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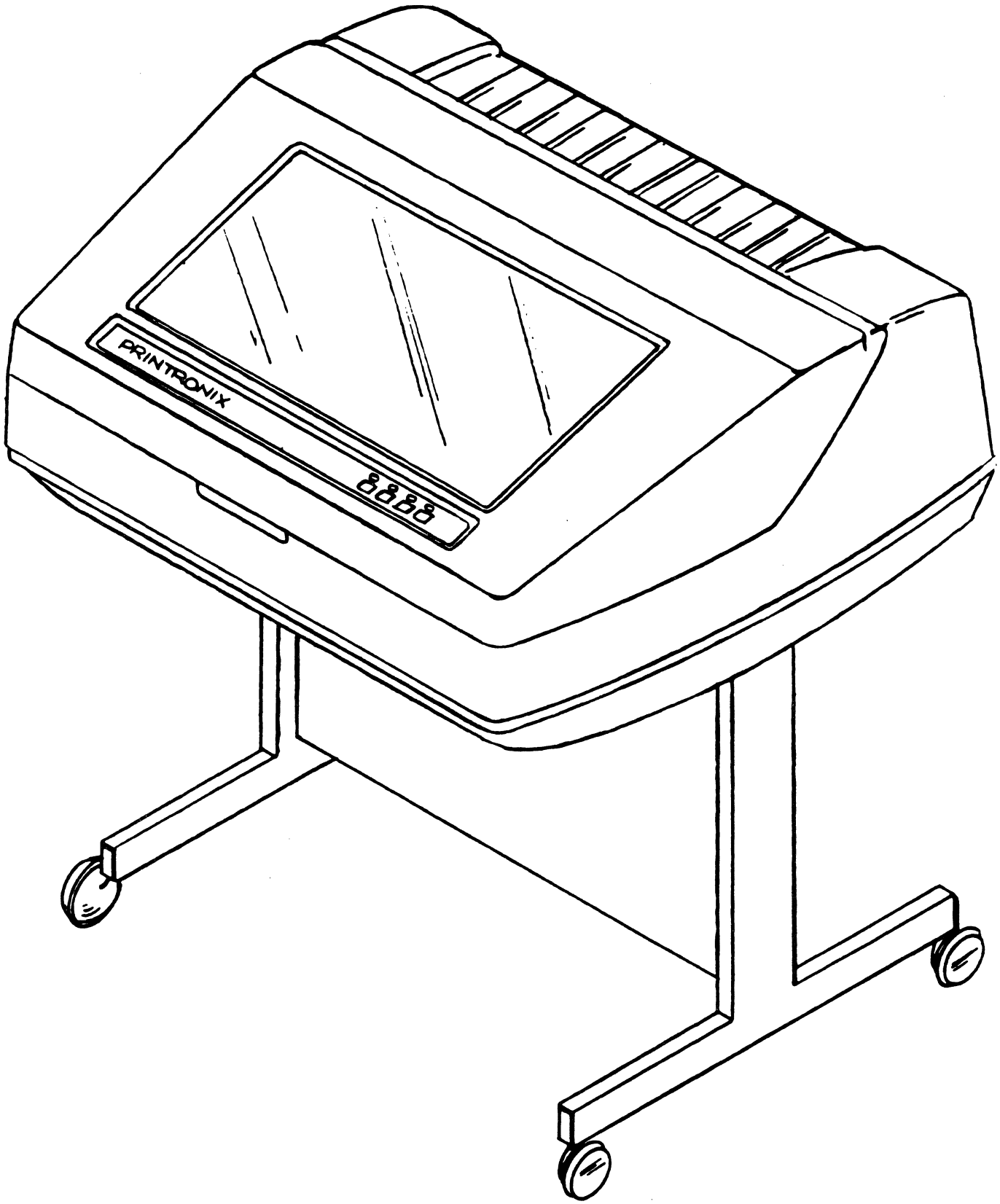


MVP Printer with Pedestal

Section 1
INTRODUCTION

1.1 SCOPE

This field maintenance manual provides information required to maintain and repair the Printronix MVP line printer. The manual contains the following sections:

1. Introduction
2. Theory of Operation
3. Preventive and Corrective Maintenance
4. Troubleshooting Procedures
5. Illustrated Parts Breakdown (IPB)
6. Drawings

1.2 PRINTER CHARACTERISTICS

The Printronix MVP **(Figure 1-1)** is a dot matrix impact line printer that operates at variable printing speeds and dot densities, according to the print application mode selected.

Applications available with the MVP printer are as follows:

Mode	Application	Speed	Font Matrix Size
1	Correspondence/Word Processing (WP)	80 lpm	13 x 12
2	Data Processing (DP)	150 lpm	9 x 7
3	Compressed Print	200 lpm	7 x 5
4	High-Speed Plot	25 in./min	MVP Standard

Modes 1, 2 and 3 give three choices of character printing speed and matrix size. Modes 1 and 2 have an alternate Plot Mode feature (8.3 and 16.7 inches per minute, respectively); mode 4 can be used for high speed plotting (25 in/min). Therefore, there are three character printing applications and three graphics applications.

The speed/density parameters for the MVP Standard are as follows:

Character Printing	Speeds/Densities
Correspondence/Word Processing	80 lpm at 100 x 96 dpi
Data Processing	150 lpm at 60 x 72 dpi
Compressed Print	200 lpm at 62.5 x 64 dpi

NOTE:
Print speeds shown are for upper-case characters.

Graphics	Speeds/Densities
High-Resolution Graphics	100 x 96 dpi at 8.3 ipm
P-Series Plot	60 x 72 dpi at 16.7 ipm
High-Speed Plot	50 x 48 dpi at 25 ipm

In modes 1 and 2, the 17 hammers produce 8 characters each, except the first hammer; it prints only four character columns. Therefore, 132 characters are printed in a line. (That is, 17 times 8 minus 4 equals 132.) In Mode 3 printing, 10 characters are printed per hammer, except the first hammer; it prints only five character columns. Therefore, 165 characters are printed (i.e., 17 times 10 minus 5 equals 165), although the shuttle travels the same distance in either mode.

The variations in vertical and horizontal dot densities between the modes for either printing or graphics applications are possible because the motion of the Shuttle Assembly and the paper transport are under program control.

The parallel interface to the host controller is Data Products and Centronics compatible and only requires a simple change of the input/output (I/O) cable assembly and internal configuration. Additionally, an optional RS232 serial interface is available.

Internal diagnostics self check the internal logic at power up and they report any check conditions they detect by lighting each control panel's CHECK indicator and displaying the corresponding fault code. In addition, the operating configuration of the printer is printed when this information is requested by the user.

Internal configuration of the MVP printer is alterable by the user via a sequence of commands entered through the switches on the inner control panel. There is a default configuration for the printer that is asserted at power up. These parameters may be changed individually via the control panel for specific operations needed by the user. Refer to Section 4 of the User's Reference Manual for configuration details and considerations.

1.3 DOCUMENTATION

An Illustrated Parts Breakdown (IPB), schematic logic diagrams, and board assembly drawings are provided as Sections 5 and 6 of this manual. Additional documents that are available to support the MVP printer include the following:

- The Operator's Guide (Document No. 110576)
- The MVP Printer User's Reference Manual (Document No. 110577)

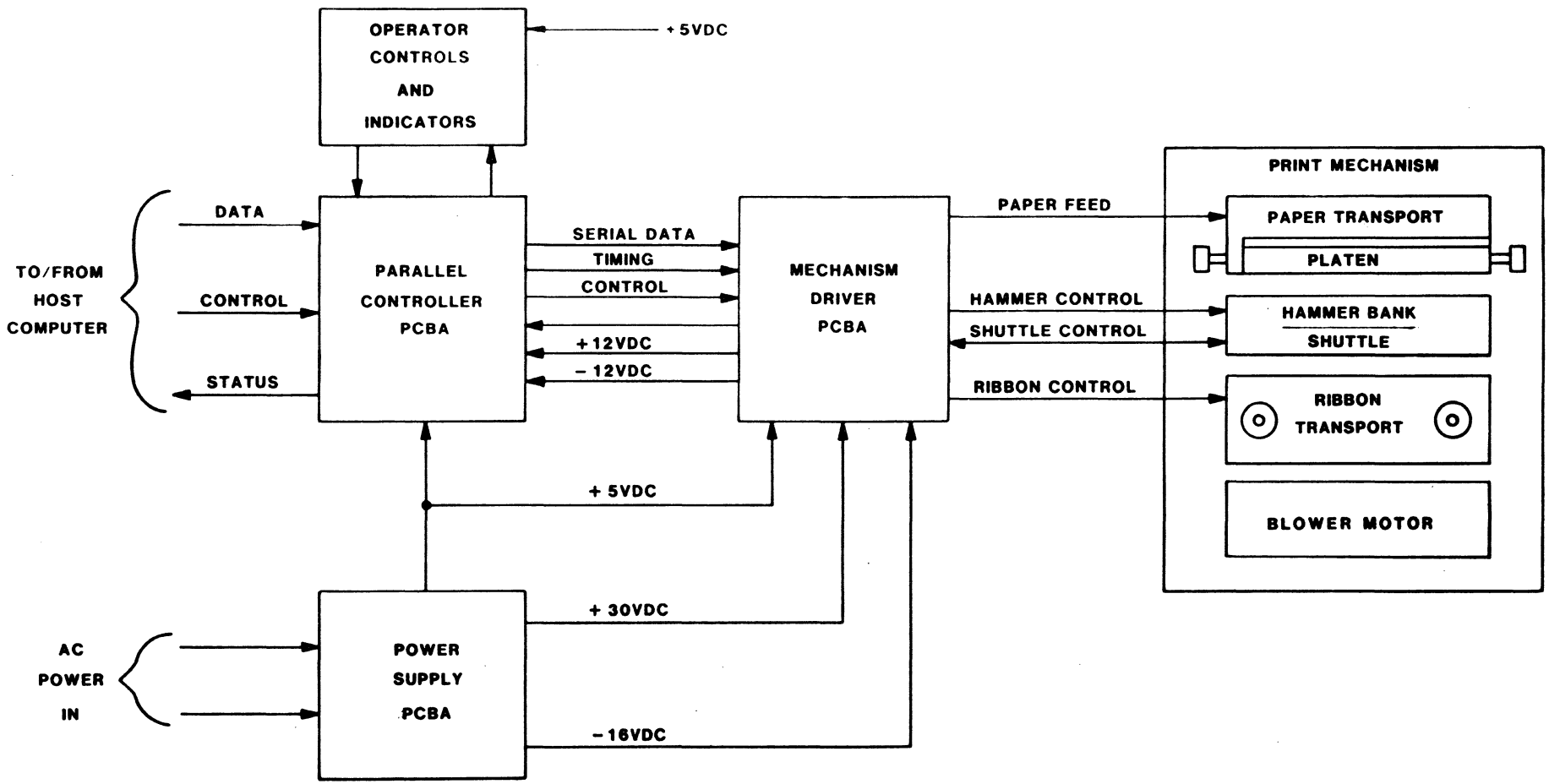


Figure 2-1. MVP Printer Functional Organization Block Diagram

Section 2
THEORY OF OPERATION

2.1 GENERAL

This section presents the theory of operation for the Printronix MVP Line Printer. Theory is presented at the functional block diagram level and is designed to aid the maintenance technician in performing field maintenance. Refer to Section 6 for detailed schematic diagrams.

2.2 FUNCTIONAL ELEMENTS

Functional elements of the printer, shown in **Figure 2-1,** consist of the following:

- Paper Transport
- Printing Mechanism
- Parallel Controller PCBA
- Mechanism Driver PCBA
- Power Supply PCBA

2.3 THE PAPER TRANSPORT

The paper transport accepts one to six part, continuous fan folded, edge perforated paper (or forms) from 3 to 16 inches edge to edge. The spline shaft knob is used to advance the paper supply vertically in the transport. During paper loading, horizontal positioning of the paper is accomplished by adjusting the two tractors laterally along the spline shaft and the support shaft. When properly positioned, each tractor may then be locked in place by its locking mechanism. Each tractor provides five pin engagement of the paper perforations. During printing the tractors are belt driven by the paper drive motor. The paper drive motor is driven by signals from the two paper feed sections of the Mechanism Driver PCBA.

2.4 THE PRINTING MECHANISM

The printing mechanism consists of the Shuttle Assembly, the Hammer Bank Assembly and the ribbon transport.

2.5 THE SHUTTLE ASSEMBLY

The Shuttle Assembly consists of the Linear Motor Bar Assembly, two bumper assemblies, two drum assemblies, the Hammer Bank Assembly, Hammer Bank Cable Assembly, Encoder PCBA, and a linear encoder. The linear motor is driven by the Mechanism Driver PCBA and sweeps the Hammer Bank Assembly laterally across the 0.8 inch distance traveled by each hammer. This distance represents 8 character spaces (WP/ DP) or 10 character spaces (compressed print). The bumpers rebound the Hammer Bank Assembly's inertial energy when the shuttle reaches either end of its travel and reverses direction. The drums provide a bearing action to the Hammer Bank Assembly, allowing it to move effortlessly. The optical linear encoder produces timing pulses that are used to determine Hammer Bank Assembly speed and direction and to synchronize printing.

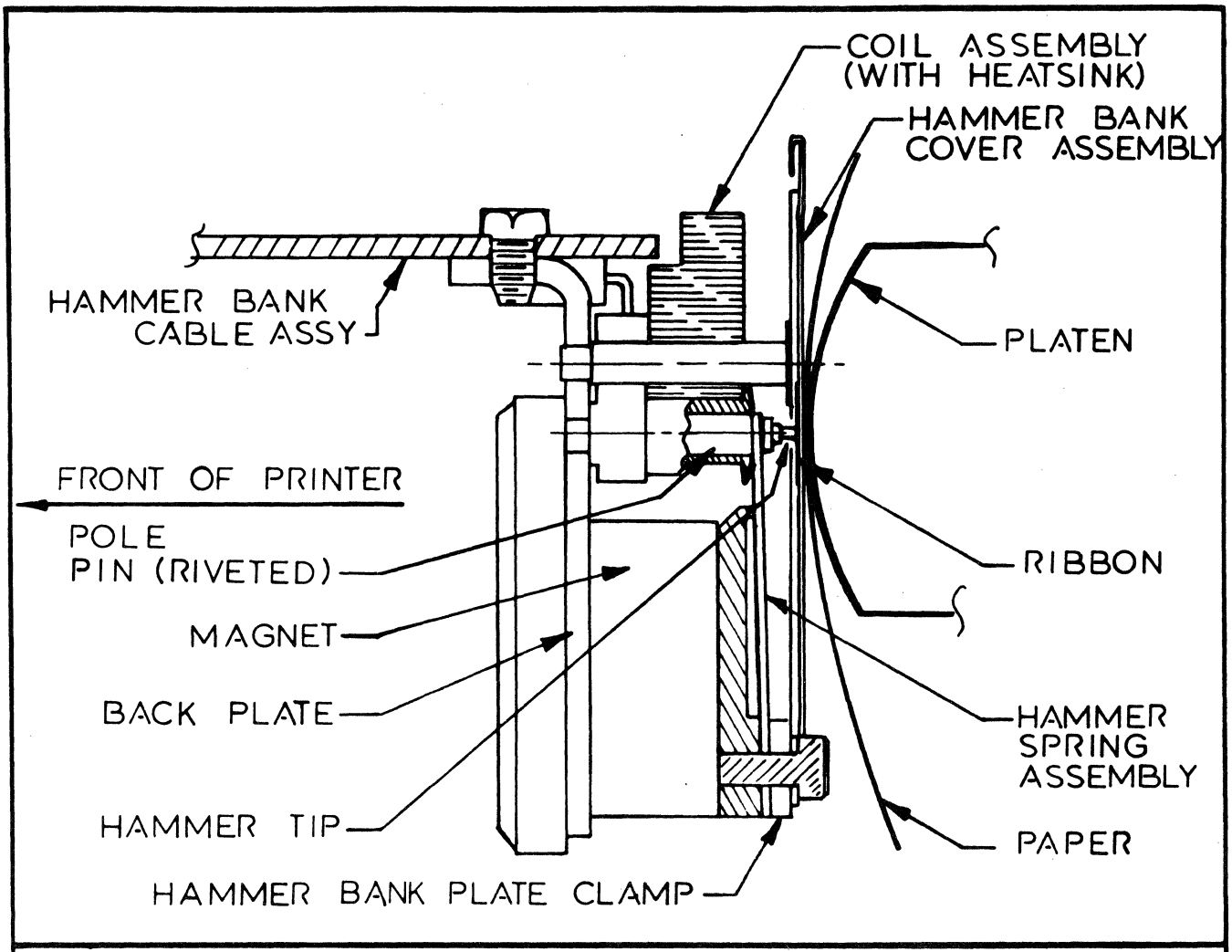


Figure 2-2. Hammer and Shuttle Arrangement, Cross Section

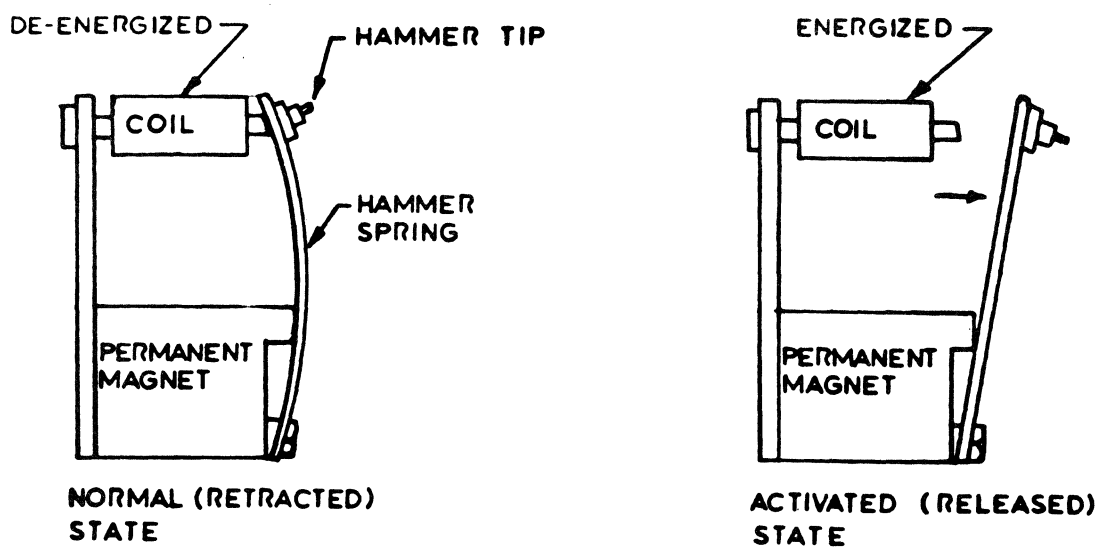


Figure 2-3. Print Hammer Action

2.6 THE HAMMER BANK ASSEMBLY

Printing is done by a row of 17 print hammers mounted on the Hammer Bank Assembly. Each hammer is a stiff leaf spring held securely on the hammer bank by a screw passing through its end. At its other end is a pointed tip. A single permanent magnet running the full length of the hammer bank holds all 17 hammer springs in the retracted (tensioned) state.

Each print hammer is associated with a normally de-energized coil mounted on a magnetized pole pin **(Figure 2-2),** the end of which directly contacts the free end of the hammer spring. When hammer driver logic determines that the hammer is to print a dot, a current pulse energizes the coil. The polarity of the resulting electromagnetic field opposes the field of the permanent magnet, releasing the hammer to impact the ribbon and paper **(Figure 2-3).** Printing is accomplished when the hammer tip strikes the ribbon against the paper, leaving a dot of ink on the paper.

During flight time the coil is again de-energized. As the hammer rebounds after striking, the permanent magnet again captures the hammer and holds it ready for the next stroke. Flight time is the same for all 17 hammers.

In the word processing and data processing modes, a line of characters is created by a scanning pattern **(Figure 2-4).** All dots in any row of the dot matrix are printed in a single scan as the shuttle moves from one side to the other through eight character spaces.

In the compressed print mode, 10 characters per hammer (except the first hammer) are produced in the same scan. **Figure 2-5** shows the order in which a single character is formed by a single print hammer.

Successive rows of dots are printed as the paper is advanced one dot row at a time, with the shuttle moving in alternate directions for alternate rows of dots. Characters are formed by various dot matrices **(Figure 2-6)** according to the selected print mode as shown in Table 2-1.

Table 2-1
Dot Matrices vs. Speed/Density

Print Mode	Speed (lpm)	Dots Horizontal	Vertical
Word Processing	80	7 on 13 centers	9 plus 3 descenders
Data Processing	150	5 on 9 centers	7 plus 2 descenders
Compressed Print	200	4 on 7 centers	5 (uppercase only)

In the word processing mode, for example, lower case characters are formed in 12 rows of a 13 by 12 dot matrix. Seven overlapping dots are printed in the horizontal plane on 13 vertical centers for accurate character rendition.

The dot printing process continues for the number of dot matrix rows determined by the selected print mode, regardless of the existence of possible descender rows. When an entire character line has been printed, the paper transport advances the paper to the top dot row of the next character line to be printed. During the line advance, the Hammer Bank Assembly continues the right/left sweeping motion; at this time, however, the print hammers are disabled from printing.

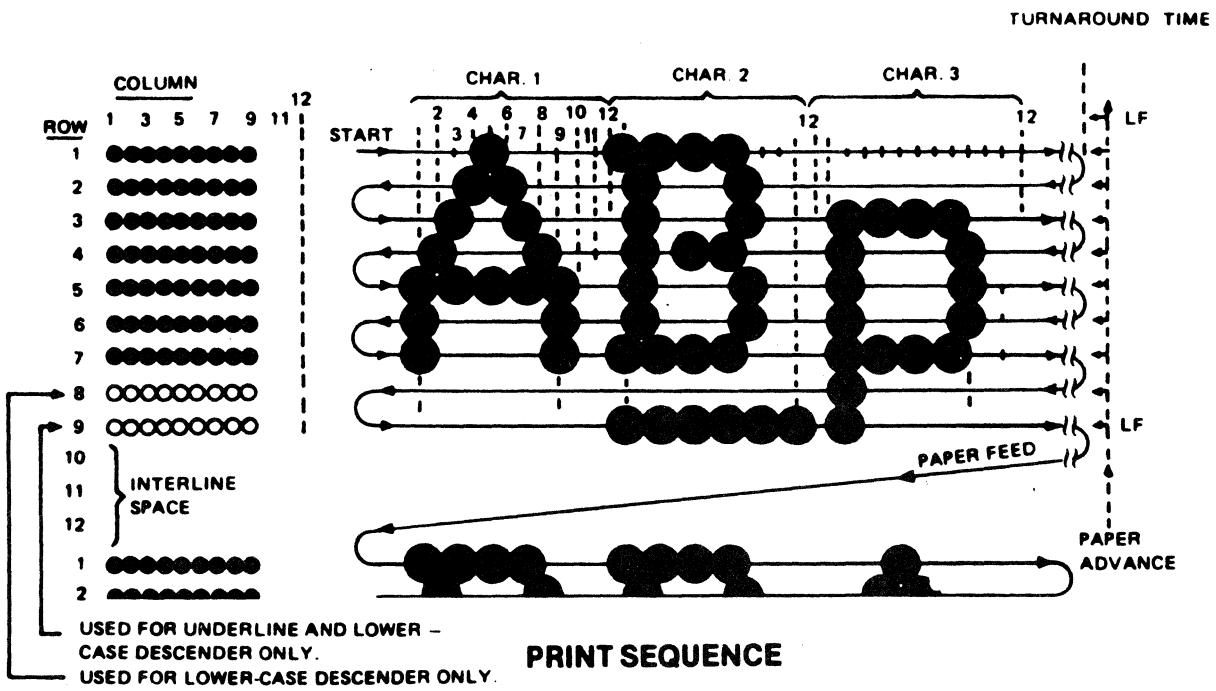


Figure 2-4. Standard Character Formation

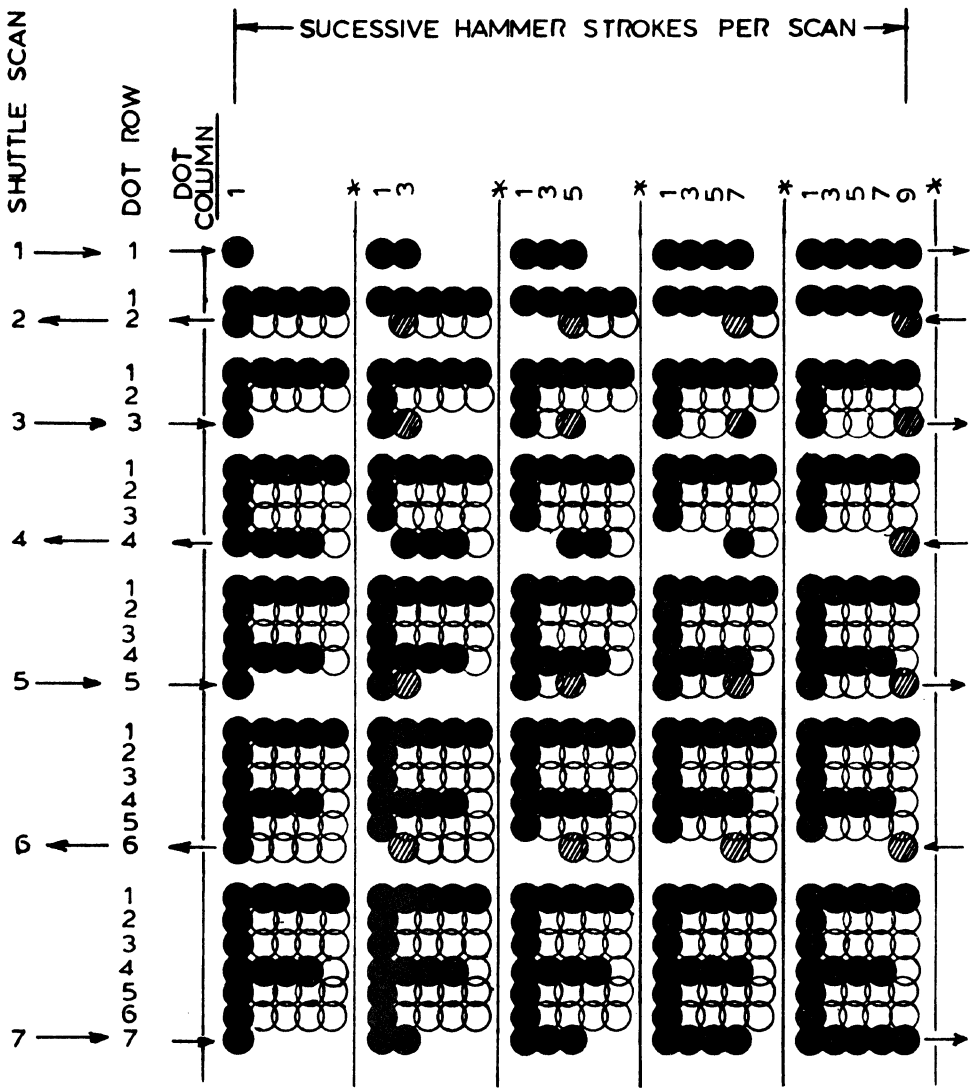
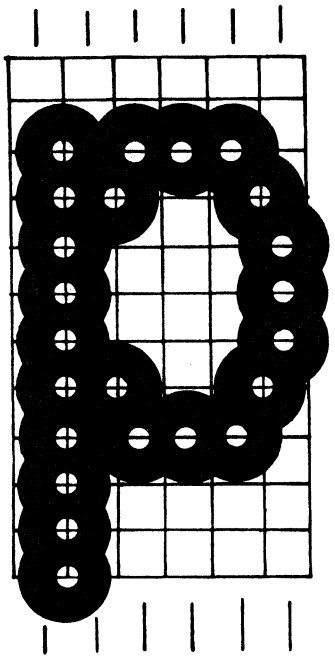
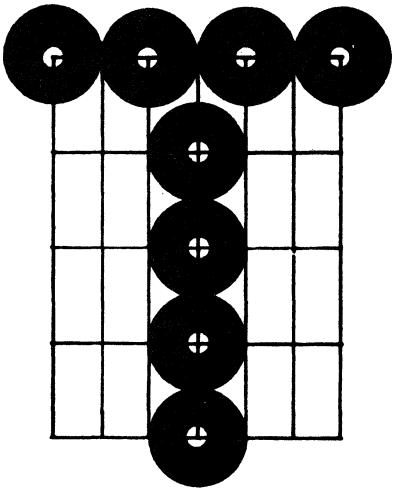


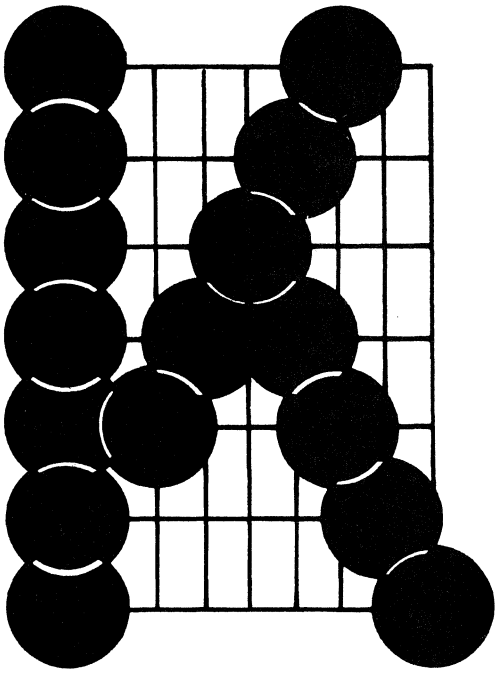
Figure 2-5. Character Formation by One Hammer, Mode 2



WORD PROCESSING MODE



COMPRESSED PRINT MODE



DATA PROCESSING MODE

Figure 2-6. Typical Character Dot Patterns, By Mode

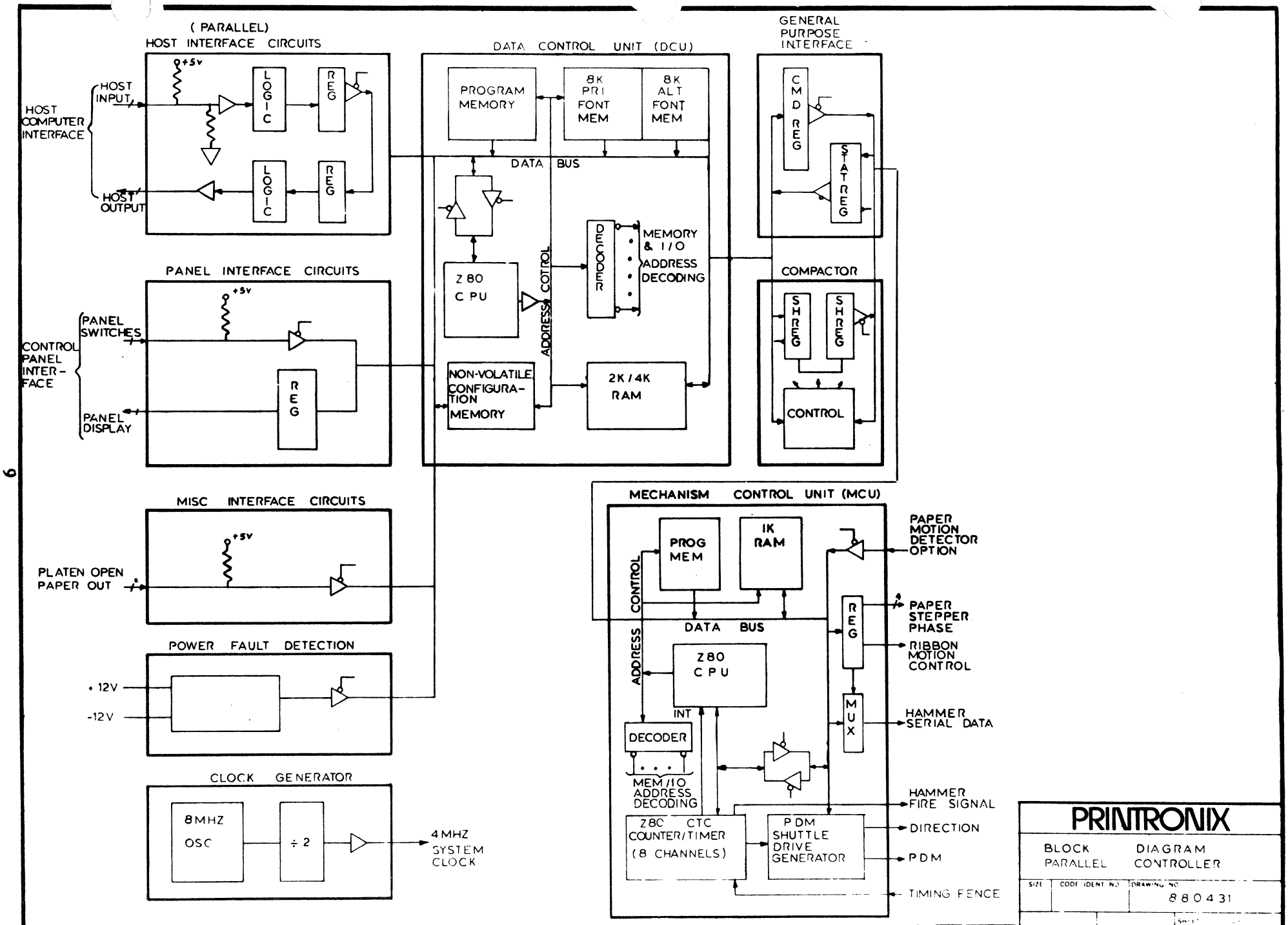


Figure 2-7. Parallel Controller Block Diagram

2.7 THE RIBBON TRANSPORT

The printer ribbon advances continuously on spool hubs. The ribbon motors are driven while the Hammer Bank Assembly is running and stop when the Hammer Bank Assembly stops. Ribbon motion is reversed when the wire threaded through either end of the ribbon is detected.

Constant ribbon tension is obtained by controlling the motors with a differential drive circuit. At any moment while the Hammer Bank Assembly is in motion, one motor acts as a driving motor drawing the ribbon against the resistance exerted by the other motor. This system operates to maintain a constant motor speed and constant ribbon tension. When the end of the ribbon is detected, the two motors exchange roles.

2.8 THE PARALLEL CONTROLLER PCBA

The Parallel Controller PCBA contains logic circuits **(Figure 2-7)** for communicating with the host data source, with the operator control panels and with the Mechanism Driver PCBA.

Functionally, the Parallel Controller PCBA is divided into two primary sections: the Data Control Unit (DCU) and the Mechanism Control Unit (MCU). Each section contains a Z80 CPU microprocessor to control its operation.

2.9 THE DATA CONTROL UNIT (DCU)

The DCU microprocessor controls data operations between the host controller and the printer. The MCU microprocessor controls the printing mechanism elements via the Mechanism Driver PCBA.

The DCU receives coded information from the host controller that determines characters to be printed, font selection, line spacing, plotting, EVFU selection, elongated characters, and paper movement. In turn, the DCU returns status data to the host. The MCU controls the printing mechanism and the paper transport via the Mechanism Driver PCBA, and monitors the shuttle direction and speed.

2.10 THE HOST INTERFACE

When the printer is on line and ready to operate, it sends the "ready" (IRDY) and "on line" (IONLINE) output signals to the host controller via the host interface. When the host controller is ready to transfer a byte of code, it puts the byte on the host interface data lines: DATA 1 through DATA 8, followed by a Data Strobe (DATA STB) pulse. DATA STB loads the byte into the interface latches. DATA STB also sets the Interrupt latch, which sends interrupt TRGO to the DCU microprocessor.

Upon receiving TRGO, the CPU services the interrupt, using an interrupt service subroutine in program memory. The microprocessor sends addressing information to the DCU I/O Port Decoding logic. The decoder will generate the Read Host Control (NRDHCTRL) or Read Host Data (NRDHDATA) in response. This action transfers the host's data byte or control byte onto the DCU Data Bus (DD0-DD7). Next, the CPU generates a write control (NDWR) signal, which is used to store the byte of data in random access memory (RAM). NWRCTRL also is applied to the Host Interface circuitry to generate ACK/NACK. The ACK/NACK signal is sent to the host controller to indicate that the printer is ready to receive the next byte of data.

2.11 THE COMPACTOR

Each of the application modes — word processing, data processing or compressed print — uses a different font width. Therefore, as each character code is received from the host data source, it is addressed to font memory by the DCU microprocessor. Font memory establishes the proper character width value for the print aplication mode selected. This width value is applied to the compactor control logic.

The character data byte is a parallel input into the compactor from the DCU Data Bus. The compactor adjusts the character according to its width value. After each character has been processed through the compactor, it is stored in the MCU RAM memory. The compactor generates Data Available (NDAV) to the MCU microprocessor via the input port logic and the MCU Data Bus. To transfer the data from the compactor to the MCU Data Bus (MDO-MD7), the MCU microprocessor generates the Read Compactor (NRDCOMP) signal via the I/O Address Decoder logic to send the data to the MCU RAM via the MCU Data Bus.

2.12 THE MECHANISM CONTROL UNIT (MCU)

The MCU, through the General Purpose Interface Status Register, then informs the DCU that the compactor is available for processing the next character.The character from the MCU RAM buffer memory is loaded into the Hammer Serial Data Multiplexer.

The output of the Hammer Serial Data Multiplexer is applied serially to the input of the Serial Shift Register on the Mechanism Driver PCBA. This is accomplished via the Compare (COM) line.

2.13 THE PDM SHUTTLE DRIVE GENERATOR

At the PDM Shuttle Drive Generator, a byte of motion data is presented to the Shuttle Drive Generator latch and is loaded into it by a NWRSTLMTR pulse. Bit 0 is sent immediately to the Mechanism Driver PCBA where it determines the direction the Hammer Bank assembly is to take. Bits 1 through 7 are applied to the generator's counter and are loaded into it when the 32 microsecond PULSE coincident to MSYSCLK. The high order bit of the counter is set to a high or low state and remains at that level until the counter count progresses far enough to change it. The result is a pulse width modulated signal (NLMD) which is sent to the linear motor driver to control shuttle speed. The width depends on the contents of the byte latched into the generator.

2.14 THE MECHANISM DRIVER PCBA

The Mechanism Driver PCBA contains those circuits required to drive the printing mechanism. These driver circuits are under control of the Parallel Controller PCBA. The Mechanism Driver PCBA also produces, by use of regulators, the +12 VDC and -12 VDC required by the Parallel Controller PCBA to monitor power failures. The +12 VDC is derived from the +30 VDC output of the Power Supply PCBA, while the -12 VDC is derived from the -16 VDC output of the Power Supply PCBA.

The Mechanism Driver PCBA contains driver circuits for the printing mechanism as follows **(Figure 2-8):**

- Hammer Bank Drivers
- Linear Motor Drivers
- Ribbon Motor Drivers
- Paper Feed Motor Drivers
- Blower Driver
- Optical Encoder Analog to Digital Converter

2.15 HAMMER BANK LOGIC

The hammer bank logic consists of a 17 bit serial shift register and 17 data latches. The serial data output (COM) of the hammer serial data multiplexer on the Parallel Controller PCBA is clocked into the shift register by the Hammer Serial Clock (NHSC). After the data is shifted in serially, parallel outputs 1 through 17 are loaded into the hammer data latches by Hammer Clock (NHCK), which is sent from the Parallel Controller PCBA. Each output of the latch is connected directly to the input of the corresponding hammer driver circuit.

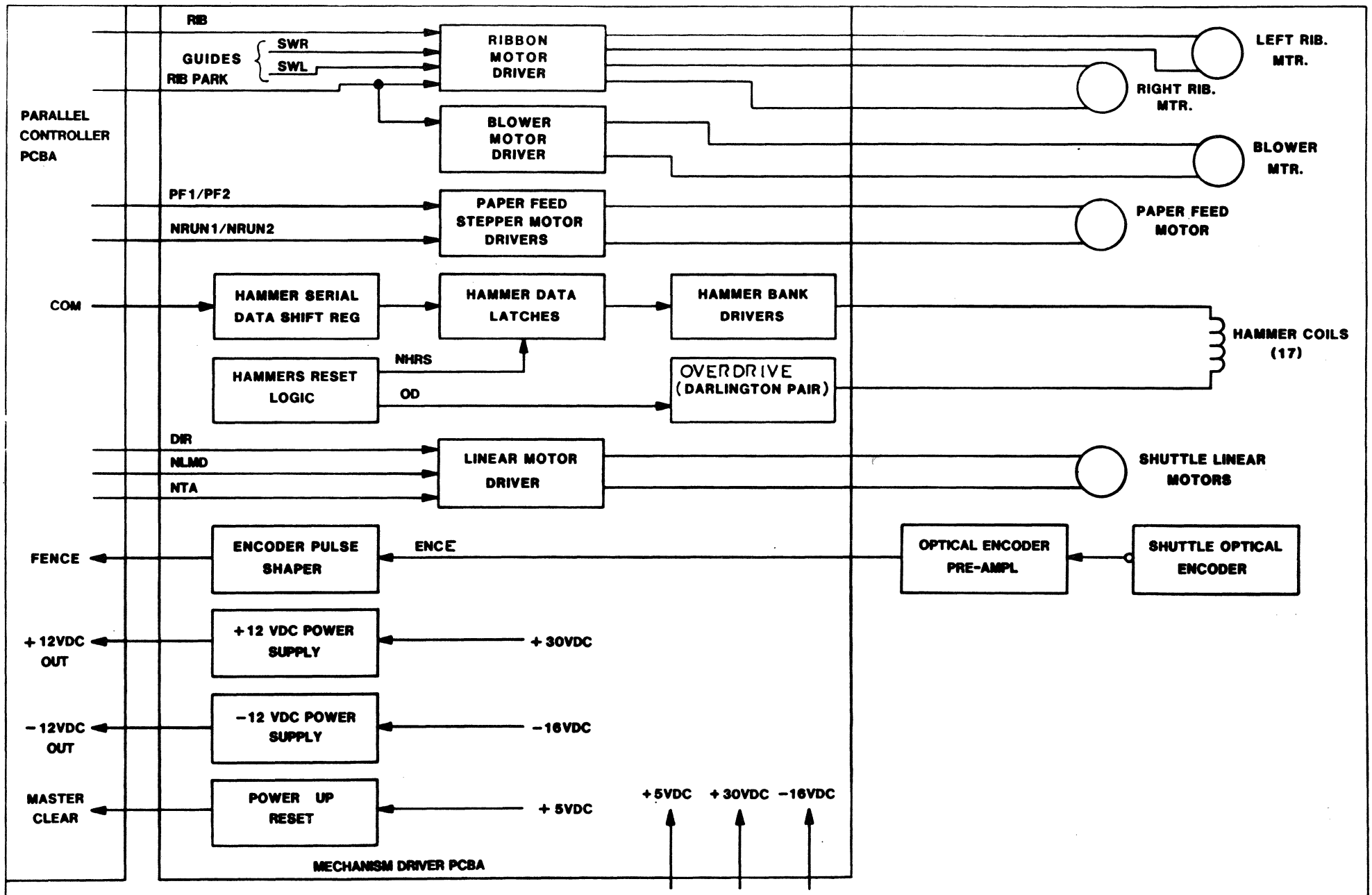


Figure 2-8. Mechanism Driver Block Diagram

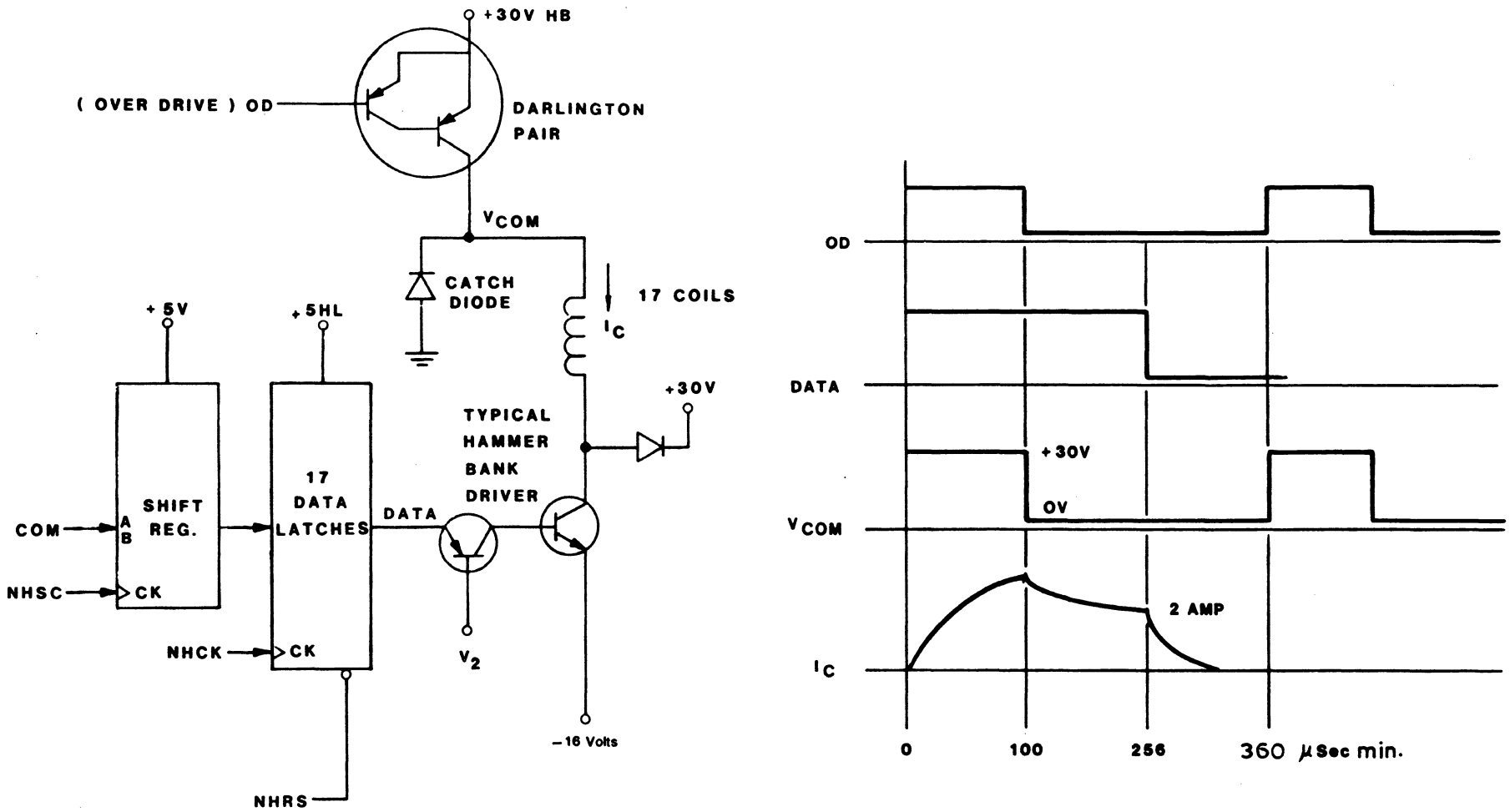


Figure 2-9. Hammer Bank Logic, Drivers and Waveforms

After the data is transferred from the shift register to the latches, the shift register is cleared by the Hammer Clear pulse (NHAMCLR). The source of NHAMCLR is the I/O Address Decode logic on the Parallel Controller PCBA. After printing, the hammer data latches are cleared by the Hammer Reset pulse (NHRS) sent from the hammer reset/overdrive logic.

2.16 HAMMER RESET/OVERDRIVE LOGIC

The hammer reset/overdrive logic is used to generate the signals, Hammer Reset (NHRS) and Overdrive (OD). NHRS is used to clear (reset) the 17 hammer data latches after printing. OD is used to control the Darlington drivers for partially energizing and de-energizing the hammer coils during print operation. NHRS and OD are derived from signals from the Parallel Controller PCBA: Hammer Clock (NHCK), which loads data into the hammer data latches; and MSYSCLK, the system clock.

2.17 THE HAMMER BANK DRIVERS

The hammer bank drivers consist of 17 identical drivers (one for each hammer coil) and two identical Darlington drivers. One Darlington driver energizes nine hammer coils while the other energizes the remaining eight hammer coils. Each of the 17 outputs of the data latch is connected to the input of the corresponding hammer driver **(Figure 2-9).**

When a hammer is to print, its hammer driver is turned on by the data latch output, and the return path to - 16 VDC for the associated hammer coil is completed. Simultaneously, the Darlington drivers are turned on by OD, and +30 VDC is applied to all the coils. Each of the coils that has its hammer driver enabled by the data latch is energized. When the coil is energized, the hammer is released to print.

After 100 microseconds, +30V HB is disconnected from the coil when OD turns off the Darlington drives. - 16V remains applied to the coils to sustain coil current and is turned off when NHRS clears the data latch.

2.18 LINEAR MOTOR DRIVER

The linear motor driver provides drive for the two linear motor coils on the shuttle and consists of two push pull drivers and control circuits. The three inputs to the linear motor drivers (NLMD, DIR and NTA) come from the MCU section on the Parallel Controller PCBA. The Linear Motor Drive pulse (NLMD) is a pulse-width modulated signal generated by the shuttle drive generator. The shuttle speed is directly proportional to pulse width the longer the drivers are on, the more energy is transferred to the shuttle through the linear motors.

The Direction (DIR) input also is generated by the shuttle drive generator on the Parallel Controller PCBA and is used to control left and right shuttle direction by steering the polarity of the NLMD pulses to the linear motor drivers. The remaining input signal to the linear motor drivers is the Turn Around (NTA) signal. NTA is sent from the Parallel Controller PCBA output port register and is used to inhibit any NLMD pulses during turn around, enabling the shuttle to decelerate and reverse direction.

2.19 THE RIBBON DRIVER

The ribbon driver circuits **(Figure 2-10)** drive the ink ribbon from one reel to the other as it passes between the hammer bank and the platen. The direction of ribbon travel is reversed automatically as the end of ribbon is detected by sensors on the ribbon guide. A wire is woven through the ribbon at each end to provide detection of end of ribbon.

The ribbon is driven by two dc motors in a servo circuit. For either direction of travel, one motor is the driven motor, drawing the ribbon against resistance exerted by the other motor. This system maintains constant motor speed and ribbon tension. When the end of ribbon is detected, the two motors exchange roles. The ribbon is in motion only while printing is taking place. This activity is controlled by the Ribbon (RIB) and Ribbon Park (RIB PARK) signals from the MCU on the Parallel Controller PCBA.

Whenever an end of ribbon sensor (RIB SWR or RIB SWL) is activated, it establishes the cross coupled latch at the input of the ribbon driver circuit in a state to turn on the related FET (Q15 or Q16). If, for example, the left hand sensor (RIB SWL) resets the latch, FET Q15 is turned off and Q16 is turned on. With Q16 turned on, the output of the left ribbon motor driver (Q6 and Q18) is increased considerably by the voltage divider network consisting of resistors R22, R49, and R163. This connects the left ribbon motor as the driving motor, with the right ribbon motor providing drag for ribbon tension.

When the right end of ribbon is detected, the latch is set to the opposite state and the control circuits and motors reverse roles. When no printing is taking place, RIB PARK is high and both FETS (Q15 and Q16) are turned off. The motors then act in equal opposition to stop ribbon movement. RIB PARK also is applied to the blower motor driver circuit. There, it is used to turn off the blower when printing is not in process.

2.20 THE PAPER DRIVE MOTOR DRIVERS

The paper drive motor is an incremental (stepper) motor containing two pairs of coils. One pair of coils is driven by Paper Feed Motor Driver signals PF1/NRUN1, while the other pair is driven by PF2/NRUN2. The paper feed motor drivers are controlled by paper feed pulses, either the two-phase Paper Feed signals PF1 and NRUN1 or PF2 and NRUN2.

Pressing the TOF switch causes the MCU to generate the paper feed pulses. Momentarily pressing the TOF switch causes paper to advance one line. When the switch is held down, paper slews to the top of form position.

Paper feed pulses are under program control and require no manual intervention. Each pair of PF1/NRUN1 and PF2/NRUN2 pulses increment the motor one step to advance paper one dot row. PF1/NRUN1 and PF2/NRUN2 pulses control the identical and essentially independent drive circuits. Each drive circuit operates in like fashion.

The paper feed pulses are gated to a push-pull current amplifier to provide current through one pair of the motor coils. A constant current controller circuit is used to stabilize the inductive current pulses (smoothing paper drive operation and protecting circuit components). This controller circuit monitors current flow through the motor coils and controls the duration of the pulses applied to the push/pull driver. The effect of this circuit is to maintain motor coil current at a relative constant value, while moving the motor shaft at variable speeds.

The motor coil current is monitored across a 0.1-ohm resistor (R27) connected to the ground side of the push/pull driver. The voltage drop across this resistor controls the limiting action of the circuit and drives a low pass filter. The filtered output signal is an error input signal to the controller circuit. The stages of the controlled circuit are referenced to VREF and RAMP. VREF provides constant voltage through a regulator tied to +5VDC, while RAMP is a linear amplifier which provides a constant current.

The output of the controller is a pulse with a duration proportional to the input error signal. This variable width pulse is used to gate the paper feed pulses to the push/pull drivers and, consequently, vary both the duration of the motor drive pulses and the speed of the motor.

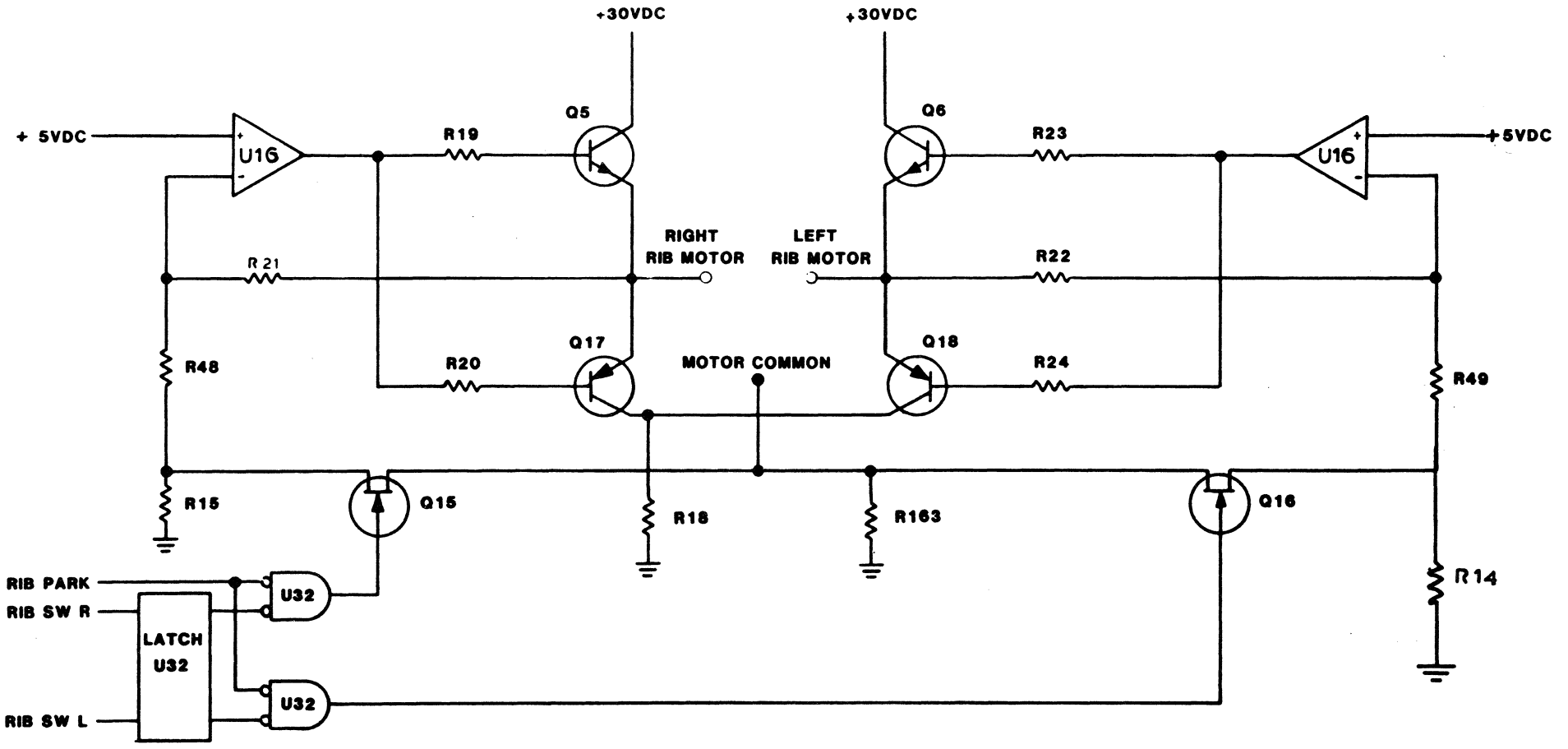


Figure 2-10. The Ribbon Driver Circuit

2.21 POWER-UP RESET LOGIC

The power up reset logic is located on the Mechanism Driver PCBA and is used to generate the Master Clear signal (NMC). The circuit is activated (NMC is low) by sensing the presence of +5 VDC when power is turned on initially.

The +5 VDC charges an RC network which then turns the circuit off (NMC high). NMC is used to clear the microprocessors on the Parallel Controller PCBA to establish the initial program load state.

2.22 THE ENCODER CIRCUIT

The encoder circuit accepts the analog output of the encoder preamplifier located on the shuttle. The function of this circuit is to shape the analog input (ENCE) to digital pulses (FENCE) at the output. The output is applied to the Parallel Controller PCBA for maintaining shuttle and print control.

2.23 THE +12 VDC AND -12 VDC POWER SUPPLIES

The +12 VDC and -12 VDC power supplies are located on the Mechanism Driver PCBA. The +12 VDC supply regulates the 30 VDC input to provide +12 VDC at the output. The -12 VDC supply regulates the -16 VDC input to provide -12 VDC at the output.

2.24 THE POWER SUPPLY PCBA

The Power Supply PCBA is a switching power supply. The regulated outputs are +5 VDC, -16 VDC and +30 VDC. While all outputs are supplied to the Mechanism Driver PCBA, only +5 VDC is supplied to the Parallel Controller PCBA, the Control Panel PCBAs, and the Encoder PCBA.

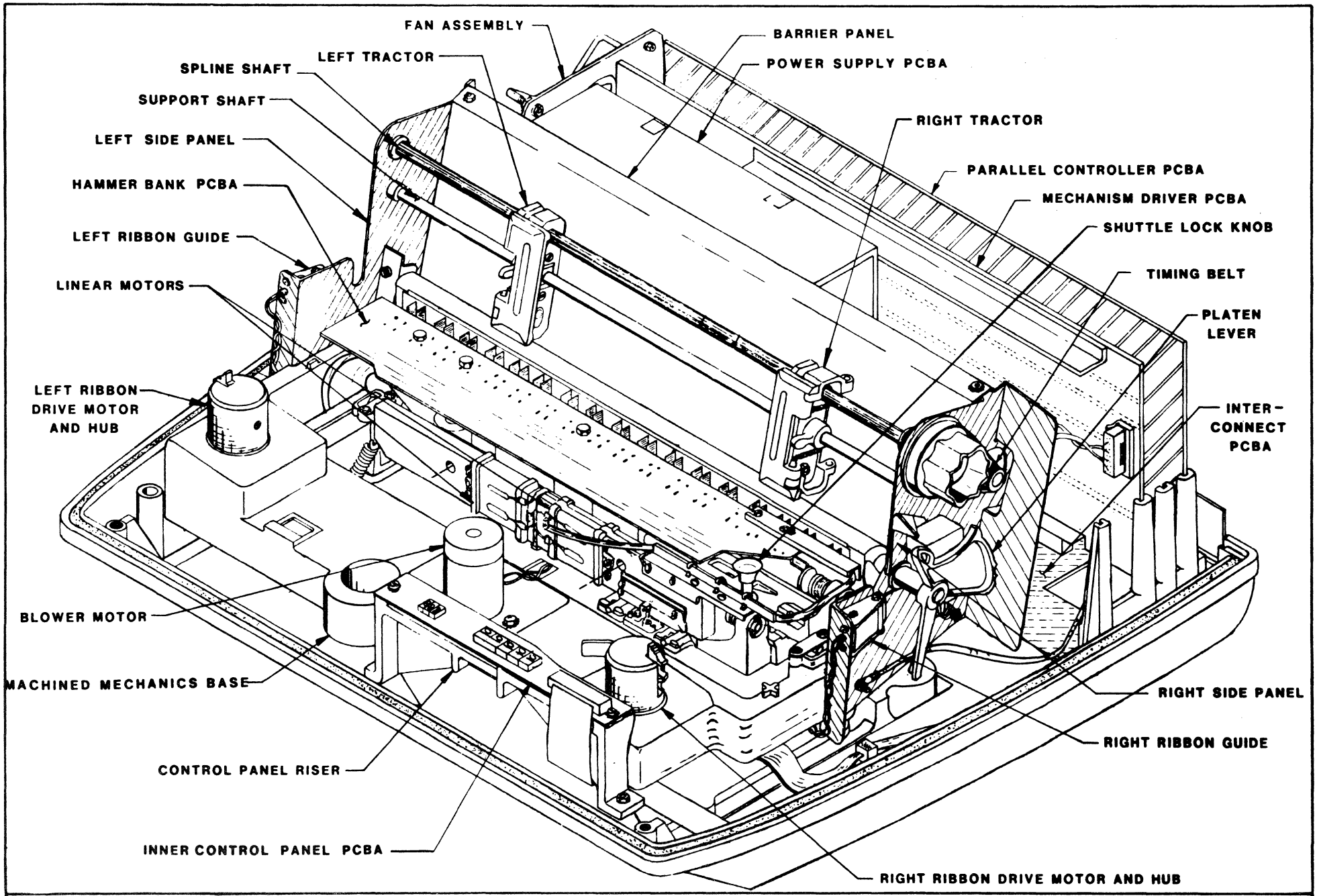


Figure 3-1. The MVP Printer, Cabinet Housing and Shuttle Cover Removed

Section 3
PREVENTIVE AND CORRECTIVE MAINTENANCE

3.1 GENERAL

This section provides instructions for field maintenance of the MVP Printer **(Figure 31).** The following paragraphs provide both preventive and corrective maintenance procedures. The information is arranged by assemblies, with all procedures related to an assembly grouped together.

CAUTION

Unless specified otherwise, all procedures in this section must be performed with power disconnected from the printer to avoid the possibility of injury to personnel or damage to the equipment.

Tools and test equipment recommended for field maintenance of the MVP Printer are listed in Table 3-1. The hammer tip alignment tool, the exerciser and the bumper adjustment tool are available only from Printronix. The remaining items are commercially available; equivalent items may be substituted.

Table 3-1.
Recommended Tools and Test Equipment

Item	Printronix No.	Mfg. No. (Suggested)
Hammer Tip Alignment Tool	110497-001	—
Bumper Adjustment Tool (Bumper Locknut Spanner)	110459-001	—
Exerciser	101635	—
Bearing Lubricant, M3	101805-001	—
Screwdriver, Torque, 12 to 36 in. lbs., adjustable	—	Utica TS35
Screwdriver, Torque Adapter	—	Utica HW-18
Screwdriver, Torque Hex Socket-3/16"	—	Utica W-8
Screwdriver, Torque Hex Adapter-3/16"	—	Utica HW-4
Screwdriver, Torque Hex Adapter-5/32"	—	Utica HW-6
Crescent Wrench	—	Utica 91-4C
Screwdriver, Allen Hex	—	Xcelite 99PS40
Screwdriver, Phillps	—	Xcelite X100
Screwdriver, Phillps	—	Xcelite X102
Screwdriver, Slot	—	Xcelite A184
Screwdriver, Slot	—	Xcelite R3164
Nut Driver Set	—	Xcelite PS120
Diagonal Cutters	—	Erem 91EH
Pliers, Chain Nose	—	Erem 11DH
Rule, Steel 6"	—	General 616
Feeler Gauge Set	—	Pronto 000AA

Table 3-1 continued

2 Dowell Pins, 3/16 x 1"	—	—
Adhesive	101854-005	Loctite 918
Pipers Grip Ring	—	Truarc 1120
Scale, Weight, 0 to 40 lbs.	—	—
Ratchet, 3/8" Drive	—	—
Extension 3", 3/8 Drive	—	—
Socket 7/16", 3/8 Drive	—	—
Exacto Knife and Blades	—	—
Digital Voltmeter	—	—
Awl	—	—
Oscilloscope & Probes (35 MHz or better)	—	—

3.2 PREVENTIVE MAINTENANCE

Preventive maintenance consists of periodic cleaning and lubrication of the printer, along with visual inspection of assemblies in the printer and a check of the tension of the timing belt and the tractor belt.

The MVP printer should be cleaned at regular intervals to maintain printing quality and operating efficiency. In addition to general cleaning of the interior and exterior, special cleaning may be required at the following points:

- Shuttle Assembly
- Hammer Bank Cover Assembly
- Hammer tips and coils
- Linear Encoder
- Ribbon Guide Assemblies
- Paper Detect Switch Assembly
- Blower Assembly
- Adjustable Tractors

Individual cleaning instructions are provided in the corresponding paragraphs in this section.

There are two locations in the MVP Printer that require lubrication: the shuttle axles and the platen wear saddles. Individual lubrication instructions are provided in the appropriate paragraphs.

Preventive maintenance procedures should be performed every six months or at the end of every 500 hours of operation. Depending on use and operating environment, more or less frequent maintenance may be required to maintain the operating efficiency of the printer.

3.3 CORRECTIVE MAINTENANCE

Corrective field maintenance of the MVP Printer includes mechanical alignments and adjustments, along with assembly removal and replacement. The following assemblies are considered factory repairable only, and no procedures are given for replacement or repair of components within these assemblies:

- Parallel Controller PCBA or Serial Controller PCBA
- Mechanism Driver PCBA
- Power Supply PCBA
- Inner Control Panel Board PCBA
- Encoder PCBA
- Shuttle Assembly

Note that the first three PCBAs in this list are the three major circuit boards in the printer. No field repair should be attempted on these boards.

Alignments and adjustments that may be performed as part of field maintenance include:

- Shuttle Cover Assembly paper scale adjustment
- Hammer Spring alignment
- Linear Encoder adjustment
- Shuttle Bumper adjustment
- Timing Belt alignment
- Timing Belt tension adjustment
- Tractor skew alignment
- Tractor Belt adjustment
- Paper Ironer adjustment
- Hammer Bank to Platen gap adjustment
- Platen adjustment
- Ribbon Guide Assembly adjustment

Individual instructions for performing these alignments and adjustments are provided in the appropriate paragraphs in this section.

3.4 THE PRINTER CABINET

The printer cabinet (**Figure 3-2**) consists of a cabinet base with a removable cabinet housing. A hinged cabinet cover allows access for interior cleaning by the operator. The Front Control Panel PCBA is mounted on the hinged cabinet cover.

The MVP Printer should be cleaned at regular intervals to prevent the build up of paper dust and chaff, ribbon lint and ink that may interfere with its operation.

a. Cleaning the Exterior

Clean the exterior of the printer using a soft cloth and a mild detergent. Do not use abrasive cleaners, particularly on the printer window.

b. Cleaning the Interior

To clean the interior of the printer, remove the power cord and proceed as follow:

1. Open the cabinet cover.
2. Move the platen lever to the load position (fully open).
3. Remove the paper from the paper transport.
4. Remove the ribbon spools from the ribbon hubs.
5. Use a soft brush to dislodge and a vacuum to remove paper dust and ribbon lint. Give special attention to the tractors, the Hammer Bank Assembly and the base pan.

3.5 THE CABINET HOUSING

a. Removal and Replacement

To remove the cabinet housing, refer to **Figure 3-2,** remove the power cord, and perform the following steps:

1. Open the cabinet cover.
2. At the inside right side of the printer, disconnect the Front Control Panel ribbon cable at connector J31.
3. At the front right and left inside corners of the printer, remove the two hex head screws that secure the cabinet housing to the base.
4. At the rear of the cabinet housing, loosen the two Phillips head screws.
5. Close the cabinet cover.
6. Carefully lift the cabinet housing off the printer.

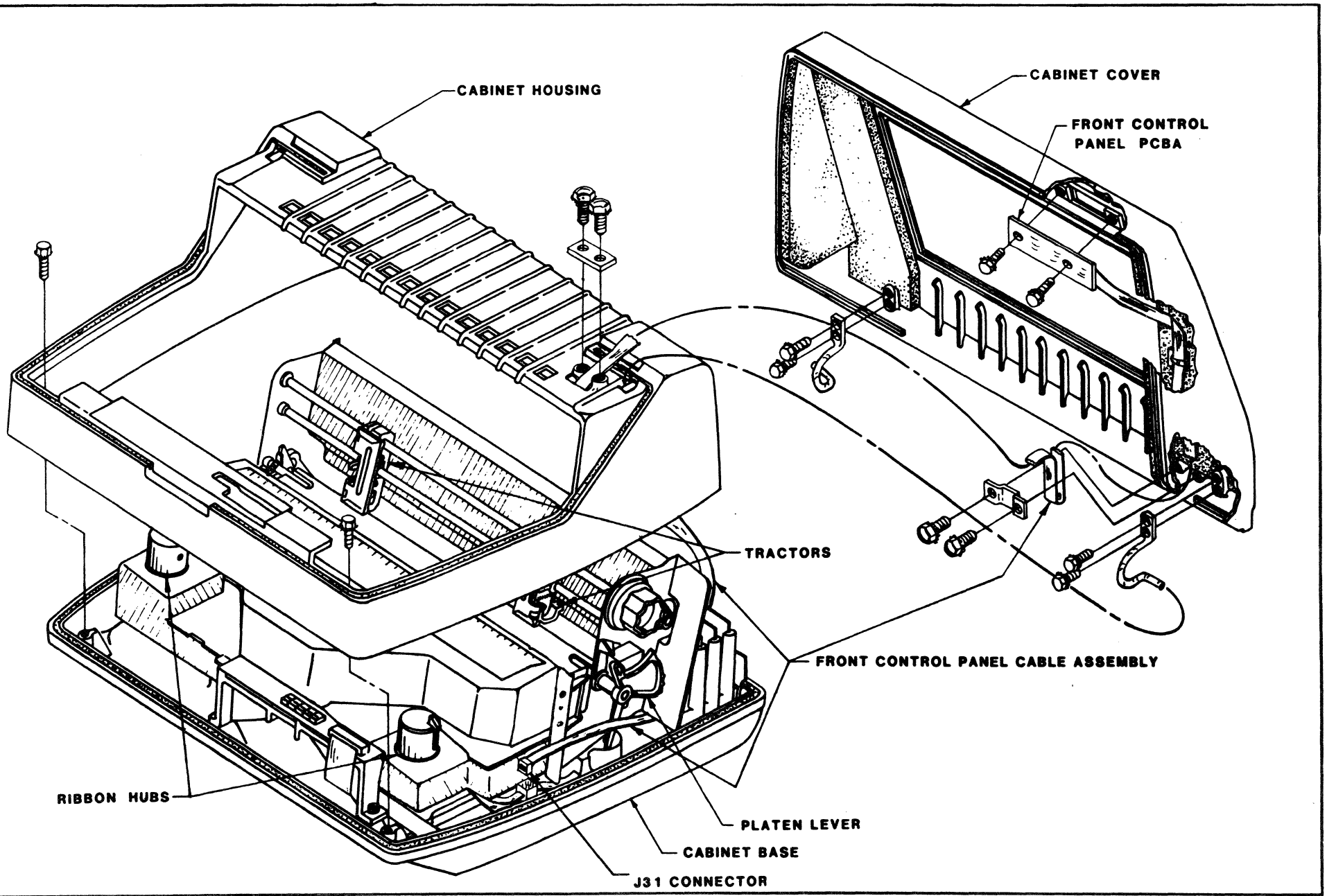


Figure 3-2. The Printer Cabinet

To replace the cabinet housing, reverse the removal procedures, taking care to avoid damaging the ribbon cable. Route the Front Control Panel cable behind and underneath the right side plate. Observe the keying of connector J31. Be sure to slide the I/O connector plate into the grooved cutout at the right rear of the cabinet housing.

3.6 THE FRONT CONTROL PANEL PCBA

The Front Control Panel PCBA is mounted on the front cover and has operator control switches/indicators mounted on it.

a. Inspection

Each switch on the Front Control Panel PCBA has a LED indicator. To verify the correct operation of the front control panel switches and indicators, apply power to the printer and check normal operation switch functions per Section 3 of the Operator's Guide.

b. Removal and Replacement

The Front Control Panel PCBA must be replaced as a complete assembly including the attached cable. The PCBA may be removed and replaced with the cabinet housing attached to the cabinet base or removed from it.

To remove the Front Control Panel PCBA, refer to **Figure 3-2** and proceed as follows:

1. Remove the power cord and open the cabinet cover.
2. Disconnect the Front Control Panel Cable from connector J31.
3. Remove the two hex head screws that secure the "U" clamp holding the cable assembly to the cabinet cover.
4. Remove the two hex head screws that secure the clamp holding the cable assembly to the cabinet housing.
5. Carefully thread the cable assembly through the opening in the cabinet housing.
6. Cut the tie wrap holding the cable assembly to the cover.
7. Remove the two hex screws holding the PCBA to the cabinet cover.
8. Remove the PCBA and the attached cable assembly.

To replace the Front Control Panel PCBA, proceed as follows:

1. Position the PCBA on the cabinet cover. Verify that the switches are not binding on the cover.
2. Attach the PCBA to the cabinet cover with two hex head screws.
3. Attach the Front Panel Cable to the cabinet cover, using the "U" clamp and the two hex head screws. Leave at least a half inch loop, so that the cable does not bind when the cover is open.
4. Carefully thread the cable through the opening in the cabinet cover.
5. Replace the clamp that secures the cable assembly to the cabinet housing and secure it with the two hex screws.
6. Replace the tie wrap holding the cable to the cover. Route the cable behind and underneath the right side plate.
7. Reconnect the cable to connector J31. Observe the keying of the connector.
8. Verify correct panel operation per Section 3 of the Operator's Guide.

3.7 THE CABINET COVER

a. Removal and Replacement

To remove only the cabinet cover, refer to **Figure 3-2**, remove the power cord and proceed as follows:

1. Open the cabinet cover.
2. Remove the two hex head screws that secure the "U" clamp that holds the Front Control Panel Cable to the cabinet cover.
3. Cut the tie wrap that holds the cable to the cover.
4. Remove the two hex head screws that hold the Front Control Panel PCBA to the cover, and carefully set the PCBA in a position where it cannot be damaged.
5. Remove the hex head screws and washers that secure the cabinet cover to the right and left hinges on the cabinet housing.
6. Remove the cover carefully.

To replace the cabinet cover, proceed as follows:

1. Hold the cabinet cover in the open position and secure it to the hinges, using hex head screws and washers.
2. Attach the Front Control Panel PCBA to the cover, using two hex head screws. Verify that the switches are not binding against the cover.
3. Position the Front Control Panel Cable along the side of the cover and secure the cable to the cover, using the "U" clamp and two hex head screws. Leave at least a half inch loop so that the ribbon cable will not bind when the cover is open.
4. Install a new tie wrap to secure the ribbon cable to the cover.
5. Close the cover and verify its alignment with the cabinet housing and the latch bracket. If adjustment is required, loosen the hinge screws, reposition the cover as necessary, and tighten the hinge screws.

3.8 THE INNER CONTROL PANEL PCBA

The Inner Control Panel PCBA is mounted on the Control Panel Riser inside the printer. The Inner Control Panel Cable Assembly connects to the PCBA.

To remove the Inner Control Panel PCBA, refer to **Figure 3-3** and proceed as follows:

1. Remove the cabinet housing per subsection 3.5.
2. Disconnect P32 at the right front edge of the PCBA.
3. Remove the two Phillips head screws and lockwashers that hold the PCBA.
4. Lift the Inner Control Panel PCBA off the Control Panel Riser.

To replace the Inner Control Panel PCBA, reverse the removal procedures.

3.8.1 THE INNER CONTROL PANEL CABLE ASSEMBLY

To remove the Inner Control Panel Cable Assembly:

1. Remove the cabinet housing per subsection 3.5.
2. Remove connector P32 from the Inner Control Panel PCBA.
3. Remove the Parallel Controller PCBA, the Mechanism Driver PCBA and the Power Supply PCBA per subsections 3.10 through 3.12. Remove the Serial Controller PCBA and the Option PCBA, if installed.
4. Remove the two hex head screws that secure the J3 connector to the base pan.
5. Remove the four hex-head screws from the Interconnect Board PCBA (**Figure 3-4**) and raise the board.
6. Withdraw the cable assembly.

To replace the Inner Control Panel Cable Assembly, reverse the removal procedures.

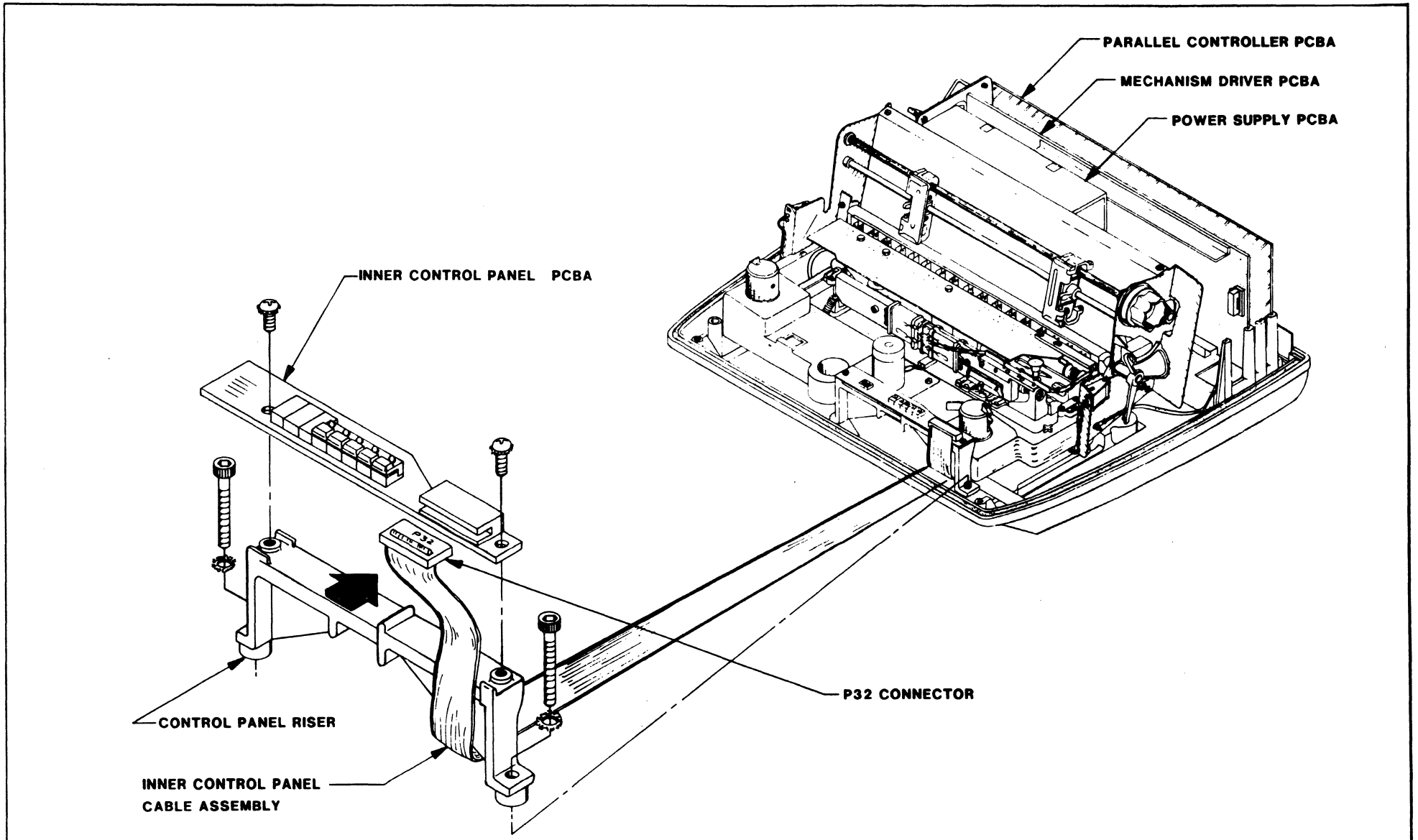


Figure 3-3. The Inner Control Panel and Cable Assembly

3.9 THE PRINTED CIRCUIT BOARD ASSEMBLIES (PCBAs)

No procedures are provided for fault isolation to the component level on circuit boards. The PCBAs may need to be removed because they are defective or to service other areas in the printer where the boards in place would create an access problem. The principal PCBAs are removable by simply pulling them up and out of their guides and connectors. The following subsections describe the removal of the PCBAs located in the rear of the printer.

3.10 THE PARALLEL CONTROLLER PCBA (OR THE OPTION SERIAL CONTROLLER PCBA)

a. Removal and Replacement

To remove the Parallel Controller PCBA (or the Serial Controller PCBA), refer to **Figure 3-4** and proceed with the following steps:

1. Remove the cabinet housing per subsection 3.5.
2. Grasp the Parallel Controller PCBA firmly at both ends and lift it straight up in the slots of the mounting post.
3. Open the restraining latches and disconnect the I/O Cable Assembly from connector P4 of the PCBA.

To replace the Parallel Controller PCBA (or the Serial Controller PCBA), perform the following steps:

1. Transfer the Program PROMs, Font PROMs and the Configuration PROM to the replacement board.
2. Connect the I/O Cable Assembly at connector P4 and close the restraining latches.
3. Slide the Parallel Controller PCBA (or the Serial Controller PCBA) into position in the slots of the mounting posts. Be certain that the edge connectors at the bottom of the PCBA are seated firmly in the connectors on the the Mother Board PCBA and that the I/O cable is properly dressed (not crimped).
4. Apply power to the printer, run the configuration test and verify that the printer is otherwise operating correctly.

3.11 MECHANISM DRIVER PCBA

a. Removal and Replacement

To remove the Mechanism Driver PCBA, refer to **Figure 3-4** and perform the following steps:

1. Remove the cabinet housing per subsection 3.5.
2. Disconnect the Paper Drive Motor Assembly cable from connector P16 at the right edge of the Mechanism Driver PCBA.
3. Grasp both sides of the Mechanism Driver PCBA and lift it directly upward in the guide slots.

To replace the Mechanism Driver PCBA, reverse the removal procedures. Be sure to observe the keying of the mating connectors at P16 and dress the I/O Cable Assembly loop under the Mechanism Driver PCBA.

3.12 THE POWER SUPPLY PCBA

a. Removal and Replacement

To remove the Power Supply PCBA, refer to **Figure 3-5** and perform the following steps:

1. Remove the cabinet housing per subsection 3.5.
2. At the upper left side of the Power Supply PCBA, lift up the protective flap. Press in the edge clips of each connector and remove connector J18 from J1 and connector J19 from J2.
3. Grasp the Power Supply PCBA with both hands and lift it straight up in the guide slots.

To replace the Power Supply PCBA, reverse the removal sequence.

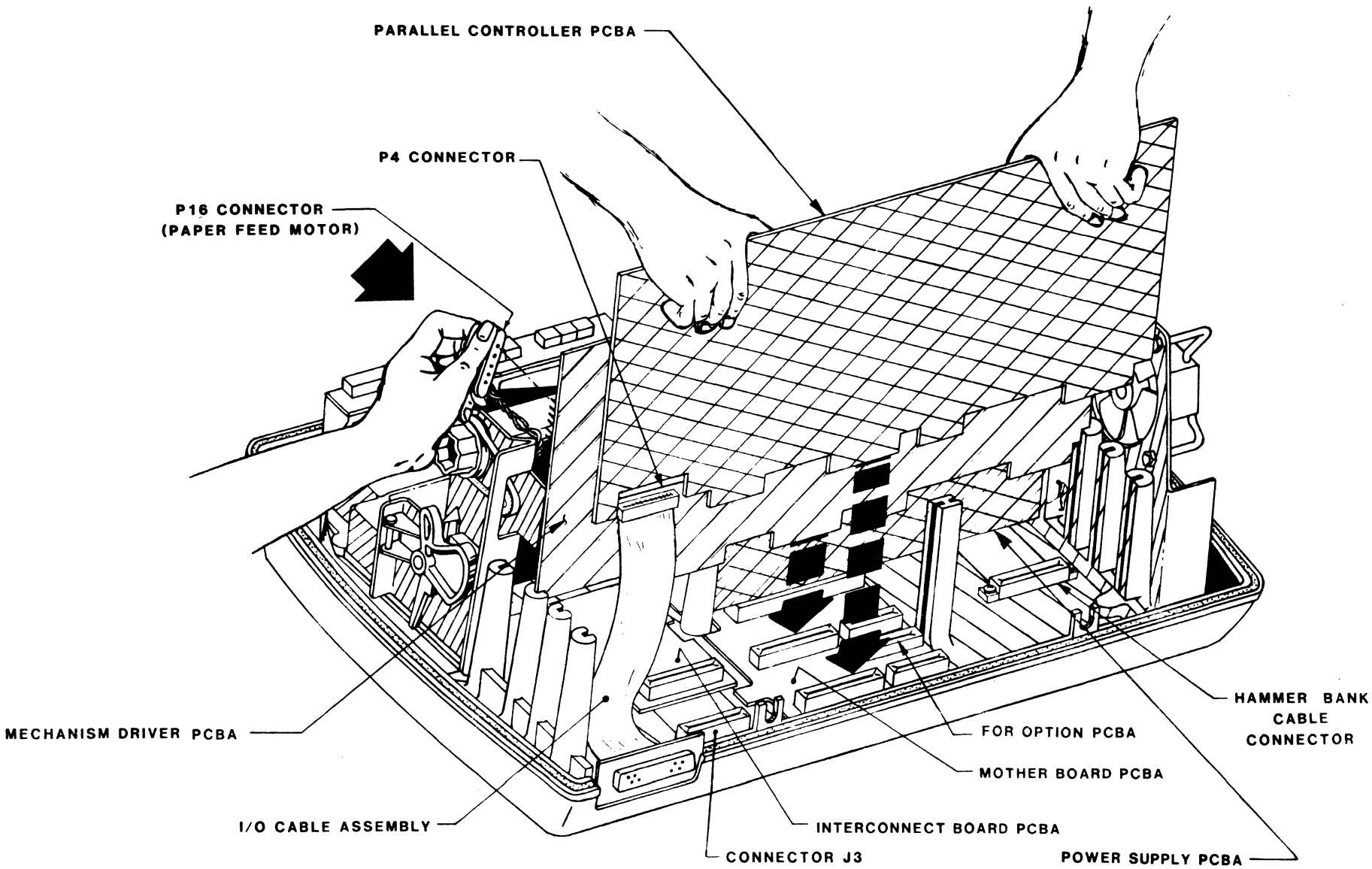


Figure 3-4. Rear View of Printer, Major PCBAs in Place

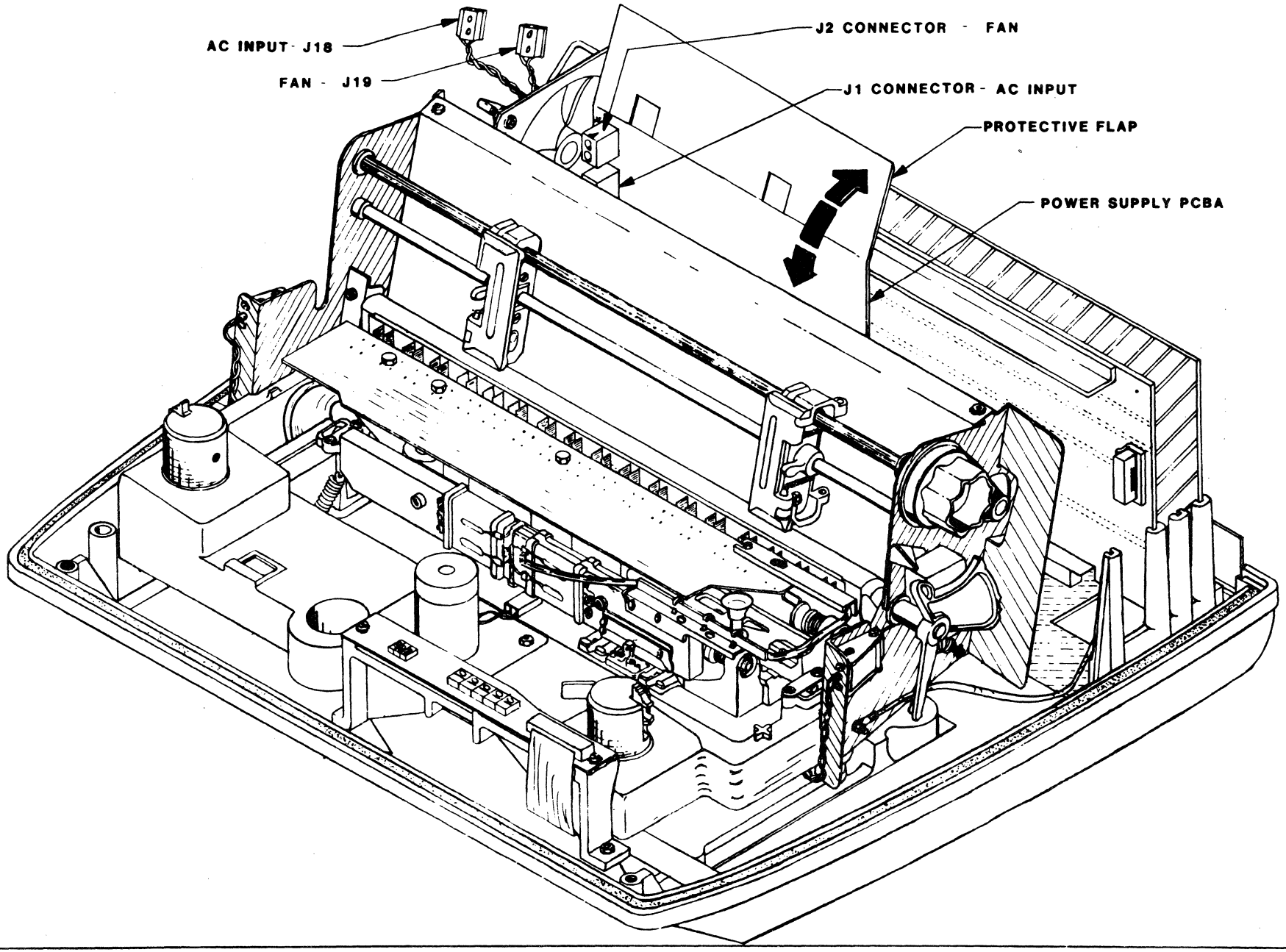


Figure 3-5. Power Supply PCBA Removal

3.13 THE INTERCONNECT BOARD PBCA

a. Removal and Replacement

To remove the Interconnect Board PCBA, refer to **Figure 3-6** and perform the following steps:

1. Remove the cabinet housing per subsection 3.5.
2. Remove the Parallel Controller PCBA, the Mechanism Driver PCBA and the Power Supply PCBA per subsections 3.10 through 3.12. Remove the Serial Controller PCBA and the Option PCBA, if installed.
3. Disconnect the eight connectors from the Interconnect PCBA.
4. Remove the four hex screws and lift the Interconnect PCBA out of its position.

To replace the Interconnect Board PCBA, reverse the removal sequence.

3.14 THE MOTHER BOARD PCBA

a. Removal and Replacement

To remove the Mother Board PCBA, refer to **Figure 3-6** and perform the following steps:

1. Remove the cabinet housing per subsection 3.5.
2. Remove the Parallel Controller PCBA, the Mechanism Driver PCBA and the Power Supply PCBA per subsections 3.10 through 3.12. Remove the Serial Controller PCBA and the Option PCBA, if installed.
3. Disconnect the ground wire, labeled CHAS-GND, from the Mother Board PCBA.
4. Remove the seven hex head screws that secure the Mother Board PCBA to the cabinet base and lift out the Mother Board PCBA.

To replace the Mother Board PCBA, reverse the removal procedures.

3.15 THE SHUTTLE COVER ASSEMBLY

a. Paper Scale Adjustment

There is a 132 unit scale on the Shuttle Cover Assembly. To adjust the paper scale, leave the Shutttle Cover Assembly in place and slide the scale laterally so that positions 1 and 132 are directly in front of the corresponding characters on a 132 character printout.

b. Removal and Replacement

To remove the Shuttle Cover Assembly, refer to **Figure 3-7** and proceed as follows:

1. Open the cabinet cover and the platen lever.
2. Remove the ribbon from the ribbon spool hubs.
3. Grasp the Shuttle Cover Assembly at both ends, lift it upward to free the two tabs at its front from the slots in the Machined Mechanics Base and remove the cover assembly.

To replace the Shuttle Cover Assembly, grasp it at both ends, insert the two front tabs into the slots in the Machined Mechanics Base and press the holes on each side of the cover assembly firmly into place on the positioning guides on the casting. Then, reverse steps 1 and 2.

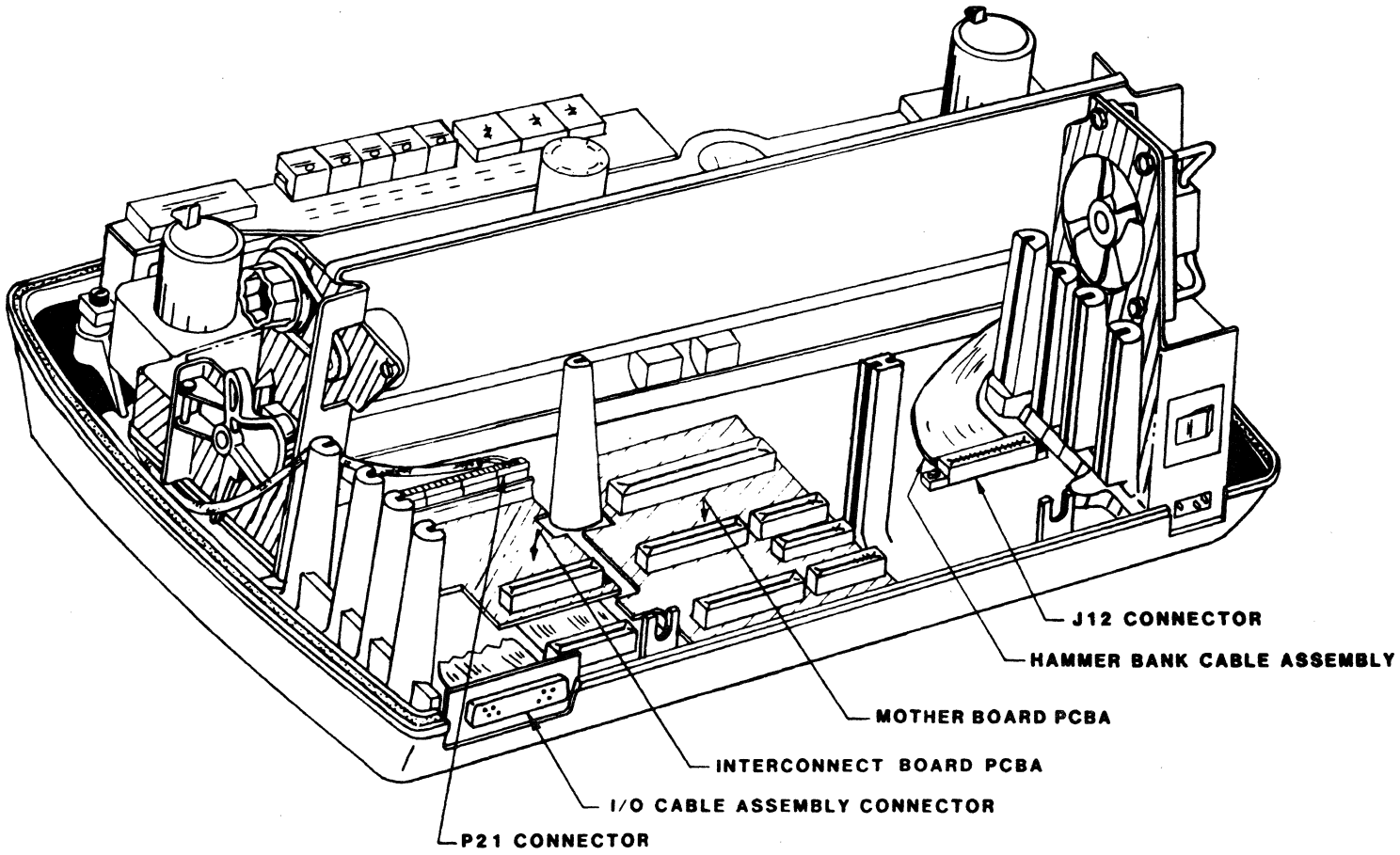


Figure 3-6. Rear View of Printer, Major PCBAs Removed

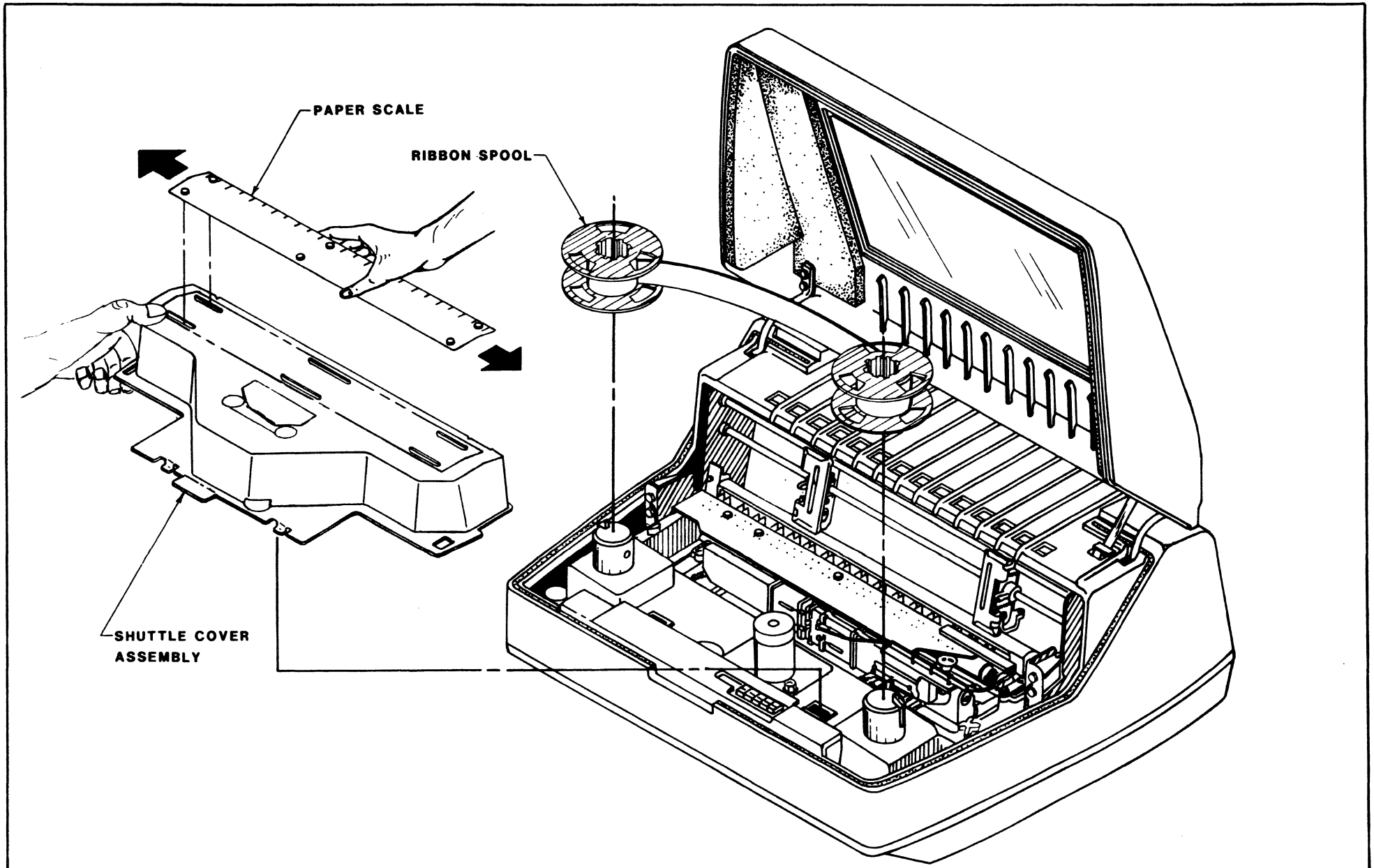


Figure 3-7. The Shuttle Cover

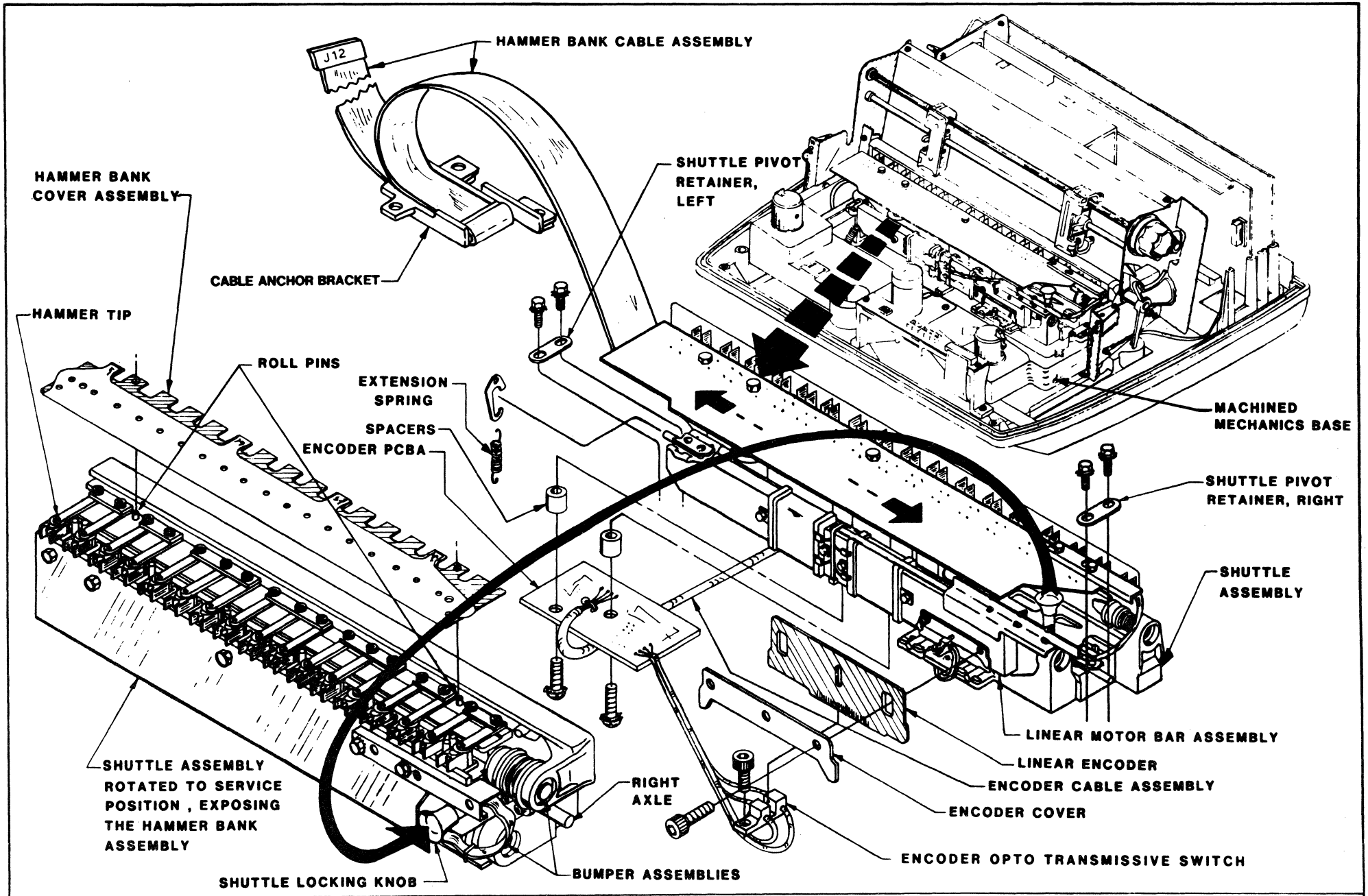


Figure 3-8. The Shuttle Assembly in Normal and Service Positions

3.16 THE SHUTTLE ASSEMBLY

The Shuttle Assembly **(Figure 3-8)** includes the following major assemblies:

- Hammer Bank Assembly
- Hammer Bank Cable Assembly
- Linear Motor Bar Assembly
- Encoder PCBA
- Bumper Assemblies

a. Lubrication

The axles at both ends of the Shuttle Assembly should be lubricated twice a year with bearing lubricant M3. To lubricate the shuttle axles, proceed as follows:

1. Remove the Shuttle Cover Assembly per subsection 3-15.
2. At the left side of the shuttle, push the Hammer Bank Cable Assembly aside and remove the two hex-head screws and lock washers holding the shuttle pivot retainer **(Figure 3-8)**; then, remove the retainer.
3. At the right side, remove the two hex head screws and lock washers holding the shuttle pivot retainer; then, remove the retainer.
4. Apply a small amount of bearing lubricant M3 at both ends of the shuttle axle.
5. Replace both shuttle pivot retainers and their associated hardware.
6. Replace the Shuttle Cover Assembly.

b. Removal and Replacement

To remove the Shuttle Assembly as a complete unit, refer to **Figure 3-8** and perform the following steps:

1. Remove the cabinet housing per subsection 3.5 and the Shuttle Cover Assembly per subsection 3.15.
2. Remove the Parallel Controller PCBA, the Mechanism Driver PCBA and the Power Supply PCBA per subsections 3.10 through 3.12. Remove the Serial Controller PCBA and the Option PCBA, if installed.
3. Remove the two hex head screws securing the Hammer Bank Cable Assembly connector J12 to the cabinet base **(Figure 3-6).**
4. Feed connector J12 and the cable around the side of the Machined Mechanics Base.
5. Remove the three hex head screws from the cable anchor bracket. The third screw can be accessed by rotating the Shuttle Assembly to the service position.
6. Carefully slide the cable anchor bracket to the side and feed the cable up through the opening in the Machined Mechanics Base.
7. Disconnect P21 from the Interconnect and feed the encoder cable assembly around the right side of the Machined Mechanics Base and up through the hole in the center of the base.
8. Remove the two extension springs at the front of the Shuttle Assembly using a spring removal tool.
9. At the left and right sides of the Shuttle Assembly, remove the hex head screws and washers and the shuttle pivot retainers.
10. Support the Shuttle Assembly and, simultaneously, grasp the shuttle lock knob.
11. Carefully swing the shuttle forward and lift it out of the saddle.

To replace the Shuttle Assembly, reverse the removal procedures. When replacement is complete, verify the following:

1. The portion of the Hammer Bank Cable Assembly between the left side of the Shuttle Assembly and the Anchor Bracket has no sharp bends or creases.
2. The Shuttle Assembly rotates easily between the normal and service positions and there is no slack in the Encoder Cable.
3. Print quality of Repeating Test patterns is acceptable. If it is not, perform Hammer Spring alignment (subsection 3.17) and Bumper Assembly Adjustment (subsection 3.21) as necessary and rerun patterns. Refer to Section 4, Category 6 for persistent problems.

3.17 THE HAMMER SPRINGS AND COILS

a. Cleaning

Unless cleaned periodically, the hammer tips may accumulate ribbon lint and paper dust which will eventually impair print quality.

To clean the Hammer Bank Assembly, follow the cleaning procedure of subsection 3.20; then, run Underlines Test Pattern (Address: Data = 02.4) and verify print quality.

b. Alignment

Alignment of a hammer tip is necessary when the hammer spring or its coil is replaced, or when print performance tests indicate a misalignment.
To align a hammer tip, use the hammer tip alignment tool (Part No. 110497-001.) Refer to **Figure 3-9** and proceed as follows:

1. Remove the power cord; then, remove the Shuttle Cover Assembly per subsection 3.15.
2. Move the tractors, rotate the Shuttle Assembly to the service position and remove the Hammer Bank Cover Assembly per subsection 3.20a.
3. Position the hammer tip alignment tool against the the roll pins **(Figure 3-9, Detail C)** and the hammer tips **(Figure 3-9, Detail B).**

CAUTION

Carbide hammer tips are used in the hammer bank. Be especially careful when removing or replacing the Hammer Bank Cover Assembly or performing other procedures in the hammer bank area. The carbide tips may be chipped or broken off if excess lateral force is applied to them.

4. Loosen the Allen head screw that holds the hammer. It may be necessary to loosen the adjacent screws on the same clamp plate.
5. Adjust the position of the hammer so the tip touches the corner of the hammer tip slot in the alignment tool **(Figure 3-9, Detail B).**
6. Torque the Allen head screws to 12 inch pounds. Be sure the clamp plate is parallel to the hammer alignment tool and touching it.
7. Carefully remove the hammer alignment tool.
8. Replace the Hammer Bank Cover Assembly, rotate the Shuttle Assembly to its normal position and re-install the ribbon.
9. Apply power to the printer; the CHK indicator should light. Use a pencil or other solid object to actuate the Interlock switch and by-pass the fault condition.
10. Verify print quality by running the Underlines Test pattern. Repeat the alignment procedure, if necessary.
11. Remove the ribbon and re-install the Shuttle Cover Assembly.

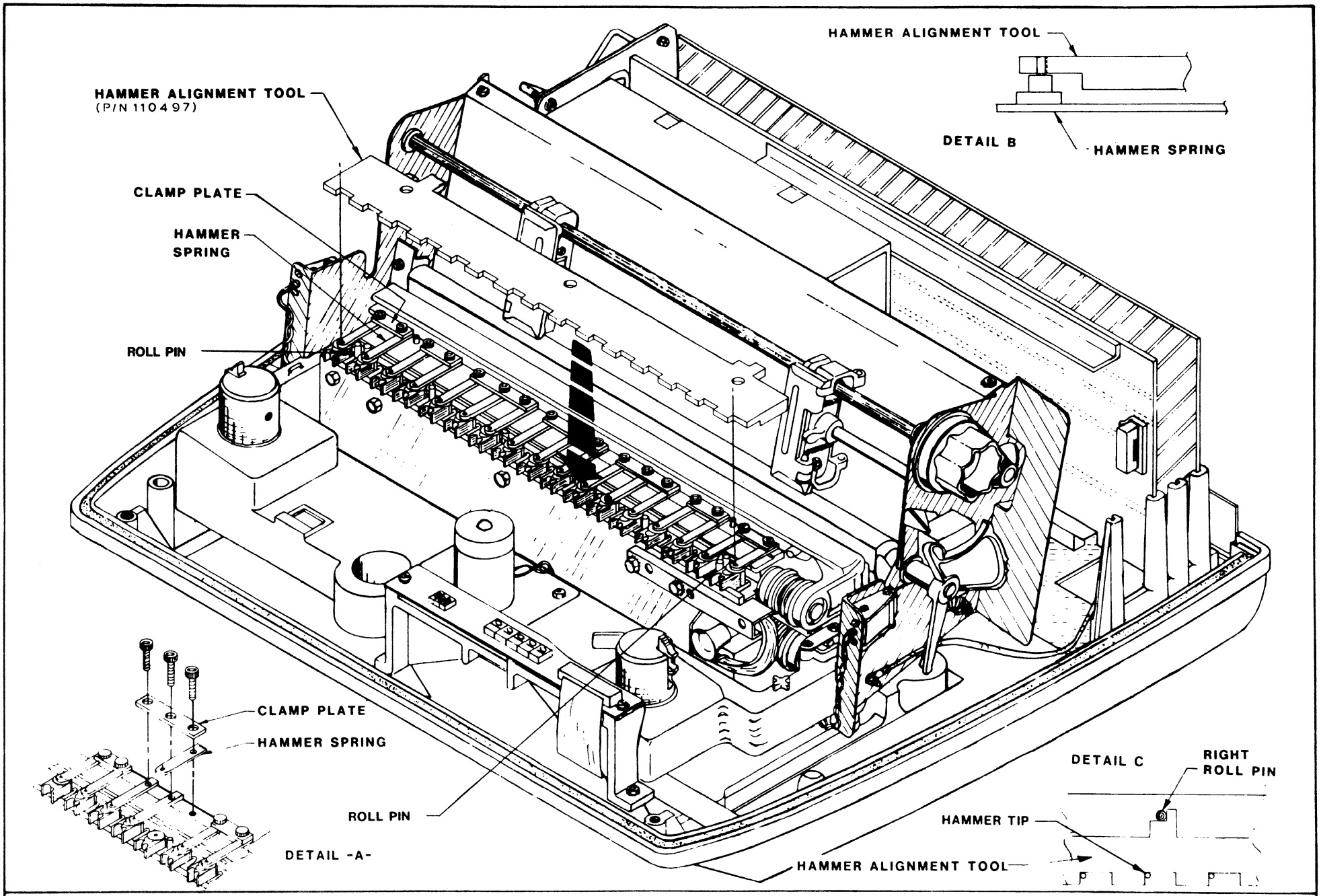


Figure 3-9. Hammer Spring Alignment and Replacement

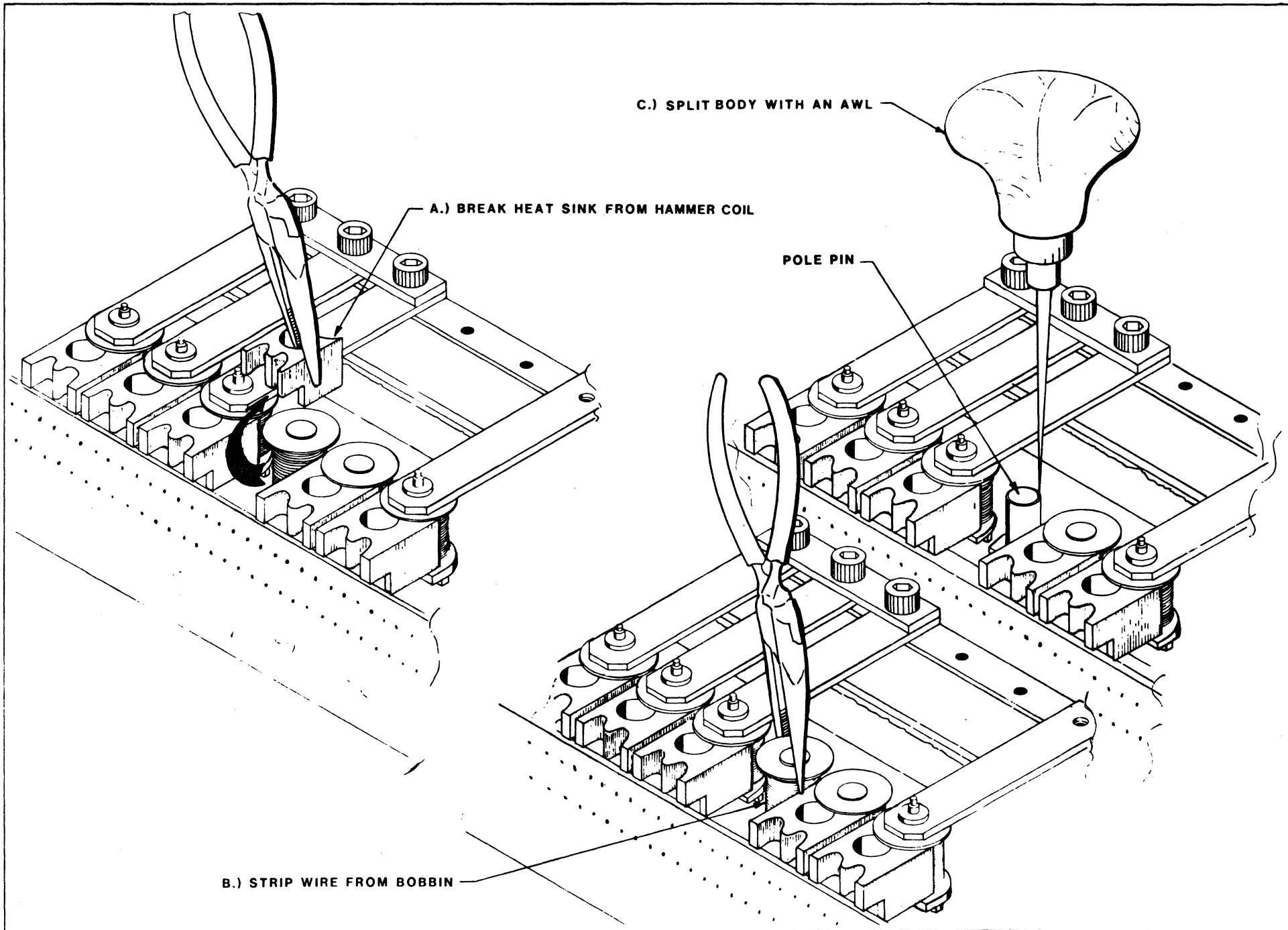


Figure 3-10. Hammer Coil Assembly Removal

c. Replacing a Hammer Spring

To replace a hammer spring, refer to **Figure 3-9** (Detail A) and proceed as follows:

1. Remove the power cord; then remove the Shuttle Cover Assembly per subsection 3.15.
2. Move the tractors, rotate the Shuttle Assembly to the service position and remove the Hammer Bank Cover Assembly per subsection 3.20a.
3. Remove the Allen head screw securing the defective hammer. It may be necessary to loosen the adjacent screws on the same clamp plate.
4. Remove the hammer spring by sliding it forward over the hammer coil pole pin.
5. Install the new hammer spring between the hammer coil and the clamp plate.
6. Replace, but do not tighten, the Allen head screw.
7. Perform the alignment procedures given in step b, above.

d. Replacing a Hammer Coil Assembly

Each hammer coil is integral with its pole pin and mounting base. The hammer coil is held in place in the Hammer Bank Assembly by adhesive.

To remove and replace a hammer coil:

1. Remove the hammer spring as described in step c, above.
2. Break off the hammer coil heat sink **(Figure 3-10);** then strip off the top of the coil and the wires from the bobbin.
3. Split the bobbin with an awl, peel the bobbin off the pole pin,and carefully remove the bobbin pins from the Hammer Bank Cable Assembly Connector; thoroughly clean the pole pin.
4. Put a drop of adhesive at the base of the new hammer coil and install the new coil on the pole pin. Press the coil down firmly on the base of the pin. Insert the bobbin pins in the connector on the Hammer Bank Cable Assembly.
5. Replace the hammer spring, clamp plate (if it was removed), and screw; align the hammer per step b, above.

3.18 THE LINEAR ENCODER

a. Inspection and Cleaning

To clean the Linear Encoder, wipe it with a tissue dampened in isopropyl alcohol. Then, blow through the windows to eliminate any lint or particles that may be obstructing them. Be careful not to bend the linear encoder.

b. Removal

To remove the Linear Encoder, refer to **Figure 3-11** and proceed as follows:

1. Remove the shuttle cover per subsection 3.15.
2. With the shuttle in the normal position, remove the two Allen head screws securing the encoder cover.
3. Remove the encoder cover and carefully lift out the encoder, using needle nose pliers. Note the relative positions of the slots in the encoder.

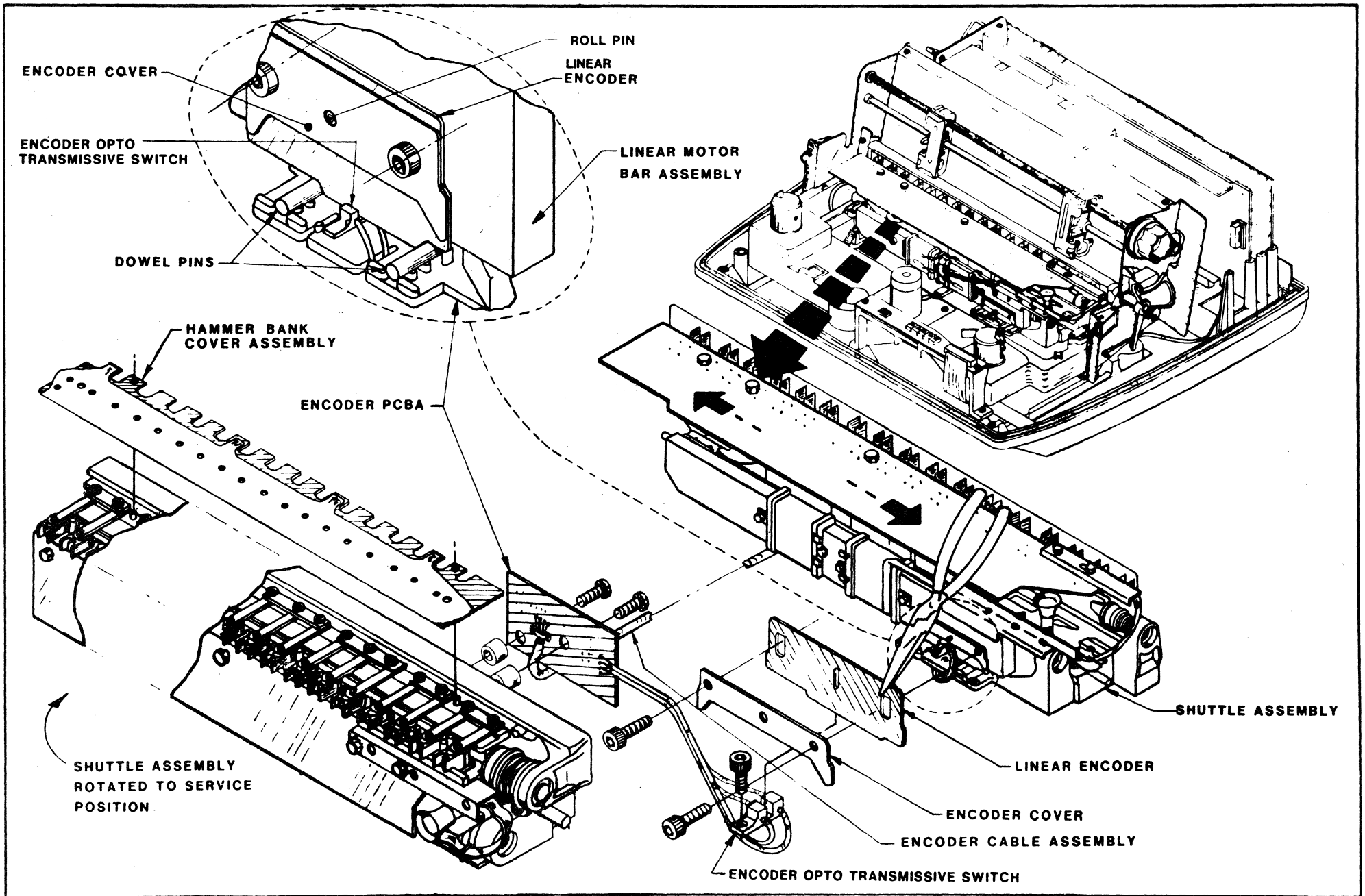


Figure 3-11. The Linear Encoder and the Encoder PCBA

To replace the Linear Encoder:

1. Place two 3/16 in. by 1 in. dowel pins in the slots in the shuttle **(Figure 3-11).**
2. Position the Linear Encoder in the encoder optical switch slot so that the encoder is resting on the roll pin of the Linear Motor Bar Assembly and both dowel pins. Be sure that the encoder slots are aligned with the screw holes on the Linear Motor Bar Assembly.
3. Install the encoder cover with its smooth rounded edges against the encoder; then, secure it with the two hex head screws.
4. Carefully remove the dowel pins so as not to bend, misalign or damage the encoder.
5. Replace the shuttle cover and install the ribbon.
6. Verify proper operation by running a test pattern.

3.19 THE ENCODER PCBA

a. Removal and Replacement

The Encoder PCBA is attached underneath the Shuttle Assembly.

To remove the Encoder PCBA, refer to **Figure 3-11** and perform the following steps:

1. Remove the cabinet housing per subsection 3.5.
2. Remove the linear encoder per subsection 3.18 b.
3. Remove the encoder optical switch screw.
4. Remove the three hex head screws from the cable anchor bracket. The third screw can be accessed by rotating the Shuttle Assembly to the service position. Afterward, rotate the Shuttle Assembly to the normal position.
5. Carefully slide the cable anchor bracket to the side.
6. Disconnect P21 from the interconnect Board PCBA; then, feed the Encoder Cable Assembly around the right side of the Machined Mechanics Base and up through the hole in the center of the base.
7. Remove the two extension springs at the front of the Shuttle Aseembly **(Figure 3-8),** using a spring removal tool.
8. Remove the hex head screws and their washers, plus the shuttle pivot retainers **(Figure 3-8)** from the left and right side of the Shuttle Assembly.
9. Carefully lift the Shuttle Assembly and turn it upside down; then, rest it on the Machined Mechanics Base.
10. Remove the Encoder PCBA hardware from the Shuttle Assembly; then, slide the PCBA toward the Encoder Optical Switch so that the optical switch becomes loose from its mount.

To replace the Encoder PCBA, reverse the removal steps.

3.20 THE HAMMER BANK ASSEMBLY

a. Cleaning

To clean the Hammer Bank Assembly, proceed as follows:

1. Remove the Shuttle Cover Assembly per subsection 3.15.
2. Unlock the tractors and move each to its own side of the paper transport.
3. Rotate the Shuttle Assembly to the service position by lifting up the shuttle lock knob at the right side of the Shuttle Assembly and pulling it toward the front of the printer. Release the knob and let the Shuttle Assembly drop into the service position.
4. Carefully lift the ends of the Hammer Bank Cover Assembly from the roll pins in the shuttle and pivot the cover on its edge **(Figure 3-8).** The Hammer Bank Cover Assembly will tend to stick to the magnetized shuttle; be extremely careful not to bend the cover or allow it to come loose while pivoting it.

CAUTION

Carbide hammer tips are used in the hammer bank. Be especially careful when removing or replacing the Hammer Bank Cover Assembly or performing other servicing procedures in the hammer bank area. The carbide tips may be chipped or broken off if excess lateral force is applied to them.

5. Use a soft brush slightly moistened with alcohol to clean the hammer tips. Vacuum accumulated paper debris or ribbon lint from the hammer tips and the Hammer Bank Assembly. Clean the Hammer Bank Cover Assembly with wipers moistened lightly with isopropyl alcohol.
6. Carefully reinstall the Hammer Bank Cover Assembly (locating it on roll pins and observing the Caution) and rotate the Shuttle Asssembly to the normal position.
7. Slide the Hammer Bank Assembly to the right and to the left; observe that it moves freely.

b. Alignment of Hammer Springs

Align the hammer springs per subsection 3.17b.

3.20.1 THE HAMMER BANK CABLE ASSEMBLY

a. Removal and Replacement

To remove the Hammer Bank Cable Assembly, refer to **Figure 3-12** and proceed as follows:

1. Remove the cabinet housing per subsection 3.5.
2. Remove the Shuttle Cover Assembly per subsection 3.15.
3. Remove the Parallel Controller PCBA, the Mechanism Driver PCBA and the Power Supply PCBA per subsections 3.10 through 3.12. Remove the Serial Controller PCBA and the Option PCBA, if installed.
4. Remove the two hex head screws securing Hammer Bank Cable Assembly Connector J12 to the Cabinet base **(Figure 3-6)**, and feed the cable assembly around the left side of the Machined Mechanics Base.
5. Remove the two hex head screws that hold the cable anchor bracket to the Machine Mechanics Base; then, rotate the Shuttle Assembly to the service position and remove the third screw.
6. Carefully slide the cable anchor bracket to the side and feed the cable assembly up through the opening in the Machined Mechanics Base.
7. Rotate the Shuttle Assembly to the service position.
8. Remove the Allen head screw that holds the cable lead (E1) on the bracket.
9. Disconnect the four wire clips (E2, E3, E4, and E5) on the two linear motors.
10. On the right side of the Shuttle Assembly, remove the three Linear Motor cable clips from the Linear Motor Cable Guide and the two linear Motor Cable Clips from the hammer bank linear motor cable guide.
11. Remove the two hex head screws that hold the hammer bank linear motor cable guide and spacers to the Hammer Bank Assembly.
12. Remove the three hex head screws that hold the Hammer Bank Cable Assembly to the Hammer Bank Assembly.
13. Hold the Hammer Bank PCBA firmly, and carefully pull it forward until all coil bobbin pins have disconnected from the sockets.

Removal is now complete.

To replace the Hammer Bank Cable Assembly, reverse the removal procedure.

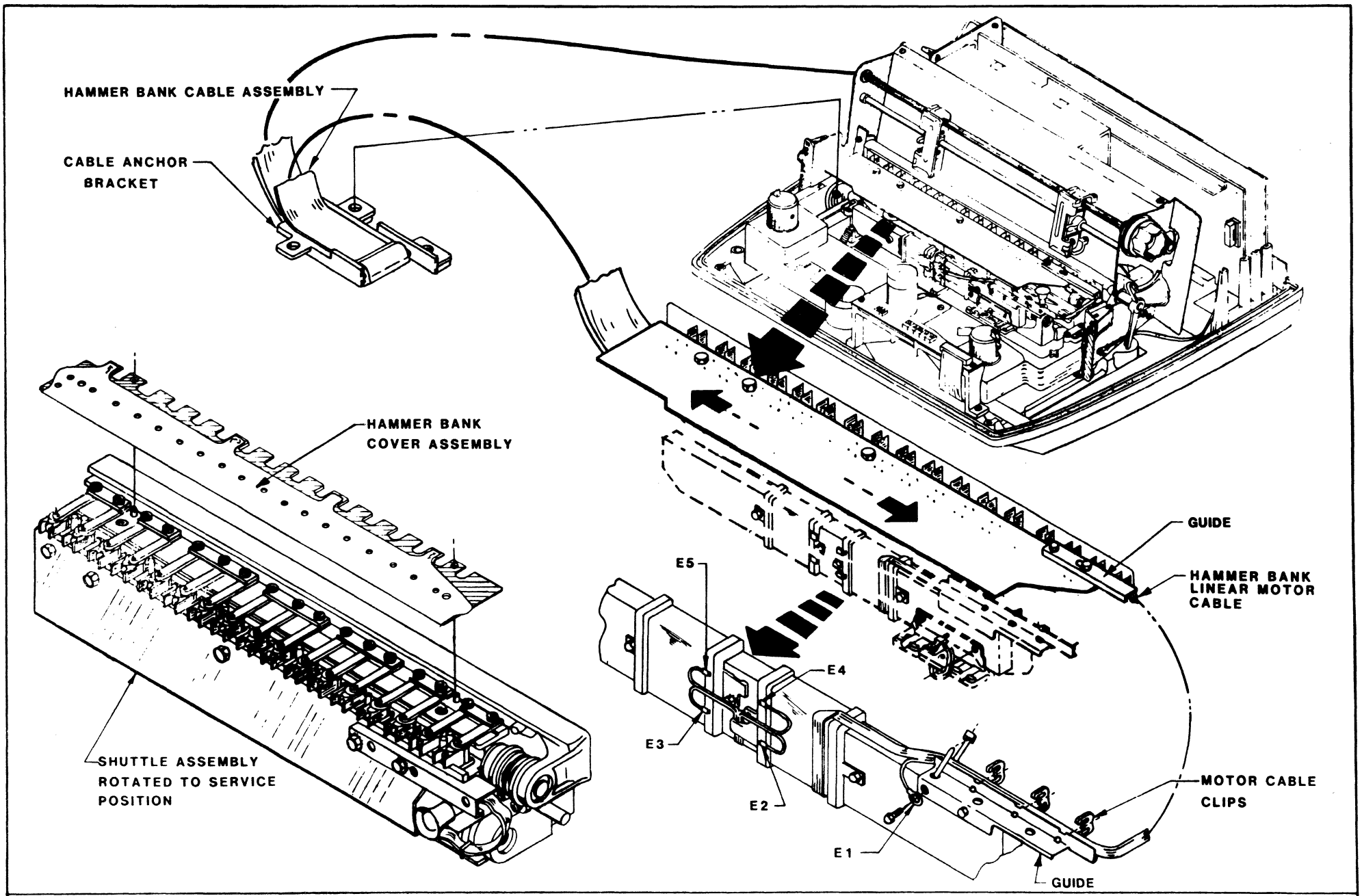


Figure 3-12. The Hammer Bank Assembly

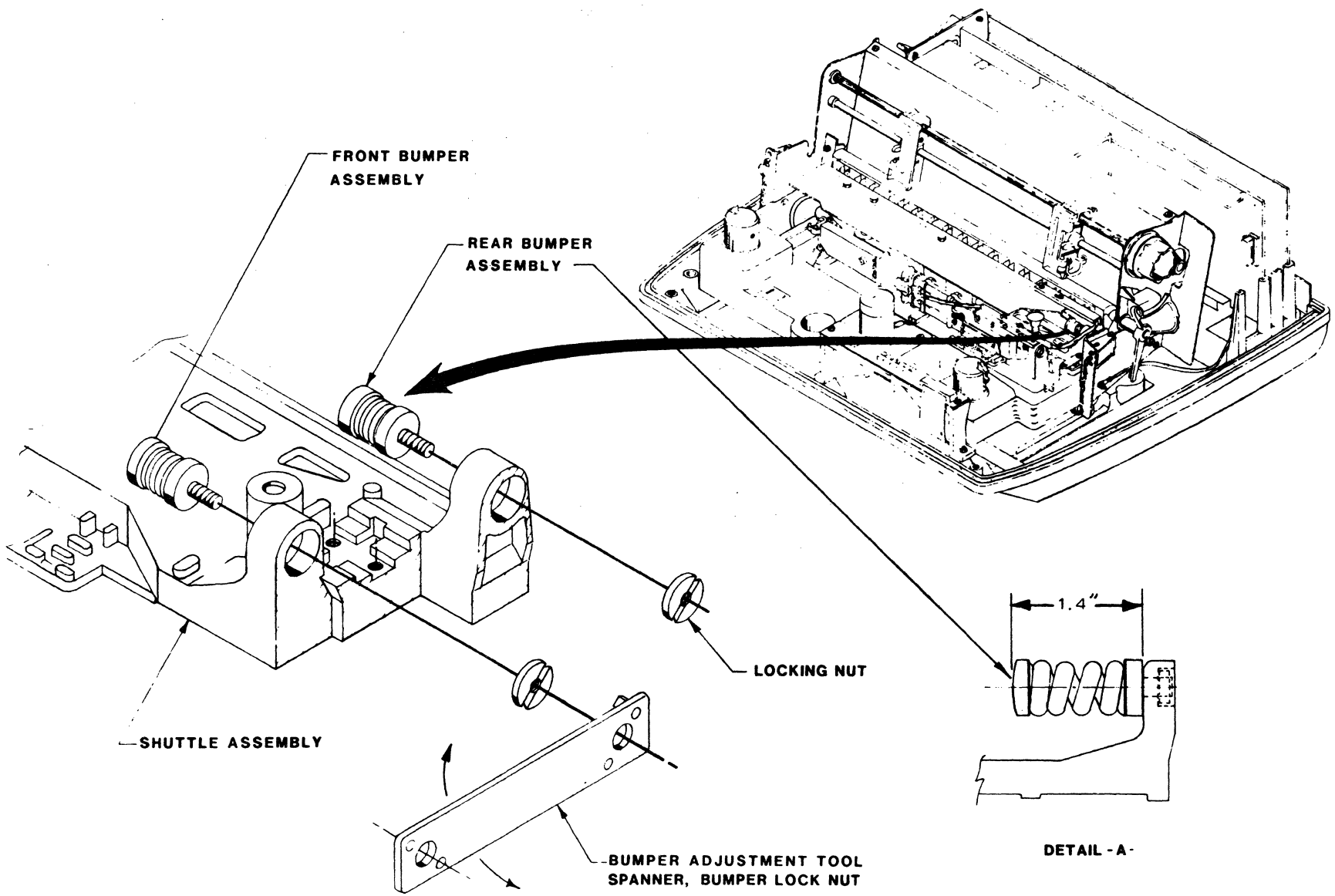


Figure 3-13. The Bumper Assemblies

3.21 THE BUMPER ASSEMBLIES

There are two Bumper Assemblies at the right side of the Shuttle assembly. They are used to rebound the shuttles inertial energy when the shuttle reverses direction.

a. Inspection

Inspect the Bumper Assemblies for signs of uneven wear or deterioration of the rubber bumpers. If the rubber is cracked, chipped, or worn unevenly, replace the bumper. A knocking sound, specially when printing underlines, is an indication that bumpers are out of adjustment. To verify this, perform the stroke timing check described in b. Adjustment: steps 24 through 28.

b. Adjustment

The Bumper Assemblies must be adjusted to provide overall printing quality. Stroke timing and hammer phasing must be checked at this time, and adjusted if necessary. For convenience, the procedures for bumper adjustment, stroke timing and hammer phasing are grouped together here.

To adjust the bumpers:

1. Place printer in an off line condition.
2. Press 2nd FUNC switch.
3. Select mode 4.
4. Select Address. Data = 12.1 for motor bar rebound spring adjustment (front bumper).

CAUTION

The Shuttle Assembly will be moving forcefully against each bumper during the adjustment procedure. DO NOT PUT FINGERS BETWEEN THE SHUTTLE AND EITHER BUMPER. Instead, take care to grip only the edge surface of the bumper pad while rotating the Bumper Assembly during adjustment and do not touch the linear motor cable guides (Figure 3-13).

5. Press the 2nd FUNC switch. Shuttle motion will begin without printing and the rebound rate of the front bumper will appear in the digital display.
6. Notice the display reading:
   a. If it is 145±2, continue to step 13.
   b. If it is not 145±2, continue to step 7.
7. Press RDY switch to stop the shuttle motion.
8. Loosen the locking nut at the right end of the front bumper (figure 3-13) by rotating it counterclockwise with the bumper locknut spanner (P/N 110459-001).
9. Press 2nd FUNC switch and repeat steps 4 and 5.
10. Rotate the front bumper pad by its edge surface until a reading of 145±2 is achieved.

NOTE:

Clockwise rotation decreases the reading; counterclockwise rotation increases the reading.

Hold the bumper firmly to prevent any further displacement and press the RDY switch. Shuttle motion will stop.

11. Tighten the locking nut.
12. Press 2nd FUNC switch and verify the specified setting by repeating procedure steps 4 through 7.
13. Press the F/L switch; shuttle motion will re-start and the rebound rate of the hammer bank rebound spring (rear bumper) will appear in the digital display.

14. Notice the display reading:
    a. If it is 245±2, continue to step 23.
    b. If it is not 245±2, continue to step 15.
15. Press RDY switch to stop the shuttle motion.
16. Loosen the locking nut at the right end of the rear bumper by rotating it counterclockwise with the bumper locknut spanner.
17. Press the 2nd FUNC switch.
18. Select Address. Data = 12.2, for hammer bank rebound spring adjustment (rear bumper).
19. Press 2nd FUNC switch. Shuttle motion will begin without printing and the rebound rate of the rear bumper will appear in the digital display.
20. Rotate the rear bumper pad by its edge surface until a reading of 245 is achieved.

NOTE:
Clockwise rotation decreases the reading; counterclockwise rotation increases the reading.

Hold the bumper firmly to prevent any further displacement and press the RDY switch. Shuttle motion will stop.

21. Tighten the locking nut.
22. Repeat steps 17, 18, 19, and 14.
23. Press RDY switch, shuttle motion will stop.

To adjust stroke timing:

1. Select 2nd FUNCTION.
2. Select Address. Data = 13.0 to verify stroke timing. (Defined as half of period of shuttle movement.) Once the display reads 13.0, press the DATA switch and hold it until the display count reaches 13.0 again.
3. Press the 2nd FUNC switch; shuttle motion will begin and repeating "H" will be printed.
4. Notice the display reading:
    a. If it is 51.5±4.0 continue to step 28.
    b. If it is not 51.5±4.0 readjust bumpers by selecting a new rebound rate. Values less than 51.5 will decrease the stroke timing and values greater than 51.5 will increase the stroke timing.
5. Press the RDY switch; shuttle motion will stop.

To adjust Hammer Phasing:

1. Select 2nd FUNCTION.
2. Select Mode 1.
3. Select: Address. Data = 14.0 for Hammer Phasing adjustment. Once the display reads 14.0, press DATA switch and hold it until the display count reaches 14.0 again.
4. Press the 2nd FUNC switch; the printing of all H's will begin and the current phasing index value (nominally, 050) for the selected mode will appear in the display.

NOTE:
The index range is between 005 and 095.

5. Determine whether the dots in each column of each H being printed are within +0.005 inch of being a straight line.
   a. If they are a straight line, go to step 6.
   b. If they are not a straight line, press and hold DATA switch or the ADDR switch until they are.

NOTE:

Each time the DATA switch is pressed and held, the index value increases; each time the ADDR switch is pressed and held, the index value decreases.

6. Press the RDY switch; the phasing adjustment routine is exited and the index value for the selected mode is stored in the EAROM.
7. Repeat bumper adjustments and hammer phasing adjustments for the remaining two modes, 2 and 3.

c. Removal and Replacement

To replace the Front Bumper Assembly, proceed as follows:

1. With the shuttle assembly in the printing position, remove the locking nut located on the outside of the mounting flange and unscrew the Bumper Assembly.
2. Replace the new Bumper Assembly and secure it with the locking nut after it is coarsely adjusted as shown in **Figure 3-13, Detail A.** (Use a steel rule for best results.)
3. After replacement, adjust the Bumper Assembly as described in adjustment section b.

The procedure for replacing the rear Bumper Assembly is the same as that for replacing the front Bumper Assembly, except that placing the shuttle in the service position gives better access.

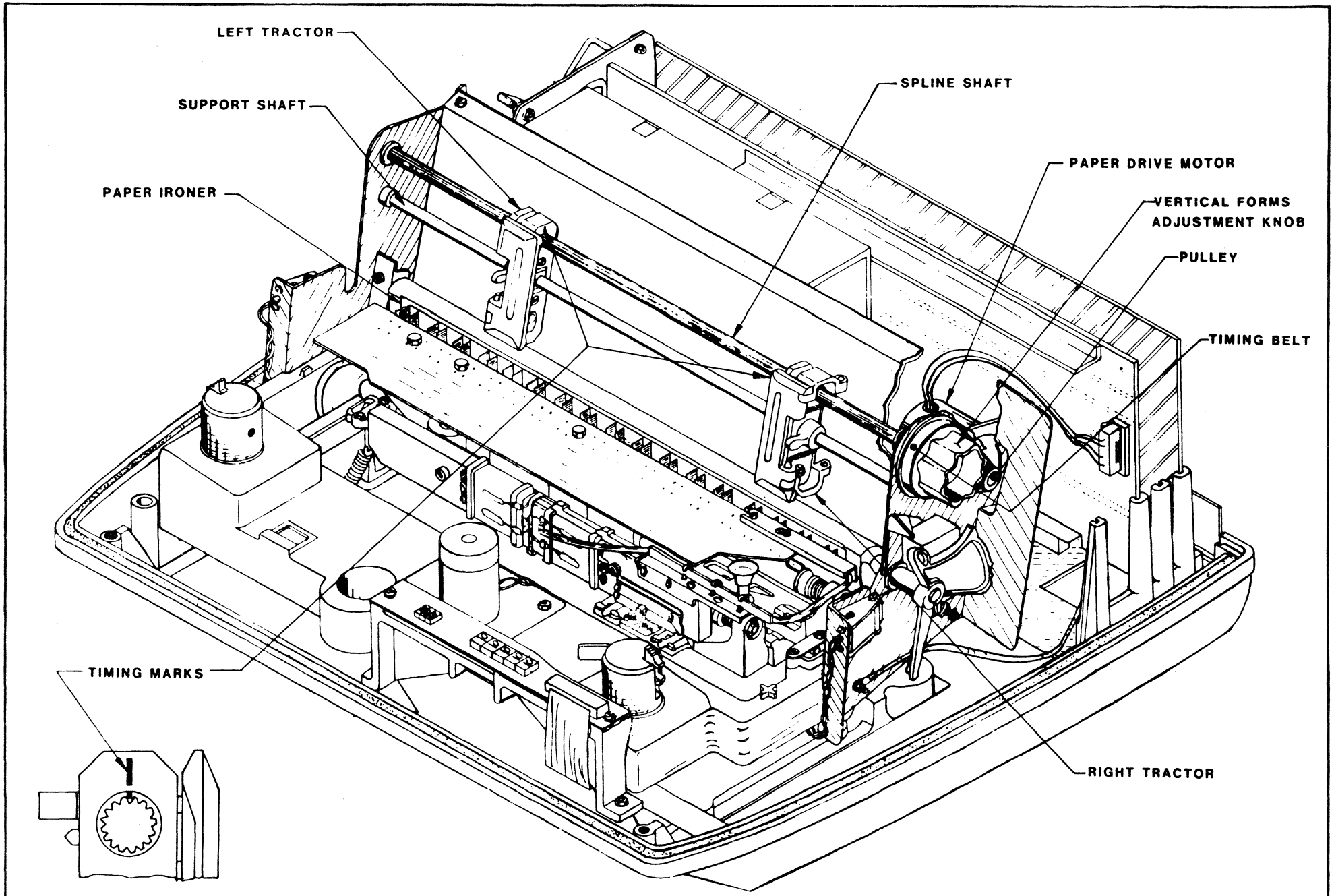


Figure 3-14. The Paper Feed Mechanism

3.22 PAPER FEED MECHANISM

The paper feed mechanism **(Figure 3-14)** includes the following components:

- the paper drive motor and pulley,
- the timing belt,
- the Spline Shaft Assembly,
- the support shaft,
- the left and right tractors,
- the Vertical Forms Adjustment Controls, and
- the paper ironer.

3.23 THE PAPER FEED TIMING BELT

a. Checking Timing Belt Tension

Incorrect timing belt tension can lead to excessive wear of the paper feed mechanism. Further, it can shorten belt life, damage the paper feed motor bearings.

To check tension, remove the cabinet housing and the belt shield; then, depress the upper span of the belt with a finger at the approximate mid point between the pulleys; observe 1/16 inch deflection of the belt at that point **(Figure 3-15).** If the deflection is less than nominal, ease the belt tension per step b, below.

b. Adusting the Timing Belt

To adjust the tension of the timing belt, refer to Figure 3-16 and proceed as follows:

1. Remove the belt shield and the two hex head screws that secure it.
2. Loosen the two hex head screws that hold the paper drive motor to the right side plate.
3. Press down on the motor shaft with a 40 pound weight scale.
4. Set the tension between 7 and 9 pounds and torque the two hex head screws that hold the motor to 32 ±2 in-lb.
5. Replace the belt shield and its two screws.

c. Removal and Replacement

To remove the timing belt, remove the cabinet housing per subsection 3.5; then refer to **Figure 3-15** and proceed as follows:

1. Remove the belt shield and the two screws that secure it.
2. Loosen the two hex head screws that hold the paper drive motor.
3. Slide the belt off both the spline shaft pulley and the drive motor pulley.

To replace the belt, reverse the removal procedure. After replacing the belt, adjust the belt tension as described in step b, above.

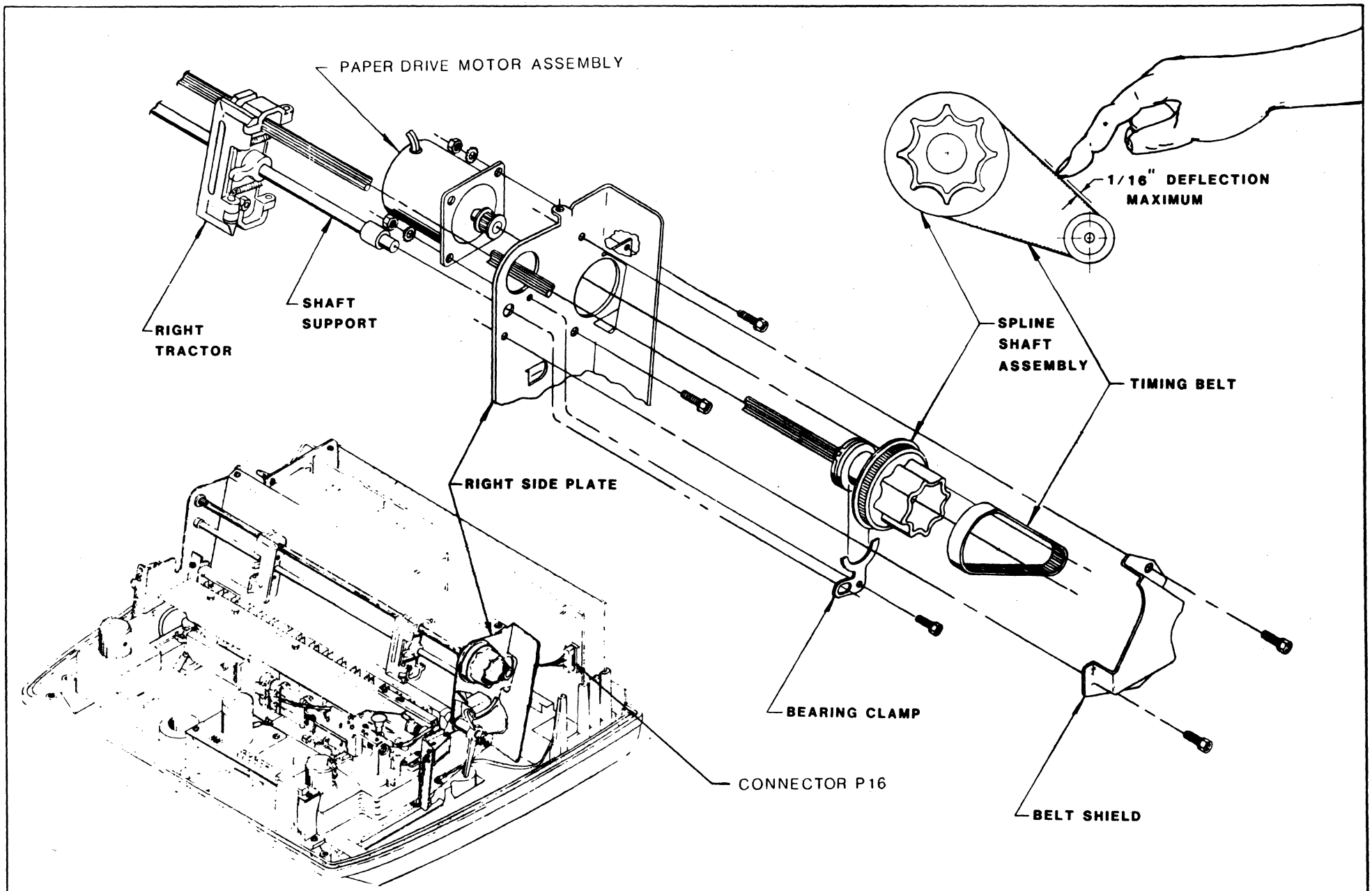


Figure 3-15. The Paper Drive Motor and the Timing Belt

3.24 THE PAPER DRIVE MOTOR ASSEMBLY

a. Inspection

The pulley on the paper drive motor must be aligned with the pulley on the Spline Shaft Assembly so that the timing belt will track properly. If the timing belt is not tracking in a straight line, alignment is required.

b. Alignment

To align the motor pulley with the spline shaft pulley, remove the cabinet housing per subsection 3.5 and perform the following steps:

1. Remove the belt shield and its hardware.
2. Loosen the two set screws on the side of the motor pulley.
3. Align the paper drive motor pulley with the spline shaft pulley and center the timing belt on the motor pulley.
4. Tighten the set screws in the pulley.
5. Check that tracking is correct by doing several Top of Form operations and watching the belt action.
6. Replace the belt shield and its hardware.
7. Replace the cabinet housing.

c. Removal and Replacement

To remove the paper drive motor assembly, perform the following steps:

1. Remove the cabinet housing per subsection 3.5.
2. Disconnect the drive motor cable from connector P16 on the Mechanism Driver PCBA.
3. Remove the belt shield and the two hex head screws that secure it to the right side plate.
4. Remove the barrier panel.
5. Carefully remove the motor and the two hex head screws, washers, and nuts that secure the motor to the right side plate.

To replace the paper drive motor assembly, perform the following steps:

1. Position the drive motor on the right side plate.
2. Insert and tighten the star washers, nuts, and screws that hold the paper feed motor.
3. Align the paper feed belt by adjusting the pulley on the motor shaft for proper tracking during TOF operation.
4. Connect the motor cable to connector P16 on the Mechanism Driver PCBA.
5. Replace the barrier panel.
6. Adjust the timing belt tension per subsection 3.23.
7. Replace the cabinet housing per subsection 3.5.

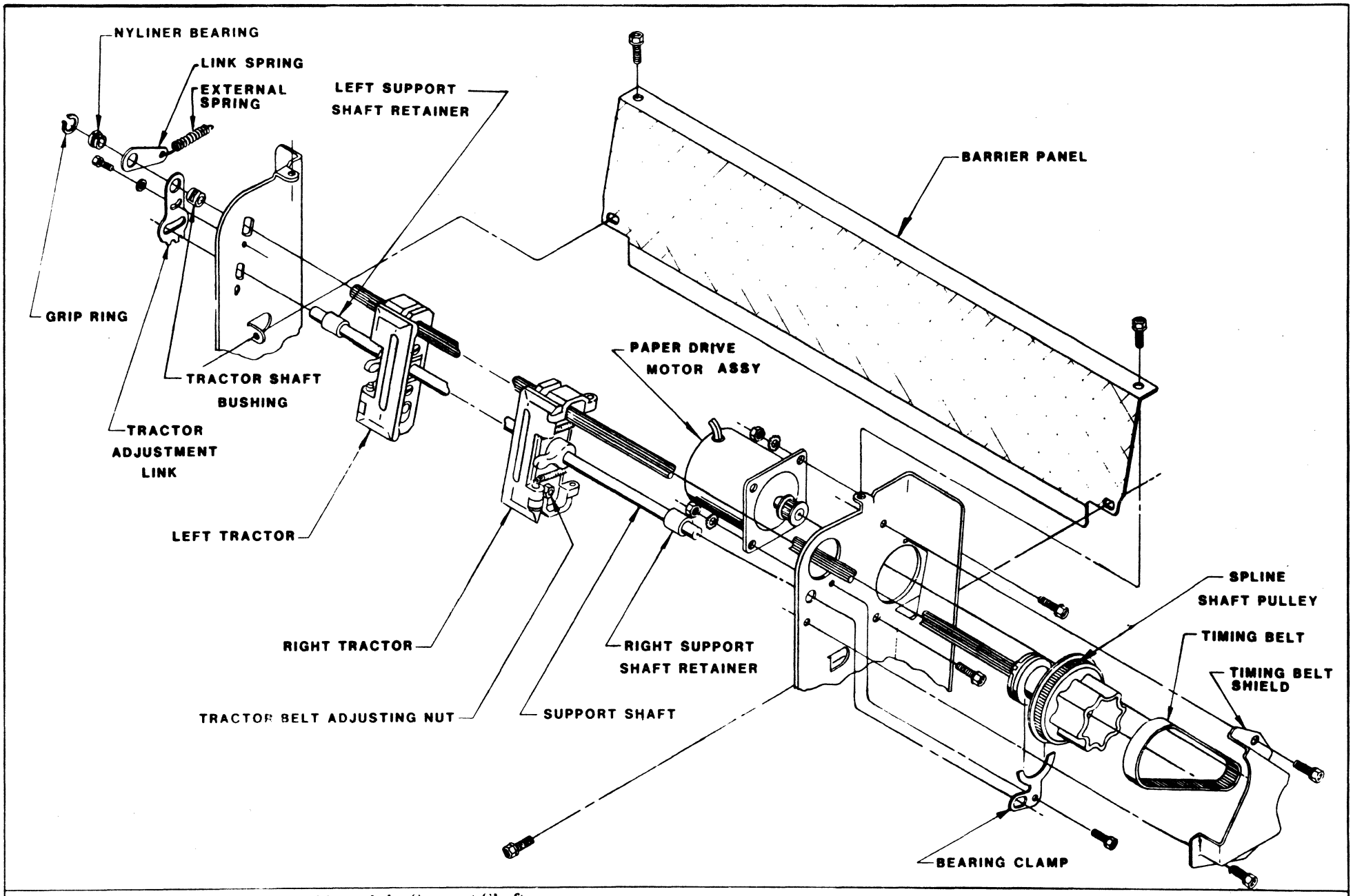


Figure 3-16. The Spline Shaft Assembly and the Support Shaft

3.25 THE SPLINE SHAFT ASSEMBLY AND THE SUPPORT SHAFT

a. Inspection and Cleaning

Wipe off accumulated paper, dust, and debris from the spline shaft and support shaft with a clean cloth. Excessive timing belt tension will cause the spline shaft to wobble. Check timing belt tension per subsection 3.23 and adjust it, if necessary.

b. Removal and Replacement

To remove the Spline Shaft Assembly and the Support Shaft, remove the cabinet housing per subsection 3.5. Then, refer to **Figure 3-16** and perform the following steps:

1. Remove the grip ring from the left end of the Spline Shaft Assembly, using grip ring pliers; then remove the nyliner bearing.
2. Disengage the spring link from the left side plate and remove the spring and the spring link.
3. Remove the tractor adjusting link, along with the hex head screw and lock washer that secure it.
4. Remove the tractor shaft bushing.
5. Remove the belt shield and the two hex head screws securing it
6. Remove the spline shaft bearing clamp, along with the hex head screw and washer that secure it to the right side plate.
7. Remove the timing belt from the spline shaft pulley.
8. Unlock the two tractors and slide both toward the center. Carefully slide the Spline Shaft Assembly to the right and out of the tractors.

NOTE:
This completes the removal of the spline shaft assembly and the support shaft. If the support shaft or the tractors are to be replaced, perform the following steps:

1. Grip the support shaft firmly and slide it about two inches to the left so that it clears the right side plate.
2. Pivot the right end of the support shaft forward and pull it toward the right until it clears the left side plate.
3. Remove one retainer from the support shaft if the tractors are to be replaced. Otherwise, remove both retainers if the support shaft is to be replaced.
4. Slide the tractors off the support shaft.

To replace the Spline Shaft Assembly and the support shaft, perform the following steps:

1. Press a support shaft retainer onto one end of the support shaft.
2. Insert the support shaft into the support shaft hole of each tractor. Make sure that the left and right tractors are are on the left and right side, respectively.
3. Press a shaft retainer onto the other end of the support shaft.
4. Set the support shaft in position and press the retainers against the left and right side plates to hold the shaft in place.
5. Open the tractor covers and rotate the tractor belts so that the timing marks **(Figure 3-14)** are directly upwards on both tractors.
6. Insert the spline shaft through the right side plate and then through the spline shaft hole of each tractor. Make certain that the same spline is inserted through the marked grooves in both tractors.
7. At the right end of the Spline Shaft Assembly, install the spline shaft bearing clamp. Secure it with its hex head screw and washer.
8. Install the tractor shaft bushing onto the spline shaft and press it into place in the side plate.
9. Install the tractor adjusting link and secure it with a hex head screw and washer.
10. Install the link spring assembly.

11. Install the nyliner bearing on the shaft.
12. Using grip ring pliers, install the grip ring to secure the link spring assembly.
13. Replace the timing belt
14. Replace the belt shield and the two hex head screws that secure it.
15. Perform the skew alignment that is described next in c.
16. Replace the cabinet housing.

c. Skew Alignment

Align the Spline Shaft Assembly and the support shaft so that the first line of print is parallel to the perforation between sheets:

1. Loosen the hex head screw that secures the tractor adjusting link.
2. Run a page of E's; then fold the right edge back over to the left edge and verify that the top line is an equal distance from the top of form on both halves of the page (hold the paper up to a strong source of light).
3. Move the link as required to obtain proper alignment.
4. Tighten the hex head screws.

3.26 THE TRACTORS

a. Inspection and Cleaning

Use a stiff brush and vacuum to remove accumulated paper dust and lint from the tractors. Rotate the spline shaft to expose all areas of each tractor for cleaning.

b. Belt Adjustment

To adjust the tractor belt tension, place the tractor in the center of the spline shaft, and perform the following steps:

IMPORTANT
Both tractor belts must be adjusted to the same tension.

1. Loosen the screw and nut on the side of the tractor, using a screw driver and nut driver. Press downward equally on the nut and screw to increase belt tension if the belt appears loose.
2. Tighten the screw and the nut.
3. Adjust the other tractor's belt tension to match the first, if necessary.
4. Install paper and apply power to the printer. Run several TOF tests to verify that the paper feed motor is not binding. If it is, repeat the belt adjustment procedure.

c. Removal and Replacement

If either paper tractor fails, remove and replace both tractors per the following procedure:

1. Remove the Spline Shaft Assembly and the support shaft per subsection 3.25, but shifts the shaft only as far as necessary to remove the tractors.
2. Slide the new tractors on to the spline shaft and support shaft and replace all components per subsection 3.25.

NOTE:
Be sure to align both tractors on the spline shaft so that each timing mark is on the same spline.

3. After replacing the tractors, check the tension of the timing belt; adjust tension, if necessary, per subsection 3.23.
4. Adjust the skew alignment of the Spline Shaft Assembly and the support shaft per subsection 3.25, as necessary.

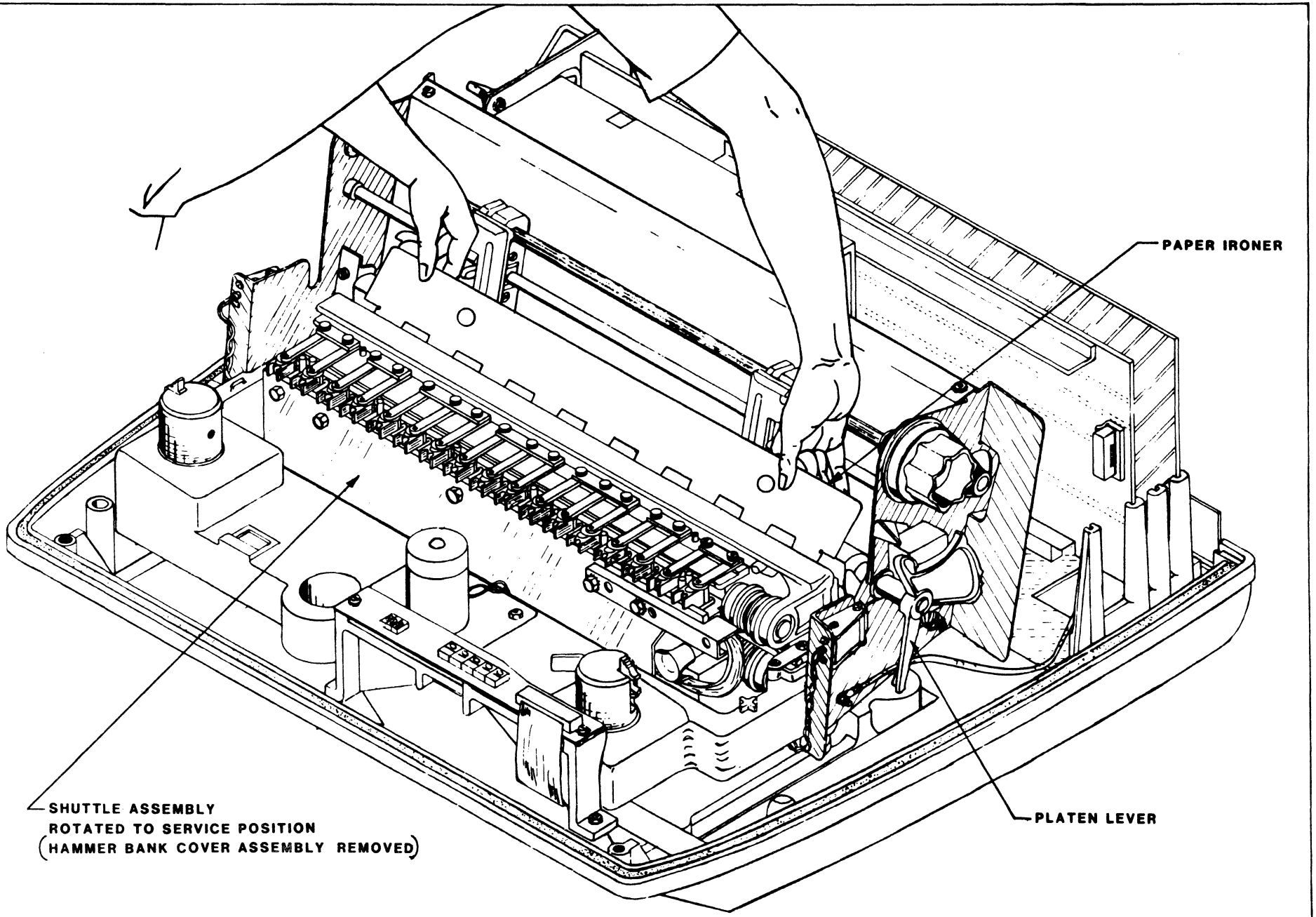


Figure 3-17. Paper Ironer Removal

3.27 THE PAPER IRONER

a. Inspection and Cleaning

The paper ironer should be cleaned to remove any paper debris or accumulation of grease or ink. Use a shop towel or paper wiper dampened with isopropyl alcohol.

b. Removal and Replacement

The paper ironer is held in position by two lateral slots that engage the ironer mounting plate at the outboard edge. To remove the paper ironer, refer to **Figure 3-17** and proceed as follows:

1. Move the platen lever to the load position (fully open).
2. Remove the Shuttle Cover Assembly per subsection 3.15.
3. Rotate the Shuttle Assembly to the service position per subsection 3.20a, step 3.
4. Apply thumb pressure at both ends of the ironer, toward the rear of the printer. Continue pressing until the ironer slots disengage from the plate; then, lift the ironer out.

To reinstall the ironer, simply press it back into position so that it is fully seated in the slots of the ironer mounting plate.

3.28 THE PLATEN

a. Adjustment

To obtain uniform print density, the gap between the hammer tips and the platen must be uniform and accurate. To adjust the hammer tip to platen gap, refer to **Figure 3-18, detail A** and proceed as follows:

1. Set the platen lever to the load position (fully open) and remove the paper.
2. Remove the Shuttle Cover Assembly per subsection 3.15.

CAUTION

The tungsten carbide hammer tips are more susceptible than steel tips to breakage from lateral stress. Use care to raise the cover free of the tips before it is withdrawn from the Shuttle Assembly.

3. Remove the paper ironer per subsection 3.27b.
4. Remove the Hammer Bank Cover Assembly per subsection 3.20a, steps 3 and 4.
5. Rotate the Shuttle Assembly to the normal position.
6. Measure the platen gap as follows:
   a. Insert a 0.014-inch feeler gauge between the platen and the hammer tips, within two hammer positions of one end of the hammer bank.

CAUTION

Be sure that the gauge does not bend or interfere with the paper ironer

   b. Carefully move the platen lever to the one part paper position. (DO NOT FORCE it into position against the feeler gauge.) The gauge should move with very little friction between the surfaces and lie in contact with both. To be sure that the gauge is vertical in both the lateral and front to rear planes, shift it slightly until minimal friction is encountered.
7. Repeat the gap measurement within two hammer positions of the other end of the hammer bank.
8. Set the platen gap to 0.014 ±0.001 inch by adjusting the platen gap set screw at that end of the platen.
9. Check both ends of the platen after an adjustment. An adjustment at one end will alter the other end slightly.
10. When the gap at both ends is adjusted correctly, replace the Hammer Bank Cover Assembly, the ribbon, and the paper ironer.
11. Run the repeating H print test to determine print quality.
12. a. If print quality is acceptable, replace the Shuttle Cover Assembly.
    b. If print quality is not acceptable, repeat the adjustment procedure. Adjust the gap to 0.013 inch or 0.015 inch, as necessary.

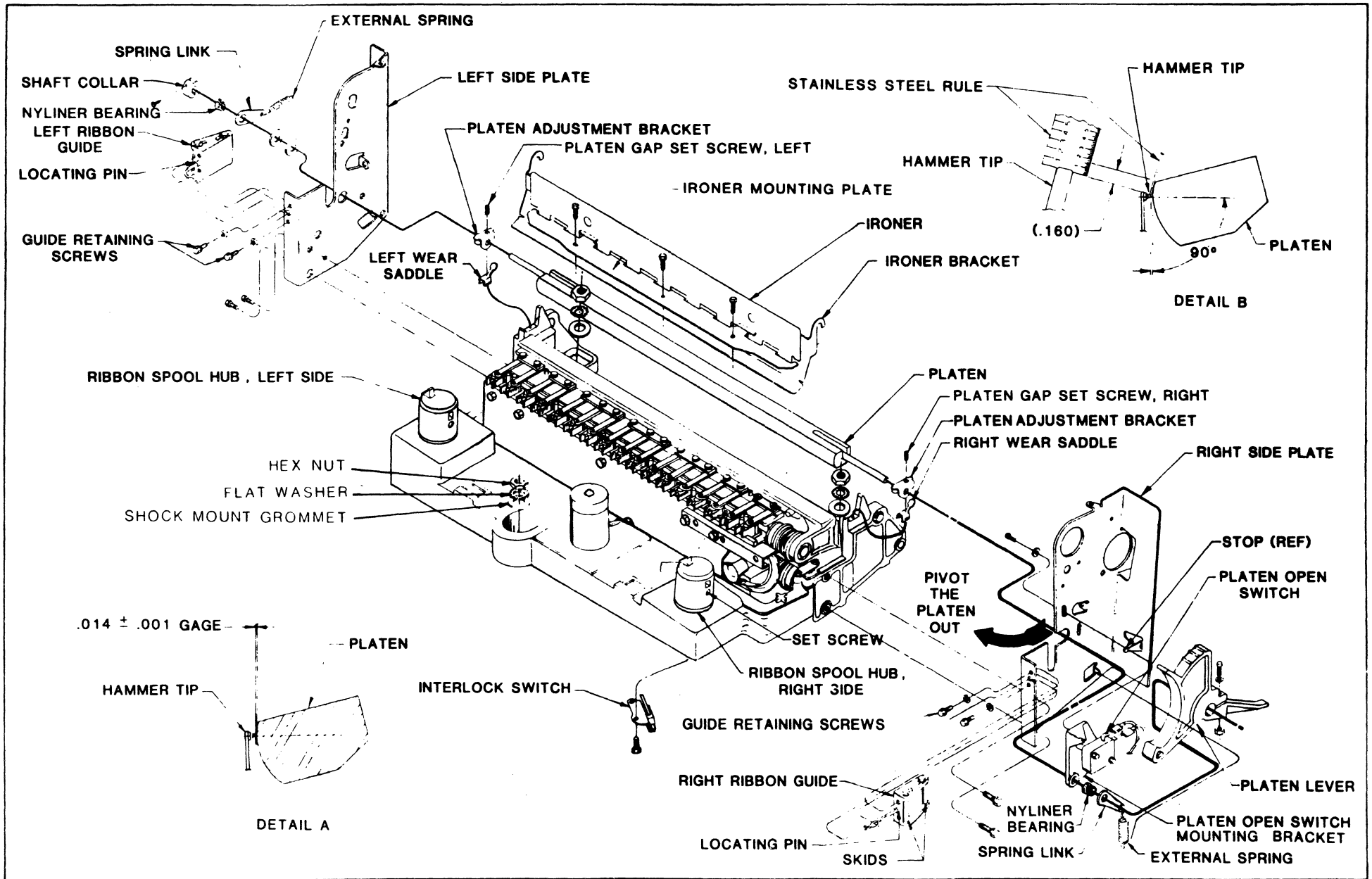


Figure 3-18. The Platen Assembly, Ribbon Guides and Spool Hubs

b. Removal and Replacement

To remove the platen, refer to **Figure 3-18** and proceed as follows:

1. Remove the cabinet housing per subsection 3.5.
2. Remove the paper and the Shuttle Cover Assembly per subsection 3.5; then rotate the Shuttle Assembly to the service position per subsection 3.20a, step 3.
3. Remove the ironer per subsection 3.27.
4. Remove the three screws and lockwashers from the ironer mounting plate and lift it and the ironer bracket out of the printer.
5. Remove the right ribbon guide.
6. At the right side, remove the platen lever after loosening its retaining screw.
7. At the right side, remove the nyliner bearing, the spring link, and the external spring.
8. Remove the platen open switch bracket.
9. At the left side, remove the shaft collar after loosening its retaining screw.
10. Remove the nyliner bearing, the external spring, the spring link and the two flat washers.
11. Pivot the platen forward until it clears the right side plate; then slide it to the right until it clears the left side plate.
12. Remove each platen adjust bracket and its screw from the left and right wear saddles. DO NOT DISTURB the position of the wear saddles.

To replace the platen, reverse the removal procedure; then make the following adjustments:

1. Remove the Hammer Bank Cover Assembly per subsection 3.20a, steps 3 and 4; then rotate the Shuttle Assembly to the normal position.
2. Loosen the platen lever screw; then, position the platen so that the distance from the hammer tip to the flat top surface of the platen is 0.160 inch **(Figure 3-18, detail B).**
3. Adjust the platen lever so that the one part mark on the lever coincides with the pointer on the platen open switch assembly when the lever is against the bottom of the stop on the right side plate; then, tighten the platen lever screw.
4. Adjust the platen gap per step a, above.
5. Adjust the right ribbon guide per subsection 3.32.
6. Restore the printer to normal condition per subsection 3.20a, steps 3 and 6.
7. Install paper, apply power and verify print quality by running repeating tests.
8. Replace the cabinet housing per subsection 3.5.

3.29 THE PLATEN OPEN SWITCH ASSEMBLY

a. Removal and Replacement

To remove the Platen Open Switch Assembly, refer to **Figure 3-18** and proceed as follows:

1. Remove the cabinet housing per subsection 3.5.
2. Rotate the platen lever to the fully closed, single part paper position.
3. Disconnect the two leads from the Platen Open Switch Assembly.
4. Remove the Platen Open Switch from the stand off posts by removing the two Phillips head screws that secure the switch.

To replace the Platen Open Switch, reverse the removal procedure.

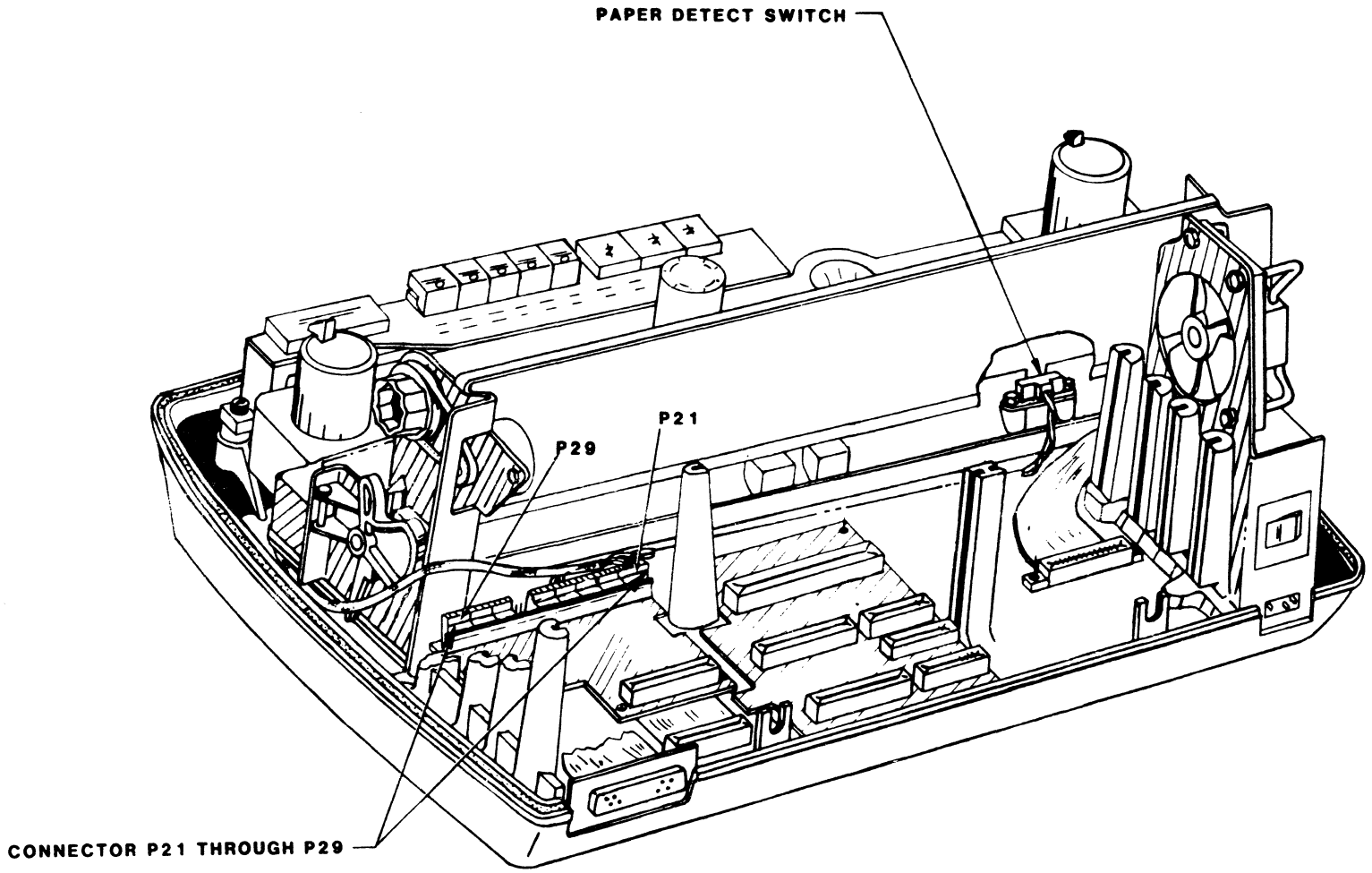


Figure 3-19. Paper Detect Switch Removal

3.30 THE PAPER DETECT SWITCH ASSEMBLY

a. Removal and Replacement

To remove the Paper Detect Switch Assembly, refer to **Figure 3-19** and perform the following steps:

1. Remove the cabinet housing per subsection 3.5.
2. Remove the Parallel Controller PCBA, the Mechanism Driver PCBA and the Power Supply PCBA per subsections 3.10 through 3.12. Remove the Serial Controller PCBA and the Option PCBA, if installed.
3. Disconnect P25 from the Interconnect Board PCBA
4. Use a 5 16 inch open end wrench to loosen the two hex head screws and washers securing the Paper Detect Switch Assembly to the stand off posts on the Machined Mechanics Base.
5. Slide out the Paper Detect Switch Assembly, toward the rear of the printer.

To replace the Paper Detect Switch Assembly, reverse the removal procedure. Note that the washers must be installed between the switch and the stand-off posts, and the switch assembly must be parallel to the ironer bracket.

3.31 THE RIBBON DRIVE MOTORS

a. Removal and Replacement

The removal procedure is the same for both the left and right Ribbon Drive Motors. To remove a ribbon drive motor, refer to **Figure 3-20** and perform the following steps:

1. Remove the cabinet housing per subsection 3.5; then, open the platen lever and remove the ribbon.
2. Remove the three large circuit boards per subsections 3.10 through 3.12. Remove the Serial Controller PCBA and the Option PCBA, if installed.
3. Disconnect the ribbon drive motor connector **(Figure 3-19)** from the Interconnect Board PCBA (P28 for the left motor or P29 for the right motor).
4. Cut the tie wraps that secure the Ribbon Drive Motor cable wires and thread the cable along the side of the printer.
5. Remove the ribbon spool hub by loosening the screw in the side of the hub and lifting the hub off the motor shaft.
6. Place one hand under the Ribbon Drive Motor and remove the three extension T washer hex head screws and flat washers that secure the Ribbon Drive Motor to the Machined Mechanics Base.
7. Remove the Ribbon Drive Motor and its associated cable. Remove the shim, if there is one.

To replace a Ribbon Drive Motor, reverse the removal procedure.

b. Inspection

Verify that the spool hubs are fully seated on the motor shaft with the set screw of each engaging the flat portion of the Ribbon Drive Motor shaft.

3.32 THE RIBBON GUIDES

a. Inspection and Cleaning

The ribbon guides should be inspected and cleaned periodically to prevent the accumulation of excess ink from the ribbon. Clean the ribbon guides, using a cloth dampened with isopropyl alcohol.

b. Adjustment

Misadjusted ribbon guides may cause the ribbon to fold over, resulting in print errors, damage to the ribbon and shuttle motion problems. To check and adjust ribbon tracking, verify that each hub is fully seated on its motor shaft; then, perform the following steps:

1. Install paper in the printer and mount the ribbon spools on the hubs with the full spool on the right hand hub. Run a repeating test pattern.
2. Momentarily short the screws across the left ribbon guide skids to cause the ribbon to run from right to left. Check to see that the ribbon is tracking centered in the left hand ribbon guide.

3. If the ribbon is not centered in the left hand ribbon guide, loosen the ribbon guide's holding screws but leave them snug enough to hold by friction **(Figure 3-18)**. Pivot the guide on its locating pin (at the front of the guide) so that the ribbon tracks in the center of the guide; then, tighten the screws.
4. Assure that the ribbon is centered on the take up (left hand) spool and that it winds without interference at the spool flanges.
5. After completing the ribbon tracking adjustment at the left hand guide, allow most of the ribbon to accumulate on the left spool; then, momentarily short the right hand ribbon guide skids to cause the ribbon to move now from left to right.
6. Perform Steps 3 and 4 for the right hand guide.
7. After adjusting the right hand guide, momentarily short the left hand ribbon guide skids for ribbon motion from right to left. Recheck tracking at the left hand guide and spool and readjust, if necessary.
8. Allow the ribbon to unreel completely in both directions under the ribbon reversing controls. Verify proper tracking, spooling, and reversing action.

c. Removal and Replacement

To remove a ribbon guide, refer to **Figure 3-18**, and perform the following steps:

1. Remove the cabinet housing per subsection 3.5; then, open the platen lever and remove the ribbon completely.
2. Disconnect the appropriate ribbon guide connector **(Figure 3-19)** from the Interconnect Board PCBA. (For the left ribbon guide, disconnect P24; for the right ribbon guide, disconnect P23.) Remove the PCBAs for access to the left guide's cable.
3. Cut the tie wraps and thread the cable carefully along the side of the Machined Mechanics Base.
4. At the front of the ribbon guide, remove the two hex head screws that secure the ribbon guide to the side plate.
5. Pull the ribbon guide toward the side of the printer and slide the cable out of the slot in the tab of the side plate.
5. Remove the ribbon guide and its associated cable.

To replace a ribbon guide, perform the following steps:

1. Slide the ribbon guide cable into the slot in the side plate tab and position the guide on the rear of the tab.
2. Replace the two hex head screws.
3. Thread the cable along the Machined Mechanics Base, replace the tie wrap and reconnect the connector to the Interconnect Board PCBA. Replace any removed PCBAs.
4. After replacement of a ribbon guide, align the ribbon guide for correct ribbon tracking, as described in step b, above.

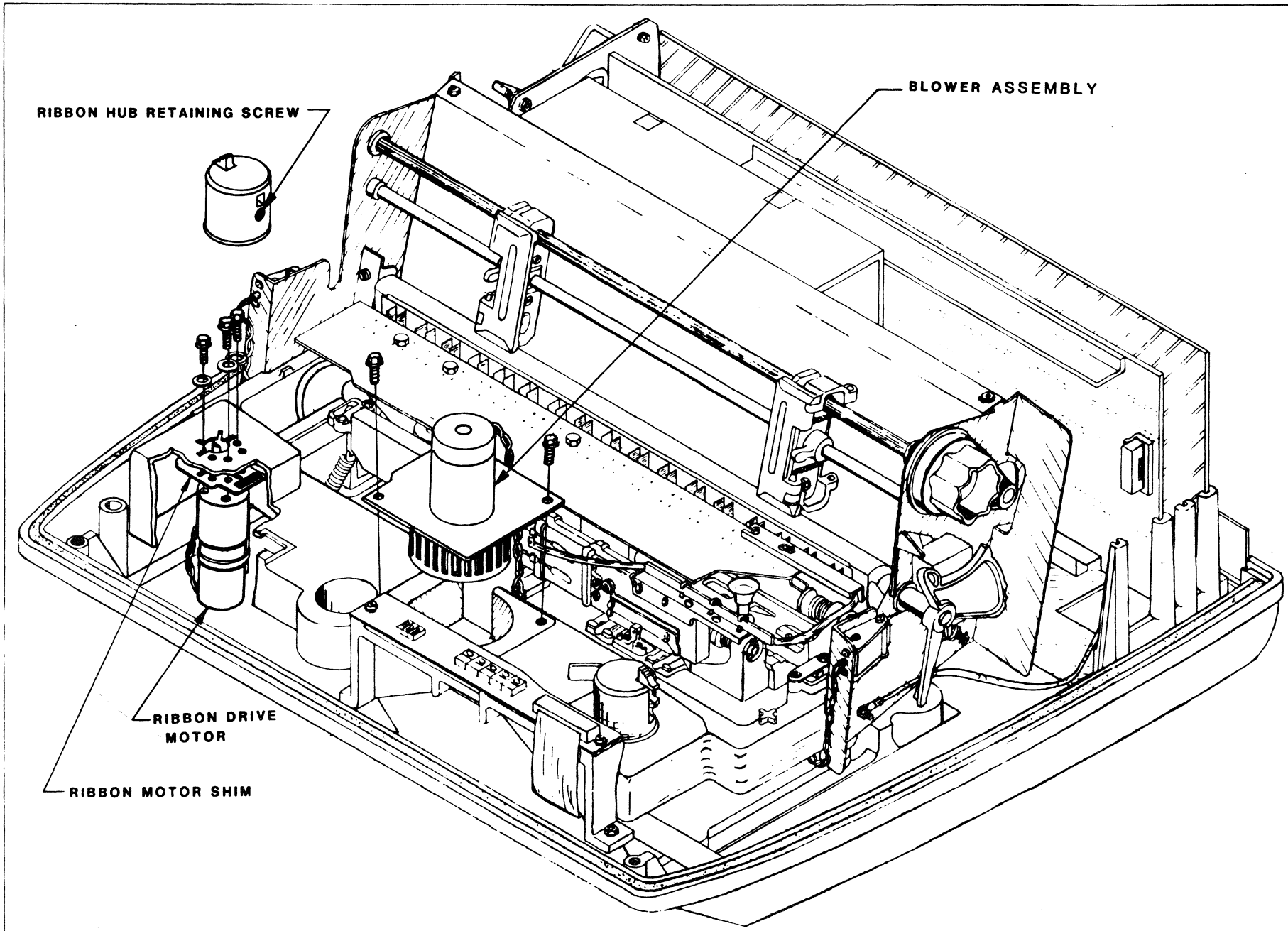


Figure 3-20. Ribbon Drive Motor and Blower Assembly Removal

3.33 THE BLOWER ASSEMBLY

a. Inspection and Cleaning

The blower wheel of the blower motor assembly should be cleaned, using a brush or vacuum to dislodge accummulated paper lint or chaff. The blower wheel is accessible for cleaning when the blower assembly is removed.

b. Removal and Replacement

To remove the blower assembly, refer to **Figure 3-20** and perform the following steps:

1. Remove the cabinet housing per subsection 3.5.
2. Disconnect P27 from the Interconnect Board PCBA **(Figure 3-19).**
3. Feed the cable and its connector around the right side and up through the cut out in the Machined Mechanics Base, underneath the Shuttle Assembly.
4. Remove the two hex head screws and lock washers that secure the blower assembly to the Machined Mechanics Base, and lift the blower assembly.

To replace the blower assembly, reverse the removal procedure.

3.34 THE INTERLOCK SWITCH ASSEMBLY

a. Removal and Replacement

The Interlock Switch Assembly is located underneath the Machined Mechanics Base between the Blower Assembly and the right ribbon motor. The base must be lifted in order to remove the Interlock Switch Assembly.

To remove the Interlock Switch Assembly, refer to **Figure 3-18** and perform the following steps:

1. Remove the cabinet housing per subsection 3.5.
2. Remove the Shuttle Cover Asssembly per subsection 3.15.
3. Remove the Parallel Controller PCBA, the Mechanism Driver PCBA and the Power Supply PCBA per subsections 3.10 through 3.12. Remove the Serial Controller PCBA and the Option PCBA, if installed.
4. Disconnect P32 from the Inner Control Panel PCBA.
5. Remove the Allen head screws and lock washers that secure the Control Panel Riser to the cabinet base **(Figure 3-3).**
6. Remove the Control Panel Riser.
7. Remove the barrier panel and the four screws that hold it in place **(Figure 3-16)**
8. Remove the three 7/16 hex nuts, flat washers and shock mount grommet that secure the Machined Mechanics Base to the cabinet base **(Figure 3-18)**
9. Lift up the Machined Mechanics Base to gain access to the Interlock Switch Assembly.
10. Remove the one external T washer, hex head, 5/16 inch screw that secures the Interlock Switch Assembly and lift out the switch.
11. Disconnect the two leads from the Interlock Switch Aseembly.

To replace the Interlock Switch Assembly, reverse the removal procedure.

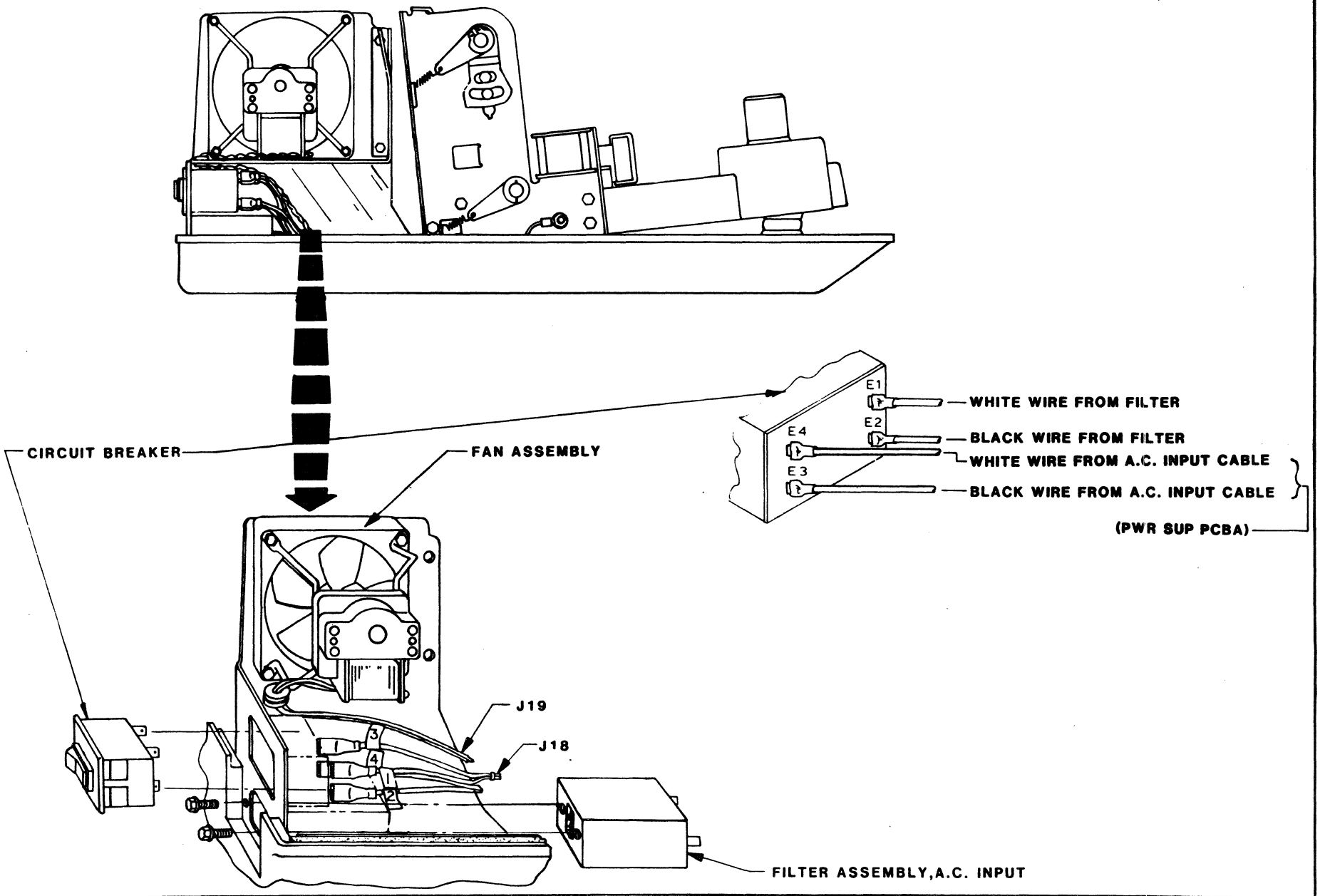


Figure 3-21. Fan Assembly, Filter Assembly, and Circuit Breaker Removal

3.35 THE FAN ASSEMBLY

The Fan Assembly is located at the left rear of the printer above the AC Input Filter Assembly and the Circuit Breaker.

a. Inspection and Cleaning

The fan should be cleaned periodically, using a vacuum cleaner or soft brush to remove accumulated paper lint and chaff.

b. Removal and Replacement

To remove the Fan Assembly, refer to **Figure 3-21**, and perform the following steps:

1. Remove the cabinet housing per subsection 3.5.
2. Remove the Parallel Controller PCBA per subsection 3.10 and the Power Supply PCBA per subsection 3.12. Remove the Serial Controller PCBA and the Option PCBA, if installed.
3. Disconnect the AC fan connector from J2 on the Power Supply PCBA.
4. Remove the four hex head bolts, four lock washers, and four hex nuts securing the fan assembly and carefully lift it out.

To replace the Fan Assembly, reverse the removal procedure.

3.36 THE CIRCUIT BREAKER

a. Removal and Replacement

To remove the Circuit Breaker, refer to **Figure 3-21** and perform the following steps:

1. Remove the cabinet housing per subsection 3.5.
2. Disconnect the four fast on connectors at the rear of the Circuit Breaker, noting their location on the terminals.
3. Press in on the spring clips on both sides of the Circuit Breaker and remove the Circuit Breaker through the opening in the fan support by pushing toward the rear of the printer.

To replace the Circuit Breaker, reverse the removal procedure.

3.37 THE AC INPUT FILTER ASSEMBLY

a. Removal and Replacement

To remove the AC Input Filter Assembly, refer to **Figure 3-21** and perform the following steps:

1. Remove the cabinet housing per subsection 3.5.
2. Disconnect the ground wire from the fan support.
3. Disconnect the two fast on connectors at the rear of the AC Input Filter Assembly. Note their location and labeling.
4. Remove the two hex head screws and flat and lock washers at the front of the AC Input Filter Assembly. Pull the filter toward the front of the printer and lift it out the side when it clears.

To replace the AC Input Filter Assembly, reverse the removal procedures.

Section 4
TROUBLESHOOTING PROCEDURES

4.1 GENERAL

This section provides information that is intended to assist the field maintenance technician locate and correct the cause of improper printer operation. The maintenance technician should be thoroughly familiar with the contents of the MVP Operator's Guide, the MVP User's Reference Manual, and this manual.

Refer to the Illustrated Parts Breakdown (Section 5) and the Preventive and Corrective Maintenance section (Section 3) of this manual for specific information concerning the parts to be replaced or adjusted. Following completion of any repair or adjustment of components or assemblies, perform the routine performance tests noted for the symptom. These tests are summarized in Table 4-1 at the end of this section.

4.2 FAULT ISOLATION

Improper printer operation may be caused by (1) an electronic failure in the PCBAs; (2) a mechanical failure in the printing mechanism, the ribbon transport, or the paper transport; or (3) interface problems. In general, many failures can be remedied by replacing the Parallel Controller PCBA, the Mechanism Driver PCBA or the Power Supply PCBA. Failure fault codes and their descriptions are summarized in Table 4-2 at the end of this section.

Simple adjustments of hammer alignment, platen gap, shuttle turnaround time adjustment,timing belt tension ,and tractor belt tension will cure many problems associated with poor print quality. The remaining problems are attributable mostly to particular assemblies of the printing mechanism, or (in rare instances) to the interconnecting PCBAs and cable assemblies.

4.3 TROUBLESHOOTING AIDS

There are a number of categories of failure that a printer can experience. These categories can be summarized as follows:

1. The control panel indicators, switches and displays do not act as they are expected.
2. The CHECK indicator is lighted and a fault code is shown in the display.
3. The paper transport does not feed properly.
4. The ribbon transport does not feed properly.
5. The Shuttle Assembly is noisy, moves erratically or stalls.
6. Printed characters are poorly aligned, show extra dots or have improper density.
7. Interface problems between the printer and the host.
8. The Blower Assembly is defective.

Each category is approached individually, beginning with a description of the normally expected operation. Various symptoms are presented, along with simple troubleshooting techniques that are designed to point to the possible sources of the failure.

Each failure source is referenced to a subsection of Section 3, which details the procedure to be used to clean, mechanically adjust, or remove and replace the suspected assembly. Hammer phasing is an electronic adjustment that may be required; it is detailed in subsection 3.21. Specifics of the various failures, their symptoms and the possible solutions round out the remainder of this section.

4.4 CATEGORY 1: CONTROL PANEL INDICATORS, SWITCHES AND DISPLAYS OPERATE IMPROPERLY

Whenever power is applied to the printer, all the switches/indicators on both of its control panels should light up for about two seconds while the printer runs its internal self check. Then, all indicators should extinguish except RDY, which should start to flash. This category discusses, by symptom, those circumstances that can prevent this sequence from occurring as expected.

Symptom 1: All Indicators Light Up and Remain Lighted At Power Up
If the control panel indicators fail to extinguish after seconds at power-up, replace one or both of the following assemblies per the subsection indicated.

- Mechanism Driver PCBA — Subsection 3.11
- Parallel Controller PCBA — Subsection 3.10

Symptom 2: No Indicators Light Up At Power Up
If none of the control panel indicators light up when power is applied to the printer, determine whether the printer cooling fan blades are rotating.

1. If the blades are NOT rotating, verify that the printer is receiving proper line voltage.
2. If the fan blades ARE rotating, verify that the control panel cable assemblies are properly connected. If the indicators still fail to light up, replace one or more of the following assemblies per the subsection indicated.

- Power Supply PCBA — Subsection 3.12
- Parallel Controller PCBA — Subsection 3.10
- Mechanism Driver PCBA — Subsection 3.11
- Front Control Panel Board PCBA — Subsection 3.6
- Inner Control Panel Board PCBA — Subsection 3.8
- Circuit Breaker — Subsection 3.36
- AC Input Filter Assembly — Subsection 3.37

Symptom 3: Indicators Light Up Improperly
Each control panel has four functions that are shared dually by the other panel. A fifth function (2nd Function) is unique to the Inner Control Panel Board PCBA. During normal operation, the indicators for these functions should light and extinguish properly under program control or when the switches are pressed.

3.1 Indicators on Both Control Panels If indicators on both control panels light up improperly, replace either one or both of the following assemblies per the subsection indicated.

- Parallel Controller PCBA — Subsection 3.10
- Mechanism Driver PCBA — Subsection 3.11

3.2 Front Control Panel PCBA Indicators Only — If the indicators on just the front control panel light up improperly, replace the Front Control Panel PCBA per Subsection 3.6.

3.3 Inner Control Panel PCBA Indicators Only — If the indicators on just the Inner Control Panel PCBA light up improperly, replace the Inner Control Panel PCBA per Subsection 3.8.

Symptom 4: Digital Display Operates Improperly
If the digital display does not correctly display the test pattern, configuration setup or CHECK error codes, replace one or more of the following assemblies per the subsection indicated.

- Inner Control Panel PCBA — Subsection 3.8
- Inner Control Panel Cable Assembly — Subsection 3.8
- Parallel Controller PCBA — Subsection 3.10

Symptom 5: Switches on Only One Control Panel Operate Improperly
If the switches on one control panel operate incorrectly but the switches on the other do not, replace the failing control panel assembly per the subsection indicated.

- Front Panel Control PCBA — Subsection 3.6
- Inner Control Panel PCBA — Subsection 3.8

1.2 Fault Code 012 (Platen Lever Open) — Either the platen lever is open or the Shuttle Cover Assembly is off or out of position. Determine which condition exists and either 1) close the platen lever or 2) inspect the Shuttle Cover Assembly to verify its tabs are in perfect condition; then, reset the Shuttle Cover Assembly. (Replace if the tabs are damaged.)

If the printer continues to signal fault code 012, replace one or more of the following assemblies per the subsection indicated:

- Interlock Switch Assembly — Subsection 3.34
- Platen Open Switch Assembly — Subsection 3.29
- Parallel Controller PCBA — Subsection 3.10
- Power Supply PCBA — Subsection 3.12

4.5 CATEGORY 2: CHK INDICATOR LIGHTS UP

Whenever the CHK indicator lights up, a fault condition exists. The particular fault is identified by a code displayed in the digital display. These paragraphs discuss the fault conditions and their fault codes.

Symptom 1: CHK Indicator Flashes
A flashing CHK indicator indicates an operator correctable fault. Any one of fault codes 011, 012, 014 or 015 may be in the digital display. Each fault code is discussed below.

1.1 Fault Code 011 (No Paper) — The printer is out of paper. To correct this condition, load paper if it is missing. If the printer continues to signal fault code 011, replace one or more of the following assemblies per the subsection indicated.

- Paper Detect Switch Assembly — Subsection 3.30
- Mechanism Driver PCBA — Subsection 3.11
- Parallel Controller PCBA — Subsection 3.10
- Power Supply PCBA — Subsection 3.12

1.3 Fault Code 014 (Shuttle Jam) — There is a shuttle jam. Refer to subsection 4.8, symptom 2, to eliminate the cause.

1.4 Fault Code 015 (Shuttle Not Up to Speed) — The shuttle is moving at less than its proper speed. Refer to subsection 4.8, symptom 2, to eliminate the cause.

Symptom 2: CHK Indicator On Steadily
There is a fault condition that can be corrected only by a trained field service representative.

2.1 Fault Codes 030, 031, 032, 040, 050, 051 ("Soft Faults") These are faults that can be bypassed temporarily by the user (Refer to Section 3 of the Operator's Guide). There is either a memory check sum or a pattern check, as follows:

030 DCU ROM check sum.
031 DCU data RAM pattern check.
032 DCU configuration memory check sum.
040 Primary font ROM check sum.
041 Alternative font ROM check sum.
050 MCU program ROM check sum.
051 MCU data RAM pattern check.

When any of these faults occur, replace the Parallel Controller PCBA per subsection 3.10.

2.2 Fault Codes 060, 061 (Power Supply Failure) The user cannot bypass either of these faults. There is a power supply failure as follows:

060 +30 +12 volt failure
061 -16 -12 volt failure

When either failure occurs, replace the Power Supply PCBA per subsection 3.12.

If the printer continues to signal the fault, replace one or more of the following assemblies per the subsection indicated.

- Mechanism Driver PCBA — Subsection 3.11
- Parallel Controller PCBA — Subsection 3.10
- Mother Board PCBA — Subsection 3.14
- Serial Controller PBCA, if installed — Subsection 3.10

4.6 CATEGORY 3: THE PAPER TRANSPORT DOES NOT FEED PROPERLY

This category discusses several fault conditions that can occur during the paper feeding process. Paper Motion tests and the EVFU test contained in the Selectable Test Pattern group are helpful in evaluating paper motion:

06.1 top of form, slew, print 1 line 6 times.
06.2 vertical tap, 1 inch, 2 inch, 2 inch, 2 inch, 2 inch.
06.3 progressive skip, 1 through 15 lines.
06.4 print 2 lines and skip one line, 15 times.
07.1 EVFU test: seek channel to 3 different channels.

Symptom 1: Paper Does Not Feed At All

Verify that there is no paper jam; then, replace one or more of the following assemblies per the subsection indicated.

- Paper feed timing belt, if it is broken Subsection 3.23
- Paper drive motor Subsection 3.24
- Mechanism Driver PCBA Subsection 3.11
- Parallel Controller PCBA Subsection 3.10
- Paper Ironer, if bent or nicked Subsection 3.27
- Tractor Belt tensioning device screw and nut are too tight Subsection 3-26

Symptom 2: Paper Feeds Erratically

If the paper feeds erratically, adjust or replace one or more of the following assemblies per the subsection indicated.

- Spline Shaft Assembly bent. (Rare) Replace per subsection 3.25.
- Paper feed timing belt tension too tight. Adjust tension per subsection 3.23.
- Paper feed timing belt defective. Replace the timing belt per subsection 3.23.
- Platen gap incorrect. Adjust per subsection 3.28.
- Paper too thick. Replace with paper having correct weight.
- Damaged pulley on the Spline Shaft Assembly.
- Tractor belt tensioning device nut and screw too tight. Adjust per subsection 3.26.
- Tractor belt tension too tight. Adjust tractor belt tension per subsection 3.26.
- Tractor sprocket broken. Replace tractor per subsection 3.26.
- Paper feeding into printer incorrectly. Remove and reload the paper supply.
- Mechanism Driver PCBA defective. Replace per subsection 3.11
- Parallel Controller PCBA defective. Replace per subsection 3.10.
- Serial Controller PCBA (if installed) defective. Replace.

Symptom 3: Paper Drags

If the paper drags, adjust or replace one or more of the following assemblies per subsection indicated.

- Platen gap adjusted improperly. Adjust platen gap per subsection 3.28.
- Paper ironer damaged. Replace the ironer per subsection 3.27.
- Paper feed timing belt tension adjusted improperly. Adjust belt tension per subsection 3.23.
- Paper feed timing belt worn. Replace the belt per subsection 3.23.
- Either tractor's belt tensioning device screw and nut too tight. Adjust per subsection 3.26.
- Either tractor installed improperly. Replace per subsection 3.26.

Symptom 4: Top of Form Does Not Operate

If the printer fails to perform the top of forms operation correctly, adjust or replace one or more of the following assemblies per the subsection indicated:

- Either tractor's belt tensioning device nut and screw too tight. Adjust per subsection 3.26.
- The Front Control Panel PCBA or its TOF switch is defective. Replace per subsection 3.6.
- The Inner Control Panel PCBA or its TOF switch is defective. Replace per subsection 3.8.
- Parallel Controller PCBA defective. Replace per subsection 3.10.
- Serial Controller PCBA (if installed) defective. Replace.

4.7 CATEGORY 4: THE RIBBON TRANSPORT FEEDS IMPROPERLY

This category describes a number of causes of improper ribbon feeding. To ensure proper ribbon feeding, verify that the ribbon is positioned correctly in the Hammer Bank Cover Assembly, the ribbon spools are pushed all the way down on the spool hubs with the locking latch snapped over the spool, and that the ribbon is tracking properly in the ribbon guide assemblies.

Symptom 1: Ribbon Does Not Feed

If the ribbon does not move at all, replace one or more of the following assemblies per the subsection indicated.

- Ribbon Drive Motor — Subsection 3.31
- Parallel Controller PCBA — Subsection 3.10
- Mechanism Driver PCBA — Subsection 3.11
- Power Supply PCBA — Subsection 3.12

Symptom 2: Ribbon Folds Over

If the ribbon folds over, adjust or clean one or more of the following assemblies per the subsection indicated.

- Ribbon path has lint, paper chaff, or ink accumulation. Clean the Hammer Bank Assembly per subsection 3.20 and wipe the ribbon guides clean with a cloth dampened with isopropyl alcohol.
- Ribbon guides adjusted improperly. Adjust per subsection 3.32.
- Spool hubs seated improperly. Adjust per subsection 3.31.

Symptom 3: Ribbon Does Not Run Smoothly

The ribbon may fail to run smoothly through the ribbon path; that is,the ribbon may (1) become perforated or torn, or (2) not run smoothly through the guides. Clean, adjust, or replace one or more of the following assemblies, based on which conditions are observed; then, replace the ribbon if necessary.

Ribbon path has accumulations of lint, chaff or ink. Clean ribbon guides per subsection 3.32. Also, rotate the Shutle Assembly to the service position and clean the Hammer Bank Cover Assembly with a cloth dampened with isopropyl alcohol. Then, clean the hammer springs with a brush dampened with alcohol.

Hammer Bank Cover Assembly broken, bent, or mispositioned. Rotate the Shuttle Assembly to the service position and reposition or replace the Hammer Bank Cover Assembly.

Ribbon guides fractured. Replace per subsection 3.32.

Platen gap incorrect. Adjust per subsection 3.28.

Ribbon damaged by a "dragging hammer." Refer to subsection 4.9, symptom 4, to eliminate the cause.

Symptom 4: End of Ribbon Not Detected

If the ribbon movement does not change direction when the end of the ribbon is reached, correct one or both of the following causes as indicated.

- Ribbon guides have heavy lint, chaff and ink accumulations . Clean with a cloth dampened with isopropyl alcohol.
- Ribbon lacks the wire provided normally to signal end of ribbon. Replace the ribbon.

If the problem persists, momentarily short the screws across each ribbon guide, one at a time; the ribbon should reverse direction each time. If it does not, replace one or both of the following assemblies per the subsection indicated.

- Ribbon guide — Subsection 3.32
- Mechanism Driver PCBA — Subsection 3.11

4.8 CATEGORY 5: THE SHUTTLE ASSEMBLY MOVES IMPROPERLY

These subsections discuss a number of causes of improper Shuttle Assembly movement.

Symptom 1: Shuttle Does Not Move

If the Shuttle Assembly does not move at all, verify that the shipping screws in the Linear Motor Bar Assembly at the front of the Shuttle Assembly have been removed; then, if the problem persists, replace one or more or the following assemblies per the subsection indicated.

- Parallel Controller PCBA — Subsection 3.10
- Mechanism Driver PCBA — Subsection 3.11
- Encoder PCBA — Subsection 3.19
- Shuttle Assembly — Subsection 3.16
- Hammer Bank Cable Assembly defective. Remove Hammer Bank Assembly per subsection 3.20.

Symptom 2: Shuttle Jams or Moves Too Slowly

A shuttle jam is due to either jammed paper, a folded ribbon, an incorrect platen gap, a defective Parallel Controller PCBA, or a defective Mechanism Driver PCBA. Determine which condition exists and either:

1. Remove the jammed paper, correct the cause and reload new paper,
2. Correct the cause of ribbon foldover per subsection 4.7, symptom 2, and straighten the ribbon,
3. Adjust the platen gap per subsection 3.28, or
4. Replace the Parallel Contoller PCBA per subsection 3.10. Replace the Serial Controller PCBA, if installed.
5. Replace the Mechanism Driver PCBA per subsection 3.11.

Symptom 3: Shuttle Assembly Moves Erratically

If the Shuttle Assembly does not move smoothly, replace one or more of the following assemblies per the subsection indicated.

- Linear Encoder — Subsection 3.18
- Parallel Controller PCBA — Subsection 3.10
- Mechanism Driver PCBA — Subsection 3.11
- Encoder PCBA — Subsection 3.19
- Hammer Bank Cable Assembly defective. Remove the Hammer Bank Assembly per subsection 3.20.

Symptom 4: Shuttle Movement Produces Knocking Sound

A knocking sound during Shuttle Assembly turn around indicates misadjusted or worn Bumper Assemblies. Adjust or replace per subsection 3.21.

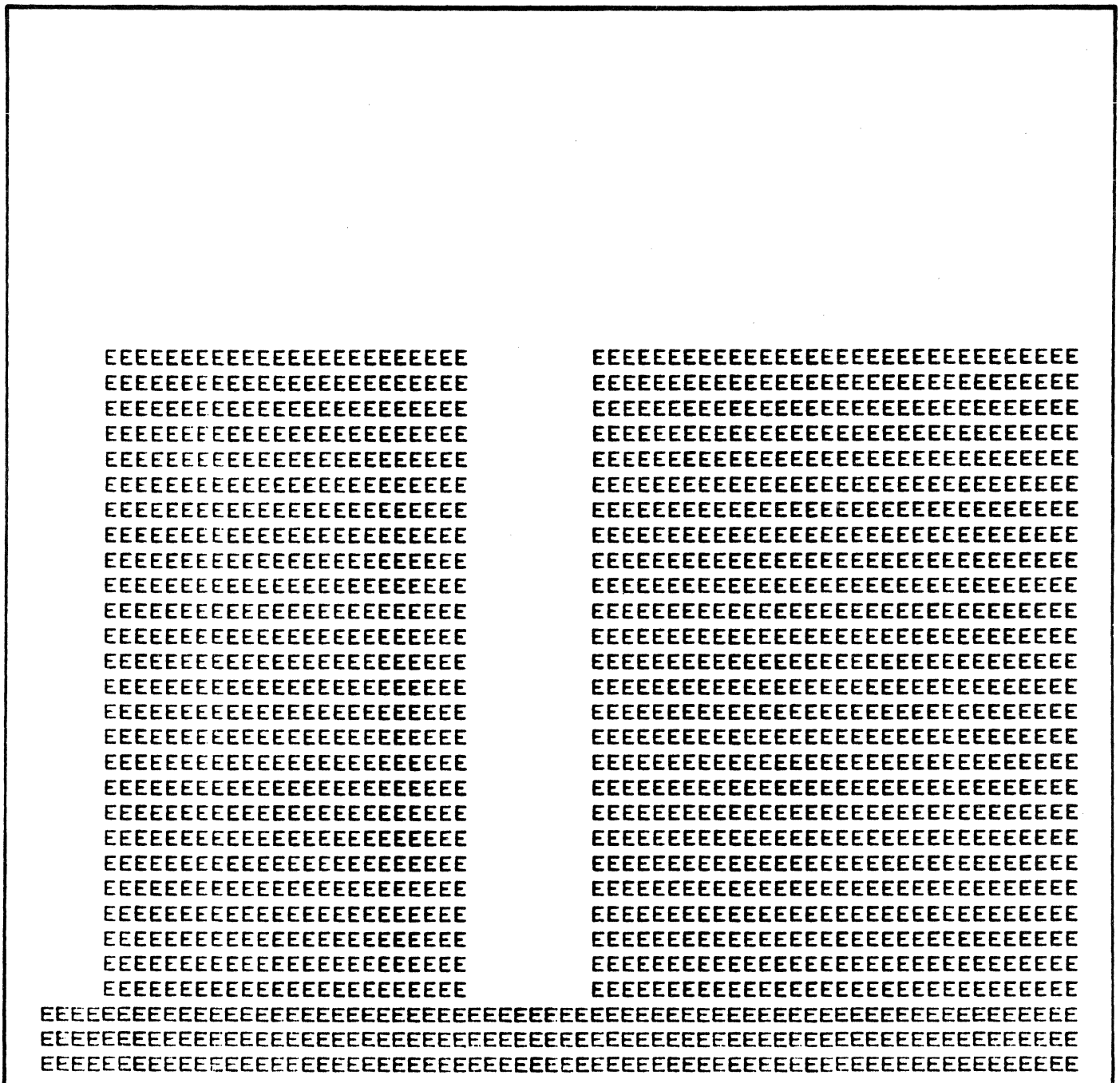


Figure 4-1. Missing Characters

4.9 CATEGORY 6: THE PRINTER DOES NOT PRINT PROPERLY

This category discusses a number of causes of print problems. Repeating Tests and printing tests contained in the Selectable Test Pattern group are helpful in evaluating print problems. These tests are referred to within the symptom that discusses the particular problem.

Symptom 1: Printer Does Not Print

The printer should print when under the control of an exerciser or the host computer, or when Selectable Test Patterns are run. If the printer does not print at all under any of these conditions, replace one or more of the following assemblies per the subsection indicated.

- Parallel Controller PCBA — Subsection 3.10
- Mechanism Driver PCBA — Subsection 3.11
- Power Supply PCBA — Subsection 3.12

If the printer fails to print only when controlled by the host computer, the fault lies within the printer controller, the computer's software, or the I/O interface cables.

Symptom 2: Characters Missing

Test patterns all "E" (02.1), all "H" (02.2) or Shift Recycle (03.1) can be helpful in determining missing characters. Figure 4-1 illustrates missing characters.

2.1 Consistant Missing Characters — If a particular group of character positions are missing consistantly, clean, adjust or replace one or more of the following assemblies per the subsection indicated.

- Broken hammer tip. Replace hammer spring per subsection 3.17.
- Chaff or lint particles have accumulated between the hammer and pole pin. Clean the hammer spring and pole pin per subsection 3.17.
- Platen gap is adjusted improperly. Adjust per subsection 3.28.
- Coil is open (does not read a nominal 5.2 Ohms), shorted or visibly burned. Replace per subsection 3.17.
- Mechanism Driver PCBA defective. Replace per subsection 3.11.
- Platen lever open too far. Close for good character rendition.

2.2 Random Missing Characters — If the missing characters are not concentrated in a particular area, correct one or more of the following assemblies per the subsection indicated:

- Ribbon folds over. Correct per subsection 4.7, symptom 2.
- Ribbon worn. Replace the ribbon.

Symptom 3: Missing Dots ("Dropout")

If the printer misses dot rows and/or columns, Repeating Test Patterns 02.1 (all E), 02.3 (all#), or 03.3 (black plot, half speed) can be helpful in determining the dropout. Figure 4-2 illustrates dropout.

3.1 Consistant Dropout — Consistant dropout generally signals a mechanical problem. Clean or adjust one or more of the following assemblies per the subsection indicated.

- Platen gap too wide (dropout may extend over a number of characters at either side of the platen). Adjust per subsection 3.28.
- Hammer Bank Cover Assembly has accumulations of lint, chaff and ink. Rotate the Shuttle Assembly to the service position. Then, remove the Hammer Bank Cover Assembly and clean it thoroughly with a cloth dampened with isopropyl alcohol.
- Hammer spring tension is too light. Tweak the hammer spring toward the platen and rerun the performance test. If dropout persists, replace the hammer spring per subsection 3.17.

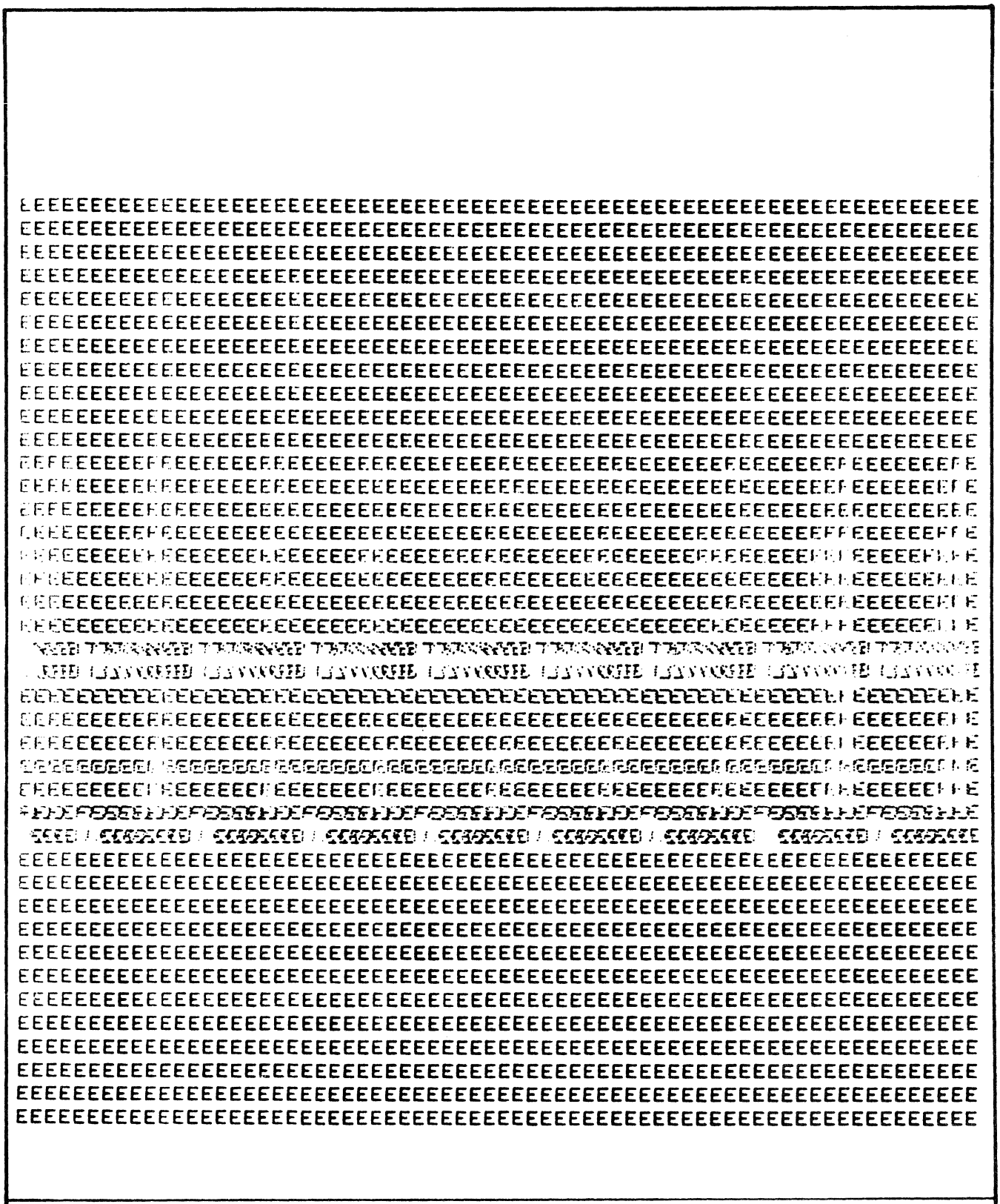


Figure 4-2a. Drop Out

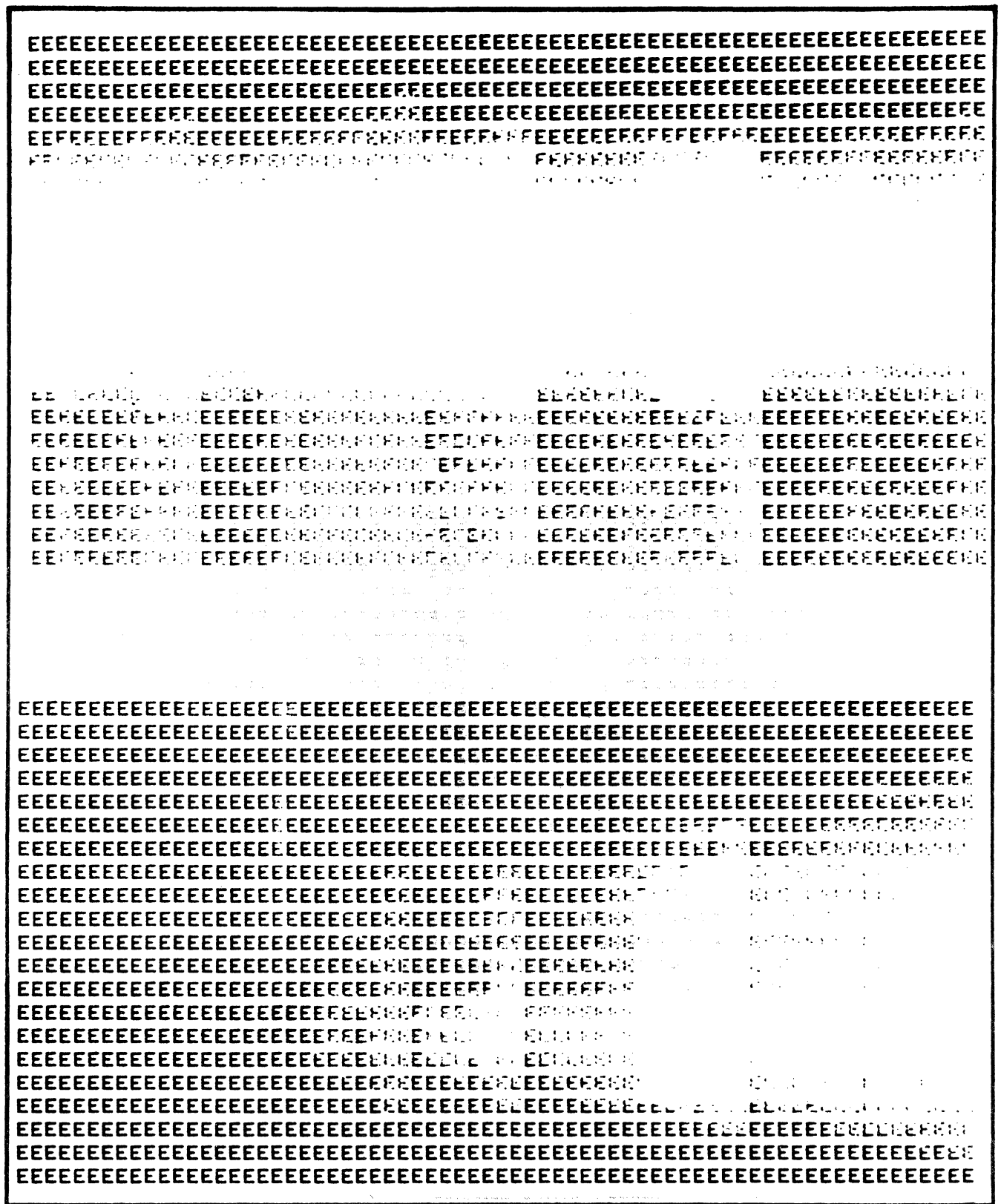


Figure 4-2b. Drop Out

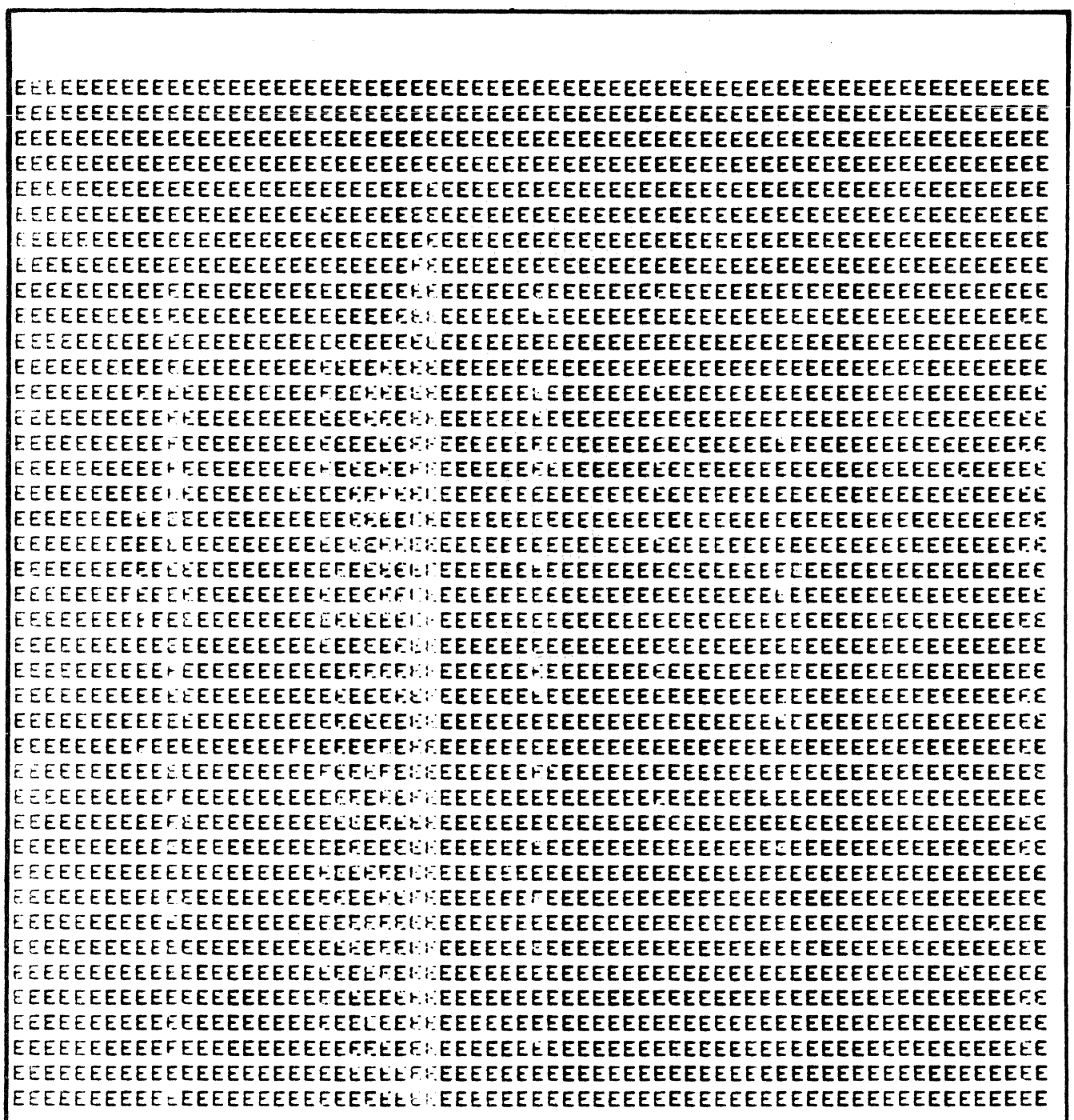


Figure 4-3. Dragging Hammers

3.2 Random Dropout — Random dropout may be the result of either a mechanical problem or an electronic problem. Replace one or more of the following assemblies per the subsection indicated.

Ribbon worn or damaged Check the ribbon path per subsection 4.7, symptom 3; then replace the ribbon.

- Coil is open (does not read a nominal 5.2), shorted or visibly burned — Subsection 3.17
- Shuttle Assembly — Subsection 3.16
- Parallel Controller PCBA (or Serial Controller PCBA) — Subsection 3.10
- Mechanism Driver PCBA — Subsection 3.11
- Coil not positioned correctly on pole pin — Subsection 3.17
- Power Supply PCBA — Subsection 3.12

Symptom 4: Character Positions are Light, or Smeared or both ("Dragging Hammer")")
A "dragging hammer" is one which does not retract properly. The result is that a group of character positions is produced that appears consistantly light or smeared (possibly, with retrace patterns appearing during line spacing and/or with dot row 1 overprinted across the entire space).

Any of the repeating test patterns — 02.1 (all E), 02.0 (all H), 02.3 (all #), or 03.2 (row increment) —can be helpful in pinpointing the faulty hammer. **Figure 4-3** illustrates a dragging hammer.

Clean or replace assemblies per the subsection indicated.

- Chaff or lint particles have accumulated between the hammer and pole pin. Clean the hammer spring and pole pin per subsection 3.17.
- Hammer spring defective. Replace per subsection 3.17.
- Coil open (not the nominal 5.2 Ohms), shorted or burned. Replace per subsection 3.17.
- Coil not positioned correctly on pole pin. Replace coil per subsection 3.17.

Symptom 5: Dots Misplaced
If the printer misplaces dots as it prints, one or more of the following items must be aligned, adjusted or replace, based on the problems that may exist:

- One or more hammers misaligned. Align per subsection 3.17.
- Platen gap adjusted improperly. Adjust per subsection 3.28.
- Encoder defective. Replace per subsection 3.18.
- "Noise" in the electrical system, caused by either 1) improper grounding due to loose or damaged ground wire or cables, or 2) a defective motor. Restore proper grounding.
- Hammer phasing adjusted improperly. Adjust hammer phasing per subsection 3.21.
- Font PROM defective. Replace it on Parallel Controller PCBA.

Symptom 6: Improper Print Density
Improper Print Density occurs when the printer prints too light or too dark. To investigate the problem, run an all black plot print test pattern (03.3) followed by either of the Repeating Test Patterns 02.1 (all E) or 02.2 (all H). **Figure 4-4** illustrates improper density.

When print density problems appear, install a new ribbon and re-run some of the test patterns. If the problem persists, adjust or replace either or both of the following assemblies per the subsection indicated:

- Platen gap adjusted improperly. Adjust platen gap per subsection 3.28.
- One or more hammer springs is defective or needs tweaking. Proceed as follows:
  1. If the print for the hammer spring is too light, tweak the hammer toward the platen and rerun the performance tests.

Figure 4-4. Improper Print Density

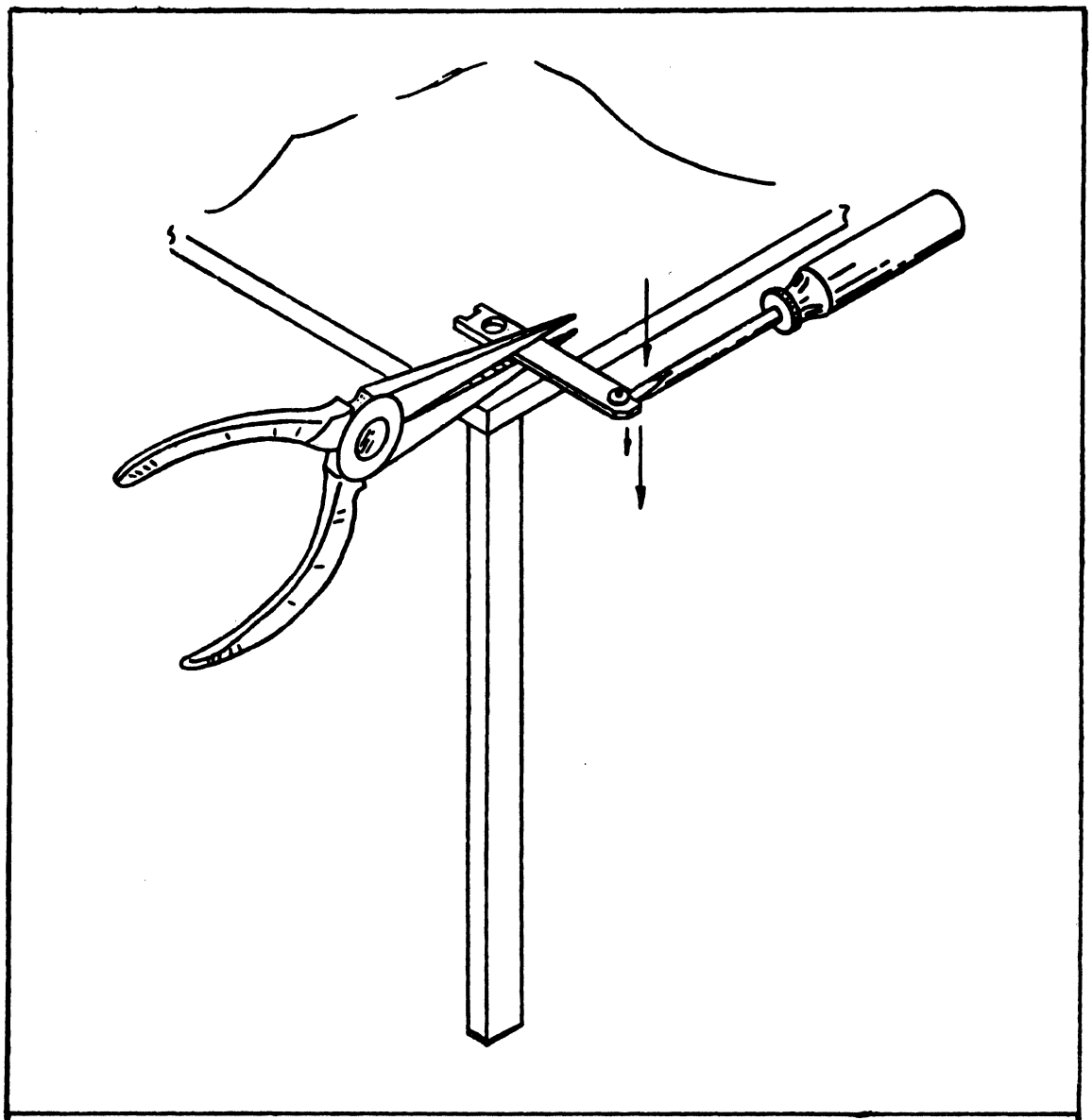


Figure 4-5. Tweaking the Hammer Springs

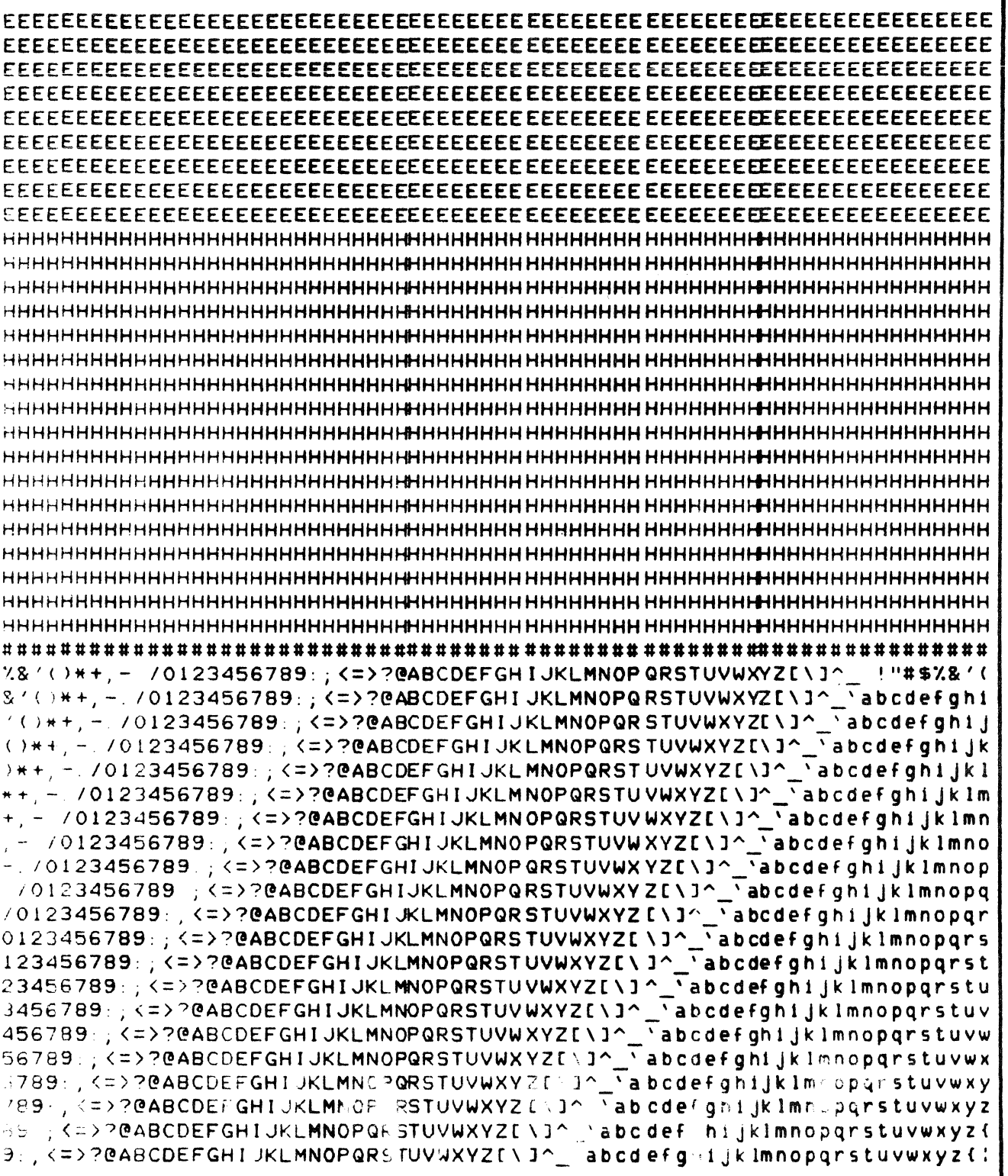


Figure 4-6. Horizontal Misalignment of Hammers

2. If the print for the hammer spring is too dark:
   a. Remove the Shuttle Cover Assembly and rotate the Shuttle Assembly to the service position.
   b. Remove the spring per subsection 3.17.
   c. Grip the spring in a pair of longnose pliers so that the screw hole is just covered and tweak the spring in the direction opposite the hammer tip **(Figure 4-5).**
   d. Replace the spring per subsection 3.17 and rotate the Shuttle Assembly to the normal position.
3. Repeat the performance tests; if the problem persists, remove and replace the coil per subsection 3.17.

Symptom 7: Improper Horizontal Alignment
Improper horizontal alignment of hammer springs is detectable by executing one of the Repeating Test Patterns 02.1 (all E) or 02.2 (all H). **Figure 4-6** illustrates horizontal misalignment of dot rows that may be masked by interline spaces in character printing. Align hammers per subsection 3.17.

Symptom 8: Improper Vertical Alignment
Improper vertical alignment can result from a combination of improper mechanical adjustments. Repeating test patterns 02.2 (all H) and 02.4 (all underline) are tests for pinpointing vertical alignment problems.

8.1 Character Positions Vertically Misaligned — If the test results resemble **Figure 4-7,** hammers corresponding to the misaligned characters are misaligned vertically. Align the hammers per subsection 3.17.

8.2 Characters Misformed Vertically — If test patterns 02.2 (all H) and 02.4 (all underline) reveal characters which are misshapen along the vertical plane (as illustrated in **(Figure 4-8)** the hammer phasing is adjusted improperly. Measure the platen gap per subsection 3.28, steps 1 through 6 to verify a gap of 0.014 + 0.001 inch; adjust as necessary. Then, adjust hammer phasing per subsection 3.21.

8.3 Erratic Character Height — The printer may produce characters of improper and erratic height due to erratic paper feeding (as detailed in subsection 4.6, symptom 2).

8.4 Compressed Print — Compressed print **(Figure 4-9)** can result from a paper transport friction problem or from electronic problems that produce improper dot row counts. Compressed print also can result from any of the problems that cause erratic paper feeding, as detailed in subsection 4.6, symptom 2.

Adjust or remove and replace one or more of the following assemblies per the subsection indicated.
- Paper Drive Motor defective. Replace per subsection 3.24
- Platen gap adjusted improperly. Adjust per subsection 3.28.
- Parallel Controller PCBA defective. Replace per subsection 3.10.
- Either tractor belt tensioning device nut and screw too tight. Adjust per subsection 3.26.

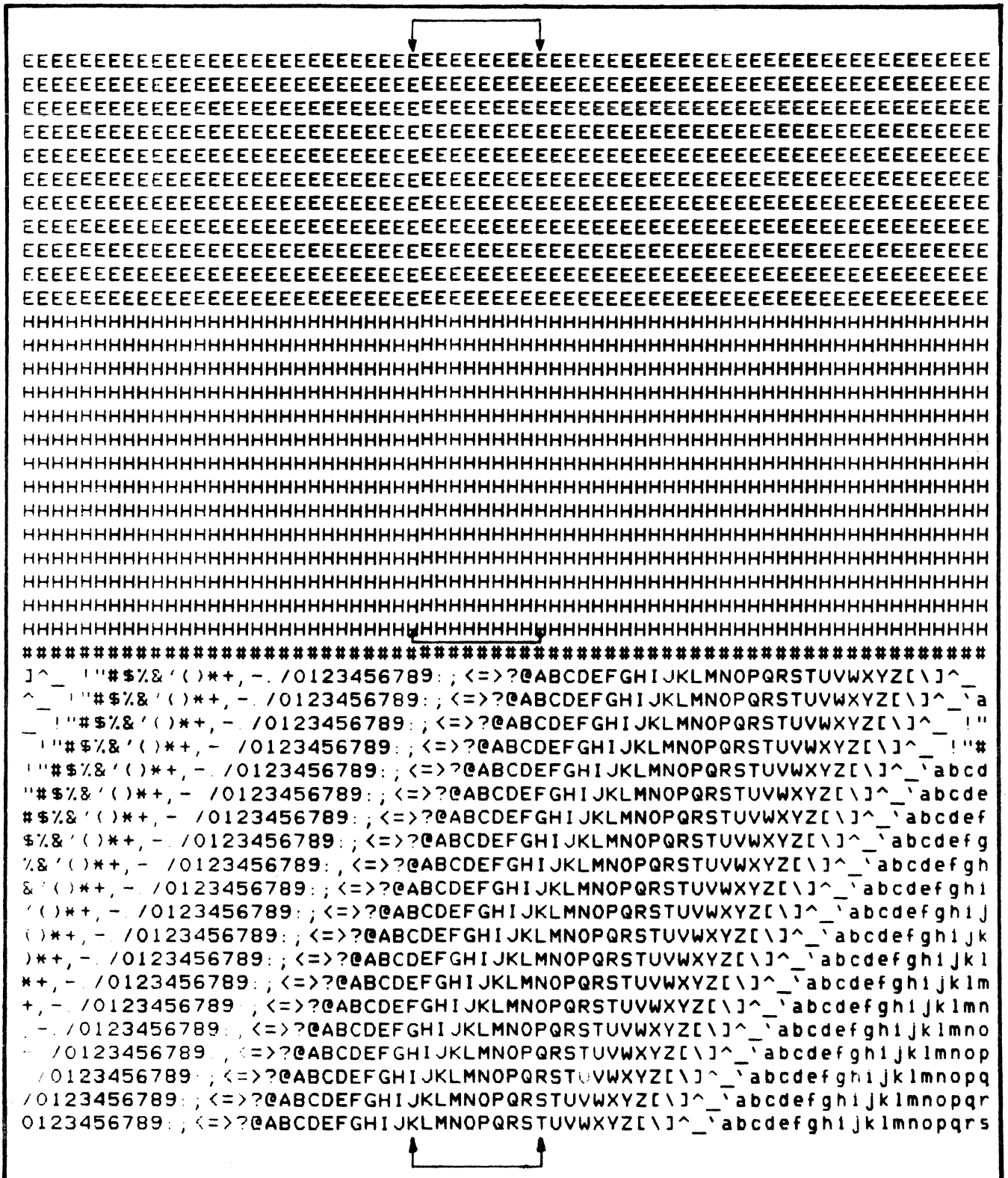


Figure 4-7. Vertical Misalignment of Hammers

Figure 4-8. Vertically Misformed Characters

```
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
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EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrst
23456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
3456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuv
456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvw
56789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwx
6789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxy
789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz
89:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{
9:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|
:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}
;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @
>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @A
?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @AB
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABC
ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCD


klmnopqrstuvwxyz{|}~ @ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ !"#$%&'()*+,-.
lmnopqrstuvwxyz{|}~ @ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ !"#$%&'()*+,-./
mnopqrstuvwxyz{|}~ @ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ !"#$%&'()*+,-./0
nopqrstuvwxyz{|}~ @ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ !"#$%&'()*+,-./01
opqrstuvwxyz{|}~ @ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ !"#$%&'()*+,-./012
pqrstuvwxyz{|}~ @ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ !"#$%&'()*+,-./0123
qrstuvwxyz{|}~ @ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ !"#$%&'()*+,-./01234
rstuvwxyz{|}~ @ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ !"#$%&'()*+,-./012345
stuvwxyz{|}~ @ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ !"#$%&'()*+,-./0123456
tuvwxyz{|}~ @ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ !"#$%&'()*+,-./01234567
uvwxyz{|}~ @ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ !"#$%&'()*+,-./012345678
vwxyz{|}~ @ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_ !"#$%&'()*+,-./0123456789
```

Figure 4-9. Compressed Print

```
>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @
?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @A
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @AB
ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABC
BCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCD
CDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDE
DEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEF
EFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFG
FGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFGH
GHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFGHI
HIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFGHIJ
IJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFGHIJK
JKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFGHIJKL
KLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFGHIJKLM
LMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFGHIJKLMN
MNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFGHIJKLMNO
NOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFGHIJKLMNOP
OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFGHIJKLMNOPQ
PQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFGHIJKLMNOPQR
QRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFGHIJKLMNOPQRS
RSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFGHIJKLMNOPQRST
STUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFGHIJKLMNOPQRSTU
TUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~ @ABCDEFGHIJKLMNOPQRSTUV
```

```
WXYZ[\]^_`abcdef   57 58 59 5A 5B 5C 5D 5E 5F 60 61 62 63 64 65 66 0A
XYZ[\]^_`abcdefg   58 59 5A 5B 5C 5D 5E 5F 60 61 62 63 64 65 66 67 0A
YZ[\]^_`abcdefgh   59 5A 5B 5C 5D 5E 5F 60 61 62 63 64 65 66 67 68 0A
Z[\]^_`abcdefghi   5A 5B 5C 5D 5E 5F 60 61 62 63 64 65 66 67 68 69 0A
[\]^_`abcdefghij   5B 5C 5D 5E 5F 60 61 62 63 64 65 66 67 68 69 6A 0A
\]^_`abcdefghijk   5C 5D 5E 5F 60 61 62 63 64 65 66 67 68 69 6A 6B 0A
]^_`abcdefghijkl   5D 5E 5F 60 61 62 63 64 65 66 67 68 69 6A 6B 6C 0A
^_`abcdefghijklm   5E 5F 60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 0A
_`abcdefghijklmn   5F 60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 0A
`abcdefghijklmno   60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F 0A
abcdefghijklmnop   61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F 70 0A
bcdefghijklmnopq   62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F 70 71 0A
cdefghijklmnopqr   63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F 70 71 72 0A
defghijklmnopqrs   64 65 66 67 68 69 6A 6B 6C 6D 6E 6F 70 71 72 73 0A
efghijklmnopqrst   65 66 67 68 69 6A 6B 6C 6D 6E 6F 70 71 72 73 74 0A
fghijklmnopqrstu   66 67 68 69 6A 6B 6C 6D 6E 6F 70 71 72 73 74 75 0A
ghijklmnopqrstuv   67 68 69 6A 6B 6C 6D 6E 6F 70 71 72 73 74 75 76 0A
hijklmnopqrstuvw   68 69 6A 6B 6C 6D 6E 6F 70 71 72 73 74 75 76 77 0A
ijklmnopqrstuvwx   69 6A 6B 6C 6D 6E 6F 70 71 72 73 74 75 76 77 78 0A
jklmnopqrstuvwxy   6A 6B 6C 6D 6E 6F 70 71 72 73 74 75 76 77 78 79 0A
klmnopqrstuvwxyz   6B 6C 6D 6E 6F 70 71 72 73 74 75 76 77 78 79 7A 0A
lmnopqrstuvwxyz{   6C 6D 6E 6F 70 71 72 73 74 75 76 77 78 79 7A 7B 0A
mnopqrstuvwxyz{|   6D 6E 6F 70 71 72 73 74 75 76 77 78 79 7A 7B 7C 0A
```

Figure 4-10. Data Stream Printout (15.0 and 15.1)

Symptom 9: Garbled Print and/or Incorrect Font
If the printer produces print characters other than those expected, run the Datastream Code Printout (15.0 and 15.1) and evaluate their printout. **Figure 4-10** shows the patterns for 15.0 (normal ASCII printout) and 15.1 (ASCII characters and their hexadecimal code equivalent). If the patterns printed are the expected ones, the Parallel Controller PCBA is defective. Replace per subsection 3.10. If Datastram Code Printout 15.1 is selected, cycle power to printer to clear it after evaluation is completed.

The Hammer Bank Cable Assembly is defective. Replace the Hammer Bank Assembly per subsection 3.20.1.

The Encoder PCBA is defective. Replace per subsection 3.19.

The shuttle is moving at less than the proper speed causing fault code 015 to be displayed. Refer to subsection 4.8, symptom 2, for corrective measures.

4.10 CATEGORY 7: THE PRINTER DOES NOT INTERFACE PROPERLY WITH THE HOST

This category discusses a number of problems in the interface between the printer and its host computer.

Symptom 1: No Printing Under Computer Control
If the printer fails to print under control of the host computer, first execute the selectable list patterns used to perform the internal diagnostics. Correct any fault detected by these routines.

If this does not correct the fault, use the exerciser to verify the interface circuitry of the Parallel Controller PCBA.

1) If the operation fails,
   - Parallel Controller PCBA Subsection 3.10.
2) If the operation is successful, one or more of the following problems may exist within the host system.
   - The host computer interface cable is defective or too long. Replace the cable assembly or add pull up and pull down resistors to the Parallel Controller PCBA per Section 6 of the Users Reference Manual.
   - The host computer's printer controller is defective.
   - Application program contains errors.

Symptom 2: Constant Busy Status Sent to Computer
If the printer generates constant BUSY status signals to the host computer, the Parallel Controller PCBA is defective. Replace per subsection 3.10.

4.11 CATEGORY 8: BLOWER MOTOR NOT FUNCTIONING

If the blower motor fails to operate:

1) The Mechanism Driver PCBA is defective. Replace per subsection 3.11.
2) If the blower motor is defective, replace per subsection 3.33.

Table 4-1
SELECTABLE TEST PATTERNS AND SERVICE AIDS

ADDR REF	TYPE OF PRINTOUT	ADDR DATA DISPLAY READOUT	ADDR REF TEST PATTERNS
00	Config	**00.1**	Configuration printout including part numbers of each installed PROM and font. If serial interface option is present, size of installed buffer also is printed.
		00.2	Printout of each installed character set including font part number.
01	Auto. Sequence	**01.1**	One complete sequence of test patterns 04.5 through 07.1
		01.2	Continuous sequence of test patterns 04.5 through 07.1.
02 & 03	Repeating tests	**02.1**	All "E" repeating
		02.2	All "H" repeating
		02.3	All "#" repeating
		02.3	All "_____" repeating
		03.1	Shift recycle repeating
		03.2	Row increments repeating
		03.3	All black plot, half speed repeating
		03.4	64 character set, underlined, repeating
04 & 05	Print Tests	**04.5**	Upper/lowercase underlined 33 lines
		04.6	Row increment, full character set
		05.1	Shift recycle, full character set
		05.2	Double high 16 lines
06	Paper Motion tests	**06.1**	Top of Form, slew, and print one line six times
		06.2	Vertical tab one inch, 2 inch, 2 inch, 2 inch, 2 inch
		06.3	Progressive skip 1 through 15 lines
		06.4	Print 2 lines and skip one 15 times
07	EVFU tests	**07.1**	EVFU test, channel seek to three different channels
08 to 10	Reserved		

Table 4-1 (continued)

ADDR REF	TYPE OF PRINTOUT	ADDR. DATA DISPLAY READOUT	ADDR REF TEST PATTERNS
11	Internal Diagnostics	**11.0**	Internal Diagnostics. Depressing 2nd FUNC causes the internal diagnostics routine to be run and, if a fault exists, to display a fault code as described in Table 4-2. Upon successful completion of the diagnostics, the printer returns to the off-line state with the RDY indicator flashing
12	Rebound Index	**12.1**	Motor Bar Rebound Index Display. Motor Bar Rebound Index displayed as a 1xx index number. Shuttle operates without printing. By depressing F/L switch, the Hammer Bank Rebound Index (ADDR/DATA 12.2) is displayed automatically without interruption in printer operation.
		12.2	Hammer Bank Rebound Index Display. Hammer Bank Rebound Index displayed as a 2xx index number. By depressing F/L switch, the motor Bar Rebound Index (ADDR/DATA 12.1) is displayed automatically without interruption in printer operation.
13	Stroke Time	**13.0**	Stroke Time Display. Average stroke time displayed in xx.x milliseconds. Printer prints "H" repeating.
14	Phasing	**14.0**	Hammer Phasing Index. Capability is provided to display an index number which represents the Hammer Phasing Index. The printer prints "H" repeating. Nominal index number is 050. The actual number displayed reflects the index stored in the EAROM for the selected print speed. Capability is provided to change the value of the Hammer Phasing Index in 001 increments (+direction) or 001 decrements (-direction). The index adjustment range does not exceed 005 to 009.

Table 4-1 (continued)

ADDR REF	TYPE OF PRINTOUT	ADDR. DATA DISPLAY READOUT	ADDR REF TEST PATTERNS
			Service procedure is as follows: Depressing 2nd FUNC initiates the Hammer Phasing routine and the Hammer Phasing Index is displayed. Momentarily depressing ADDR switch causes the display to decrement by 1 in the -direction from the last displayed number. To terminate the routine, depress the RDY switch. The last displayed index number is stored in the EAROM memory when the phasing routine is terminated by depressing the RDY switch. the newly stored index number is used for subsequent hammer phasing in the same speed.
15	Datastream Code Printout	**15.0**	Enable normal operations.
16 through 19	Reserved		

Table 4-2
FAULT CODES

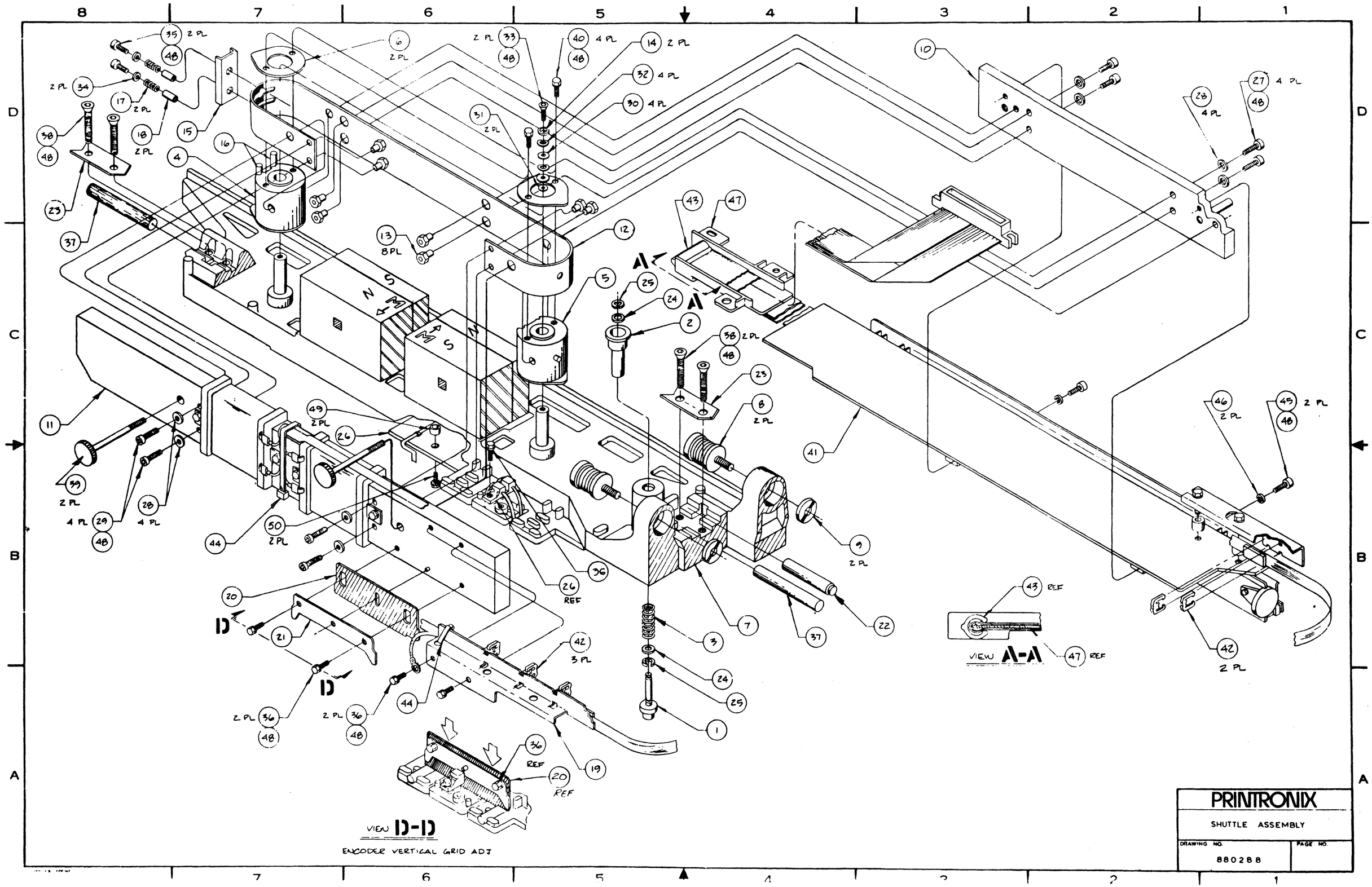
CHK INDICATOR	DISPLAY READOUT (FAULT CODE)	OPERATOR CORRECTABLE?	DESCRIPTION
Flashing	011	Yes	Paper Out.
Flashing	012	Yes	Platen open or shuttle cover removed.
Flashing	013	Yes	No Paper motion (PMT Option).
Flashing	014	Yes	Shuttle Jammed.
Flashing	015	Yes	Shuttle not up to speed.
All LED's On	Blank	No	Internal processor malfunction.
Steady	030	No*	DCU program ROM check sum.
Steady	031	No*	DCU data RAM pattern check.
Steady	032	No*	DCU configuration memory check sum.
Steady	033	No*	Control and status interface timeout.
Steady	040	No*	Primary font ROM check sum.
Steady	041	No*	Alternative font ROM check sum.
Steady	050	No*	MCU program ROM check sum.
Steady	051	No*	MCU data RAM pattern check.
Steady	060	No	Power supply: +30 12 voltage failure.
Steady	061	No	Power supply: -16 12 voltage failure.

*** Indicates Soft Fault**

PRINTRONIX

BILL OF MATERIAL
880288 SHUTTLE ASSEMBLY

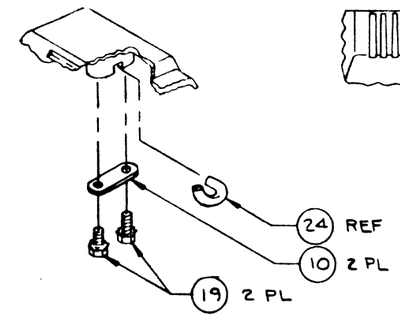
ITEM NO.	PART NO.	DESCRIPTION
1	110258-001	PIN ASSY, SHUTTLE LOCK
2	110257-001	KNOB, SHUTTLE LOCK
3	110254-001	SPRING, SHUTTLE LOCK
4	110289-001	DRUM ASSY, LEFT
5	110290-001	DRUM ASSY, RIGHT
6	110031-001	RETAINER BAND
7	110287-001	MAGNET ASSY, SHUTTLE
8	110192-001	BUMPER ASSY
9	110188-001	NUT, LOCKING
10	110314-001	BAR ASSY, HMR BANK MOUNTING
11	110305-001	BAR ASSY, LINEAR MOTOR
12	110186-001	BANK, SHUTTLE
13	110015-001	CLAMP, BANK
14	110399-001	WASHER, COUNTERSINK
15	110013-001	BAR, BANK TENSION
16	110510-001	PIN, BANK - SUPPORT
17	110158-001	SPRING, BAND TENSION
18	110016-001	SPACER, BAND TENSION
19	110236-001	GUIDE, LINEAR MOTOR CABLE
20	110159-001	ENCODER, LINEAR
21	110160-001	COVER, ENCODER
22	110198-001	PIN SPRING
23	110133-001	CLAMP, SHUTTLE PIVOT PIN
24	110008-008	WASHER
25	105678-002	RING, RETAINING
26	110487-001	PCBA, ENCODER
27	101514-050	SCREW, HEX SOCKET HD CAP
28	110008-006	WASHER, FLAT
29	101514-048	SCREW, HEX SOCKET HD CAP
30	110008-003	WASHER
31	110008-004	WASHER
32	101552-004	WASHER, CURVED SPRING
33	101524-006	SCREW, HEX SOCKET FLAT HD 82°
34	110008-001	WASHER
35	102288-004	SCREW, BUTTON HD SOCKET
36	102786-404	SCREW, HEX WASHER HD
37	101515-007	PIN, DOWEL
38	101524-008	SCREW, HEX SOCKET FLAT HD 82
39	110603-001	SCREW ASSY, SHUTTLE RESTRAINING
40	105728-001	SCREW, HEX WASHER HD
41	110598-001	HAMMERBANK ASSEMBLY
42	110237-001	CLIP, L.M. CABLE
43	110204-001	CLIP, CABLE ANCHOR
44	101480-001	TIE WRAP
45	101514-015	SCREW, SOCKET HD, CAP UNC
46	102158-001	WASHER, SPLIT LOCK
47	110175-001	BRACKET, CABLE ANCHOR
48	101854-002	ADHESIVE, LOCTITE
49	106520-001	SPACER - NYLON
50	105728-007	SCREW EXT. T WASHER


35 2 PL
48
6 2 PL
2 PL 33
48
40 4 PL
48
14 2 PL
32 4 PL
30 4 PL
10
27 4 PL
48
28 4 PL
2 PL 34
17 2 PL
18 2 PL
15
16
4
31 2 PL
38
48
23
37
13 8 PL
12
5
43
47
25
24
2
38 2 PL
48
23
8 2 PL
41
9 2 PL
7
3
24
25
1
22
37
26 REF
36
26
44
50 2 PL
49 2 PL
11
39 2 PL
4 PL 29
48
28 4 PL
20
21
42 3 PL
2 PL 36
48
2 PL 36
48
44
19
36 REF
20 REF
VIEW D-D
ENCODER VERTICAL GRID ADJ
46 2 PL
45 2 PL
48
42 2 PL
43 REF
47 REF
VIEW A-A
PRINTRONIX
SHUTTLE ASSEMBLY
DRAWING NO. 880288
PAGE NO.

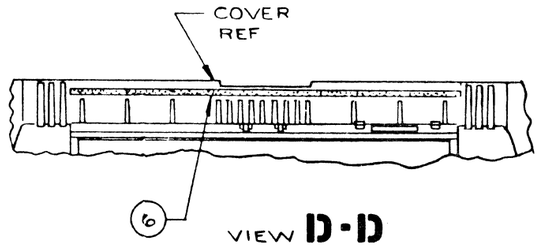
PRINTRONIX

BILL OF MATERIAL
880303 CABINET KIT, BASIC

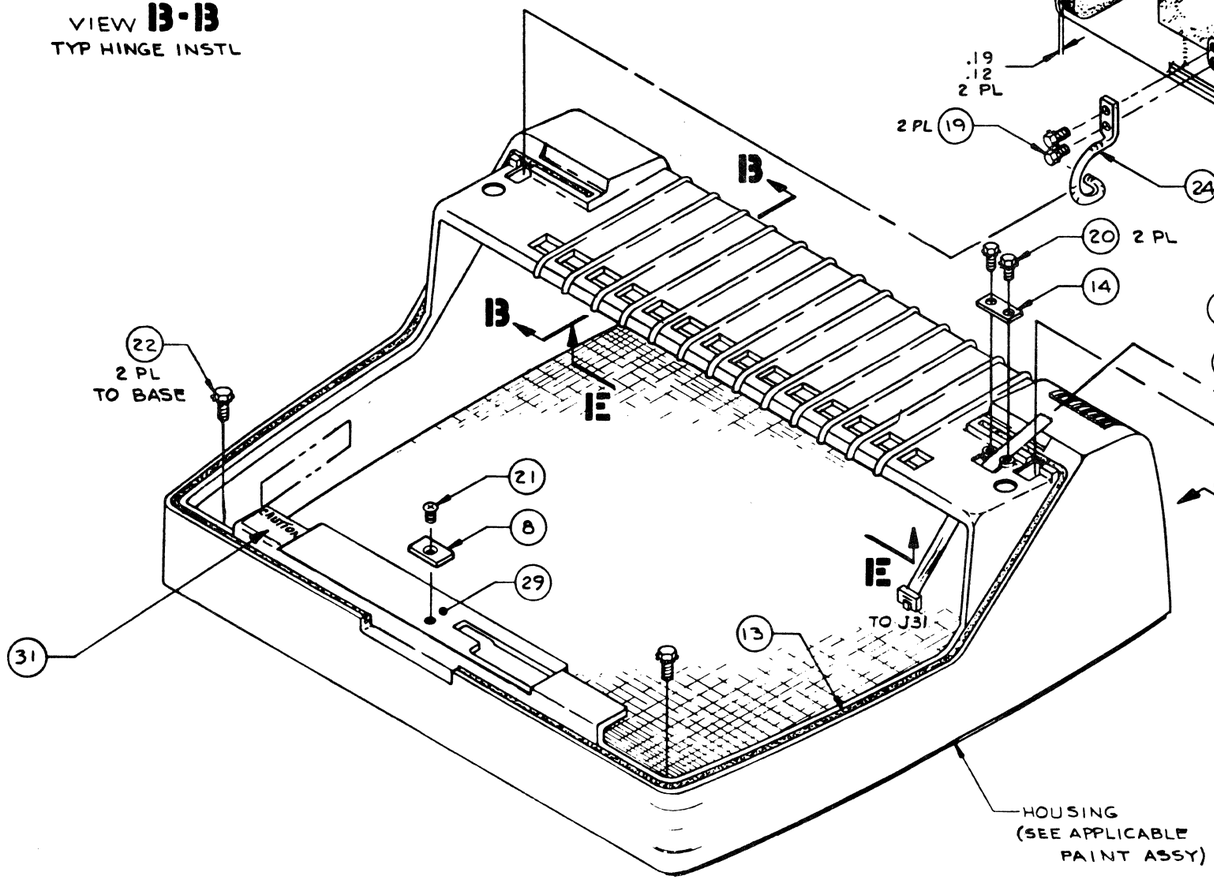
ITEM NO.	PART NO.	DESCRIPTION
1	110355-001	PCBA, FRONT PANEL
2	110215-001	WINDOW, CABINET
3	110536-103	ACOUSTIC FOAM, SIDE COVER (LH)
4	110536-102	ACOUSTIC FOAM, SIDE COVER (RH)
5	110536-105	ACOUSTIC FOAM, TOP COVER
6	105812-002	ACOUSTIC FOAM
7	110219-001	HINGE, CABINET
8	110321-001	PLATE, LATCH
9	101531-001	LATCH, MAGNETIC
10	110181-001	RETAINER, SHUTTLE PIVOT
11	110322-001	BRACKET, LATCH
12	110319-001	CLAMP, CABLE
13	105872-001	ACOUSTIC FOAM
14	110318-001	CLAMP, CABLE
15	101634-001	HOLDER, CABLE TIE
16	105838-001	WASHER, FINISHING
17	105839-001	SCREW, OVAL HD, PHILLIPS
18		
19	102787-106	SCREW, HEX HD, INDT W/EXT T. L.W.
20	102786-606	SCREW, HEX HD, W/LK WASH UNC
21	102159-002	SCREW, FLAT HD, 100° PHIL
22	102787-110	SCREW, HEX HD, INDT W/EXT T. L.W.
23	102786-604	SCREW, HEX HD W/LK WASH UNC
24	110219-002	HINGE, CABINET
25	101562-002	TAPE, DOUBLE CONTACT
26	105728-001	SCREW, HEX WASHER HD
27	101480-001	TIE, WRAP
28	110536-104	ACOUSTIC FOAM, BOARD SUPPORT
29	110512-001	LABEL, CONTROL PANEL
30	110536-001	ACOUSTIC FOAM, NESTED FORM
	110372	CABINET KIT, STANDARD HOUSING & COVER GRAY

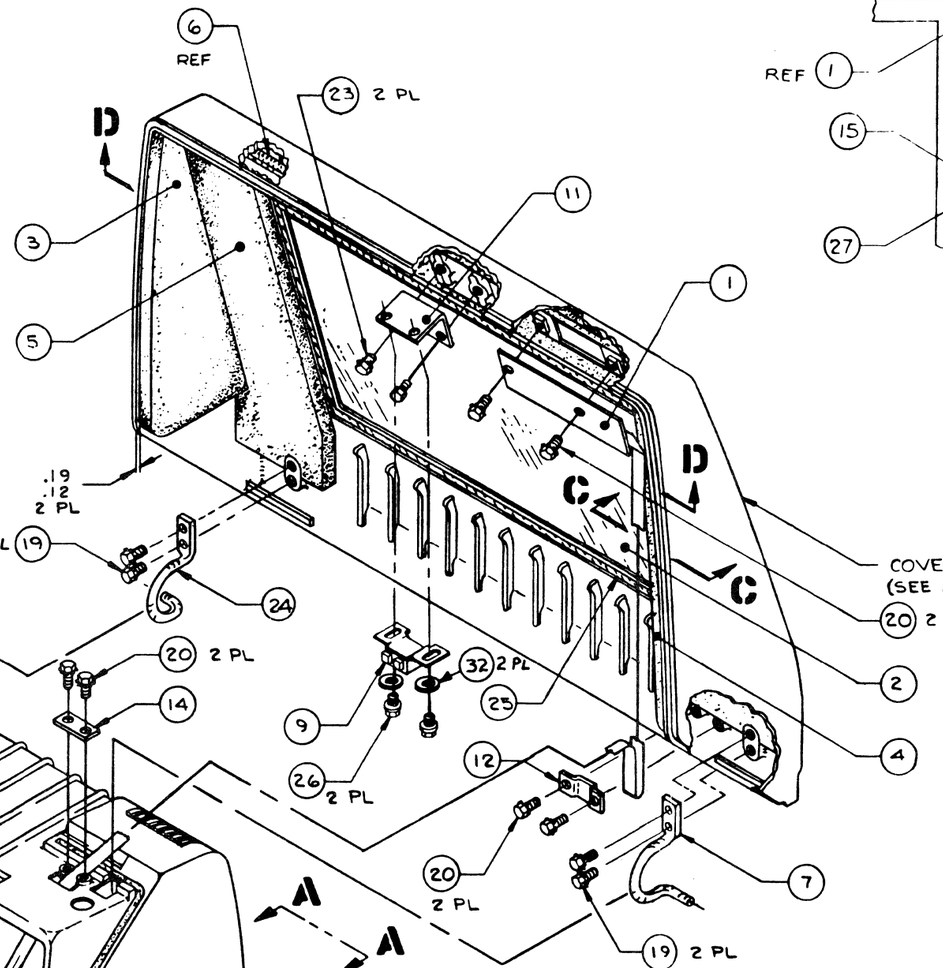


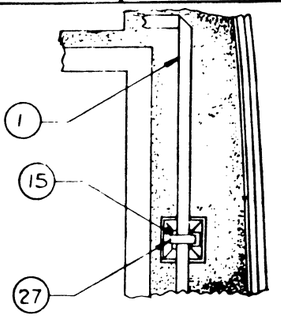
VIEW **B-B**
TYP HINGE INSTL



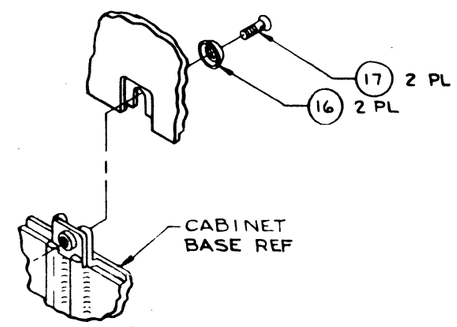
VIEW **D-D**







VIEW **C-C**



VIEW **A-A**
HSG TO BASE INSTL

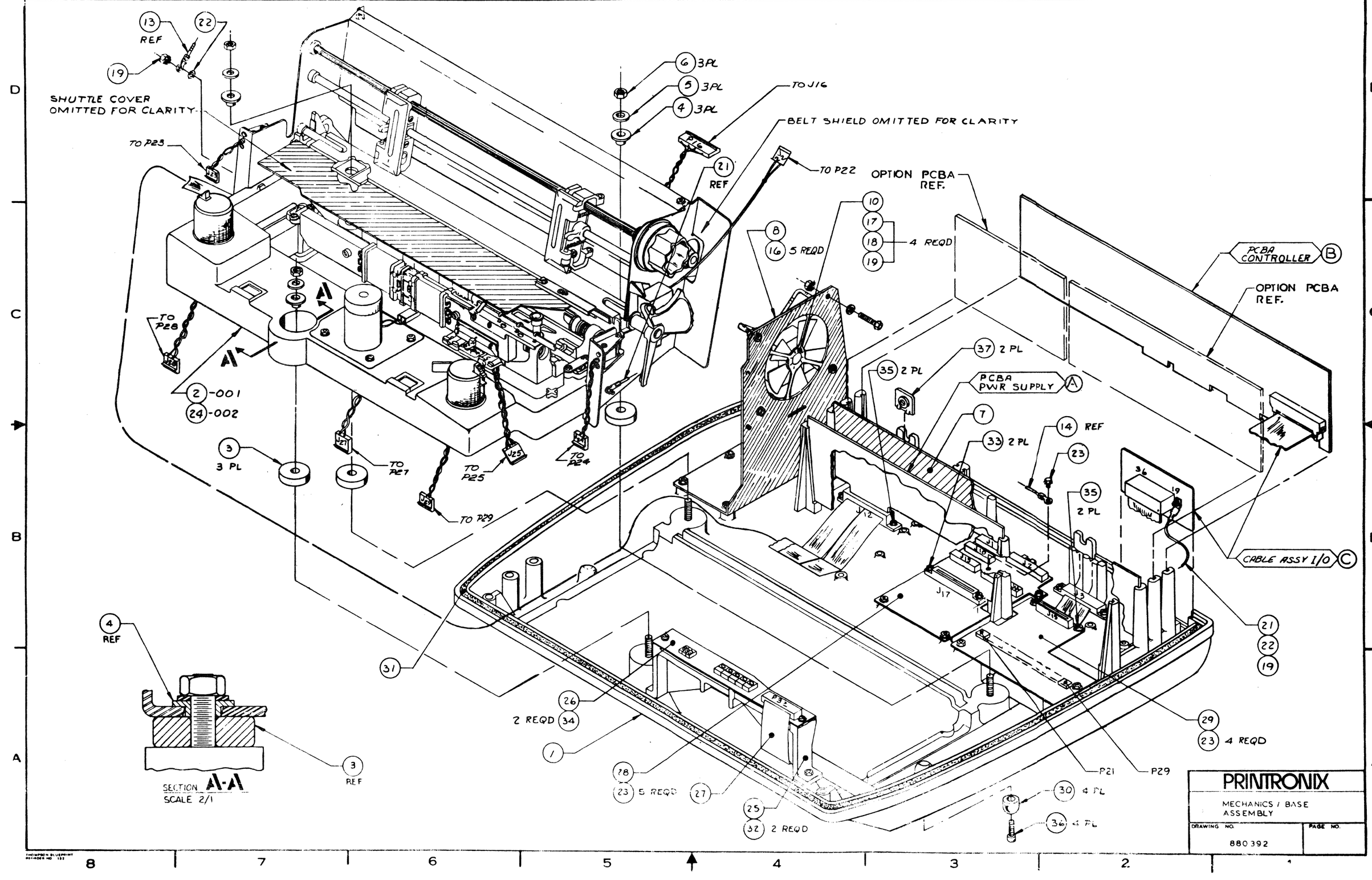
PRINTRONIX	
CABINET KIT, BASIC	
DRAWING NO 880303	PAGE NO

PRINTRONIX

110392
MECHANICS/BASE ASSY

ITEM NO.	PART NO.	DESCRIPTION
	110995-001	
1	110207-001	BASE, CABINET
2		
3	110282-001	SHOCK MOUNT
4	110283-001	GROMMET, SHOCK MOUNT
5	101526-028	WASHER, FLAT
6	102788-140	NUT, HEX, W/EXT T LW
7	110239-001	PCBA, MECH DRIVER
8	110224-001	SUPPORT, FAN
9	105705-001	CIRCUIT BREAKER (DOMESTIC, 120V and 240V)
10	110454-001	FAN ASSY
11	110464-001	CABLE ASSY, A.C. INPUT
12	110516-001	FILTER ASSY, A.C. INPUT
13	110453-001	GROUND ASSY, CHASSIS
14	110453-002	GROUND ASSY, CHASSIS
15		
16	102786-606	SCREW, HEX HD, W/LW UNC
17	102786-616	SCREW, HEX HD, W/LW UNC
18	101526-002	WASHER, FLAT
19	102788-600	NUT, HEX W/EXT T LW
20	101527-001	WASHER, LOCK, EXT TOOTH
21	110517-001	CABLE ASSY, INTFC GND
22	101527-003	WASHER, LOCK, EXT TH
23	102786-404	SCREW, HEX HD W/LW UNC
24	110301-002	MECHANICS ASSY, 'P' SERIES
25	110317-001	RISER, CONTROL PANEL
26	110331-001	PCBA, INNER CONTROL PANEL
27	110461-001	CABLE ASSY, INNER CONTROL PANEL
28	110295-001	PCBA, MOTHER BOARD
29	110438-001	PCBA, INTERCONNECT BOARD
30	101570-001	RUBBER FOOT
31	105872-001	ACOUSTIC FOAM
32	102787-108	SCREW, HEX HD, INDENTED W/EXT T LW
33	102786-408	SCREW, HEX HD W/LW UNC
34	102559-604	SCREW, PAN HD W/LW UNC
35	102786-406	SCREW, HEX HD W/LW UNC
36	102998-003	SCREW, SOC HD, CAP UNF
37	110320-001	NUTPLATE
38	101526-005	WASHER, FLAT
39	102788-400	NUT, HEX W/EXT T LW
40	110572-001	BRACKET, ANTI-STATIC BRUSH

ITEM NO.	PART NO.	DESCRIPTION
41	110573-001	BRUSH, ANTI-STATIC
42	101539-003	CONNECTOR, MALE FAST-ON
A	110499-001	POWER SUPPLY ASSEMBLY
B	110270-001	PCBA PARALLEL CONTROLLER
B	110668-001	PCBA PARALLEL CONTROLLER
B	110500-001	PCBA SERIAL CONTROLLER
C	110628-001	PCBA, INTERFACE, RACK & PANEL (DATA PRODUCTS, WINCHESTER CONN.)
C	110638-001	PCBA, INTERFACE, "D" CONN. (DATA PRODUCTS, AMP CONN.)
C	110376-001	CABLE ASSY, I/O CENTRONICS
C	110689-001	CABLE ASSY, I/O SERIAL

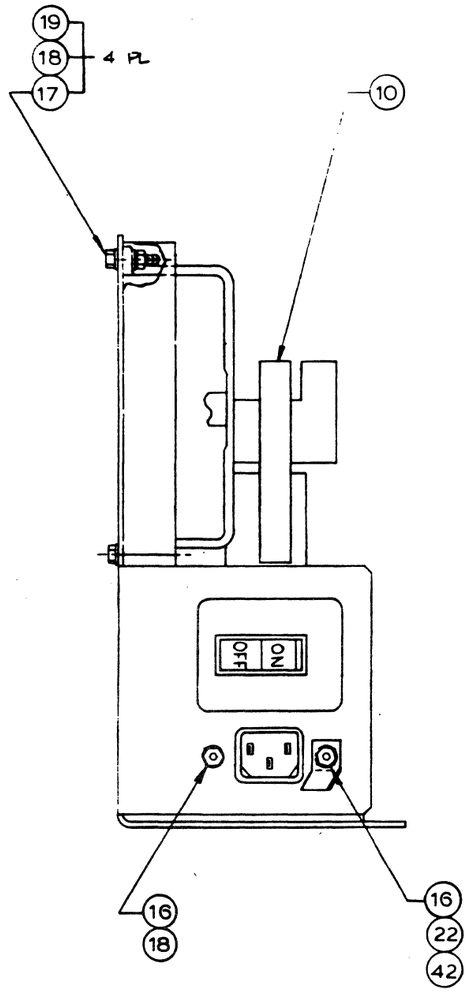


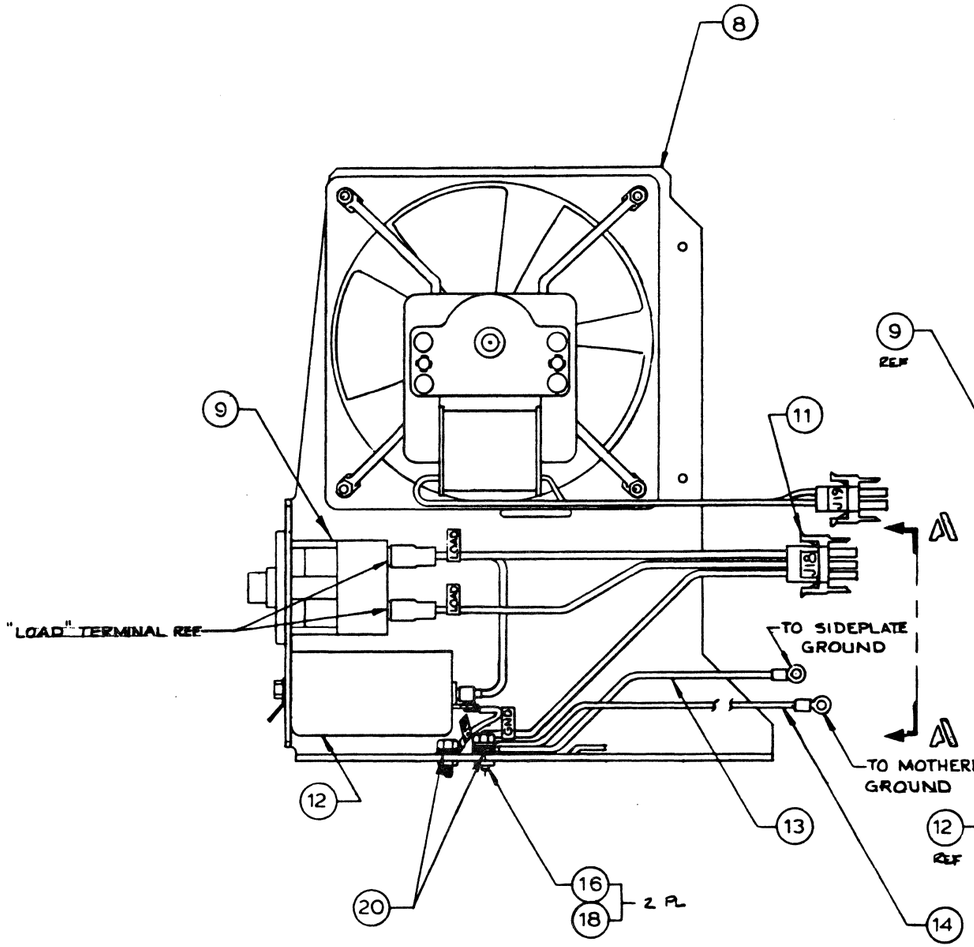
PRINTRONIX

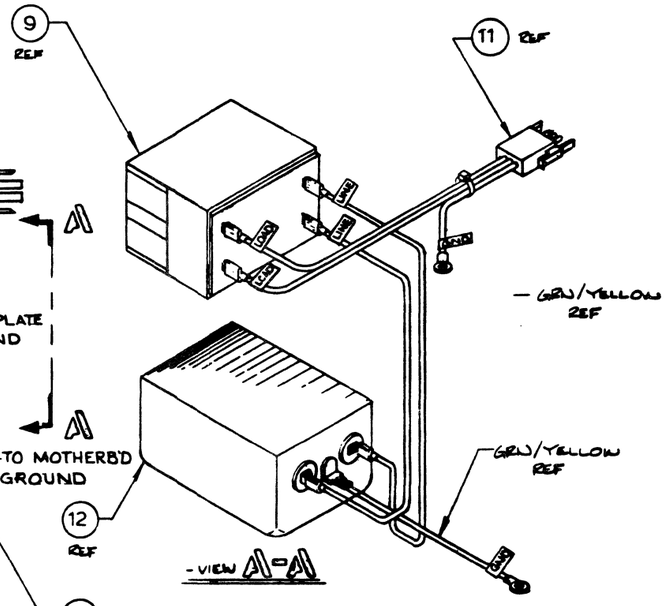
MECHANICS / BASE ASSEMBLY

DRAWING NO.	PAGE NO.
880 392	

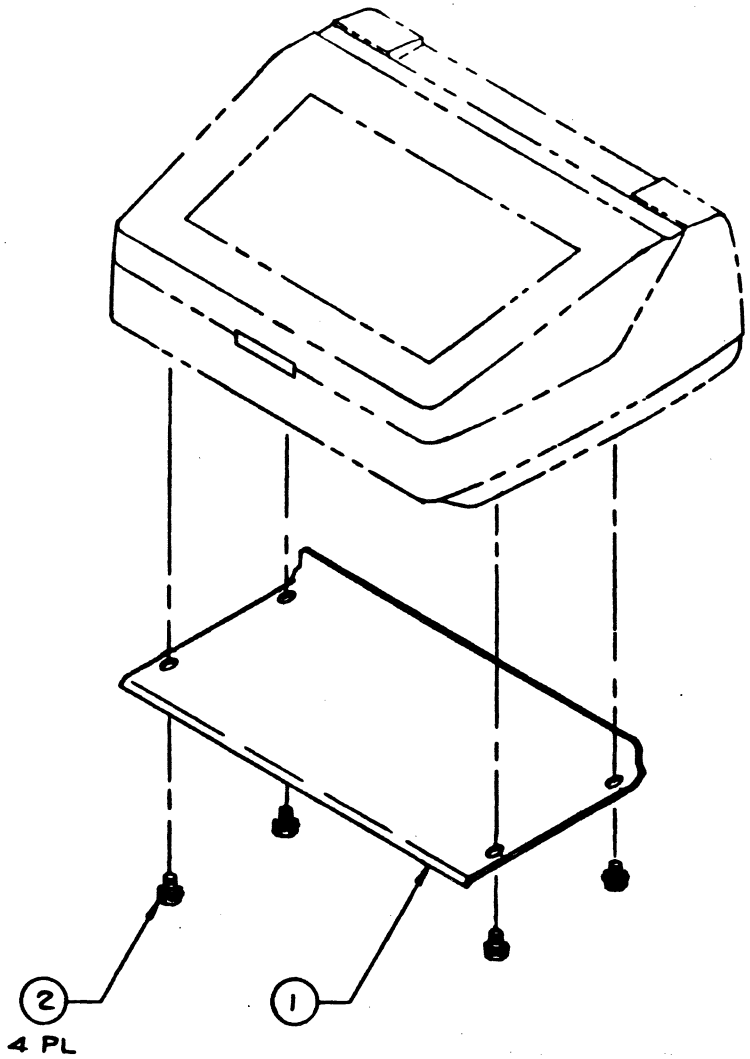
THOMPSON BLUEPRINT
PRINTER NO. 132







PRINTRONIX	
A.C. INPUT FAN ASSY.	
DRAWING NO. 880 392	PAGE NO.



MATERIAL LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	110315-001	GUIDE, PAPER, BOTTOM
2	4	102786-605	SCREW, HEX HD WITH EXT T. L W

PRINTRONIX

BOTTOM PAPER GUIDE KIT

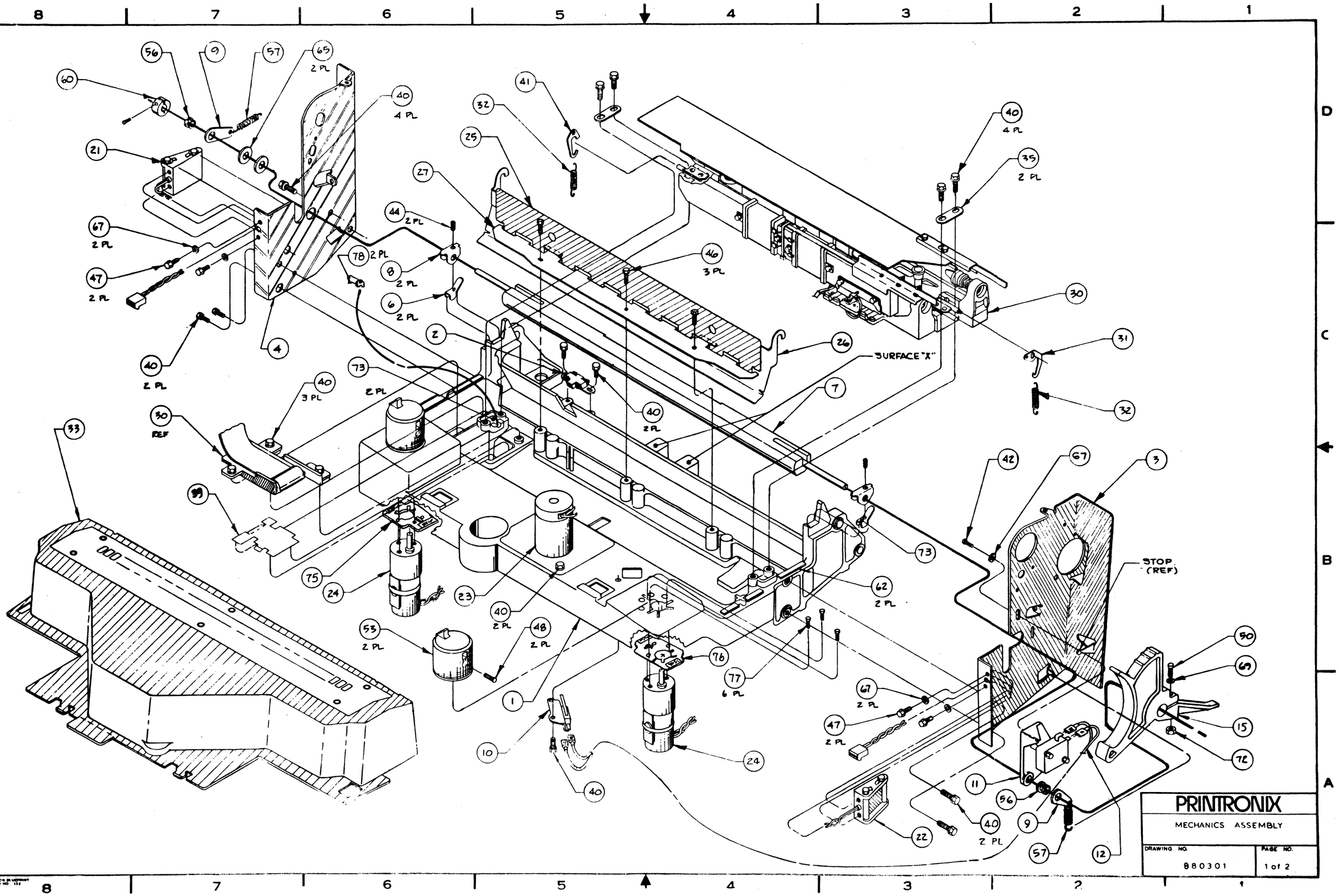
DRAWING NO.	PAGE NO.
880494	

PRINTRONIX

MECHANICS ASSEMBLY
880301

ITEM NO.	PART NO.	DESCRIPTION
1	110113-001	MECHANICS BASE, MACHINED
2	110307-001	SWITCH ASSY, PAPER DETECT
3	110130-001	SIDE PLATE, RIGHT
4	110129-001	SIDE PLATE, LEFT
5	110279-001	PANEL, BARRIER
6	110579-001	SADDLE, WEAR
7	110513-001	PLATEN ASSY.
8	110245-001	BRACKET, PLATEN ADJUST
9	110280-001	LINK SPRING
10	110463-001	SWITCH ASSY, INTERLOCK
11	110472-001	SWITCH ASSY, PLATEN OPEN
12	110390-001	CABLE ASSY, PLATEN OPEN & INTERLOCK
13		
14		
15	110107-001	LEVER, PLATEN
16		
17	110127-001	SHAFT, SUPPORT
18	110422-001	RETAINER, SUPPORT SHAFT
19	110391-001	SPLINE SHAFT ASSY
20	110281-001	CLAMP, BEARING
21	110418-001	GUIDE ASSY, RIBBON LH
22	110418-002	GUIDE ASSY, RIBBON RH
23	110308-001	BLOWER ASSY
24	110352-001	MOTOR ASSY, RIBBON DRIVE
25	110408-001	IRONER
26	110549-001	BRACKET, IRONER MOUNTING
27	110548-001	PLATE, IRONER MOUNTING
28	110446-001	LINK, TRACTOR ADJUSTING
29	110447-001	BUSHING, TRACTOR SHAFT
30	110288-001	SHUTTLE ASSY
31	110199-001	LINK, OVER-CENTER
32	110556-001	SPRING, EXT.
33	110471-001	COVER ASSY, SHUTTLE
34	DELETED	
35	110181-001	RETAINER, SHUTTLE PIVOT
36	DELETED	
37		
38		
39	110430-001	CLOSURE, CABLE EXIT
40	105728-004	SCREW, EXT T. WASHER HEX HD
41	110200-001	LINK, SPRING
42	103677-001	SCREW, PAN HD CRUCIFORM DRIVE
43		
44	101509-012	SCREW, SET SOCKET UNF
45	102787-108	SCREW, HEX HD W/ext LK WASHER

ITEM NO.	PART NO.	DESCRIPTION
46	105728-001	SCREW, EXT T. WASHER HEX HD
47	102786-406	SCREW, HEX HD W/EXT LK WASHER
48	103677-009	SCREW, PAN HD, CRUCIFORM DRIVE
49		
50	101514-037	SCREW, SOC HD, CAP
51	105786-001	TRACTOR SET, RH. & LH.
52	DELETED	
53	102526-001	HUB, DRIVE MOTOR, RIBBON SPOOL
54	REF	ADJ. TRACTOR, 6 PIN (RH)
55	REF	ADJ. TRACTOR, 6 PIN (LH)
56	101309-002	BEARING, NYLINER
57	105741-001	SPRING, EXT
58	105741-003	SPRING, EXT
59	101551-002	GRIP RING
60	102400-002	COLLAR, SHAFT
61	105808-001	BELT, TIMING
62	105812-001	ACOUSTIC FOAM
63	110473-001	SHIELD BELT
64		
65	101526-024	WASHER, FLAT
66		
67	101526-005	WASHER, FLAT
68	101526-002	WASHER, FLAT
69	101526-037	WASHER, FLAT
70	101527-002	WASHER, LOCK, EXT TOOTH
71	103714-003	NUT, PLAIN HEX UNF
72	101525-001	NUT, PLAIN HEX UNC
73	101805-001	BEARING LUBRICANT
74	110353-002	MOTOR ASSY, PAPER DRIVE
75	103126-003	TAPE (DOUBLE COATED)
76	110565-001	SHIM, RIBBON MOTOR
77	102786-405	SCREW, HEX HD W/EXT LK WASHER NOTE: FOR RIBBON MOTORS HAVING DOUBLE SHIM (P/N 110565-001) UNDER SAME MOTOR USE: SCREWS, HEX, HD. P/N 102786-407
78	110563-001	SADDLE, SHUTTLE PIVOT WEAR



PRINTRONIX

MECHANICS ASSEMBLY

DRAWING NO.	PAGE NO.
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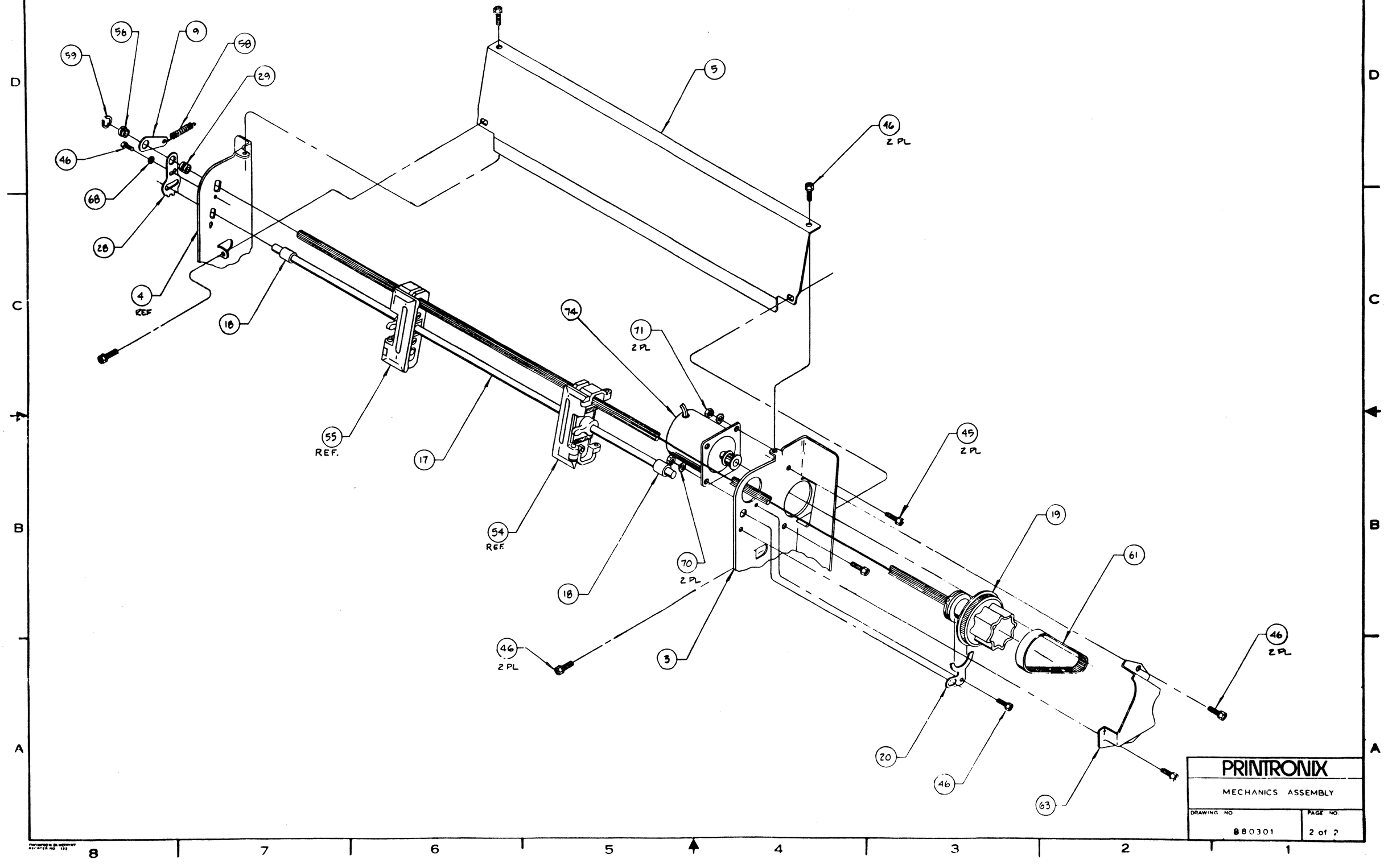

PRINTRONIX

MECHANICS ASSEMBLY

DRAWING NO.	PAGE NO.
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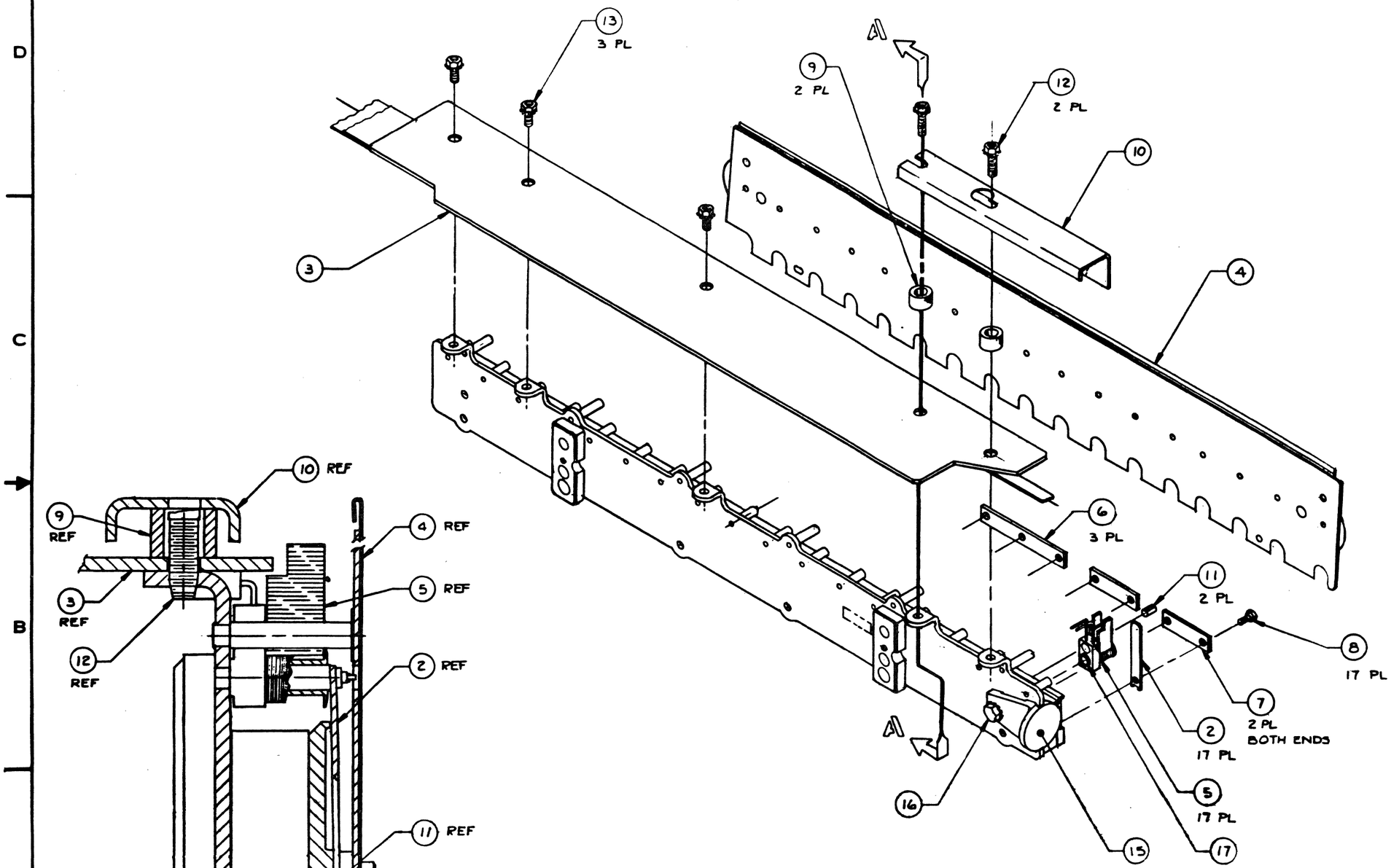
PRINTRONIX

HAMMER BANK ASSEMBLY
880593

ITEM NO.	PART NO.	DESCRIPTION
1		
2	105059-001	HAMMER SPRING ASSY, CARBIDE TIP
3	110599-001	CABLE ASSY, HAMMERBANK
4	110218-001	COVER ASSY, HAMMERBANK
5	103601-001	COIL, HAMMER
6	110713-001	PLATE, CLAMP
7	110173-002	PLATE, CLAMP
8	105575-001	SCREW, HIGH STR, INT HEX SOC HD
9	110248-001	SPACER, LIN MTR CABLE GUIDE
10	110235-001	GUIDE, HMRBK LIN MTR CABLE
11	101319-001	PIN, ROLL
12	105728-002	SCREW, EXT. T. WASHER HEX HD
13	105728-001	SCREW, EXT. T. WASHER HEX HD
14	101537-005	ADHESIVE CYANOACRYLATE
15	110426-001	BUMPER, REBOUND HMRBK
16	102786-804	SCREW, HEX HD W/L.W. UNC
17	101854-005	ADHESIVE, LOCTITE



SECTION A - A
SCALE 4:1

PRINTRONIX	
HAMMER BANK ASSY.	
DRAWING NO. 880598	PAGE NO. 2 of 2

PRINTRONIX

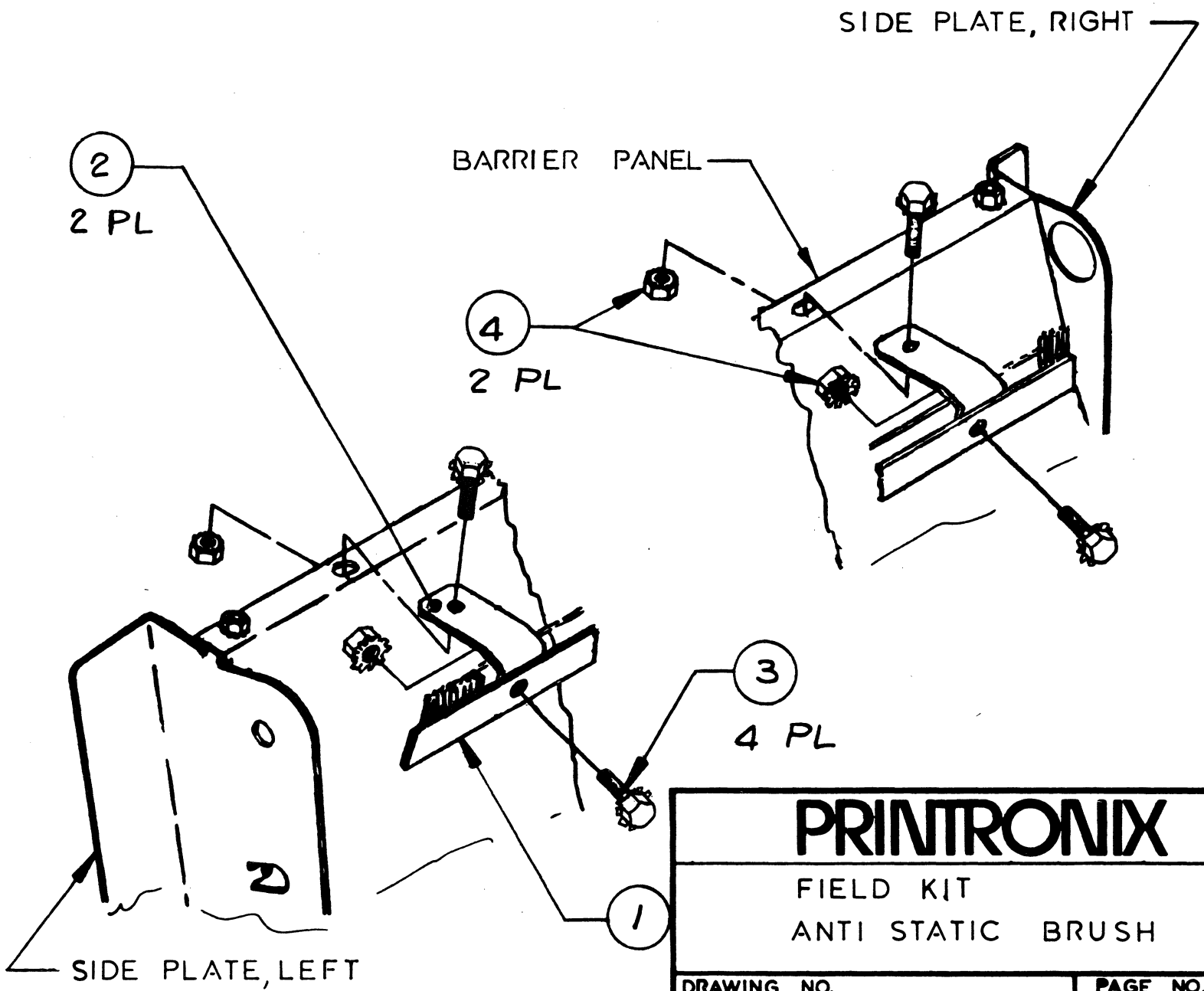
880657
PEDESTAL & PAPER BSKT KIT, MVP

ITEM NO.	PART NO.	DESCRIPTION
1	103704-002	PAPER BASKET KIT
1	110370-001	PEDESTAL KIT
103704-002	PAPER BASKET KIT	
1	101648-001	PAPER BASKET
2	101616-001	PAPER GUIDE
3	104001-001	HARDWARE KIT, PAPER BASKET
4	104003-001	CARTON, OUTER, PAPER BASKET
5	104679-000	PAPER BASKET INSTAL
6	104988-001	INSERT, CARTON, PAPER BASKET
7	110670-000	PAPER BASKET INSTALLATION
110370-001	PEDESTAL KIT	
1	110369-001	LEG, PEDESTAL, LEFT
2	110369-002	LEG, PEDESTAL, RIGHT
3	110369-003	PANEL, MODESTY
4	110369-004	PANEL, PAPER, GUIDE
5	110371-000	PRINTER PEDESTAL ASSY & INSTL
6	110667-001	FOAM, ACOUSTICAL INSERT
7	110667-002	FOAM, ACOUSTICAL INSERT
8	105812-005	FOAM, ACOUSTIC
9	102787-108	SCREW, HEX HD IND W/EXT TH L.W.
10	101526-001	WASHER, FLAT
11	110369-005	TOUCH-UP PAINT BLACK
12	110370-000	PEDESTAL KIT

PRINTRONIX

110591
FIELD KIT, ANTI-STATIC BRUSH

ITEM NO.	PART NO.	DESCRIPTION
1	110573-001	BRUSH, ANTI-STATIC
2	110572-001	BRACKET, ANTI-STATIC BRUSH
3	102786-406	SCREW, HEX HD, W/LK WASH
4	102788-400	NUT, HEX/EXT TH L.W.



PRINTRONIX

FIELD KIT
ANTI STATIC BRUSH

DRAWING NO.	PAGE NO.
880591	

PRINTRONIX

PCBA, MECH. DRIVER

ASSY. NO. 880239

REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
R14, 15	101399-294	2	RESISTOR, FILM, 1/4W 1%, 29.4K OHM
R21, 22	101399-105	2	RESISTOR, FILM, 1/4W, 1% 100K OHM
R81, 90	101399-202	2	RESISTOR, FILM, 1/4W, 1% 200K OHM
R149	101422-151	1	RESISTOR, FILM, 1/2W, 5% 15 OHM
R18	101422-221	1	RESISTOR, FILM, 1/2W, 5% 22 OHM
R121	101422-153	1	RESISTOR, FILM, 1/2W, 5% 1.5K OHM
R122	101422-203	1	RESISTOR, FILM, 1/2W, 5% 2K OHM
R6, 27, 58	103348-008	3	RESISTOR, WIREWOUND, 1W .1 OHM
R26	101400-562	1	RESISTOR, FILM, 1W, 5% 560 OHM
R128	101421-132	1	RESISTOR, FILM, 2W, 5% 130 OHM
R163	102235-001	1	RESISTOR, WIREWOUND, 10W, 5% 25 OHM
RP1, 2	103385-004	2	RESISTOR, SIP, 470 OHM (9EA/PKG)
RP4, 7, 9	105850-102	3	RESISTOR, SIP, 1K OHM (4EA/PKG)
RP3	101364-001	25	RESISTOR, SIP, 3K OHM (4EA/PKG)
RP6, 8	105850-472	2	RESISTOR, SIP, 4.7K OHM (4EA/PKG)
RP5	103385-005	1	RESISTOR, SIP, 4.7K OHM (7EA/PKG)
Q47	105845-001	1	TRANSISTOR, TIP31
Q2, 3, 5, 6, 8, 9, 12, 13, 27, 28 29, 30, 31, 32, 33, 34, 35, 38, 39 40, 41, 42, 43, 44, 45	101364-001	25	TRANSISTOR, TIP121
Q1, 4, 7, 10, 11, 14, 22, 23, 26 48	103370-001	10	TRANSISTOR, TIP127
Q25	105702-001	1	TRANSISTOR, 2N2222A
Q17, 18, 19, 20, 21, 37	105789-001	6	TRANSISTOR, 2N2907A
Q24	101368-001	1	TRANSISTOR, 2N4234
Q15, 16	102230-001	2	TRANSISTOR, 2N4393, FET
Q36, 46	105790-001	2	TRANSISTOR, 2N6330
CR1, 2, 3, 4, 6, 7, 8, 10, 11, 12 13, 14, 16, 17, 18, 19, 21, 22, 23 24, 25, 27, 28, 29, 31, 32, 33	102872-001	27	DIODE, 1N914B

PRINTRONIX

PCBA, MECH. DRIVER

ASSY. NO. 880239

REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
R82, 88	101337-153	2	RESISTOR, COMP, 1/4W, 5% 1.5K OHM
R31, 57, 76	101337-203	3	RESISTOR, COMP, 1/4W, 5% 2K OHM
R8, 30, 54, 59, 60, 63, 84, 87	101337-243	8	RESISTOR, COMP, 1/4W, 5% 2.4K OHM
R42, 43	101337-273	2	RESISTOR, COMP, 1/4W, 5% 2.7K OHM
R165, 166, 167, 168, 169, 170, 171 172, 173, 176, 177, 178, 179, 180 181, 182, 183	101337-303	17	RESISTOR, COMP, 1/4W, 5% 3K OHM
R73, 74	101337-333	2	RESISTOR, COMP, 1/4W, 5% 3.3K OHM
R124, 131	101337-473	2	RESISTOR, COMP, 1/4W, 5% 3.9K OHM
R2, 3, 4, 80, 118, 125, 127, 140 157	101337-473	9	RESISTOR, COMP, 1/4W, 5% 4.7K OHM
R9, 13, 25, 33, 34, 36, 38, 79, 94 97, 98, 99, 101, 106, 109, 126 129, 133, 135, 144, 150, 161, 184 185, 186, 187, 188, 189, 190, 191 192, 193	101337-104	32	RESISTOR, COMP, 1/4W, 5% 10K OHM
R11, 28, 85, 86, 164	101337-184	5	RESISTOR, COMP, 1/4W, 5% 18K OHM
R47, 52, 62, 95	101337-204	4	RESISTOR, COMP, 1/4W, 5% 20K OHM
R37, 134, 136	101337-274	3	RESISTOR, COMP, 1/4W, 5% 27K OHM
R108	101337-474	1	RESISTOR, COMP, 1/4W, 5% 47K OHM
R12, R46	101337-514	2	RESISTOR, COMP, 1/4W, 5% 51K OHM
R107	101337-155	1	RESISTOR, COMP, 1/4W, 5% 150K OHM
R53, 91	101337-754	2	RESISTOR, COMP, 1/4W, 5% 75K OHM
R16, 17	101337-105	2	RESISTOR, COMP, 1/4W, 5% 100K OHM
R130	101337-395	1	RESISTOR, COMP, 1/4W, 5% 390K OHM
R10, 55, 56	101337-435	3	RESISTOR, COMP, 1/4W, 5% 430K OHM

PRINTRONIX

PCBA, MECH. DRIVER

ASSY. NO. 880239

REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
	110553-001	1	PCB, MECH DRIVER
	110275-000	REF	SCHEMATIC, MECH DRIVER
C10, 21, 22	102291-221	3	CAPACITOR, CERAMIC, .0022mfD, 100V, 10%
C29	102291-333	1	CAPACITOR, CERAMIC, .0033mfD, 100V, 10%
C28, 20, 27	102291-101	3	CAPACITOR, CERAMIC, .001mfD, 100V, 10%
C13, 14, 17, 46	102291-103	4	CAPACITOR, CERAMIC, .01mfD, 100V, 10%
C1, 2, 4, 5, 6, 7, 8, 9, 15, 16 18, 19, 23, 24, 35, 36, 37, 41, 48 49, 50, 54, 55	102291-105	23	CAPACITOR, CERAMIC, .1mfD, 100V, 10%
C3, 11, 12, 40	101362-004	4	CAPACITOR, TANT, 1mfD, 35V
C26, 30, 52, 53	101362-001	4	CAPACITOR, TANT, 3.3mfD, 15V
C47	101362-010	1	CAPACITOR, TANT, 10mfD, 15V
C25	101362-012	1	CAPACITOR, TANT, 22mfD, 15V
C31, 32, 33, 34, 38, 39, 42, 43 44	105936-227	9	CAPACITOR, ELECT, RADIAL, 220mfD, 50V
R141	101337-101	1	RESISTOR, COMP, 1/4W, 5%, 10 OHM
R120	101337-151	1	RESISTOR, COMP, 1/4W, 5% 15 OHM
R20, 24	101337-471	2	RESISTOR, COMP, 1/4W, 5% 47 OHM
R39, 44, 100, 105, 158, 159	101337-102	6	RESISTOR, COMP, 1/4W, 5% 100 OHM
R75	101337-122	1	RESISTOR, COMP, 1/4W, 5% 120 OHM
R148	101337-182	1	RESISTOR, COMP, 1/4W, 5% 180 OHM
R162	101337-222	1	RESISTOR, COMP, 1/4W, 5% 220 OHM
R19, 23, 93, 151, 152	101337-472	5	RESISTOR, COMP, 1/4W, 5% 470 OHM
R119, 147	101337-622	2	RESISTOR, COMP, 1/4W, 5% 620 OHM
R96	101337-752	1	RESISTOR, COMP, 1/4W, 5% 750 OHM
R1, 7, 32, 35, 40, 41, 45, 50, 64 65, 66, 67, 68, 69, 70, 71, 72, 77 78, 102, 103, 104, 110, 111, 112 113, 114, 115, 116, 117, 123, 139 142, 145, 146, 153, 154, 155, 156 160	101337-103	40	RESISTOR, COMP, 1/4W, 5% 1K OHM

PRINTRONIX

PCBA, MECH. DRIVER

ASSY. NO. 880239

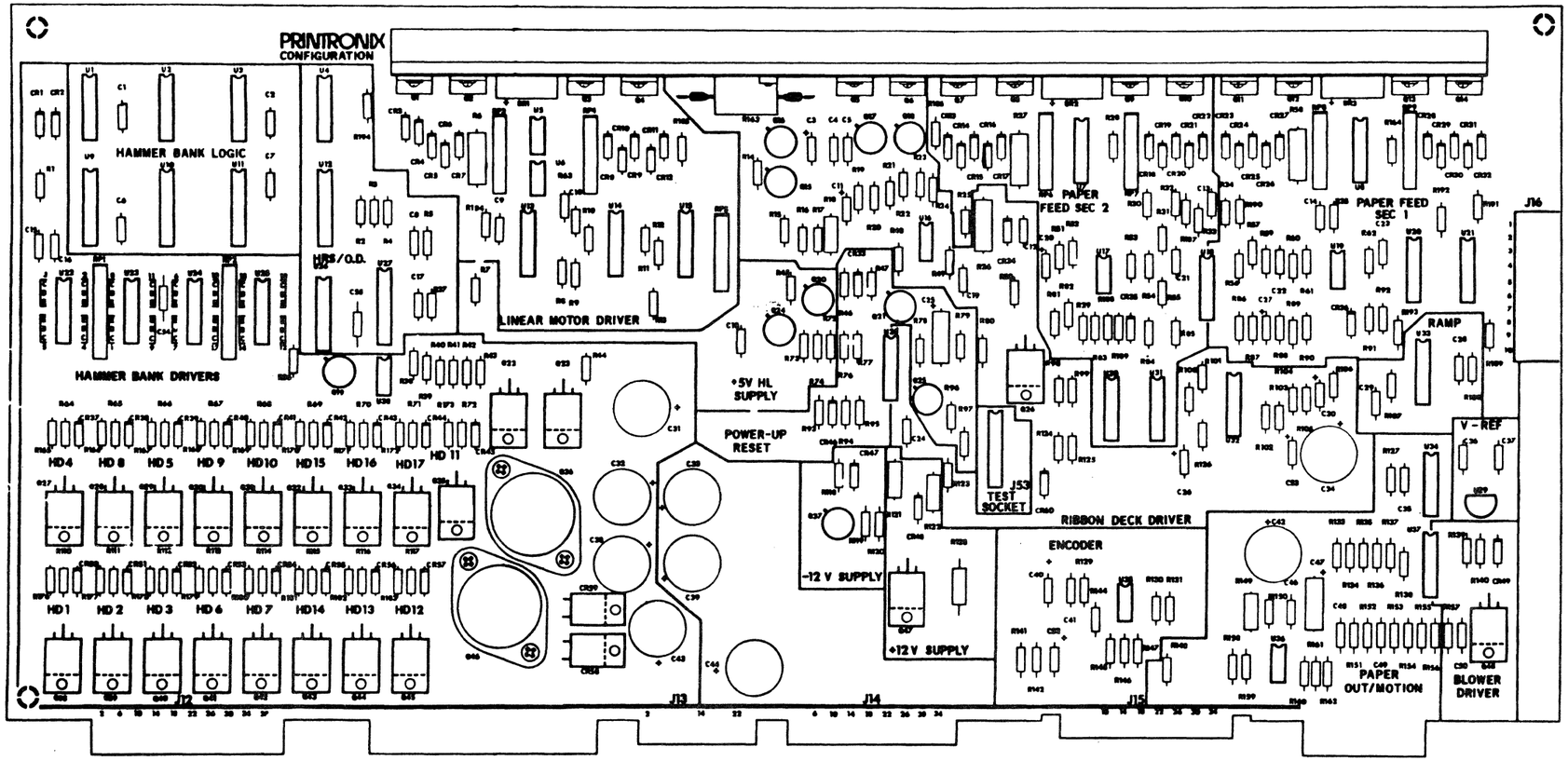
REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
CR5, 9, 15, 20, 26, 30, 37, 38, 39 40, 41, 42, 43, 44, 45, 49, 50, 51 52, 53, 54, 55, 56, 57, 60	101336-001	25	RECTIFIER, 1N4004
CR34	102232-001	1	DIODE, ZENER, 1N4750
CR35, 36	101894-007	2	DIODE, ZENER, 1N5221B
CR47, 48	105797-001	2	DIODE, ZENER, 1N5242B
CR46	105939-001	1	DIODE, ZENER, 1N5228B
CR58, 59	105844-001	2	RECTIFIER, UES1401
U21, 31	101338-001	2	IC, 7400, NAND, 2 INPUT, QUAD
U13, 20, 30	101339-001	3	IC, 7402, NOR, 2 INPUT, QUAD
U15, 32	101341-001	2	IC, 7406, BUFFER, O.C., HEX
U34	102302-001	1	IC, 74LS107, FLIP FLOP, DUAL
U12	105793-001	1	IC, 74LS112, FLIP FLOP, DUAL
U27	105794-001	1	IC, 74LS123, ONE SHOT, DUAL
U1, 2, 3	101352-001	3	IC, 74164, SHIFT REG, 8 BIT PAR OUT
U9, 10, 11	101353-001	3	IC, 74174, LATCH, HEX
U26	105795-001	1	IC, 74LS390, COUNTER
U4	103343-001	1	IC, 74LS393, COUNTER
U7, 8, 14, 18, 28, 33, 37	101358-001	7	IC, LM339, COMPARATOR, QUAD
U16, 17, 19, 35	102871-001	4	IC, LM358, OP AMP, DUAL
U36	105796-001	1	IC, NE555, TIMER
U29	101878-001	1	IC, LM78L02, POS VOLTAGE REG.
U5, 6, 38	105847-001	3	IC, SN75462, POS NAND DRIVER
J53	101385-001	1	16 PIN DIP SOCKET
J16	101332-004	1	CONNECTOR, 10 PIN
BR1, 2, 3	105799-001	3	BRIDGE RECTIFIER
	110250-001	1	HEAT SINK
	110468-001	1	INSULATOR, HEAT CONDUCTING
	110249-001	1	STIFFENER, PCB

PRINTRONIX

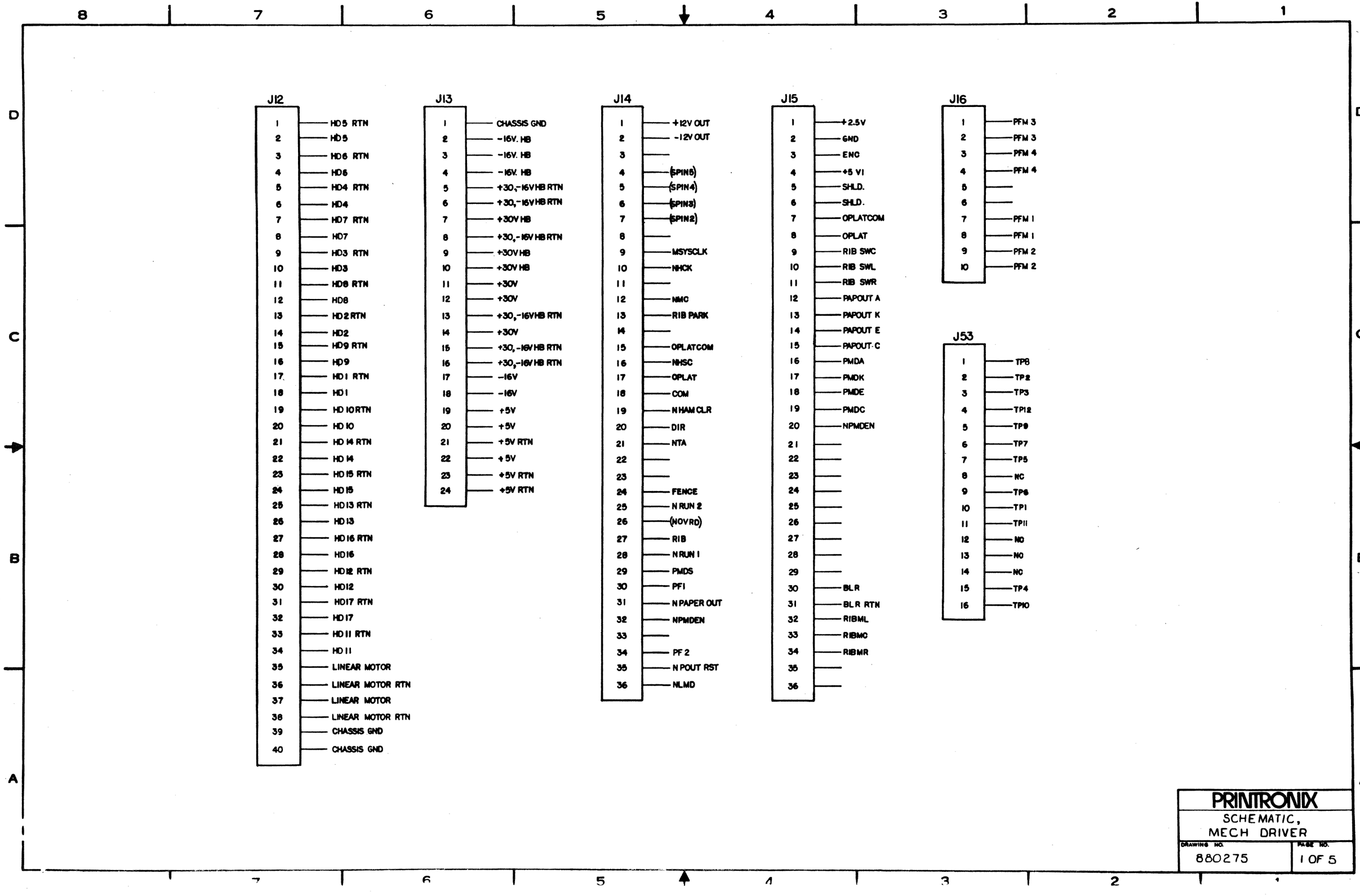
PCBA, MECH. DRIVER

ASSY. NO. 880239

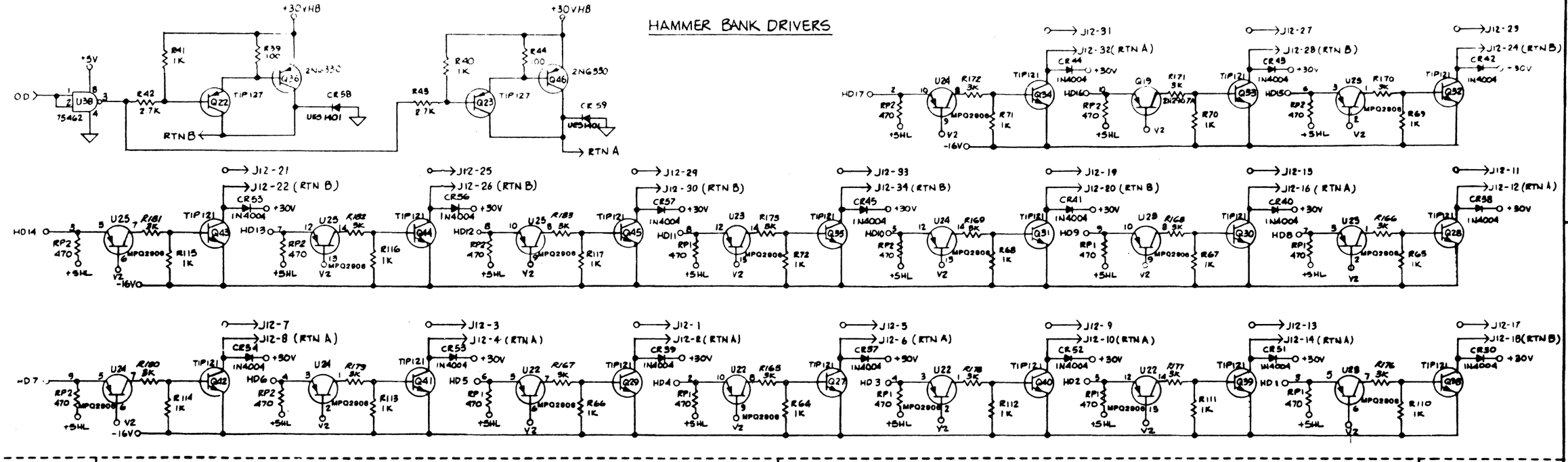
REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
U22, 23, 24, 25	105846-001	4	TRANSISTOR, QUAD, MPQ2906
	106525-001	2	SCREW, PHD PH W/EXT T WSHR
	106524-001	19	SCREW, PHD, PH W/NYL CLR WSHR
	101479-001	A/R	WIRE, STRANDED
R194	SELECT IN TEST	1	RESISTOR
	101513-001	4	SCREW, PAN HEAD, PHILLIPS
	102788-400	4	SCREW, HEX WITH EXT TOOTH LOCK WASHER
R137, 138	101337-106	2	RESISTOR, COMP, 1/4W, 5% 1MEG OHM
R83, 89, 29, 92	101399-253	4	RESISTOR, FILM, 1/4W, 1% 2.49K OHM
R5	101337-823	1	RESISTOR, COMP, 1/4W, 5% 8.2K OHM
R48, 49, 51, 61	101399-104	4	RESISTOR, FILM, 1/4W, 1% 10K OHM

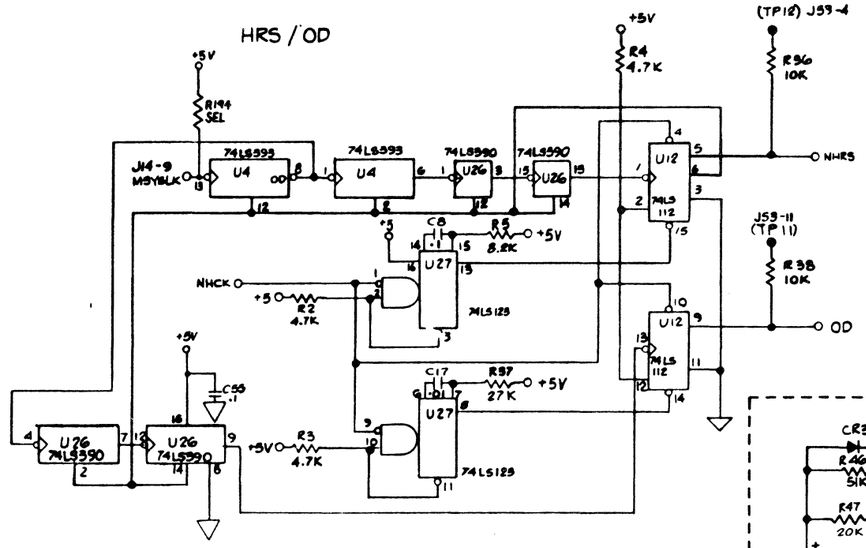


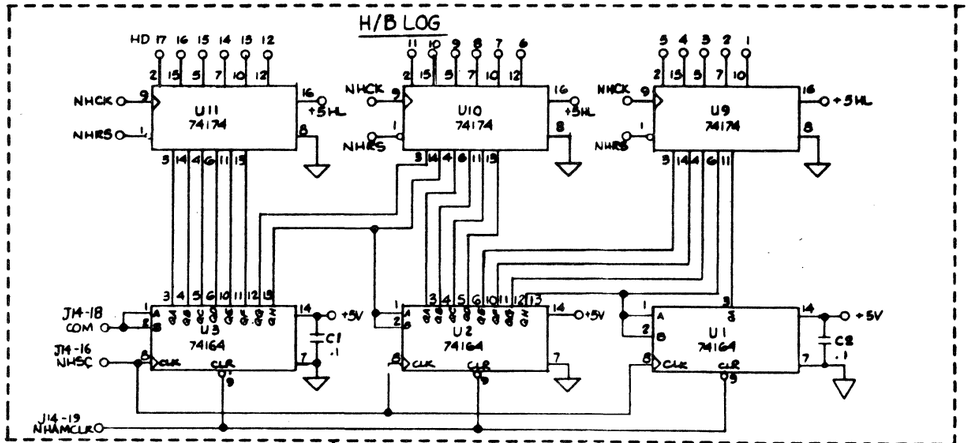
PRINTRONIX	
PCBA, MECH DRIVER	
DRAWING NO. 880239	PAGE NO. 1 OF 6

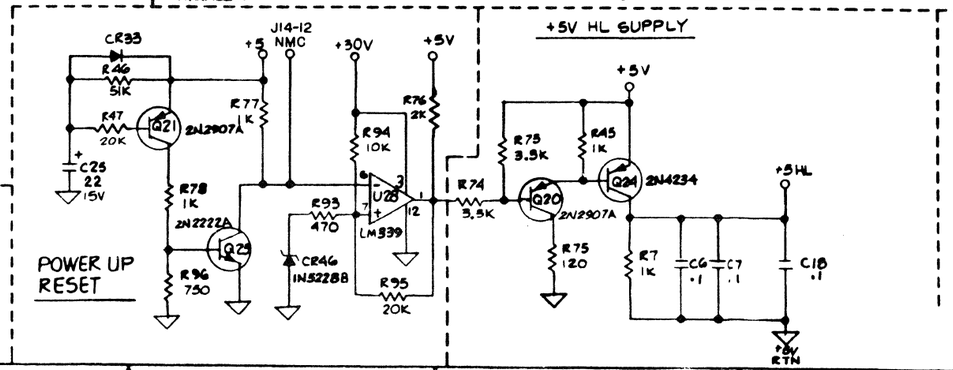

J12
1 HD5 RTN
2 HD5
3 HD6 RTN
4 HD6
5 HD4 RTN
6 HD4
7 HD7 RTN
8 HD7
9 HD3 RTN
10 HD3
11 HD8 RTN
12 HD8
13 HD2 RTN
14 HD2
15 HD9 RTN
16 HD9
17 HD1 RTN
18 HD1
19 HD10RTN
20 HD10
21 HD14 RTN
22 HD14
23 HD15 RTN
24 HD15
25 HD13 RTN
26 HD13
27 HD16 RTN
28 HD16
29 HD12 RTN
30 HD12
31 HD17 RTN
32 HD17
33 HD11 RTN
34 HD11
35 LINEAR MOTOR
36 LINEAR MOTOR RTN
37 LINEAR MOTOR
38 LINEAR MOTOR RTN
39 CHASSIS GND
40 CHASSIS GND
J13
1 CHASSIS GND
2 -16V. HB
3 -16V. HB
4 -16V. HB
5 +30,-16V HB RTN
6 +30,-16V HB RTN
7 +30V HB
8 +30,-16V HB RTN
9 +30V HB
10 +30V HB
11 +30V
12 +30V
13 +30,-16V HB RTN
14 +30V
15 +30,-16V HB RTN
16 +30,-16V HB RTN
17 -16V
18 -16V
19 +5V
20 +5V
21 +5V RTN
22 +5V
23 +5V RTN
24 +5V RTN
J14
1 +12V OUT
2 -12V OUT
3
4 (SPIN1)
5 (SPIN4)
6 (SPIN3)
7 (SPIN2)
8
9 MSYSCLK
10 NHCK
11
12 NMC
13 RIB PARK
14
15 OPLATCOM
16 NHSC
17 OPLAT
18 COM
19 NHAMCLR
20 DIR
21 NTA
22
23
24 FENCE
25 N RUN 2
26 (NOVRD)
27 RIB
28 N RUN 1
29 PMDS
30 PF1
31 N PAPER OUT
32 NPMDEN
33
34 PF 2
35 N POUT RST
36 NLMD
J15
1 +2.5V
2 GND
3 ENC
4 +5 V1
5 SHLD.
6 SHLD.
7 OPLATCOM
8 OPLAT
9 RIB SWC
10 RIB SWL
11 RIB SWR
12 PAPOUT A
13 PAPOUT K
14 PAPOUT E
15 PAPOUT C
16 PMDA
17 PMDK
18 PMDE
19 PMDC
20 NPMDEN
21
22
23
24
25
26
27
28
29
30 BLR
31 BLR RTN
32 RIBML
33 RIBMC
34 RIBMR
35
36
J16
1 PFM 3
2 PFM 3
3 PFM 4
4 PFM 4
5
6
7 PFM 1
8 PFM 1
9 PFM 2
10 PFM 2
J53
1 TP8
2 TP2
3 TP3
4 TP12
5 TP9
6 TP7
7 TP5
8 NC
9 TP6
10 TP1
11 TP11
12 NO
13 NO
14 NC
15 TP4
16 TP10
PRINTRONIX
SCHEMATIC,
MECH DRIVER
DRAWING NO. 880275
PAGE NO. 1 OF 5

HAMMER BANK DRIVERS









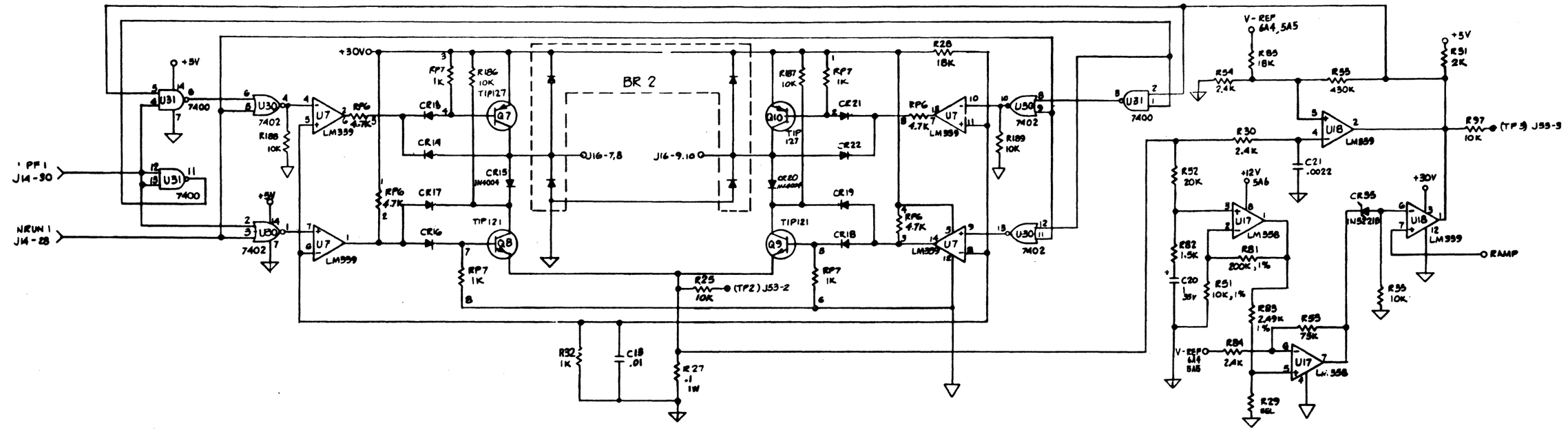
PRINTRONIX

SCHEMATIC, MECH DRIVER

DRAWING NO. 880275

PAGE NO. 2 OF 5

PAPER FEED SEC 2



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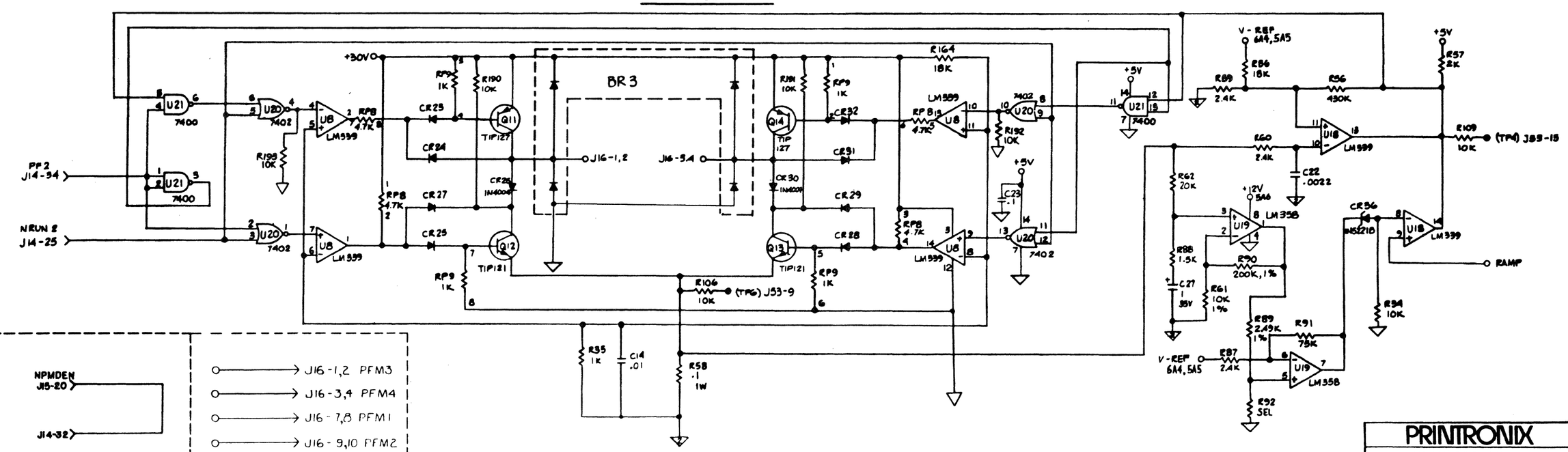

NPMDEN J15-20 → J14-32

- J16-1,2 PFM3
- J16-3,4 PFM4
- J16-7,8 PFM1
- J16-9,10 PFM2

PRINTRONIX

SCHEMATIC, MECH DRIVER

DRAWING NO.	PAGE NO
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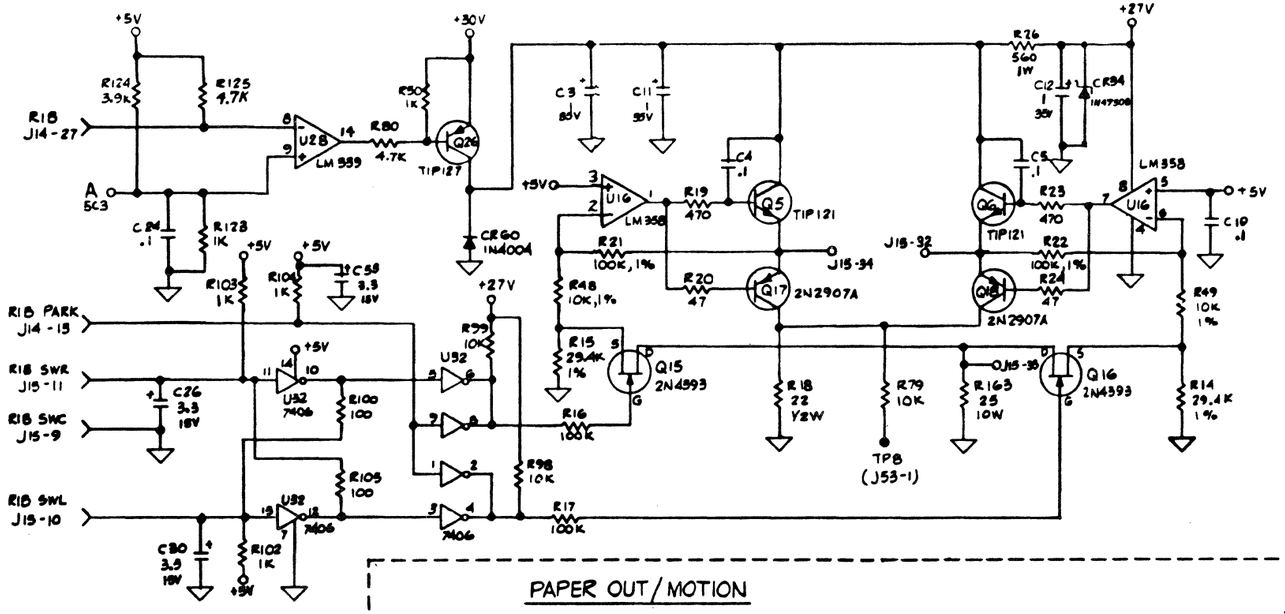
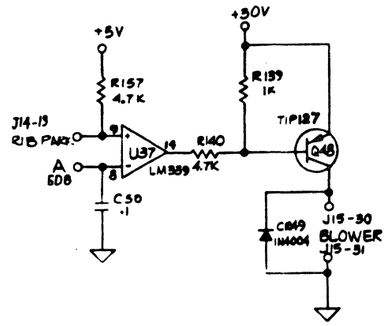
RIB / DECK DRIVER



BLOWER DRIVER



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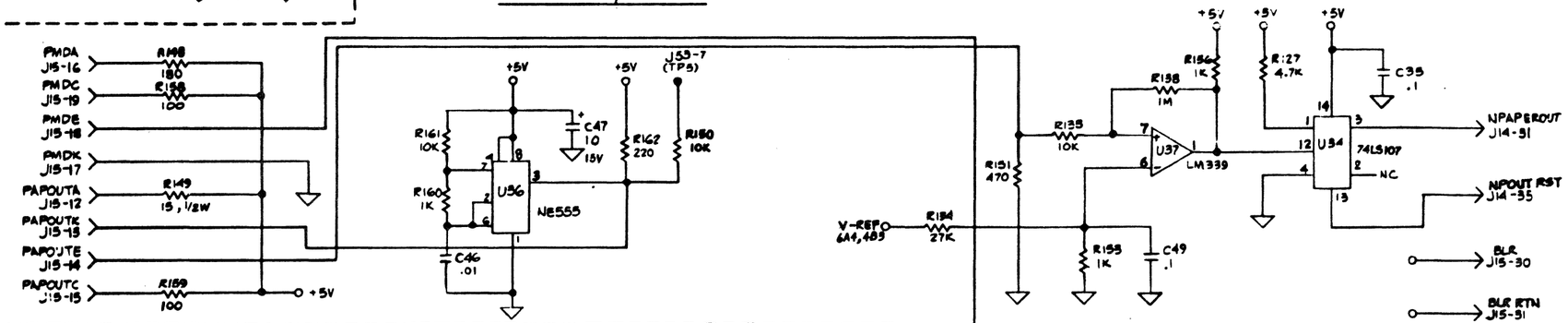

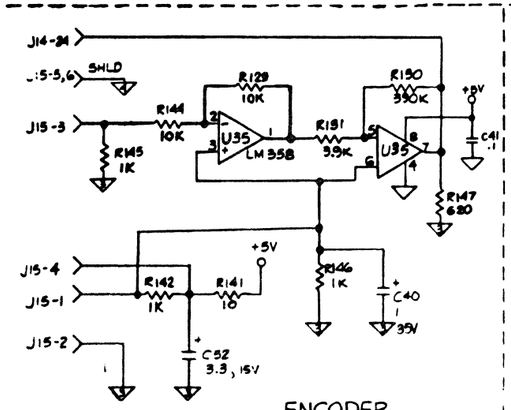

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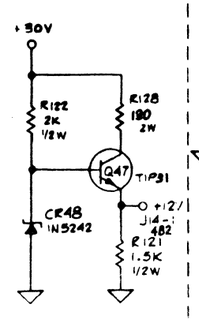
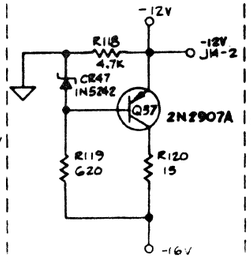
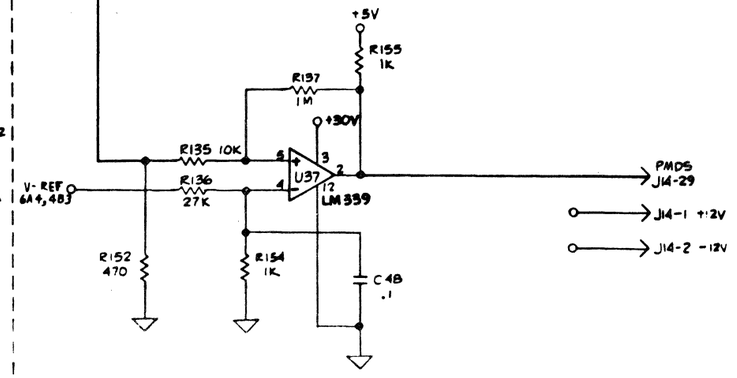


+12V SUPPLY



-12 SUPPLY



PRINTRONIX	
SCHEMATIC, MECH DRIVER	
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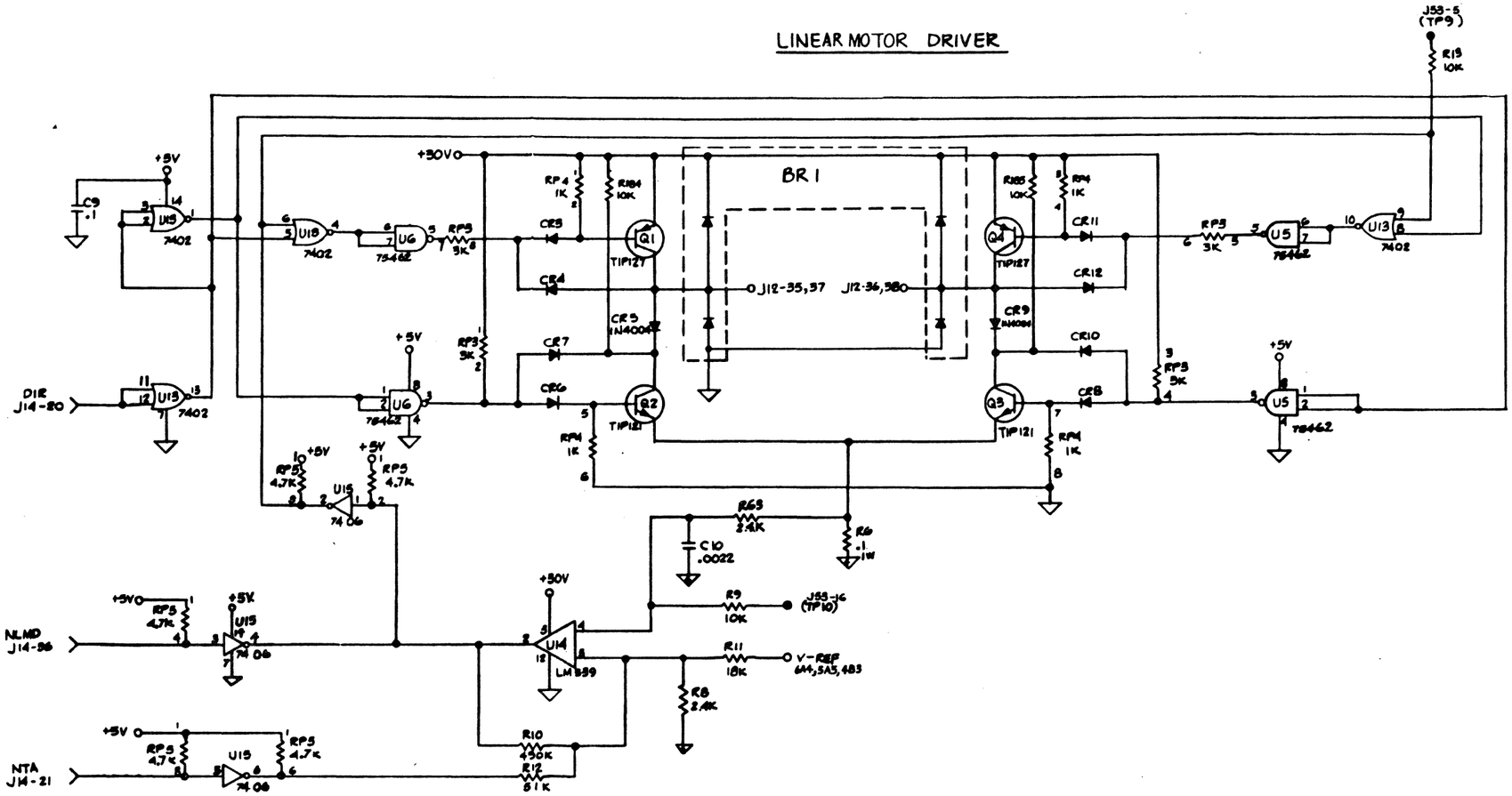
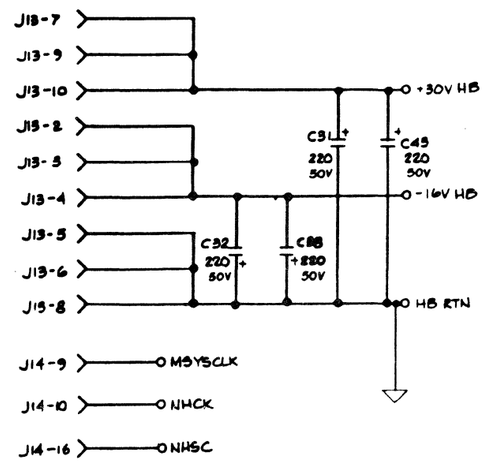
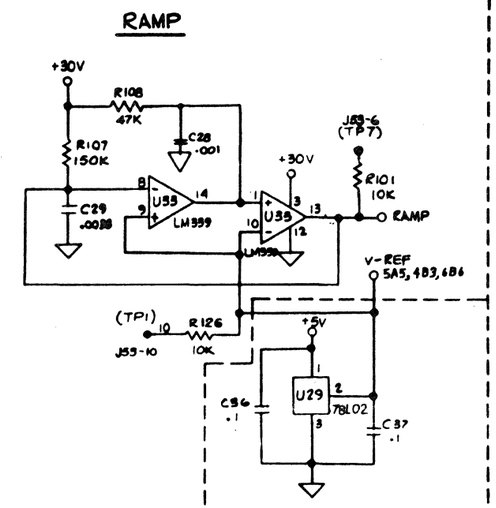
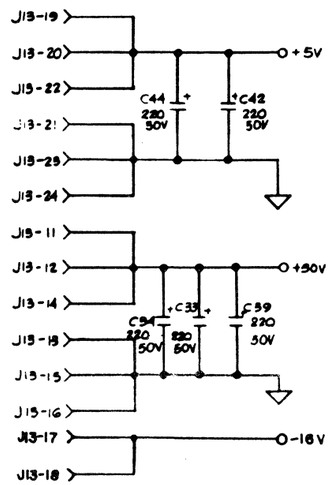
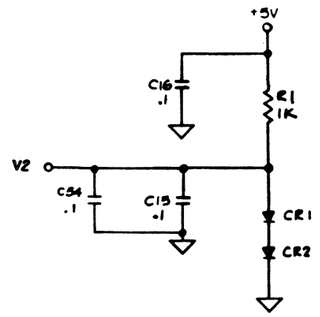
LINEAR MOTOR DRIVER











PRINTRONIX

SCHEMATIC, MECH DRIVER

DRAWING NO.	PAGE NO
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PRINTRONIX

PCBA, PARALLEL CONTROLLER

ASSY. NO. 880270

REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
10D, 10E, 13D, 13E	103342-001	4	IC, 74LS244, BUFFER, OCTAL, TRI STATE
8A, 8D	10574S-001	2	IC, 74LS245, TRANSCEIVER, OCTAL
9D, 9E, 11E, 14E, 15D, 15E	103380-001	6	IC, 74LS273, D FLIP FLOP, OCTAL
11D, 12D, 16D, 17D	105689-001	4	IC, 74LS374, D FLIP FLOP, OCTAL
16C	102294-001	1	IC, 7407 BUFFER, HEX O.C.
2B, 3A	101340-001	2	IC, 7404, HEX INV
1C, 16A	105696-001	2	IC, 9602, RETRIGGERABLE TIMER
Q1, 2, 4	105789-001	3	TRANSISTOR, PNP, 2N2907A
Q3	105702-001	1	TRANSISTOR, NPN, 2N2222A
Y1	101375-005	1	CYRSTAL, 8 MHZ
P4	105840-001	1	CONNECTOR, 40 PIN
	110249-001	2	STIFFENER, PCB
C11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27 28, 29, 30, 31, 32, 33, 34, 35, 36 37, 38, 39, 40	102291-105	30	CAPACITOR, CERAMIC, .1 MFD, 100V
C7, 8, 9, 10, 41, 42, 43, 44, 45 46	101362-010	10	CAPACITOR, TANTALUM, 10 MFD, 15V
C1, 2	102291-560	2	CAPACITOR, CERAMIC, 56PF, 100V
C4, 5	101362-004	2	CAPACITOR, TANT, 1 MFD, 35V
C47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57	102291-332	11	CAPACITOR, CERAMIC, 330 PF, 100V
C3, 6	102291-101	2	CAPACITOR, CERAMIC, .001 MFD, 100V
R1, 4	101337-101	2	RESISTOR, COMP, 1/4 W, 5%, 10 OHM
R20	101337-472	1	RESISTOR, COMP, 1/4 W, 5%, 470 OHM
R3, 6, 17, 18, 19	101337-123	5	RESISTOR, COMP, 1/4 W, 5%, 1.2K OHM
R7, 8	101337-822	2	RESISTOR, COMP, 1/4 W, 5%, 820 OHM
R9, 10, 23	101337-334	3	RESISTOR, COMP, 1/4 W, 5%, 33K OHM
R11, 12, 13, 14, 15, 16, 21, 22	101337-104	8	RESISTOR, COMP, 1/4 W, 5%, 10K OHM
R24, 26, 28, 32, 33	101337-102	5	RESISTOR, COMP, 1/4 W, 5%, 100 OHM
3B, 12E	101381-103	2	RESISTOR NETWORK, 10K DIP 14PIN
15C, 18C	101381-102	2	RESISTOR NEWTWORK, 1.0K DIP 14PIN

PRINTRONIX

PCBA, PARALLEL CONTROLLER

ASSY. NO. 880270

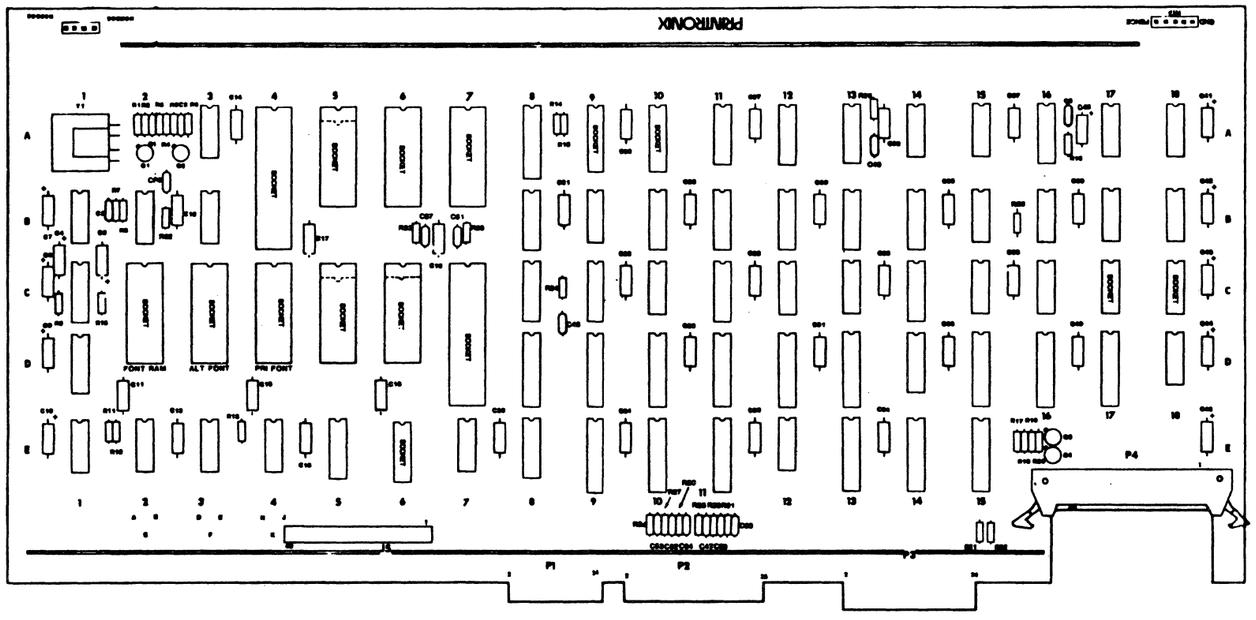
REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
	110552-001	1	PCB, PARALLEL CONTROLLER
	110431-001	REF	SCHEMATIC, PARALLEL CONTROLLER
4A, 7C	105735-001	2	Z80A CPU
6A, 7A	105734-001	2	Z80A CTC
6C	105798-001	1	RAM, 2K x 8, MK4802
9A, 10A	105694-001	2	RAM, 1K x 4, 2114
6E	110559-001	1	CONFIG MEM "P" SERIES DEFAULT
4A, 7C	102253-001	2	SOCKET, 40 PIN
2C, 3C, 4C, 5A, 5C, 6A, 6C, 7A	101334-003	8	SOCKET, 28 PIN
6E, 9A, 10A	105080-001	3	SOCKET, 18 PIN
17C, 18C	101384-001	2	SOCKET, 14 PIN
2E, 13C, 15A	103299-001	3	IC, 74LS00, NAND, 2 IN, QUAD
1D, 9B, 15B	103319-001	3	IC, 74LS02, NOR, 2 IN, QUAD
1C, 14A	103330-001	2	IC, 74LS04, INVERTER, HEX
3E, 11A, 16B	103331-001	3	IC, 74LS08, AND, 2 IN, QUAD
7E	103332-001	1	IC, 74LS10, NAND, 3 IN, TRIPLE
13A, 18B, 18D	103333-001	3	IC, 74LS14, INVERTER, SCHMITT, HEX
4E, 12C	105686-001	2	IC, 74LS32, OR, 2 IN QUAD
1B, 17A	103932-001	2	IC, 74LS74, D FLIP FLOP DUAL
17B, 18A	103336-001	2	IC, 74LS86, EXOR, 2 IN, QUAD
8B	105747-001	1	IC, 74LS109, JK FLIP FLOP, DUAL
10B, 12B, 13B, 14B	103378-001	4	IC, 74LS138, DECODER 3 TO 8
5E, 11B	105692-001	2	IC, 74LS139, DECODER, 2 TO 4, DUAL
8E	102301-001	1	IC, 74LS151, SELECTOR, 1 OF 8
11C, 14C	103338-001	2	IC, 74LS161, COUNTER, 4 BIT, SYNC
8C, 9C	105687-001	2	IC, 74LS163, COUNTER, 4 BIT, SYNC
10C	105688-001	1	IC, 74LS164, SHIFT REG, 8 BIT, PAR OUT
14D	105690-001	1	IC, 74LS165, SHIFT REG, 8 BIT, PAR IN

PRINTRONIX

PCBA, PARALLEL CONTROLLER

ASSY. NO. 880270

REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
R2, 5	101337-222	2	RESISTOR COMP, 1/4 W, 5%, 220 OHM
12A	106526-001	1	IC, 74LS175, QUAD D FLIP FLOP
R25, 27, 29, 30, 31, 34	101337-471	6	RESISTOR COMP, 1/4 W, 5%, 47 OHM
	103411-002	1	CONNECTOR, STRIP - MALE, 4 PIN
	103411-003	1	CONNECTOR, STRIP - MALE, 5 PIN
Q1, 2, 3, 4	102956-002	4	INSULATOR, TRANSISTOR
R35, 36, 37	101337-562	3	RESISTOR COMP, 1/4 W, 5%, 560 OHM
17DA	103385-001	1	SIP RESISTOR, 2%, 10K, 9 PER
	101617-001	A/R	WIRE, SOLID, 30 AWG, BLUE



PRINTRONIX	
PCBA, PARALLEL CONTROLLER	
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SPARE CIRCUITS

TYPE	LOCATION	OUTPUT PIN
74LS02	1D	13
74LS02	9B	10
74LS04	1E	4
74LS04	1E	6
74LS08	11A	8
74LS10	7E	12
74LS14	13A	8
74LS14	13A	10
74LS14	13A	12
74LS32	12C	8
74LS86	18A	6
74LS86	18A	8
74LS85	18A	11
7404	5A	2
7404	3A	12
10KDIP	12E	1,2,4,5,12
10KDIP	9B	13
1KDIP	15C	3,4,5,6,7
1KDIP	18C	1,2,13
10KSIP	17DA	8

LOAD [illegible]

TYPE	[illegible]	+5V PIN
74LS00	7	14
74LS02	7	14
74LS04	7	14
74LS08	7	14
74LS10	7	14
74LS14	7	14
74LS74	7	14
74LS86	7	14
74LS32	7	14
74LS109	8	16
74LS138	8	16
74LS151	8	16
74LS139	8	16
74LS161	8	16
74LS163	8	16
74LS164	7	14
74LS165	8	16
74LS175	8	16
74LS244	10	20
74LS245	10	20
74LS273	10	20
74LS374	10	20
7404	7	14
7407	7	14
2114	9	18
2764	14	28
9602	8	16
X2210	8	18
MK4802	12(14)	24(28)
Z80 CPU	29	11
Z80 CTC	5	24

CONNECTORS

P1	
P2	
P3	
P4	
J5	

PRINTRONIX

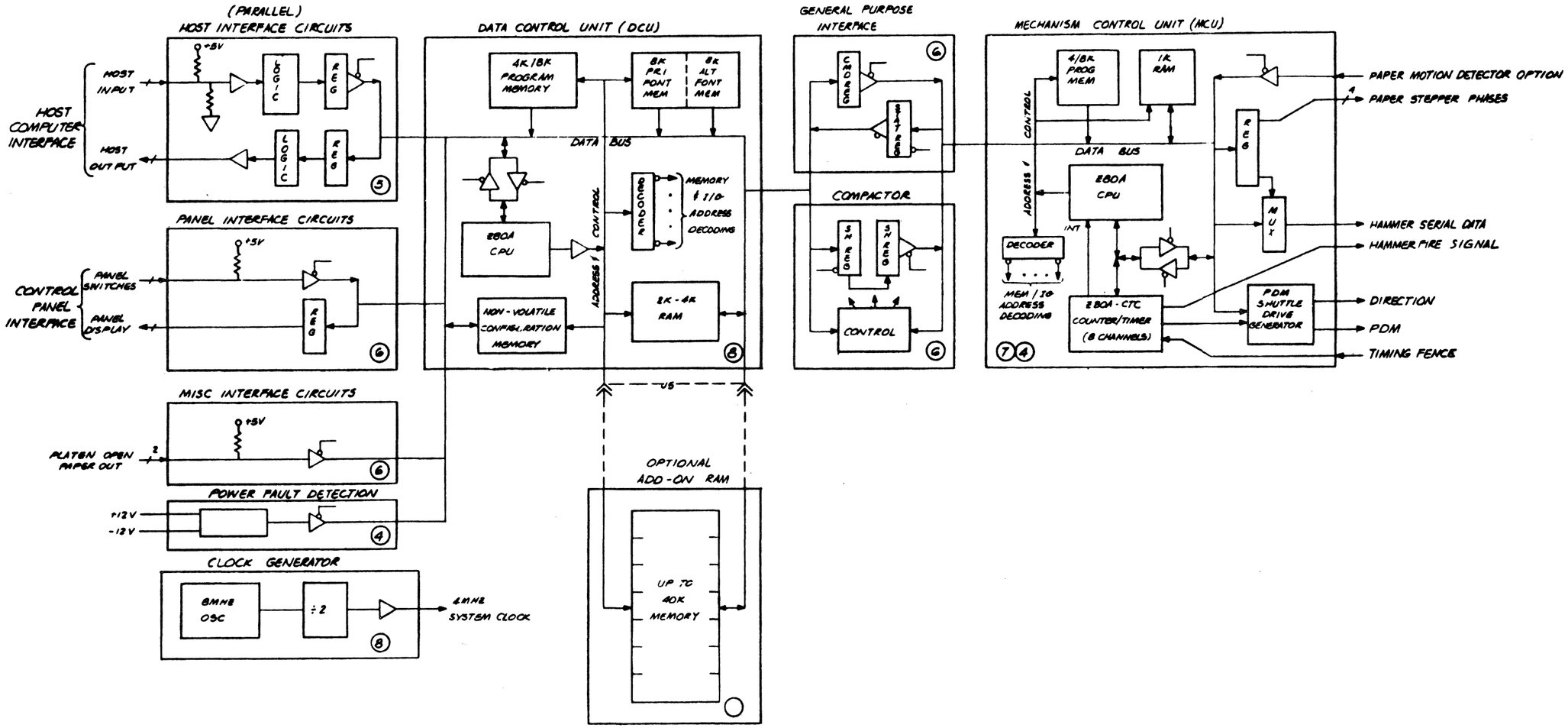
SCHEMATIC

PARALLEL CONTROLLER

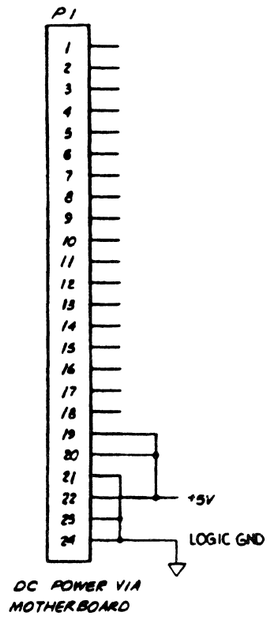
DRAWING NO. 880431

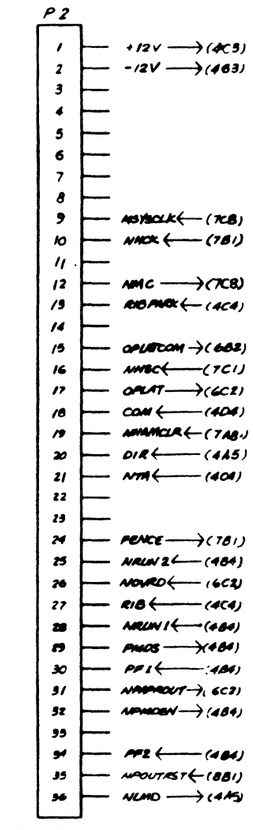
PAGE NO. 1 of 8

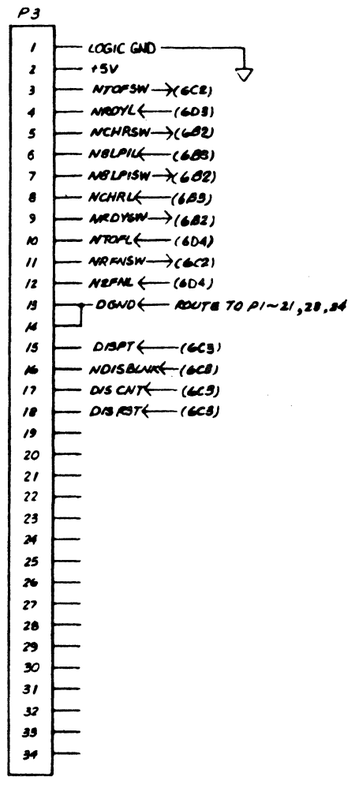
BLOCK DIAGRAM OF MVP CONTROLLER

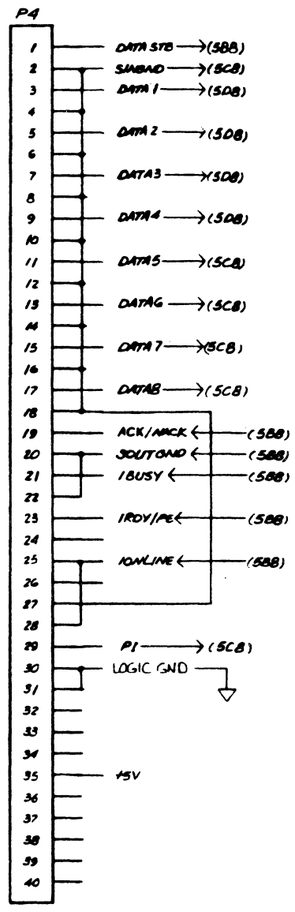


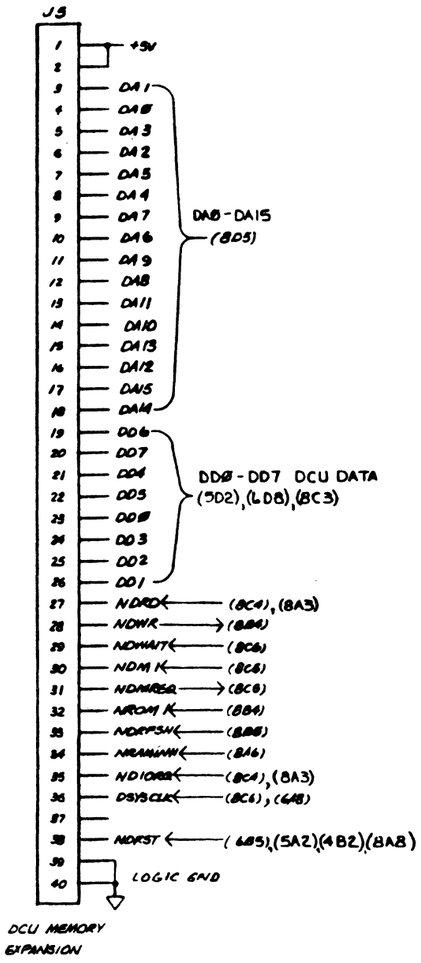
PRINTRONIX	
SCHEMATIC, PARALLEL CONTROLLER	
DRAWING NO. 880431	PAGE NO. 2 OF 8

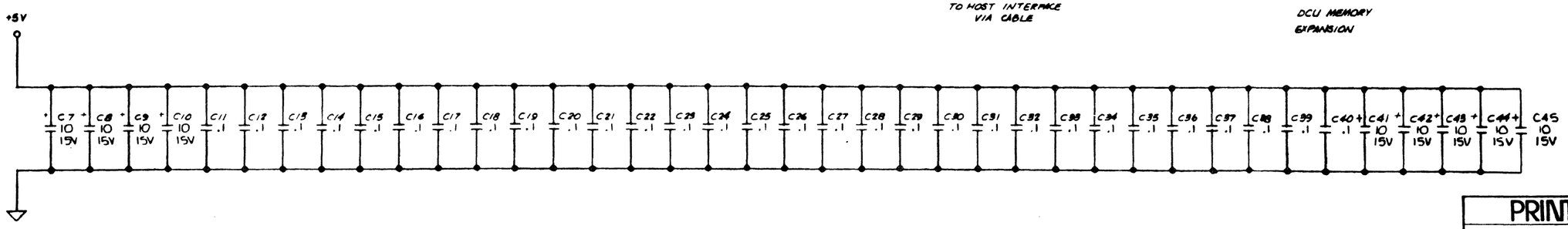












PRINTRONIX

SCHEMATIC, PARALLEL CONTROLLER

DRAWING NO. 880431

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HAMMER SERIAL DATA MUX

MD7 MD6 MD5 MD4 MD3 MD2 MD1 MD0 → 8E 74LS151 → COM (3C6)

OUTPUT PORT REGISTERS

MD7 MD6 MD5 MD4 MD3 MD2 MD1 MD0 → 9E 74LS273
- BIT4 → RNB (3B6)
- BIT3 → ATTN (6B8)
- BIT2 → CMDACK (6B2)
- BIT1 → RIBMRK (3C6)
- NTA
- R31 47 → C55 330PF → NTA (3C6)

(7B6) NWRREG 2 → 11E 74LS273
- MD7 MD6 MD5 MD4 MD3 MD2 MD1 MD0
- WIDTH3 WIDTH2 WIDTH1 WIDTH0 ← (6A5)
- NRUN2 → (3B6)
- PP2 → (3B6)
- NRUN1 → (3B6)
- PP1 → (3B6)

12A 74LS175 → STEP (7B4); NC

NWRREG 1 (7B6)

INPUT PORT

MD7 MD6 MD5 MD4 MD3 MD2 MD1 MD0 → 10E 74LS244
- 12K 10K → +5V
- NPMDEN (3B6)
- PMOS (3B6)
- NFENCE (7B2)
- SPIN 4 (3D6)
- SPIN 3 (3D6)
- SPIN 2 (3D6)
- CMDAV (6C3)
- NDAV (6A5)

NWRDMISC (7A6)

(7D8) MD0-MD7 MCD DATA BUS (6D7)

POM SHUTTLE DRIVE GENERATOR

MD0 MD1 MD2 MD3 MD4 MD5 MD6 MD7 → 9D 74LS273 → CLR

(7B6) NWRSTLMTR

+5V R15 10K

(7B4) 32µSPULSE → 8B 74LS109 (CLK, R, P, Q)

(7C8) MSYS CLK

8C 74LS163 (LD, P, CLR, RCO) → 9C 74LS163 (LD, CLR, QD)

(6A8), (6B8), (4A2), (7A5) NWRST

R24 100 → C48 330 PF

R25 47 → C47 330 PF → D/R (3C6)

14A 74LS04 → NLMD (3B6)

POWER FAULT DETECTOR

+12V (3D6) → R22 10K → Q3 2N2222A ← R18 1.2K ← +5V; Q3 → PVF (6B2); Q3 → R19 1.2K

+5V → R17 1.2K → Q4 2N1907A → R21 10K → -12V (3D6); Q4 → R20 470 → NMVF (6B2)

WATCH DOG TIMERS

+5V → R9 33K; C4 1µ 35V TOMS → 1C ½ 9602

NDRUN (8B1) → 1C; 1C → NC

1C → 10 74LS02 → NDRST (3B2), (6B5), (5A2), (8A8)

NODOOG → LOGIC GND → NOMDOG

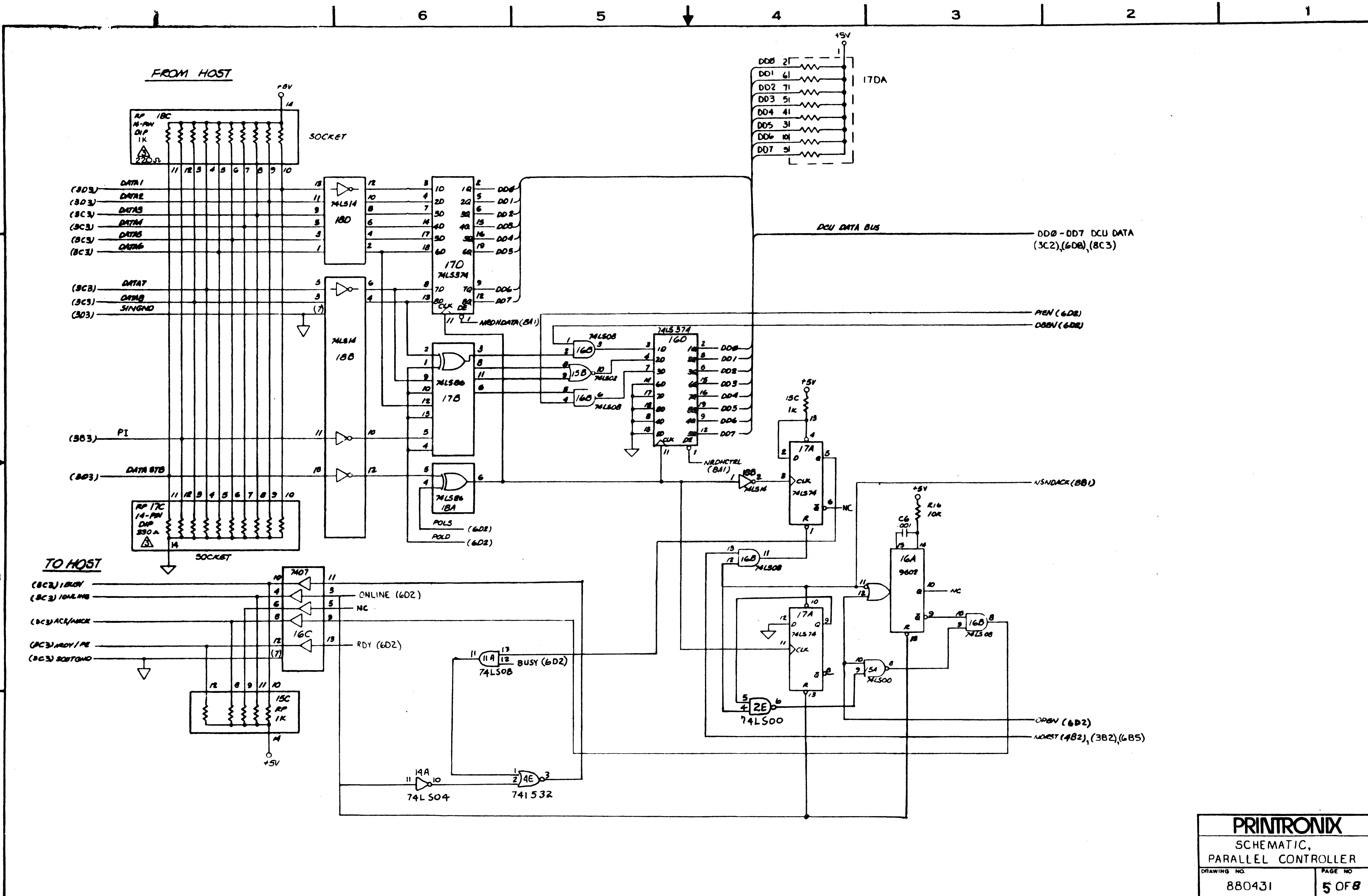
+5V → R10 33K; C8 1µ 35V TOMS → 1C ½ 9602 (CLR)

NMRUN (7B8) → 1C; 1C → NC

1C → 10 74LS02 → NMRST (7A5), (4B8), (6A8), (6B2)

1C → 9A 7404

(8B0) (7B7) NMC



PRINTRONIX

SCHEMATIC, PARALLEL CONTROLLER

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DD0 - DD7 DCU DATA

(3C2)
(5D2)
(8C3)

MD0 - MD7 DATA BUS

(4C8) (7D2)

74LS374 12D

(8B1) NDWRSPIF

NMRDGPIF (7A8)

74LS374 11D

(8A1) NDORDPIF

NMWRSPIF (7A8)

(8B1) NDCNDRCLR

+5V R14 10K

74LS109 8B

(8B1) NDWR COMP DATA

74LS168 14D

+5V 15C 1K

74LS04 14A

74LS164 10C

74LS244 10D

MD7 MD6 MD5 MD4 MD3 MD2 MD1 MD0

NRDCOMP (7A8)

74LS00 15A

NORST (4B2) (5A2) (3B2)

DBL DOT (4B4)

74LS02 15B

(8B1) NDMPPAD

74LS161 14C

74LS00 13C

NBUFFULL (7B8)

NCOMPCLR (7B6)

74LS161 11C

WIDTH 0 WIDTH 1 WIDTH 2 WIDTH 3 (4C4)

(8B1) NCOMPWIDTH

74LS00 13C

74LS32 12C

74LS04 14A

(8C6) DSYSCLK (3B2)

R36 100

330PF C49

(4A2) NMRST (6A8) (6B2) (4B8)

NDAY (4A4)

PANEL INTERFACE CIRCUITS

74LS273 14E

DD7 DD6 DD5 DD4 DD3 DD2 DD1 DD0

NMRPAN 1 (8B1)

NEARRECALL (8A8)
RESTORE (8A8)
NC
N2PNL (3C5)
NRDYL (3D5)
NTOPL (3C5)
NBLPL (3D5)
NCHPL (3C5)

74LS273 15E

NMRPAN 2 (8B1)

PLLEFTPR (4B4)
PLRIGHTPR (4B4)
CMDAV (4A4)
DISPT (3C5)
NDISBLANK (3C5)
DISCNT (3C5)
DISRST (3C5)

HOST INTERFACE CIRCUITY

74LS273 15D

NMRCTRL (8B2)

FOLD (5B6)
POLS (5B6)
PIBN (5C2)
DBBN (5C2)
ONLINE (5B6)
PRPPOUT (5B6)
BUSY (5B6)
RDY (5B6)

74LS244 15E

NRDAAN (8A1)

+5V 12E

OPLIT (3C6)
NPAPROUT (3B6)
NDVRD (3B6)
NRPAEN (3C5)
NRDYSW (3C5)
NTOPSW (3D5)
NBLPSW (3D5)
NCHRSW (3D5)
OPLATCOM (3C6)

74LS241 13D

NORDMISC (8A1)

ATTN (4C4)
CMDACK (4C4)
NMRST (4A8) (6A8) (6B2) (4B8) (7A5)
PVF (4C8)
NNVF (4B2)

MISC INTERFACE CIRCUITS

PRINTRONIX

SCHEMATIC,
PARALLEL CONTROLLER

DRAWING NO. 880431

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CLOCK DRIVER

CPU & DATA BUFFER

MD0-MD7 DATABUS (4C8) (6D7)

PROGRAM MEMORY

RAM MEMORY

HAMMER CLOCK SELECT

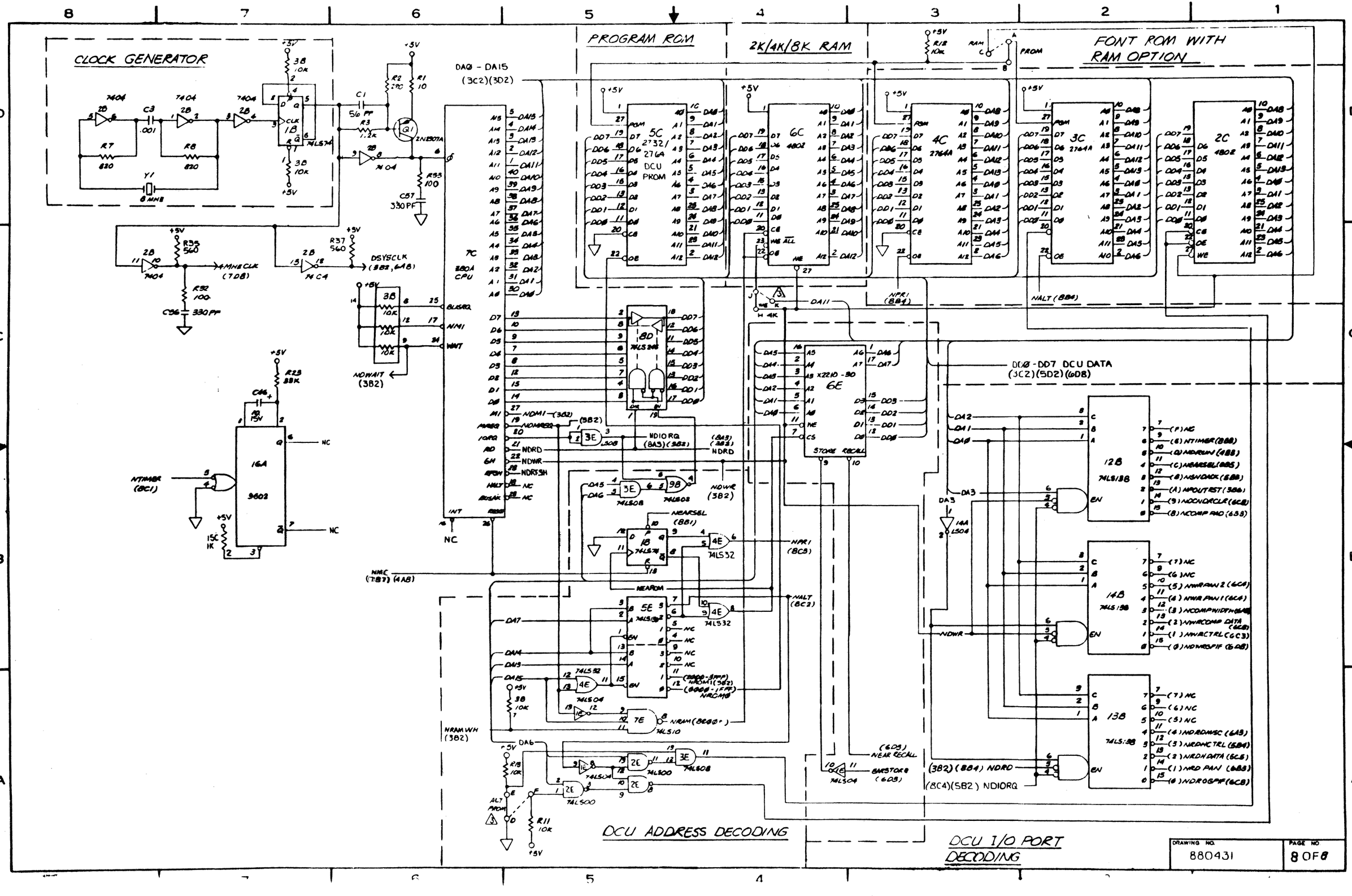
I/O ADDRESS DECODE

MEMORY SELECT DECODE

COUNTER/TIMER CHIPS

FENCE

PRINTRONIX	
SCHEMATIC, PARALLEL CONTROLLER	
DRAWING NO. 880431	PAGE NO 7 OF 8


CLOCK GENERATOR
PROGRAM ROM
2K/4K/8K RAM
FONT ROM WITH RAM OPTION
5C 2732/2764 DCU PROM
6C 4802
4C 2764A
3C 2764A
2C 4802
DA0 - DA15 (3C2)(3D2)
DD0 - DD7 DCU DATA (3C2)(5D2)(6D8)
Z80A CPU
DCU ADDRESS DECODING
DCU I/O PORT DECODING
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PRINTRONIX

PCBA, PARALLEL CONTROLLER

ASSY. NO. 110668

REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
	110642-001	1	PCB, PARALLEL CONTROLLER
	110669-000	REF	SCHEMATIC, PARALLEL CONTROLLER
4A, 7C	106648-001	2	I.C., Z80B CPU
6A, 7A, 4E	106765-001	3	I.C., Z80B CTC
6C	105798-001	1	I.C., RAM, 2K x 8, MK4802
9A, 10A	105694-001	2	I.C., RAM, 1K x 4, 2114
6E	110559-001	1	PROM, CONFIG MEM "P" SERIES DEFAULT
(4A, 7C)	102253-001	2	SOCKET, 40 PIN
(2C, 3C, 4C, 5A, 5C, 6A, 6C, 7A)	101384-003	8	SOCKET, 28 PIN
(6E, 9A, 10A)	105080-001	3	SOCKET, 18 PIN
(17C, 18C)	101384-001	2	SOCKET, 14 PIN
2EA, 13C, 15A	103299-001	3	IC, 74LS00, NAND, 2 IN. QUAD
1D, 9B, 15B	103319-001	3	IC, 74LS02, NOR, 2 IN. QUAD
1E, 14A	103330-001	2	IC, 74LS04, INVERTER, HEX
2EB, 11A, 16B	103331-001	3	IC, 74LS08, AND, 2 IN, QUAD
7E	103332-001	1	IC, 74LS10, NAND, 3 IN, TRIPLE
13A, 18B, 18D	103333-001	3	IC, 74LS14, INVERTER, SCHMITT, HEX
3E, 12C	105686-001	2	IC, 74LS32, OR, 2 IN QUAD
1B, 17A	103932-001	2	IC, 74LS74, D FLIP FLOP DUAL
17B, 18A	103336-001	2	IC, 74LS86, EXOR, 2 IN, QUAD
8B	105747-001	1	IC, 74LS108, JK FLIP FLOP, DUAL
10B, 12B, 13B, 14B	103378-001	4	IC, 74LS138, DECODER 3 TO 8
5E, 11B	105692-001	2	IC, 74LS139, DECODER 2 TO 4, DUAL
8E	102301-001	1	IC, 74LS151, SELECTOR, 1 OF 8
11C, 14C	103338-001	2	IC, 74LS161, COUNTER, 4 BIT, SYNC
8C, 9C	105687-001	2	IC, 74LS163, COUNTER, 4 BIT, SYNC
10C	105688-001	1	IC, 74LS164, SHIFT REG, 8 BIT, PAR OUT
14D	105690-001	1	IC, 74LS165, SHIFT REG, 8 BIT, PAR IN
10D, 10E, 13D, 13E	103342-001	4	IC, 74LS244, BUFFER, OCTAL, TRI STATE
8A, 8D	105748-001	2	IC, 74LS245, TRANSCEIVER, OCTAL
9D, 9E, 11E, 14E, 15D, 15E	103380-001	6	IC, 74LS273, D FLIP FLOP, OCTAL

PRINTRONIX

PCBA, PARALLEL CONTROLLER

ASSY. NO. 110668

REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
11D, 12D, 16D, 17D	105689-001	4	IC, 74LS374, D FLIP FLOP, OCTAL
16C	102294-001	1	IC, 7407 BUFFER, HEX O.C.
2B, 3A	101340-001	2	IC, 7404, HEX INV
1C, 16A	105696-001	2	IC, 9602, RETRIGGERABLE TIMER
Q1, 2, 4	105789-001	3	TRANSISTOR, PNP 2N2907A
Q3	105702-001	1	TRANSISTOR, NPN 2N2222A
Y1	101375-005	1	CRYSTAL, 8MHZ
P4	105840-001	1	CONNECTOR, 40 PIN
	110249-001	2	STIFFENER, PCB
C11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	102291-105	30	CAPACITOR, CERAMIC, .1MFD, 100V
C7, 8, 9, 10, 41, 42, 43, 44, 45 46	101362-010	10	CAPACITOR, TANTALUM, 10MFD, 15V
C2	102291-560	1	CAPACITOR, CERAMIC, 56PF, 100V
C4, 5	101362-004	2	CAPACITOR, TANT, 1MFD, 35V
C47, 48, 49, 50, 52, 53, 54, 55, 56	102291-332	9	CAPACITOR, CERAMIC, 330PF, 100V
C3, 6	102291-101	2	CAPACITOR, CERAMIC, .001MFD, 100V
R1, 4	101337-101	2	RESISTOR, COMP, 1/4W, 5%, 10 OHM
R20	101337-472	1	RESISTOR, COMP, 1/4W, 5%, 470 OHM
R3, 6, 17, 18, 19	101337-123	5	RESISTOR, COMP, 1/4W, 5%, 1.2K OHM
R7, 8	101337-822	2	RESISTOR, COMP, 1/4W, 5%, 820 OHM
R9, 10, 23	101337-334	3	RESISTOR, COMP, 1/4W, 5% 33K OHM
R11, 12, 13, 14, 15, 16, 21, 22, 38, 39, 40	101337-104	11	RESISTOR, COMP, 1/4W, 5%, 10K OHM
R24, 26, 32	101337-102	3	RESISTOR, COMP, 1/4W, 5%, 100 OHM
3B, 12E	101381-103	2	RESISTOR NETWORK, 10K DIP 14 PIN
15C, 18C	101381-102	2	RESISTOR NETWORK, 1.0K DIP 14 PIN
R2, 5	101337-222	2	RESISTOR, COMP, 1/4W, 5% 220 OHM

PRINTRONIX

PCBA, PARALLEL CONTROLLER

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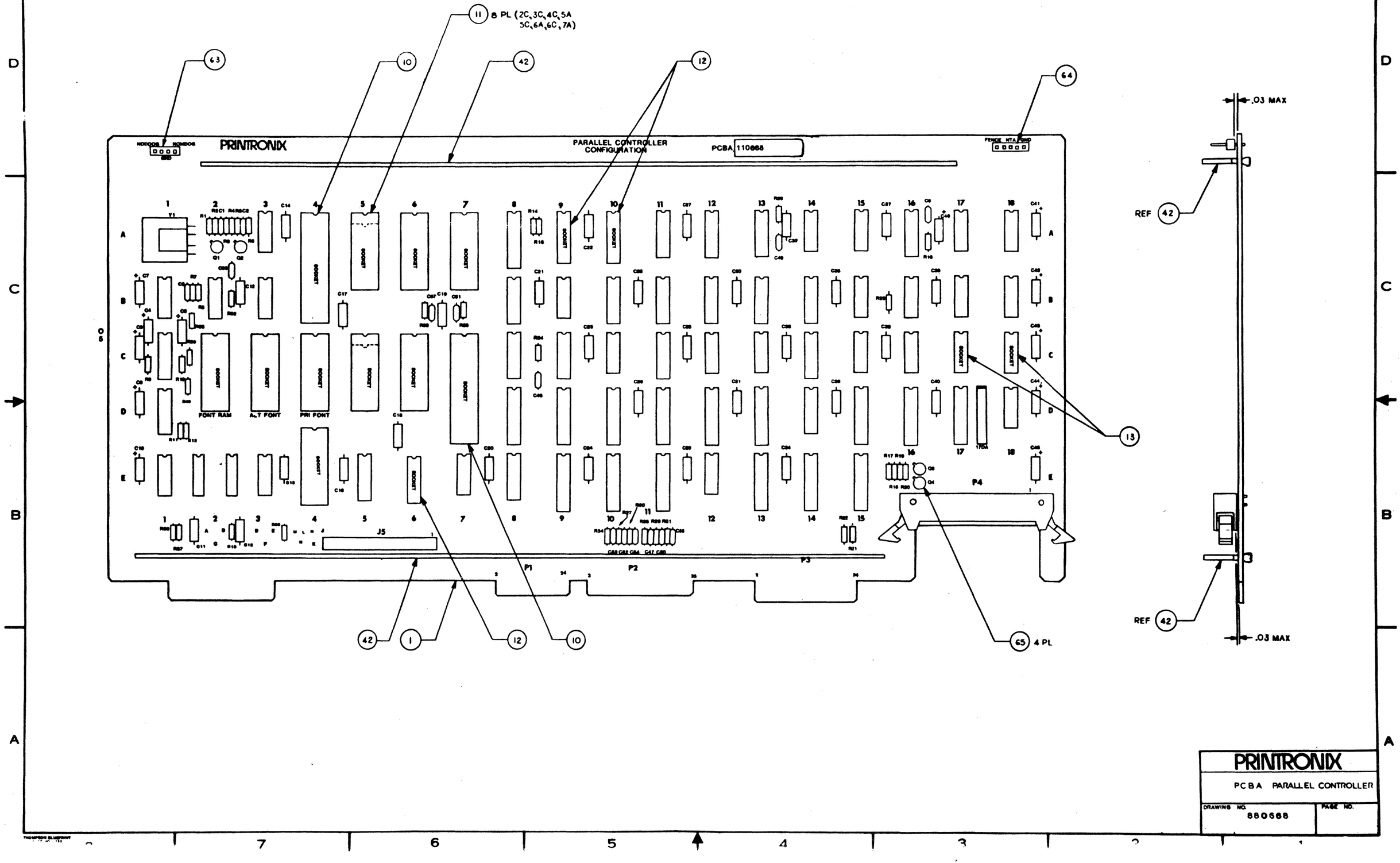
REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
12A	106526-001	1	IC, 74LS175, QUAD D FLIP FLOP
R25, 27, 29, 30, 31, 34	101337-471	6	RESISTOR, COMP, 1/4W, 5% 47 OHM
	103411-002	1	CONNECTOR, STRIP - MALE, 4 PIN
	103411-003	1	CONNECTOR, STRIP - MALE, 5 PIN
(Q1, 2, 3, 4)	102956-002	4	INSULATOR, TRANSISTOR
R35, 36, 37	101337-562	3	RESISTOR, COMP, 1/4W, 5%, 560 OHM
17DA	103385-002	1	SIP RESISTOR, 2%, 10K, 9 PER
R28, 33	101337-182	2	RESISTOR, COMP, 1/4W, 5%, 180 OHM
C51, 57	102291-222	2	CAPACITOR, CERAMIC, 220pf, 100V
C1	102291-820	1	CAPACITOR, CERAMIC, 82pf, 100V


11 8 PL (2C, 3C, 4C, 5A 5C, 6A, 6C, 7A)
63
10
42
12
64
PRINTRONIX
PARALLEL CONTROLLER CONFIGURATION
PCBA 110668
.03 MAX
REF 42
13
42
1
12
10
65 4 PL
P1
P2
P3
P4
J5
FONT RAM
ALT FONT
PRI FONT
SOCKET
REF 42
.03 MAX
PRINTRONIX
PCBA PARALLEL CONTROLLER
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I.C. GND AND VOLTAGE INFO.

TYPE	GND PIN	+5V PIN
74LS00	7	14
74LS02	7	14
74LS04	7	14
74LS08	7	14
74LS10	7	14
74LS14	7	14
74LS74	7	14
74LS86	7	14
74LS32	7	14
74LS109	8	16
74LS138	8	16
74LS151	8	16
74LS139	8	16
74LS161	8	16
74LS163	8	16
74LS164	7	14
74LS165	8	16
74LS175	8	16
74LS244	10	20
74LS245	10	20
74LS273	10	20
74LS374	10	20
7404	7	14
7407	7	14
2114	9	18
2764	14	26
9602	8	16
X2210	8	18
MK4802	12(14)	24(28)
Z80BCPU	29	11
Z80BCTC	5	24

SPARE CIRCUITS

TYPE	LOCATION	OUTPUT PIN
74LS02	1D	13
74LS02	9B	10
74LS04	1E	4
74LS04	1E	6
74LS08	11A	8
74LS10	7E	12
74LS14	13A	6
74LS14	13A	10
74LS14	13A	12
74LS32	12C	6
74LS86	18A	3
74LS86	18A	8
74LS86	18A	11
7404	3A	2
7404	3A	12
10KDIP	12E	1,2,4,5,12
10KDIP	3B	13
1KDIP	15C	3,4,5,6,7
1KDIP	18C	1,2,13
10KSIP	17DA	8

PRINTRONIX

SCHEMATIC

PARALLEL CONTROLLER

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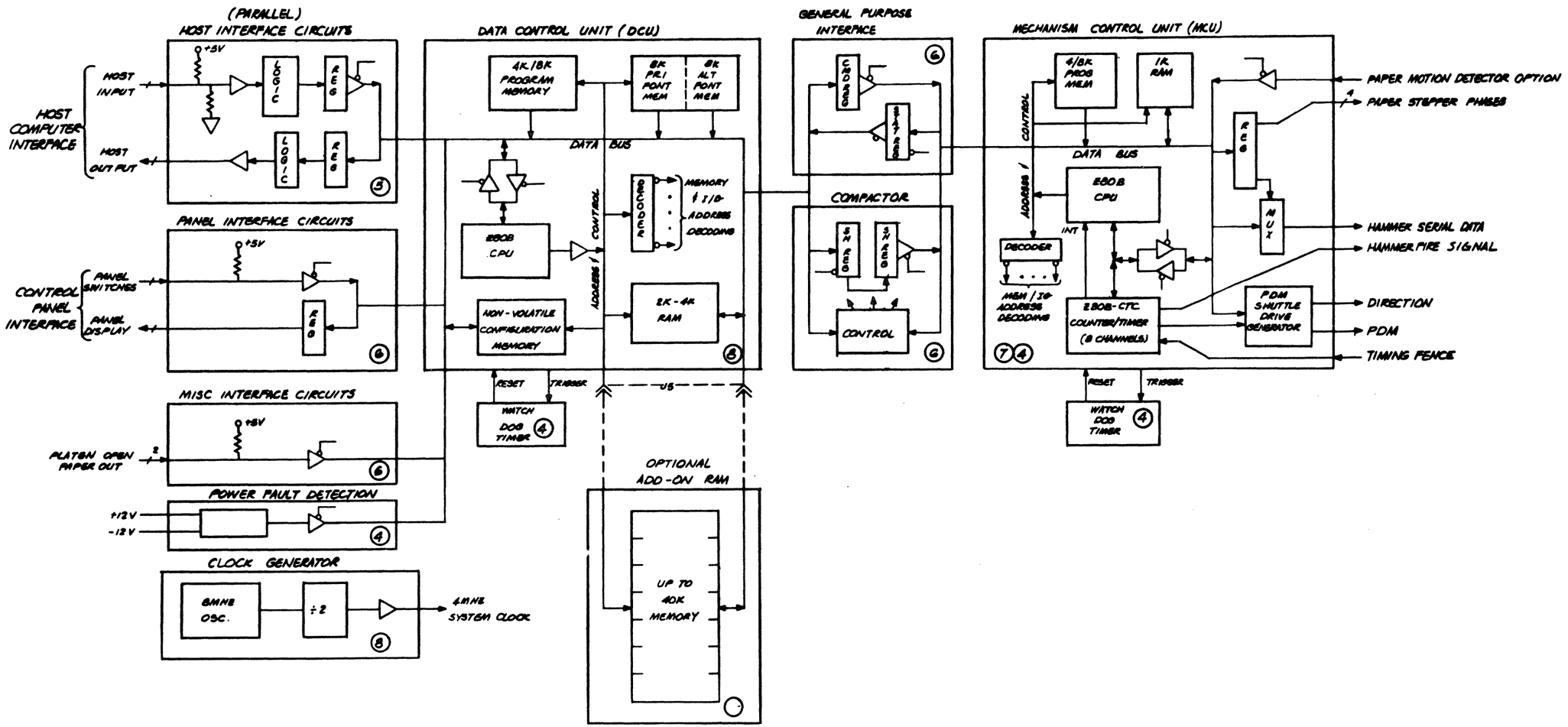
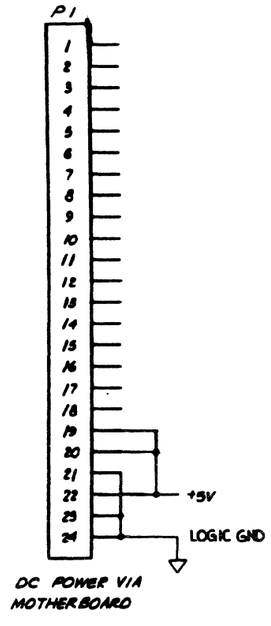
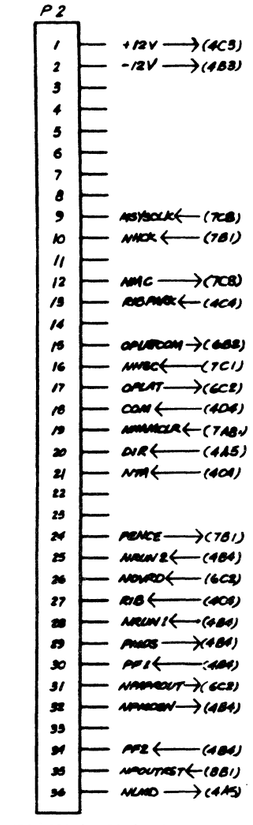
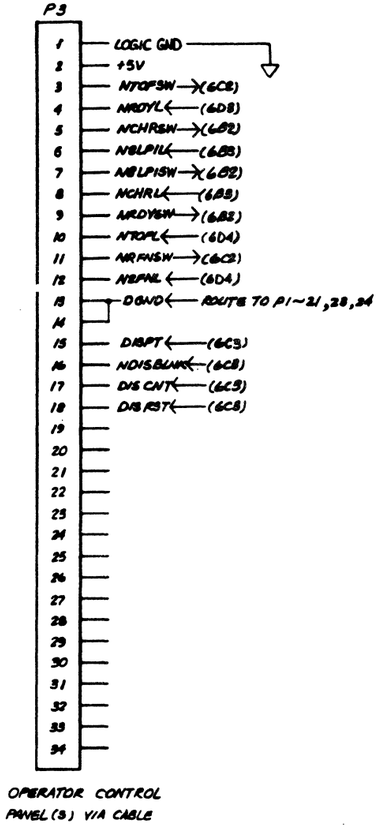
BLOCK DIAGRAM OF MVP CONTROLLER

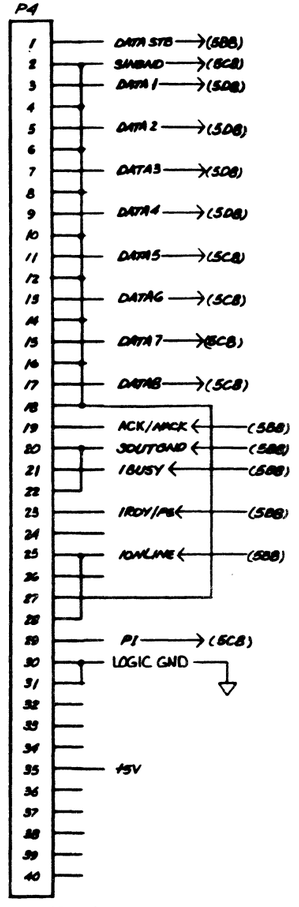


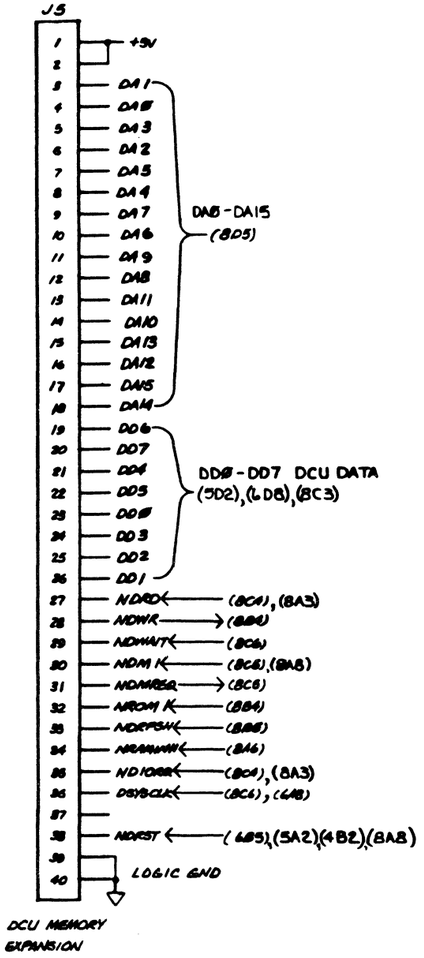
PRINTRONIX	
SCHEMATIC	
PARALLEL CONTROLLER	
DRAWING NO. 880669	PAGE NO. 2

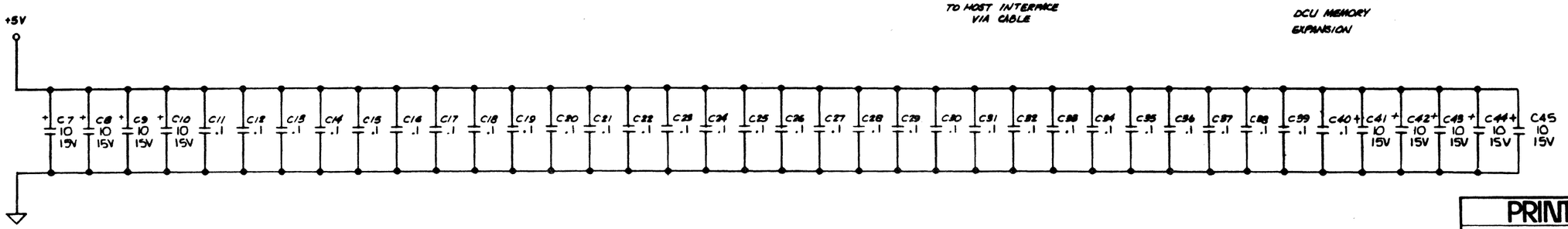












PRINTRONIX

SCHEMATIC

PARALLEL CONTROLLER

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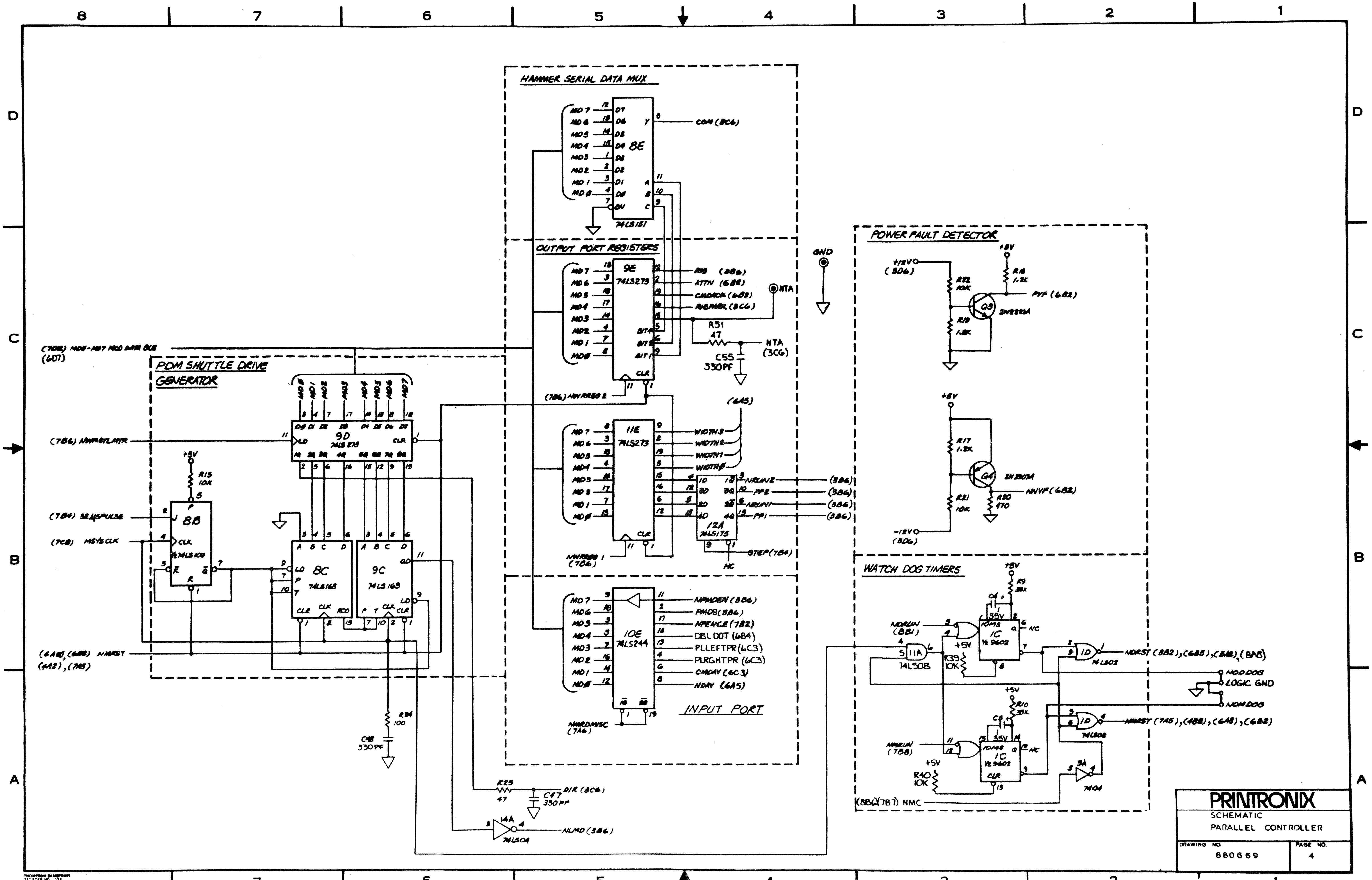

HAMMER SERIAL DATA MUX
OUTPUT PORT REGISTERS
INPUT PORT
PDM SHUTTLE DRIVE GENERATOR
POWER FAULT DETECTOR
WATCH DOG TIMERS
74LS151
74LS273
74LS175
74LS244
74LS109
74LS163
74LS04
74LS08
74LS02
2N2222A
2N3907A
PRINTRONIX
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FROM HOST

TO HOST

DCU DATA BUS

DD0 - DD7 DCU DATA
(3C2), (6D8), (8C3)

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PARALLEL CONTROLLER

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DD8 - DD7 DCU DATA

(3C2) (5D2) (8C3)

MD8 - MD7 DATA BUS

(4C8) (7D2)

74LS374 120 → NMRDGPIF (7A8)

74LS374 110 → NMWRGPIF (7A8)

(8B1) NDWRGPIF

(8A1) NDDROPIF

(8B1) NDCMDRCLR

(8B1) NWR COMP DATA

74LS86 14D

74LS164 10C

74LS244 10D

74LS04 14A

74LS00 15A

74LS02 15B

74LS32 12C

74LS14 13A

74LS04 14A

74LS00 13C

74LS00 15C

74LS00 13C

74LS109 8B

74LS161 14C

74LS161 11C

+5V RN 10K

FSC 1K

A86 100

330PF C49

(8B1) NCMPPAD

(8B1) NCOMPWIDTH

(8C6) (3B2) DBYSCLR

(4A8) NMRST (6A8) (6B2) (4B8)

NBUFFULL (7B8)

NCOMPCLR (7B6)

WIDTH 0

WIDTH 1

WIDTH 2

WIDTH 3

(4C4)

NDAV (4A4)

NMRDCOMP (7A8)

NDIRST (4B2) (5A2) (3B2)

DBL DOT (4B4)

PANEL INTERFACE CIRCUITS

74LS273 14S

NEARRECALL (8A8)

EARSTORE (8A8)

ENNMI (8B7)

N12MIL (3C5)

NRDYL (3D6)

NTOPL (8C5)

NBLPIL (3D8)

NCNYL (3C5)

NMRPAN1 (8B1)

74LS273 14S

PLLEFTPR (4B4)

PLRGHTPR (4B4)

CMDNV (4A6)

DISPT (3C5)

NDISBLANK (3C5)

DISOVT (3C5)

DISRST (3C5)

NMRPAN2 (8B1)

HOST INTERFACE CIRCUITY

74LS273 15D

POLD (5B6)

POLS (5B6)

PIBN (8C2)

DBBN (5C2)

ONLINE (5B6)

DPEN (5A2)

BUSY (5B6)

RDY (5B6)

NMRCTRL (8B2)

74LS244 15E

GPLIT (3C6)

NMPARPOUT (3B6)

NDVRD (3B6)

NMPWEN (3C5)

NRDYEN (3C5)

NTOPEN (3D5)

NBLPIEN (3D5)

NCMDEN (3D5)

GPLATCOM (3C6)

NRDPAN (8A1)

+5V 12E

74LS244 15D

ATTN (4C4)

CMDACK (4C4)

NMRST (4A8) (6A8) (6B2) (4B8)(7A5)

PVF (4C8)

NMVF (4B2)

NDRDMISC (8A1)

MISC INTERFACE CIRCUITS

PRINTRONIX

SCHEMATIC

PARALLEL CONTROLLER

DRAWING NO. 880669

PAGE NO. 6

CLOCK DRIVER

CPU & DATA BUFFER

MD0 - MD7 DATA BUS (4C8) (6D7)

PROGRAM MEMORY

RAM MEMORY

HAMMER CLOCK SELECT

I/O ADDRESS DECODE

MEMORY SELECT DECODE

COUNTER/TIMER CHIPS

PRINTRONIX	
SCHEMATIC	
PARALLEL CONTROLLER	
DRAWING NO. 880669	PAGE NO. 7

CLOCK GENERATOR

PROGRAM ROM

2K/4K/8K RAM

FONT ROM WITH RAM OPTION

DA0 - DA15 (3C2)(3D2)

DD0 - DD7 DCU DATA (3C2)(5D2)(6D8)

DCU ADDRESS DECODING

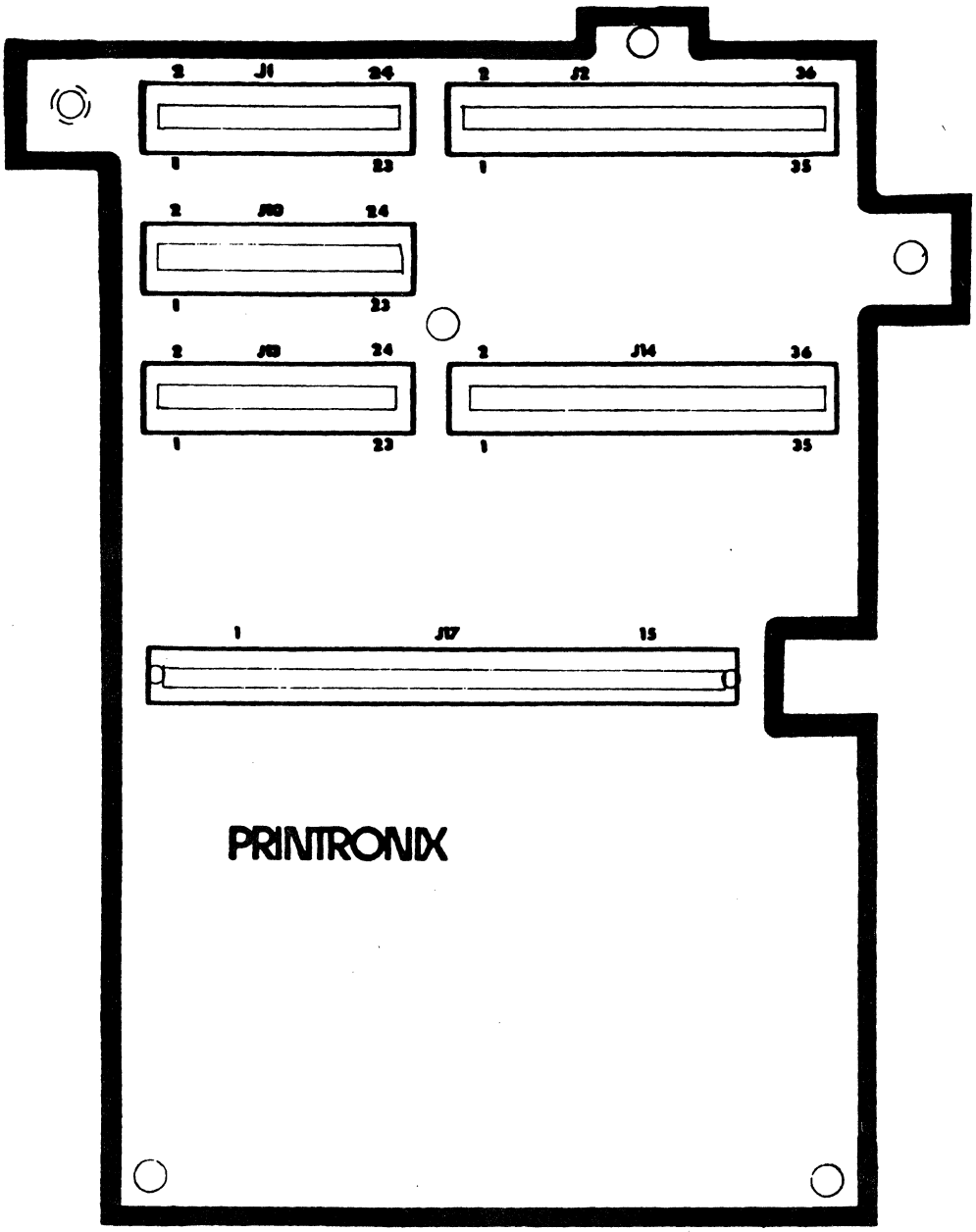
DCU I/O PORT DECODING

PRINTRONIX
SCHEMATIC
PARALLEL CONTROLLER
DRAWING NO. 880669
PAGE NO. 8

PRINTRONIX

ASSY. NO. 880295

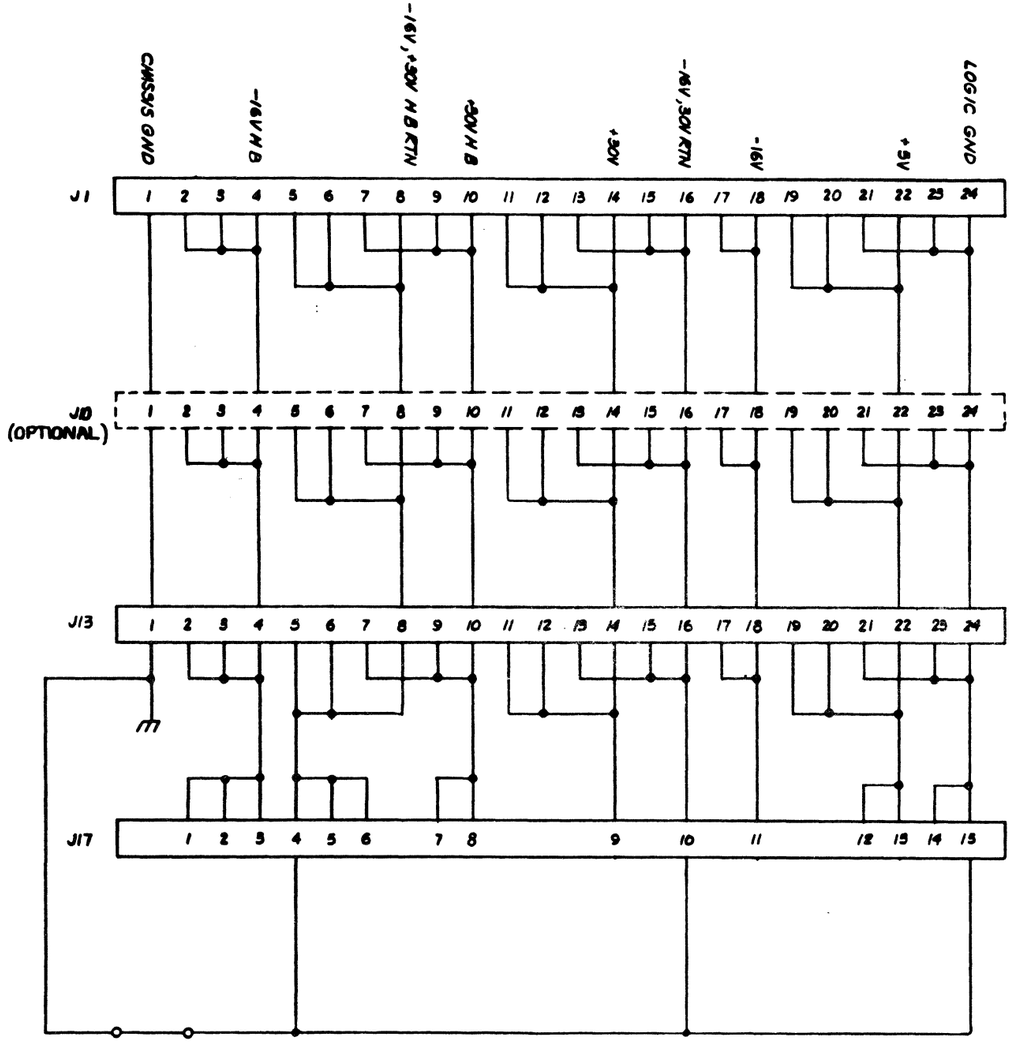
REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
J1, J3, J10	105863-002	2	CONNECTOR, CARD EDGE, P.C. MTG 24 PIN
J2, 14	105863-001	2	CONNECTOR, CARD EDGE, P.C. MTG 36 PIN
J17	105864-001	1	CONNECTOR, CARD EDGE, P.C. MTG 15 PIN
-	110580-001	1	PCB, MOTHER BOARD
-	110437-000	REF	SCHEMATIC, MOTHER BOARD

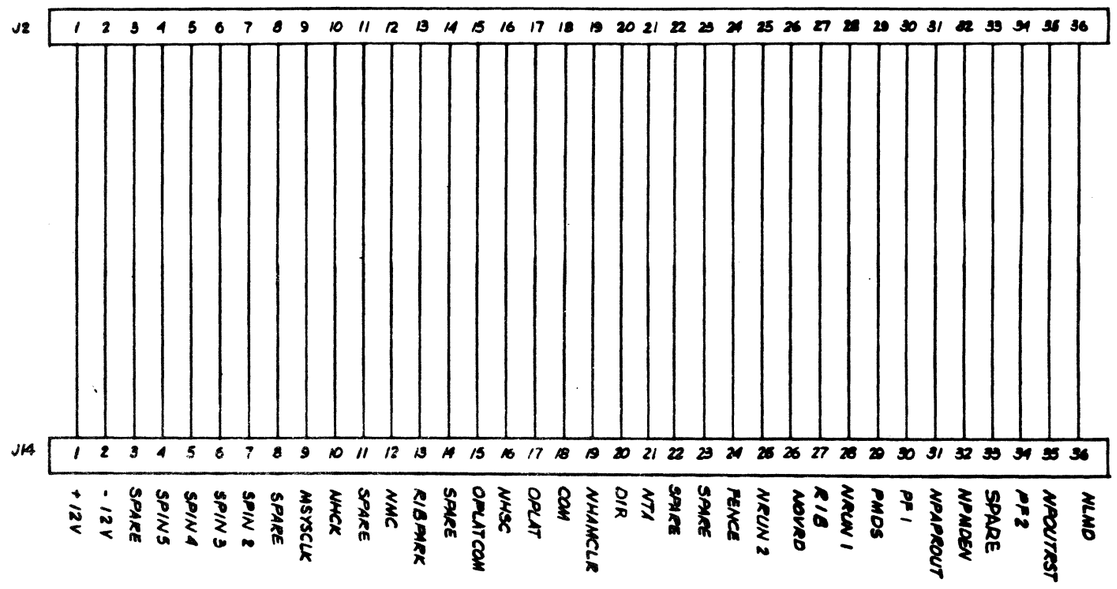


PRINTRONIX

MOTHER BOARD
PCBA

DRAWING NO.	PAGE NO.
880295	





J1, J2 CONTROLLER PCBA
J10 OPTIONAL CONNECTOR
J13, J14 MECHANISM DRIVER PCBA
J17 POWER SUPPLY PCBA

NOTES: UNLESS OTHERWISE SPECIFIED

PRINTRONIX	
SCHEMATIC MOTHER BOARD	
DRAWING NO. 880437	PAGE NO.

ITEM NO.	PART NO.	DESCRIPTION
1	110501-001	PCB, SERIAL CONTROLLER
2	110505-000	SCHEMATIC, SERIAL CONTROLLER
3		
4	110249-001	STIFFENER, PCB
5	105840-002	CONNECTOR, 34 PIN
6	103411-002	CONNECTOR STRIP, MALE, 4 PIN
7	103411-003	CONNECTOR STRIP, MALE, 5 PIN
8	101385-001	CONNECTOR, DIP SOCKET, 16 PIN
9	105080-001	SOCKET, I.C., 18 PIN
10	103103-001	SOCKET, I.C., 34 PIN
11	101384-003	SOCKET, I.C., 28 PIN
12	102253-001	I.C. SOCKET, 40 PIN
13	102291-330	CAPACITOR, 33 pF, ± 10%, 100V
14	102291-220	CAPACITOR, 68 pF, ± 10%, 100V
15	102291-222	CAPACITOR, 220 pF, ± 10%, 100V
16	102291-332	CAPACITOR, 330 pF, ± 10%, 100V
17	102291-472	CAPACITOR, 470 pF, ± 10%, 100V
18	102291-471	CAPACITOR, .0047 uf, ± 10%, 100V
19	102291-101	CAPACITOR, .001 uf, ± 10%, 100V
20	102291-103	CAPACITOR, .01 uf, ± 10%, 50V
21	102291-105	CAPACITOR, .1 uf, ± 10%, 100V
22	101362-020	CAPACITOR, .33 uf, ± 10%, 50V
23	101362-004	CAPACITOR, 1 uf, ± 20%, 35V
24	101362-010	CAPACITOR, 10 uf, ± 10%, 15V
25	101362-005	CAPACITOR, 22 uf, ± 20%, 15V
26		
27		
28	101336-001	RECTIFIER, 1N4004
29	101894-008	DIODE, ZENER, 1N5266B
30	106605-001	RECTIFIER, BRIDGE, VM400
31	105789-001	TRANSISTOR, 2N2907A
32	105702-001	TRANSISTOR, 2N2222A
33	103372-001	TRANSISTOR, MPSA06
34	102868-001	TRANSISTOR, 2N4236
35		
36	101337-471	RESISTOR, 47 OHM, ± 5%, 1/4W
37	101337-621	RESISTOR, 62 OHM, ± 5%, 1/4W
38	101337-182	RESISTOR, 180 OHM, ± 5%, 1/4W
39	101337-332	RESISTOR, 330 OHM, ± 5%, 1/4W
40	101337-392	RESISTOR, 390 OHM, ± 5%, 1/4W
41	101337-472	RESISTOR, 470 OHM, ± 5%, 1/4W
42	101337-103	RESISTOR, 1K, ± 5%, 1/4W
43	101337-123	RESISTOR, 1.2K, ± 5%, 1/4W
44	101337-203	RESISTOR, 2K, ± 5%, 1/4W
45	101337-223	RESISTOR, 2.2K, ± 5%, 1/4W

ITEM NO.	PART NO.	DESCRIPTION
46	101337-473	RESISTOR, 4.7K, ± 5%, 1/4W
47	101337-104	RESISTOR, 10K, ± 5%, 1/4W
48	101337-204	RESISTOR, 20K, ± 5%, 1/4W
49	101337-334	RESISTOR, 33K, ± 5%, 1/4W
50	101337-394	RESISTOR, 39K, ± 5%, 1/4W
51	101337-564	RESISTOR, 56K, ± 5%, 1/4W
52	101337-105	RESISTOR, 100K, ± 5%, 1/4W
53	106766-001	RESISTOR, 15M, ± 5%, 1/4W
54		
55		
56		
57	103385-001	RESISTOR NETWORK, I.C., SIP, 10K
58	101381-103	RESISTOR NETWORK, I.C. DIP, 10K
59		
60		
61	103299-001	I.C., 74LS00
62	103319-001	I.C., 74LS02
63	101340-001	I.C., 7404
64	103330-001	I.C., 74LS04
65	106746-001	I.C., 74HC04
66	103331-001	I.C., 74LS08
67	103332-001	I.C., 74LS10
68	103333-001	I.C., 74LS14
69	103334-001	I.C., 74LS20
70	105686-001	I.C., 74LS32
71	103932-001	I.C., 74LS74
72	103336-001	I.C., 74LS86
73	105747-001	I.C., 74LS109
74	103378-001	I.C., 74LS138
75	105692-001	I.C., 74LS139
76	102301-001	I.C., 74LS151
77	103338-001	I.C., 74LS161
78	105687-001	I.C., 74LS163
79	105688-001	I.C., 74LS164
80	105690-001	I.C., 74LS165
81	106526-001	I.C., 74LS175
82	102026-001	I.C., SN75188
83	102027-001	I.C., SN75189A
84	106747-001	I.C., 74HC193
85	103342-001	I.C., 74LS244
86	105748-001	I.C., 74LS245
87	103380-001	I.C., 74LS273
88	106624-001	I.C., 74LS368
89	105689-001	I.C., 74LS374
90	105694-001	I.C., 2114

ITEM NO.	PART NO.	DESCRIPTION
91		
92	105798-001	I.C., 4802
93	105696-001	I.C., 9602
94	102131-001	I.C., TIL111
95	106749-001	I.C., XR215
96	106748-001	I.C., NE556
97	106604-001	I.C., UART
98		
99	106648-001	I.C., Z80B CPU
100	106765-001	I.C., Z80B CTC
101	110559-002	PROM, CONFIG MEM, "P" SER DEFAULT
102		
103		
104	101375-007	CRYSTAL, 2 MHZ
105	101375-003	CRYSTAL, 4.9152 MHZ
106	101337-363	RESISTOR, 3.6K, ± 5%, 1/4W

ITEM NO.	PART NO.	DESCRIPTION
91		
92	105798-001	I.C., 4802
93	105696-001	I.C., 9602
94	102131-001	I.C., TIL111
95	106749-001	I.C., XR215
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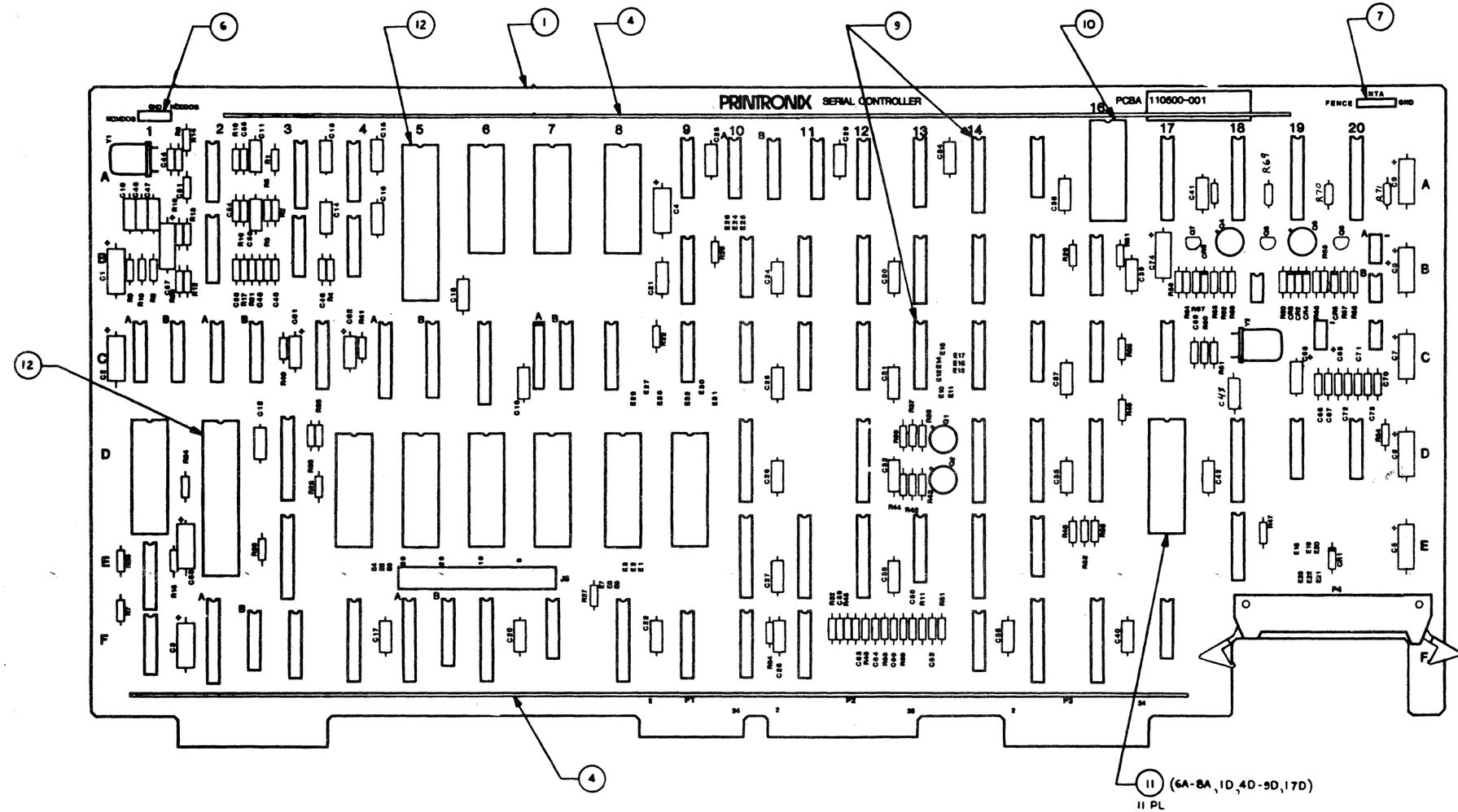


PRINTRONIX	
PCBA SERIAL CONTROLLER	
DRAWING NO. 880500	PAGE NO.

JUMPER TABLE

JUMPER	FUNCTION	SCHEMATIC LOCATION	
		SHEET	ZONE
E1 - E2	FONT RAM ENABLE (IN ETCH)	4	D2
E2 - E3	FONT RAM ENABLE(OPTION) & CUT E1-E2	4	D2
E5 - E6	2K/4K STATIC RAM (IN ETCH)	4	C6
E5 - E4	8K STATIC RAM(OPTION) & CUT E5-E6	4	C6
E8 - E7	FONT RAM ENABLE (IN ETCH)	4	D3
E8 - E9	FONT RAM ENABLE(OPTION) & CUT E8-E7	4	D3
E10-E11 E12-E13 E14-E15 E16-E17	ITALICS OPTION CUT THESE TRACES	5	A7
E18-E19- E20-E22	EXTERNAL CLOCK (IN ETCH)	10	C2
E18-E23	TXCLK (EXTERNAL)(OPTION) & CUT E18-E19, E19-E22	10	C2
E20-E21	RCVCLK(EXTERNAL)(OPTION) & CUT E19-E20, E19-E22	10	C2
E24-E26	8K STATIC RAM (OPTION) CUT E24 - E25	4	C7
E24-E25	2K/4K STATIC RAM (IN ETCH)	4	C7
E27- E29	ALT FONT PROM ENABLE (IN ETCH)	4	C3
E27-E28	ALT FONT RAM ENABLE (OPTION) CUT E27- E29	4	C3
E30-E32	PRI FONT 2 PROM ENABLE (IN ETCH)	4	C2
E30-E31	PRI FONT 2 RAM ENABLE (OPTION) CUT E30 - E32	4	C2
E33-E34	SYSTEM CLOCK BREAKPOINT REQUIRE JUMPER BLOCK	3	B7

SPARE CIRCUITS

TYPE	LOCATION	OUTPUT PINS
74LS00	2CA	3
	12A	3,8,11
7404	14F	8
	17C	4
74LS04	2CB	2,4,10
	10AA	6
	10C	2,10
74HC04	2A	4,10
74LS08	11A	3,8,11
74LS10	9C	12
74LS14	15B	2,6,8
74LS32	1F	6,8
74LS74	15A	5-6
RESISTOR NETWORK 10K TO +5V	2FB	4
	17F	2,10,13
9602	1E	9-1

IC GND AND VOLTAGE INFO

TYPE	GND PIN	+5V PIN	+12V PIN	-12V PIN
74LS00	7	14		
74LS02	7	14		
7404	7	14		
74HC04	7	14		
74LS04	7	14		
74LS08	7	14		
74LS10	7	14		
74LS14	7	14		
74LS20	7	14		
74LS32	7	14		
74LS74	7	14		
74LS86	7	14		
74LS109	8	16		
82S129	8	16		
74LS138	8	16		
74LS139	8	16		
74LS151	8	16		
74LS161	8	16		
74LS163	8	16		
74LS164	7	14		
74LS165	8	16		
74LS175	8	16		
SN75188	7		14	1
SN75189A	7	14		
74HC193	8	16		
74LS244	10	20		
74LS245	10	20		
74LS273	10	20		
74LS368	8	16		
74LS374	10	20		
2114	9	18		
2210	8	18		
2764A	14	28		
4802	12	24		
9602	8	16		
NE556	7	14		
TIL111	—	—		
UART	4	26		
XR215	—	16		
Z80B CPU	29	11		
Z80BCTC	5	24		

CONNECTORS

P1	DC POWER
P2	TO MECH DRIVER
P3	OPERATOR CONTROL PANEL
P4	HOST INTERFACE
J5	DCU MEMORY EXPANSION

REFERENCE DESIGNATORS

LAST USED	NOT USED
C74	
CR6	
J5	J1, J2, J3, J4
P4	
Q7	
R67	
Y2	

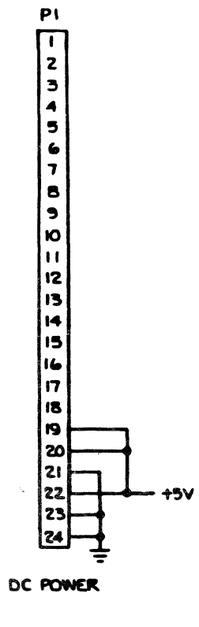
PRINTRONIX

SCHEMATIC

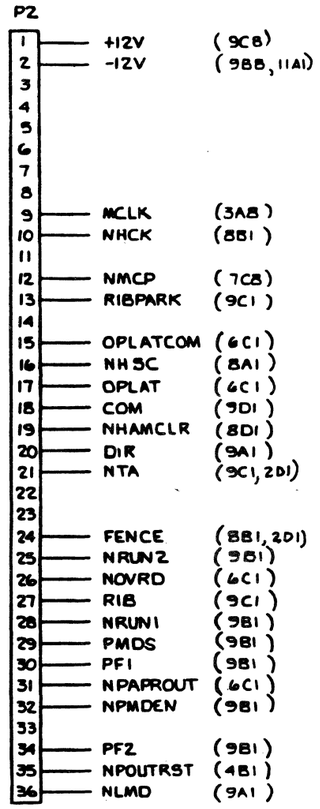
SERIAL CONTROLLER

DRAWING NO. 880505

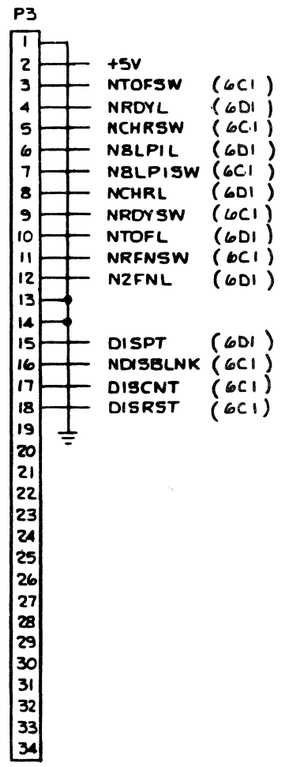
PAGE NO. 1 of 11



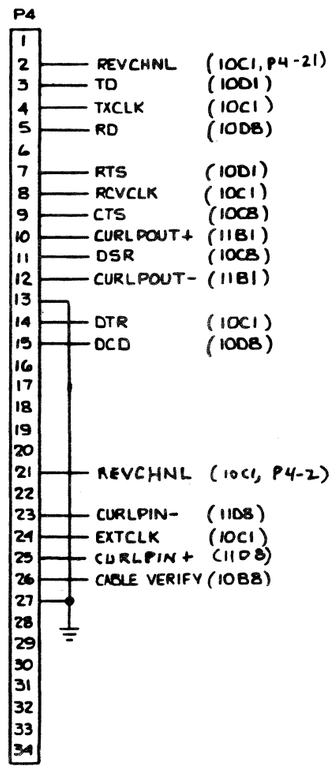
DC POWER



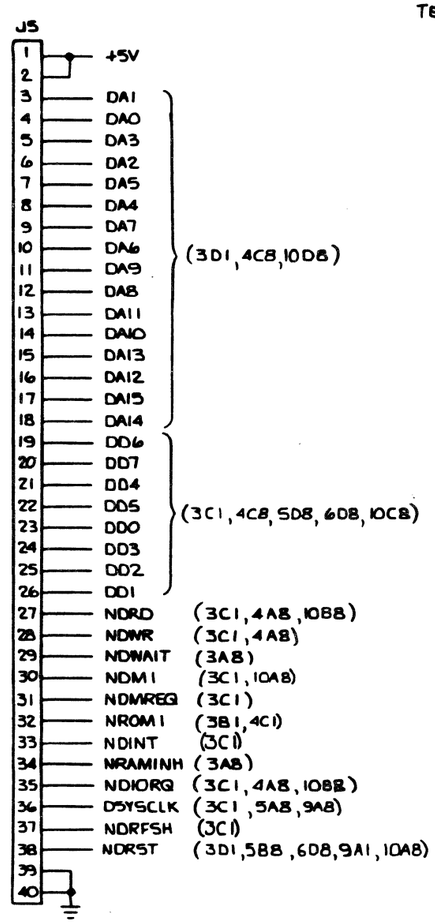
FROM/TO MECH DRIVER



OPERATOR CONTROL PANEL

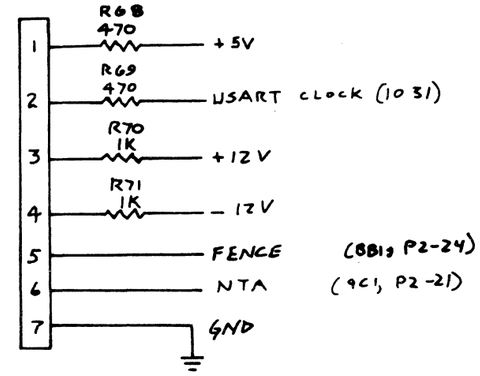


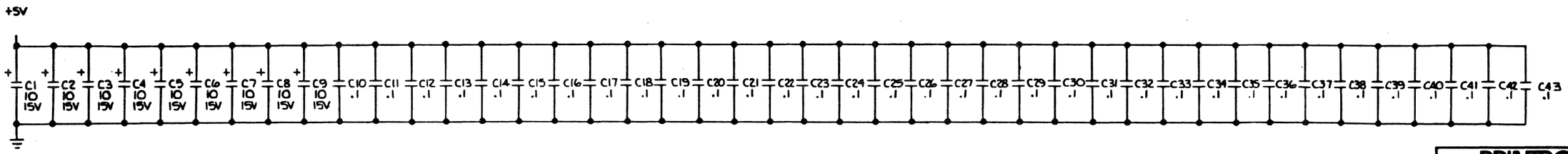
HOST INTERFACE



DCU MEMORY EXPANSION

TEST STRIP





PRINTRONIX

SCHEMATIC

SERIAL CONTROLLER

DRAWING NO.	PAGE NO.
880505	2 of 11

CLOCK GENERATOR

2A 74HC04 · 2A 74HC04 · C44 33PF · C47 .1 · R8 20K · +5V · R3 15M · Y1 2MHZ · C48 .1 · R9 2K · R12 2K · R10 2K · R13 2K · 2B XRZ15 · -Vee · C56 68PF · C57 1,±20%, 35V · R18 62 · R20 4.7K · R21 4.7K · R17 4.7K

R1 20K · R2 1K · C45 .01 50V · 3B NE556 · R4 1K · R6 39K · C49 .01 50V · C46 .0047 · R5 33K · C50 .1 · C51 .01 50V · R14 56K · C54 .01 50V

2FB 10K · 10K · 10K

4B 74HC04 · 4A 74HC04

+5V · 3A 74HC193 (CP_D, CP_U, Q1, Q0) · 14

2A 74HC04 · C55 .01 50V · 2A 74HC04 · R16 100K · R19 100K

14F 7404 · 14F 7404 · R11 47 · C52 330PF

C53 33 50V · R15 33K

MSYSCLK (7D8, 8D8, 9C8)

(P2-9) MCLK

(4B1) NTIMER

1E 9602

+5V R7 1K · 2CA 74LS00

(6D1) ENNMI

(J5-29) NDWAIT

(7C8, 9A8) NMC

(J5-34) NRAMINH

2D Z80B CPU

A10 A8 A6 A4 A3 A5 A7 A9 A2 A0 A12 A13 A15 A14 A11 A1 D7 D6 D5 D4 D3 D2 D1 D0 M1 MREQ IORQ RD WR RFSH HALT BUSAK INT RESET

BUSRQ · NMI · WAIT · Φ

3D 74LS244 · 3E 74LS244

DA10 DA8 DA6 DA4 DA3 DA5 DA7 DA9 DA2 DA0 DA12 DA13 DA15 DA14 DA11 DA1

2CB 74LS04

DAO - DA15 (J5-3 TO J5-18, 4C8, 10D8)

2FA 74LS245 · CD7 CD6 CD5 CD4 CD3 CD2 CD1 CDO · DD7 DD6 DD5 DD4 DD3 DD2 DD1 DDO

1F 74LS32 · 1CA 74LS08

1D Z80B CTC · CSO CS1 CE IEO · IEI TRGO TOO TRG1 TO1 TRG2 TO2 TRG3 RESET INT RD IORQ MT Φ

DAO DA1 DA2 DA3 DA7 · 9C 74LS10

R25 10K · R23 10K · R24 10K · R26 10K · +5V

TRGO (10B1) · TRG1 (10A1) · NC NC NC NC NC

NDRST (J5-38, 5B8, 6D8, 9A1, 10A8)

NDINT (J5-33)

DSYSCLK (J5-36, 5A8, 9A8)

DDO - DD7 (J5-19 TO J5-26, 4C8, 5D8, 6D8, 10C8)

NDM1 (J5-30, 10A8)

NDMREQ (J5-31)

NDIORQ (J5-35, 4A8, 10B8)

NDRD (J5-27, 4A8, 10B8)

NDWR (J5-28, 4A8)

NDRFSH (J5-37)

MEMORY ADDRESS DECODE

15A 74LS74

9A 74LS32

13A 74LS139 (B, A, EN)

DA7 · DA14 · DA13 · DA15

10AA 74LS04 · 9C 74LS10

10AB 74LS32 · 10AB 74LS32 · 10AA 74LS04

NEARSEL (4B1)

NEAROM (4B8)

NALT (4C1)

NROM1 (J5-32, 4C1)

NROMO (4C8)

NRAM (4C1)

NPRI 1 (4C1)

NPRI 2 (4C1)

NPRISEL (6A1)

PRINTRONIX

SCHEMATIC

SERIAL CONTROLLER

DRAWING NO. 880505 · PAGE NO. 3 of 11

PROGRAM ROM

2K/4K/8K RAM

FONT ROM W/RAM OPTION

PROGRAM ROM Ø (4D, 2764A)

PROGRAM ROM 1 (6D, 2764A, 7CA-8)

RAM Ø (5D, 4802)

RAM 1 (16A, 4802)

PRI FONT 1 (7D, 2764A)

ALT FONT (8D, 2764A/4808)

PRI FONT 2 (9D, 2764A/4808)

+5V

R27 10K

E8 ALT RAM
E7 ALT PROM
E3 PRI-2 RAM
E2 PRI-2 PROM
E1

E29 ROM – E27
E28 RAM
E32 ROM – E30
E31 RAM

E4 E5 E6 8K 4K

NROMØ (3A1)

DA11

DDØ-DD7 (J5-19 TO J5-26, 3C1, 5D8, 6D8, 10C8)

DAØ-DA15 (J5-3 TO J5-18, 3D1, 10D8)

10AB 74LS32

E26 8K E24 2K E25

10AA 74LS04

9A 74LS32

NPRI 2 (3A1)
NALT (3B1)
NPRI 1 (3A1)
NROM1 (J5-32, 3B1)
NRAM (3A1)

CONFIGURATION EAROM

14A X2210-30

DA5 DA4 DA3 DA2 DA1 DAØ
DA6 DA7
DD3 DD2 DD1 DDØ

(3B1) NEAROM
(6D1) EARSTORE
(6D1) NEARRECALL

14F 7404

(J5-28, 3C1) NDWR

NDIORQ (J5-35, 3C1, 10B8)
NDRD (J5-27, 3C1, 10B8)

DA2 DA1 DAØ
DA3

12B 74LS138
13B 74LS138
14B 74LS138

10AA 74LS04

11B 10AB 74LS32

NITALICS (5C8)
NTIMER (3A8)
NDRUN (9A8)
NEARSEL (3B1)
SWRTOB (N.C.)
NPOUTRST (P2-35)
NDCNDRCLR (5C8)
NCOMPPAD (5B8)
NDMEMSEL (6A8)
NWRPAN 2 (6C8)
NWRPAN 1 (6D8)
NCOMPWIDTH (5A8)
NWRCOMPDATA (5C8)
NWRCTRL (10A8)
NDWRGPIF (5D8)
NDRDSTAT (6A8)
SRDØ6 (N.C.)
SRDØ5 (N.C.)
NDRDMISC (6B8)
SRDØ3 (N.C.)
SRDØ2 (N.C.)
NRDPAN (6C8)
NDRDGPIF (5C8)

DCU I/O PORT DECODING

DRAWING NO 880505
SHT 4

DCU TO MCU INTERFACE

(6D1) DBLDOTEN

DD0-DD7 (J5-19 TO J5-26, 3C1, 4C8, 6D8, 10C8)

MD0-MD7 (7D1, 9A1)

GENERAL PURPOSE I/F

(4A1) NDNRGPIF

NMRDGPIF (8C1)

NMWRGPIF (8D1)

(4A1) NDRDGPIF

(6B1) DCNDRFLG

(4B1) NDCNDRCLR

(4A1) NWRCOMPDATA

(4B1) NITALCS

NDRST (J5-38, 3D1, 6D8, 9A1, 10A8)

(4B1) NCOMPPAD

(4B1) NCOMPWIDTH

(6B1) COMPBSY

DSYSCLK (J5-36, 3C1, 9A8)

DD7

COMPACTOR

NRDCOMP (8C1)

DBLDOT (9B1)

NCOMPCLR (8D1)

WIDTH 0 (9B1)

WIDTH 1 (9C1)

WIDTH 2 (9C1)

WIDTH 3 (9C1)

NMRST (6B1, 8D8, 9C8)

NDAV (9A1)

NBUFRFUL (8D1)

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PANEL INTERFACE CIRCUITS

DD0-DD7 (JS-19 TO JS-26, 3C1, 4C8, 5D8, 10C8)

(4B1) NWRPAN1

NDRST (JS-38, 3D1, 5B8, 9A1, 10A8)

(4B1) NWRPAN2

(4A1) NRDPAN

(4A1) NDRDMISC

(4B1) NDMEMSEL

(4A1) NDRDSTAT

16F 74LS273

DD7	18	19	NEARRECALL (4B8)
DD6	3	2	EARSTORE (4B8)
DD5	13	12	ENNMI (3A8)
DD4	14	15	NZFNL (P3-12)
DD3	17	16	NRDYL (P3-4)
DD2	4	5	NTOFL (P3-10)
DD1	7	6	N8LPIL (P3-6)
DD0	8	9	NCHRL (P3-8)
		11	
		1	

10D 74LS273

DD7	18	19	PLLEFTPR (9B1)
DD6	3	2	PLRGHTPR (9B1)
DD5	13	12	DBLDOTEN (5D8)
DD4	14	15	CMDAV (9B1)
DD3	17	16	DISPT (P3-15)
DD2	4	5	NDISBLNK (P3-16)
DD1	7	6	DISCNT (P3-17)
DD0	8	9	DISRST (P3-18)
		11	
		1	

+5V

17F 10K

15F 74LS244

DD7	18	2	OPLAT (P2-17)
DD6	3	17	NPAPROUT (P2-31)
DD5	12	8	NOVRD (P2-26)
DD4	14	6	NRFNSW (P3-11)
DD3	16	4	NRDYSW (P3-9)
DD2	5	15	NTOFSW (P3-3)
DD1	7	13	N8LPISW (P3-7)
DD0	9	11	NCHRSW (P3-5)
		1	
		19	

OPLATCOM (P2-15)

MISC INTERFACE CIRCUITS

+5V

R29 10K

12D 74LS244

DD7	18	2	DCNDRFLG (5C8)
DD6	3	17	COMPBSY (5A8)
DD5	12	8	ATTN (9C1)
DD4	14	6	CMDACK (9C1)
DD3	16	4	NMRST (5A1, 8D8, 9C8)
DD2	5	15	SRD0482 (N.C.)
DD1	7	13	PVF (9A1)
DD0	9	11	NNVF (9A1)
		1	
		19	

14D 74LS273

DD7	18	19	
DD6	3	2	
DD5	13	12	
DD4	14	15	
DD3	17	16	
DD2	4	5	
DD1	7	6	
DD0	8	9	NPRISEL (3A1)
		A	
		11	
		1	

NDCTS (10C8)

16D 74LS244

DD7	18	2	
DD6	3	17	
DD5	12	8	
DD4	14	6	
DD3	16	4	
DD2	5	15	
DD1	7	13	
DD0	9	11	
		1	
		19	

PRINTRONIX

SCHEMATIC

SERIAL CONTROLLER

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MCU CPU AND DATA BUFFER

+5V

5A Z80B CPU

MSYSCLK (3A8, 8D8, 9C8)

(3A8, 9A8) NMC

(P2-12) NMCP

(8D8) NMINT

7CA 10K

74LS14

74LS08

74LS02

74LS32

74LS04

74LS245

MD0-MD7 (5D1, 9A1)

NMRD (8D8)

NMWR (8B1)

NMIORQ (8D8)

NMMREQ (8C1)

NMM1 (8D8)

D0-D7 (8B8)

MA0-MA14 (8D8)

PROGRAM MEMORY

(8C1) CEROM

6A 2764A

RAM MEMORY

5CB 2114

5CA 2114

CERAM (8C1)

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COUNTER / TIMER CHIPS

I/O ADDRESS DECODE

MEMORY SELECT DECODE

HAMMER CLOCK SELECT

(7C1) MA0-MA14
(7C1) NMM1
(7C1) NM1ORQ
(7C1) NMRD
(3A8, 7D8, 9C8) MSYSCLK
(7B8) NMINT
(5A1, 6B1, 9C8) NMRST
(9D8) 32USPULSE
(7C1) D0-D7
(9B1) STEP

8A Z80B CTC
7A Z80B CTC
8C 74LS139
7CB 74LS138
11F 74LS109
14F 7404
15B 74LS14
11B 74LS02
2CA 74LS00
2CA 74LS00

R33 47 C60 330PF → NHAMCLR (P2-19)
R30 47 C58 330PF → NCOMPCLR (5B1)
NMRUN (9A8)
NBUFRFUL (5A1)
NWRREG2 (9C1)
NWRREG1 (9A1)
NWRSTLMTR (9D8)
NMWRGPIF (5D1)
R32 47 C59 330PF → NHSC (P2-16)
NMRDMISC (9A1)
NRDCOMP (5B1)
NMRDGPIF (5D1)
CERAM (7A1)
CEROM (7B8)
NMMREQ (7C1)
NMWR (7C1)
NHCK (P2-10)
FENCE (P2-24)
NFENCE (9B1)

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PDM SHUTTLE DRIVE GENERATOR

(8D1) NWRSTLMTR

+5V

R34 10K

(8B8) 32MSPULSE

(3A8, 7D8, 8D8) MSYSCLK

11F 74LS109

MD0 MD1 MD2 MD3 MD4 MD5 MD6 MD7

8F 74LS273

R45 47

C63 330PF

9F 74LS163

10F 74LS163

14F 7404

(5A1, 6B1, 8D8) NMRST

POWER FAULT DETECTOR

(PZ-1) +12V

+5V

R44 1.2K

R42 10K

Q2 2N2222A

R43 1.2K

+5V

R36 1.2K

Q1 2N2907A

R37 10K

R39 470

(PZ-2, 11A1) -12V

WATCH DOG TIMERS

+5V

C61 ±20% 35V

R40 33K

(4B1) NDRUN

(5A8, 3C1, J5-36) DSYSCLK

ICA 74LS08

10MS 3C 9602

74LS02

ICB

R38 10K

NODDOG

GND

NOMDOG

C62 ±20% 35V

R41 33K

(8D1) NMRUN

+5V

R35 10K

2CB 74LS04

(3A8, 7C8) NMC

HAMMER SERIAL DATA MUX

MD7 MD6 MD5 MD4 MD3 MD2 MD1 MD0

5FB 74LS151

COM (PZ-18)

GND NTA

10E 74LS273

BIT4 BIT2 BIT1 CLR

R46 47

C64 330PF

RIB (PZ-27)

ATTN (6B1)

CMDACK (6B1)

RIB PARK (PZ-13)

NTA (PZ-21)

NWRREG2 (8D1)

11E 74LS273

13E 74LS175

WIDTH 3 (5A1)

WIDTH 2 (5A1)

WIDTH 1 (5A1)

WIDTH 0 (5A1)

NRUN2 (PZ-25)

PFZ (PZ-34)

NRUN1 (PZ-28)

PF1 (PZ-30)

OUTPUT PORT REGISTERS

STEP (8B8)

INPUT PORT

17F 10K

+5V

12E 74LS244

NPMDEN (PZ-32)

PMD (PZ-29)

NFENCE (8B1)

DBLDOT (5B1)

PLLEFTPR (6D1)

PLRGHTPR (6D1)

CMDAV (6D1)

NDAV (5A1)

NMRDMISC (8C1)

MD0-MD7 (5D1, 7D1)

NWRREG1 (8D1)

DIR (PZ-20)

NUMD (PZ-36)

PVF (6B1)

NNVF (6B1)

NDRST (J5-38, 3D1, 5B8, 6D8, 10A8)

DRAWING NO. 880505

SHT 9

DA0-DA15
(J5-3 TO J5-18, 3D1, 4C8)

(11D1) CURLPDTAIN

NCURLOOP

RXINVERT

74LS86 74LS00 74LS00

(P4-5) RD

(P4-15) DCD

(P4-9) CTS

(P4-11) DSR

75189A C65 22OPF

75189A C66 22 ±20% 15V

75189A C67 470PF

75189A C68 470PF

+5V R47 10K

74LS368 (15)

DD0-DD7
(J5-19 TO J5-26, 3C1, 4C8, 5D8, 6D8)

(J5-35, 3C1, 4A8) NDIORQ

(6A8) NDCTS

74LS04 74LS08 74LS20

(J5-27, 3C1, 4A8) NDRD

(P4-26) CABLE VERIFY

74LS273 74LS244 +5V R48 10K

(11C8) LINEBRK

(11C8) ACTVLOOP

(4A1) NWRCTRL

(J5-30, 3C1) NDMI
NDRST
(J5-35, 3D1, 5B8, 6D8, 9A1)

NEXTCLK
TXINVERT
REV CHNL

DA0
DA1
DA2
MARKIN

DA3 DA7 74LS20

17D UART

AO A1 R/W RXD DCD CTS DSR
DD7 DD6 DD5 DD4 DD3 DD2 DD1 DD0
D7 D6 D5 D4 D3 D2 D1 D0
CE TXRDY RXRDY RESET BRCLK TXD RTS DTR TXC RXC TXEMT

MARKOUT (11C8)

+5V R54 10K

74LS86 SN75188 C70 22OPF — TD (P4-3)

SN75188 C71 470PF — RTS (P4-7)

+5V 17F 10K

SN75188 C72 470PF — DTR (P4-14)

+5V 17F 10K

SN75188 C73 470PF — REVCHNL (P4-2, P4-21)

+5V R52 10K R53 10K

74LS368 — TXCLK (P4-4)

E18 E23 E19 E22 E20 E21

74LS368 — EXTCLK (P4-24)

RCVCLK (P4-8)

CR1 1N4004

TRG0 (3D1)

74LS86 +5V R49 10K

C69 .001

74LS04 74LS04 74LS04 R50 1.2K R51 1.2K

Y2 4.9152 MHz

USART CLOCK (2D1)

TRG1 (3D1)

RS232C SERIAL
INTERFACE CIRCUITS

PRINTRONIX
SCHEMATIC
SERIAL CONTROLLER
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CURRENT LOOP SERIAL INTERFACE CIRCUITS

(P4-21) CURLPIN +
(P4-23) CURLPIN -
20BA VM400
Q3 MPSA06
R57 100K
+5V
RG1 2.2K
20BB TIL111
CURLPDTAIN (100B)
R55 330
20C TIL111
(10AB) LINEBRK
(100I) MARKOUT
(10AB) ACTVLOOP
16B 74LS00
R56 10K
16C 74LS86
R65 1K
R66 180
Q6 2N4236
CR5 IN4004
R58 330
18B TIL111
R60 100K
CR2 IN5266B
Q5 MPSA06
CR3 IN4004
CR4 IN4004
19C VM400
CURLPOUT +(P4-10)
CURLPOUT -(P4-12)
R62 1K
R59 1K
Q4 2N4236
R63 1K
CR6 IN4004
R67 390
Q7 MPSA06
R64 1K
C74 10 15V
-12V (P2-2, 98B)

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SCHEMATIC	
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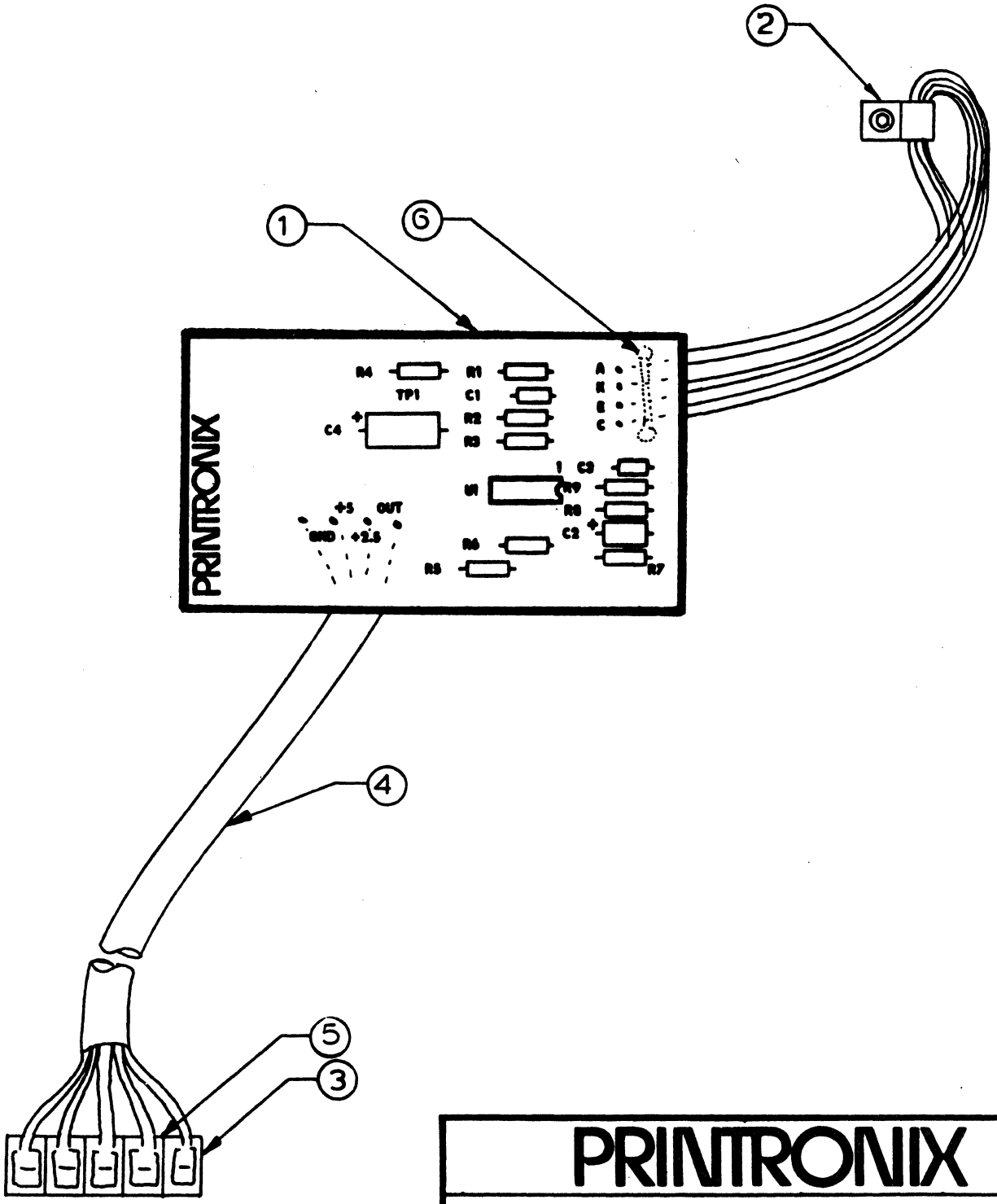
PRINTRONIX

ASSY. NO. 880313

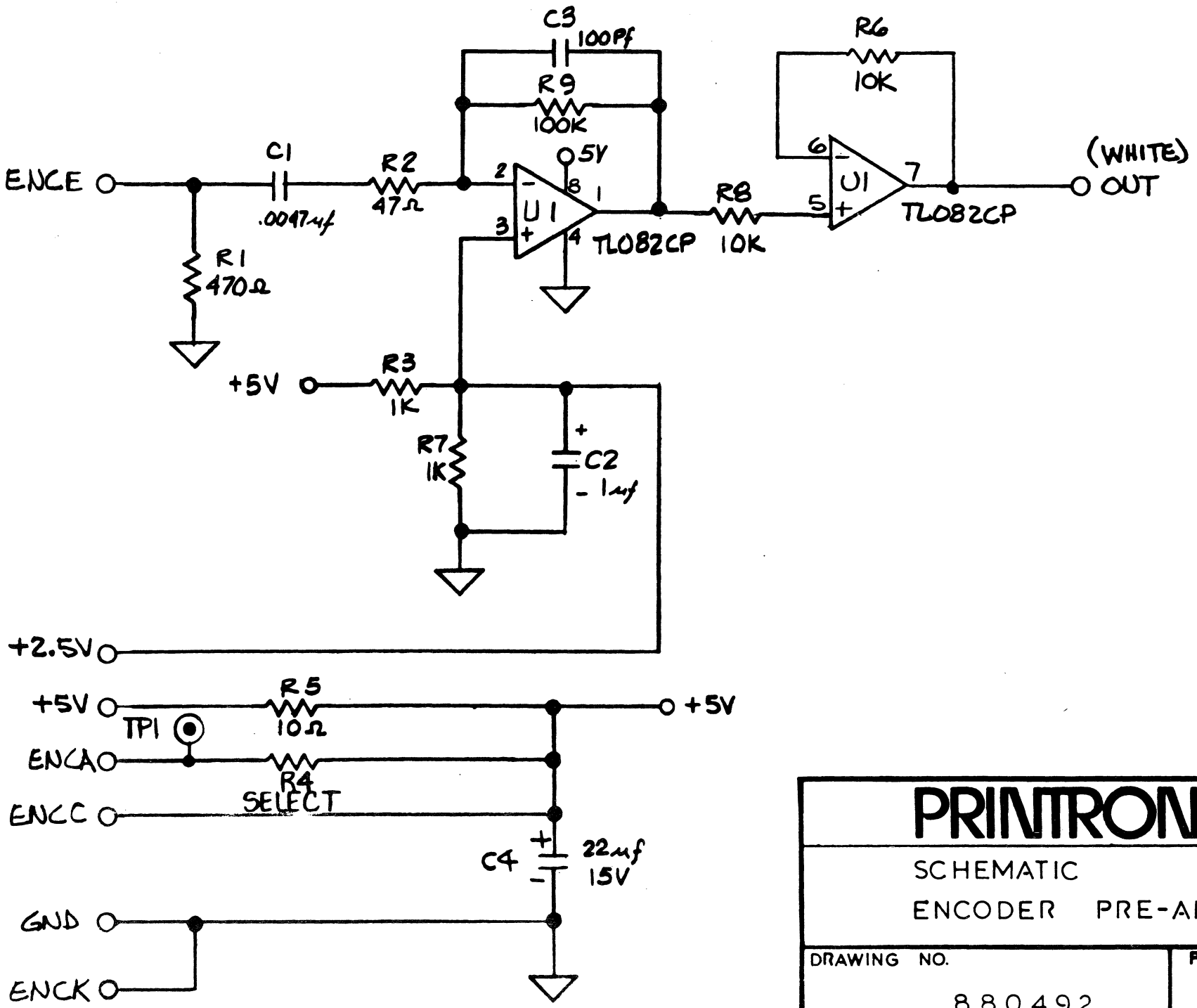
REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
C1	102291-471	1	.0047 uf, 100V CERAMIC CAP
C2	101362-004	1	1 uf, 35V, TANT CAP
C3	102291-102	1	100 pf, 100V, CERAMIC CAP
C4	101362-019	1	20 uf, 15V, TANT CAP
R1	101337-472	1	470 OHMS, RESISTOR, 5%, 1/4W
R2	101337-471	1	47 OHMS, RESISTOR, 5%, 1/4W
R3, R7	101337-103	2	1K OHMS, RESISTOR, 5%, 1/4W
R4	101337-182	1	18K OHMS, RESISTOR, 5%, 1/4W
R5	101337-101	1	10 OHMS, RESISTOR, 5%, 1/4W
R6, R8	101337-104	2	10K OHMS, RESISTOR, 5%, 1/4W
R9	101337-105	1	100K OHMS, RESISTOR, 5%, 1/4W
U1	105969-001	1	IC, OP-AMP, TL082CP
-	110488-001	1	PCB ENCODER
1	110487-001	1	PCBA ENCODER
-	110492-000	REF	SCHEMATIC, ENCODER
2	105811-001	1	SWITCH, OPTO TRANSMISSIVE
3	105948-005	1	CONNECTOR, IDT
4	102334-001	A/R	WIRE, 4 COND, SHIELDED
5	102901-001	1	TAPE, LABEL
6	101480-001	2	TIE WRAP



PRINTRONIX

ENCODER PCBA

DRAWING NO.	PAGE NO.
880313	



PRINTRONIX

SCHEMATIC

ENCODER PRE-AMP

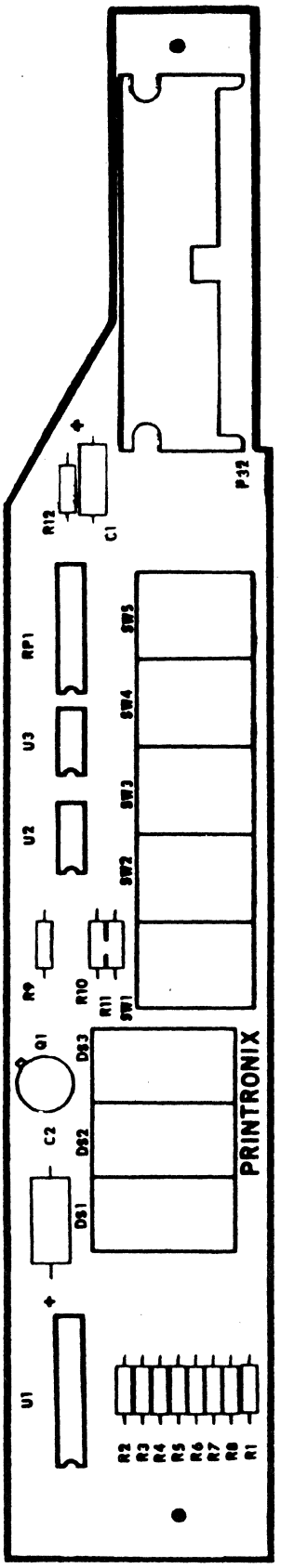
DRAWING NO.	PAGE NO.
880492	

PRINTRONIX

PCBA, INNER CONTROL PANEL

ASSY. NO. 880331

REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
	110585-001	1	PCB, INNER CONTROL PANEL
	110336-000	REF	SCHEMATIC, INNER CONTROL PANEL
U1	105858-001	1	IC, MM74C925
U2, 3	105847-001	2	IC, SN75462
DS1, 2, 3	105860-001	3	DISPLAY, LED SINGLE DIGIT NUMERIC, DL-704
SW1, 2, 3, 4, 5	105857-001	5	SWITCH/LED MODULE
Q1	101366-001	1	TRANSISTOR, 2N2906A
R2, 3, 4, 5, 6, 7, 8, 11	101337-181	8	RESISTOR, 18 OHMS, 1/4W, 5%
R9, 10	101337-103	2	RESISTOR, 1K, 1/4W, 5%
R1, 12	101337-104	2	RESISTOR, 10K, 1/4W, 5%
RP1	105861-151	1	RESISTOR NETWORK, 150 OHMS 14 PINS
C1	101362-002	1	CAPACITOR, 1 MFD, 15V
P32	105862-001	1	CONNECTOR, RIGHT ANGLE P.C. MTG, 34 PIN
C2	101362-010	1	CAPACITOR, 10 MFD, 15V



PRINTRONIX

INNER CONTROL

PANEL PCBA

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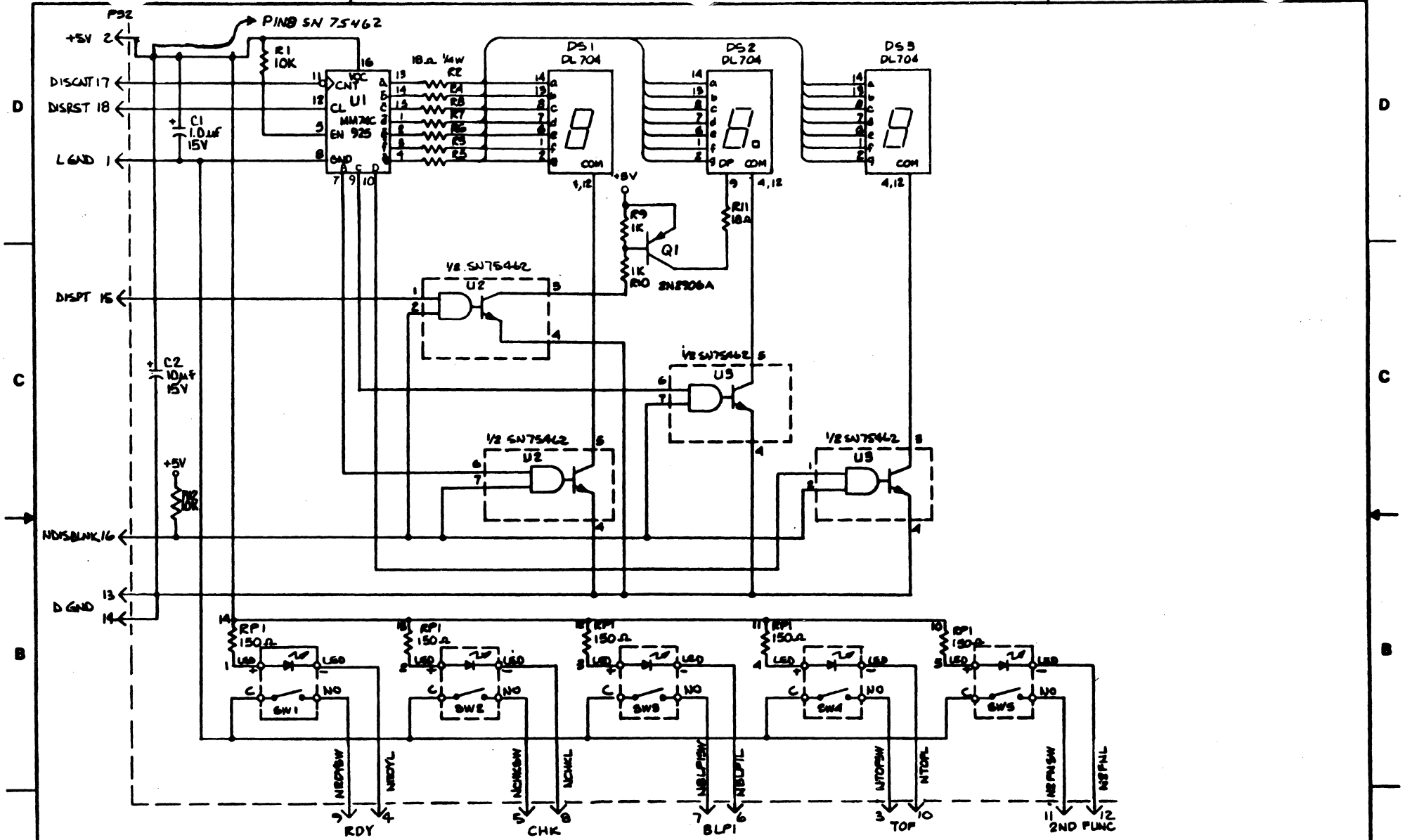

PRINTRONIX	
SCHEMATIC, INNER CONTROL PANEL	
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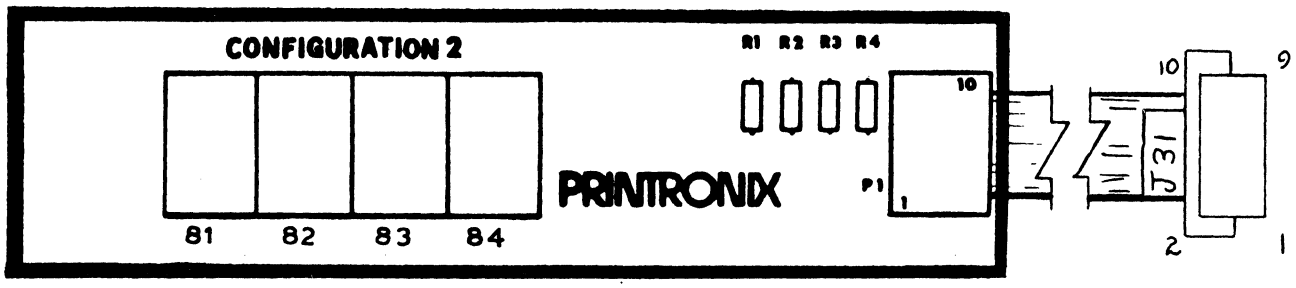
PRINTRONIX

ASSY. NO. 880355

REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
P1	101328-001	1	CONNECTOR, PADDLE BOARD, 10 PIN
R1, R2, R3, R4	105856-151	4	RESISTOR, 150 OHMS, 1/8W, 5%
SW1, 2, 3, 4	105857-001	1	SWITCH/LED MODULE
-	110356-001	1	PCB, FRONT CONTROL PANEL
-	110360-000	REF	SCHEMATIC, FRONT CONTROL PANEL BOARD
J3	106649-001	1	CONNECTOR, PLUG, MASS TERM
	102901-001	1	TAPE, LABEL
	101488-001	A/R	CABLE, FLAT RIBBON, NESTABLE



PRINTRONIX

FRONT PANEL

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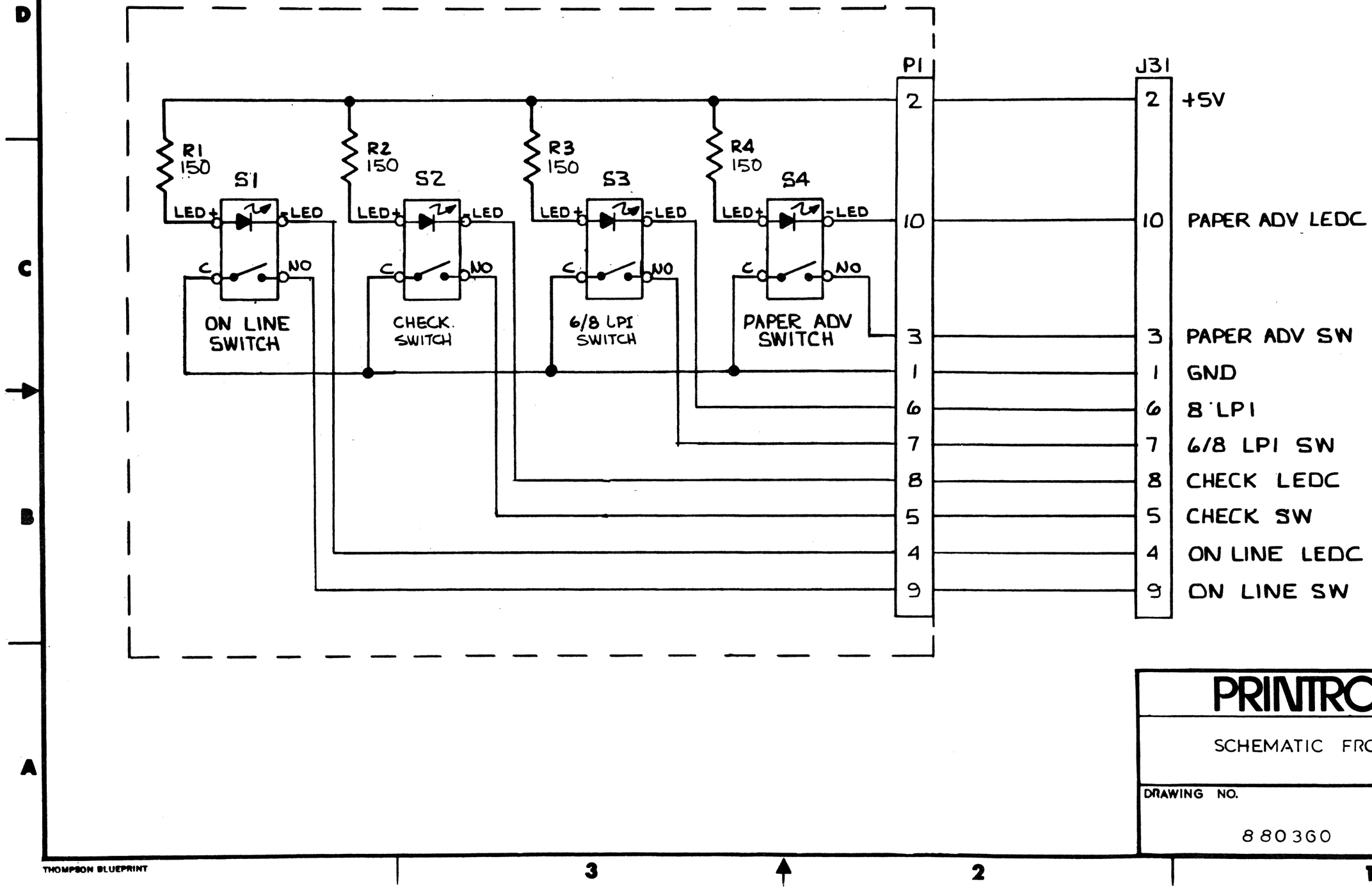

PRINTRONIX

SCHEMATIC FRONT PANEL

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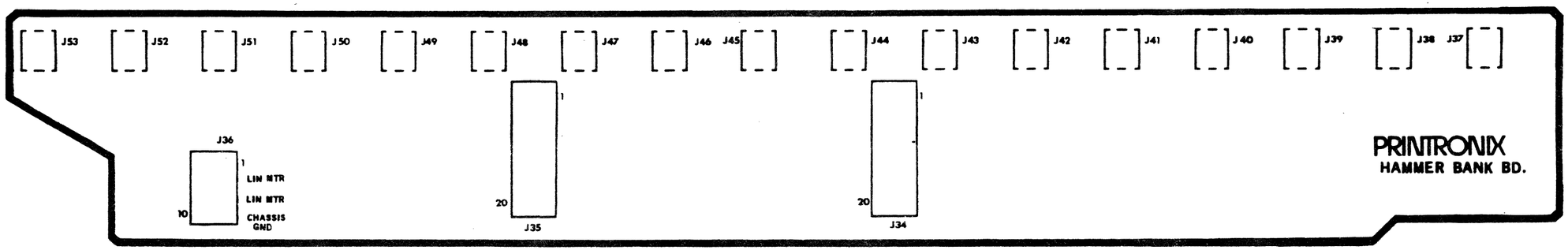
THOMPSON BLUEPRINT

PRINTRONIX

PCBA HAMMER BANK BOARD
PART OF HAMMER BANK CABLE ASSY.
PCBA NOT SOLD AS SPARE.

ASSY. NO. 880265

REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
J34, 35	101328-002	2	CONNECTOR, P.C. MTG., 20 PIN
J36	101328-001	1	CONNECTOR, P.C. MTG, 10 PIN
J37 thru J53	101329-002	17	CONNECTOR, P.C. MTG., 2 PIN
	110311-000	REF	SCHEMATIC, HAMMER BANK



PRINTRONIX

HAMMERBANK BOARD

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HAMMER BANK PCB

J12

HC5 RTN	1	
HC5	2	
HC6 RTN	3	
HC6	4	
HC4 RTN	5	
HC4	6	
HC7 RTN	7	
HC7	8	
HC3 RTN	9	
HC3	10	
HC8 RTN	11	
HC8	12	
HC2 RTN	13	
HC2	14	
HC9 RTN	15	
HC9	16	
HC1 RTN	17	
HC1	18	
HC10 RTN	19	
HC10	20	
HC14 RTN	21	
HC14	22	
HC15 RTN	23	
HC15	24	
HC13 RTN	25	
HC13	26	
HC16 RTN	27	
HC16	28	
HC12 RTN	29	
HC12	30	
HC17 RTN	31	
HC17	32	
HC11 RTN	33	
HC11	34	
LIN MTR	35	
LIN MTR RTN	36	
LIN MTR	37	
LIN MTR RTN	38	
CHASSIS GND	39	
CHASSIS GND	40	

PCBA-MVP2 MECHANISM DRIVER

J34

1	HAM COIL 5
2	HAM COIL 6
3	HAM COIL 4
4	HAM COIL 7
5	HAM COIL 3
6	HAM COIL 8
7	HAM COIL 2
8	HAM COIL 9
9	HAM COIL 1
10	HAM COIL 10
11	HAM COIL 14
12	HAM COIL 15
13	HAM COIL 13
14	HAM COIL 16
15	HAM COIL 12
16	HAM COIL 17
17	HAM COIL 11
18	
19	
20	

J35

J41 J42 J40 J43 J39 J44 J38 J45 J37 J46 J50 J51 J49 J52 J48 J53 J47

(each: 1, 2)

J36

CHASSIS GND	E1
LIN MTR RTN	E4
LIN MTR RTN	E3
LIN MTR	E2
LIN MTR	E5

LINEAR MOTOR COILS

10	
9	
8	
7	
6	
5	
4	
3	
2	
1	

PRINTRONIX

SCHEMATIC
HAMMER BANK

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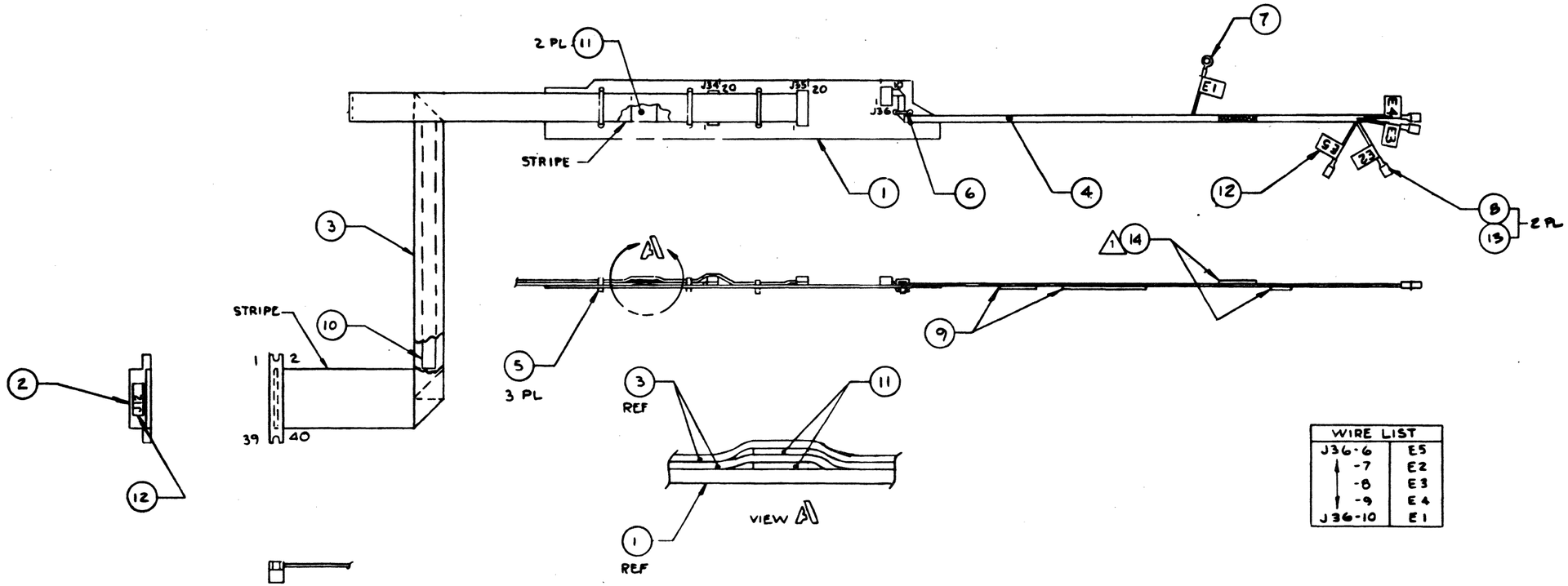
880310
CABLE ASSY, HAMMER BANK

ITEM NO.	PART NO.	DESCRIPTION
1	110265-001	PCBA, HAMMER BANK
2	101330-001	CONNECTOR, 40 PIN
3	101488-003	CABLE, FLAT RIBBON, NESTABLE
4	106665-001	CABLE, RIBBON 28 AWG
5	110172-001	CLIP, CABLE
6	101480-001	TIE, WRAP
7	105949-001	SPADE, RING
8	106505-001	CONNECTOR, FAST-ON RECEPTACLE
9	105812-001	FOAM, ADHESIVE BACKED
10	101562-001	TAPE, DOUBLE CONTACT
11	103126-002	TAPE, DOUBLE ADHESIVE
12	102901-001	TAPE, LABEL
13	106564-001	SLEEVE, INSULATING, FLAT
14	101562-002	TAPE, DOUBLE CONTACT



WIRE LIST	
J36-6	E5
-7	E2
-8	E3
-9	E4
J36-10	E1

1 DO NOT REMOVE PROTECTIVE BACKING

THOMPSON BLVD. 9181

PRINTRONIX

CABLE ASSEMBLY
HAMMER BANK

DRAWING NO. 880 310

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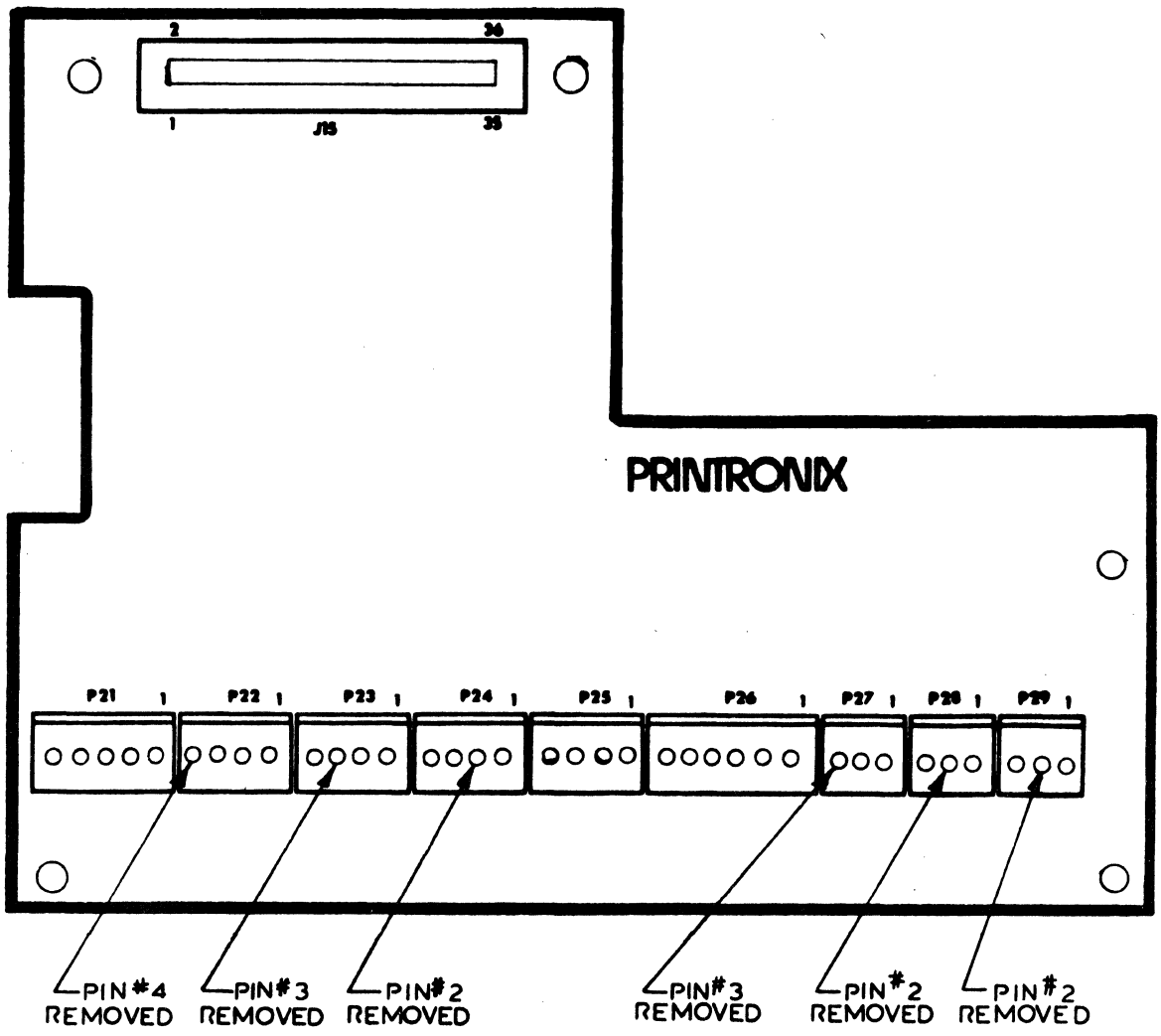
PRINTRONIX

PCBA, INTERCONNECT BOARD

ASSY. NO. 880438

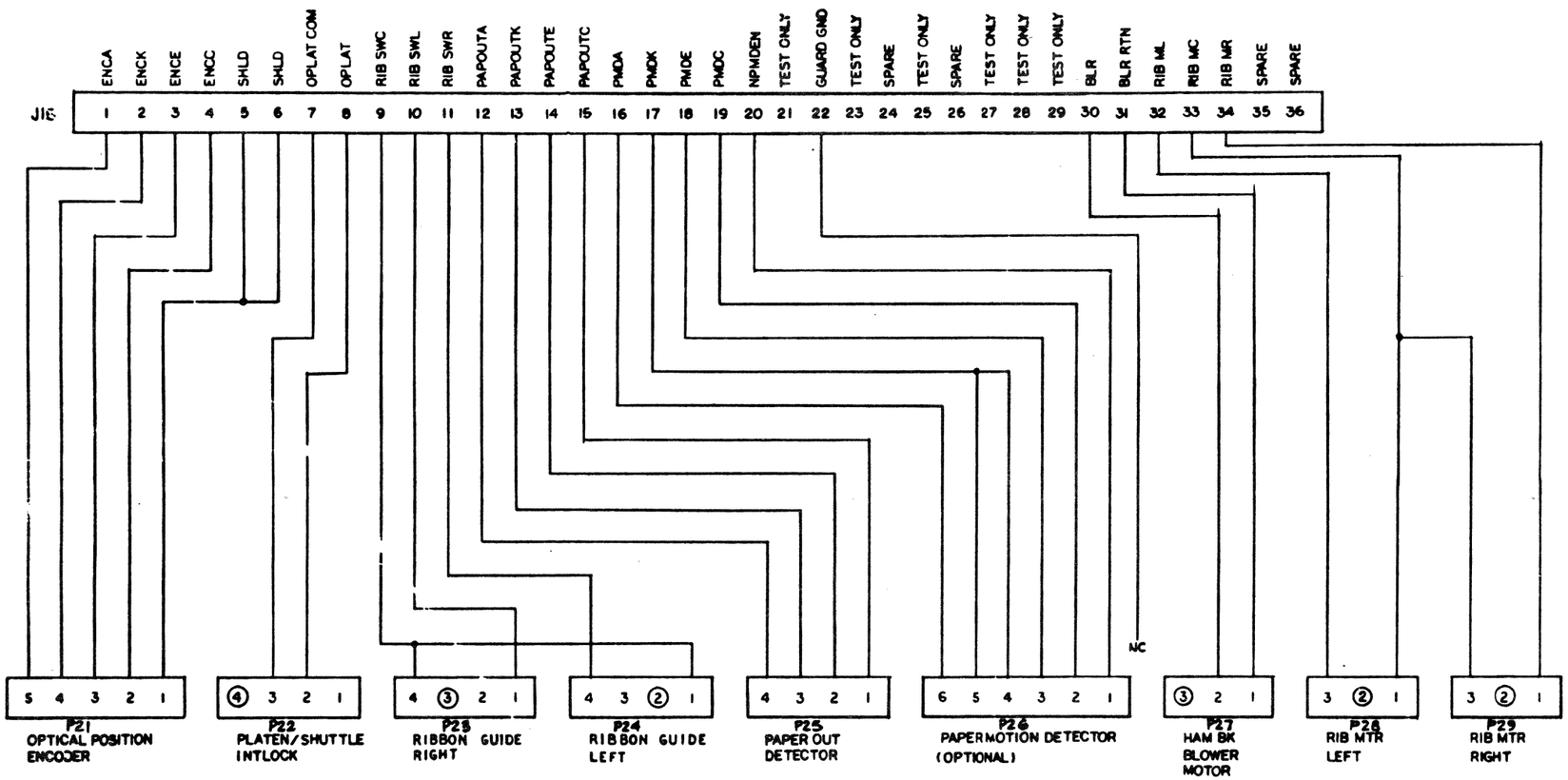
REFERENCE DESIGNATOR	PART NUMBER	QTY	DESCRIPTION
	110439-001	1	PCB, INTERCONNECT BOARD
	110443-000	REF	SCHEMATIC, INTERCONNECT BOARD
J15	105863-001	1	CONNECTOR, CARD EDGE, P.C. MTG, 36 PIN
P27, 28, 29	101332-002	3	CONNECTOR, P.C. MTG, 3 PIN, MALE
P22, 23, 24, 25	101332-006	4	CONNECTOR, P.C. MTG, 4 PIN, MALE
P21	101332-001	1	CONNECTOR, P.C. MTG, 5 PIN, MALE
P26	101332-003	1	CONNECTOR, P.C. MTG, 6 PIN, MALE



PRINTRONIX

INTERCONNECT BOARD

DRAWING NO.	PAGE NO.
880438	



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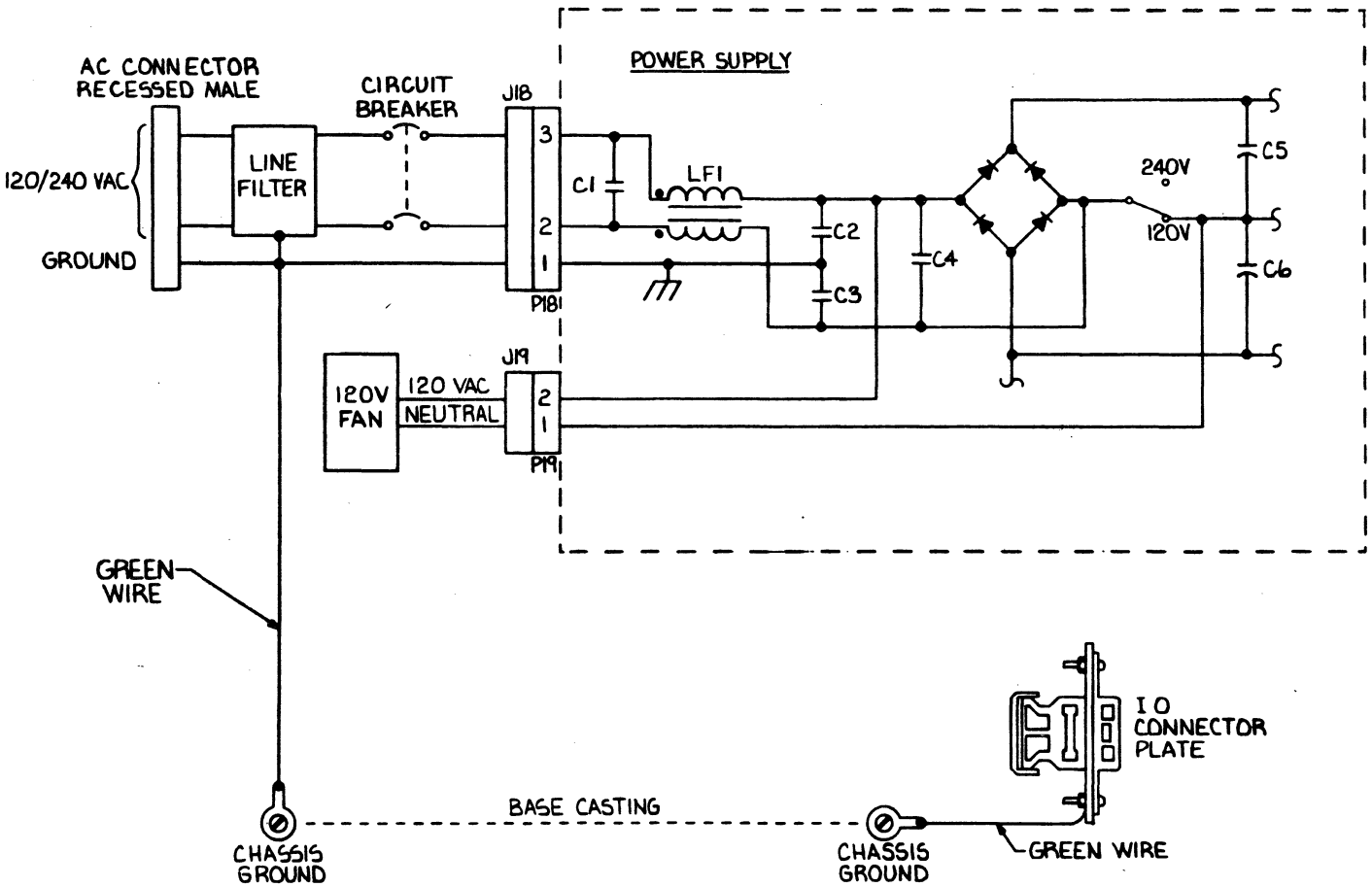

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