ER-LQP02-TM-001

LQP02 Printer Technical Manual

Prepared by Educational Services
of
Digital Equipment Corporation

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NOTE

The purpose of this manual is to provide installation, operation, and support level maintenance information for the LQP02 printer. Consult the LQP02 Pocket Service Guide, EK-LQP02-PS-001, for primary service information.

GENERAL DESCRIPTION

INTRODUCTION

The LQP02 printer is a full character daisywheel printer that is capable of operating from either 115 or 230 Vac and 50 or 60 Hz power sources. It is capable of printing a variety of character fonts, including proportional spacing, by interchanging printwheels. The LQP02 front panel allows the operator to both monitor printer status and to signal the host system. It has a ribbon drive system that will accept either fabric or mylar ribbons in disposable cartridges that are operator replaceable. The primary method of paper feed is the friction platen mode of operation with the optional capability of supporting a tractor feed system or automatic sheet feeder. The LQP02 communication line can operate at baud rates ranging from 75 to 9600 in full duplex.

Maintenance is straightforward since the design employs the modular concept of replaceable parts.

SCOPE OF MANUAL

The scope of this manual is to provide installation, operation, and support level maintenance information for the LQP02 printer. Consult the LQP02 Pocket Service Guide, EK-LQP02-PS-001, for primary service information.

The GENERAL DESCRIPTION chapter presents a broad overview of the LQP02 printer. For more detailed information, refer to the appropriate chapter.

The INSTALLATION chapter details receiving, installation, and inspection testing instructions.

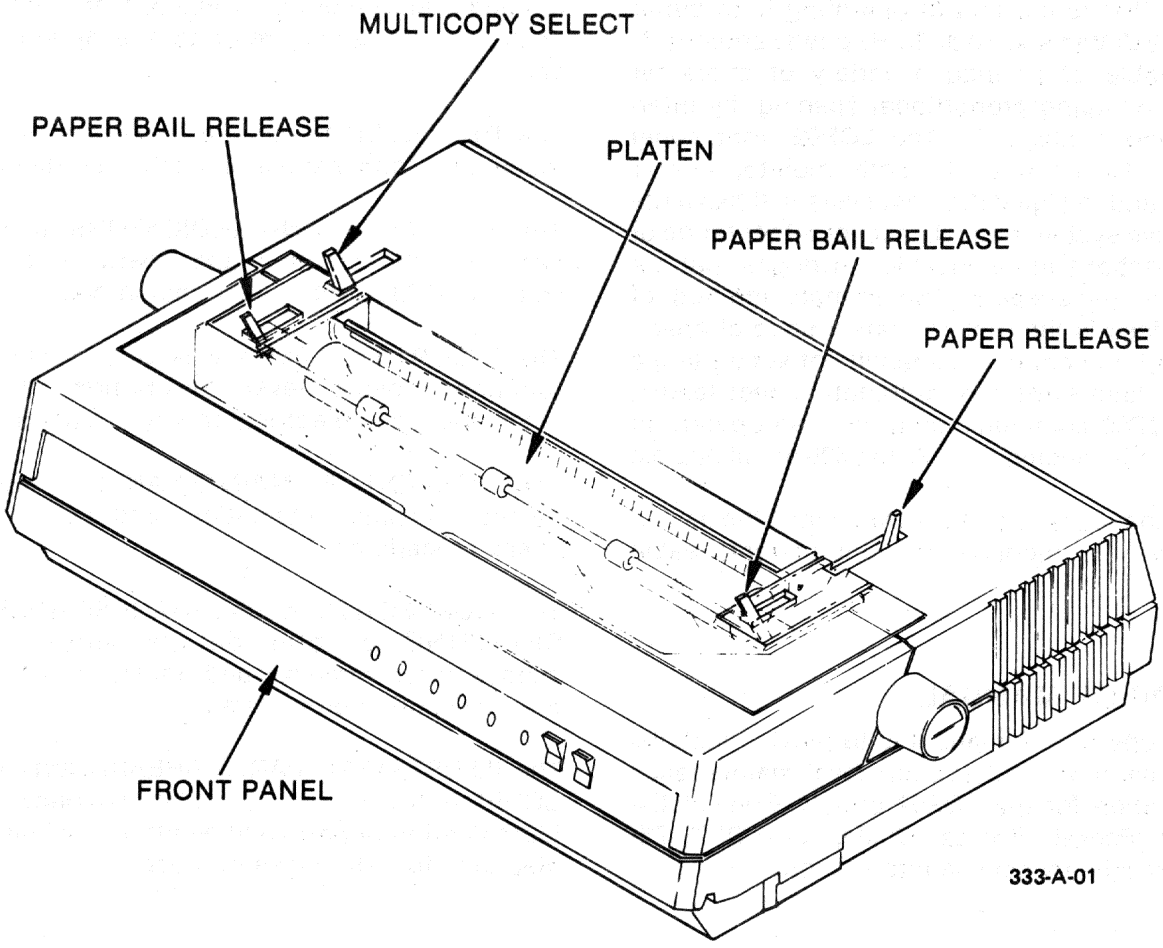
The CONTROLS AND INDICATORS chapter describes the function and operation of the various LQP02 controls and indicators.

The THEORY OF OPERATION chapter offers a functional block level description of the mechanical and electrical theory of operation.

The PREVENTIVE MAINTENANCE chapters details cleaning, lubrication, and adjustment check procedures.

The CORRECTIVE MAINTENANCE/TROUBLESHOOTING chapter details adjustment, subassembly removal and replacement, and troubleshooting procedures.

The ILLUSTRATED PARTS BREAKDOWN AND SCHEMATICS chapter provides exploded view identification of parts and electronic schematic diagrams for references purposes.



The LQP02 Printer

RECOMMENDED SPARE PARTS

The following list details the major spares, subassemblies, and piece parts recommended for field level maintenance of the LQP02 printer.

ITEM	VENDOR P/N	DESCRIPTION	SPARE LEVEL	QUANTITY PER PRINTER
1	80032-03	Cradle Assy., Std. 12.84	B	1
2	80153	Shaft, Front Feed Roller	A	2
3	80154	Shaft, Rear Feed Roller	A	2
4	80175	Gear, Tractor Drive	A	1
5	80202	Gear, Idler	B	1
6	80331-06	Motor, Paper Feed	B	1
7	80387	Spring, Ribbon Tension Arm	B	1
8	80438	Guide, Paper Edge	B	1
9	80713	Spring, Hammer	A	1
10	80714-08	Hammer Assy., Std.	A	1
11	80784	Plate, Hammer Guide Nut	A	1
12	81973-03	Scale, Paper	A	1
13	83006-09	Cover Assy, Complete	A	1
14	83007-03	Mechanism Assy., Printer	C	1
15	83010-06	Carriage Assy., Complete	B	1
16	83031-01	Motor Assy., Carriage	B	1
17	83037-01	Armature Assy., Hammer	A	1
18	83040-02	Platen Assy., Complete	C	1
19	83088-01	Closure, Left Mask	B	1
20	83088-02	Closure, Right Mask	B	1
21	83109-06	Panel Assy., Front	B	1
22	83111-01	Mask, Top	B	1
23	83121-02	Belt, Drive	B	1
24	84377-01	Guide, Card	B	1
25	83248-01	Latch, Card Guide	A	2
26	83260-01	Wiper, Felt Guide	B	2
27	83300-01	Arm, Detent	A	1
28	83319-01	Spring, Impression Control	B	1
29	83370-02	Pivot, Printwheel Motor	A	2
30	83388-01	Pivot, Ribbon Latch	B	2
31	83443-01	Lever, Feed Roller Release	A	1
32	83444-01	Lever, Impression Control	A	1
33	83543-01	Washer, Thrust	A	2
34	83544-01	Bearing, Spherical	A	1
35	83547-01	Key, Ribbon Drive	A	2
36	83548-01	Spring, Ribbon Drive	A	2
37	83553-01	Clutch Assy., Ribbon Drive	A	1
38	83568-01	Cam, Carriage Shaft Lock	A	4
39	83591-01	Core Assy., Platen	A	1
40	83605-01	Eccentric, Hammer Arm Stop	B	1

NOTES: A = Recommended for Central Spare Inventory
B = Recommended for Branch Spare Inventory
C = Included as part of Customer Distribution Kit (Vendor P/N 84333-01)

RECOMMENDED SPARE PARTS - CONTINUED

ITEM	VENDOR P/N	DESCRIPTION	SPARE LEVEL	QUANTITY PER PRINTER
41	83997	Kit, Miscellaneous Hardware	C	1
42	84109-01	Lever, R.H. Paper Bail	B	1
43	84114-01	Lever, L.H. Paper Bail	B	1
44	84232-01	Motor Assy., Ribbon Feed	A	1
45	84239-01	Eccentric, Hammer Arm Stop	A	1
46	84363-01	Fan, DC	B	1
47	85000-03	Needle Roll, 0.062 X 0.53	A	1
48	90714-01	PCB Assy., Serial Interface Controller	C	1
49	90716-01	PCB Assy., Motherboard	B	1
50	90718-01	PCB Assy., Front Panel	B	1
51	91162-XX	PCB Assy., Digital	C	1
52	91174-XX	PCB Assy., Analog	C	1
53	91372-01	PCB Assy., Power Supply	C	1
54	97028-01	Transistor (Q2), Carriage (NPN)	B	1
55	97029-01	Transistor (Q1), Carriage (PNP)	B	1

NOTES: A = Recommended for Central Spare Inventory
B = Recommended for Branch Spare Inventory
C = Included as part of Customer Distribution Kit (Vendor P/N 84333-01)

The Miscellaneous Hardware Kit (Vendor P/N 83997) includes the following:

ITEM	VENDOR P/N	DESCRIPTION	QUANTITY PER KIT
1	80234	Spring, Platen Latch	2
2	80329	Roller Assy., Paper Bail	1
3	80334	Spring, Cradle	2
4	80368	Photon Module, EOR	1
5	83059-01	Bumper, Rubber	1
6	83069-01	Sensor Assy., EOT Photo	1
7	83369-01	Spring, Ribbon Latch	1
8	83429-02	Knob, Platen	1
9	84222-01	Latch, Ribbon	2
10	94096-03	Fuse, 230Vac, 3 amp	3
11	94218-001	Picofuse, 1 amp	3
12	94218-002	Picofuse, 2 amp	3
13	94218-005	Picofuse, 5 amp	3

ACCESSORIES

A tractor feed system and automatic sheet feeder are available as optional accessories for use with the LQP02 printer.

SUPPLIES

A wide variety of printwheels and ribbon cartridges are available for use with the LQPO2 printer.

INSTALLATION

GENERAL

This chapter describes installation of the LQP02 printer, including receiving, power and signal cable connections, and inspection testing.

RECEIVING

Each printer is shipped in an individual carton for protection against shipping damage. Unpack the printer as follows:

1. Inspect the shipping carton for any signs of damage. If any damage is observed, have the delivery agent note the damage on the shipping documents. Some shippers may wish to be present when the carton is opened if external damage is apparent.

2. Open the carton and remove the packaged printer, and a bag containing a printwheel and ribbon cartridge.

3. Remove the cardboard packing tube containing the platen from recesses in the left and right styrofoam end caps.

4. Remove the left and right styrofoam end caps from the printer. Remove the plastic bag from around the printer.

5. Without turning the printer over, remove the metal shipping strap from the outside of the bottom cover by removing two screws.

6. Remove the top cover to expose the operator access area of the printer. Remove the desiccant bag and all packing materials used to secure the carriage and paper bail during shipment.

7. Install the printwheel, ribbon cartridge and platen. Reinstall the top cover.

8. Inspect the printer for scratches and dents, loose, missing or damaged parts, and any other damage that might impair proper printer operation.

9. Retain all packing materials for possible reuse.

INSTALLATION

Interface the printer to the system in which it will be used as follows: Refer to the LQP02 Rear Panel Switch and Connector Access illustration.

1. According to system instructions, connect the RS-232-C serial data cable between the host system and the printer.

2. Connect the power cable from the printer to a convenient power outlet. Verify that the local power source satisfies the power requirements of the printer and that the VOLTAGE SELECT switch is properly placed down for 115 Vac, or up for 230 Vac operation.

INSPECTION TESTING

After interfacing the printer to its host system, verify that the printer has a printwheel and ribbon cartridge installed. Install paper in the printer and proceed to test as follows:

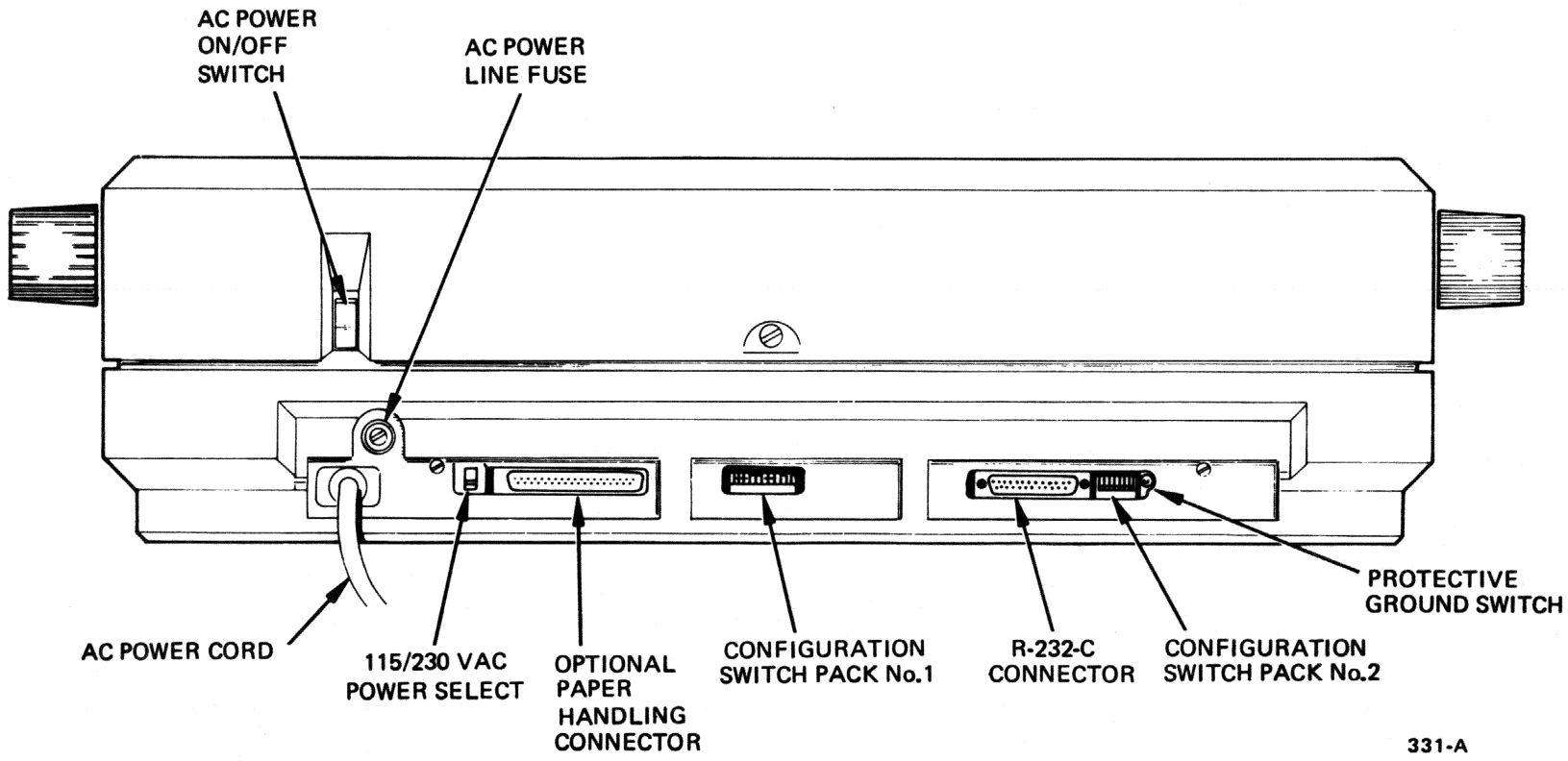
1. Turn the Power Switch to ON and verify that the printer correctly performs a power-up restore sequence.

2. Verify that the green POWER indicator is illuminated.

3. Verify that both the RIBBON OUT and PAPER OUT indicators are functioning by alternately installing and removing a ribbon cartridge and paper.

4. Exercise the printer and host system by having the printer print about 15 minutes of average text and/or specialized test patterns. Perform the printer self-test routine if it is desired to test the printer while isolated from the host system.

5. Verify that all commands are executed correctly and that all characters are printed with satisfactory print quality.



LQP02 Rear Panel Switch and Connector Access

CONTROLS AND INDICATORS

GENERAL

The Controls and Indicators of the LQP02 printer are divided into two categories; those pertaining to operator functions and those reserved for the system manager. The operator category consists of those controls and indicators located in the area of the front panel, along with the main power switch, cover interlock switch, audible alarm, and column indicator. The system manager category consists of two DIP switch packs, a protective ground switch, and a voltage select switch, all located on the rear panel of the printer. This chapter describes the function and operation of these various controls and indicators.

OPERATOR CONTROLS AND INDICATORS.

(Refer to the Operator Front Panel Controls and Indicators illustration)

Power Switch. The Power Switch is located at the back of the printer near the right corner. The printer restores and comes ready when this switch is activated.

Cover Interlock Switch. The Cover Interlock Switch is a magnetic proximity switch that is activated when the operator access cover (top cover) is removed. At this time the printer is stopped, the carriage disabled, and the status protocol handler informed. When the cover is replaced, the carriage and printwheel will return to their last active position. At this time, the status condition will be reset.

Pause Switch. The Pause Switch is a rocker type switch located on the front panel. When activated it will stop the printer and inform the status protocol handler of a pause condition. Deactivating the switch resets this status condition.

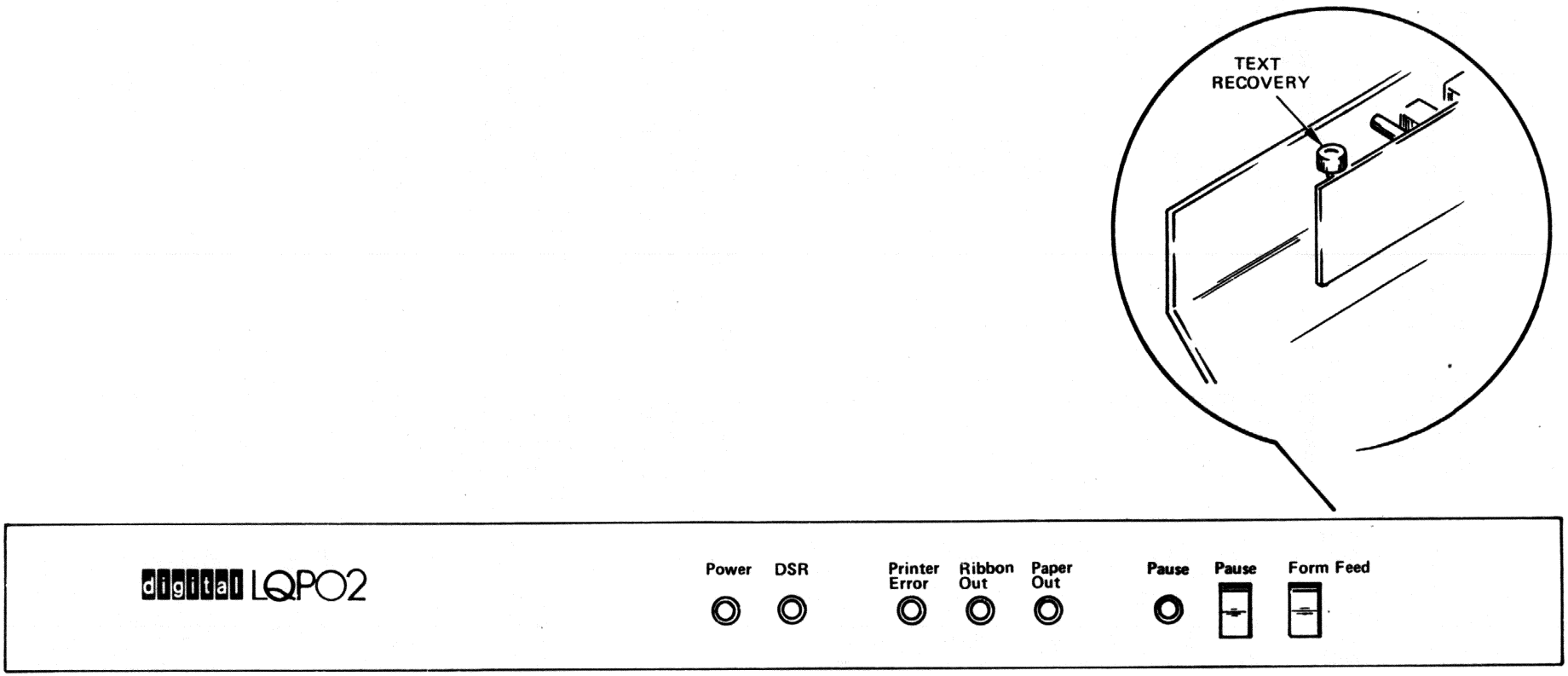
Form Feed Switch. The Form Feed Switch is a momentary contact switch located on the front panel. When activated it causes the paper to advance a preset number of lines, or to the next top of form position. If a sheet feeder is installed, activating the Form Feed Switch will cause a new form to be inserted from tray 1. This switch is operational only when the printer is not processing data from the input buffer. If the Pause Switch is enabled while data is available in the input buffer, the form feed function will be held inoperative in order to preserve the integrity of the document being printed. Also, the Form Feed Switch is used to advance the level of self-test (refer to the Printer Self-Test paragraph).

Text Recovery Switch. The Text Recovery Switch is a momentary contact switch located behind the front panel in the operator access area of the printer. When activated, this switch signals the host of a printer malfunction that would cause a loss of text, and informs the status protocol handler. This status condition is reset either after a polled or unsolicited status signal is transmitted to the host.

Power On Indicator. The Power On Indicator is a green front panel LED that is illuminated when power is applied to the printer.

Data Set Ready (DSR) Indicator. The Data Set Ready Indicator is a green front panel LED that indicates the state of the DSR line when the printer is in Full Modem Control Mode. In this mode, when the DSR line is active, the Data Set Ready Indicator is illuminated. In the Restricted Modem Control Mode, the Data Set Ready Indicator is not illuminated.

Paper Out Indicator. The Paper Out Indicator is a red front panel LED that blinks to indicate a paper out condition (provided that SP1, 10, the Paper Out Enable switch, is selected). A paper out condition halts the printer and informs the status protocol handler. This status condition is reset after the paper out condition is corrected. Normally this indicator is not illuminated.



Operator Front Panel Controls and Indicators

Ribbon Out Indicator. The Ribbon Out Indicator is a red front panel LED that blinks to indicate a ribbon out condition. A ribbon out condition halts the printer and informs the status protocol handler. This status condition is reset after the ribbon out condition is corrected. Normally this indicator is not illuminated.

Printer Error Indicator. The Printer Error Indicator is a red front panel LED that blinks to indicate that the printer has errored due to a hardware malfunction. Such an error stops the printer and causes the status.protocol handler to be informed. By successfully performing an initialization sequence, this status condition can be reset. Normally this indicator is not illuminated.

Pause Indicator. The Pause Indicator is a yellow front panel LED that blinks to indicate that the printer is in a pause condition. Normally this indicator is not illuminated.

Audible Alarm. The audible alarm will momentarily sound when any one of the following error conditions occur:

Paper Out
Ribbon Out
Printer Error
Communication I/O Error
Buffer Overflow
Cover Open

In addition, the audible alarm will sound during a self-test sequence, and can be activated by a BEL (07H) code.

Column Indicator. The Column Indicator is a ruled scale that indicates the position of the print hammer in both 10 and 12 pitch.

SYSTEM MANAGER CONFIGURATION SWITCHES. (Refer to the System Manager Configuration Switches illustration)

The two configuration DIP switch packs located on the rear panel of the printer, designated SP1 (12-position) and SP2 (8-position), are polled at power-up. The following format is used to identify the switch positions: for example, SP1, 5, identifies Switch Pack 1, position 5. Switch position 0-zero is down, and position 1-one is up.

Baud Rate Select Switches, SP1, 1-2-3-4. The Baud Rate Select Switches are active in the following positions:

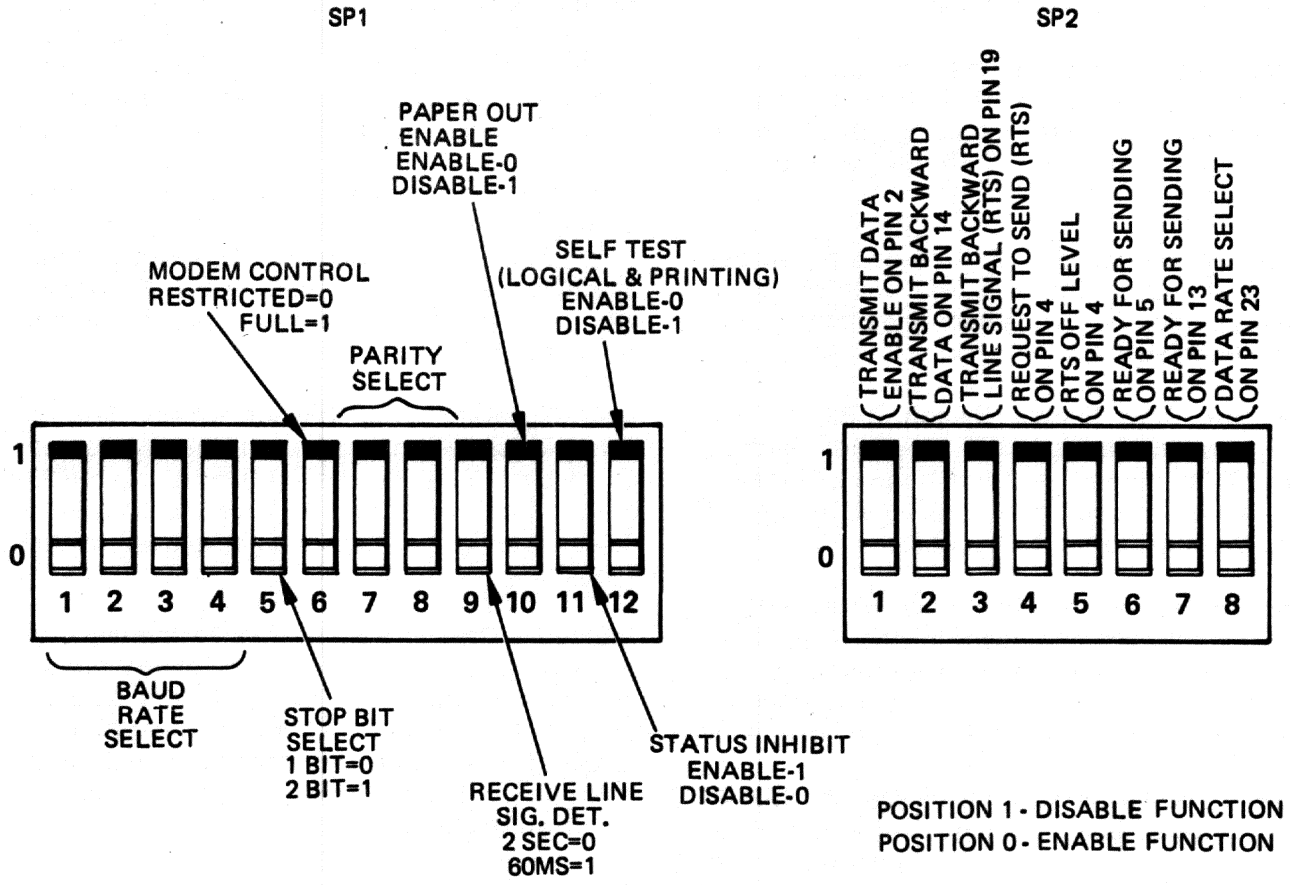
SP1 SWITCH POSITIONS 1 2 3 4	BAUD RATE TRANSMIT	RECEIVE
0 0 0 0	75	600
1 0 0 0	75	1200
0 1 0 0	110	110
1 1 0 0	134.5	134.5
0 0 1 0	150	150
1 0 1 0	200	200
0 1 1 0	300	300
1 1 1 0	600	600
0 0 0 1	1200	1200
1 0 0 1	1800	1800
0 1 0 1	2000	2000
1 1 0 1	2400	2400
0 0 1 1	3600	3600
1 0 1 1	4800	4800
0 1 1 1	7200	7200
1 1 1 1	9600	9600

Stop Bit Switch, SP1, 5. This switch provides selectable one or two stop bit transmission formatting. One stop bit is active when SP1, 5 is placed in the 0-position; two stop bits when in the 1-position.

Full Modem/Restricted Modem Control Switch, SP1, 6. This switch provides full modem control with handshake when placed in the 1-position, or restricted modem control with handshake in the 0-position.

Parity Enable Switches, SP1, 7-8. The parity enable switches are active in the following positions:

SP1 SWITCH POSITIONS 7 8	PARITY
0 0	MARK
0 1	ODD
1 0	SPACE
1 1	EVEN



System Manager Configuration Switches

Receive Line Signal Detect (RLSD) Disconnect Timing Switch, SP1, 9. This switch provides either the standard two second RLSD abort timer when placed in the 0-position, or a 60ms abort timer when placed in the 1-position.

Paper Out Enable Switch, SP1, 10. This switch when placed in the 0-position enables the Paper Out Sensor, or disables the Paper Out Sensor when placed in the 1-position.

Status Inhibit Switch SP1, 11. This switch when placed in the 1-position inhibits status transmission for polled requests until all printer buffers are empty. This switch is used for test purposes.

Self-Test Switch, SP1, 12. This switch provides a logical and printing self-test when placed in the 0-position, and triggered by depressing the Form Feed switch.

Transmit Data Enable Switch, SP2, 1. This switch when placed in the 0-position enables transmitted data to be output on pin 2 of the I/O connector. Transmit data is disabled at pin 2 of the I/O connector in the 1-position.

Transmit Backward Channel Data Switch, SP2, 2. This switch when placed in the 0-position enables transmitted data to be output on pin 14 of the I/O connector. Transmit data is disabled at pin 14 of the I/O connector in the 1-position.

Transmit Backward Line Signal Switch, SP2, 3. This switch enables the Request To Send (RTS) function on pin 19 of the I/O connector when placed in the 0-position and disables the RTS function on pin 19 when placed in the 1-position.

Request To Send Switch, SP2, 4. This switch enables the Request To Send (RTS) function on pin 4 of the I/O connector when placed in the 0-position and disables the RTS function on pin 4 when placed in the 1-position.

Request To Send Off Level Switch, SP2, 5. This switch causes pin 4 of the I/O connector to assume an EIA RS-232-C off level when placed in the 0-position.

Ready For Sending Switch, SP2, 6. This switch enables the Ready For Sending function on pin 5 of the I/O connector when placed in the 0-position and disables the Ready For Sending function on pin 5 when placed in the 1- position.

Backward For Sending Switch, SP2, 7. This switch enables the Ready For Sending function on pin 13 of the I/O connector when placed in the 0-position and disables the Ready For Sending function on pin 13 when placed in the 1-position.

Data Signalling Rate Selector Switch, SP2, 8. This switch when placed in the 0-position enables the Data Rate Select function on pin 23 of the I/0 connector and disables the Data Rate Select function on pin 23 when placed in the 1-position.

Protective Ground Switch. This switch is a toggle switch located on the back of the printer near the left corner. When placed in the up position, printer frame ground is connected to pin 1 of the I/O connector. This connection is broken when the Protective Ground Switch is placed in the down position.

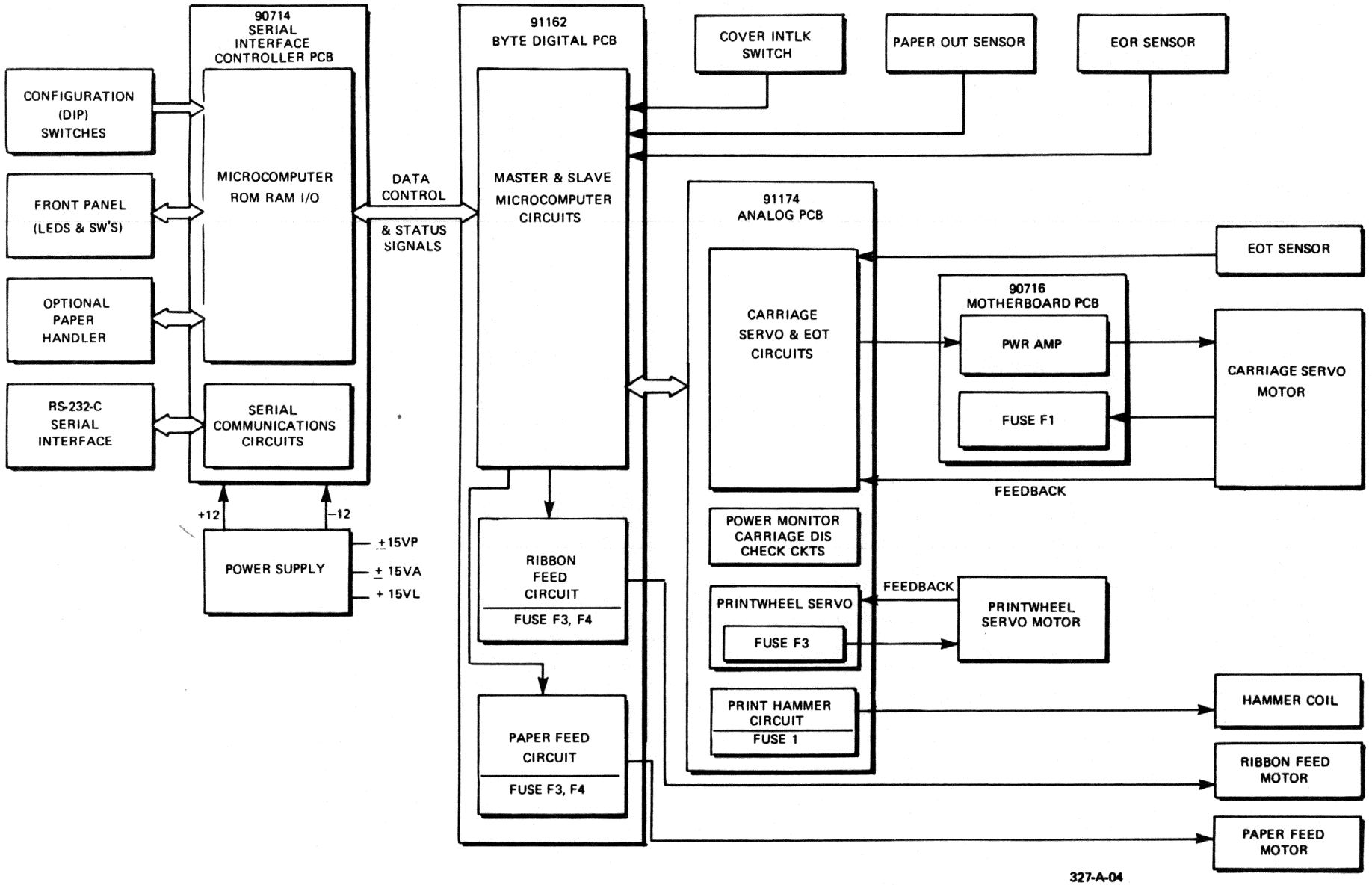
Voltage Select Switch. This is a slide switch located on the back of the printer near the right corner. When placed in the down position the printer is configured for 115 Vac operation, or 230 Vac operation when placed in the up position.

FUNCTIONAL BLOCK LEVEL THEORY OF OPERATION

GENERAL

This section offers a simplified explanation of the theory of operation of the major components and circuits that comprise the LQP02 printer. Beginning with an overall LQP02 printer block diagram, the intention is to depict the transfer of data from the interface, through data processing by the three PCB's (Serial Interface Controller, Digital, and Analog), to the actual printing activity by the mechanical parts. Next, each PCB is separately treated, to better emphasize their individual operational scheme in relation to the complete printer system. The motherboard and power supply are not discussed because their function is considered typical.

This section is presented as an aid to acquiring a fundamental technical understanding of the LQP02 printer. For a more detailed circuit examination, refer to the appropriate schematic.



LQP02 Printer Block Diagram

FUNCTIONAL BLOCK LEVEL THEORY - SERIAL INTERFACE CONTROLLER PCB. (Refer to the Serial Interface Controller PCB Block Diagram illustration)

The purpose of the Serial Interface Controller PCB is to interface a host system and printer by converting RS-232-C serial data to ASCII parallel data. This is accomplished chiefly by the USART (Universal Synchronous/Asynchronous Receiver-Transmitter) and CPU (Central Processing Unit).

Serial data is accepted by the Serial Interface Controller PCB via the 25-pin EIA connector and delivered to the USART. The USART functions as a converter to produce ASCII parallel data from the serialized input data. In addition, the USART monitors the quality of the incoming data to detect the occurrence of communication errors (framing, parity, and overrun errors). This ASCII parallel data from the USART is next transferred to the CPU for processing.

The CPU immediately places all printer data in temporary RAM storage (a 256-character buffer). A buffer handshaking protocol based on the control characters DC1 (XON) and DC3 (XOFF) is employed when the rate of incoming data exceeds that of the printing throughput. Actual data processing occurs as the CPU then begins to withdraw data from the buffer, on a first in-first out basis, in order to reference it to the appropriate instruction held in memory. This instruction specifies an operation and the values or location of its operands.

For example, if the CPU has withdrawn from the buffer the Escape Sequence Mnemonic for a Next Line Command, it must then retrieve from ROM those instructions necessary to execute the relocation of the active position to the left margin on the next line. Non-volatile or main program instructions, such as the printable character set, are stored in ROM; volatile instructions used for temporary application, e.g. tabs, form lengths, etc., are stored in RAM. The CPU relies upon memory to supply the instructions for how data is to be processed, and a clock circuit to provide timing. Having accomplished this, the CPU then outputs the processed data to the Digital PCB.

In addition to interfacing data between a host system and printer, the Serial Interface Controller PCB also interfaces the configuration (DIP) switches, front panel operator switches and indicators, and optional paper handling accessories.

FUNCTIONAL BLOCK LEVEL THEORY - DIGITAL PCB. (Refer to the Digital PCB Block Diagram illustration)

The purpose of the Digital PCB is to execute the parallel input data supplied by the Serial Interface Controller PCB and to develop the input to the Analog PCB. Electronically, the primary components of the Digital PCB are a master and slave microcomputer, each having a corresponding I/O expander.

Input data to the Digital PCB arrives on the input data bus and is clocked into a data latch by a strobe. This same strobe also sets a data strobe latch which acts to "flag" the master microcomputer that data is present at the data latch. The master microcomputer then responds by issuing a read command pulse to enable the output of the data latch and place the data on the main data bus. The master microcomputer receives the data from the bus and transmits a clear command to reset the strobe latch and thereby clear

the input to the Digital PCB for subsequent incoming data.

The master microcomputer is responsible for discriminating all incoming data to determine its distribution. Data pertaining to carriage motion and paper feed is reserved for the master microcomputer. Data pertaining to printwheel motion, ribbon feed, and the print hammer is delegated by the master to be handled by the slave microcomputer. ACK/BUSY handshaking is employed between the master and the slave microcomputers for proper system coordination. This is necessary to prevent the simultaneous occurrence of such events as paper feed and hammer fire.

Basically, the signal distribution from the microcomputers is as follows: Carriage motion digital signals from the master microcomputer, together with printwheel and print hammer digital signals from the slave microcomputer, are transferred to the Analog PCB. Paper feed digital signals from the master I/O expander and ribbon feed digital signals from the slave I/0 expander, are used to control respective paper feed or ribbon feed stepper motors. This is accomplished by the logic level of the signals in enabling or disabling power transistors that govern the direction of current flow through the motor windings.

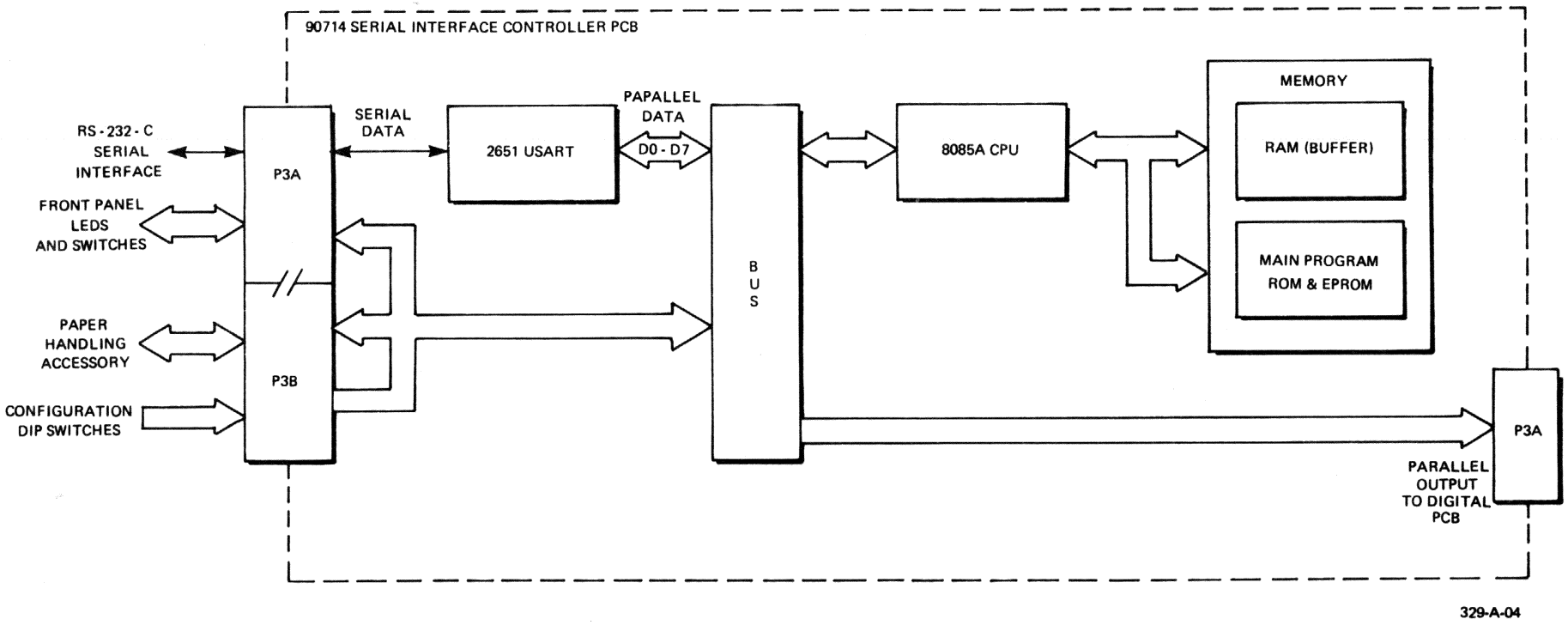
Of note to the field service technician is the fuse protection incorporated on the Digital PCB for the paper feed and ribbon feed circuits.

FUNCTIONAL BLOCK LEVEL THEORY - ANALOG PCB. (Refer to the Analog PCB Block Diagram illustration)

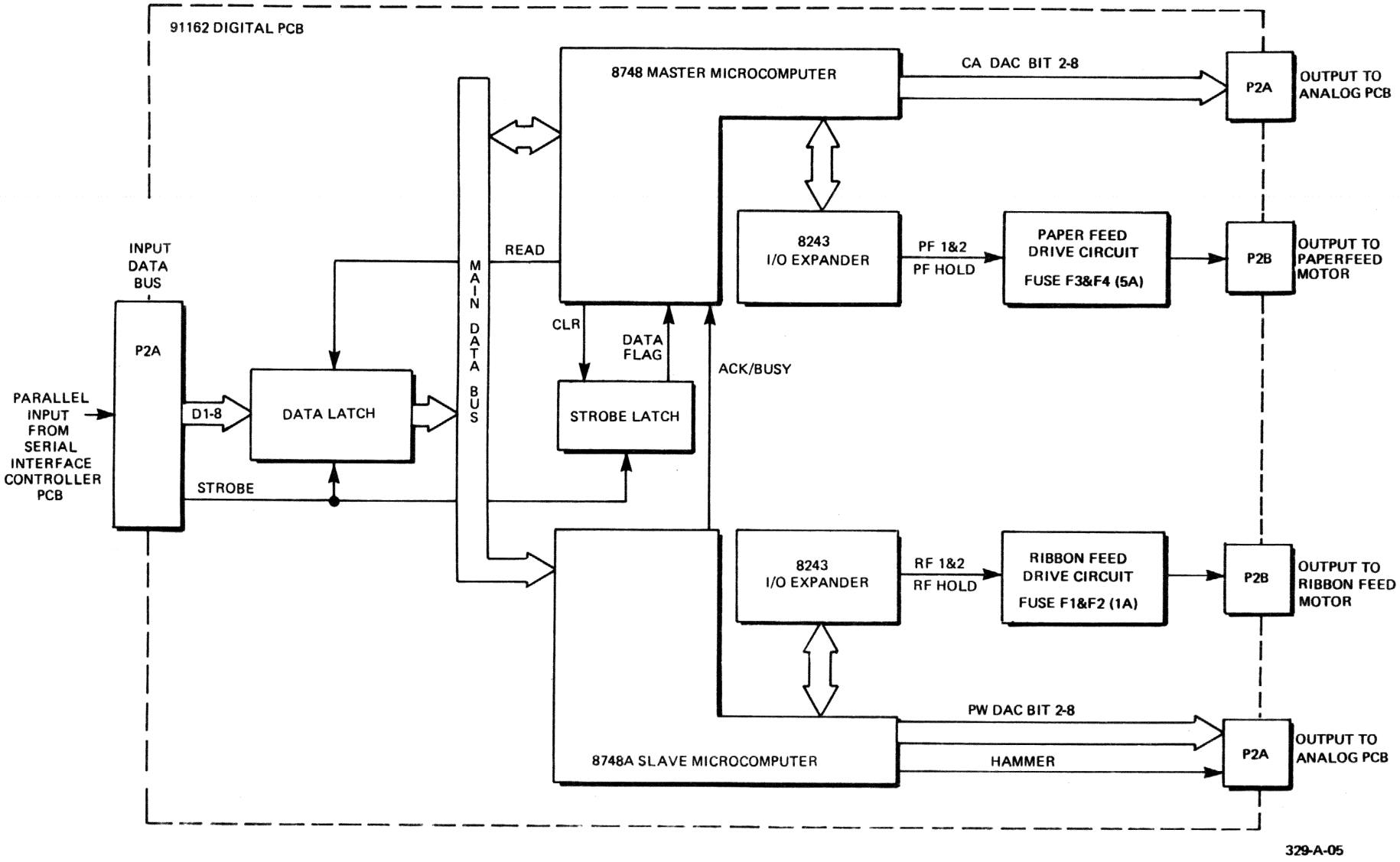
The purpose of the Analog PCB is to convert the digital input from the Digital PCB into analog signals for driving the carriage motor, printwheel motor, and print hammer functions. Additional functions handled by the Analog PCB include the EOT (End of Travel) sensor, carriage disable, power monitor, and the check circuits.

Both the carriage and printwheel assemblies are driven by individual servo systems. Carriage or printwheel motion data received from the Digital PCB is input to a corresponding carriage or printwheel DAC (Digital-to-Analog converter). The analog output from a DAC is transferred to the respective carriage or printwheel signal conditioning circuit, each comprised of zero crossing detectors, position and velocity tachometers, clock generator, and error amplifier. From the signal conditioning circuits, a voltage is developed to power that system's servo motor. When a carriage or printwheel movement is to be made, the extent of the move determines the duration of this voltage applied to the servo motor. Throughout any movement of carriage or printwheel, feedback signals are returned to the signal conditioning circuits to trigger a clock generator and complete the servo loop. Pulses from the clock generator are then carried to the Digital PCB microcomputers for continuous tracking of carriage and printwheel absolute position.

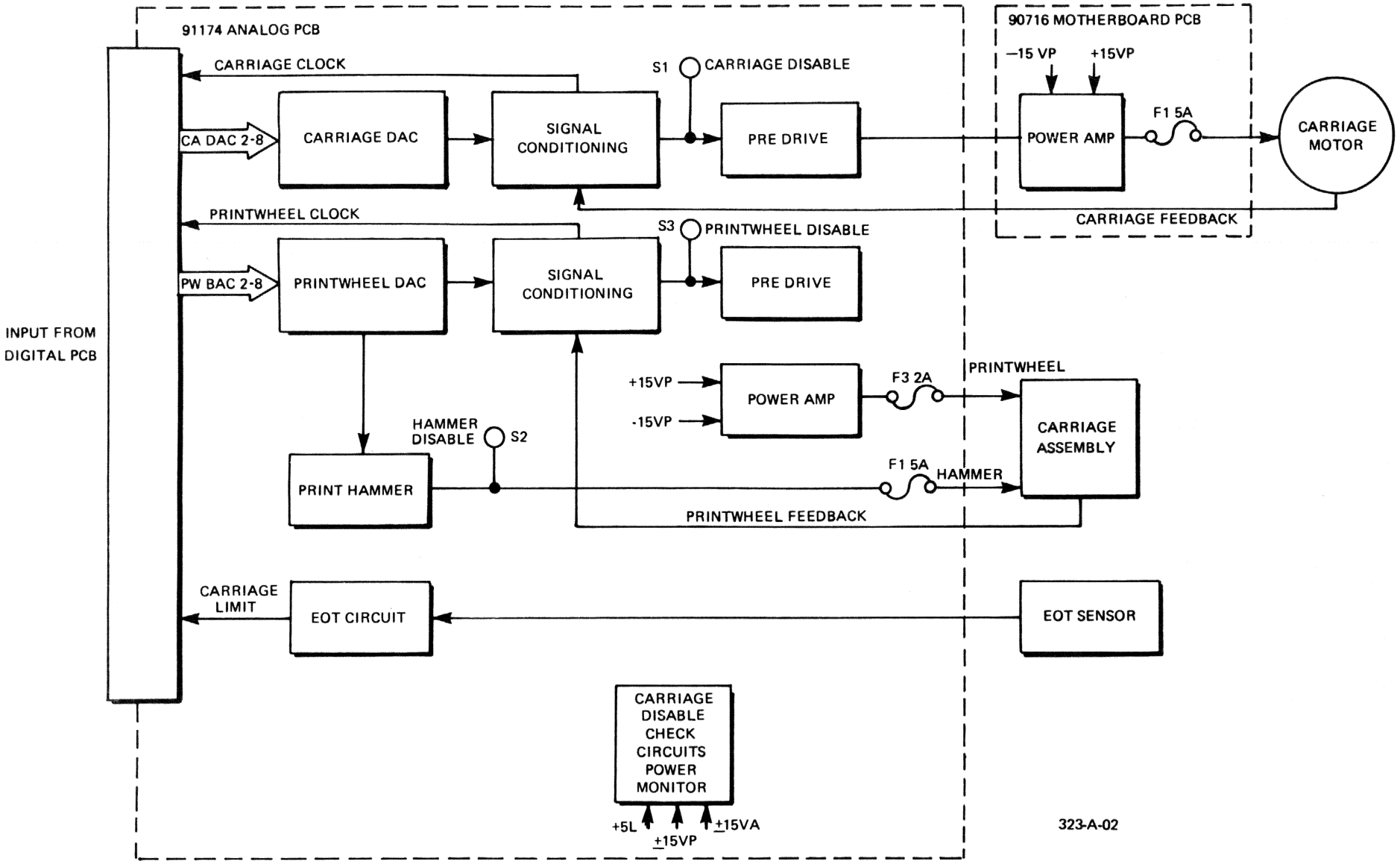
The two servo systems operate the same, but have some unique features. Namely, the output of the carriage servo is transferred to an external power amplifier with fuse protection located on the Motherboard Assembly. Conversely, the printwheel servo power amplifier with fuse protection is located on the Analog PCB. Furthermore, the printwheel DAC also handles print hammer data.



Serial Interface Controller PCB Block Diagram



Digital PCB Block Diagram



Analog PCB Block Diagram

PREVENTIVE MAINTENANCE

GENERAL

When properly maintained the LQP02 printer will provide many years of excellent service. The following preventive maintenance procedures are provided to assure trouble-free operation of the printer when it is used in an average operating environment. Printers used in harsh environments, in applications that are unusually demanding, or with certain paper or ribbon supplies, may require different or more frequent preventive maintenance. Remove power to the printer before performing any preventive maintenance procedure.

RECOMMENDED CLEANING AGENTS AND LUBRICANTS

RECOMMENDED CLEANING AGENTS AND LUBRICANTS

CLEANING AGENTS	LUBRICANTS
Isopropyl Alcohol or Freon Low Residue Cleaners*; e.g. Formula 409, Fantastic, Mild Soap and Water, etc. Fedron Platen Cleaner	Shell Tellus Oil #46 (Vendor P/N 84191-01)
*Clean plastic parts with a low residue cleaner only.	

CLEANING

Printwheel and Card Guide. These parts are normally cleaned by the printer operator as required, or by the field service technician during a corrective maintenance service call.

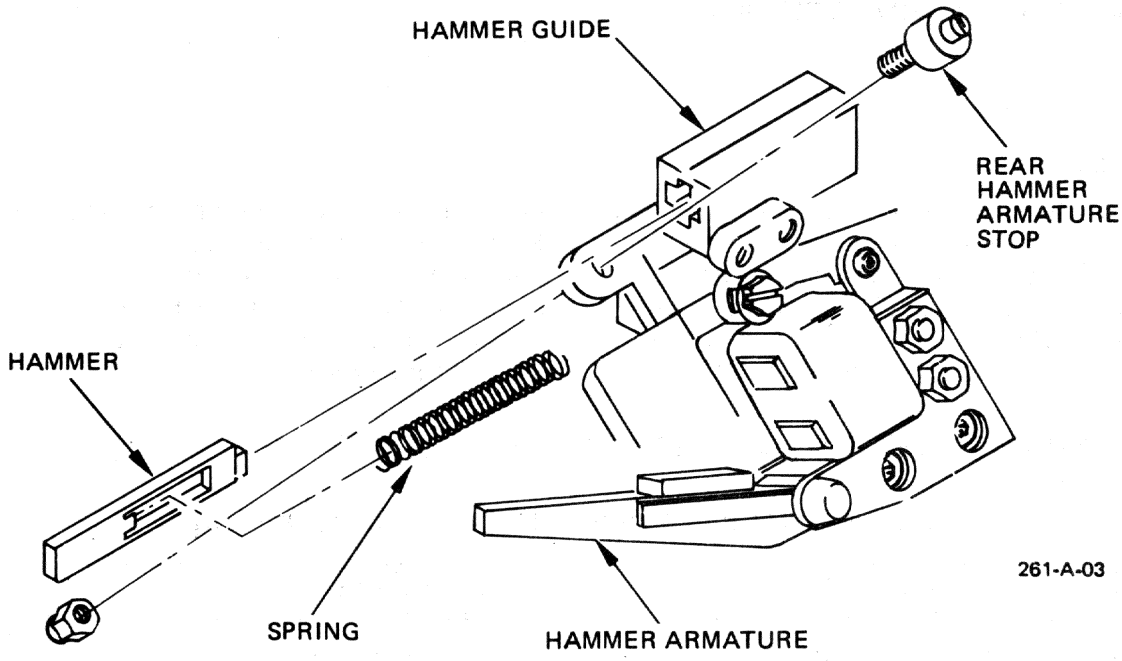
If required, an operator or field service technician can clean a printwheel by (1) removing it from the printer, (2) soaking it in a low residue cleaner, (3) carefully removing any ink or other foreign matter with a medium stiffness brush, and (4) thoroughly rinsing and drying the printwheel prior to reinstallation.

If required, the operator or the field service technician can clean the card guide by using a soft cloth or tissue moistened with a low residue cleaner. First remove the ribbon cartridge, printwheel, and platen.

Print Hammer. The print hammer should be cleaned every six months (depending on operating environment, application, supplies, etc.) as follows: Refer to the Print Hammer Cleaning illustration.

1. Remove the top cover, ribbon cartridge, and printwheel.

2. Remove the rear hammer armature stop and allow the hammer armature to pivot toward the front of the printer.



Print Hammer Cleaning

3. Carefully slide the print hammer out of the hammer guide. Take care not to lose the interior hammer spring.

4. Clean both the print hammer and the inside of the hammer guide with isopropyl alcohol or Freon solvent. Use a cotton swab moistened in one of these cleaners to clean the hammer guide.

5. Carefully replace the hammer spring inside the print hammer and install the print hammer in the hammer guide. Note that the face of the print hammer is a "wedge" shape. Install the print hammer with the wide end of the wedge up.

6. Pivot the hammer armature up to the print hammer and install the rear hammer armature stop.

7. Adjust the rear hammer armature stop (refer to the Print Hammer Armature Rear Stop Adjustment procedure).

8. Reinstall the printwheel, ribbon cartridge, and the top cover.

9. Print several lines of text and inspect for proper print quality. If necessary, make any additional printer adjustments required to obtain correct print quality.

Platen, Feed Rollers, and Paper Bail Rollers. As required (depending on operating environment, application, supplies, etc.), clean the platen, feed rollers, and paper bail rollers with Fedron platen cleaner. Fedron is a strong solvent; do not let it come in contact with plastic parts, and use only in a well ventilated work area.

Remove the platen, front feed rollers, and rear feed rollers from the printer (refer to the Feed Roller Removal and Replacement procedure). Moisten a soft cloth with Fedron platen cleaner and wipe all dirt, ink, and other accumulated soil from these rubber parts.

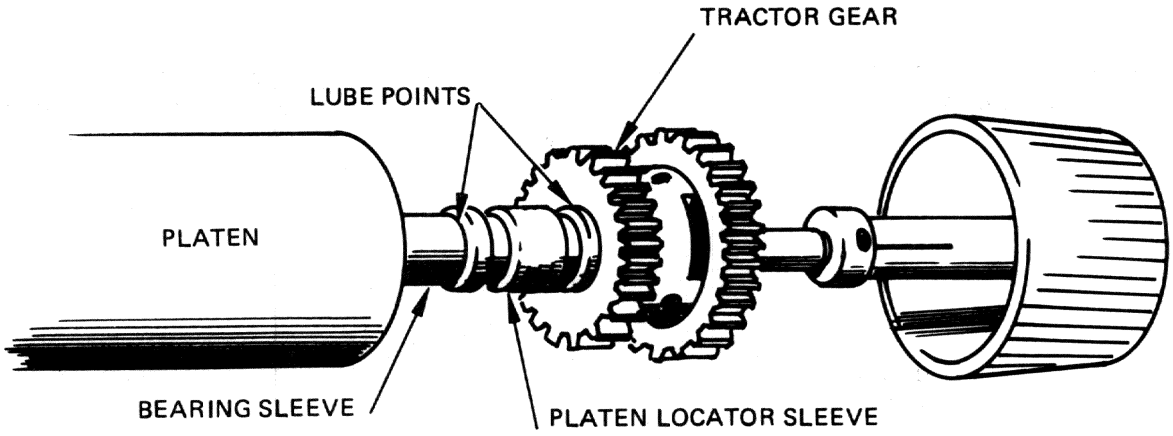
Covers. The operator can clean the painted covers, when necessary, with a soft cloth or tissue moistened with a low residue cleaner.

Metal Parts. A field service technician or operator can clean any of the metal parts, if necessary, with a safe degreasing solvent (isopropyl alcohol, Freon, etc.).

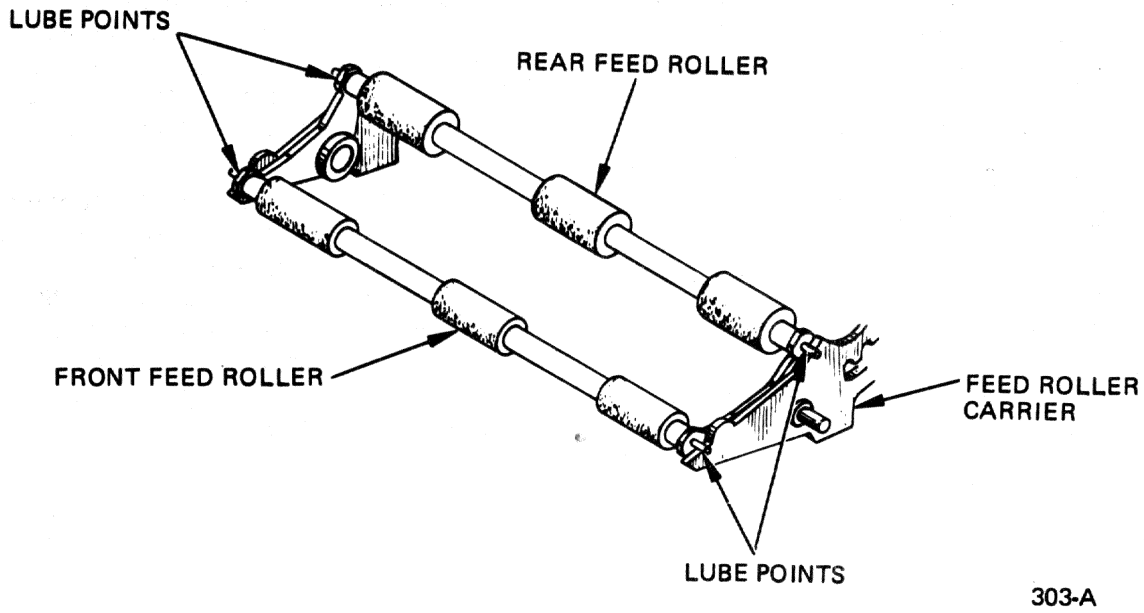
LUBRICATION

Platen Sleeves. Every two years (depending on operating environment, application, supplies, etc.), lubricate the left and right platen sleeves with a couple drops of Tellus #46 oil. Remove the platen from the printer and apply the lubricant between the sleeves, ensuring that it flows to the shaft. Rotate the sleeves to distribute the lubricant evenly. Clean up any excess oil and avoid contact with the platen. Refer to the Platen Sleeve Lubrication illustration.

Feed Rollers. As required (depending on operating environment, application, supplies, etc.), lubricate each end of the front and rear feed roller shafts where they pass through the feed roller carrier (8 places) with one drop of Tellus #46 oil. Remove the platen and platen cradle to gain access to the front and rear feed rollers. Refer to the Feed Roller Shaft Lubrication illustration.

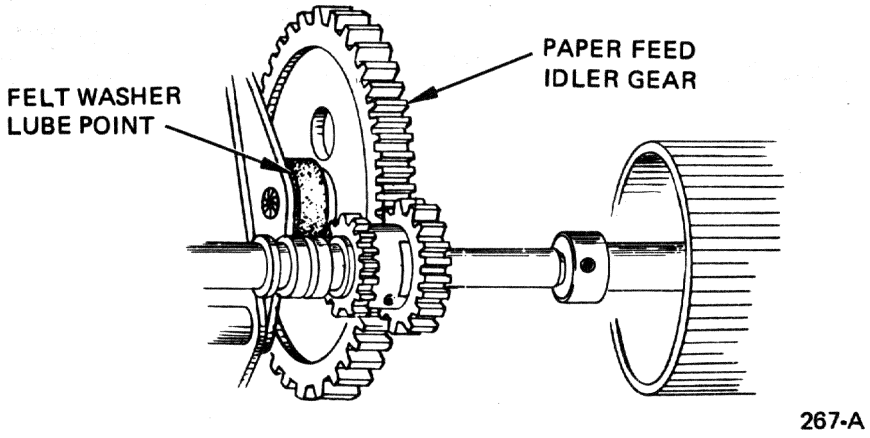


Platen Sleeve Lubrication



Feed Roller Shaft Lubrication

Paper Feed Idler Gear. Once every year (depending on operating environment, application, supplies, etc.), lubricate the felt washer behind the paper feed idler gear with two drops of Tellus #46 oil. Clean up any excess oil. Refer to the Paper Feed Idler Gear Lubrication illustration.



Paper Feed Idler Gear Lubrication

Carriage Guide Shafts. Once every year (depending on operating environment, application, supplies, etc.), clean the carriage guide shafts with a soft cloth moistened with isopropyl alcohol or Freon solvent. Lubricate each shaft by applying a light film (approximately four drops) of Tellus #46 oil.

Felt Wipers. Once every year (depending on operating environment, application, supplies, etc.), lubricate the left and right felt wipers on the rear carriage guide shaft with approximately 20 drops of Tellus #46 oil. The wipers are retained next to the carriage by wiper brackets. It is not necessary to remove the felt wipers to lubricate them.

NOTE

When an excessive build up of contamination occurs, replace the wipers with new lubricated felt wipers. Felt wiper replacement will seldom be necessary in clean operating environments.

PREVENTIVE MAINTENANCE GUIDE

OPERATOR — As required

FIELD SERVICE — As required during a corrective maintenance service call

FIELD SERVICE — Once every six months*

FIELD SERVICE — Once every year*

FIELD SERVICE — Once every two years*

FIELD SERVICE — Not normally required unless environments, application, or supplies require

	X	X				Clean Printwheel
X	X					Clean Card Guide
X	X					Clean Platen
X	X					Clean Feed Rollers
X	X					Clean Paper Bail Rollers
X	X					Clean Covers
X	X					Clean Metal Parts
	X					Check Print Quality
		X				Clean Print Hammer
			X			Lubricate Paper Feed Idler Gear
			X			Clean Carriage Guide Shafts
			X			Lubricate Felt Wipers
				X		Lubricate Platen Sleeves
					X	Lubricate Feed Roller Shafts
					X	Replace Felt Wipers

* Depending on operating environment, application, supplies, etc.

ADJUSTMENT CHECK

During a preventive maintenance inspection, or as required, the following adjustment check should be performed in addition to performing the required cleaning and lubrication procedures.

Print Quality. On every preventive maintenance inspection or emergency service call, check for proper print quality as follows:

1. Ensure that the printwheel and ribbon cartridge installed in the printer are not defective or worn.

2. Ensure that the Multicopy Select Lever is in the full forward position (toward the operator).

3. Print several lines of mixed characters and text, using the full width of the print line. This print strike-up should include:

- Several lines of text in both upper and lower case;
- Tall, symmetrical characters (e.g. slash, parentheses, upper case "I") across the full print line;
- Wide, symmetrical characters (e.g. upper case "O", "H", "M", "W") across the full print line;
- Lower case, descending characters (e.g. lower case "g", "y", "q", "p") across the full print line;
- Underscores in groups of at least five;
- Punctuation marks (e.g. quotation mark, apostrophe, period, comma) across the full print line; and
- A line containing every character, numeral, and symbol on the printwheel.

For example:

The quick brown fox jumped over the lazy dog's back.

THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK.

IIIII OOOOO HHHHH MMMMM WWWWW WWWWW MMMMM HHHHH OOOOO IIIII

ggggg yyyyy ppppp qqqqq qqqqq ppppp yyyyy ggggg ggggg yyyyy

///// ((((( ))))) !!!!! ????? ????? !!!!!))))) (((((/////

"""""""" ..... """" ,,,,, ::::: ::::: ,,,,, """" ..... """""""

ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz

1234567890 1234567890 1234567890 1234567890

4. Inspect the print strike-up. All characters, numerals, and symbols should print with equal ink density.

The characters printed on the left side of the platen should appear the same as those characters printed on the right side.

5. If necessary, refer to the Platen Height and Depth adjustment and the four Print Hammer Mechanism adjustments in the Corrective Maintenance/Troubleshooting Chapter to obtain correct print quality.

CORRECTIVE MAINTENANCE/-TROUBLESHOOTING

GENERAL

The following corrective maintenance procedures are to be used as a guide by the field service technician in performing adjustment, subassembly removal and replacement, and troubleshooting of the LQP02 printer. All cleaning, lubrication, adjustment check, and adjustment procedures mentioned can be found in their respective chapters and sections. Read all pertinent procedures thoroughly before beginning.

TOOLS REQUIRED

The following common hand tools are required to perform field level service on the LQP02 printer.

TOOLS REQUIRED

TOOL	SIZE
Open End Wrench	3/16, 1/4, 5/16,3/8, and 5/8 Inch
Screwdriver	1/8, 1/4, and 3/8 Inch Flat Head
Nutdriver	3/16 and 1/4 Inch
Six Fluted Spline Wrench	0.072 and 0.096 Inch
Flat Nose Pliers	
Spring Hook	
Flat Feeler Gauge Set	
Digital Multimeter	
Torx Wrench Handle and Drivers	T-8H, T-9H, and T-15H

In addition, the following special tools are also required.

Combo Gauge, Vendor P/N 73296-01 (new P/N pending).
Bumper Ring Gauge, Vendor P/N 73046.

ADJUSTMENTS

Very few mechanisms in the LQP02 printer will require adjustment until a worn part must be replaced. Where one adjustment interacts with another, it is noted. After performing any series of adjustment procedures, it is recommended that the Print Quality Adjustment Check be performed (refer to the Preventive Maintenance Chapter.).

Power Supply Voltages. Adjust the internal power supply voltages as follows: Refer to the Power Supply Test Points and Adjustments illustration.

1. Remove the top and intermediate cover assemblies (refer to the Cover Removal and Replacement procedure).

2. Remove the card cage cover to gain access to the power supply.

3. Power up the printer and, using a digital multimeter, check the +5 Vdc, +15 Vdc, and -15 Vdc power supply outputs at the designated test points on the power supply PCB.

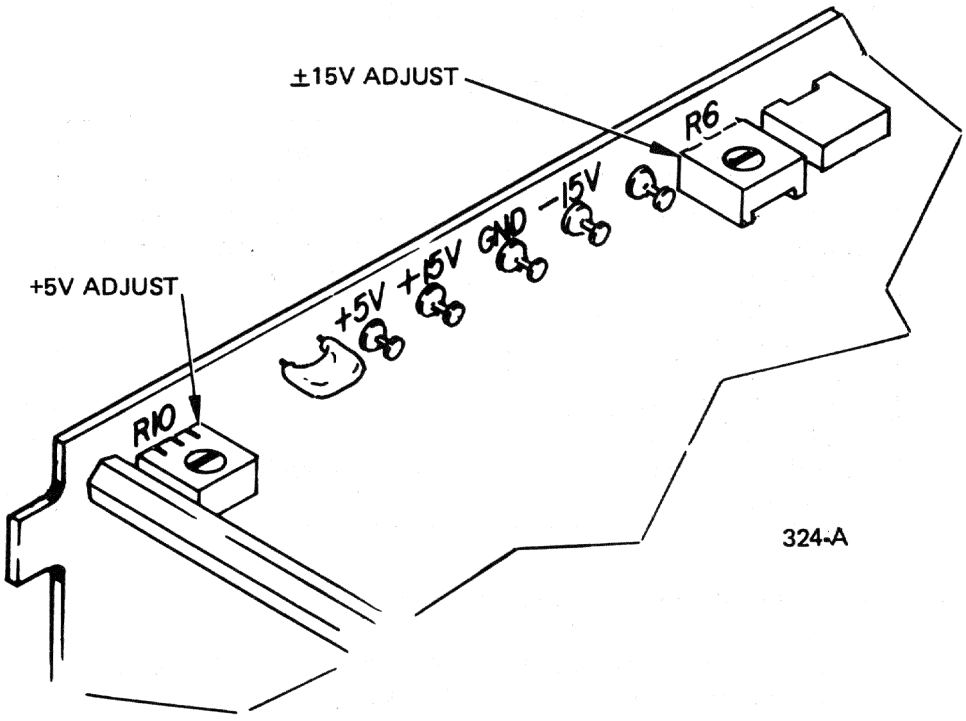
Optimum indications should be as follows: Adjust as necessary.

At the + 5 Vdc test point, read + 5.1 Vdc
At the +15 Vdc test point, read +15.5 Vdc
At the -15 Vdc test point, read -15.5 Vdc

4. Adjust R10 on the power supply PCB to obtain +5.1 Vdc at the +5 Vdc test point.

5. If either the +15 Vdc or -15 Vdc is not indicated at its respective test point, adjust R6 on the power supply PCB so that the lower of the two voltages indicates 15.5 Vdc. The second voltage will track this adjustment or be slightly higher.

6. Replace the card cage cover and the intermediate and top cover assemblies.



Power Supply Test Points and Adjustments

Paper Feed Idler Gear. Adjust the paper feed idler gear to eliminate any backlash or binding in the paper feed gear train (paper feed motor gear, paper feed idler gear, platen drive gear) as follows: Refer to the Paper Feed Idler Gear Adjustment illustration.

1. Disconnect power to the printer.

2. Remove the top and intermediate cover assemblies (refer to the Cover Removal and Replacement procedure).

3. Loosen screws "A" and "B" with a 1/4 inch nutdriver. Screw "A" can be accessed through the hole in the paper feed idler gear. Leave these screws loose enough to allow adjustment, but

also retain the new gear position without being held.

4. Move the paper feed idler gear and its mounting plate so that the idler gear teeth just bottom in both the paper feed motor gear and the platen drive gear.

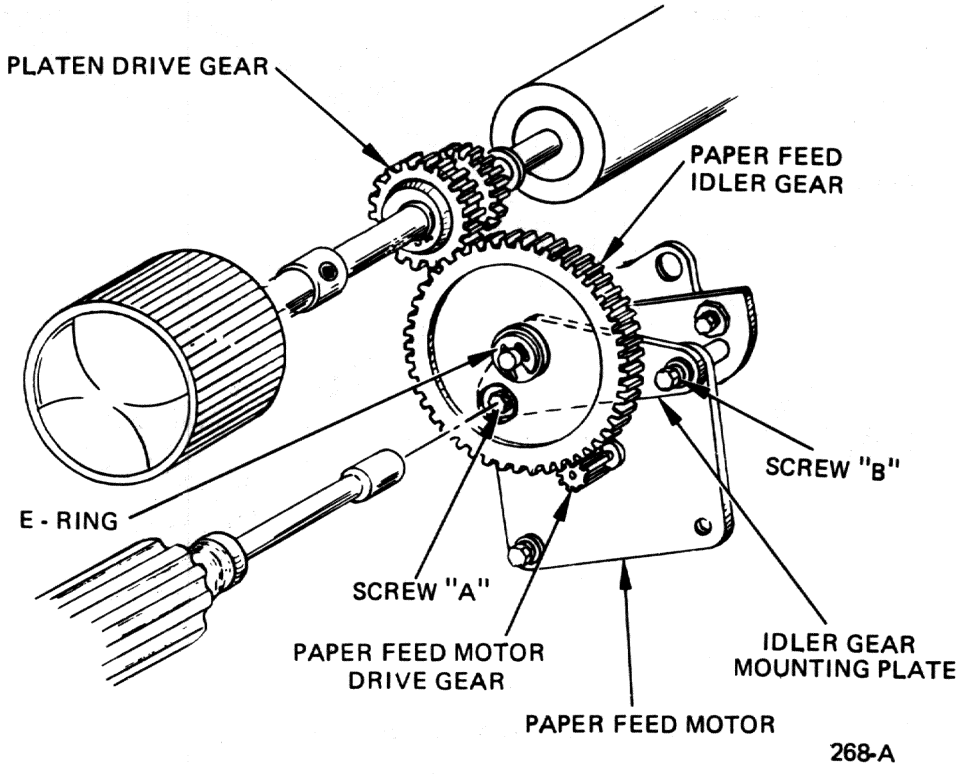
5. Tighten screws "A" and "B".

6. To check for the "no backlash" condition, hold the paper feed motor gear and try to rotate the platen drive gear. No appreciable motion should be detected.

7. To check for the "no bind" condition, remove the E-ring that retains the paper feed idler gear on its mounting stud. If there is "no bind" between any of the gears, the paper feed idler gear will slide on and off its mounting stud freely. Install the E-ring.

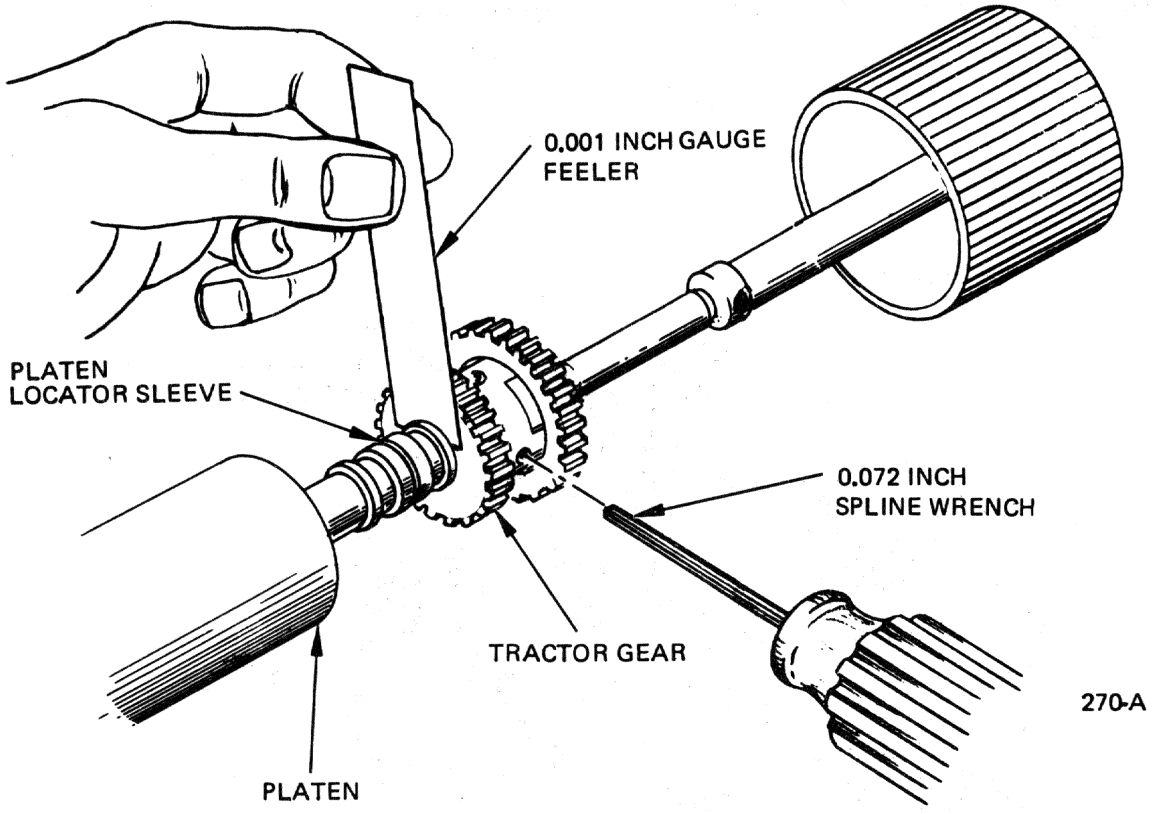
8. Adjust the idler gear mounting plate until you obtain both conditions (no backlash and no bind) in the paper feed gear train.

9. Replace the intermediate and top cover assemblies.



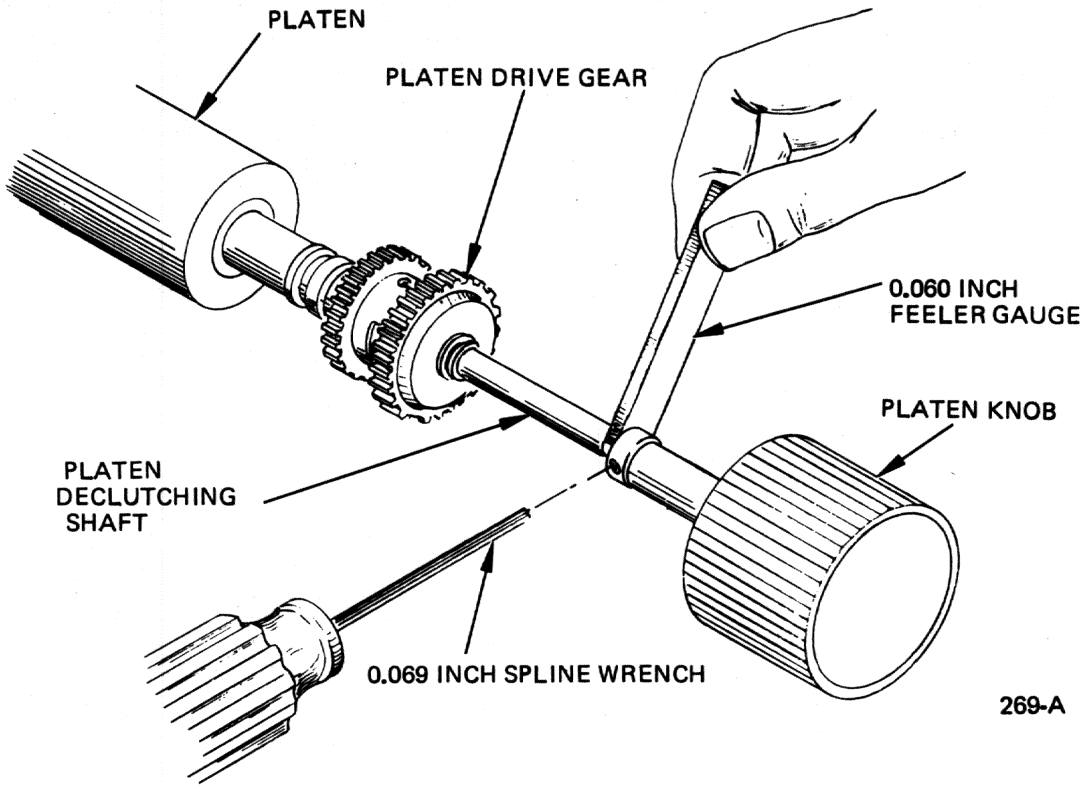
Paper Feed Idler Gear Adjustment

Platen Locator Sleeve (Tractor Gear). Adjust the tractor gear on the right hand end of the platen for a maximum platen locator sleeve end play of 0.001 - 0.004 inch. Use a 0.072 inch six fluted spline wrench to loosen the tractor gear setscrews. Refer to the Platen Locator Sleeve Adjustment illustration.



Platen Locator Sleeve Adjustment

Right Hand Platen Declutching Shaft. Adjust the right hand platen knob so that there is a 0.060 ± 0.005 inch clearance between the right hand platen knob and the platen declutching shaft. This clearance ensures that the operator can push in on the right platen knob far enough to disengage the platen driver from the platen drive gear.



Right Hand Platen Declutching Shaft Adjustment

Platen Height and Depth. The position of the platen within the printer is very important for optimum print quality as well as for correct paper feed. Adjust the platen height and depth as follows:

1. Disconnect power to the printer.

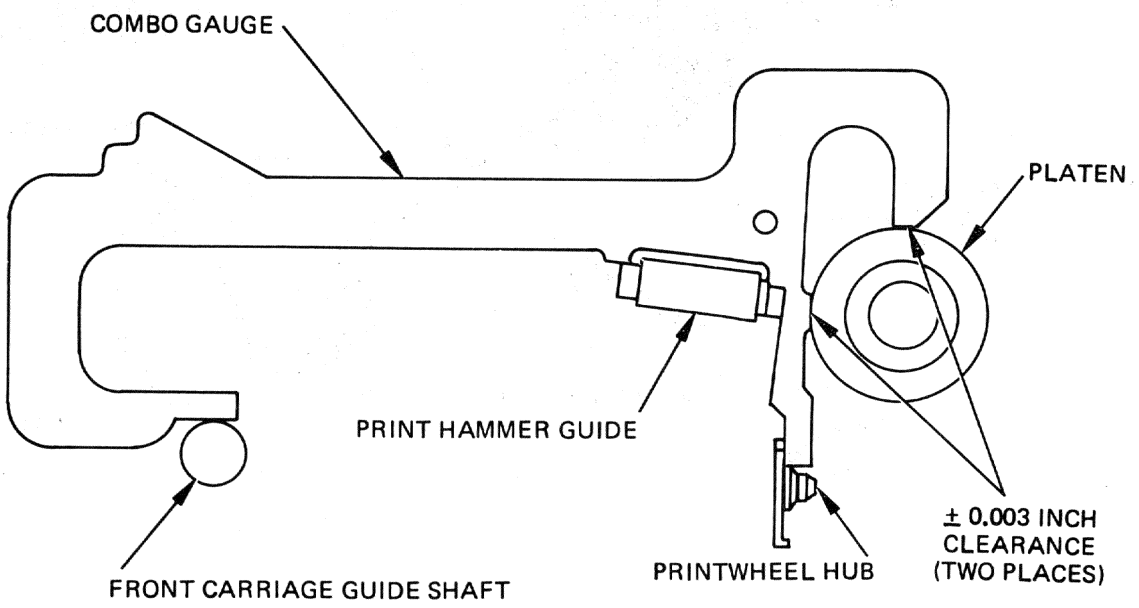
2. Remove the top and intermediate covers assemblies (refer to the Cover Removal and Replacement procedure). Remove the front panel assembly (refer to the Front Panel Removal and Replacement procedure).

3. Remove the ribbon cartridge, printwheel, and card guide (refer to the Card Guide Removal and Replacement procedure). Verify that the print hammer mechanism is down and locked.

4. Make all adjustments and adjustment checks with the Multicopy Select Lever in the full forward position (toward the operator).

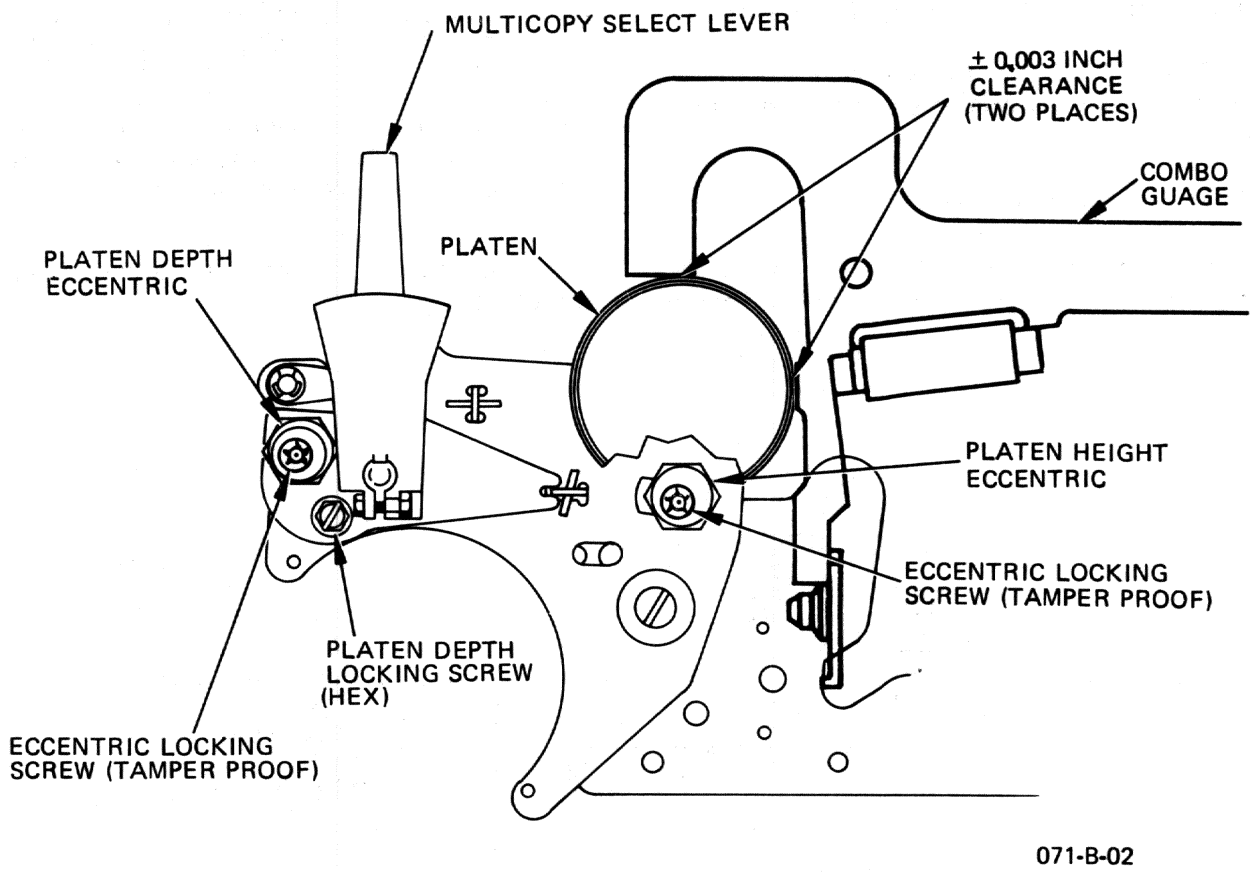
5. Move the carriage assembly to the extreme right side of the printer.

6. Install the combo gauge to measure platen height and depth. When properly installed, the combo gauge straddles the carriage assembly and rests on the front carriage guide shaft and the printwheel hub. Be careful that the position of the print hammer guide does not interfere with positioning the combo gauge on the printwheel hub. If necessary, loosen the print hammer guide and move it aside. Refer to the Combo Gauge Installation (Platen Height and Depth Adjustment) illustration.



Combo Gauge Installation (Platen Height and Depth Adjustment)

7. On both the right and left hand sides of the platen carrier assembly there are two adjustable eccentrics. The rear platen eccentric is used to adjust platen depth (front to rear position) and the front platen eccentric is used to adjust platen height. Refer to the Platen Height and Depth Adjustments illustration.



Platen Height and Depth Adjustments

8. Adjust the right hand platen height eccentric by loosening its lock screw with a Torx T-15H driver and rotate the eccentric with a 5/8 inch open end wrench until the top surface of the platen just touches the combo gauge (± 0.003 inch). Tighten the lock screw.

9. Adjust the right hand platen depth eccentric by loosening the two lock screws with a Torx T-15H driver and screwdriver, and rotate the eccentric with a 5/8 inch open end wrench until the platen's front surface just touches the combo gauge (± 0.003 inch). Tighten the lock screws.

10. Move the carriage assembly and combo gauge to the printer's extreme left side.

11. Make the left hand platen height and depth adjustments in the same way as done for the right hand side (steps 8, 9 and 10).

12. Because of the interrelationship between these eccentrics and the platen carrier assembly, changing one eccentric's position may slightly affect one or more of the others. Before proceeding, ensure that the platen height and depth is correct on both ends of the platen.

13. If in step 6 you had to loosen the print hammer guide, adjust the print hammer height and angle, and check all other print hammer related adjustments (refer to the Print Hammer Mechanism Adjustment procedures). Install the card guide and verify its adjustment (refer to the Card Guide Adjustment procedure).

14. Install the printwheel and ribbon cartridge.

15. Power-up the printer and perform the Print Quality Adjustment Check (refer to the Preventive Maintenance Chapter).

16. Replace the front panel assembly and the intermediate and top cover assemblies.

Carriage End of Travel Sensor. Adjust the carriage End of Travel (EOT) sensor as follows:

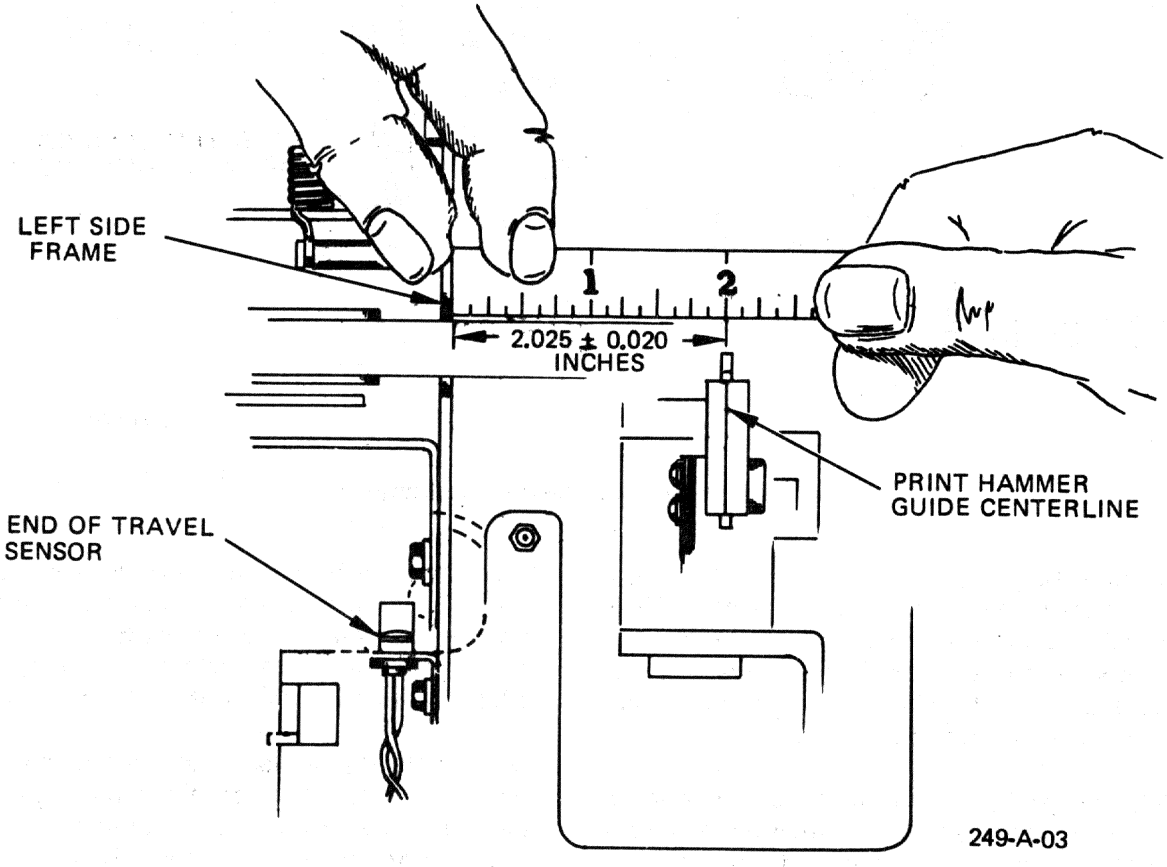
1. Cause the printer to execute a restore sequence (power the printer down and then back up).

2. Remove the top cover and ribbon cartridge.

3. Measure the distance between the printer's inside left side frame and the white centerline on the print hammer guide. This distance should be 2.025 ± 0.020 inches. Refer to the Carriage End of Travel Sensor Adjustment illustration.

4. Adjust the EOT sensor left or right to obtain this condition. Always measure this adjustment after completing a restore sequence.

5. Replace the ribbon cartridge and the printer top cover.



Carriage End of Travel Sensor Adjustment

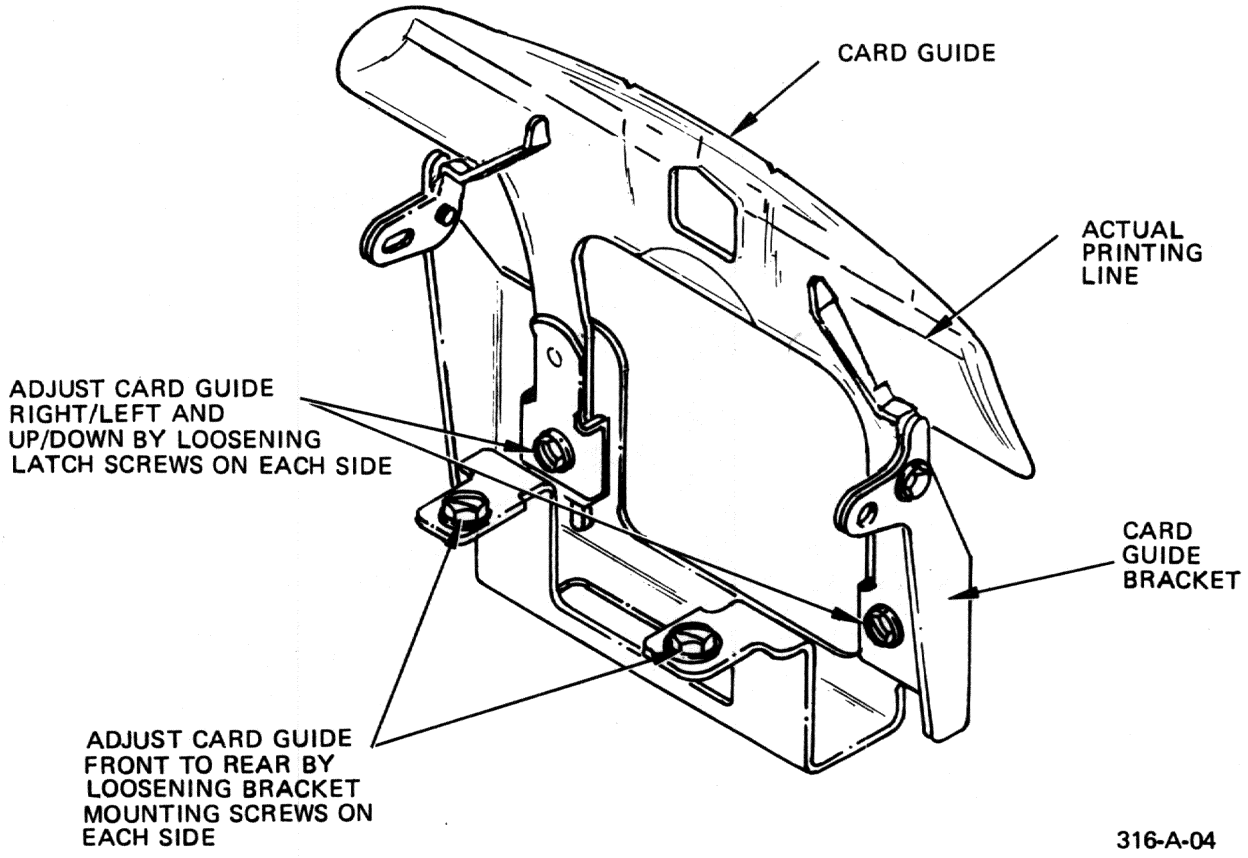
Card Guide. The plastic card guide performs two functions: (1) it holds the paper flat against the platen, and (2) it provides horizontal and vertical reference marks so that the operator knows where the next character will be printed. Adjust the card guide position as follows: Refer to the Card Guide Adjustment illustration.

1. Disconnect power to the printer and remove the top cover.

2. Remove the ribbon cartridge and printwheel.

3. Adjust the card guide bracket front to rear so that the card guide just touches the front surface of the platen. As you move the Multicopy Select Lever to the rear, a clearance between the card guide and platen should result by the time you have moved the Multicopy Select Lever a short distance. Ensure that the card guide is parallel to the platen and that there is no interference between the card guide bracket and the front feed rollers.

4. Adjust the card guide up and down, and right to left by loosening the 3/16 inch hex head screws that secure the two card guide channels and card guide latches to the card guide bracket. Adjust the card guide position so that its horizontal and vertical red reference lines correctly indicate the position of the next printed character. Upper case characters on the current print line should appear to just "sit" on the horizontal reference line. The vertical reference line indicates where the center of the next character will be printed (e.g. the ascending line of an upper case "I").



Card Guide Adjustment

5. Check the ribbon guide finger adjustment (refer to the Ribbon Guide Fingers adjustment procedure) and readjust as necessary.

6. If, in step 5, you changed the ribbon guide finger adjustment, check the front to rear position of the card guide and adjust if necessary (step 3).

7. Replace the printwheel, ribbon cartridge, and top cover.

Ribbon Guide Fingers. Adjust the ribbon guide fingers as follows: Refer to the Ribbon Guide Fingers Adjustment illustration.

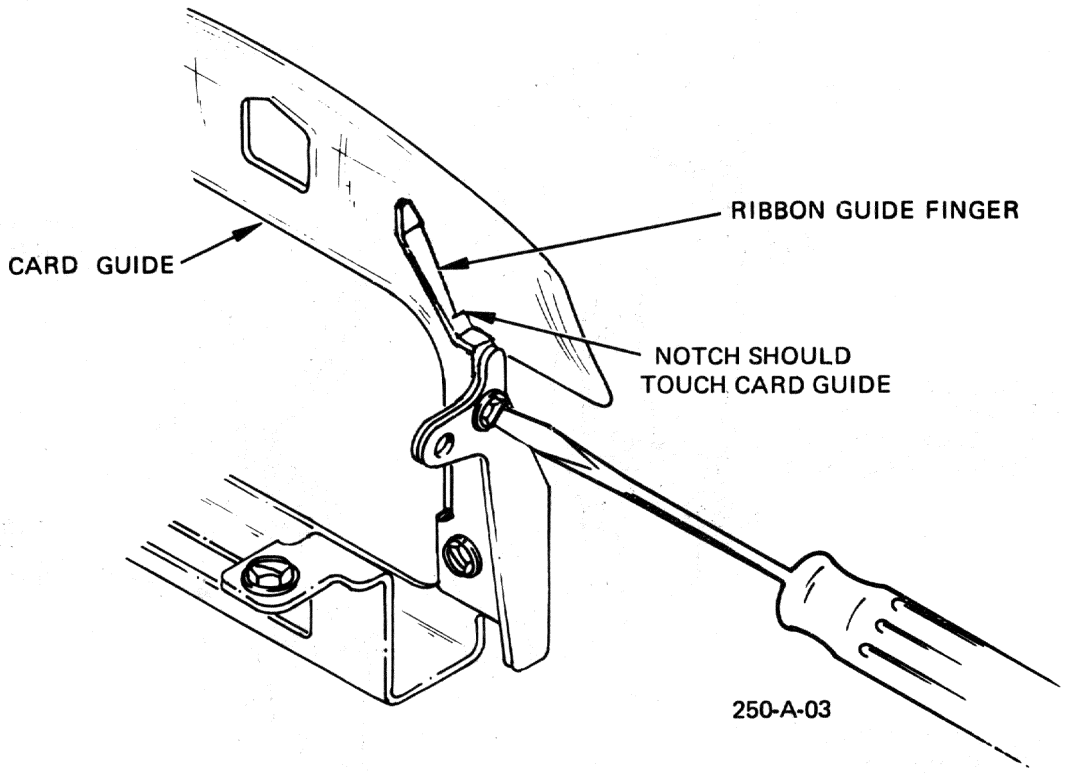
1. Disconnect power to the printer.

2. Remove the top cover, ribbon cartridge, and printwheel.

3. Ensure that the platen height and depth and card guide adjustments are correct (refer to the appropriate adjustment procedures).

4. Loosen the 3/16 inch hex head mounting screws that secure the ribbon guide fingers. Adjust as necessary so that the notch on each finger touches the face of the card guide. Tighten the mounting screws.

5. Replace the printwheel, ribbon cartridge, and the top cover.



Ribbon Guide Fingers Adjustment

Carriage Drive Belt Tension. Carriage drive belt tension is adjusted as follows: Refer to the Combo Gauge Installation (Carriage Drive Belt Tension Adjustment) illustration.

1. Disconnect power to the printer.

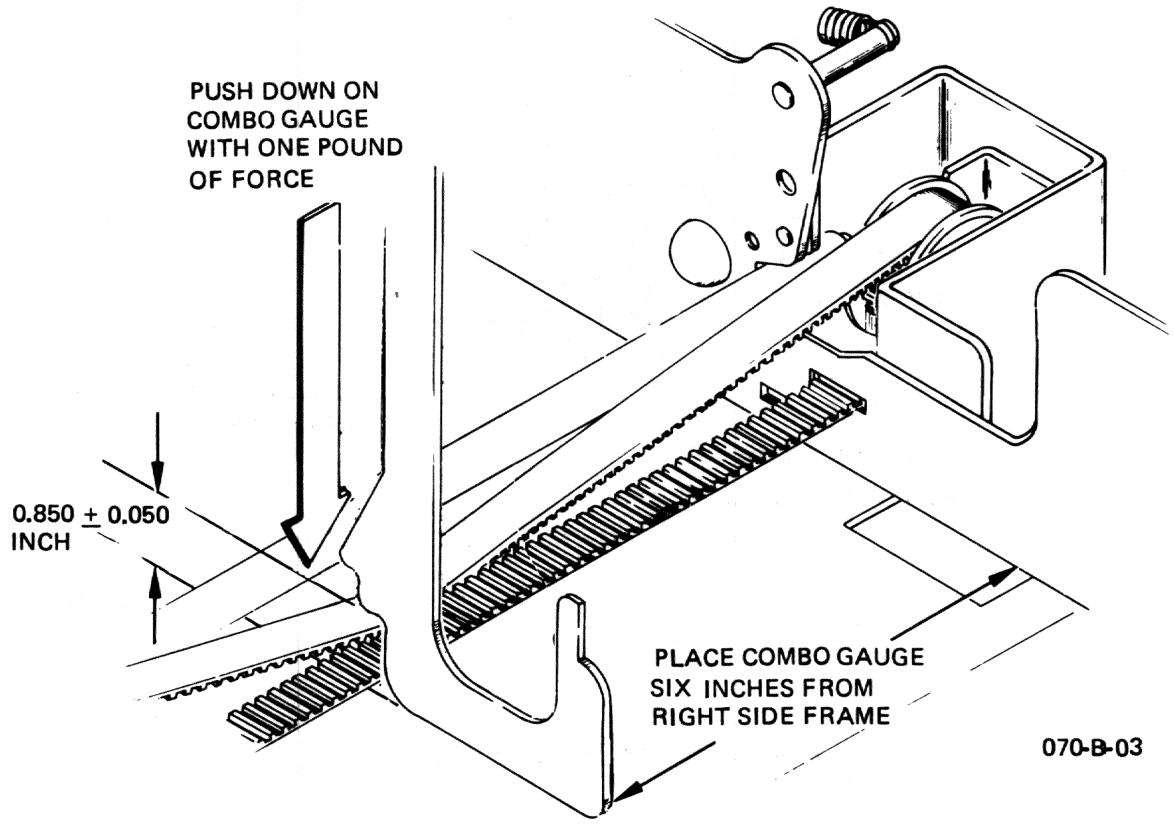
2. Remove the top cover.

3. Move the carriage assembly to the left side frame.

4. At a point six inches from the printer's right side frame push directly down on the drive belt with a one pound force. A spring scale or a one pound weight will work.

5. At this same point on the drive belt, measure the distance between the top of the drive belt and the bottom of the structure assembly. This distance should be 0.850 ± 0.050 inch.

This distance can be verified by using the first step on the combo gauge as shown in the illustration below.

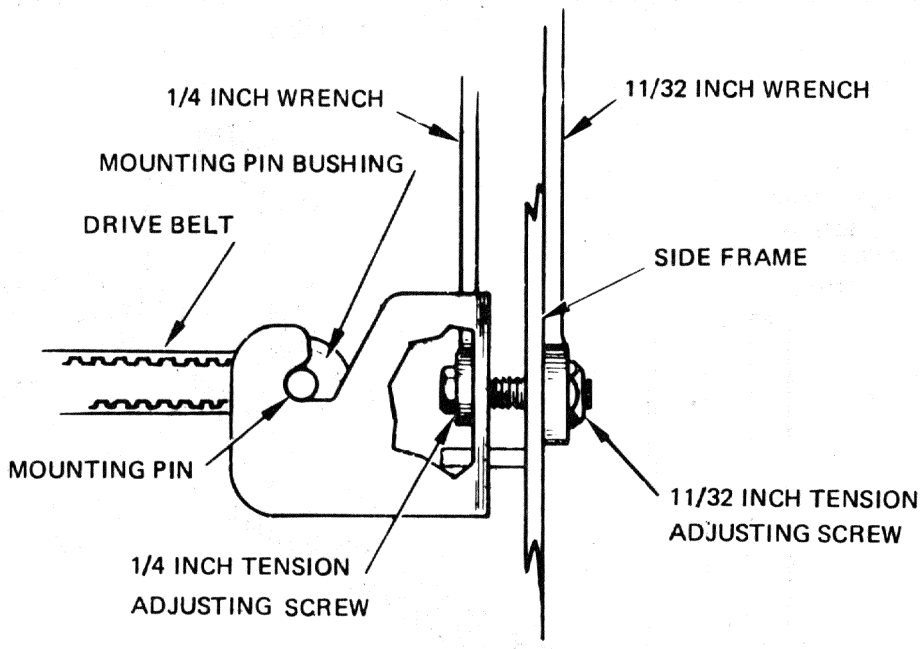


Combo Gauge Installation (Carriage Drive Belt Tension Adjustment)

6. If the drive belt tension is not correct, turn the drive belt tension adjusting nut clockwise to increase belt tension or counterclockwise to decrease belt tension (refer to the Carriage Drive Belt Tension Adjustment illustration). Hold the tension adjusting screw with a wrench while turning the drive belt tension adjusting nut.

7. After altering drive belt tension, move the carriage assembly back and forth several times and then recheck for correct tension (steps 3 through 6).

8. Replace the top cover assembly.



Carriage Drive Belt Tension Adjustment

Print Hammer Mechanism. There are four adjustments relative to the print hammer mechanism; namely, print hammer height and angle, print hammer penetration, and print hammer armature front and rear stops. These adjustments are interrelated and must all be checked, and readjusted if necessary, when changing any one of them. All print hammer mechanism adjustments should be performed in the order here presented.

Before adjusting the print hammer mechanism, ensure that the platen height and depth adjustment is correct (refer to the appropriate adjustment procedure) and that the Multicopy Select Lever is in its full forward position.

When adjusting the print hammer mechanism, ensure that the print hammer cleaning procedure has been recently performed or do so

prior to adjusting the print hammer mechanism. Proceed as follows:

1. Disconnect power to the printer.

2. Remove the top cover assembly and the front panel assembly (refer to the Front Panel Removal and Replacement procedure).

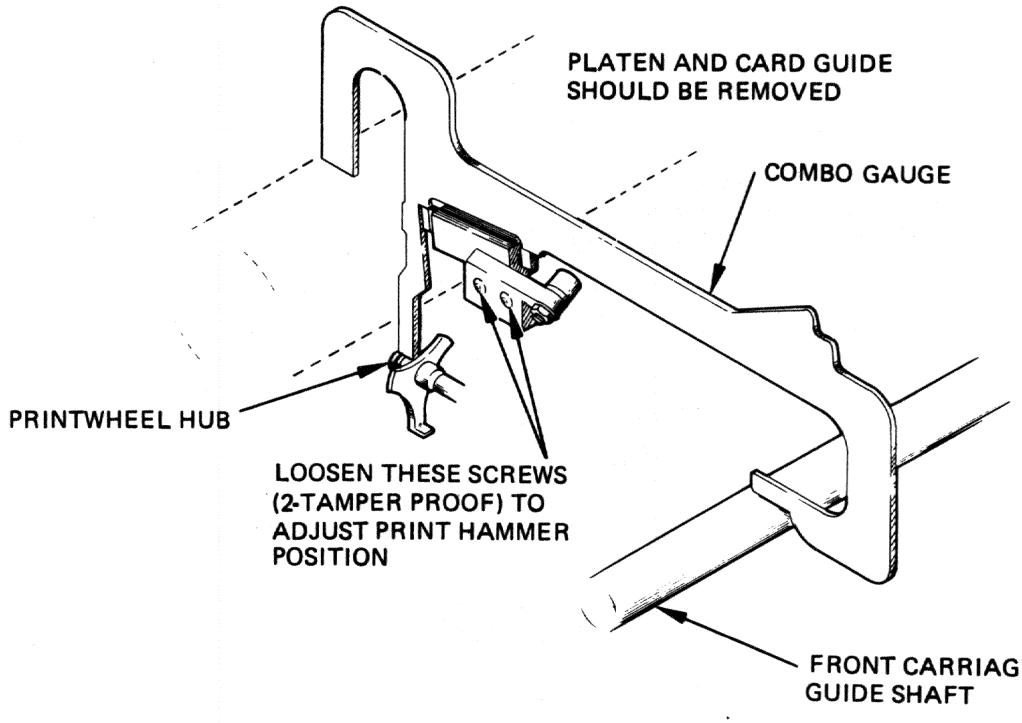
3. Remove the ribbon cartridge, printwheel, platen, and card guide (refer to the Card Guide Removal and Replacement procedure).

4. Verify that the print hammer mechanism is down and locked.

- **Print Hammer Height and Angle**

Proper position of the print hammer is necessary for optimum print quality. Final "fine" adjustment, based on inspection of a print strike-up, may occassionally be necessary.

1. Install the combo gauge as shown below. When properly installed the combo gauge straddles the carriage assembly and rests on the front carriage guide shaft and the printwheel hub as reference points to measure print hammer position. Refer to the Combo Gauge Installation (Print Hammer Height and Angle Adjustment) illustration.



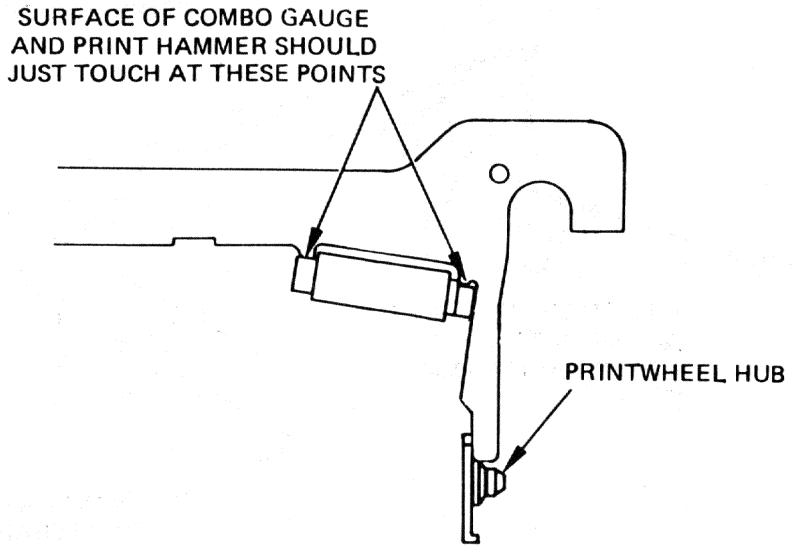
Combo Gauge Installation (Print Hammer and Angle Adjustments)

2. When properly adjusted, the front and rear top surfaces of the print hammer should just touch the reference areas of the combo gauge (refer to the Proper Print Hammer Adjustment illustration). Ensure that the gauge is resting on the printwheel hub and is not being supported by the print hammer guide.

3. If necessary, loosen the two screws that secure the print hammer guide to the printwheel motor casting using a Torx T-8H driver, and adjust the print hammer guide to meet the condition in step 2.

4. Print hammer position is now adjusted. After all other print hammer mechanism adjustments have been made, install the platen, card guide (verify adjustment according to the Card Guide Adjustment procedure), printwheel, and ribbon cartridge, and perform the Print Quality Adjustment Check (refer to the Preventive Maintenance Chapter). If the tops and bottoms of the characters on the print strike-up are not equally dense, refine the Print Hammer Height and Angle adjustment. That is, if the bottom of the characters appear light, then slightly lower the rear of the print hammer (the end nearest to the front panel); if the top of the characters appear light, then slightly raise the rear of the print hammer.

5. When all print hammer mechanism adjustments have been completed, and the Print Quality Adjustment Check indicates excellent print quality, install the front panel assembly and the top cover assembly.



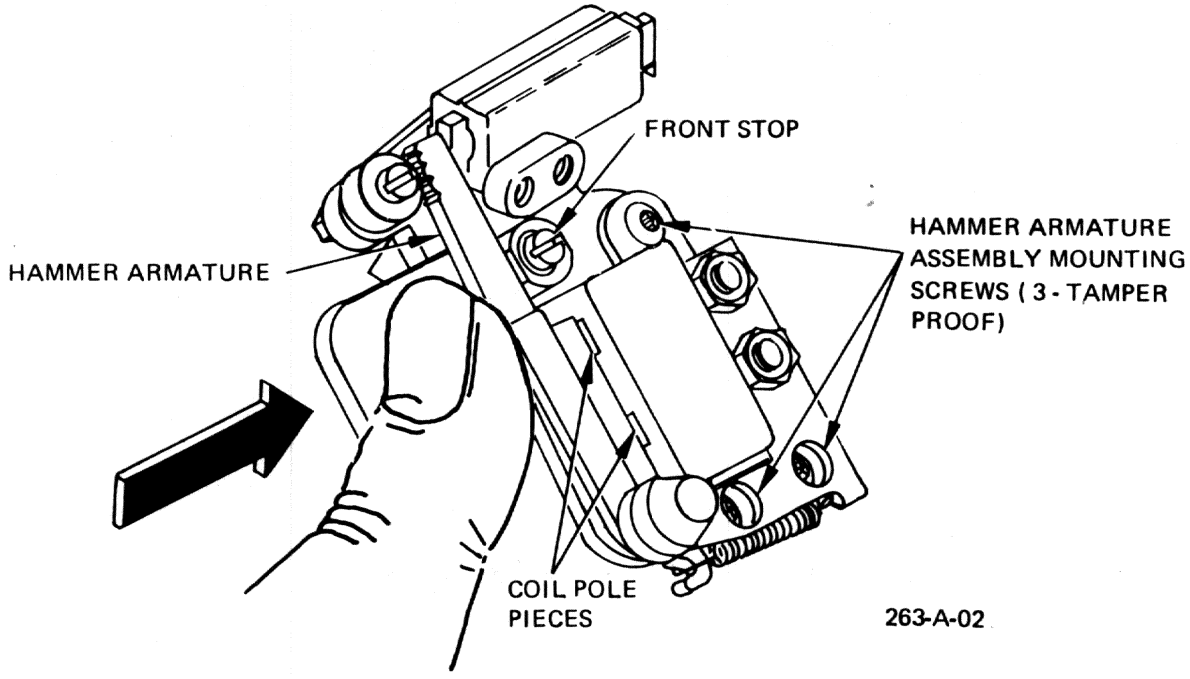
Proper Print Hammer Adjustment

- **Print Hammer Penetration**

1. Ensure that print hammer height and angle are correct (refer to the preceding Print Hammer Height and Angle Adjustment procedure).

2. Ensure that the printwheel is not damaged and is "true." To do so, remove the printwheel and lay it on a flat surface. Note that all printwheel spokes should be in the same plane; none should be bent or warped. Replace the printwheel if necessary.

3. Manually push the hammer armature toward the platen until it contacts the hammer armature coil pole pieces. If the hammer armature cannot touch the coil pole pieces, loosen the eccentric hammer armature front stop and rotate it away from the armature. Refer to the Print Hammer Penetration Adjustment illustration.

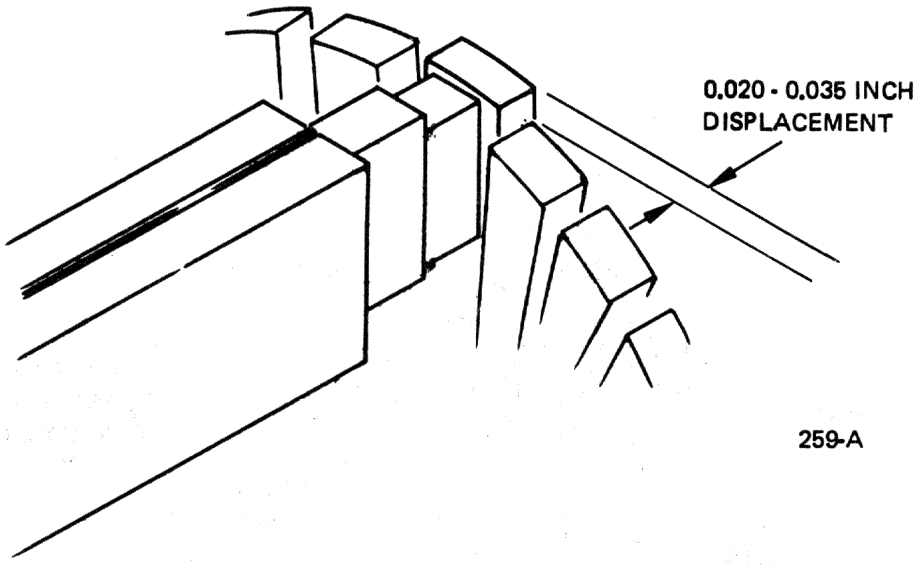


Print Hammer Penetration Adjustment

4. The position of the hammer armature assembly is correct when, with the armature held against the coil pole pieces, the print hammer has pushed a printwheel spoke 0.020 to 0.035 inch forward (approximately one half the thickness of the printwheel spoke measured at the character die). Check this measurement at several locations around the printwheel. Refer to the Proper Printwheel Spoke Displacement illustration.

5. If the above condition is not met, loosen the three screws that secure the hammer armature assembly to the printwheel motor casting using a Torx T-9H driver, and adjust as necessary. Tighten the mounting screws and recheck this adjustment.

6. Perform the Print Hammer Armature Front Stop adjustment.



Proper Printwheel Spoke Displacement

- **Print Hammer Armature Front Stop**

This adjustment minimizes the long term wear that could result from the hammer armature excessively impacting against the coil pole pieces. Adjust the front stop as follows: Refer to the Print Hammer Armature Front Stop Adjustment illustration.

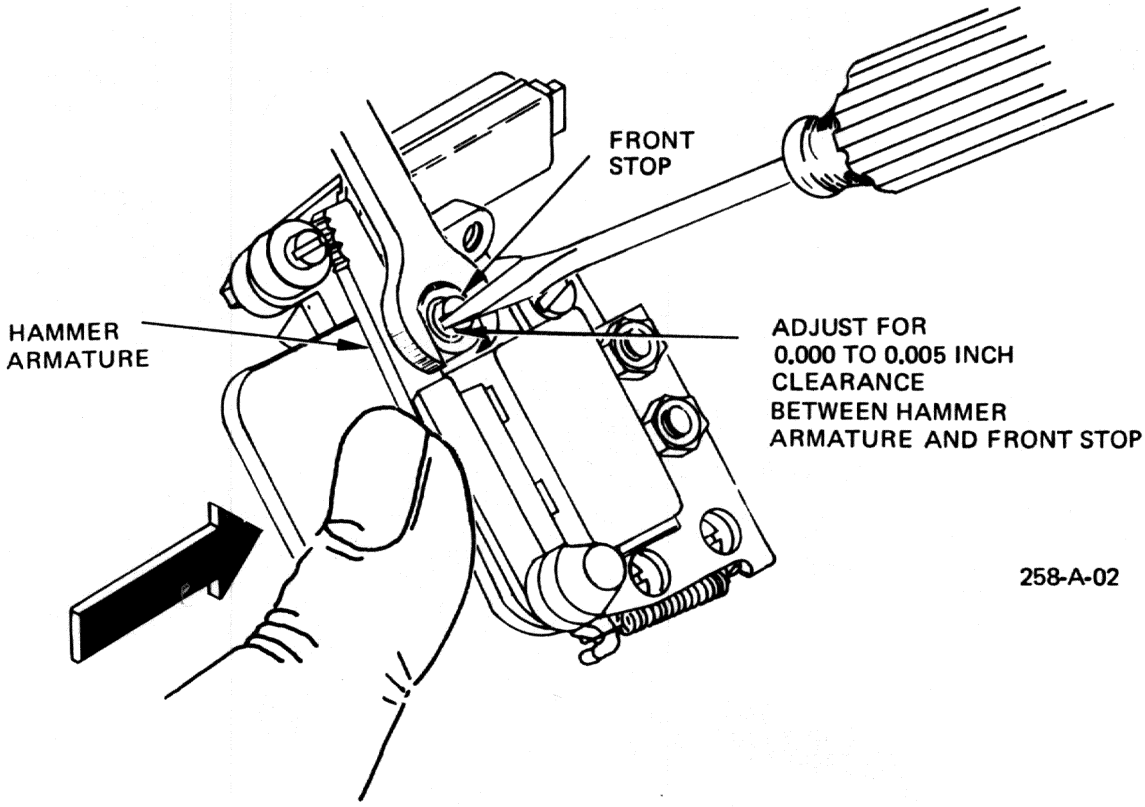
1. Ensure that print hammer height, angle, and penetration are correct (refer to the preceding print hammer mechanism adjustments).

2. Loosen the eccentric hammer armature front stop.

3. Manually push the hammer armature forward until it contacts the hammer armature coil pole pieces. Hold the armature in this position.

4. Rotate the front stop until there is a 0.000 to 0.005 inch clearance between the hammer armature and the front stop.

5. Tighten the front stop lock screw.



Print Hammer Armature Front Stop Adjustment

- **Print Hammer Armature Rear Stop**

This adjustment establishes the rest position of both the hammer armature and the print hammer. A correct rear stop adjustment is essential for optimum print quality and correct functioning of the print hammer mechanism. Adjust the rear stop as follows: Refer to the Print Hammer Armature Rear Stop Adjustment illustration.

1. Ensure that the print hammer height, angle, penetration, and armature front stop are correctly adjusted (refer to the preceding print mechanism adjustments).

2. Loosen the 3/16 inch locking nut on the eccentric hammer armature rear stop.

3. Manually push the hammer armature toward the platen until it contacts the hammer armature coil pole pieces. Hold the armature in this position.

4. Rotate the eccentric rear stop until there is a 0.063 to 0.068 inch clearance between the hammer armature and the rear stop. NOTE: Installing the bumper ring gauge, Vendor P/N 73046 on the rear stop and adjusting for exactly "no clearance" results in the correct adjustment.

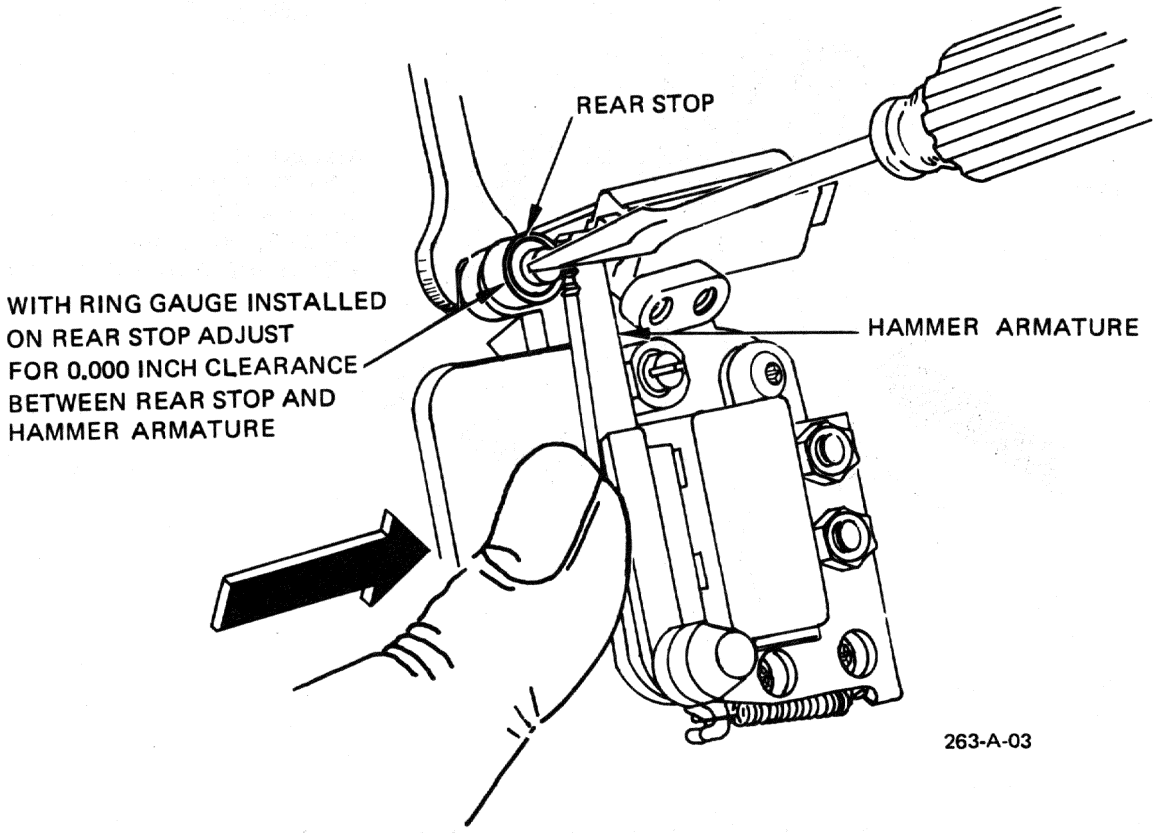
5. Tighten the rear stop lock nut.

6. Install the platen, card guide (verify adjustment according to the Card Guide Adjustment procedure), printwheel, and ribbon cartridge.

7. Install the front panel assembly and top cover.

8. Reconnect power to the printer.

9. Perform a Print Quality Adjustment Check (refer to the Preventive Maintenance Chapter).



Print Hammer Armature Rear Stop Adjustment

SUBASSEMBLY REMOVAL AND REPLACEMENT

COVER REMOVAL AND REPLACEMENT

- **Top Cover**

1. Removal of the top cover exposes the operator access area of the printer for servicing. The top cover is held in place by retainer clips and studs, and is removed by pushing up at the front corners and lifting it free of the printer.

2. To reinstall the top cover, position it in line with the intermediate and bottom covers and press down until the retainer clips and studs snap into place.

- **Intermediate Cover**

1. Remove the printer top cover and platen.

2. Loosen the retaining screw at the rear of the intermediate cover assembly (1/4 turn).

3. Remove the two captive screws located just below the platen on each side of the printer that secure the intermediate cover to the bottom cover. Remove the intermediate cover.

4. Before reinstalling the intermediate cover, first move the Multicopy Select and Paper Release Levers forward. Align the bottom and intermediate covers and install the two screws removed in step 3. Tighten the retaining screw on the rear of the intermediate cover.

5. Reinstall the platen and top cover.

- **Bottom Cover**

1. Disconnect the power cord and the data cables from the printer.

2. Remove the top and intermediate covers as outlined above.

3. Loosen the seven screws that secure the card cage top cover and remove the cover. Remove the PCB's and the power supply from the card cage.

4. Disconnect all ground straps between the mechanical subassembly, the front panel, and the card cage.

5. Disconnect the cover interlock cable, the front panel cable, and the mechanical subassembly cables from the motherboard PCB.

6. Remove the four screws that secure the front panel to the bottom cover. Remove the front panel.

7. Move the printer to the edge of a level surface to gain access to the bottom surface of the printer. Do not turn the printer over. Remove the four screws securing the bottom cover to the mechanical subassembly. These are accessible through the shock mounts from below.

8. Lift the mechanical subassembly from the bottom cover while at the same time carefully withdrawing all cables and connectors from the card cage subassembly.

9. Remove the four screws securing the card cage subassembly to the bottom cover. These are located at each corner of the card cage. Remove the card cage subassembly from the bottom cover.

10. To reassemble, locate the card cage subassembly in the bottom cover and secure in place with the four screws removed in Step 9 above.

11. Install the mechanical subassembly in the bottom cover and insert all cables disconnected in Step 8 into the card cage. Take care that no cables are pinched. Secure the mechanical subassembly in place with the four screws removed in Step 7 above.

12. Install the front panel in the bottom cover and secure in place with the four screws removed in Step 6 above.

13. Connect all ground straps between the mechanical subassembly, the front panel, and the card cage.

14. Connect all cables between the mechanical subassembly and the motherboard PCB, the front panel, and the cover interlock (refer to the Motherboard Connector Locations illustration).

15. Install the PCB's and power supply in the card cage.

16. Install the card cage top cover. Install the printer intermediate cover, the platen, and the top cover.

17. Connect the data cables and the power cord.

FRONT PANEL REMOVAL AND REPLACEMENT

1. Disconnect power to the printer and remove the top cover.

2. Disconnect the cable to the front panel PCB. Disconnect the ground straps between the front panel and the mechanical subassembly.

3. Remove four screws securing the front panel to the bottom cover. Remove the front panel.

4. To reassemble, install the front panel and secure it in place with its four mounting screws. Connect the front panel PCB cable and the ground straps.

5. Install the printer top cover.

PRINTED CIRCUIT BOARD REMOVAL AND REPLACEMENT

1. Disconnect power to the printer.

2. Remove the printer top and intermediate cover assemblies (refer to the Cover Removal and Replacement procedure).

3. Loosen the seven screws on the card cage top cover and remove the cover.

4. Remove the PCB(s). Looking into the card cage from the front of the printer, the PCB's are arranged with the analog PCB adjacent to the platen, followed by the digital PCB, serial interface controller PCB, and the power supply assembly.

5. When replacing the PCB's, ensure that their edge connectors are clean; visually inspect the motherboard for foreign objects; and verify that any PCB mounted switches are in their correct positions.

6. Replace the card cage top cover and the printer intermediate and top cover assemblies.

1. Disconnect power to the printer.

2. Remove the printer top and intermediate cover assemblies (refer to the Cover Removal and Replacement procedure).

3. Loosen the seven screws that secure the card cage top cover and remove the cover.

4. Disconnect the AC power connector from the power supply PCB (J1).

5. Remove the power supply assembly from the card cage.

6. When replacing the power supply, ensure that the power supply PCB edge connector is clean and inspect the motherboard for foreign objects.

7. Connect the AC power connector to the power supply PCB (J1).

8. Perform the Power Supply Voltages Adjustment Check if necessary (refer to the Power Supply Voltages Check procedure).

9. Replace the card cage top cover and the printer intermediate and top cover assemblies.

MOTHERBOARD REMOVAL AND REPLACEMENT

1. Disconnect power to the printer.

2. Remove the top and intermediate cover assemblies (refer to the Cover Removal and Replacement procedure) and the card cage top cover.

3. Remove all PCB's (refer to the Printed Circuit Board Removal and Replacement procedure).

4. Remove the power supply assembly (refer to

Motherboard Connectors List:

J1A, J1B	Analog PCB
J2A, J2B	Digital PCB
J3A, J3B	Serial Interface Controller PCB
J4	Power Supply
J5	Printwheel Motor, Hammer Coil, Ribbon Feed Motor
J6	Paper Feed Motor
J7	Carriage Motor
J8	Front Panel
J9	End of Travel Sensor
J10, J11, J12	Not Connected
J13	Paper Out Sensor
J14	Cover Off Sensor (Interlock)
J15	Carriage Encoder
J16	Printwheel Encoder, End of Ribbon Sensor
J17	Paper Handling Device
J18	RS-232-C Interface
J22	Card Cage Fan

the Power Supply Removal and Replacement procedure).

5. Disconnect all connectors that plug into the motherboard. Refer to the above list and to the Motherboard Connector Locations illustration.

6. Remove the eleven screws that fasten the motherboard to the card cage.

7. Remove the motherboard PCB.

8. Before reinstalling the motherboard PCB, ensure that all connectors are clean.

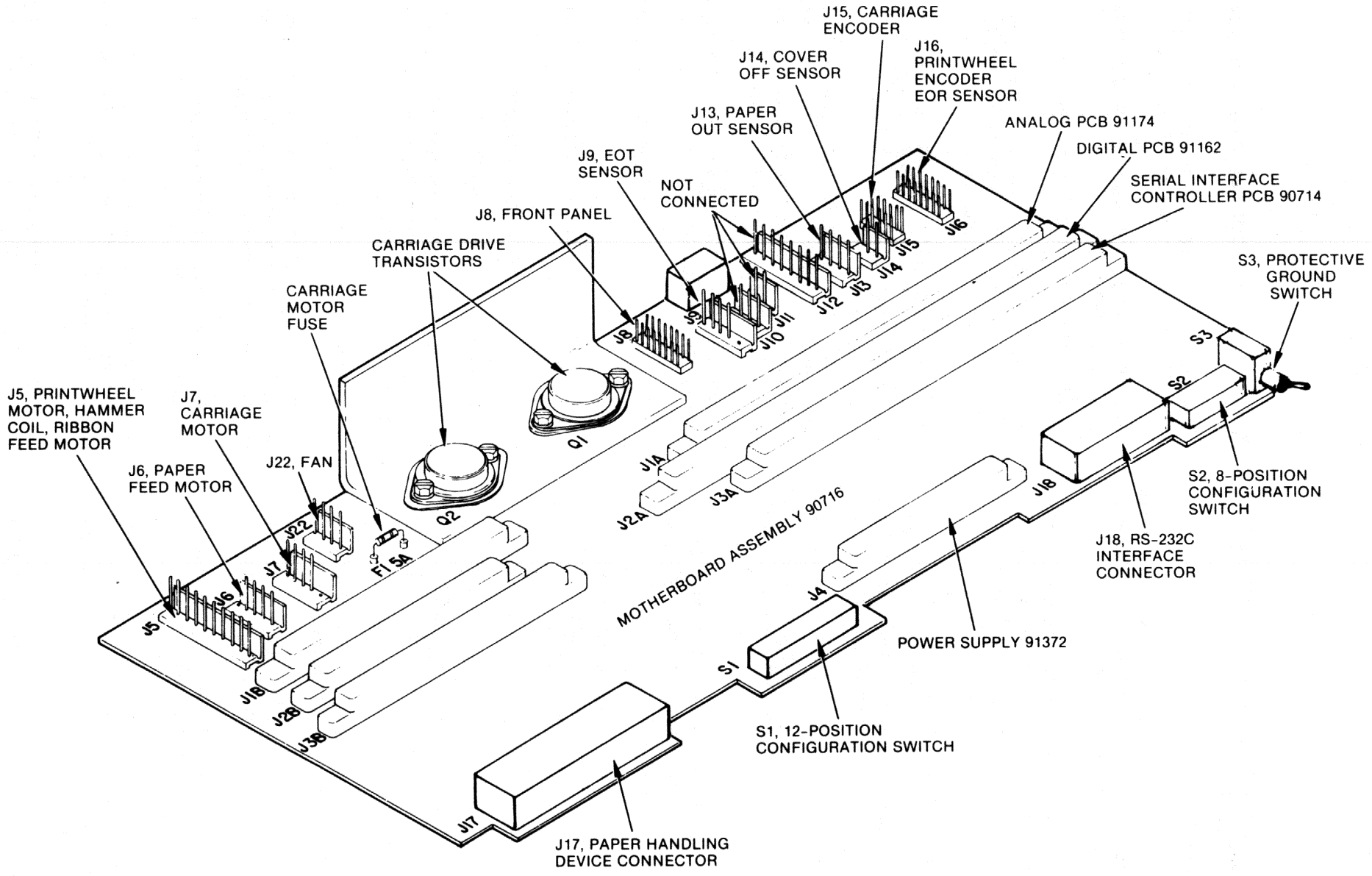
9. Replace the motherboard and its mounting screws. Before tightening the mounting screws, install the analog PCB. This will correctly position the motherboard in relation to the PCB guides, card cage, and the bottom cover.

10. Tighten two motherboard mounting screws, remove the analog PCB, and tighten the remaining mounting screws.

11. Connect all of the connectors disconnected from the motherboard in Step 5 above.

12. Install the PCB's and the power supply in the card cage.

13. Replace the card cage top cover and the printer intermediate and top cover assemblies.



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Motherboard Connector Locations

ELECTRONIC SUBASSEMBLY REMOVAL AND REPLACEMENT

1. Disconnect power to the printer.

2. Remove the printer top and intermediate cover assemblies (refer to the Cover Removal and Replacement procedure).

3. Remove the card cage top cover, the PCB's, and the power supply (refer to the PCB and Power Supply Removal and Replacement procedures).

4. Disconnect all connectors and ground straps from the motherboard PCB and the electronic subassembly (refer to the Motherboard Removal and Replacement procedure).

5. Remove the four screws that retain the mechanical subassembly in the bottom cover (these screws are accessible through the bottom cover).

6. Remove the four screws from the inside bottom of the card cage, that retain the card cage in the printer bottom cover.

7. Remove the card cage from the printer while lifting up on the mechanical subassembly to provide adequate clearance. After removal, insert the PCB's and power supply in the card cage and replace the card cage top cover.

8. To reinstall the electronic subassembly, first remove the card cage top cover, PCB's, and power supply. Inspect the motherboard for foreign objects.

9. Install the card cage in the printer bottom cover while lifting up on the mechanical subassembly to provide adequate clearance. Insert all cables disconnected in Step 4 in the card cage. Take care that no cables are pinched.

10. Secure the mechanical subassembly in place with its four mounting screws.

11. Connect all the connectors and ground straps disconnected from the motherboard and electronic subassembly (refer to the Motherboard Connectors Locations illustration).

12. Replace the PCB's, power supply assembly,

POWER SUPPLY REMOVAL AND REPLACEMENT

card cage top cover, the printer intermediate cover, the platen, and the printer top cover.

CARRIAGE DRIVE TRANSISTOR(S) REMOVAL AND REPLACEMENT

1. Disconnect power to the printer.

2. Remove the printer top and intermediate cover assemblies (refer to the Cover Removal and Replacement procedure).

3. Remove the card cage top cover and the PCB's (refer to the Printed Circuit Board Removal and Replacement procedure).

4. Remove the screws that secure the final carriage drive transistor(s) to the motherboard and heatsink. There is screwdriver access to these screws through the platen carrier assembly.

5. Remove, and replace if necessary, the final carriage drive transistor(s).

6. Replace the PCB's and the card cage top cover.

7. Replace the printer intermediate and top cover assemblies.

FAN REMOVAL AND REPLACEMENT

1. Disconnect power to the printer.

2. Remove the printer top and intermediate cover assemblies (refer to the Cover Removal and Replacement procedure).

3. Remove the card cage top cover.

4. Remove the PCB's and the power supply assembly (refer to the PCB and Power Supply Removal and Replacement procedures).

5. Disconnect the fan power connector from J22 on the motherboard.

6. Remove the three screws that secure the fan and ground strap to the card cage. Remove the fan from the printer.

7. To reinstall the fan, secure it and the ground strap to the card cage with their mounting

screws. Connect the fan power connector to J22 on the motherboard.

8. Reinstall the power supply assembly and the PCB's.

9. Replace the card cage top cover and the printer intermediate and top cover assemblies.

MECHANICAL SUBASSEMBLY REMOVAL AND REPLACEMENT

1. Disconnect power to the printer.

2. Remove the printer top and intermediate cover assemblies (refer to the Cover Removal and Replacement procedure).

3. Remove the card cage top cover, the PCB's, and the power supply assembly (refer to the PCB and Power Supply Removal and Replacement procedures).

4. Disconnect all connectors and ground straps between the mechanical subassembly, the electronic subassembly, and the front panel. Refer to the Motherboard Removal and Replacement procedure for a list of connectors by description and connector number.

5. Remove the four screws from beneath the bottom cover that retain the mechanical subassembly in the printer. Remove the mechanical subassembly from the printer.

6. Before reinstalling the mechanical subassembly in the printer, inspect it for foreign objects.

7. Install the mechanical subassembly in the bottom cover and insert the cables disconnected in Step 4 in the card cage. Take care that no cables are pinched.

8. Reconnect all the connectors and ground straps disconnected in Step 4 (refer to the Motherboard Connector Locations illustration).

9. Replace all PCB's, the power supply assembly, the card cage top cover, platen, and the printer intermediate and top cover assemblies.

PAPER FEED MOTOR REMOVAL AND REPLACEMENT

1. Disconnect power to the printer.

2. Remove the printer top and intermediate cover assemblies (refer to the Cover Removal and Replacement procedure).

3. Remove the card cage top cover, the power supply assembly, and the PCB's (refer to the PCB and Power Supply Removal and Replacement procedures).

4. Disconnect the paper feed motor connector from J6 on the motherboard and carefully withdraw the cable and connector from of the card cage.

5. Remove the paper feed idler gear and the felt washer from the shaft of the paper feed motor, by removing the retaining E-ring (refer to the Paper Feed Motor Removal and Replacement illustration).

6. Remove the three mounting screws, washers, and spacers that secure the paper feed motor and the idler gear mounting plate to the platen carrier assembly side frame. Remove the paper feed motor.

7. To reassemble, secure the paper feed motor and the idler gear mounting plate in place, with the three spacers, washers, and screws removed in Step 6 above.

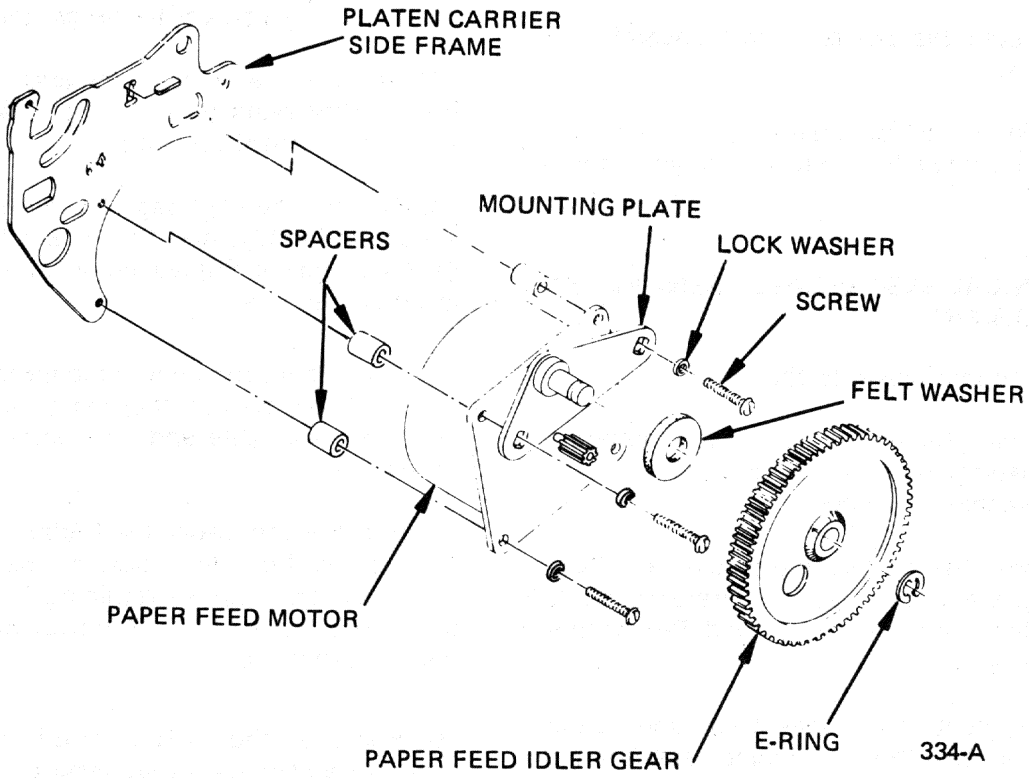
8. Install the felt washer and the idler gear on the shaft of the paper feed motor and secure them with the E-ring removed in Step 5.

9. Insert the paper feed motor cable and connector into the card cage and connect it to J6 on the motherboard.

10. Replace the PCB's, the power supply, the card cage top cover, and the platen.

11. Perform the paper feed idler gear adjustment (refer to the Paper Feed Idler Gear Adjustment procedure).

12. Replace the printer intermediate and top cover assemblies.



Paper Feed Motor Removal and Replacement

FRONT AND REAR FEED ROLLER REMOVAL AND REPLACEMENT

1. Disconnect power to the printer and remove the top cover.

2. Remove the platen and the cradle assembly (you may rest the cradle assembly over the top of the platen brace assembly if you prefer, but be careful not to damage the two cradle springs).

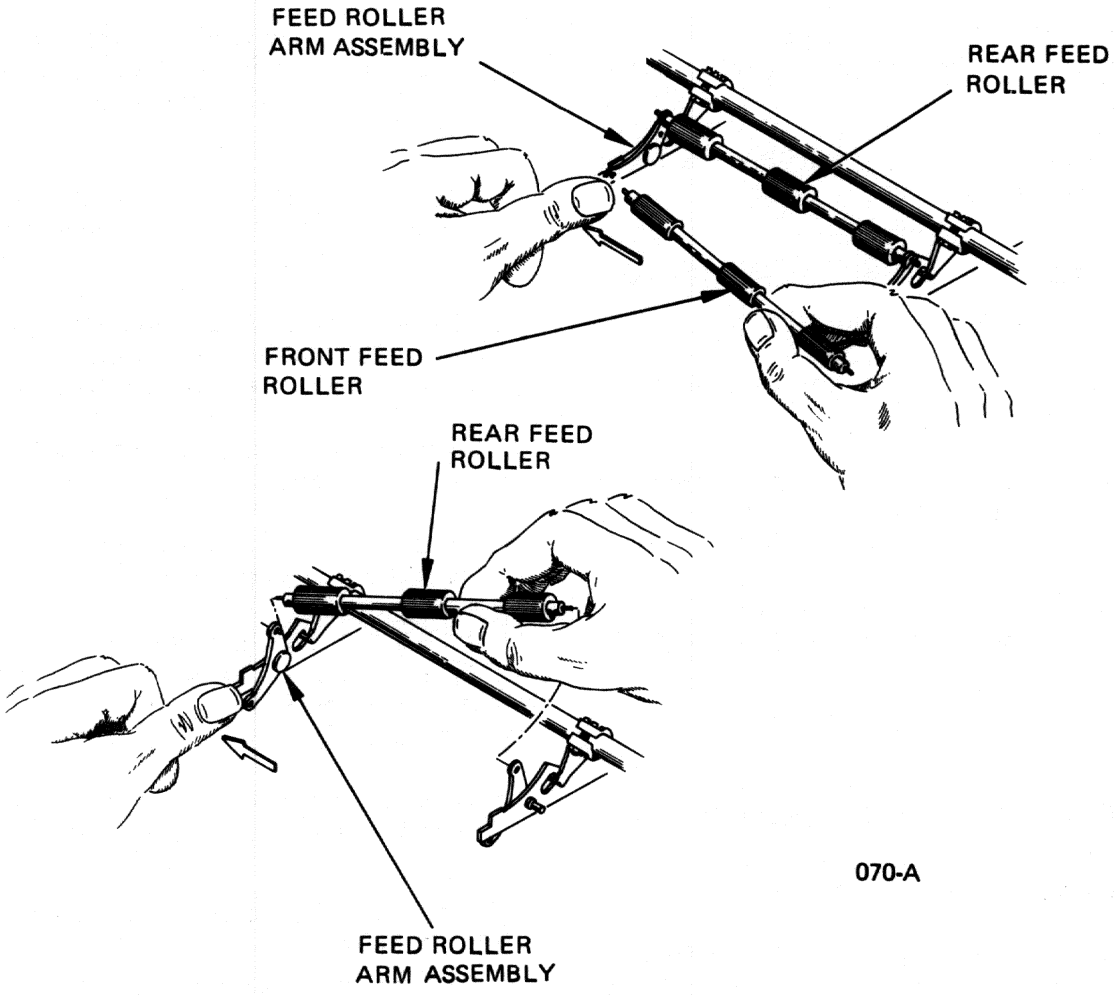
3. The front feed rollers must be removed first. Gently spread one of the feed roller arm assemblies enough to allow removal of the front feed roller. Remove the second front feed roller in the same manner (refer to the Feed Roller Removal and Replacement illustration).

4. To remove a rear feed roller, you must first remove the associated front feed roller. Pivot the rear feed roller up and forward ninety degrees. Gently spread the feed roller arm assembly enough to allow removal of the rear feed roller. Remove the second rear feed roller in the same manner.

5. To replace the front and rear feed rollers, simply reverse the procedure in steps 3 and 4, remembering that rear feed rollers must be reinstalled before their associated front feed rollers.

6. If removed in Step 2 above, install the cradle assembly (be sure to install the cradle springs on the cotter pins in the platen brace).

7. Install the platen and the top cover.



Feed Roller Removal and Replacement

DRIVE BELT REMOVAL AND REPLACEMENT

1. Disconnect power to the printer and remove the top cover.

2. Remove the ribbon cartridge and the printwheel.

3. Back the drive belt tension adjusting screw out of the pulley mounting bracket far enough to remove tension from the drive belt.

4. Remove the right and left hand belt cleats that secure the drive belt to the carriage assembly. Remove the drive belt.

5. To reinstall, pass the drive belt through the slots in the printer side frames, and around the carriage motor pulley and drive belt pulley.

6. Secure the ends of the drive belt on the car-

riage assembly with the belt cleats removed in Step 4.

7. Perform the drive belt tension adjustment (refer to the Drive Belt Tension Adjustment procedure).

8. Replace the printwheel and ribbon cartridge, and install the top cover.

FELT WIPER REMOVAL AND REPLACEMENT

1. Disconnect power to the printer.

2. Remove the top cover and the ribbon cartridge.

3. Remove the left and right wiper retainers on the carriage assembly to gain access to the two felt wipers. Remove the two felt wipers.

4. Replace and lubricate the felt wipers as necessary (refer to the Felt Wipers lubrication procedure).

5. Install the wiper retainers.

CARRIAGE DRIVE MOTOR REMOVAL AND REPLACEMENT

1. Disconnect power to the printer.

2. Remove the printer top and intermediate cover assemblies (refer to the Cover Removal and Replacement procedure).

3. Remove the card cage top cover, the PCB's, and the power supply (refer to the PCB and Power Supply Removal and Replacement procedures).

4. Disconnect the carriage drive motor harness from the motor and the carriage encoder connector from J15 on the motherboard.

5. Carefully withdraw the carriage encoder cable and connector from the card cage.

6. Relieve tension on the drive belt by removing the drive belt tension adjusting screw. Remove the drive belt pulley from its bracket.

7. Remove the four carriage drive motor mounting screws and remove the carriage motor from its mounting bracket. Remove the motor from the printer.

8. To replace the carriage drive motor, first secure it to its mounting bracket with the four screws removed in Step 7.

9. Connect the carriage drive motor and carriage encoder cables. Insert the carriage encoder cable and connector into the card cage.

10. Connect the carriage encoder connector to J15 on the motherboard.

11. Install the PCB's, power supply assembly, and the card cage top cover.

12. Install the carriage drive belt, drive belt pulley, and adjusting hardware. Adjust drive belt tension (refer to the Drive Belt Tension Adjustment procedure).

13. Replace the platen, and the printer intermediate and top cover assemblies.

CARRIAGE ASSEMBLY REMOVAL AND REPLACEMENT

1. Disconnect power to the printer.

2. Remove the printer top and intermediate cover assemblies (refer to the Cover Removal and Replacement procedure).

3. Remove the ribbon cartridge, printwheel, and platen from the printer.

4. Remove the card cage top cover, power supply assembly, PCB's, and the mechanical subassembly (refer to the appropriate Removal and Replacement procedures).

5. Remove all cable clamps and tie downs on the mechanical subassembly associated with

the J5 and J16 cables. Note the proper routing of these cables.

6. Remove the carriage drive belt (refer to the Drive Belt Removal and Replacement procedure).

7. Position the carriage assembly to the right hand side of the printer.

8. To remove the carriage as an assembly, you must also remove both carriage guide shafts. Note that each carriage guide shaft end sits in an elongated slot in the printer side frame and is retained there by a lock plate and screw.

9. Loosen the four screws that hold the guide shaft lock plates to the side frames, and move the lock plates away from the shafts. Remove the two screws from over the grip rings that retain the shafts laterally in the side frames.

10. Remove the carriage assembly and both guide shafts as a unit by lifting the guide shafts until they clear the slots in the side frames. Lift carriage and guide shafts out of the mechanical subassembly.

11. Pull the front guide shaft out of the carriage spherical bearing.

12. Remove the felt wipers from the rear guide shaft and pull the rear guide shaft out of the carriage assembly.

13. To replace the carriage assembly, insert the rear guide shaft into the carriage assembly and the front guide shaft into the spherical bearing.

14. Install felt wipers on the rear guide shaft (perform the Felt Wiper Replacement and Lubrication procedure listed in the Preventive Maintenance chapter if necessary).

15. Install the carriage assembly and guide shafts as a unit in the mechanical subassembly. Insert the rear guide shaft ends into their side frame slots first; then lower the front guide shaft ends into their side frame slots.

16. Install the two screws over the grip rings that retain the shafts laterally in the side frames. Secure the guide shafts in place with the four lock plates and screws.

17. Route the two carriage assembly cables into the card cage and install connectors J5 and J16 on the motherboard. Install all cable clamps and tie downs for these cables on the mechanical subassembly.

18. Secure the mechanical subassembly in place. Tighten the four mounting screws.

19. Install the drive belt and adjust for proper tension (refer to the Carriage Drive Belt Tension Adjustment procedure).

20. Install the PCB's, power supply assembly, and the card cage top cover.

21. Install the printwheel, ribbon cartridge, and platen. Install the printer intermediate and top cover assemblies.

CARD GUIDE REMOVAL AND REPLACEMENT

1. Disconnect power to the printer.

2. Remove the top cover, ribbon cartridge, and the printwheel.

3. Tilt the print hammer mechanism back (as if you were going to remove the printwheel).

4. Remove the card guide by spreading the spring metal card guide latches and gently lifting up on the card guide.

5. Clean the card guide if necessary (refer to the Card Guide Cleaning procedure). Reinstall the card guide by inserting it into the two card guide latches.

6. Check the card guide adjustments (refer to the Card Guide Adjustment procedure).

7. Install the printwheel, ribbon cartridge, and top cover assembly.

TROUBLESHOOTING

GENERAL

The LQP02 printer is designed to allow quick and easy troubleshooting. This chapter is intended to serve as a guide to assist the troubleshooter in isolating common LQP02 failures. Provided is a 6-part list dealing with power, paper feed, ribbon feed, carriage motion, printwheel motion, and hammer fire malfunctions. Listed are the symptoms likely to be exhibited by these malfunctions, along with their probable causes and suggested remedies.

The troubleshooter is encouraged to preface the 6-part troubleshooting list with a thorough visual inspection, followed by a power-up (restore) sequence and the printer self-test exercise. Careful observation of the printer and its behavior during this time can quickly point-up a problem area.

VISUAL INSPECTION

With power removed from the printer, remove the top and intermediate covers and the top cover from the card cage. Perform the following visual inspection checks:

1. Look for paper clips, staples, and any other foreign matter that might interfere with the operation of the carriage and printwheel assemblies.

2. Slide the carriage back and forth and check for freedom of movement.

3. Inspect the carriage guide rails for damage or contamination. Check the condition of the carriage spherical bearing and felt wipers.

4. Check the carriage drive pulleys for freedom of movement. Inspect the drive belt for damage and improper tension.

5. Inspect the carriage electrical cables and ensure that they are firmly clamped to the structure assembly. These clamps provide an electrical ground to eliminate noise and erratic operation. Inspect the ends of the cables for broken wires and make sure that the connectors are firmly attached to the motherboard.

6. Rotate the printwheel and check for interference. Inspect the printwheel for damage or signs of unusual wear. Replace it if necessary.

7. Verify that the printwheel assembly is firmly locked in place.

8. Manually operate the hammer to check for binding or signs of unusual wear. Clean the hammer as necessary.

9. Manually operate the hammer armature and check for freedom of movement. Verify that the front and rear armature stops, hammer assembly, and armature assembly are securely fastened.

10. Manually advance the ribbon and check for interference. Check that the ribbon guides clear the card guide.

11. Inspect the ribbon and ribbon cartridge. Verify that the ribbon is properly threaded around the guides without curling, and that the clear leader portion of the ribbon is past the End of Ribbon sensor. The ribbon should be taut, but should advance freely.

12. Remove the platen and check for wear, ink build-up, and damage. Inspect the platen and tractor drive gears. Check the operation of the bearing sleeve and platen declutching shaft. Clean the platen if necessary.

13. Check the paper feed rollers and rotate to check for freedom of movement. Clean if necessary. Check the operation of the Paper Release Lever.

14. Install the platen and check for end-play at the platen latches. Verify that there is no binding or backlash in the gears of the paper feed drive train.

15. Remove and inspect the printed circuit boards and the power supply. Check for any burnt or otherwise damaged components. Check for any foreign material on the motherboard.

16. Check that switches S1, S2, and S3 on the analog PCB are in the correct positions for normal operation. Check that the Voltage Select switch on the power supply is in the correct position. Check that the System Manager switches are properly configured.

17. Install the printed circuit boards and the power supply so that they make good contact with their motherboard connectors.

18. Install the top cover on the card cage and the printer intermediate and top covers.

POWER-UP (RESTORE) THE PRINTER

Initialize the printer by moving the power switch to ON. Check that the fan is running and that the proper restore sequence has occurred. The following events comprise a restore sequence:

1. The carriage assembly should move to the left most print position.

2. The printwheel should rotate and come to rest at its index position (lowercase "w" on standard printwheels).

3. The ribbon supply should advance.

4. The audible alarm should briefly sound.

5. The front panel indicator lights (Printer Error, Ribbon Out, Paper Out, and Pause) should flash twice and then extinguish.

6. The printer should assume its default parameters (See APPENDIX).

Proceed to the self-test exercise if the printer successfully restored, or to the appropriate troubleshooting list.

PRINTER SELF-TEST EXERCISE

Three levels of self-test are supported by the LQP02 printer:

1. Logical self-test

2. Printing self-test

3. Loop back self-test

After the printer is placed in self-test mode (position zero on SP1, 12), depressing the Form Feed switch on the front panel advances the selection of the level of self-test desired. Each time the Form Feed switch is depressed the next level of self-test is entered. Depressing the Form Feed switch at the completion of the third level of self-test (loop-back), resets the self-test sequence to the first level (logical self-test).

• **Logical Self-Test.** The logical self-test is always performed as part of the initialization sequence. This level of self-test verifies RAM and ROM operation and checks all data registers. A satisfactory test is indicated when the Printer Error, Ribbon Out, Paper Out, and Pause indicators flash twice and extinguish. If the test fails, the printer enters a CHECK mode and the next level of self-test can not be entered.

• **Printing Self-Test.** The following self-test routine is a very thorough test of the printwheel and carriage servo systems, and the paper feed, ribbon feed, restore, and printing functions. Performance of this self-test routine is a stringent test of the multiple microprocessor based control electronics. The only circuitry not specifically tested or exercised by this self-test routine is a portion of the interface used by a host system to control the printer during normal use. Load the printer with paper; the printing self-test routine is as follows:

1. Printwheel. This test exercises and tests the printwheel servo system. Starting at the printwheel index position, the printwheel is commanded to move to position 96 (one half the distance around the printwheel), and then is commanded to move back to position zero. Position zero corresponds to the printwheel index position which is now verified. These motions continue, each one being smaller by one printwheel position, with the printwheel index position verified each time the printwheel is commanded to return to position zero. If the printwheel index position is not sensed during anyone of these movements, an error has occurred in the printwheel servo system. At this time, the printer is placed in CHECK and the self-test routine is halted.

2. Carriage. This test exercises and tests the carriage servo system. Starting at the leftmost legal printing position, the carriage assembly is commanded to move 114 times, back and forth, in diminishing increments. As successive carriage movements gradually become smaller, the carriage finally comes to reach the center of the print field, from where it is commanded left a specific amount and halted just short of interrupting the EOT (End of Travel) Sensor. EOT Sensor operation is then verified. Next, the carriage is commanded to move further left, this time to interrupt the EOT Sensor, and again EOT Sensor operation is verified. If it is detected that during anyone of these movements that the EOT Sensor has not responded correctly, the carriage servo system has errored. The printer is placed in check and the self-test routine is halted.

3. Restore. The printer executes the portion of its controlling restore program that positions the carriage at its leftmost legal printing position and the printwheel at the printwheel index position. If a carriage motion related problem occurs, the printer is placed in CHECK and the self-test routine is halted.

4. Paper Feed. This test exercises the ribbon feed, paper feed, and printing functions. The words "SELF TEST" are printed vertically on the paper loaded in the printer followed by a printout of the entire printwheel character set. Printing is alternated with paper feed motion. If a sheet feeder is installed, it will also be exercised, cycling through trays 1, 2, and 3, and printing one line of characters on each page inserted. Correct execution of these functions can be visually checked by the technician.

- **Loop Back Self-Test.** This test checks the integrity of the serial and parallel line electronics through the use of two DEC provided loop back connectors - one connected at the I/O Data Connector and one at the I/O Option Connector on the rear panel. The loop back connectors must be in place in order for the test to pass. If the test passes, the printer will print the following message, "I/O TEST PASSED." If the test fails, the following message will be printed, "I/O TEST FAILED."

TROUBLESHOOTING LIST

To correct common LQP02 printer malfunctions, refer to the appropriate part in the following troubleshooting list:

Part 1 - Power Malfunctions;
Part 2 - Paper Feed Malfunctions;
Part 3 - Ribbon Feed Malfunctions;
Part 4 - Carriage Motion Malfunctions;
Part 5 - Printwheel Motion Malfunctions;
Part 6 - Hammer Fire Malfunctions.

LQP02 PRINTER TROUBLESHOOTING LIST

PART 1 - POWER

	SYMPTOM		PROBABLE CAUSE		REMEDY
1.	No response from printer	a.	No output from power supply	a.	Verify Power Switch ON, integrity of power cord and AC line fuse
		b.	Shorted component on Analog or Digital PCB. Defective power supply.	b.	Repair or replace defective PCB or power supply
	Erratic response from printer	a.	Incorrect power supply voltages/defective power supply	a.	Verify power supply voltages and adjust as necessary
				b.	Replace power supply
		b.	Defective cover interlock	a.	Verify that top cover is properly closed. Verify that interlock switch is functional and that J14 is connected on motherboard. Repair or replace as necessary.
	Continuous or random CHECK condition	a.	Incorrect power supply voltages or defective power supply	a.	Verify power supply voltages and adjust as necessary
				b.	Replace power supply

PART 2 - PAPER FEED

2.	No Paper Feed/Erratic Paper Feed	a.	Fuses F3 and/or F4 open on Digital PCB	a.	Check for shorted components. Replace fuses F3 and/or F4.
		b.	Paper Feed drivers Q15-Q18 open on Digital PCB	a.	Replace Digital PCB

PART 2 - PAPER FEED (Cont)

	SYMPTOM		PROBABLE CAUSE		REMEDY
2.	No Paper Feed/Erratic Paper Feed (cont)	c.	Open connection in paper feed motor circuit	a.	Check paper feed motor harness and connection at J6 on motherboard
				b.	Replace paper feed motor
		d.	Defective paper feed motor	a.	Replace paper feed motor
		e.	Form Feed switch on front panel defective	a.	Replace Front Panel PCB
		f.	No Paper Feed Command	a.	Verify paper feed in self-test. Verify Paper Feed Command at Interface
		g.	Defective Serial Interface Controller, Digital, or Analog PCB	a.	Replace defective PCB
	Poor paper registration	a.	Dirty Platen	a.	Clean platen
		b.	Paper feed idler gear out of adjustment	a.	Adjust paper feed idler gear as necessary
		c.	Defective platen	a.	Replace platen
		d.	Loose forms tractor gear	a.	Adjust forms tractor gear
	Paper Out Indicator ON, but paper supply OK	a.	Defective Paper Out Sensor, harness, or Digital PCB (open circuit)	a.	Verify sensor integrity and harness connected at J13 on motherboard
				b.	Replace defective sensor
				c.	Replace defective Digital PCB
	Paper supply exhausted but printing continues	a.	Defective Paper Out Sensor, harness, or Digital PCB (shorted circuit)	a.	Verify sensor integrity and harness connected at J13 on motherboard
				b.	Replace defective sensor
				c.	Replace defective Digital PCB
		b.	SP1, 10 in wrong position	a.	Place SP1, 10 in zero position

PART 3 - RIBBON FEED

	SYMPTON		PROBABLE CAUSE		REMEDY
3.	No Ribbon Feed/ Erratic Ribbon Feed	a.	Defective ribbon cartridge	a.	Replace ribbon cartridge
		b.	Fuses F1 and/or F2 open on Digital PCB	a.	Check for shorted components. Replace fuses F1 and/or F2
		c.	Ribbon Feed driver transistors Q11-Q14 open on Digital PCB	a.	Replace Digital PCB
		d.	Open connection in ribbon feed motor circuit	a.	Verify integrity of ribbon feed motor harness and connection at J5 on motherboard
		e.	Defective Digital or Analog PCB	a.	Replace defective PCB
	Ribbon Out Indicator ON, but ribbon supply OK	a.	Defective EOR sensor, harness, or Digital PCB (open circuit)	a.	Verify sensor integrity and harness connection at J16 on motherboard
				b.	Replace defective sensor
				c.	Replace defective Digital PCB
	Ribbon supply exhausted but printing continues	a.	Defective EOR sensor, harness, or Digital PCB (shorted circuit)	a.	Verify sensor integrity and harness connection at J16 on motherboard
				b.	Replace defective sensor
				c.	Replace defective Digital PCB

PART 4 - CARRIAGE MOTION

4.	Carriage fails to move to left margin on power-up	a.	Carriage servo disabled	a.	Check position of switch S1 on Analog PCB
		b.	Fuse F1 on motherboard open	a.	Check for shorted components; replace fuse
		c.	Carriage driver transistors Q1 and Q2 open	a.	Replace Q1 and Q2

PART 4 - CARRIAGE MOTION (Cont)

	SYMPTOM		PROBABLE CAUSE		REMEDY
4.	Carriage Motor fails to move to left margin on power-up (cont)	d.	Defective carriage servo/ harness	a.	Verify harness connections at J7 and J15 on motherboard
				b.	Repair or replace carriage motor as necessary
				c.	Replace Digital or Analog PCB
		e.	Broken or loose drive belt or pulley	a.	Adjust or replace as necessary
	Carriage crashes into side frame	a.	Carriage driver transistors Q1 and or Q2 shorted on motherboard	a.	Replace Q1 and Q2
		b.	Defective Digital or Analog PCB	a.	Replace defective PCB
		c.	Defective carriage motor	a.	Replace carriage motor
	Carriage slowly moves to rest at right side frame on power-up	a.	Defective EOT sensor/ harness	a.	Verify the integrity of the EOT sensor and connection of harness at J9 on motherboard
				b.	Repair or replace EOR sensor as necessary
		b.	Defective Digital or Analog PCB	a.	Replace defective PCB
	Uneven margins or spacing	a.	Defective carriage servo/ harness	a.	Verify harness connections at J7 and J15 on motherboard
				b.	Repair or replace carriage motor as necessary
		b.	Loose drive belt	a.	Adjust drive belt tension
		c.	Defective Serial Inteface Controller, Digital, or Analog PCB	a.	Replace defective PCB
		d.	Incorrect host system commands	a.	Perform self-test. If OK, check host system

PART 5 - PRINTWHEEL MOTION

	SYMPTOM		PROBABLE CAUSE		REMEDY
5.	Printwheel fails to move and index on power-up	a.	Printwheel servo disabled	a.	Check position of switch S3 on Analog PCB
		b.	Fuse F3 on Analog PCB	a.	Check for shorted components; replace fuse
		c.	Printwheel driver transistors Q5 and Q6 open	a.	Replace Analog PCB
		d.	Defective printwheel servo/ harness	a.	Verify harness connections at J5 and J16 on motherboard
				b.	Repair or replace carriage assembly as necessary
		e.	Defective Digital or Analog PCB	a.	Replace defective PCB
	Printwheel spins continuously on power-up	a.	Printwheel driver transistors Q5 and/or Q6 shorted on analog PCB	a.	Replace Analog PCB
	Printwheel spins slowly after carriage restores	a.	Defective printwheel servo circuitry	a.	Verify harness connections at J5
				b.	Repair or replace carriage assembly as necessary
				c.	Replace Digital or Analog PCB

PART 6 - HAMMER FIRE

6.	Hammer does not fire	a.	Hammer circuit disabled	a.	Check position of switch S2 on analog PCB
		b.	Fuse F1 on analog PCB open	a.	Check for shorted components; replace fuse
		c.	Defective hammer driver transistor Q4 on Analog PCB	a.	Replace Analog PCB
		d.	Defective hammer coil/ harness	a.	Verify integrity of hammer coil and connection of harness at J5 on motherboard

PART 6 - HAMMER FIRE (Cont)

	SYMPTOM		PROBABLE CAUSE		REMEDY
6.	Hammer does not fire (cont)	d.	Defective hammer coil/ harness (cont)	b.	Repair and replace hammer coil or carriage assembly as necessary
		e.	Defective Digital or Analog PCB	a.	Replace defective PCB
	Hammer fires but prints poorly	a.	Print hammer mechanism out of adjustment	a.	Check all print hammer adjustments
				b.	Clean print hammer mechanism
		b.	Defective Digital or Analog PCB	c.	Replace defective PCB
	Hammer fires but does retract	a.	Hammer binding	a.	Clean print hammer mechanism
		b.	Defective hammer fire circuit on Analog PCB	a.	Replace Analog PCB

ILLUSTRATED PARTS BREAKDOWN AND SCHEMATICS

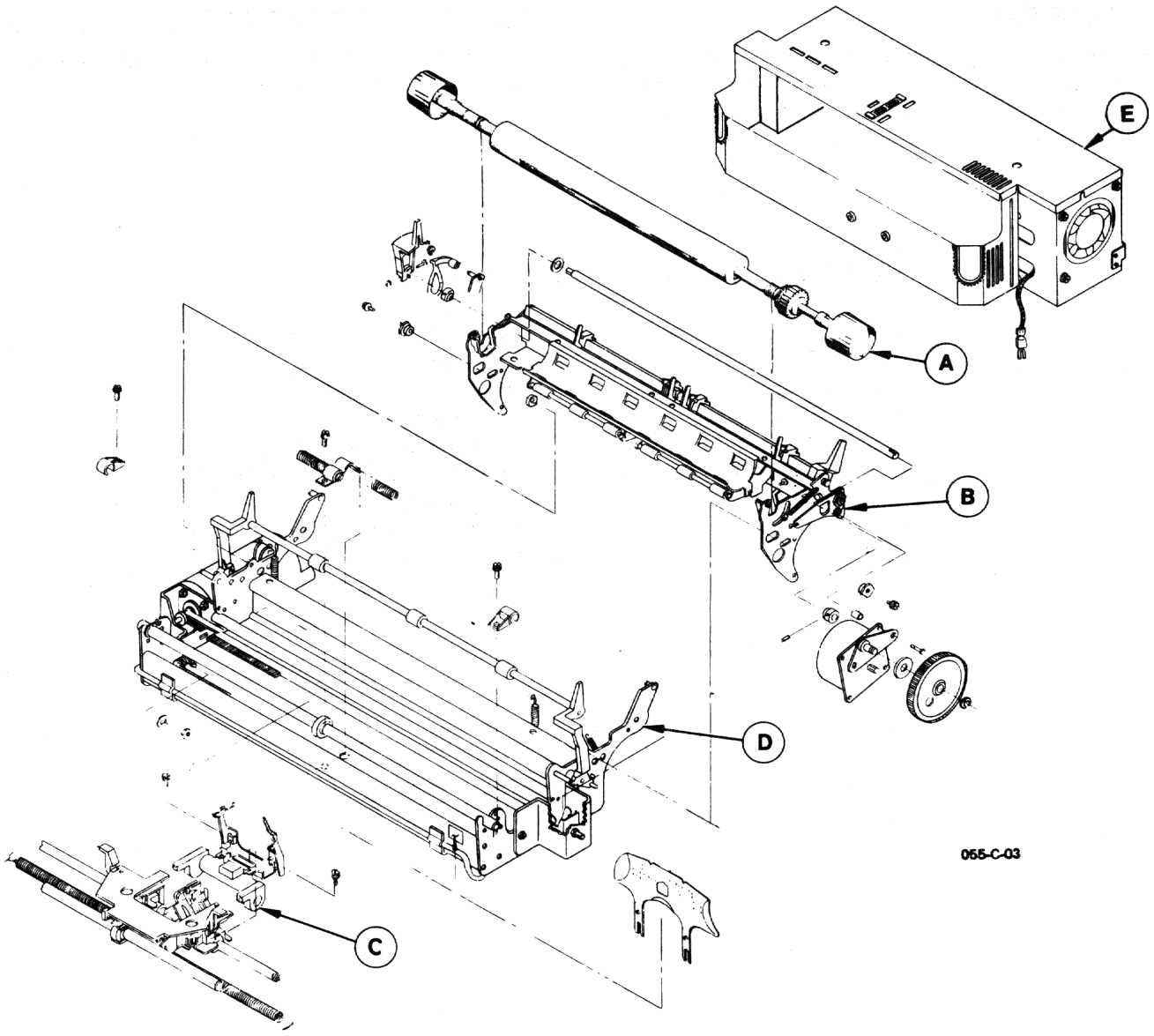
GENERAL

The following illustrated parts breakdowns and schematics are provided as reference material to assist in the location and identification of parts, and circuit analysis.

ILLUSTRATED PARTS BREAKDOWNS

The following LQP02 printer illustrated parts breakdowns are provided:

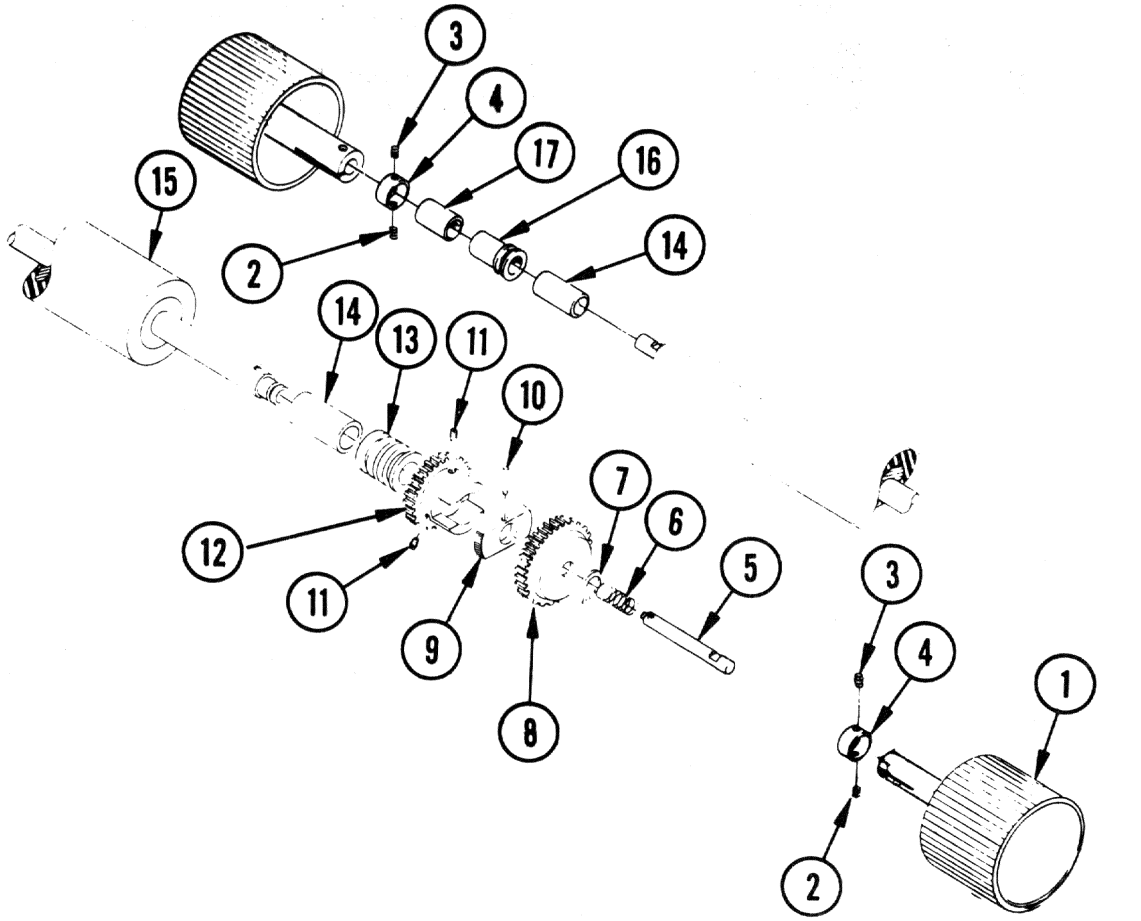
VENDOR PART NUMBER	DESCRIPTION
83007-82	LQP02 Printer Final Assembly
83040-02	Platen Assembly
83009-02	Platen Carrier Assembly
83010-06	Carriage Assembly
83039-04	Printwheel Motor Assembly
84377-01 & 86647-01	Card Guide and Bracket Assembly
83021-04	Structure Assembly
84202-13	Card Cage Assembly
83006-09	Cover Set



LQP02 Printer Final Assembly

LQP02 PRINTER FINAL ASSEMBLY

ITEM	VENDOR PART NUMBER	DESCRIPTION
A	83040-02	Platen Assembly
B	83009-02	Platen Carrier Assembly
C	83010-06	Carriage Assembly
	83039-04	Printwheel Motor Assembly
	84377-01 and 86647-01	Card Guide & Bracket Assembly
D	83021-04	Structure Assembly
E	84202-13	Card Cage Assembly

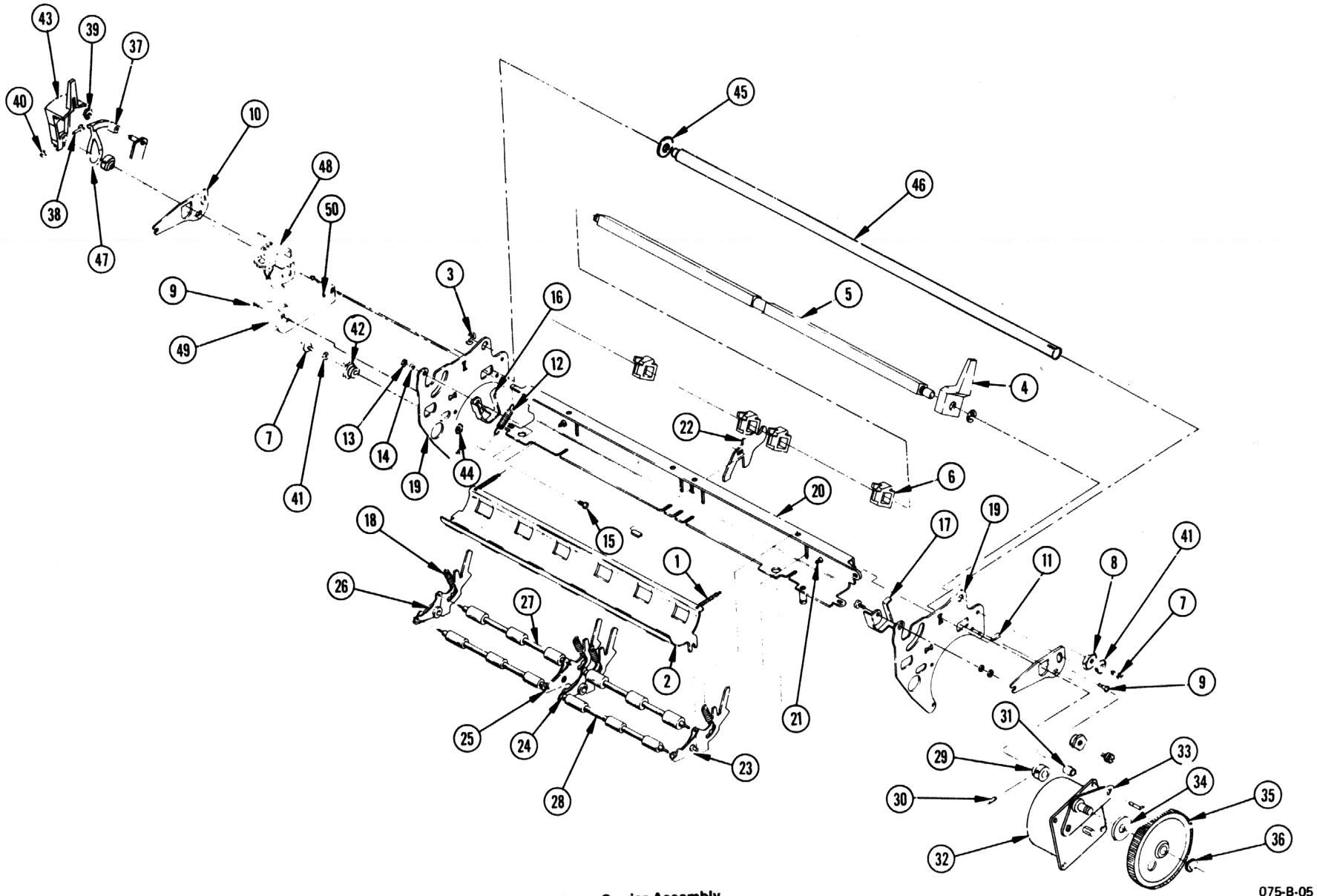


271-A-01

Platen Assembly

PLATEN ASSEMBLY

ITEM	VENDOR PART NUMBER	DESCRIPTION
1	83429-02	Platen Knob
2	85207-03	Setscrew, 8-32 X 0.187 Inch Long Splined
3	85207-04	Setscrew, 8-32 X 0.250 Inch Long Splined
4	83430-01	Sleeve, Platen Knob
5	83593-01	Shaft, Platen Declutching
6	80198	Compression Spring
7	85145-31	Ring, External Retaining
8	80177	Platen Gear
9	80176	Platen Driver
10	85000-03	Needle Roll
11	85206-03	Setscrew, 6-32 X 0.187 Inch Long Splined
12	80175	Gear, Tractor Drive
13	84129-01	Sleeve, Platen Locator
14	80513-01	Platen Spacer, 1.061 Inch Long
15	83592-01	Spacer
16	80515	Sleeve, Platen Bearing
17	80513-02	Platen Spacer, 0.620 Inch Long

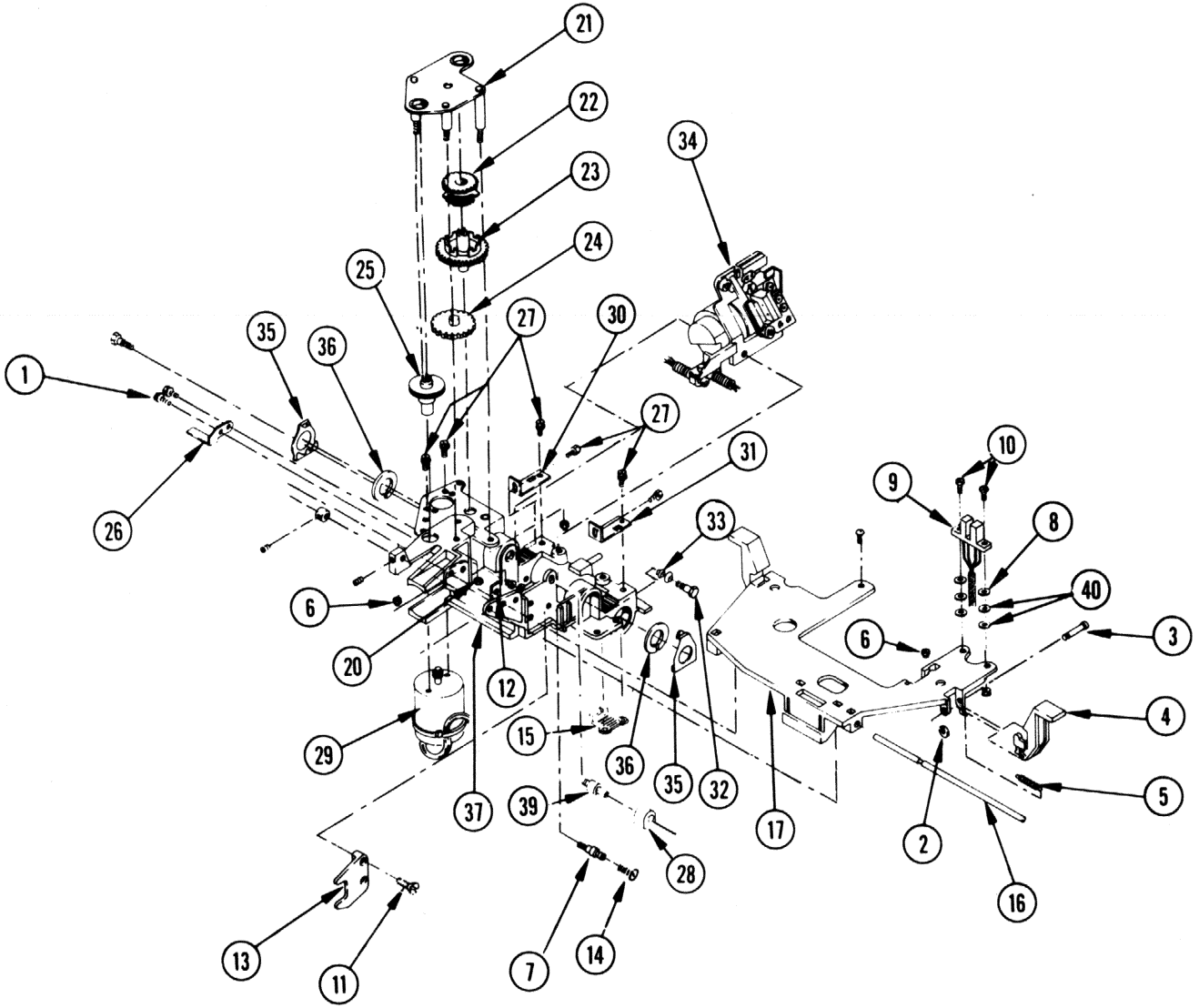


Platen Carrier Assembly

075-B-05

PLATEN CARRIER ASSEMBLY

ITEM	VENDOR PART NUMBER	DESCRIPTION
1	80384	Cradle Spring
2	80032-03	Cradle
3	85128-31	Retainer, E-Ring
4	83443-01	Lever, Feed Roller Disable Release
5	83442-01	Shaft, Feed Roller
6	81110-01	Cam, Feed Roller
7	85586-01	Screw, 8-32 X 1/2 Inch Long, Torx Tamper Proof
8	83096-01	Eccentric, Platen Depth
9	83026-09	Screw, 8-32 X 0.250 Inch Long
10	83302-01	Plate, Impression Control
11	80132	Wedge
12	80234	Spring, External Platen
13	85122-66	Nut, No. 6-32 Hex
14	85124-06	Washer, No. 6 Helical Lock
15	84148-01	Screw, Shoulder
16	84128-02	Latch, Left Platen
17	84128-01	Latch, Right Platen
18	83060-01	Spring
19	83445-01	Platen Frame
20	83512-01	Brace Assembly, Platen
21	85544-01	Cotter Pin
22	81124-01	Support, Feed Roller
23	81107-01	Arm Assembly, Feed Roller
24	81106-01	Arm Assembly, Feed Roller
25	81105-01	Arm Assembly, Feed Roller
26	81104-01	Arm Assembly, Feed Roller
27	80154	Shaft, Rear Feed Roller
28	80153	Shaft, Front Feed Roller
29	83314-01	Cam, Impression Control
30	85206-04	Screw, 6-32 X 0.250 Inch Long
31	80197-02	Spacer
32	84219-01	Motor Assembly, Paper Feed
33	83304-01	Plate Assembly
34	80398	Washer, Felt
35	80202	Idler Gear
36	85128-31	E-Ring
37	83300-01	Detent Arm
38	83023-13	Screw, 4-40 X 0.500 Inch Long
39	85128-18	E-Ring
40	85122-04	Nut, No. 4-40 Hex
41	85124-01	Washer, No. 8 Helical Lock
42	83416-01	Eccentric, Platen Height
43	83444-01	Lever, Impression Control
44	83436-01	Spacer
45	83440-01	Spacer
46	81112-01	Shaft, Impression Control
47	83319-01	Spring, Impression Control
48	84566-01	Bracket
49	84567-01	Cable Assembly (Paper Out Sensor)
50	85489-01	Clamp, Cable

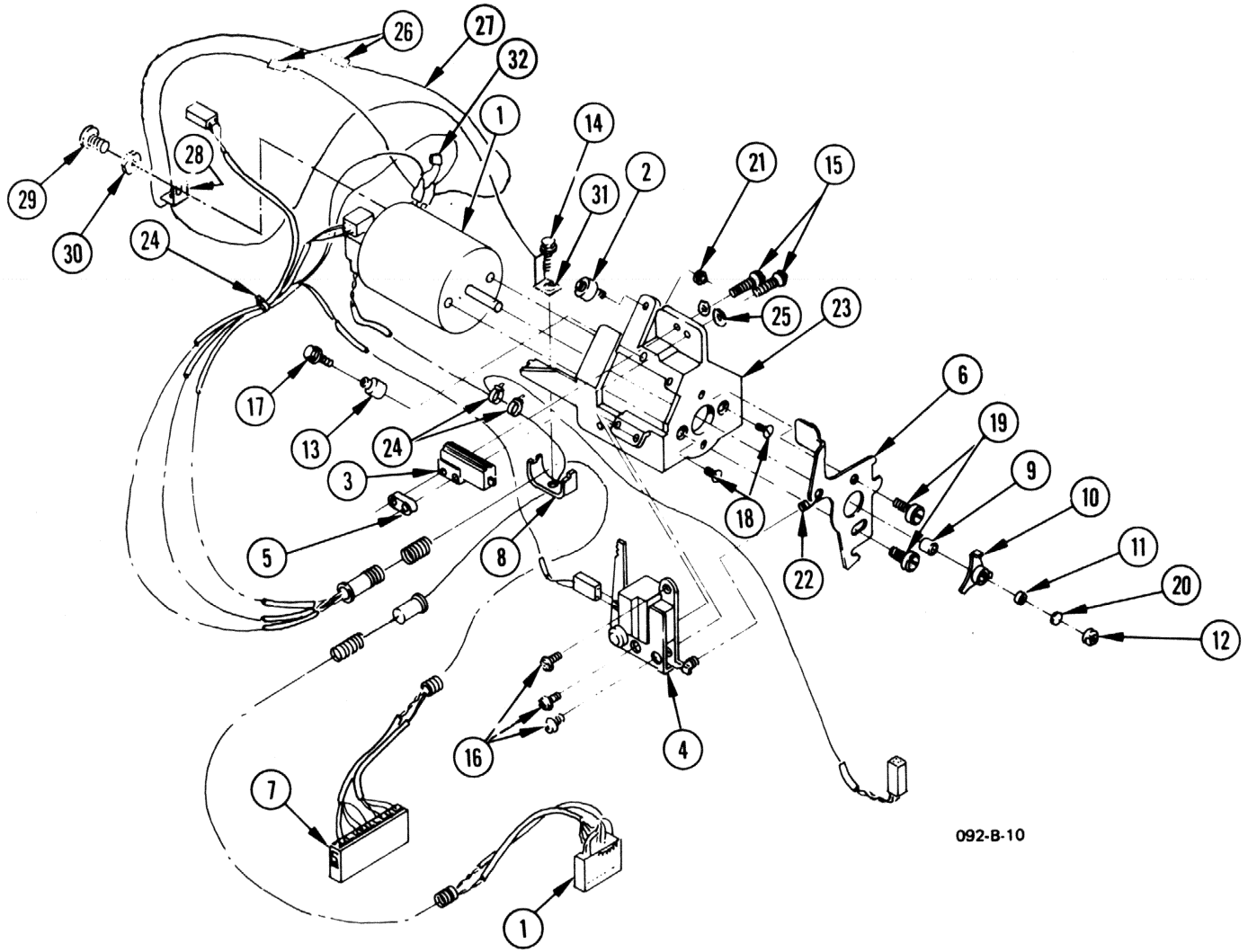


047-C-07

Carriage Assembly

CARRIAGE ASSEMBLY

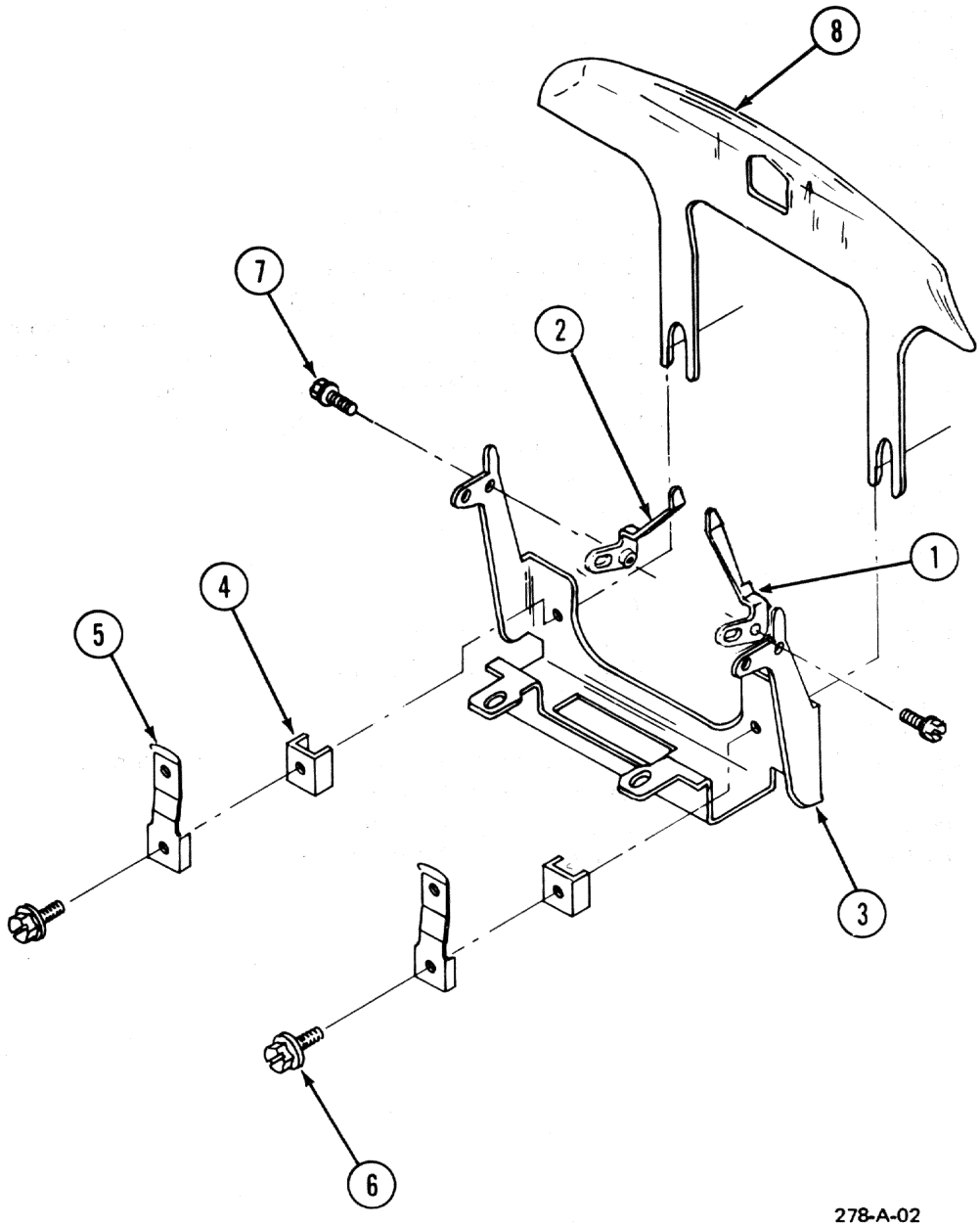
ITEM	VENDOR PART NUMBER	DESCRIPTION
1	83023-10	Screw, 4-40 X 0.250 Inch Long
2	85128-09	E-Ring
3	83388-01	Pivot, Ribbon Latch
4	84222-01	Latch, Ribbon Cassette
5	83369-01	Spring, Ribbon Latch
6	85512-02	Nut, No. 4-40 Self Lock
7	83077-01	Eccentric
8	85125-04	Washer, No. 4 Flat
9	- - - -	End of Ribbon Sensor (Part of Signal Harness 83001-02; refer to Printwheel Motor Assembly)
10	85004-06	Screw, 4-40 X 0.375 Inch Long
11	85066-10	Screw, 6-32 X 0.625 Inch Long
12	84140-01	Nut Plate
13	84139-01	Support, Carriage
14	83023-14	Screw, 4-40 X 0.875 Inch long
15	83160-01	Cleat, Belt
16	81159-01	Shaft, Ribbon Support
17	83280-01	Support, Ribbon
18	83152-01	Nut Plate
19	83435-01	Bracket, Magnet
20	85512-03	Nut, No. 5-40 Self Lock
21	83358-01	Plate Assembly, Ribbon Gear
22	84488-01	Clutch Assembly, Ribbon Drive
23	86667-02	Clutch Assembly, Ribbon
24	83352-01	Gear, Ribbon Idler
25	86668-01	Rewind Assembly, Ribbon
26	81158-01	Shutter, End of Travel Sensor
27	83023-09	Screw, 4-40 X 0.185 Inch Long
28	83148-01	Bumper, Ribbon Support
29	84232-01	Motor Assembly, Stepper
30	84150-02	Bracket, L.H. Retaining
31	84150-01	Bracket, R.H. Retaining
32	83370-02	Pivot, Print Motor
33	85140-01	Washer
34	83039-04	Motor Assembly, Printwheel
35	84149-01	Retainer, Felt Wiper
36	83260-01	Wiper, Felt Guide
37	83289-01	Carriage Assembly
38	86647-01	Card Guide and Bracket Assembly
39	83149-01	Stop, Support
40	85126-04	Washer, No. 6 Flat



Printwheel Motor Assembly

PRINTWHEEL MOTOR ASSEMBLY

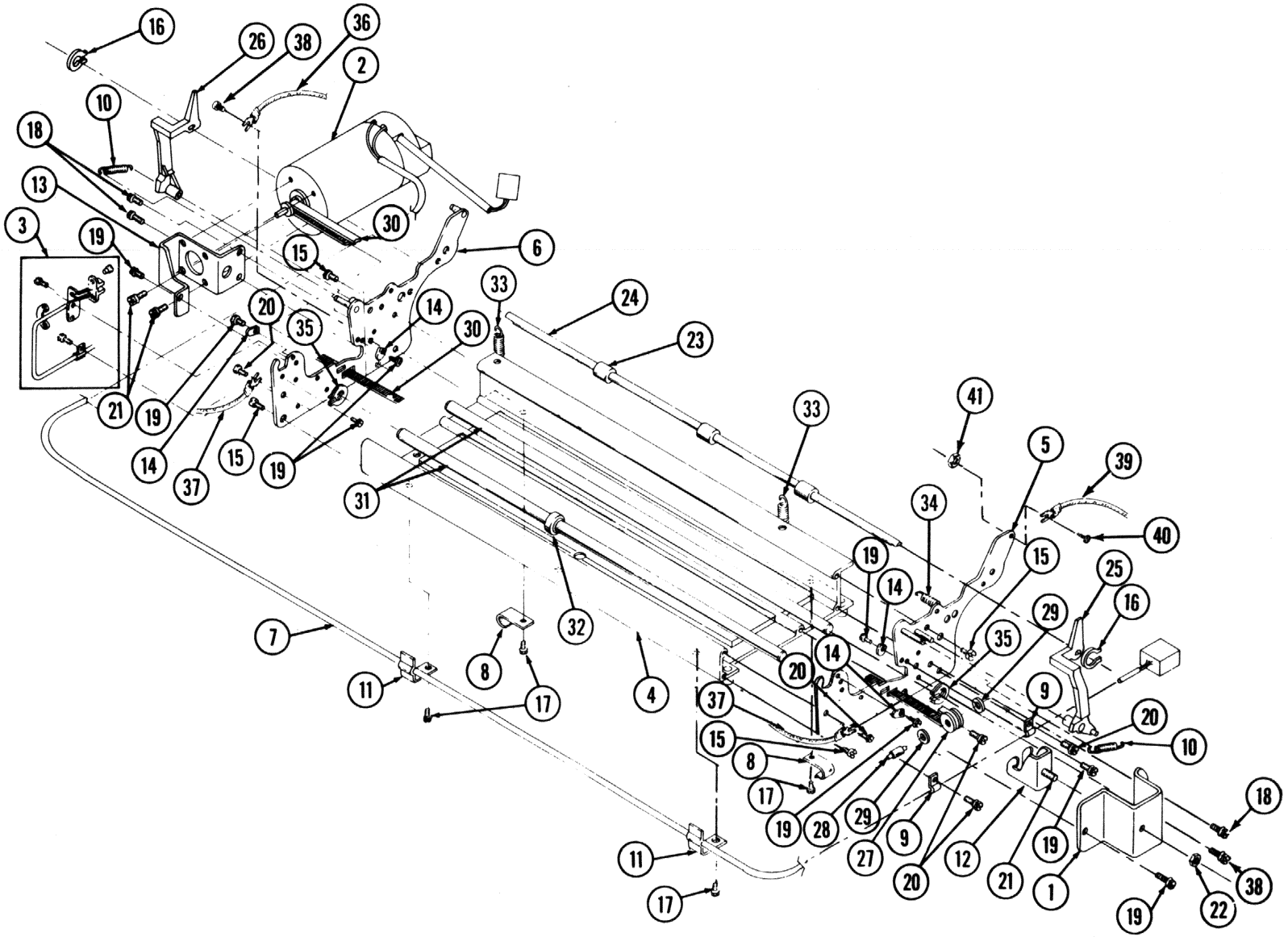
ITEM	VENDOR PART NUMBER	DESCRIPTION
1	83001-02	Harness Assembly, Signal
2	83605-01	Armstop Assembly, Hammer
3	80714-08	Hammer Assembly
4	83037-01	Armature Assembly, Hammer
5	80784	Nut Plate
6	81543-01	Latch, Print Motor
7	83003-04	Harness Assembly, Power
8	86620-01	Retainer, Cable Shield
9	81559-01	Spacer, Printwheel Hub
10	80376	Hub, Print Disk
11	80407	Collet, Print Disk Hub
12	80256	Pilot, Printwheel
13	84239-01	Eccentric, Hammer Armature Stop
14	83023-15	Screw, 4-40 X 3/4 Inch Long
15	85600-305	Screw, 3-48 X 5/8 Inch Long Torx Pan Head, Tamper Proof
16	85600-402	Screw, 4-40 X 1/4 Inch Long Torx Pan Head, Tamper Proof
17	83023-13	Screw, 4-40 X 1/2 Inch Long Hex Head
18	85066-05	Screw, 6-32 X 5/16 Inch Long Flat Head
19	81544-01	Screw, Print Motor Latch
20	85140-10	Washer, Belleville
21	85137-05	Nut, Self Lock
22	80304	Spring
23	83085-01	Casting, Motor
24	84123	Tie Wrap
25	85124-03	Washer, No.3 Lock
26	93108	Capacitor, 0.047 Microfarad
27	94114	Wire, 20 Gauge
28	84534-01	Lug, Ground
29	85616-203	Screw, 2-56 X 3/16 Inch Long Thread Forming
30	85125-02	Washer, Plain Narrow
31	94435-02	Lug, Locking Terminal
32	93214	Capacitor, 0.1 Microfarad



Card Guide and Bracket Assembly

CARD GUIDE AND BRACKET ASSEMBLY

ITEM	VENDOR PART NUMBER	DESCRIPTION
1	83125-02	Finger, R.H. Ribbon
2	83125-01	Finger, L.H. Ribbon
3	83076-01	Bracket, Card Guide
4	83249-01	Channel, Card Guide
5	83248-01	Latch, Card Guide
6	83022-10	Screw, 3-56 X 1/4 Inch Long
7	83022-03	Screw, 3-56 X 3/16 Inch Long
8	84377-01	Card Guide

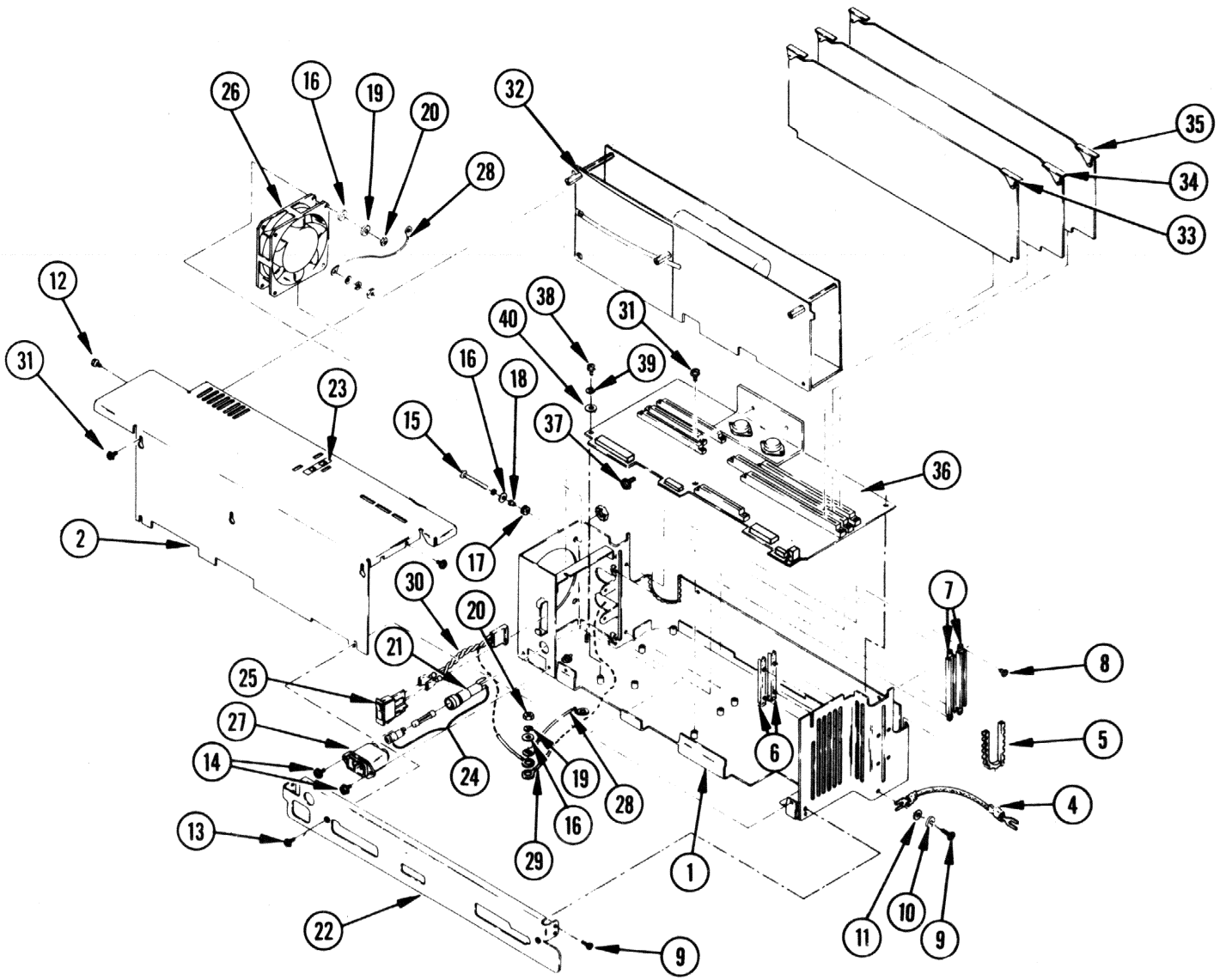


Structure Assembly

003-R-05

STRUCTURE ASSEMBLY

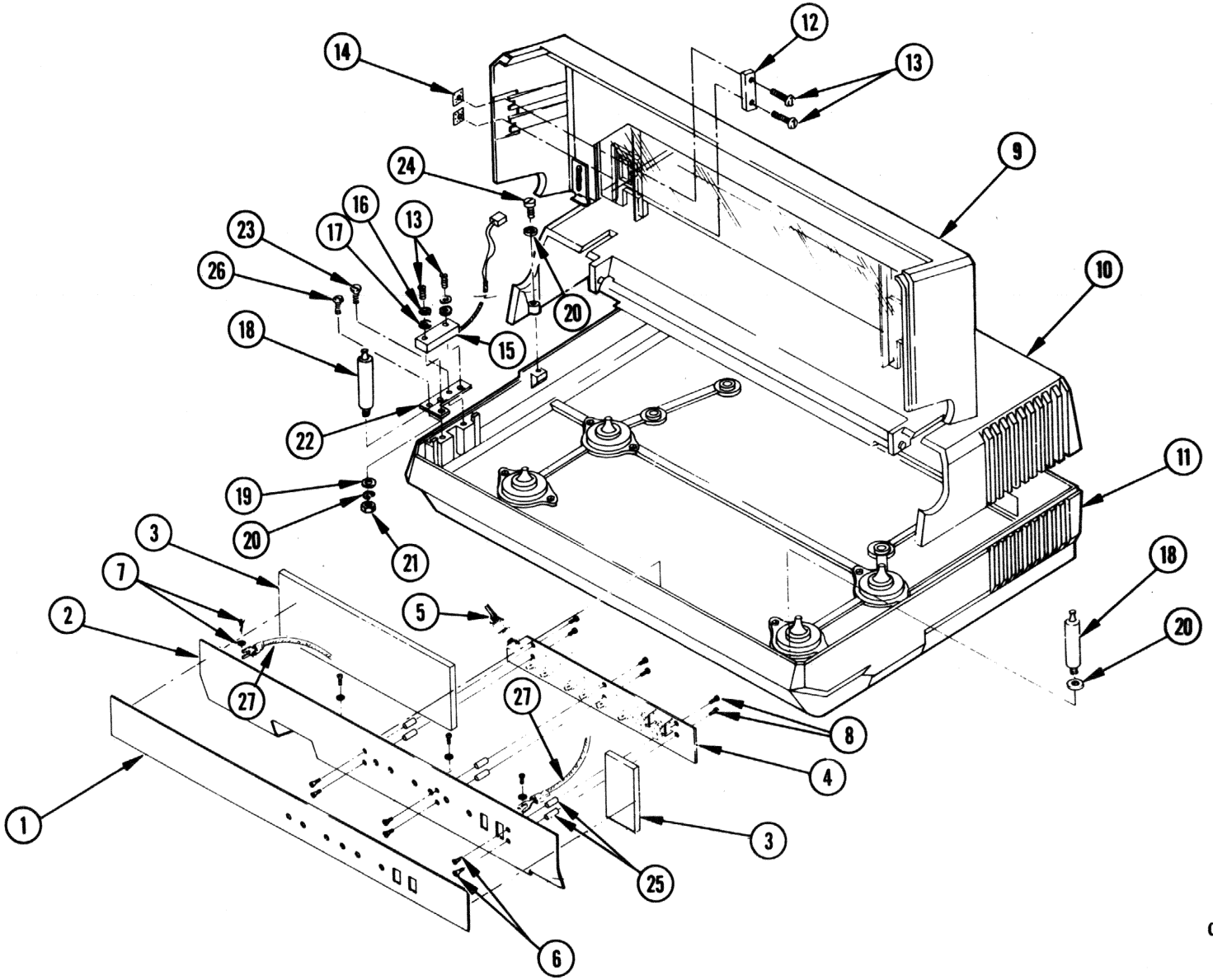
ITEM	VENDOR PART NUMBER	DESCRIPTION
1	83032-01	Bracket Assembly, Pulley Mounting
2	83031-01	Motor/Encoder Assembly
3	83069-01	Bracket Assembly, Photo Sensor
4	83098-01	Extrusion Assembly
5	83318-01	Side Frame Assembly, R.H.
6	83318-02	Side Frame Assembly, L.H.
7	94464-01	Harness Assembly, Carriage Motor
8	94406-04	Clamp, Cable
9	85141-01	Clamp, Cable
10	83066-01	Spring, Paper Bail
11	83067-01	Clamp, Metal Cable
12	83538-01	Bracket, Pulley Adjust
13	81531-01	Bracket, Motor Mounting
14	83568-01	Cam, Carriage Shift Lock
15	83311-01	Screw, Shoulder
16	85129-21	Retainer, Grip Ring
17	85300-01	Screw, 6-32 X 1/4 Inch Long Taptite
18	83026-11	Screw, 8-32 X 3/8 Inch Long Sems
19	83025-09	Screw, 6-32 X 1/4 Inch Long Sems
20	85301-05	Screw, 8-32 X 1/2 Inch Long T/F
21	85057-10	Screw, 8-32 X 5/8 Inch
22	85512-05	Nut, No. 8 Lock
23	80329	Roller Assembly
24	84115-01	Bail, Paper
25	84109-01	Lever, R.H. Paper Bail
26	84114-01	Lever, L.H. Paper Bail
27	83505-02	Pulley Assembly, Timing Belt
28	83542-01	Shaft, Bearing
29	83543-01	Washer, Thrust
30	83121-02	Belt, Timing
31	80116-01	Shaft, Carriage Guide
32	83544-01	Bearing, Spherical
33	83441-01	Spring, Platen Puller
34	80236	Spring, Platen Extension
35	85129-50	Retainer, Grip Ring
36	84364-01	Ground Strap
37	87685-01	Ground Strap
38	83026-11	Screw, 8-32 X 7/16 Inch Long Hex Hd/washer
39	84364-02	Ground Strap (Part of Card Cage Assembly)
40	83025-10	Screw, 6-32 X 5/16 Inch Long Sems
41	85122-06	Nut, No. 6-32 Hex



Card Cage Assembly

CARD CAGE ASSEMBLY

ITEM	VENDOR PART NUMBER	DESCRIPTION
1	84121-02	Card Cage, Large
2	84122-02	Cover, Card Cage Top
3	- - - -	No Longer Assigned
4	84364-01	Ground Strap (Part of Structure Assembly)
5	83061-01 & 02	Grommet Strip
6	83573-01	Card Guide, Snap-In
7	83569-01	Card Guide, Metal
8	83062-01	Rivet
9	85546-01	Screw, No. 4 Sheet Metal
10	85126-04	Washer, No. 4 Plain
11	85124-04	Washer, No. 4 Lock
12	83023-09	Screw, 4-40 Hex Slot/Cone
13	85554-09	Screw, 4-40 Pan Head Black
14	83023-10	Screw, 4-40 Hex Slot/Cone
15	85006-28	Screw, 6-32 X 1 3/4 Inch Long Pan Hd
16	85126-06	Washer, No. 6 Plain
17	85424-02	Grommet, Rubber
18	85146-01	Eyelet
19	85124-06	Washer, No. 6 Lock
20	85122-06	Nut, No. 6 Hex Head
21	83107-01	Standoff, Fuse
22	83145-03	Rear Panel, DEC
23	84107-01	Bar, Stabilizer
24	99187-01	Fuse Holder Assembly
25	83055-01	Switch
26	84363-01	Fan Assembly, DC
27	99188-01	Line Filter Assembly
28	99176-07	Wire Assembly
29	84364-02	Ground Strap
30	84371-01	Cable Assembly
31	83025-10	Screw, 6-32
32	91872-01	PCB Assembly, Power Supply
33	90714-01	PCB Assembly, Serial Interface Controller
34	91162-XX	PCB Assembly, Digital
35	91174-XX	PCB Assembly, Analog
36	90716-01	PCB Assembly, Motherboard
37	83027-04	Screw, 10-32
38	85006-07	Screw, 6-32 X 7/16 Inch Long
39	85124-06	Washer, No. 6 Helical Lock
40	84373-02	Washer, Counterbored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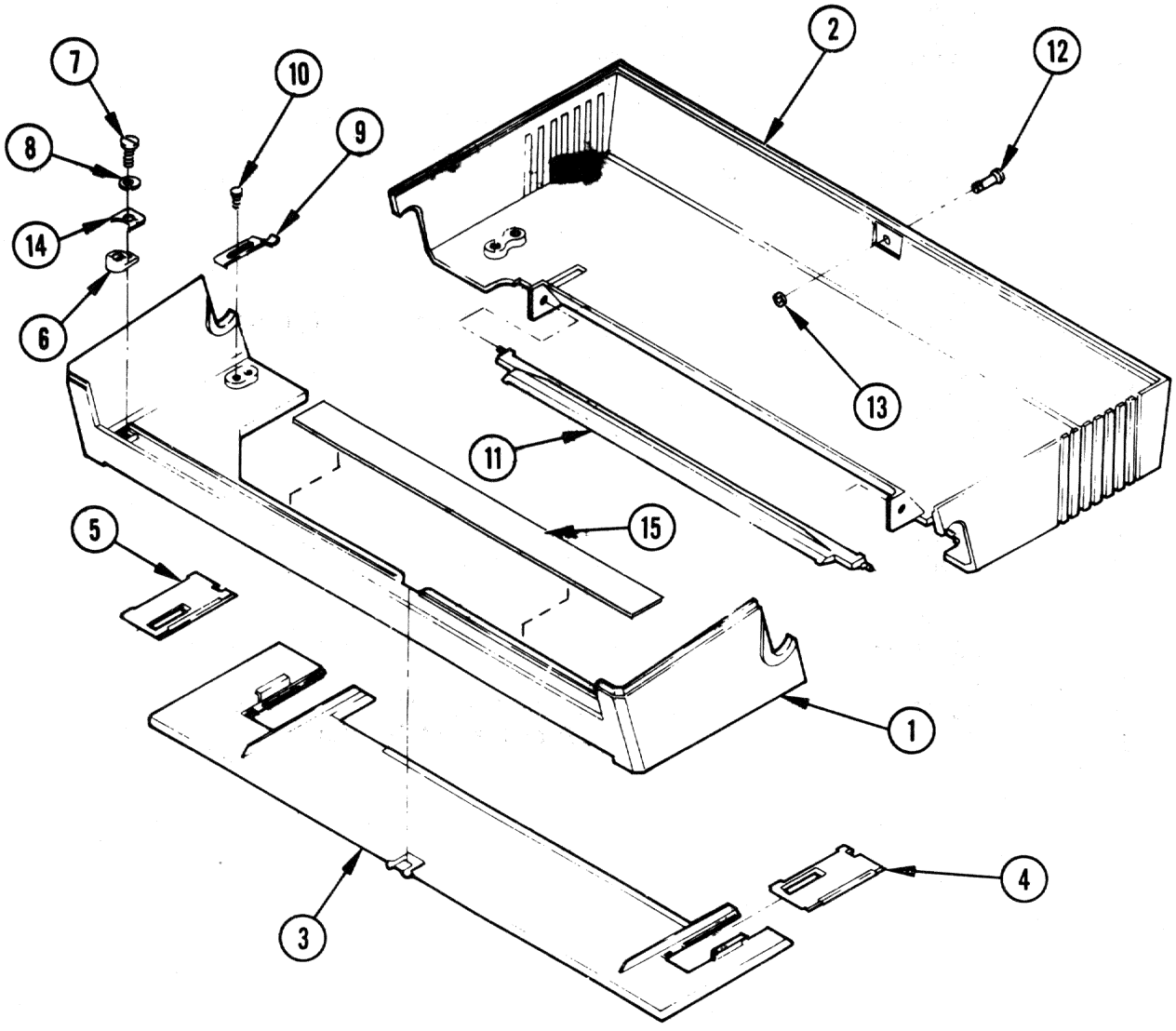
094-B-04

Cover Set

COVER SET

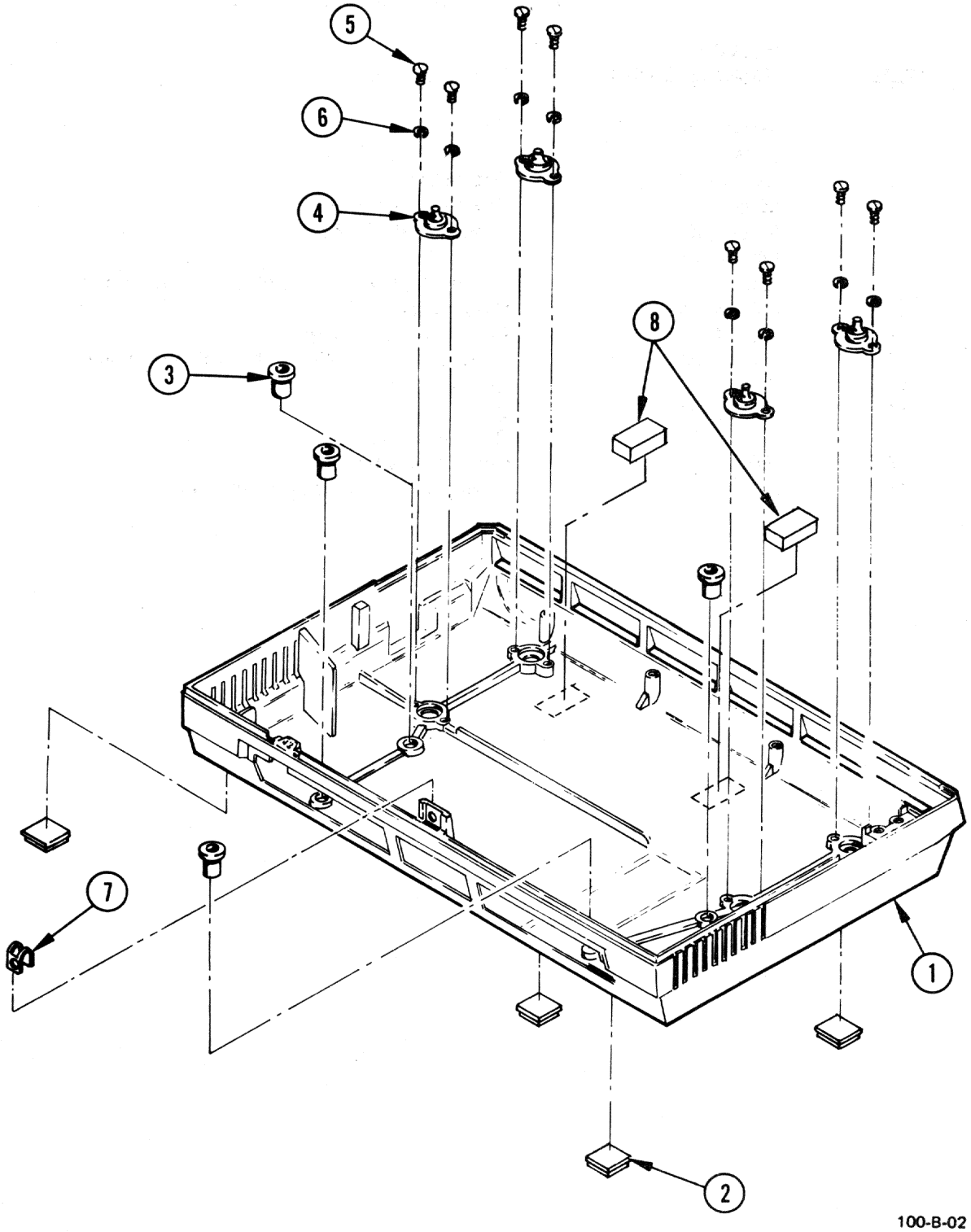
ITEM	VENDOR PART NUMBER	DESCRIPTION
1	83103-06	Front Mask
2	83138-03	Front Panel
3	84188-01	Accoustical Pad
4	90718-01	PCB, Front Panel Assembly
5	84369-01	Harness Assembly
6	85064-06	Screw, 4-40 X 3/8 Inch Long Flat Head
7	83025-12	Screw, 6-32 Hex Head W/Cone Washer
8	85004-05	Screw, 4-40 X 5/16 Inch Long Pan Head
9	83043-02	Top Cover
10	83042-02	Intermediate Cover
11	83041-02	Bottom Cover
12	94560-02	Magent, Proximity Switch
13	85004-07	Screw, 4-40 X 7/16 Inch Long Pan Head
14	85597-01	Clips, Tinnerman
15	86682-01	Wire Assembly, Proximity Switch
16	85124-04	Washer, No. 4 Lock
17	85126-04	Washer, No. 4
18	84376-01	Stud, Cover Catch
19	85126-06	Washer, No. 6 Flat
20	85124-06	Washer, No. 6 Lock
21	85122-06	Nut, No. 6-32 Hex
22	84367-01	Plate, Adapter
23	85066-04	Screw, 6-32 Flat Head
24	85016-11	Screw, 6-32 X 0.688 Inch Long Fillister Head
25	83595-01	Spacer
26	83025-10	Screw, 6-32 X 0.31 Inch Long Pan Head
27	87685-01	Ground Strap (Part of Structure Assembly)



Top and Intermediate Covers

TOP AND INTERMEDIATE COVERS

ITEM	VENDOR PART NUMBER	DESCRIPTION
1	83043-02	Top Cover
2	83042-02	Intermediate Cover
3	83111-02	Top Mask
4	83088-01	Closure, Left Mask
5	83088-02	Closure, Right Mask
6	84375-01	Catch, Top Cover
7	85004-06	Screw, 4-40 X 0.375 Inch Long Pan Head
8	85126-04	Washer, No. 4 Plain
9	83114-01	Retainer, Top Cover
10	85006-04	Screw, 6-32 X 0.250 Inch Long Pan Head
11	81973-03	Scale, Paper
12	83139-01	Stud
13	83141-01	Retainer, Push On
14	84374-01	Plate, Stiffener
15	84564-01	Label, System Manager Switches



Bottom Cover

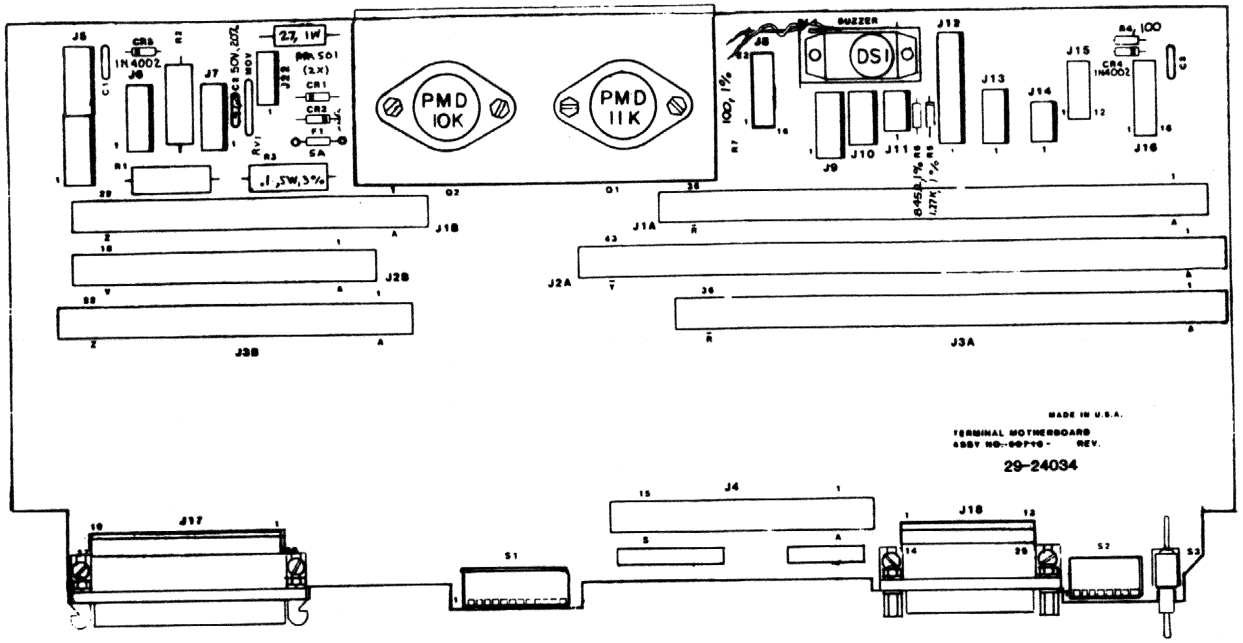
BOTTOM COVER

ITEM	VENDOR PART NUMBER	DESCRIPTION
1	83041-02	Bottom Cover
2	85152-01	Foot
3	85422-02	Well Nut
4	85151	Shockmount
5	85006-04	Screw, 6-32 X 0.250 Inch Long Pan Head
6	85124-06	Washer, No. 6 Helical Lock
7	83140-01	Receptacle, Clip-on
8	84389	Stop

SCHEMATICS

The following LQP02 printer schematics are provided:

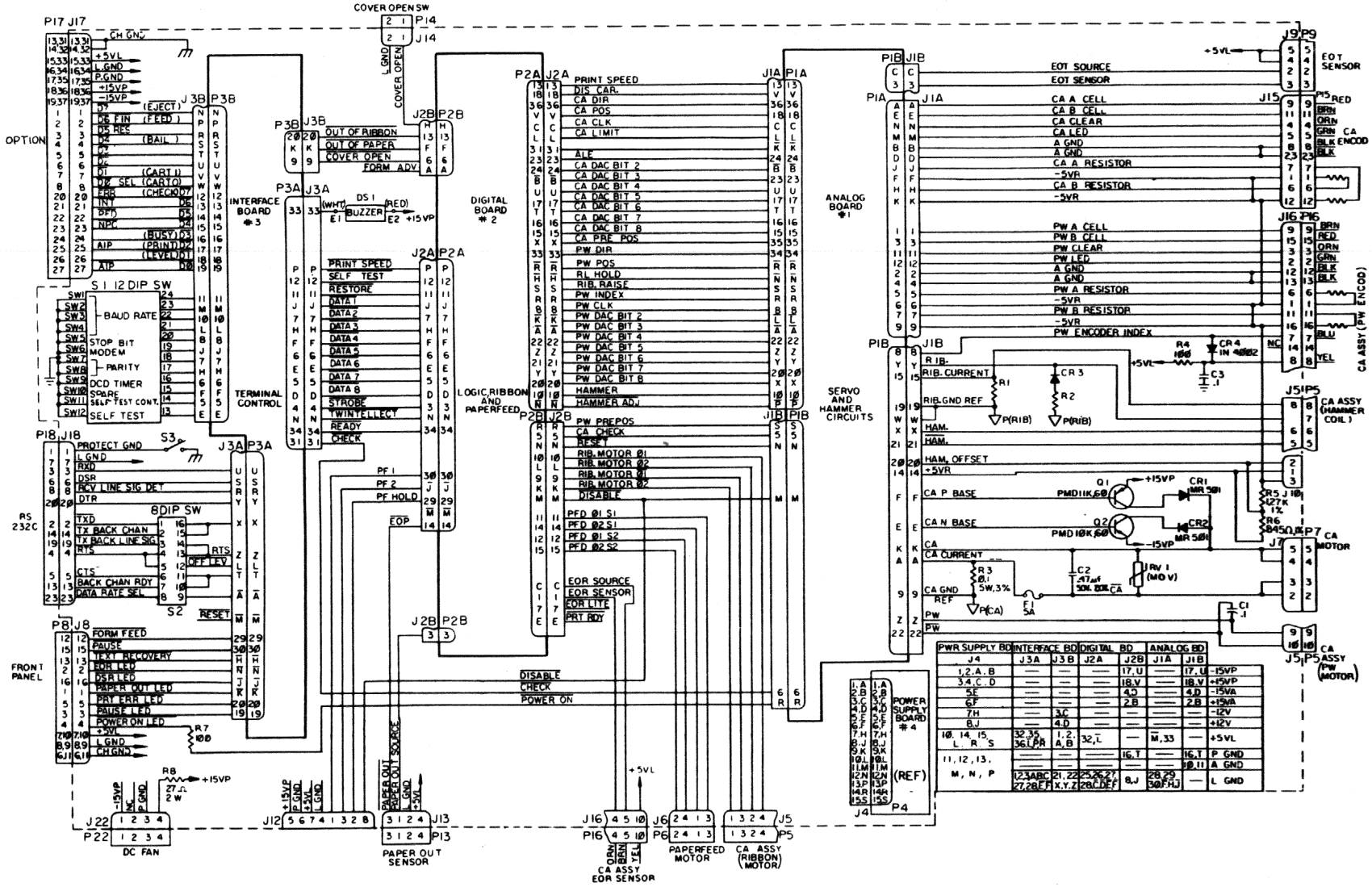
VENDOR PART NUMBER	DESCRIPTION
90716-01	Motherboard PCB
90718-01	Front Panel PCB
90714-01	Serial Interface Controller PCB
91162-XX	Digital PCB
91174-XX	Analog PCB
91372-01	Power Supply PCB



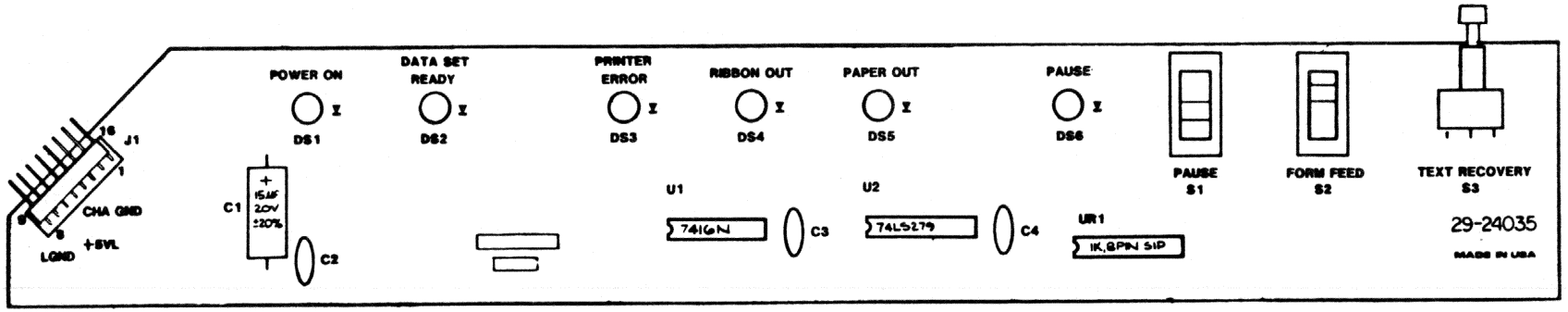
NOTES:
UNLESS OTHERWISE SPECIFIED:

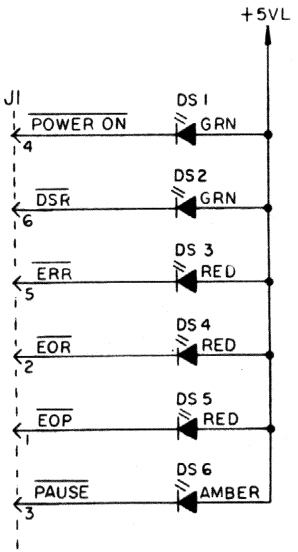
1. ALL RESISTANCE VALUES IN OHMS, 1/4W, 5%.
2. ALL 1% RESISTORS ARE 1/8W.
3. ALL CAPACITORS ARE .1μf, 50V +80 – 20%.

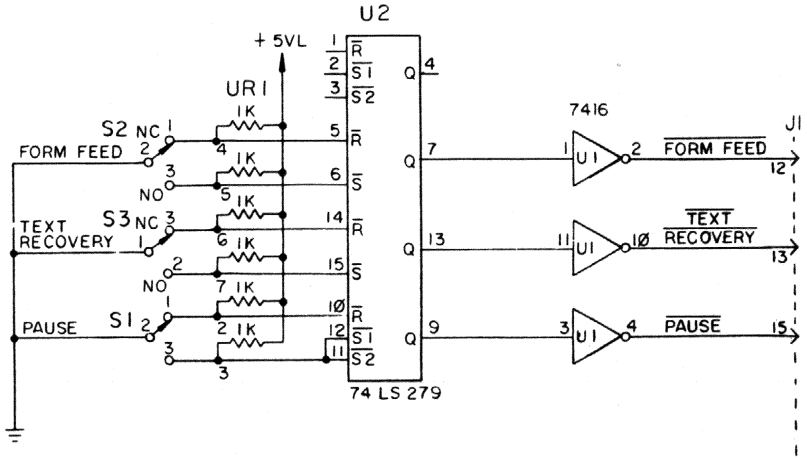
MOTHERBOARD PCB
90716-011 REV. C
SHEET 1 OF 2

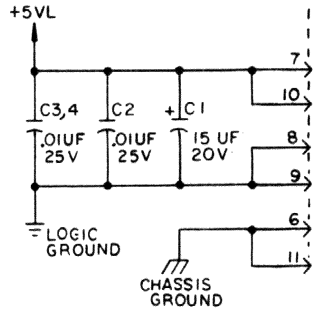


MOTHERBOARD PCB
90716-01 REV. C
SHEET 2 OF 2





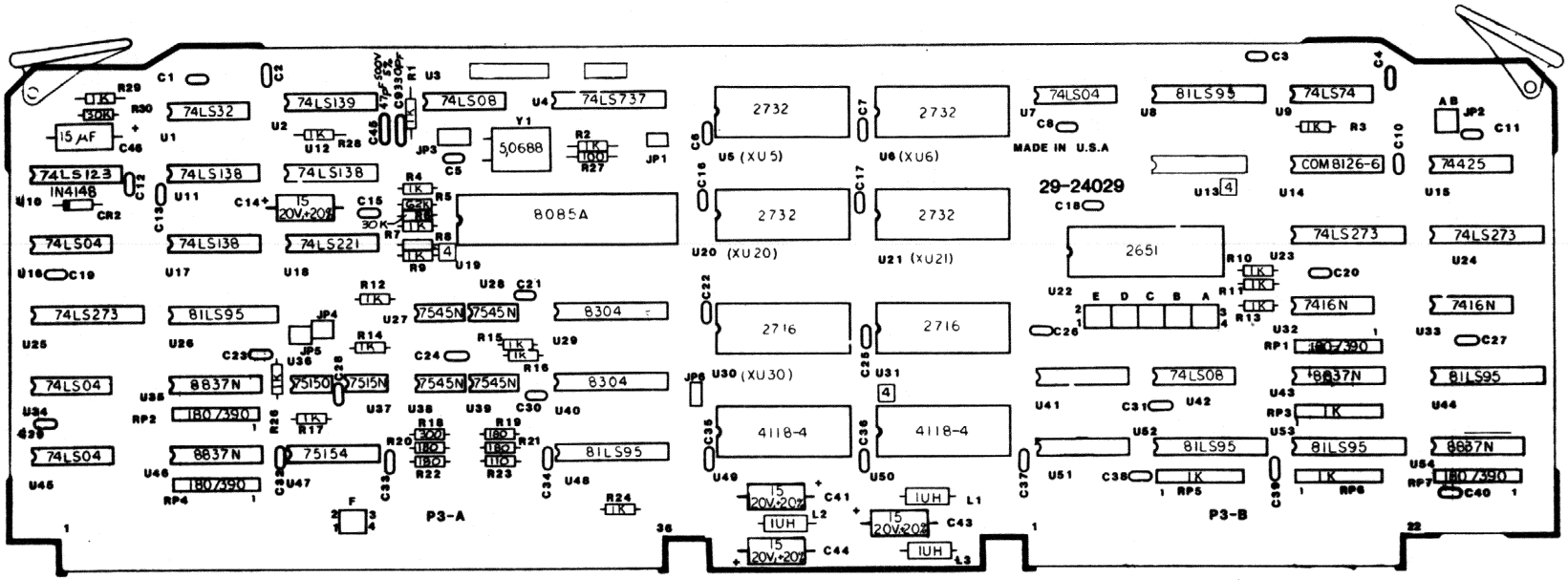




NOTE:
UNLESS OTHERWISE SPECIFIED:

1. ALL CAPACITORS ARE .01μf 25V, 20%.

FRONT PANEL PCB
90718- REV. A
SHEET 1 OF 1



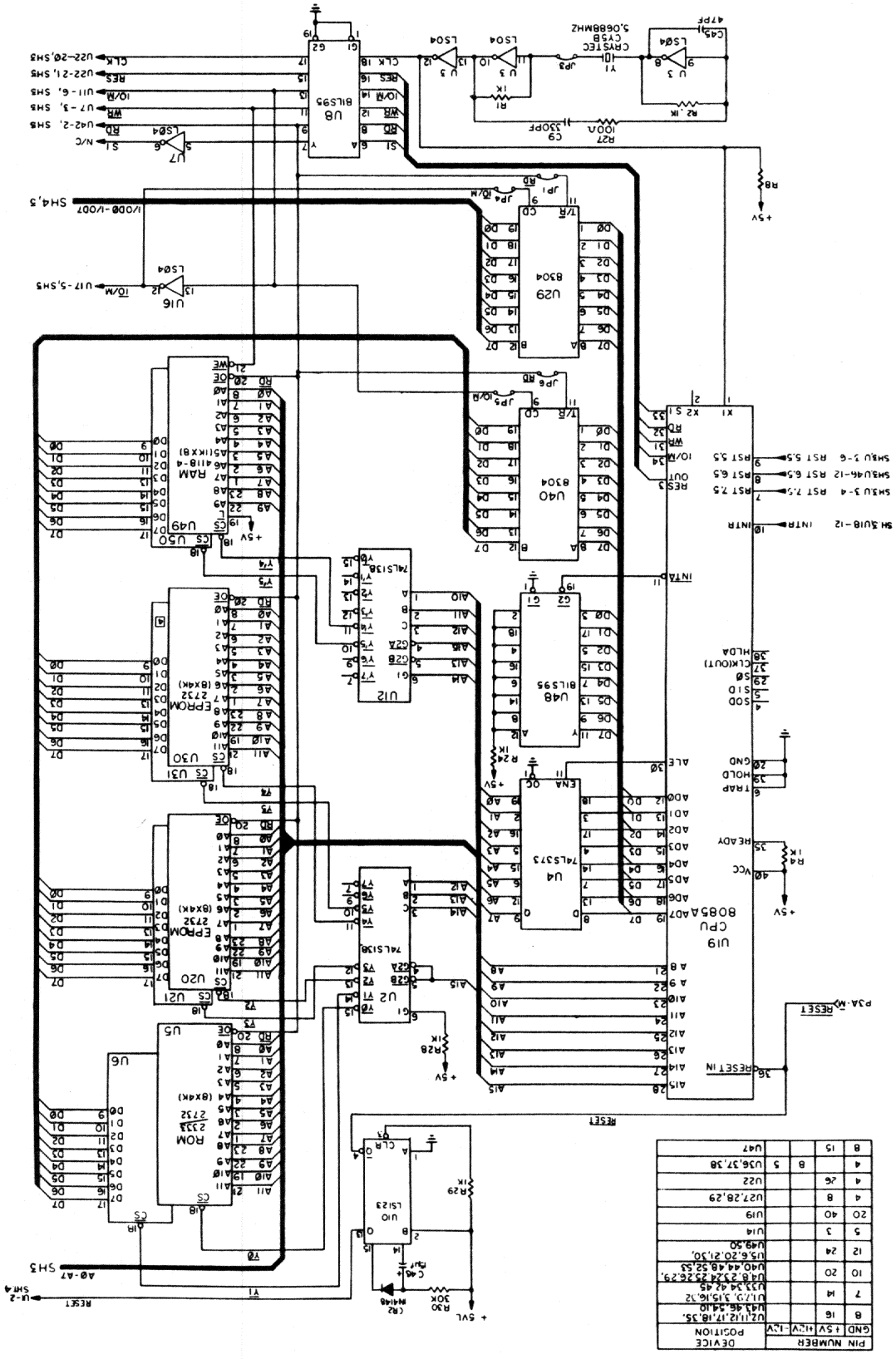
123

NOTES:

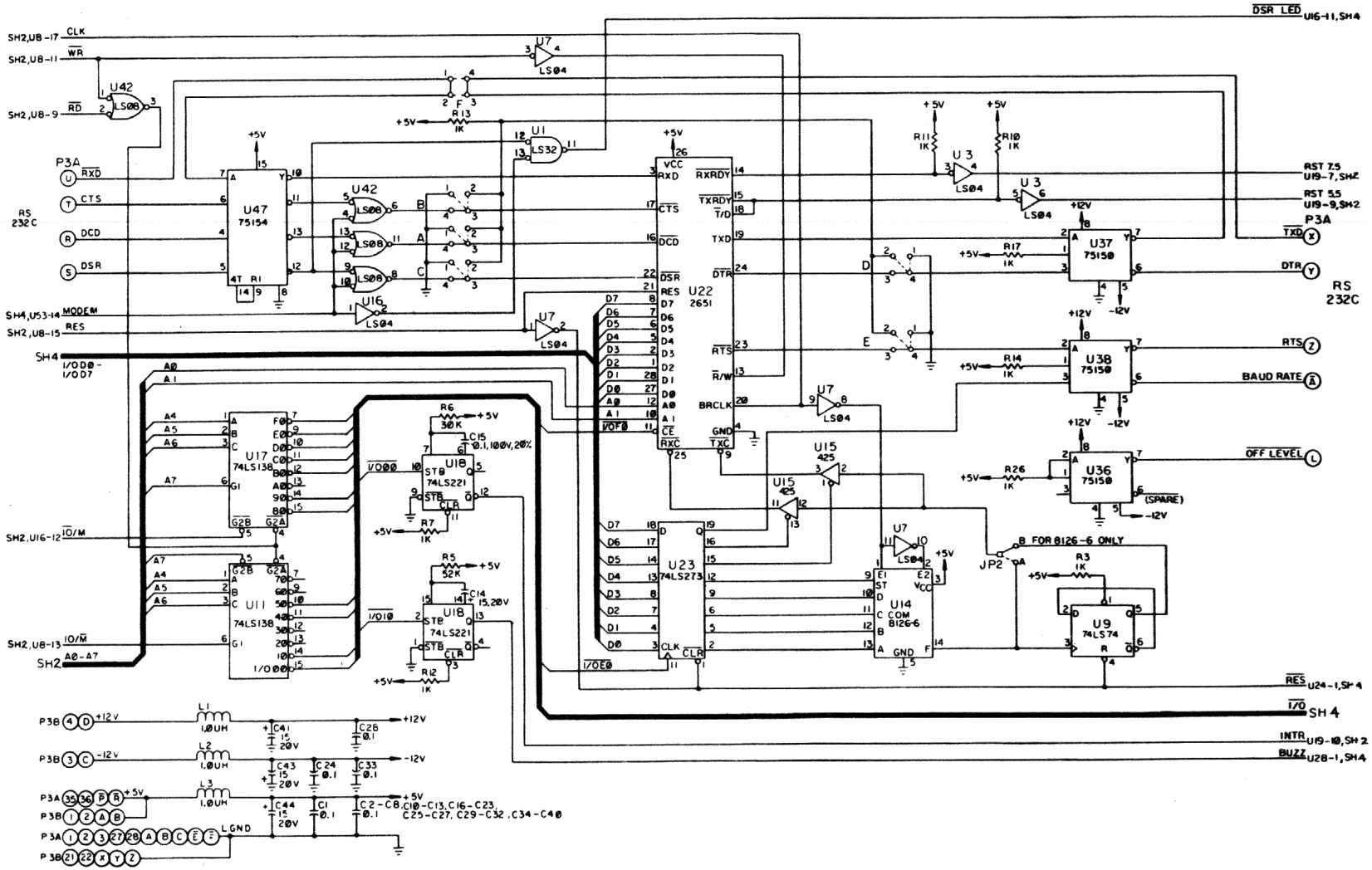
1. ALL RESISTANCE VALUES ARE IN OHMS, 1/4W, 5%.

2. ALL CAPACITANCE VALUES ARE IN MICROFARADS
   ALL CAPACITORS ARE 0.1μF, 50V, −20%, +80%

SERIAL INTERFACE
CONTROLLER PCB
90714-01 REV. E
SHEET 1 OF 4

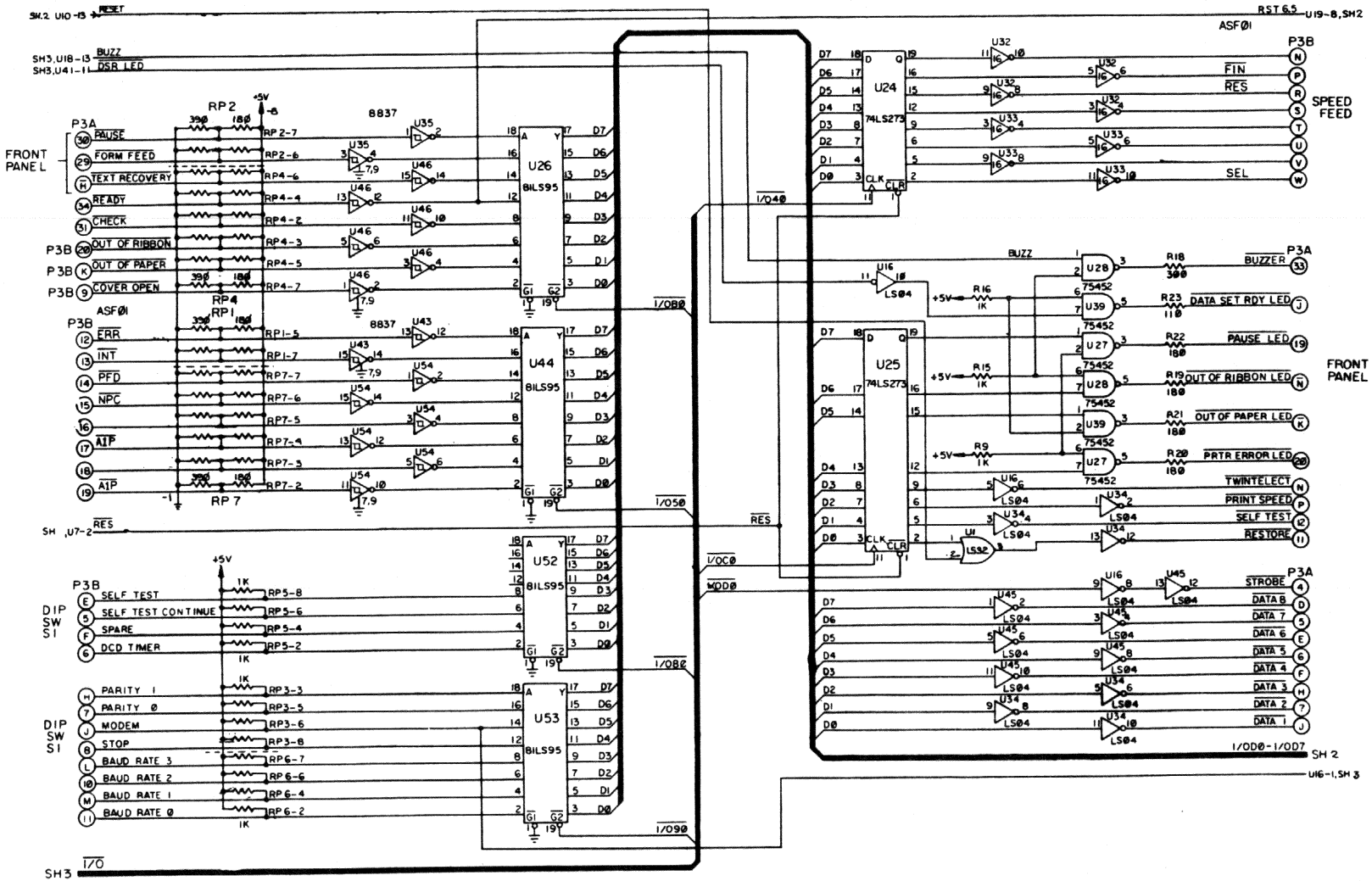


PIN NUMBER				DEVICE POSITION
GND	+5V	+12V	-12V	
8	16			U2,11,12,17,18,35, U43,46,54,10
7	14			U33,34,42,45 U1,7,9, 31,51,61,72
10	20			U4,8,23,24,25,26,29, U40,44,48,52,55
12	24			U5,6,20,21,50, U49,50
5	3			U14
20	40			U19
4	8			U27,28,29
4	26			U22
4		8	5	U36,37,38
8	15			U47



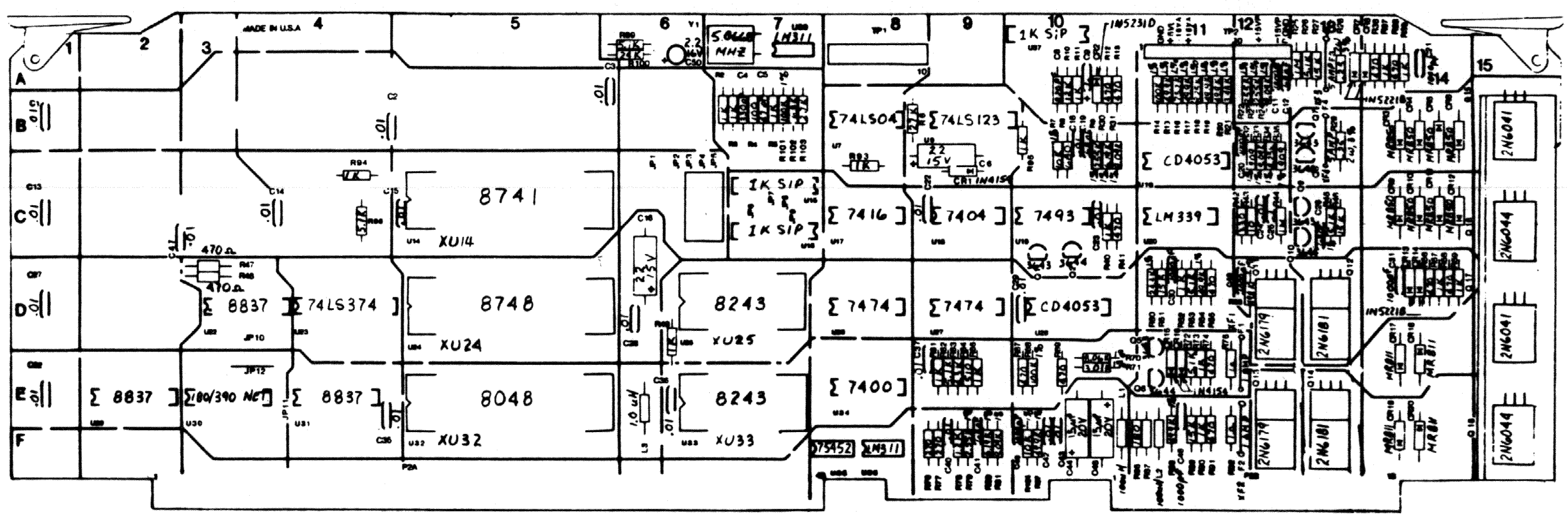
SERIAL INTERFACE CONTROLLER PCB

90714-01 REV. E
SHEET 3 OF 4



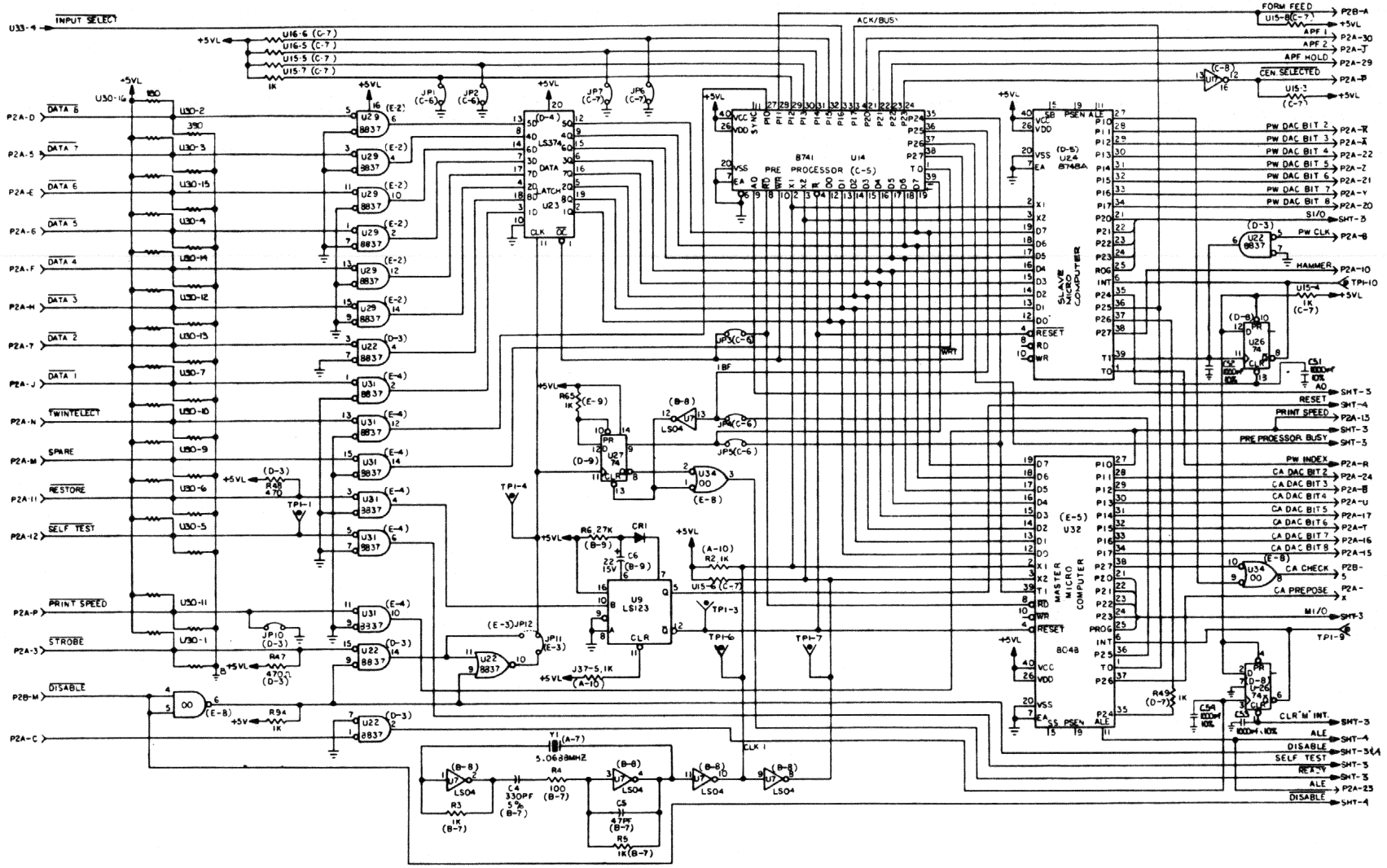
SERIAL INTERFACE CONTROLLER PCB

90714-01 REV. E
SHEET 4 OF 4

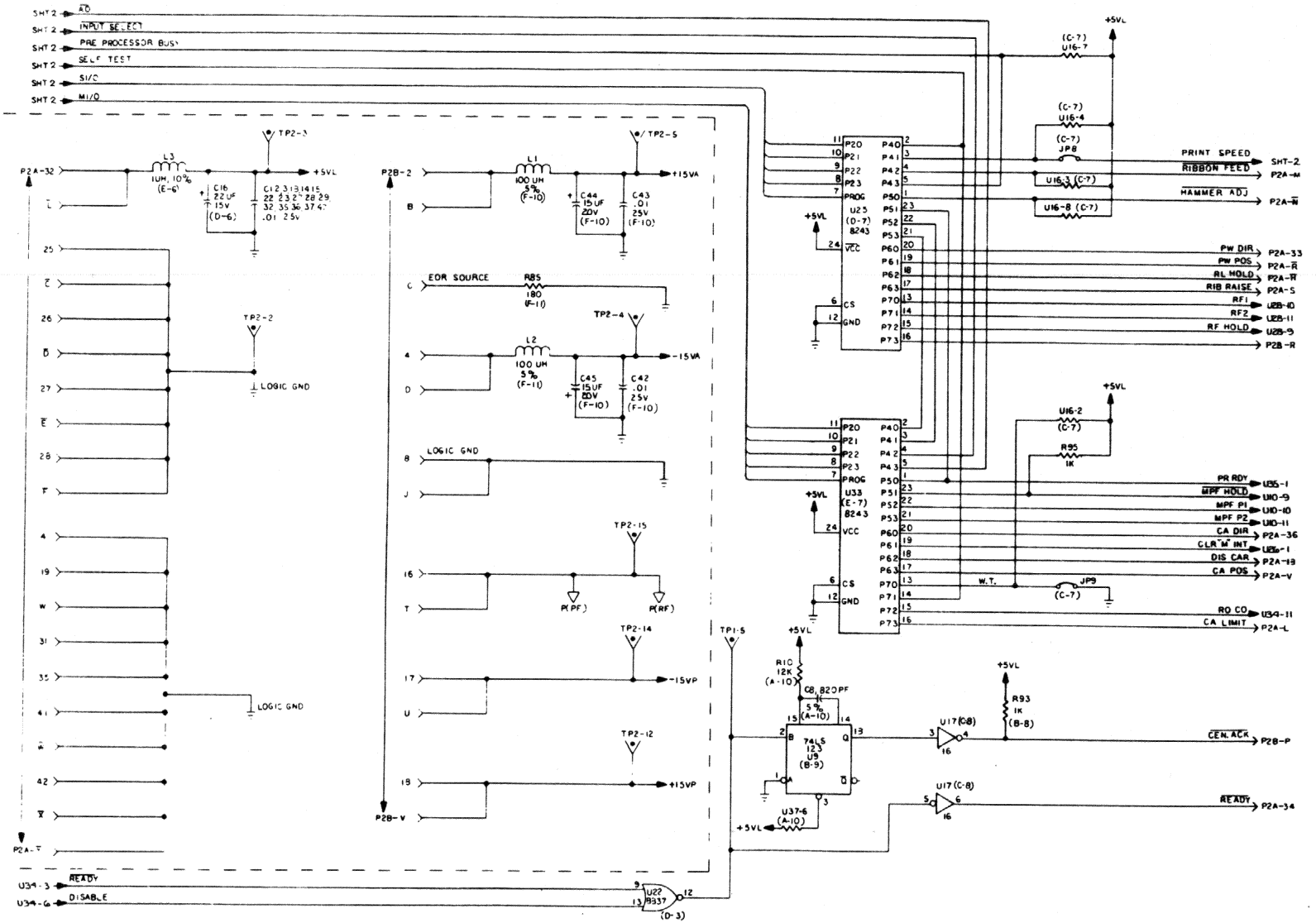


NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL CAPACITOR VALUES IN µf.
2. ALL RESISTOR VALUES IN OHMS, 1/4 W., 5%.
3. ALL 1% RESISTORS ARE 1/8 W.

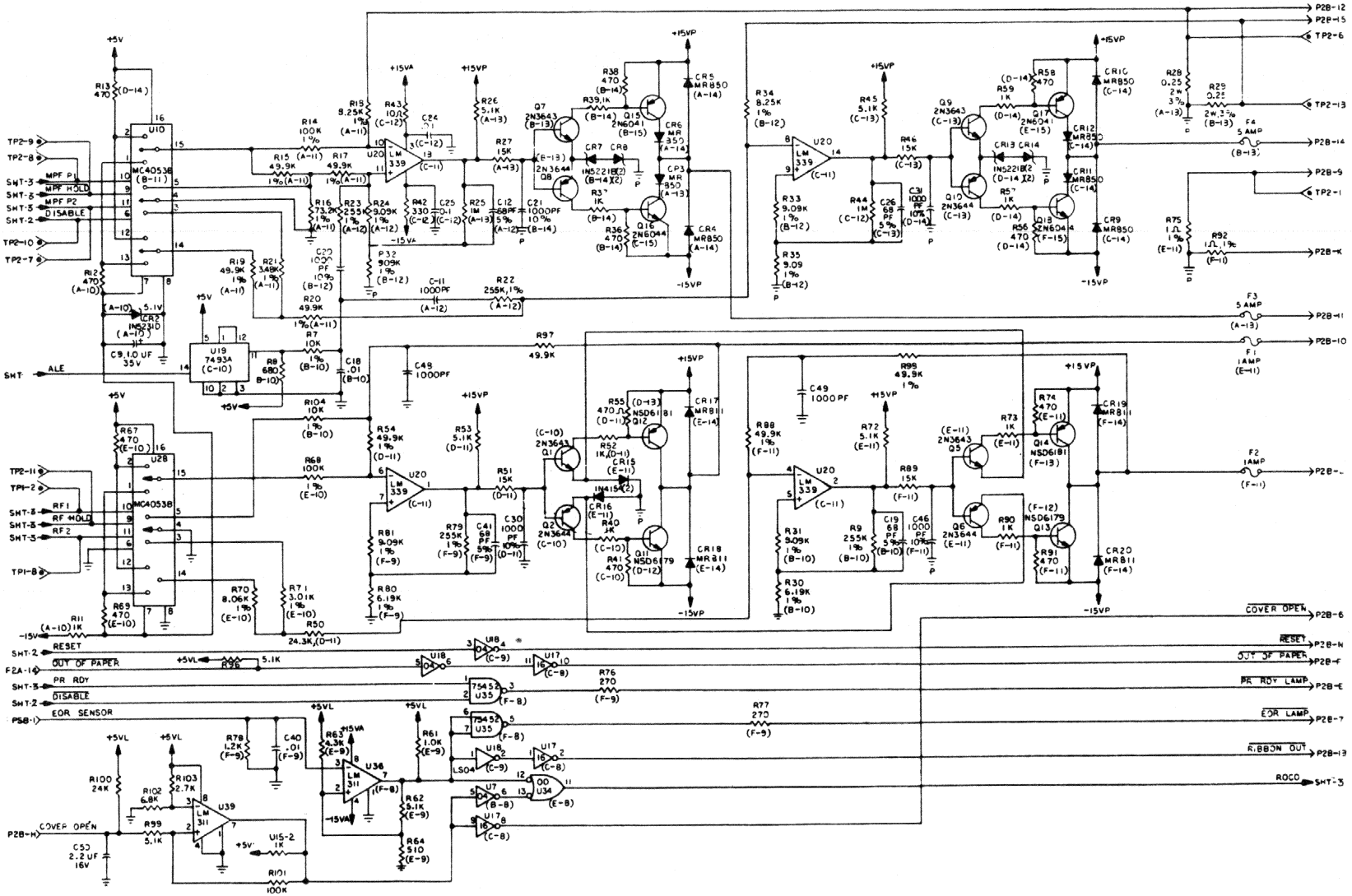
DIGITAL PCB
91162-XX REV. N
SHEET 1 OF 4



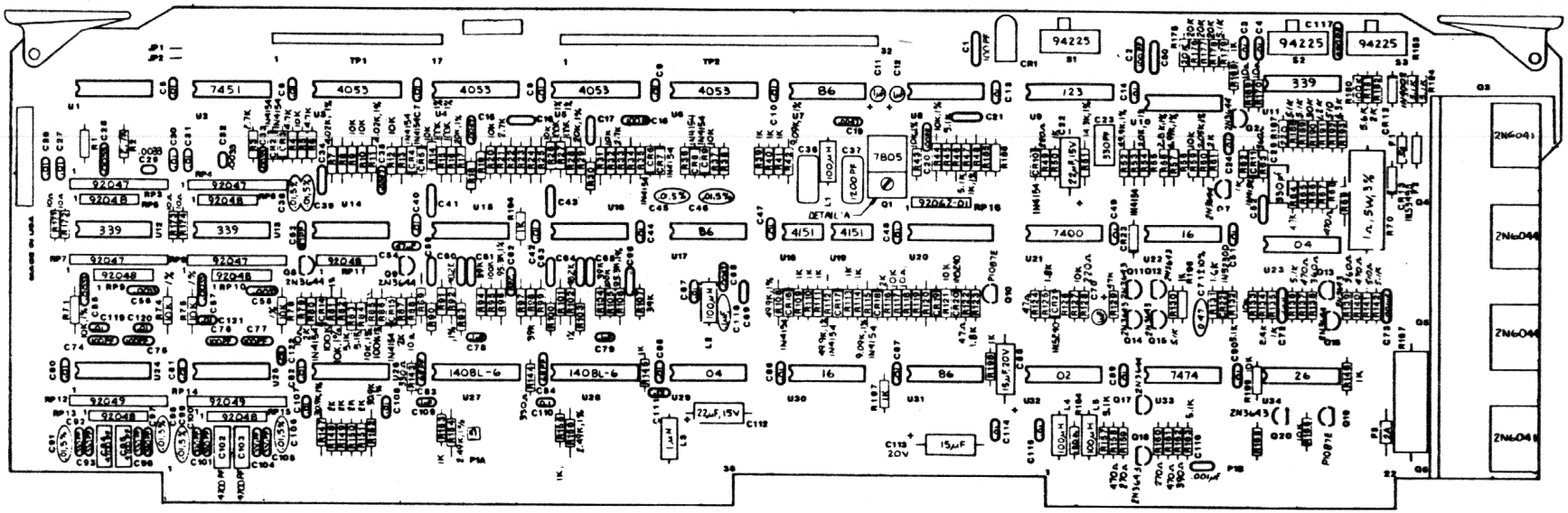
DIGITAL PCB
91162-XX REV. N
SHEET 2 OF 4



DIGITAL PCB
91162-XX REV. N
SHEET 3 OF 4



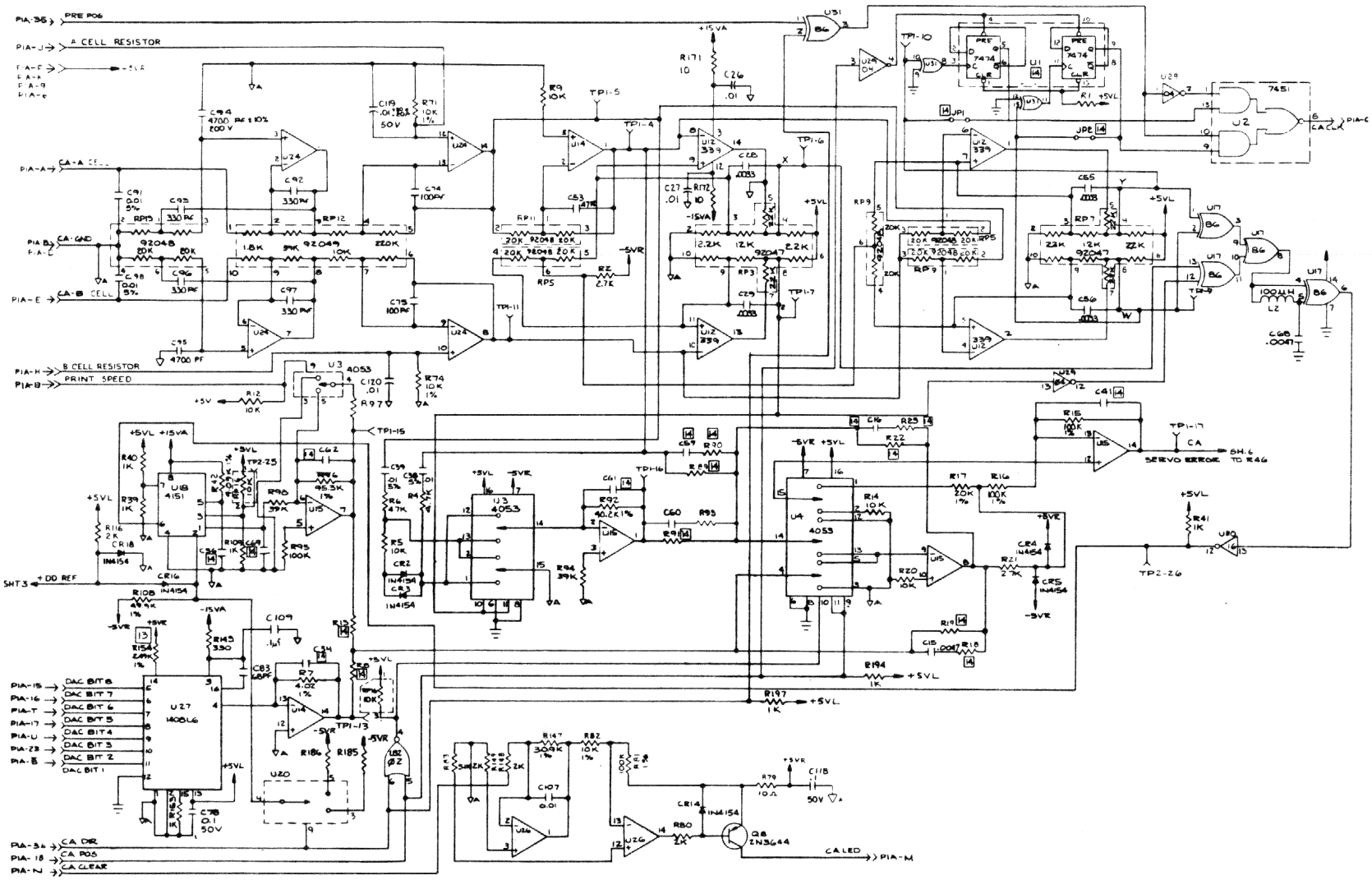
DIGITAL PCB
91162-XX REV. N
SHEET 4 OF 4



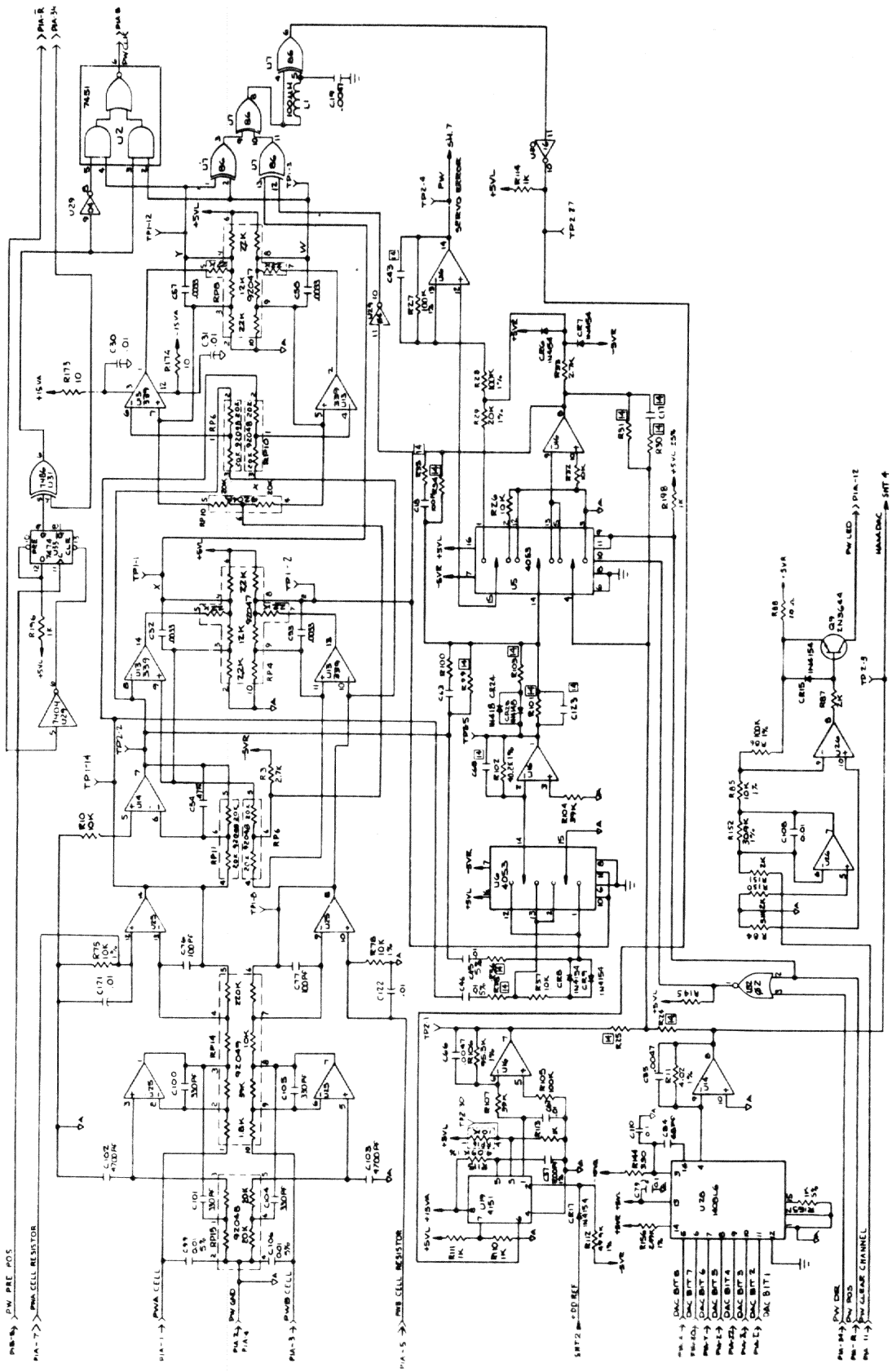
NOTES: UNLESS OTHERWISE SPECIFIED.

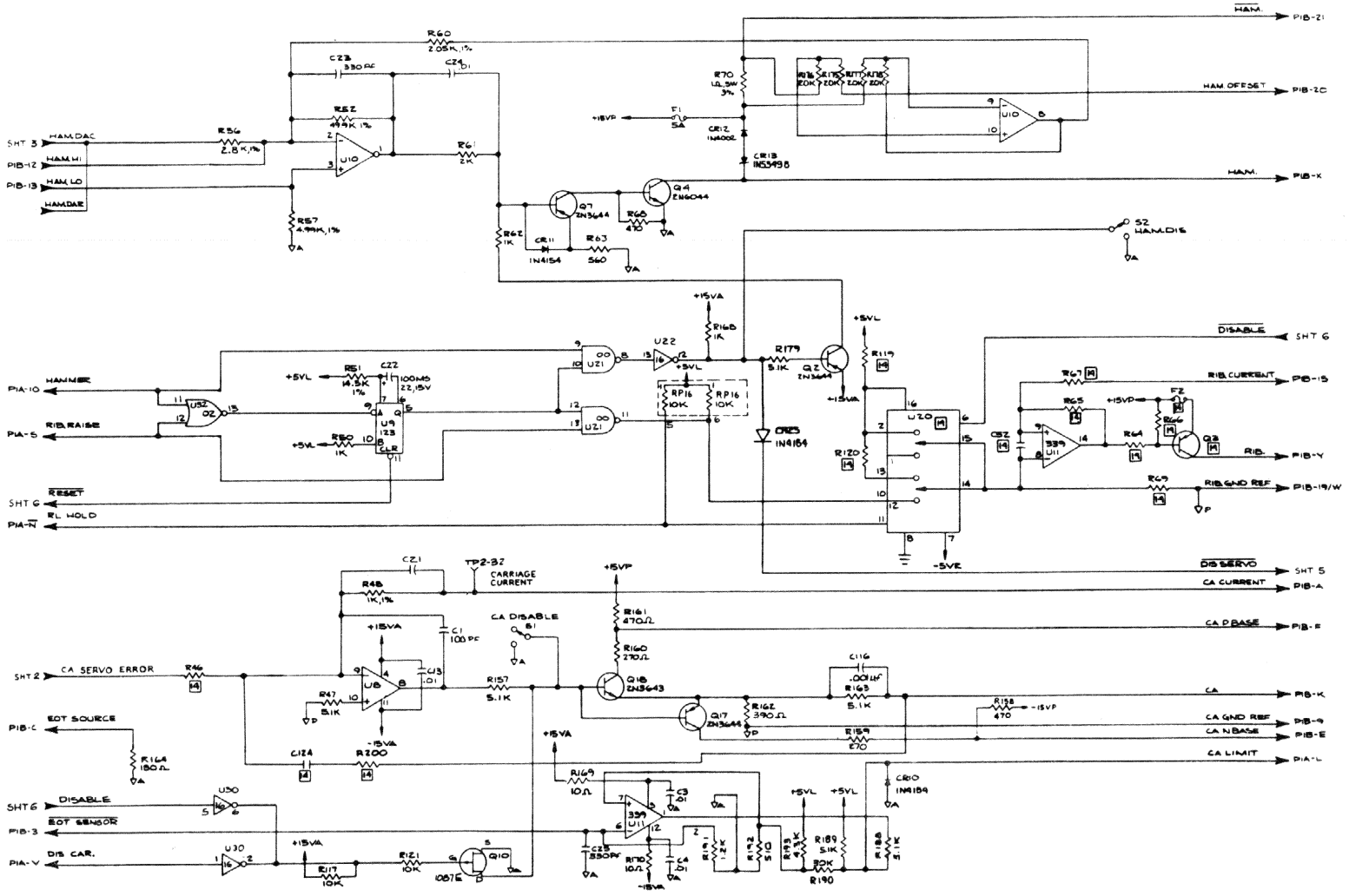
1. ALL CAPACITANCE VALUE ARE IN MICROFARADS.
2. ALL RESISTANCE VALUE ARE IN OHMS, 1/4 W, 5%.
3. ALL 1% RESISTORS ARE 1/8 W.
4. ALL .01μF CAPACITORS ARE 25V, 20%.
5. ALL 47PF CAPACITORS ARE 500V, 5%.
6. ALL 100PF AND 68PF CAPS ARE 300V, ±5%.
7. ALL 330PF CAPS ARE 100V, ±5%.
8. ALL 820 PF CAPS ARE 100V, ±5%.
9. ALL 1200PF CAPS ARE 100V, ±1%.

ANALOG PCB
91174-XX REV. F
SHEET 1 OF 6

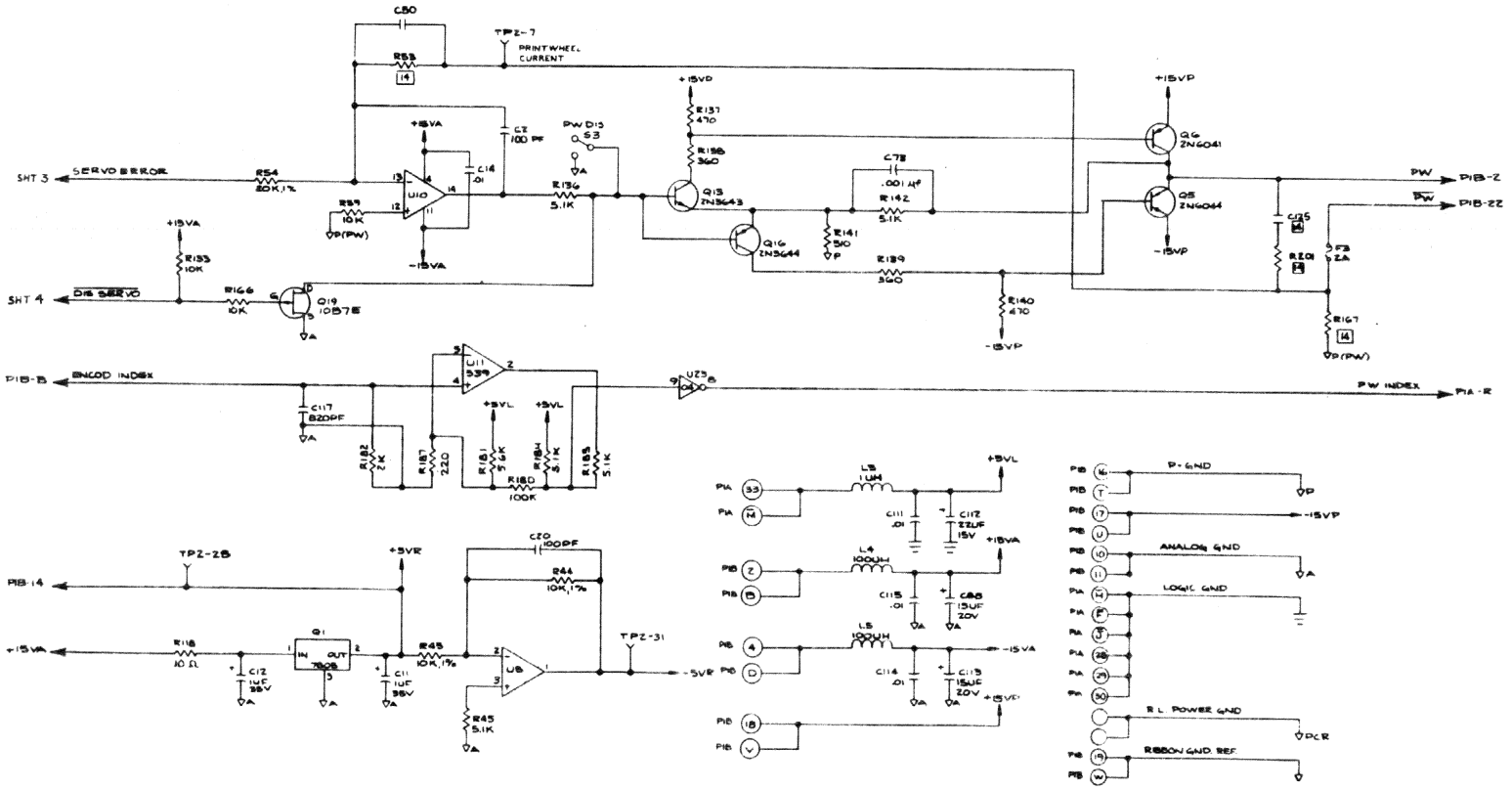


ANALOG PCB
91174-XX REV. F
SHEET 2 OF 6

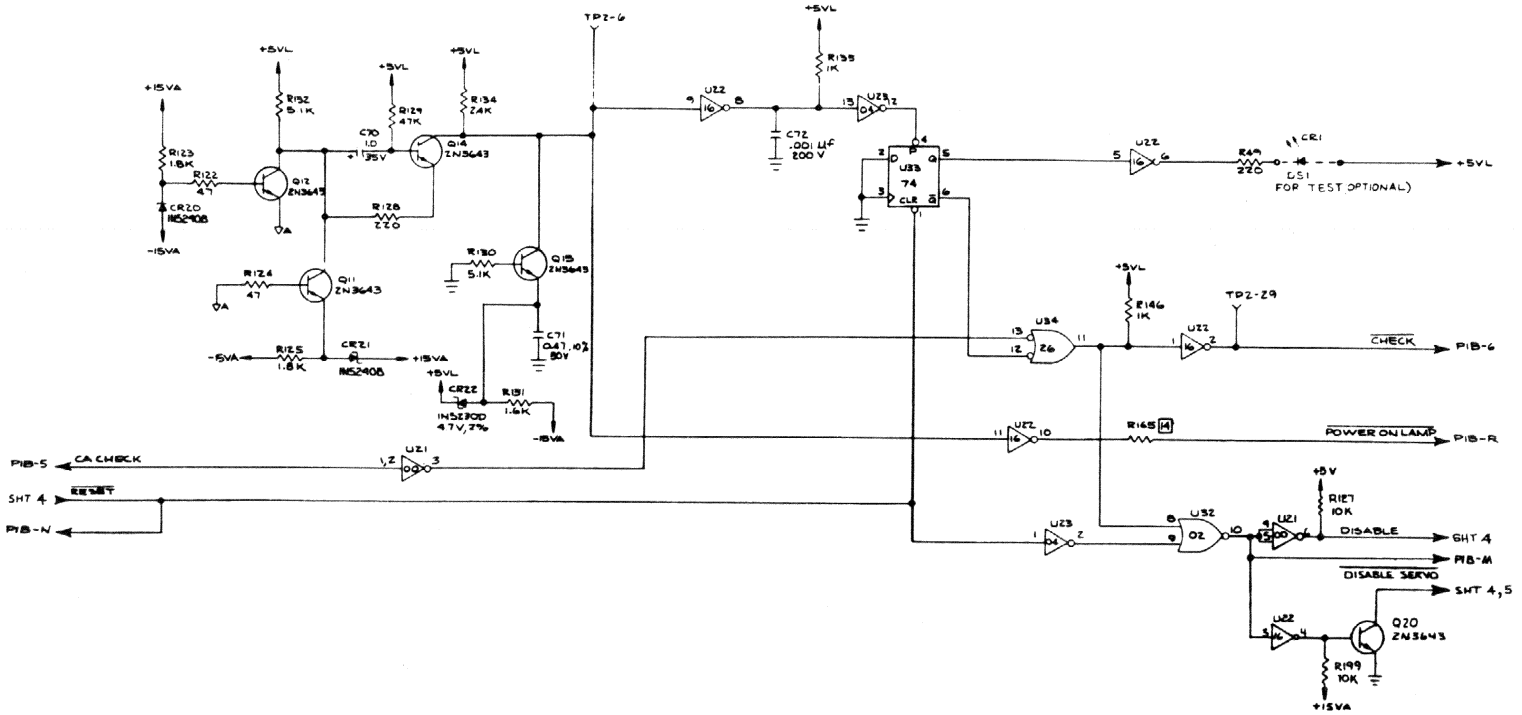




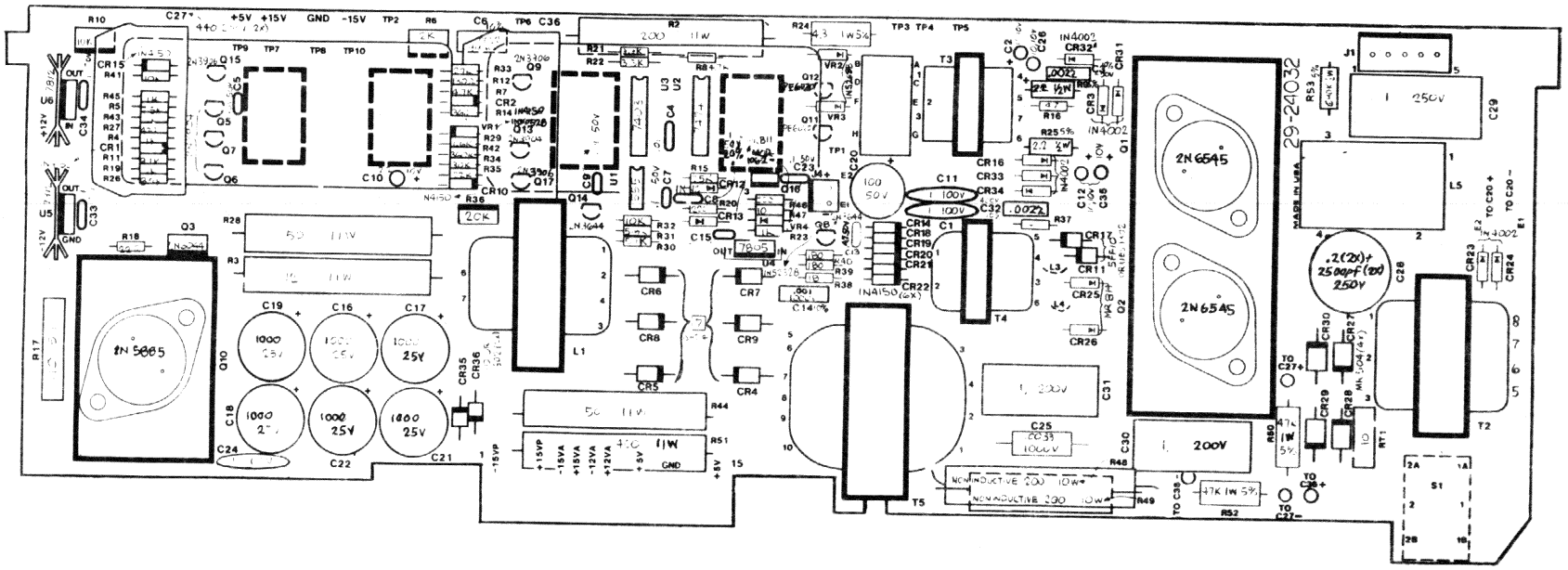
ANALOG PCB
91174-XX REV. F
SHEET 4 OF 6



ANALOG PCB
91174-XX REV. F
SHEET 5 OF 6



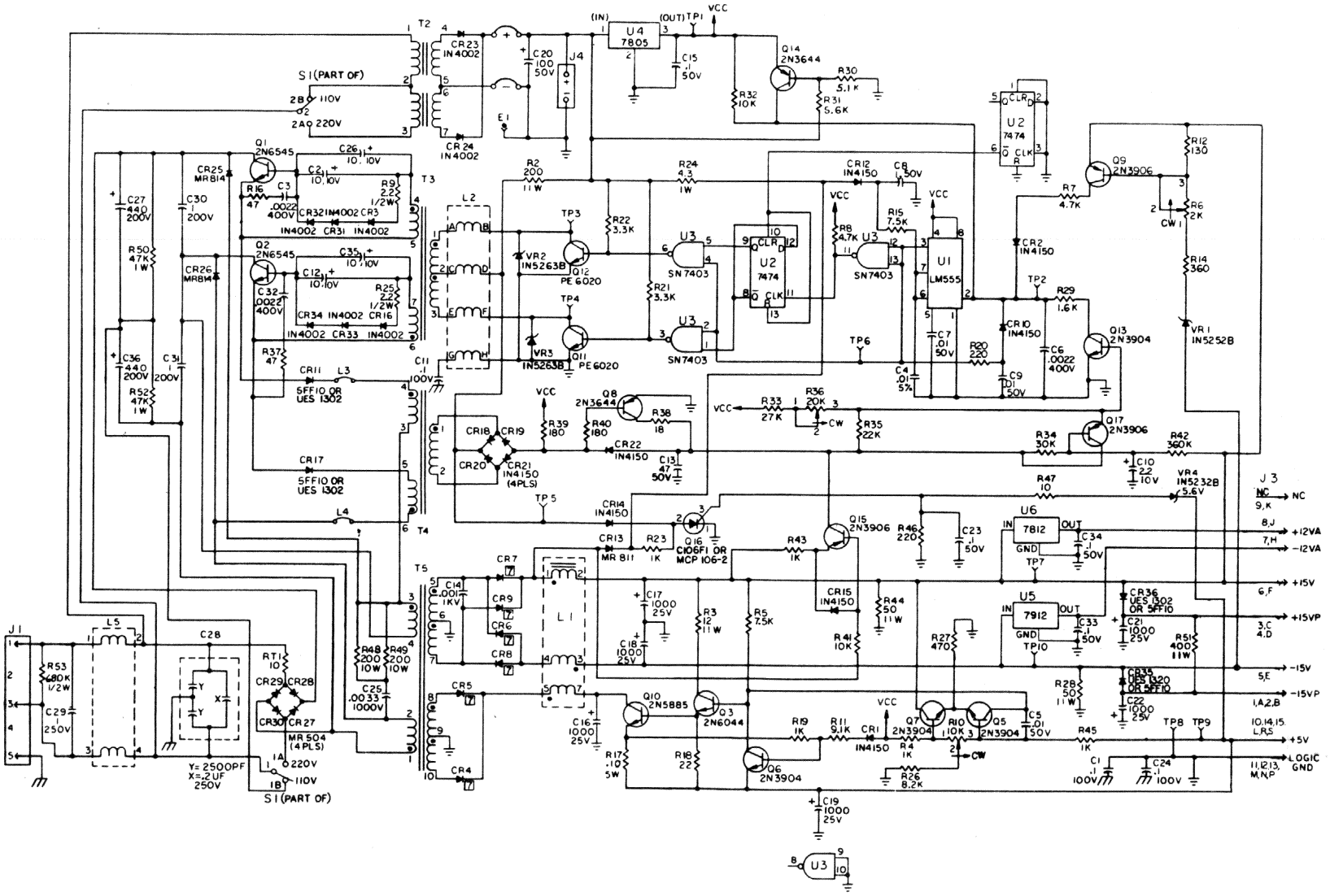
ANALOG PCB
91174-XX REV. F
SHEET 6 OF 6



NOTES:
UNLESS OTHERWISE SPECIFIED:

1. ALL RESISTANCE VALUES ARE IN OHMS, 1/4W, 5%.
2. ALL CAPACITANCE VALUES ARE IN MICROFARADS.

POWER SUPPLY PCB
91372-01 REV. B
SHEET 1 OF 2



POWER SUPPLY PCB
91372-01 REV. B
SHEET 2 OF 2

APPENDIX

- LQP02 Command Set Summary
- Full Modem Control Signal Requirements
- Restricted Modem Control Signal Requirements
- LQP02 Default Parameters

LQP02 COMMAND SET SUMMARY

VERTICAL MOTION COMMANDS

MNEMONIC	SEQUENCE	FUNCTION

LQP02 COMMAND SET SUMMARY

VERTICAL MOTION COMMANDS

MNEMONIC	SEQUENCE	FUNCTION
LF		Line Feed
VT		Vertical Tab (Form Feed if no Tab Set)
FF		Form Feed
VPA	ESC [Pn d	Set Active Line to Line Pn
VPR	ESC [Pn e	Move Active Line Pn Lines Down the Page
VPB	ESC [Pn k	Move Active Line Pn Lines Up the Page
IND	ESC D	Line Feed by Adding VAI
RI	ESC M	Negative Line Feed by Subtracting VAI
PLD	ESC K	1/2 VAI Line Feed (subscript)
PLU	ESC L	Negative 1/2 VAI Line Feed (superscript)
NEL	ESC E	Line Feed and Carriage Return to Left Margin
		HORIZONTAL MOTION COMMANDS
SP		Move Carriage to the Right One Space
BS		Move Carriage to the Left One Space
HT		Move Carriage to the Right to the Next Tab Stop, or to the Right Margin if no Tab Present (if Wraparound Enabled, to the Left Margin, Next Line)
CR		Return Carriage to the Left Margin
HPA	ESC [Pn '	Absolute Horizontal Tab to Set Active Column to Column Pn
HPR	ESC [Pn a	Move the Active Column Pn Spaces to the Right (Relative Position Command)
HPB	ESC [Pn j	Move the Active Column Pn Spaces to the Left (Relative Position Command)
NEL	ESC E	Carriage Return to Left Margin and Line Feed

CONTROL FUNCTIONS

MNEMONIC	SEQUENCE	FUNCTIONS
DECPTS	ESC [Ps! x	Select Printwheel Table 1, When Ps = 0 or 1 Select Printwheel Table 2, When Ps = 2
DECUND	ESC [Pn! w	Select Underline Character Pn Other Than Default Character
DECFPP	ESC # 9	Perform Pending Motion
DECASFC	ESC [Ps! v	Perform a Sheet Feed Operation
RIS	ESC C	Initialize Printer
DA	ESC [Ps c ESC [?13; Pnc	Printer Identification Request Printer Response Format
DSR	ESC [5n ESC [? 2n	Polled Report Request Enable Brief Unsolicited Reports and Send an Extended Report
	ESC [? 1n ESC [? 3n	Disable All Unsolicited Reports Enable Extended Unsolicited Reports and Send an Extended Report

FORMAT COMMANDS

TBC	ESC [4; 3 g	Clear All Vertical and Horizontal Tabs
SPI	ESC [Pnv; Pnh Sp G	Set Vertical and Horizontal Advance Increments Where Pnv and Pnh Are in 1/720 Inch Increments
DECSHORP	ESC [Ps w	Set HAI To a Preset Value
DECVERP	ESC [Ps z	Set VAI To a Preset Value
DECSCPP	ESC [Pn t	Set Form Length to Pn Lines
DECSS	ESC [Pn ! y	Set Horizontal Space Increment (Proportional Spacing Mode)
HTS	ESC H	Set Horizontal Tab
TBC	ESC [Ps g	Clear Horizontal Tab
DECSHTS	ESC [Pn1; Pn2;...Pn16 u	Set Horizontal Tabs List for Columns Pn1 to Pn16
TBC	ESC [3 g	Clear Horizontal Tabs List
VTS	ESC J	Set Vertical Tab

FORMAT COMMANDS

MNEMONIC	SEQUENCE	FUNCTIONS
TBC	ESC [1 g	Clear Vertical Tab
DECSVTS	ESC [Pn1; Pn2;...Pn16 v	Set Vertical Tabs List for Lines Pn1 to Pn16
TBC	ESC [4 g	Clear Vertical Tabs List
DECSLRM	ESC [Pn1; Pn2 s	Set Left Margin to Column Pn1 and Right Margin to Column Pn2
DECSTBM	ESC [Pn1; Pn2 r	Set Top Margin to Line Pn1 and Bottom Margin to Line Pn2
DCS	ESC P u ESC	Inovation Sequence Terminate Above
DECFIL	ESC [Pn1; Pn2...! s	Enter Control Parameters Pn1, Pn2,...! s for Right Hand Justification

FEATURE ENABLE/DISABLE COMMANDS

PUM	ESC [11 h ESC [11 1	Enable/Disable Horizontal and Vertical Positioning Mode Functions
DECAWN	ESC [?7 h ESC [?7 1	Enable/Disable Right Margin Wraparound
LNM	ESC [20 H ESC [20 1	Enable/Disable Line Feed on Carriage Return or Wraparound
DECPSP	ESC [?27 h ESC [?27 1	Enable/Disable Proportional Spacing Mode
SGR	*ESC [4 m	Enable Underlining
	*ESC [1 m *ESC [?1m	Set Primary Overprint Mode Set Secondary Overprint Mode
	*ESC [8 m	Hammer Disable Mode
	*ESC [? 2m	Enable Shadow Print
	*ESC [Ps m	Disables Above Functions Where Ps = 0 (null)

FULL MODEM CONTROL SIGNAL REQUIREMENTS

The following signals are required for Full Modem Control.

DB25P PIN NO.	SIGNAL DESCRIPTION	SOURCE	CCITT CIRCUIT NO.
1	Protective Ground		101
2	Transmitted Data	Printer	103
3	Received Data	Modem	104
4	Request to Send	Printer	105
5	Ready for Sending	Modem	106
6	Data Set Ready	Modem	107
7	Signal Ground		102
8	Data Channel Received Line Signal Detector	Modem	109
13	Backward Channel Ready	Modem	121
14	Transmitted Backward Channel Data	Printer	118
19	Transmitted Backward Channel Line Signal	Printer	120
20	Data Terminal Ready	Printer	108/2
23	Data Signaling Rate Selector	Printer	111

RESTRICTED MODEM CONTROL SIGNAL REQUIREMENTS

The following signals are required for Restricted Modem Control.

DB25P PIN NO.	SIGNAL DESCRIPTION	CCITT CIRCUIT NO.
1	Protective Ground	101
2	Transmitted Data	103
3	Received Data	104
4	Request to Send	105
7	Signal Ground	102
20	Data Terminal Ready	108/2

The printer assumes an ON condition on the following lines, regardless of their actual state.

DB25P PIN NO.	SIGNAL DESCRIPTION	CCITT CIRCUIT NO.
5	Ready for Sending	106
6	Data Set Ready	107
8	Data Channel Received Line Signal Detector	109

LQP02 DEFAULT PARAMETERS

PARAMETER	DEFAULT
Horizontal Pitch	10 Character Inch
Vertical Pitch	6 Lines/Inch
Forms Length	66 Lines
Horizontal Tabs	Every 8 Columns to Column 153
Vertical Tabs	Every 8 Lines to Line 121
Left Margin	Column 1
Right Margin	Column 132
Top Margin	Line 1
Bottom Margin	Line 66
Active Position	Column 1, Line 1
Sheet Feeder	Tray 1
New Line Mode	Disabled
Right Margin Wrap Mode	Disabled
Proportional Spacing Mode	Disabled
Right Justification	Disabled
Underlining	Disabled
Underline Wheel Position Table 1	55
Underline Wheel Position Table 2	15
Over Printing	Disabled
Shadow Printing	Disabled
Programmed Composite Characters	Cleared
Printwheel Parameters	Default Tables 1 (WP) and 2 (WPS/ Reprogrammable
Active Printwheel Table	Table 1
Positioning Unit Mode	Disabled
Unsolicited Status Reports	Disabled