LG01 600 LPM Text Printer
Technical Manual

Part Number: EK-OLG01-TM-002

LG01 600 LPM Text Printer

Technical Manual

EK-OLG01-TM.002

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TABLES

This manual contains information for service personnel who provide on-site maintenance of the LG01 600 LPM Text Printer. Repairs are made by exchanging field replaceable units (FRUs) rather than replacing components.

For more information on the LG01 printer see:

- LG01 600 LPM Text Printer Installation/Operator's Manual EK-OLG01-IN
- LG01 600 LPM Text Printer User's Guide EK-OLG01-UG

Throughout this manual **NOTES**, **CAUTIONS**, and **WARNINGS** have the following meanings:

NOTE:	The information is important to the understanding of the process being described.
CAUTION:	The information describes a process that can damage the equipment or software.
WARNING:	The information describes a process that can harm the user.

CHAPTER 1
INTRODUCTION

1.1 HOW TO USE THIS MANUAL

This manual is used in diagnosing LG01 600 LPM Text Printer problems, locating faulty field replaceable units (FRUs), and removing and replacing these FRUs. When using this manual to repair an LG01 printer, follow the steps listed below.

1. Check the fault code in the control panel display area.
2. Look up the fault code in Chapter 2.
3. Perform the corrective action listed in the fault tables. If necessary, go to the specified flowchart in Chapter 2.
4. As you follow the procedures listed in the flowchart, you may be instructed to run a test. Printer tests are described in Chapter 3.
5. Once you have isolated a faulty FRU, go to Chapter 4 for removal and replacement instructions.

1.2 LG01 FUNCTIONAL SECTIONS AND FRUs

The LG01 printer is made up of nine functional sections. Each functional section consists of one or more field replaceable units. This section contains a breakdown of the functional sections, the FRUs contained in each functional section, and a functional description of each FRU. The functional sections of the LG01 printer are listed below. See Chapter 5 for a list of recommended spare parts and FRUs.

- Hammerbank -- Section 1.2.1
- Ribbon System -- Section 1.2.2
- Cooling System -- Section 1.2.3
- Horizontal Motion -- Section 1.2.4
- Vertical Motion -- Section 1.2.5
- Control Panel -- Section 1.2.6
- Platen -- Section 1.2.7
- Card Cage Boards -- Section 1.2.8
- Power Supply -- Section 1.2.9

1.2.1 Hammerbank

The hammerbank section consists of the hammerbank with flexures and yoke, the position sensor, and the hammer-driver board.

- Hammerbank -- Consists of 66 hammers with 33 hammers on the top and 33 hammers on the bottom. Hammers are grouped into modules with three hammers to a module. Each hammer prints two adjacent columns. At the tip of each hammer is a ball which strikes the paper.

- Position sensor -- Supplies voltage for the LED that senses linear actuator motion. Also monitors linear actuator hammer module circuitry (Figure 1-1).

- Hammer-driver board -- Causes the hammers to fire. Hammers are fired corresponding to the dot data received from the sequencer board. It also monitors the 68 volt input and hammer module circuitry (Figure 1-1). The hammer-driver fuses, located on the hammer-driver board, are all 2.0 A and socketed for easy replacement. Figure 1-2 is a chart listing each fuse, the three hammers each fuse protects, and the columns that are printed by each hammer at 10 CPI.

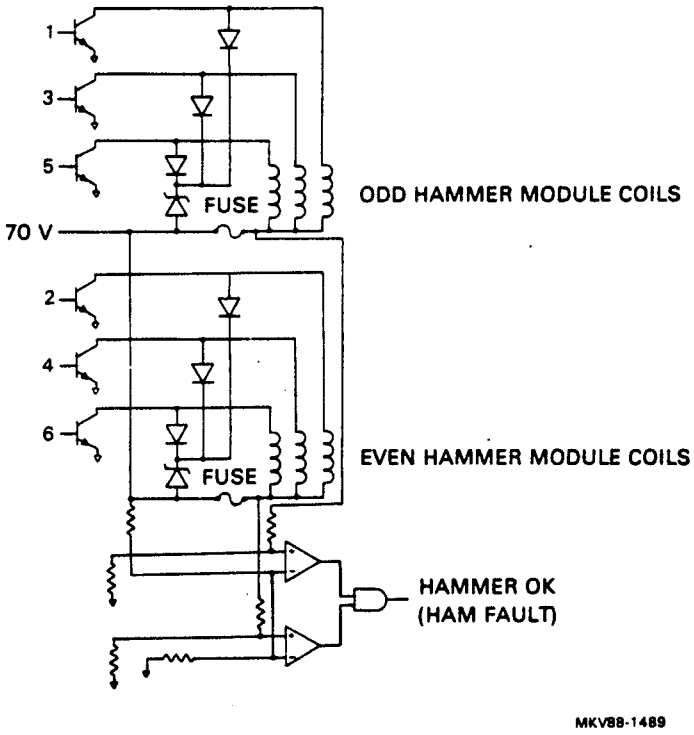
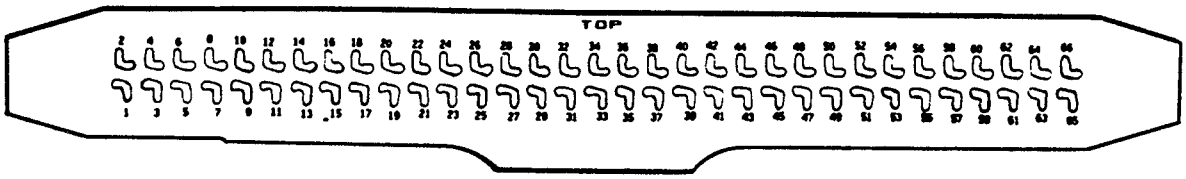


Figure 1-1 Hammer Module Circuitry



HAMMERBANK

Fuse	Hammers	Columns
F1	1 3 5	1, 2 5, 6 9, 10
F3	7 9 11	13, 14 17, 18 21, 22
F5	13 15 17	25, 26 29, 30 33, 34
F7	19 21 23	37, 38 41, 42 45, 46
F9	25 27 29	49, 50 53, 54 57, 58
F11	31 33 35	61, 62 65, 66 69, 70
F13	37 39 41	73, 74 77, 78 81, 82
F15	43 45 47	85, 86 89, 90 93, 94
F17	49 51 53	97, 98 101, 102 105, 106
F19	55 57 59	109, 110 113, 114 117, 118
F21	61 63 65	121, 122 125, 126 129, 130

Fuse	Hammers	Columns
F2	2 4 6	3, 4 7, 8 11, 12
F4	8 10 12	15, 16 19, 20 23, 24
F6	14 16 18	27, 28 31, 32 35, 36
F8	20 22 24	39, 40 43, 44 47, 48
F10	26 28 30	51, 52 55, 56 59, 60
F12	32 34 36	63, 64 67, 68 71, 72
F14	38 40 42	75, 76 79, 80 83, 84
F16	44 46 48	87, 88 91, 92 95, 96
F17	50 52 54	99, 100 103, 104 107, 108
F20	56 58 60	111, 112 115, 116 119, 120
F22	62 64 66	123, 124 127, 128 131, 132

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Figure 1-2 Hammer-Drive Fuse Chart

1.2.2 Ribbon System

The ribbon system section consists of the ribbon shield and cartridge support assembly.

- Ribbon shield -- Keeps the ribbon from rubbing on the paper and prevents smearing. Also keeps dirt out of the hammer module area.
- Cartridge support assembly -- Supports the ribbon cartridge.

1.2.3 Cooling System

The cooling system section consists of the blower assembly, plenum, and airflow sensor switch (air pressure switch).

- Blower assembly -- Draws air in from the back of the printer, through the card cage, and forces air through the plenum ducts to cool the hammerbank and linear actuator.
- Plenum -- Distributes air from the blower to the linear actuator and hammerbank.
- Airflow sensor switch -- Monitors airflow in the plenum to the linear actuator.

1.2.4 Horizontal Motion

The horizontal motion section consists of the linear actuator motor and shuttle position sensor.

- Linear actuator motor -- Moves the hammerbank two character position sweeps (at 10 CPI) in each horizontal direction.
- Shuttle position sensor -- Monitors hammerbank horizontal position. The shuttle position sensor is located under the right side of the hammerbank. The position sensor board is located under the ribbon cartridge support assembly or under the position sensor.

1.2.5 Vertical Motion

The vertical motion section consists of the paper motion sensor assembly, paper out sensor assembly, paper advance motor/encoder assembly, and the upper and lower tractor drive shafts.

- Paper motion sensor assembly -- Monitors paper motion and is located on the upper-left tractor.
- Paper out sensor assembly -- Monitors the presence of paper and is located on the lower-left tractor.

- Paper advance motor/encoder assembly -- Drives the paper tractors through the paper drive belt and the upper and lower tractor drive shafts, and provides feedback to the paper and status board.

1.2.6 Control Panel

The control panel section consists of the control panel switch assembly and the control panel board.

- Control panel switch assembly -- Allows the operator to run the LG01 printer, make printing format selections, and check machine status on the display (see the LG01 600 LPM Text Printer Installation/Operator's Manual for details). This assembly is also used by service personnel to run diagnostic tests (Chapter 3) and to troubleshoot fault conditions (Chapter 2).

1.2.7 Platen

The platen section consists of the platen assembly and platen open switch.

- Platen assembly -- Provides a firm surface area for printing. Includes platen, forms-thickness lever, and forms-thickness gauge.

- Platen open switch -- Senses whether the platen gap is open or closed.

1.2.8 Card Cage Boards

The card cage section has seven board slots, six of which are used on the LG01 printer. When the red LEDs on each board are ON, +5 Vdc is present. See Figure 1-3 for the locations of the card cage boards.

- I/O board -- Communicates with the host computer and the operator (via control panel). There are two types of I/O boards -- **parallel** and **serial**. Switchpack and jumper selections are described in the LG01 600 LPM Text Printer Installation/Operator's Manual. The I/O board converts commands received into function-level commands for the control CPU board. The I/O board can be located in either of the first two board slots on the left side of the card cage.

- Control CPU board -- Converts commands from the I/O board into machine-specific data to operate the machine-drive electronics. It monitors voltage levels, paper out, printer control, and I/O fault status. It can be used to run diagnostic tests if the control panel is not operational. See **CONTROL CPU BOARD TESTS** in Chapter 3 for the procedure to use the switches on this board to run diagnostic tests.

- Sequencer board -- Supplies hammers with dot data, finds the proper shuttle position for each dot, and then turns the hammer drivers ON and OFF to produce a dot. It also commands paper advance timing.

- Shuttle and ribbon board -- Drives the shuttle and ribbon systems.

- Paper and status board -- Controls and monitors paper motion and reports paper motion problems to the control CPU board.

- Power Amplifier board -- Supplies chopped 77 volts to the linear actuator and paper advance motor when enabled by the shuttle and ribbon board, or the paper and status board.

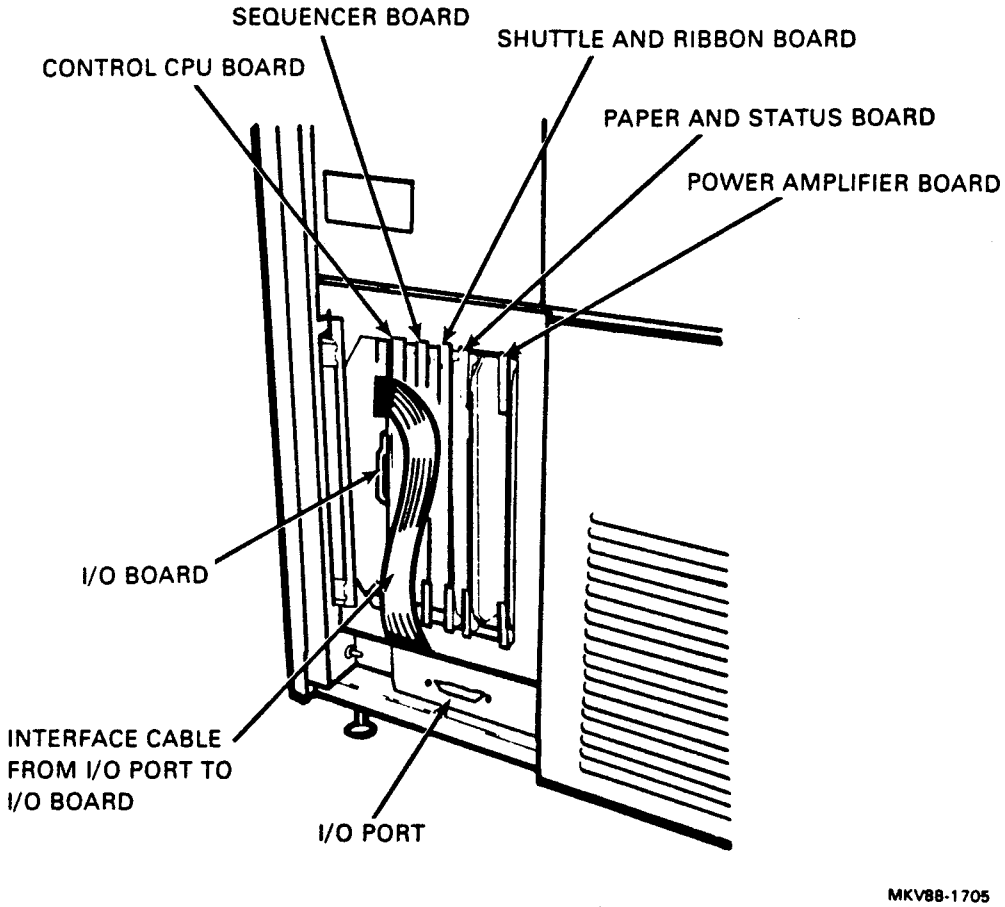

Figure 1-3 Card Cage Boards

1.2.9 Power Supply

The power supply section consists of the universal power supply assembly and power rectifier/regulator board.

- Universal power supply assembly -- Converts ac line voltages into voltages needed for printer operation.

- Power rectifier/regulator board -- Receives 77 Vac, 24 Vac, and 8 Vac from the universal power supply assembly. These voltages are full-wave rectified, filtered, and regulated to produce +68 Vdc, +20 Vdc, +8 Vdc, +15 Vdc, and -15 Vdc. An unregulated +77 Vdc is also sent to the paper advance motor and the linear actuator motor.

  The ac input voltages, regulated output voltages, and the boards that use these voltages are listed in Table 1-1. The pinouts on the power rectifier/regulator board are shown in Table 1-2. The ac input fuses on the power rectifier/regulator board and the voltages they protect are listed in Table 1-3.

Table 1-1 Power Rectifier/Regulator Board Voltages

AC Input Voltage	Regulated To	Used By
77 volts	+68 volts**	Hammer-driver board
77 volts	+20 volts	Power amplifier board Shuttle and ribbon board Paper and status board Trouble status circuitry
77 volts	Unregulated	Paper advance motor drive Linear actuator motor drive
24 volts	+15 volts	Shuttle and ribbon board* Paper and status board Power amplifier board Control CPU board Sequencer board Serial I/O board for RS-232-C Parallel I/O board
24 volts	-15 volts	Paper and status board Shuttle and ribbon board Power amplifier board Control CPU board Sequencer board Serial I/O board for RS-232-C Parallel I/O board
8 volts	+5 volts (Regulation of this voltage takes place on each board, not on the power rectifier/ regulator board)	Drive TTL logic: I/O board Control CPU board Sequencer board Shuttle and ribbon board Paper and status board Hammer-driver board

* Additional regulation takes place on the shuttle and ribbon board to drive the position sensor (+15 Vdc is regulated to +10 Vdc).

** 77 volts is regulated to +70 Vdc and a potentiometer (R2) on the power rectifier/regulator board is used to adjust the +70 Vdc down to +68 Vdc before sending it to the hammer-driver board.

Table 1-2 Power Rectifier/Regulator Board Pinouts

Connector	Pin	Voltage
P7 to Power Amp	1,4	+77 V
	2,3	+77 V Return
P903 to Hammer Driver	1,2,3	+8 V Return
	4,5,6	+68 V Return
	7	+8 V
	8,9,10	+68 V
	11	+15 V
	12	Not Used
P805 to Backplane	1,3,9,10	GND
	2	+20 V
	4	+24 V
	5	Not Used
	6	-15 V
	7	+8 V Return
	8	+15 V
	11,12	+8 V

Table 1-3 Power Rectifier/Regulator Board Fuses

Fuse Number	Value	Voltage Protected
F1	5 Amp -- Slo-Blo	+77 Vdc
F2*	2 Amp	24 Vac
F3*	12 Amp	77 Vac
F4*	12 Amp	8 Vac
F5*	12 Amp	8 Vac
F6*	2 Amp	24 Vac

* These fuses are on the ac input side of the power rectifier/ regulator board and the voltages must be measured on the ac scale of the multimeter. Fuse F3 only protects one-half of the 77 Vac input and measures approximately 40 Vac-to-ground.

1.3 LG01 THEORY OF OPERATION

The electronics used in the LG01 printer is based on an Intel™ 8085 microprocessor design. The following sections describe the systems that make up the LG01 electronics. Figure 1-4 is a block diagram of the LG01 electronics.

The electronics consists of the following components:

- I/O board with an 8085 microprocessor
- Control CPU board with an 8085 microprocessor
- Sequencer board
- Hammer-driver board
- Shuttle and ribbon board
- Shuttle position sensor
- Linear actuator motor
- Paper and status board
- Paper advance motor/encoder
- Power amplifier board
- Power rectifier/regulator board
- Ribbon motor
- Control panel board that attaches to the membrane-switch panel

The LG01 electronics is broken down into the following systems:

- Interface
- Control
- Hammer Fire
- Shuttle and Ribbon
- Paper
- Power Supply

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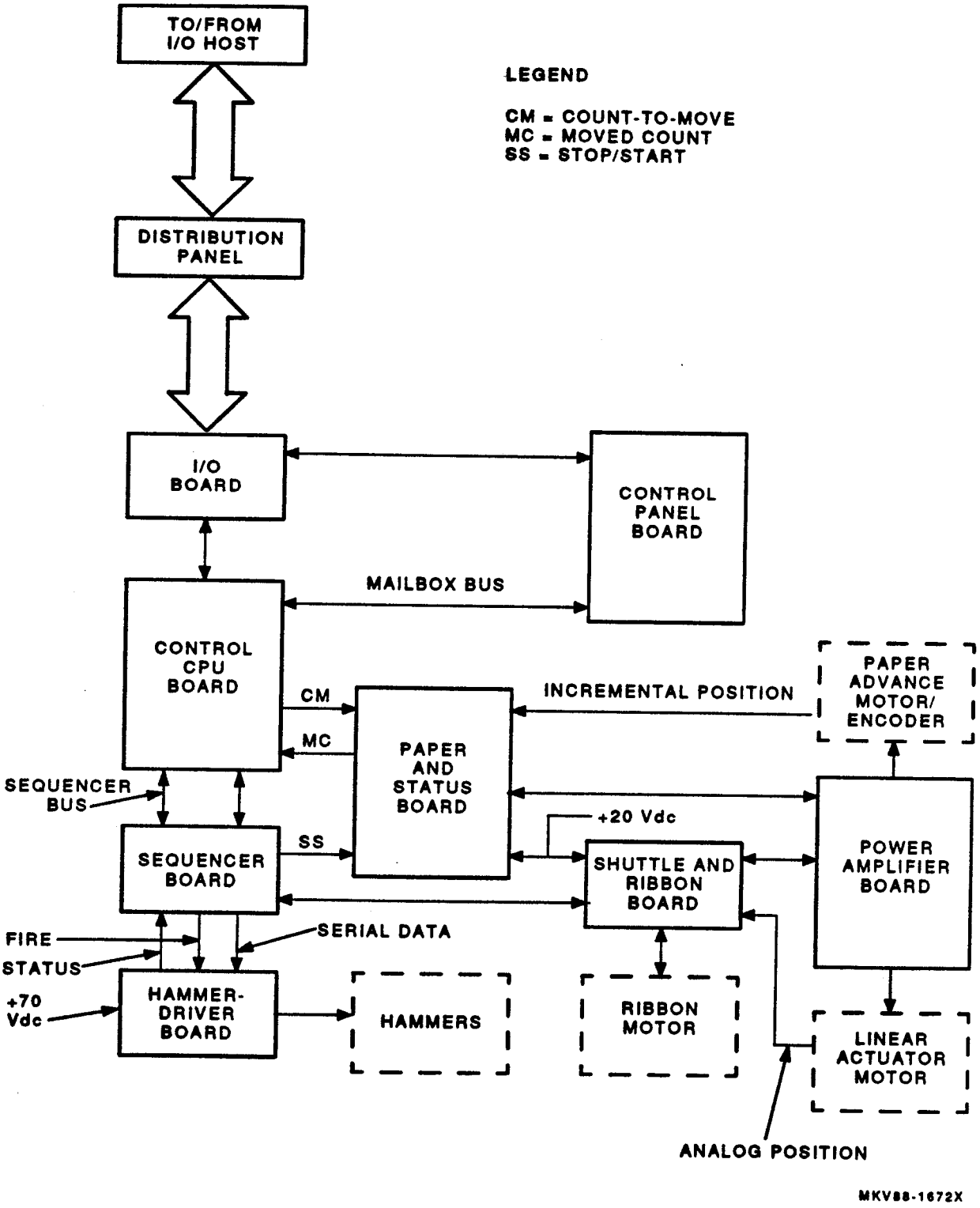


Figure 1-4 LG01 Electronics Block Diagram

1.3.1 Interface System

The interface system uses the I/O board to communicate with the host and the LG01 printer operator. It accepts input data and commands from the host or operator and converts these into function-level commands for the control CPU board. For example, a slew to VFU channel 2 command, input to the I/O board would be converted to a move the form 784 microsteps forward for the control CPU board.

The I/O board, the control panel board, and the control CPU board communicate with each other using a commonly-shared RAM called the mailbox, which is located on the control CPU board.

1.3.2 Control System

The control system uses the control CPU board to convert I/O commands into commands which operate specific LG01 printer machinery. The control CPU board has no knowledge of print format, position, or operation. It only knows how to make machinery move in response to I/O commands.

The control CPU board monitors the status of the LG01 printer machinery and reports to the I/O board. The I/O board WRITEs this data to the control panel display as error or status messages.

The I/O board sends the control CPU board parameter select data. This data lets the control CPU board know what mode the machinery needs to be in, the shuttle sweep distance and time, the paper advance distances for each dot row, and the shuttle position profiles for dot placement. This data is also used to enable the control CPU board to assemble a program for the sequencer board. The control CPU board accepts character data a line at a time and sends this data a dot row at a time, using the selected font, to the sequencer board while generating appropriate paper motion commands and monitoring machine operation.

1.3.3 Hammer-Fire System

The hammer-fire system consists of the sequencer board and the hammer-driver board. The sequencer board contains a special-purpose TTL processor which keeps the 66 hammers supplied with dot data, finds the proper shuttle position for each dot, and then turns the hammer drivers ON and OFF to produce a dot. The sequencer board also commands paper advance timing because it is the only device close enough to the machinery to know when the last dot of a row has been printed and paper can be moved. The control CPU board determines the distance the paper is to be moved and the sequencer board determines when paper can be moved.

The control CPU board communicates with the sequencer board through a RAM known as the sequencer RAM. The sequencer RAM is the sequencer board's program and data memory. The control CPU board divides this RAM in half, loads one-half with the program and dot-row data, and informs the sequencer board to start processing. While the sequencer board is processing the first half, the control CPU board is loading the second half with program and dot-row data. When the sequencer board reports that it has finished processing the first half, the control CPU board swaps the sequencer board's control and data pointers to the second half and informs it to start processing. While the sequencer board is processing the second half, the control CPU board is reloading the first half with new data. This process continues as long as there is something left to print.

The hammer-driver board contains a 66-bit shift register that provides one-dot storage per hammer in the power circuit to connect the hammer coils between 68 volts and ground to cause the hammers to cycle. The hammer-driver board also contains pico fuses for hammer protection, monitoring circuits (hammer OK and 68 volts OK), and isolation circuits to control the 68 volts and isolate this 68 volts from the rest of the logic system.

1.3.4 Shuttle and Ribbon System

The shuttle and ribbon system is controlled by the shuttle and ribbon board. The shuttle system is a closed-loop servo system that uses a switching-power amplifier to run a linear actuator motor. This motor moves the hammers for horizonal positioning.

The power amplifier board chops the 77 volts power at approximately 20 kHz. This is the final drive to the linear actuator motor.

The shuttle sweep is derived from one of four profiles stored in a ROM. Profile data is accessed, amplified, and sent to a D/A converter to generate the analog error signal. The shuttle profile data determines how the shuttle moves, whether it be sawtooth or sinusoidal. The distance moved is determined by the profile signals amplitude. The rate or frequency at which the profile ROM data is accessed determines the frequency of the shuttle. This clock rate is determined by the control CPU board.

A second D/A converter on the shuttle and ribbon board takes hammer-fire position data from the sequencer board and compares it with the actual shuttle position which is determined by the shuttle position sensor. When the positions are within 400 ns, the shuttle and ribbon board sends an on position signal to the sequencer board to fire the hammers. This lead time is necessary to get the hammers moving so that when the shuttle is in position the hammers strike.

The shuttle system also has sensing circuits that shut the system down and cause fault messages/codes to be displayed if errors occur.

The shuttle and ribbon board also drives the ribbon system and monitors the ribbon platform switch to determine if a ribbon is installed.

1.3.5 Paper System

The paper drive system uses a dc motor to drive the forms tractors for vertical positioning. This motor has a rotary encoder mounted on the motor shaft which provides feedback to the paper and status board regarding the direction of paper motion and the amount of distance moved. The final drive to the motor is provided by the switching-power amplifier board. The drive voltage is 77 volts.

The amount to move error signal is set by an 8-bit up/down counter. This counter drives a D/A converter to produce the error signal that causes the motor to move. When the motor moves, the rotary encoder provides feedback that steps the counter back to null.

The control CPU board provides an input pulse stream from its step counter to drive the 8-bit up/down counter off null. The steps taken pulses from the rotary encoder, decrements the control CPU steps counter back to zero and allows the servo to return to null.

The paper drive system includes fault detection and interlock circuits that shut the system down for lack of a counter clock or an overspeed condition. The paper motion sensor circuitry is also located on the paper and status board.

1.3.6 Power Supply System

The power supply system consists of a transformer with a ferro-resonant capacitor, filter capacitors, and a power rectifier/regulator board.

The transformer supplies 77 Vac, 24 Vac, and 8 Vac to the power rectifier/regulator board where the voltages are full-wave rectified, filtered, and regulated.

The ac input voltages and regulated output voltages for the power rectifier/regulator board are shown in Table 1-1.

1.4 LG01 CIRCUIT BOARD FUNCTIONS

The following sections contain a description of the functions performed by the circuit boards in the LG01 printer. Figures containing block diagrams of the circuit boards are also provided.

1.4.1 I/O Board

A block diagram of the I/O board is shown in Figure 1-5.

Data appears at the I/O connector accompanied by a strobe pulse for interrogation. If the data is printable, it is DMAd (Direct Memory Accessed) to the I/O RAM. After the character is put into memory, the host is informed. Invalid characters may be ignored or replaced with a space, depending upon the switchpack and jumper selections on the I/O board.

A counter is set to the buffer size and each character received decrements the counter as it is DMAd into memory. When the counter is decremented to zero, a buffer full status is generated which disables the input RAM. If the I/O board is configured for autoprint, the 132nd character will generate a busy signal and the line of print will be transferred from the I/O board to the control CPU board to be printed.

A control code that causes a print cycle (paper motion command) generates a busy signal and transfers the line of print to the control CPU board to be printed. If the paper-instruction input goes active, the next character received will generate a busy signal. If an escape sequence is received by the I/O board, each character in the escape sequence must be examined. This results in generating a busy signal for each character of the sequence.

All operations to and from the control panel are examined under the control of the I/O board. VFU data is loaded to the control CPU board under the control of the I/O board. The I/O board receives input data and converts this data to functional level commands which are passed to the control CPU board processor via a commonly-shared RAM called the mailbox.

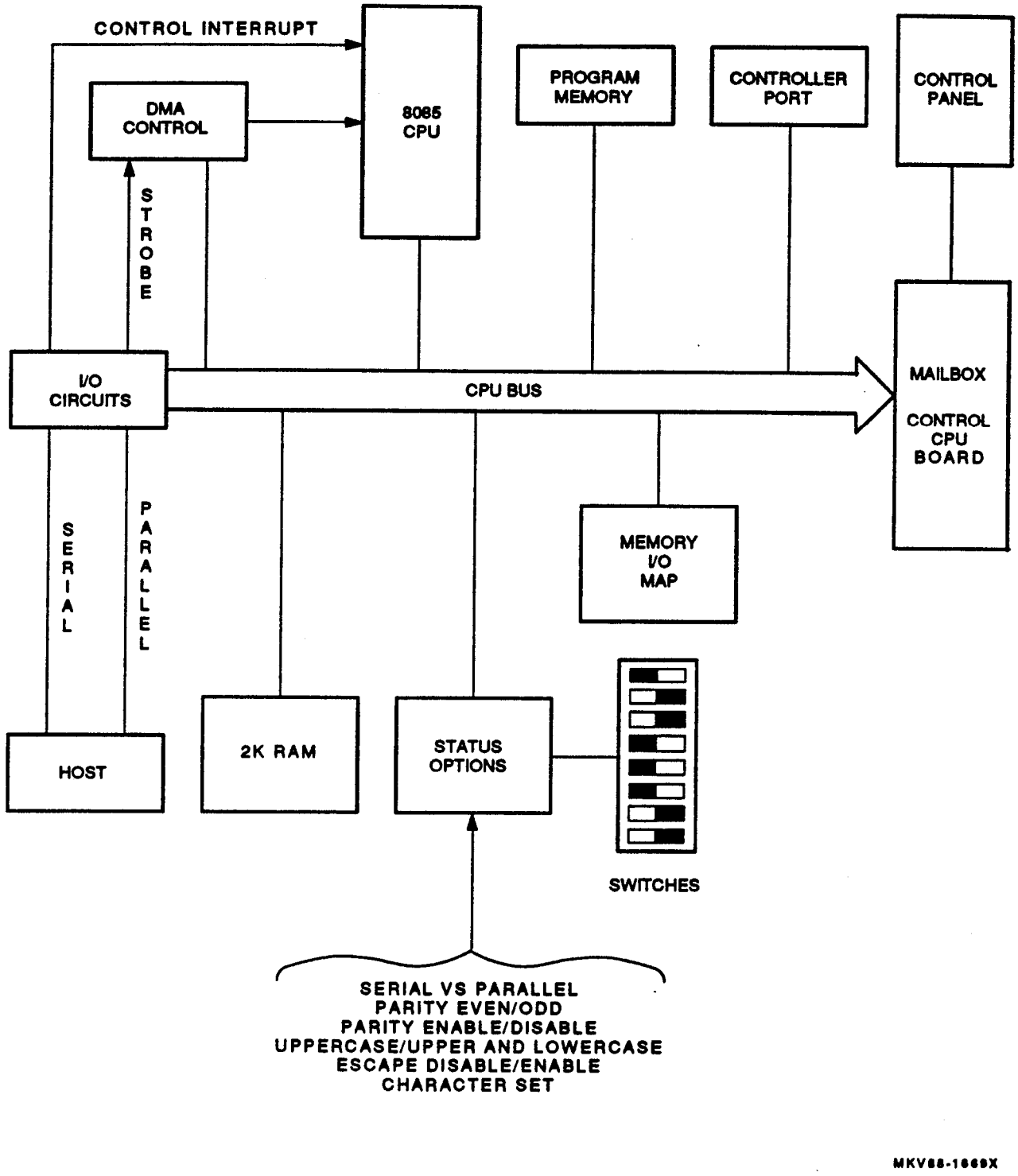


Figure 1-5 I/O Board Block Diagram

1.4.2 Control CPU Board

A block diagram of the control CPU board is shown in Figure 1-6.

The control CPU board processor accepts characters a line at a time and sends this data a dot row at a time, using the selected font, to the sequencer board. The control CPU board also generates the appropriate paper motion commands.

Data, along with the font selection data, is sent from the I/O board to the control CPU board via the mailbox. The data is taken from the mailbox a byte at a time. The appropriate font is then selected to determine the dot-row data to be sent to the sequencer board for printing. Shuttle profile and shuttle sweep data is sent, along with the dot-row data, to the sequencer board to control where the dots get placed on the paper.

The control CPU board processor is responsible for monitoring printer operations and fault status such as voltage, paper motion, platen open, paper out, ribbon fault, and ribbon drive. If a fault is encountered, the status will be sent via the mailbox to the control panel for display and to the I/O board so that the host can be informed that a fault exists. The control CPU board contains a self-test switch (S1) that can be used to run self-tests if the control panel is not working and the control panel tests cannot be run (see Section 3.3).

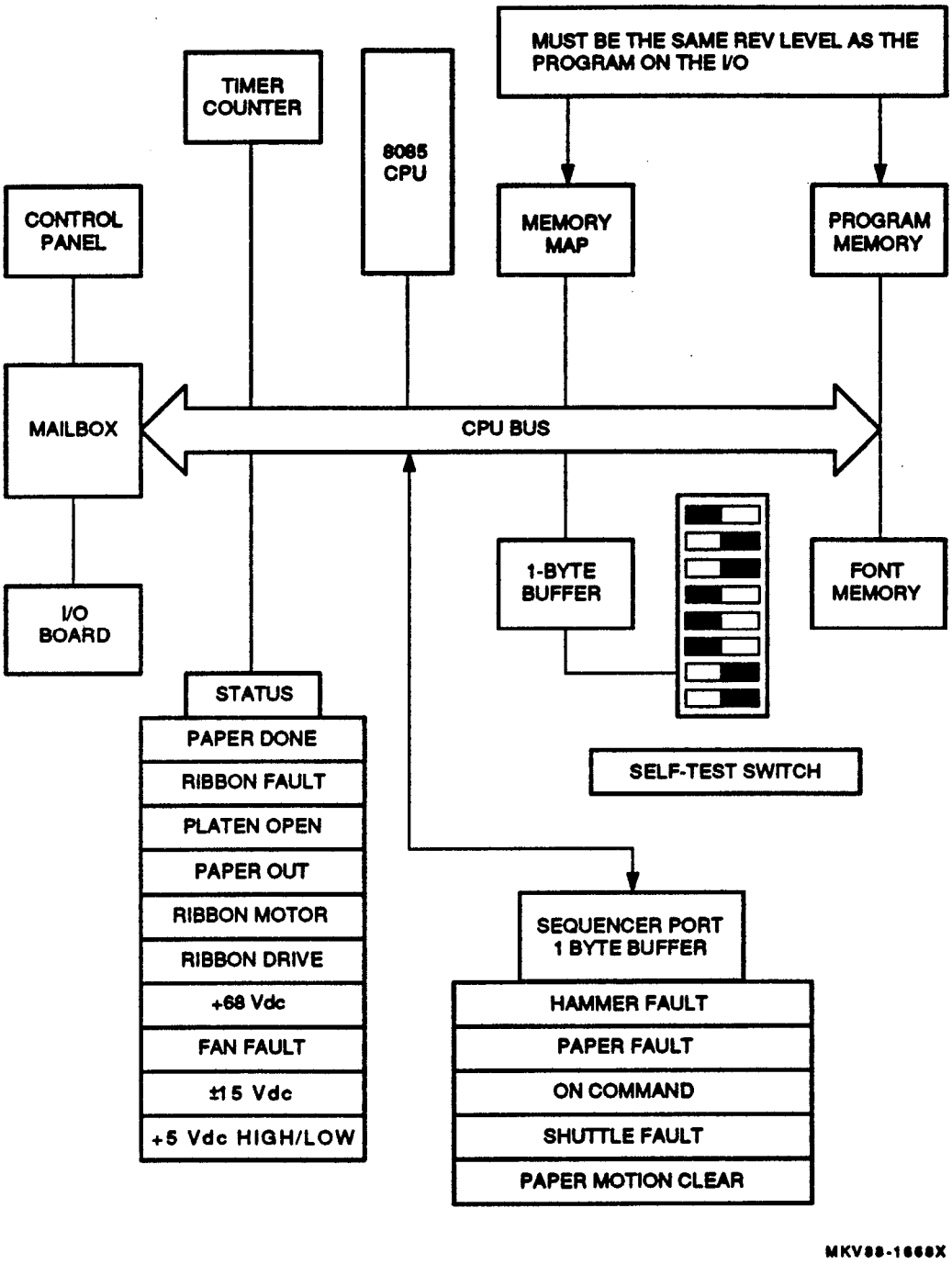


Figure 1-6 Control CPU Board Block Diagram

1.4.3 Sequencer Board

A block diagram of the sequencer board is shown in Figure 1-7.

The sequencer board contains a special-purpose TTL processor which keeps the 66 hammers supplied with dot data, finds the proper shuttle position for each dot, and then turns the hammer drivers ON and OFF to produce a dot.

The sequencer board communicates with the control CPU board through a shared dual port RAM known as the sequencer RAM. The sequencer RAM is the sequencer board's program and data memory. The control CPU board divides this RAM in half, loads one-half with the program and dot-row data, and informs the sequencer board to start processing. While the sequencer board is processing the first half, the control CPU board is loading the second half with program and dot-row data. When the sequencer board reports that it has finished processing the first half, the control CPU board swaps the sequencer board's control and data pointers to the second half and informs it to start processing. While the sequencer board is processing the second half, the control CPU board is reloading the first half with new data. This process continues as long as there is something left to print. The sequencer boards responsibility is to ensure that the dots are put in the right location on the paper, based on the data that is received by the control CPU board from the I/O board.

On power-up or character mode change, a program that contains shuttle direction, the number of shuttle sweeps per dot row, and dot-positioning data to control hammer fire and length of shuttle sweep is sent to the sequencer RAM. When ready to print a line of text, the control CPU board loads dot data for the first dot row into the sequencer RAM. The sequencer board sends dot-position data to the shuttle and ribbon board to be compared against the actual position of the shuttle.

Fire points for the characters are sent to the hammer-driver board. When the proper position is detected by the sequencer board, the hammers corresponding to the dot data are fired. This continues until the top dot row for the first character is complete. The other character fire points are sent to the hammer-driver board next and the operation continues until the top dot row is complete. While the first dot row prints, the second dot row is sent to the sequencer board. When the last dot row is printed, the paper is advanced to the next line. This routine continues until all data has been printed.

The sequencer board also commands paper advance timing because it is the only device close enough to the machinery to know when the last dot of a row has been printed and paper can be moved. The control CPU board determines the amount paper is to be moved and the sequencer board determines when paper can be moved.

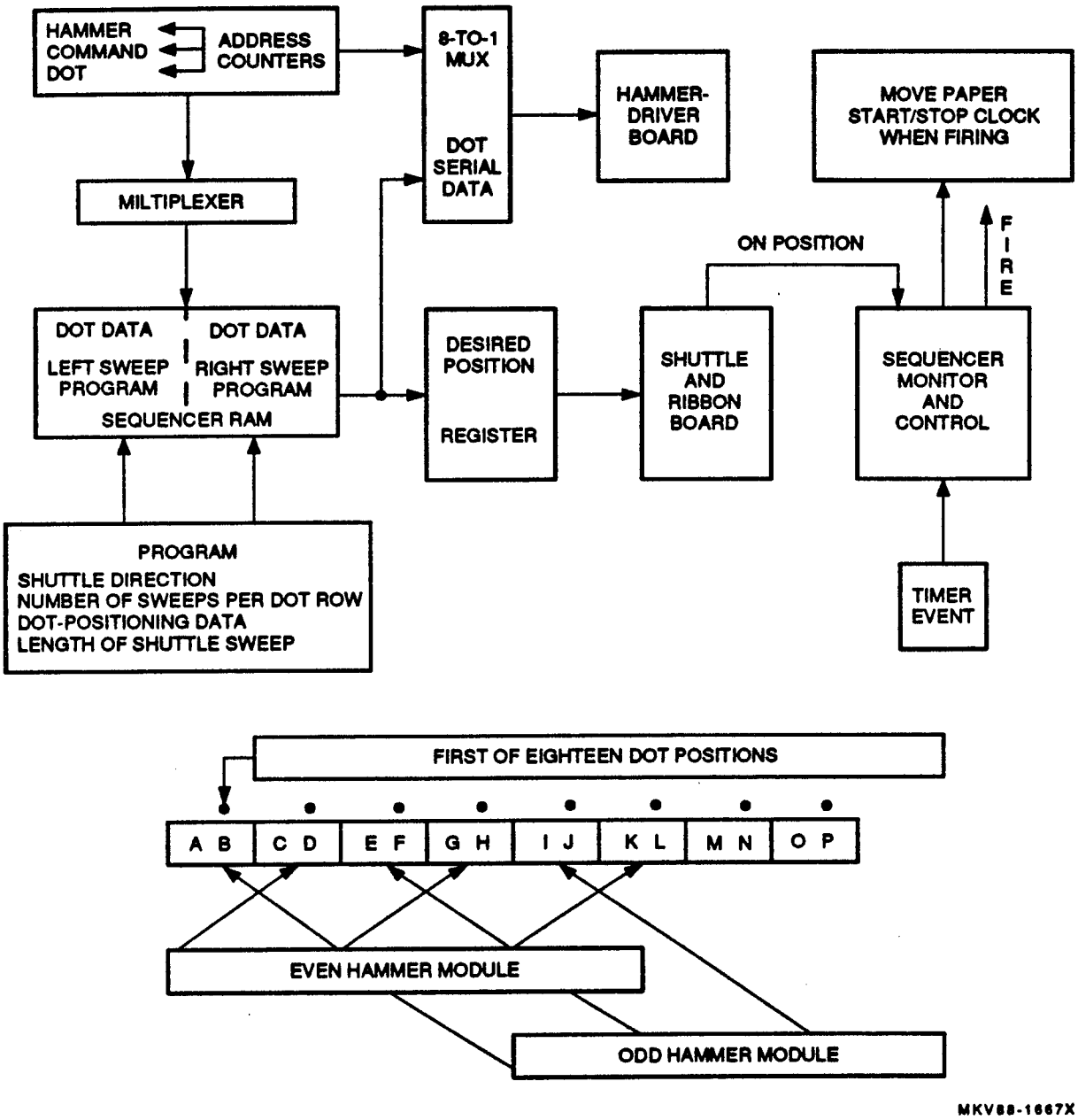


Figure 1-7 Sequencer Board Block Diagram

1.4.4 Shuttle and Ribbon Board

A block diagram of the shuttle and ribbon board is shown in Figure 1-8.

The shuttle and ribbon board controls the drive for the shuttle servo system and the ribbon system. The shuttle system is a closed loop servo system that uses a switching-power amplifier to run a linear actuator motor. This motor moves the hammers for horizontal positioning. The shuttle sweeps back and forth across the form, allowing dot placement where needed.

The power amplifier board chops the 77 volts power at approximately 20 kHz. This is the final drive to the linear actuator motor.

The shuttle sweep is derived from one of four profiles stored in a ROM. Profile data is accessed, amplified, and sent to a D/A converter to generate the analog error signal. The shuttle profile data determines how the shuttle moves, whether it be sawtooth or sinusoidal. The distance moved is determined by the profile signals amplitude. The rate or frequency at which the profile ROM data is accessed determines the frequency of the shuttle. This clock rate is determined by the control CPU board.

A second D/A converter on the shuttle and ribbon board takes hammer-fire position data from the sequencer board and compares it with the actual shuttle position which is determined by the shuttle position sensor. When the positions are within 400 ns, the shuttle and ribbon board sends an on position signal to the sequencer board to fire the hammers. This lead time is necessary to get the hammers moving so that when the shuttle is in position the hammers strike.

The shuttle and ribbon board also drives the ribbon system and monitors the ribbon platform switch to determine if a ribbon is installed. The control CPU board sends a start command to the ribbon control which enables the drive logic to supply a path for current flow through the ribbon motor.

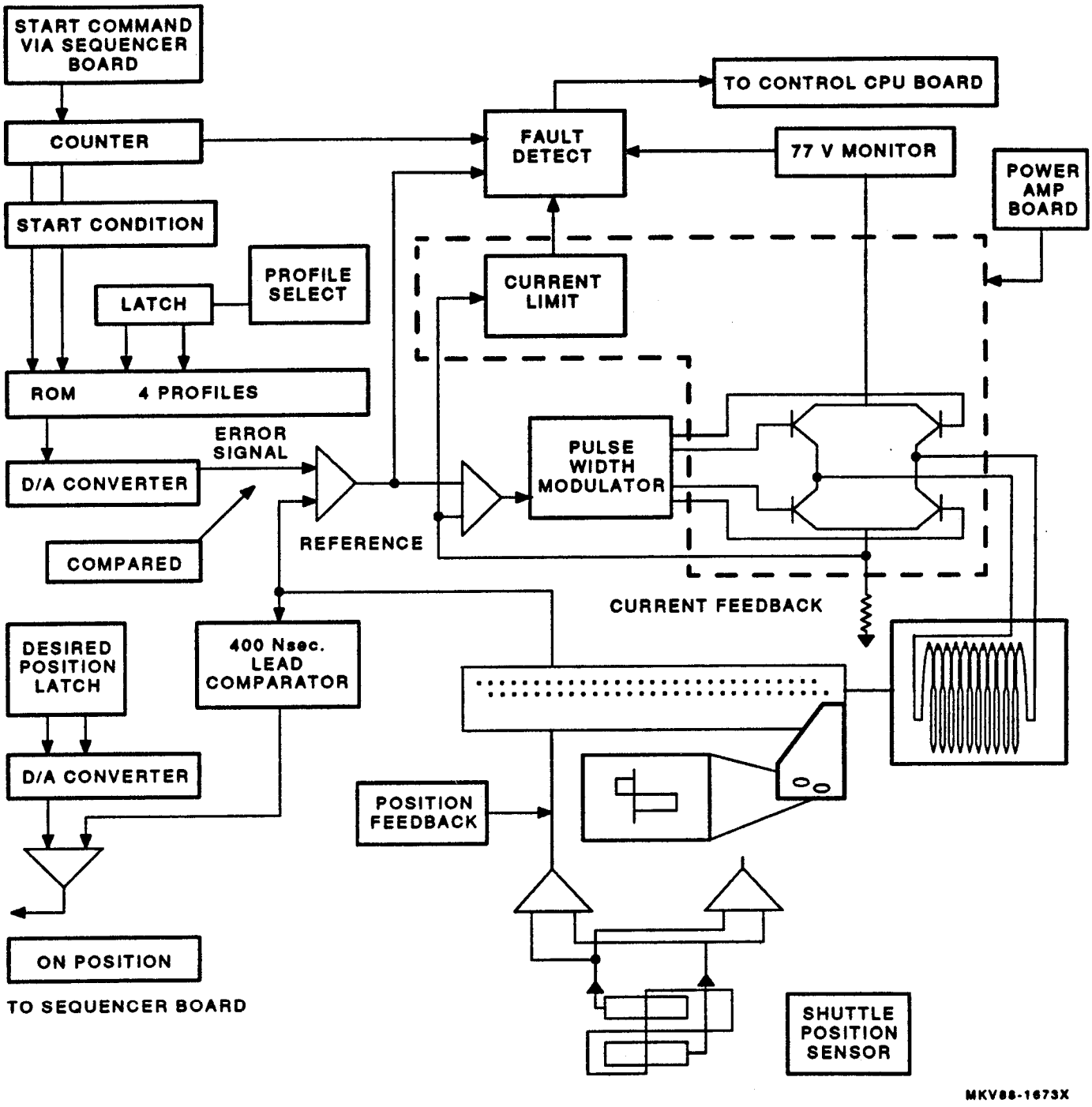


Figure 1-8 Shuttle and Ribbon Board Block Diagram

1.4.5 Paper and Status Board

A block diagram of the paper and status board is shown in Figure 1-9.

The responsibility of the paper and status board is to control paper movement and to signal the control CPU board when any paper motor control problems occur.

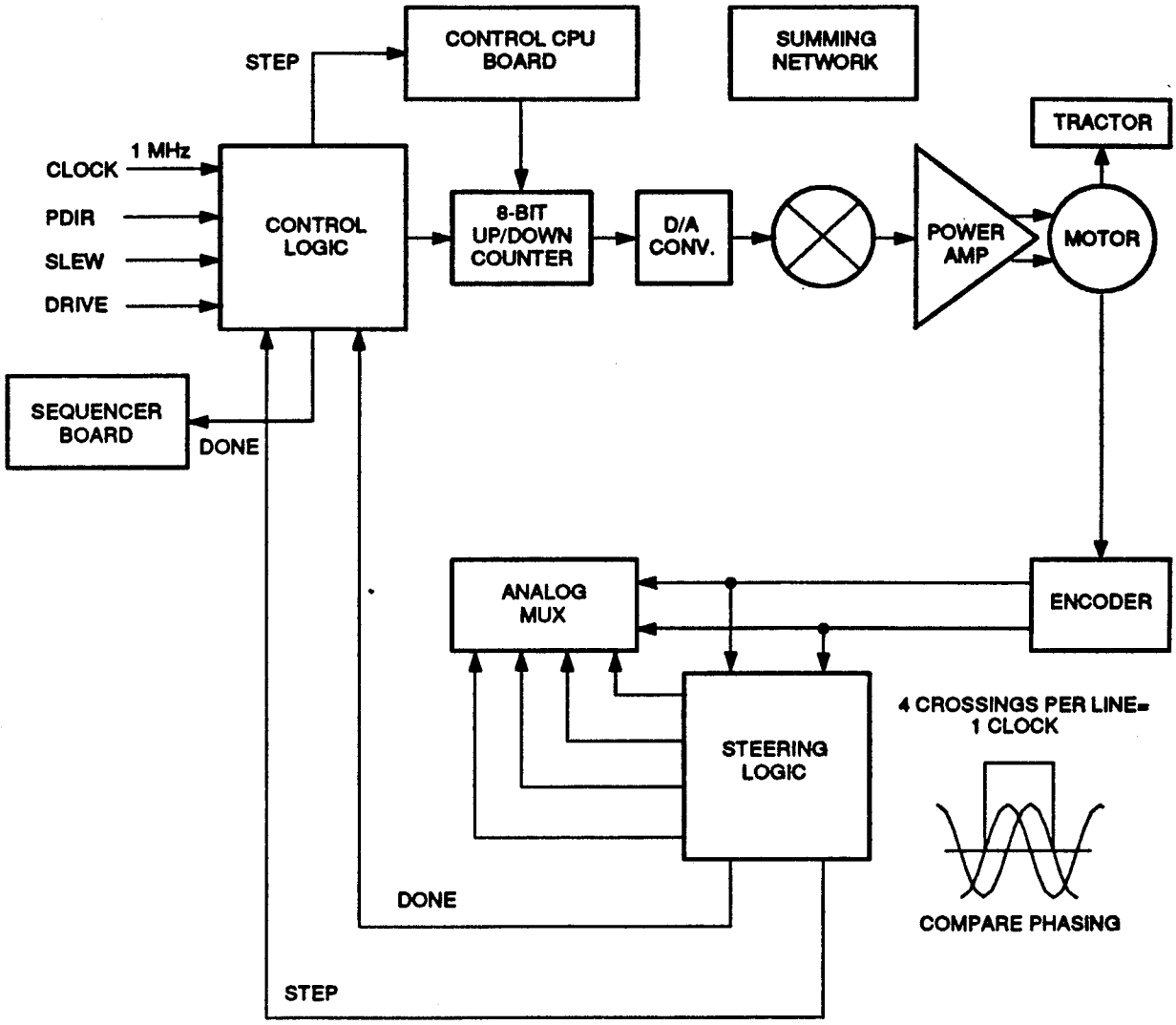
The paper drive system uses a dc motor to drive the forms tractors for vertical positioning. This motor has a rotary encoder mounted on the motor shaft which provides feedback to the paper and status board regarding the direction of paper motion and the amount of distance moved. The motor is driven by the switching-power amplifier board which connects a chopped 77 volts in the proper phase to command motion.

The paper movement commands can be generated by the control CPU board or the sequencer board, depending on the mode of operation. All monitoring is done by the control CPU board. When the control CPU board or the sequencer board determines that paper is to be stepped, the paper drive status is activated to allow an error voltage to be generated.

The amount to move is set by an 8-bit up/down counter at the servo input. This counter drives a D/A converter to produce the error signal that causes the motor to move. When the motor moves, the rotary encoder provides feedback that steps the counter back to null. The control CPU board provides an input pulse stream from its step counter to drive the 8-bit up/down counter off null. The steps taken pulses from the rotary encoder, decrements the control CPU boards step counter back to zero and allows the servo to return to null. If the paper is to be slewed, the slew status will be activated to produce a constant error signal which will cause the motor to drive continuously. When the slew status is dropped, the paper and status board will go to a step mode which allows the error to be zeroed and the motor to stop.

The paper drive system includes fault-detection circuits that shut the system down for lack of a counter clock or an overspeed condition, and interlock circuits to isolate the 77 volts from the rest of the system.

The paper motion sensor circuitry is also located on the paper and status board. The control CPU board monitors the paper motion flipflop and sets it if it is in the Reset state. Each tractor feed hole that passes over the paper motion sensor produces a logic level change. Two holes passing over the sensor generate a pulse that resets the paper motion flipflop. If the flipflop is not in the Reset state when monitored, a paper motion error is generated and printer operation is halted.



SHUTDOWN CONDITIONS

1. OVER-SPEED CONDITION
2. POWER SUPPLY VOLTAGES OFF
3. SLOW CLOCK (1 MHz DIVIDED)
4. RESET
5. ENCODER LATCHED OR UNPLUGGED

TYPES OF MOTION

1. DOT ROW STEP
2. FULL LINE STEP
3. SLEW (VT, FF, ETC...)
4. ENABLED BY SEQ.
5. ENABLED BY CONTROL CPU
6. MONITORED BY CONTROL CPU

MKV88-1670X

Figure 1-9 Paper and Status Board Block Diagram

1.4.6 Power Amplifier Board

A block diagram of the power amplifier board is shown in Figure 1-10.

The power amplifier board converts relatively low-level analog signals into high-power 77 volt signals to drive the paper advance motor and the linear actuator motor when it is enabled. This is a switching-power amplifier because neither of these motors can withstand having 77 volts applied to them all the time. The power amplifier board also provides current feedback to the paper and status board and the shuttle and ribbon board to close the servo loops.

The shuttle portion of the power amplifier board can be shut down by a shuttle and ribbon board problem, or by an overcurrent condition in the power amplifier linear actuator motor circuitry. The paper advance portion of the power amplifier board is controlled completely by the paper and status board.

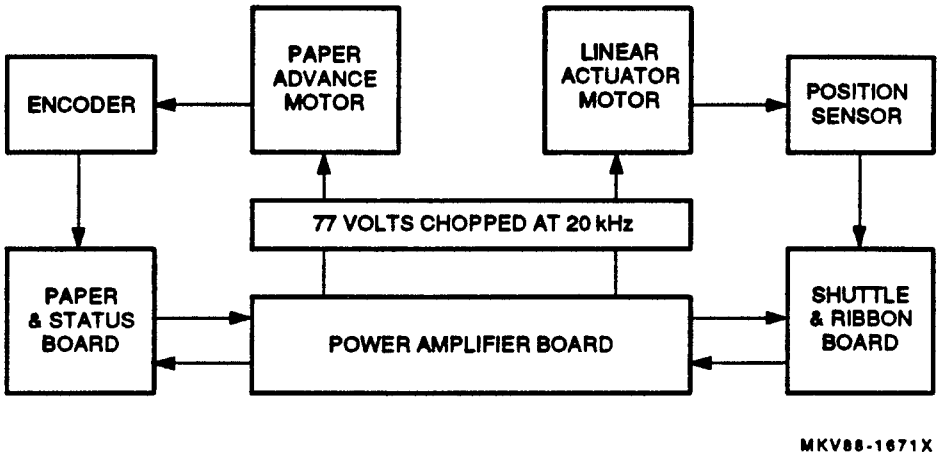


Figure 1-10 Power Amplifier Board Block Diagram

1.4.7 Hammer-Driver Board

A block diagram of the hammer-driver board is shown in Figure 1-11.

Dot data is sent to the hammer-driver board along with serial clock pulses from the sequencer board. Sixty-six clock pulses are always sent to load the dot data. The dot data is dependent upon the font data that was sent to the sequencer board from the control CPU board. When the shuttle reports to the sequencer board that it is in the proper position, the sequencer board sends a hammer-fire pulse to the hammer-driver board. The hammer-fire pulse enables the outputs from the shift registers that contain the dot data.

The hammer-driver board also monitors the +68 Vdc and the hammer-module 3-pack circuitry, and reports their status back to the control CPU board via the sequencer board. The +68 Vdc status is sent directly back to the control CPU board. Each 3-pack module is protected by a 2.0 A pico-type fuse (Figure 1-2) located in the +68 Vdc bus on the output side of the individual drive transistors. When a fuse blows, all three hammers of the module are taken out of the circuit. This is sensed by the hammer OK circuitry and a hammer fault signal is sent to the control CPU board for display.

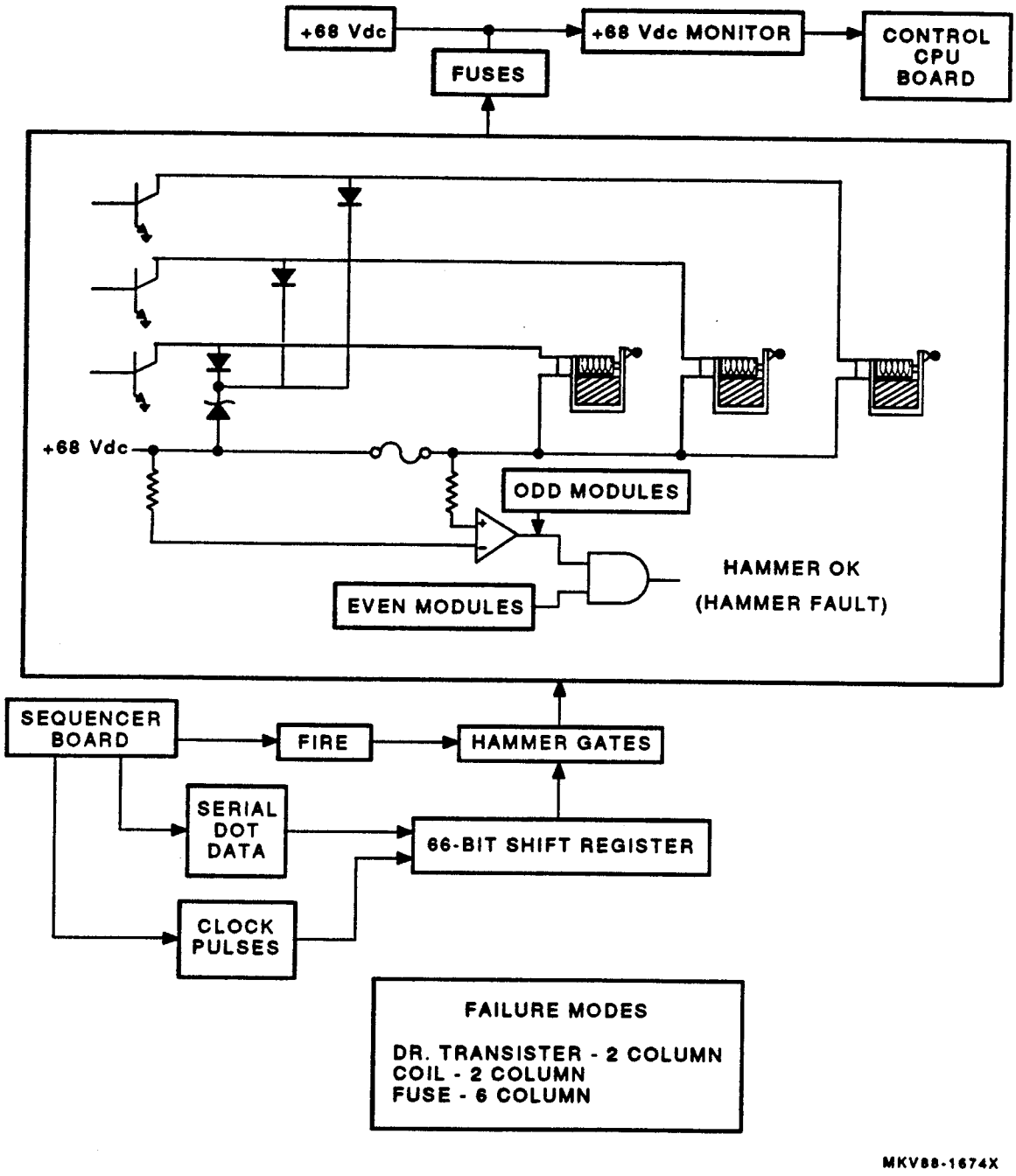


Figure 1-11 Hammer-Driver Board Block Diagram

1.4.8 Control Panel Board

The control panel board interfaces the control panel switches to the printer through the mailbox. It also displays the machine status as determined by the I/O board or the control CPU board via the mailbox, and provides the circuitry to beep the sonalert.

1.4.9 Shuttle Position Sensor Board

The shuttle position sensor is comprised of a photosensor and an amplifier board. It senses shuttle position by the intensity of the light that passes through two holes in the shuttle vane. The light intensity is converted into a proportional analog signal that is sent to the shuttle and ribbon board.

1.4.10 Power Rectifier/Regulator Board

The LG01 power supply consists of a transformer with a ferro-resonant capacitor, filter capacitors, and a power rectifier/regulator board. A block diagram of the LG01 power supply is shown in Figure 1-12.

The transformer secondary supplies 77 Vac, 24 Vac, and 8 Vac to the power rectifier/regulator board. These ac inputs are fused on the power rectifier/regulator board (Table 1-3).

The rectifier circuits on the power rectifier/regulator board full-wave rectify and filter the ac inputs.

The regulator circuits on the power rectifier/regulator board receive the dc voltages from the rectifier circuits. The 77 volts is regulated to 70 volts, and adjusted to +68 Vdc with a potentiometer (R2) on the power rectifier/regulator board before being sent to the hammer-driver board. The 77 volts is also zener regulated to +20 Vdc for use by the power amplifier board to keep the linear actuator motor from squealing at power-up and power-down, by the paper and status board for error detection, and by the trouble status circuitry for control panel displays. The unregulated 77 volts is sent to the power amplifier board to drive the linear actuator motor and the paper advance motor. The +24 Vdc and -24 Vdc is regulated to +15 Vdc and -15 Vdc for use on the shuttle and ribbon board, the paper and status board, the power amplifier board, the control CPU board, the sequencer board, and the I/O board. The +24 Vdc is also used to drive the ribbon motor. The +8 Vdc is sent to all boards and regulated to +5 Vdc for TTL logic by regulators on the individual boards. The LEDs on each board indicate the presence of +5 Vdc on the board.

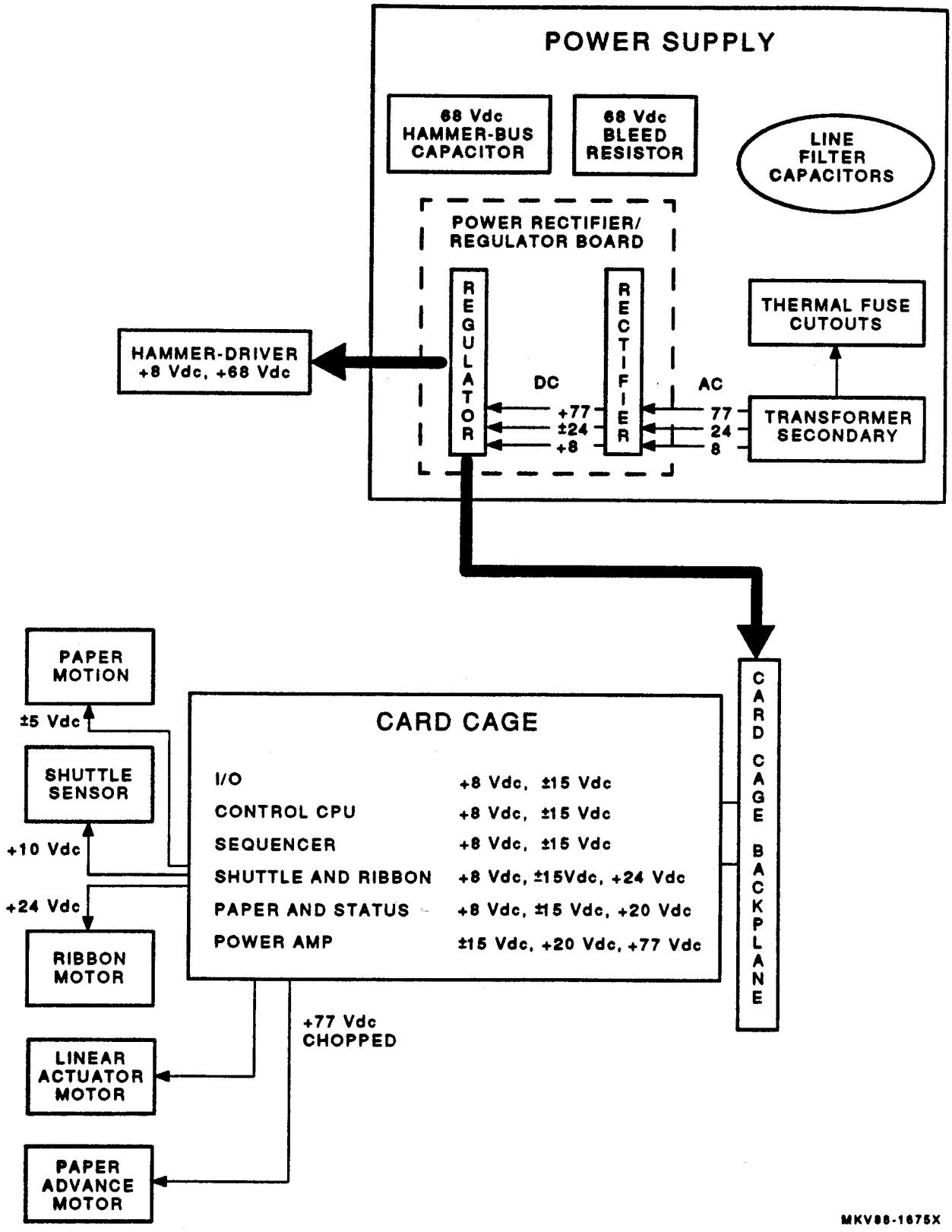


Figure 1-12 Power Supply Block Diagram

CHAPTER 2
PROBLEM DIAGNOSIS

2.1 INTRODUCTION

This chapter contains information for diagnosing and correcting fault conditions. It contains a table listing the fault message displays, the problem causing the fault message, and the corrective action to take to correct the condition. It also contains diagnostic flowcharts for use in correcting fault conditions and print-quality problems.

2.2 CORRECTING FAULT CONDITIONS

Whenever a fault occurs the bell sounds, the printer stops, and a fault message scrolls across the display on the control panel. The following sections contain the procedure for correcting faults and the functions performed by the CLEAR key.

2.2.1 Fault Correction Procedure

Follow the procedure given below to correct the fault condition.

> NOTE
> If the LG01 printer stopped printing in the middle of a form, you may be able to complete printing the form before correcting the fault. Press and hold down the RUN key until the whole form is printed. Depending on the type of fault, pressing the RUN key may not always print the remainder of the form.

1. Find the scrolling fault message or fault code listed in Table 2-2 in this chapter.

2. Correct the fault as described in the Corrective Action column of the fault table.

3. After the fault has been corrected, press the CLEAR key once to clear the fault code. While the CLEAR key is being pressed, any other uncorrected faults will be displayed.

2.2.2 Using the CLEAR Key

The CLEAR key performs many different functions depending on what mode or condition the printer is in. The CLEAR key functions are listed in Table 2-1.

CAUTION

Pressing the CLEAR key in Normal mode results in lost data.

Table 2-1 CLEAR Key Functions

Printer Mode or Condition	Result of Pressing CLEAR
Fault Condition	• Fault code is cleared • While CLEAR is pressed, other uncorrected fault messages are displayed • STOP is displayed
OPERator or TEST mode	• Printer returns to NORMal off-line mode • STOP is displayed
NORMal mode	• Data is cleared from buffer • CLER is displayed and bell sounds • The following format settings reset to power-up values: Characters per inch Lines per inch Font and language Character width Character height • The following format settings do not reset to power-up values: Form length Bottom-of-form skip Paper motion ON/OFF Escape sequence ON/OFF

If a fault occurs while printing (NORM mode), press the CLEAR key once to clear the fault condition. Pressing the CLEAR key again results in lost data. If a fault occurs in TEST mode and the LG01 printer needs to be reset, press the CLEAR key three times:

- The first time to clear the fault
- The second time to exit TEST mode
- The third time to reset the printer

2.3 FAULT DISPLAYS

When a fault occurs the bell sounds, the printer stops, and a fault message scrolls across the display on the control panel. This section describes the four types of faults and contains a fault message table with corrective actions (Table 2-2). The four types of faults are:

- **Hard Faults** -- Hard faults require correction before the LG01 printer can resume operation.

- **Transient Faults** -- Transient faults are caused by an improper LG01 printer state that has gone away. Proper operation may resume.

- **Run-With-Error Faults** -- When a run-with-error fault occurs, the LG01 printer runs without damage, but there may be errors in the printout.

- **I/O Faults** -- Initialization (I/O) fault codes display as part of a diagnostic self-test performed at power-up. These codes indicate hardware faults in the I/O board. The fault codes can be cleared to operate the LG01 printer, but data transfer may be incorrect. I/O faults do not scroll, but display as a code of **IExx**.

Table 2-2 LG01 Fault Messages/Codes/Corrective Actions

Scrolling Message Display	Fault Code	Problem	Corrective Action
BOF > MAX	BOF	Bottom-of-form skip greater than maximum	Use smaller BOF skip or larger forms length.
CNTL CPU STOP	CNTL	Control CPU failure	See Figure 2-1.
COxx	COxx	Control checksum error	Reseat/replace control CPU board.
CONTROL CPU CHECKSUM ERROR	CONT	Control CPU software fault	See Figure 2-5.
DENSITY ERROR	DENS	Incorrect density selected	Inform system's programmer that wrong density command was sent from computer.
ERRB RIBBON CMD	ERRB	Incorrect ribbon command	Make sure proper ribbon is installed.
ERRD RIBBON OUT	ERRD	Ribbon cartridge not installed	1. Install ribbon cartridge. 2. If fault persists, see Figure 2-13.
ERRE HAMMER FAULT	ERRE	Hammers out	See Figure 2-2.
ERRF CPI ERROR	ERRF	Incorrect CPI setting selected	Inform system's programmer that wrong CPI command was sent from computer.
ERRG LPI WRONG	ERRG	Wrong LPI (lines per inch) setting selected	1. Press CLEAR. 2. Inform system's programmer that wrong LPI command was sent from computer.
ERRH FL TOO BIG	ERRH	Form length too long	See Figure 2-3.

Table 2-2 LG01 Fault Messages/Codes/Corrective Actions (Cont)

Scrolling Message Display	Fault Code	Problem	Corrective Action
ERR1 POWER UP	ERR1	Nonrequested branch to power-up routine	1. Reseat/replace I/O board. 2. Reseat/replace control CPU board.
ERR3 SEQ RAM	ERR3	Sequencer RAM fault	See Figure 2-4.
ERR4 M/B RAM	ERR4	Mailbox RAM fault	See Figure 2-5.
ERR6 ELEC FAULT	ERR6	Control CPU electronics fault	See Figure 2-6.
ERR8 MODE SELECT	ERR8	Sequence build error	See Figure 2-7.
ERR9 FONT ERROR	ERR9	Wrong font command	See Figure 2-8.
ESC FORMAT ERROR	ESC	Incorrect escape sequence	Inform system's programmer that the escape sequence is incorrect.
FAN FAULT	FAN	Cooling system failure	See Figure 2-9.
FERR	FERR	Invalid down-line load data	Check down-line load file.
FLS INCORRECT	FLS	Invalid form length selected	Inform system's programmer that wrong form length command was sent from computer.
FONT SEL ERROR	FONT	Invalid font selected	Select valid font or run with default font.
FPnn	FPnn	Control panel checksum error	1. Check I/O switch settings. 2. Reseat/replace I/O board.

Table 2-2 LG01 Fault Messages/Codes/Corrective Actions (Cont)

Scrolling Message Display	Fault Code	Problem	Corrective Action
FX nn nn = channel number	F+X	Paper instruction error	Correct paper instruction; check I/O switch settings.
HALT	HALT	I/O CPU failure	Reseat/replace I/O board.
IERR	IERR	I/O hardware error	Reseat/replace I/O board.
I/O?	I/O?	I/O CPU stopped	1. Check I/O board switch and jumper selections. 2. Reseat/replace I/O board.
IOxx I/O CK SUM	IOxx	I/O checksum error	Reseat/replace I/O board.
IRAM I/O RAM ERROR	IRAM	I/O RAM fault	Replace I/O board.
NOVF NO VFU	NOVF	VFU not loaded	1. Use DAVFU. 2. Use form-length select sequence.
OPTVON VALUE	OPTV	Option value incorrect	Inform system's programmer that wrong option value was sent from computer.
PAPD DRIVE	PAPD	Paper servo fault	See Figure 2-10.
PAPM MOTION	PAPM	Paper motion fault	See Figure 2-11.
PAPR OUT	PAPR	Paper out	1. Load paper. 2. Press CLEAR.
PLTN OPEN	PLTN	Platen lever open	1. Close platen lever. 2. Press CLEAR.

Table 2-2 LG01 Fault Messages/Codes/Corrective Actions (Cont)

Scrolling Message Display	Fault Code	Problem	Corrective Action
PRER	PRER	Parity error	See Figure 2-12.
REPEAT	REPE	Error in repeat sequence	Inform system's programmer that wrong repeat sequence was sent from computer.
RIBN MOTION	RIBN	Ribbon motion error	See Figure 2-13.
RIBN OUT	RIBN	No ribbon cartridge installed	1. Install ribbon cartridge. 2. If fault persists, see Figure 2-13.
SEQ STOP ERROR	SEQ	Sequencer fault	Replace sequencer board, then replace control CPU board and hammer-driver board.
SET NOT LOADED	SET	Font selection not installed	Inform system's programmer that non-installed font command was sent from computer.
SHTL STOPPED	SHTL	Shuttle not working	See Figure 2-14. If fault persists, replace shuttle and ribbon board.
SIZE VALUE ERROR	SIZE	Incorrect character size selected	Inform system's programmer that wrong character size command was sent from computer.
SIZFONT	SIZF	Invalid character size	Use smaller size.
STRB WHILE BUSY	STRB	Input attempted from host while printer is busy	See Figure 2-15.

Table 2-2 LG01 Fault Messages/Codes/Corrective Actions (Cont)

Scrolling Message Display	Fault Code	Problem	Corrective Action
UNDF FATAL	UNDF	Electronic	Replace control CPU board.
VDVF FORMAT ERROR	VDVF	Error in VFU format loading	Correct VFU format.
VERR FORMAT TOO LONG	VERR	Form length too long (>200) VFU load error	Inform system's programmer that wrong form length command was sent from computer.
VMER	VMER	DAVFU RAM error	Reseat/replace control CPU board.
WAIT CNTL CPU	WAIT	Control CPU is not responding (on power-up)	Replace control CPU board.
+5 VOLT HIGH	+5H	+5 volts high	See Figure 2-16.
+5 VOLT LOW	+5L	+5 volts low	See Figure 2-17.
15 VOLT POWER	15	15 volts low	See Figure 2-18.
+70 VOLT POWER	+70	+70 volts low	See Figure 2-19.

2.4 PRINT-QUALITY PROBLEMS

Print-quality problems usually show up on the printout, but will not cause an error message or code to be displayed on the control panel. Figures 2-20, 2-21, and 2-22 are flowcharts for various print-quality problems.

2.5 DIAGNOSTIC FLOWCHARTS

This section contains diagnostic flowcharts to help correct LG01 printer faults and print-quality problems. The diagnostic flowcharts included in this section are listed below by title and figure number.

Flowchart Title	Figure Number
CNTL CPU STOP Flowchart	Figure 2-1
ERRE HAMMER FAULT Flowchart	Figure 2-2
ERRH FL TOO BIG Flowchart	Figure 2-3
ERR3 SEQ RAM Flowchart	Figure 2-4
ERR4 M/B RAM or CONTROL CPU CHECKSUM ERROR Flowchart	Figure 2-5
ERR6 ELEC FAULT Flowchart	Figure 2-6
ERR8 MODE SELECT Flowchart	Figure 2-7
ERR9 FONT ERROR Flowchart	Figure 2-8
FAN FAULT Flowchart	Figure 2-9
PAPD DRIVE Flowchart	Figure 2-10
PAPM MOTION Flowchart	Figure 2-11
PRER Flowchart	Figure 2-12
RIBN OUT Flowchart	Figure 2-13
SHTL STOPPED Flowchart	Figure 2-14
STRB WHILE BUSY Flowchart	Figure 2-15
+5 VOLT HIGH Flowchart	Figure 2-16
+5 VOLT LOW Flowchart	Figure 2-17
+15 VOLT POWER or -15 VOLT POWER Flowchart	Figure 2-18
+70 VOLT POWER Flowchart	Figure 2-19
Missing Print Flowchart	Figure 2-20
Compressed Print Flowchart	Figure 2-21
Varying Gap Between Characters Flowchart	Figure 2-22

PROBLEM: CNTL CPU STOP is displayed.

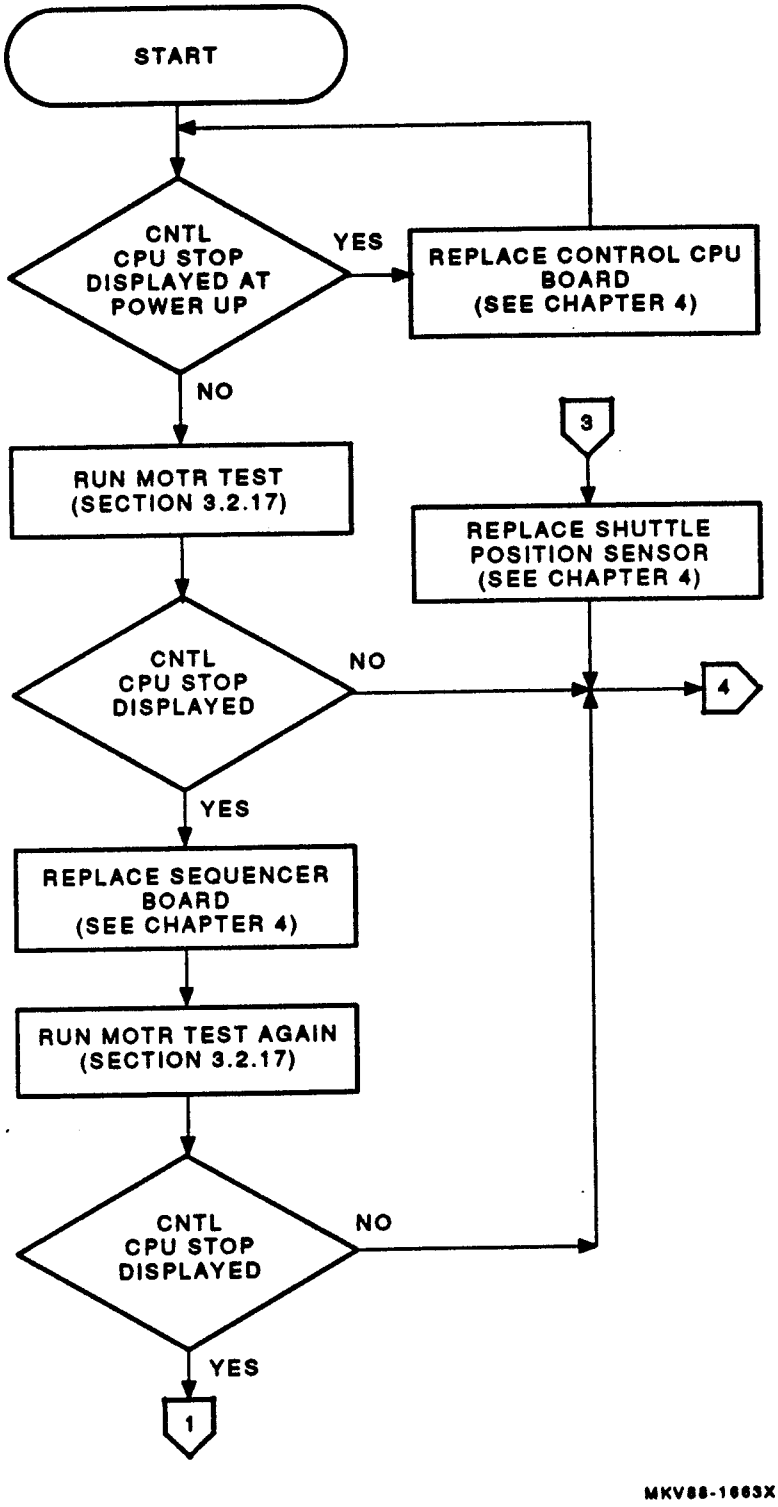


Figure 2-1 CNTL CPU STOP Flowchart (Sheet 1 of 3)

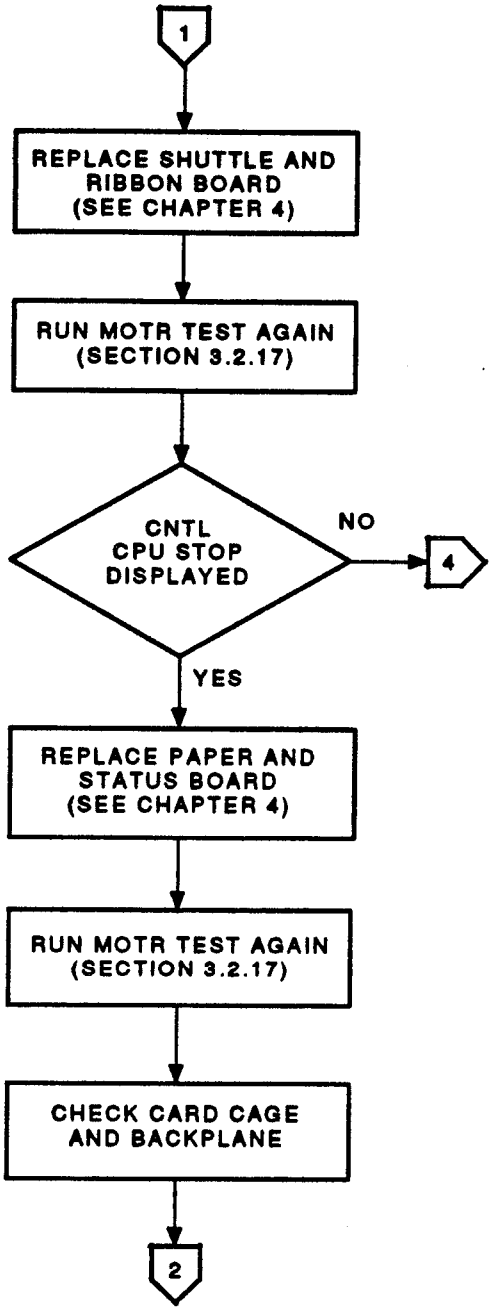


Figure 2-1 CNTL CPU STOP Flowchart (Sheet 2 of 3)

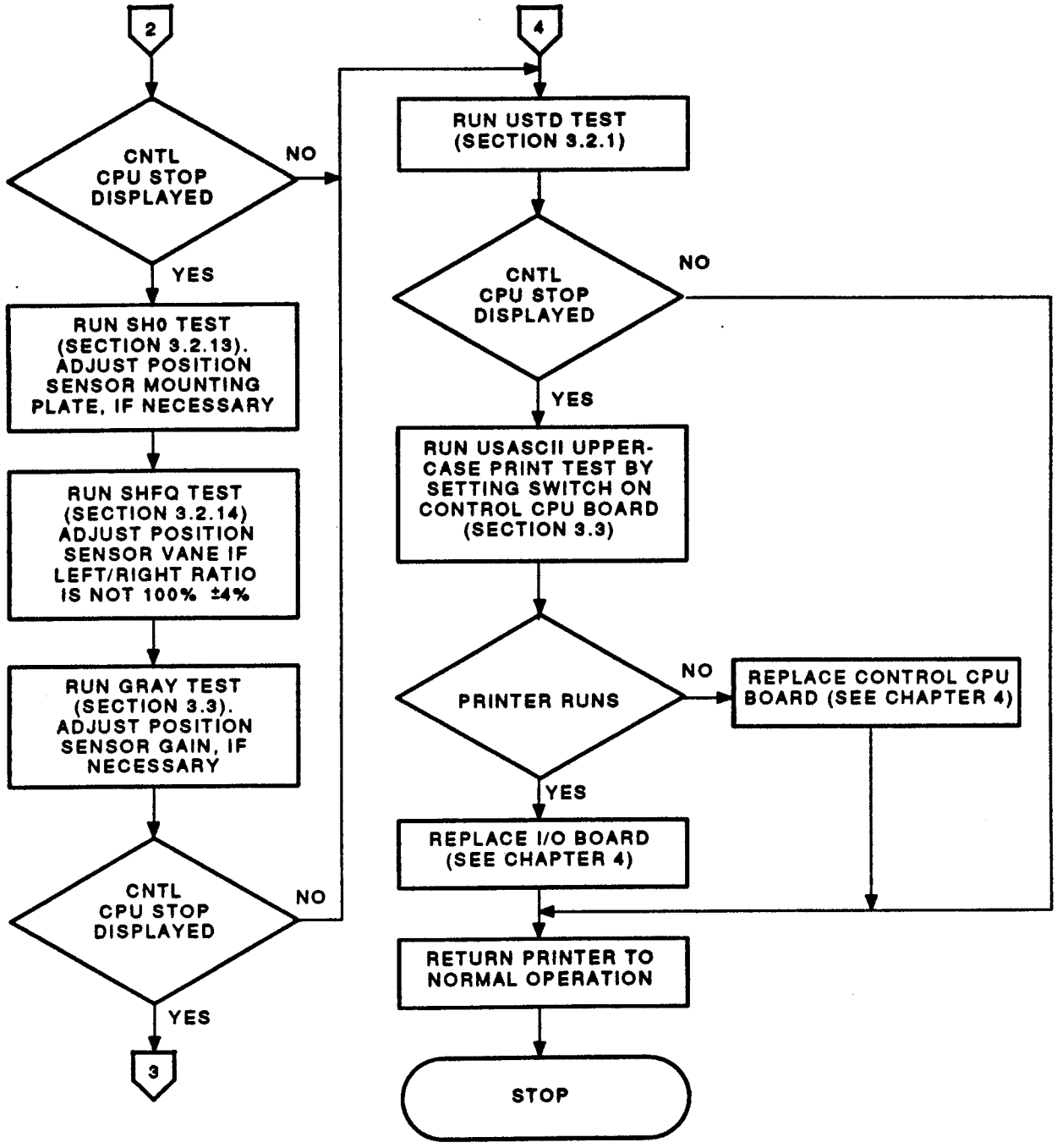


Figure 2-1 CNTL CPU STOP Flowchart (Sheet 3 of 3)

PROBLEM: ERRE HAMMER FAULT is displayed.

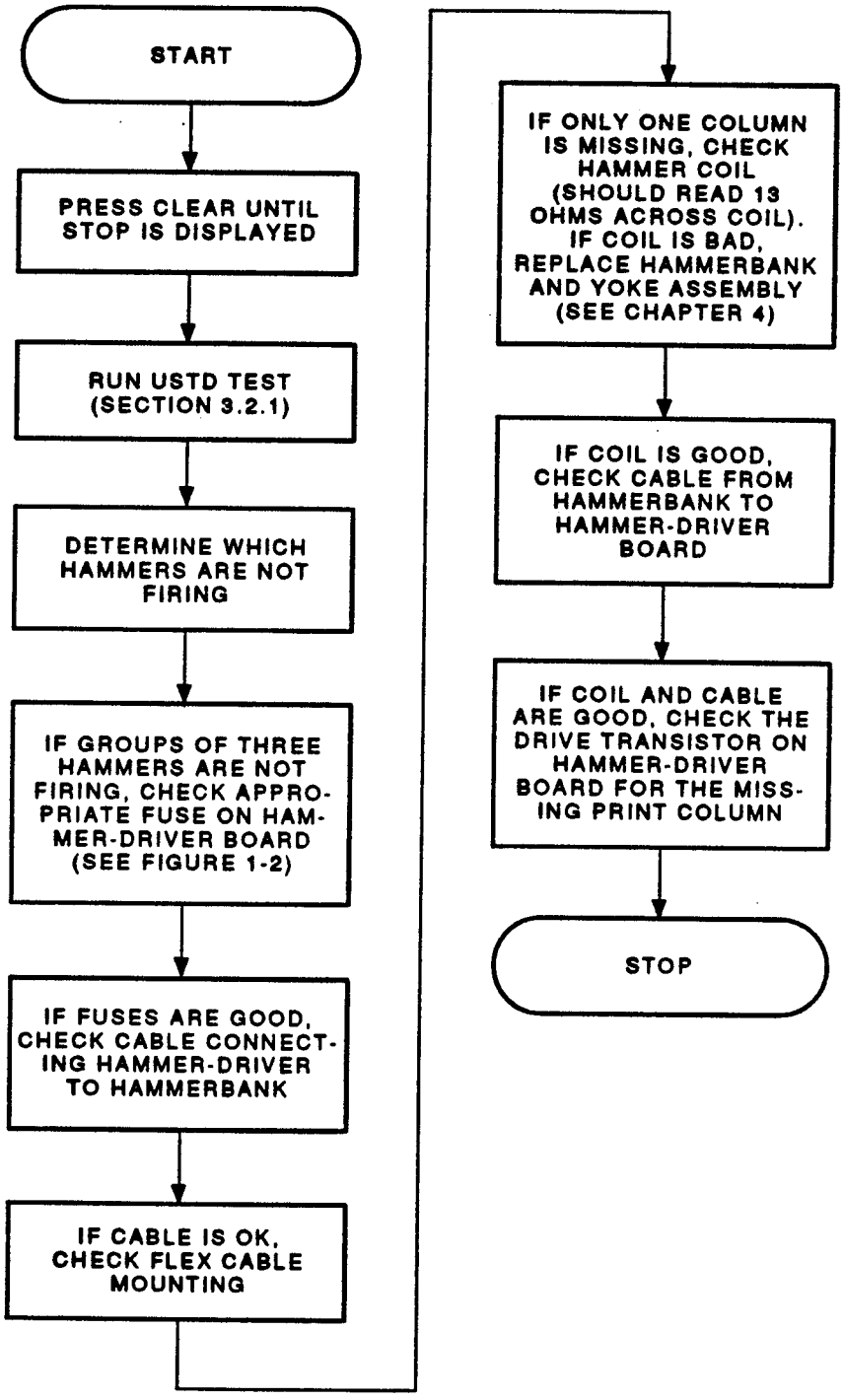


Figure 2-2 ERRE HAMMER FAULT Flowchart

PROBLEM: ERRH FL TOO BIG is displayed.

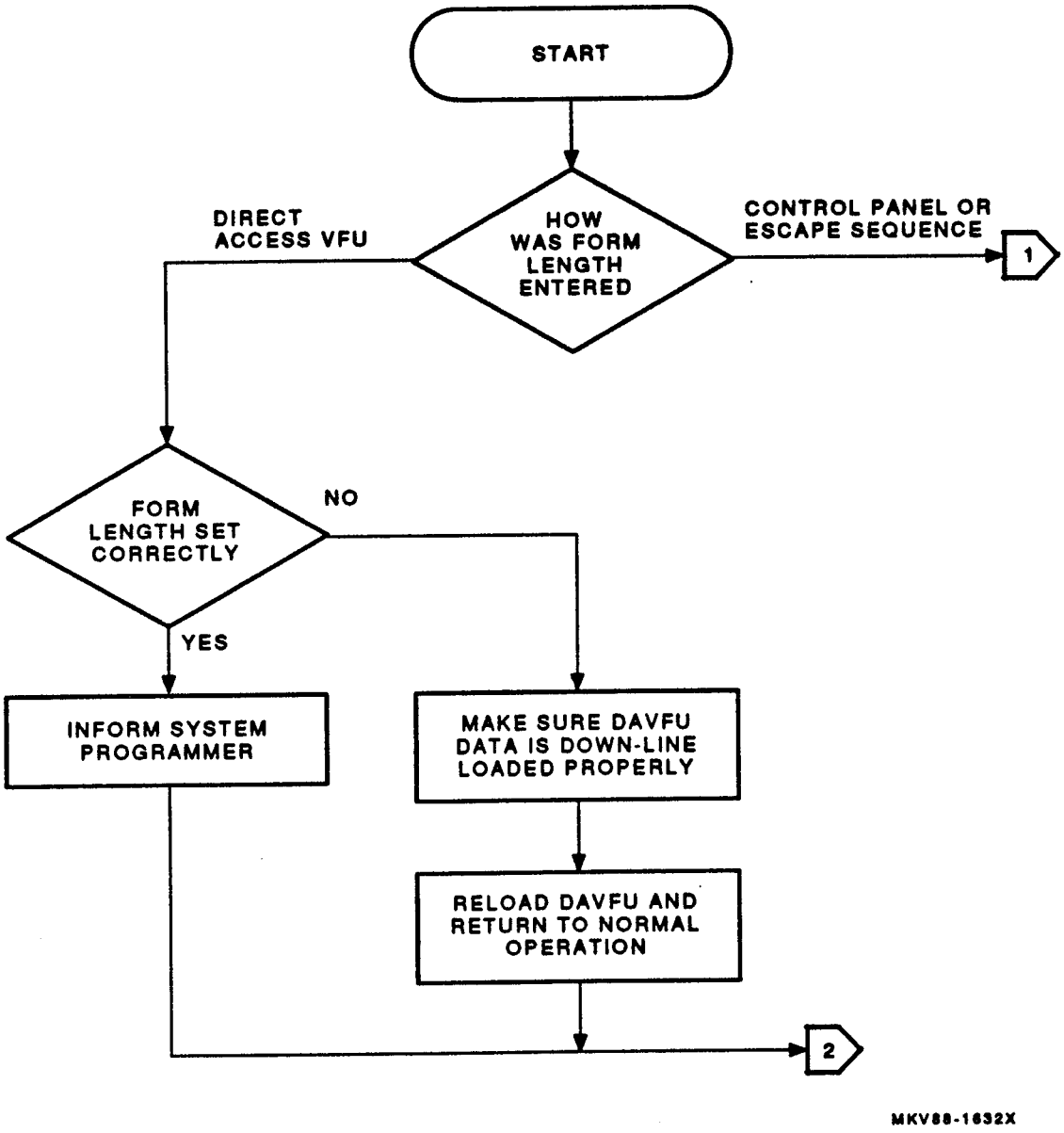


Figure 2-3 ERRH FL TOO BIG Flowchart (Sheet 1 of 2)

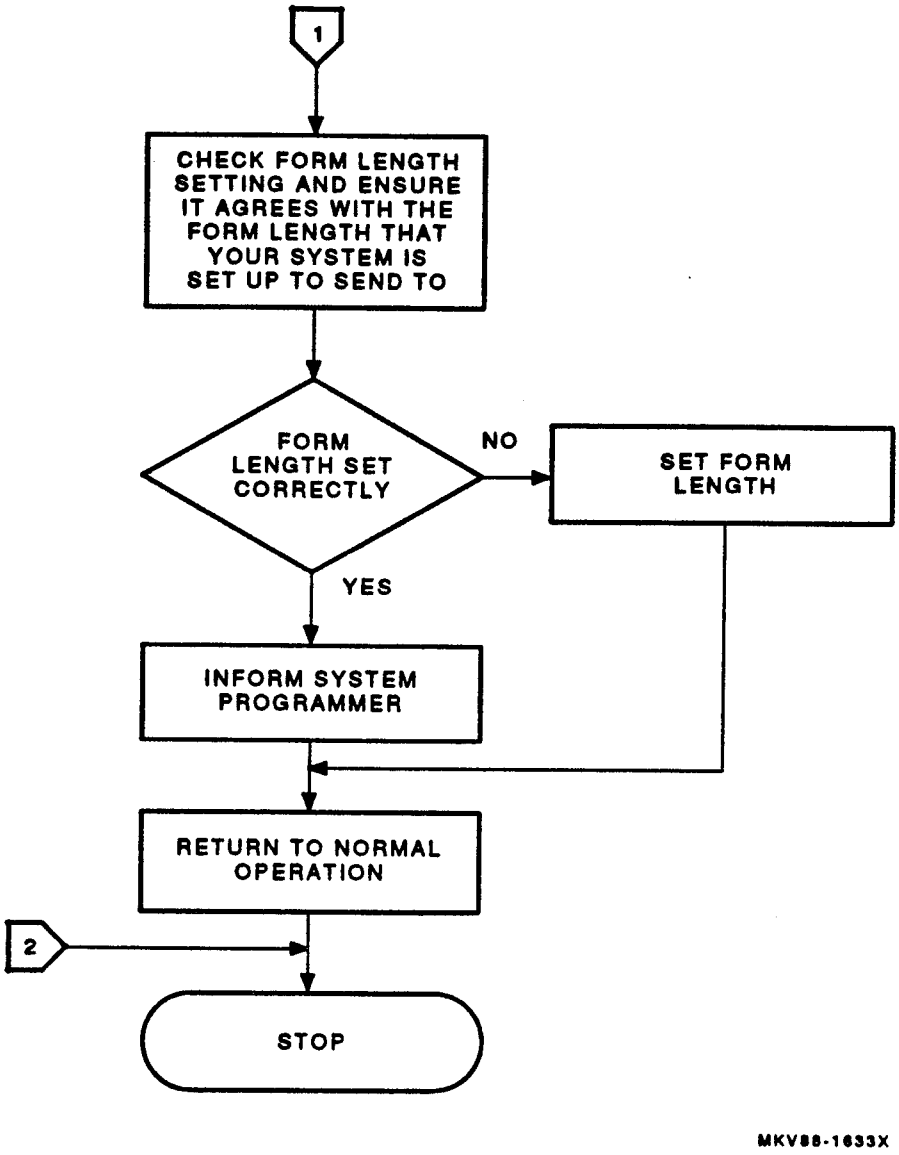


Figure 2-3 ERRH FL TOO BIG Flowchart (Sheet 2 of 2)

PROBLEM: **ERR3 SEQ RAM** is displayed.

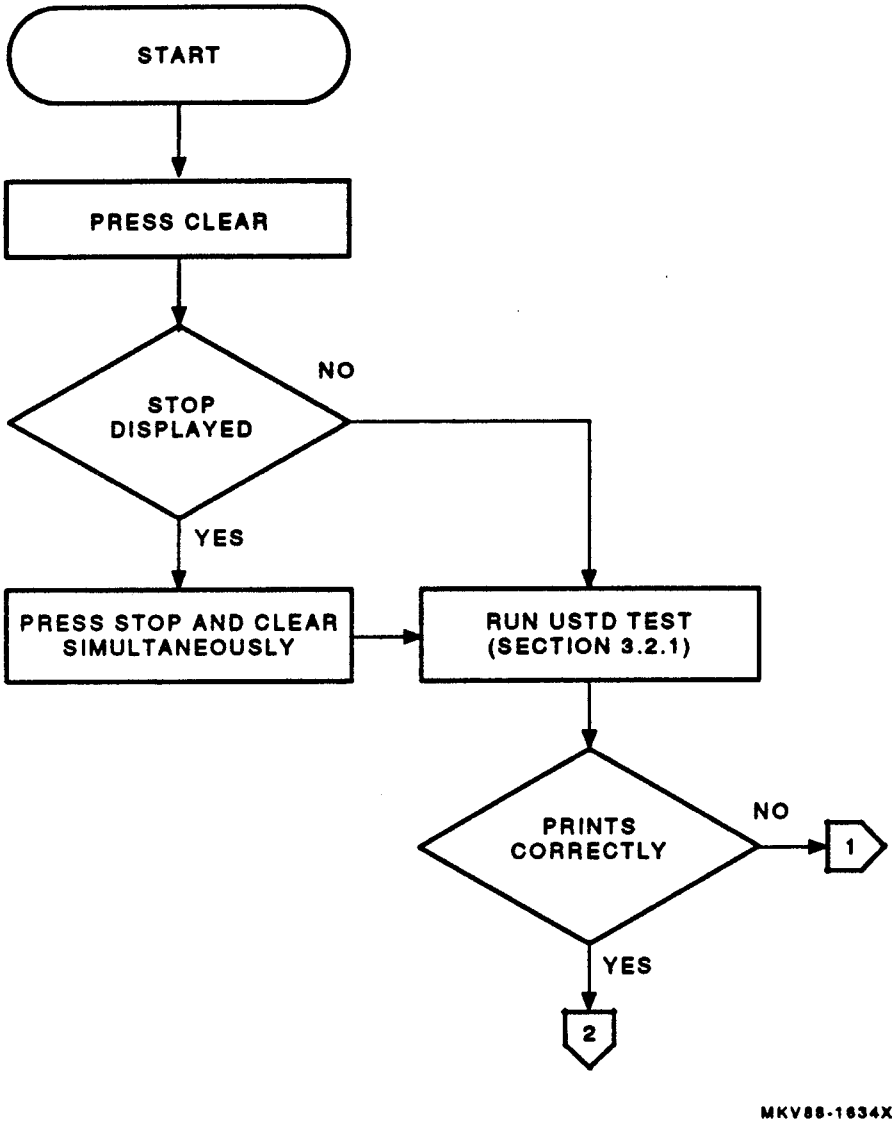


Figure 2-4 ERR3 SEQ RAM Flowchart (Sheet 1 of 2)

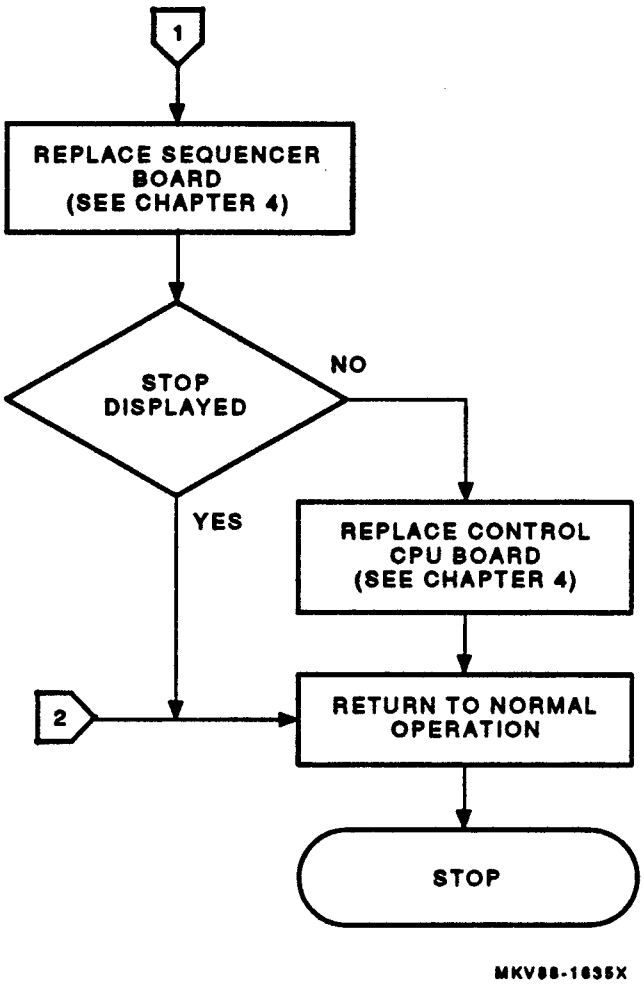


Figure 2-4 ERR3 SEQ RAM Flowchart (Sheet 2 of 2)

PROBLEM: ERR4 M/B RAM or CONTROL CPU CHECKSUM ERROR is displayed.

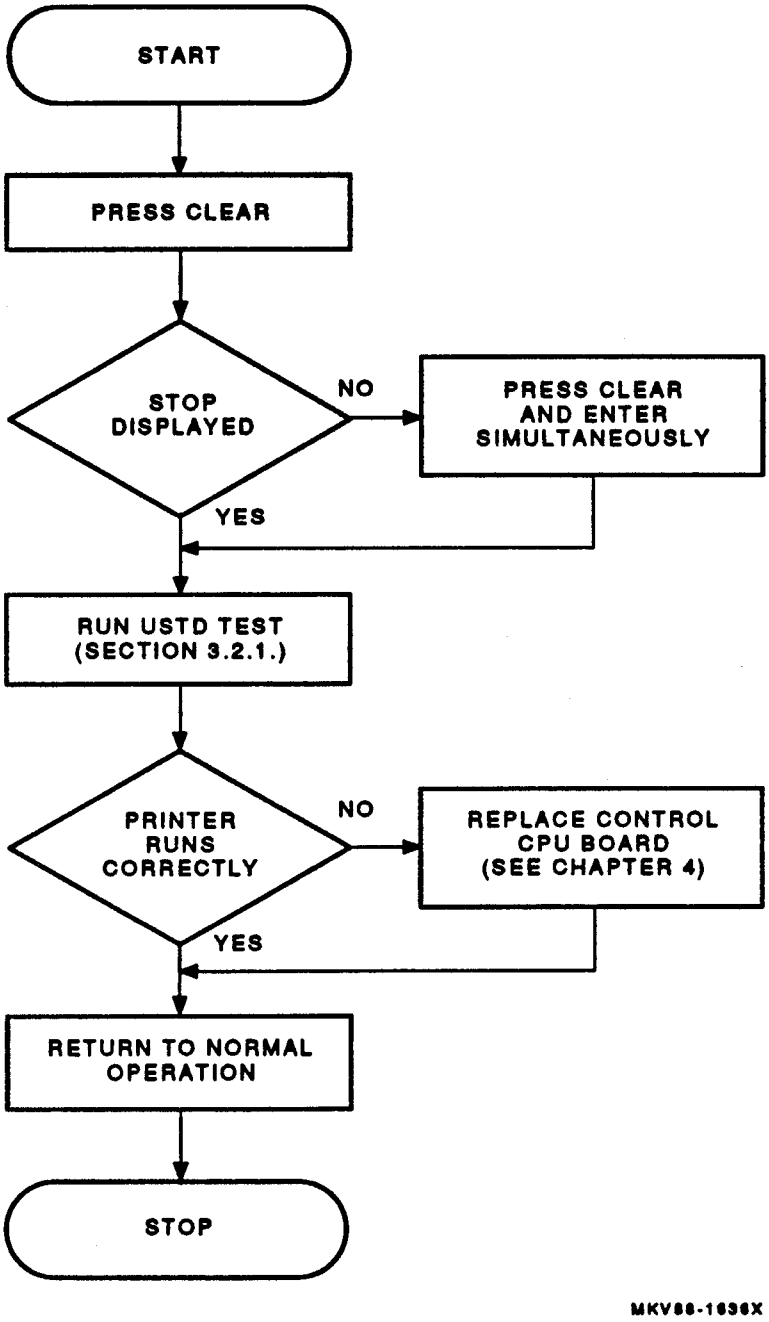


Figure 2-5 ERR4 M/B RAM or CONTROL CPU CHECKSUM ERROR Flowchart

PROBLEM: ERR6 ELEC FAULT is displayed.

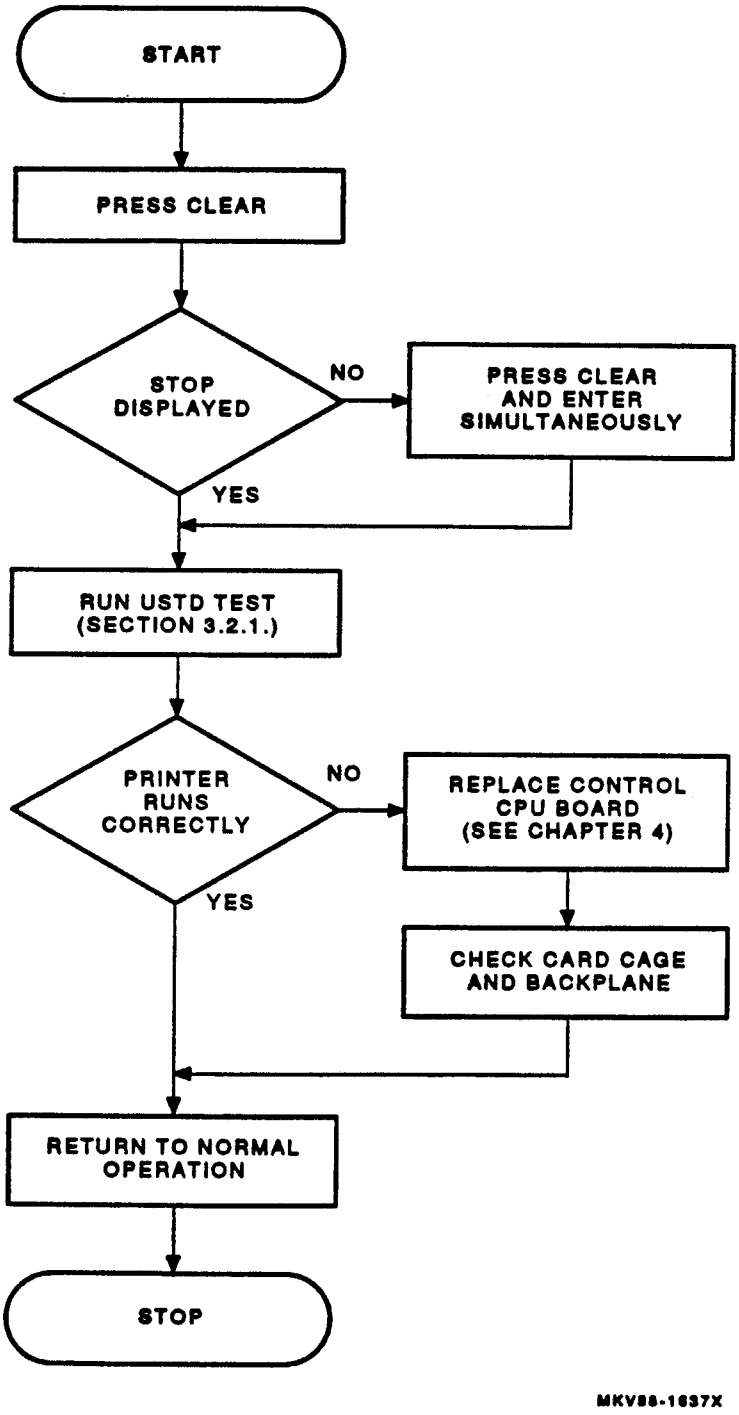


Figure 2-6 ERR6 ELEC FAULT Flowchart

PROBLEM: ERR8 MODE SELECT is displayed.

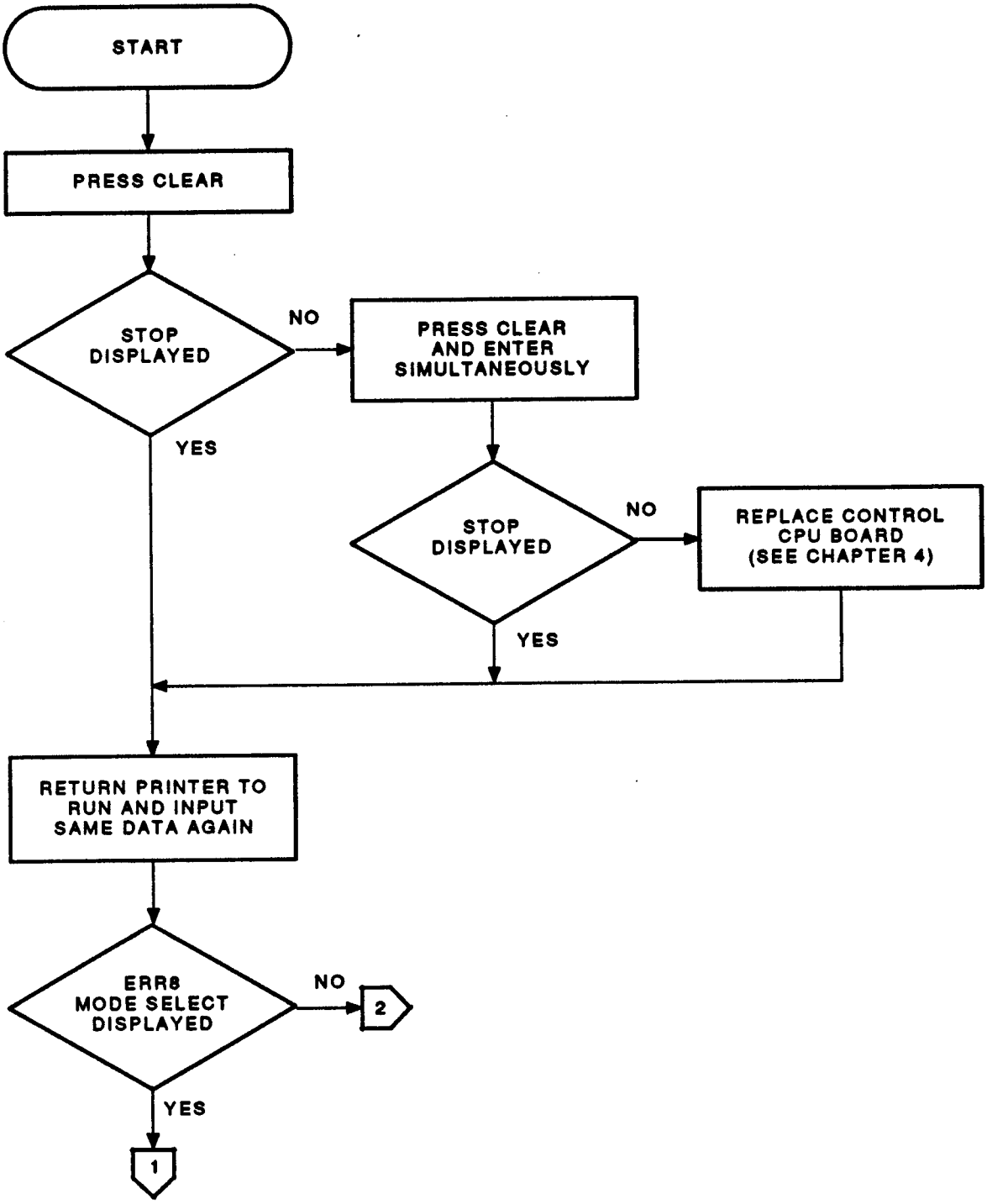


Figure 2-7 ERR8 MODE SELECT Flowchart (Sheet 1 of 2)

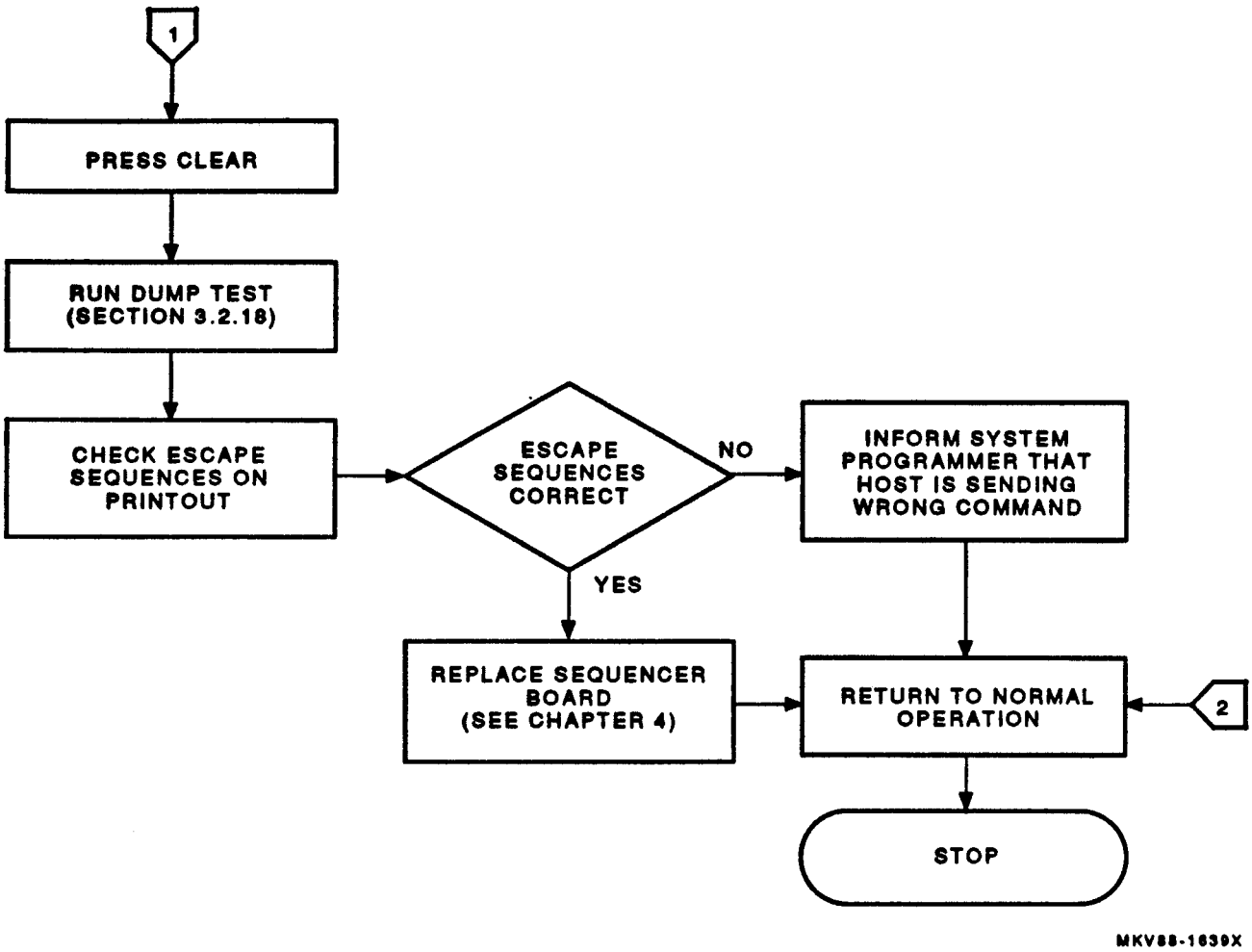


Figure 2-7 ERR8 MODE SELECT Flowchart (Sheet 2 of 2)

PROBLEM: ERR9 FONT ERROR is displayed.

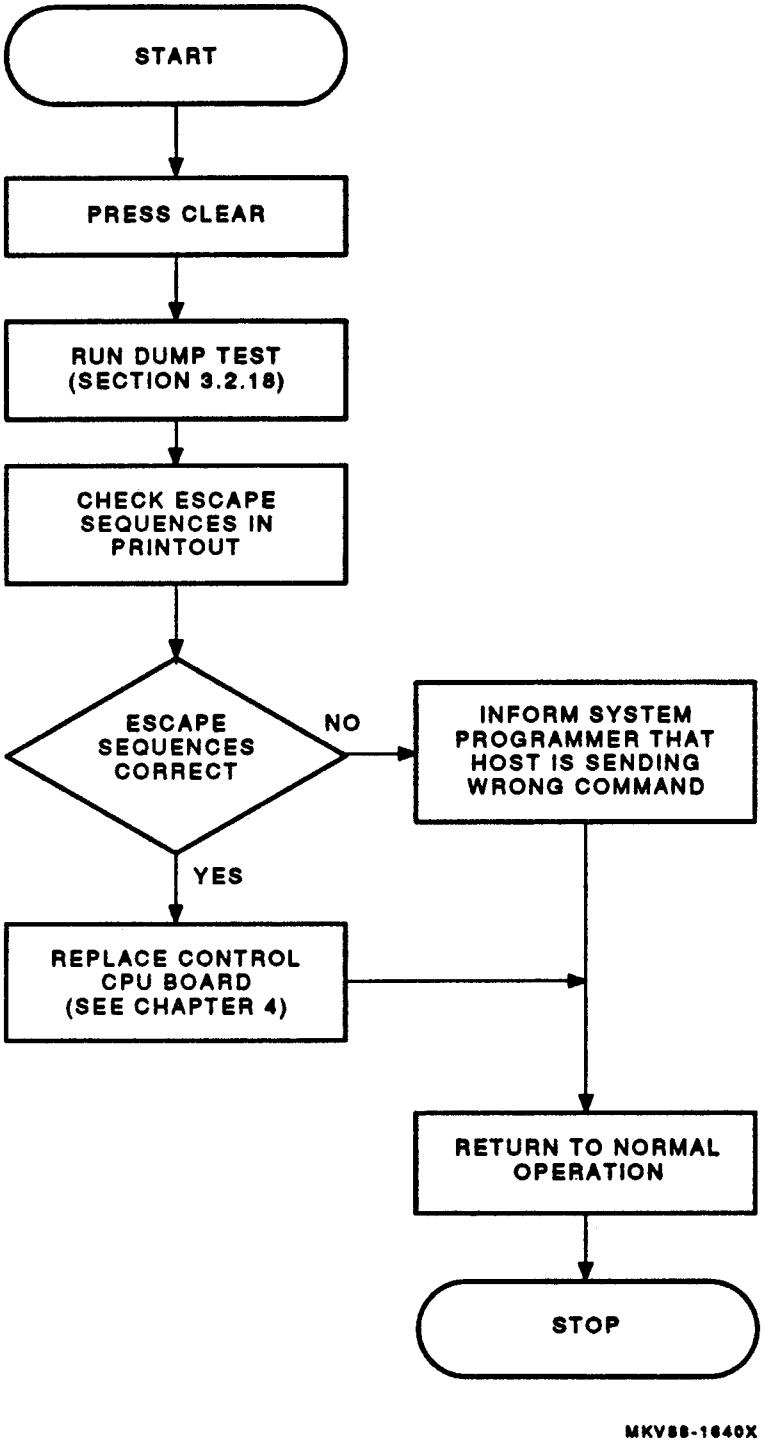


Figure 2-8 ERR9 FONT ERROR Flowchart

PROBLEM: **FAN FAULT** is displayed.

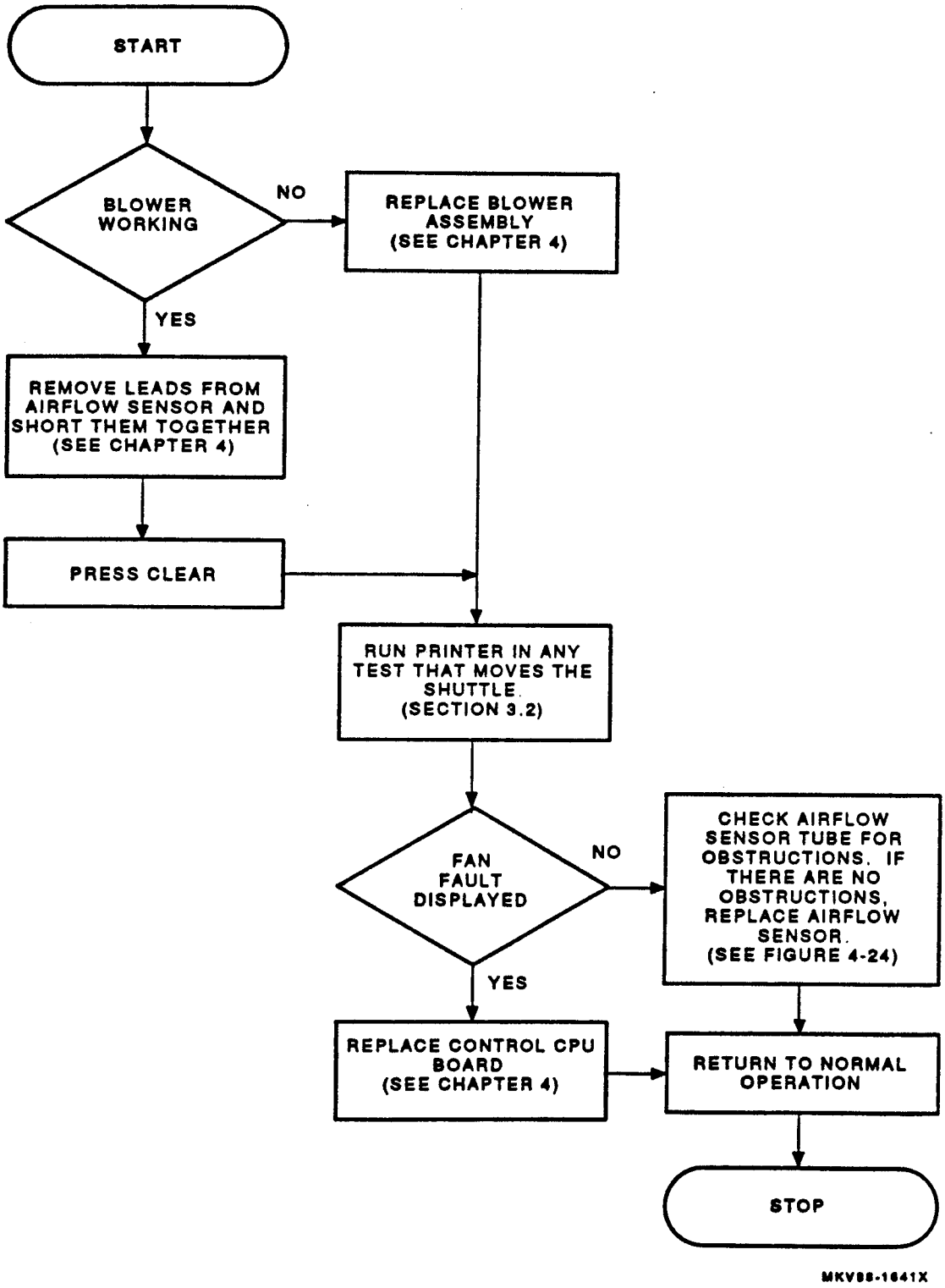


Figure 2-9 FAN FAULT Flowchart

PROBLEM: **PAPD DRIVE** is displayed.

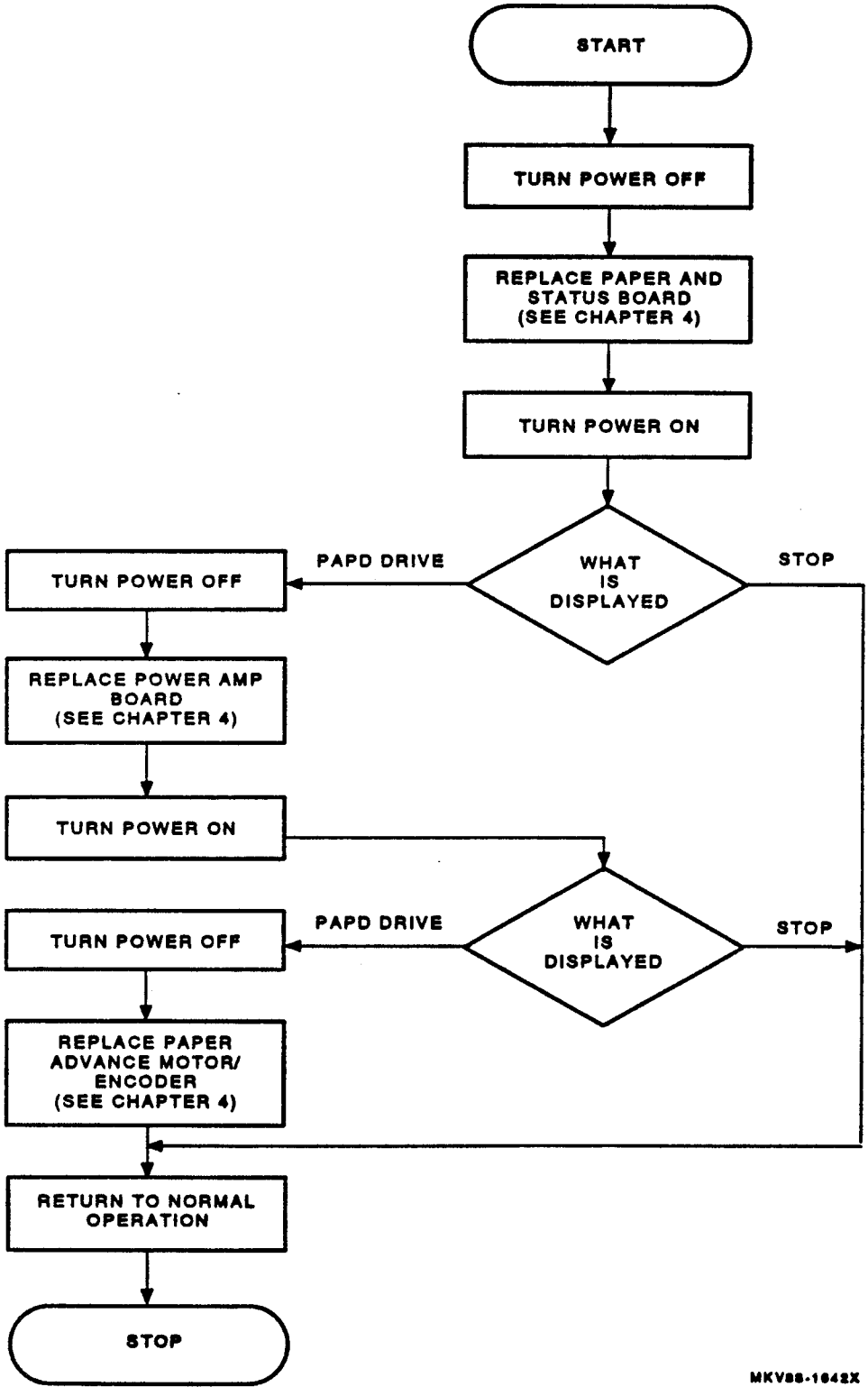


Figure 2-10 PAPD DRIVE Flowchart

PROBLEM: **PAPM MOTION** is displayed.

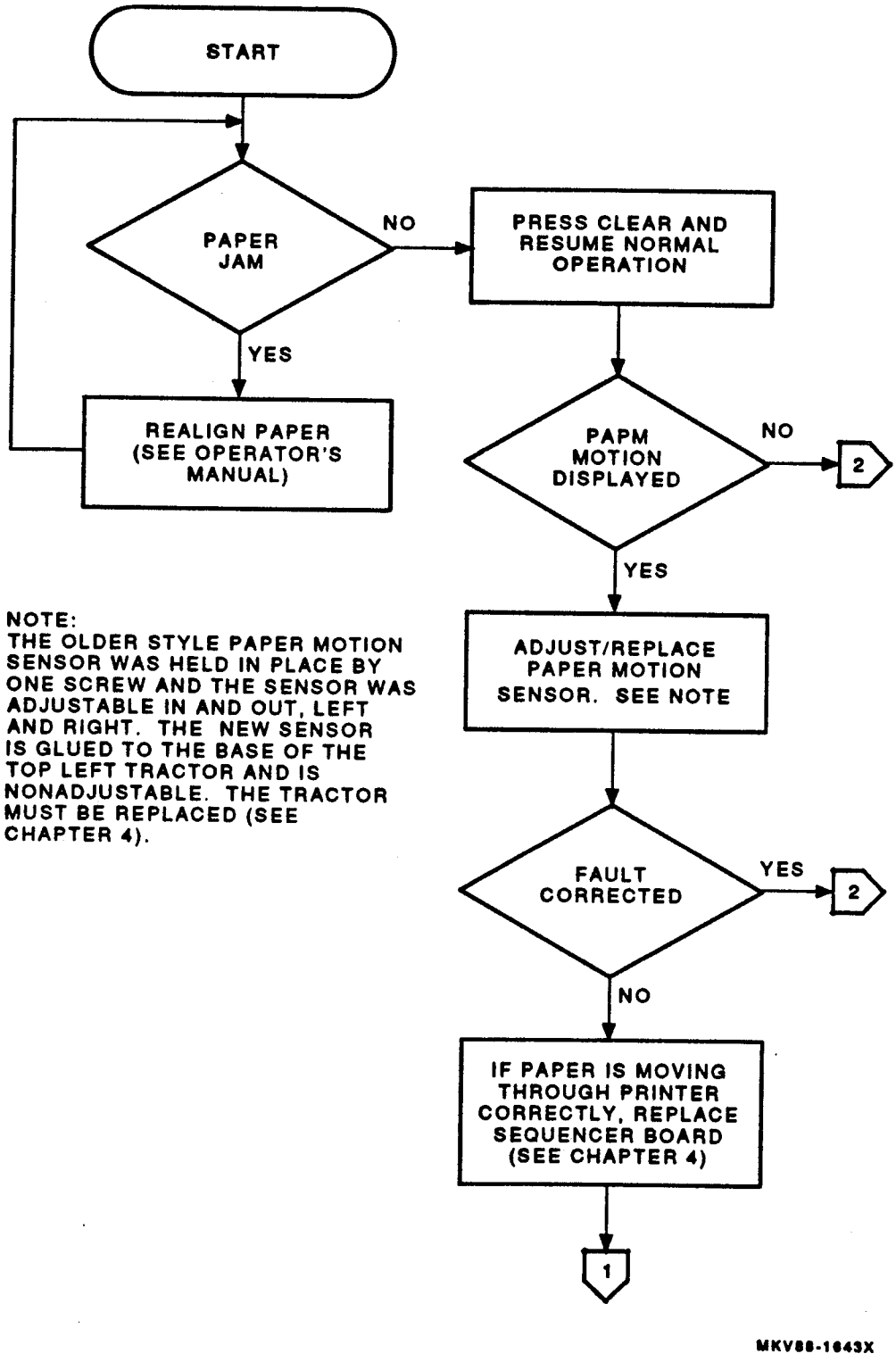


Figure 2-11 PAPM MOTION Flowchart (Sheet 1 of 3)

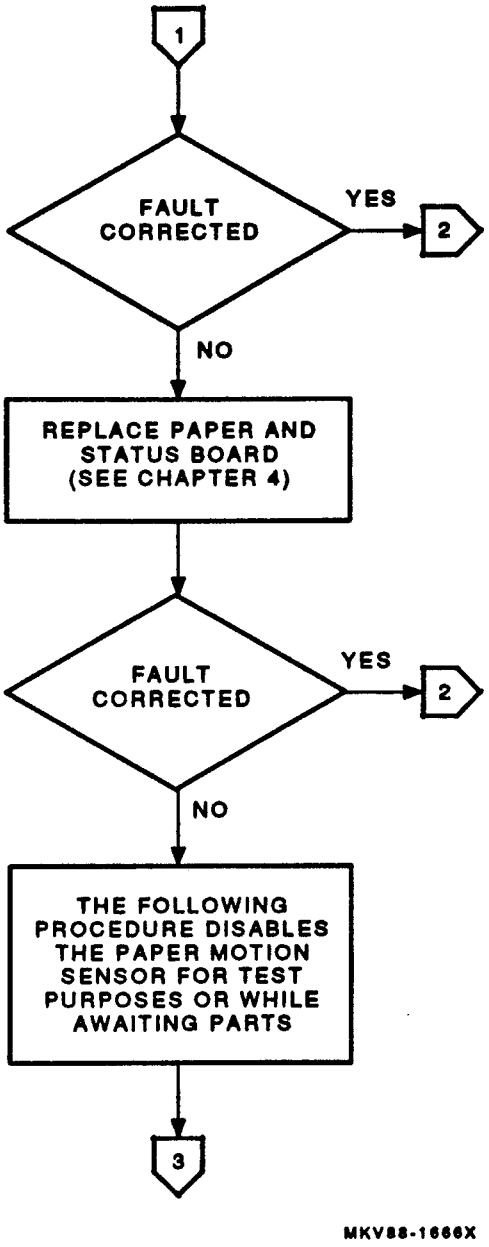


Figure 2-11 PAPM MOTION Flowchart (Sheet 2 of 3)

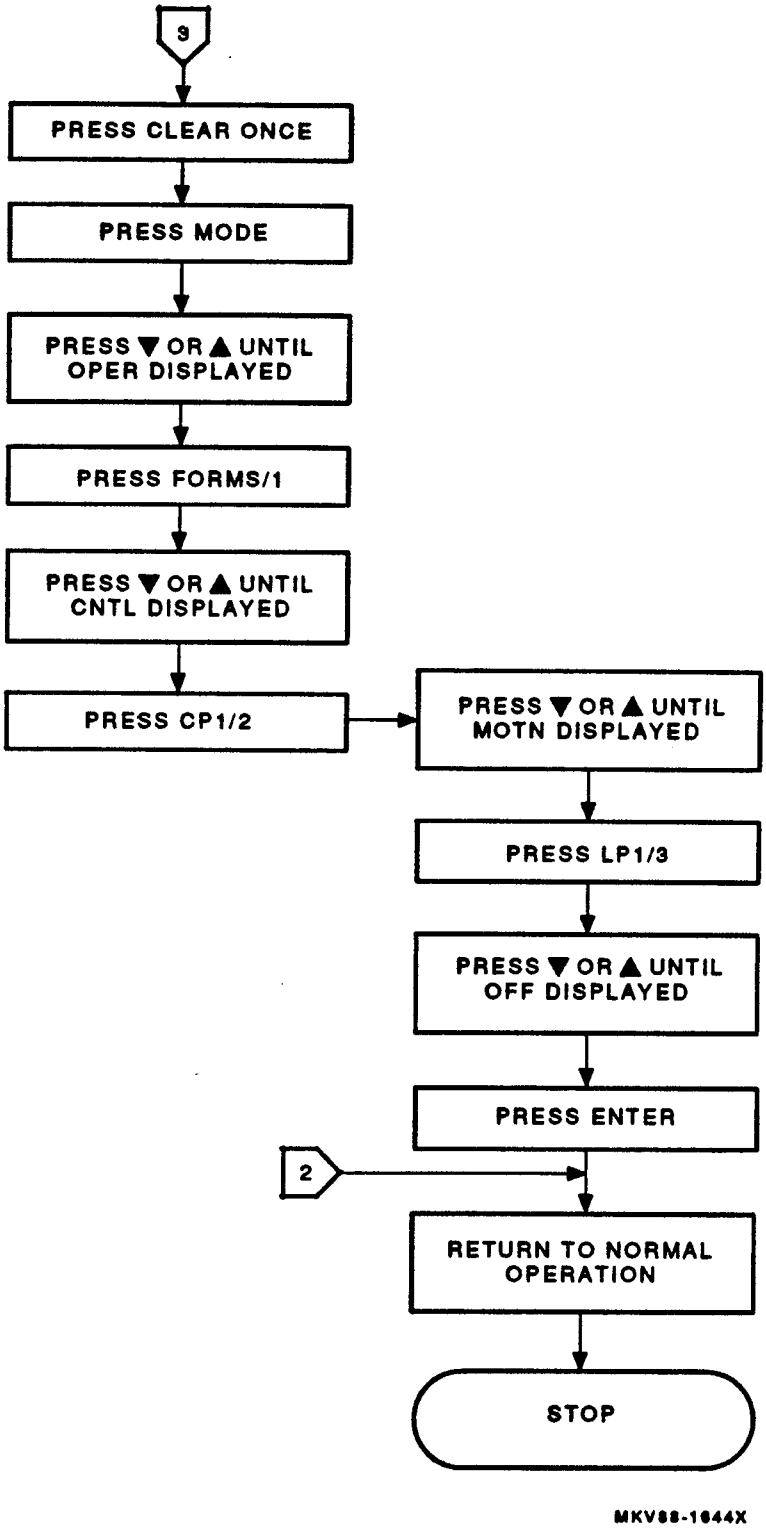


Figure 2-11 PAPM MOTION Flowchart (Sheet 3 of 3)

PROBLEM: PRER is displayed.

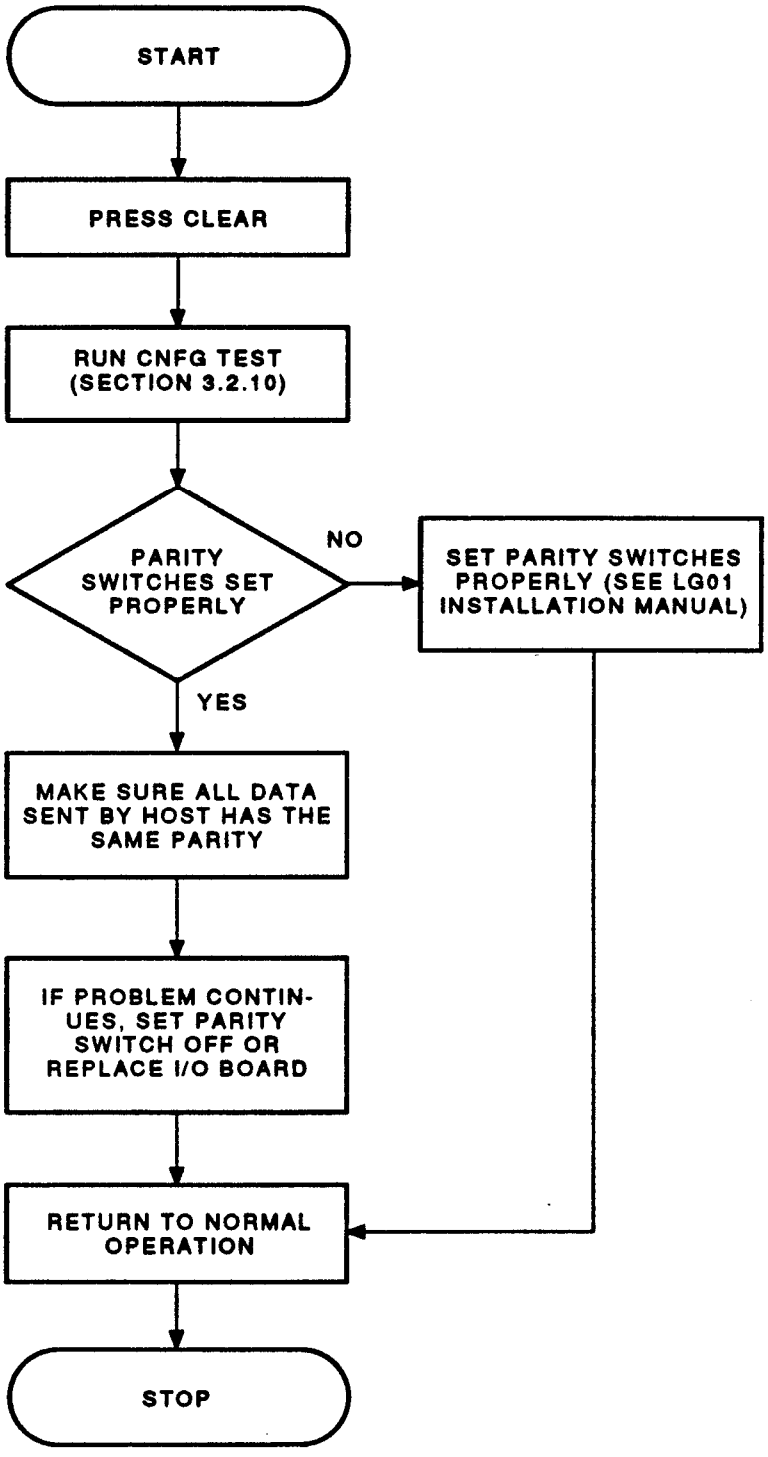


Figure 2-12 PRER Flowchart

PROBLEM: **RIBN OUT** is displayed.

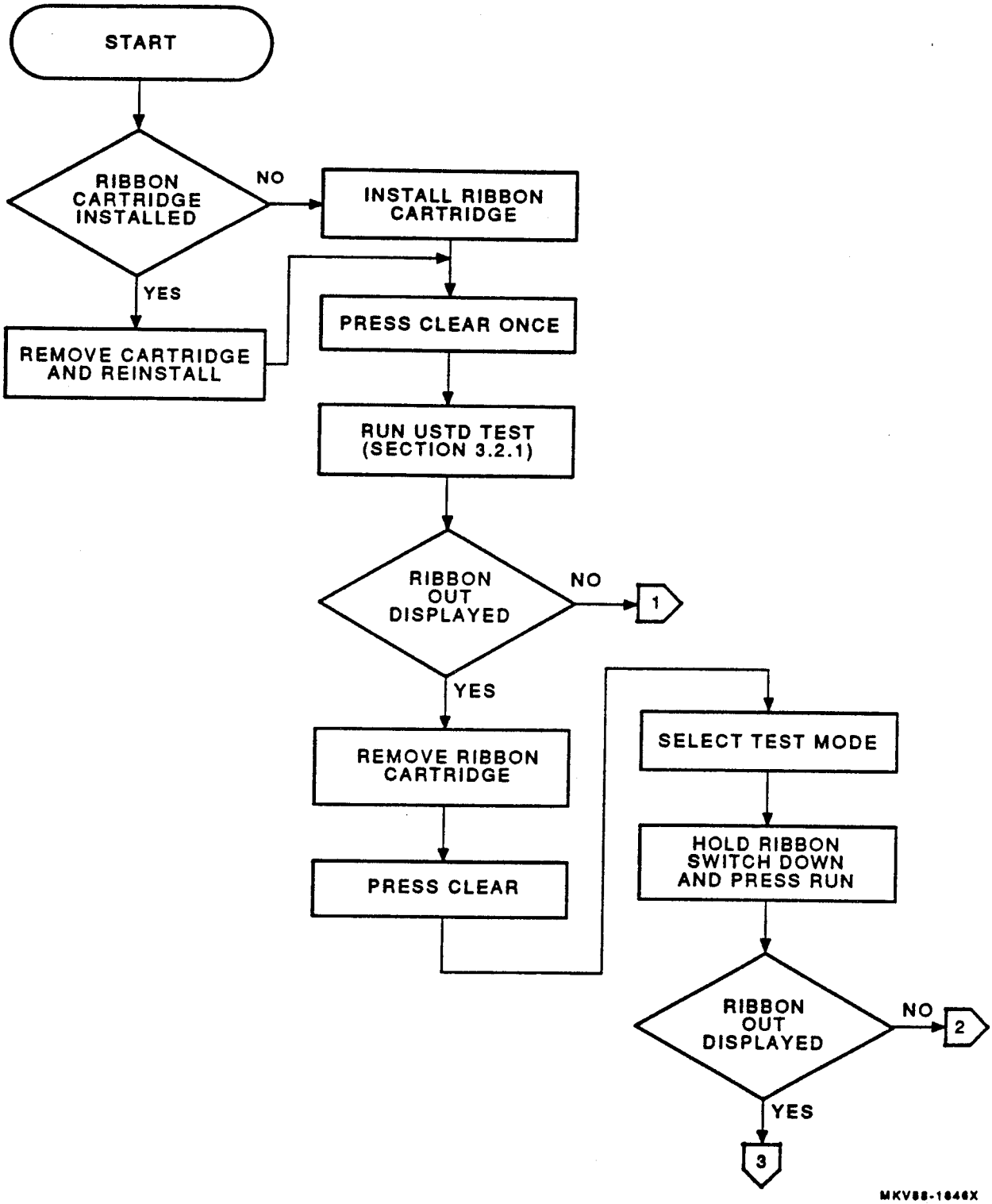


Figure 2-13 RIBN OUT Flowchart (Sheet 1 of 2)

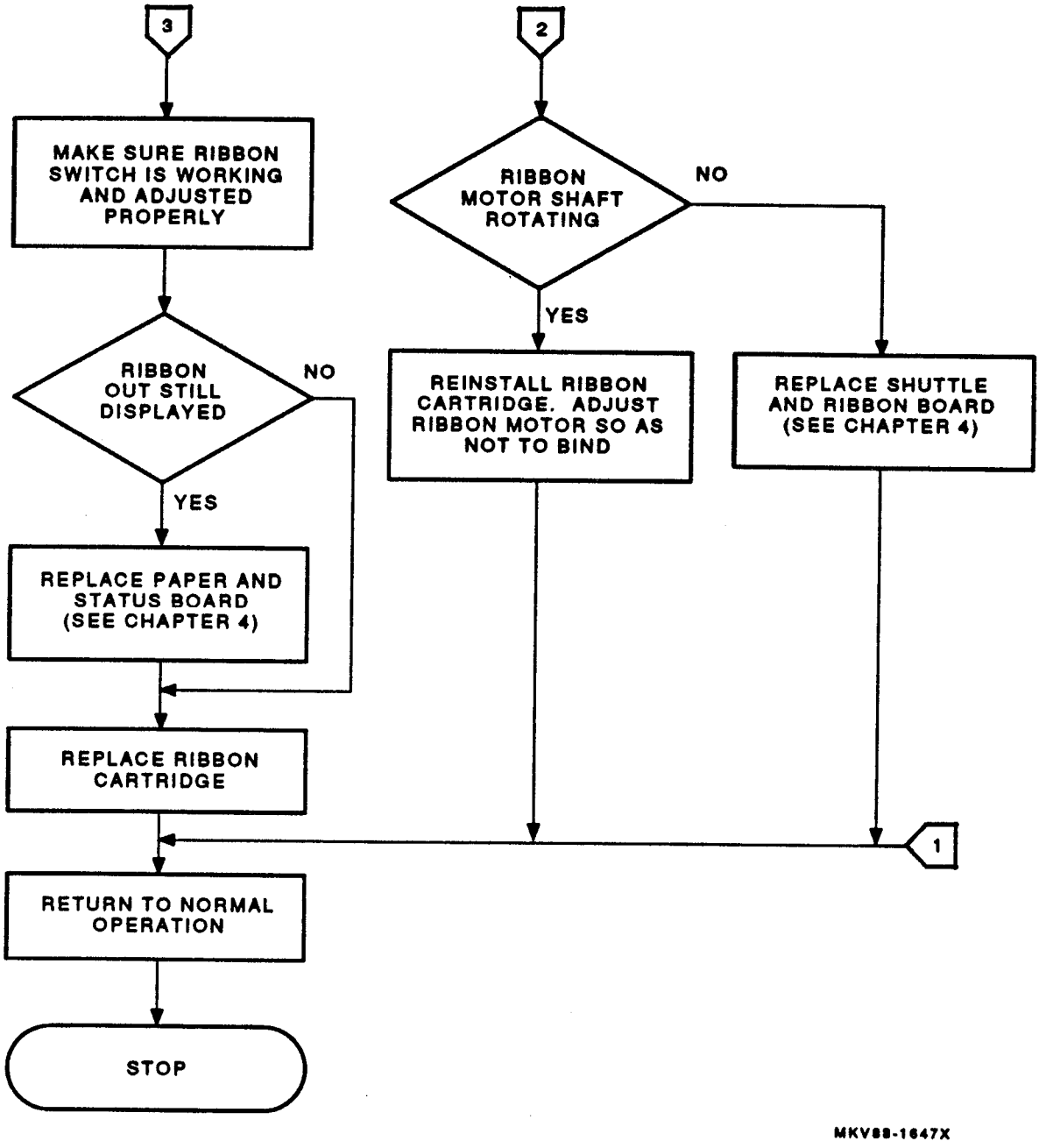


Figure 2-13 RIBN OUT Flowchart (Sheet 2 of 2)

PROBLEM: SHTL STOPPED is displayed.

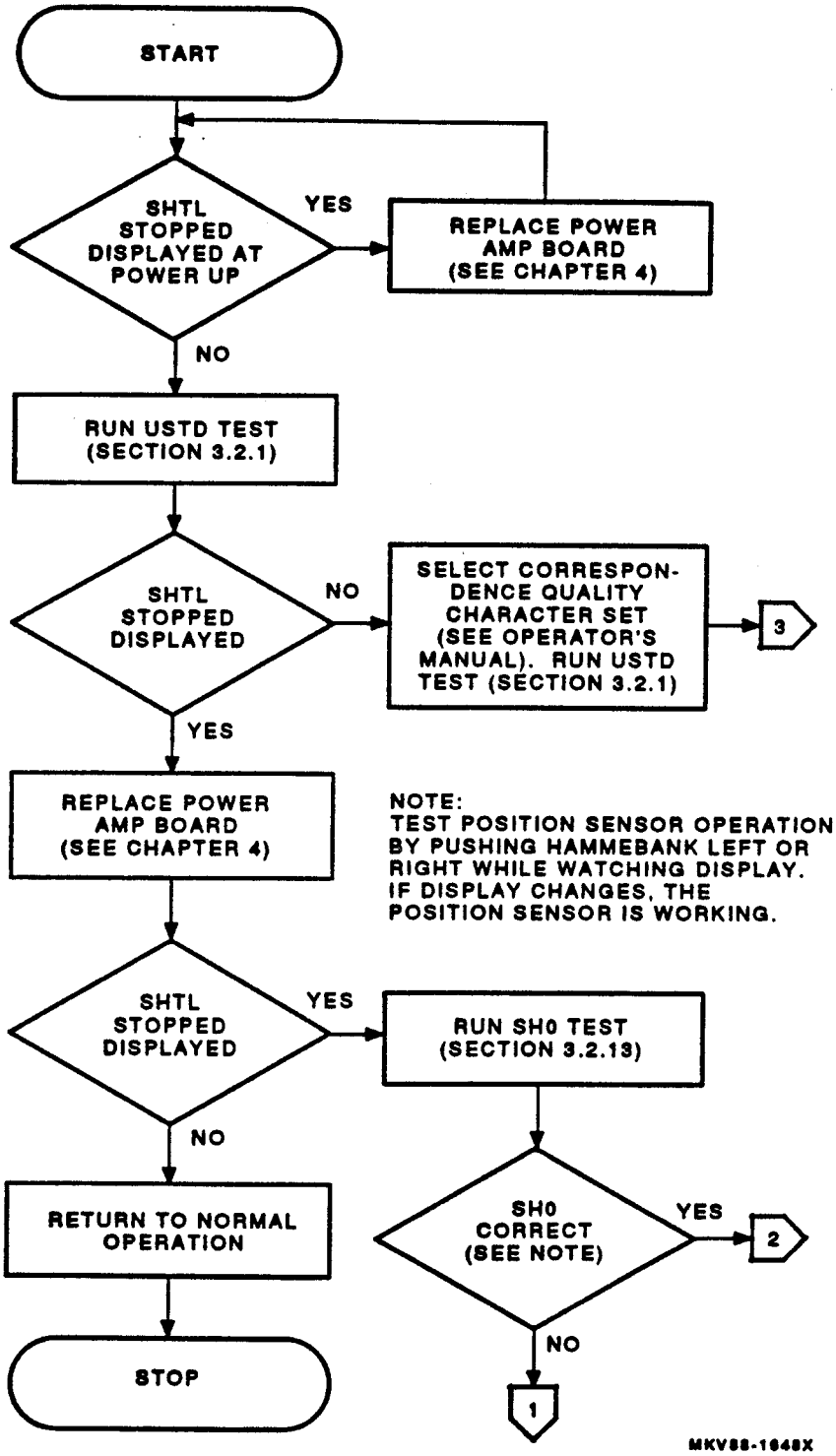


Figure 2-14 SHTL STOPPED Flowchart (Sheet 1 of 3)

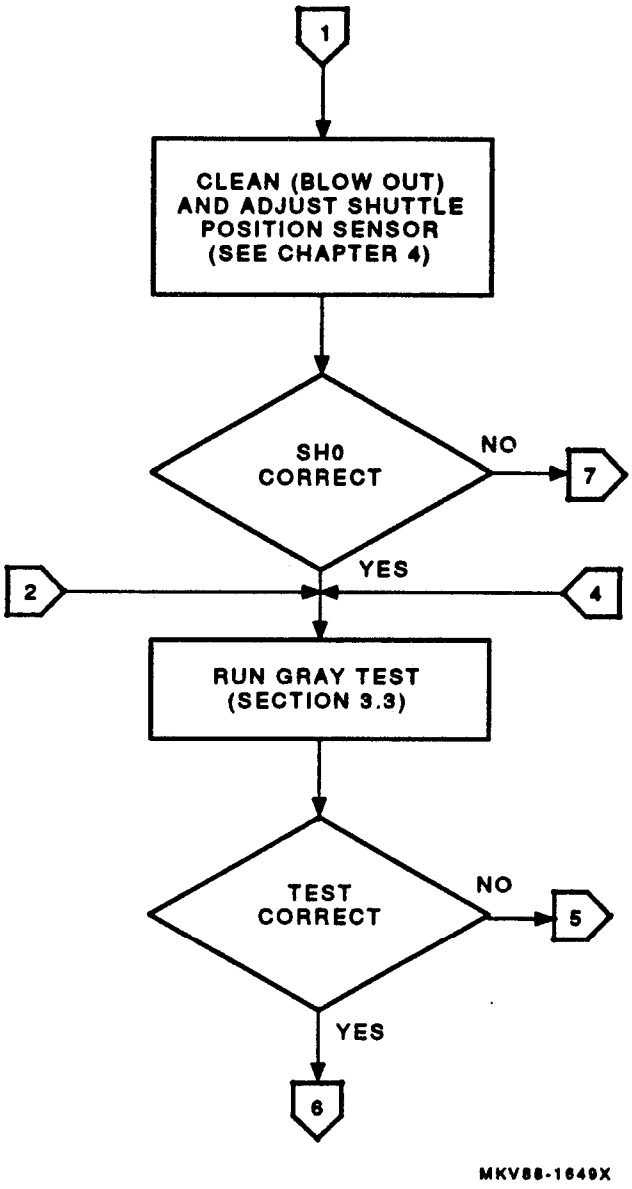


Figure 2-14 SHTL STOPPED Flowchart (Sheet 2 of 3)

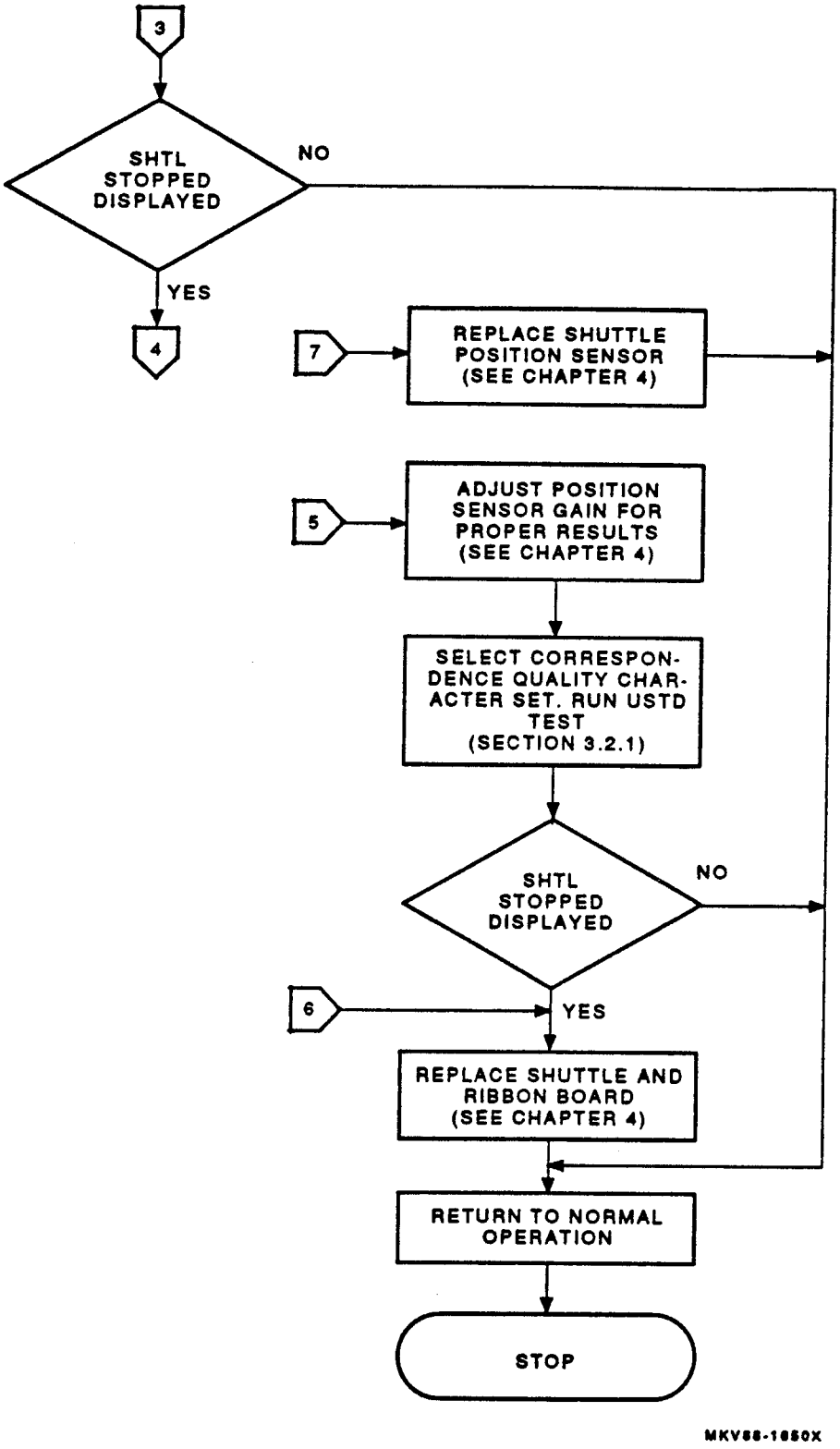


Figure 2-14 SHTL STOPPED Flowchart (Sheet 3 of 3)

PROBLEM: **STRB WHILE BUSY** is displayed.

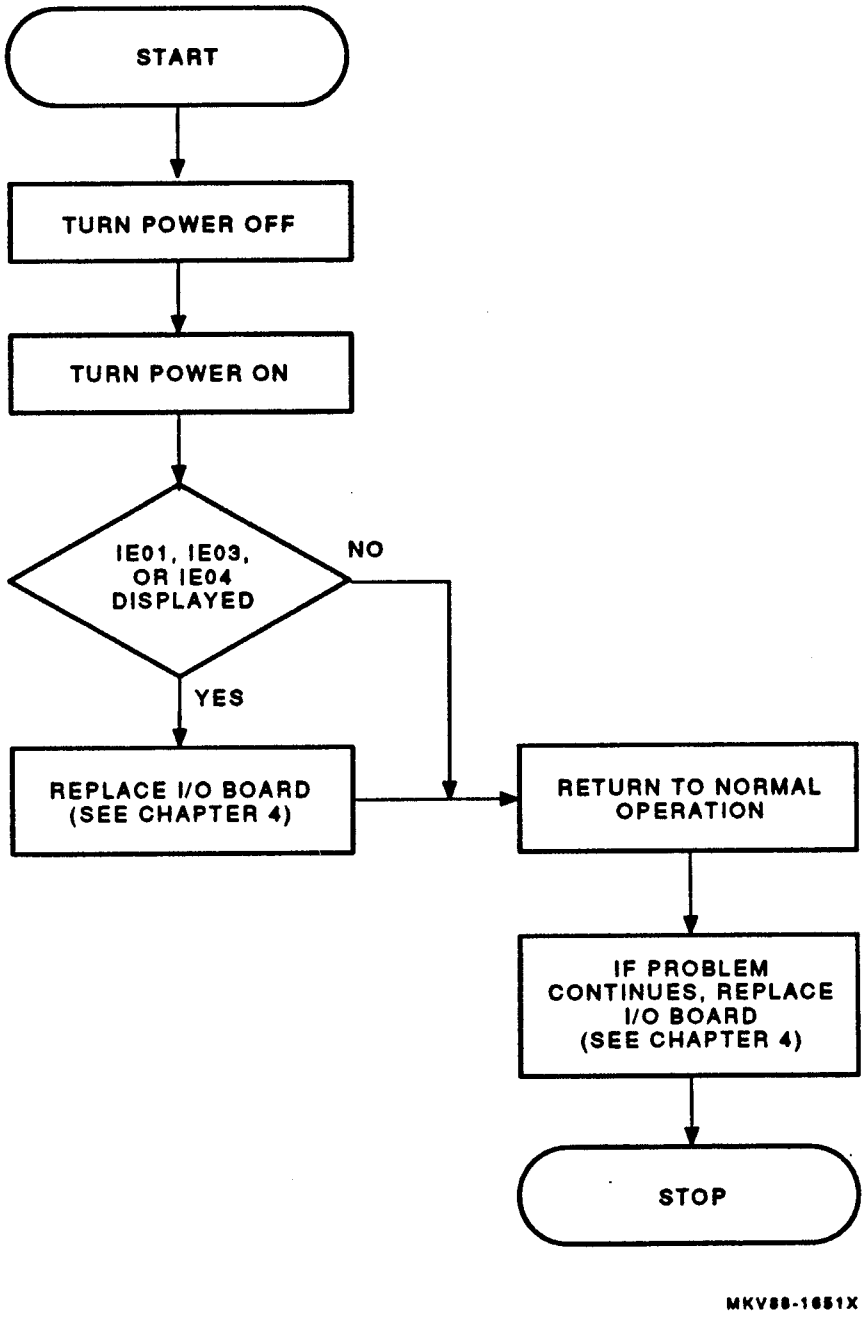


Figure 2-15 STRB WHILE BUSY Flowchart

PROBLEM: +5 VOLT HIGH is displayed.

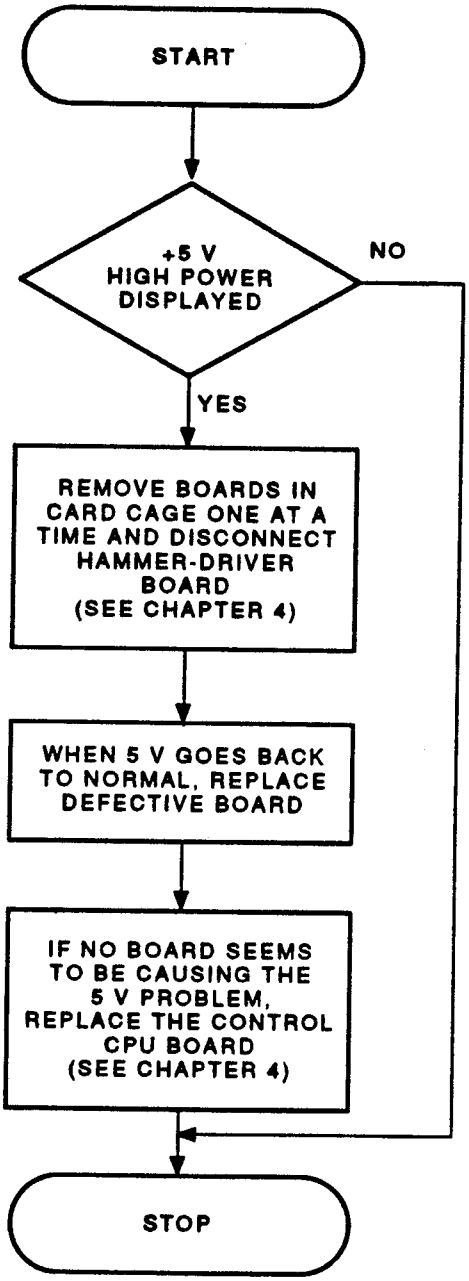


Figure 2-16 +5 VOLT HIGH Flowchart

PROBLEM: **+5 VOLT LOW** is displayed.

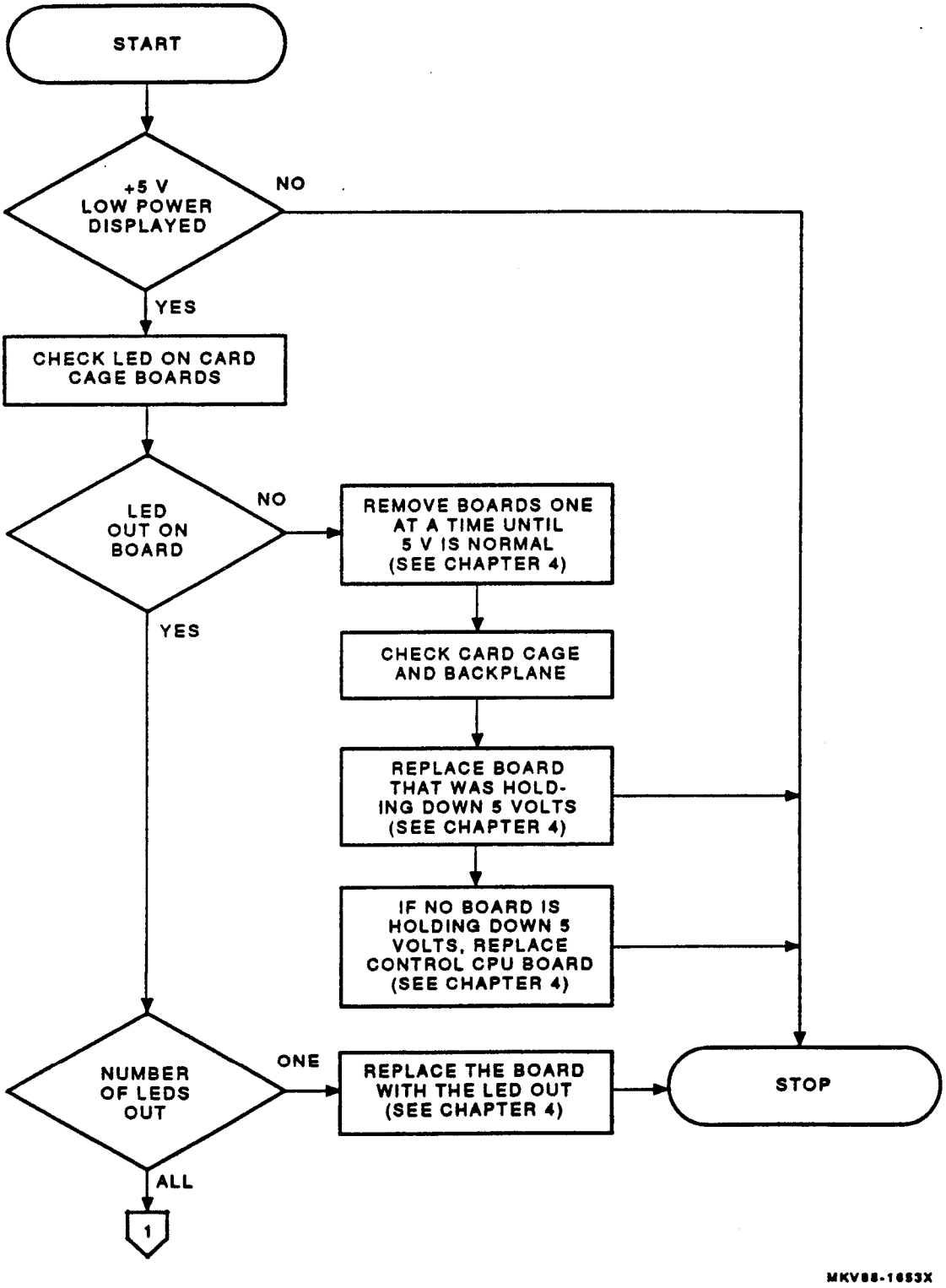


Figure 2-17 +5 VOLT LOW Flowchart (Sheet 1 of 2)

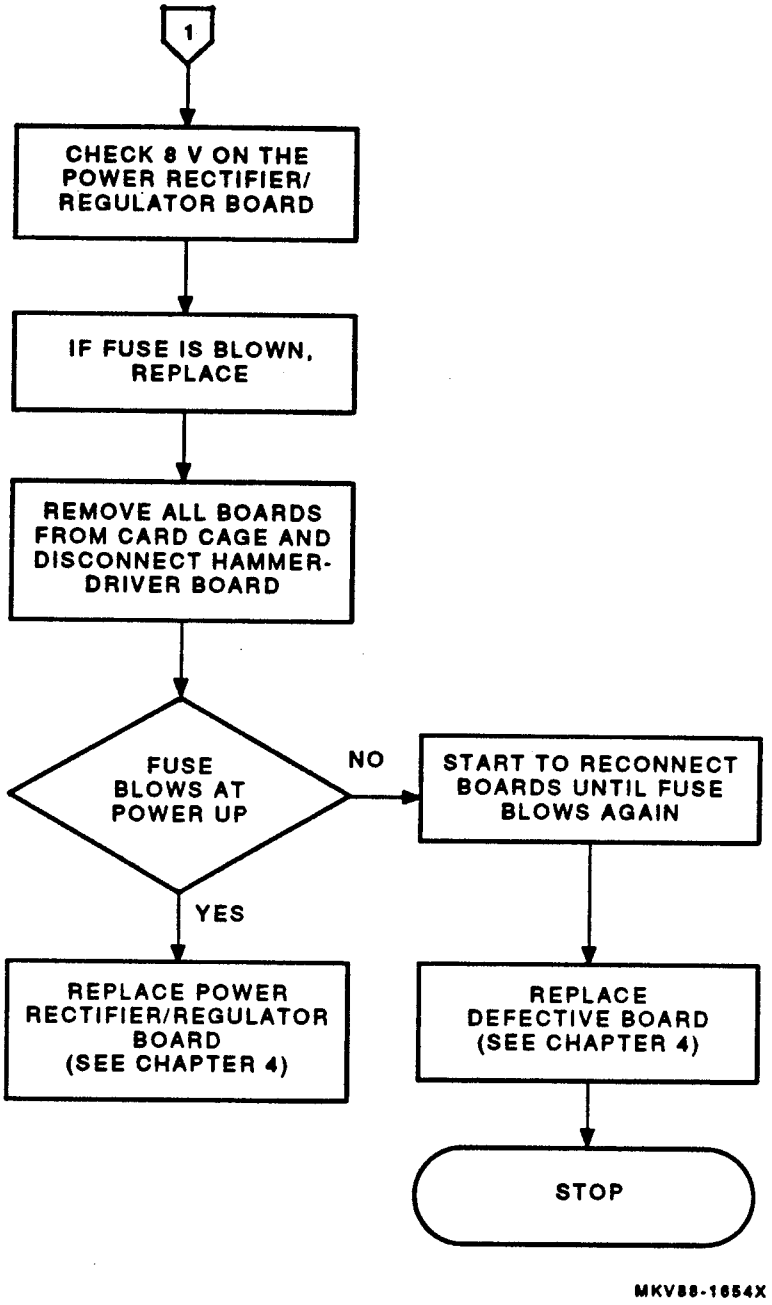


Figure 2-17 +5 VOLT LOW Flowchart (Sheet 2 of 2)

PROBLEM: +15 VOLT POWER or -15 VOLT POWER is displayed.

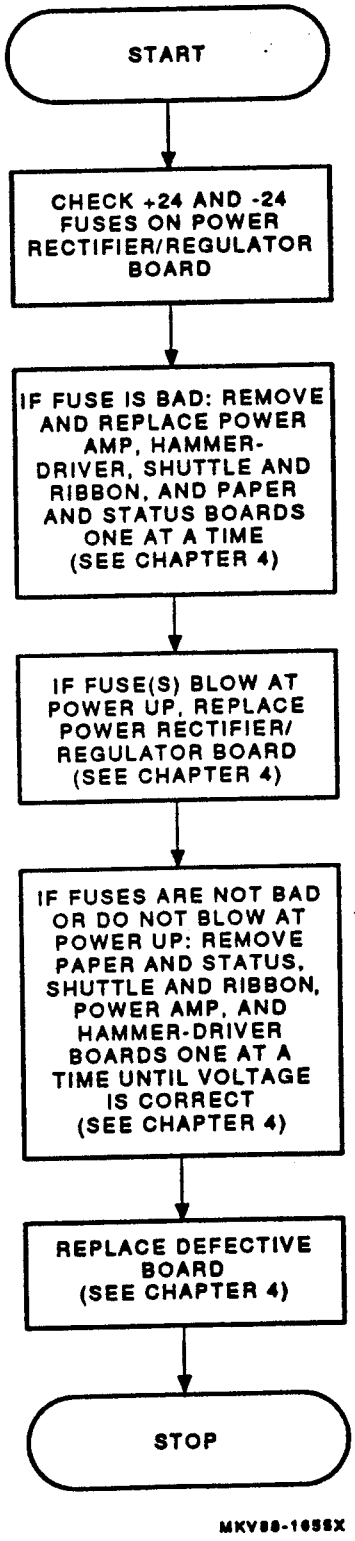


Figure 2-18 +15 VOLT POWER or -15 VOLT POWER Flowchart

PROBLEM: **+70 VOLT POWER** is displayed.

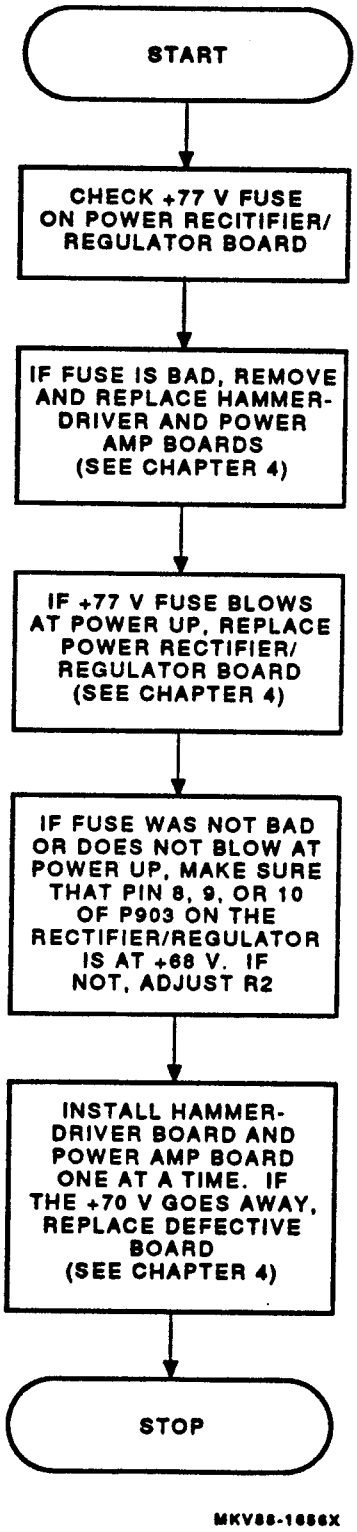


Figure 2-19 +70 VOLT POWER Flowchart

PROBLEM: Missing Print in One Area of the Page

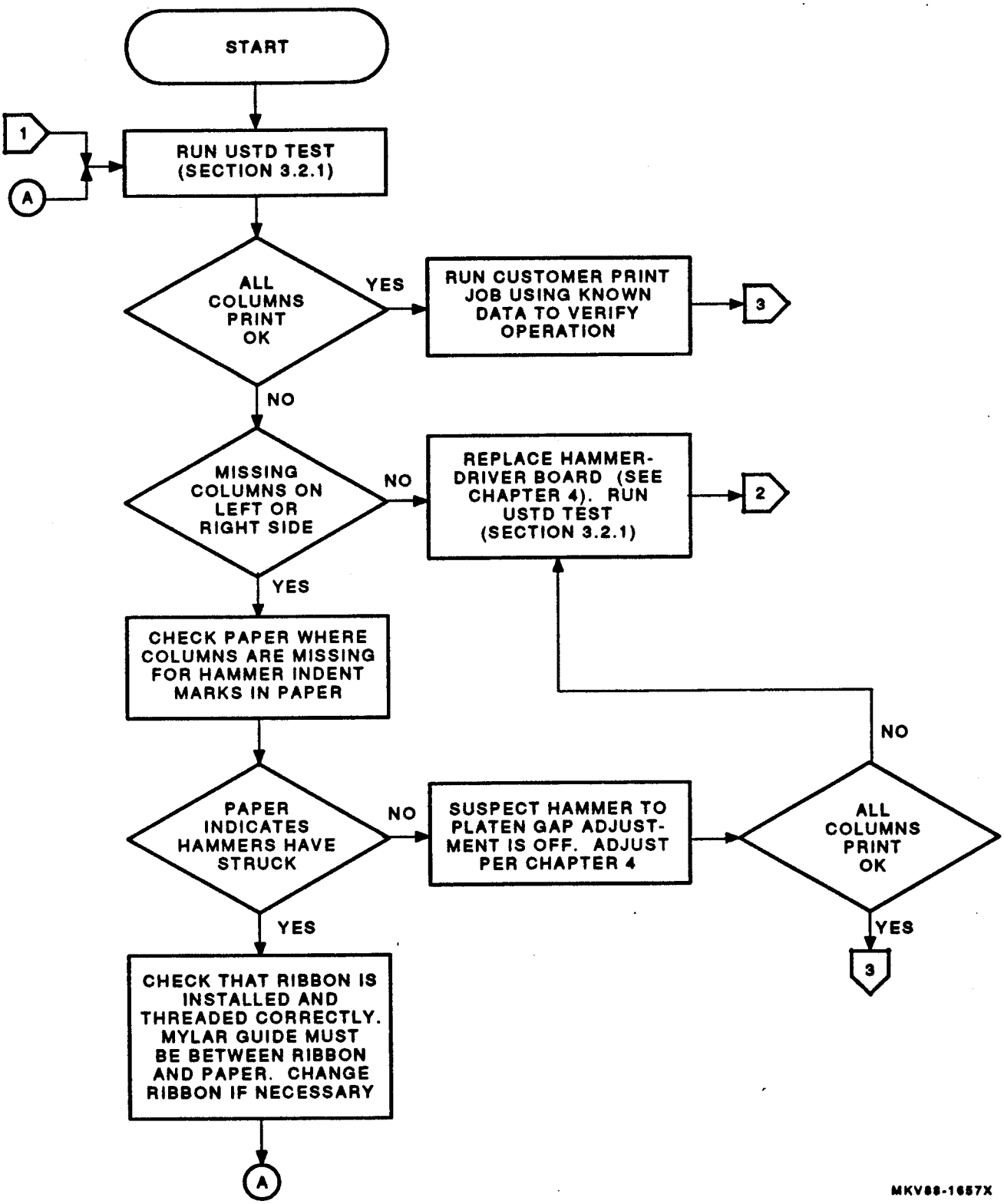


Figure 2-20 Missing Print Flowchart (Sheet 1 of 2)

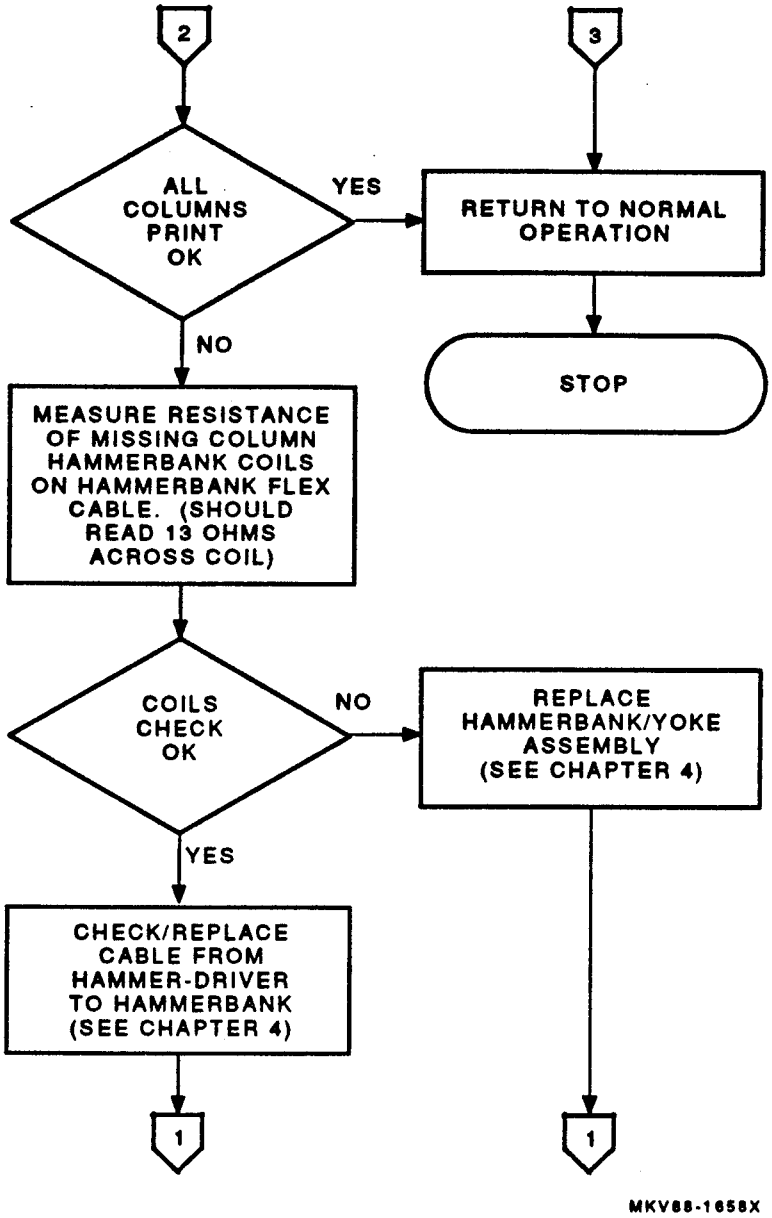


Figure 2-20 Missing Print Flowchart (Sheet 2 of 2)

PROBLEM: Some Print Lines are Compressed in Height

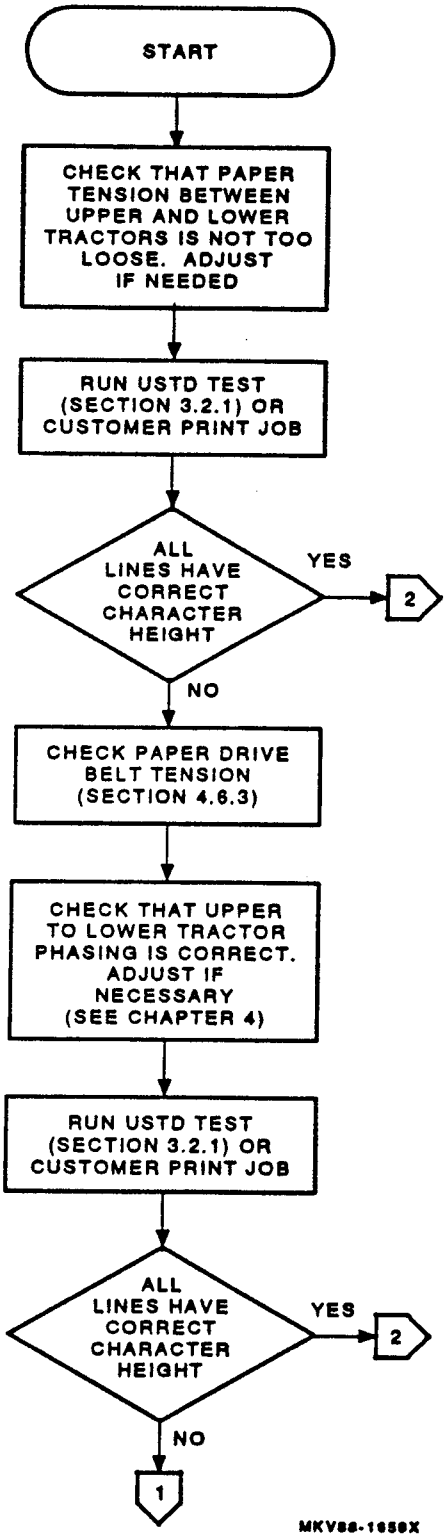


Figure 2-21 Compressed Print Flowchart (Sheet 1 of 2)

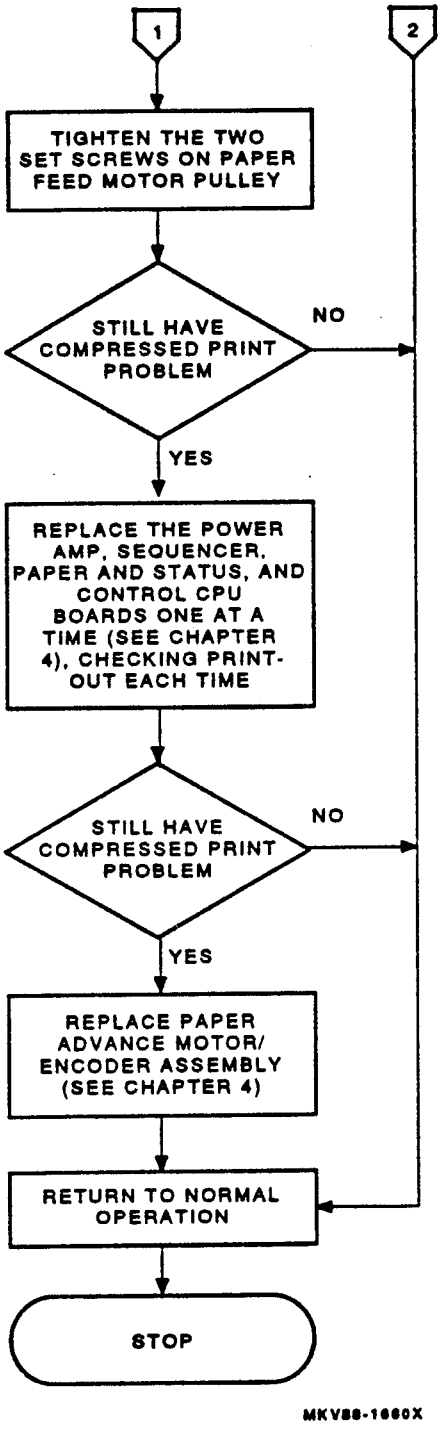


Figure 2-21 Compressed Print Flowchart (Sheet 2 of 2)

PROBLEM: Varying Gap Between Characters on a Line

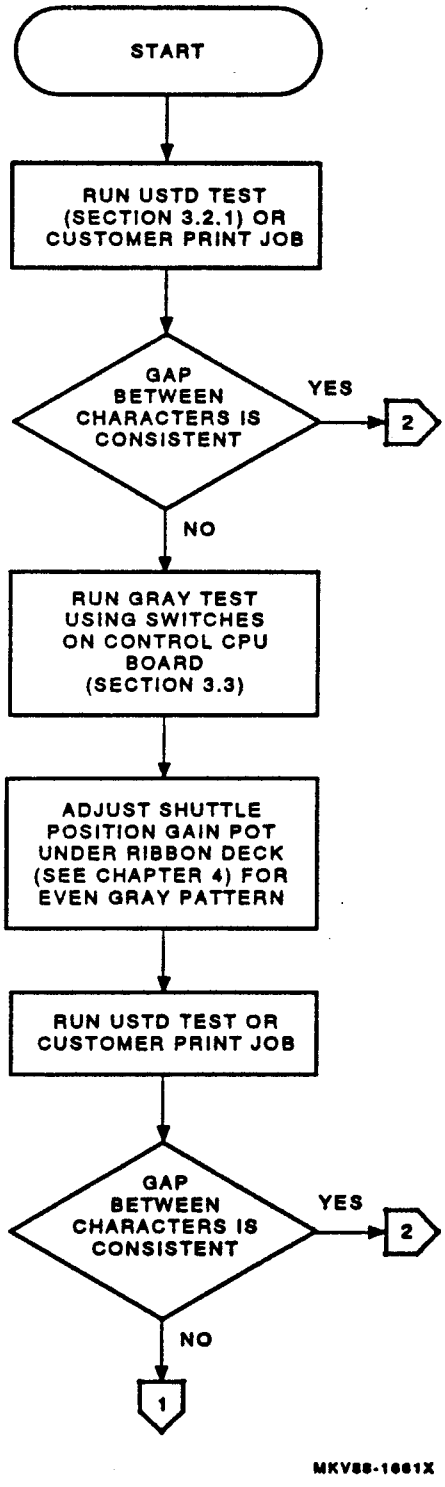


Figure 2-22 Varying Gap Between Characters Flowchart (Sheet 1 of 2)

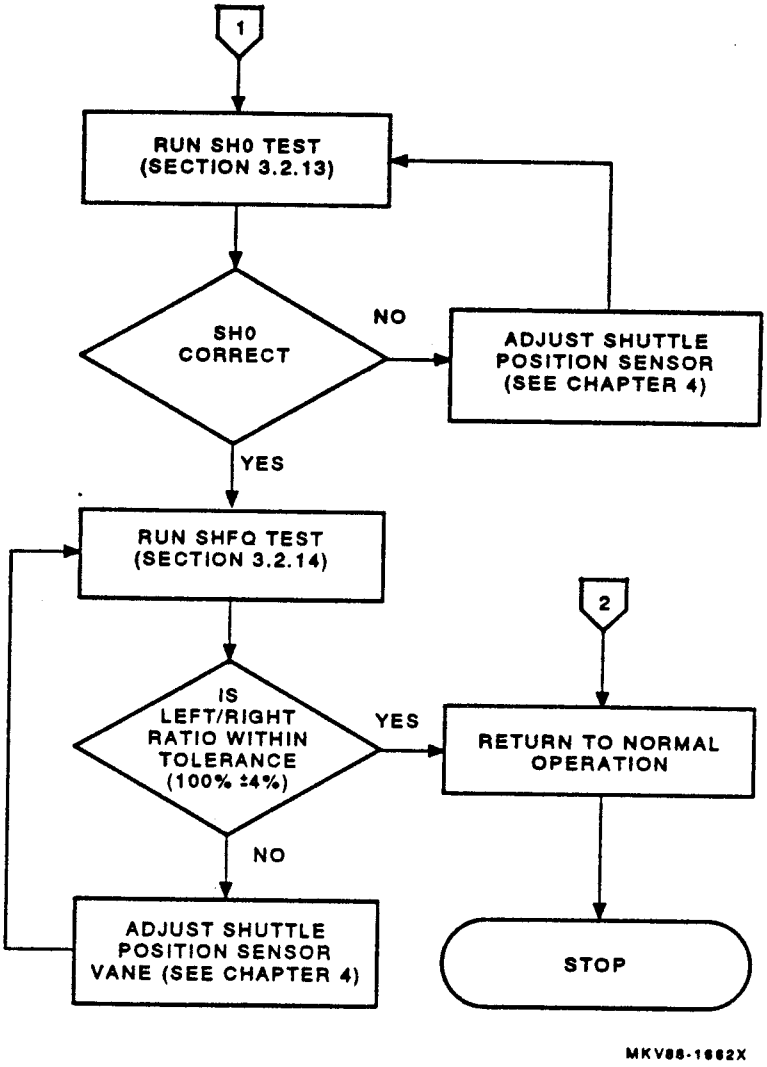


Figure 2-22 Varying Gap Between Characters Flowchart
(Sheet 2 of 2)

3.1 GENERAL

This chapter contains the procedures for running the LG01 600 LPM Text Printer diagnostic tests from the control panel. These tests are used to diagnose problems originating in the LG01 printer and problems caused by computer commands sent to the LG01 printer.

This chapter also contains the procedures for running diagnostic tests from the control CPU board if the control panel is not functioning.

3.2 CONTROL PANEL TESTS

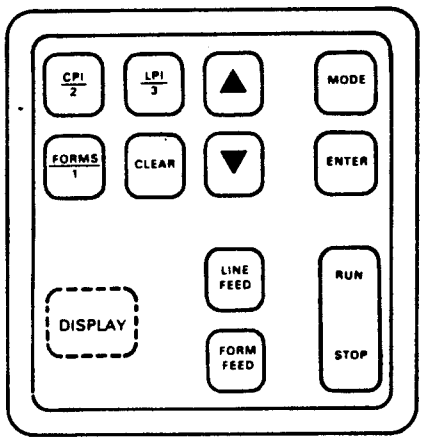
All control panel diagnostic tests are run in the TEST mode. The control panel and the keys used to select the mode, the test category, the test type within each category, and the specific test within each type are shown in Figure 3-1. This figure also contains a chart showing the two test categories, the six test types, and the eighteen specific tests that can be run from the control panel.

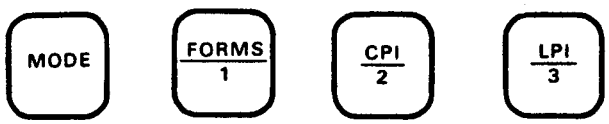
When preparing to run a control panel test, use the following procedure to enter the TEST mode.

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.

2. Press the MODE key. Then press either arrow key until TEST is displayed.

3. Refer to the specific procedures in this section for performing individual tests. This section contains the procedures for running all eighteen print and diagnostic tests.





TEST	PRINT	UPER	USTD APAP A132 63/9
		LOWR	LCST 100%
		PLOT	GRID CROS PBOX
		OPTN	CNFG CHRS MBOX
	DIAG	LOCL	SHO SHFQ SWIT INDI MOTR
		ONLN	DUMP

MKV88-1805

Figure 3-1 Control Panel, Control Keys, and Test Chart

3.2.1 Uppercase Standard Print Test (USTD)

The USTD test prints a rolling pattern of uppercase characters from the font and language currently selected. The I/O board generates this test. Figure 3-2 shows a sample printout from this test.

PROCEDURE:

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until PRNT is displayed.
4. Press the CPI/2 key, then press either arrow key until UPER is displayed.
5. Press the LPI/3 key, then press either arrow key until USTD is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. After printing several pages, press the RUN/STOP key to stop the test.
9. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.

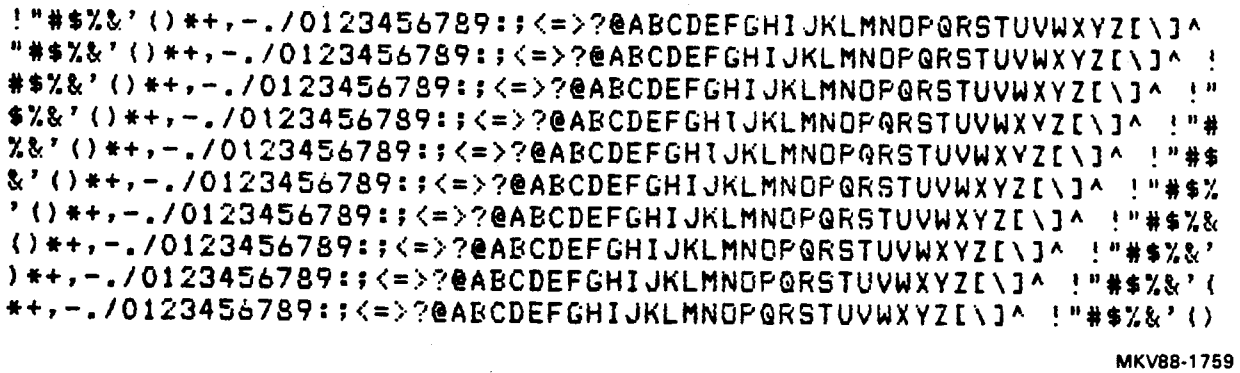


Figure 3-2 Sample Uppercase Standard Print Test Printout

3.2.2 Advance Paper and Print Test (APAP)

The APAP test checks forward and reverse paper motion. Inspect the tractor holes after running the test for elongated holes. Figure 3-3 shows a sample printout from this test.

PROCEDURE:

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until PRNT is displayed.
4. Press the CPI/2 key, then press either arrow key until UPER is displayed.
5. Press the LPI/3 key, then press either arrow key until APAP is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. After printing several pages, press the RUN/STOP key to stop the test.
9. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.

```
/0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ !"#$%&'()*+,-./01
0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ !"#$%&'()*+,-./012

-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ !"#$%&'()*+,-./
./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ !"#$%&'()*+,-./0
```

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Figure 3-3 Sample Advance Paper and Print Test Printout

3.2.3 USASCII Uppercase Print Test (A132)

The A132 test prints a rolling pattern of uppercase USASCII data-processing characters. The control CPU board generates this test. Figure 3-4 shows a sample printout from this test.

PROCEDURE:

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until PRNT is displayed.
4. Press the CPI/2 key, then press either arrow key until UPER is displayed.
5. Press the LPI/3 key, then press either arrow key until A132 is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. After printing several pages, press the RUN/STOP key to stop the test.
9. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ !"
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ !"#
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ !"#$
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ !"#$%
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ !"#$%&
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^ !"#$%&'
```

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Figure 3-4 Sample USASCII Uppercase Print Test Printout

3.2.4 63/9 Uppercase Print Test (63/9)

The 63/9 test prints a rolling pattern of uppercase USASCII data-processing characters. The control CPU board generates this test. Figure 3-5 shows a sample printout from this test.

PROCEDURE:

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until PRNT is displayed.
4. Press the CPI/2 key, then press either arrow key until UPER is displayed.
5. Press the LPI/3 key, then press either arrow key until 63/9 is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. After printing several pages, press the RUN/STOP key to stop the test.
9. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^
'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^
*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^
-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^
0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^
```

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Figure 3-5 Sample 63/9 Uppercase Print Test Printout

3.2.5 Lowercase/Uppercase Standard Print Test (LCST)

The LCST test prints uppercase/lowercase data-processing characters from the DEC multinational character set. The I/O board generates this test. To print both uppercase and lowercase, an interface board switch must be set for uppercase/lowercase printing. Figure 3-6 shows a sample printout from this test.

PROCEDURE:

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until PRNT is displayed.
4. Press the CPI/2 key, then press either arrow key until LOWR is displayed.
5. Press the LPI/3 key, then press either arrow key until LCST is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. After printing several pages, press the RUN/STOP key to stop the test.
9. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.

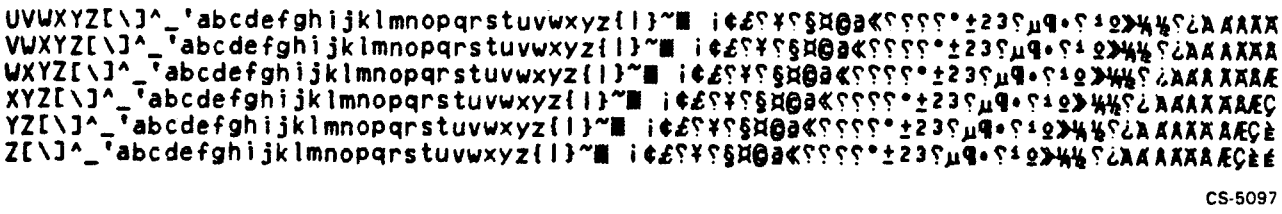

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Figure 3-6 Sample Lowercase/Uppercase Standard Print Test Printout

3.2.6 100% Uppercase/Lowercase Characters Print Test (100%)

The 100% test prints the full uppercase/lowercase USASCII data-processing character set. The control CPU board generates this test. Figure 3-7 shows a sample printout from this test.

PROCEDURE:

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until PRNT is displayed.
4. Press the CPI/2 key, then press either arrow key until LOWR is displayed.
5. Press the LPI/3 key, then press either arrow key until 100% is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. After printing several pages, press the RUN/STOP key to stop the test.
9. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.

```
  !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'a
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'ab
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abc
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcd
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcde
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdef
```

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Figure 3-7 Sample 100% Uppercase/Lowercase Characters Print Test Printout

3.2.7 Grid Plot Test (GRID)

The GRID test prints a grid pattern. It is used to check the control of paper motion. If the grid shows wavy lines, check paper motion control. Figure 3-8 shows a sample printout from this test.

PROCEDURE:

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until PRNT is displayed.
4. Press the CPI/2 key, then press either arrow key until PLOT is displayed.
5. Press the LPI/3 key, then press either arrow key until GRID is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. After printing several pages, press the RUN/STOP key to stop the test.
9. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.

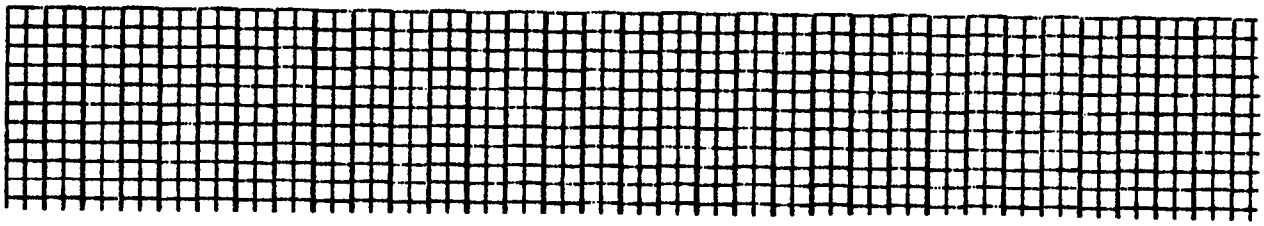

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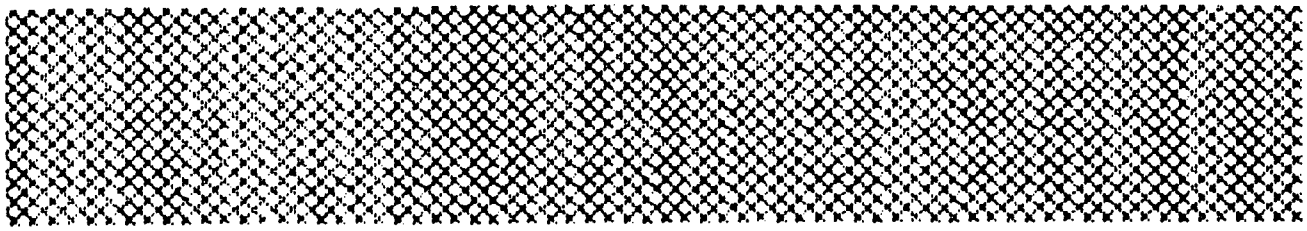
Figure 3-8 Sample Grid Plot Test Printout

3.2.8 Crosshatch Plot Test (CROS)

The CROS test tests the general LG01 printer functions. It may be used to check the alignment of a new hammer 3-pack module with the rest of the hammerbank. Figure 3-9 shows a sample printout from this test.

PROCEDURE:

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until PRNT is displayed.
4. Press the CPI/2 key, then press either arrow key until PLOT is displayed.
5. Press the LPI/3 key, then press either arrow key until CROS is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. After printing several pages, press the RUN/STOP key to stop the test.
9. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.



CS-5100

Figure 3-9 Sample Crosshatch Plot Test Printout

3.2.9 Plot Mailbox Test (PBOX)

The PBOX test plots the last line of data that was entered into the mailbox. The last line entered may be from the host computer or from a previous test. The line of data is plotted repeatedly until the test is stopped.

PROCEDURE:

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until PRNT is displayed.
4. Press the CPI/2 key, then press either arrow key until PLOT is displayed.
5. Press the LPI/3 key, then press either arrow key until PBOX is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. After printing several pages, press the RUN/STOP key to stop the test.
9. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.

If the following line from the 100% test was just printed and is in the mailbox memory, the PBOX test will print out the pattern shown in Figure 3-10.

!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLM

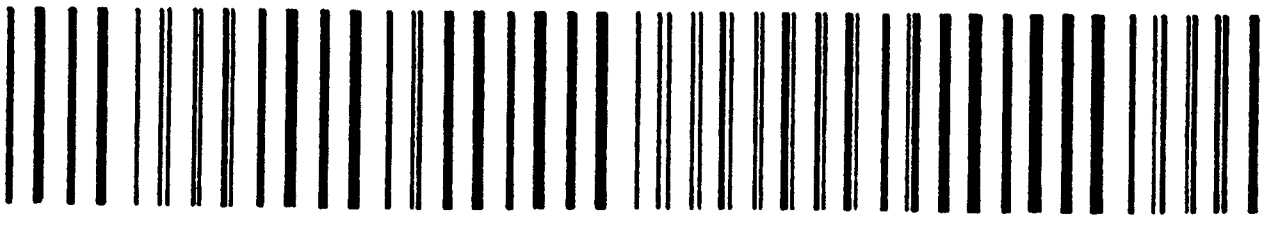


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Figure 3-10 Sample Plot Mailbox Test Printout

3.2.10 Configuration Test (CNFG)

The CNFG test lists the different parameters concerning the LG01 printer configuration, such as; character sets installed, options installed, and settings of the interface board switches. Figure 3-11 shows a configuration test printout.

PROCEDURE:

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until PRNT is displayed.
4. Press the CPI/2 key, then press either arrow key until OPTN is displayed.
5. Press the LPI/3 key, then press either arrow key until CNFG is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. After printing several pages, press the RUN/STOP key to stop the test.
9. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.

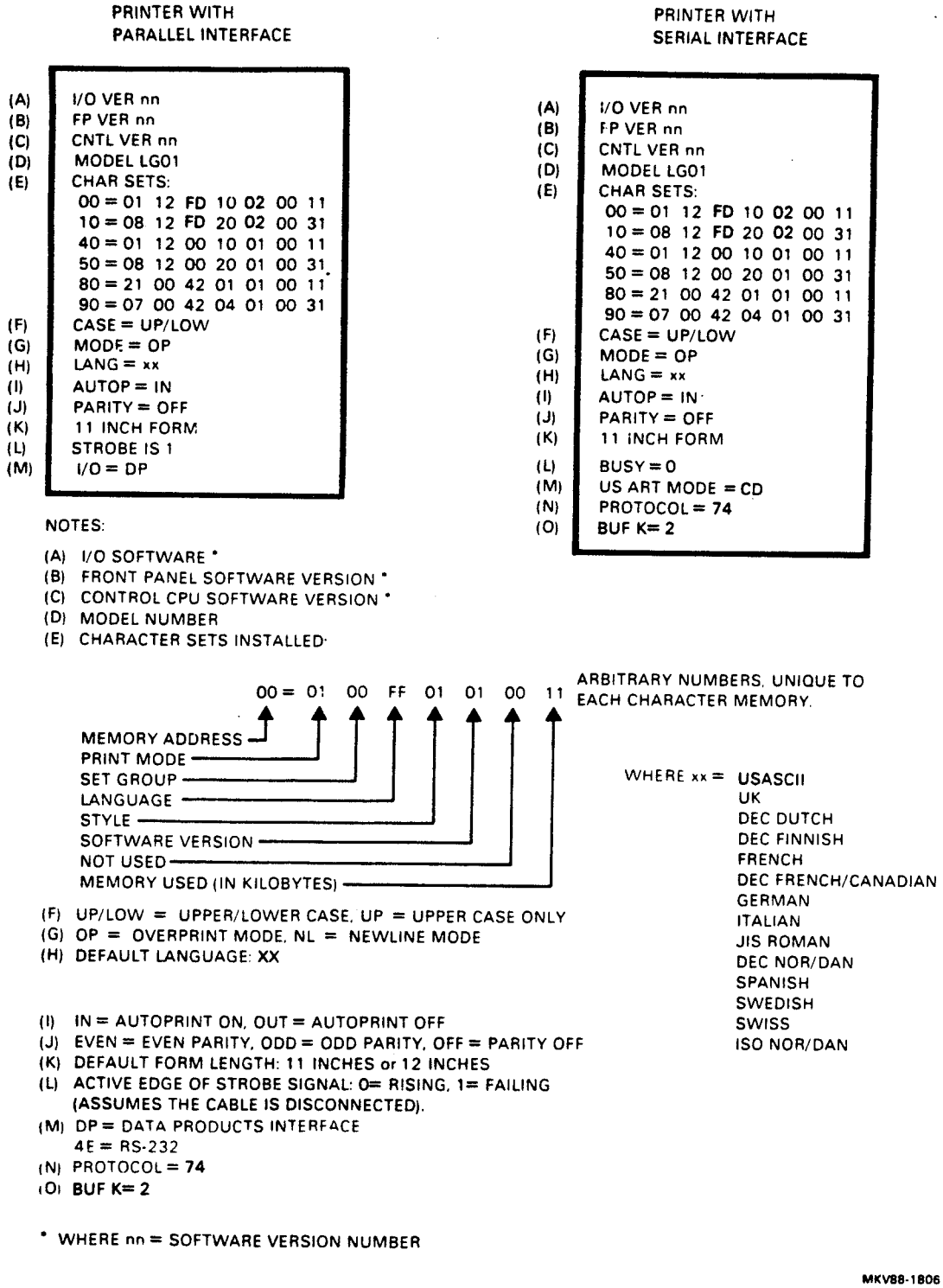

Figure 3-11 Configuration Test (Serial and Parallel I/O) Printout

3.2.11 Character Matrix Test (CHRS)

The CHRS test prints a rolling pattern of characters from the font currently selected. The characters are enlarged so the dot matrix can be clearly seen. The CHRS test is useful in checking and altering down-line loaded fonts. Figure 3-12 shows a sample printout from this test.

PROCEDURE:

1. Send a line of data to the printer from the host computer.
2. Press the RUN/STOP key. STOP is displayed.
3. Press the MODE key, then press either arrow key until TEST is displayed.
4. Press the FORMS/1 key, then press either arrow key until PRNT is displayed.
5. Press the CPI/2 key, then press either arrow key until OPTN is displayed.
6. Press the LPI/3 key, then press either arrow key until CHRS is displayed.
7. Press the ENTER key.
8. Press the RUN/STOP key to start the test.
9. After printing several pages, press the RUN/STOP key to stop the test.
10. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.

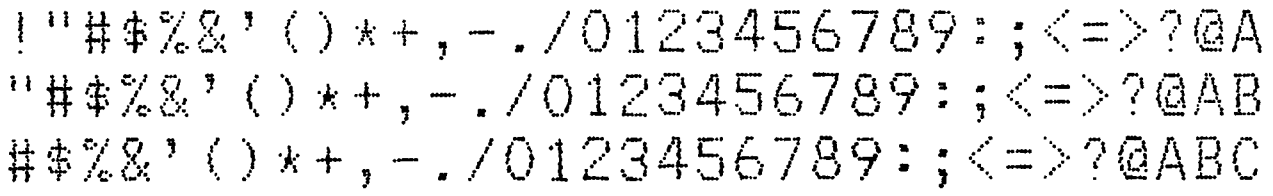

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Figure 3-12 Sample Character Matrix Test Printout

3.2.12 Mailbox Character Mode Test (MBOX)

The MBOX test prints the last line of data that was entered into the mailbox. The last line entered may be from the host computer or from a previous test. The line of data is printed repeatedly until the test is stopped. Figure 3-13 shows a sample printout from this test.

PROCEDURE:

1. Send a line of data to the printer from the host computer or run one of the print tests from the control panel.
2. Press the RUN/STOP key. STOP is displayed.
3. Press the MODE key, then press either arrow key until TEST is displayed.
4. Press the FORMS/1 key, then press either arrow key until PRNT is displayed.
5. Press the CPI/2 key, then press either arrow key until OPTN is displayed.
6. Press the LPI/3 key, then press either arrow key until MBOX is displayed.
7. Press the ENTER key.
8. Press the RUN/STOP key to start the test.
9. After printing several pages, press the RUN/STOP key to stop the test.
10. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.

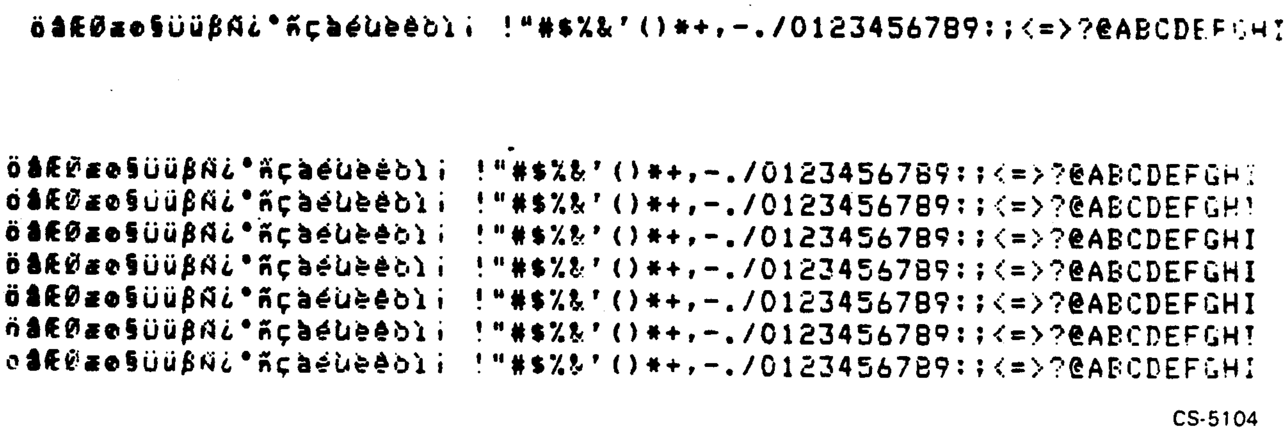


Figure 3-13 Sample Mailbox Character Mode Test Printout

3.2.13 Shuttle 0 Alignment Test (SH0)

The SH0 test is run when mechanically aligning the shuttle, or when replacing the shuttle and ribbon board.

PROCEDURE:

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until DIAG is displayed.
4. Press the CPI/2 key, then press either arrow key until LOCL is displayed.
5. Press the LPI/3 key, then press either arrow key until SH0 is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. Note the code displayed on the control panel and compare it with the values listed in Table 3-1.
9. Press the RUN/STOP key to stop the test.
10. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.

After this test runs, the control panel displays one of the values listed in Table 3-1.

Table 3-1 Shuttle 0 Alignment Test Values

Displays	Meaning
LF00, LF01, RT00, RT01	Shuttle is centered
LF02-LF99	Shuttle is to the left-of-center
RT02-RT99	Shuttle is to the right-of-center

The shuttle is aligned properly if the value displayed is LF00, LF01, RT00, or RT01. Any other value means that the shuttle position sensor mounting plate needs adjustment (see Step 15 in Section 4.9.2).

3.2.14 Shuttle Frequency Test (SHFQ)

The SHFQ test prints the following data:

- Resonant shuttle frequency (displayed on the control panel and also printed on the printout). This value should be 37.5 Hz ± 1.5 Hz.
- Damping ratio. The damping ratio reflects mechanical drag. This value should be less than 10%. If the drag is too high, check for an obstruction in the shuttle system movement.
- Left/Right ratio. The % sweep left-of-center should equal the % sweep right-of-center. Sweep % can be changed by adjusting the shuttle position sensor vane height. This left/right value should be 100% ± 4%.

A printout change in any value indicates a shuttle problem. Use this test when mechanically testing the shuttle. Figure 3-14 shows a sample printout from this test.

PROCEDURE:

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until DIAG is displayed.
4. Press the CPI/2 key, then press either arrow key until LOCL is displayed.
5. Press the LPI/3 key, then press either arrow key until SHFQ is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. Note the shuttle frequency displayed on the control panel.
9. After printing an adequate amount, press the RUN/STOP key to stop the test.
10. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.

```
Shuttle frequency is  36.8 Hz, with  06 % damping, and  96 % left/right ratio.
```

CS-5105

Figure 3-14 Sample Shuttle Frequency Test Printout

3.2.15 Switches Test (SWIT)

The SWIT test indicates if the processor is reading each control panel key when it is pressed. If the key is being read, its name is displayed on the control panel when it is pressed. If it is not being read by the processor, the name does not display. Table 3-2 contains a list of the control panel keys and their display names.

PROCEDURE:

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until DIAG is displayed.
4. Press the CPI/2 key, then press either arrow key until LOCL is displayed.
5. Press the LPI/3 key, then press either arrow key until SWIT is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. Press any control panel key to be tested and verify that the corresponding name appears in the display.
9. Press the RUN/STOP key to stop the test.
10. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.

Table 3-2 Control Panel Key Display

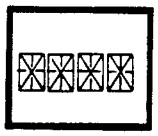
Control Panel Key	Display
FORM FEED	FF
LINE FEED	LF
FORMS/1	FORM
CPI/2	CPI
LPI/3	LPI
MODE	MODE
ENTER	ENTR
CLEAR	CLR
RUN/STOP	RUN/SWIT
UP ARROW	UP
DOWN ARROW	DOWN

3.2.16 Indicators Test (INDI)

The INDI test lights every functioning bar in the control panel display and sounds the bell. Use this test to find any nonfunctioning bars. Figure 3-15 shows the pattern when all bars light.

PROCEDURE:

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until DIAG is displayed.
4. Press the CPI/2 key, then press either arrow key until LOCL is displayed.
5. Press the LPI/3 key, then press either arrow key until INDI is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. Look at the control panel display and verify that all of the bars in the display light and the bell sounds. If any bars are not functioning, they will not light and the bell will not sound.
9. Press the RUN/STOP key to stop the test.
10. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.



CS-5106

Figure 3-15 Indicator Test Bar Pattern

3.2.17 Motors Test (MOTR)

The MOTR test is used in troubleshooting motor problems.

PROCEDURE:

1. If the printer is in the RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until DIAG is displayed.
4. Press the CPI/2 key, then press either arrow key until LOCL is displayed.
5. Press the LPI/3 key, then press either arrow key until MOTR is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. If all of the motors are running, the paper will advance, the ribbon will advance, and the shuttle will move.
9. Press the RUN/STOP key to stop the test.
10. To exit TEST mode, press the MODE key, then press either arrow key until NORM is displayed.

3.2.18 Remote File Dump (DUMP)

The DUMP test is a debugging tool. It dumps all data characters, control codes, and escape sequences as they come from a remote file. In the printout created by this test:

- Data characters are printed as ASCII codes.
- Control codes are printed as hexadecimal codes enclosed in angle brackets (or other codes depending on the selected language). For example, the <CR> code is printed as <0D> and the <ESC>c escape sequence is printed as <1B>c.

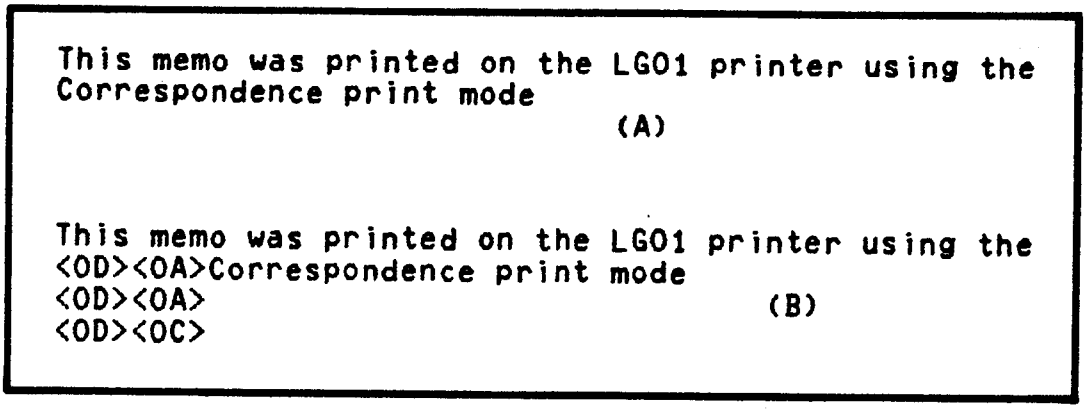
PROCEDURE:

1. If the printer is in the *RUN state, press the RUN/STOP key. STOP is displayed.
2. Press the MODE key, then press either arrow key until TEST is displayed.
3. Press the FORMS/1 key, then press either arrow key until DIAG is displayed.
4. Press the CPI/2 key, then press either arrow key until ONLN is displayed.
5. Press the LPI/3 key, then press either arrow key until DUMP is displayed.
6. Press the ENTER key.
7. Press the RUN/STOP key to start the test.
8. After data is received from the host, press the RUN/STOP key to stop the test.
9. Press the CLEAR key, then press either arrow key until CLER is displayed.
10. Press the ENTER key.

Figure 3-16 shows a remote file dump printout in two parts.

Part A Printout of a file sent to the LG01 printer from the host computer.

Part B Sample dump of that file.



CS-5107

Figure 3-16 Sample Remote File Dump Printout

3.3 CONTROL CPU BOARD TESTS

If the control panel is not working and the control panel tests cannot be run, there are alternate tests that can be run from the control CPU board. If these tests run successfully while the control panel does not work, either the control panel board or the interface board is probably faulty. These tests are run by setting switches on the lower-right corner of the CPU board (Figure 3-17). The tests run as soon as the printer is powered up.

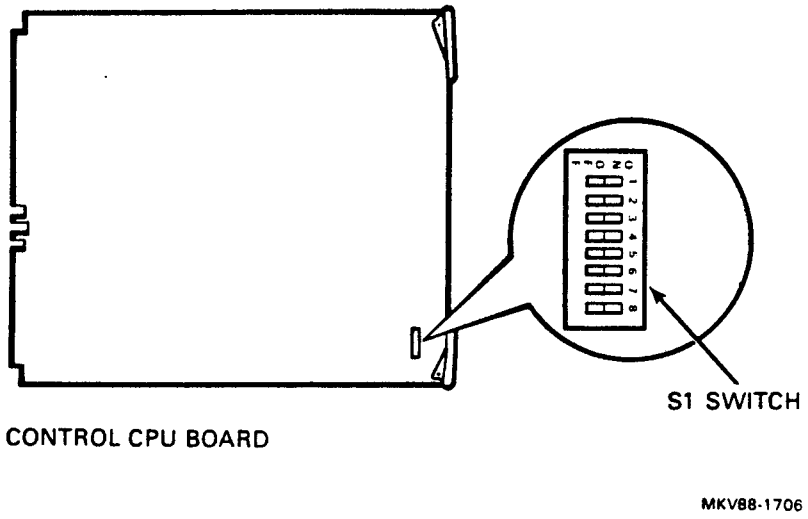


Figure 3-17 Control CPU Board Switch Location

PROCEDURE:

1. Remove the rear panel from the printer (Section 4.3.7).
2. Set the switches in positions 1, 2, and 3 on switch S1 to OFF.
3. Refer to Table 3-3 and select the specific test by setting the switches in positions 4 and 5 to the indicated position.
4. Refer to Table 3-4 and select the testing mode by setting the switches in positions 6 and 7 to the indicated position.
5. To start the test, set the switch in position 8 to ON.
6. When testing is finished, set the switch in position 8 back to OFF.

Table 3-3 Test Selection Switch Settings

Switch S1 Switch 4	Position 5	Switch Position 6 OFF 7 OFF Print Mode	Switch Position 6 ON 7 OFF Plot Mode	Switch Position 6 ON 7 ON Extended Mode
OFF	OFF	Character Mode Test Pattern (same as MBOX test -- see Figure 3-13)	Plot Mode Test Pattern (same as PBOX test -- see Figure 3-10)	Shuttle Alignment (same as SH0 test -- see Section 3.2.13)
ON	OFF	USASCII Upper-case Print Test (same as A132 test -- see Figure 3-4)	Grid Plot Test (same as GRID test -- see Figure 3-8)	Shuttle Frequency Test (same as SHFQ test -- see Figure 3-14)
OFF	ON	100% Uppercase/ lowercase Print Test (same as 100% test -- see Figure 3-7)	Gray Test (prints solid gray pattern)	Not used
ON	ON	63/9 Uppercase Print Test (same as 63/9 test -- see Figure 3-5)	Pattern (same as CROS test -- see Figure 3-9)	Not used

Table 3-4 Mode Selection Switch Settings

Switch S1 Switch 6	Position 7	Mode Selection
OFF	OFF	Print Mode
ON	OFF	Plot Mode
OFF	ON	Not Used
ON	ON	Extended Mode

CHAPTER 4
MECHANICAL DISASSEMBLY/ASSEMBLY

4.1 INTRODUCTION

This chapter contains the removal and replacement procedures for the LG01 Field Replaceable Units (FRUs).

4.2 REMOVAL AND REPLACEMENT PROCEDURES

Some of the FRUs in the LG01 printer cannot be removed without first removing other assemblies. The removal instructions in this chapter are arranged in sequential order of full disassembly.

Instructions that refer to "left", "right", "front", or "rear" are in relationship to viewing the printer from the front, looking toward the rear of the printer.

The following is a list of special tools required for disassembly and reassembly of the LG01 printer.

- Tension spring gauge
- Gauge kit (P/N 29-25551) consisting of:
  - -- Sensor shim gauge
  - -- Linear motor shim gauge (three required)
  - -- Linear motor spacer block (two required)
  - -- Platen gap gauge (left)
  - -- Platen gap gauge (right)
  - -- Tractor phasing gauge
  - -- 0.017 feeler gauge
  - -- Paper tension eccentric wrench
  - -- Tractor pulley retainer tool

4.3 LG01 OUTER COVERS

The outer covers of the LG01 600 LPM Text Printer (Figure 4-1) include:

- A lid mounted to the top cover
- A top cover
- A front door
- A rear panel
- A left-side panel
- A right-side panel

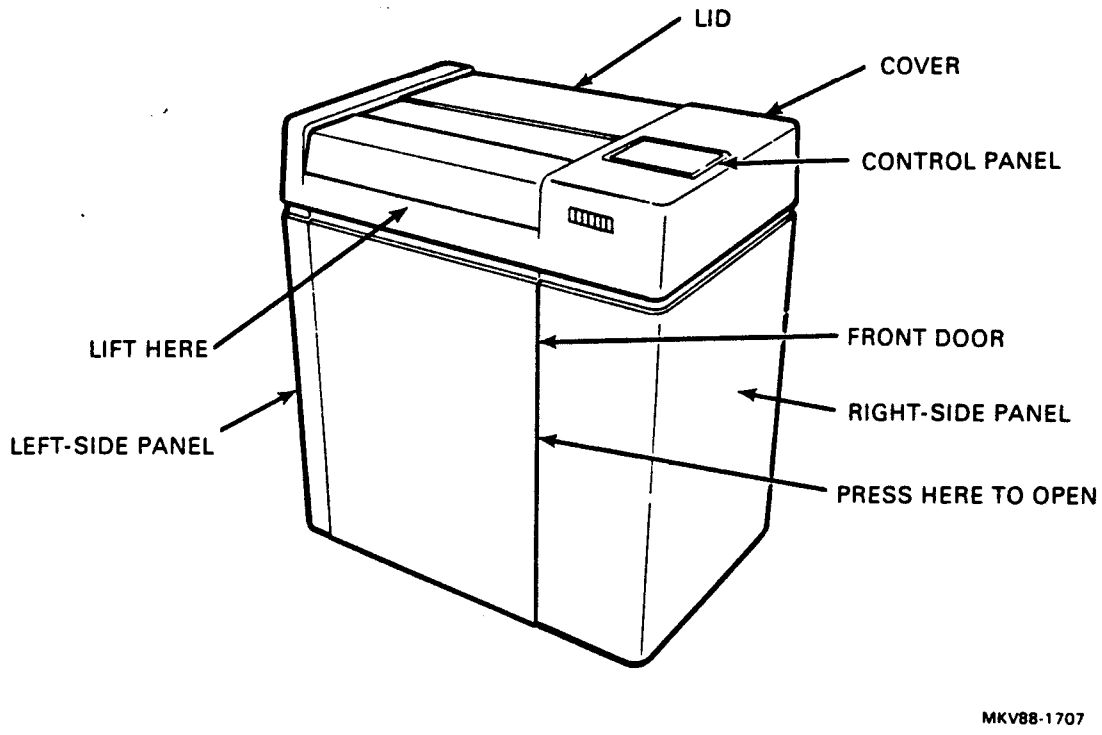


Figure 4-1 LG01 Line Printer Outer Covers

4.3.1 Removing the Lid

Use the following procedure to remove the printer lid.

1. Open the lid to its upper limit (Figure 4-2). The lid will stay open in this vertical position.

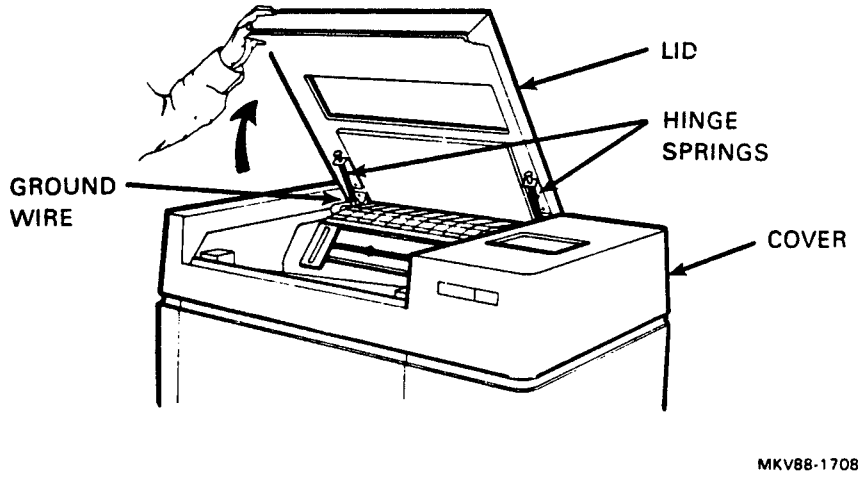


Figure 4-2 LG01 with Lid Raised

2. While holding the lid in its open position, pull down on each hinge spring and pull each spring foot forward from its bracket (Figure 4-3).

3. Remove the screw and hinge guard plate from each hinge guard, and lift the lid off of the hinge pins (Figure 4-3).

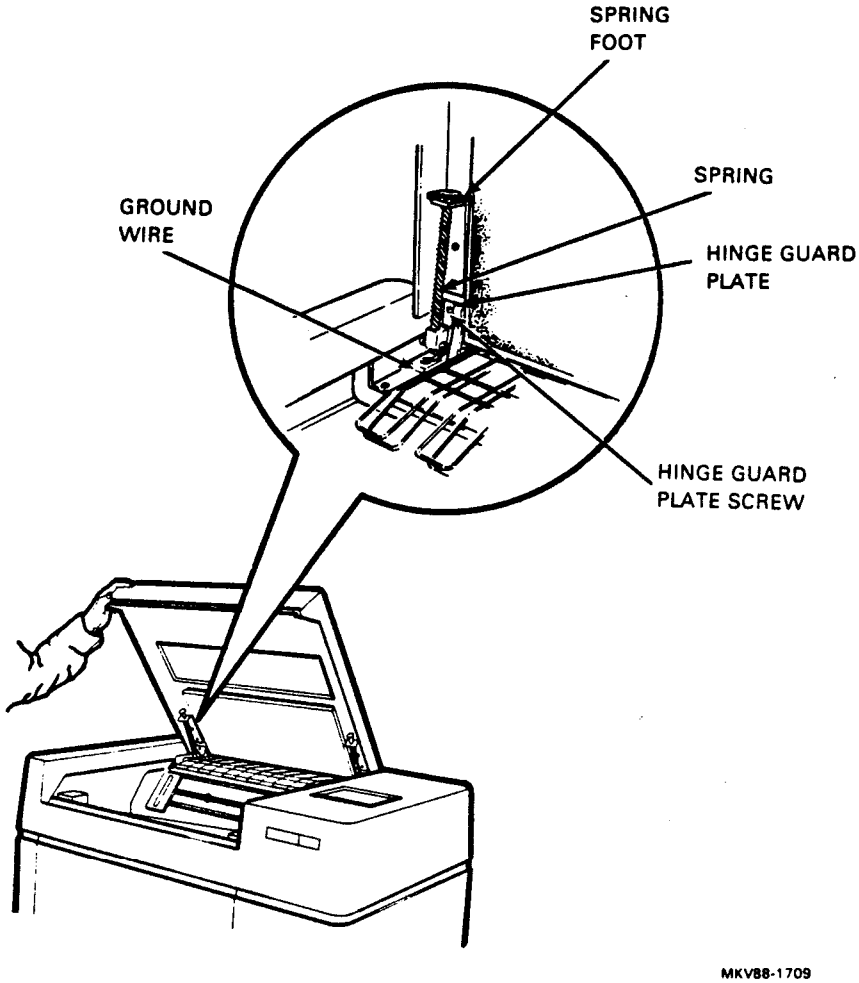


Figure 4-3 Lid Hinge Springs and Hinge Guard Plate

4.3.2 Replacing the Lid

Use the following procedure to replace the printer lid.

1. Position the lid on the two hinge pins (Figure 4-3).
2. Position the hinge guard plate and install the retaining screw and the hinge guard plate on each hinge guard.
3. Place the spring foot of the right-hand hinge spring in its bracket.
4. Place the spring foot of the left-hand hinge spring in its bracket.
5. Close the lid.

4.3.3 Removing the Cover

Use the following procedure to remove the printer cover.

1. Open the lid (Figure 4-2).
2. Clear the paper path.
3. Loosen the two cover retaining screws located in the front of the cover (Figure 4-4).

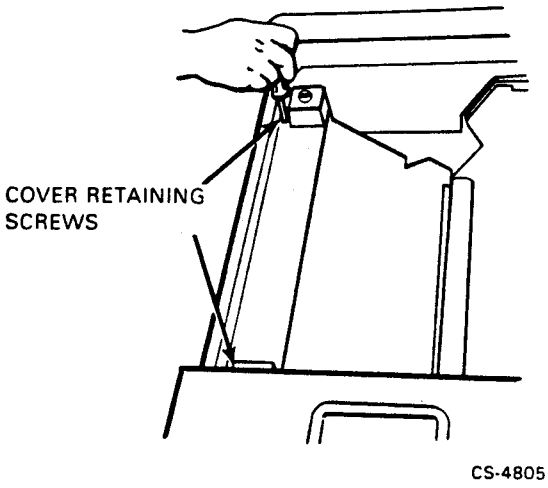


Figure 4-4 Cover Retaining Screws

4. Remove the screw securing the ground wire on the left hinge plate. Remove the ground wire and replace the screw.
5. Close the lid completely.
6. Raise the cover and secure it with the cover support rod (Figure 4-5).

CAUTION
The lid could spring open when raising the cover.

7. Disconnect the cover restraint cable (Figure 4-5).

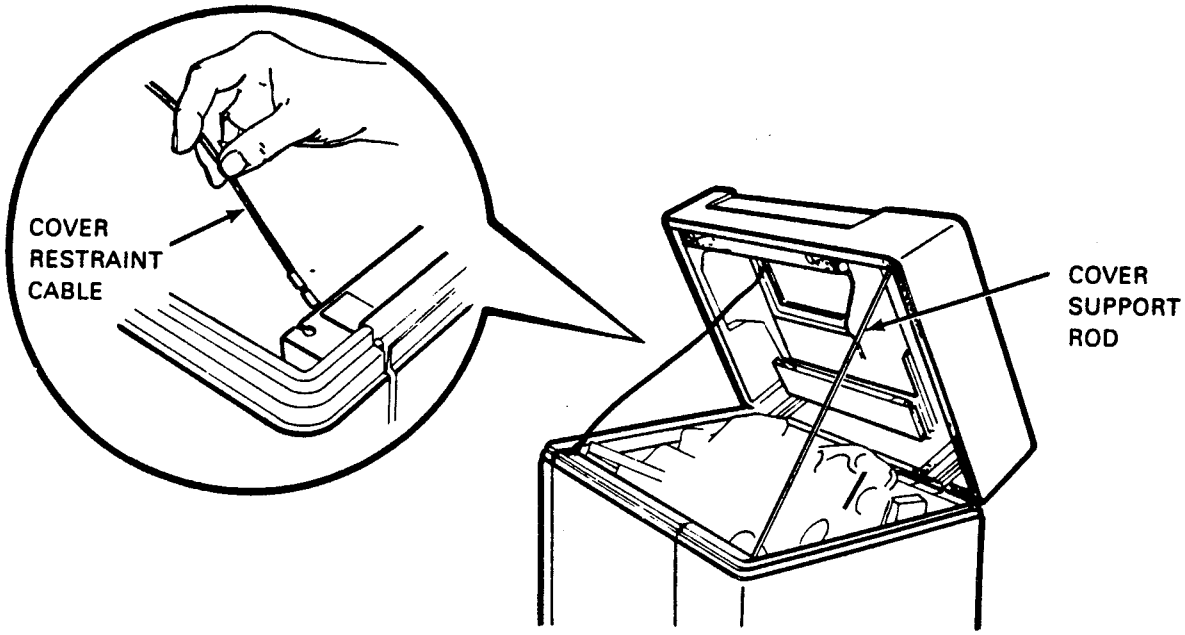


Figure 4-5 Cover Support Rod and Cover Restraint Cable

8. Disconnect the control panel cable from the control panel (Figure 4-6).

9. Lower the cover support rod.

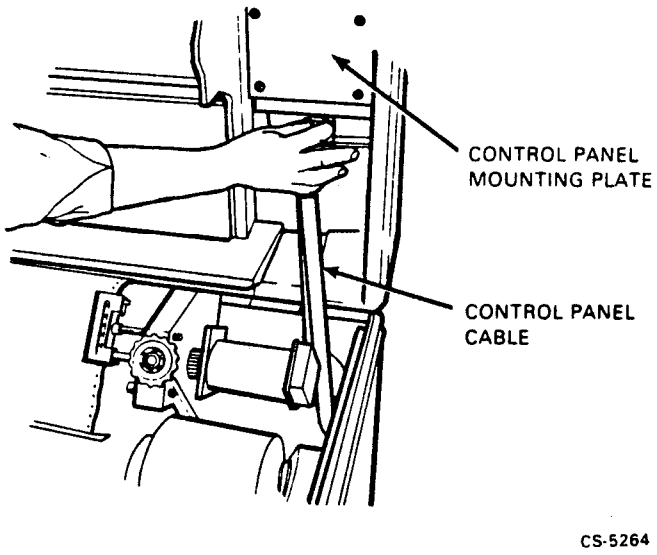


Figure 4-6 Control Panel Cable

10. While holding the cover open, remove the four hinge plate retaining screws (two per hinge) from the printer frame (Figure 4-7).

11. Lift the cover off of the printer.

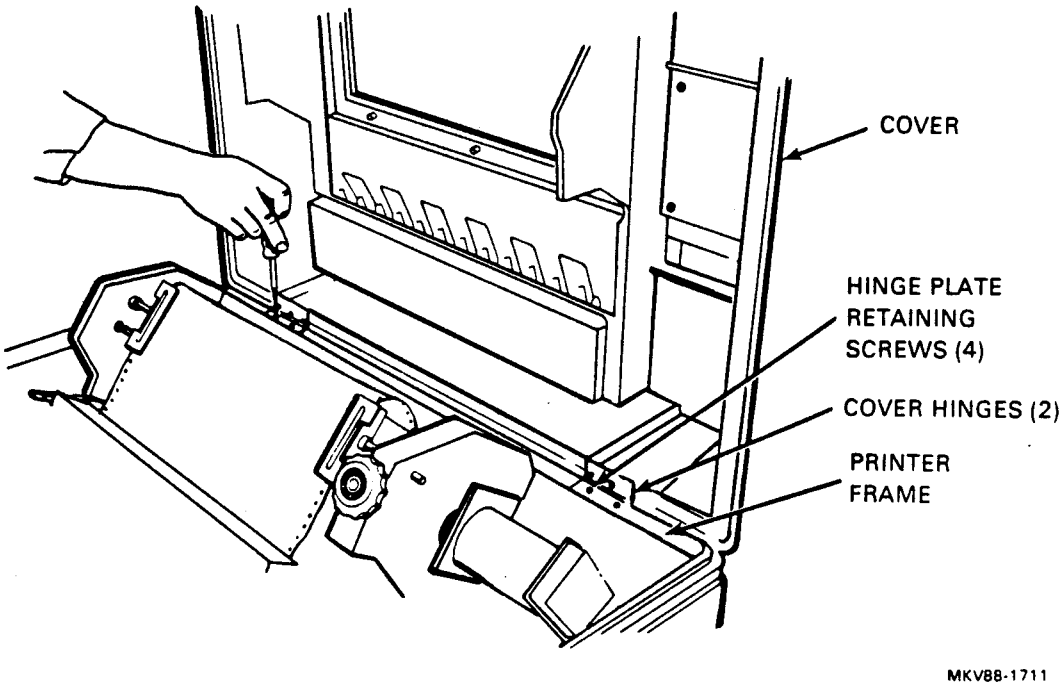


Figure 4-7 Cover Hinges

4.3.4 Replacing the Cover

Use the following procedure to replace the printer cover.

1. Position the cover so that the hinge plates are properly aligned with the holes in the frame.
2. Install the four hinge plate retaining screws that secure the hinge plates to the printer frame (Figure 4-7).
3. Connect the cover restraint cable (Figure 4-5).
4. Secure the cover with the cover support rod (Figure 4-5).
5. Connect the control panel cable to the control panel (Figure 4-6).
6. Lower the cover support rod and close the cover (Figure 4-5).
7. Raise the lid.
8. Tighten the cover restraining screws (Figure 4-4).
9. Reattach the ground wire to the left hinge plate (Figure 4-3).
10. Close the lid.

4.3.5 Removing the Front Door

Use the following procedure to remove the front door on the printer.

1. Perform Steps 1, 3, 5, and 6 of the cover removal procedure in Section 4.3.3.
2. Open the front door by applying pressure to the middle of the right side of the door.
3. Disconnect the door restraint cable (Figure 4-8).
4. Lift the door from the hinge pins and set the door aside.

4.3.6 Replacing the Front Door

Use the following procedure to replace the front door on the printer.

1. Carefully align the hinges on the door with the hinge pins on the frame (Figure 4-8).
2. Slide the door down onto the hinge pins.
3. Reconnect the door-restraint cable.
4. Perform Steps 6 through 8 and Step 10 of the cover replacement procedure in Section 4.3.4.

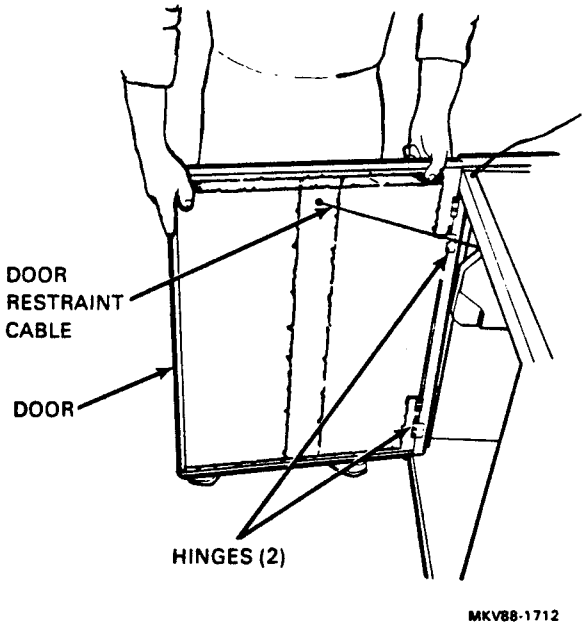


Figure 4-8 Front Door Removal

4.3.7 Removing the Rear Panel

Use the following procedure to remove the rear panel on the printer.

WARNINGS

Be careful when working behind the LG01 printer with the cover open. When the cover is open, the lid can spring open if it is jarred.

Before removing the rear panel, make sure the power to the printer is OFF and and the power cord is removed.

1. Set the power switch to OFF.
2. Unplug the power cord and the communications cable from the printer.
3. Remove the 10 plastic ESD caps from the rear panel retaining screws (Figure 4-9).
4. Loosen, but do not remove, the 11 rear panel retaining screws (Figure 4-9).
5. Lift the rear panel off of the frame.

4.3.8 Replacing the Rear Panel

Use the following procedure to replace the rear panel on the printer.

1. Position the rear panel on the frame so that the holes are aligned with the 11 retaining screws (Figure 4-9).
2. Tighten the 11 retaining screws.
3. Reinstall the 10 plastic ESD caps by pressing them onto the rear panel retaining screws.
4. Reconnect the power cord and the communications cable to the printer.

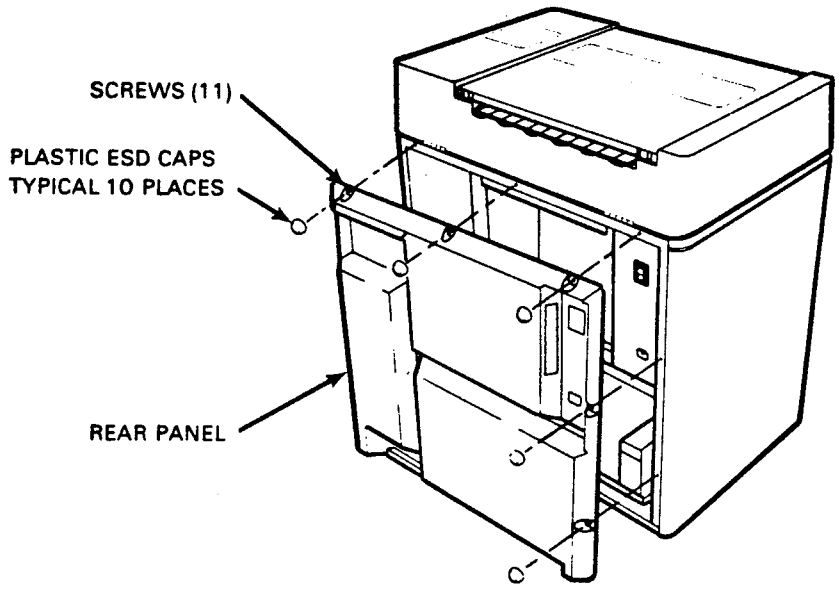


Figure 4-9 Rear Panel Removal

4.3.9 Removing the Left-Side Panel

Use the following procedure to remove the left-side panel.

1. Perform Steps 1, 3, 5, and 6 of the cover removal procedure in Section 4.3.3.

WARNING

Be careful when working behind the LG01 printer with the cover open. When the cover is open, the lid can spring open if it is jarred.

2. Perform the rear panel removal procedure in Section 4.3.7.

3. On the back of the frame, loosen the three retaining screws holding the left-side panel to the frame one full turn (Figure 4-10).

4. Perform Steps 2 through 4 of the front door removal procedure in Section 4.3.5.

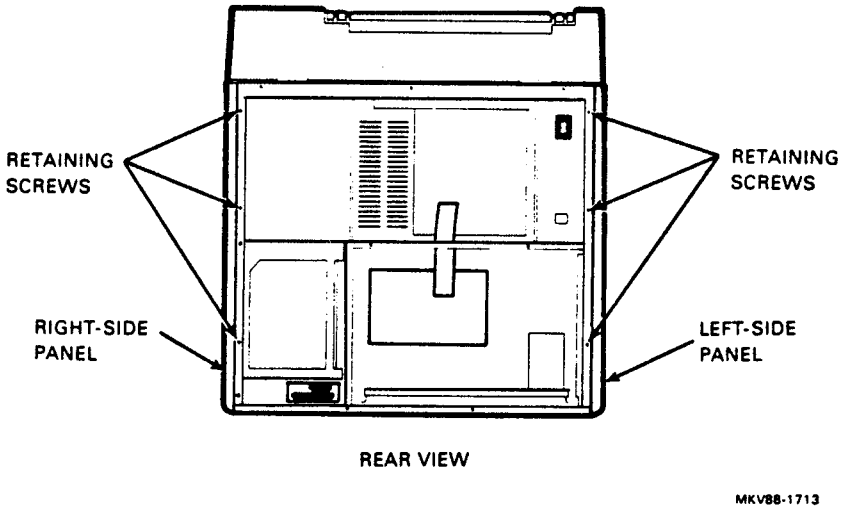


Figure 4-10 Rear Retaining Screws for Right- and Left-Side Panels

5. Remove the three retaining screws from the front of the frame assembly (Figure 4-11).

6. Remove the two retaining screws from the top of the frame assembly.

7. Lift the left-side panel away from the frame and set it aside.

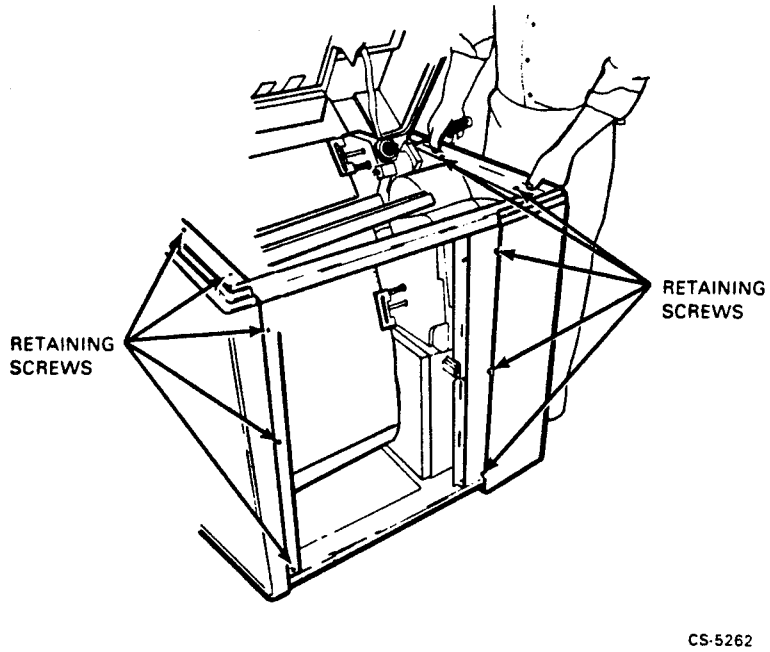


Figure 4-11 Front and Top Retaining Screws for Right- and Left-Side Panels

4.3.10 Replacing the Left-Side Panel

Use the following procedure to replace the left-side panel.

1. Lift the left-side panel into place, being careful to align the screw holes and to slide the panel under the rear screw retainers.

2. Insert the two retaining screws into the top of the left-side panel, and the three retaining screws into the front of the left-side panel (Figure 4-11).

3. Tighten the eight retaining screws that hold the left-side panel in place.

4. Perform Steps 1 through 3 of the front door replacement procedure in Section 4.3.6.

5. Perform Steps 6 through 8 and Step 10 of the cover replacement procedure in Section 4.3.4.

6. Perform the rear panel replacement procedure in Section 4.3.8.

4.3.11 Removing the Right-Side Panel

Use the following procedure to remove the right-side panel.

1. Perform Steps 1, 3, 5, and 6 of the cover removal procedure in Section 4.3.3.

WARNING

Be careful when working behind the LG01 printer with the cover open. When the cover is open, the lid can spring open if it is jarred.

2. Perform the rear panel removal procedure in Section 4.3.7.

3. On the back of the frame, loosen the three retaining screws holding the right-side panel to the frame one full turn (Figure 4-10).

4. Open the front door.

5. Remove the three retaining screws from the front of the frame assembly (Figure 4-11).

6. Remove the two retaining screws from the top of the frame assembly (Figure 4-11).

7. Lift the right-side panel away from the frame and set it aside.

4.3.12 Replacing the Right-Side Panel

Use the following procedure to replace the right-side panel.

1. Lift the right-side panel into place, being careful to align the screw holes and to slide the panel under the rear screw retainers.

2. Insert the two retaining screws into the top of the right-side panel, and the three retaining screws into the front of the right-side panel (Figure 4-11).

3. Tighten the eight retaining screws that hold the right-side panel in place.

4. Perform the rear panel replacement procedure in Section 4.3.8.

5. Perform Steps 6 through 8 and Step 10 of the cover replacement procedure in Section 4.3.4.

6. Close the front door.

4.4 CARD CAGE BOARDS

Use the following procedures to remove and replace the card cage printed circuit boards (PCBs). Access to the card cage boards requires the removal of the rear panel.

WARNING

Before performing any removal or replacement procedures for components inside the LG01 printer, make sure the power to the printer is OFF and the power cord is removed.

4.4.1 Removing the Card Cage Boards

Use the following procedure to remove the card cage boards.

1. Perform the rear panel removal procedure in Section 4.3.7.

2. Grasp the board to be removed by the ejectors at the top and bottom, then lift the ejectors away from the board, and pull the board free from card cage (Figure 4-12).

4.4.2 Replacing the Card Cage Boards

Use the following procedure to replace the card cage boards.

1. Grasp the board at the top and bottom, and carefully slide it into the proper slot in the card cage (Figure 4-12).

2. Press the board into the jack and close the ejectors.

3. Perform the rear panel replacement procedure in Section 4.3.8.

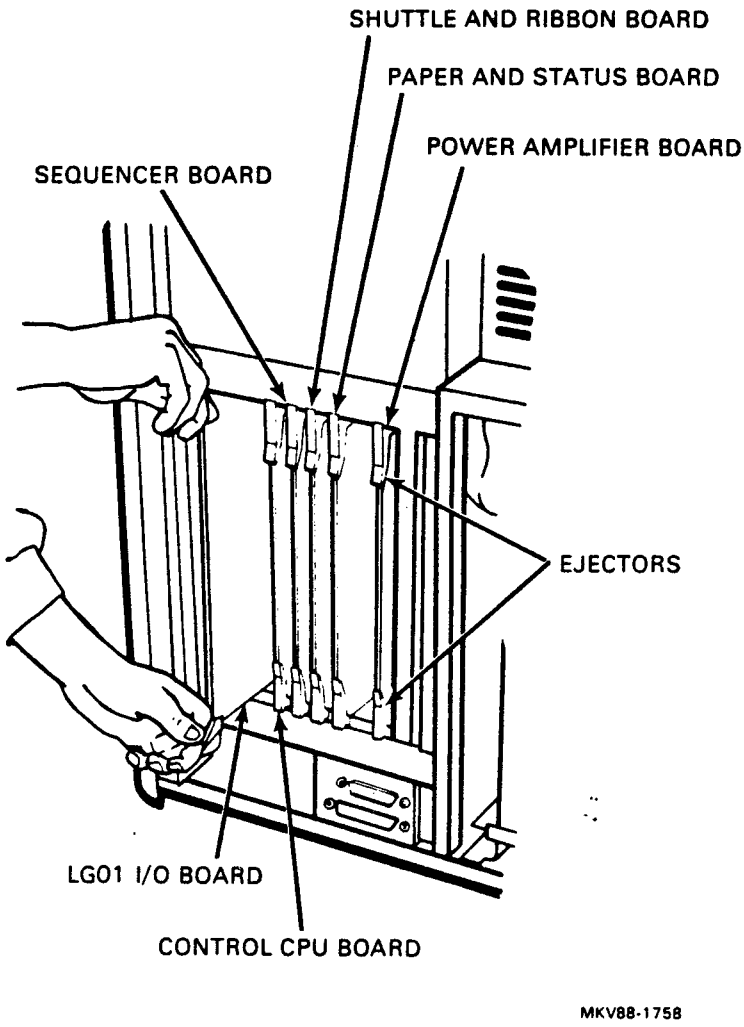


Figure 4-12 Card Cage Boards and Ejectors

4.5 CONTROL PANEL ASSEMBLY (P/N 29-25557)

Use the following procedures to remove and replace the control panel assembly.

WARNING

Before performing any removal or replacement procedures for components inside the LG01 printer, make sure the power to the printer is OFF and the power cord is removed.

4.5.1 Removing the Control Panel Assembly

Use the following procedure to remove the control panel assembly.

1. Perform Steps 1, 3, 5, and 6 of the cover removal procedure in Section 4.3.3.

2. Disconnect the control panel cable from the control panel (Figure 4-6).

3. Remove the four mounting screws from the rear of the control panel mounting plate (Figure 4-6).

CAUTION

Be careful when removing the control panel. The bottom plate, the control panel board, the mounting plate w/membrane switch attached, and the control panel cover are separate pieces held in place by the four mounting screws.

4. Remove the bottom plate, the control panel board, the mounting plate w/membrane switch, and the control panel cover.

5. Disconnect the interconnecting cable to separate the mounting plate w/membrane switch from the control panel board (Figure 4-13).

4.5.2 Replacing the Control Panel Assembly

Use the following procedure to replace the control panel assembly.

1. Reconnect the mounting plate w/membrane switch to the control panel board with the interconnecting cable (Figure 4-13).

2. Fold the membrane switch so that the display window on the membrane switch aligns with the display on the control panel board when it is mounted to the control panel.

3. Lay the control panel cover over the top half of the switches. Align the control panel board bottom plate with the mounting holes.

4. Insert the four control panel assembly mounting screws into the mounting plate (see Figure 4-6).

5. Reconnect the control panel cable to the control panel.

6. Perform Steps 6 through 8 and Step 10 of the cover replacement procedure in Section 4.3.4.

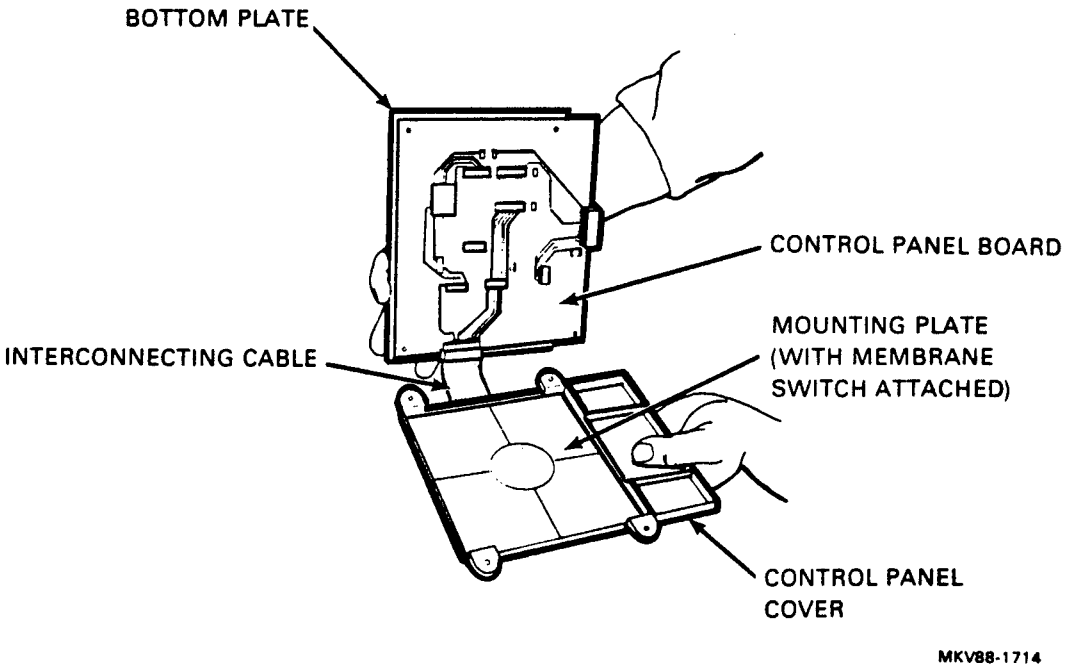


Figure 4-13 Control Panel Assembly Components

4.6 TRACTORS

Use the following procedures to remove and replace the upper and lower tractors and to perform the tractor phasing alignment. The tractors should be removed and replaced in pairs. The two upper tractors are a pair, and the two lower tractors are a pair.

WARNING

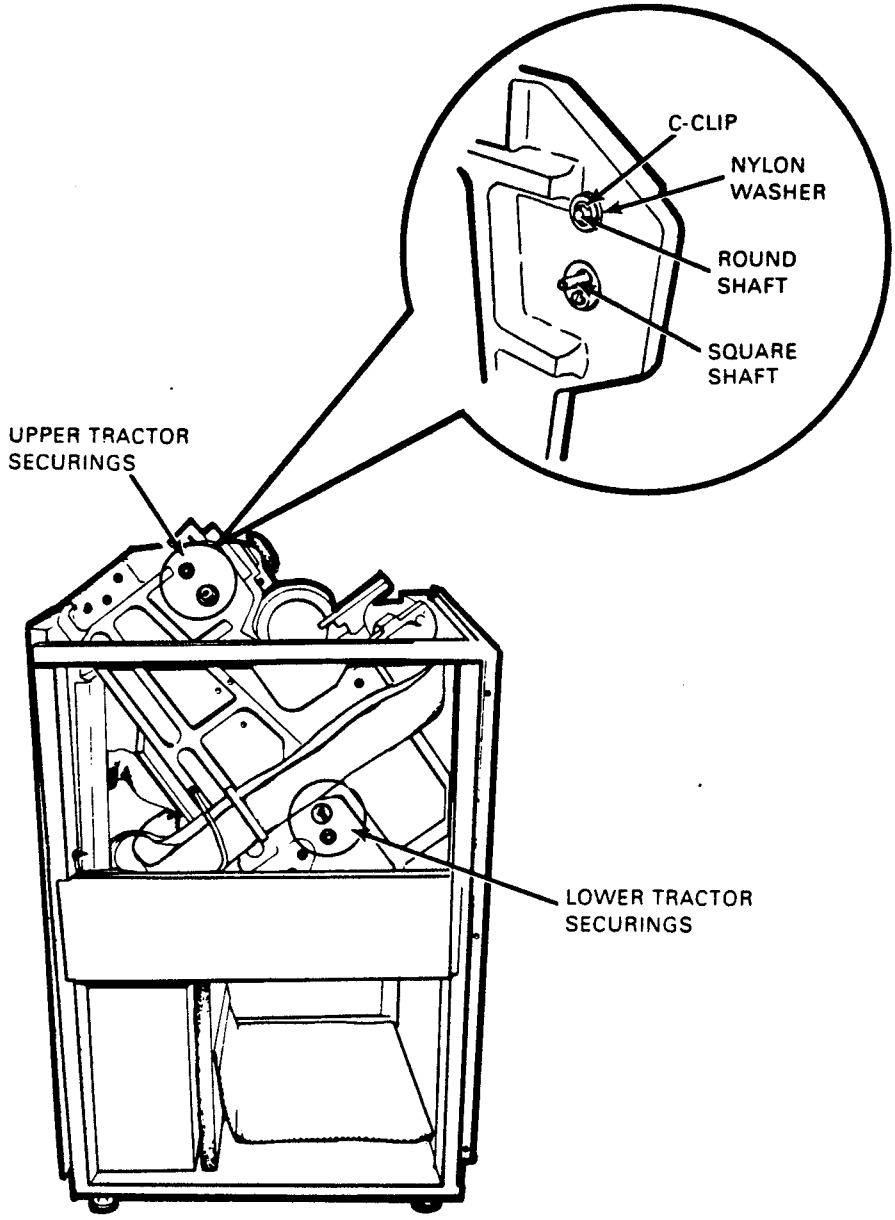
Before performing any removal or replacement procedures for components inside the LG01 printer, make sure the power to the printer is OFF and the power cord is removed.

4.6.1 Removing the Upper Tractors (P/N 29-26394)

Use the following procedure to remove the upper-left and upper-right tractors.

1. Perform Steps 1, 2, 3, 5, and 6 of the cover removal procedure in Section 4.3.3.

2. On the left-outboard side of the print-mechanism frame (Figure 4-14), remove the C-clip and nylon washer from the round shaft.



NOTE
THIS DETAIL SHOWS THE UPPER TRACTOR SECURINGS. THE LOWER TRACTOR SECURINGS ARE REVERSED IN POSITION (ROUND SHAFT ON THE BOTTOM).

CS-5266

Figure 4-14 Tractor Securings

3. On the round shaft at the left inboard side of the print-mechanism frame, loosen the set screw on the collar (Figure 4-15).

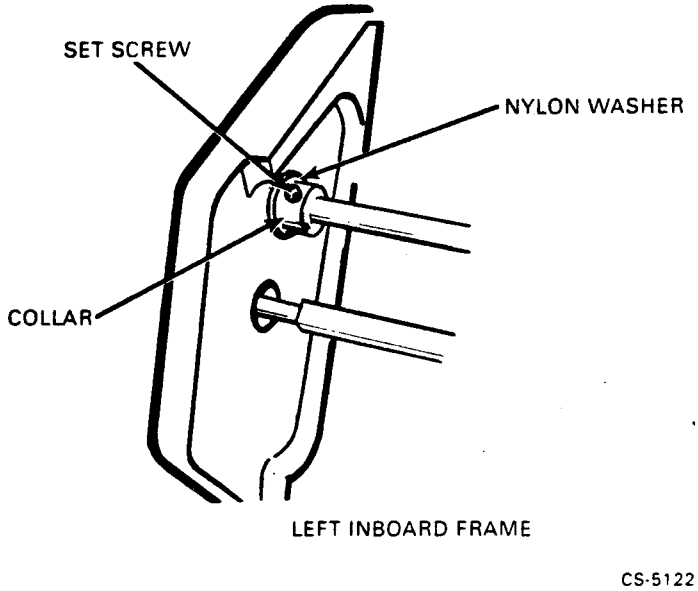


Figure 4-15 Tractor Collar Set Screw

4. Disconnect the paper motion sensor cable (Figure 4-16).

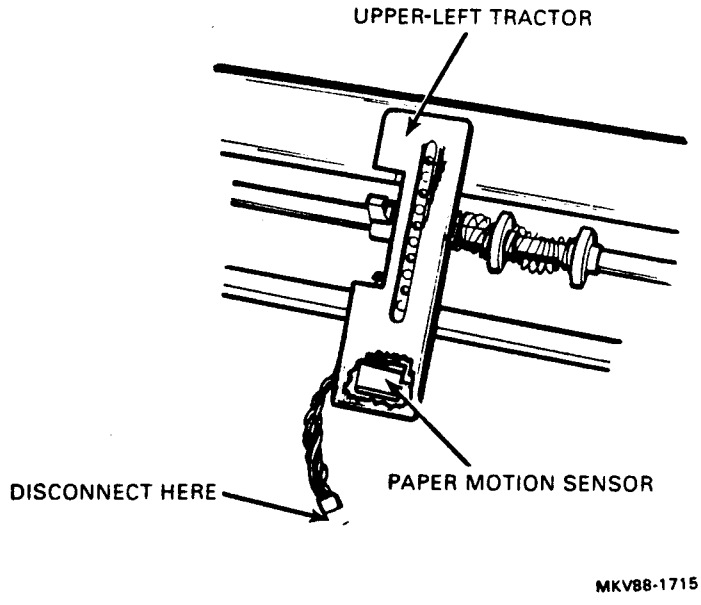
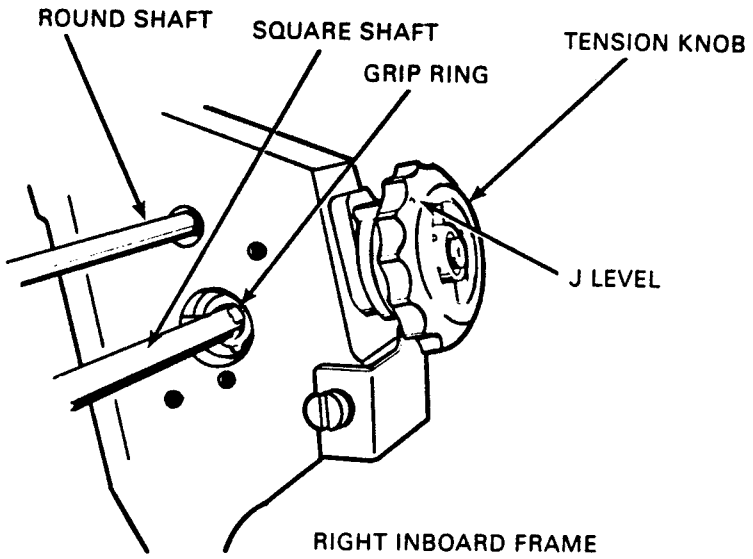


Figure 4-16 Paper Motion Sensor Cable

5. On the right inboard side of the print-mechanism frame, remove the grip ring that secures the tractor drive pulley to the square shaft, and slide the grip ring to the middle of the shaft (Figure 4-17).

6. Set the tension knob to level "J" (Figure 4-17). This sets the belt tension to its minimum.



NOTE
THE UPPER TRACTOR IS SHOWN. ON THE LOWER TRACTOR, THE SQUARE SHAFT IS ON THE TOP.

MKV88-1716

Figure 4-17 Tractor Shaft Grip Ring and Tension Knob

7. Loosen the three hex base plate mounting screws on the paper advance motor/encoder base plate, and rotate the plate to remove the tension from the tractor drive belt. Then remove the drive belt from the tractor pulley (Figure 4-18).

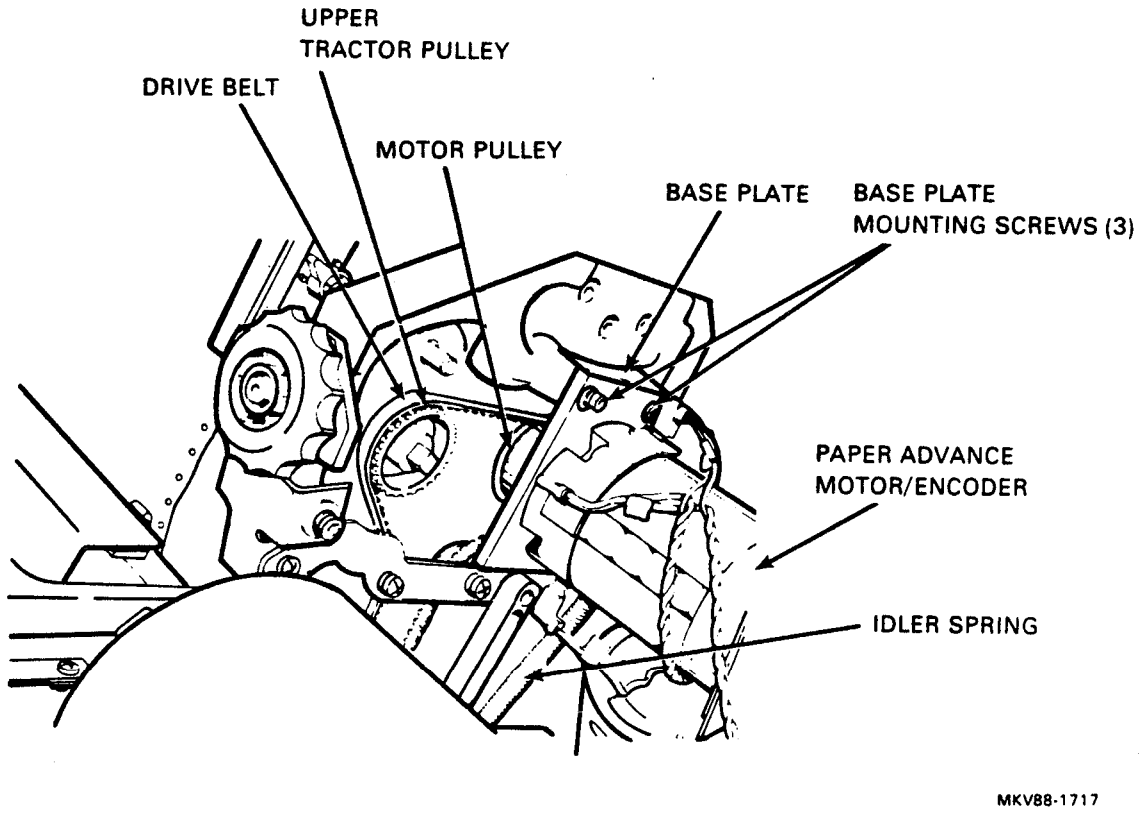


Figure 4-18 Paper Advance Components

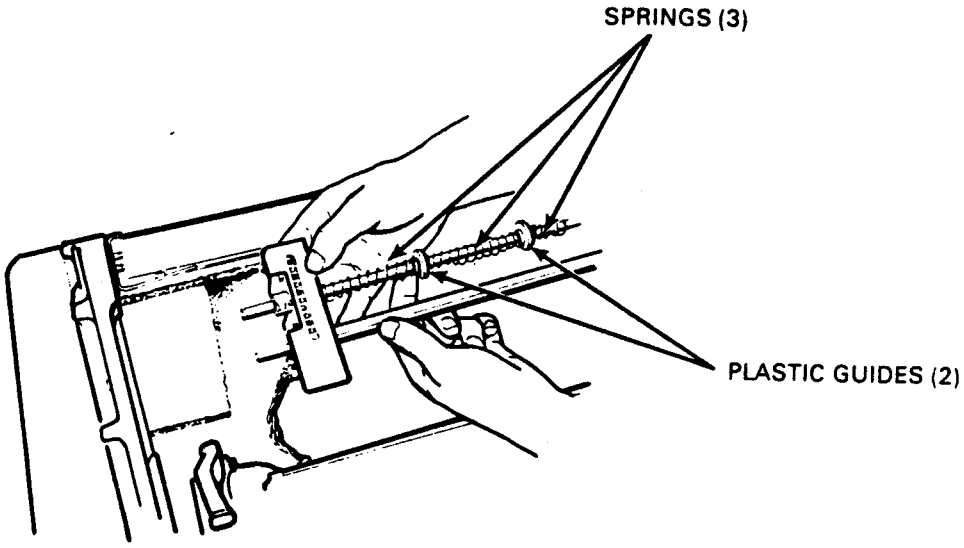
8. Slide both tractor shafts to the right until there is enough room on the left side to slip the tractors off the shafts (Figure 4-19).

9. Remove the nylon washer and collar from the left end of the round shaft.

10. Remove the upper-left tractor.

11. Remove the three springs and two plastic guides from the round shaft.

12. Remove the upper-right tractor.



NOTE
THE UPPER TRACTOR IS SHOWN. ON THE LOWER TRACTOR, THE ROUND SHAFT, SPRINGS, AND PLASTIC GUIDES ARE ON THE BOTTOM.

MKV88-1749

Figure 4-19 Tractor, Spring, and Plastic Guide Removal

4.6.2 Replacing the Upper Tractors

Use the following procedure to replace the upper-left and upper-right tractors.

1. Install the tractor pulley retainer tool.

2. Slide the right tractor on over the left end of the two shafts. Make sure that the white phasing mark or the small black hole on the tractor sprocket lines up with the raised black index mark on the tractor body (Figure 4-20).

3. Slide the three springs and the two plastic guides onto the round shaft in the correct order (Figure 4-19).

4. Slide the left tractor on over the left end of the two shafts. Make sure that the white phasing mark or the small black hole on the tractor sprocket lines up with the raised black index mark on the tractor body (Figure 4-20).

5. Slide the collar and then the nylon washer onto the left end of the round shaft. These remain on the left inboard side of the print-mechanism frame (Figure 4-15).

6. Slide the shafts back through the holes in the left inboard side of print-mechanism frame.

NOTE
It may be necessary to tap the right end of the square shaft in order to insert the shaft completely.

7. Replace the grip ring that holds the tractor pulley to the square shaft (Figure 4-17).

8. On the left outboard side of the print-mechanism frame, install the nylon washer and the C-clip on the round shaft (Figure 4-14).

9. On the left inboard side of the print-mechanism frame, slide the nylon washer and collar against the print-mechanism frame. Pull the round shaft to the right to remove slack on both sides between the washers and the print-mechanism frame.

10. Secure the collar to the round shaft with the set screw (Figure 4-15).

11. Reconnect the paper motion sensor cable (Figure 4-16).

12. Perform the tractor phasing alignment in Section 4.6.3.

13. Remove the tractor pulley retainer tool.

14. Perform Steps 6 through 8 and Step 10 of the cover replacement procedure in Section 4.3.4.

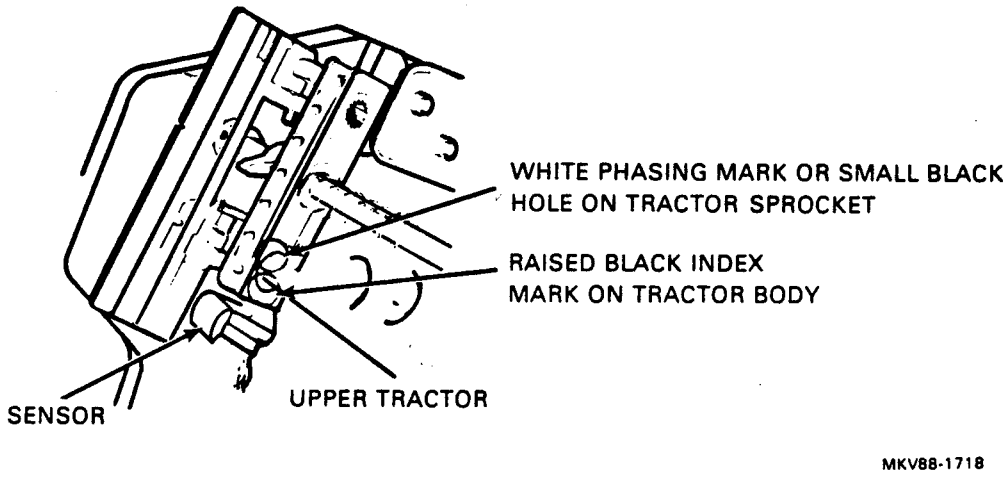


Figure 4-20 Upper Tractor Alignment

4.6.3 Tractor Phasing Alignment

Use the following procedure when installing the tractor pulley drive belt to ensure proper phasing between the upper and lower tractor systems.

1. Position the paper tension knob so that the letter J is vertical (Figure 4-17).

2. Rotate the upper and lower tractor shafts until the phasing marks on the upper and lower tractors are in the positions shown in Figure 4-21.

3. Install the tractor phasing gauge between the upper-right tractor and the lower-right tractor (do not alter the shaft positions from their previous settings) and close the platen completely by bringing the forms-thickness lever fully forward.

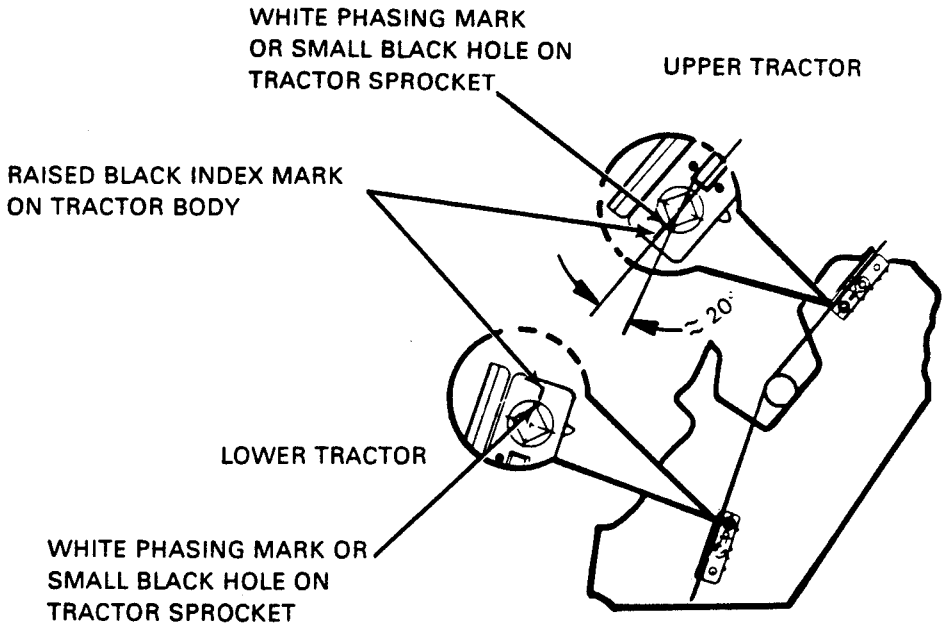


Figure 4-21 Upper and Lower Tractor Phasing Mark Positions

4. Thread the drive belt between the two belt idlers and over the motor pulley (Figure 4-22).

5. Position the drive belt over the lower tractor drive pulley. While keeping the tractor phasing gauge taut, position the drive belt over the upper tractor drive pulley.

6. Tighten the drive belt by rotating the paper advance motor/encoder base plate upward and toward the rear of the printer (Figure 4-22). Tighten the upper-rear hex screw on the paper advance motor/encoder base plate to hold the paper advance motor/encoder in position.

7. Check the belt tension with the tension spring gauge. Belt tension is correct when a force of 2.5 lbs ± 0.2 lbs produces a midspan deflection of 0.25 in. ± 0.05 in between the upper-tractor drive pulley and the motor pulley (Figure 4-22).

8. Check the tractor phasing gauge. If the gauge is too tight or too loose, use the paper tension eccentric wrench to make fine adjustments.

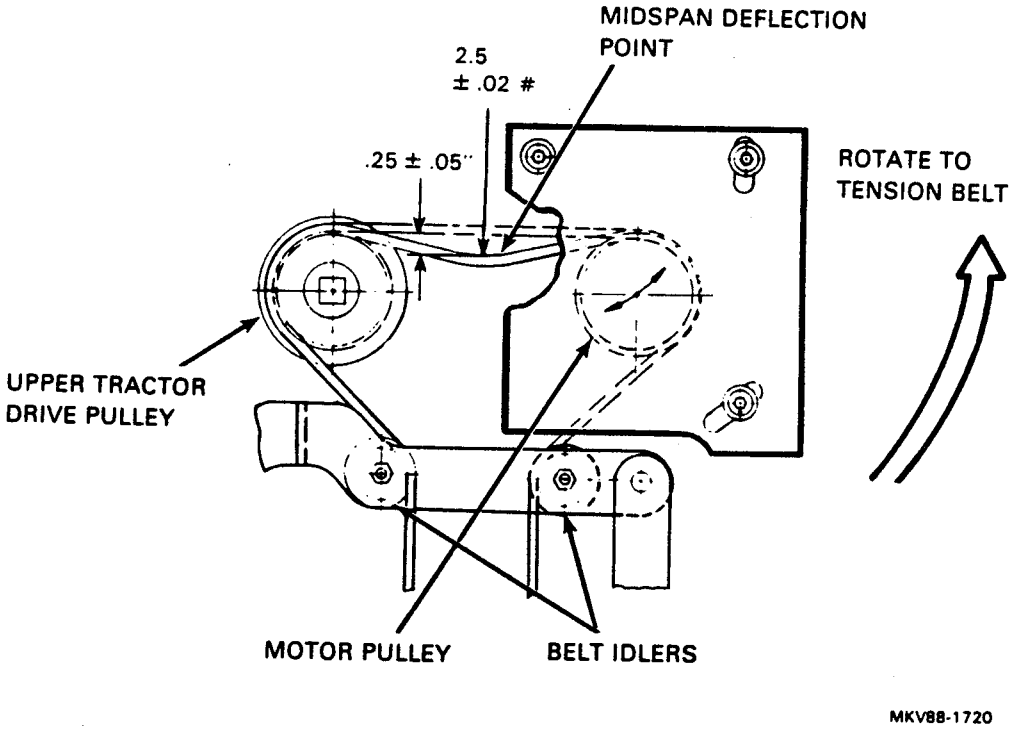


Figure 4-22 Tractor Drive Belt Installation

9. To use the paper tension eccentric wrench, loosen the eccentric locking screw (Figure 4-23). Rotate the eccentric wrench for the proper tension and then tighten the eccentric locking screw.

10. If the proper tension cannot be obtained using the paper tension eccentric wrench, the drive belt is improperly installed. Set the tension knob so that the letter J is vertical, and repeat Steps 5 through 9.

11. Tighten the three hex paper advance motor/encoder base plate mounting screws.

12. Perform Steps 6 through 8 and Step 10 of the cover replacement procedure in Section 4.3.4.

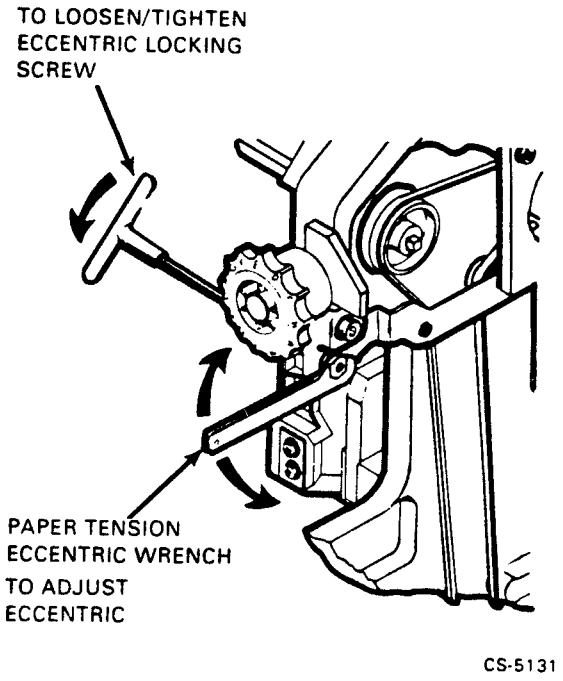


Figure 4-23 Paper Tension Eccentric Adjustment

4.6.4. Removing the Lower Tractors (P/N 29-26395)
Use the following procedure to remove the lower-left and lower-right tractors.

1. Perform Steps 1, 2, 3, 5, and 6 of the cover removal procedure in Section 4.3.3.

2. Perform the front door removal procedure in Section 4.3.5.

3. Perform the rear panel removal procedure in Section 4.3.7.

4. Perform the left-side panel removal procedure in Section 4.3.9.

5. Perform the right-side panel removal procedure in Section 4.3.11.

6. Remove the two 5/16 outboard clamp screws that hold the clamp securing the outboard plenum to the blower assembly (Figure 4-24).

7. On the inside frame, remove the 5/16 inboard plenum screw that secures the inboard plenum to the frame (Figure 4-24).

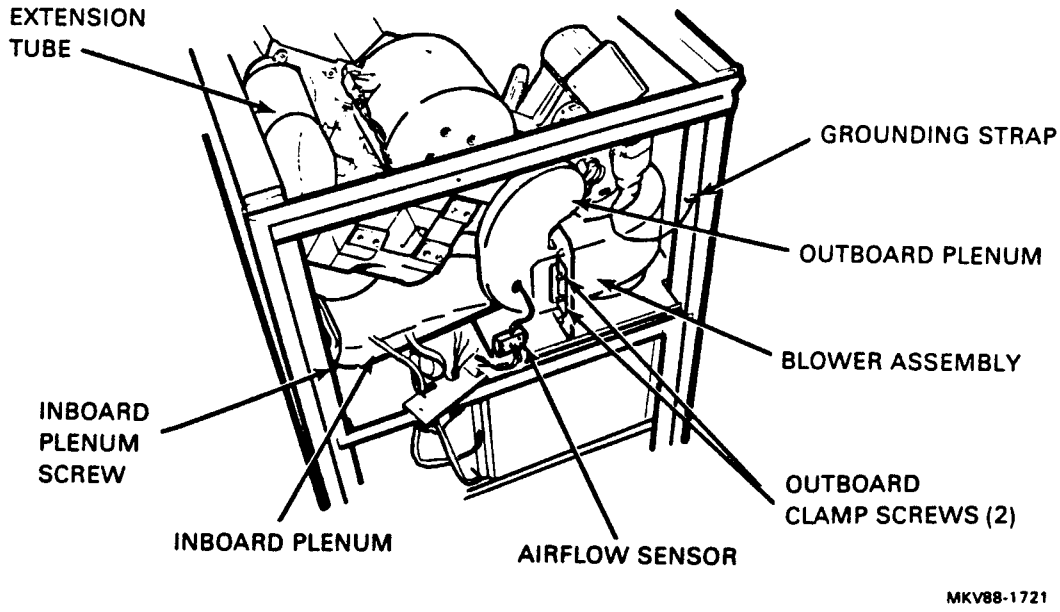


Figure 4-24 Air System Components

8. Remove the air bellows from the linear actuator motor (Figure 4-25).

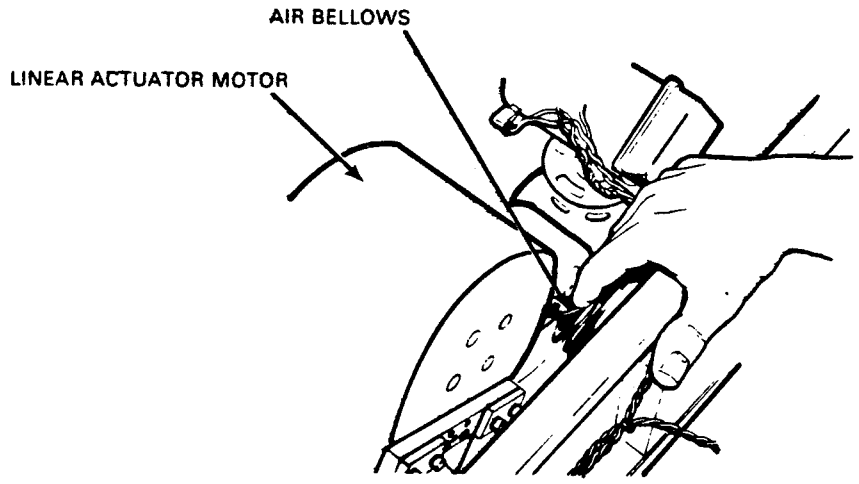


Figure 4-25 Linear Actuator Motor and Air Bellows

9. Remove the airflow sensor hose from the outboard plenum (Figure 4-24).

10. Remove the inboard and outboard plenums.

11. On the left outboard side of the print-mechanism frame (Figure 4-14), remove the C-clip and nylon washer from the round shaft.

12. On the round shaft at the left inboard side of the print-mechanism frame, loosen the set screw on the collar (Figure 4-15).

13. Disconnect the paper out switch by removing the cable at the rear of the lower-left tractor (Figure 4-26).

14. On the lower right inboard side of the print-mechanism frame, remove the grip ring that secures the tractor drive pulley to the square shaft, and slide the grip ring to the middle of the shaft (Figure 4-17).

15. Loosen the three hex base plate mounting screws on the paper advance motor/encoder base plate, and rotate the plate to remove the tension from the tractor drive belt. (Figure 4-18).

16. Remove the drive belt from the tractor pulley.

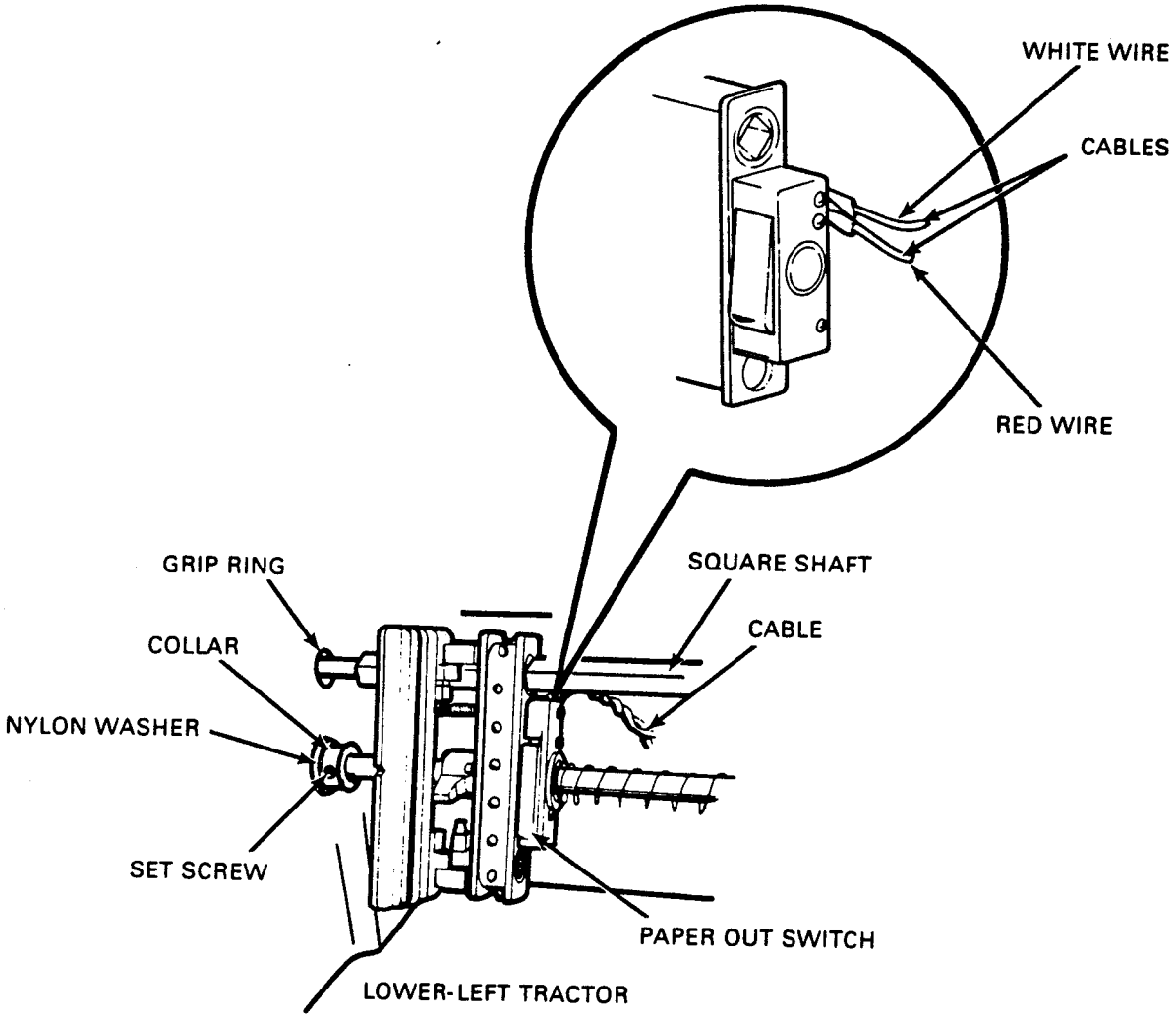


Figure 4-26 Paper Out Switch

17. Slide both tractor shafts to the right until there is enough room on the left side to slip the tractors off the shafts (Figure 4-19).

18. Remove the nylon washer and collar from the left end of the round shaft.

19. Remove the lower-left tractor.

20. Remove the three springs and two plastic guides from the round shaft.

21. Remove the lower-right tractor.

4.6.5 Replacing the Lower Tractors

Use the following procedure to replace the lower-left and lower-right tractors.

1. Install the tractor pulley retainer tool.

2. Slide the right tractor on over the left end of the two shafts. Make sure that the white phasing mark or the small black hole on the tractor sprocket lines up with the raised black index mark on the tractor body (Figure 4-20).

3. Slide the three springs and the two plastic guides onto the round shaft in the correct order (Figure 4-19).

4. Slide the left tractor on over the left end of the two shafts. Make sure that the white phasing mark or the small black hole on the tractor sprocket lines up with the raised black index mark on the tractor body (Figure 4-20).

5. Slide the collar and then the nylon washer onto the left end of the round shaft. These remain on the left inboard side of the print-mechanism frame (Figure 4-15).

6. Slide the shafts back through the holes in the left inboard side of the print-mechanism frame.

> NOTE
> **It may be necessary to tap the right end of the square shaft in order to insert the shaft completely.**

7. Replace the grip ring that holds the tractor pulley to the square shaft (Figure 4-17).

8. On the left outboard side of the print-mechanism frame, install the nylon washer and the C-clip on the round shaft (Figure 4-14).

9. On the left inboard side of the print-mechanism frame, slide the nylon washer and collar against the print-mechanism frame. Pull the round shaft to the right to remove slack on both sides between the washers and the print-mechanism frame.

10. Secure the collar to the round shaft with the set screw (Figure 4-15).

11. Connect the paper out switch wires to the top two pins on the switch. The white wire is connected to the top pin of the switch and the red wire is connected to the middle pin of the switch as it sits in the printer.

12. Perform the tractor phasing alignment in Section 4.6.3.

13. Remove the tractor pulley retainer tool.

14. Install the air bellows on the linear actuator motor (Figure 4-25).

15. Install the inboard plenum and secure it to the frame with the 5/16 inboard plenum screw (Figure 4-24).

16. Install the outboard plenum and secure it to the blower assembly with the plenum clamp and the two 5/16 outboard clamp screws (Figure 4-24).

17. Reconnect the airflow sensor hose to the outboard plenum.

18. Perform the right-side panel replacement procedure in Section 4.3.12.

19. Perform the left-side panel replacement procedure in Section 4.3.10.

20. Perform the rear panel replacement procedure in Section 4.3.8.

21. Perform the front door replacement procedure in Section 4.3.6.

22. Perform Steps 6 through 8 and Step 10 of the cover replacement procedure in Section 4.3.4.

4.7 PLATEN ASSEMBLY (P/N 29-25586)

Use the following procedures to remove and replace the platen assembly.

WARNING

Before performing any removal or replacement procedures for components inside the LG01 printer, make sure the power to the printer is OFF and the power cord is removed.

4.7.1 Removing the Platen Assembly

Use the following procedure to remove the platen assembly.

1. Perform Steps 1, 2, 3, 5, and 6 of the cover removal procedure in Section 4.3.3.

2. Remove the two platen clamps, one on each side of the platen (Figure 4-27 and Figure 4-28).

NOTE

Lifting the forms-thickness lever allows easier access to the left platen clamp.

3. Remove the ribbon cartridge by lifting the ribbon cartridge up and away from the ribbon platform.

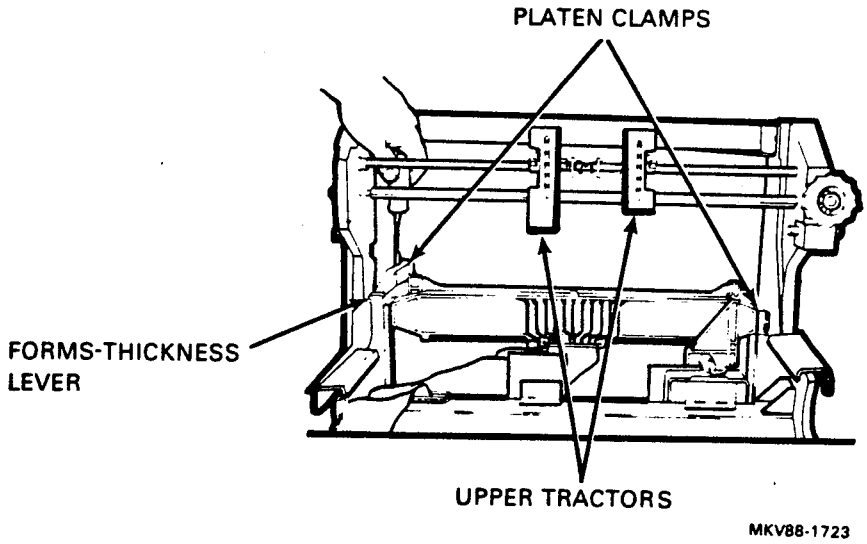


Figure 4-27 Platen Clamps

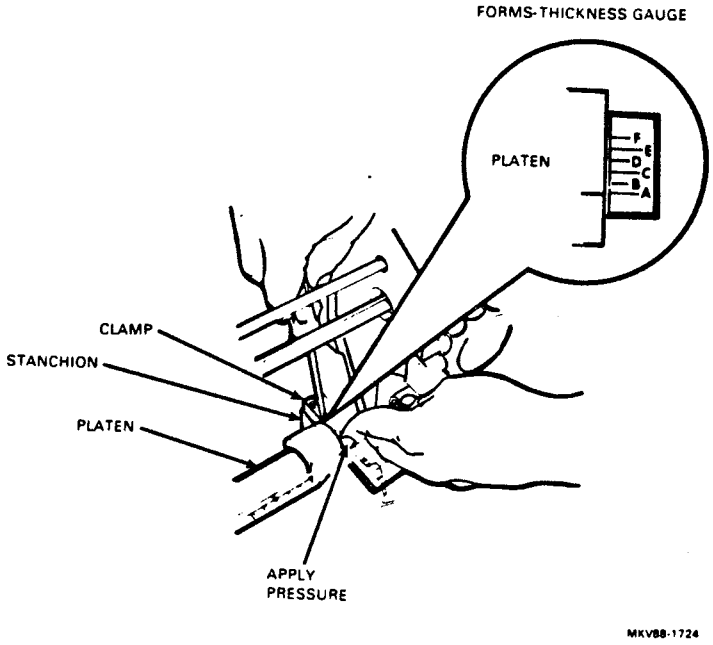


Figure 4-28 Right Platen Clamp and Forms-Thickness Gauge

4. On the right side of the platen, remove the forms-thickness gauge from between the platen and the stanchion (Figure 4-28).

5. Open the platen gap by lifting the forms-thickness lever and lift the platen from the stanchions. Remove the left side first because the platen is spring loaded on the right side (Figure 4-29).

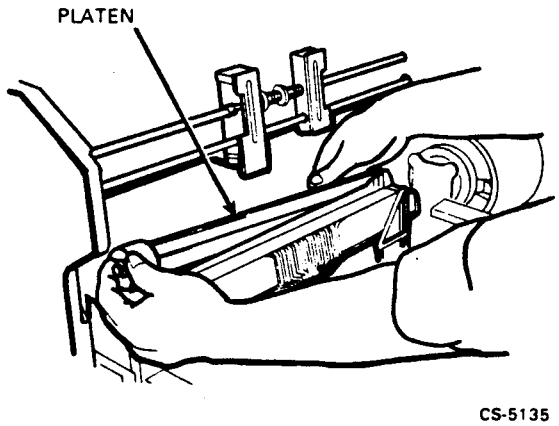


Figure 4-29 Platen Removal

4.7.2 Replacing the Platen Assembly

Use the following procedure to replace the platen assembly.

1. Insert the platen into the stanchions by first inserting the right end into the spring in the right stanchion and then easing the left end into the left stanchion (Figure 4-29).

2. Insert the left and right platen gap gauges. Ensure that the platen gap is closed by pushing the forms-thickness lever down.

3. On the right side of the platen, insert the forms-thickness gauge between the platen and the stanchion.

4. Install the platen clamps (Figure 4-27).

5. Apply pressure against the front of the clamps and tighten the clamp screws (Figure 4-28).

6. Check that there is no forward or backward movement of the platen when the platen gap is closed (forms-thickness lever in the down or closed position). If the platen moves, loosen the platen clamps and repeat Step 5.

7. Install the ribbon cartridge.

8. Perform Steps 6 through 8 and Step 10 of the cover replacement procedure in Section 4.3.4.

4.8 PLATEN OPEN SWITCH (P/N 29-25572)

Use the following procedures to remove and replace the platen open switch.

WARNING

Before performing any removal or replacement procedures for components inside the LG01 printer, make sure the power to the printer is OFF and the power cord is removed.

4.8.1 Removing the Platen Open Switch

Use the following procedure to remove the platen open switch.

1. Perform Steps 1, 2, 3, 5, and 6 of the cover removal procedure in Section 4.3.3.
2. Move the forms-thickness lever to the down or closed position.
3. Remove the two leads from the platen open switch (Figure 4-30). The platen open switch is located below the platen on the right side of the printer.
4. Remove the two screws securing the platen open switch to the stanchion.
5. Remove the platen open switch.

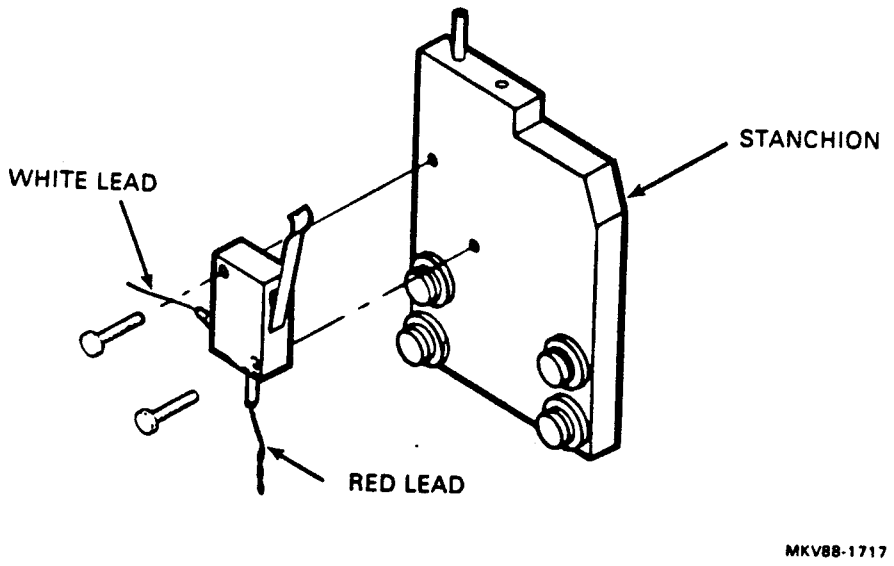


Figure 4-30 Platen Open Switch

4.8.2 Replacing the Platen Open Switch

Use the following procedure to replace the platen open switch.

1. Secure the platen open switch to the right stanchion with the two screws (Figure 4-30).

2. Connect the two leads to the platen open switch; the red lead to the NO contact and the white lead to the COM contact (Figure 4-30).

3. Check the operation of the platen open switch. Place the forms-thickness lever in the up or open position and verify that the platen open switch is open. Place the forms-thickness lever in the down or closed position and verify that the platen open switch is closed.

4. Perform Steps 6 through 8 and Step 10 of the cover replacement procedure in Section 4.3.4.

4.9 HAMMERBANK AND YOKE ASSEMBLY (P/N 29-25553)

Use the following procedures to remove and replace the hammerbank and yoke assembly.

WARNING

Before performing any removal or replacement procedures for components inside the LG01 printer, make sure the power to the printer is OFF and the power cord is removed.

4.9.1 Removing the Hammerbank and Yoke Assembly

Use the following procedure to remove the hammerbank and yoke assembly.

1. Perform Steps 1, 2, 3, 5, and 6 of the cover removal procedure in Section 4.3.3.

2. Raise the forms-thickness lever to open the platen and remove the ribbon cartridge by lifting the ribbon cartridge up and away from the ribbon platform.

3. Remove the ribbon platform by performing the following steps.

   a. Disconnect the air extension tube (tan color) from the inboard plenum to the ribbon platform on the right side of the ribbon platform.

   b. Remove the four mounting screws, one at each corner of the ribbon platform (Figure 4-31).

   c. Lift the ribbon platform off of the mounting brackets and print-mechanism casting notches.

   d. Disconnect the ribbon motor cable (Figure 4-32).

   e. Carefully remove the ribbon platform from the printer.

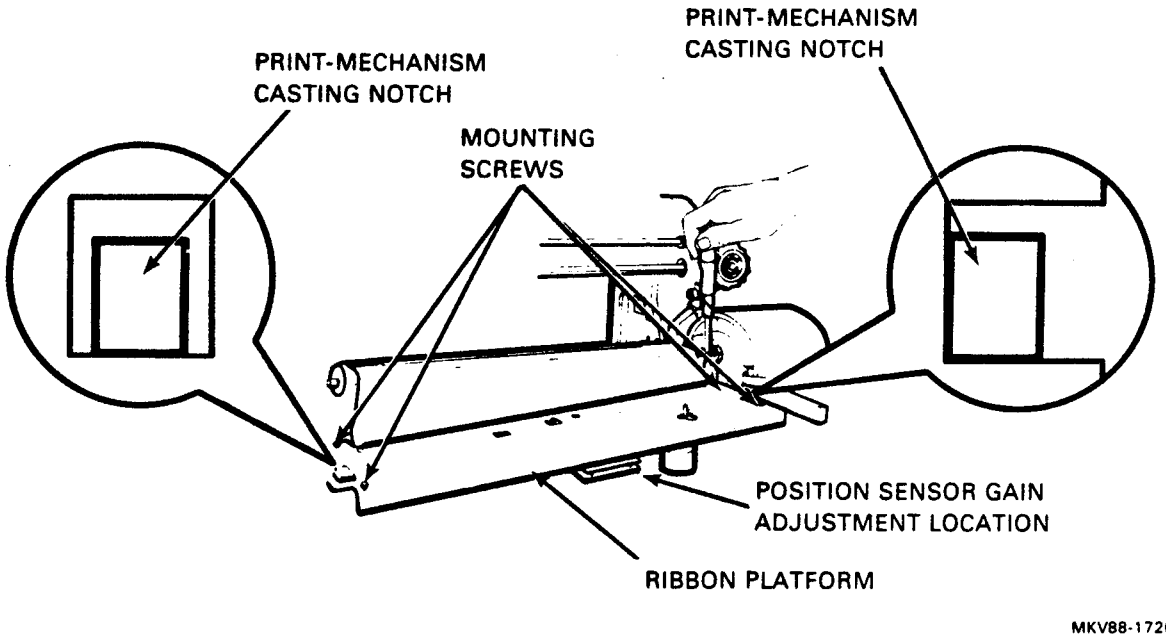


Figure 4-31 Ribbon Cartridge Support Assembly and Ribbon Platform

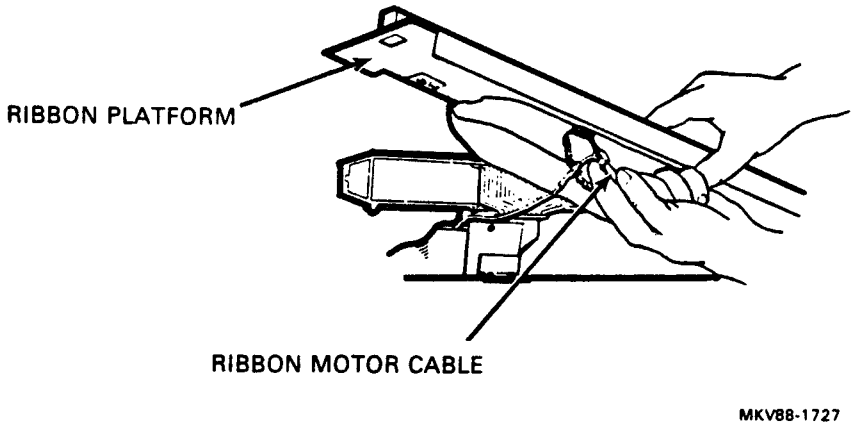


Figure 4-32 Ribbon Motor Cable

4. Lift the forms-thickness lever to open the platen.

5. Insert the three 0.025-inch linear motor shim gauges between the bobbin and the linear actuator motor (Figure 4-33).

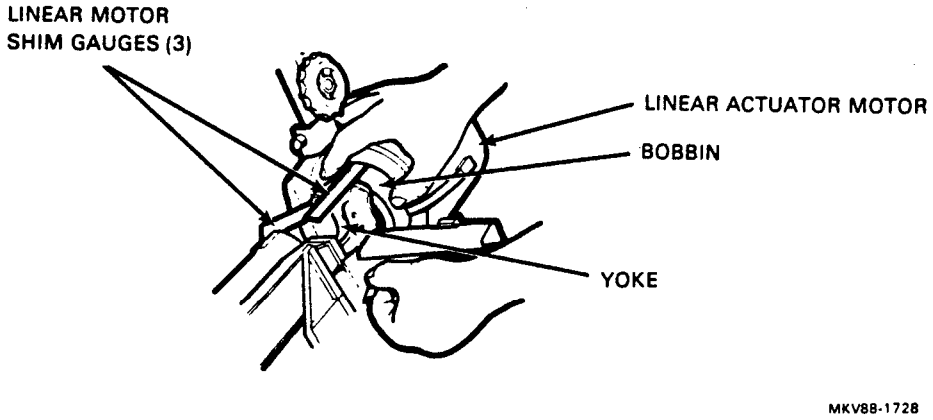


Figure 4-33 Linear Motor Shim Gauges

6. Loosen the lower-rear Allen mounting screw that secures the yoke to the bobbin on the linear actuator motor (Figure 4-34). The screw hole on the yoke is slotted so that the yoke can be removed without removing the Allen mounting screw.

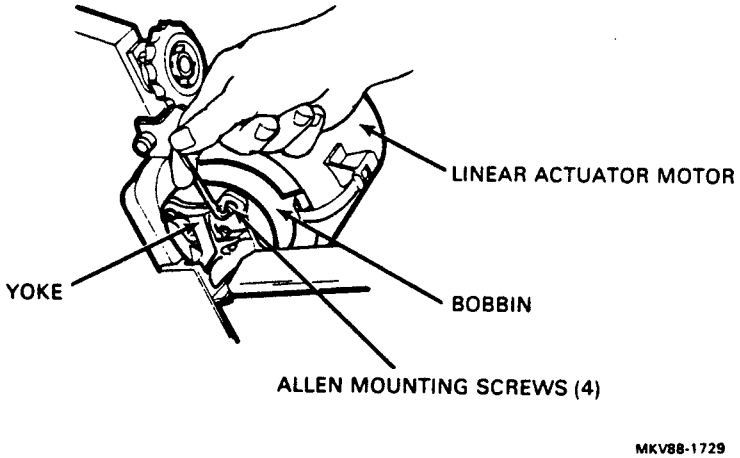


Figure 4-34 Yoke Mounting Screws

7. Remove the other three Allen mounting screws that secure the yoke to the bobbin on the linear actuator motor.

8. Remove the two mounting screws from the cable clamp bracket located below the hammerbank (Figure 4-35).

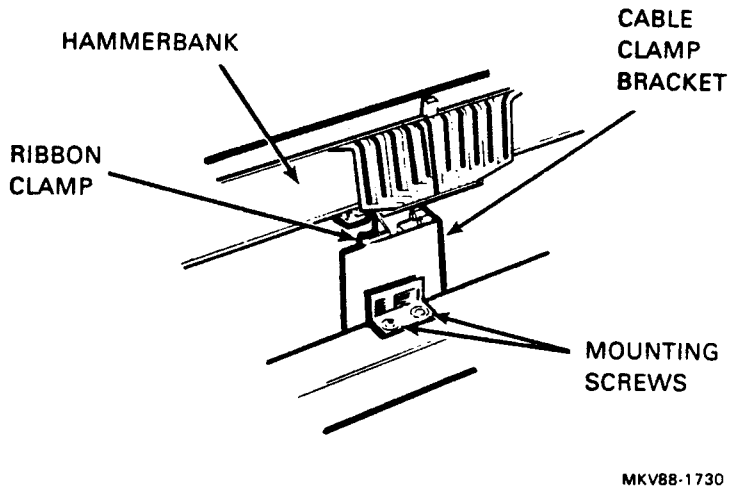


Figure 4-35 Hammerbank Cable Clamp Bracket

9. Release the plastic ribbon clamp (Figure 4-36) to free the ribbon cables.

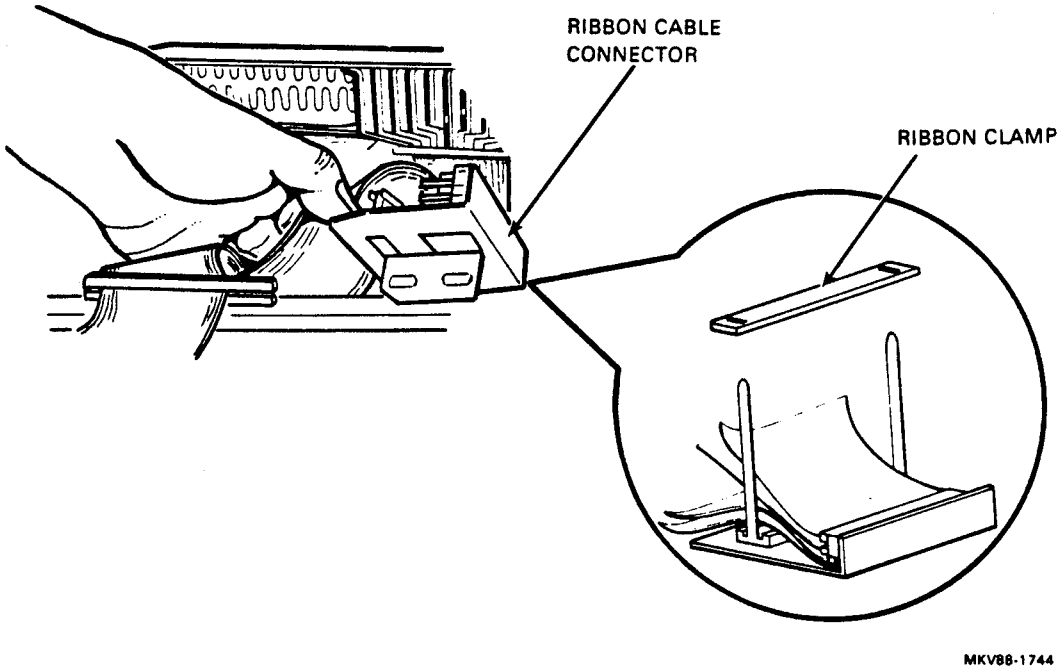


Figure 4-36 Ribbon Cable Connector

10. Disconnect the ribbon cables.

11. Disconnect the hammerbank ribbon cable connector from the cable clamp bracket (Figure 4-36).

12. Open the front door of the printer.

13. Remove the four mounting screws from the lower-right and lower-left hammerbank flexure band clamps (Figure 4-37).

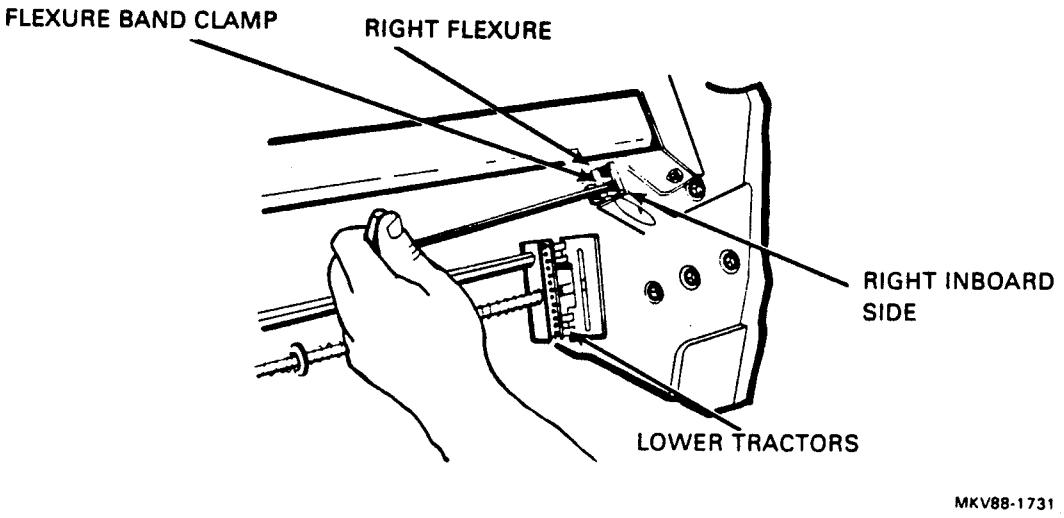


Figure 4-37 Lower Flexure Band Clamp Location

14. Remove the two lower hammerbank flexure band clamps.

15. From the top of the printer, carefully remove the hammerbank, yoke, and flexures (Figure 4-38). **Be careful not to damage the position sensor vane.**

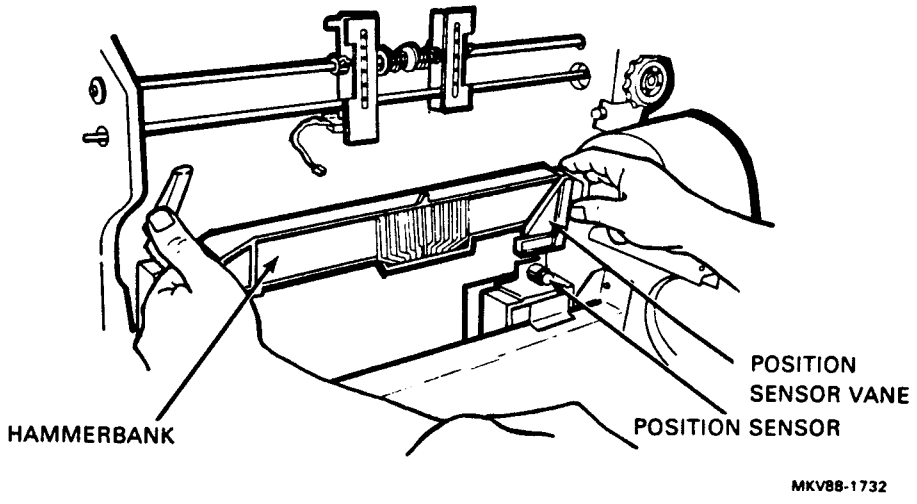


Figure 4-38 Hammerbank Removal

4.9.2 Replacing the Hammerbank and Yoke Assembly

Use the following procedure to replace the hammerbank and yoke assembly.

1. Ensure that the three 0.025-inch linear motor shim gauges are inserted between the bobbin and the linear actuator motor (Figure 4-33).

2. Being careful not to move the position sensor vane (Figure 4-38), slide the hammerbank into position.

3. Align the lower flexures with the flexure mounting holes (Figure 4-37).

4. Insert the flexure band clamps (Figure 4-39) so that the dowel goes into the side of the print-mechanism frame.

5. On the left side, position the flexure band clamp and insert the four retaining screws. **Do not tighten the screws.**

6. On the right side, position the flexure band clamp and insert the four retaining screws. **Do not tighten the screws.**

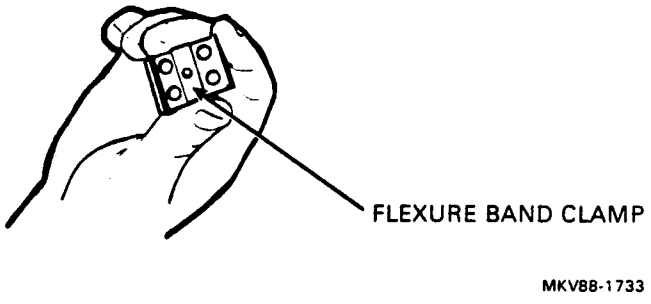


Figure 4-39 Flexure Band Clamp

7. Insert the three Allen mounting screws that secure the yoke to the bobbin on the linear actuator motor (Figure 4-34). **Do not tighten the screws.**

8. Adjust the gap between the hammerbank and the platen by performing the following steps.

   a. Insert the two platen gap gauges between the outside edges of the hammerbank and the platen collars (Figure 4-40). Close the platen by pushing the forms-thickness lever down to the closed position.

      NOTE
      An alternate way to set the gap between the platen and the hammerbank is to insert six sheets of single-part paper between the upper and lower tractors. Close the platen by pushing the forms-thickness lever down to the closed position and continue with Step 8b.

   b. Push the hammerbank against the platen, trapping the platen gap gauges between the outside edges of the hammerbank and the platen collars.

   c. While squeezing the hammerbank and the platen together, use the torque wrench to torque the lower flexure band clamp retaining screws to 25 inch-pounds.

   d. While squeezing the hammerbank and the platen together, use the torque wrench to torque the four Allen mounting screws that secure the yoke to the bobbin on the linear actuator motor to 25 inch-pounds.

   e. Open the platen by lifting the forms-thickness lever to the open position and remove the two platen gap gauges or the six sheets of single-part paper.

   f. Remove the three linear motor shim gauges, making sure that the shim gauges have equal and adequate play.

9. Connect the hammerbank ribbon cable to the ribbon cable connector on the cable clamp bracket (Figure 4-36).

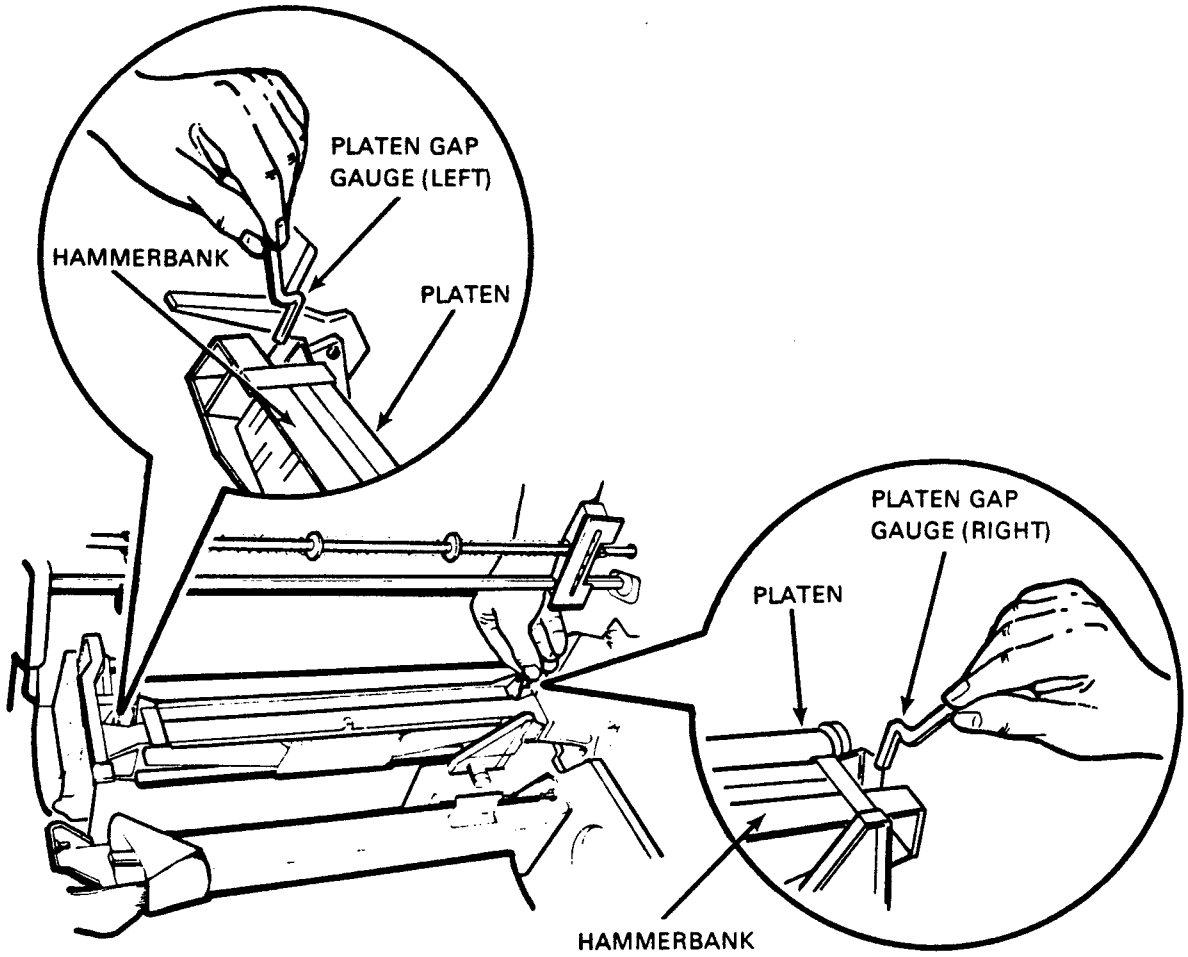


Figure 4-40 Hammerbank to Platen Gap Adjustment

10. Secure the ribbon cables to the cable clamp bracket using the plastic ribbon clamp.

11. Install the cable clamp bracket using the two mounting screws (Figure 4-35).

12. Align the raised white line on the position sensor vane with the raised white mark on the position sensor (Figure 4-41).

13. Adjust the gap between the position sensor vane and the position sensor by perform the following steps.

    a. Loosen the four inner screws on the base of the position sensor.

    b. In the gap between the position sensor and the front of the position sensor vane, insert the 0.017-inch sensor shim gauge.

    c. Tighten the four inner screws on the base of the position sensor.

14. Plug the power cord into the printer and an electrical outlet, turn the printer ON, and perform the SH0 test (Section 3.2.13).

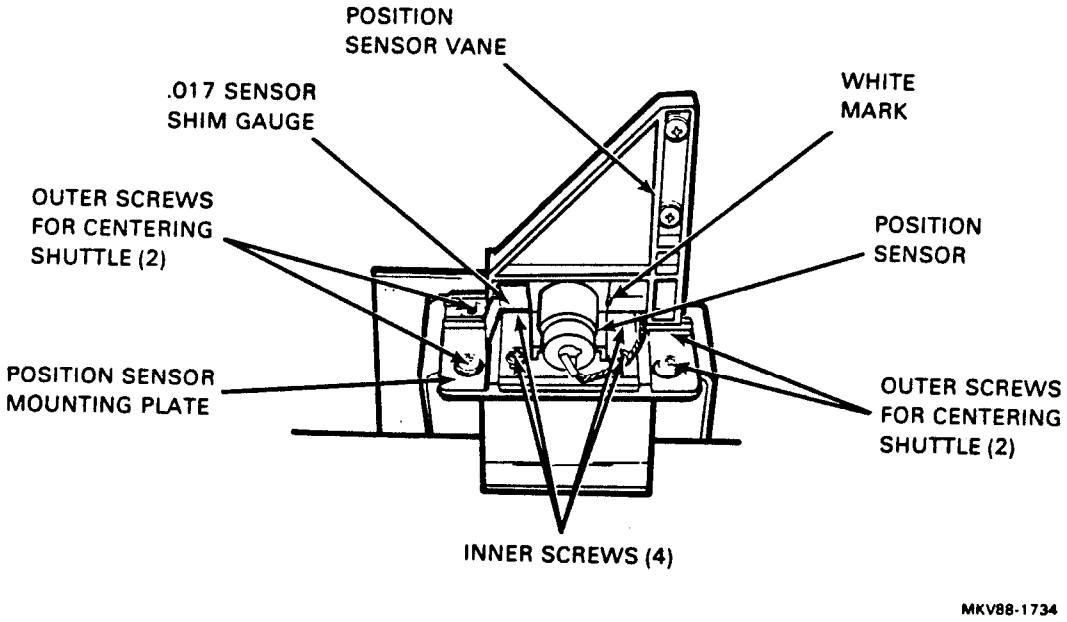


Figure 4-41 Position Sensor Gap Adjustment

15. Center the shuttle by performing the following steps.

    a. Loosen the four outer screws on the position sensor mounting plate (Figure 4-41).

    b. Move the position sensor to one side until the control panel displays LF00, LF01, RT00, or RT01. The sonalert beeper should beep slower or stop beeping.

    c. Tighten the four outer screws on the position sensor mounting plate.

16. Turn the printer OFF.

17. Install the ribbon platform by performing the following steps.

    a. Place the ribbon platform over the print-mechanism casting notches as shown in Figure 4-31.

    b. Reconnect the ribbon motor cable (Figure 4-32).

    c. Align the ribbon platform screw holes with the mounting bracket screw holes.

    d. Install the four ribbon platform mounting screws.

    e. Reconnect the air extension tube from the inboard plenum to the ribbon platform.

18. Install the ribbon cartridge.

19. Perform Steps 6 through 8 and Step 10 of the cover replacement procedure in Section 4.3.4.

20. Install paper in the printer and turn the printer ON.

21. Check the print quality by running the USTD test (Section 3.2.1).

22. Verify that the characters print across the full width of the print sample. If characters drop out on the right side, check the ribbon cartridge for proper installation.

    If further adjustment is necessary, check the ribbon platform installation procedures in Step 17.

23. After running the USTD test, turn the printer OFF.

24. Perform the rear panel removal procedure in Section 4.3.7.

25. Turn the printer ON.

26. Check the print quality by running the GRAY test from the control CPU board (Section 3.3/Table 3-3).

27. Check for a correct shuttle sweep: no overlaying and no white lines between the hammers (Figure 4-42). If either condition exists, adjust the position sensor gain for the proper shuttle sweep (Figure 4-43).

NOTE

On older printers, the position sensor gain potentiometer is located below the shuttle position sensor assembly and is accessed from below as shown in Figure 4-43. On newer printers, the board and gain potentiometer have been relocated next to the ribbon motor and are accessed from the front with the cover raised as shown in Figure 4-31.

28. Observe the printout for uniform density from side to side. If the density is greater on one side, adjust the platen gap by performing the following steps.

    a. Insert the three 0.025-inch linear motor shim gauges between the bobbin and the linear actuator motor (Figure 4-33).

    b. Loosen the four Allen mounting screws that secure the yoke to the bobbin on the linear actuator motor (Figure 4-34).

    c. Loosen the eight hammerbank flexure band clamp screws (Figure 4-37).

    d. Perform the procedure in Step 8.

29. Run the SHFQ test (Section 3.2.14).

30. Run the SH0 test (Section 3.2.13) again to verify the alignment.

31. Perform the rear panel replacement procedure in Section 4.3.8.

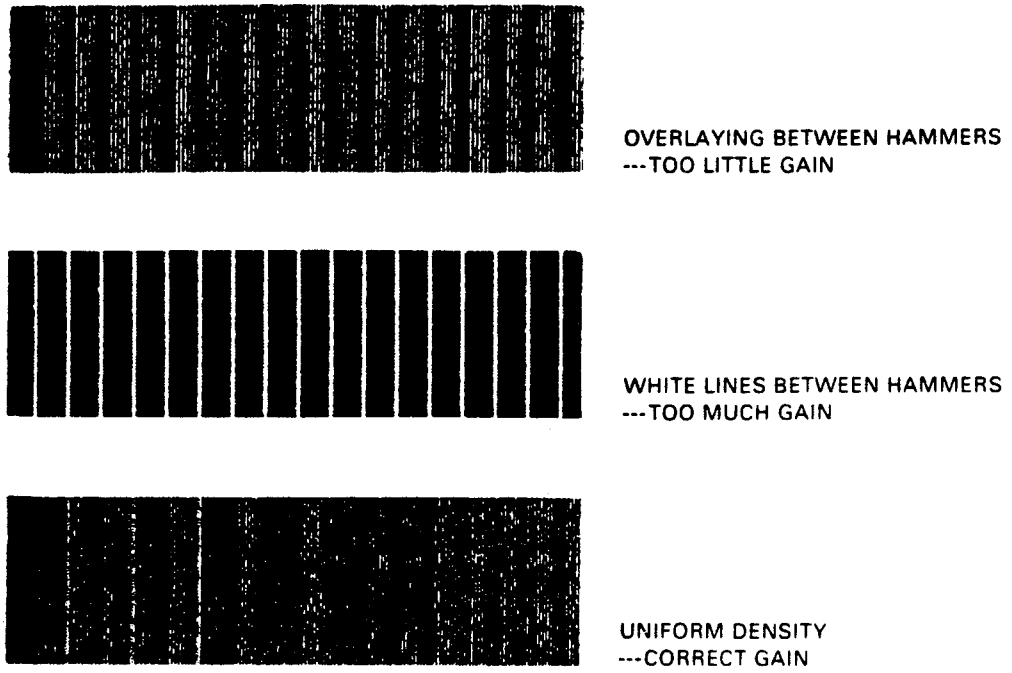


Figure 4-42 Sample GRAY Test Printout

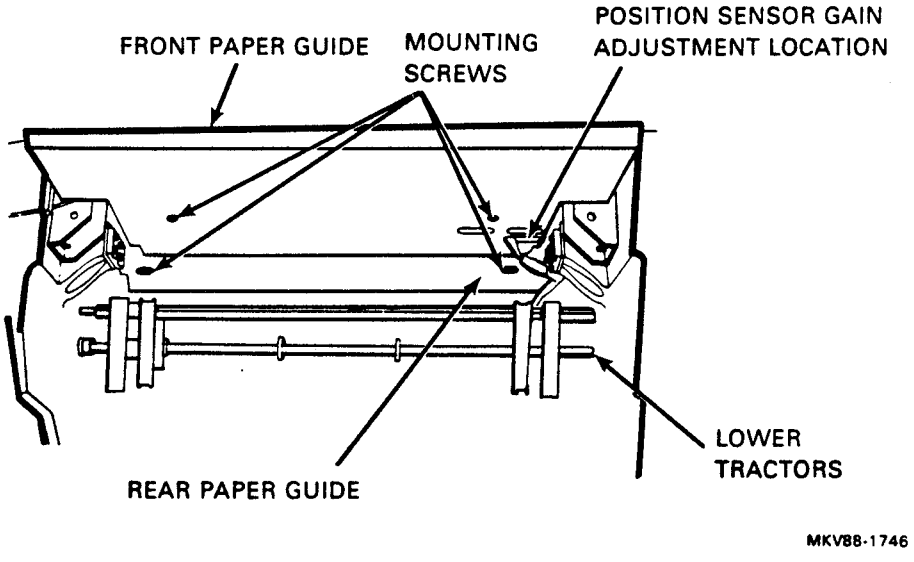


Figure 4-43 Position Sensor Gain Adjustment

4.9.3 Cleaning the Hammers

Dirt may prevent one or more of the hammers from firing. Use the following procedure to clean the hammers.

1. Perform Steps 1, 2, 3, 5 and 6 of the cover removal procedure in Section 4.3.3.

2. Perform Steps 2 and 3 of the hammerbank and yoke removal procedure in Section 4.9.1.

3. Take a piece of tablet paper and clean between the hammers and coils (Figure 4-44).

4. Perform Steps 17 and 18 of the hammerbank and yoke replacement procedure in Section 4.9.2.

5. Perform Steps 6 through 8 and Step 10 of the cover replacement procedure in Section 4.3.4.

6. Run the USTD test (Section 3.2.1) and check to see that all hammers are printing.

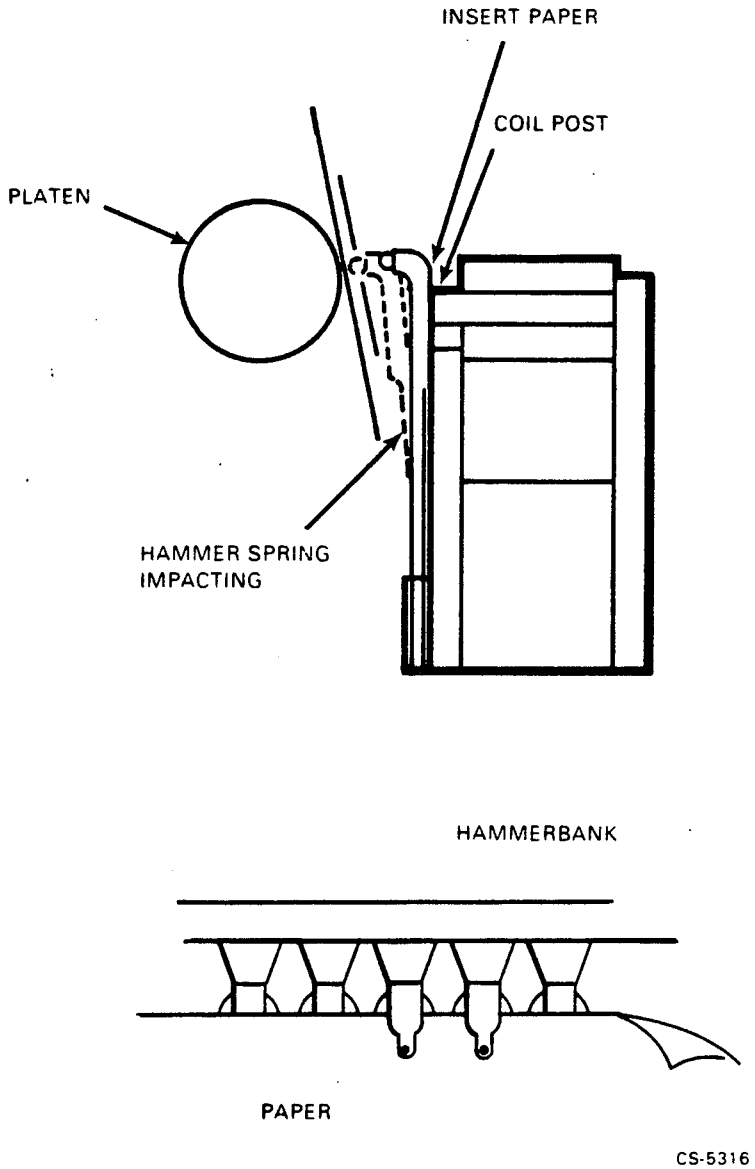


Figure 4-44 Cleaning the Hammers

4.10 BLOWER ASSEMBLY (P/N 29-25563)

Use the following procedures to remove and replace the blower assembly.

WARNING

Before performing any removal or replacement procedures for components inside the LG01 printer, make sure the power to the printer is OFF and the power cord is removed.

4.10.1 Removing the Blower Assembly

Use the following procedure to remove the blower assembly.

1. Perform Steps 1, 3, 5, and 6 of the cover removal procedure in Section 4.3.3.

2. Perform the rear panel removal procedure in Section 4.3.7.

3. Perform the right-side panel removal procedure in Section 4.3.11.

4. Unscrew the four hex screws and nuts, one at each corner of the sound baffle, and slide the sound baffle down through the paper path and out the front-door entrance (Figure 4-45). This process requires some manipulation of the sound baffle.

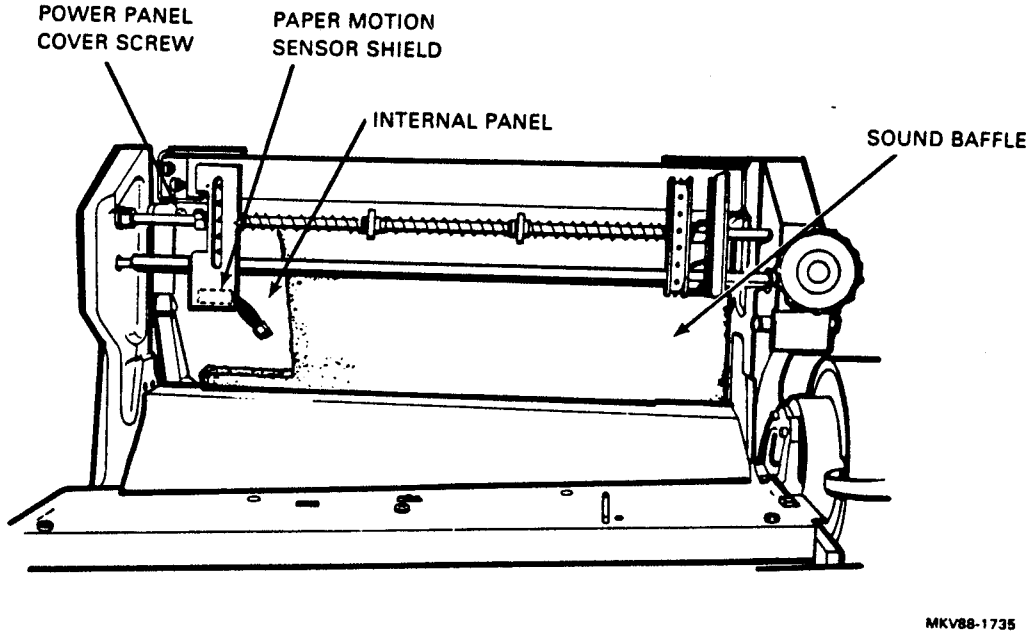


Figure 4-45 Sound-Baffle Location

5. Remove the screw securing the power panel cover which is located inside the left-rear corner of the printer. Notice that the blower motor cable enters this panel at the bottom.

6. Disconnect the leads from the blower motor cable at TB1-1 and TB1-2 (Figure 4-46).

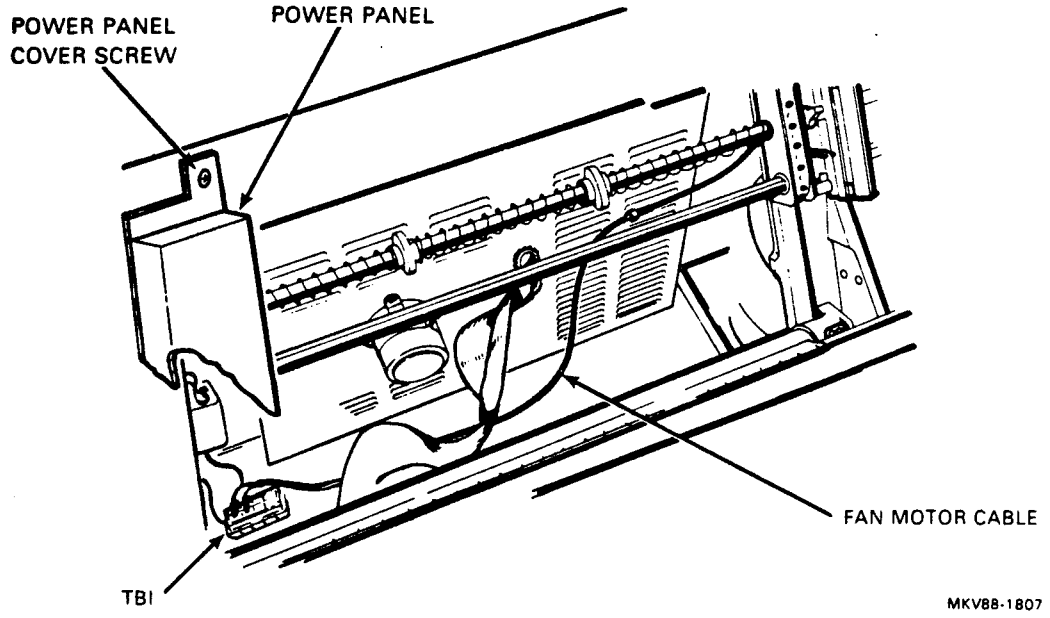


Figure 4-46 Blower Motor Cable Leads

7. Remove the air bellows from the linear actuator motor (Figure 4-25).

8. Disconnect the air extension tube (tan color) from the inboard plenum to the ribbon platform on the right side of the ribbon platform.

9. Remove the outboard and inboard plenums by performing the following steps.

   a. Remove the two outboard clamp screws that hold the clamp securing the outboard plenum to the blower assembly (Figure 4-24).

   b. On the inside frame, remove the self-tapping inboard plenum screw that secures the inboard plenum to the frame (Figure 4-24).

c. Remove the airflow sensor hose from the outboard plenum (Figure 4-24).

d. Remove the inboard and outboard plenums.

10. Disconnect the grounding strap from the internal side of the frame (Figure 4-24).

11. Remove the four kep nuts that secure the blower assembly to the blower assembly support plate (Figure 4-51).

12. Remove the blower assembly.

4.10.2 Replacing the Blower Assembly

Use the following procedure to replace the blower assembly.

CAUTION
Do not touch the fan blades. They are balanced at the factory.

1. Position the blower assembly on the blower assembly support plate and secure it with the four kep nuts (Figure 4-51).
2. Connect the blower motor cable leads to TB1-1 and TB1-2 (Figure 4-46).
3. Reinstall the power panel cover.
4. Reinstall the inboard plenum and secure it to the frame with the 5/16 self-tapping inboard plenum screw (Figure 4-24).
5. Reinstall the outboard plenum and secure it to the blower assembly with the plenum clamp and the two 5/16 outboard clamp screws (Figure 4-24).
6. Reattach the air bellows to the linear actuator motor (Figure 4-25).
7. Reconnect the air extension tube from the inboard plenum to the ribbon platform.
8. Reconnect the airflow sensor hose to the outboard plenum.
9. Reconnect the grounding strap (see Figure 4-24).
10. Reinstall the sound baffle.
11. Plug the power cord into the printer and an electrical outlet, then turn the printer ON and check the operation of the blower assembly and the printer.
12. Turn the power OFF.
13. Perform the right-side panel replacement procedure in Section 4.3.12.
14. Perform the rear panel replacement procedure in Section 4.3.8.
15. Perform Steps 6 through 8 and Step 10 of the cover replacement procedure in Section 4.3.4.

4.11 PAPER ADVANCE MOTOR/ENCODER (P/N 29-25555)

Use the following procedures to remove and replace the paper advance motor/encoder.

WARNING

Before performing any removal or replacement procedures for components inside the LG01 printer, make sure the power to the printer is OFF and the power cord is removed.

4.11.1 Removing the Paper Advance Motor/Encoder

Use the following procedure to remove the paper advance motor/encoder.

1. Perform Steps 1, 3, 5, and 6 of the cover removal procedure in Section 4.3.3.
2. Perform the rear panel removal procedure in Section 4.3.7.
3. Perform the right-side panel removal procedure in Section 4.3.11.
4. Disconnect the four leads from the paper advance motor/encoder (see Figure 4-47).
5. Remove the tie-wraps securing the encoder cable (Figure 4-48).
6. Disconnect the encoder cable from the card cage backplane and remove it from the cable clamp (Figure 4-48).

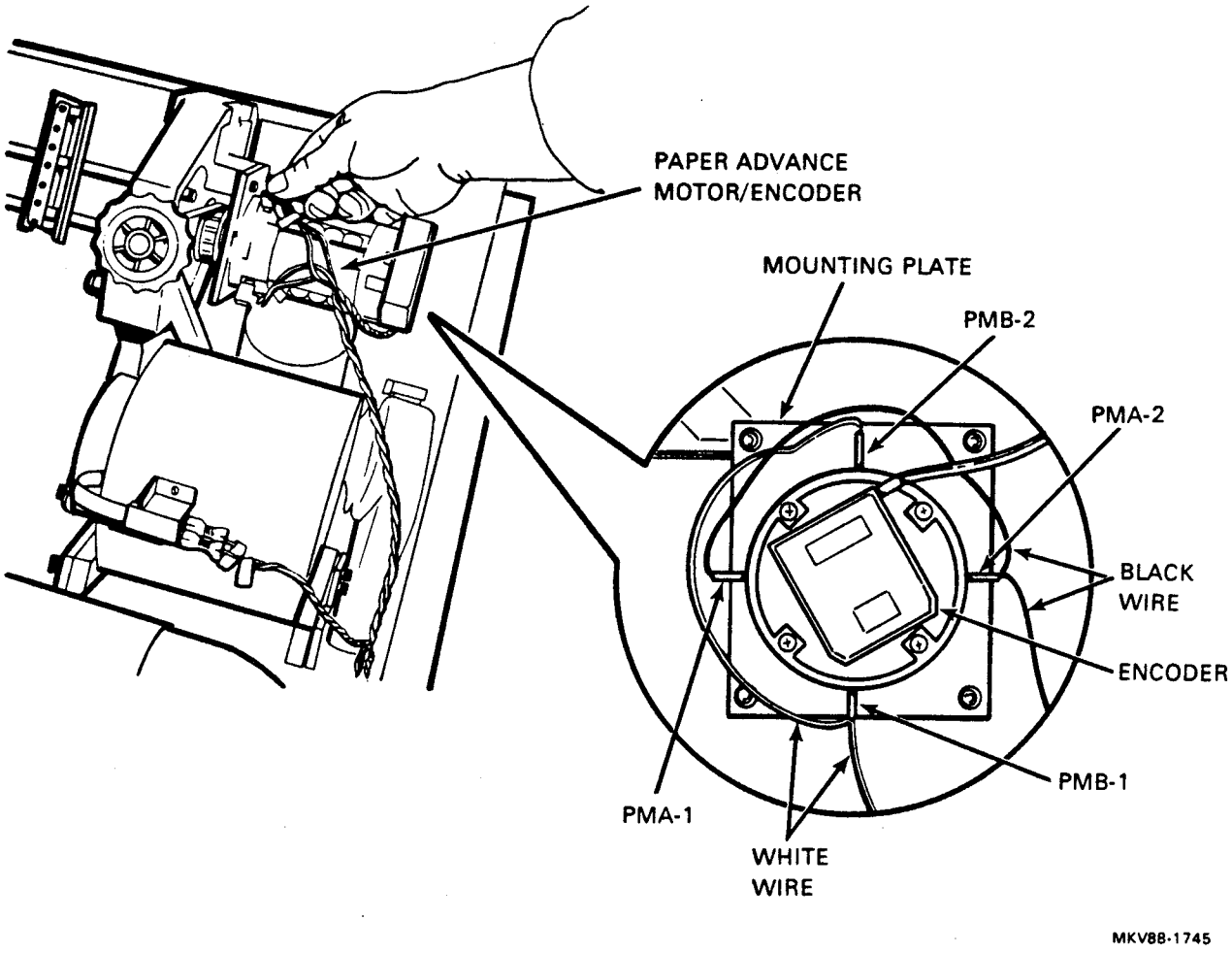


Figure 4-47 Paper Advance Motor/Encoder Location

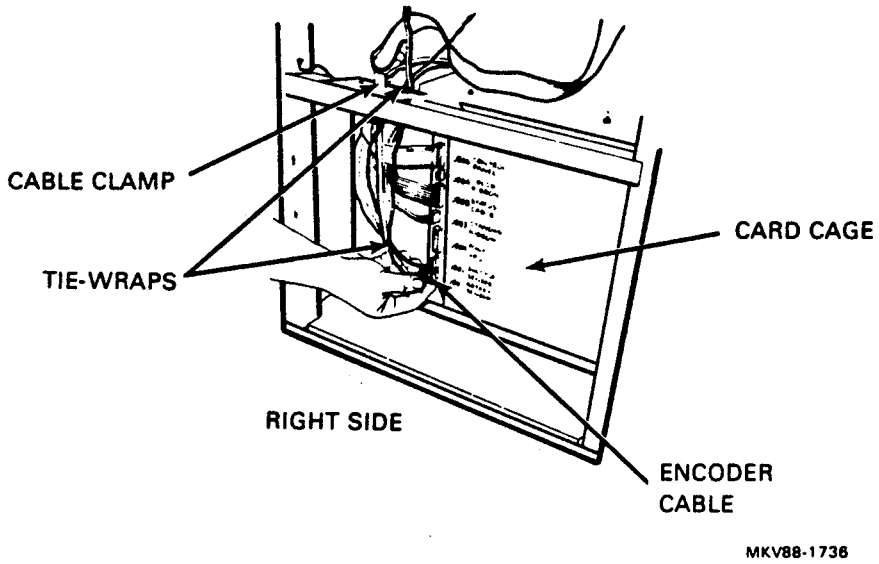


Figure 4-48 Encoder Cable and Card Cage Connection

NOTE

The upper to lower tractor phasing is critical for correct operation of the LG01 printer. Verify the upper and lower tractor phasing mark positions (Figure 4-21) before removing the drive belt so that it can be installed correctly during the replacement procedures.

7. Loosen the three hex base plate mounting screws holding the paper advance motor/encoder. The tension of the idler spring causes the paper advance motor/encoder to move.

8. Disconnect the idler spring from the paper advance motor/encoder base plate (Figure 4-49).

9. Remove the drive belt from the paper advance motor/encoder pulley.

10. Remove the three hex base plate mounting screws that secure the base plate to the frame and remove the paper advance motor/encoder (Figure 4-49).

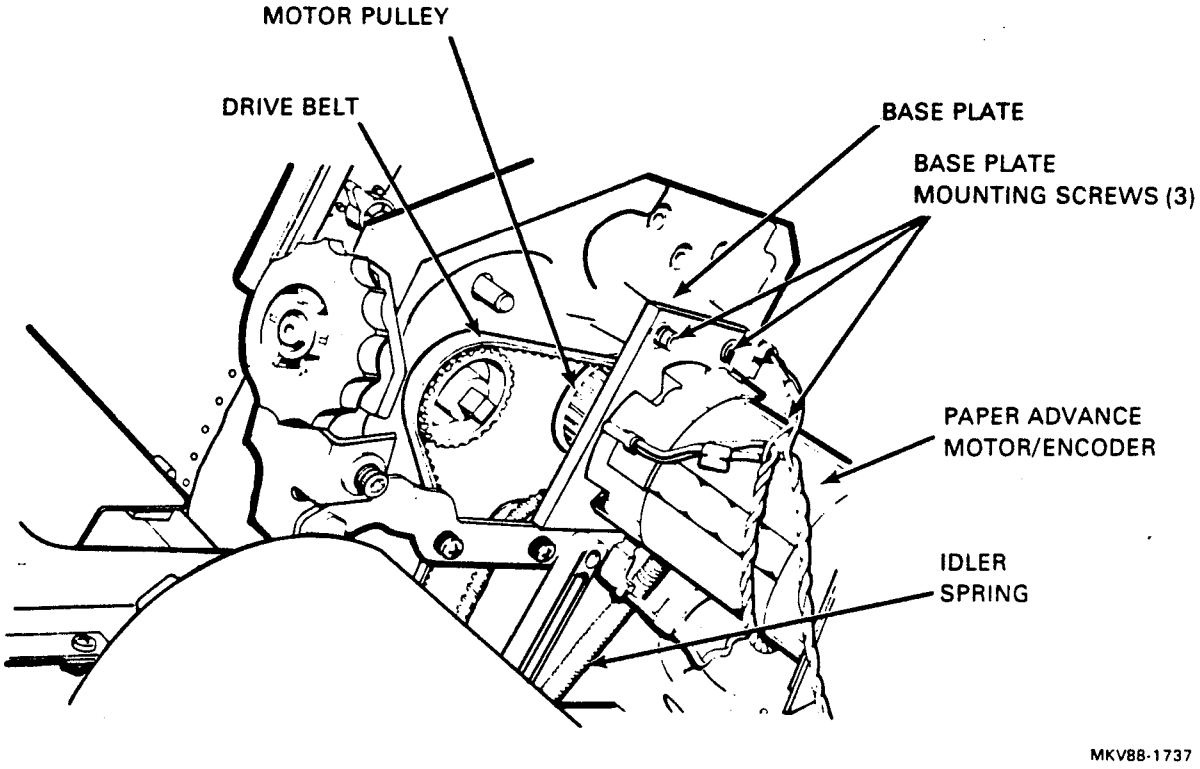


Figure 4-49 Paper Advance Motor/Encoder Components

4.11.2 Replacing the Paper Advance Motor/Encoder

Use the following procedure to replace the paper advance motor/encoder.

1. Position the paper advance motor/encoder base plate against the right-side frame and install the three hex base plate mounting screws (Figure 4-49).

   NOTE
   Do not tighten these screws at this time.

2. Reconnect the idler spring to the paper advance motor/encoder base plate.

3. Reconnect the four leads to the paper advance motor/encoder (Figure 4-47).

4. Route the encoder cable through the cable clamp and connect it to the card cage backplane (Figure 4-48).

5. Perform the tractor phasing alignment in Section 4.6.3.

6. Plug the printer into an electrical outlet, turn the printer ON, and load the printer with paper. Check that the paper tracks properly.

7. Perform the right-side panel replacement procedure in Section 4.3.12.

8. Perform the rear panel replacement procedure in Section 4.3.8.

9. Perform Steps 6 through 8 and Step 10 of the cover replacement procedure in Section 4.3.4.

4.12 LINEAR ACTUATOR MOTOR BOBBIN (P/N 29-25552)

Use the following procedures to remove and replace the linear actuator motor bobbin.

WARNING

Before performing any removal or replacement procedures for components inside the LG01 printer, make sure the power to the printer is OFF and the power cord is removed.

4.12.1 Removing the Linear Actuator Motor Bobbin

Use the following procedure to remove the linear actuator motor bobbin.

WARNING

The linear actuator motor and bobbin weighs 15.88 kg (35 lbs). Use normal lifting precautions when removing.

1. Perform Steps 1, 2, 3, 5, and 6 of the cover removal procedure in Section 4.3.3.
2. Perform the rear panel removal procedure in Section 4.3.7.
3. Perform the right-side panel removal procedure in Section 4.3.11.
4. Open the front door of the printer.
5. Performs Steps 2 through 6 of the hammerbank and yoke removal procedure in Section 4.9.1.
6. Disconnect the leads from the linear actuator motor (Figure 4-50).
7. Disconnect the air bellows from linear actuator motor (Figure 4-25).
8. Remove the two 5/16 outboard clamp screws that hold the clamp securing the outboard plenum to the blower assembly (Figure 4-24).
9. On the inside frame, remove the 5/16 self-tapping inboard plenum screw that secures the inboard plenum to the frame (Figure 4-24).
10. Remove the airflow sensor hose from the outboard plenum (Figure 4-24).

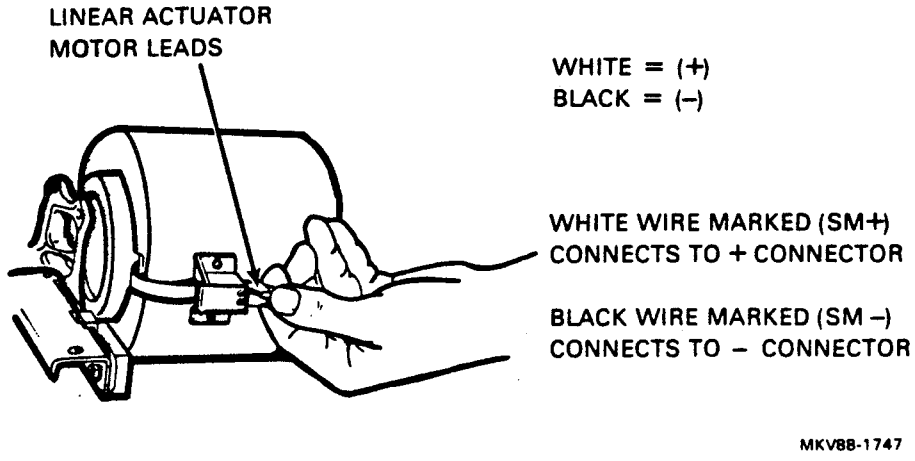


Figure 4-50 Linear Actuator Motor Leads

11. Remove the inboard and outboard plenums.

12. Four flexure straps are used for mounting the linear actuator motor (Figure 4-51). Loosen the eight mounting hex screws from the bottom of the four flexure straps (two screws on each flexure strap).

13. While supporting the linear actuator motor securely, remove the eight mounting hex screws from the bottom of the four flexure straps (Figure 4-51).

14. Carefully lift the linear actuator motor and bobbin from the printer.

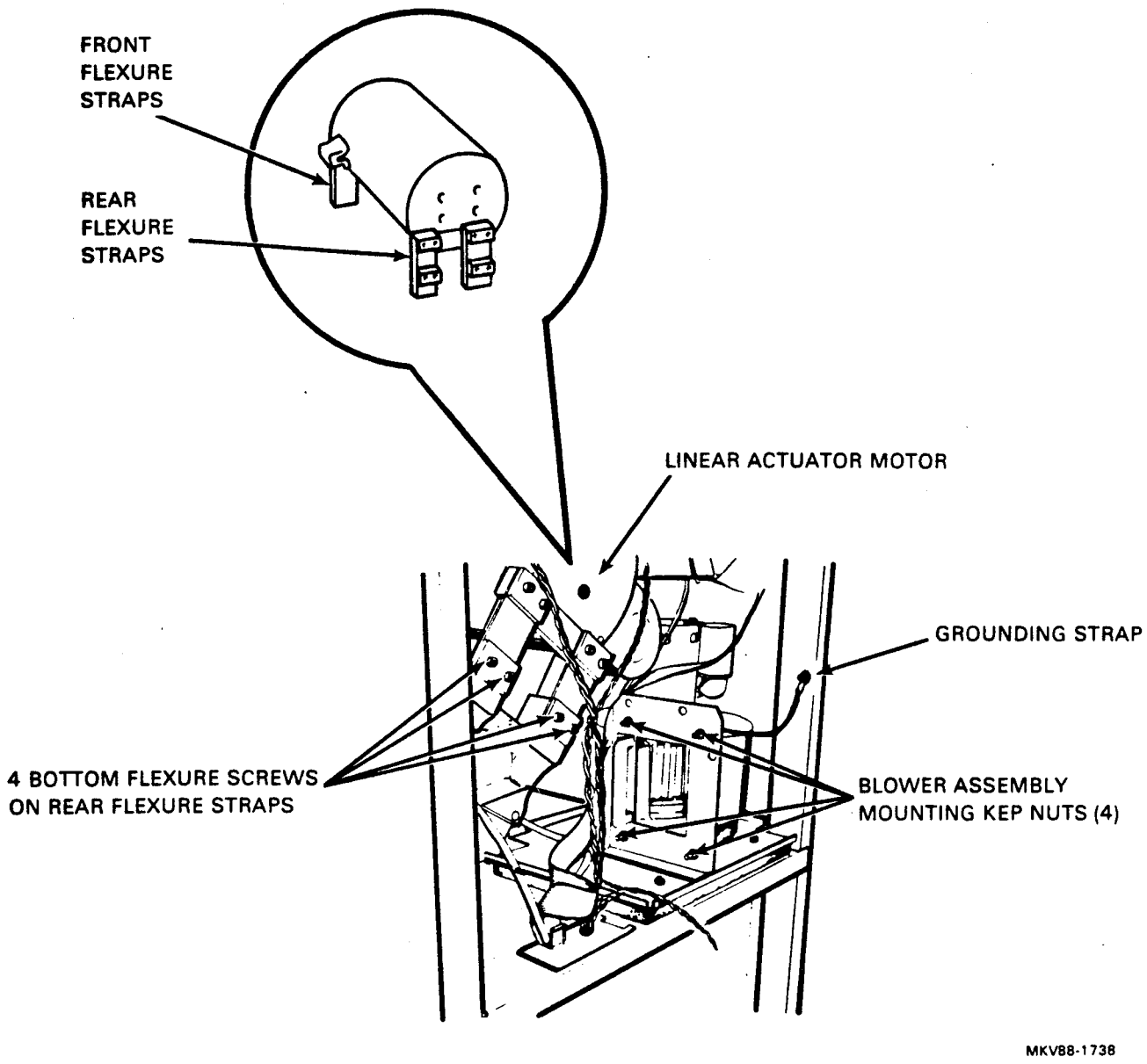


Figure 4-51 Flexure Straps and Mounting Screws

4.12.2 Replacing the Linear Actuator Motor Bobbin

Use the following procedure to replace the linear actuator motor bobbin.

1. Carefully position the linear actuator motor and bobbin in place (Figure 4-52) and insert the eight mounting hex screws into the bottom of the four flexure straps. **Do not completely tighten these screws.**

2. To set the linear actuator motor height, insert the linear motor spacer blocks between the upper and lower flexure straps on the front and rear of the linear actuator motor (Figure 4-52).

3. Tighten the eight mounting hex screws on the flexure straps to 25 inch-pounds.

4. Remove the linear motor spacer blocks.

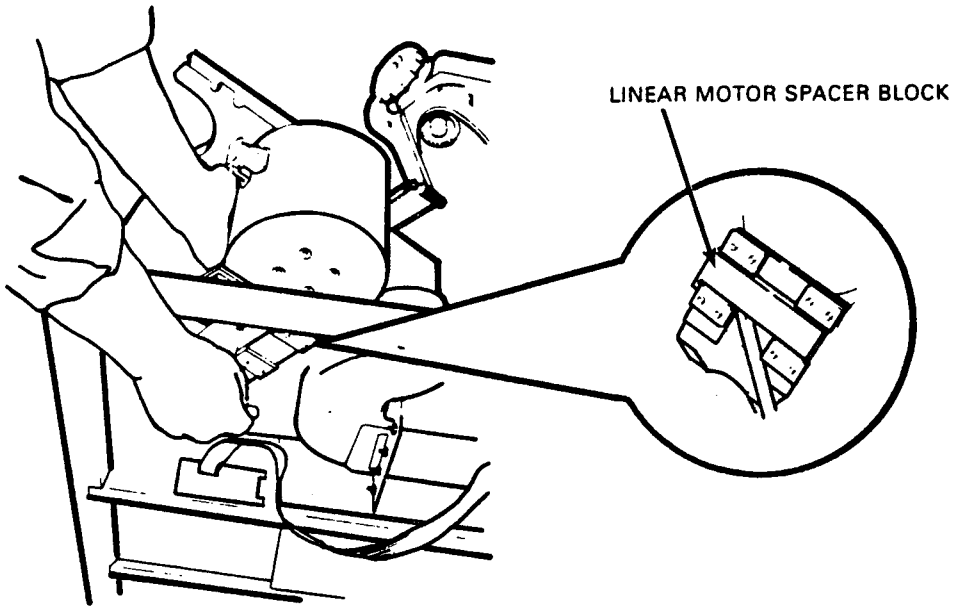


Figure 4-52 Linear Motor Spacer Block Placement

5. Install the inboard plenum and secure it to the frame with the 5/16 self-tapping inboard plenum screw (Figure 4-24).

6. Install the outboard plenum and secure it to the blower assembly with the plenum clamp and the two 5/16 outboard clamp screws.

7. Reconnect the airflow sensor hose to the outboard plenum.

8. Reconnect the air bellows to the linear actuator motor (Figure 4-25).

9. Insert but do not tighten the four Allen mounting screws that secure the yoke to the bobbin on the linear actuator motor.

10. Insert the three 0.025-inch linear motor shim gauges between the bobbin and the linear actuator motor. The linear actuator motor can be moved slightly to insert the shim gauges.

11. Adjust the forward/backward placement of the linear actuator motor so that the bobbin aligns with the hammerbank yoke.

12. With a torque wrench, torque the four Allen mounting screws that secure the yoke to the bobbin on the linear actuator motor to 25 inch-pounds.

13. Remove the linear motor shim gauges.

14. Reconnect the leads to the linear actuator motor (Figure 4-50).

15. Plug the power cord into the printer and an electrical outlet, turn the printer ON, and perform the SH0 test (Section 3.2.13).

16. If necessary, center the shuttle by performing the following steps.

    a. Loosen the four outer screws on the position sensor mounting plate (Figure 4-41).

    b. Move the position sensor to one side until the control panel displays LF00, LF01, RT00, or RT01. The sonalert beeper should beep slower or stop beeping.

    c. Tighten the four outer screws on the position sensor mounting plate.

17. Turn the printer OFF.

18. Check the platen gap (refer to the replacing the hammerbank and yoke assembly procedure in Section 4.9.2).

19. Install the ribbon platform by performing the following steps.

    a. Place the ribbon platform over the print-mechanism casting notches as shown in Figure 4-31.

    b. Reconnect the ribbon motor cable (Figure 4-32).

    c. Align the ribbon platform screw holes with the mounting bracket screw holes.

    d. Install the four ribbon platform mounting screws.

    e. Reconnect the air extension tube from the inboard plenum to the ribbon platform.

20. Install the ribbon cartridge.

21. Turn the printer ON.

22. Load paper into the printer and run the SH0 test (Section 3.2.13), the SHFQ test (Section 3.2.14), and the GRAY test (Section 3.3/Table 3-3).

23. Perform the right-side panel replacement procedure in Section 4.3.12.

24. Perform the rear panel replacement procedure in Section 4.3.8.

25. Perform Steps 6 through 8 and Step 10 of the cover replacement procedure in Section 4.3.4.

4.13 PAPER MOTION SENSOR ASSEMBLY

Use the following procedures to remove and replace the paper motion sensor assembly. The paper motion sensor assembly is part of the upper-left tractor and not a separate FRU. The upper-left and upper-right tractors must be replaced if the paper motion sensor fails.

WARNING

Before performing any removal or replacement procedures for components inside the LG01 printer, make sure the power to the printer is OFF and the power cord is removed.

4.13.1 Removing the Paper Motion Sensor Assembly

To remove the paper motion sensor assembly, refer to the upper tractor removal procedure in Section 4.6.1.

4.13.2 Replacing the Paper Motion Sensor Assembly

Replace the paper motion sensor assembly by following the upper tractor replacement procedure in Section 4.6.2.

After replacing the upper-left and upper-right tractors, check the operation of the paper motion sensor assembly by performing the following steps.

1. Plug the power cord into the printer and into an electrical outlet and turn the printer ON.
2. With paper loaded, run the USTD test (Section 3.2.1). A paper motion fault SHOULD NOT occur.
3. Remove the paper from the upper-left tractor and run the USTD test again. A paper motion fault SHOULD occur.
4. If the conditions in Steps 2 and 3 are met, the paper motion sensor assembly is working properly.
5. Reinstall the paper in the upper-left tractor.

4.14 SHUTTLE POSITION SENSOR ASSEMBLY (P/N 29-25584)

Use the following procedures to remove and replace the shuttle position sensor assembly.

WARNING

Before performing any removal or replacement procedures for components inside the LG01 printer, make sure the power to the printer is OFF and the power cord is removed.

4.14.1 Removing the Shuttle Position Sensor Assembly

Use the following procedure to remove the shuttle position sensor assembly.

1. Perform Steps 1, 2, 3, 5, and 6 of the cover removal procedure in Section 4.3.3.
2. Open the printer front door.
3. Remove the four front paper guide mounting screws and lift the front paper guide out (Figure 4-43).

NOTE

Move the lower tractors to the left and right frames so that the front paper guide can be removed.

4. Perform Steps 2 and 3 of the hammerbank and yoke assembly removal procedure in Section 4.9.1.
5. Remove the two rear paper guide mounting screws and lift the rear paper guide out (Figure 4-43).
6. Remove the two screws securing the shuttle position sensor vane to the hammerbank and carefully remove the shuttle position sensor vane (Figure 4-53).
7. Remove the four outer screws securing the shuttle position sensor to the position sensor mounting bracket (Figure 4-53).
8. Remove the cable connected to the position sensor board (Figure 4-54).
9. Remove the three nuts securing the position sensor board to the bracket (Figure 4-54).
10. Remove the position sensor board.

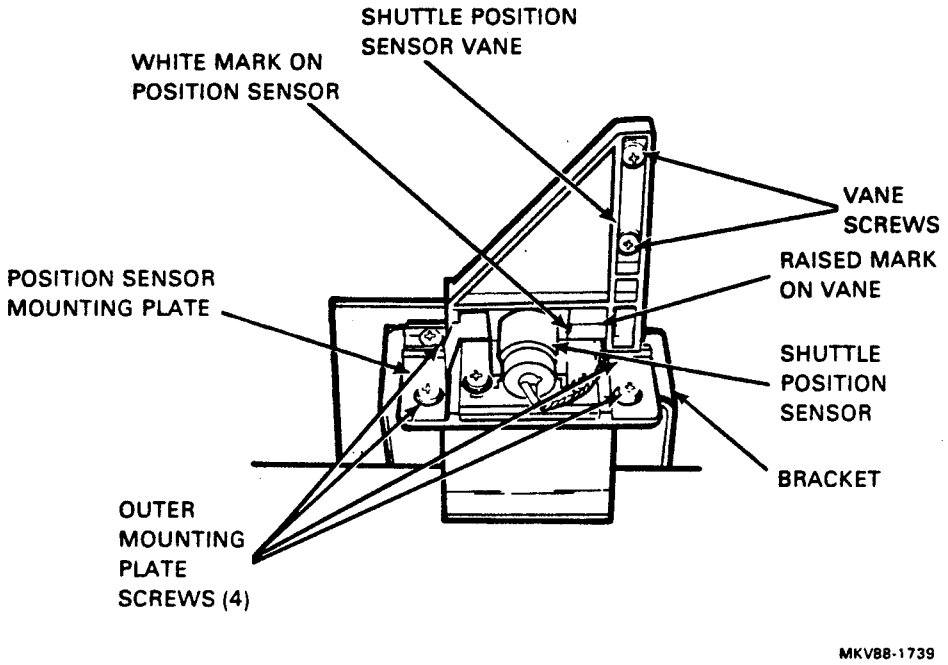


Figure 4-53 Shuttle Position Sensor Assembly

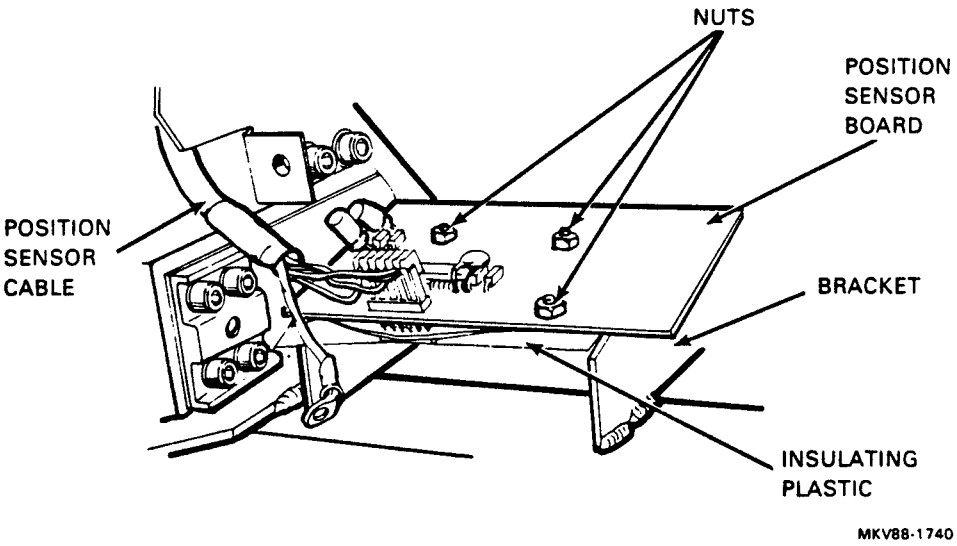


Figure 4-54 Shuttle Position Sensor Board

4.14.2 Replacing the Shuttle Position Sensor Assembly

Use the following procedure to replace the shuttle position sensor assembly.

1. Place the shuttle position sensor assembly so that it sits properly on the sensor position mounting bracket. Install, but do not tighten the four mounting screws.

2. Install the shuttle position sensor board with the three nuts, making sure that the insulating plastic is between the bracket and the board (Figure 4-54).

3. Install the vane screws in the shuttle position sensor vane (Figure 4-53). Position the position sensor vane so that the raised white mark on the vane aligns with the center of the white mark on the position sensor.

4. Tighten the position sensor vane mounting screws.

5. Insert the 0.017-inch sensor shim gauge on the front side of the sensor between the sensor and the vane (Figure 4-41). Tighten the position sensor mounting screws.

6. Connect the position sensor cable to the shuttle position sensor board (Figure 4-54).

7. Plug the printer into an electrical outlet, turn the printer ON, and perform the SH0 test (Section 3.2.13). If necessary, center the shuttle by performing Step 15 of the hammerbank and yoke assembly replacement procedure (Section 4.9.2).

8. Turn the printer OFF.

9. Install the rear paper guide with the two mounting screws.

10. Install the ribbon platform by performing the following steps.

    a. Place the ribbon platform over the print-mechanism casting notches as shown in Figure 4-31.

    b. Reconnect the ribbon motor cable (Figure 4-32).

    c. Align the ribbon platform screw holes with the mounting bracket screw holes.

d. Install the four ribbon platform mounting screws.

e. Reconnect the air extension tube from the inboard plenum to the ribbon platform.

11. Install the ribbon cartridge.

12. Turn the printer ON.

13. Load paper in the printer.

14. Perform the SHFQ test (Section 3.2.14). If the left/right ratio is not 100% ± 4%, adjust the shuttle position sensor vane height.

15. Check the position sensor gain and the print quality by performing the GRAY test (Section 3.3/Table 3-3).

16. Adjust the sensor gain if necessary. See Step 27 of the hammerbank and yoke replacement procedure in Section 4.9.2.

17. Install the front paper guide with the four mounting screws.

18. Perform Steps 6 through 8 and Step 10 of the cover replacement procedure in Section 4.3.4.

4.15 PAPER OUT SWITCH

Use the following procedures to remove and replace the paper out switch. The paper out switch is part of the lower-left tractor and not a separate FRU. The lower-left and lower-right tractors must be replaced if the paper out switch fails.

WARNING

Before performing any removal or replacement procedures for components inside the LG01 printer, make sure the power to the printer is OFF and the power cord is removed.

4.15.1 Removing the Paper Out Switch

To remove the paper out switch, refer to the lower tractor removal procedure in Section 4.6.4.

4.15.2 Replacing the Paper Out Switch

Replace the paper out switch by following the lower tractor replacement procedure in Section 4.6.5.

After replacing the lower-left and lower-right tractors, check the operation of the paper out switch by performing the following steps.

1. Plug the printer into an electrical outlet, load the printer with paper, and turn the printer ON. A paper out fault SHOULD NOT occur.

2. Remove the paper from the lower-left tractor and close the tractor door. A paper out fault SHOULD occur.

3. If the conditions in Steps 1 and 2 are met, the paper out switch is working properly.

4. Reinstall the paper in the lower-left tractor.

4.16 POWER SUPPLY

Use the following procedures to remove and replace the power rectifier/regulator board and the power supply assembly.

WARNING

Before performing any removal or replacement procedures for components inside the LG01 printer, make sure the power to the printer is OFF and the power cord is removed.

4.16.1 Removing the Power Rectifier/Regulator Board (P/N 29-25577)

Use the following procedure to remove the power rectifier/regulator board.

1. Turn the power to the printer OFF and remove the power cord.

2. Perform the rear panel removal procedure in Section 4.3.7.

3. Remove the power amplifier board from the card cage (Figure 4-55).

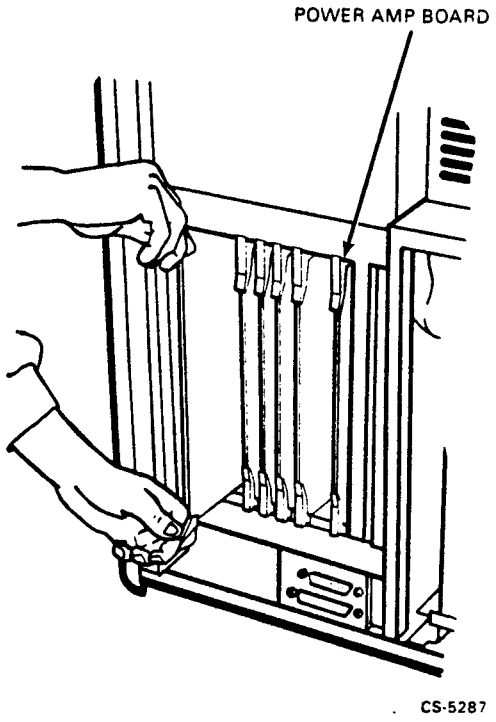


Figure 4-55 Power Amplifier Board Removal

4. Disconnect the cable from J805 on the inside rear of the card cage (Figure 4-56).

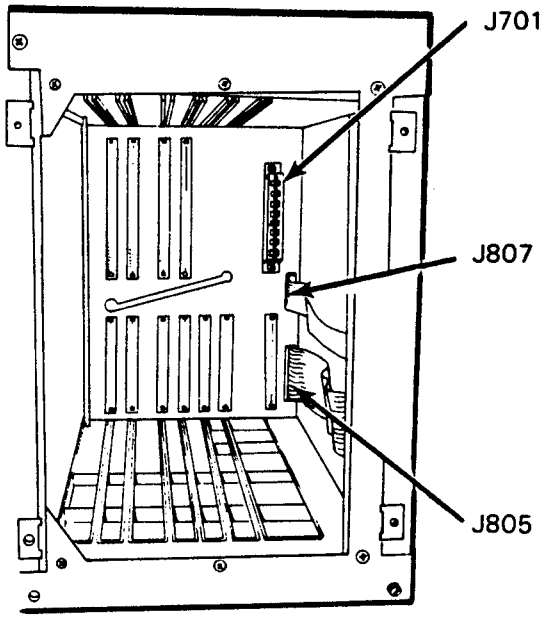


Figure 4-56 Card Cage Cables

5. Disconnect J7, J3A, and J3B from the power rectifier/ regulator board (Figure 4-57).

6. Remove the wire connected to the TAB located on the bottom-right corner of the power rectifier/regulator board.

7. Disconnect J903 from the hammer-driver board (Figure 4-57).

8. Remove the two nuts securing the leads from the bleeder resistor to the power rectifier/regulator board.

9. Remove the nut securing the green/yellow ground wire to the power rectifier/regulator board from the chassis frame.

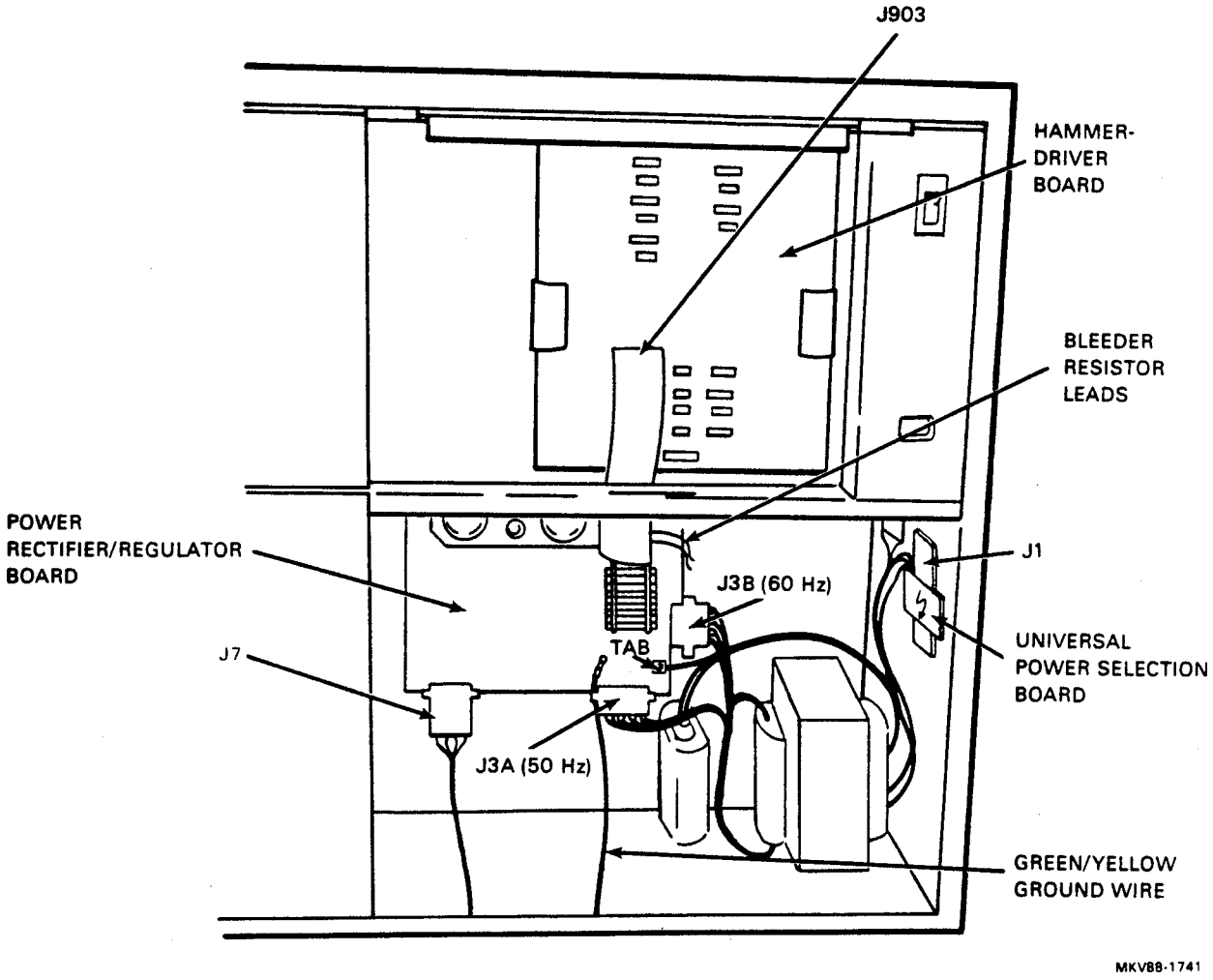


Figure 4-57 Location of Power Supply Components

10. Perform Step 4 of the sound baffle removal procedure in Section 4.10.1 or remove the left-side panel (Section 4.3.9).

11. Remove the two screws holding the capacitor assembly in place (Figure 4-58) through the access provided from the previous step.

12. Remove the six mounting screws holding the power rectifier/regulator board in place (Figure 4-58) and remove the board from the cabinet.

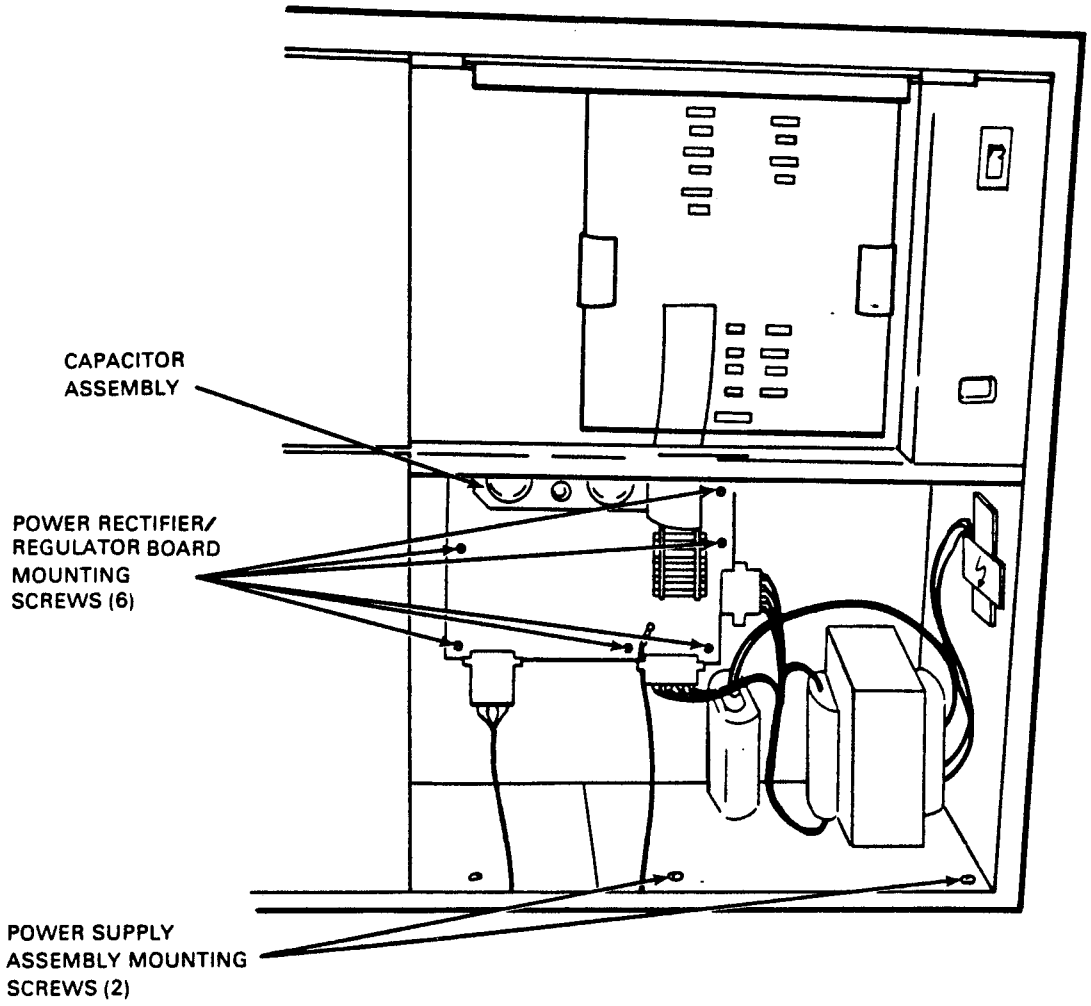


Figure 4-58 Power Rectifier/Regulator Board

4.16.2 Replacing the Power Rectifier/Regulator Board

Use the following procedure to replace the power rectifier/regulator board.

1. Position the power rectifier/regulator board and install the six retaining screws (Figure 4-58).

2. Position the capacitor assembly and install the two retaining screws.

3. Position the sound baffle and install the four retaining screws (Figure 4-45) or replace the left-side panel (Section 4.3.10).

4. Reconnect the two wires from the bleeder resistor to the power rectifier/regulator board with the two nuts (Figure 4-57).

5. Reconnect the green/yellow ground wire from the chassis frame to the power rectifier/regulator board with the retaining nut.

6. Reconnect the wire from the secondary side of the transformer to the TAB located on the bottom-right corner of the power rectifier/regulator board.

7. Reconnect J3A and J3B to the power rectifier/regulator board (Figure 4-57). Refer to the printer power options section in Chapter 2 of the LG01 600 LPM Text Printer Installation/Operator's Manual for the proper power configuration connections.

8. Connect the power cord to the printer, turn the power ON, and check the following voltages on the power rectifier/regulator board.

Connector	Pins	Vdc	Tolerance
P805	4 to 1	+24	±3.0 Vdc
P805	12 to 7	+8	+2.0 to -0.4 Vdc
P805	8 to 1	+15	±0.75 Vdc
P805	6 to 1	-15	±0.75 Vdc
P805	2 to 1	+20	±1.0 Vdc

9. Turn the power OFF, unplug the printer, and connect the cable to J805 (Figure 4-56) on the inside rear of the card cage, and the cable to J903 (Figure 4-57) on the hammer-driver board.

10. Insert the power amplifier board in the card cage (Figure 4-55).

11. Plug the printer into an electrical outlet, turn the power ON, and check the following voltages on the power rectifier/regulator board.

Connector	Pins	Vdc	Tolerance
P7	1 to 2	+77	+3.0 to -4.0 Vdc
P903	10 to 6	+68	±1.0 Vdc

If +68 Vdc is incorrect, adjust R2 on the power rectifier /regulator board to obtain the proper voltage reading.

12. Turn the power OFF, unplug the printer, and reconnect J7 (Figure 4-57) to the power rectifier/regulator board.

13. Plug the printer into an electrical outlet, turn the power ON, and check the printer operation.

14. Perform the rear panel replacement procedure in Section 4.3.8.

4.16.3 Removing the Power Supply Assembly

Use the following procedure to remove the power supply assembly.

WARNING

The power supply assembly weighs 18.14 kg (40 lbs). Use normal lifting precautions when removing.

1. Turn OFF the power and remove the power cord from the printer.
2. Perform the rear panel removal procedure in Section 4.3.7.
3. Disconnect J3A and J3B from the power rectifier/regulator board (Figure 4-57).
4. Remove the wire connected to the TAB located on the bottom-right corner of the power rectifier/regulator board.
5. Remove the two nuts securing the clear plastic cover to the universal power selection board.
6. Disconnect J1 from the universal power selection board (Figure 4-57).
7. Remove the two screws securing the universal power selection board to the side frame and remove the board.
8. Remove the two mounting screws from the power supply assembly (Figure 4-58).
9. Carefully slide the power supply assembly out of the printer.

4.16.4 Replacing the Power Supply Assembly

Use the following procedure to replace the power supply assembly.

1. Carefully slide the power supply assembly into place in the printer and secure it with the two mounting screws.

2. Position the universal power selection board and install the two mounting screws (Figure 4-57).

3. Reconnect J1 to the universal power selection board (Figure 4-57). Refer to the printer power options section in Chapter 2 of the LG01 600 LPM Text Printer Installation/Operator's Manual for the proper power configuration connections.

4. Position the clear plastic cover over the universal power selection board and secure it with the two nuts.

5. Reconnect the wire to the TAB located on the bottom-right corner of the power rectifier/regulator board.

6. Reconnect J3A and J3B to the power rectifier/regulator board (Figure 4-57). Refer to the printer power options section in Chapter 2 of the LG01 600 LPM Text Printer Installation/Operator's Manual for the proper power configuration connections.

7. Connect the power cord, turn the power ON, and check the following voltages on the power rectifier/ regulator board.

Connector	Pins	Vdc	Tolerance
P805	4 to 1	+24	±3.0 Vdc
P805	12 to 7	+8	+2.0 to -0.4 Vdc
P805	8 to 1	+15	±0.75 Vdc
P805	6 to 1	-15	±0.75 Vdc
P805	2 to 1	+20	±1.0 Vdc

8. Turn the power OFF.

9. Perform the rear panel replacement procedure in Section 4.3.8.

4.17 HAMMER-DRIVER BOARD (P/N 29-25556)

Use the following procedures to remove and replace the hammer-driver board.

WARNING

Before performing any removal or replacement procedures for components inside the LG01 printer, make sure the power to the printer is OFF and the power cord is removed.

4.17.1 Removing the Hammer-Driver Board

Use the following procedure to remove the hammer-driver board.

1. Perform the rear panel removal procedure in Section 4.3.7.

WARNING

There is 70 volts across the two capacitor mounting screws. Using the screwdriver and the clip lead, short out the capacitor mounting screws before starting the removal procedure (Figure 4-59).

2. Disconnect J901, J902, J903, and J904 from the hammer-driver board (Figure 4-59).

3. Remove the six hammer-driver board mounting screws and the two capacitor mounting screws from the hammer-driver board (Figure 4-59).

4. Remove the hammer-driver board.

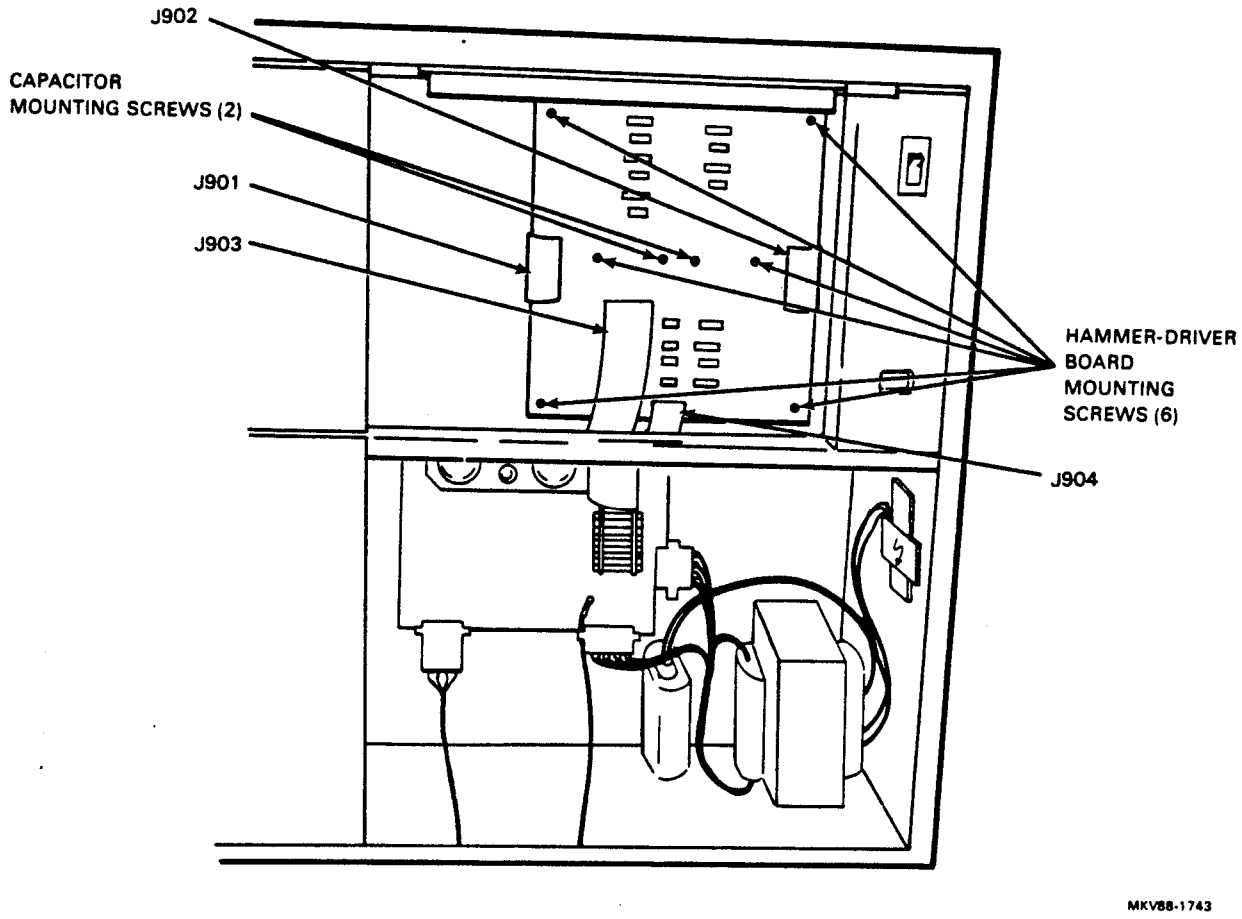


Figure 4-59 Hammer-Driver Board

4.17.2 Replacing the Hammer-Driver Board

Use the following procedure to replace the hammer-driver board.

1. Position the hammer-driver board in the printer and install the six hammer-driver board mounting screws and the two capacitor mounting screws (Figure 4-59).

2. Reconnect J901, J902, J903, and J904 to the hammer-driver board.

3. Plug the printer into an electrical outlet, turn the power ON, and check the printer's operation. Verify that all hammers are printing by running the USTD test (Section 3.2.1).

4. Perform the rear panel replacement procedure in Section 4.3.8.

4.18 BULKHEAD PANEL ASSEMBLY (Serial -- P/N 29-26214, Parallel -- P/N 29-26159)

Use the following procedures to remove and replace the bulkhead panel assembly.

WARNING

Before performing any removal or replacement procedures for components inside the LG01 printer, make sure the power to the printer is OFF and the power cord is removed.

4.18.1 Removing the Bulkhead Panel Assembly

Use the following procedure to remove the bulkhead panel assembly.

1. Disconnect the communications cable from the bulkhead panel assembly (Figure 4-60).
2. Perform the rear panel removal procedures in Section 4.3.7.
3. Remove the four mounting screws and lift out the bulkhead panel assembly (Figure 4-60).

NOTE

To gain access to the two hidden screws on the left side of the bulkhead panel assembly, loosen the three right-side panel rear retaining screws (Figure 4-10) and push the right-side panel away from the printer.

4. Remove the cable connecting the bulkhead panel assembly to the printer.

4.18.2 Replacing the Bulkhead Panel Assembly

Use the following procedure to replace the bulkhead panel assembly.

1. Position the bulkhead panel assembly and reconnect the cable connecting the bulkhead panel assembly to the printer.

2. Position the bulkhead panel assembly and install the four mounting screws.

3. Push the rear edge of the right-side panel back into place and tighten the three right-side panel rear retaining screws.

4. Perform the rear panel replacement procedure in Section 4.3.8.

5. Reconnect the communications cable to the bulkhead panel assembly.

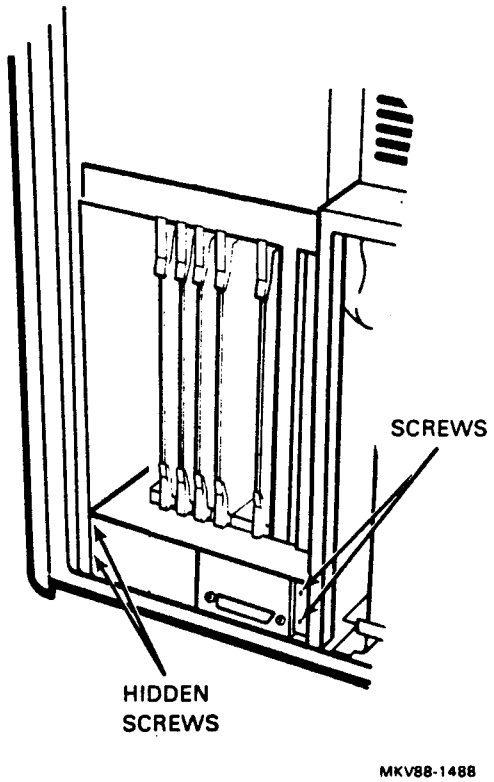


Figure 4-60 Bulkhead Panel Assembly

Table 5-1 contains a list of the recommended spare parts and FRUs for the LG01 printer.

Table 5-1 Recommended Spare Parts and FRUs

Part Description	Part Number
Fabric Ribbon (4/box)	29-25549
Gauge Kit	29-25551
Linear Actuator Motor Bobbin	29-25552
Hammerbank and Yoke Assembly	29-25553
Pico fuse -- 2 A	29-25554
Paper Advance Motor/Encoder	29-25555
Hammer-Driver Board	29-25556
Control Panel Board	29-25557
Airflow Sensor Switch	29-25558
Sequencer Board	29-25560
LG01 Control CPU Board	29-25561
Ribbon Drive Motor	29-25562
Blower Assembly	29-25563
LG01 Serial I/O Board	29-25564
LG01 Parallel I/O Board	29-25569
Paper Drive Belt	29-25570
Platen Open Switch	29-25572
Power Amplifier Board	29-25573
Paper and Status Board	29-25574
Shuttle and Ribbon Board	29-25575
Circuit Breaker	29-25576
Power Rectifier/Regulator Board	29-25577
Fuse -- 5 A Slo-Blo	29-25578
Fuse -- 2 A 250 V	29-25579
Fuse -- 12 A 250 V	29-25580
Ribbon Platform Switch	29-25581
Shuttle Position Sensor Assembly	29-25584
Ribbon Shield	29-25585
Platen Assembly	29-25586
Plenum Seal	29-26156
LG01 Parallel Cable/Bulkhead Assembly	29-26159
LG01 Serial Cable/Bulkhead Assembly	29-26214
Power Cord, U.S.	29-26226
Caster Kit	29-26227

Table 5-1 Recommended Spare Parts and FRUs (Cont)

Part Description	Part Number
Upper Tractors (Pair)	29-26394
Lower Tractors (Pair)	29-26395
Door Latch Mounting Bracket	29-26863
Door Latch	29-26864
Antistatic Brush	29-26865
Ribbon Motor/Gearhead	29-26866
Door Hinge	29-26867
Power Amplifier Interconnect Cable	29-26868
Hinge Pin	29-26869
Backplane	29-26870

Special tools that are required to maintain the LG01 600 LPM Text Printer are included in the Gauge Kit (P/N 29-25551). The special tools contained in the Gauge Kit are listed below and shown in Figure 5-1.

Tool	Quantity Required
Sensor Shim Gauge	1
Linear Motor Shim Gauge	3
Linear Motor Spacer Block (optional)	2
Platen Gap Gauge (left)	1
Platen Gap Gauge (right)	1
Tractor Phasing Gauge	1
0.017 Feeler Gauge	1
Paper Tension Eccentric Wrench	1
Tractor Pulley Retainer Tool	1

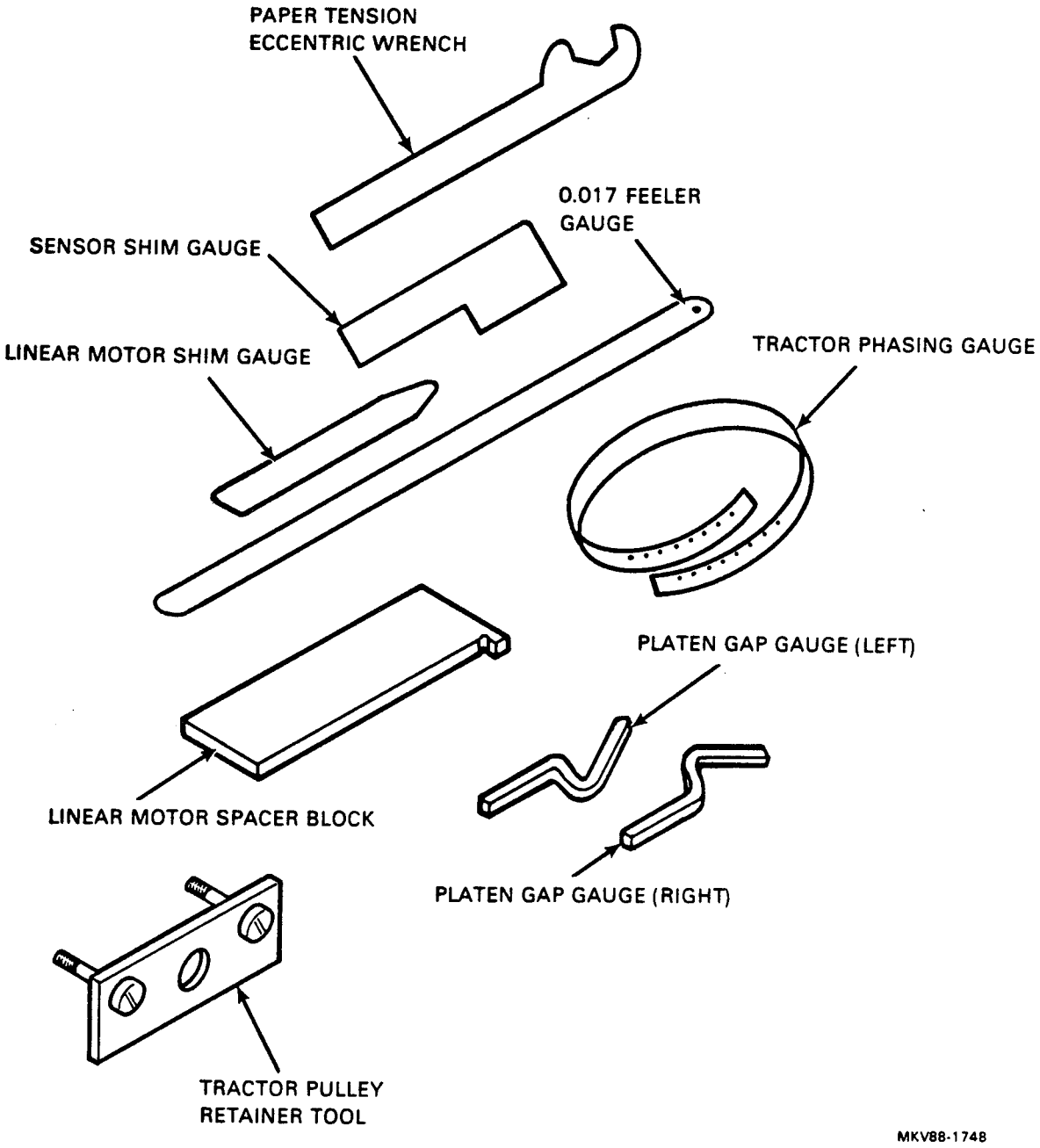


Figure 5-1 LG01 Gauge Kit Tools

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