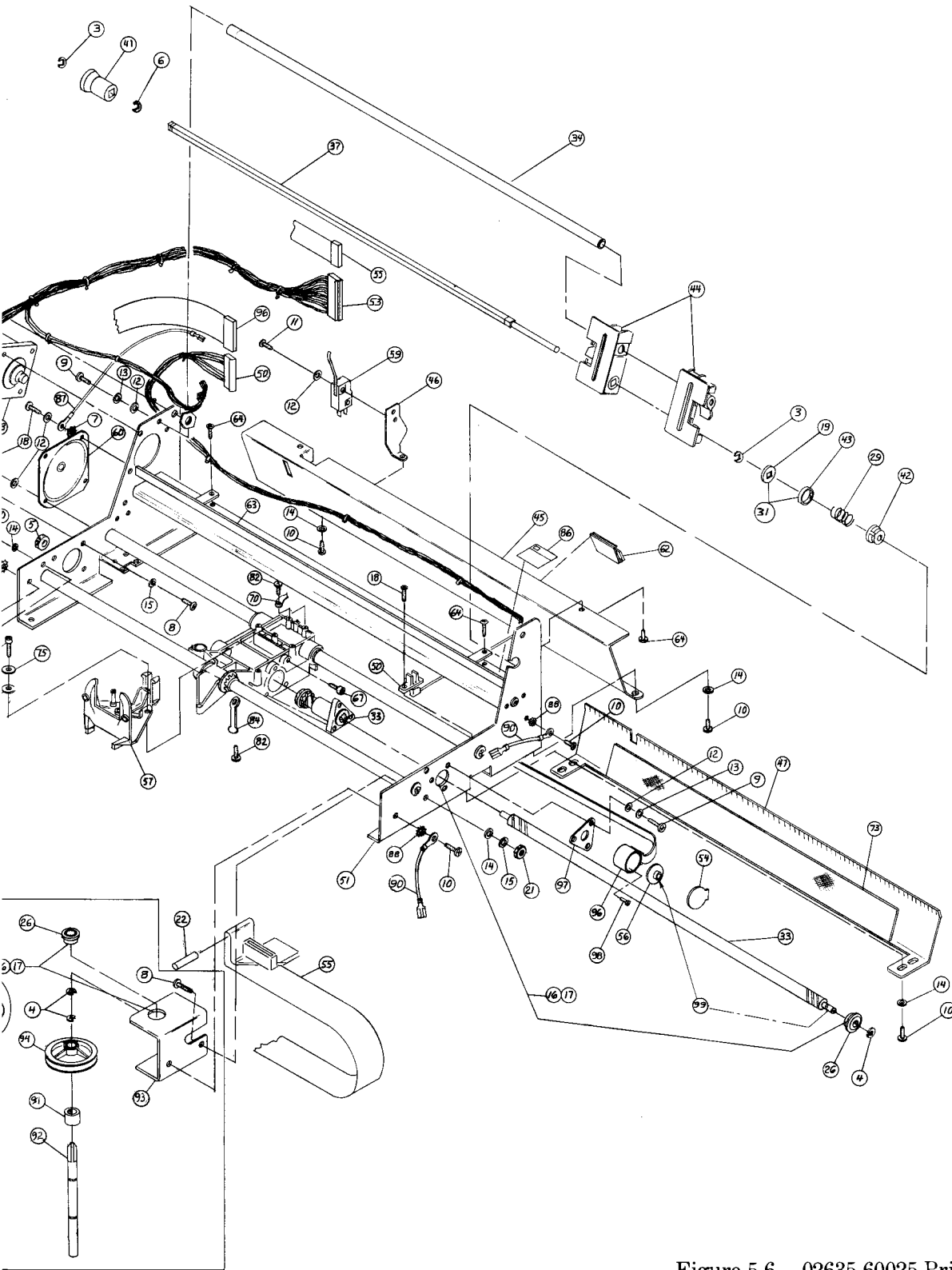
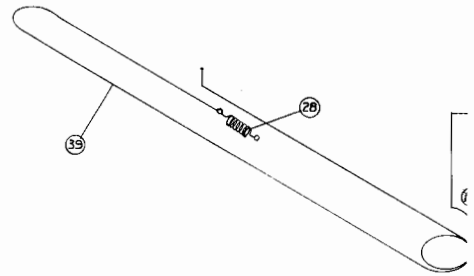
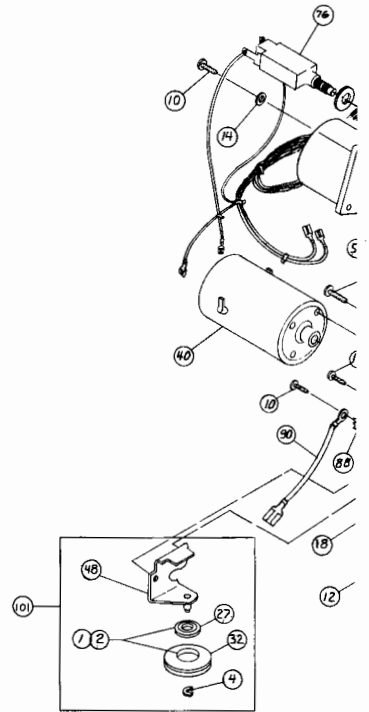
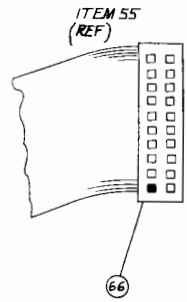


Figure 5-6. 02635-60025 Print Mechanism Assembly (2635B)



NOTE:
REFERENCE DESIGNATORS ARE
COORDINATED WITH OTHER
PRINT MECHANISM DRAWINGS

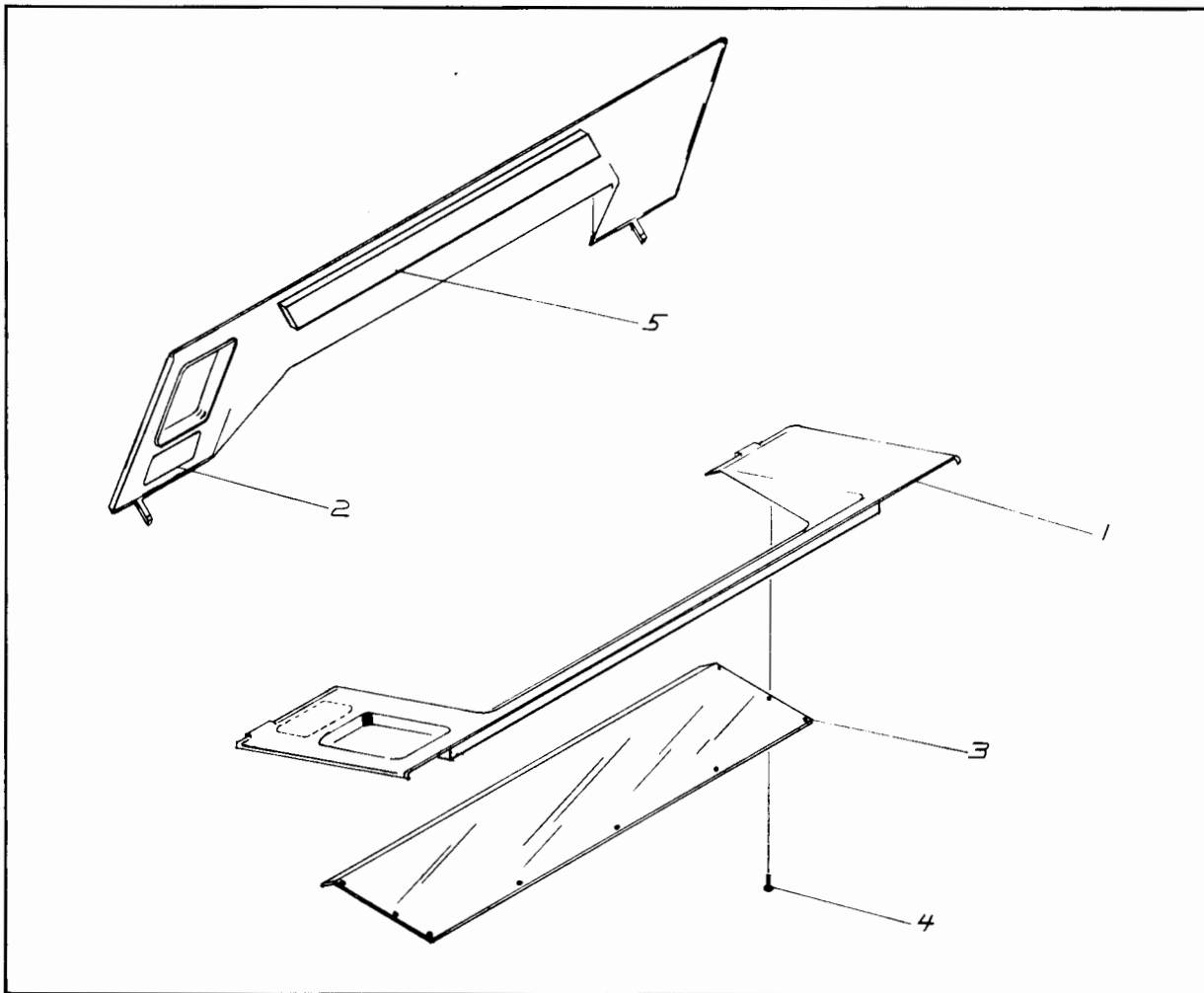


Figure 5-7. 02631-60202 Access Cover Assembly (2631B)/02631-60146 Access Cover Assembly (2631G)

02631-60202 Access Cover Assembly (2631B)

02631-60146 Access Cover Assembly (2631G)

REF. DES./ INDEX NO.	DESCRIPTION	HP PART NO.
1	CVR:ACCESS PNTD	02631-00002
2	LABEL: INFO	7120-7095
3	WINDOW: SS	4040-1191
4	SCR:4X20 .312	0624-0324
5	SND INS:ACC CVR LABEL (2631G)	02631-00047 02631-00083

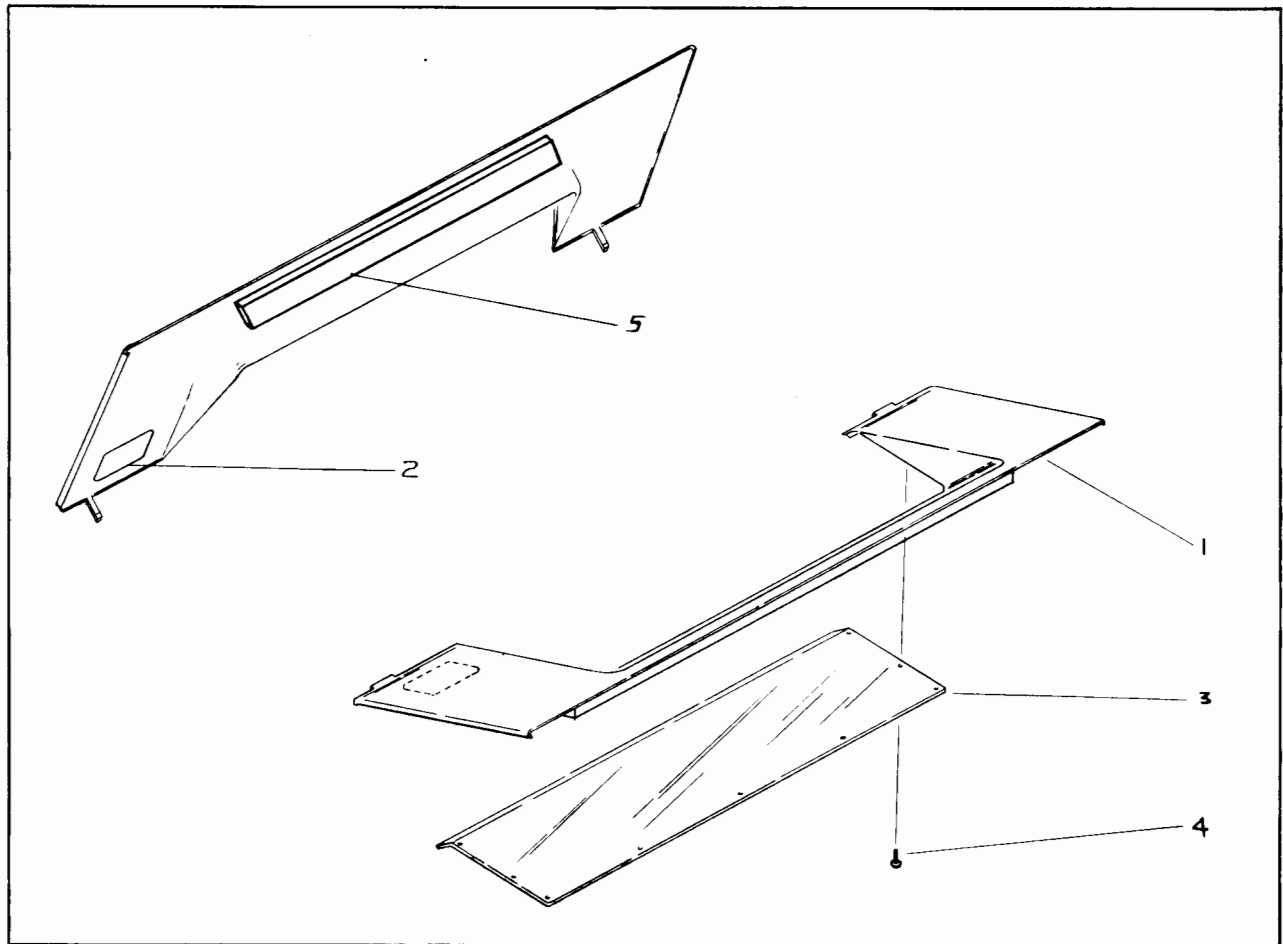


Figure 5-8. 02635-60023 Access Cover Assembly (2635B)

02635-60023 Access Cover Assembly (2635B)

REF. DES./ INDEX NO.	DESCRIPTION	HP PART NO.
1	CVR:ACCESS PNTD	02635-00006
2	LABEL: INFO	7120-7095
3	WINDOW: SS	4040-1191
4	SCR:4X20 .312	0624-0324
5	SND INS:ACC CVR	02631-00047

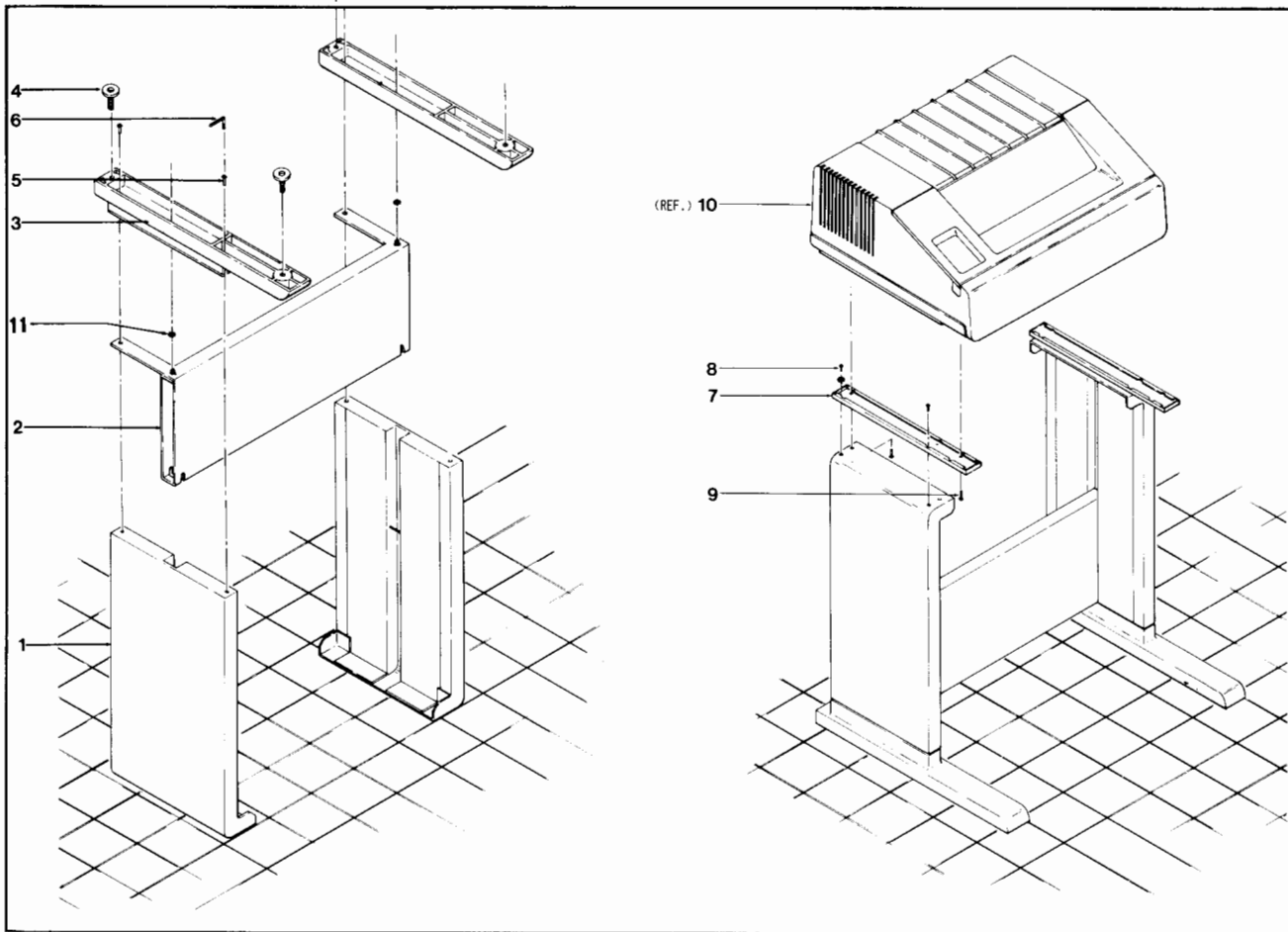


Figure 5-9. 260097-60001 Pedestal Assembly

26097-60001 Pedestal Assembly (2635B)

REF. DES./ INDEX NO.	DESCRIPTION	HP PART NO.
1	LEG ASSEMBLY (2635B)	02635-60005
2	SKIRT ASSEMBLY	02631-60052
3	FOOT ASSEMBLY	02631-60058
4	GLIDE (STANDARD)	0403-0260
4	CASTER (OPT 001)	1492-0045
5	SCR:M6P100X30MM	0515-0094
6	MTRC SKT SCR KEY	8710-1155
7	MOUNTING ARM	02631-00024
8	SCR:M6P100Z10MM	0515-0093
9	SCR:M5X10 PAN	0515-0052
10	PRINTER/TERMINAL	
11	WSHR:M6 STAR PAPER SHELF (NOT SHOWN)	2190-0598 26097-00001

Part No. 02631-90919
Microfiche No. 02631-90819
Printed in U.S.A. 6/81

