

TECHNICAL MANUAL

MODEL 101A PRINTER

REVISION H

JULY 1975

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SECTION 1 INTRODUCTION

This manual describes the Model 101A printer, manufactured by Centronics Data Computer Corporation. It provides general information, detailed theory of operation and maintenance information enabling field service personnel to maintain the printer. For serial input or other detailed interface information, a separate document for each interface is published for your reference.

The manual is grouped into eight sections, each with its specific purpose.

- Section 1 - INTRODUCTION, introduces the reader to the scope and content of the manual, and provides the reader with a general description of the printer.
- Section 2 & 3 - INSTALLATION & OPERATION, contains additional installation and operation data not included in the Operators Manual.
- Section 4 - THEORY OF OPERATION, contains a detailed description of each major operation performed by the printer electronics, including flow chart, timing diagrams and circuit diagrams.
- Section 5 - REMOVAL, REPLACEMENT AND ADJUSTMENT PROCEDURES, includes step-by-step removal and replacement procedures for all major assemblies and sub-assemblies in the printer.
- Section 6 - MAINTENANCE, includes preventive maintenance procedures, and recommended spare parts list.
- Section 7 - ELECTRICAL DRAWINGS AND LIST OF MATERIALS, contains a complete set of schematic, wiring and component board layout diagrams and their associated list of materials for the electrical portion of the printer.
- Section 8 - MECHANICAL DRAWINGS AND PARTS LISTS, includes all printer assembly drawings and their associated part lists for the mechanical portion of the printer.

At the end of the manual are several appendices which include a glossary of signal mnemonics, standard 9 x 7 character set, and parallel interface specifications.

1.1 GENERAL DESCRIPTION (Figure 1-1)

The Model 101A printer is a medium speed impact printer which uses a 9 x 7 dot matrix for character generation.

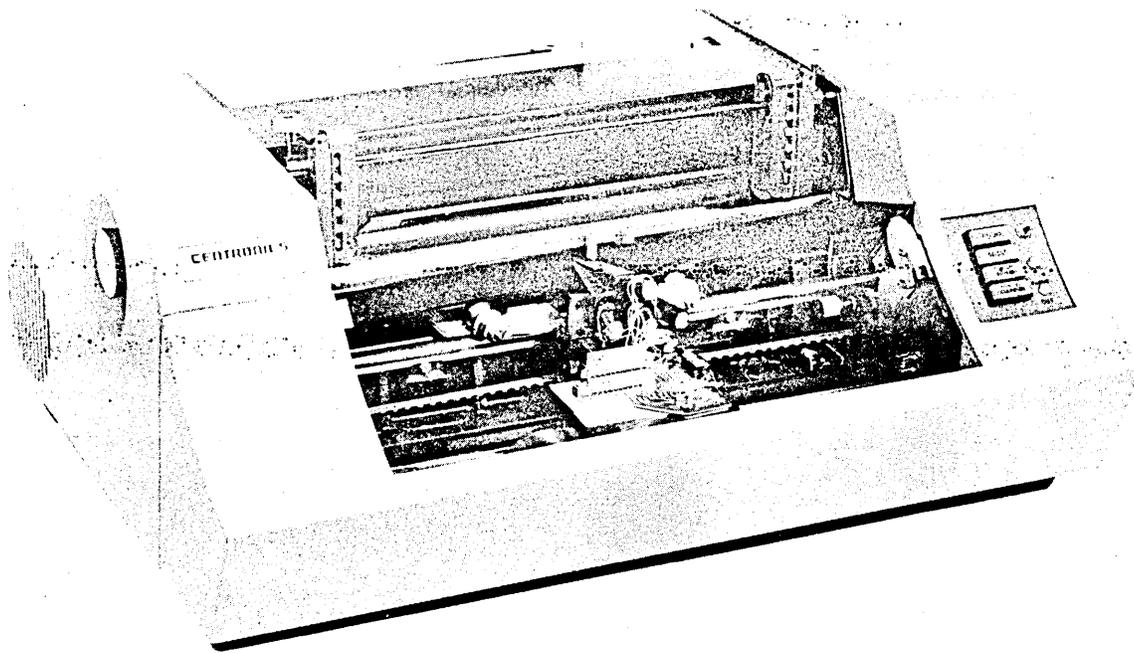


Figure 1-1. MODEL 101A PRINTER (FRONT COVER REMOVED)

The unit prints at a rate of 165 characters per second with an average speed of 132 characters per second (including the return time for the printing head). The printer is capable of printing 132 columns, with paper width varying from 4 inches to 14-7/8 inches. The unit uses sprocket-fed paper with 6 lines to the inch vertically and 10 characters per inch horizontally. The printer does not require special paper and can produce an original plus four copies.

1.2 LOGIC FLOW DIAGRAM (Figure 1-2)

The 132-character input buffer can receive parallel data at a rate of up to 75,000 characters per second. If the input device transmits serial data (100-9600 Baud), then an optional RS232 interface is required to assemble the serial data, then transfer it in parallel to the input buffer in the printer.

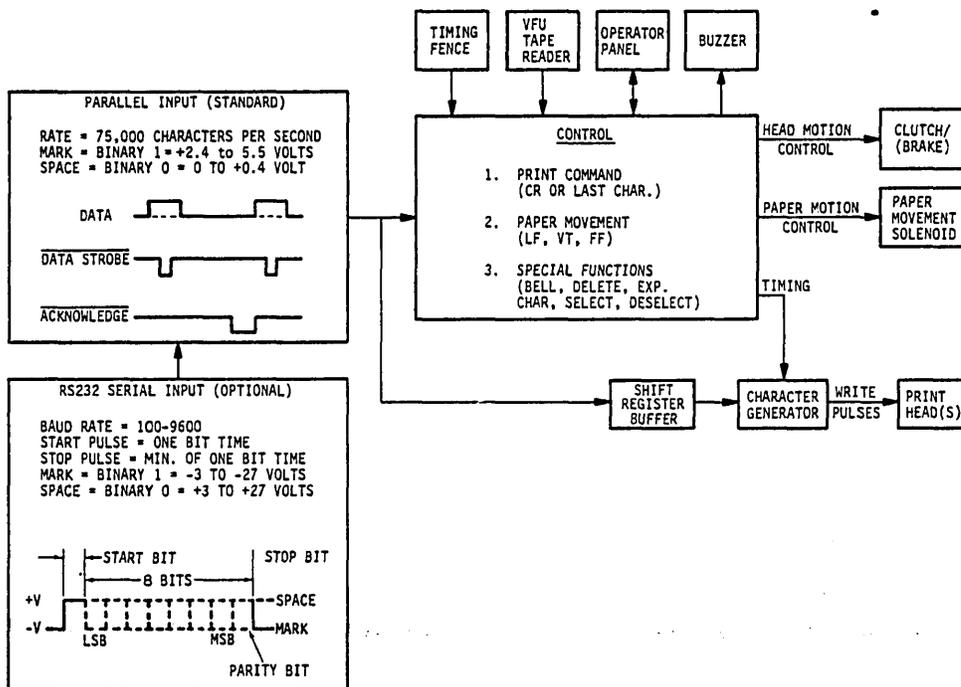


Figure 1-2. BASIC BLOCK DIAGRAM

Once a line of printable characters is stored in the buffer, head motion is initiated by activating the forward clutch, causing the print head to move from left to right across the paper. With the head in motion, data is transmitted from the buffer to the character generator. From there, character write pulses are sent to the driver circuits, which energize the print head solenoids causing the print wires to form the characters on the paper.

Paper movement is initiated by a line feed, vertical tab and form feed function. The Vertical Format Unit (VFU) tape reader provides vertical tab and top of form spacing control by means of a perforated paper tape.

In addition, the printer recognizes the following special control codes: bell, delete, select, de-select and elongated character, as described in Section 1.3.3.

1.3 PRINTER OPERATION

Basically, all printer functions can be grouped into one of the following three categories: 1) character printing, 2) paper movement, and 3) other auxiliary functions such as printer select/deselect, delete, etc.

1.3.1 CHARACTER PRINTING (Figures 1-3, 1-4)

A small aluminum carriage supports the print head assembly. During printing operation, the carriage travels along the print line from left to right. Printing is accomplished by selectively firing the print wires as the print head moves from left to right across the print line. Printing impulses energize the print solenoids and drive the print wires against the ribbon, paper and platen to form the characters in a dot matrix pattern. When the solenoids are de-energized, the wires are withdrawn so they are flush with the surface of the jewel. Each solenoid can fire independently up to five times for any one character. Figure 1-3 shows an example of the dot matrix forming the letter H. All character formations in the standard 9 x 7 dot matrix are shown in the Series 100 Operators Manual.

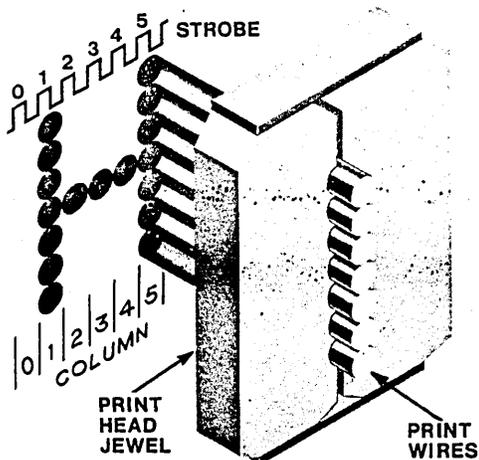


Figure 1-3. PRINTING THE LETTER (H)

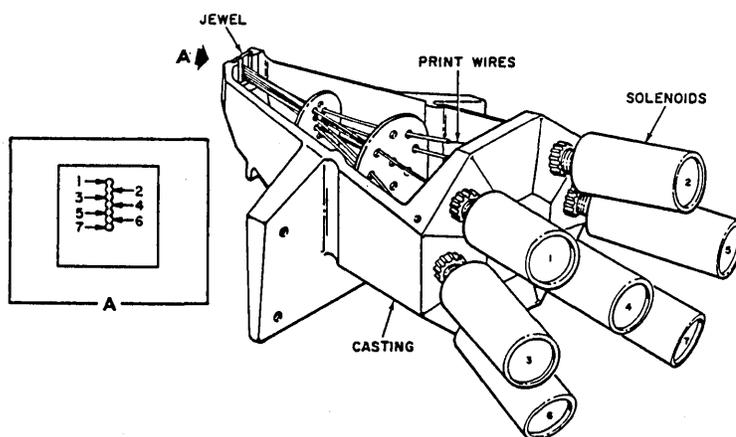


Figure 1-4. PRINT HEAD COMPONENTS

The print head (Figure 1-4) consists of the jewel, casting and seven solenoids with attached print wires. The seven print solenoids and their attached print wires are arranged radially around the print head. The free ends of the print wires pass through a wire guide at the front of the print head, which properly spaces the wires so that the correct wire passes through the correct hole in the print jewel.

Printing action is initiated when the input buffer has been filled or a carriage return (CR) code has been received. The print head then sweeps across the page until a CR command is decoded at the buffer output or the head reaches the 132-column limit (right) switch. At this time, the print head returns to the left margin and an automatic line feed is performed. As an option, the automatic line feed can be disabled.

1.3.2 PAPER MOVEMENT (Figure 1-5)

Paper can be moved manually by rotating the platen knob or automatically by any of three paper movement commands: line feed, vertical tab and form feed.

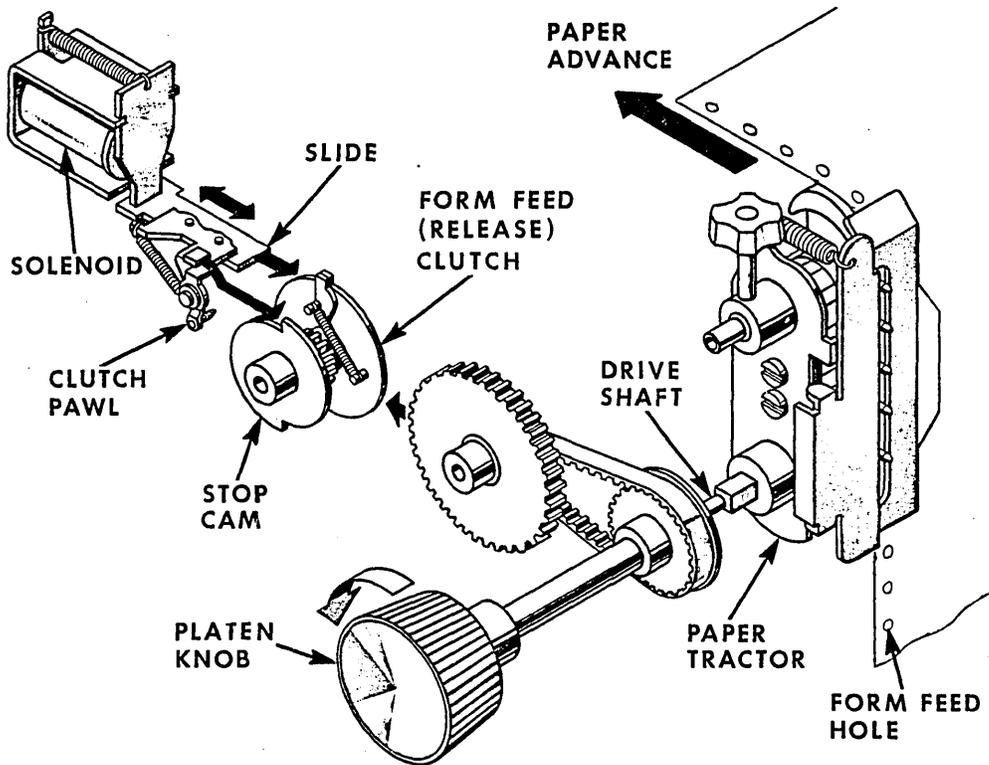


Figure 1-5. PAPER MOVEMENT MECHANISM

A small independent motor not shown in Figure 1-5, provides the power necessary to move the sprocket-feed tractors which control paper movement. To move the paper, the printer electronics activates a line feed solenoid which activates a clutch that mechanically links the motor to the sprocket-feed tractors.

To initiate a single line feed, the form feed solenoid is energized from 15 milliseconds. For paper slewing, a dc level is applied to the form feed solenoid allowing paper to advance until the Vertical Format Unit (VFU) deactivates the level. Upon completion of the line feed command, a 60-90 millisecond delay is generated. This allows the clutch pawl and clutch mechanism to return hole before another line feed is allowed.

To initiate a single line feed, the form feed solenoid is energized for 15 milliseconds. For paper slewing, a dc level is applied to the form feed solenoid allowing paper to advance until the Vertical Format Unit (VFU) deactivates the level.

The VFU is controlled by a paper tape, which uses one track for top of form indication and one track for vertical tab. The movement of the paper tape is caused by direct mechanical linkage to the gear train which drives the paper feed tractors.

When the printer runs out of paper, a sensing switch activates a two-second audible tone in a speaker located at the rear. The printer also stops printing and lights the PAPER EMPTY light on the control panel.

1.3.3 SPECIAL FUNCTIONS

In addition to the printable characters shown in Appendix B, the printer can recognize the following special functions:

Carriage return (Octal 015) - Initiates the printing of a line.

Form Feed (Octal 014) - Moves the paper until the next hole in Tape Reader Channel 7 is reached.

Vertical Tab (Octal 013) - Moves the paper until the next hole in Tape Reader Channel 5 is reached.

Line Feed (Octal 012) - Advances the paper one line.

Delete (Octal 177) - Initializes the printer electronics and clears the buffer.

Bell (Octal 007) - Generates a two-second audible tone in the speaker at the rear of the printer.

Select (Octal 021) - Allows printer to receive data, same as activating SELECT switch.

De-Select (Octal 023) - Inhibits printer from receiving data, same as deactivating SELECT switch.

1.4 SYSTEM CHARACTERISTICS

1.4.1 SPECIFICATIONS SUMMARY

The Model 101A printer contains all the features described in the previous sub-sections of this manual. Some of these features, in addition to a few characteristics of this manual not previously mentioned, are summarized in the following specifications:

Printing Method	Impact, character-by-character, one line at a time.
Printing Rate - Characters	165 characters per second
- Full Lines	60 lines per minute (132 character line)
- Short Lines	200 lines per minute (20-30 characters)
Transmission Rate - Serial	100 to 9600 baud (with Serial option)
- Parallel	Up to 75,000 characters per second

Data Input	Parallel (Serial option available)
Character Structure	9 x 7 or 5 x 7 dot matrix, 10-point type equivalent
Code	USASCII - 64 characters printed, lower case characters recognized and printed as upper case equivalent.
Indicator-Switch Controls	ON/OFF, SELECT, TOP OF FORM, FORMS OVERRIDE, LINE FEED
Indicator	PAPER OUT
Manual Controls	Form Thickness, Paper Advance Knob
Character Buffer	132 characters (1 line)
Format	132 characters maximum per line, 6 lines per inch
Paper Feed	Sprocket feed, adjustable from 4" to 14-7/8" width
Paper	Standard sprocketed paper
Number of Copies	Original and up to four carbon copies
Dimensions	11½" high, 20" deep, 27-3/4" wide
Weight	118 pounds
Electrical Requirements	115 VAC $\pm 10\%$, 60 Hz 115/230 VAC $\pm 10\%$, 50 Hz (option)
Temperature - Operating - Storage	40 ^o to 100 ^o F -40 ^o to 160 ^o F
Humidity - Operating - Storage	5% to 90% (no condensation) 0% to 95%

1.4.2 STANDARD AND OPTIONAL FEATURES

standard features

Vertical format control
 Audio alarm
 Elongated boldface characters (line-by-line)
 Parallel data input

optional features

Foreign and other character sets
 Serial communication interfaces
 Popular parallel interfaces
 Automatic motor control (eliminates standby noise)

standard features

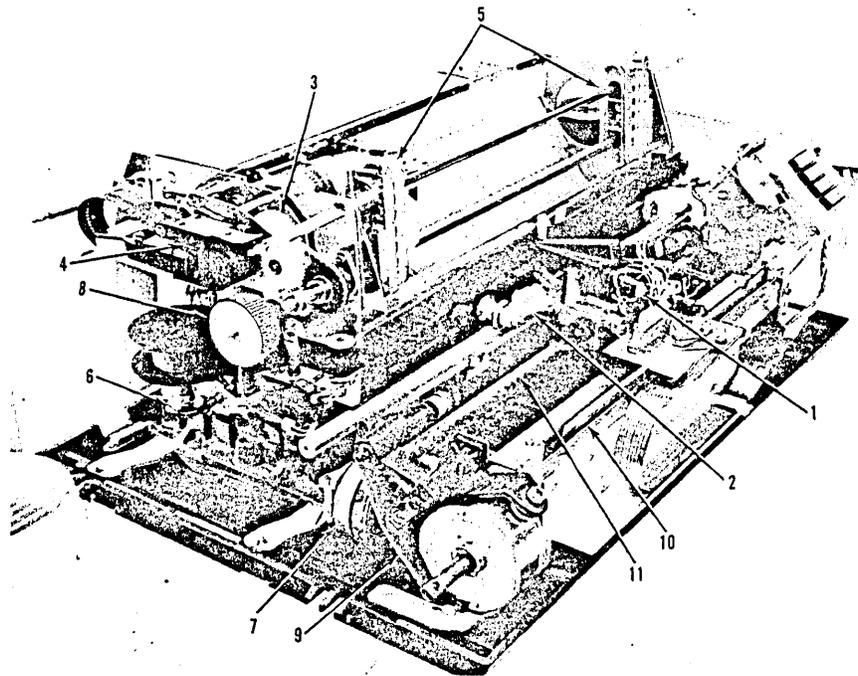
Prints original plus four copies
Fixed vertical/horizontal registration
Paper runaway inhibit (6 second time out)
Gated strobe pulse (data input)
Separate prime line and fault line to output connector
Provision for additional character set
Remote select/deselect
50 or 60 Hertz, 115 or 230 Volts AC
Automatic line feed disabled by jumper

optional features

Selectable single character elongation
Elapsed time indicator
Expanded character sets (up to 128 characters)

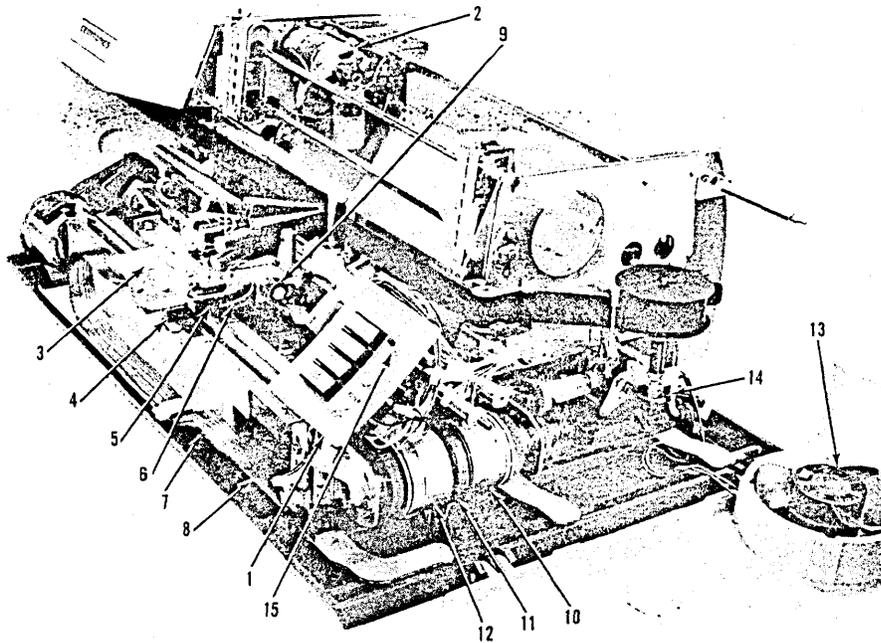
1.4 PHYSICAL DESCRIPTION (Figures 1-6 through 1-9)

The printer is approximately 11½" high, 20" deep, 27-¾" wide and weighs approximately 118 pounds. The referenced figures contain different photographic views of the printer taken with the covers removed. Each major printer assembly is located on these figures and identified in the table below the photo.



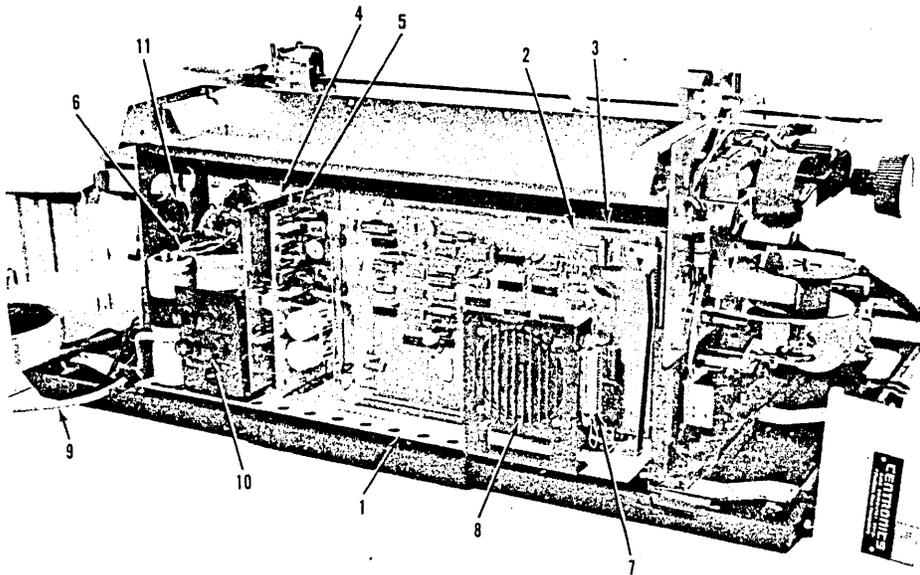
- | | | | |
|------------------------|--------------------------|----------------|---------------------|
| 1. Print Head Assembly | 4. VFU Tape Reader | 7. Spring Drum | 10. Timing Fence |
| 2. Carriage | 5. Pin Feed Mechanism | 8. Platen Knob | 11. Main Drive Belt |
| 3. Form Feed Mechanism | 6. Ribbon Feed Mechanism | 9. Damper | |

Figure 1-6. LEFT FRONT VIEW OF 101A PRINTER



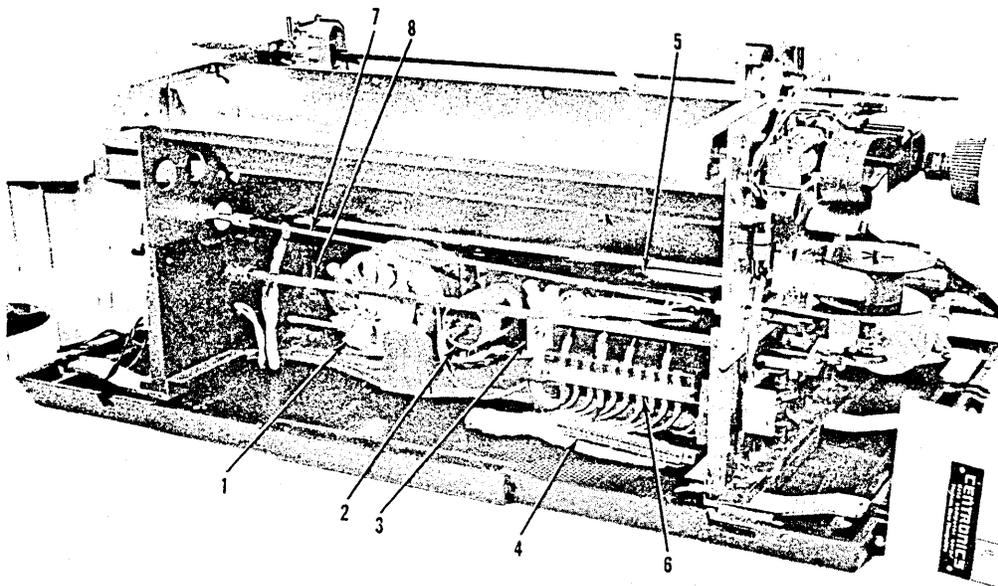
- | | | | |
|---------------------------------------|-----------------------|--------------------------------|---------------------------|
| 1. Operator Control Panel | 5. Optical Pick-Up | 9. Penetration Control Knob | 13. Cooling Fan |
| 2. Form Feed Motor | 6. Optic Bundle | 10. Forward Clutch | 14. Ribbon Feed Mechanism |
| 3. Video Amplifier and Cable Assembly | 7. Ribbon Cable | 11. Main Pulley and Drive Belt | 15. Line Feed |
| 4. Light Source | 8. Power Driver Board | 12. Reverse Clutch | |

Figure 1-7. RIGHT FRONT VIEW OF 101A PRINTER



- | | | | |
|-----------------------|--------------------------|--------------------|------------------|
| 1. Electronics Cavity | 4. +5VDC Power Supply | 7. Input Connector | 10. Fuses |
| 2. Electronic Card 1 | 5. ±12VDC Power Supply | 8. Speaker | 11. In-Line Fuse |
| 3. Electronic Card 2 | 6. +30 Volt Power Supply | 9. AC Power Input | |

Figure 1-8. REAR VIEW OF 101A PRINTER



- | | | |
|-----------------------------|--------------------------|-------------------------|
| 1. Main Motor | 4. Electronics Connector | 7. Ribbon Reversing Rod |
| 2. Motor Starting Capacitor | 5. Power Transformer | 8. Ribbon Drive Rod |
| 3. AC Power Connector | 6. Power Distribution | |

Figure 1-9. REAR VIEW (101A ELECTRONICS CAVITY REMOVED)

SECTIONS 2 AND 3
INSTALLATION AND OPERATION

A separate operators manual contains most of the installation, set-up and operating procedures for the Model 101A printer. This operators manual should be referred to during normal printer installation and operation.

Included on the following pages is additional information not contained in the operators manual.

2.1 SITE PREPARATION (Figure 2-1)

A line drawing of the printer dimensions is shown in Figure 2-1. As shown in this drawing, the width of the installation site must take into account the side covers in an opened position.

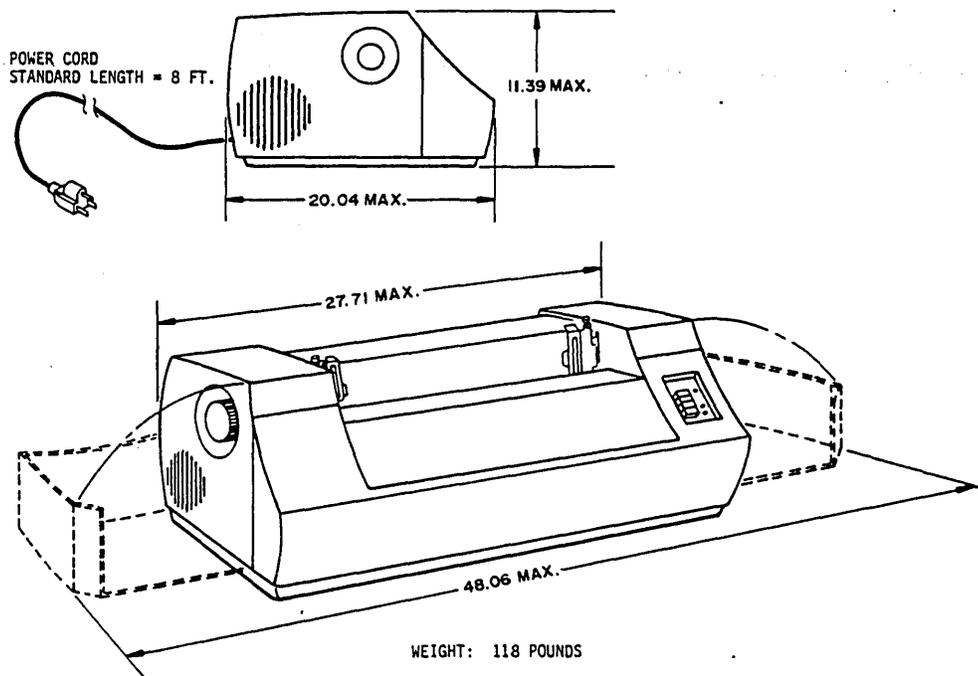


Figure 2-1. PRINTER DIMENSIONS

Environmental and electrical requirements at the installation site are as follows:

- Temperature: 40° to 100° F (Operating)
-40° to 160° F (Storage)
- Humidity: 5% to 90% (no condensation) - Operating
0% to 95% - Storage
- Electrical: 117 VAC ±10%, 60 Hz, 5 amps
117/234 VAC ±10%, 50 Hz, 5 amps

2.2 SHIPPING CRATE

The printer is shipped in a crate approximately 20 inches high, 27 inches deep and 32 inches wide. The crate is made of weatherized, triple-walled cardboard. When properly strapped, the packing crate and printer is capable of fork lift operation with a seven-high stacking capability.

Shipped with the printer are the following items:

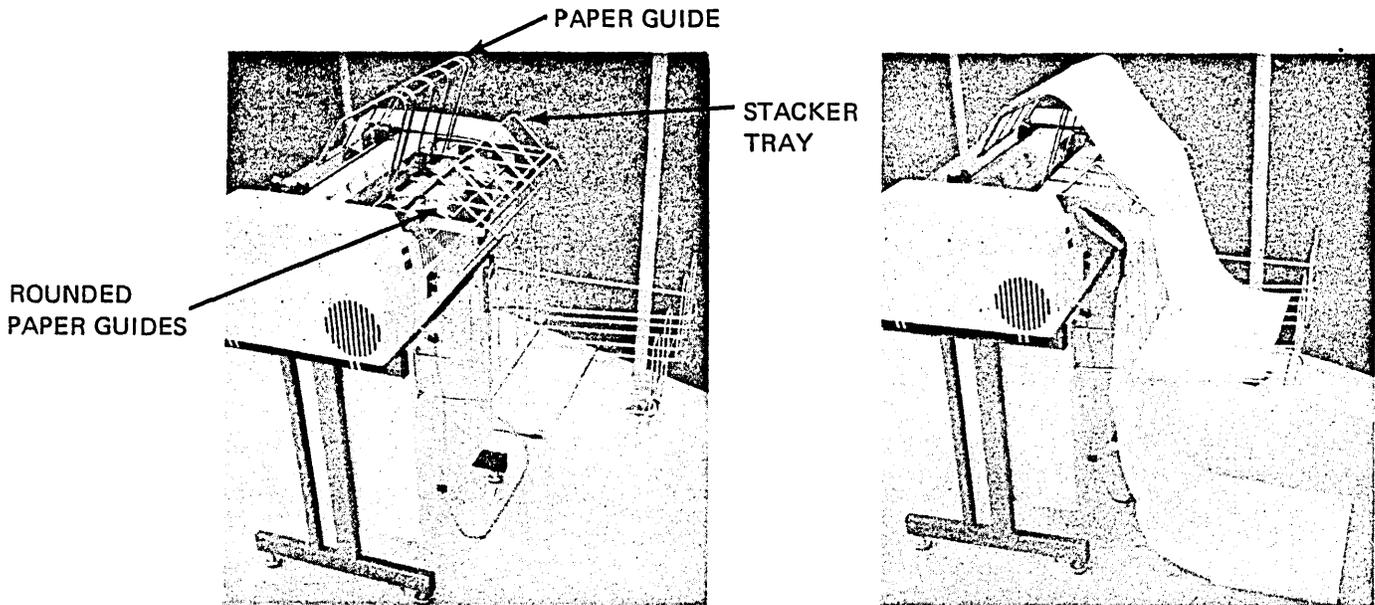
- (1) If a special interface is used, the interface card is included with the printer. For certain interfaces such as the RS232, a special cable is also shipped. Cabling requirements for the standard parallel interface are defined in Appendix B.
- (2) A standard vertical format paper tape providing six line feeds (one inch) for each vertical tab and 66 line feeds (11 inches) for each form feed code. This tape is a part of the Vertical Format Unit. Refer to the Operators Manual for duplicating the existing tape, or if a different format is desired, for generating a new tape.
- (3) Documentation - All documentation describing that particular printer is included in a plastic bag under the printer. This documentation includes a technical manual for the printer and any optional interface, and a notice of all approved changes incorporated in the printer but not documented in the manual. Please keep this documentation with the printer at all times so that accurate information will be available for troubleshooting purposes.
- (4) Pin Feed Knobs - These knobs are contained in a small plastic bag stapled to the guide bar for the pin feed unit.
- (5) Print Sample - A sample printout from that particular printer is included in the upper paper pan.
- (6) Unpacking/Repacking and Set-up Instruction Sheet.

Shipped in a separate container is the paper guide and stacker assembly. Installation instructions for this assembly are included with the assembly and also in Section 2.3.

2.3 PAPER GUIDE AND STACKER ASSEMBLY (#527001001)

ASSEMBLY INSTRUCTIONS

Attach paper guide and stacker assembly (one piece) to the back, top of printer by first removing two screws from the left and right side, and install using a flat bladed screwdriver. Make sure rounded paper guides rest on top of printer in front of paper feed opening.



PRINTER STAND OPERATION

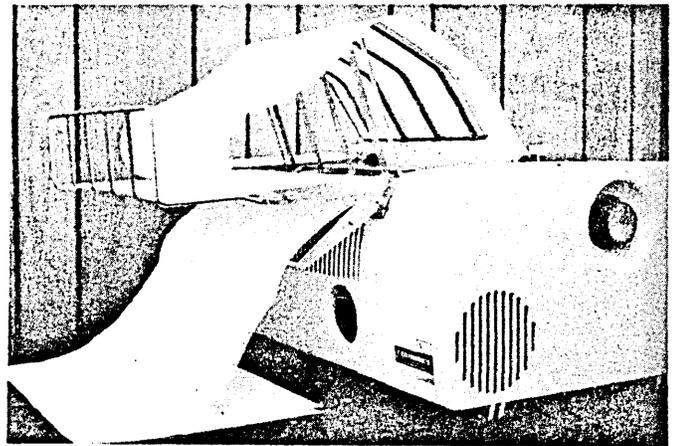
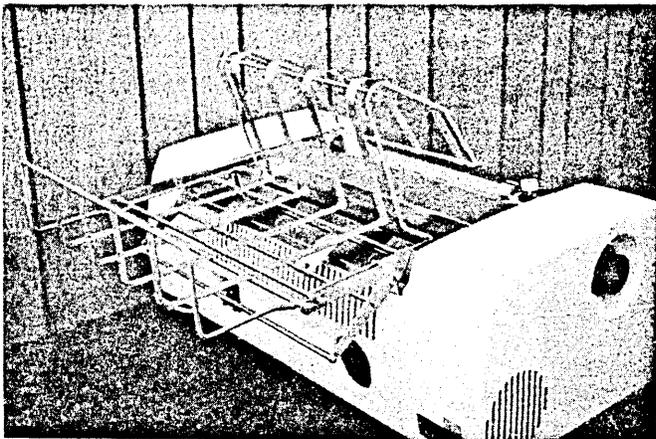


TABLE TOP OPERATION

SECTION 4 THEORY OF OPERATION

4.1 INTRODUCTION (Figures 4-1 and 4-2)

This section on the theory of operation contains a detailed description of each major function performed by the Model 101A printer electronics. Throughout this section, reference is made to the schematic diagrams contained in Section 7. The section is organized as follows:

- Paragraph 4.2 Basic Timing
- 4.3 Initializing the Printer
- 4.4 Loading Data
- 4.5 Character Printing
- 4.6 Paper Movement
- 4.7 Special Functions
- 4.8 Power Supplies

A basic block diagram of the 101A printer and a flow chart of the over-all printer operation are contained in Figures 4-1 and 4-2.

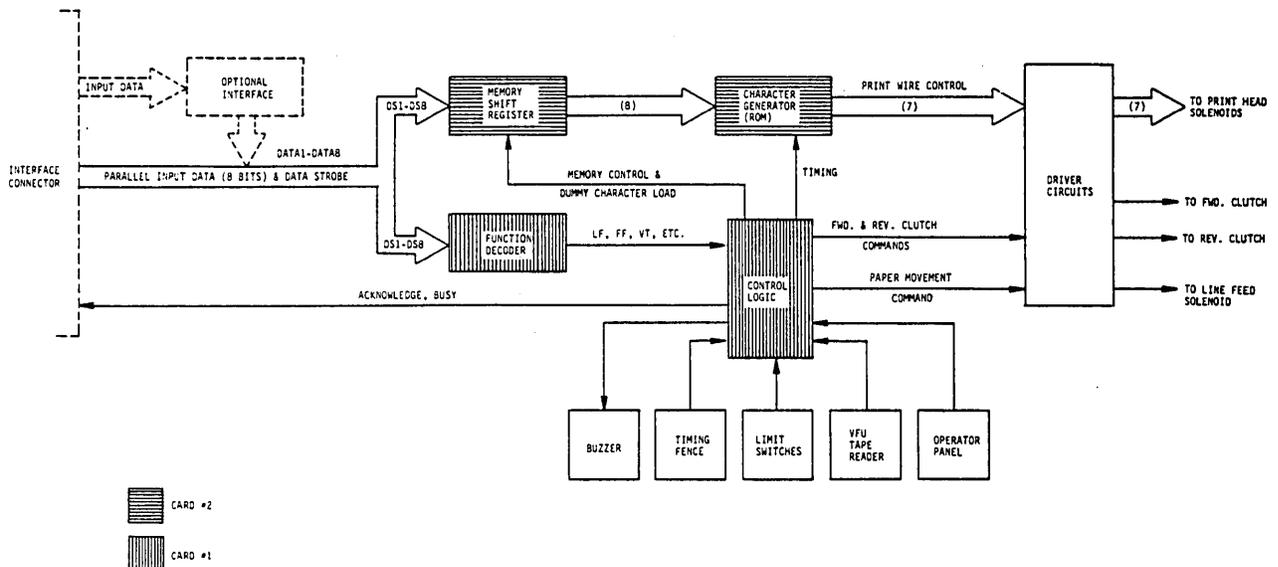


Figure 4-1. MODEL 101A FUNCTIONAL BLOCK DIAGRAM

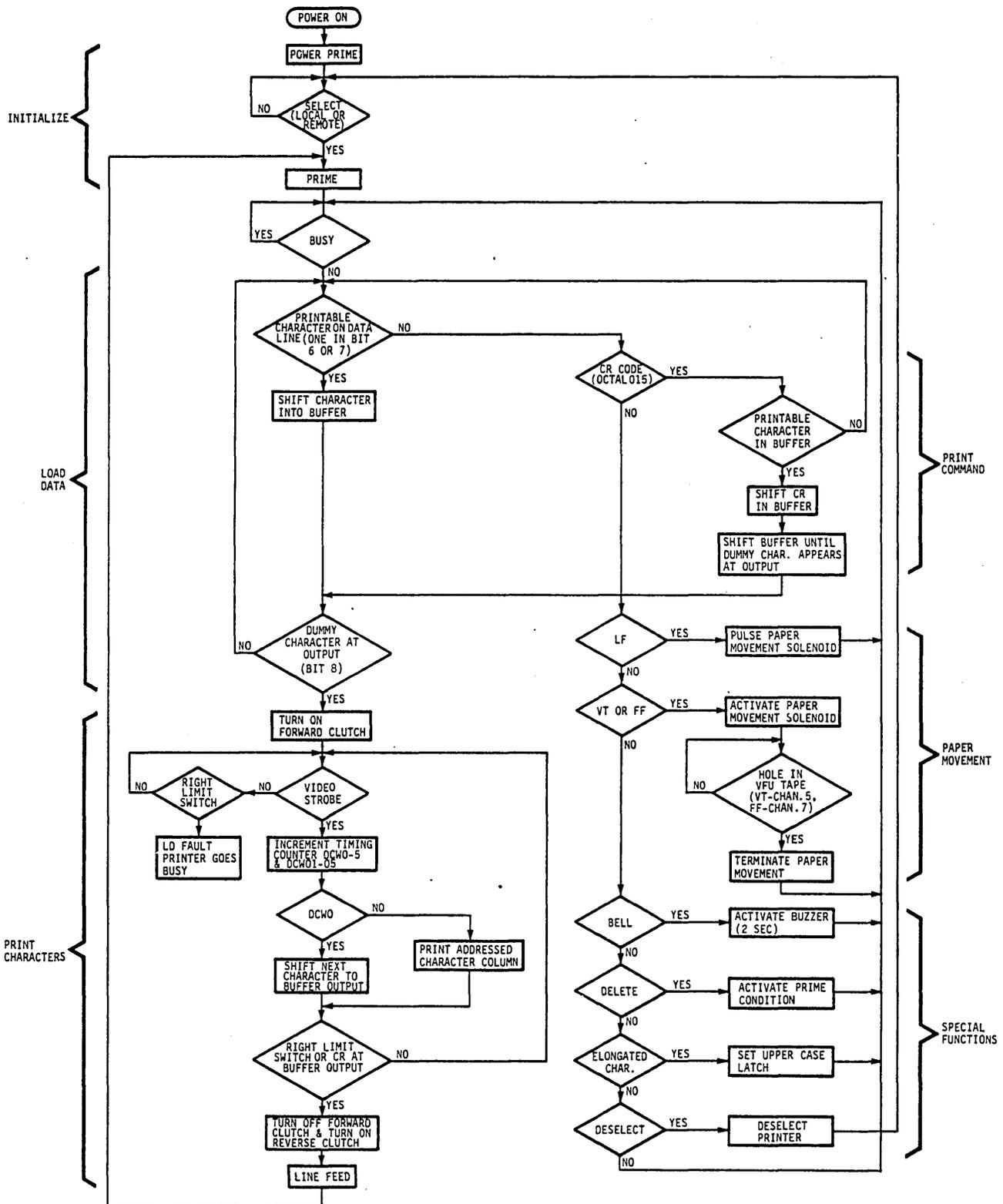


Figure 4-2. FUNCTIONAL FLOW CHART

The block diagram is arranged to show signal flow between major electrical assemblies within the printer. The flow chart briefly describes all major operations performed by the printer, such as initializing, loading data, printing characters, paper movement and special functions.

4.2 BASIC TIMING (See Figure 4-3)

The basic timing clock (\overline{OSC}) for the printer electronics is derived from a 100 KHz oscillator ME10. Capacitor C4 controls the frequency. Signal \overline{OSC} is inverted to generate OSCXT for the interface connector and the optional interface board. Signal \overline{OSC} is used on Card #1, signal OSC' is used on Card #1 and #2.

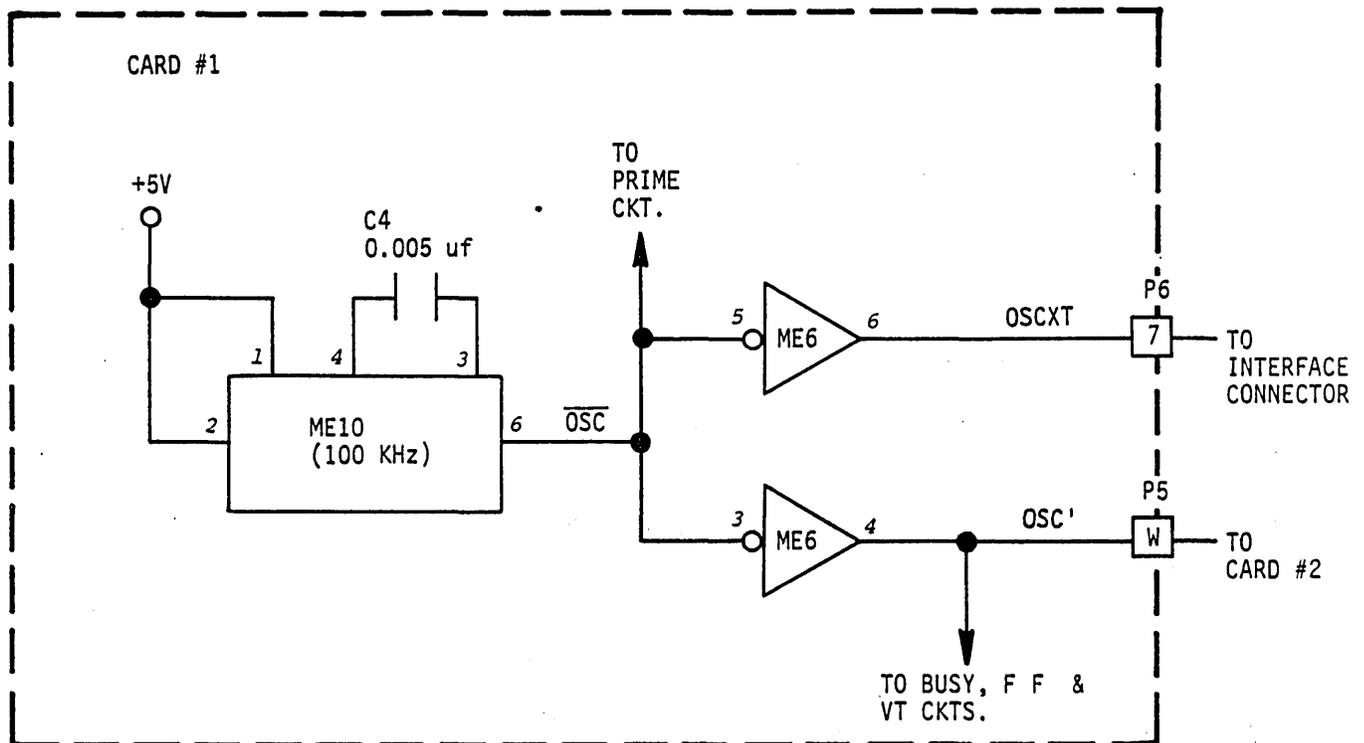


Figure 4-3. BASIC TIMING CIRCUIT

4.3 INITIALIZING THE PRINTER

Before the printer can accept input data, it must first be PRIME'd and SELECT'ed. The prime operation initializes the printer logic to a ready state. The select operation after causing a prime condition, resets the busy line to the interface connector and makes the printer ready to receive data.

4.3.1 PRIME CIRCUIT (Figure 4-4, Timing; Figure 4-5, Circuit)

The prime circuit which is used to initialize the printer electronics, can be activated by any one of the following conditions:

- a. Power-up,
- b. Selecting the printer,
- c. End of a line of print,
- d. Input delete code,
- e. INPUT PRIME signal at the interface connector.

The prime circuit resets the printer logic, clears the buffer, and places a dummy character in the first character position in the buffer. A timing diagram of the prime timing is shown in Figure 4-4.

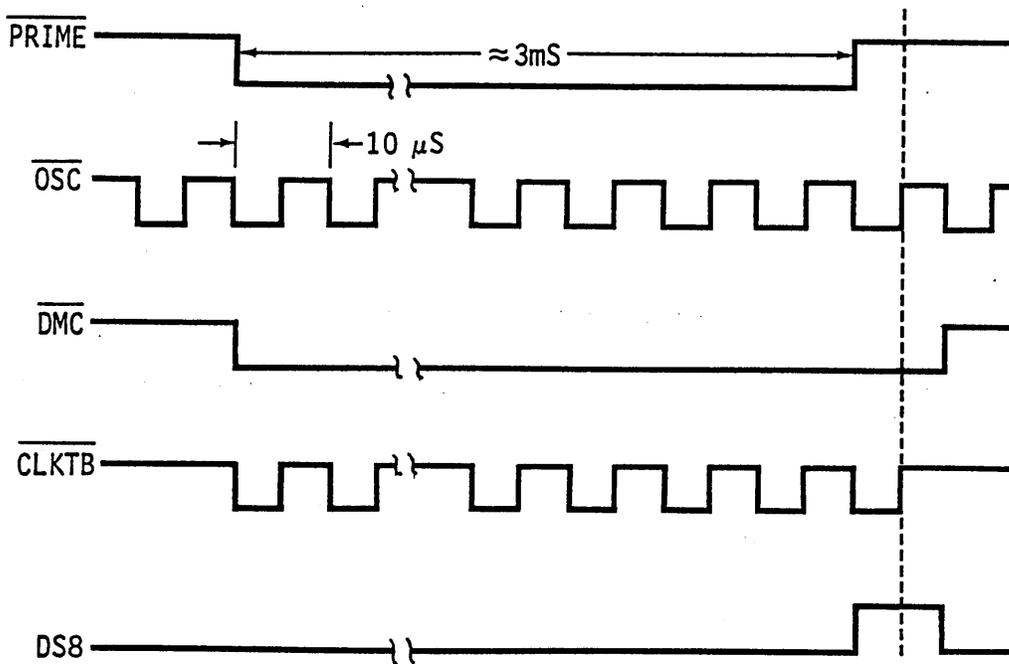


Figure 4-4. PRIME TIMING

During a prime condition, signal $\overline{\text{PRIME}}$ goes low, resetting the $\overline{\text{DMC}}$ flip-flop. The low $\overline{\text{DMC}}$ then allows the $\overline{\text{OSC}}$ clock to generate $\overline{\text{CLKTB}}$ pulses for the buffer. At the same time, the low $\overline{\text{PRIME}}$ signal generates a high SCRL signal which disables the buffer input and allows the $\overline{\text{CLKTB}}$ pulses to clock ZEROS into the buffer.

Since the $\overline{\text{PRIME}}$ and $\overline{\text{DMC}}$ flip-flops are both activated on the low-going edge of $\overline{\text{OSC}}$, the $\overline{\text{DMC}}$ flip-flop remains set for one clock time after $\overline{\text{PRIME}}$ is reset. During the clock interval in which $\overline{\text{PRIME}}$ and $\overline{\text{DMC}}$ are both active, DS8 goes high and a ONE is clocked into bit 8 of the buffer forming the "dummy" character.

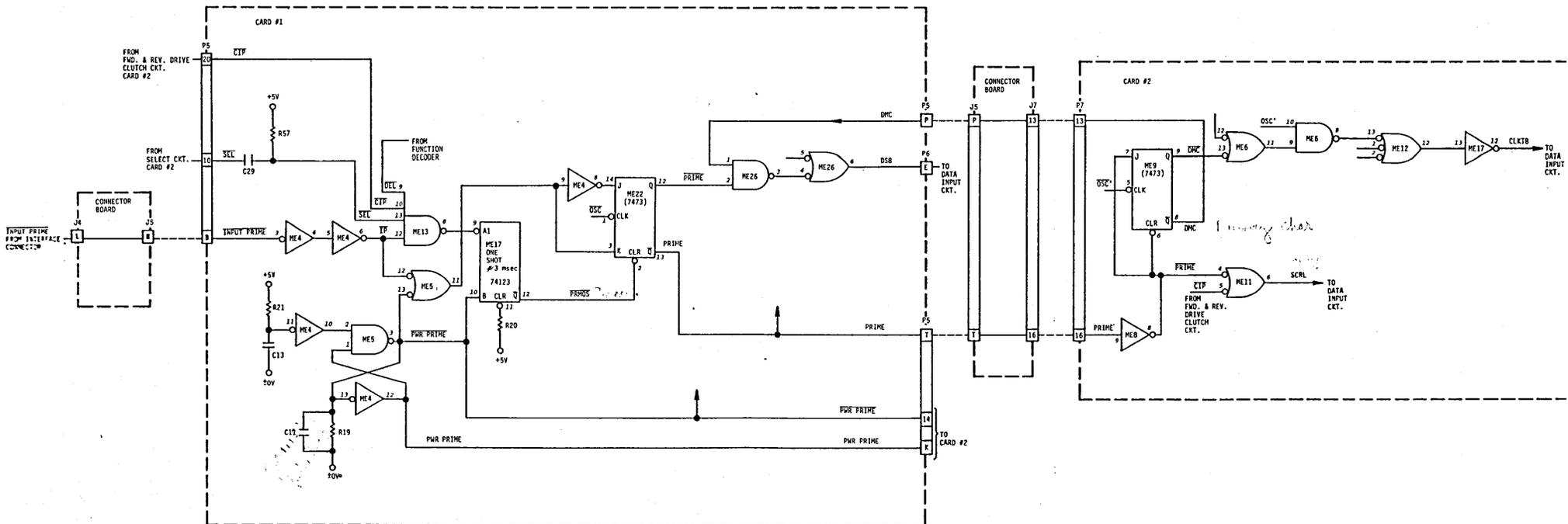


Figure 4-5. PRIME CIRCUIT

The following paragraphs describe the several conditions which can cause a prime operation.

- 1) Power Turn-on - When the printer is first turned on, capacitors C11 and C13 are both discharged and signal PWR PRIME is held low, causing a power prime condition. PWR PRIME remains low until C13 charges to approximately +2V through R21. This generates a high at ME4-11 and a low at ME4-10. Before PWR PRIME can go high, it must first charge capacitor C11, which keeps PWR PRIME low an additional amount of time. The total duration of PWR PRIME is approximately 100 milliseconds.
Signal PWR PRIME ensures that the Select flip-flop and EOP latch are reset during power-up. Also for the duration of PWR PRIME, the PRIME flip-flop is set causing a Prime condition in the printer.
- 2) Selecting the Printer - When the SELECT switch on the front panel is pressed or a Select code (octal 021) is received, signal SEL goes low. RC network R57/C29 generates a pulse from this low-going SEL signal, which fires the PRMOS one-shot. This generates a 3 millisecond pulse (PRMOS). PRMOS resets flip-flop ME22 causing PRIME. After the 3 millisecond PRMOS interval, the next OSC sets ME22 terminating the Prime condition.
- 3) Terminating a Line of Characters - When the printer finishes printing a line of characters, signal CIP goes high, firing the PRMOS one-shot which causes a prime condition as described in (2) above.
- 4) Detecting a Delete Code - Detection of a delete code (177) on the input data lines, fires the PRMOS one-shot causing a prime condition as described in (2) above.
- 5) Detecting a Remote Prime (INPUT PRIME) - When interface signal INPUT PRIME goes low, the low IP allows the next OSC pulse to reset the PRIME flip-flop causing a Prime condition. When INPUT PRIME goes back high, the rising edge of IP triggers one shot PRMOS, extending the prime condition for an additional 3 milliseconds.

4.3.2 SELECT CIRCUIT (Figure 4-6)

Before it can receive data, the printer must first be selected. This can be done either by the SELECT switch on the front panel or by an octal 021 code on the input data lines.

The single-pole, double throw, pushbutton SELECT switch on the front panel is buffered by a latch flip-flop on Card #2. The low-going SELCLK signal generated by pressing and releasing the switch clocks flip-flop SEL set. Note that each power prime condition resets the SEL flip-flop so that the printer is in a de-select state when power is first applied.

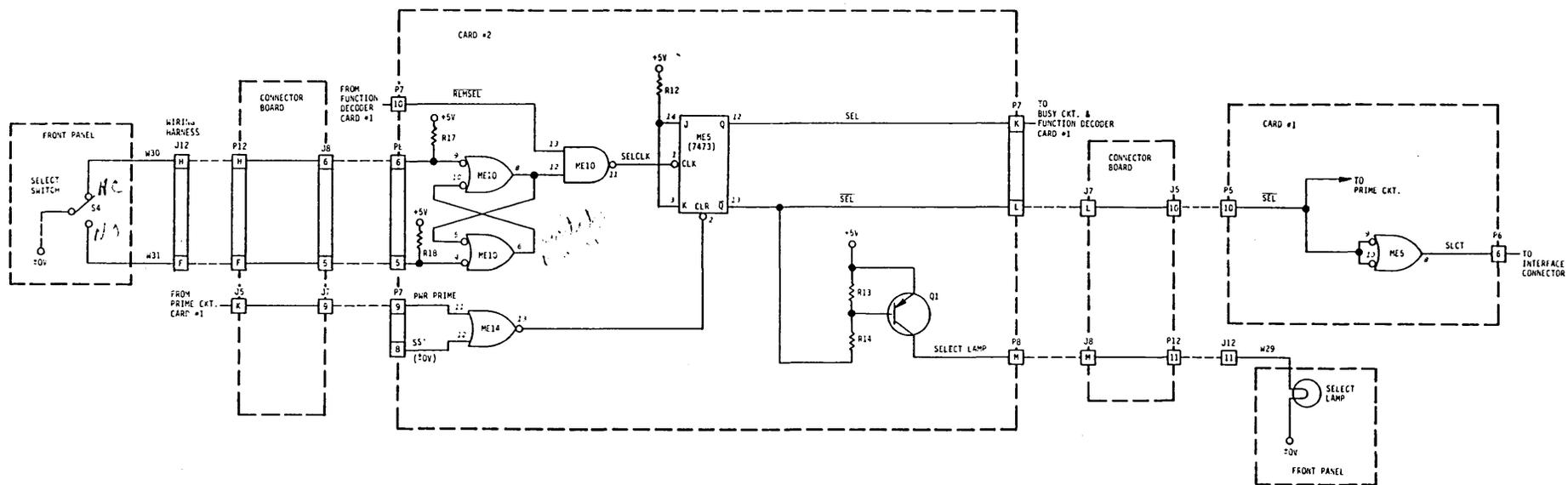


Figure 4-6. SELECT CIRCUIT

The printer can also be selected from a remote location by receiving an octal 021 code. While the Select code is on the data lines, $\overline{\text{REMSEL}}$ is low and SELCLK is high. At the end of the data strobe, $\overline{\text{REMSEL}}$ goes high and SELCLK goes low, clocking the SEL flip-flop. Because SEL is one of the constraints on the REMSEL decode, if the printer is already selected, the decoder is prevented from generating REMSEL. As a result, consecutive select codes will leave the printer in the selected state.

Similarly, the printer can be deselected either by again pressing the SELECT switch or an octal 023 code on the data lines.

While the printer is deselected, the low SEL signal generates a busy condition and activates the FAULT line to the interface connector. When selected, the high SEL signal causes a prime condition and lights the SELECT indicator on the operator panel. The select status of the printer can also be monitored by means of signal SLCT at the interface connector.

4.4 LOADING DATA

4.4.1 GENERAL (Figure 4-7/4-8)

The single line, 133-character buffer in the 101A is capable of receiving parallel data at a rate of up to 75,000 characters per second.

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

The diagram in Figure 4-7 shows the timing involved in transferring data, which does not cause a busy condition.

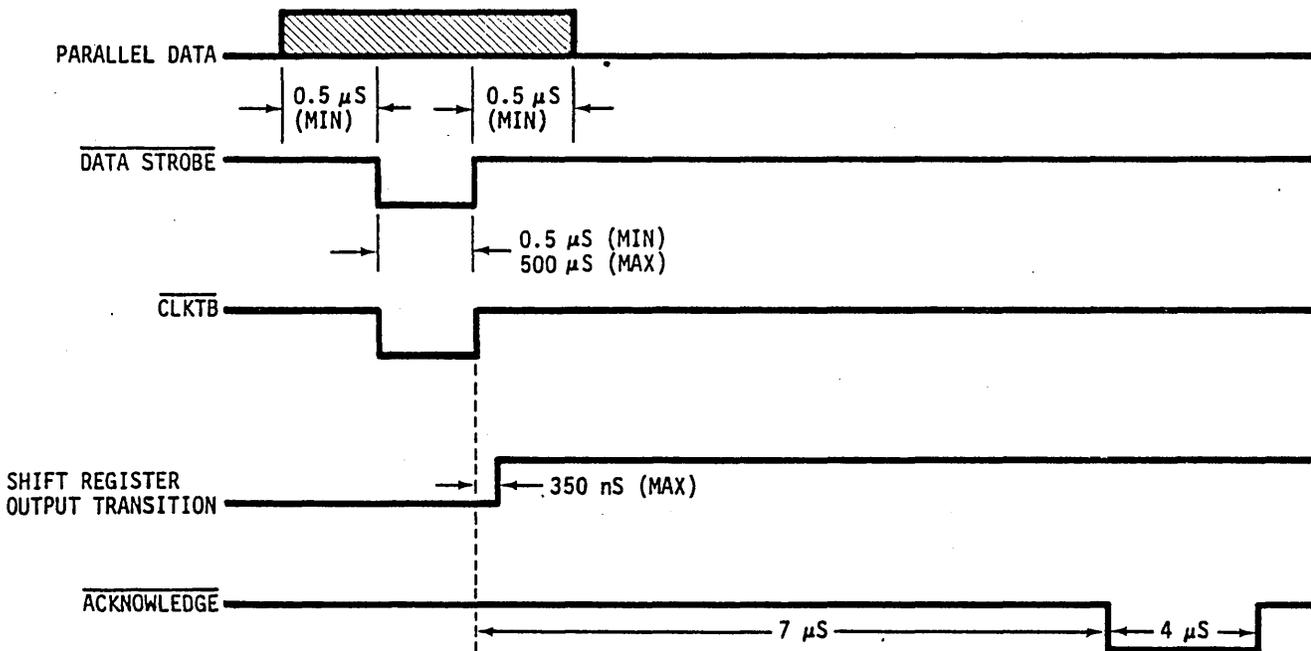
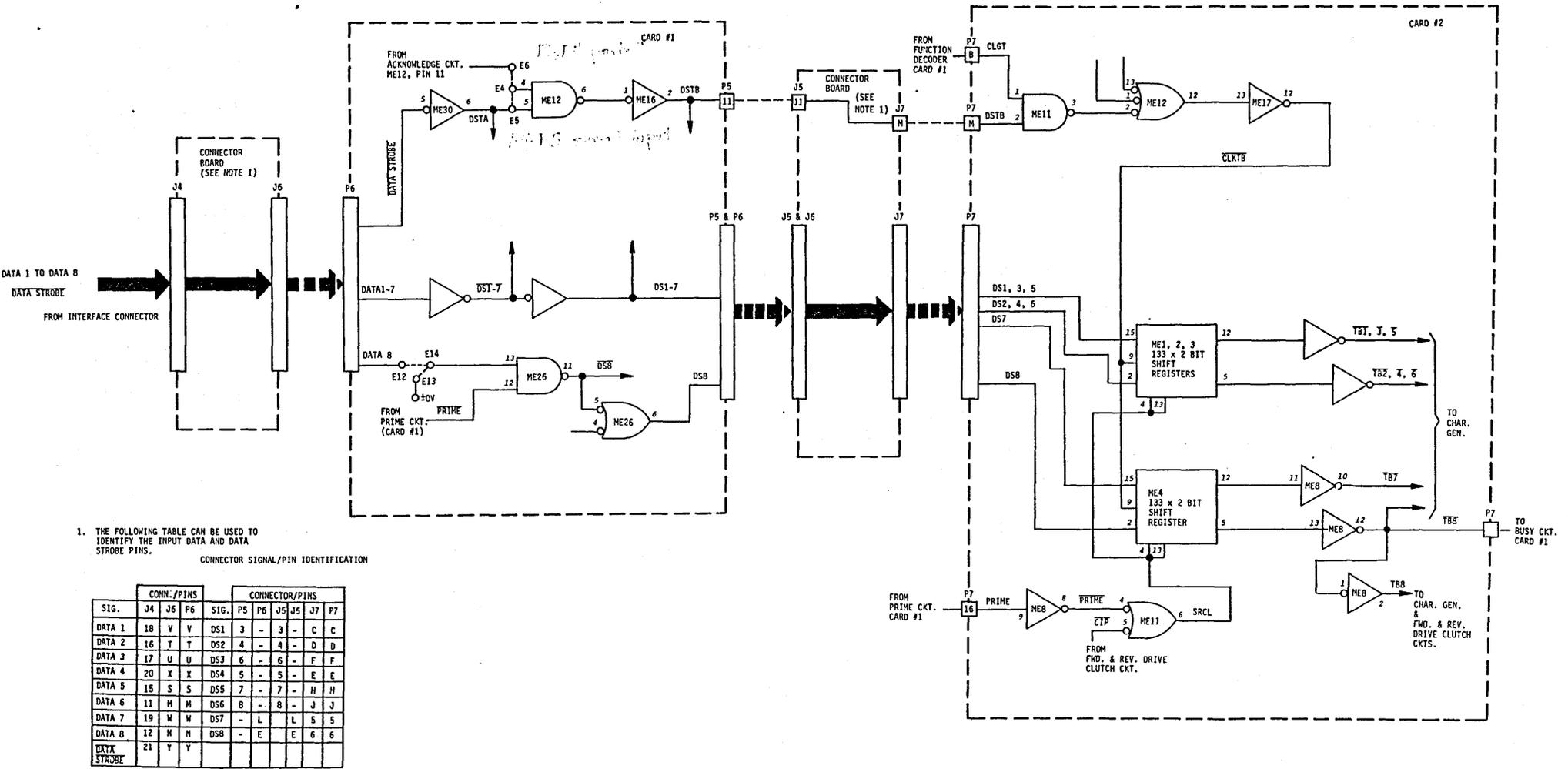


Figure 4-7. INPUT DATA TIMING - NO BUSY CONDITION

4.4.2 DATA STROBE

As shown in the timing diagram of Figure 4-7, the data lines must be stable at least 0.5 usec before and after DATA STROBE, and the DATA STROBE pulse must be at least 0.5 usec wide. As a standard feature, the 101A will not recognize a data strobe during the acknowledge delay interval. As an option, however, a non-gated data strobe is available.



1. THE FOLLOWING TABLE CAN BE USED TO IDENTIFY THE INPUT DATA AND DATA STROBE PINS.
 CONNECTOR SIGNAL/PIN IDENTIFICATION

SIG.	CONN./PINS			CONNECTOR/PINS						
	J4	J6	P6	SIG.	P5	P6	J5	J5	J7	P7
DATA 1	18	V	V	DS1	3	-	3	-	C	C
DATA 2	16	T	T	DS2	4	-	4	-	D	D
DATA 3	17	U	U	DS3	6	-	6	-	F	F
DATA 4	20	X	X	DS4	5	-	5	-	E	E
DATA 5	15	S	S	DS5	7	-	7	-	H	H
DATA 6	11	M	M	DS6	8	-	8	-	J	J
DATA 7	19	W	W	DS7	-	L	L	5	5	
DATA 8	12	N	N	DS8	-	E	E	6	6	
DATA STROBE	21	Y	Y							

Figure 4-8. DATA INPUT CIRCUIT

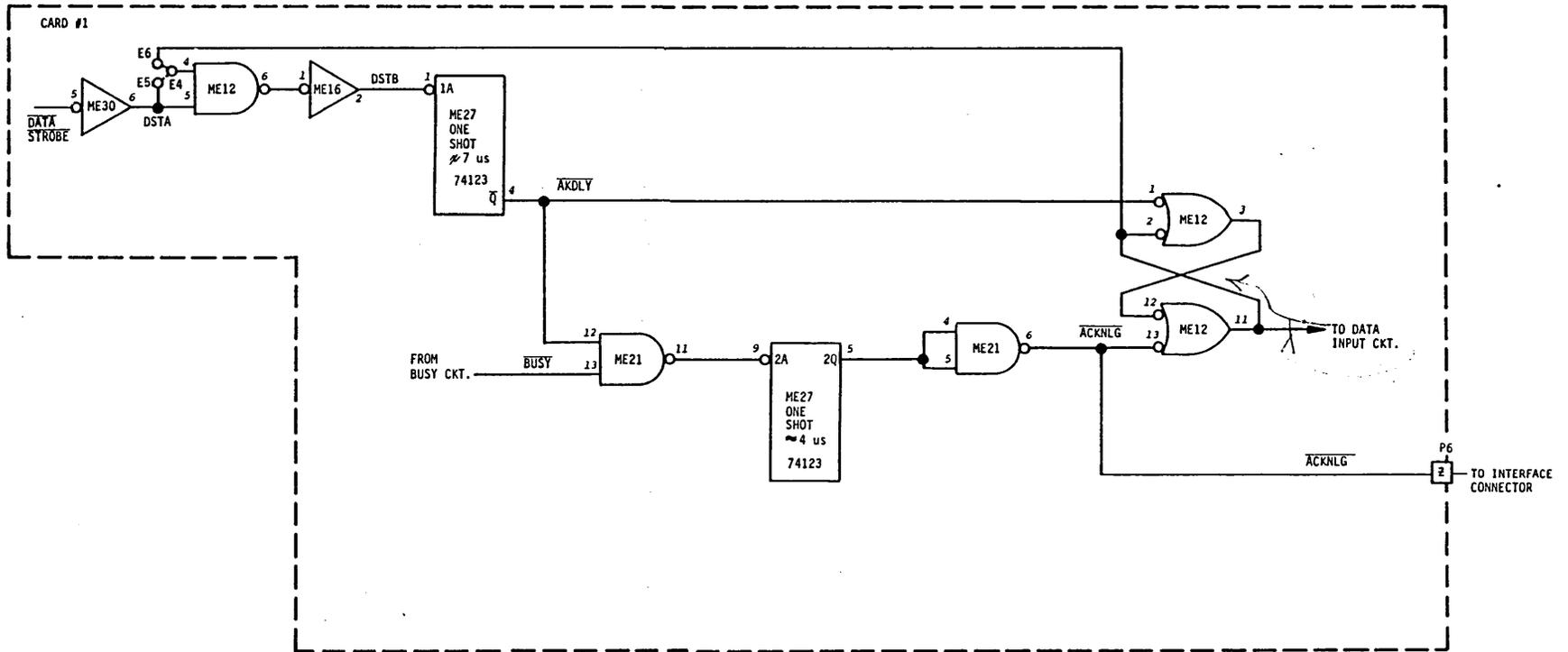


Figure 4-9. ACKNOWLEDGE CIRCUIT

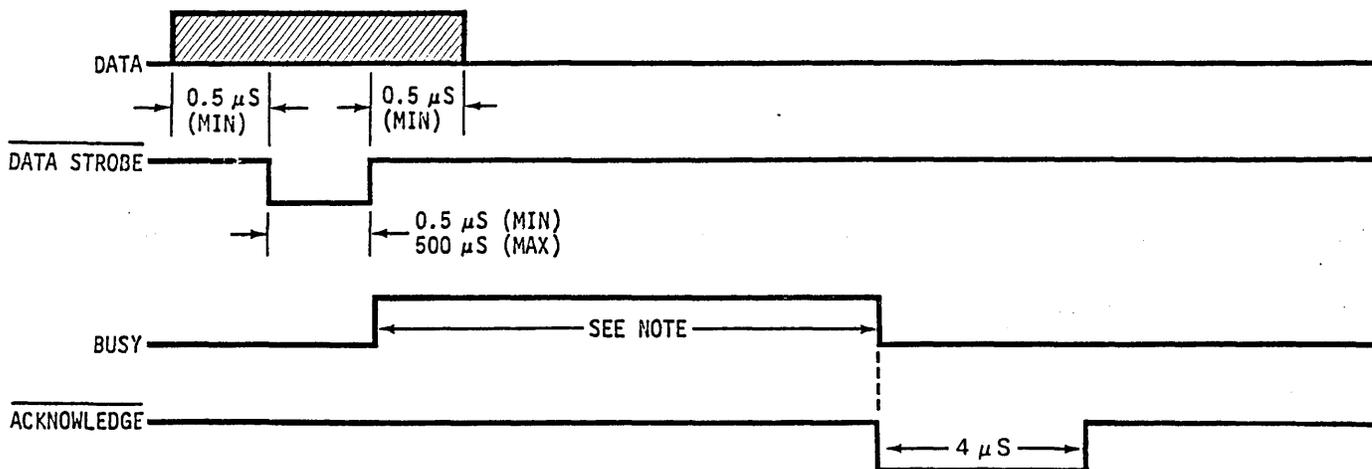
4.4.3 ACKNOWLEDGE (Figure 4-9)

The trailing edge of the gated data strobe (DSTB) triggers the $\overline{\text{AKDLY}}$ one-shot generating a 7 usec $\overline{\text{AKDLY}}$ pulse. This sets a latch (ME12) which prevents subsequent data strobes from being accepted. If the printer did not go busy as a result of the received data, the trailing edge of $\overline{\text{AKDLY}}$ triggers the Acknowledge one-shot generating a 4 usec $\overline{\text{ACKNLG}}$ pulse to the interface connector. This $\overline{\text{ACKNLG}}$ pulse also resets the latch, allowing the printer to receive the next DATA STROBE pulse.

If the printer went busy as a result of the received data, the trailing edge of $\overline{\text{BUSY}}$ generates the $\overline{\text{ACKNLG}}$ pulse.

4.4.4 BUSY TIMING (Figure 4-10, Timing; Figure 4-11, Circuit)

The timing diagram in Figure 4-10 shows the interface timing involved in receiving any character that causes a busy condition in the printer.



Note:

<u>Received Data</u>	<u>Octal Code</u>	<u>Duration of Busy</u>
Bell	007	2 seconds
Line Feed	012	75-105 msec
Vertical Tab	013	300-310 msec
Form Feed	014	3-3.5 sec
Carriage Return or 132nd char- acter in a line.	015	6 msec per character plus 270 msec max. return time.
Delete	177	3 msec
Deselect	023	Until printer is selected.

Figure 4-10. INPUT DATA CAUSING BUSY

A busy condition is developed by the 8-input gate ME15 pin 8. The output of this gate is normally low when the printer is not busy, and goes high when any of the following conditions occurs:

1. The printer has been deselected (SEL is low);
2. A prime condition is in progress (DMC is high);
3. A printing operation is in progress ($\overline{\text{CIP}}$ is low);
4. A Carriage Return code has been received prior to the 132nd character in a line ($\overline{\text{ZBCR}}$ is low);
5. The dummy character appears at the Shift Register output ($\overline{\text{TB8}}$ is low);
6. A paper movement operation such as line feed, form feed, or vertical tab is in progress ($\overline{\text{PM}}$ is low);
7. A line feed operation has just been completed ($\overline{\text{DLYLF}}$ is low);
8. A malfunction in the video circuit ($\overline{\text{LD}}$ is low), a Bell condition ($\overline{\text{BSP}}$ is low) or a Carriage Return code has been received ($\overline{\text{SCR}}$ is low). This causes $\overline{\text{ORBZ}}$ to go low.

As soon as a busy condition is detected, the BUSY signal to the external connector goes high. The low-going OSC signal clocks the output of gate ME15 into flip-flop ME22. As a result, flip-flop ME22 delays the trailing edge of the BUSY signal to the interface connector by one clock interval after the busy state is terminated.

Also, whenever a Form Feed (LFF) or Vertical Tab (LVT) code is received, signal SVFD goes high, immediately resetting flip-flop ME22, causing a BUSY signal.

The trailing edge of BUSY generates a 4 usec Acknowledge pulse ($\overline{\text{ACKNLG}}$) to the interface connector, indicating that the operation is complete.

4.4.5 CLOCKING INPUT DATA INTO THE BUFFER (Figure 4-7, 4-12)

If the received data has a ONE in bit 6 or 7 (indicating a printable character), signal CLGT goes high allowing the gated data strobe DSTB to generate a CLKTB pulse. This clocks the received character (DS1-DS8) into the shift register.

If the received character is a control code ($\overline{\text{ZERO}}$ in bits 6 and 7) other than a carriage return, then CLGT goes low inhibiting CLKTB, and the character is not clocked into the shift register.

If a carriage return code (octal 015) is received and at least one printable character has been received for that line (ie., First Character Clock FCLK is set), then the CR code is stored in the shift register.

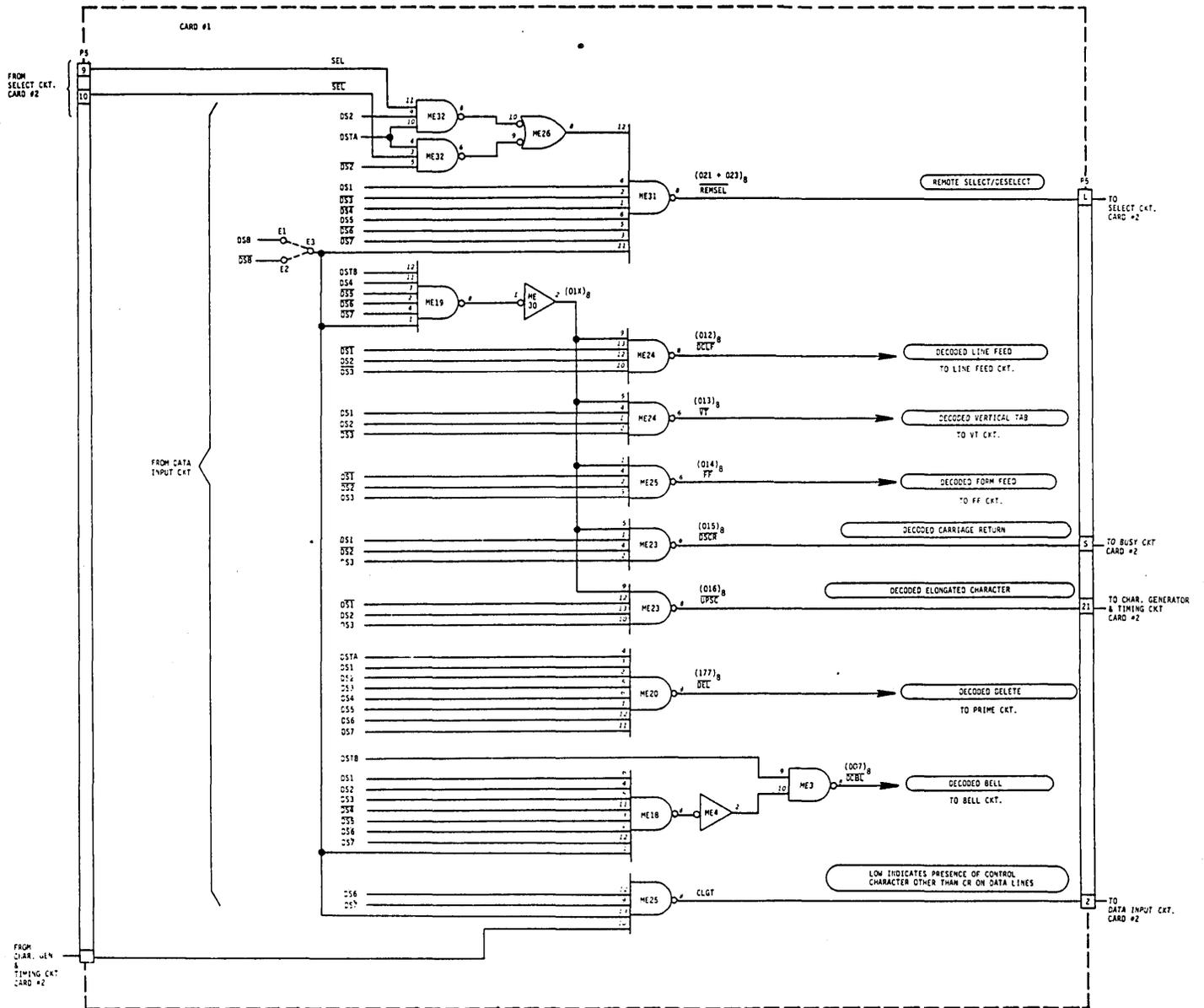


Figure 4-12. FUNCTION DECODER

4.4.6 FUNCTION DECODER (Figure 4-12)

Data inputs from the interface connector are first buffered and then applied to decoder gates. If a control code is detected, the decoder output causes the following action in the printer.

Printer Control Functions (Card 2)

Function	Mnemonic	Octal Code	Printer Action
1. Carriage Return	<u>DSCR</u>	015	Shift the buffer until dummy character appears at the output and print the line of characters.
2. Form Feed	<u>FF</u>	014	Move the paper until the next Top of Form hole in Channel 1 of the tape reader is detected.
3. Vertical Tab	<u>VT</u>	013	Move the paper until the next Vertical Tab hole in Channel 2 of the tape reader is reached.
4. Line Feed	<u>DCLF</u>	012	Advance the paper one line.
5. Delete	<u>DEL</u>	177	Prime the printer electronics.
6. Bell	<u>DCBL</u>	007	Generate an audible tone, about two seconds in duration, in the speaker at the rear of the printer.
7. Elongated Characters	<u>UPSC</u>	016	Print the line of characters as elongated characters (double width).
8. Select	<u>REMSEL</u>	021	Select the printer.
9. Deselect	<u>REMSEL</u>	or 023	Deselect the printer.

4.5 CHARACTER PRINTING (Figure 4-13)

When the dummy character appears at the shift register output ($\overline{\text{TB8}}$), the logic activates an electromechanical clutch which causes the print head to move from left to right across the page.

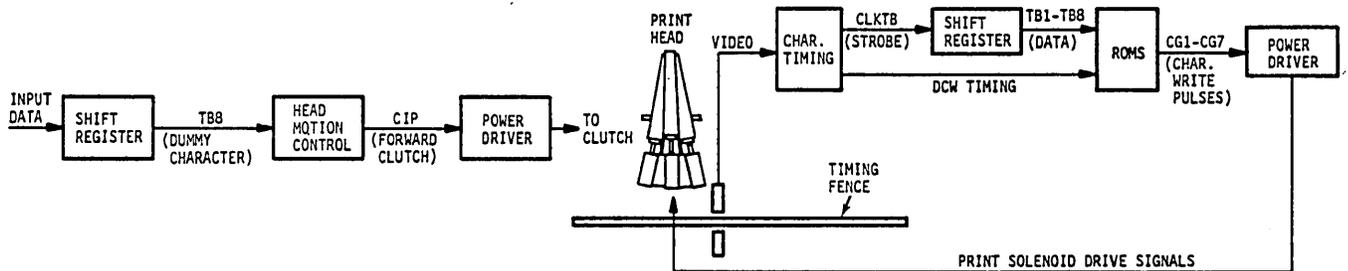


Figure 4-13. CHARACTER PRINTING BLOCK DIAGRAM

As the print head carriage moves across the page, the timing fence (and light source) generate timing inputs to the video amplifier board. These timing signals are used by the logic to register the five full columns of dots in the printed character.

The logic uses two ROM (Read-Only Memory) elements for each character set. One ROM defines the dot pattern for the five full-step columns, the other defines the dot pattern for the four half-step columns in a 9 x 7 matrix. These ROM outputs control seven driver circuits which activate the seven print head solenoids.

This section describes the character printing operation as follows:

- Paragraph 4.5.1 Initiating the Printing Operation
- 4.5.2 Print Head Motion
- 4.5.3 Character Registration and Timing
- 4.5.4 Character Generator (ROM)
- 4.5.5 Print Head Operation
- 4.5.6 Terminating the Printing Operation

4.5.1 INITIATING THE PRINTING OPERATION (Figure 4-14)

As data is received by the printer, the dummy character is shifted through the shift register. As the 132nd character is received, the dummy character appears at the shift register output. If a carriage return code (octal 015) is received before the 132nd character, this code generates ZBCR. This allows the OSC clock to generate CLKTB pulses, shifting the register until the dummy character appears at the output. A high TB8 indicates dummy character.

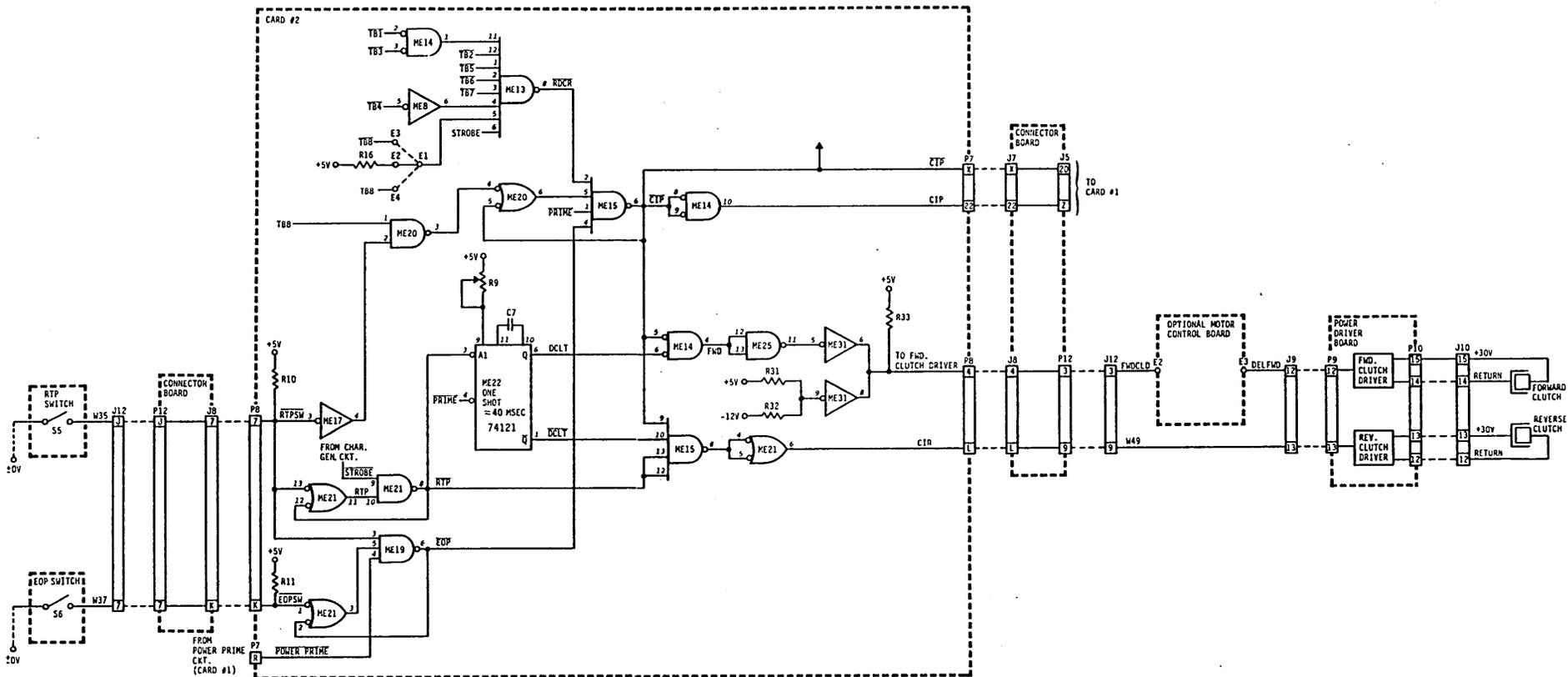


Figure 4-14. FORWARD AND REVERSE CLUTCH DRIVE CIRCUITS

When TB8 goes high and the left limit switch is activated (RTPSW is high), a low CIP signal is generated. The low CIP signal gated by Delayed Clutch (DCLT) and the -12V supply, controls a driver circuit (via the optional Motor Control circuit) on the power driver board, the output of which activates the forward clutch.

Limit switches are located at the right and left end of the printer. These switches (RTP switch on the left, EOP switch on the right) are activated by a magnet mounted on the underside of the carriage mechanism. Actuation of the RTP switch indicates the carriage is at its leftmost position. Actuation of the EOP switch indicates the carriage is at its rightmost position. The output of these two switches are used to control the forward clutch logic (CIP) and to detect failures in the video signal from the timing fence (LD).

4.5.2 PRINT HEAD MOTION (Figure 4-14; Schematic - Section 7)

Power for moving the print head from left to right across the page is transmitted from the main drive motor to an electromechanical clutch mechanism. The clutch is controlled by the CIP signal. CIP is gated with: (1) Delayed Clutch signal (DCLT) to ensure that the print head rests at the left margin for at least 40 milliseconds before being reactivated; and (2) the -12V supply, to ensure that the -12V supply is on before activating the forward clutch. This gated CIP signal controls the forward clutch driver.

The input to the power driver is normally low thereby causing the current flowing through R42 to be shunted through CR31 to ground. Diode CR30 offsets the diode drop of CR31. When the input signal goes active high, CR31 becomes back biased, causing current to flow through CR30, R49, and transistor Q29 and Q28 to saturate, and current to flow through Q29 and R41. The current flowing through Q28 also flows through and activates the forward clutch. The clutch current is limited by R40.

When the clutch signal goes low, Q29 and Q28 turn off. Diode CR29 provides a current path until the magnetic field of the forward clutch is dissipated.

4.5.3 CHARACTER REGISTRATION AND TIMING (Figure 4-15, Timing; Figure 4-16, Circuit)

As the print head assembly moves across the timing fence, the vertical slots on the timing fence interrupt light to the optical pick-up head, generating a video signal. The VIDEO AMP output then triggers the STROBE one-shot ME18 on the logic card, initiating the print timing shown in Figure 4-15.

The STROBE one-shot is adjusted for 450 usec. The leading edge of STROBE also triggers a delay one-shot (ME32-4) adjusted for a 500 usec output pulse. The trailing edge of this pulse triggers the Delayed Strobe (DELSTB) one-shot which is adjusted to the same pulse width as STROBE. In normal character printing, STROBE is used for full-step timing and DELSTB for the half-step timing.

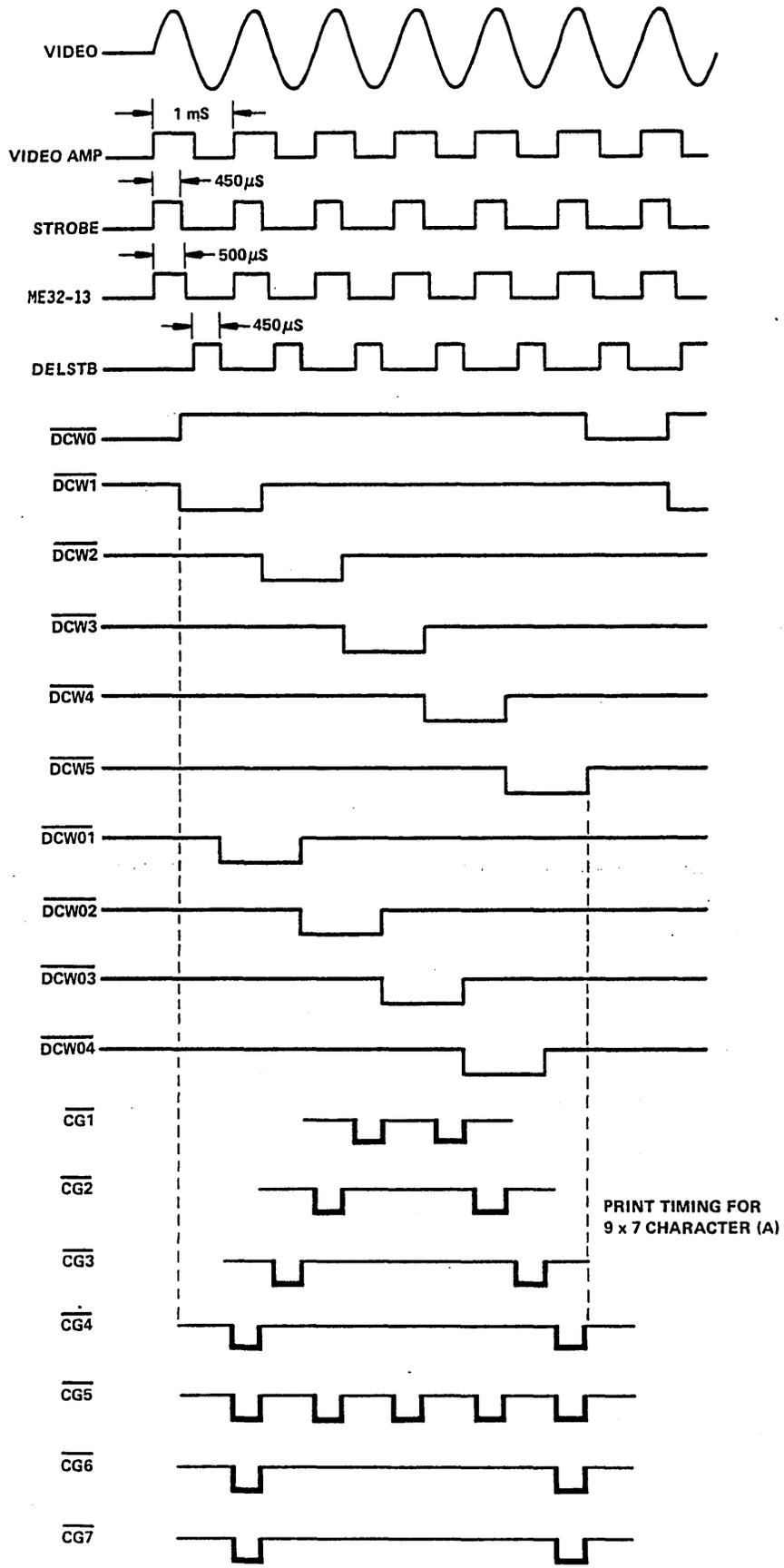


Figure 4-15. CHARACTER TIMING

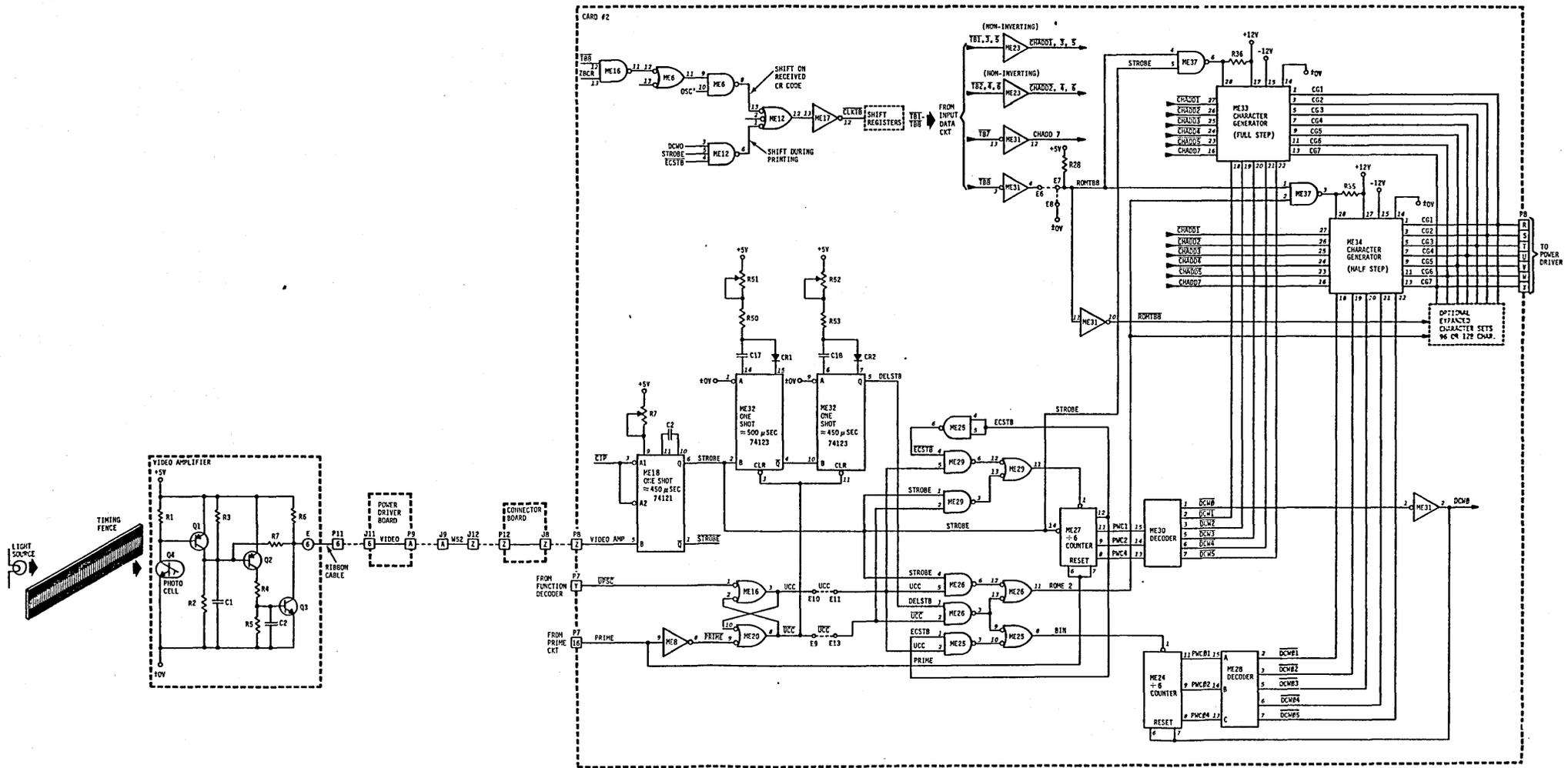


Figure 4-16. CHARACTER REGISTRATION AND TIMING CIRCUIT

4.5.3.1 Video Amplifier (Figure 4-16)

The circuit used to amplify the video signal generated by the timing fence is located on the video amplifier assembly board, contained on the print head carriage.

Referring to schematic drawing #63002319 in Section 7, the video amplifier consists of a high gain amplifier with positive feedback. When the photo cell is dark, no current flows through it and the base of Q1 is held at +5 volts through resistor R1. When Q1 is turned off, Q2 is turned on through resistors R2 and R7. Q2 being on also turns on Q3 through resistor R4.

Because Q3 is on, the collector is held at approximately ground, thereby allowing the current to flow through R7 and holding Q2 on through the positive feedback. When the photo transistor detects light, current is allowed to flow through it, thereby drawing current through transistor Q1 and resistor R2. Q1 then turns on and turns transistor Q2 off by shunting the current away from the base of Q2. When Q2 turns off, Q3 also turns off and the collector of Q3 is held to +5 volts through R6. R7 serves to drive Q2 further into the cut-off region. Capacitors C1 and C2 are used for proper frequency response and noise suppression. Resistor R3 is used to prevent leakage by keeping Q2 from turning off.

4.5.3.2 Timing Signals (Figure 4-15, Timing; Figure 4-16, Circuit)

For normal character printing, five consecutive STROBE pulses are counted down by the divide-by-six counter ME27. The counter outputs PWC1, 2 and 4 are then decoded to generate timing outputs DCW0-DCW5. These timing intervals correspond to the five full-step columns in the character matrix. The quiescent state of this strobe counter is DCW0 which corresponds to the space interval between characters. During DCW0, the STROBE input generates a CLKTB pulse which clocks the next character to the output of the shift register. The DCW1-DCW5 timing outputs are used to address the appropriate column in the "full-step" ROM (character generator).

During each video interval both a STROBE pulse and a DELSTB pulse of the same width is generated as shown in Figure 4-15. During normal character printing (when UCC is high), four consecutive DELSTB inputs to counter ME24 generate timing outputs DCW01-DCW04. These four timing intervals correspond to the four additional ("half-step") columns in the 9 x 7 matrix. Timing signals (DCW01-DCW04) are used to address the appropriate column in the "half-step" ROM (character generator).

During elongated character printing, the UCC latch is set allowing alternate STROBE pulses to clock the strobe counter and alternate ECSTB pulses to clock the delayed strobe counter. As a result, timing outputs DCW1-DCW5 and DCW01-DCW04 are twice as long during elongated character mode than during normal character mode.

During the space interval between characters (DCW0), the delayed strobe counter is reset.

4.5.4 CHARACTER GENERATOR (ROM) - Figure 4-16

The logic board can contain up to four ROM elements, depending on the selected character generating capabilities of that printer. The ROM's in element locations ME33 and ME35 each provide full-step outputs (i.e., columns 1, 3, 5, 7, 9) for up to 64 characters. The ROM's in locations ME34 and ME36 each provide half-step outputs (i.e., columns 2, 4, 6, 8) for up to 64 characters. ME33 and 34 are used for the standard 64 character set, ME34 and 36 are used for the optional character sets.

Each ROM (Character Generator) element has three inputs (in addition to the input voltages):

- (1) The character address - The standard 64 character ROM's (ME33 and ME34) are addressed by $\overline{\text{TB1}}-\overline{\text{TB5}}$ (CHADD1-CHADD5) and $\overline{\text{TB7}}$ (CHADD7). By using TB7 inverted as character address bit 6, lower case character codes are automatically printed as upper case characters (e.g., as upper case A - 100001, and a lower case a - 1100001, both apply the same character address to the ROM). In the optional ROM's (ME35 and ME36), character address bit 6 is controlled by $\overline{\text{TB6}}$.
- (2) Column Address - Timing outputs $\overline{\text{DCW1}}-\overline{\text{DCW5}}$ specify the five "full-step" columns in each 9 x 7 character matrix in ROM's ME33 and ME35. Timing output $\overline{\text{DCW01}}-\overline{\text{DCW04}}$ specify the four "half-step" columns in each 9 x 7 matrix in ROM's ME34 and ME36.
- (3) Timing - A low input to pin 28 of each ROM gates the 7-bit dot configuration of the addressed character and column to the output of that ROM. For the full-step ROM's (ME33 and ME35), this timing input is STROBE ANDed with ROMTB8 or $\overline{\text{ROMTB8}}$. For a standard 64-character configuration, ROMTB8 is always high allowing each STROBE pulse to gate the standard ROM output. The STROBE pulse provides the timing input for gating the 7-bit dot pattern to the print head solenoids.

For the half-step ROM's (ME34 and ME36), the timing input is ROME2 ANDed with ROMTB8 or $\overline{\text{ROMTB8}}$. For normal character printing, ROME2, is coincident with Delayed Strobe signal DELSTB. This effectively interleaves the dot pattern from the half-step ROM's with the dot pattern from the full-step ROM's.

For elongated character printing, ROME2 is coincident with each STROBE signal. This combined with the fact that the DCW timing signals are twice as long during elongated character mode, causes the printed character to be twice as wide as a normal character. An example of the character (Y), both in normal and elongated style, is shown in Figure 4-17.

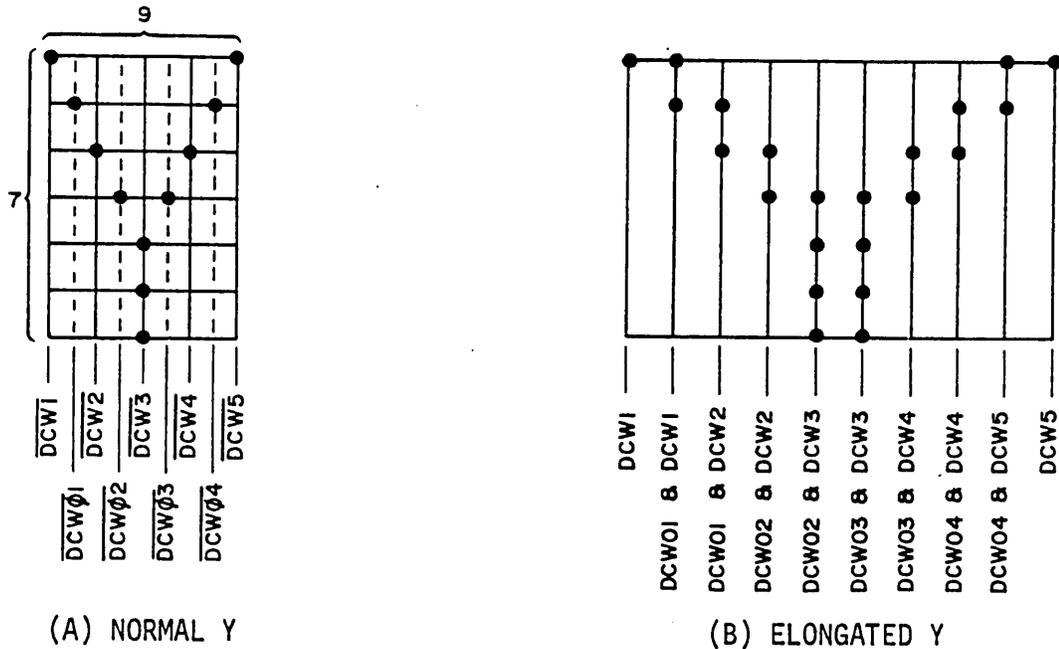


Figure 4-17. NORMAL AND ELONGATED CHARACTERS

The seven outputs from all four ROM's are wire ORed together and applied to the Power Driver board as signals CG1-CG7.

4.5.5 PRINT HEAD OPERATION (Figures 4-18, 4-19)

The print head is the device used to print the characters. The head contains seven solenoids that move seven wires against the ribbon to form the column of dots on the paper. The position of these solenoids and the location of the wires in the head are shown in Figure 4-18. Solenoid #1 controls the top dot and solenoid #7 controls the bottom dot in a column. The wires come from each solenoid and are positioned at a jewel located at the end of the head. The length of these wires is approximately 3.5 inches and each wire requires about one ounce of force to begin its movement. The amount of force needed to move the wires 0.015 inch (i.e., the distance necessary to make a dot on the paper) is about 12 ounces.

The total distance travelled by the wires is approximately 0.015-inch, but under normal operation, the end of the head is about 0.006 inch from the ribbon and paper. The reason for locating the wires closer than 0.015 inch from the paper, is to account for the amount of force absorbed by the ribbon and paper upon impact.

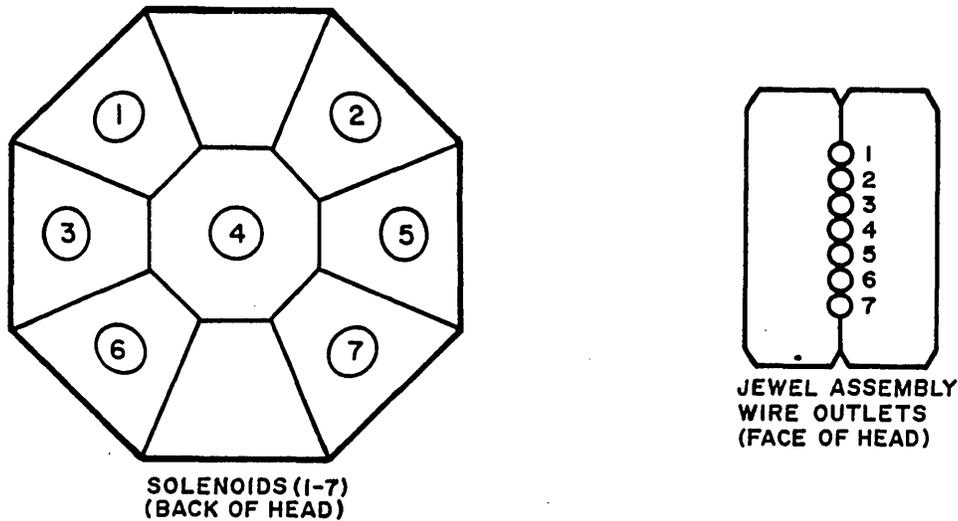


Figure 4-18. SOLENOID POSITIONS, 1 THROUGH 7

The electrical timing and mechanical movement of the wires is shown in Figure 4-19. As shown, a 450 microsecond pulse is used to complete the impact. The voltage used to drive the solenoids is +35 volts unregulated. This voltage is about +35 to +38 volts when the pins are in an idle state, but drops to about +30 volts when all pins are engaged at the same time. From the beginning of the 450 microsecond drive pulse, about 200 microseconds is required before the wire starts to move in each solenoid. Once the wire starts moving, an additional 300 microseconds is required before the wires make an impact on the paper. Approximately 500 microseconds more are required for the wire to retract to its normal position.

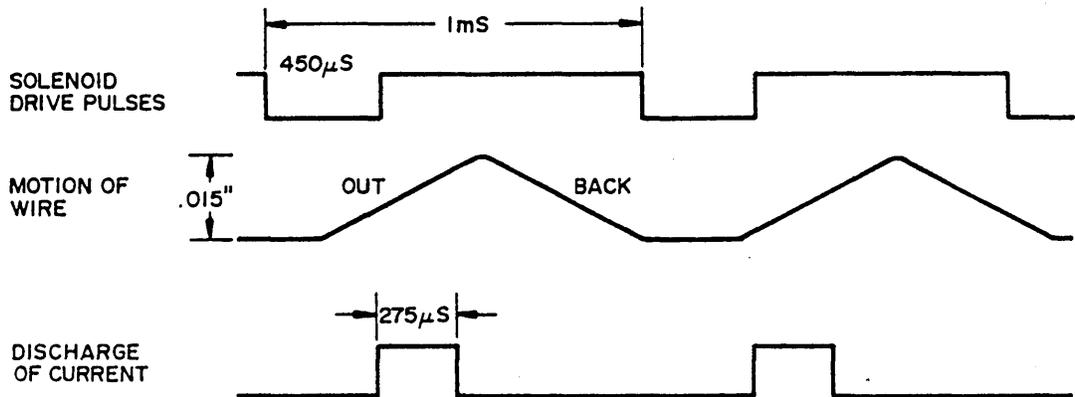


Figure 4-19. PRINT HEAD TIMING

4.5.6 POWER DRIVER CIRCUITS (Schematics, Section 7)

4.5.6.1 Solenoid Drivers (Figure 4-20)

The wire ORed outputs from the character generator CG1-CG7 are applied to the solenoid power driver circuits where they are inverted, amplified and used to generate current pulses for firing the solenoid in each head.

Since all solenoid driver circuits are identical and operate in the same manner, only the first one, controlled by CG1 will be described.

Referring to Power Driver schematic #63002275, when CG1 goes high indicating an active condition for solenoid #1, current flows through R4. If CR40 is back-biased (which is the normal operating condition), the current flows into the base of Q3 turning it on. The current through Q3 then develops a +5V level across Zener diode CR3. This +5V causes Q2 and Q1 to act as emitter followers, developing a voltage of approximately 3.8V across R1. Resistor R2 limits power dissipation in Q2.

The 3.8V across R1 allows approximately a 2.5 amp current flow through solenoid #1 and transistor Q1. When Q1 is first turned on, the inductance of the solenoid prevents current flow through Q1. Transistor Q1 is saturated at this time. When current flow through the solenoid reaches approximately 2.5 amps, Q1 goes into the active region and limits the current to this value.

When CG1 goes inactive low, Q3 turns off, turning off Q2 and Q1. When Q1 turns off, the solenoid current flows through CR2 and C1. The value of C1 is chosen to act as a parallel resonant circuit with the inductance of the solenoid. Diode CR2 allows only a quarter-wave of the resonant frequency. A waveform diagram is shown in Figure 4-20.

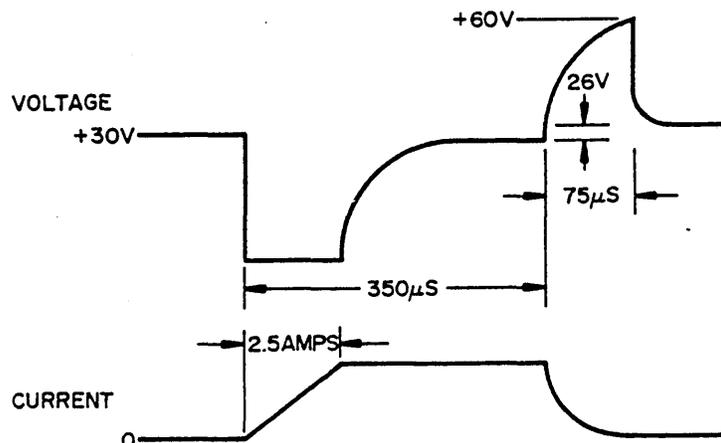


Figure 4-20. POWER DRIVER WAVEFORM

4.5.6.2 Capacitor Discharge Circuits

After C1, C2, C3, C4, C6, C7 and C8 have charged to approximately 60 volts because of the discharging solenoid current, resistors R61, R62, R64, R66 and R67 serve to bleed off this charge so that the capacitors will be at a 30 volt bias at the time of the next discharge. The value of the resistor is chosen so that a time constant of about 275 microseconds results.

4.5.6.3 Shut-Off Circuit

Diodes CR40, CR41, CR42, CR43, CR44, CR45, CR39 have their cathodes tied together and connected to Q32. When the printer is turned on, the +5 volt supply closes relay K1. This prohibits current from flowing through CR35 and into the base of Q32, thereby ensuring that Q32 is shut off. In this condition diodes CR39 through CR45 cannot shunt current away from the solenoid drivers. When the machine is shut off, however, it is characteristic that the 5 volt supply output drops before the 30 volt supply output.

When this happens, K1 opens, allowing the current to flow through R47 and CR35 into the base of Q32, thereby saturating Q32. This connects the bases of all the solenoid drivers to ground through diodes CR39 through CR45, preventing any of the solenoids from firing during power turn off. The Clutch and Line Feed Drivers are also attached to the collector of Q32 through diodes CR36, CR37 and CR38. Therefore, during power turn off, the clutches will release and paper movement will be inhibited.

4.5.7 TERMINATING THE PRINTING OPERATION

4.5.7.1 General

When the print head carriage reaches the right limit switch (\overline{EOP} goes low) or when a CR character is detected at the shift register output, (\overline{RDCR} goes low), CIP goes high, turning off the forward clutch. The high CIP: (1) generates a low CIR which activates the reverse clutch returning the print head to the left margin, (2) triggers the PRMOS one-shot generating prime condition, and (3) triggers the Line Feed one-shot (if the automatic line feed is not disabled) causing the paper to advance one line. During the Line Feed (LF) and Delayed Line Feed (DLYLF) interval, the printer remains busy and cannot accept data. At the end of the DLYLF interval, however, the printer goes unbusy and data can be received during the carriage return.

When the print head reaches the left margin, the low-going \overline{RTP} signal triggers one-shot ME22-6 generating a 40 millisecond Delayed Clutch interval (DCLT). During this time both clutches are prevented from turning on.

4.5.7.2 Reverse Clutch Driver

Power for moving the print head from right to left is transmitted from the main drive motor to a reverse clutch mechanism. Signal CIR from the logic board directly controls the reverse clutch driver on the Power Driver board, unaffected by the optional motor control circuit.

The reverse clutch driver operation is identical to that of the forward clutch driver described in Section 4.5.2, except that it is controlled by a signal CIR instead of CIP.

4.6 PAPER MOVEMENT

Three separate printer functions can cause a paper movement operation: line feed, form feed, and vertical tab. Each of these functions causes the paper to move by activating the Paper Movement Solenoid (PMSOL), which in turn activates a clutch that mechanically links the form feed motor to the paper feed tractors.

For each line feed operation, the solenoid is energized 15 milliseconds. At the end of this interval a 60-90 millisecond line feed delay is generated to allow the clutch pawl and clutch mechanism to return home before another paper movement operation is allowed.

In response to a form feed or vertical tab command, a dc level is applied to the solenoid, allowing continuous movement of the paper. This paper movement is terminated when a hole is detected in the appropriate channel of the vertical format paper tape. The operation of the VFU is described in Section 4.6.4.

4.6.1 LINE FEED (Figure 4-21, Circuit; Figure 4-22, Timing)

The line feed operation can be generated by any of the following three conditions:

- (1) After printing a line of characters (if the automatic line feed is not disabled, E10 to E11 is connected) then the low-going forward clutch signal CIP, triggers the LF one-shot.
- (2) Receiving a line feed code (octal 012) - The function decoder generates a low DCLF pulse during data strobe, the trailing edge of which triggers the LF one-shot.
- (3) Pressing the LINE FEED switch on the operator panel - Pressing this switch causes REMLFSW to go low. When the switch is released, the high-going REMLFSW triggers the LF one-shot.

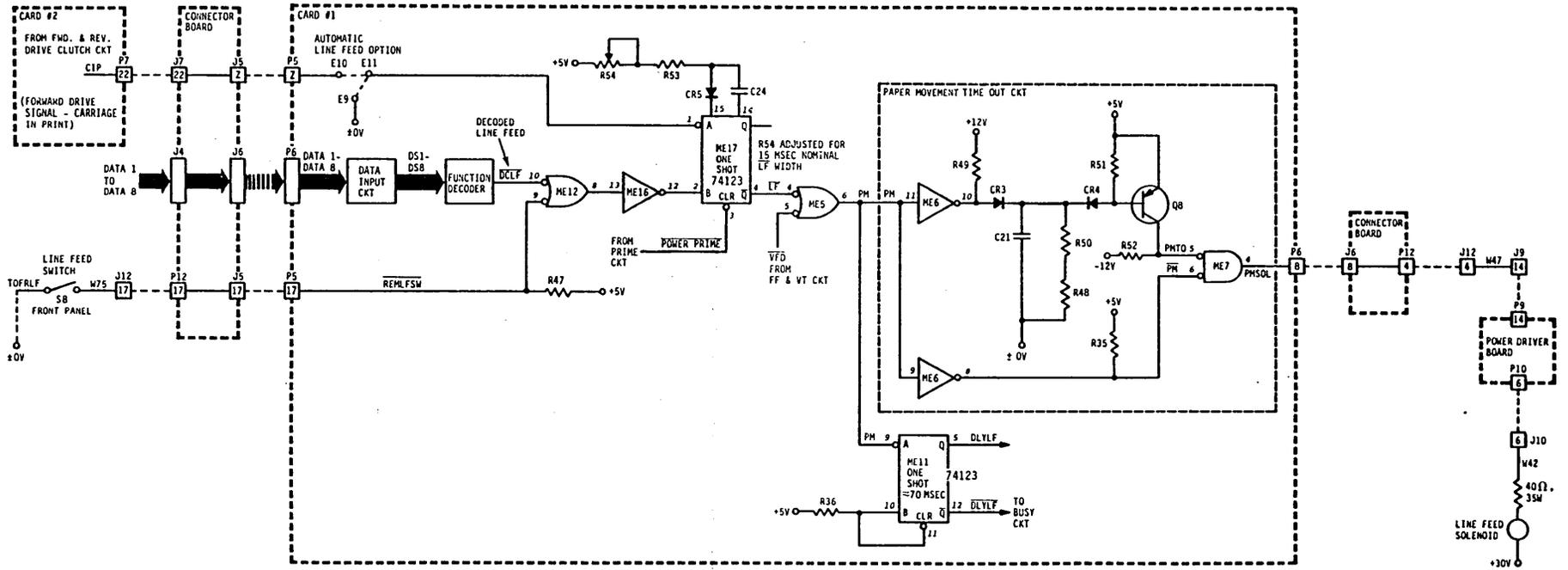


Figure 4-21. LINE FEED CIRCUIT

The width of the LF pulse generated by any of these three conditions is normally adjusted to 15 millisecond by means of R54.

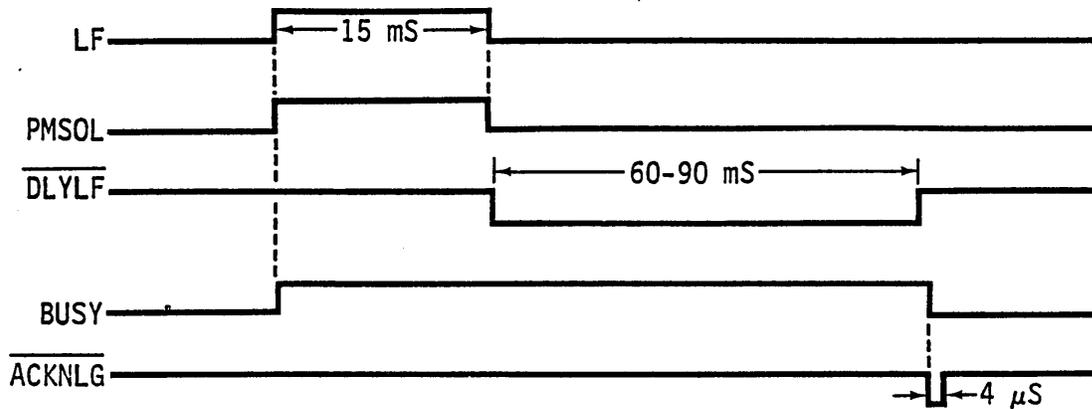


Figure 4-22. LINE FEED TIMING

The low \overline{LF} generates PM, and if no paper time-out condition has occurred (PMT0 is low), PM generates PMSOL. The high PMSOL signal activates the line feed solenoid via the Power Driver board. The trailing edge of PM triggers a 60-90 millisecond Delay Line Feed interval DLYLF. During both the LF and DLYLF intervals, the printer remains busy.

4.6.2 FORM FEED (Figure 4-23, Circuit; Figure 4-24, Timing)

A form feed operation can be generated by either of the following two conditions:

- (1) Receiving a form feed code (octal 014) - The decoded form feed signal \overline{FF} sets latch LFF which generates a high SVFD signal. SVFD allows the next OSC' to set the VFD flip-flop. The resulting low \overline{VFD} signal then activates PM and PMSOL which activates the line feed solenoid.
- (2) Pressing the TOP OF FORM switch on the operator panel - This generates a low \overline{TOF} signal which sets the LFF latch and generates PMSOL as described in (1) above.

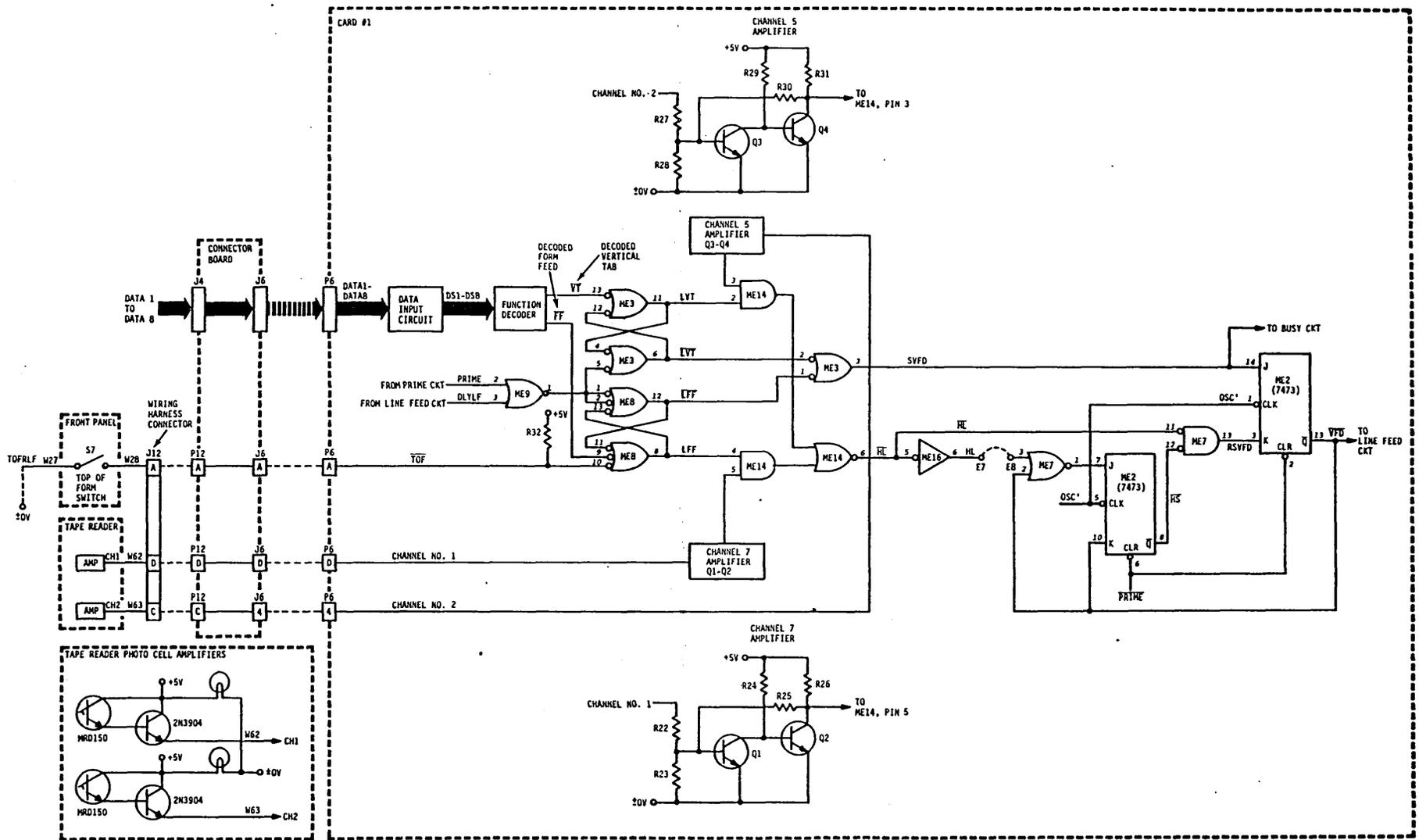


Figure 4-23. FORM FEED AND VERTICAL TAB CIRCUIT

In either case, the high PMSOL signal activates the line feed solenoid and generates a busy condition. This continues until a hole is detected in channel 7 of the paper tape, at which time signal \overline{HL} goes low. The low \overline{HL} allows the next OSC' clock to reset the HS flip-flop and generate RSVFD. The following OSC' clock resets VFD which disables PM and PMSOL. The trailing edge of PM activates a 60-90 millisecond DLYLF interval.

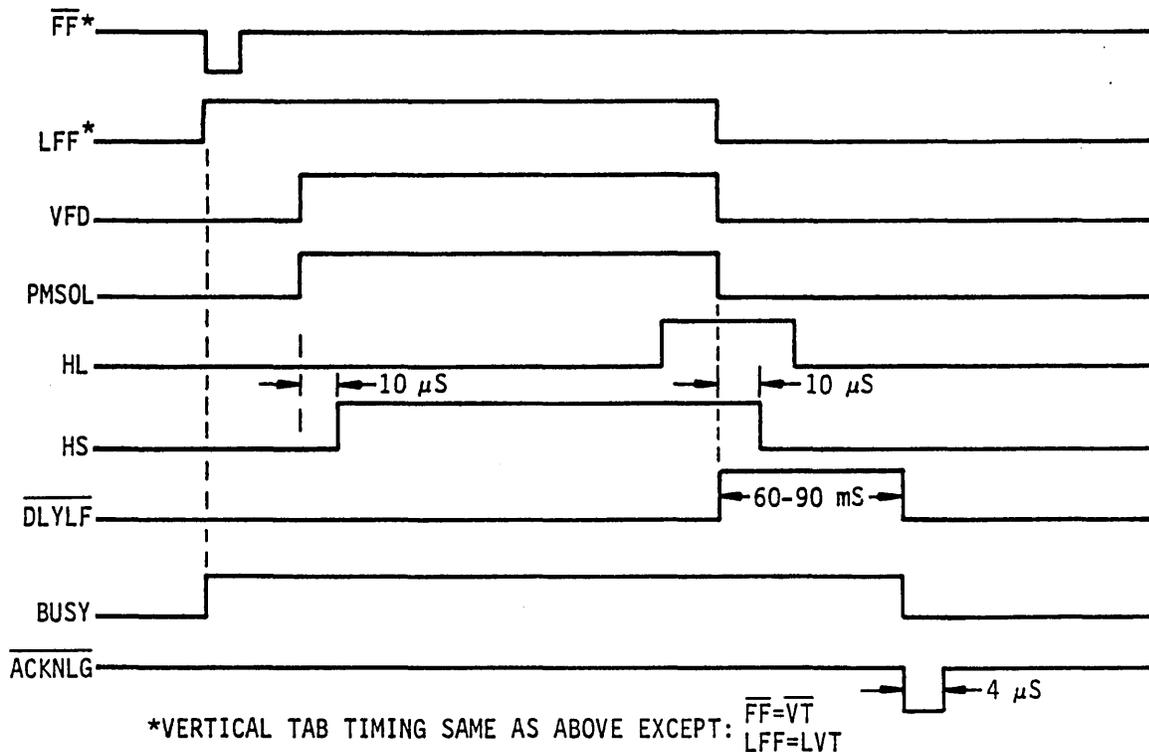


Figure 4-24 FORM FEED AND VERTICAL TAB TIMING

For as long as PMSOL is active, the printer remains in a busy condition. If a paper time-out is detected, PMSOL is immediately deactivated and the FAULT line is activated.

4.6.3 VERTICAL TAB (Figure 4-23, Circuit; Figure 4-24, Timing)

A vertical tab operation is generated by receiving a vertical tab code (octal 013). The decoded vertical tab signal sets latch LVT which generates a high SVFD signal. SVFD allows the next OSC' to set the VFD flip-flop. The resulting low \overline{VFD} signal then activates PM and PMSOL which activates the line feed solenoid.

The high PMSOL signal activates the line feed solenoid and generates a busy condition. This continues until a hole is detected in channel 5 of the paper tape, at which time signal \overline{HL} goes low. The low \overline{HL} allows the next OSC' clock to reset the HS flip-flop and generate RSVFD. The following OSC' clock resets VFD which disables PM and PMSOL. The trailing edge of PM activates a 60-90 millisecond DLYLF interval.

For as long as PMSOL is active, the printer remains in a busy condition. If a paper time-out is detected, PMSOL is immediately deactivated and the FAULT line is activated.

4.6.4 VERTICAL FORMAT UNIT

The vertical format unit (VFU) consists of a standard 8-channel (only two channels of which are used) paper tape reader, located on the upper left side of the printer just under the left cover. Movement of the paper tape in the VFU is caused by direct mechanical linkage to the gear train that drives the paper feed tractors. As a result, each line feed advances the paper by one line and the tape by one sprocket hole.

Each form feed function advances paper until the next hole is detected in channel 7 of the paper tape. Similarly, each vertical tab function advances paper until the next hole is sensed in channel 5 of the paper tape.

The following two paragraphs describe the operation of the tape reader amplifiers in the VFU and the amplifier tape channel amplifiers on Card 1.

4.6.4.1 Vertical Format Control Tape Reader (Figure 4-23)

Each channel in the vertical format control tape reader contains a photo transistor (type MRD150) and a single transistor amplifier (type 2N3904). The 2N3904 transistor acts as an emitter follower amplifier to provide current gain. When the photo transistor is dark, no current flows through it and no current flows through the base of the 2N3904; hence no current flows through the 2N3904 transistor. When light shines on the MRD150 photo transistor, current flows through it and into the base of the 2N3904 where it is amplified by the transistor.

4.6.4.2 Vertical Format Control Amplifiers (Figure 4-23)

Since the amplifiers used for both the Form Feed and Vertical Tab channels are identical, only channel one will be described. There is normally no current flowing into the base of Q2. This keeps Q1 off and supplies base current to Q2 through resistor R24. Q2 then turns on and develops approximately zero voltage across it, allowing resistor R24 to maintain the base of Q1 at ground. When the tape reader senses a hole, current flows through R22 and R23 into the base of Q1, thereby turning it on. The collector of Q1 is approximately ground, shunting the current through R24 away from the base of Q2. This turns off Q2, and allows its collector to be held at +5 volts through resistor R26. R25 then supplies current to the base of Q1 maintaining Q1 turned on.

4.6.5 PAPER TIME OUT CIRCUIT (Figure 4-21)

To prevent paper runaway in the case of a machine failure, a paper time-out circuit is included. Prior to a paper movement command, capacitor C21 is charged to approximately +12V through R49 and CR3. Each time a paper movement command is initiated, the high PM signal causes a low output at ME6-10 back-biasing diode CR3. This allows C21 to discharge through R48 and R50 until either the paper movement is terminated or CR4 is forward-biased. If CR4 gets forward-biased, Q8 turns on causing PMTO to go high which disables PMSOL and terminates paper movement.

The time-out interval is approximately 6 seconds.

4.6.6 LINE FEED SOLENOID DRIVER (Schematic - Section 7)

Signal PMSOL from Card 1 is normally low (inactive). In this state, current flows through R39 and CR28 to ground. The diode drop of CR27 balances the diode drop of CR28 thereby maintaining the line feed driver in the off condition. When PMSOL goes active high, CR28 becomes back biased and current flows through R39, CR27, R48 and into the base of Q27, saturating it. The collector current, limited by R38, flows into transistor Q26, turning it on and causing current to flow through the Line Feed Solenoid. When signal PMSOL returns low, transistors Q27 and Q26 turn off. The fly-back voltage then appears across CR24, which provides a current path until the magnetic field of the line feed solenoid is dissipated.

4.7 SPECIAL FUNCTIONS

In addition to the paper movement and character printing functions, the printer also performs the following special functions: Bell, Delete, Paper Empty, and Motor Control (optional).

4.7.1 BELL (Figure 4-25)

Reception of a bell code (007) or detection of a paper empty condition (\overline{PE} goes low) triggers the BELL one-shot generating a 1 to 2 second BELL signal. This BELL signal turns on Q2 enabling multivibrator ME29. The 2 KHz output from ME29 is then applied to the speaker through Q3 and Q4 on Card 2. The speaker is located at the rear of the printer.

During this same time, the low \overline{DCBL} or \overline{PE} followed by the high BELL output generates a low \overline{BSP} signal. This generates a high ORBZ which creates a BUSY condition.

4.7.2 DELETE

The delete code is used to reset the control logic, same as a prime condition. Reception of a delete code causes the function decoder to generate a low DEL signal. The trailing edge of Data Strobe (DSTA) then causes DEL to go high, triggering the PRMOS one-shot. This initiates a prime condition as described in Section 4.3.1.

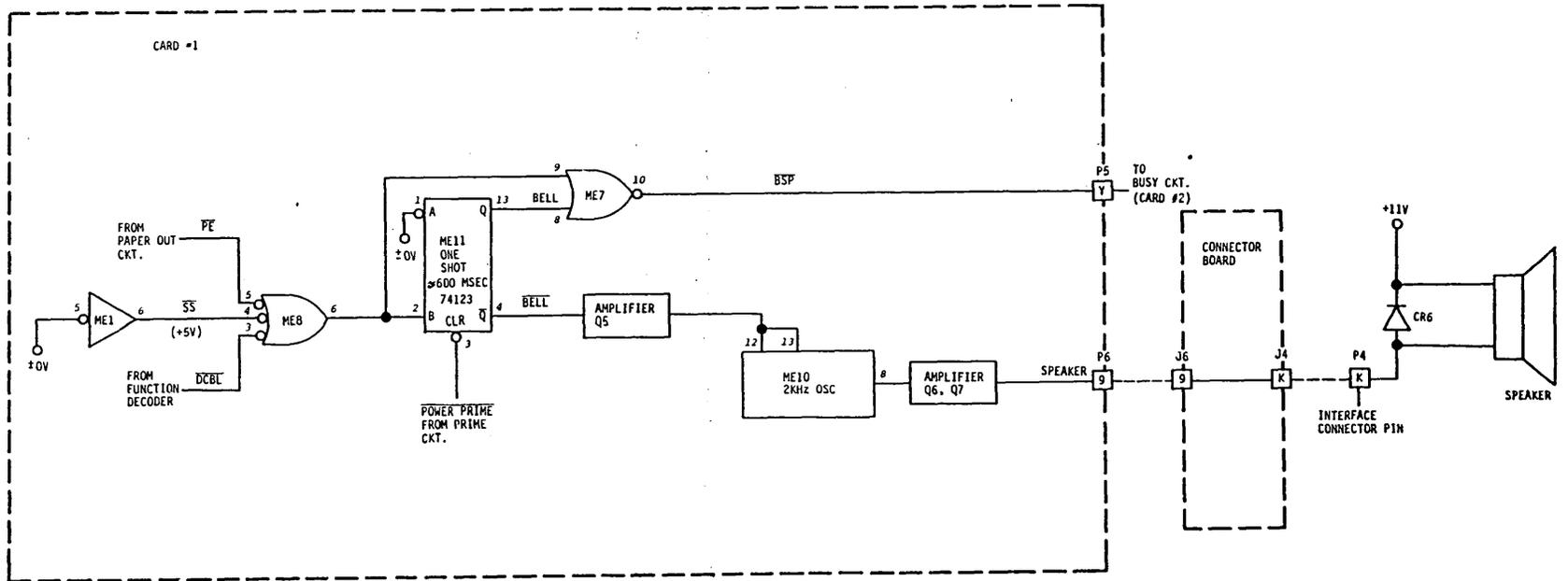


Figure 4-25. BELL CIRCUIT

4.7.3 PAPER EMPTY (Figure 4-26)

The paper empty condition is controlled by normally-open PAPER OUT switch S2. With paper in the printer, a high PAPER OUT input is applied to Card 1 generating a high \overline{PE} and a low PE signal. When the printer runs out of paper, switch S2 closes, turning on the PAPER OUT lamp on the front panel and activating the PE signal. This high PE signal goes to the interface connector to indicate a paper-out condition. The low \overline{PE} signal activates the bell and activates the BUSY line as long as the paper empty condition exists.

To continue printing on the last form during a paper empty condition, pressing the FORMS OVERRIDE switch on the front panel removes the low PAPER OUT input to Card 1 deactivating signal PE. This allows printing to continue until the FORMS OVERRIDE switch is released.

4.7.4 MOTOR CONTROL (OPTIONAL)

The Motor Control board mates to the printer electronics via molex connectors. A wire harness is located in the paper pan region, (see Figure 4-2), and is connected to a cable from the board.

With the optional motor control feature, if no print or paper movement command is received during any 9-second interval, a solid-state switch is deactivated which removes the 115 VAC from the drive and form feed motors. The dc voltages to the printer electronics are not affected. The motors are automatically turned back on by the next print or paper movement command. (This section includes a Central Circuit location diagram, Figure 4-12, an Interconnection diagram, Figure 4-13 and a timing diagram Figure 4-14.)

One-shot ME3 generates a 9-second interval during which time the Forward Clutch signal (FWDCLD) and the Paper Movement signal (PMSOL) are monitored. During any 9-second interval generated by one of these print or paper movement commands, the solid-state switching circuit is activated, thereby delivering 115 VAC to the motors. If the 9-second interval is exceeded without receiving another print or paper movement signal, then the switching circuit is deactivated removing 115 VAC from the motors. The next print or paper movement command automatically turns on the motors.

The solid-state switching circuit is connected in the 115 VAC power line to the motors. It consists of an optically coupled isolator (ME1), a silicon controlled rectifier SCR (Q2), a full-wave bridge rectifier (CR3, 4, 5, 6) and a triac (Q1). ME1 provides isolation and is used as a switching network, containing an LED emitter and photo darlington sensor. The triac Q1 is basically two SCR's connected in parallel and oriented in opposite directions. Across Q1 are R9 and C7 which comprise an RC snubber network for preventing the line voltage rate of change from turning triac Q1 on without a valid gate signal.

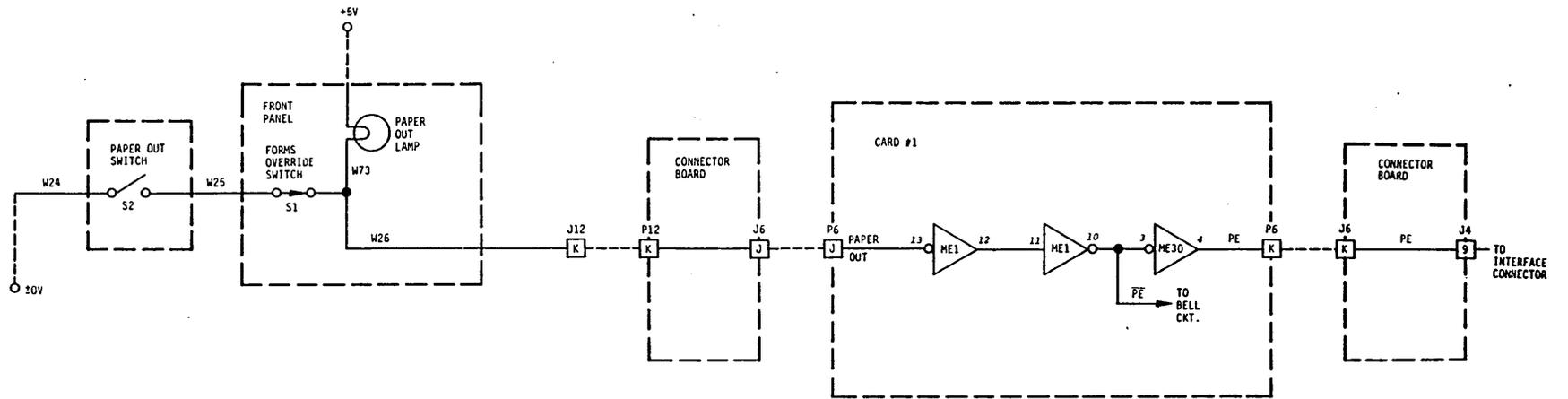


Figure 4-26. PAPER EMPTY

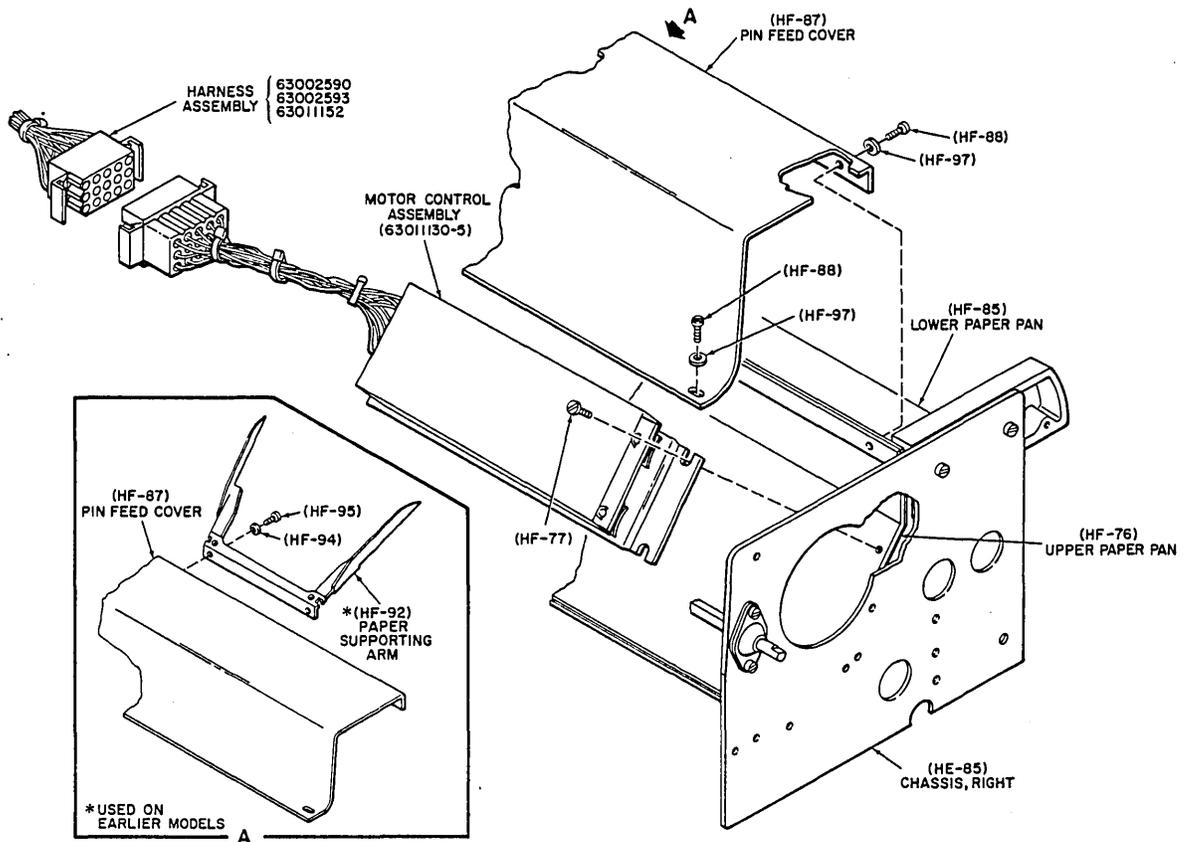


Figure 4-27. MOTOR CONTROL MOUNTING

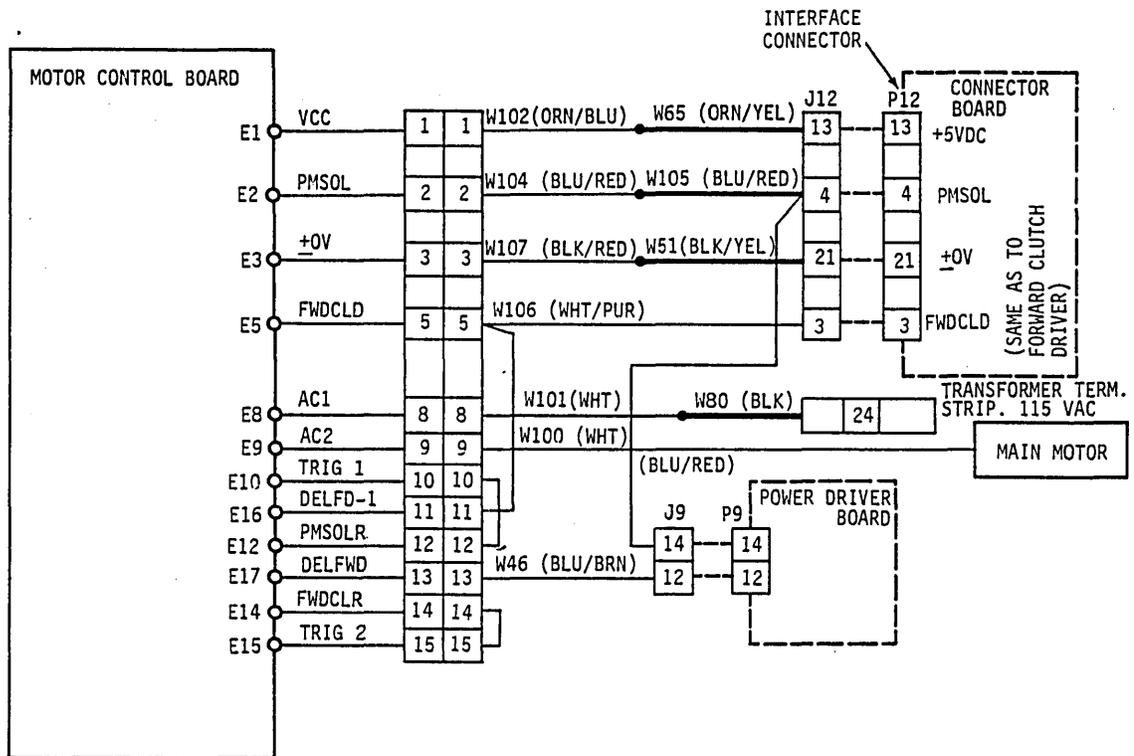


Figure 4-28. MOTOR CONTROL BOARD INTERCONNECTION DIAGRAM

The following discussion assumes that the motors are off, therefore, FWDCLD or PMSOL must activate the motor control circuit to turn on the motors.

The leading edge of FWDCLD or PMSOL triggers the one-shot causing the output at ME1 pin 3 to go high for a 9-second interval. The resulting low on ME5, pin 6 appears on the cathode (pin 2) of ME2. This turns on ME2, causing current to flow from ME2 pin 4 (emitter) into the gate of SCR Q2, turning it on. With Q2 conducting, thus "shorting" the full-wave bridge rectifier, a current pulse, produced by one half of the AC line voltage and passed by the "shorted" rectifier, flows into the gate of the triac (Q1) switching it to the ON state. Q1 then shunts current away from the rectifier, thus reducing the principle current to Q2, turning it off. Current then flows through Q1 to the motors for that half of the AC signal.

When the AC line current is zero, Q1 turns off. As the next half of the AC signal appears, current again flows to the bridge rectifier turning Q2 back on. This action, as before, pulses Q1 but with the opposite polarity, turning it on to pass this half of the AC signal to the motors.

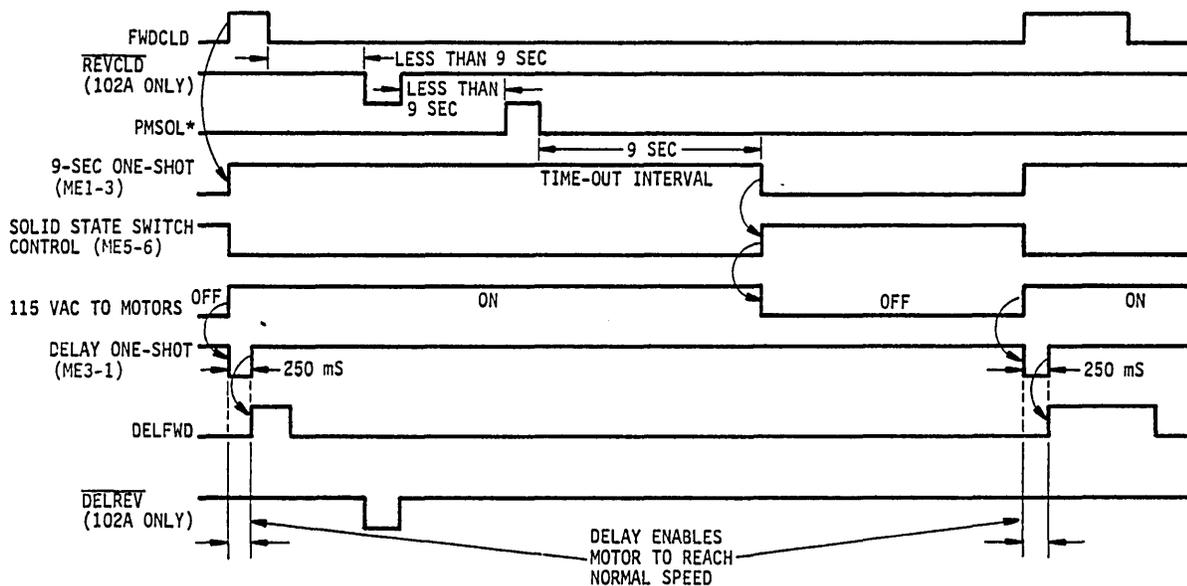
The above operation keeps repeating itself during the 9-second interval, switching Q1 from the OFF state to the ON state, for either polarity of voltage applied to the main terminals of Q1.

Coincident with the activation of the motor control circuit from an OFF to an ON condition, the high output of ME1, pin 3 triggers Delay one-shot ME3, which generates a low at ME3, pin 1. If a FWDCLD signal is received, the signal is inhibited from generating DELFWD by this low being applied to ME4, pin 5 and 10. When one-shot ME3 times-out (approximately 250 milliseconds later), FWDCLD generates a DELFWD signal which activates the Forward or Reverse Clutch Driver, depending on which signal was received. The purpose of the delay is to allow the main motor to reach normal speed before the clutch is activated.

If another FWDCLD or PMSOL signal is received during a 9-second interval (motors ON), the leading edge re-triggers one-shot ME1 for another 9-second interval. The solid-state switch and Delay one-shot ME3 remain unaffected during this time. Therefore, the 115 VAC keeps being supplied to the motors and, if a FWDCLD signal was received, it is gated directly to the clutch driver without being delayed.

If no FWDCLD or PMSOL signal is received during a 9-second interval, one-shot ME1 times-out causing its output ME1, pin 3 to go low. This turns off ME2 by delivering a high to ME2, pin 2, which in turn stops current flow out of ME2-4 and prevents Q2 from turning on. With Q2 off, there is no current flow from the bridge rectifier to pulse Q1. Therefore, Q1 does not conduct, removing 115 VAC from the motors.

No further action occurs until another FWDCLD or PMSOL signal is received. At this time, any one of these signal inputs being active causes a high at ME1, pin 3 which: 1) activates the switch circuitry and turns on the motors, and 2) triggers Delay one-shot ME3. If a FWDCLD signal was received, the signal is delay approximately 250 milliseoncds then gated to the Power Driver board.



*ACTIVATION OF THE PMSOL SIGNAL DEPENDS ON THREE FUNCTIONS: LINE FEED, VERTICAL TAB AND FORM FEED. IF TWO CONSECUTIVE LINE FEEDS ARE SENT TO THE PRINTER DURING A MOTOR-OFF CONDITION, THEY SHOULD BE SPACED 300 MILLISECONDS APART.

Figure 4-29. MOTOR CONTROL TIMING

4.7.5 FAULT CIRCUIT (Figure 4-30)

A low $\overline{\text{FAULT}}$ signal to the interface connector is generated by any of the following three conditions:

- (1) A paper empty condition ($\overline{\text{PE}}$ is low),
- (2) The printer is deselected (SEL is low),
- (3) A malfunction in the video circuit ($\overline{\text{LD}}$ is low). If the print head travels from the left limit switch (RTPSW) to the right limit switch (EOPSW) without a single STROBE being generated, then the LD flip-flop is set indicating an error condition.

4.8 POWER SUPPLIES (Figure 4-31, Schematics - Section 7)

The complete power distribution circuit for the 101A is shown in Figure 4-31, from the primary input (115 VAC, 60 Hz) to the DC voltages developed by the internal power supplies for driving the logic circuitry.

The standard printer is pre-wired at the factory for 115 VAC, 60 Hz. However, as an option, the printer can be wired for other input voltages. Schematic No. 63001105 in Section 7 shows the necessary connections on the multi-tap 50/60 Hz transformer (T1), for various input voltages (either 50 or 60 Hz).

In addition, for a 50 Hz input voltage, the 60 Hz motor pulley HB-91 (Part No. 525841001) must be changed to a 50 Hz pulley HB91-1 (Part No. 525344001). (See Figure HB, Section 8)

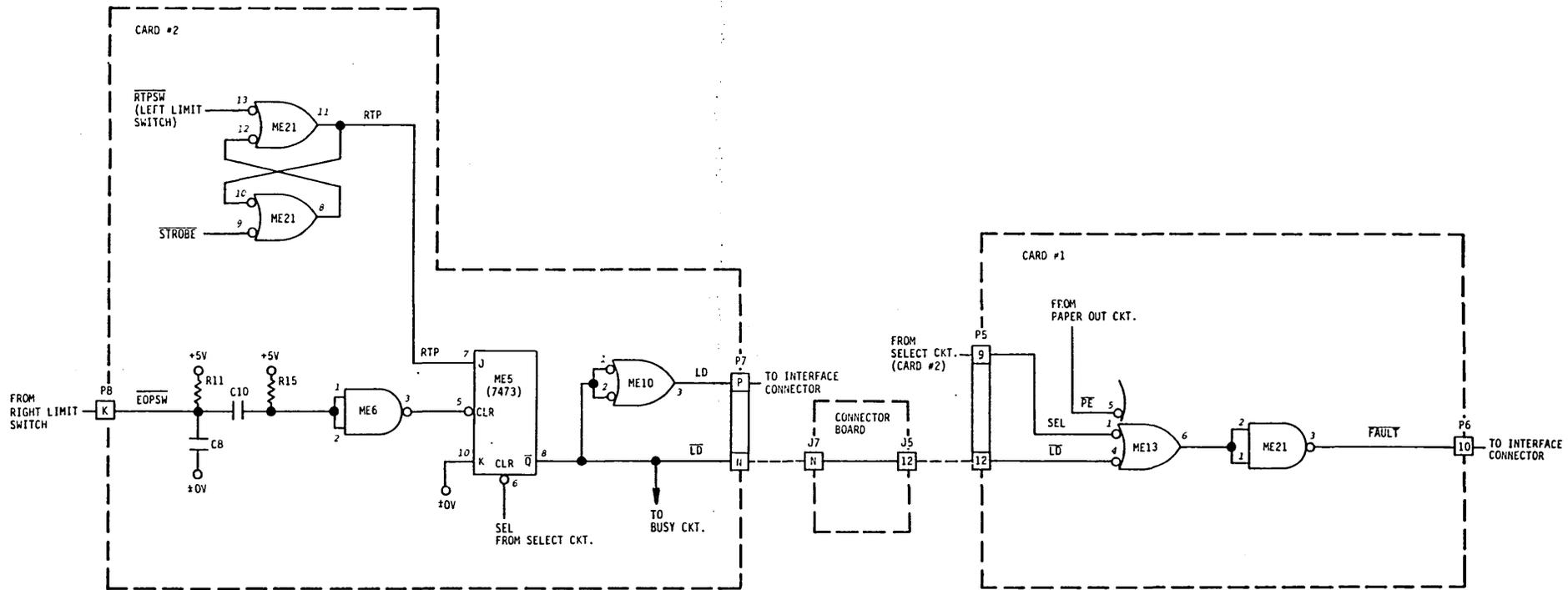


Figure 4-30. FAULT CIRCUIT

The input voltage is fused by a 5 amp slo-blo fuse (F4) and applied to the input transformer through connector P13-J13 and the ON/OFF switch on the front panel. A 1 uf capacitor (C1) and 470K ohm resistor (R3) located on the suppression board (Schematic No. 63002318) in back of the operator panel slightly above the ON/OFF switch filters any transients generated by the switch or transformer.

The 115 VAC to drive the main motor, form feed motor and left and right cooling fans is obtained from the 115 VAC primary winding, terminal 24 of the multitap transformer. The 115 VAC is applied via the optional motor control switch, which provides automatic ON/OFF control of the motors and fans.

The secondary of the multitap transformer develops the following voltages:

35 VAC center-tapped
26.5 VAC
11 VAC

These voltage are delivered through connector J13-P13 to their respective power supplies.

The 35 VAC and 11 VAC voltages are sent through the connector board and used as inputs to the +5V regulator (via connector J1-P1) and to the +12V and -12V regulator (via connector J2-P2). These input voltages are rectified, filtered and regulated, then sent to the logic cards. The regulated dc outputs from these three power supplies are also sent via the connector board to the optional interface board. The 26.5 VAC is also obtained through J13-P13 and used to generate +35V unregulated for the power driver board.

4.8.1 +5V REGULATOR (Schematic #63011143)

The 11 VAC output from the secondary winding of the transformer is rectified by bridge rectifier CR1, CR2, CR3, CR4 and filtered by C4 located in the cavity. This filtered output is fused through F1 and regulated by regulator element ME1 which maintains the +5V output. Capacitors C3 and C5 provide additional filtering for high frequency transients that might appear at the output. Resistor R7 is a bleeder resistor allowing some current flow through the regulator keeping it in the active region.

Overvoltage protection is provided by components CR5, R6 and Q1. With the output at a normal +5V, Zener diode CR5 inhibits current flow through R6, holding the gate of SCRQ1 at ground. However, when the output voltage exceeds +6.8V, the Zener diode CR5 conducts, developing voltage across R6 and turning on SCRQ1. This shorts the input and blows fuse F1.

4.8.2 +12V AND -12V REGULATORS (Schematic #63002308)

The voltage generated by the 35 VAC center-tapped secondary winding of T1 is used as inputs to the +12V and -12V regulators. The operation of both circuits is identical to that of the +5V regulator described in Section 4.8.1.

4.8.3 +35V POWER SUPPLY, UNREGULATED (Schematic #63002307)

The 26.5 VAC output from the transformer is rectified by diode bridge MD1 and filtered by R19-C15 to generate the +35V unregulated voltage for the power driver circuits. All of these components are located in the electronics cavity. The +35V output is fused through F5 and used as a voltage input to the power driver board via connector P13-J13.

SECTION 5
REMOVAL, REPLACEMENT AND ADJUSTMENT PROCEDURES

5.1 INTRODUCTION

This section describes the operation, removal, replacement and adjustment of each major mechanical assembly in the Model 101A series printer.

5.2 MECHANICAL ASSEMBLIES

The mechanical assemblies and their reference figures are covered in the order listed below. Mechanical drawings, and parts lists, are contained in Section 8 of this manual.

<u>Section</u>	<u>Title</u>	<u>Figure and Reference Parts Symbol</u>
5.2.1	Cover	Figure A
5.2.2	Carriage Mechanism	Figure HA
5.2.3	Driving Mechanism	Figure HB
5.2.4	Spring Drum	Figure HC
5.2.5	Damper	Figure HD
5.2.6	Frame	Figure HE
5.2.7	Paper Feed Mechanism	Figure HF
5.2.8	Pin Feed Unit	Figure HG
5.2.9	Form Feed Mechanism	Figure HH
5.2.10	Ribbon Feed Mechanism	Figure HI
5.2.11	Hardware, Electrical	*Figure HJ
5.2.12	Paper Guide	Section 2
5.2.13	Print Head and Associated Assemblies	B

*Parts list only

Note: Section 5 has been updated for Revision H of the Model 101A printer.

5.2.1.3 Adjustments

Side covers (A-4, A-3) lock into speed clips located on inside walls of covers. For perpendicular adjustment of covers, in relation to base, adjust length of ball stud (A-19) with nut (A-32) located at ends of standoffs (A-39), if required.

5.2.2 CARRIAGE MECHANISM (Figure HA)

5.2.2.1 Operation

The function of the carriage mechanism is to hold the head under the best condition to print characters against the platen and to move the head from left to right and return it to the starting position after printing the last character.

The carriage (HA-9) has two guide rollers (upper) (HA-10), a guide roller unit (HA-21) and two rollers (upper and lower) (HA-26, 31) to hold the carriage on the guide bar (HE-8) and guide plate (HE-23). The head bracket (HA-1), mounted on the carriage, holds the head by four screws and is movable back and forth up to 1 mm (0.039-in.). This adjustment is made by turning an eccentric shaft on the head penetration adjusting knob (HA-32). The adjustment is determined by the number of copies to be run. The head lock knob (HA-33) is mounted on the left-hand side of the carriage and locks the eccentric shaft after positioning head in relation to platen. Play between head bracket and carriage can be eliminated by gib (HA-45) which is fixed on carriage by two screws (HA-46) and positioned by set-screws (HA-48). When the carriage is positioned over the right or left-hand reed switch (HE-78) a magnet, mounted on lower portion of carriage, closes the reed switch and sends a signal to indicate the carriage position to electronic logic.

The carriage is moved by the main driving belt (HA-36). Parts (HA-41) through (HA-44) and HA-58) through (HA-64) are mounted on the under-side portion of the carriage. These parts are designed to absorb shock on the belt and are adjustable for proper belt tension and linear alignment.

The ribbon guide roller (HA-5), mounted on the carriage and head bracket, holds the ribbon at proper position and ensures proper tension on the ribbon while printing. Bracket (HA-50) supports the ribbon cable, lamp holder, and fiber optic assembly. This assembly determines print registration.

5.2.2.2 Removal/Replacement Procedure

A. Head

For removal and installation of print head, refer to Section 5.2.13.2.A.

B. Carriage (HA-9)

1. With carriage at mid position, remove main driving belt (See next para. C.).
2. Remove complete damper unit by removing screws (HD-29).
3. Remove bracket (HA-50) by removing screws (HA-55).
4. Loosen head lock knob (HA-33) and slide head back from platen to clear guide roller (HI-111) by turning head adjusting knob (HA-32). Release ribbon from ribbon guide roller (HA-5).

CAUTION!

AT THIS POINT, BE CAREFUL NOT TO DAMAGE LEFT REED SWITCH AND CASE (HE-78) WHEN CARRIAGE IS REMOVED FROM LEFT SIDE OF MACHINE.

5. Move carriage to left and remove it from guide bar and guide plate.
6. To install carriage, reverse above procedure.

C. Main Driving Belt (HA-36)

To remove belt, perform the following steps:

1. Loosen nut (HC-12) and screw (HC-11) on spring drum (HC-1).
 - a. Release main spring (part of HC-1) tension by intermittently pivoting pawl (HC-10) to slowly unwind internal spring. (Note that spring may suddenly unwind with considerable noise, a normal occurrence).
2. Remove nuts, washers (HA-64, 63, 62) on shaft (A) (HA-59) (IT IS NOT NECESSARY TO REMOVE SCREWS, WASHERS (HA-41, 43) AND HOLDER (A) (HA-58) ATTACHED TO UNDERSIDE OF CARRIAGE EXCEPT FOR NEW ASSEMBLY PARTS INSTALLATION.)
3. Remove left nut (HA-44) from screw (HA-43) with a 10 millimeter (0.4-in.) open-end wrench.
4. Using two 10 millimeter open-end wrenches, remove remaining two nuts from screw (HA-43). Belt will separate.
5. Remove left end of belt to the right by feeding through left hole in base of printer chassis frame.
6. Continue to pull entire belt to the right feeding it through hole on right side of printer chassis and out.

7. If necessary, loosen clutch field assembly tabs (part of HB-140) (Fig. 8-3A) attached to printer base and feed belt out through the tabs.
8. To install belt, reverse above procedure but first start with applying tension on spring of spring drum (refer to para. 5.2.4.3.).

D. Guide Roller and Guide Roller Unit (HA-10, 21)

1. To remove guide roller unit, remove bolts (HA-22). This unit may be replaced as a complete assembly.
2. To remove guide rollers from carriage, remove nut (HA-20) and spring washer (HA-19).

5.2.2.3 Adjustments

A. To Adjust Play Between Carriage and Guide Bar (HE-8) or Guide Plate (HE-23)

1. Adjust the distance between carriage (HA-9) and guide plate (HE-23) by loosening nut (HA-29) and turning eccentric axle (HA-25) to allow gap of 0.01 through 0.03 mm (0.0004-0.0012-in.) between upper and lower rollers (HA-26, HA-31) and the guide plate.
2. The carriage, without main driving belt (HA-36) should be able to move on guide bar (HE-8) and guide plate with no more than 100 grams (3.5 ounces) tension. Note, that the guide roller unit (HA-21) is adjusted to the carriage (HA-9) by the manufacturer prior to shipping, if a carriage is to be readjusted or replaced.

B. To Adjust Play Between Carriage and Head Bracket (HA-1)

1. After loosening screws (HA-46) and nuts (HA-49), adjust play by positioning gib (HA-45) with set-screws (HA-48) and then tighten screws and nuts. Head bracket should be able to move smoothly using head adjusting knob (HA-32).

C. To Adjust Ribbon Guide Roller (HA-5)

1. The eccentric shaft (HA-6) is used to make this adjustment from the mounting face of the bracket to the farthest point of tangency on roller, the dimension should be 53.50 mm (2.106-in.).

D. To Adjust Tension of Main Driving Belt (HA-36)

1. Remove main driving belt (HA-36) from holder (HA-58) by loosening nuts (HA-64) and pushing down on belt. Adjustment of tension can now be made by turning nuts (HA-44) on screw (HA-43) with 10 mm (0.4-in.) open-end wrench. See next step No. 2 for belt tension specifications.
2. For the Model 101 Series, apply main belt tension by the following method:
 - a. Main belt is attached to carriage.
 - b. Carriage is at start position, (at rest).
 - c. At a point midway between spring drum assembly (HC-1) on the left, and forward and reverse clutches on the right, deflect top of belt upward 9-11 millimeters (0.35-0.43-inch) using an upward pull equivalent to 500 grams, (17.6 ounces).
 - d. When correct tension has been attained, reverse step in para. D.1.
3. Ensure that carriage returns from any run-out position under spring drum tension. (See para. 5.2.4.3.).

5.2.3 DRIVING MECHANISM (Figure 8-3 and Figure 8-3A)

5.2.3.1 Operation

A. Motor Drive Chain (Figure 5-1)

Driving power of motor (HB-98) is transmitted to forward and reverse clutches as follows: Motor - intermediate pulley with gear (HB-22) - intermediate gear for forward clutch (HB-30) - pulley (HB-60) for forward and reverse clutch. Motor - intermediate pulley with gear (HB-22) - intermediate shaft with pulley (HB-80) - pulley (HB-60) for forward and reverse clutch. Looking from front, motor rotates counterclockwise; therefore, pulley for reverse clutch rotates counterclockwise. When either forward or reverse clutch actuates by signal, pulley (HB-63) for main driving belt rotates to move carriage.

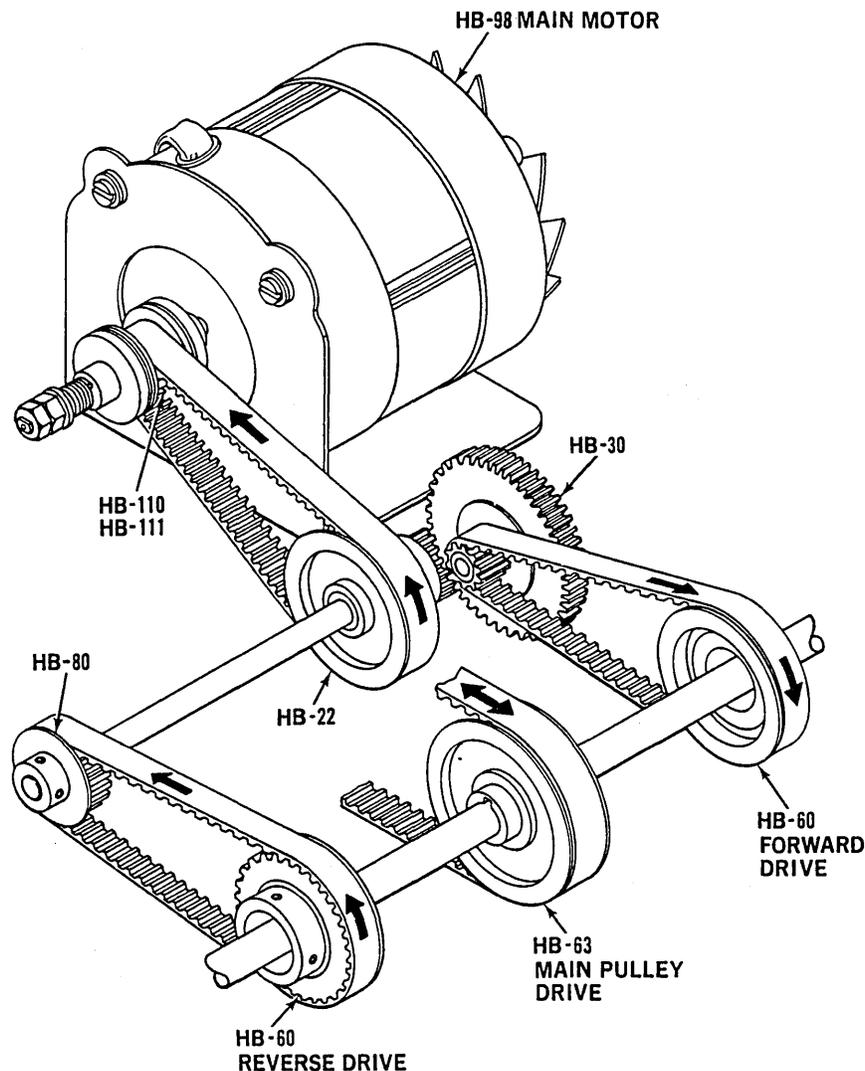


Figure 5-1. SERIES 101 DRIVE TRAIN

B. Clutch Alinement and Function (Fig. 8-3A)

Alinement of clutches is as follows: Viewed from the front of the printer (right side), the order is - reverse clutch assembly (HB-139) followed by forward clutch assembly (HB-139). Because of a preload condition (surface to surface contact) between splined armature (HB-142) and keyed rotor (HB-141) no gap adjustment is required. Slight tension (preload) is maintained by a spring (HB-144) pressing against the fixed, forward and reverse driving pulley (HB-60) and its splined armature (HB-142).

The armature hub (HB-143) inserts into the splined armature maintaining torque drive for either forward or reverse drive. Clutch field assembly (HB-140) is prevented from rotating about its shaft (HB-50) by means of tabs (See Fig. 8-3A, A and B) that extend from field assemblies (HB-140) and mount to the printer base. When a signal is sent from electronic logic to coil in forward or reverse clutch field assembly, the magnetized rotor (HB-141) holds the splined armature (HB-142), and friction torque is transmitted to shaft and drive pulley (HB-60) (forward or reverse). When signal current stops, torque chain between armature and rotor is discontinued, and the armature is restored to initial preload condition (surface to surface contact).

C. Operating Conditions, Drive Mechanism (Figure 5-2)

Alternate forces are exerted on timing belts (HB-48, and belt 49) including main drive belt (HA-36) and motor (HB-98) because of inertia of print head carriage and forward and reverse clutch timing peaks. These variations in the power transmission route are normally handled by the use of a motor clutch plate (HB-98) (part of motor) and motor pulley driver (HB-92) installed to protect belts and motor.

Normal cycle time of carriage and machine operating sounds are directly influenced by alternate dropping and raising time of torque on clutches, which also affect belt tensions. Therefore, all drive mechanism parts should be properly adjusting using recommended procedures where applicable.

5.2.3.2 Removal/Replacement Procedure

- A. Main Motor (HB-98) (With covers and rear electronic cavity removed)
(Retain all mounting hardware and parts if replacing motor)

Steps A.1. through A.5. are keyed to Figure HI.

1. Remove right and left-hand bevel gears (HI-27) by loosening set-screws (HI-29).
2. Remove right and left-hand shaft bushing holders (HI-130, 133) by removing screws (HI-131).

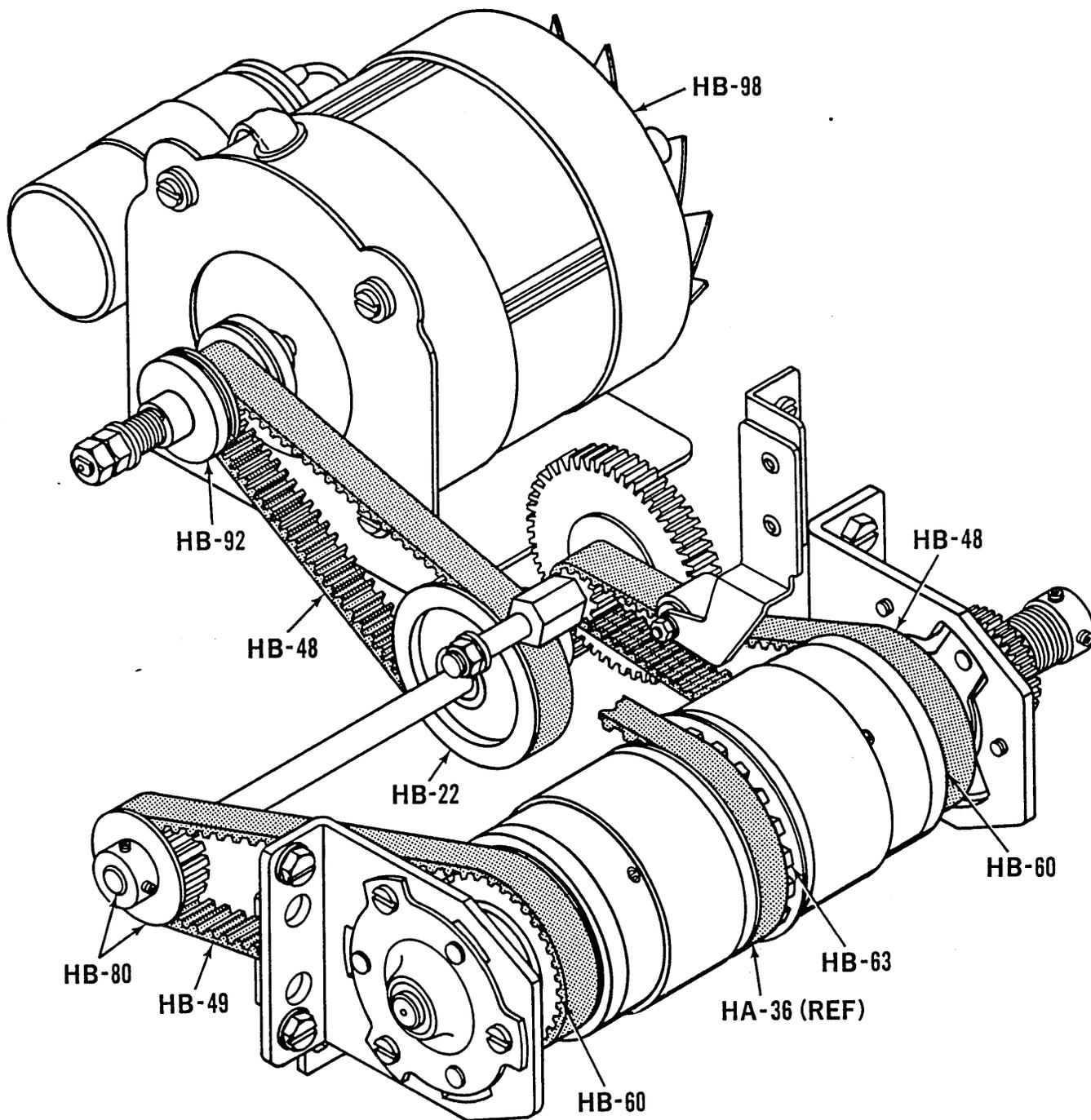


Figure 5-2. MAIN MOTOR DRIVE AND DRIVE BELT ARRANGEMENTS

3. Remove snap rings (HI-105) on both ends of shaft. Retain parts.
4. Loosen set-screw (HI-19) on driving bevel gear (HI-18).
5. Remove shaft (HI-103) and washers (HI-104).

Steps A.5. through A.6. are keyed to Figure HB (part 1)

6. Loosen nut (HB-19) and back off belt tensioner bolt (HB-18) up to maximum travel.
7. Remove four attaching screws (HB-17) from underneath the printer base (Fig. 8-1, item 2) and remove main motor with mounting bracket (HB-9).

Refer to Printer Wiring Diagram in Section 7 for wiring diagram in steps A.8. through A.10. if motor is being replaced.

8. Cut two wires (red), No. W18 and W19 as close to motor as possible.
9. Remove ground lug attached to motor.
10. Unsolder two wires (yellow) on motor capacitor (HB-13) retain capacitor and bracket if motor is being replaced.
11. Remove motor from mounting bracket (HB-9) by removing four screws with four external washers (HB-12 and 11).

B. Main Motor Belt Removal (HB-48)

When main motor is replaced, it is recommended that the belt (HB-48) be replaced at the same time.

1. Remove and discard main motor belt (HB-48) between motor pulley (HB-22) and pulley (HB-110/111) by first removing intermediate gear (HB-30) for forward clutch by removing nut and washers (HB-28, 29, 96) at front of printer. Retain pulley and mounting hardware.

C. Preparation of Main Motor w/Fan and Clutch Plate (HB-98) Prior to Installation

1. Solder two capacitor wires (yellow) from motor to terminals of retained capacitor (HB-13) of step A.10. Insulate points of contact.
2. Solder two red wires of motor (HB-98) to red wires, W18 and W19. (Refer to step A.8.). Insulate points of contact.

D. Installation of Motor Pulley Driver (HB-92) and Main MotorNote

The following parts are to be added (in the order indicated, a through e), to the shaft of the motor and are in addition to the pinned clutch plate and fan that are factory delivered with the motor (HB-98). Refer to Figure (HB) (Part 1).

- a. Motor pulley 60 Hz or 50 Hz (HB-110, HB-111).
 - b. Motor pulley driver (HB-92).
 - c. Spring for HB-92 (HB-93).
 - d. Nuts for HB-93 (HB-112).
1. Tighten nut (HB-112) so that spring coils squeeze together, but not overlapping. Tighten second check nut (HB-112).
 2. Insert motor into back of printer (shaft facing front of printer) and set over motor mounting holes.
 3. Install new belt (HB-48) over intermediate pulley (HB-22) and main motor pulley (HB-110, or HB-111).
 4. Insert mounting bolts (HB-17) into main motor through base underneath printer. Do not tighten until the following steps are performed.
 - a. Insert adjusting bolt (HB-18) into side flange of motor mounting bracket and turn. Motor belt will tighten.
 - b. Adjust motor and bracket parallel to front paper pan (HF-89) by sighting straight down on the top of two slotted-head screws (HB-12) of the mounting bracket (HB-9) and align screws parallel to the front paper pan.
 - c. Tighten four mounting bolts (HB-17).
 - d. Tighten nut (HB-19) on adjusting bolt.
 - e. Press ON/OFF Switch on operator panel of printer to test alignment and operation of main motor and belt tension while operating. With switch OFF readjust adjusting bolt and mounting nuts, if required.
 5. Reinstall intermediate gear (HB-30) for forward clutch which was removed in step B.1. Ensure that forward clutch pulley belt (HB-48) is over hole when pulley shaft (HB-103) is inserted so that it fits over smaller gear of gear (HB-30).

6. Place other end of pulley belt over the forward clutch gear (HB-60).
 7. To adjust eccentric idle shaft (HB-27) (Fig. 8-3, part 1, View B) and back lash for intermediate pulley (HB-30), refer to paragraph 5.2.3.3.C.
 8. For final installation of motor, reverse steps A.1. through A.6. at para. 5.2.3.2.A.
 9. Install ribbon through extended pins on right and left-hand control levers (HI-88, 90).
- E. Forward and Reverse Clutch Drive Mechanism (Refer to Figure HB, part 1 and 2, and HI)
1. Forward Clutch (HB-139)
 - a. Remove clutch spring (HI-4) on sleeve (HI-5) by loosening two set-screws (HI-6). Slide off spring and sleeve.
 - b. Remove clutch gear (HI-1).
 - c. Remove ribbon drive shaft unit by removing screws (HI-17) from right side of printer.
 - d. Slip off pulley belt (HB-48) between forward clutch pulley (HB-60) and intermediate pulley for forward clutch (HB-30).
 - e. Remove bushing bracket (HB-51) from shaft (HB-50) (Part 2) by removing screws (HB-52) and one washer (HB-96).
 - f. Remove sleeve (HB-62) from shaft.
 - g. Loosen screws (HB-61) and remove pulley (HB-60).
 - h. Remove clutch spring (HB-144), hub (HB-143), and splined armature (HB-142).
 - i. Slide clutch rotor (HB-141) over shaft, and remove both key (HB-64) and rotor.

Note

To remove total parts of the forward and rear clutch assembly from its shaft, proceed with removal of the reverse clutch parts in paragraph 5.2.3.2.E., Step 2 below, and then the removal of forward and reverse field assemblies (HB-140) and main belt pulley (HB-63) in Step 3.

2. Reverse Clutch (HB-139)
 - a. Disengage belt (HB-49) between intermediate shaft with pulley (HB-80) and reverse pulley (HB-60).
 - b. Remove screws (HB-52) and two washers (HB-96) from bracket (HB-51) and slide off bushing (HB-53) with bracket from shaft.
 - c. Remove sleeve (HB-62) from shaft.
 - d. Loosen set-screws (HB-61), and remove reverse pulley (HB-60).
 - e. Remove spring (HB-144), hub (HB-143) and splined armature (HB-142).
 - f. Slide clutch rotor (HB-141) over shaft, and remove both key (HB-64) and rotor.

3. Forward and Reverse Field Assemblies (HB-140) and Main Belt Pulley (HB-63)
 - a. Cut forward clutch field assembly wires No. W39 (brn/yel) and W40 (red/blu) (See Fig. 8-3A). Ensure that wires are properly identified prior to cut. Note that two blue wires emerge from the clutch field assembly and join these color coded wires. (Refer to Wiring Diagram 63002333, Section 7)
 - b. Cut reverse clutch field assembly wires No. W34 (red/pur) and W43 (brn/grn) (See Fig. 8-3A). Ensure that wires are properly identified prior to cut. Note that two blue wires emerge from the clutch field assembly and join these color coded wires. (Refer to Wiring Diagram 63002333, Section 7)
 - c. Free mounted forward and reverse field assemblies (HB-140) by loosening two screws, washers and brackets (HE-72, 73, 71) from right side of main frame (HE-1) and sliding each bracket away from field holder tabs A and B (Figure 8-3A).
 - d. Slide main belt pulley (HB-63) off slide. Retain key (HB-64).
 - e. For complete assembly replacement of forward and reverse clutches and main motor pulley, reverse steps of paragraph 5.2.3.2.E, Steps 1, 2 and 3.

Note

When assembling forward and reverse clutch and shaft parts, begin assembly by adjusting main motor pulley (HB-63), keys (HB-64) spacer (HB-109) and clutch field assemblies (HB-140) on center of shaft.

F. Timing Belts (HB-48, 49)

1. For forward clutch belt (HB-48), remove intermediate gear for forward clutch (HB-30) by removing nut (HB-28) and use procedure in para. D.5. through 7. for installation.
2. For reverse clutch belt (HB-49) removal, refer to procedure in para. E.2.a. through 2.c.

G. Intermediate Shaft with Pulley (HB-80)

1. Remove intermediate shaft with pulley (HB-30) by removing nut (HB-28) and washers (HB-29). Slide belt (HB-48) off the pulley prior to removal.
2. Loosen pulley (HB-22) on intermediate shaft (HB-80) by loosening two set-screws (HB-23). Slide off pulley belt (HB-48).
3. Pull out pinned pulley and shaft (HB-80) toward front of printer. This step will free pulley (HB-22) and felt washers (HB-24).

5.2.3.3 AdjustmentsA. To Adjust Motor Pulley Drive (HB-92) and Motor Clutch Plate (Part of Motor)

1. Torque of these slip clutches is 33.3 oz/in. through 97.2 oz/in. Adjust by changing tension of spring (HB-93) with nuts (HB-112).
2. If compression of spring is increased too much speed of carriage is accelerated, timing belt receives abnormal shock and squeaking noises will come from forward and reverse clutches.

Note

Make sure that there is no oil on surfaces of motor clutches.

B. To Adjust Belt Tension (Timing Belt HB-48, 49)

Proper belt tension is obtained under the following condition:

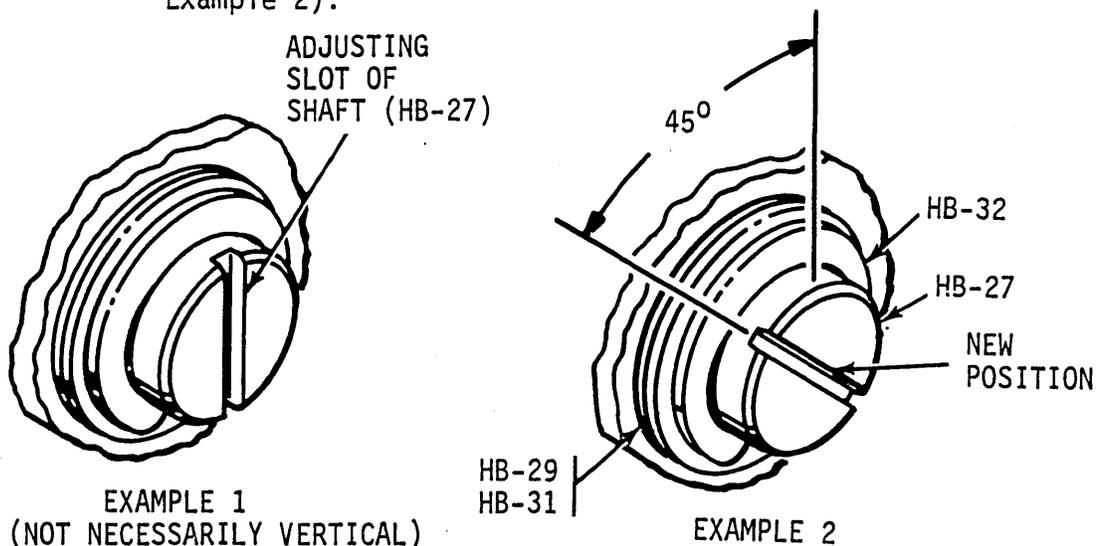
When about 300 grams (10.6 oz.) pressure is applied to upper half of belt, mid point between pulleys, belt depression is about 3 to 4 mm (0.12 to 0.16-in.).

Adjustment of belt tensions is as follows:

1. Belt (HB-48) between motor pulley (HB-110, HB-111) and pulley (HB-22); adjust belt tension by loosening nuts (HB-19) and screws (HB-17). Adjust bolt (HB-18) to change position of motor, then tighten all screws and nuts.
2. Belt (HB-48) between pulley (HB-30) and pulley (HB-60) for forward clutch; adjust belt tension by loosening screws (HB-79) washers (HB-114) and positioning tensioner bracket (rear) A (HB-75). Make sure that belt is pushed down horizontally and contacts tensioner L (HB-77) completely. If contact is not complete, adjust tensioner bracket (rear) B (HB-76) by loosening screws (HB-79) and washers (HB-114) and re-position bracket (HB-76). Then repeat above adjustment as in beginning of step 2.
3. Belt (HB-49) between pulley (HB-80) and reverse pulley (HB-60); adjust belt tension by loosening screws (HB-39, 79). Position tensioner bracket (front) (HB-33) by making sure tensioner (HB-34) is pushed up against the belt completely before tightening screws.

C. Backlash Adjustment of Intermediate Pulley (HB-30) for Forward Clutch

1. With the spur gear on intermediate pulley (HB-22) meshed with intermediate pulley (HB-30) at the back of the printer, begin the following adjustments with some play between the teeth of both gears.
 - a. Turn offset idle shaft (HB-27) clockwise with a screwdriver until play ceases to exist between gears. Determine this by moving gears forward and backward by hand until there is no backlash movement between gear teeth.
 - b. When screwdriver slot of adjusting shaft (HB-27) comes to rest after no backlash movement (See Example 1) rotate shaft counterclockwise 45 degrees or 1/8 of a turn (See Example 2).



- c. Insert a feeler gauge between the sides of two meshed gear teeth for a minimum gap of 0.012-inch through a maximum gap of 0.015-inch (0.30 to 0.38 mm max.). (See Figure. A)

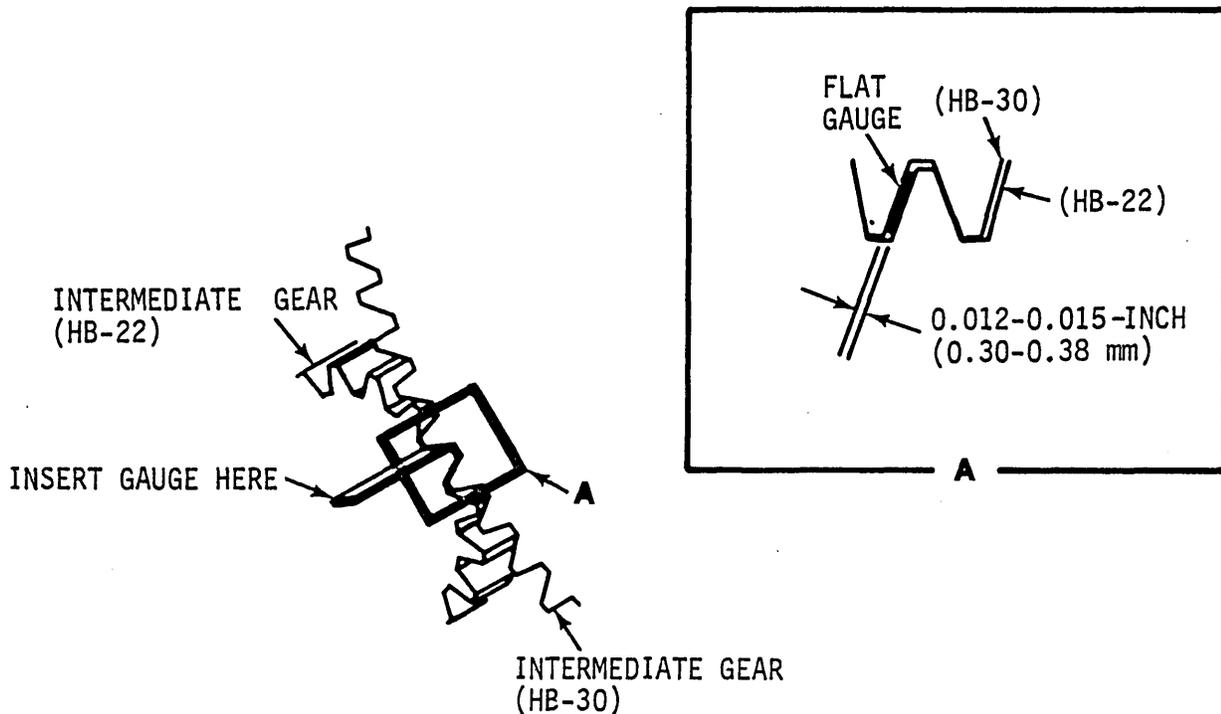


Figure A. USE OF FEELER GAUGE FOR BACKLASH ADJUSTMENT

- d. When satisfactory movement of gear (HB-30) has been established, lock up nut and washers (HB-28, 29, 96), with a 10 millimeter open-end wrench, while at the same time, holding correct adjusting screw position with screwdriver.
- e. Complete re-assembly of the following steps:
- (1) Add a few drops of Anderol No. 465 oil to eccentric idle shaft (HB-27) and on both felt washers (HB-31). (See Fig. 8-3)
 - (2) Forward and reverse pulley belts (HB-48, 49) and main motor pulley belt (HB-48) should be in position for operation. If motor is turned on, at this point, gears should operate with minimum noise, as torque of main motor is distributed without strain along intermediate shaft (HB-80) to forward and reverse clutches.

D. Intermediate Shaft w/Pulley, Idle Shaft, Felt Washer Lubrication

1. Remove all external accessory covers.
2. Remove cavity assembly 63001105-1 (Section 7 of manual).
3. Remove power driver board assembly 63002242-1 (Section 7 of manual).
4. Tilt machine backwards, 90 degrees from site position, to expose underneath portion of printer.
5. Apply Anderol Oil No. 465 to two felt washers (HB-24) located on counter shaft w/pulley (HB-80).
6. Apply Anderol Oil No. 465 to two felt washers (HB-31) located on idle shaft (HB-27) for intermediate gear for forward clutch (HB-30).

E. Intermediate Shaft Bushings - Lubrication

1. Check that shaft bushings (HE-7) are secure in printer machine support.
2. Secure loose bushings by using loctite (or equiv.) on outside surfaces that contact base frame of printer. Clean surrounding support holes prior to installation. Avoid loctite touching inside surfaces of bushings where shaft rotates. Clean interior shaft hole of bushing.
3. Lubricate inside surfaces of bushings and intermediate shaft (HB-80) with Anderol No. 465 oil prior to installation or replacement.

F. Forward and Reverse Clutches (No Clutch Gap)

1. Since revision D of this section covers installation of new preload clutches (See Figure 8-3A), there is no gap required between the rotor (HB-141) and splined armature (HB-142) for both forward and rear clutch.

G. Bushing End-Play Adjustment (Pre-Load Clutch) (Refer Fig. 5-3A)

To ensure smooth rotation of clutch shaft (HB-50) (Preload) perform the following adjustments:

1. Tighten screws (HB-52) on rear (forward clutch) bushing bracket (HB-51).
2. Loosen screws (HB-52) on front (rear clutch) bushing bracket (HB-51).

3. Insert flat gauge between spacer (HB-62) and hub of drive pulley (HB-60). Maintain a gap of 0.002-0.004-in. max. (0.05-0.10 mm) and tighten bracket to this dimension.

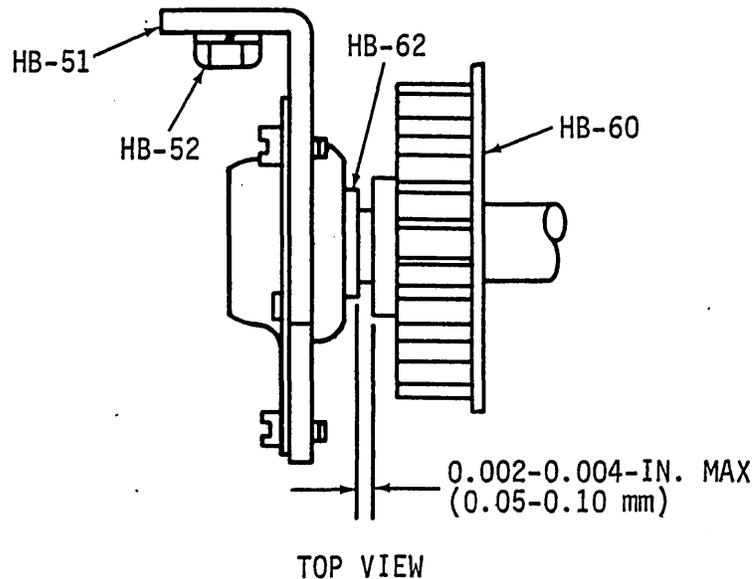


Figure 5-3A. BUSHING END-PLAY ADJUSTMENT FOR PRELOAD CLUTCH SHAFT (HB-50)

5.2.4 SPRING DRUM (Figure HC)

5.2.4.1 Operation

1. Provides spring tension for return of head.

5.2.4.2 Removal/Replacement Procedure (with left cover down)

1. Release spring pawl (HC-10) by slowly loosening nut (HB-12) and screw (HC-11).
2. Actuate pawl (HC-10) to release spring tension step-by-step.

Note

Spring may unwind suddenly with excessive noise.

3. Roll belt (HA-36) off pulley (HC-5).
4. Loosen nut (HC-9) and remove drum assembly from brackets (HC-6, 7).

5. Drum may be disassembled by removing nuts (HC-9) and shaft (HC-8).
6. To assemble, reverse above procedure.

5.2.4.3 Adjustments

1. Spring drum w/main spring (HC-1) should have only enough tension to return carriage unit smoothly from any position to starting position without any other force.
2. Main spring tension should be 1 to 1.4 kg (2.2-3.1 lbs). To adjust, loosen nut (HC-12) and back off screw (HC-11) slightly; this will release the holding pawl (HC-10). Rotate spring drum (HC-1) counterclockwise to increase tension, and rotate clockwise to decrease tension.
3. Proper tension will be obtained by winding spring drum about ten times when carriage is positioned at starting position. The purpose of the spring drum is to hold down carriage motion at home position, so that 11 windings is about maximum. Note that pawl is easily released from teeth on spring drum with main spring loosening at once if nut (HC-12) and screw (HC-11) are loosened too quickly.

5.2.5 DAMPER (Figure HD)

5.2.5.1 Operation

1. Dampers return print head motion.

5.2.5.2 Removal/Replacement Procedures

1. Remove screws (HD-29) to remove complete unit.
2. Loosen nut (HD-24) and back out center screw (HD-23). Remove unit damper cylinder (HD-1) from frame (HD-37).
3. Remove snap ring (HD-16) and remove pin (HD-21).
4. Remove lid (HD-11) by removing screws (HD-12).
5. Remove spring (HD-10).
6. Take off split pin (HD-9) from nut (HD-8).
7. Remove nut (HD-8).
8. Remove steel washer (HD-7) and packing (HD-6).

9. To install packing, reverse above procedure and coat inside of cylinder lightly with recommended NYE RHEOLUBE No. 723-MS, or equiv.

Note following points of above procedure:

- a. Split pin (HD-9) should not interfere with movement of spring (HD-10).
- b. Piston Rod (HD-2) should be returned to normal position easily by spring (HD-10), when pushing down piston rod by hand and releasing.
- c. When replacing lid (HD-11), care should be taken that rod (HD-2) moves freely in bushings.

5.2.5.3 Adjustments

1. Tighten center screw (HD-23) with enough force to hold damper cylinder (HD-1). Additional tightening may lock piston rod (HD-2).
2. When replacing damper cushion (HD-33) on carriage stopper lever (HD-32), clean contact surface with alcohol and sandpaper. Fit cushion and cap (HD-34) using recommended Eastman 910 glue, or equiv.

5.2.6 FRAME (Figure HE)

5.2.6.1 Operation

The following two reed switches and flexible timing fence are located on frame of printer:

1. Left-hand reed switch w/case (HE-78). This switch should be closed to output signal of RTP (ready to print) while carriage is positioned over it.
2. Right-hand reed switch w/case (HE-78). This switch should be closed to output signal of EOP (end of print) when carriage is positioned over it.
3. Flexible Timing Fence (HE-C). The timing fence is used to interrupt light through vertical slots for the optic pick-up head.

5.2.6.2 Removal/Replacement Procedures

- A. The following removable parts are not described in a disassembly/assembly order but their locations are on the Frame (HE) drawing with their key numbers.
1. Platen (HE-2) and Platen Holder (HE-3). Left chassis (HE-86) and right chassis (HE-85).
 2. Left chassis (HE-86) and right chassis (HE-85).
 3. Damper (right/unit (HE-92).
 4. Right Clutch Stop (HE-70) and Left Clutch Stop (HE-71).
 5. Operator Panel (HE-89) and Support (HE-90).
 6. Rubber Feet (HE-24).
 7. Left guide plate (HE-63) and right guide plate (HE-62) for cavity.
 8. Limit Switch (Reed) w/case (HE-78).
- B. Installation of Flexible Timing Fence 63002440 (Fig. 8-6 and Fig. 5-3)
1. Mount spring clasp (Fig. 5-3/A) on left bracket support (HE-55) using two screws (Fig. 5-3/F), two split lockwashers (Fig. 5-3/B) and two flat washers (Fig. 5-3/E). Clasp should be horizontal and perpendicular to printer machine casting (HE-1) when mounted on left bracket support. (HE-55).
 2. Mount right bracket clamp (Fig. 5-3/D) using two screws (Fig. 5-3/F) and two split lockwashers (Fig. 5-3/B).
 3. Mount left side of flexible timing fence behind clasp (Fig. 5-3/A) by placing mounting hole over spring projection pointing towards back of printer.
 4. Insert right side of flexible fence (tab end) between right clamp (Fig. 5-3/D) and right mounting bracket (HE-54). Right side surface of fence should read "THIS SIDE OUT, RIGHT" (facing operator).

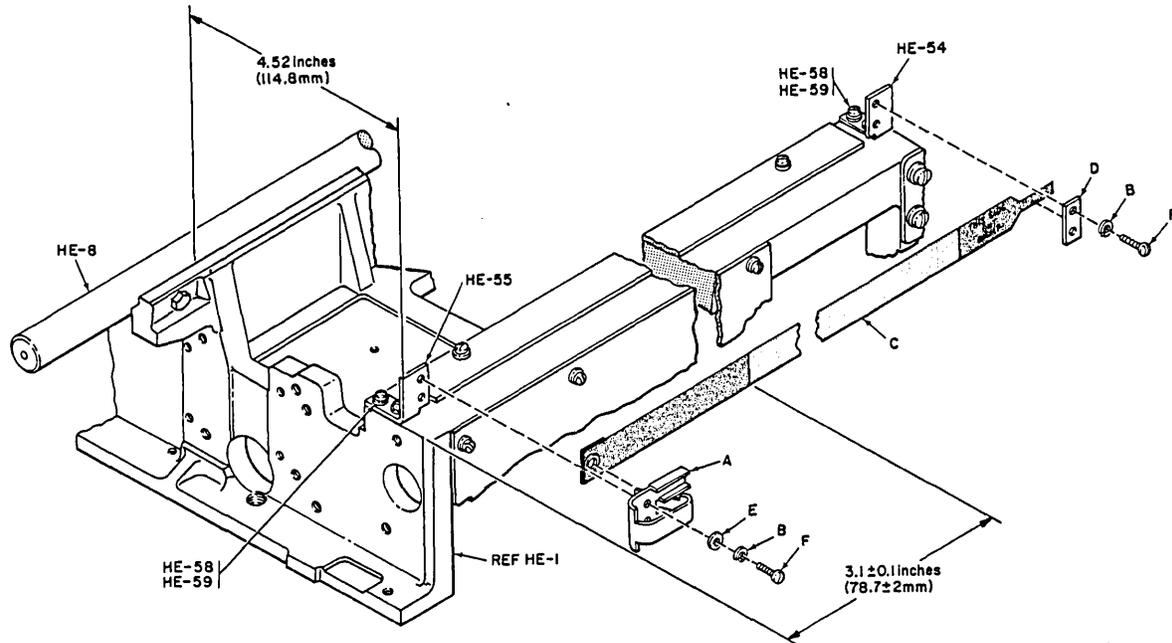


Figure 5-3. FLEXIBLE TIMING FENCE MOUNTING, SERIES 101

Note

When adjusting timing fence, in next step, avoid surface contact or any abrasion to emulsion side of timing fence (side marked "THIS SIDE OUT").

5.2.6.3 Adjustments

A. Positioning of Timing Fence (Flexible)

1. Loosen screws (Fig. 5-3/F) on clamp (Fig. 5-3/D) and pull tab of fence to the right so that the first window of the fence is located 3.1 ± 0.1 inches (78.7 ± 2 mm) from edge of printer casting (See Fig. 5-3, Ref. HE-1). (Note that this dimension adjusts for a 5/8-inch print margin on printing form).
2. Secure fence under right clamp, when correct dimension has been applied, by tightening hardware.

B. Parallelism of Suspended Timing Fence

1. From the front edge of guide bar (HE-8) (Fig. 5-3) measure 4.52 inches (114.8 mm) out to the left and right edges of the fence. Do not exceed given dimensions.

2. If parallelism is not uniform along entire length of fence, loosen screws and washers (Fig. 5-3), (HE-58, 59) in either left or right bracket (HE-55, 54) and obtain equal measurement at both ends. Tighten hardware when correct dimensions have been obtained.
3. Recheck dimension from edge of printer casting to first window of fence maintaining 3.1 ± 0.1 inches. Re-adjust, if necessary.

C. Optic Head (No locating dimension from fence) (Refer to para. 5.2.13.3.B.)

1. Set fibre optic head by loosening adjusting screws (Fig. 8-12/37) on top of bracket (Fig. 8-10/26) and place face of head as close to fence without touching. Test run print head, by hand, full length ensuring that fence does not touch optic head. Tighten screws, (Refer also to Fig. 5-10).

D. Light Assembly (No locating dimension from fence) (Refer para. 5.2.13.3.B.)

1. Loosen adjusting screws on top of video amplifier board (See Fig. 8-12, item 35) and set light assembly at maximum distance from fence (See Fig. 5-10). Tighten screws.

E. Maintenance of Flexible Mylar Timing Fence

Timing fence can be wiped clean using micro-wipes (lint free, no abrasives). For more extensive cleaning use mild soap and water. CAUTION: DO NOT USE ANY ORGANIC SOLVENTS.

F. Static Adjustment/Limit (Reed) Switch

Proper location of left-hand reed switch is approximately 1.07-inches (27.2 mm) to right, from machined surface, where frame (HD-22) is mounted on frame (HE-1), to center of right-hand reed switch case itself. (See Figure 5-4)

Proper location of right-hand reed switch center of case is 3 to 5 mm (0.12 to 0.20-in.) to right from last slit on timing fence assembly (HE-C).

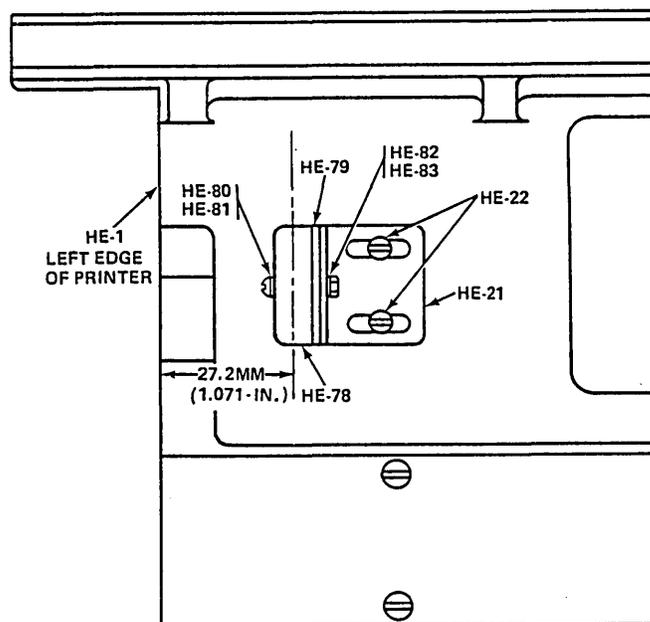


Figure 5-4. LOCATION OF LEFT REED SWITCH (TOP VIEW)

G. Dynamic Adjustment/Limit (Reed) Switches

This adjustment follows the above static settings. The test for the left-hand limit (reed) switch, is single character line check for smooth operation of over 200 lines per minute.

The test for the right-hand limit (reed) switch is to ensure 132-characters printed. Lines should be transmitted without a carriage return (CR) signal, if possible, to ensure limit switch (reed) returns print head to start of print position.

5.2.7 PAPER FEED MECHANISM (Figure HF)

5.2.7.1 Operation

Paper is fed manually between the paper pan (upper) (HF-76) and the paper pan (lower) (HF-85). As paper appears at paper pan (front) (HF-89), pull up and place left and right sprocket holes of paper on corresponding left and right pins of pin feed belt unit (HG-19) on the same horizontal plane.

When setting printing position of paper, move paper up or down by first pulling paper feed knob (HF-99) outward. To move paper down, pull out knob (HF-99) and rotate knob in a clockwise position. Paper moves up by turning knob in a counterclockwise motion. Direct coupling, non-slip movement of paper is accomplished by serrated portion of knob inserted into opposing serrated coupler (HF-100). Pulling knob outward disconnects the direct coupling of serrated parts and allows upward and downward motion of paper.

5.2.7.2 Replacement/Removal Procedures

A. Paper Feed Knob (HF-99)

1. Pry out cap (HF-107) from knob.
2. Remove snap ring (HF-106), collar (HF-103) spring (HF-104) knob (HF-99) and spring (HF-105).

B. Pin Feed Pulley, FF Reader Gear (HF-14, 16) and Driving Shaft (HF-98) (for Pin Feed Ass'y)

1. Remove snap ring (HF-6).
2. Remove holder, bushing and retainer (HF-2, 3, 4) supporting shaft on left and right side of printer by removing screws (HF-5).
3. Loosen screws (HF-13) on FF reader gear.
4. Loosen screws on pin feed pulley (HF-14).
5. Slide shaft to the right, and when shaft is flush with left chassis support (HE-86), remove pin feed pulley (HF-14) from belt (HH-28).
6. Remove shaft completely to the right and out.
7. Remove coupler (HF-100), sleeve (HF-101) and loose reader gear (HF-16).
8. Reverse removal procedures to install above assemblies at para. A and B above.
9. Cap HF-107) may require Eastman 910, or loctite or equiv. to retain.

5.2.7.3 Adjustments

1. Paper empty (PE) switch (HF-78) should function normally when paper is inserted, or when paper terminates. If adjustment of switch is required, remove screws (HF-88) and washer (HF-97) and remove pin feed cover (HF-87). Loosen switch nuts (HF-81) and position switch accordingly. (Ref. Section 4, para. 4.7.3).

5.2.8 PIN FEED UNIT (Figure HG)

5.2.8.1 Operation

Pin feed tractors, left and right (HG-19) provide pin guides for paper to travel vertically up or down. To move paper down, pull paper feed knob (HF-99) outward and rotate counterclockwise; to move paper up, rotate clockwise. Tractors are adjustable and are locked in position by fixing knobs (HG-18). Paper holders (HG-14, 21) are used to keep paper on pin feed tractors when printer is in use.

Direct coupling of paper feed knob and paper feed shaft (See Figure HF-99) is accomplished by serrated portion of spring actuated knob (HG-99) inserting into opposing serrated coupler (HF-100). When this occurs, while printer is operating, paper is then moved by logic signals affecting function of the form feed mechanism (Refer to Figure HH).

5.2.8.2 Removal/Replacement Procedure

A. Paper Drive Shaft (HF-98) (See Fig. HF)

1. Refer to paragraph 5.2.7.2 for Removal of Paper Knob (HF-99).
2. Remove spring (HF-105).
3. Loosen set-screws (HF-102) on coupler (HF-100).
4. Loosen set-screw (HF-13) on FF reader gear (HF-16).
5. Loosen set-screw (HF-15) on pin feed pulley (HF-14).
6. Remove snap ring (HF-6) located in front of left-hand bushing (HF-3).
7. Loosen two fixing knobs (HG-18) on left and right pin feed units (HG) and slide both units on driving shaft (HF-98) and guide bar (HF-7) to the extreme right.
8. Loosen set-screw (HF-9) on collar (HF-8) of guide bar. Slide collar to right.
9. Remove outside nut (HF-11) on right end of guide bar of pin feed unit.
10. Lift and slide guide bar to left and out from two pin feed units and FF chassis (right) (HH-81) of printer.
11. Remove two screws (HF-5) from holder (HF-2) located on extreme right end of driving shaft and detach holder (HF-2), bushing (HF-3) and retainer (HF-4).

12. Slide driving shaft (HF-98) to the right through two pin feed units and out of FF chassis (right) of printer.
13. To reassemble reverse procedure.

5.2.8.3 Adjustments

A. Pin Feed Holders and Paper Guide Plates (Left and Right)

1. Clearance between pin feed holders (HG-1, 20) and spring activated paper guide plates (HG-14, 21) should be 0.065 ± 0.015 -inch (1.65 ± 0.4 mm). Adjust clearance by bending right angle metal stopper located just above top hinge pin hole of pin feed holders, left and right.

B. Pin Feed Belt Units

1. For proper tension of pin feed belt units (HG-19), adjust as they are in place on the guide bar (HF-7) and driving shaft (HF-98) as follows:
 - a. Remove screws (HG-11) to remove plastic belt paper guide (HG-10).
 - b. With a 1.5 millimeter (0.059-in.) allen-wrench, loosen set-screws (HG-2) on paper feed holders (HG-1, 20).
 - c. Rotate eccentric stop sleeve (HG-7). Test for flexibility of pin feed timing belt units (HG-19) so that they are under similar tension on each side, (not too flexible or too tight). Tighten set-screws.
 - d. When paper is inserted on pin feed timing belt units (HG), left and right, the difference between the pins in the left and right horizontal plane should be minimal. Adjust as follows:
 - (1) Loosen fixing knob stoppers (HG-18) at top of left and right pin feed holders (HG-1, 20).
 - (2) Slide pin feed units together in middle of paper shaft.
 - (3) Open both paper guide plates (HG-14, 21).
 - (4) Loosen two allen-head set-screws (HG-6) on each pin feed driving pulley (HG-5) with a 2 millimeter (0.078-in.) allen-wrench.

- (5) Align pins on belts (HG-19) in same plane. (Sight stoppers on pin feed holders (HG-1, 20), for reference points in same horizontal plane, or insert straight edge supported on both stoppers to check alignment of pins).
- (6) Actual alignment can be done in two ways: (1) by hand moving each belt (2) or pull paper knob (HF-99) outward and rotate paper feed shaft (HF-98) which rotates eccentric sleeve (HG-3).
- (7) When left and right pin feed belts are aligned, tighten two set-screws (HG-6) on both driving pulleys (HG-5).

C. Pin Feed Stopper (Maintaining 5/8-in. nominal paper margin)

1. Loosen set-screw (HF-9) on pin feed collar (HF-8) of guide bar for pin feed unit (HF-7).
2. Maintain 0.2-in. (1 mm) dimension between collar and left chassis (HE-86). Tighten set-screw.
3. Perform timing fence adjustment, if required) Refer to para. 5.2.6.3.).
4. Set left paper guide plate unit (HG-20) flush to collar and tighten lock-knob (HG-18).
5. Check for 5/8-in. (15.8 mm) nominal margin of print out on paper.
6. Recheck fence dimension (step 3) if margin is not 5/8-in. (15.8 mm) nominal.

5.2.9 FORM FEED MECHANISM (Figure HH)

5.2.9.1 Operation

A. Form Feed Torque Transmission

Torque of form Feed (FF) motor (HH-71) is transmitted to pin feed unit for paper drive (Refer to Section 5.2.8) in the following manner:

1. Motor (HH-71) - motor gear (HH-12).
2. . . . FF Clutch Unit (located between FF chassis, right (HH-81) and FF Chassis, left (HH-2) - FF Clutch gear (HH-18) - FF Clutch inside cam (HH-14) - gear with stop cam (HH-23) - FF idle gear (HH-27) with belt drive (HH-28).

3. . . . Paper Feed Mechanism (Fig. 8-7 (HF) - paper shaft (HF-98) and pin feed pulley (HF-14) - FF reader gear (HF-16).
4. . . . FF Clutch and Magnet Unit - FF reader idle gear (HH-38) - gear (HH-47) (on shaft HH-46) - sprocket (HH-44) for paper tape rotation).

B. Form Feed Assembly

Motor (HH-71) with fan; form feed clutch assembly; gear train; and tape reader (with standard 6 line/inch paper tape 63002292-1) are included in the form feed (FF) mechanism.

C. Rotation of Clutch Cam and Pawl

Upon receiving a signal from electronic logic, the solenoid (HH-84) in the form feed (FF) clutch and magnet unit (See Fig. 8-9) energizes and pulls in the slide (part of armature (HH-33) releasing the tab on FF clutch inside cam (HH-14) and FF clutch releasing pawl (HH-95). The pawl controls the FF clutch releaser (HH-15) containing three roller bearings (HH-19) that allows the constant speed motor (HH-71) and clutch shaft (HH-25) to rotate freely prior to incoming logic signals.

D. Operation of Clutch (HH-14) with Paper Movement Solenoid Signal (PMSOL)

As the armature slide pulls away from the inside cam (HH-14) and pawl (HH-95) (towards the solenoid), activated by logic command Paper Movement Solenoid (PMSOL), the roller bearings (HH-19) grip the clutch shaft (HH-25) and a rotation of one-half revolution takes place that is equal to a paper movement of 1/6-inch or one line feed (LF).

E. Paper Movement - VT and FF Signal

While each line of print is being run off on paper, the tape reader sprocket (HH-44) in tape reader unit feeds 1/10-inch pitch (holes between channel 3 and 4) at the same time. Paper is fed continuously until phototransistor (See Fig. 8-9, HH-61, view A) is energized by lamp (HH-50) in lower tape reader (HH-43) when a Vertical Tab (VT) or Top of Form (FF) hole is reached.

Each time the printer performs a logic command, i.e., VT or FF, the solenoid (HH-84) de-energizes, the spring (HH-85) activated slide returns to home position and holds the tab on the rotating FF cam (HH-14) and the releasing pawl (HH-95). Paper can not move until the solenoid is activated again by logic signals.

F. Prevention of Paper Counter Movement

The paper movement is always in one direction when the clutch cam (HH-14) is mechanically linked to the form feed shaft and motor. To prevent counter motion of paper feed mechanism, a small spring activated back stopper (HH-74) continually rides the periphery of gear with stop cam (HH-23) and is mechanically adjusted to fall into place against the cam at each half revolution when the FF clutch inside cam (HH-14) and FF clutch releasing pawl (HH-95) return to the underside of the armature slide. At this point additional lines of print are activated by selective logic signals affecting paper movement.

5.2.9.2 Removal/Replacement Procedure

1. Refer to Figure HH for the following sub units of the Form Feed Mechanism.
 - a. FF Unit
 - b. FF Clutch Unit
 - c. FF Clutch and Magnet Unit
 - d. Tape Reader (Lower)
 - e. Reader Lamp Holder Unit
 - f. Tape Reader Unit (upper)
 - g. Reader P/C Board Unit

5.2.9.3 Adjustments

- A. Gear with Stop Cam (HH-23) and Back Stopper (HH-74) Refer to Figure 8-9 (HH and Fig. 5-4A)

When FF (form feed) clutch releasing pawl (HH-95) is not held by armature slide, (part of armature HH-33), the shaft for FF clutch (HH-25) is being rotated for a line feed (clutch-on condition).

As each line feed rotation terminates, the FF clutch releasing pawl, which is slightly offset and precedes the tab on the FF clutch inside cam (HH-14), strikes the underside of the armature slide releasing the FF shaft so that FF motor (HH-71) is disconnected from the form feed mechanism by this clutch-off effect.

It is at this point, when the shaft is released, that an adjustment must be made to the gear with stop cam (HH-23) to prevent counter-movement of paper. (Refer to Figure 5-4A)

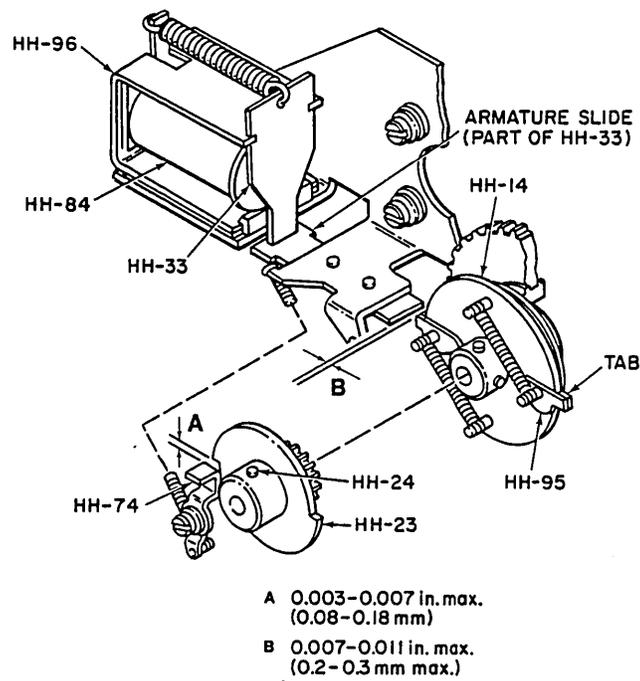


Figure 5-4A. TWO ADJUSTMENTS, GEAR WITH STOP CAM (HH-23) AND INSIDE CAM (HH-14)

1. Set the back stop cam for correct working adjustment in the following manner:
 - a. Move slide (part of armature, HH-33) by hand toward armature solenoid (HH-84).
 - b. While holding slide, rotate FF idle gear (HH-27) counter-clockwise (clutch-on condition).
 - c. Release spring activated slide (HH-33) so that cam (HH-14) and pawl (HH-95) will be held against the under-side of the slide.
 - d. Make sure that when the tab of the cam and the pawl are against the slide (clutch-off condition) that the back stopper (HH-74) drops off the notched end of gear with stop cam (HH-23). For this to happen, refer to next step.
 - e. Maintain a gap of 0.1 to 0.2 mm (0.003 to 0.007-in.) between the notch of cam (HH-23) and back stopper (HH-74) (clutch - off condition) by loosening allen-head screws (HH-24) and adjust cam accordingly.

- B. Clutch, Inner Cam (HH-14) - Armature Slide (HH-3) (Refer to Figure 5-4A)
1. To adjust proper distance of armature slide (HH-3) to hold raised tab on paper feed clutch, inner cam (HH-14) prior to line feed release, perform the following steps:
 - a. Loosen screws (HH-86) and washers (HH-82) on clutch magnet frame (HH-96) mounted to paper feed chassis (HH-81).
 - b. Slide magnet frame on paper feed chassis slots so that the distance between slide and tab on inner cam (HH-14) is from 0.2 to 0.3 mm (0.007-0.011-in.). Tighten screws and washers.
- C. Timing Belt (HH-28)
1. The timing belt (HH-28) located between FF idle gear (HH-27) and pin feed pulley (HF-14) has the following adjustment.
 - a. Loosen three nuts (HH-70) holding right chassis (HH-81) to left frame chassis (HE-86). (Rotate left frame to change tension on belt).
 - b. For proper tension of timing belt (HH-28) move belt downward 3-5 millimeters (0.118-0.196-inch) when load of 100 grams (3.5 ounces) is applied on belt at mid-point between both pulleys.
 - c. Tighten three support nuts at chassis (HH-81).

5.2.10 RIBBON FEED MECHANISM (Figure HI)

5.2.10.1 Operation

A. Ribbon Movement - Forward Clutch Drive

Torque for feeding ribbon is transmitted from shaft (HB-50) while head is moving from left to right as clutch spring (HI-4) engages sleeve (HI-5) mounted on shaft (HB-50). Above torque is transmitted to ribbon as follows:

B. Ribbon Feed Mechanism (From Front of Printer)

1. Drive-Right Side

Shaft (HB-50) - clutch gear (HI-1) - driving gear (HI-75),
bevel gear (HI-81) - driving bevel gear (HI-18) - sleeve
(HI-20) - driving slide shaft A, (HI-103). . . . (a)
bevel gear (right-hand) (HI-27) - bevel gear (right) (HI-43)
ribbon spool shaft (right) (HI-38) - ribbon

2. Drive-Left Side

Bevel gear (HI-27) - bevel gear (HI-59) - ribbon spool shaft (HI-57) - ribbon.

C. Driving Slide Shaft

Above torque transmission route for the ribbon feed mechanism (left and right) is determined by position of driving slide shaft A (HI-103) (Fig. 5-7), controlled with control spring (HI-93) (Figure 5-9), reverse control lever (right) (HI-88) (Figure 5-9), and reverse control lever (left) (HI-90) (Figure 5-7).

D. Reverse Control Ribbon Movement (left and Right)

Tension of ribbon is applied by ribbon holding plate (HI-44) and guide rollers (HI-19). When one of ribbon spools becomes empty, eyelet (or stop plate) on ribbon pulls guide pins on either reverse control lever (HI-90, 88) (right) or (left) to change ribbon feeding direction by setting washer (HI-104) against reverse control lever (right) or (left) on sliding driving slide shaft (HI-103). When ribbon does not feed, or ribbon feed mechanism binds for some reason, a safety feature releases ball (HI-76) from hole in driving shaft (HI-79), and torque of driving gear (HI-75) no longer transmits drive to driving shaft (HI-79).

5.2.10.2 Removal/Replacement Procedure

Note that all removal/replacement procedures will be done from the back of the printer. (Fig. 1-9)

A. Preliminary Disassembly

Perform the following steps prior to removing ribbon reversing rod (HI-92), sliding drive shaft A (HI-103) or ribbon spool holders (HI-35, 55).

1. Place left and right side covers in down position.
2. Remove the rear cover.
3. Loosen screw (A-25 of Section 8, Fig. A) on strain relief bracket (A-13) and set aside cable.
4. Remove screws from cavity (Fig. 1-8) at back of printer.
5. Unplug cable harness from cavity to molex connector (P13) (Refer Fig. 1-9/3).
6. Remove interface connector (J13) (See Fig. 1-9/4 from connector (P13) (part of electronic logic, connector board 6301122 (Fig. 7-38).

B. Ribbon Reversing Rod

1. On the right-hand side of printer, unscrew threaded coupler (HI-94) from connector (HI-91).
2. Loosen allen-head screw (HI-96) on stopper (HI-95) on left side of ribbon reversing rod (HI-92) using a 1.5 millimeter (0.06-in.) allen-wrench.
3. Loosen locking nut (HI-98) with a 7 millimeter (0.28-in.) wrench on left side of ribbon reversing rod.
4. Unscrew ribbon reversing rod from left coupler and remove.

C. Driving Slide Shaft - A

1. On the right side of the printer, remove two screws (HI-131) from holder (HI-133) supporting driving slide shaft A (HI-103) and drop the shaft slightly.
2. Using a 1½ millimeter (0.06-in.) allen-wrench, remove two allen-head screws (HI-29) on bevel gear (HI-27) on right side of printer.
3. Remove bevel gear and bushing.
4. Remove snap ring (HI-105) and washer (HI-140) from drive shaft A on right side of printer.
5. Repeat step C.1. through C.4. on left side of printer, but remove left holder (HI-130) in step C.1.
6. Remove driving slide shaft A to the right of the printer.
7. To reassemble, reverse order of disassembly.

D. Ribbon Spool Holder (left and right)

1. Remove both ribbon spools (left and right).
2. Remove left and right spool holders (HI-35, 55) by removing bolts (HI-54) from left and right chassis (HE-86, 85).

E. Ribbon Spool Shaft (left and right)

1. To remove left and right ribbon spool shaft (HI-38, 57) first loosen allen-head screws (HI-42) on bevel gears (HI-43, 59) and remove gear.
2. Loosen allen-head screws (HI-42) using 1½ millimeter (0.06-in.) allen wrench, on left and right collars (HI-41) located on ribbon spool shafts (HI-57, 38).

3. Remove left and right spool shaft (HI-38, 57).
4. Remove left and right nut (HI-37).
5. Remove left and right sleeve bearing (HI-36, 56).
6. To reassemble, reverse steps 1 through 4.

F. Ribbon Holding Plate (left and right)

1. To remove left and right ribbon holding plate (HI-44) from left and right ribbon spool holders (HI-55, 35), remove left and right snap rings (HI-45).

G. Reverse Control Lever (left and right)

1. To remove left and right ribbon reverse control levers (HI-90, 88) from left and right ribbon spool holders (HI-55, 35), remove left and right snap rings (HI-48) and remove levers.

H. Reversing Rod Connectors (left and right)

1. To remove left and right reversing rod connectors (HI-91, 89), remove snap rings (HI-51) from pins (HI-50) and remove pins.

I. Reassembly of Ribbon Spool Holders

1. To reassemble ribbon spool holders (HI-35, 55), reverse order of disassembly para. D. through H.

J. Ribbon Driving Shaft Assembly

1. To remove and disassemble ribbon driving shaft assembly (HI-79) perform the following steps:
 - a. Remove screws (HI-17) from left side of printer and remove bushing holder (HI-84).
 - b. Remove screws (HI-86) holding cover (HI-85) and holder (HI-84) together, releasing entire driving shaft (HI-79). Note, that clutch spring (HH-80) must be unhooked from cover (HI-85).
 - c. Remove snap ring (HI-87) on left end of driving shaft.
 - d. Release and remove driving gear (HI-75) by unscrewing allen-head set-screw (HI-78) and releasing spring (HI-77) and ball (HI-76). (Note, that caution must be taken to avoid losing spring and ball).
 - e. Remove bushing (HI-83) and clutch spring (HI-80) from shaft (HI-79).

- f. Remove bevel gear (HI-81) from shaft by releasing allen-head screw (HI-82) at right end of shaft.
 2. To reassemble ribbon driving shaft assembly (HI-79), reverse order of disassembly.
- K. Clutch Gear (HI-1) (Direct drive transmitted from forward and reverse clutch shaft (Ref: Fig. 8-3B (HB-50), and on the same drawing, (Ref: HI-1)
1. Prior to removing clutch gear (HI-1), the bushing holder (HI-84) must be removed (Refer para. J.1.a. and J.1.b.).
 2. To remove clutch gear (HI-1), loosen two allen-head screws (HI-6) from sleeve (HI-5) and slide off sleeve, clutch spring (HI-4) and gear.
 3. To reassemble, reverse order of disassembly, steps K.1. through K.3.

5.2.10.3 Adjustments

All adjustments, unless otherwise specified, will be called out from a rear view (left and right) at the back of the printer.

- A. Bevel Gears (left and right) (HI-27, 43) and (HI-27, 59)
(Refer to Figure 5-5)
1. Slide ribbon reversing rod (HI-92) to left. Arm (part of reverse control lever) (HI-88) contacts washer (HI-104) on driving slide shaft A (HI-103) and moves bevel gear (HI-27) into mesh with bevel gear (HI-43).

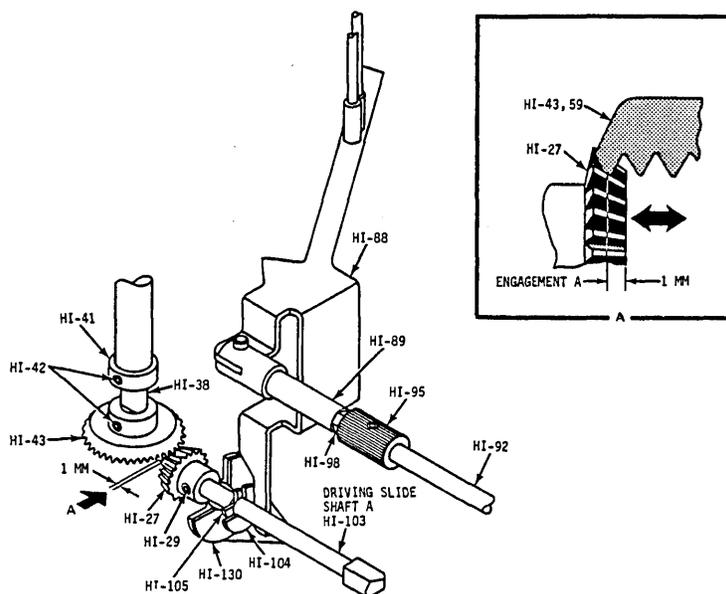


Figure 5-5. RIBBON FEED MECHANISM (REAR OF PRINTER, LEFT SIDE)

2. Adjust bevel gear (HI-27) (left side) with respect to bevel gear (HI-43) by loosening and tightening allen-head screws (HI-29) to obtain engagement A of approximately one millimeter (0.039-in.). See Fig. 5-5, and View A

B. Backlash Adjustment for Gears (HI-27, 43) and (HI-27, 59)

When engagement A (Figure 5-5) has been properly adjusted between gears (HI-27) with respect to bevel gears (HI-43, 59), adjust bevel gears (HI-43, 59) alternately to obtain correct backlash operation of gears in the following manner:

Note

When performing the next two steps, adjust one set of gears for proper backlash, then move ribbon reversing rod (HI-92) in opposite direction (to engage gears) and adjust the other set of gears (HI-27, 43) or (HI-27, 59), repeating steps B1 through B2. (See Figure 5-6)

1. Loosen allen-head screws (HI-42) on the bevel gears (HI-43, 59).
2. Adjust bevel gear up or down on ribbon spool shaft (HI-38, 57) to obtain a vertical adjustment (engagement B) of 0.05 to 0.2 millimeters (0.002-0.008-in.) between the teeth of the opposing gears (HI-27) as they mesh (See Figure 5-6). Tighten allen-head screws on bevel gear (HI-43, 59).

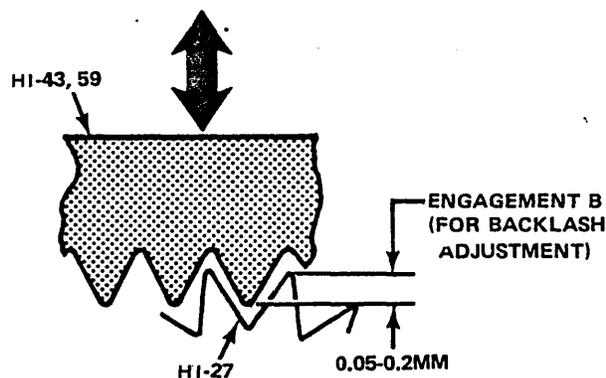


Figure 5-6. BACKLASH ADJUSTMENT, BEVEL GEAR (HI-43, 59)

C. Driving Slide Shaft A (HI-103)

If driving slide shaft A (HI-103) is removed or replaced, adjust ribbon mechanism parts in the following manner:

1. When engagement A and B of bevel gears has been made (Figure 5-5, 5-6), one snap ring (HI-105) always contacts support bushing (HI-130); the distance between other snap ring (HI-105) and the support bushing (HI-130) on shaft (HI-103) is 3 to 4 millimeters (0.12-0.16-in.). (See Figure 5-7). Note that distance between bevel gear (HI-59) and bevel gear (HI-27) is also 3-4 mm.

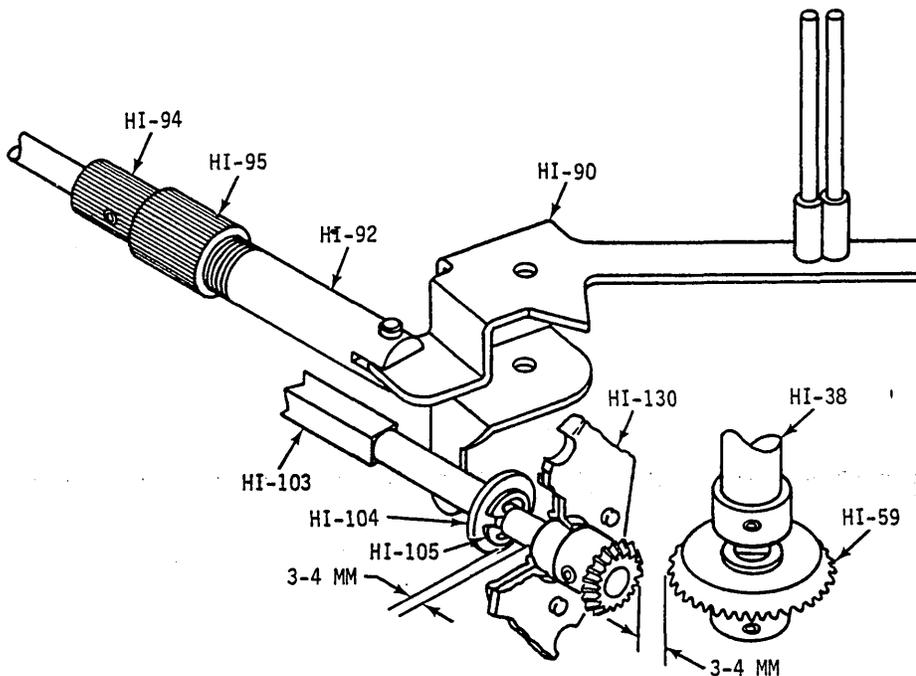


Figure 5-7. DRIVING SLIDE SHAFT A - ADJUSTMENT

2. When bushings and holders (HI-133, 130) on left and right side of printer are installed, the driving slide shaft A (HI-103) should move freely and travel an overall distance of 3.0 to 4.0 millimeters (0.12 -0.16-in.) when engaged alternately in either direction with bevel gears (HI-27, 43) or (HI-27, 59). (See Fig. 5-7)

D. Ribbon Reversing Rod (HI-92)

If ribbon reversing rod (HI-92) is removed, adjust ribbon mechanism in the following manner:

1. Thread right-hand coupler (HI-94) clockwise all the way. (Refer Figure 8-10)

2. With right bevel gears engaged (HI-27, 59), (right side, rear view) adjust gap between washer (HI-104) and ribbon reverse control arm (HI-88) between 3 and 4 millimeters (0.12-0.16-in.) by rotating ribbon reversing rod (HI-92) to control the distance. (Refer to Figure 5-8)
3. Tighten locking nut (HI-98) to prevent further rotation of ribbon reversing rod.
4. Slide both stoppers (HI-95) into place (left and right) and lock by tightening allen-screws (HI-96).

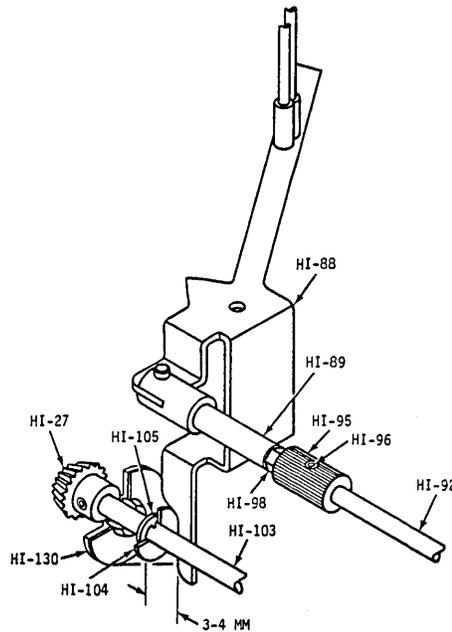


Figure 5-8. RIBBON REVERSING ROD ADJUSTMENT

E. Control Spring (HI-39) - Ribbon Reverse Timing (See Fig. 5-9)

1. When reverse control lever (HI-88) turns left by moving ribbon reversing shaft (HI-92) to left, and if Engagement A (Fig. 5-5) between bevel gear (HI-27) and bevel gear left (HI-43) is decreased to approximately 1.0 mm (0.039-in.), adjust position of control spring (HI-39) by loosening screws (HI-40) and flat washers (HI-123) to just pass roller mounted on control spring (HI-39), (located underneath left ribbon spool shaft (HI-38) over top of ramp of reverse control lever (left) (HI-88). Note, that both ribbon spools will rotate freely when driving slide shaft A (HI-103) is in neutral position (top of ramp).

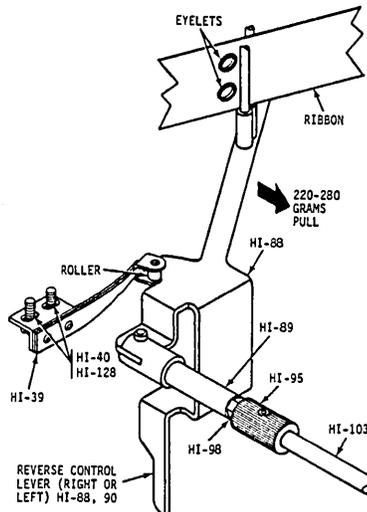


Figure 5-9. RIBBON REVERSE TIMING

2. When ribbon of spool (empty condition) containing eyelets (or small plate) is blocked by ribbon guides (part of HI-88, 90) a pull of 220-280 grams (7.7 oz - 9.8 oz) is exerted on the reverse control levers (either left or right), which reverses the ribbon movement. (See Figure 5-9)
3. Adjust bevel gear (HI-27) (right) and bevel gear (HI-59) (right) to the same gap as indicated in para. E.1.

Note

Both bevel gear (HI-27) and bevel gear (right and left) (HI-42, 59) should be timed so that they engage together after roller, mounted on control spring, passes over top of ramp of reverse control lever (HI-88). (Fig. 5-9)

F. Clutch Gear and Driving Gear Engagement (Fig. 8-10, HI-1, 75)

1. To ensure clutch gear (HI-1) and driving gear (HI-75) are meshed properly, adjust by loosening screws (HI-17). Also ensure both bevel gears (HI-18, 81) are meshed properly and positioned on driving shaft unit. Proper backlash between clutch gear (HI-1) and driving gear (HI-75) is 0.05 to 0.2 mm (0.002 - 0.008-in.).
2. Ensure that torque of driving gear (HI-75) does not transmit to driving shaft (HI-79), when spool holder is held by hand. Adjust pressure on ball (HI-76) by turning set-screw (HI-78). After making above adjustment, check the following points:

- a. When carriage is moved by hand and ribbon feed direction is changed, see that there is no slippage between driving gear (HI-75) and driving shaft (HI-79).
- b. When carriage is moved by hand, and spool is held by hand, ensure that torque of driving gear (HI-75) does not transmit to driving shaft (HI-79).

G. Ribbon Winding

1. Top Edge Curling

When the ribbon winds normally into ribbon spool, the edge of the ribbon should not be curled. If the top edge of the ribbon is curled, adjust position of ribbon spool holder (right or left) (HI-35, 55) by loosening bolts (HI-54) to incline ribbon spool shaft (right or left) (HI-38, 57) slightly backward.

2. Bottom Edge Curling

If the lower edge of the ribbon becomes curled, adjust position of ribbon spool holder (HI-35, 55) by loosening bolts (HI-54) to incline spool holder shaft (HI-57, 58) slightly forward.

H. Guide Roller Adjustment (HI-106, 114)

1. Adjust level of guide roller (right or left) (HI-106, 114) by loosening screws (HI-117) to position guide rollers (HI-119) perpendicular and parallel to side of machine.

5.2.11 ELECTRICAL HARDWARE (HJ)

In general, the parts list for this section reflects electrical and mechanical items required for the operator panel and cabling found on the main frame of the printer. There is no illustrative drawing for the accessories parts list at this printing.

5.2.12 PAPER STACKER AND GUIDE

Refer to Section 2.3.

5.2.13 PRINT HEAD AND ASSOCIATED ASSEMBLIES (Figure 8-12(B))*

The following paragraphs describe a method of removal/replacement, and wherever required, adjustments for the print head and associated assemblies. This section does not cover total parts contained in those assemblies. See Section 7 and 8 for complete parts list and assembly drawings where applicable.

*For convenience, B will be used to key text to the drawing. (See Section 8, Fig. 8-12B)

5.2.13.1 Operation

A. Print Head

Acts as a guide to keep print wires in line as each one drives against the ribbon to form characters out of dots.

B. Power Driver Board

Supplies control signals to printer solenoids and forward and rear clutches for head movement from logic boards.

C. Video Amplifier and Cable Ass'y

Amplifies and shapes the video pulse, with the cable assemblies carrying power driver outputs to the solenoids of head.

D. Bracket (HA-50)

Supports video amplifier and cables, Fibre Optics Head and bundle, and Light Assembly.

5.2.13.2 Removal/Replacement Procedures (Refer to Figure B)

A. Print Head

1. Refer to Section 5.2.1.2., steps 1 and 3, for removing the covers prior to removing head.
2. Unplug fingerboard, solenoid (B-1) from video amplifier connector (B-2).
3. Using a 3/32-in. diameter allen wrench, remove at the top, from each side of head assembly (B-3) two allen-head screws (B-4) and two internal lockwashers (B-5) attached to the head bracket (B-6) of printer carriage (B-7). Remove the lower two allen-head screws (B-10) (longer in length) and internal lockwashers (B-5).
4. To replace print head reverse disassembly procedure.

B. Power Driver Board

1. Unplug ribbon cable connector board (B-11) from power driver board connector (B-2).

2. Remove ribbon cables (B-12, B-13) from cable clamp assembly (B-14) located on the tray (B-15) by loosening the back screw, (B-16) and removing the front screw, (B-16), washer (B-5) and nut (B-17).
3. To remove entire heatsink bracket (B-18) with power driver board (B-19), remove four countersink screws (B-20) at front of printer attached to printer frame unit (B-21).
4. Reverse disassembly procedures to assemble.

C. Video Amplifier and Cable

1. For removal of video amplifier board (B-22) and cable ass'y (B-12, B-13), first refer to paragraph 5.2.13.2.B., steps 1 and 2 of this section.
2. Remove connector screw (B-23) from bracket (B-26), clip (B-46) and the fibre washer (B-24) located directly underneath the video amplifier board.
3. Remove two screws (B-25) from bracket (B-26) holding cables and video amplifier board including fibre washers (B-27) (placed as insulators) and pad assembly (B-28).

D. Installation-Video Amplifier and Cable

Install the video amplifier (B-22) and cable assembly (B-12, B-13) in the following manner:

1. Insert one screw (B-25) into ground terminal lug (B-45) (attached to board) and then into fibre washer (B-27) and enter pre-drilled hole in cables (B-12, B-13).
2. Insert one more screw (B-25) with fibre washer (B-27) and enter the other pre-drilled hole in cables. Add one fibre washer (B-17) to each screw between the underside of the cables and the pad assembly into sponge (B-29) and bracket below (B-26) into front two press-fitted rivnuts (B-30) on the bracket.
3. Insert solenoid fingerboard (B-1) from printer head into video amplifier connector (B-2).
4. Reverse procedures of 5.2.13.2.B., 1 and 2.

E. Bracket Video Amplifier

1. Remove entire bracket (B-26) with non-conductive sponge (B-29) containing fibre optics head (B-31) and bundle (B-31) and lamp housing assembly (B-32) and two lockwashers (B-34) from printer carriage unit (B-7).

5.2.13.3 AdjustmentsA. Print Head

See maintenance, Section 6, Print Head Assembly.

B. Bracket (Video Adjustment)

The adjustment of the bracket (B-26) is a preliminary step prior to alinement of lamp assembly (B-32) and fibre optics head (B-31) relative to the flexible timing fence (B-36) and print head.

1. With hardware and bracket (B-26) in position, and before tightening mounting screws (B-33), push upward on the bracket so that flanged end is flush and parallel with top front edge of printer carriage unit (B-7). Tighten screws so that slight tap would shift position of bracket.
2. Move lamp holder housing assembly (B-32) without lamp (B-41) and socket (B-42) backward on screw adjusting slots at maximum distance from timing fence (Fig. 5-10). Tighten screws (B-35) (screws must be flat-head) when right side of lamp housing is aligned parallel to edge of bracket.
3. Mount fibre optics head (B-31) to bracket (B-26) with screws (B-37), lockwashers (B-38) and flat washers (B-7). Allow lead of optic bundle (B-31) to hang freely. Do not tighten screws.

Note

The following adjustments must be made to correctly align lamp (B-41) so that this light source is directed properly through the optic fence (B-36) to slit (B-40) on fibre optic head (B-31).

4. Adjust the right, top edge of fibre optics head so that it is parallel with edge of bracket (B-26) and as close to fence without touching. (See Fig. 5-10)
 - a. If optics head is not parallel with respect to the vertically suspended fence, physically bend the bracket (B-26) slightly up or down to maintain parallelism.
 - b. Move print head by hand, all the way to the right to ensure timing fence and the face of the fibre optic head surfaces do not touch. Adjust accordingly.
 - c. Re-check timing fence alinement (para. 5.2.6.3.).

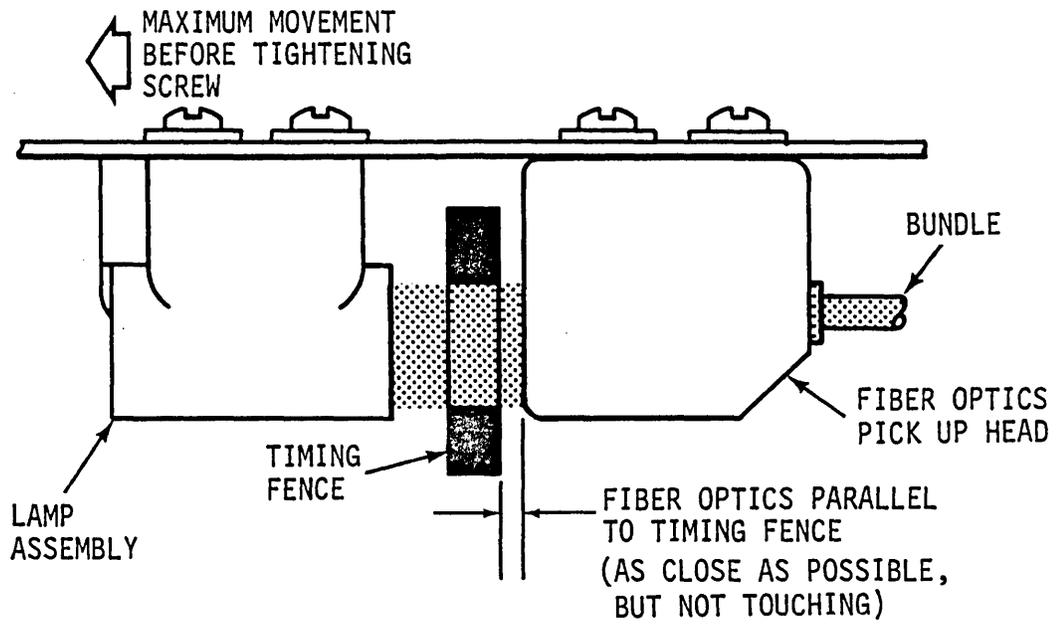
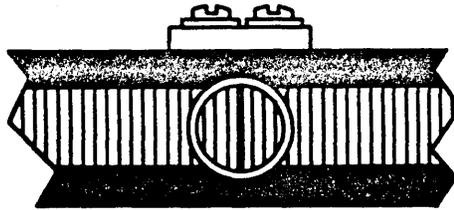
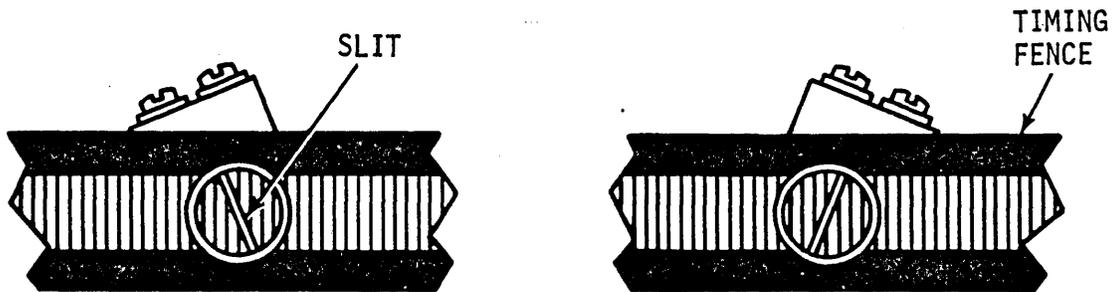


Figure 5-10. FIBRE OPTICS HEAD, ADJUSTMENT FROM OPTIC FENCE



(A) CORRECT ALIGNMENT-BLACK LINE OF FENCE PARALLEL & VERTICAL WITH SLIT ON OPTIC HEAD



(B) BRACKET TOO HIGH ON LEFT

(C) BRACKET TOO HIGH ON RIGHT

Figure 5-11. FIBRE OPTICS HEAD ALIGNMENT AND FLEXIBLE TIMING FENCE

5. From a position in front of optic timing fence (B-36) and with fibre optic bundle (B-31) pointing to a light source, correctly align illuminated slit (B-40) on optics head (B-31) by observing through empty light housing (B-32) so that light slit on optics head is completely blocked by any black line on the timing fence. (Figure 5-11 (A)).
6. The following two conditions may apply to light alignment in previous step 5 when the slit on optics bundle is out of alignment with respect to the black line on timing fence (Figure 5-11 (B) and (C)).
 - a. If the bracket (B-26) holding the optics head is too high on left (Figure 5-2 (B), tap bracket to align slit and black line (Figure 5-11 (A)).
 - b. If the bracket holding the optics bundle is too high on the right (Figure 5-11 (C), tap bracket to align slit and black line (Figure 5-11 (A)).
 - c. When correct alignment has been attained, tighten and secure bracket (B-26) with the two mounting screws (B-33) and washers (B-34) to printer carriage (B-7).
7. Insert lamp (B-41) into socket (B-42) attached to lamp retainer (part of lamp socket), but note that prior to insertion into lamp ass'y be certain lamp filament (inside lamp B-41) is in a vertical plane paralleling slit (B-40) in the opposing fibre optics head (B-31) for maximum blockage of light by black line on fence (Figure 5-11(A)). Insert and tighten screw (B-37), washers (B-38, 44) into lamp retainer (B-42) and lamp ass'y (B-32).
8. Install bundle lead of fibre optic head (B-31) into photo cell housing ass'y (B-43) installed on the video amplifier board (B-22). Tighten screw (B-25) on clamp end of photo cell housing.

C. Ribbon Cables Ass'y (B-12, B-13)

1. To position ribbon cables for operating condition, move cables to the left or right through the tray clamp (B-14). Set printer head to the left so that when print head operates normally, the ribbon cables do not strike damper (Figure HD) or that cables become too tight between printer head and tray clamp. The starting point of the head may differ among models because of small mechanical variations affecting the degree of slackness of the cables.
2. Secure cables, after proper adjustment of head, by tightening screws (B-16) washers (B-5) and nuts (B-17) on clamp (B-14) on tray (B-15).

D. Ground Lug - Video Amplifier Board

Check to see if preassembled ground lug (B-45) clears etch runs of video amplifier board, (B-22) after assembly is completed. Adjust, if required.

SECTION 6 MAINTENANCE

This section contains the following maintenance information:

<u>Paragraph</u>	<u>Description</u>
6.1	Adjustments
6.2	Preventive Maintenance

In addition, detailed removal, replacement and adjustment procedures for all mechanical assemblies are contained in Section 5. Associated mechanical drawings and parts lists are in Section 8. Detailed theory of operation on the electronics portion is contained in Section 4 and associated drawings and parts lists are in Section 7.

6.1 ADJUSTMENTS

All mechanical adjustments are described in detail in Section 5. All electrical adjustments are summarized in the following table.

<u>Item No.</u>	<u>Function</u>	<u>Signal Name</u>	<u>Element-Pin</u>	<u>Card#</u>	<u>Adj. Resistor</u>	<u>Pulse Width</u>
1	Strobe pulse	STROBE	ME18-6	2	R7	450 usec
2	Strobe Delay	-	ME32-13	2	R51	500 usec
3	Delayed Strobe pulse	DELSTB	ME32-15	2	R52	450 usec
4	Delayed Clutch Interval	DCLT	ME22-6	2	R9	40 msec
5	Line Feed pulse	LF	ME17-13	1	R54	15 msec

CENTRONICS

SERIES 100 PRINTERS PREVENTIVE MAINTENANCE PROCEDURES

(December 1974)

The following Preventive Maintenance (PM) procedures apply to the Series 101 and Series 102 printers.

Frequency of PM : 6 months
Time Required: 1.5 hours (approximately)

Cleaning Material: Medium-bristle cleaning brush,
Two soft clean cloths,
Liquid Freon

Tools Recommended:

Centronics' Tool Kit No. 63002399-1
Phillips screwdriver
Flat blade screwdriver
Jeweler's eye loupe
Decimal feeler gauges
Oil syringe

} Items not available
through Centronics

Lubricants Recommended:

Lightweight oil (choice of three)
Telus No. 27 (Shell) CDCC Spec. No. 30050005.
Teresso No. 43 (Esso) CDCC Spec. No. 30050006
Vacualine No. 1405 (Mobil) CDCC Spec. No. 30050007
Grease — CDCC Spec. No. 30050004
Oil — Anderol No. 465, Spec. No. 30050002 (for bushings
and felt washers only)

Reference Manuals: Series 101 and Series 102 Technical Manual

CENTRONICS

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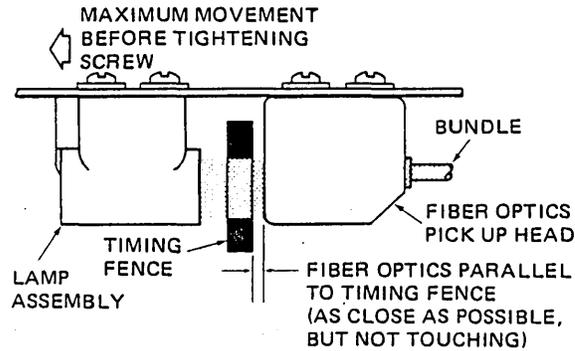
PREPARATION

Clean Printer with vacuum cleaner, if available.

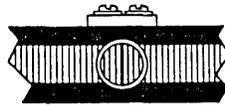
INSPECTION, ADJUSTMENT, CLEANING AND LUBRICATION

1. FIBER OPTIC HEAD

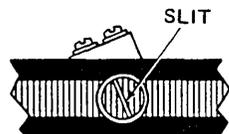
Verify proper Fiber Optic Head alignment as shown in Figures 1a and 1b (para. 5.2.13.3).



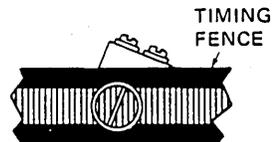
(1a)



(A) CORRECT ALIGNMENT-BLACK LINE OF FENCE PARALLEL & VERTICAL WITH SLIT ON OPTIC HEAD



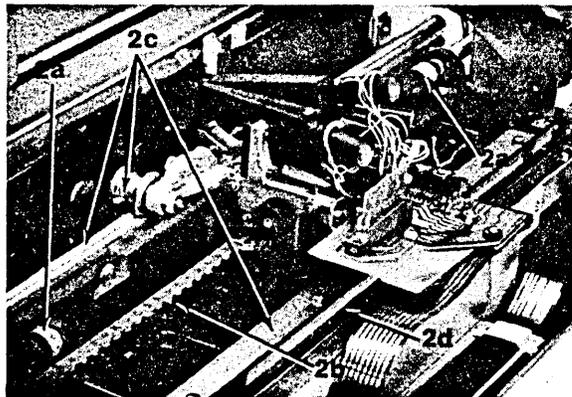
(B) BRACKET TOO HIGH ON LEFT



(C) BRACKET TOO HIGH ON RIGHT

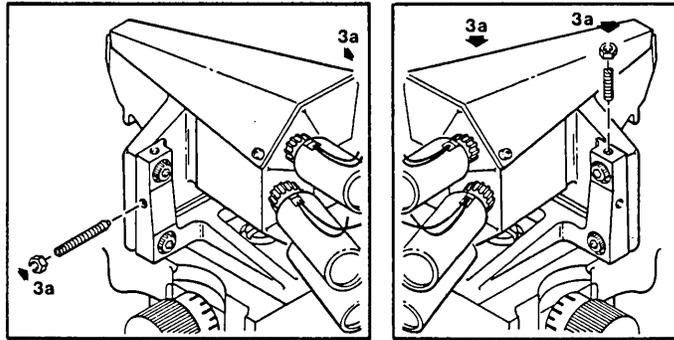
(1b)

2. CARRIAGE ASSEMBLY



- Check damper (5.2.5.2, Step 9)
- Verify proper main drive belt tension (5.2.2.3 D)
- Wipe Carriage Guide Bar, Rollers and Plate (5.2.2)
- Clean flexible timing fence using micro-wipes. (If necessary, use a mild detergent, never an organic solution (5.2.6.3 E)

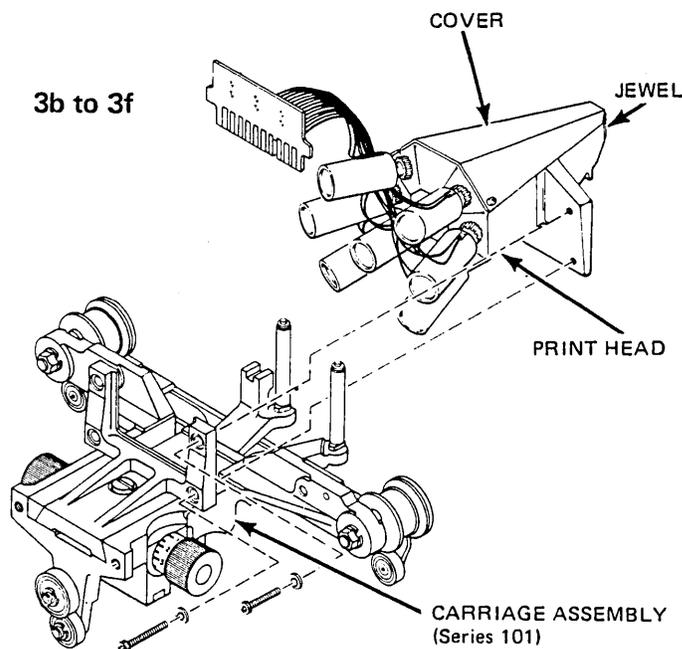
3. PRINT HEAD ASSEMBLY



HORIZONTAL ADJUSTMENT

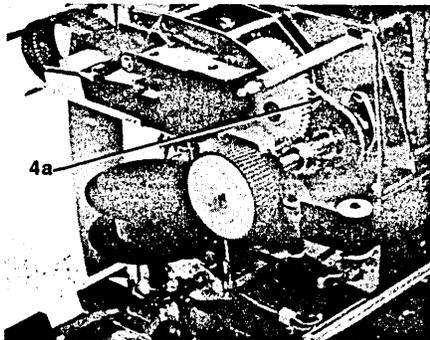
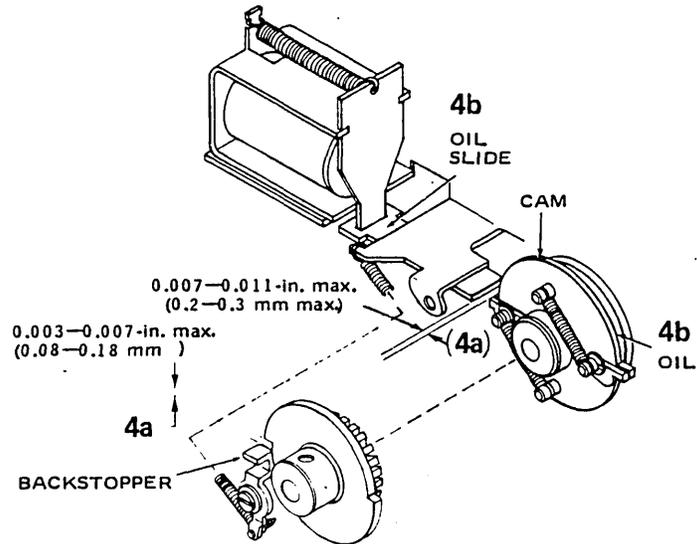
VERTICAL ADJUSTMENT

- a) For Series 102 only, verify alignment of left and right print heads (5.2.2.3)
- b) Remove print head(s) from Carriage Assembly; (5.2.2.2, Series 102) (5.2.13.2, Series 101)
- c) Remove print head cover, and clean print head jewel using a Freon cleaning solution and a medium-bristle cleaning brush (See Fig. below)
- d) Using an eye loupe, verify that print wires align flush with face of print head jewel (make sure that wires are not recessed in the jewel) (1.3.1)
- e) Replace print head cover
- f) Re-mount print head on Carriage Assembly (See Fig. below)



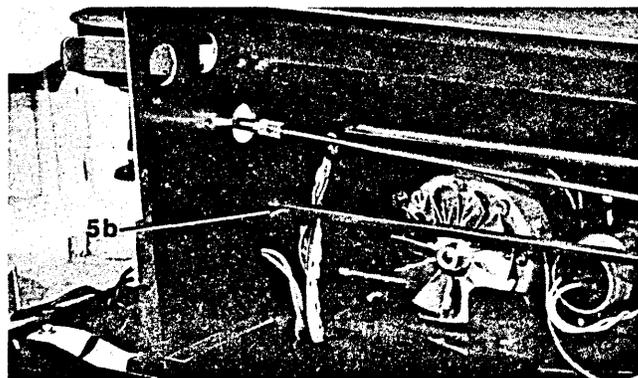
4. FORM FEED ASSEMBLY

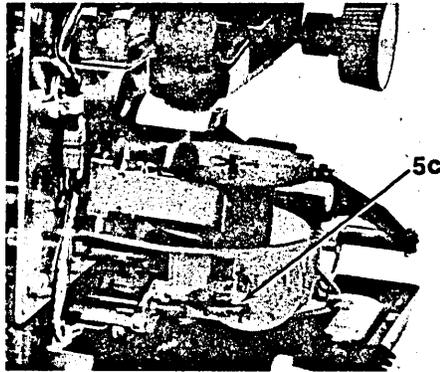
- a) Verify proper gaps and timing belt tension (5.2.9.3).
- b) Lubricate as shown in diagram below.
- c) Oil all moving shafts and bushings.



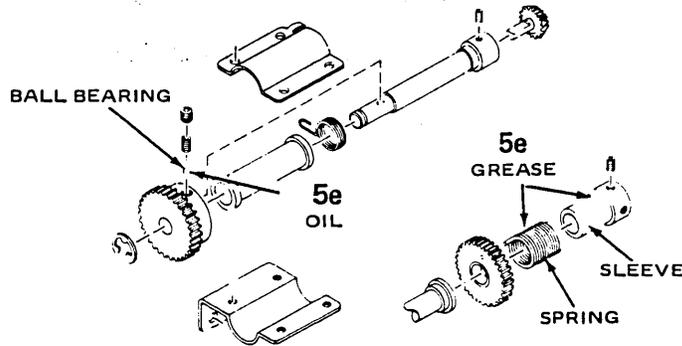
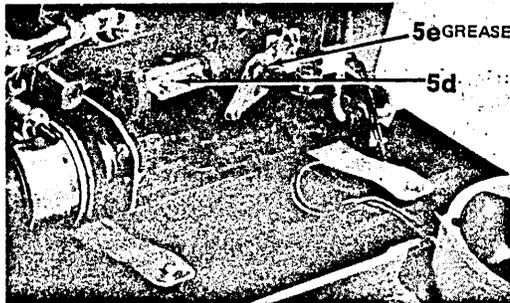
5. RIBBON FEED ASSEMBLY

- a) Check all gears for wear and proper mesh (5.2.10)
- b) Verify that ribbon spools rotate freely when driving slide shaft is in neutral position (neither spool engaged) (5.2.10.3)
- c) Manually move carriage assembly, and verify proper ribbon tracking by engaging left and then right bevel gears (5.2.10.3)





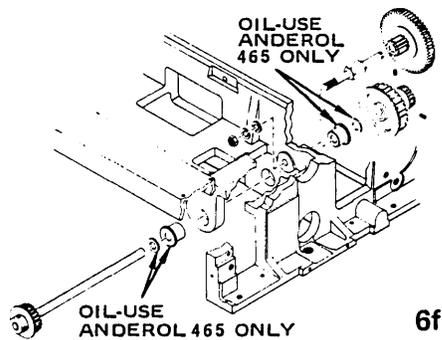
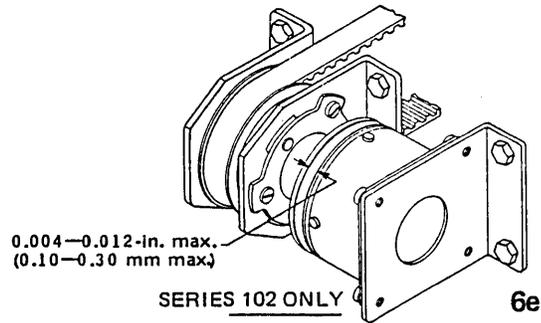
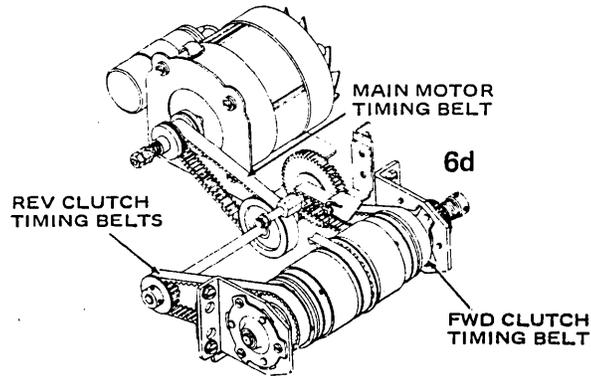
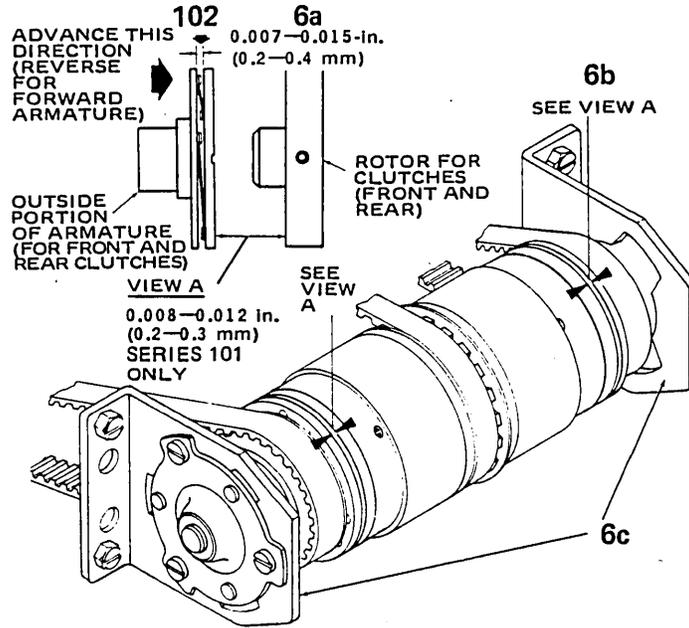
- d) Verify proper operation of ribbon feed driving gear slip clutch when the carriage is moved and the engaged ribbon spool is held stationary (5.2.10.3).
- e) Clean and lubricate as indicated in the diagrams (See Fig. below).
- f) Grease all metal-to-metal surfaces, if required.



6. DRIVE ASSEMBLY

- a) For Series 102, verify gap between armature plates for forward and reverse clutches (no gap between armature and rotors) (5.2.3.3).
 - b) For Series 101, verify a uniform gap between rotor and armature for forward and reverse clutches (5.2.3.3).
- Note: Avoid use of any lubricant on the forward and reverse clutch surfaces.
- c) For Series 101, verify no end-play on forward and reverse clutch bushing brackets (5.2.3.3).
 - d) Verify proper tension on main motor and forward and reverse clutch timing belts (5.2.3.3).
 - e) For Series 102 only, verify uniform gap between surfaces on brake assembly (See Fig. 6C) (5.2.11.3)
 - f) Oil intermediate shaft and felt washer at forward and reverse bushings. (See Fig. 6F) (5.2.3.3)

SERIES



CENTRONICS MODEL 101 & 101A PRINTERS

6.3 TROUBLESHOOTING GUIDE

CENTRONICS SERIES 100 PRINTERS SERVICE GUIDE

The following information is intended to aid service personnel in developing good service procedures and troubleshooting techniques on any of Centronics' Series 100 printers.

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

To perform this inspection, it is only necessary to open, not remove, the printer covers.

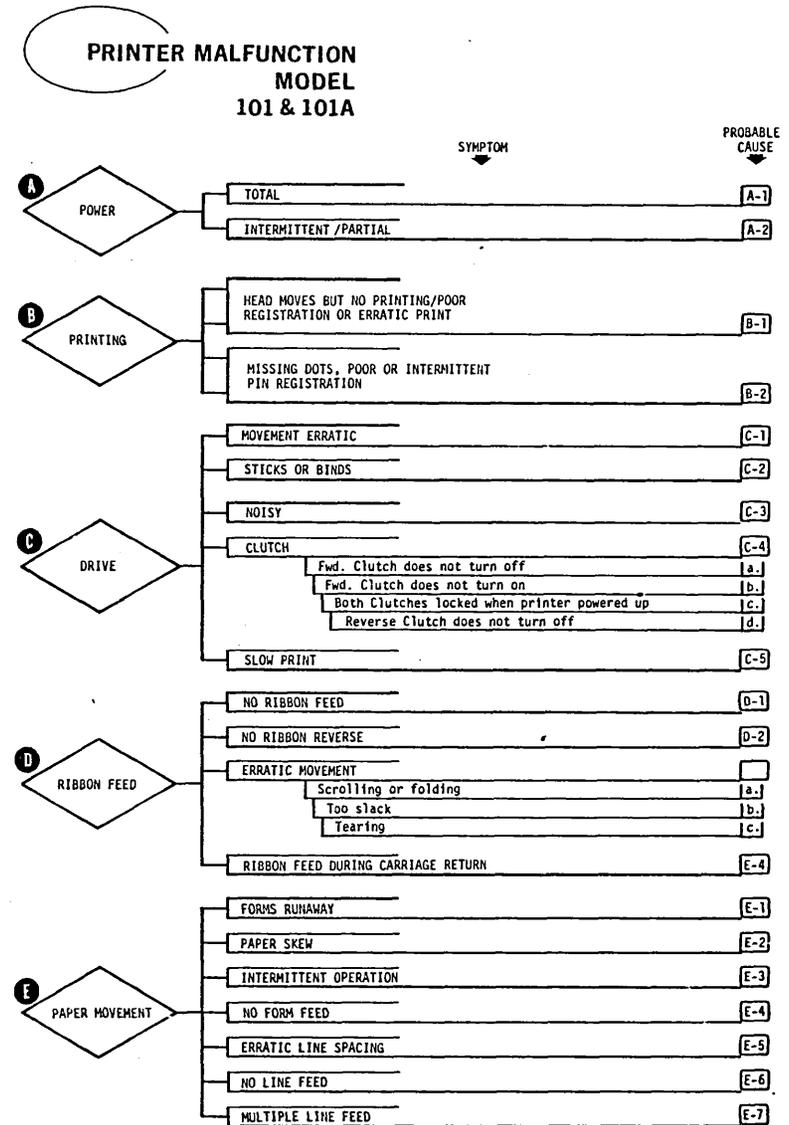
With printer power off:

1. Verify that the timing fence is clean and that a proper gap exists between the optics and the fence.
2. Verify that the carriage guide bar is clean and free of caked on dirt.
3. Verify proper tension on the main drive belt.
4. Verify smooth, free carriage motion.
5. Verify that the RTP and EOP switches are not loose.
6. Verify that the rubber bumper on the damper is not loose.
7. Verify that the backstop pawl spring is in place and not loose.
8. Check the forward/reverse clutch gap.*
9. Check the pin alignment on the pin-feed tractor units.
10. Check pin-belt tension.

With printer power on:

11. Check position of VFU paper tape over the light holes to insure proper detection of vertical tab and form feed signals.
12. Check damper operation and verify that there is no binding of the carriage stopper lever.
13. Check for smooth operation of the line feed clutch.

* (AIR-GAP CLUTCH ONLY)



A. POWER**A-1 TOTAL**

1. Damaged power cord.
2. Open AC line fuse (F4).
3. Open +5V supply fuse (F1)

A-2 INTERMITTENT - PARTIAL

1. Defective +5V regulator.
2. Defective +12V regulator.
3. Defective 30V unregulated supply.
4. Improper AC line voltage.

B. PRINTING**B-1 HEAD MOVES BUT NO PRINTING/POOR REGISTRATION OR ERRATIC PRINT**

1. Dirty or defective timing fence.
2. Optic bundle out of adjustment.
3. Improper head position.
4. Defective Video Amplifier.
5. Defective Ribbon Cable.
6. Defective optics lamp or lamp holder.
7. Dirty board or cavity connectors.
8. Improper alignment of timing fence to optic slit.
9. Improper alignment of optics lamp filament.
10. Defective safety switch.
11. Improper main belt tension.
12. Defective +12V regulator.
13. Defective +5V regulator.
14. Defective Electronics Card No. 2.

B-2 MISSING DOTS, POOR OR INTERMITTENT PIN REGISTRATION

1. Improperly aligned, dirty or damaged timing fence.
2. Defective damper assembly.
3. Defective RTP or EOP switch.
4. Defective safety switch.
5. Defective Video Amplifier.
6. Defective Ribbon Cable.
7. Dirty head connector or board contacts.
8. Defective Driver Board.
9. Improper adjustment of optic bundle.
10. Improper alignment of optics lamp filament.
11. Defective optics lamp or lamp holder.
12. Defective Electronic Card No. 1.
13. Defective Electronic Card No. 2.
14. Improper head position.
15. Improper adjustment of print head solenoid.

C. DRIVE**C-1 CARRIAGE MOVEMENT ERRATIC**

1. Gap on forward clutch not uniform.*
2. Loose main drive belt.
3. Spring drum unwound or broken.
4. Main drive belt touching driver board cables.
5. Defective bushings.
6. Worn or missing teeth on main timing belt.
7. Defective RTP switch.
8. Defective motor pulley.

9. Improperly adjusted motor clutch plate.
10. Intermittent cover interlock switch.
11. Defective drive pulleys or gears.

C-2 CARRIAGE STICKS OR BINDS

1. Fiber optics bundle touching timing fence.
2. Drive belt too tight.
3. Clutch assembly end brackets too tight.
4. Improper forward clutch gap.*
5. Spring drum too tight.
6. Reverse clutch not releasing.
7. Restricted ribbon drive.

C-3 NOISY

1. Belts too tight.
2. Belt idler worn or rubbing against casting.
3. Improperly adjusted intermediate pulley.
4. Worn intermediate shaft or bushings.
5. Corroded clutch rotors or armature.
6. Poorly lubricated spring drum.

C-4 CLUTCH**C-4A Forward Clutch Does Not Turn Off**

1. Defective EOP switch.
 2. Defective Driver Board.
 3. Defective Electronic Card No. 1.
 4. Defective Electronic Card No. 2.
 5. Improper clutch gap.*
 6. No video signal.
- a. Defective Video Amplifier.
 - b. Defective optics lamp or socket.
 - c. Defective ribbon cable.
 - d. Improperly adjusted fiber optics.
 - e. Defective Electronic Card No. 2 video return line.
 - f. Dirty timing fence.

C-4B Forward Clutch Does Not Turn On

1. Defective -12V supply fuse, F3.
2. Improper clutch gap.*
3. Defective Driver Board.
4. Defective Electronic Card #2.
5. Dirty board connectors.

C-4C Both Clutches Locked When Printer Powered Up

1. Improperly seated electronic boards.
2. Defective Driver Board.
3. Defective Electronic Card No. 2.

C-4D Reverse Clutch Does Not Turn Off

1. Defective RTP switch (check continuity to cavity).
2. Defective Driver Board.
3. Defective Electronic Card No. 1.
4. Defective Electronic Card No. 2.
5. Improper clutch gap.*
6. Dirty board or cavity connectors.

C-5 SLOW PRINT

1. Improper forward clutch adjustment.*
2. Improper reverse clutch adjustment.*
3. Improper main drive motor friction clutch adjustment.
4. Defective drive motor.
5. Dirty guide bars.
6. Improper belt tension.
7. Improper bushing seating in clutch end brackets.

D. RIBBON FEED**D-1 NO RIBBON FEED**

1. Broken ribbon drive clutch springs.
2. Improper ribbon drive shaft gear mesh.
3. Loose ribbon drive slip clutch setting.
4. Improperly seated ribbon spool.
5. Improperly engaged bevel gears.

D-2 NO RIBBON REVERSE

1. Improper ribbon drive shaft gear mesh.
2. Loose ribbon drive slip clutch setting.
3. Broken clutch spring.
4. Frozen ribbon reversing rod (old design).
5. Improperly adjusted ribbon reversing rod.

D-3 ERRATIC MOVEMENT**D-3A Scrolling or Folding**

1. Improperly adjusted guide roller.
2. Improperly adjusted rod linkage.

D-3B Too Slack

1. Worn tension arm pads (old units).

D-3C TEARING

1. Improperly adjusted drive linkage.

D-4 RIBBON FEED DURING CARRIAGE RETURN

1. Broken clutch control spring on ribbon feed clutch gear.

E. PAPER MOVEMENT**E-1 FORMS RUNAWAY**

1. Defective VFU tape.
2. Defective VFU lamps.
3. Excessive gap between VFU upper and lower reader bracket.
4. Improper alignment of reader bracket lamps to tape holes.
5. Defective Electronic Card No. 1.
6. Continuously energized solenoid.
 - a. Defective Driver Board.
 - b. Defective Electronic Card No. No. 1.

7. Solenoid slide movement restricted.

E-2 PAPER SKEW

1. Non-aligned pin feed sprockets.
2. Improper pin feed belt tension.
3. Paper pan friction against forms.
4. Pin feed holder paper thickness setting too small.
5. Print head too close to paper.
6. Incorrect paper feed (mostly in units without paper rack).

E-3 INTERMITTENT OPERATION

1. Improperly adjusted platen knob.
2. See Erratic Line Spacing.

E-4 NO FORM FEED

1. Gear mesh too tight.
2. Form feed motor clutch roller binding.
3. Defective Driver Board.
4. Defective Electronic Card No. 1.
5. Defective form feed resistor.
6. Defective solenoid.
7. Defective +12V supply.
8. Defective 30V unregulated supply.
9. Defective TOP OF FORM switch or contacts.

E-5. ERRATIC LINE SPACING

1. Excessive platen knob backlash.
2. Excessive back stop pawl and cam mechanism play.
3. Improper upper and lower reader bracket gap.

E-6. NO LINE FEED

1. Improperly adjusted form feed magnet.
2. Solenoid loose on pole.
3. Gap between slide and paper feed clutch inner dog.
4. Defective Driver Board.
5. Defective Electronic Card #1.
6. Defective platen knob assembly.
7. Defective solenoid.
8. Defective form feed resistor or bad solder connections.
9. VFU belt worn or slipping.
10. Excessive solenoid armature spring tension.
11. Solenoid slide binding.
12. Armature binding.
13. Defective LINE FEED switch or contacts.

E-7 MULTIPLE LINE FEED

1. Improperly adjusted solenoid.
2. Defective solenoid armature spring.
3. Defective Driver Board.
4. Defective Electronic Card No. 1.
5. Excessive line feed pulse width.
6. Magnetic field concentrating disc missing.
7. Solenoid slide binding.
8. Gap between slide and paper feed clutch inner dog.

* (AIR-GAP CLUTCH ONLY)

SECTION 7
DRAWINGS AND LISTS OF MATERIALS, ELECTRICAL

This section contains the schematic, wiring and assembly diagrams and lists of materials for all the electronic assemblies in the Model 101A.

Note

Refer to the Engineering Change Notice (ECN) sheets shipped with the printer for changes made to the printer which have not yet been incorporated into the drawings in this section. Always keep these Engineering Change Notice sheets with the manual.

LIST OF MATERIAL
FOR
A/N PRINTER ASSY
PRINTER ASSEMBLY 101A
(NO. 63002370, REV.U)

Item	Symbol	Part Number	Nomenclature	Quantity
1	562-121-000-01		Basic Machine (Brother Item)	1
2		63002437-1	Die Cast Head Ass'y	1
2A		63002323-1	Head Assembly (Alternate to Item 2)	1
3		63002306-1	Video Amp. and Cable Ass'y	1
4		63002242-1	Comp. Bd. Assy, Power Driver	1
5		63001105-1	Elec. Cavity Assy	1
6		63002302-1	Comp. Bd. Assy, Elec. Card No. 1	1
7		73002303-1	Comp. Bd. Assy, Elec. Card No. 2	1
8		63002304-1	Comp. Bd. Assy, ⁺ 12V Reg. uA723C	1
9		63011142-1	Comp. Bd. Assy 100 Series +5V Pwr. Sup.	1
10				
11		63002293-1	Twin Spool and Ribbon Assy	1
12		63002349-1	Pad Assy	1
13		63002321-1	Bracket Assy	1
15		63002292-1	Form Feed Tape	1
16		63002294-1	Ribbon Guide	2
17		63002300-1	Clip, P/C	1
20		37253790	Lamp (GE379)	1
21		39092502	Switch, SPST, P.B. (Line Feed)	1
22		63002354-1	Cover Assembly	1
23				
25		34507127	SCR, Pan/Phil 2-56 x 3/8 lg	2
26		34114161	SCR, Hex Soc 4-40 x 1/2 lg	2
27		34114201	SCR, Hex Soc 4-40 x 5/8 lg	2
28		34517327	SCR, Pan/Phil 4-40 x 1.0 lg	1
29		34327207	SCR, Pan/Phil 6-32 x 5/8 lg	3
30		34902007	Washer, Flat, No. 2	5
31		34805007	Washer, Lkg, No. 2	5
32		34815007	Washer, Lkg, No. 4	4
33		34815005	Lockwasher, Int. Tooth No. 4	1
34		34828005	Washer, Lock, Split, No. 6	3
36		30000000	Insulating Varnish (Glpt)	AR
37		30070000	Solder, 60/40	AR
38		63011150-1	Shorting Plug	1
39		34920005	Washer Flat #6	2
40		63002585-1	Timing Fence Kit	1
41		31460008	Terminal, Solderless (Amp 61381)	1
42		33723717-10	Screw Phil/Sh Metal #4 x .31 lg	1
43		33000001	Static Eliminator	1
45		34845005	Washer Lock Int. #10	1
46		525541001	Bolt Hex Head	1
48		63002209-1	Guide, P.C. Board	2
49		34327567	Screw, Pan Slotted 6-32 x 3" Lg	2

ELAPSED TIME INDICATOR OPTION

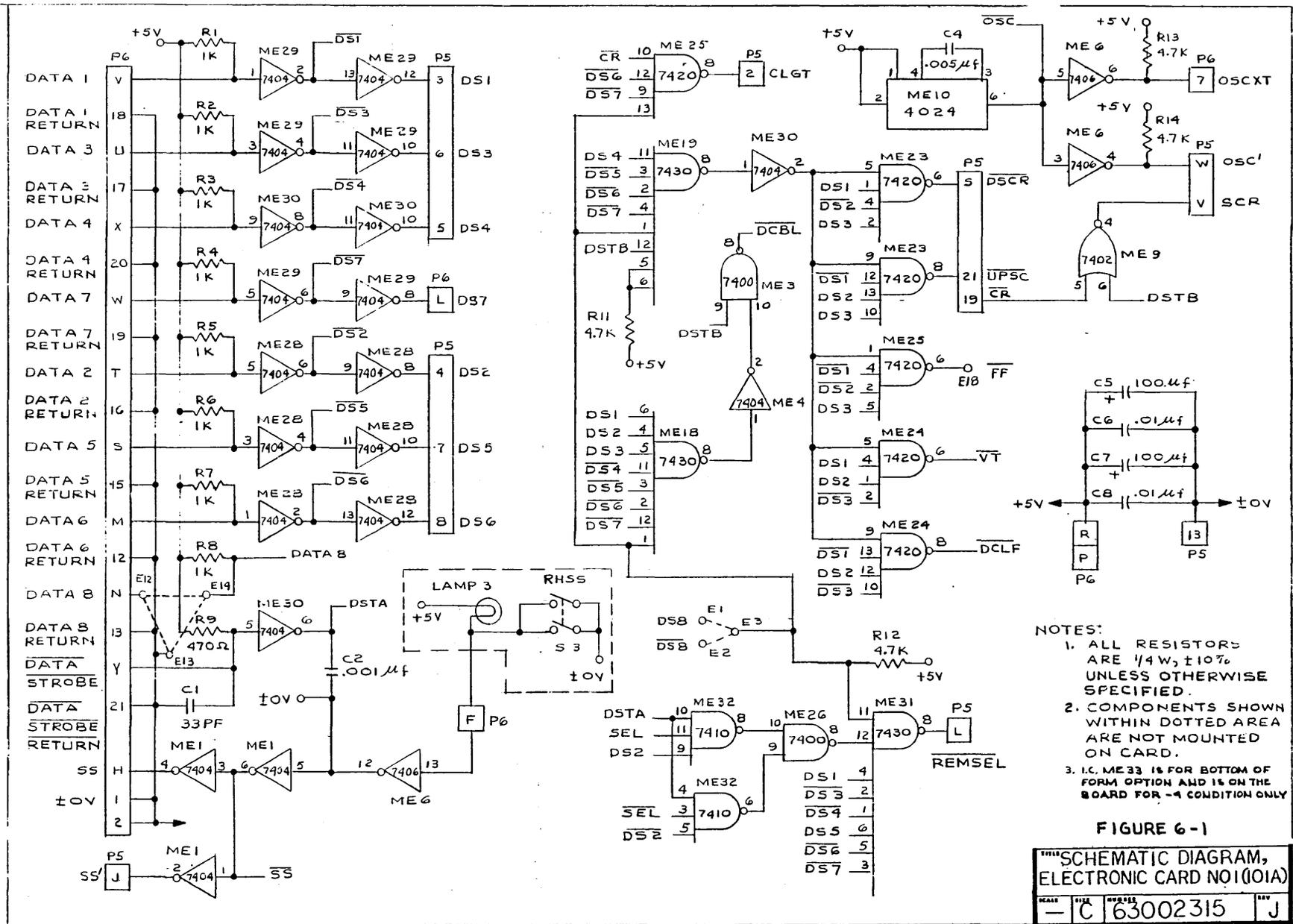
44		63002586-1	Comp. Bd. Assy Elapsed Timing Indicator	1
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CONVERSION KIT OPTION

47		63002646	220V/240V Conversion Kit	1
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7-3



- NOTES:
1. ALL RESISTORS ARE 1/4W, ±10% UNLESS OTHERWISE SPECIFIED.
 2. COMPONENTS SHOWN WITHIN DOTTED AREA ARE NOT MOUNTED ON CARD.
 3. I.C. ME33 IS FOR BOTTOM OF FORM OPTION AND IS ON THE BOARD FOR -4 CONDITION ONLY

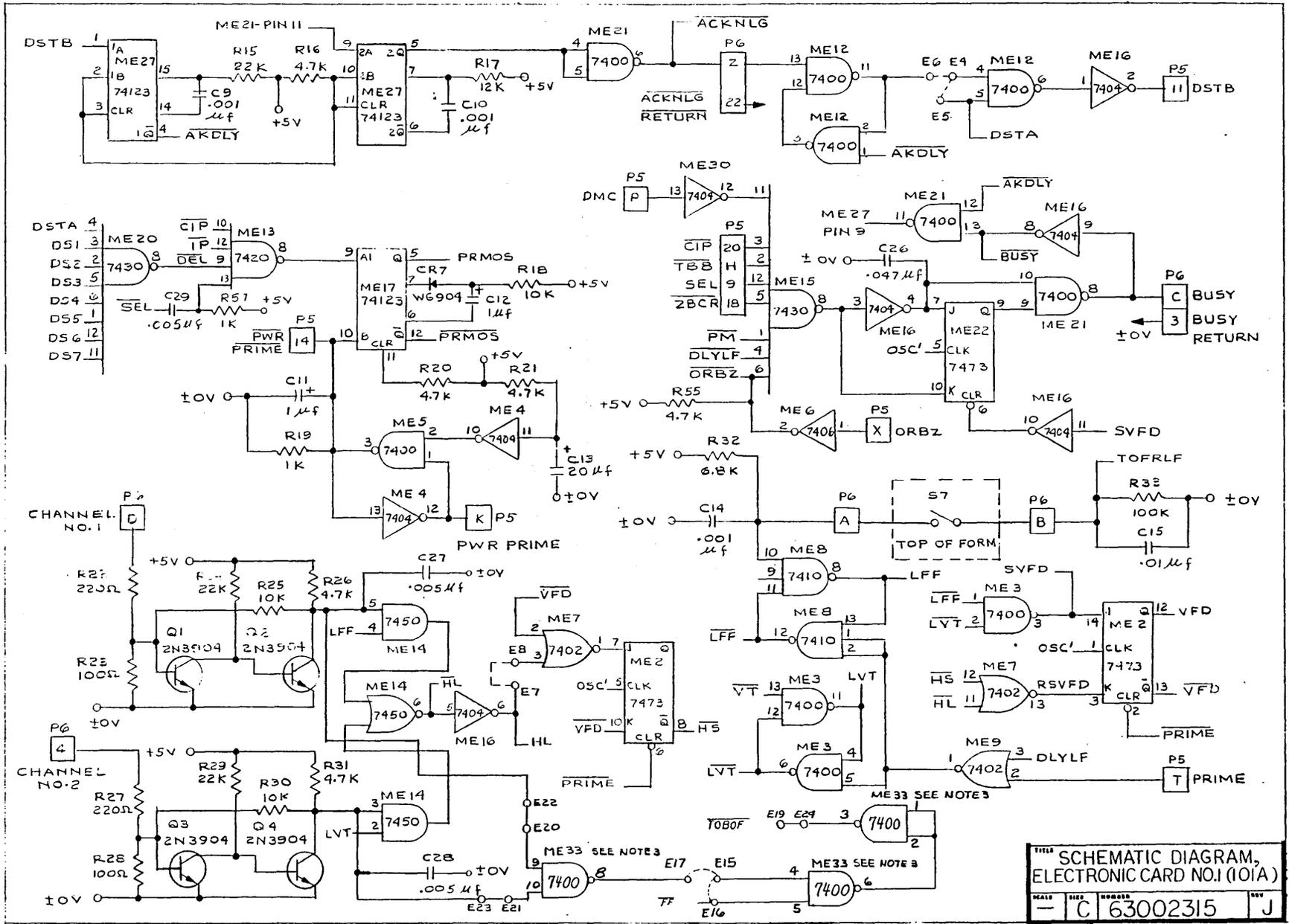
FIGURE 6-1

SCHEMATIC DIAGRAM, ELECTRONIC CARD NQ1(01A)

REV	C	63002315	J
-----	---	----------	---

Figure 7-1. SCHEMATIC DIAGRAM, ELECTRONIC CARD #1 (SHEET 1 OF 3)

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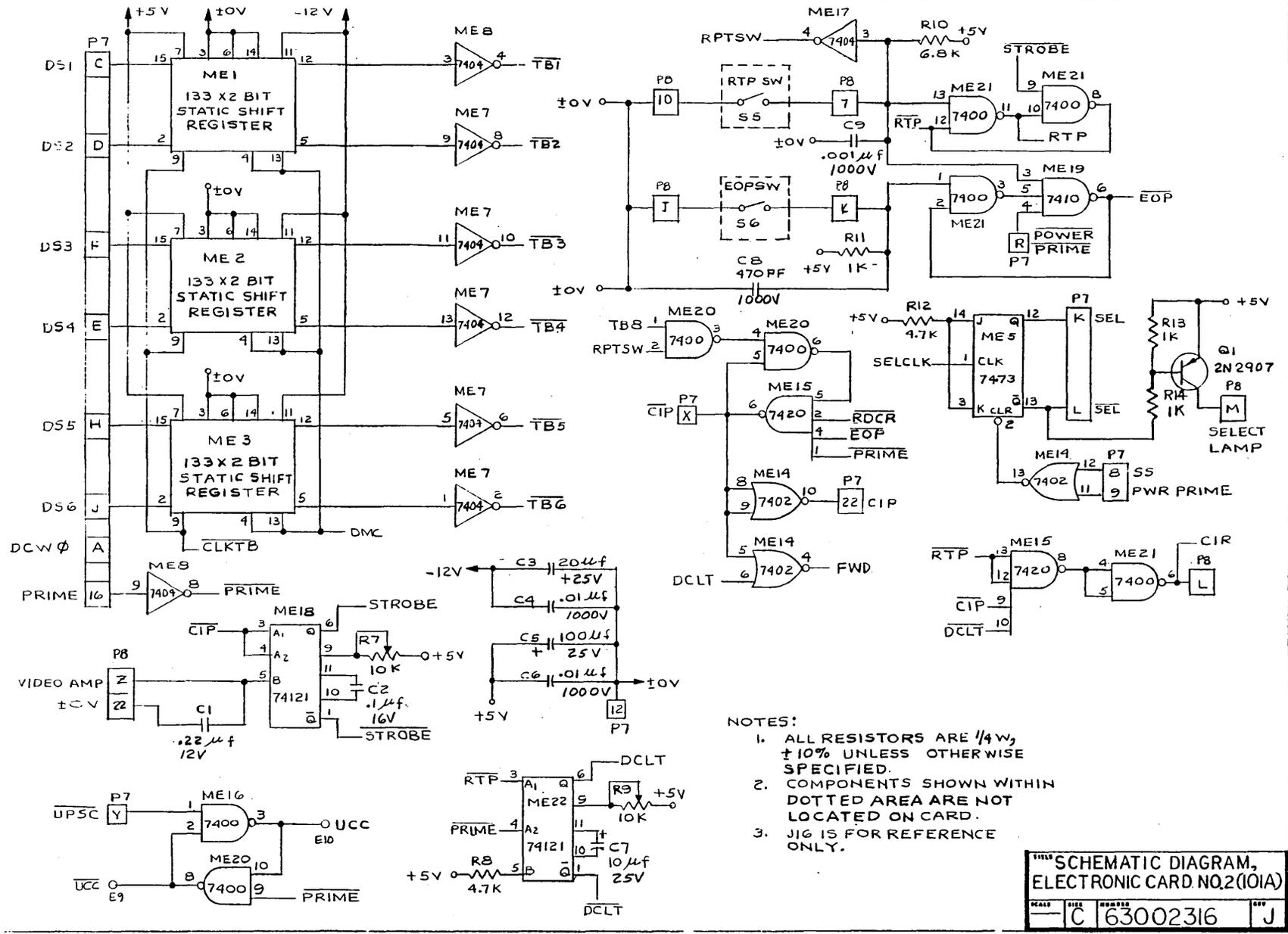
7-4

SCHEMATIC DIAGRAM, ELECTRONIC CARD NO.1 (101A)
 SCALE: INCHES: 1/8, FEET: 1/4
 NUMBER: C 63002315
 REV: J

Figure 7-2. SCHEMATIC DIAGRAM, ELECTRONIC CARD #1 (SHEET 2 OF 3)

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7-6

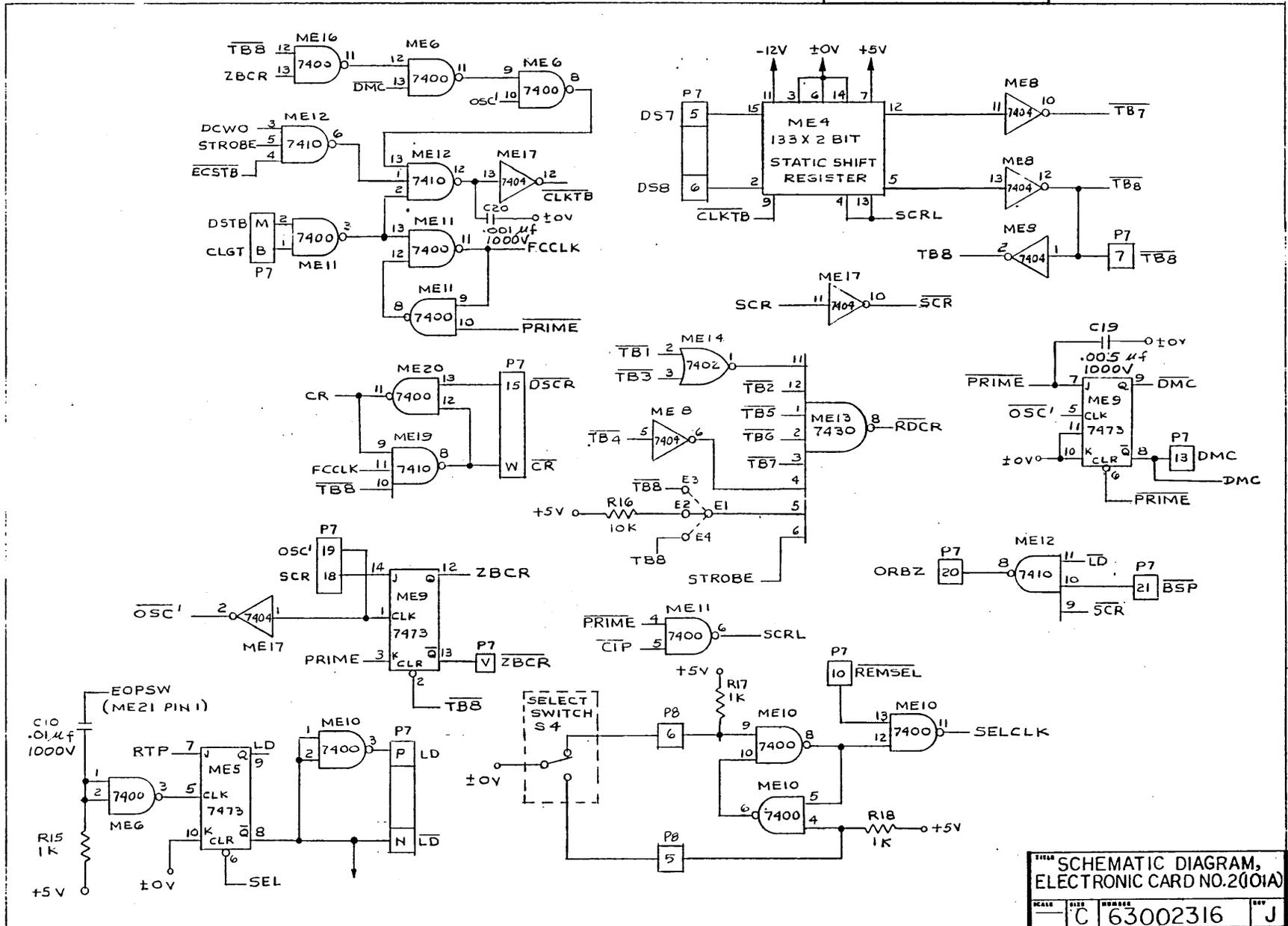


- NOTES:
1. ALL RESISTORS ARE 1/4 W, ±10% UNLESS OTHERWISE SPECIFIED.
 2. COMPONENTS SHOWN WITHIN DOTTED AREA ARE NOT LOCATED ON CARD.
 3. JIG IS FOR REFERENCE ONLY.

TITLE SCHEMATIC DIAGRAM, ELECTRONIC CARD NO.2 (IOIA)		
DEALS	SIZE	NUMBER
C	63002316	J

Figure 7-4. SCHEMATIC DIAGRAM, ELECTRONIC CARD #2 (SHEET 1 OF 3)

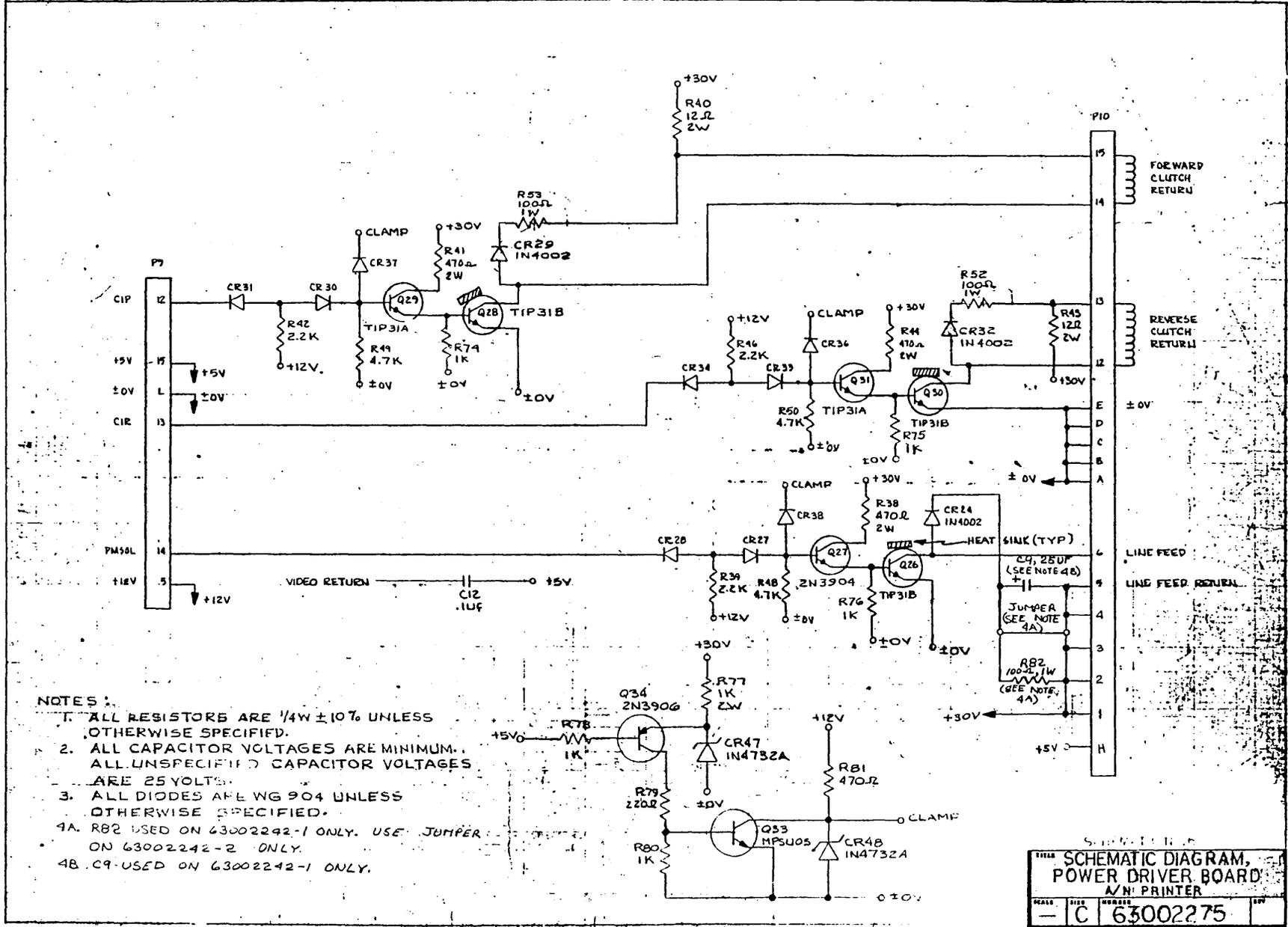
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7-7

TITAN SCHEMATIC DIAGRAM, ELECTRONIC CARD NO.2(01A)
 SCALE: C SIZE: 63002316 REV: J

Figure 7-5. SCHEMATIC DIAGRAM, ELECTRONIC CARD #2 (SHEET 2 OF 3)



- NOTES:
1. ALL RESISTORS ARE 1/4W ±10% UNLESS OTHERWISE SPECIFIED.
 2. ALL CAPACITOR VOLTAGES ARE MINIMUM. ALL UNSPECIFIED CAPACITOR VOLTAGES ARE 25 VOLTS.
 3. ALL DIODES ARE WG 904 UNLESS OTHERWISE SPECIFIED.
 - 4A. R82 USED ON 63002242-1 ONLY. USE JUMPER ON 63002242-2 ONLY.
 - 4B. C9 USED ON 63002242-1 ONLY.

SCHEMATIC DIAGRAM, POWER DRIVER BOARD M/N PRINTER			
SCALE	SIZE	REVISION	DATE
—	C	63002275	

Figure 7-7. SCHEMATIC DIAGRAM, POWER DRIVER BOARD (SHEET 1 OF 2)

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7-10

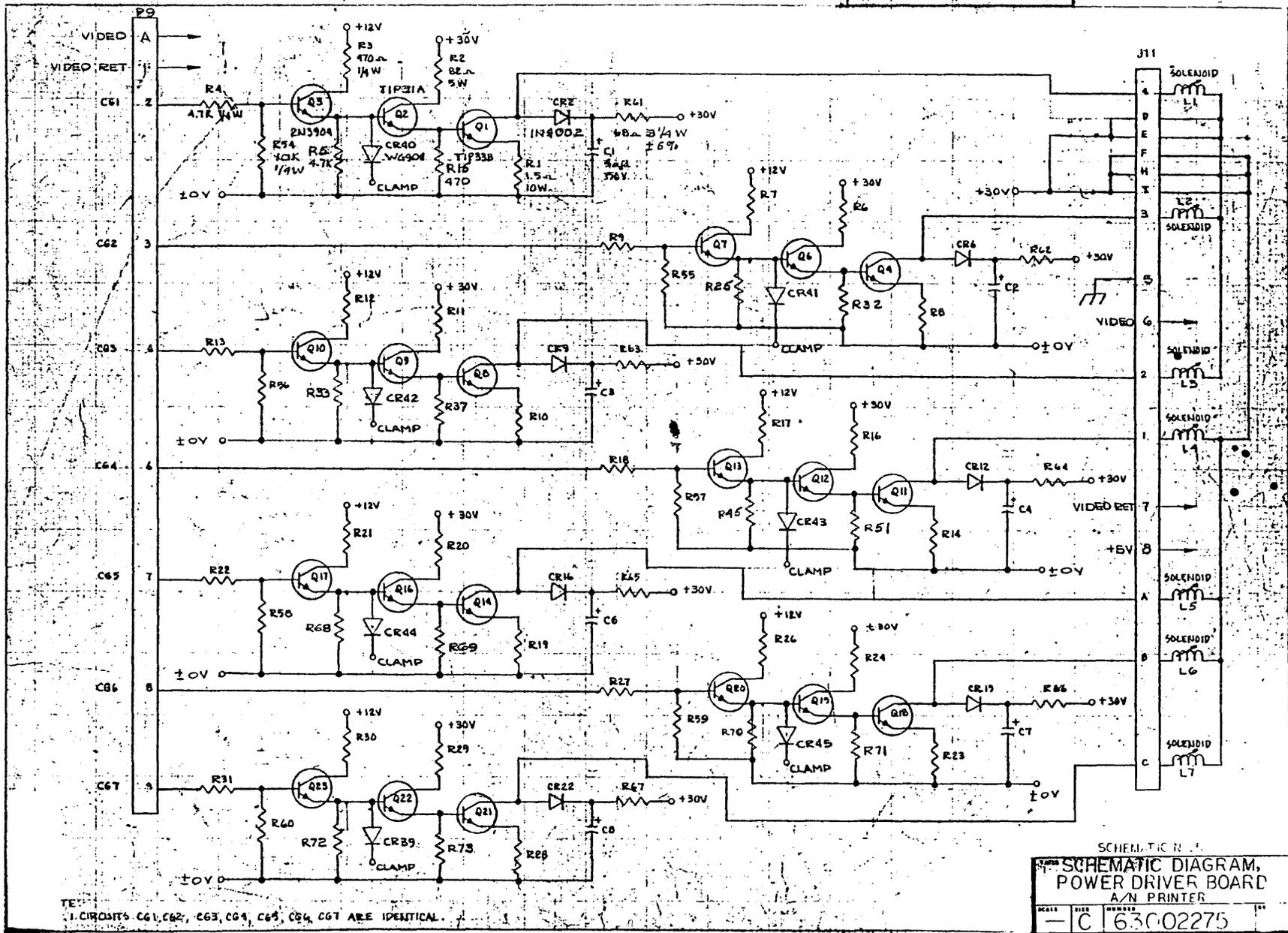


Figure 7-8. SCHEMATIC DIAGRAM, POWER DRIVER BOARD (SHEET 2 OF 2)

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7-11

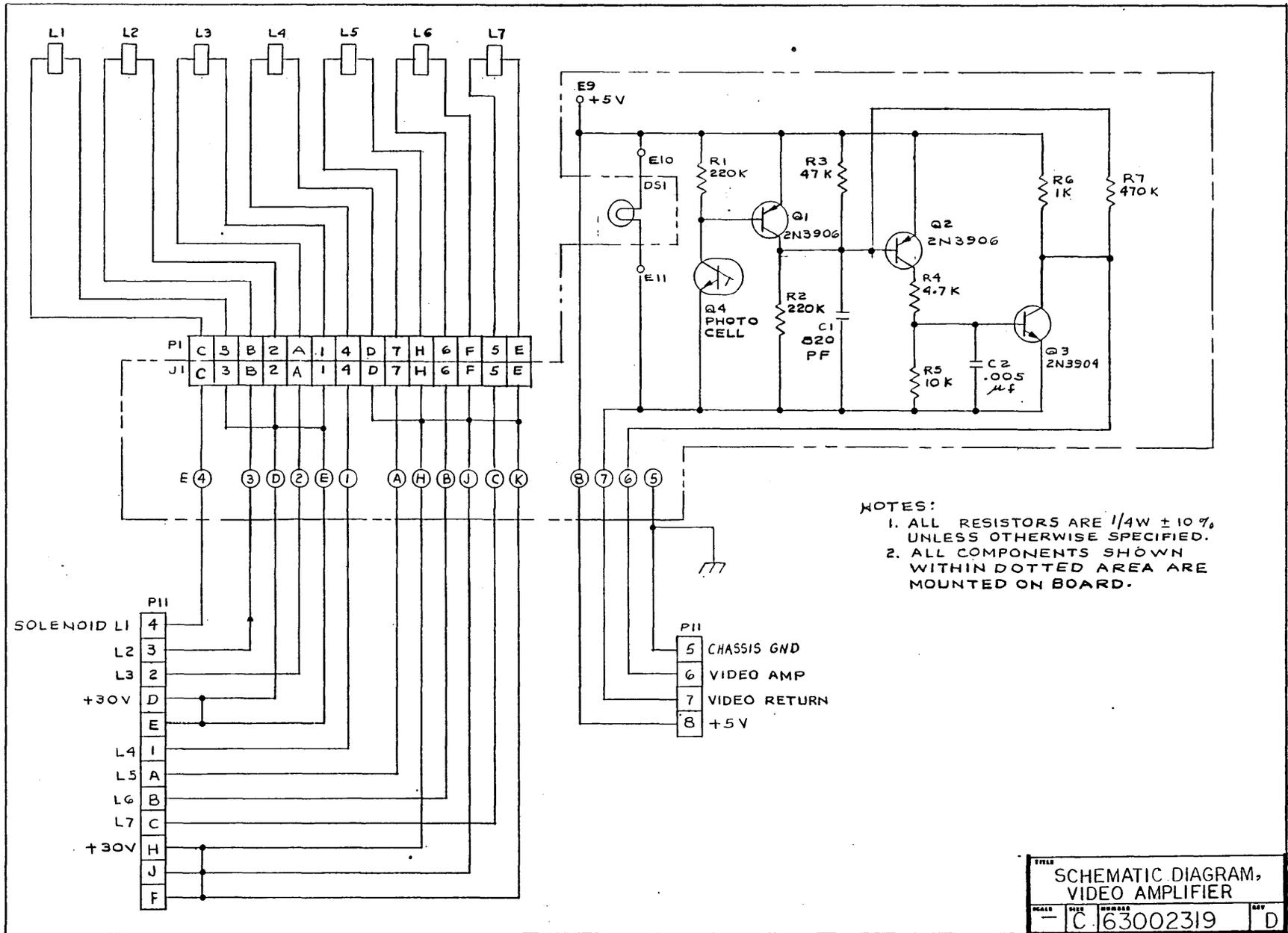


Figure 7-9. SCHEMATIC DIAGRAM, VIDEO AMPLIFIER

TITLE			
SCHEMATIC DIAGRAM, VIDEO AMPLIFIER			
SCALE	SHEET	REVISED	DATE
-	C	63002319	D

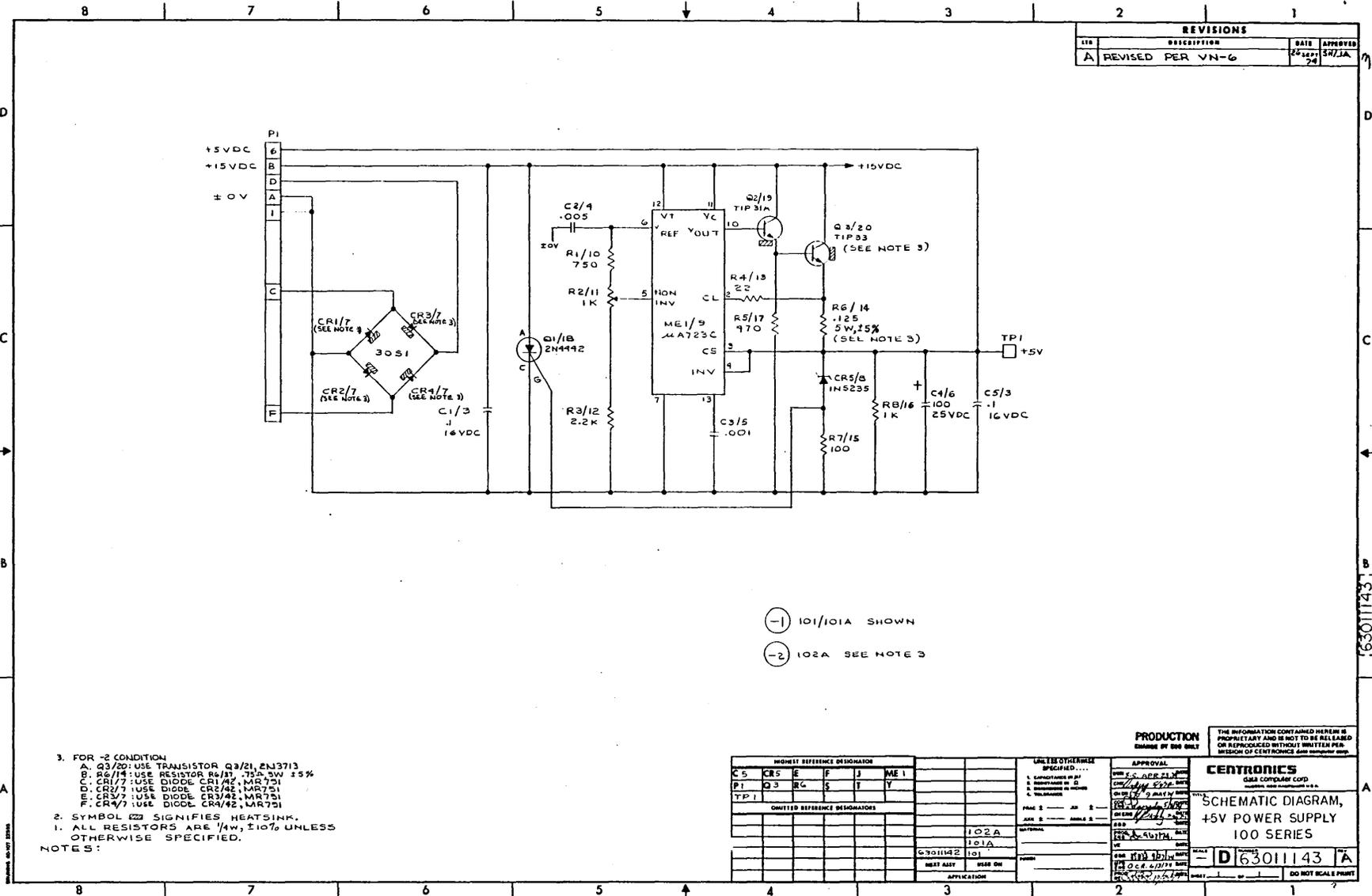


Figure 7-10. SCHEMATIC DIAGRAM, +5 VOLT REGULATOR

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7-13

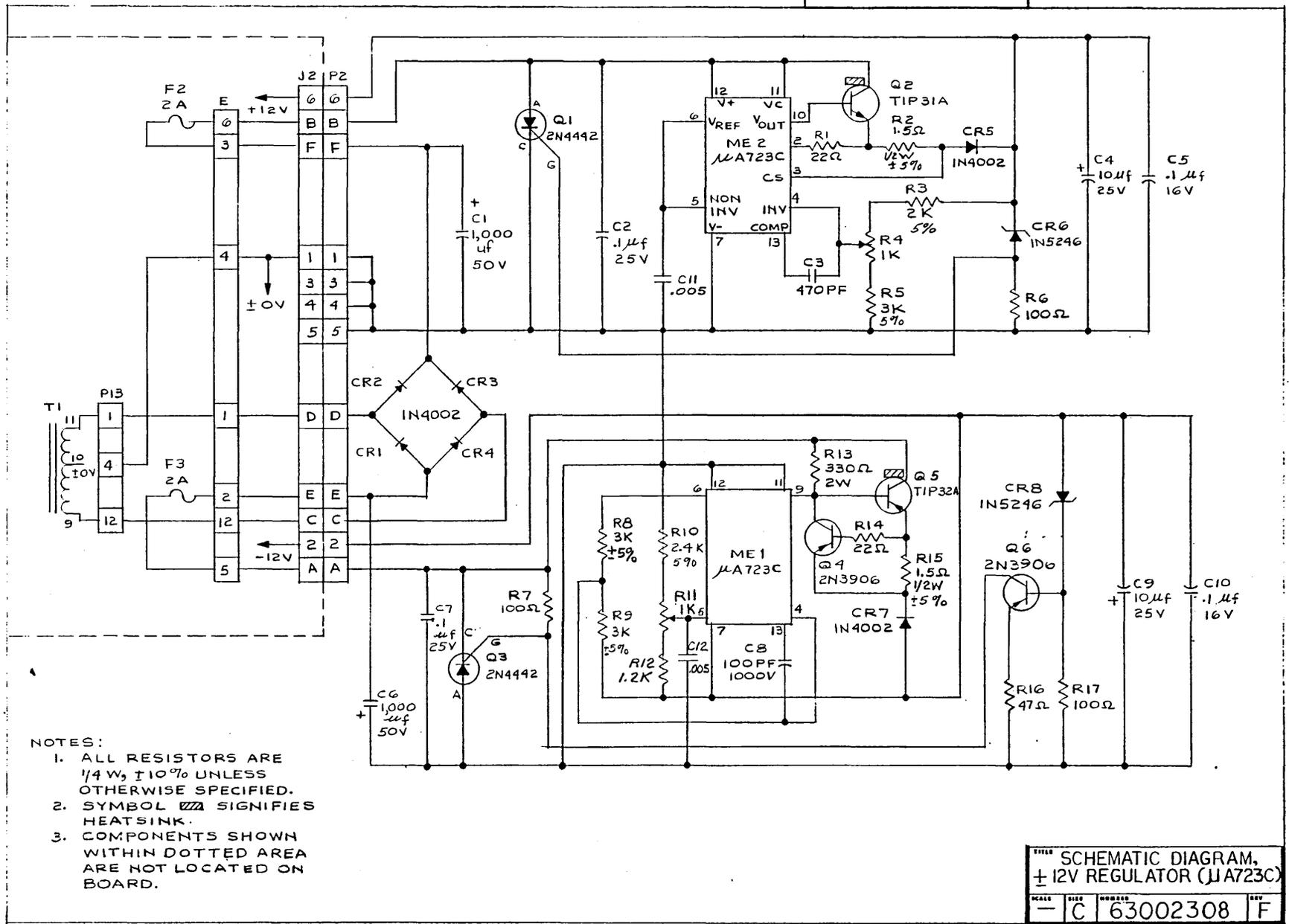
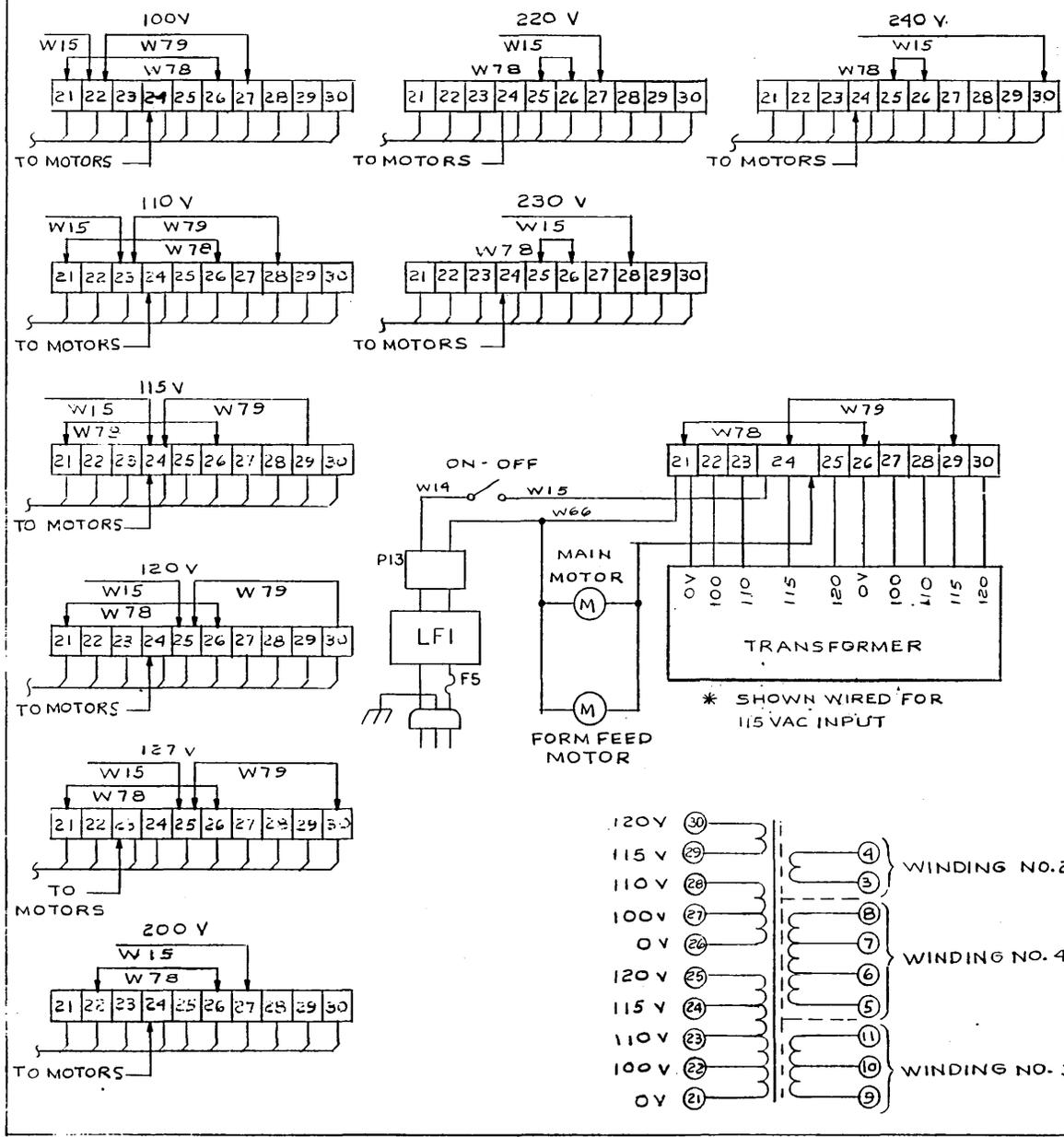


Figure 7-11. SCHEMATIC DIAGRAM ±12 VOLT REGULATOR

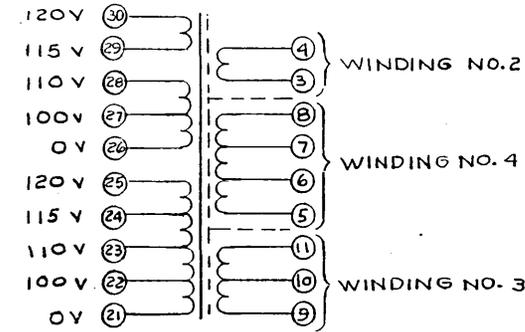
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REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	REVISED AND REDRAWN. WIRE 78 OF 110V TIED TO PIN 27. NOTE 3B, 1.2 A WAS 35.5 VAC OR GREATER PER ECO NO. 73001106 7.3.9-23-71 DWG NO. WAS 63001105-7.3.4-5-72	29 JUL 71	D. J. Barry
B	REVISED PER ECO 73015056	9 OCT 71	JA
C	REVISED PER ECO 73011062X	9 OCT 71	JA



NOTES:

- ALL WIRES WITH ARROWS ARE MOVABLE TAPS. WIRES WITHOUT ARROWS ARE FIXED AND SHOULD NOT BE MOVED.
- W 79 IS DISCARDED IN CASE OF 200V, 220V, 230V AND 240 V
- SECONDARY
 - WINDING NO. 2
PINS 3 AND 4: 0.0A., 11 VAC
2.2A., 9.9 VAC OR GREATER
 - WINDING NO. 3
PINS 9 AND 11:
0.0A., 35.0 VAC CENTER TAP
1.2A., 31.5 VAC OR GREATER
 - WINDING NO. 4
PINS 5 AND 6: 0.0A., TAP NO. 1, 21.5 VAC
PINS 5 AND 7: TAP NO. 2, 25.5 VAC
PINS 5 AND 8: TAP NO. 3, 29.5 VAC
PINS 5 AND 9: 6.0A., TAP NO. 1,
19.0 VAC OR GREATER
PINS 5 AND 7: TAP NO. 2
23.0 VAC OR GREATER
PINS 5 AND 8 TAP NO. 3
26.5 VAC OR GREATER



centronics data computer corp.

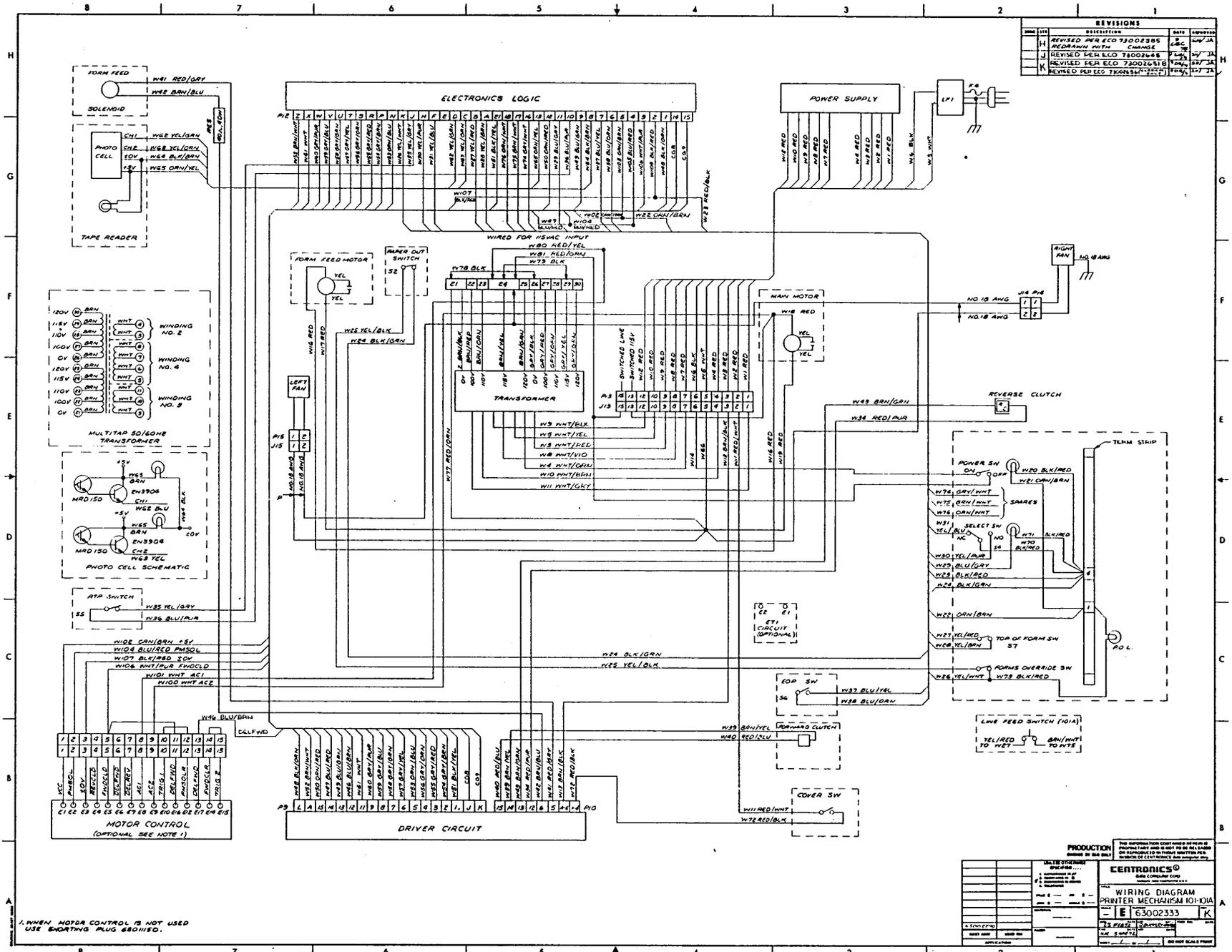
MULTITAP 50/60 HZ TRANSFORMER

SCALE: C NUMBER: 63001106 REV: C

DATE: 25 JUL 71

Figure 7-12. MULTITAP 50/60 HZ TRANSFORMER

7-14



REVISIONS			
NO.	DATE	DESCRIPTION	BY
1	10/24/54	REVISED PER ECO 73002305	WV/JA
2	11/10/54	REWORK WITH CHANGE	WV/JA
3	11/10/54	REVISED PER ECO 73002408	WV/JA
4	11/10/54	REVISED PER ECO 73002618	WV/JA
5	11/10/54	REVISED PER ECO 73002618	WV/JA

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CENTRONICS® DATA CONCEPTS CORP. WIRING DIAGRAM PRINTER MECHANISM IOH-101A E 63002333 K	THE INFORMATION CONTAINED HEREIN IS THE PROPERTY OF CENTRONICS CORPORATION. IT IS TO BE USED ONLY FOR THE MANUFACTURE OF THE EQUIPMENT SPECIFIED HEREON. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, WITHOUT PERMISSION IN WRITING FROM CENTRONICS CORPORATION.

Figure 7-13. WIRING DIAGRAM, PRINTER MECHANISM

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7-17/7-18

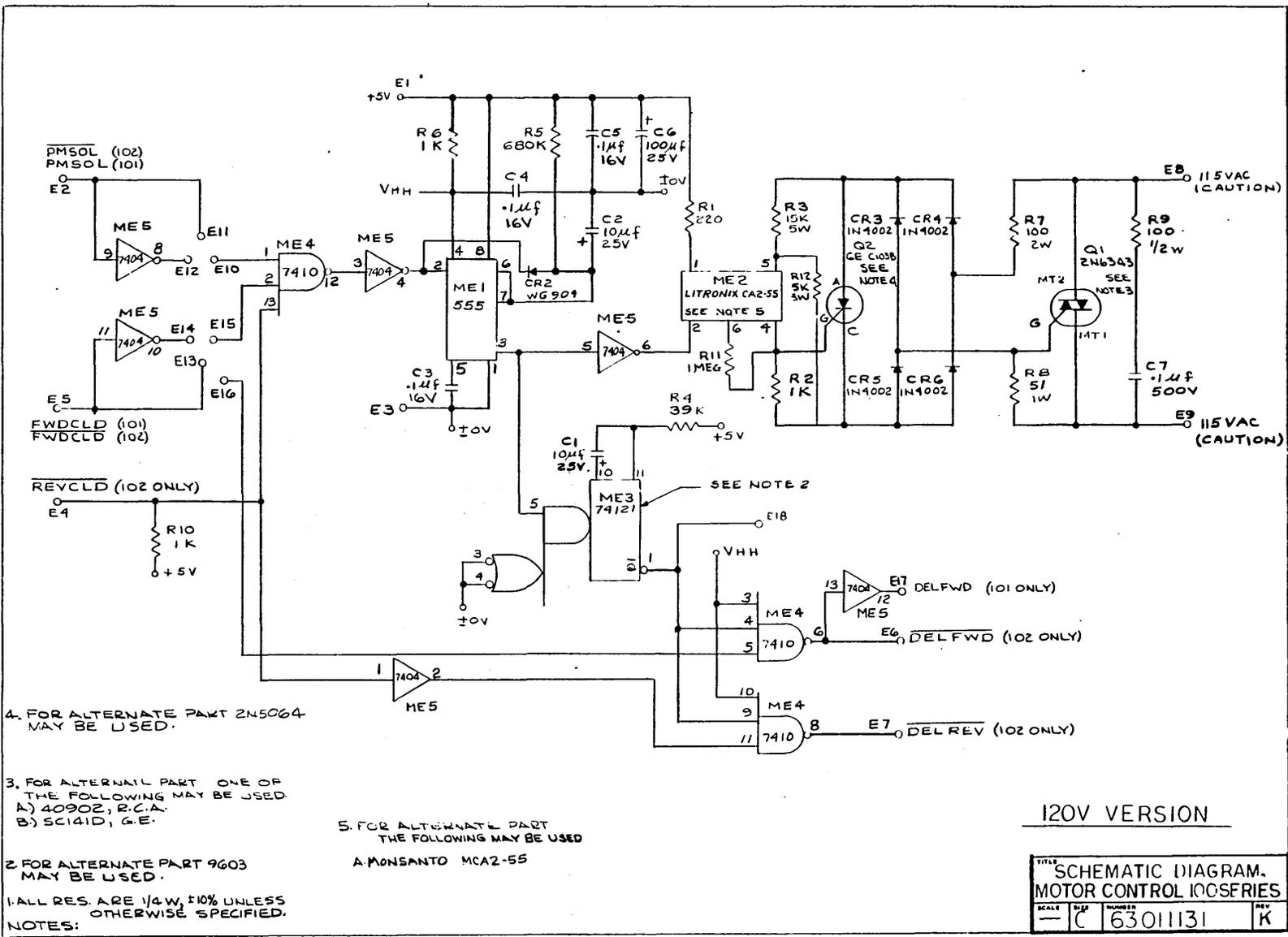


Figure 7-15. SCHEMATIC DIAGRAM, MOTOR CONTROL (OPTIONAL)

LIST MATERIALS
ELECTRONIC CARD NO. 1
(Reference: Assy Dwg. 63002302, Rev. D)

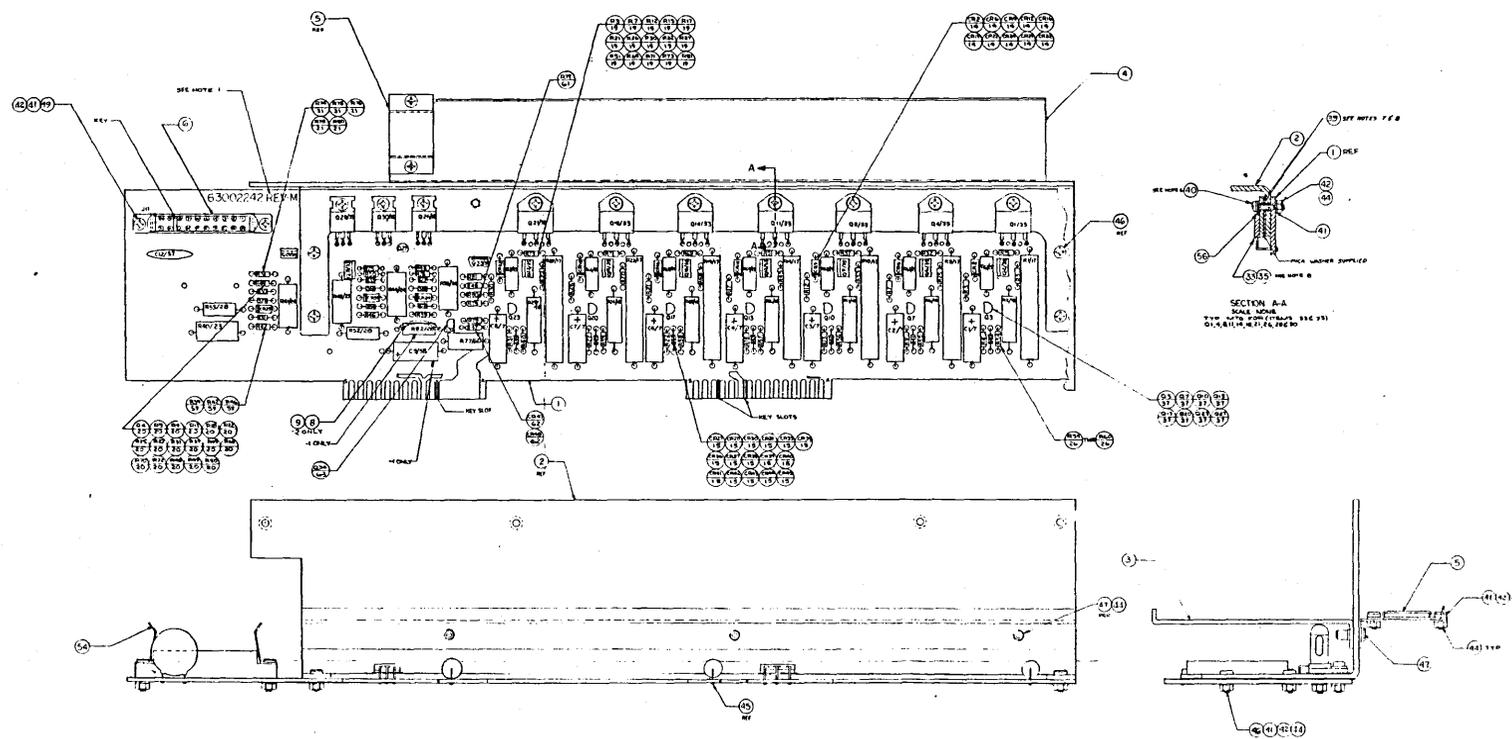
Item	Symbol	Part Number	Nomenclature	Quantity	Item	Symbol	Part Number	Nomenclature	Quantity
1		63001052-1	Component Board	1	30	R9, R34, R49	41471926	Resistor, 470 ohms, $\frac{1}{4}W$, $\pm 10\%$	3
2	C1	21330001	Capacitor, 33 PF, 1000V, $\pm 20\%$	1	31	R11, R12, R13	41472926	Resistor, 4.7K, $\frac{1}{4}W$, $\pm 10\%$	13
3	C2, C9, C10	21102000	Capacitor, .001 uf	8	-	R14, R16, R53	41472926	Resistor, 4.7K, $\frac{1}{4}W$, $\pm 10\%$	-
-	C14, C16, C20	21102000	Capacitor, .001 uf	-	-	R20, R21, R26	41472926	Resistor, 4.7K, $\frac{1}{4}W$, $\pm 10\%$	-
-	C22, C23	21102000	Capacitor, .001 uf	-	-	R55, R31, R35	41472926	Resistor, 4.7K, $\frac{1}{4}W$, $\pm 10\%$	-
4	C4, C29, C27	21502001	Capacitor, .005 uf, 1000V, $\pm 20\%$	4	-	R36	41472926	Resistor, 4.7K, $\frac{1}{4}W$, $\pm 10\%$	-
-	C28	21502001	Capacitor, .005 uf, 1000V, $\pm 20\%$	-	32	R17	41123926	Resistor, 12K, $\frac{1}{4}W$, $\pm 10\%$	1
5	C5, C7, C21	22107002	Capacitor, 100 uf, 25V	3	33	R22, R27, R43	41221926	Resistor, 220 ohms, $\frac{1}{4}W$, $\pm 10\%$	3
6	C6, C8, C15	21103003	Capacitor, 0.01 uf, 1000V, $\pm 20\%$	3	34	R23, R28, R44	41101926	Resistor, 100 ohms, $\frac{1}{4}W$, $\pm 10\%$	3
6A	C6, C8, C15	21103004	Capacitor, 0.01 uf, 1000V, $\pm 20\%$	-	35	R15, R24, R29	41223926	Resistor, 22K, $\frac{1}{4}W$, $\pm 10\%$	3
7	C11, C12	22105002	Capacitor, 1 uf, 25V	2	36	R32, R47	41682926	Resistor, 6.8K, $\frac{1}{4}W$, $\pm 10\%$	2
8	C13	22206002	Capacitor, .20 uf, 25V	1	37	R25, R30	41103926	Resistor, 10K, $\frac{1}{4}W$, $\pm 10\%$	4
9	C26	21473000	Capacitor, .047 uf, 12V	1	-	R51, R18	41103926	Resistor, 10K, $\frac{1}{4}W$, $\pm 10\%$	-
10	C17, C18	22506002	Capacitor, 50 uf, 25V	2	38	R33	41104926	Resistor, 100K, $\frac{1}{4}W$, $\pm 10\%$	1
11	C19	21224000	Capacitor, .22 uf, 12V	1	39	R37, R39	41222926	Resistor, 2.2K, $\frac{1}{4}W$, $\pm 10\%$	4
12	C24	22505002	Capacitor, 5 uf, 16V, -10 +75%	1	-	R48, R38	41222926	Resistor, 2.2K, $\frac{1}{4}W$, $\pm 10\%$	-
13					40				
14	CR1, CR2, CR3	38100904	Diode, WG904	6	41	R41	41473926	Resistor, 47K, $\frac{1}{4}W$, $\pm 10\%$	1
-	CR4, CR5, CR7	38100904	Diode, WG904	-	42	R42	41391926	Resistor, 390 ohms, $\frac{1}{4}W$, $\pm 10\%$	1
15					43	R45	41271926	Resistor, 270 ohms, $\frac{1}{4}W$, $\pm 10\%$	1
16					44	R46	41220016	Resistor, 22 ohms, 1W	1
17	ME1, ME4, ME16	35474040	Integrated Circuit, 7404	6	45	R50	41393926	Resistor, 39K, $\frac{1}{4}W$, $\pm 10\%$	1
-	ME28, ME29,	35474040	Integrated Circuit, 7404	-	46	R52	41752926	Resistor, 7.5K, $\frac{1}{4}W$, $\pm 10\%$	1
-	ME30	35474040	Integrated Circuit, 7404	-	47	R54	46203980	Resistor, 20K, Pot	1
18	ME2, ME22	35474730	Integrated Circuit, 7473	2	48	Q1, Q2	38239040	Transistor, 2N3904	4
19	ME3, ME5, ME12	35474000	Integrated Circuit, 7400	5	-	Q3, Q4	38239040	Transistor, 2N3904	-
-	ME21, ME26	35474000	Integrated Circuit, 7400	-	49	Q5, Q6, Q8	38239060	Transistor, 2N3906	3
20	ME6	35474060	Integrated Circuit, 7406	1	50	Q7	38300050	Transistor, MPS u05	1
21	ME7, ME9	35474020	Integrated Circuit, 7402	2	50A	Q7	38200311	Tip 31A may be used	-
22	ME8, ME32	35474100	Integrated Circuit, 7410	2	51		39648505-4	Wire, Hook-up, Mht, No. 26, AWG	AR
23	ME10	35440243	Integrated Circuit, 4024	1	52		30070000	Solder (60/40)	AR
24	ME11, ME17	35474123	Integrated Circuit, 74123	3	53		39610000-5	Wire, Buss, No. 22 AWG	AR
-	ME27	35474123	Integrated Circuit, 74123	-	54		39690200-20	Sleeving, No. 20 AWG (Teflon)	AR
25	ME13, ME23	35474200	Integrated Circuit, 7420	4					
-	ME24, ME25	35474200	Integrated Circuit, 7420	-					
26	ME14	35474500	Integrated Circuit, 7450	1					
27	ME15, ME18	35474300	Integrated Circuit, 7430	5					
-	ME19, ME20	35474300	Integrated Circuit, 7430	-					
-	ME31	35474300	Integrated Circuit, 7430	-					
28									
29	R1, R2, R3	41101926	Resistor, 1K, $\frac{1}{4}W$, $\pm 10\%$	11					
-	R4, R5, R6	41101926	Resistor, 1K, $\frac{1}{4}W$, $\pm 10\%$	-					
-	R7, R8	41101926	Resistor, 1K, $\frac{1}{4}W$, $\pm 10\%$	-					
-	R19, R40	41101926	Resistor, 1K, $\frac{1}{4}W$, $\pm 10\%$	-					
-	R57	41101926	Resistor, 1K, $\frac{1}{4}W$, $\pm 10\%$	-					

LIST OF MATERIALS*
 COMPONENT BOARD ASSEMBLY
 ELECTRONIC CARD NO. 2 (101A)
 (Reference: Ass'y Dwg. #63002303, Rev G9)

Item	Symbol	Part Number	Nomenclature	Quantity	Item	Symbol	Part Number	Nomenclature	Quantity
1		63001054	Component Board Artwork	1	29	ME32	35474123	Integrated Circuit, 74123	1
2	C1,C17,C18	21224000	Capacitor, .22 uf, 12V, +80 -20%	3	31				
3	C2	21104001	Capacitor, .1 uf, 16V, +80 -20%	1	32	ME37	35474260	Integrated Circuit, 7426	1
4	C3	22206002	Capacitor, 20 uf, 25V	1	33				
5	C4,C6,C10,C12, C14,C16	21103003	Capacitor .01 uf 1000V, ±20%	6	34	R16	41103926	Resistor, 10K, 1/4W, ±10%	1
6	C5,C15	22107002	Capacitor, 200 uf, 25V	2	35				
7	C7	22106002	Capacitor, 20 uf, 25V	1	36	R8,R12,R31,	41472926	Resistor, 4.7K, 1/4W, ±10%	8
8	C8	21471003	Capacitor, 470 pf, 1000V, ±20%	1	-	R32,R33,R38,	41472926	Resistor, 4.7K, 1/4W, ±10%	-
9	C9,C20	21102000	Capacitor, .001 uf (1000 pf) 1000V	5	-	R50,R53	41472926	Resistor, 4.7K, 1/4W, ±10%	-
-	C21,C22,C23	21102000	Capacitor, .001 uf (1000 pf) 1000V	-	37	R10	41682926	Resistor, 6.8K, 1/4W, ±10%	1
10	C11,C13	22206002	Capacitor, 20 uf 25VDC	2	38	R11,R13,R14,	41102926	Resistor, 1K, 1/4W, ±10%	31
11	C19	21502001	Capacitor, .005 uf, 1000V, ±20%	1	-	R15,R17,R18,	41102926	Resistor, 1K, 1/4W, ±10%	-
12					-	R21,R22,R23,	41102926	Resistor, 1K, 1/4W, ±10%	-
13					-	R24,R25,R26	41102926	Resistor, 1K, 1/4W, ±10%	-
14	CR1,CR2	38100904	Diode, WG904	2	-	R27,R28,R29	41102926	Resistor, 1K, 1/4W, ±10%	-
15	XME1,2,3,4	31410001-6	Socket	4	-	R30,R34,R35	41102926	Resistor, 1K, 1/4W, ±10%	-
16	ME1,ME2,	35531131	Integrated Circuit, 133 x 2 Bit	4	-	R36,R37,R39	41102926	Resistor, 1K, 1/4W, ±10%	-
-	ME3,ME4	35531131	Integrated Circuit, 133 x 2 Bit	4	-	R40,R41,R42	41102926	Resistor, 1K, 1/4W, ±10%	-
17	ME5,ME9	35474730	Integrated Circuit, 7473	2	-	R43,R44,R45	41102926	Resistor, 1K, 1/4W, ±10%	-
18	ME6,ME10	35474000	Integrated Circuit, 7400	9	-	R46,R47,R48	41102926	Resistor, 1K, 1/4W, ±10%	-
-	ME11,ME16	35474000	Integrated Circuit, 7400	-	-	R49	41102926	Resistor, 1K, 1/4W, ±10%	-
-	ME20,ME21	35474000	Integrated Circuit, 7400	-	39				
-	ME25,ME26	35474000	Integrated Circuit, 7400	-	40				
-	ME29	35474000	Integrated Circuit, 7400	-	41	Q1	38229070	Transistor, 2N2904	1
19	ME7,ME8	35474040	Integrated Circuit, 7404	3	42		39648505-4	Wire, Hook-Up, No. 26 AWG	AR
-	ME17	35474040	Integrated Circuit, 7404	-	43		30070000	Solder (60/40)	AR
20	ME13	35474300	Integrated Circuit, 7430	1	44		39610000-5	Wire, Hook-Up, No. 26 AWG	-
21	ME14	35474020	Integrated Circuit, 7402	1	45-71			D E L E T E D	
22	ME15	35474200	Integrated Circuit, 7420	1	72		31410001-04	28 Pin Socket	AR
23	ME18	35474121	Integrated Circuit, 74121	1	85	R7,R9,R51,R52	46103910	Resistor, 10K Pot.	4
-	ME22	35474121	Integrated Circuit, 74121	-	*5A	C4,C6,C10,C12,	21103004	Capacitor, .01 uf 50V	6
24	ME12,ME19	35474100	Integrated Circuit, 7410	2	-	C14,C16	21103004	Capacitor, .01 uf 50V	-
25	ME23	35474070	Integrated Circuit, 7407	1	16A	ME1,ME2,ME3,	35512800	Integrated, Circuit C2040	AR
26	ME24	35474920	Integrated Circuit, 7492	1		(See Note i)			
-	ME26	35474920	Integrated Circuit, 7492	-	-	ME4	35512800	Integrated, Circuit C2040	-
27	ME28	35474145	Integrated Circuit, 74145	-	-	ME33	See Assy Dwg. Table I and 6200112		REF
-	ME30	35474145	Integrated Circuit, 74145	0	-	ME34	"	"	REF
28	ME31	35474060	Integrated Circuit, 7406	1	-	ME35	"	"	REF
					-	ME36	"	"	REF

*Item numbers with subscripts are alternate parts.

REVISIONS	
REV. NO.	DESCRIPTION
1	ORIGINAL DRAWING



- NOTES:
1. LOCATE COMPONENTS APPROXIMATELY AS SHOWN. ALL DIMENSIONS SHOWN IN ALL VIEWS OF THIS DRAWING ARE APPROXIMATE. DIMENSIONS AND TOLERANCES WILL BE SHOWN ON THE DRAWING.
 2. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.
 3. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.
 4. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.
 5. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.
 6. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE SPECIFIED.

REFERENCE DRAWING:
 63002242 REV M
 POWER DRIVER BOARD

REVISION LEVEL OF DRAWING	
REV. NO.	DESCRIPTION
1	ORIGINAL DRAWING

FOR LIST OF MATERIAL
 SEE 13-0112242

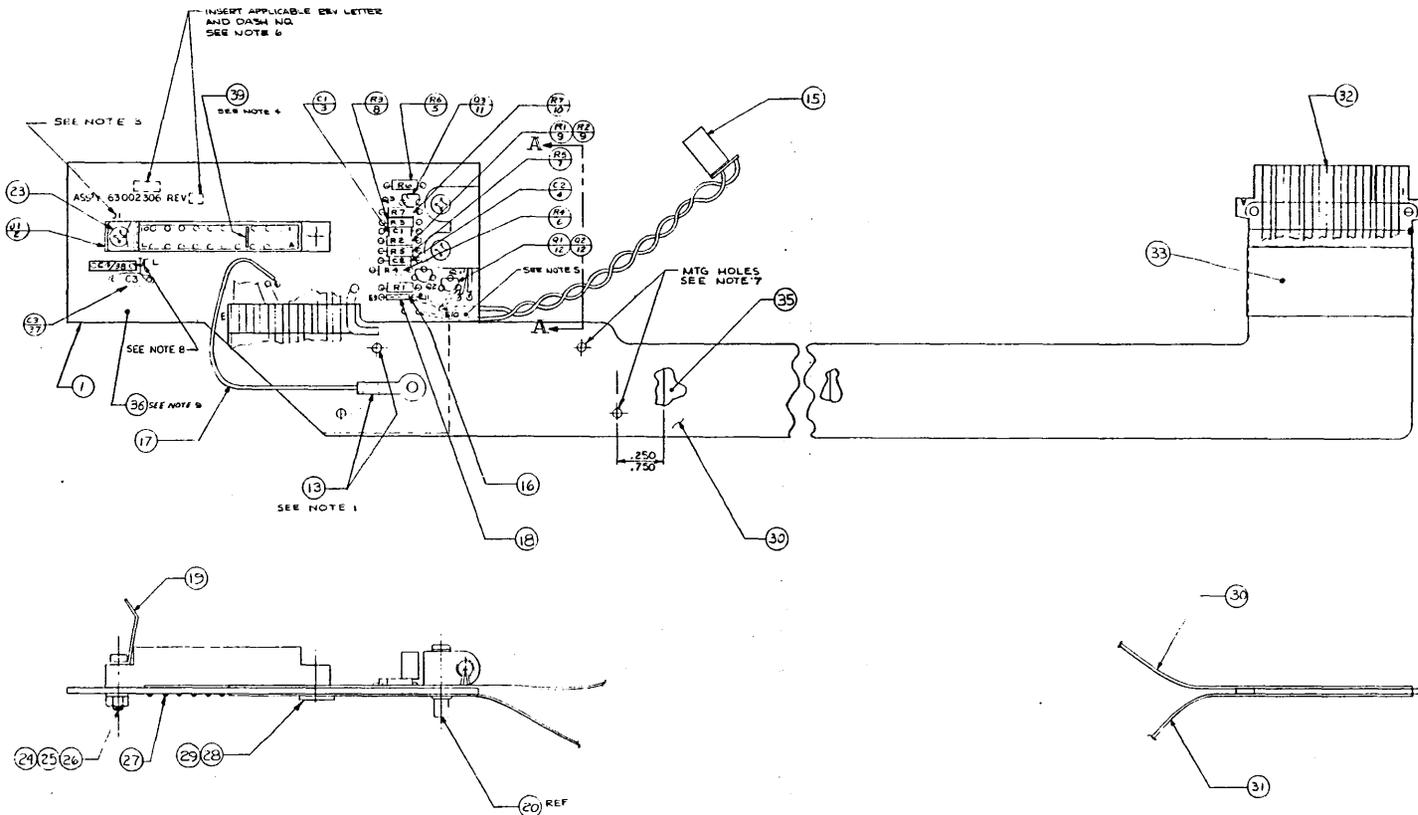
COMPONENT BOARD ASSEMBLY DRIVER BOARD	
63002242	
REVISION 1 ORIGINAL DRAWING	DATE 11/18/68

Figure 7-18. COMPONENT BOARD ASSEMBLY, POWER DRIVER BOARD

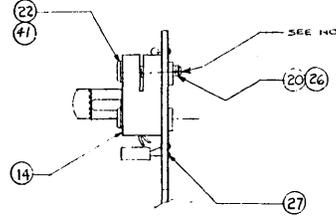
LIST OF MATERIALS
PC BD. ASSY DRIVER BOARD
LM# 63002242-4001

Item	Symbol	Part Number	Nomenclature	Quantity
1		63001018-2001	PC Bd. AW Power Driver Board	1
2		63002200-2001	Brkt. Heat Sink Driver Board	1
3		63002233-5001	Shield 101/101A	1
4		63002234-2001	Cable Tray 101/101A	1
5		63002247-5001	Cable Clamp Assy 101/101A	1
6		31230011-1001	Connector Edge 20 Pin	1
7		22405002-1001	Cap Electrolytic 4 uf 150V	7
14		38040020-1001	Diode S1 Rectifier IN4002	10
14A		38049980-1001	Diode IN4998	AR
15		38100904-1001	Diode WG904	16
17		43158105-1001	Res. WW 1.5 ohm, 10W, 5%	7
18		43820055-1001	Res. WW 82 ohm, 5W, 5%	7
19		41471926-1001	Res. Carbon 470 ohm, ½W, 10%	15
20		41472926-1001	Res. Carbon 4.7K, ½W, 10%	17
21		41102926-1001	Res. Carbon 1K, ½W, 10%	5
23		41120026-1001	Res. Carbon 12 CHM 2W, 10%	2
24		41471026-1001	Res. Carbon 470 ohm, 2W, 10%	3
26		41103926-1001	Res. Carbon 10K, ½W, 10%	7
28		41101016-1001	Res. Carbon, 100 ohm, 1W, 10%	3
29		40680325-1001	Res. 68 ohm, 3½W, 5%	7
33		38200332-1001	Transistor Tip 33B	7
35A		38200311-1001	Transistor Tip 31A	AR
36		38300050-1001	Transistor NPN HI Volt MPS V05	1
37		38239040-1001	Transistor NPN Gen Pur 2N39004	8
39		30050000-0001	Silicone Compound	AR
40		34517145-2001	Screw 4/40 x 7/16 Pan Hd Phil SS	10
41		34815005-2001	Washer, #4 Int Tooth Lock SS	21
42		34712005-2001	Nut Hex 4/40 SS	18
44		30000000-0001	Insulating Varnish	AR
45		30070000-0001	Solder	AR
46		34517105-2001	Screw, 4/4C x 5/16 Pan Hd Phil SS	6
47		34517205-2001	Screw, 4/4C x 5/8 Pan Hd Phil SS	3
49		34517165-2001	Screw, 4/40 x ½ Pan Hd Phil SS	2
54		63002300-2001	Clip, P.C. Board	2
56		35000004-2005	Washer-Nylon Insulator #4 x 3/16	7
57		21104000-1001	Cap Ceramic Disc. .1 uf 25V	1
58		22256000-1001	Cap Electrolytic 26 uf 12V	1
59		41222926-1001	Res. Carbon 2.2K, ½W, 10%	3
60		41102026-1001	Res. Carbon 1K, 2W, 10%	1
61		41221926-1001	Res. Carbon 220 ohm, ½W, 10%	1
62		38407321-1001	Diode Zener, IN4732A	2
63		38239060-1001	Transistor, Pwr. Gen. Pur 2N3906	1
REF		63002275-9001	Schem. Diag. Pwr. Driver Board	AR
REF		63001019-9001	PC Bd. Diag. Power Driver Board	AR

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	ISSUES FOR PRODUCTION WITHOUT ECO	11/73	[Signature]
B	REVIS PER ECO 73002589 REVIS PER ECO 73002589	11/73	[Signature]
B2	REV PER ETC 335, #208	11/73	[Signature]
B3	REVISED PER ECO 73002526	11/73	[Signature]
B4	REVISED PER ECO 73002589	11/73	[Signature]
B5	REVISED PER ECO 73002589 REVISED PER ECO 73002589	11/73	[Signature]
B6	REVISED PER ECO 73002589 REVISED PER ECO 73002589 REVISED PER ECO 73002589	11/73	[Signature]
MINOR CHANGES, FORMAT ONLY		6-4-73	[Signature]



- NOTES:
1. MOUNT ITEM 13 TO HOLE SHOWN, ON PRINTER ASSEMBLY, 63002290
 2. DO NOT APPLY ITEM 26 TO SCREW
 3. ALL CHARACTERS MARKED 'E' AND 'J' ARE FOR REFERENCE ONLY, AND DO NOT APPEAR ON BOARD.
 4. LOCATE KEY BETWEEN PINS C1-D.
 5. ADD GLOBULE OF ITEM 34 (RTV) TO WIRDS OF ITEM 13 (LAMP SOCKET) FACE SIDE - STRAIN RELIEF DRIDGE.
 6. MAKE 1/8 HIGH BLACK CHARACTERS AND LOCATE APPROX. AS SHOWN.
 7. ALIGN MOUNTING HOLES INDICATED BEFORE STICKING CABLES TOGETHER.
 8. SOLDER LEAD OF CAPACITOR CA TO TRACK SHOWN, 1/2 OV, AND CEMENT CAPACITOR TO BOARD USING ITEM 29
 9. *ECO'S ASSY ONLY.
 10. APPLY CONFORMAL COATING, ITEM 36, TO COMPONENT SIDE ONLY.



- (4001) FOR LIST OF MATERIAL SEE LM63002306
- (4002)
- (4003)

REFERENCE DRAWINGS:
SCHEMATIC DIAGRAM- 63002319
ARTWORK MASTER-63001060 REV C2
ARTWORK MASTER-63001063 REV-

THE INFORMATION CONTAINED HEREIN IS PROPRIETARY AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT WRITTEN PERMISSION OF CENTRONICS CORPORATION.

REV	DATE	BY	CHKD	DESCRIPTION	APPROVED
6301124	3/01				
63002290	3/00				
63002306	11/73				

<p>centronics data computer corp.</p> <p>VIDEO AMPLIFIER AND CABLE ASSEMBLY</p> <p>63002306</p>	<p>REVISED PER ECO 73002589</p>
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Figure 7-19. COMPONENT BOARD ASSEMBLY, VIDEO AMPLIFIER

LIST OF MATERIALS
VIDEO AMPLIFIER AND
CABLE ASSEMBLY
(Reference: Ass'y Dwg. #63002306-1, Rev. B6)

Item	Symbol	Part Number	Nomenclature	Quantity
1		63001060	Component Board (Artwork)	1
2	J1	31230013	Connector, P/C, 20 Pin	1
3	C1	21821004	Capacitor, 820 pf	1
4	C2	21472004	Capacitor, 4700 pf	1
5	R6	41102926	Resistor, 1K, $\frac{1}{4}$ W, $\pm 10\%$	1
6	R4	41472926	Resistor, 4.7K, $\frac{1}{4}$ W, $\pm 10\%$	1
7	R5	41103926	Resistor, 10K, $\frac{1}{4}$ W, $\pm 10\%$	1
8	R3	41473926	Resistor, 47K, $\frac{1}{4}$ W, $\pm 10\%$	1
9	R1,R2	41224926	Resistor, 220K, $\frac{1}{4}$ W, $\pm 10\%$	2
10	R7	41474926	Resistor, 470K, $\frac{1}{4}$ W, $\pm 10\%$	1
11	Q3	38239040	Transistor, 2N3904	1
12	Q1,Q2	38239060	Transistor 2N3906	2
13		31460000-1	Lug No. 4	1
14		63002257-1	PhotoCell and Housing Ass'y	1
15		31430001	Lamp Socket	1
16		39610000-5	Wire, Buss #22 AWG	AR
17		39640000-4	Wire, Hook-up, Teflon #26 AWG, Blk	AR
18		39691050-22	Insulating Sleeving #22	AR
19		63002300-1	Clip, P/C	1
20		34059161-1	PEMSERT 4-40 or equiv.	2
21				
22				
23		34517167	Screw, Pan/Phil, 4-40 UNC x $\frac{1}{2}$ Lg	1
24		34815007	Washer, Lock, No. 4	1
25		34712007	Nut, Hex, 4-40 UNC	1
26		30000000	Insulating Varnish, Glypt	AR
27		30070000	Solder, 60/40	AR
28		36614403-50	Spacer, Fibre, No. 6	3
29				
30		63002312-1	Ribbon Cable	1
31		63002312-2	Ribbon Cable	1
32		63001063	Fingerboard Artwork	1
33		35060004	Tape	AR
34				
35		35060010	Tape, Double Sided	2"
39		31240456	Kip #50 PK	1
40		30070001	Kester, Flux, 1554A	AR

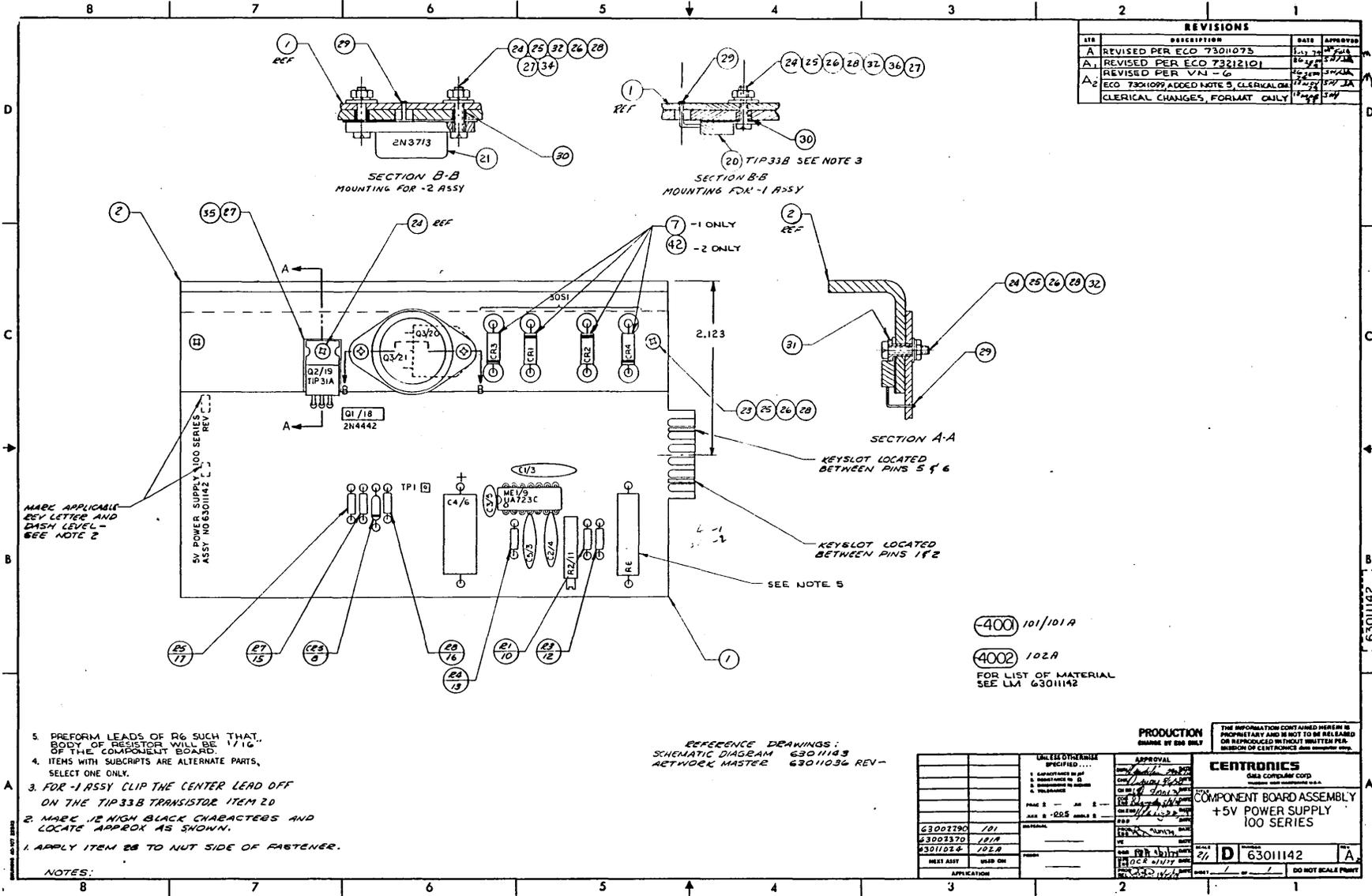


Figure 7-20. COMPONENT BOARD ASSEMBLY, +5 VOLT REGULATOR

LIST OF MATERIALS
 PC BD. ASSY +5V PWR. SUP. 100 SERIES
 LM# 63011142-4001

Item	Symbol	Part Number	Nomenclature	Quantity
1		63011036-2001	PC Bd. AW 5V Pwr. Sup. 100 Series	1
2		63011144-2001	Bracket HS 5V Pwr. Sup. 100 Series	1
3		21104001-1001	Cap Ceramic Disc .1 uf 16V	2
4		21502001-1001	Cap Ceramic Disc .005 uf 1KV	1
5		21102000-1001	Cap Ceramic Disc .001 uf 1KV	1
6		22107002-1001	Cap Electrolytic 100 uf 25V	1
7		38130901-1001	Diode S1 Rectifier 30S1	4
7A		38130905-1001	Diode Rectifier 3 Amp	AR
8		38052350-1001	Diode Zener IN5235	1
9		35207233-1001	IC Regulator UA723CN	1
10		41751926-1001	Res. Carbon 750 ohm, $\frac{1}{2}$ W, 10%	1
11		46102000-1001	Potentiometer 1K 3810P-102	1
12		41222926-1001	Res. Carbon 2.2K, $\frac{1}{2}$ W, 10%	1
13		41220926-1001	Res. Carbon 22 ohm, $\frac{1}{2}$ W, 10%	1
14		40127000-1001	Res. Carbon .125 ohm, 5W, 5%	1
15		41101926-1001	Res. Carbon 100 ohm, $\frac{1}{2}$ W, 10%	1
16		41102926-1001	Res. Carbon 1K, $\frac{1}{2}$ W, 10%	1
17		41471926-1001	Res. Carbon 470 ohm, $\frac{1}{2}$ W, 10%	1
18		38244420-1001	Transistor 2N4442	1
19		38200311-1001	Transistor Tip 31A	1
20		38200332-1001	Transistor Tip 33B	1
23		34517127-2001	Screw, 4/40 x 3/8 Pan Hd Phil	2
24		34517167-2001	Screw, 4/40 x $\frac{1}{2}$ Pan Hd Phil	2
25		34815007-2001	Washer #4 Int Tooth Lock	4
26		34712007-2001	Nut Hex 4/40	4
27		30050000-0001	Silicone Compound	AR
28		30000000-0001	Insulating Varnish	AR
29		30070000-0001	Solder	AR
30		39690200-0009	Tubing Teflon TFT 200 #9 NAT	AR
31		35000004-2005	Washer-Nylon Insulator #4 x 3/16	1
32		34912007-2001	Washer #4 Flat Ext Tooth	2
35		35070003-2002	Transistor Mounting Pad	1
36		35070003-2001	Transistor Mounting Pad	1
REF		63011037-9001	PC Bd. DD 5V Pwr. Sup. 100 Series	-
REF		63011143-9001	Schem. Diag. 5V Pwr. Sup. 100 Series.	-

LIST OF MATERIALS
 $\pm 12V$ REGULATOR
(Reference: Ass'y Dwg. #63002304, Rev. E1)

Item	Symbol	Part Number	Nomenclature	Quantity
1		63001049-1	Component Board	1
2		63002205-1	Bracket, Heat Sink	1
3	C1,C6	22108000	Capacitor, 1000 uf, 50 VDC	2
4	C2,C7	21104000	Capacitor, 0.1 uf, 25 VDC	2
5	C5,C10	21104001	Capacitor, 0.1 uf, 16 VDC	2
6	C3	21471000	Capacitor, 470 pf	1
7	C4,C9	22106002	Capacitor, 10 uf, 25 VDC	2
8	C8	21101001	Capacitor, 100 pf, 16V	1
9	C11,C12	21502001	Capacitor, .005 uf 1000V	2
10				
11	CR1,CR2,CR3,	38040020	Diode, IN4002	6
-	CR4,CR5,CR7	38040020	Diode, IN4002	-
12	CR6,CR8	38052460	Diode, IN5246	2
13	ME1,ME2	35207233	Micrologic, uA723C	2
14				
15				
16	R1,R14	41220926	Resistor, 22 ohms, $\frac{1}{2}W$, $\pm 10\%$	2
17	R2,R15	41158015	Resistor, 1.5 ohms, $1W$, $\pm 5\%$	2
18	R3	41202926	Resistor, 2K, $\frac{1}{2}W$, $\pm 5\%$	1
19	R4,R11	46102000	Resistor, 1K, Pot. IRC	2
20	R5,R8,R9	41302926	Resistor, 3K, $\frac{1}{2}W$, $\pm 5\%$	3
21	R6,R17,R7	41101926	Resistor, 100 ohms, $\frac{1}{2}W$, $\pm 10\%$	3
22				
23	R10	41242925	Resistor, 2.4K, $\frac{1}{2}W$, $\pm 5\%$	1
24	R12	41122926	Resistor, 1.2K, $\frac{1}{2}W$, $\pm 10\%$	1
25	R13	41331026	Resistor, 330 ohms, $2W$, $\pm 10\%$	1
26	R16	41470926	Resistor, 47 ohms, $\frac{1}{2}W$, $\pm 10\%$	1
27				
28	Q1,Q3	38244420	Transistor, 2N4442	2
*29	Q2	38200311	Transistor, Tip 31A	1
30	Q5	38200321	Transistor, Tip 32A	1
31	Q4,Q6	38239060	Transistor, 2N3906	2
32				
33				
34				
35		34517107	Screw, Pan HD/PHIL, NO. 4-40 x 5/16 lg	2
36		34517127	Screw, Pan HD/PHIL, No. 4-40 x 3/8 lg	2
37		34815007	Washer, Int. Tooth, No. 4	2
38		34912004	Washer, Flat, Nylon, No. 4	2
39		34712007	Nut, Hex, No. 4-40 UNC	4
40		30050000	Lubricant, Silicone	AR
41		30000000	Insulating Varnish GLYPTL	AR
42		30070000	Solder, (60/40)	AR
43		39690010-05	Cable Tie PLT21	1

LIST OF MATERIALS
CONNECTOR BOARD
(Reference: Ass'y Dwg. #63002332)

Item	Symbol	Part Number	Nomenclature	Quantity
1		63001067-1	Component Board	1
2	W-1	63002253-1	Harness Assembly	1
3	J1-J2	31230008	Connector	2
4	J3-J8	31230037	Connector	2
5		30070000	Solder, (60/40)	AR
6		39610000-7	Wire, Buss #18 AWG	AR
7		39690200-18	Sleeving, Insulating, Teflon	AR

LIST OF MATERIALS
MOTOR CONTROL
(Reference: Assy Dwg. #63011130, Rev. G)

Item	Symbol	Part Number	Nomenclature	Quantity
1		63011022-1	Component Board	1
2		63002380-1	Mounting Bracket	1
3		36600004-4	Spacer, .50 1g (LCBS-8 RITCHLOK)	4
4				
5	C1, 2	22106002	Capacitor, 10 uf, 25V	2
6	C3, 4, 5	21104001	Capacitor, .1 uf, 16V	3
7	C6	22107002	Capacitor, 100 uf, 25V	1
8	C7	21104002	Capacitor, .1 uf, 500V	1
9				
10	CR2	38100904	Diode, WG904	1
11	CR3,4,5,6	38040020	Diode, IN4002	4
12				
13	ME2	37220015	Integrated Circuit (CA2-55 LITRONIX)	1
13A	ME2	37220016	Integrated Circuit (MCA2-55 MONSANTO)	1
14	ME3	35474121	Integrated Circuit 74121/9603	1
15	ME1	35205550	Integrated Circuit 555	1
16	ME5	35474040	Integrated Circuit 7404	1
17	ME4	35474100	Integrated Circuit 7410	1
18				
19	Q1	38200002	Transistor, 2N6343	1
19A	Q1	38200146	Transistor, SC146D	1
20	Q2	38200001	Transistor, C103 B/2N5064	1
21				
22	R1	41221926	Resistor, 220 ohms, 1/4W, ±10%	1
23	R3	41102926	Resistor, 1K, 1/4W, ±10%	3
24	R3	43153055	Resistor, 15K, 5W (EL5)	1
25	R4	41393926	Resistor, 39K ohm, 1/4W, ±10%	1
26	R5	41684926	Resistor, 680K ohm, 1/4W, ±10%	1
27	R7	41101025	Resistor, 100K, 2W	1
28	R8	41510015	Resistor, 51 ohm, 1W	1
29	R9	41101946	Resistor, 100 ohm, 1/4W, ±10%	1
30	R11	41105926	Resistor, 1 Meg, 1/4W, ±10%	1
31	R12	43502035	Resistor, 5K, 3W	1
32		30070000	Solder (60/40)	AR
33				
34		63011149	Wiring Harness Motor Control	1
35				
39				
40		63011137-1	Cover, Motor Control	1
41				
42				
45		34517107	Screw, 4-40 x 5/16 1g, Pan/Phil	1
46		34912004	Washer, Nylon, #4 Flat	1
47		30000000	Insulating Varnish	1
48		34712007	Nut, Hex	1

LIST OF MATERIALS
HARNESS ASSEMBLY, MOTOR CONTROL
REFERENCE: ASSY. DWG: 63011149

ITEM	PART NO.	REV	NOMENCLATURE	QTY PER
1	31340007-1001		CONN RECEPTACLE W/EARS 15 PIN	1
2	31240020-2004		PIN TERMINAL FEMALE	15
3	39640000-0008-2		WIRE HOOK-UP 18 AWG RED	A/R
6	30070000-0001		SOLDER	A/R
7	39695231-2001		CABLE TIE 1/16-5/8X35/8	A/R
8	39640000-0006-1		WIRE TEFLON 22AWG 7/30 BROWN	A/R
9	39640000-0006-8		WIRE TEFLON 22AWG 7/30 GRAY	A/R
10	39640000-0006-3		WIRE TEFLON 22AWG 7/30 ORANGE	A/R
11	39640000-0006-4		WIRE TEFLON 22AWG 7/30 YELLOW	A/R
12	39640000-0006-5		WIRE TEFLON 22AWG 7/30 GREEN	A/R
13	39640000-0006-6		WIRE TEFLON 22AWG 7/30 BLUE	A/R
14	39640000-0006-7		WIRE TEFLON 22AWG 7/30 VIOLET	A/R
15	39640000-0006-91		WIRE E-22 7/30 WHT/BRN	A/R
16	39640000-0006-92		WIRE E-22 7/30 WHT/RED	A/R
17	39640000-0006-93		WIRE E-22 7/30 WHT/ORN	A/R
18	39640000-0006-9		WIRE TEFLON 22AWG 7/30 WHITE	A/R
19	39640000-0006-97		WIRE E-22 7/30 WHT/VIO	A/R
20	39640000-0006-0		WIRE TEFLON 22AWG 7/30 BLACK	A/R

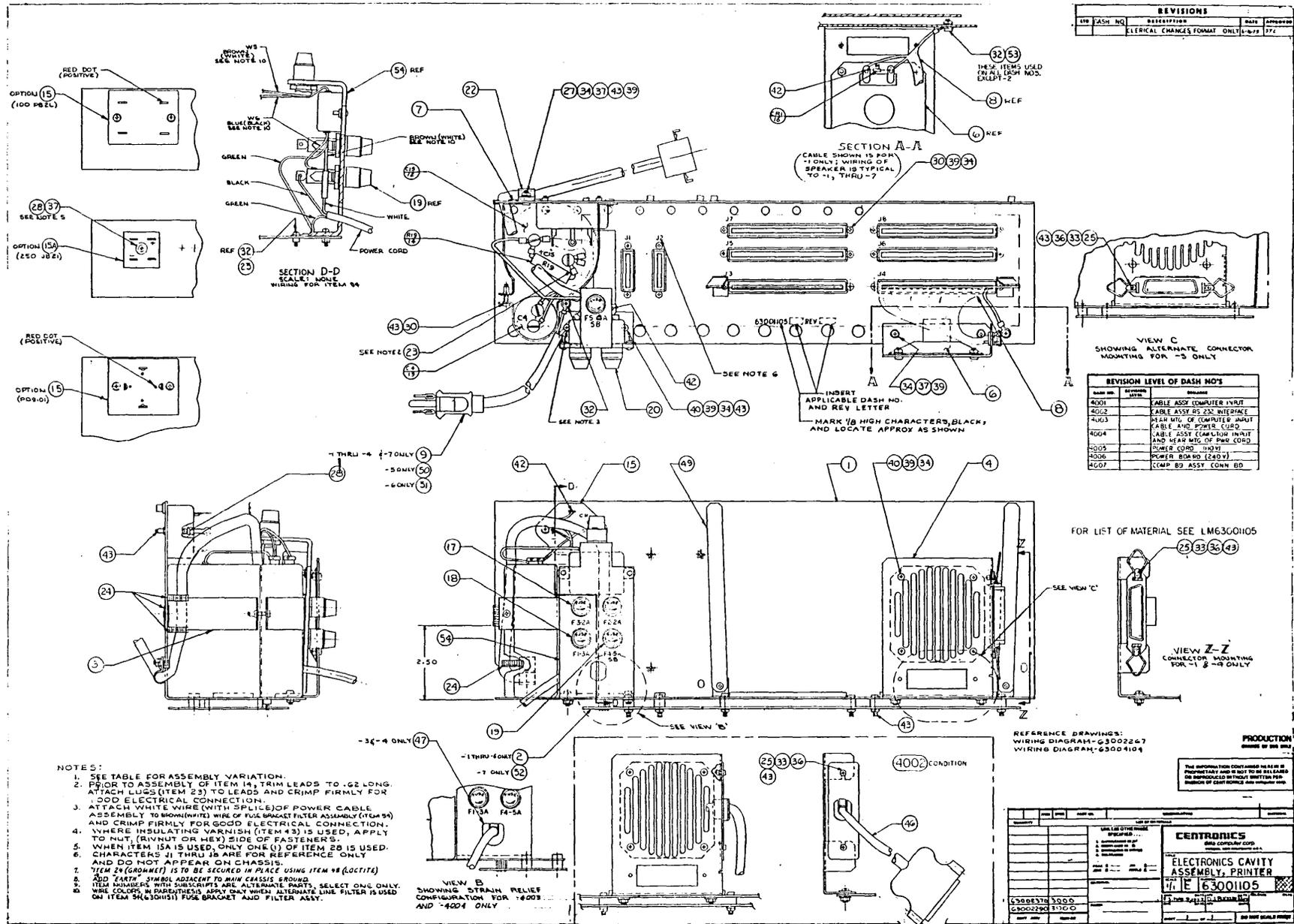


Figure 7-25. ELECTRONIC CAVITY ASSEMBLY

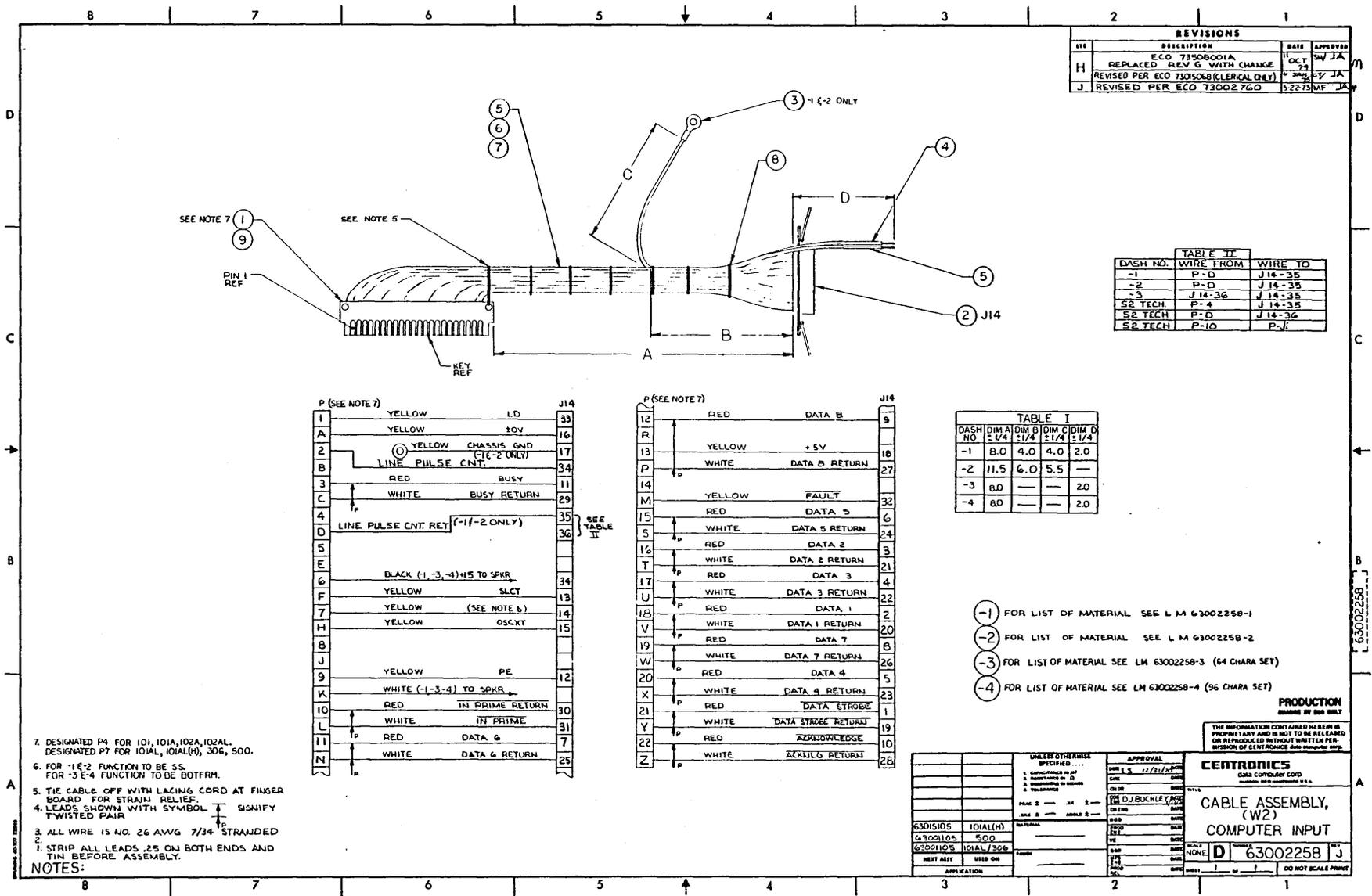
LIST OF MATERIALS
ELECT. CAVITY ASSY 101/101A 110V
LM# 63001105-4005

Item	Symbol	Part Number	Nomenclature	Quantity
1		63002227-4001	Chassis Electronics Cavity	1
2		63002332-4001	Comp. Bd. Assy Connector Bd. 101A	1
3		63002237-5001	Clamp Capacitor 101/101A	1
4		63002353-2001	Speaker Brkt. 101/101A	1
6		30470000-1001	Speaker Speco No. U-301	1
7		33400000-2001	Rivet Shoulder	2
11		39030012-1001	Fuse 8 Amp Slo Blo	1
12		22229000-1001	Cap Electrolytic 22000 uf 50V	1
13		22828000-1001	Cap Electrolytic 8200 uf 25V	1
14		43471056-1001	Res. WW 470 ohm, 5W, 10%	1
15		38109622-1001	Diode Bridge	1
15A		38125021-1001	Diode Bridge	AR
15B		38100110-1001	Diode Bridge	AR
16		38040020-1001	Diode SI Rectifier IN4002	1
17		39030002-1001	Fuse 2 Amp	2
18		39030011-1001	Fuse 3 Amp 250V	1
19		39030004-1001	Fuse 5 Amp Slo Blo	1
20		31350000-2001	Fuse Holder	5
22		36150001-2004	Clamp Cable	1
23		31460015-2004	Terminal Ring No. 10 26-24 AWG	3
24		36000000-2001	Grommet	4
25		34000007-2001	Screw 3/48 x 1/2 Lg Pan/Phil	2
27		34517127-2001	Screw 4/40 x 3/8 Pan Hd Phil	3
28		34517285-2001	Screw 4/40 x 7/8 Pan Hd Phil SS	2
30		34517207-2001	Screw 4-40 x 5/8 Pan Hd Phil	17
32		34527087-2001	Screw 6/32 x 1/4 Pan Hd Phil	2
33		34000014-2001	Nut Hex 3/48	2
34		34712007-2001	Nut Hex 4/40	25
36		34000018-2001	Washer Flat No. 3	2
37		34912007-2001	Washer #4 Flat	3
39		34815007-2001	Washer #4 Int Tooth Lock	26
40		34517107-2001	Screw 4/40 x 5/16 Pan Hd Phil	6
42		30070000-0001	Solder	AR
43		300000000		
48		300000404-0001	Adhesive Locktite	AR
49		63011146-5001	Strap Brkt. Assy 101/101A, 102A	2
50		63002494-4001	Power Cable Assy We 110V	1
53		34825007-2001	Washer #6 Int Tooth Lock	1
54		63011151-4002	Fuse Brkt. and Fltr. Assy 101 Series	1
REF		63002267-9001	Wiring Diag. Electronics Cavity	AR
REF		63004104-9001	Wiring Diag. Electronics Cavity	AR

LIST OF MATERIALS
 HARNESS ASSEMBLY (W1)
 (Reference: Ass'y Dwg. #63002253-1)

ITEM	PART NO.	REV	NOMENCLATURE	QTY PER
1	31310035-1001		CONNECTOR PLUG W/EARS	1
2	31240020-2004		PIN TERMINAL FEMALE	11
3	39640000-0008-2		WIRE HOOK-UP 18 AWG RED	A/R
4	39640000-0009-9		WIRE HOOK-UP 16AWG WHT	A/R
5	39640000-0009-0		WIRE HOOK-UP 16 AWG BLK	A/R
6	39690000-0002		TAPE LACING BLACK .010X1/16W	A/R
7	31460015-2004		TERMINAL RING NO 10 26-24 AWG	6
8	30070000-0001		SOLDER	A/R
9	36550002-3001		WIRE MARKER NO 1	1
10	36550002-3012		WIRE MARKER NO 12	1
11	36550002-3070		WIRE MARKER NO 70	1
14	31460002-2002		SPLICE INSULATED 14-16 AWG	1
15	36550002-3002		WIRE MARKER NO 2	1
16	36550002-3003		WIRE MARKER NO 3	1
17	36550002-3004		WIRE MARKER NO 4	1
18	36550002-3005		WIRE MARKER NO 5	1
19	36550002-3006		WIRE MARKER NO 6	1
20	36550002-3007		WIRE MARKER NO 7	1
21	36550002-3008		WIRE MARKER NO 8	1
22	36550002-3009		WIRE MARKER NO 9	1
23	36550002-3010		WIRE MARKER NO 10	1
24	36550002-3071		WIRE MARKER NO 71	1
25	36550002-3072		WIRE MARKER NO 72	1
26	36550002-3073		WIRE MARKER NO 73	1
27	36550002-3074		WIRE MARKER NO 74	1
28	36550002-3075		WIRE MARKER NO 75	1
29	36550002-3076		WIRE MARKER NO 76	1
30	36550002-3077		WIRE MARKER NO 77	1
31	36550002-3078		WIRE MARKER NO 78	1
32	36550002-3079		WIRE MARKER NO 79	1

7-41



REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
H	ECO 7300001A REPLACED REV G WITH CHANGE	OCT 73	SW JA
I	REVISED PER ECO 7305068 (CLERICAL ONLY)	11-23-73	SW JA
J	REVISED PER ECO 73002760	12-27-73	WF JA

TABLE J1		
DASH NO.	WIRE FROM	WIRE TO
-1	P-D	J14-36
-2	P-D	J14-35
-3	J14-36	J14-35
S2 TECH.	P-4	J14-35
S2 TECH.	P-D	J14-36
S2 TECH.	P-10	P-J

P (SEE NOTE 7)			J14
1	YELLOW	LD	33
2	YELLOW	20V	16
A	YELLOW	CHASSIS GND (-1 & -2 ONLY)	17
B	LINE PULSE CNT.		34
3	RED	BUSY	11
C	WHITE	BUSY RETURN	29
4	LINE PULSE CNT. RET.	(-1 & -2 ONLY)	35
D			36
E			
6	BLACK (-1, -3, -4)	HS TO SPKR	34
F	YELLOW	SLCT	13
7	YELLOW	(SEE NOTE 6)	14
H	YELLOW	OSCXT	15
J	YELLOW	PE	12
K	WHITE (-1, -3, -4)	TO SPKR	
L	RED	IN PRIME RETURN	30
M	WHITE	IN PRIME	31
N	RED	DATA 6	7
	WHITE	DATA 6 RETURN	25

P (SEE NOTE 7)			J14
12	RED	DATA B	9
R			17
13	YELLOW	+5V	28
P	WHITE	DATA B RETURN	16
14			32
M	YELLOW	FAULT	6
15	RED	DATA 5	24
S	WHITE	DATA 5 RETURN	3
16			21
T	WHITE	DATA 2 RETURN	4
17	RED	DATA 3	22
U	WHITE	DATA 3 RETURN	2
18	RED	DATA 1	20
V	WHITE	DATA 1 RETURN	8
19	RED	DATA 7	26
W	WHITE	DATA 7 RETURN	5
20	RED	DATA 4	23
X	WHITE	DATA 4 RETURN	1
21	RED	DATA STORAGE	19
22	WHITE	DATA STORAGE RETURN	10
Y	RED	ACKNOWLEDGE	10
Z	WHITE	ACKNOWLEDGE RETURN	28

TABLE I					
DASH NO.	DIM A	DIM B	DIM C	DIM D	DIM E
-1	8.0	4.0	4.0	2.0	
-2	11.5	6.0	5.5		
-3	8.0			2.0	
-4	8.0			2.0	

- (-1) FOR LIST OF MATERIAL SEE L M 63002258-1
- (-2) FOR LIST OF MATERIAL SEE L M 63002258-2
- (-3) FOR LIST OF MATERIAL SEE L M 63002258-3 (64 CHARA SET)
- (-4) FOR LIST OF MATERIAL SEE L M 63002258-4 (96 CHARA SET)

7. DESIGNATED P4 FOR 101, 101A, 102A, 102AL, DESIGNATED P7 FOR 101AL, 101AL(H), 306, 500.
 6. FOR -1 & -2 FUNCTION TO BE SS, FOR -3 & -4 FUNCTION TO BE BOTH FM.
 5. TIE CABLE OFF WITH LACING CORD AT FINGER BOARD FOR STRAIN RELIEF.
 4. LEADS SHOWN WITH SYMBOL \updownarrow SIGNIFY TWISTED PAIR.
 3. ALL WIRE IS NO. 26 AWG 7/34 STRANDED.
 2. STRIP ALL LEADS .25 ON BOTH ENDS AND TIN BEFORE ASSEMBLY.
 NOTES:

PRODUCTION
 DRAWING BY SW JJA

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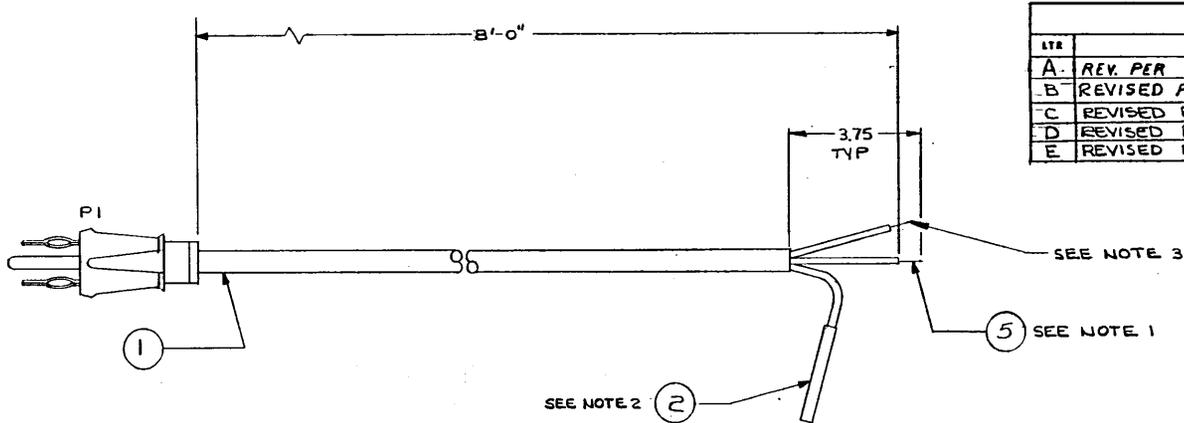
UNLESS OTHERWISE SPECIFIED...		APPROVAL	
1. DIMENSIONS IN INCHES	2. DIMENSIONS IN MILLIMETERS	DATE	BY
3. DIMENSIONS IN FEET	4. DIMENSIONS IN METERS	DATE	BY
5. DIMENSIONS IN INCHES	6. DIMENSIONS IN METERS	DATE	BY
7. DIMENSIONS IN INCHES	8. DIMENSIONS IN METERS	DATE	BY
9. DIMENSIONS IN INCHES	10. DIMENSIONS IN METERS	DATE	BY
11. DIMENSIONS IN INCHES	12. DIMENSIONS IN METERS	DATE	BY
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19. DIMENSIONS IN INCHES	20. DIMENSIONS IN METERS	DATE	BY
21. DIMENSIONS IN INCHES	22. DIMENSIONS IN METERS	DATE	BY
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47. DIMENSIONS IN INCHES	48. DIMENSIONS IN METERS	DATE	BY
49. DIMENSIONS IN INCHES	50. DIMENSIONS IN METERS	DATE	BY
51. DIMENSIONS IN INCHES	52. DIMENSIONS IN METERS	DATE	BY
53. DIMENSIONS IN INCHES	54. DIMENSIONS IN METERS	DATE	BY
55. DIMENSIONS IN INCHES	56. DIMENSIONS IN METERS	DATE	BY
57. DIMENSIONS IN INCHES	58. DIMENSIONS IN METERS	DATE	BY
59. DIMENSIONS IN INCHES	60. DIMENSIONS IN METERS	DATE	BY
61. DIMENSIONS IN INCHES	62. DIMENSIONS IN METERS	DATE	BY
63. DIMENSIONS IN INCHES	64. DIMENSIONS IN METERS	DATE	BY
65. DIMENSIONS IN INCHES	66. DIMENSIONS IN METERS	DATE	BY
67. DIMENSIONS IN INCHES	68. DIMENSIONS IN METERS	DATE	BY
69. DIMENSIONS IN INCHES	70. DIMENSIONS IN METERS	DATE	BY
71. DIMENSIONS IN INCHES	72. DIMENSIONS IN METERS	DATE	BY
73. DIMENSIONS IN INCHES	74. DIMENSIONS IN METERS	DATE	BY
75. DIMENSIONS IN INCHES	76. DIMENSIONS IN METERS	DATE	BY
77. DIMENSIONS IN INCHES	78. DIMENSIONS IN METERS	DATE	BY
79. DIMENSIONS IN INCHES	80. DIMENSIONS IN METERS	DATE	BY
81. DIMENSIONS IN INCHES	82. DIMENSIONS IN METERS	DATE	BY
83. DIMENSIONS IN INCHES	84. DIMENSIONS IN METERS	DATE	BY
85. DIMENSIONS IN INCHES	86. DIMENSIONS IN METERS	DATE	BY
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97. DIMENSIONS IN INCHES	98. DIMENSIONS IN METERS	DATE	BY
99. DIMENSIONS IN INCHES	100. DIMENSIONS IN METERS	DATE	BY

CENTRONICS
 CABLE ASSEMBLY,
 (W2)
 COMPUTER INPUT
 63002258 J

Figure 7-27. W2 CABLE ASSEMBLY, COMPUTER INPUT

LIST OF MATERIALS
 CABLE ASSEMBLY (W2)
 COMPUTER INPUT
 LM# 63002258

Item	Symbol	Number	Nomenclature	Quantity
1	P4 or P7	63001024	Finger Board, Artwork	1
2	J14	31310019	Connector, Receptacle	1
3		31460000-3	Terminal, Solderless #8	1
4		39648505-4-0	Wire, Insul. 26 AWG, Blk	AR
5		39648505-4-9	Wire, Insul. 26 AWG, Wht	AR
6		39648505-4-4	Wire, Insul 26 AWG, Yel	AR
7		39648505-4-2	Wire, Insul 26 AWG, Red	AR
8		39690000-1	Lacing, Cable	AR
10				
11		63001025-1	Drill Dwg.	REF



REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	REV. PER RIC 306	10-23	JA
B	REVISED PER ECO 73060037 TLH	11-17-79	JA
C	REVISED PER ECO 73015056 TLH	11-07-79	JA
D	REVISED PER ECO 73002634 TLH	11-07-79	JA
E	REVISED PER ECO 73002697	12-25-79	JA

LIST OF MATERIALS
POWER CABLE ASSEMBLY
(Dwg. No. 63002252, Rev. E)

P1	DESCRIPTION
	GREEN GRD
	BLACK F4 END
	WHITE TO WI-LEAD 5 (SEE REF DWG)

Item	Symbol	Part Number	Nomenclature	Quantity
1		39620001	Power Cable	1
2		31460002-3	Splice	1
5		30070000	Solder, (60/40)	AR

NOTES:

1. STRIP END .50 AND TIN.
2. STRIP END .25 AND INSTALL ITEM 2 AND CRIMP.
3. STRIP END .25.

REFERENCE DRAWING:
HARNESS ASSY, WI-D63002253

QTY	ITEM	SYMB	PART NO.	NOMENCLATURE	MATERIAL
				LIST OF MATERIALS	
				UNLESS OTHERWISE SPECIFIED...	
				1. CAPACITANCE IN μ F	
				2. RESISTANCE IN Ω	
				3. DIMENSIONS IN INCHES	
				4. TOLERANCE.	
				FRAC \pm .XX \pm	
				.XXX \pm ANGLE \pm	
				MATERIAL	
				FINISH	
				SCALE	
				DATE	
				REVISED	
				DATE	
				BY	
				DATE	
				APP. RELEASED	
				DATE	
				BY	
				DATE	

Figure 7-28. W3 POWER CABLE ASSEMBLY

SECTION 8
DRAWINGS AND PARTS LISTS, MECHANICAL

This section contains drawings and parts lists for the following major mechanical assemblies in the 101 Series Printer:

<u>Figure</u>	<u>Reference Designation</u>	<u>Description</u>
8-1	A	Cover Assembly
8-2	HA	Carriage Mechanism
8-3	HB	Drive Mechanism
8-4	HC	Spring Drum
8-5	HD	Damper
8-6	HE	Frame
8-7	HF	Paper Feed Mechanism
8-8	HG	Pin Feed Mechanism (left and right)
8-9	HH	Form Feed Mechanism
8-10	HI	Ribbon Feed Mechanism
8-11	HJ*	Electrical Hardware
8-12	B	Print Head and Associated Assemblies

*No drawing included

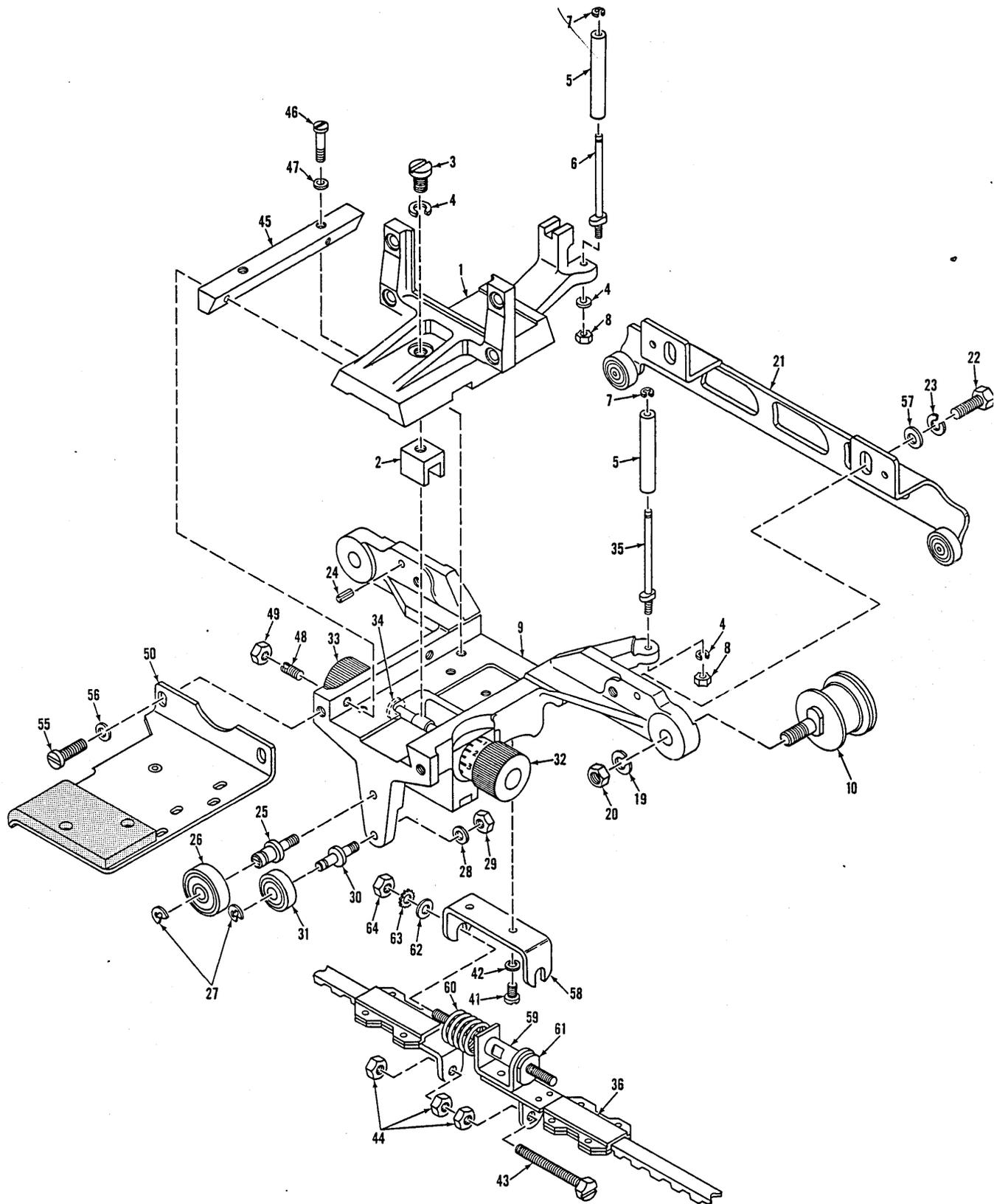
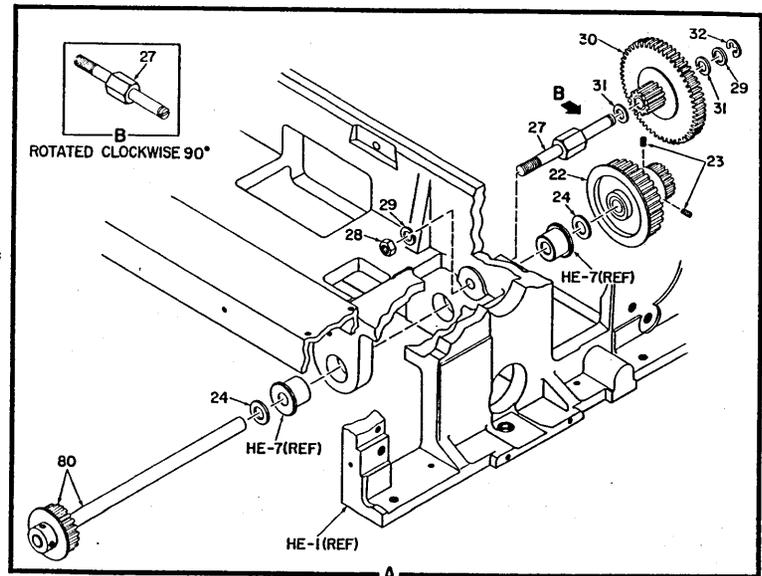
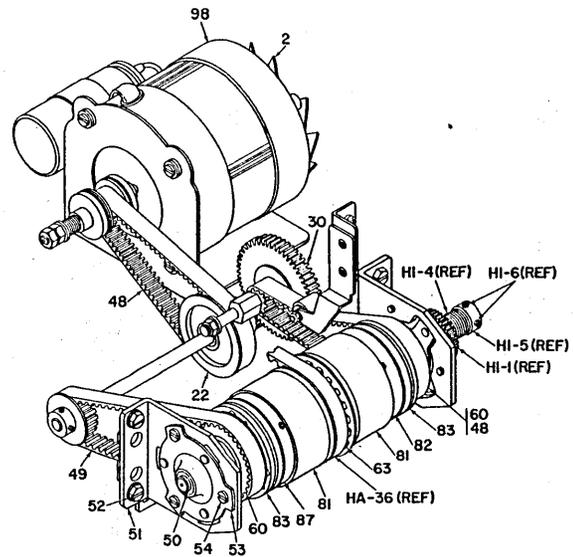
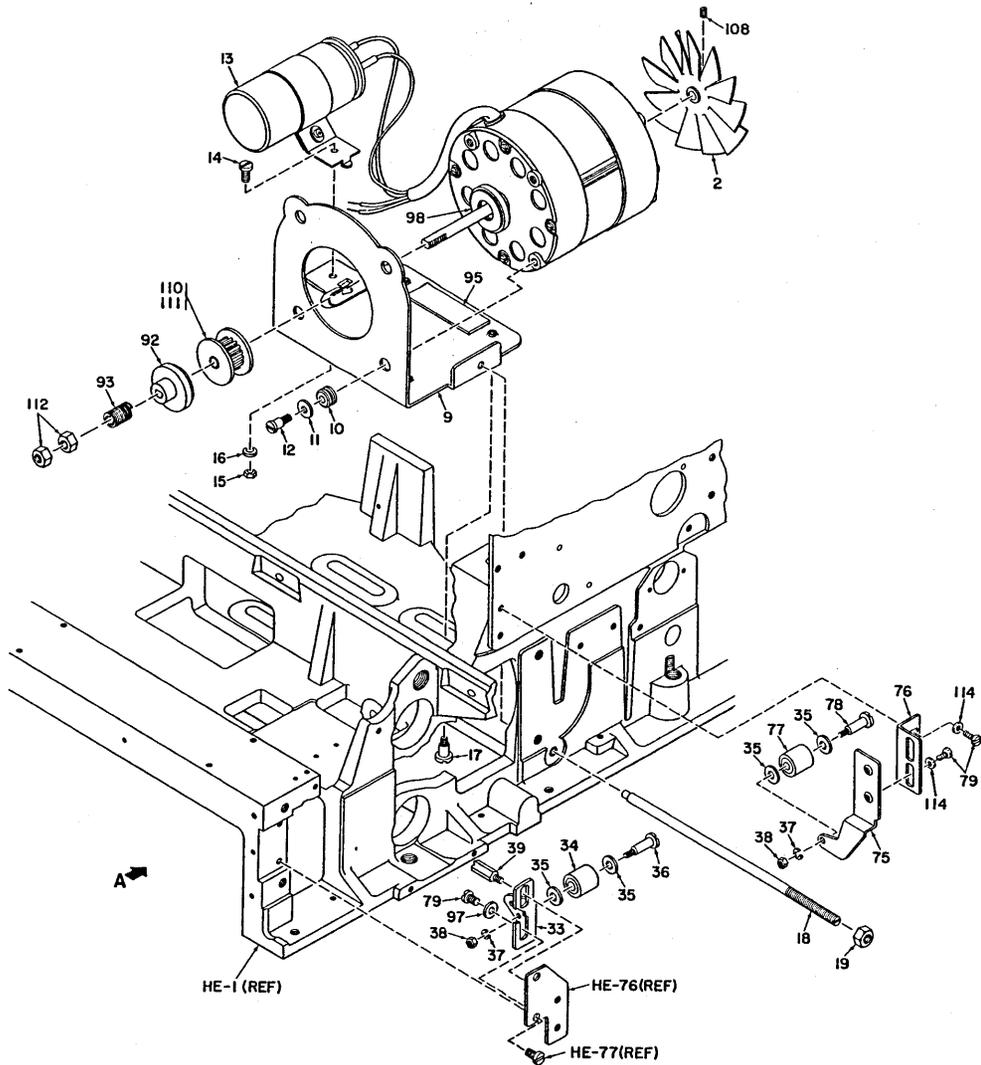


Figure 8-2. CARRIAGE MECHANISM - HA

REFER TO THE BEGINNING OF SECTION FOR POSSIBLE CHANGES NOT YET INCORPORATED ON THIS PAGE.

Figure HA - Carriage Mechanism

Reference Number	Part Number	Part Name	Quantity	Reference Number	Part Number	Part Name	Quantity
HA-1	525001000	Head bracket	1	HA-31	527243001	Roller (lower) for HE-23	1
HA-2	525002001	Fork for head adjustment	1	HA-32	525544001	Head adjusting knob	1
HA-3	007400716	Screw for HA-2	1	HA-33	525025001	Head lock knob	1
HA-4	028040247	Spring washer for HA-3, 6, 35	3	HA-34	028040247	Spring washer for HA-33	1
HA-5	525003000	Ribbon guide roller for head	2	HA-35	525027001	Shaft for HA-5	1
HA-6	525004001	Eccentric shaft for HA-5	1	HA-36	525029001	Main driving belt	1
HA-7	048020346	Snap ring for HA-6, 35	2	HA-41	007300716	Screw for	2
HA-8	021400106	Nut for HA-6, 35	2	HA-42	028030247	Spring washer for HA-41	2
	525005001	Carriage unit	1	HA-43	007064016	Screw for HA-36	1
		Note: This unit is assembled with parts covering reference number HA-9 and HA-10, also HA-19 through HA-35 and HA-41, 42, 57, 58.		HA-44	021060106	Nut for HA-43	3
HA-9	525006001	Carriage with control magnet	1	HA-45	525047000	Gib for HA-1	1
HA-10	525009001	Guide roller unit (upper)	2	HA-46	007301416	Screw for HA-45	2
HA-19	028060247	Spring washer for HA-10	2	HA-47	028030247	Spring washer for HA-46	2
HA-20	021060106	Nut for HA-10	2	HA-48	011401016	Set screw for HA-45	2
HA-21	525016001	Guide roller unit (lower)	1	HA-49	021400106	Nut for HA-48	2
HA-22	017061206	Bolt for HA-21	2	HA-50	525043001	Bracket for flat cable and Video Amplifier board.	1
HA-23	028060247	Spring washer for HA-22	2	HA-55	007400816	Screw for HA-50	2
HA-24	047310642	Spring pin for HA-21	2	HA-56	028040247	Spring washer for HA-55	2
HA-25	525020001	Eccentric Axle for HA-26	1	HA-57	025060236	Flat washer for HA-22	2
HA-26	527242001	Roller (upper) for HE-23	1	HA-58	525689001	Holder (A) for HA-59	1
HA-27	048030346	Snap ring for HA-25, 30	2	HA-59	525690001	Shaft (A) for HA-36	1
HA-28	028040247	Spring washer for HA-25, 30	2	HA-60	525716001	Spring (S) for HA-36	1
HA-29	021400106	Nut for HA-25, 30	2	HA-61	525691001	Adjusting nut for HA-59	1
HA-30	525022001	Axle for HA-31	1	HA-62	025040236	Flat washer for HA-59	2
				HA-63	550719002	Spring washer for HA-59	2
				HA-64	021400106	Nut for HA-59	2



REFER TO THE BEGINNING OF SECTION FOR POSSIBLE CHANGES NOT YET INCORPORATED ON THIS PAGE.

Figure 8-3. DRIVE MECHANISM - HB

Figure HB - Drive Mechanism

Reference Number	Part Number	Part Name	Quantity	Reference Number	Part Number	Part Name	Quantity
HB-2	525838001	Main motor fan w/set-screw	1	HB-80	525726001	Intermediate shaft w/pulley	1
HB-9	525060001	Motor bracket	1		525712001	Forward clutch unit	1
HB-10	510101001	Grommet for HB-98	4			Note: This unit is assembled with parts covering from reference number HB-81 to HB-85.	
HB-11	510061001	Washer for HB-10	4				
HB-12	525063001	Screw for HB-1, 9	4	HB-81	525095001	Clutch field assembly (forward and reverse)	2
HB-13	525064001	Capacitor unit for HB-98	1	HB-82	527325001	Clutch rotor, forward	1
HB-14	007400716	Screw for HB-13	1	HB-83	527329001	Clutch armature (forward and reverse)	2
HB-15	021400106	Nut for HB- 14	1	HB-84	021300822	Set-screw for HB-83	6
HB-16	028040247	Spring washer for HB-14	1	HB-85	021300106	Nut for HB-84	6
HB-17	525066001	Screw for HB-9 and frame	4			Note: This unit is assembled with parts covering reference number HB-83, HB-81, and HB-87.	
HB-18	525067001	Adjusting bolt for HB-48	1				
HB-19	021060106	Nut for HB-18	1	HB-87	527240001	Clutch rotor, reverse	1
HB-22	525069001	Intermediate pulley with gear	1	HB-92	525839001	Motor pulley driver	1
HB-23	525745001	Set-screw for HB-22, 80	3	HB-93	525749001	Spring for HB-92	1
HB-24	525071001	Felt washer for HB-80	2	HB-95	525846001	Cushion rubber for HB-98	1
HB-27	525075001	Idle shaft for HB-30	1	HB-96	025060236	Washer for HB-52	4
HB-28	021060106	Nut for HB-27	1	HB-98	525836001	Main motor w/fan and clutch plate	1
HB-29	025060236	Flat washer for HB-27	1	HB-108	525748001	Set-screw for HB-2	1
HB-30	525076001	Intermediate gear for forward clutch	1	HB-109	525923001	Spacer for HB-81	1
HB-31	525074001	Felt washer for HB-30	2	HB-110	527037001	Motor pulley (60 Hz)	1
HB-32	048040346	Snap ring for HB-27	1	HB-111	527035001	Motor pulley (50 Hz)	1
	525078001	Tensioner unit (front)	1	HB-112	021060306	Nut for HB-93	2
		Note: This unit is assembled with parts covering from reference number HB-33 to HB-39.		HB-114	025040236	Washer for HB-79	2
HB-33	525079001	Tensioner bracket (front)	1				
HB-34	525080001	Tensioner	1				
HB-35	511146001	Felt washer for HB-34	4				
HB-36	525082001	Axle for HB-34	1				
HB-37	028030247	Spring washer for HB-36, 78	2				
HB-38	021300106	Nut for HB-36, 78	2				
HB-39	525530001	Screw for HB-33	1				
HB-48	525672001	Timing belt (100XL)	1				
HB-49	525671001	Timing belt (130XL)	2				
HB-50	525089001	Shaft for clutches	1				
HB-51	525090001	Bushing bracket	2				
HB-52	525752001	Screw for HB-51	4				
HB-53	525092001	Bushing unit for HB-50	2				
HB-54	007400616	Screw for HB-53	6				
HB-60	525711001	Pulley for forward and reverse clutch	2				
HB-61	525744001	Set-screw for HB-60	4				
HB-62	525102001	Sleeve for HB-50	2				
HB-63	525104001	Pulley for main belt (HA-36)	1				
HB-64	525103001	Key for HB-56, 63	3				
HB	525741001	Tensioner Unit (Rear)	1				
		Note: This unit is assembled with parts covering from reference number HB-75 through HB-79, including HB-35.					
HB-75	525694001	Tensioner bracket (rear) A	1				
HB-76	525695001	Tensioner bracket (rear) B	1				
HB-77	525703001	Tensioner (L)	1				
HB-78	525696001	Axle for HB-77	1				
HB-79	007400616	Screw for HB-75, 76	5				

REFER TO THE BEGINNING OF SECTION FOR POSSIBLE CHANGES NOT YET INCORPORATED ON THIS PAGE.

8-9

REV. C

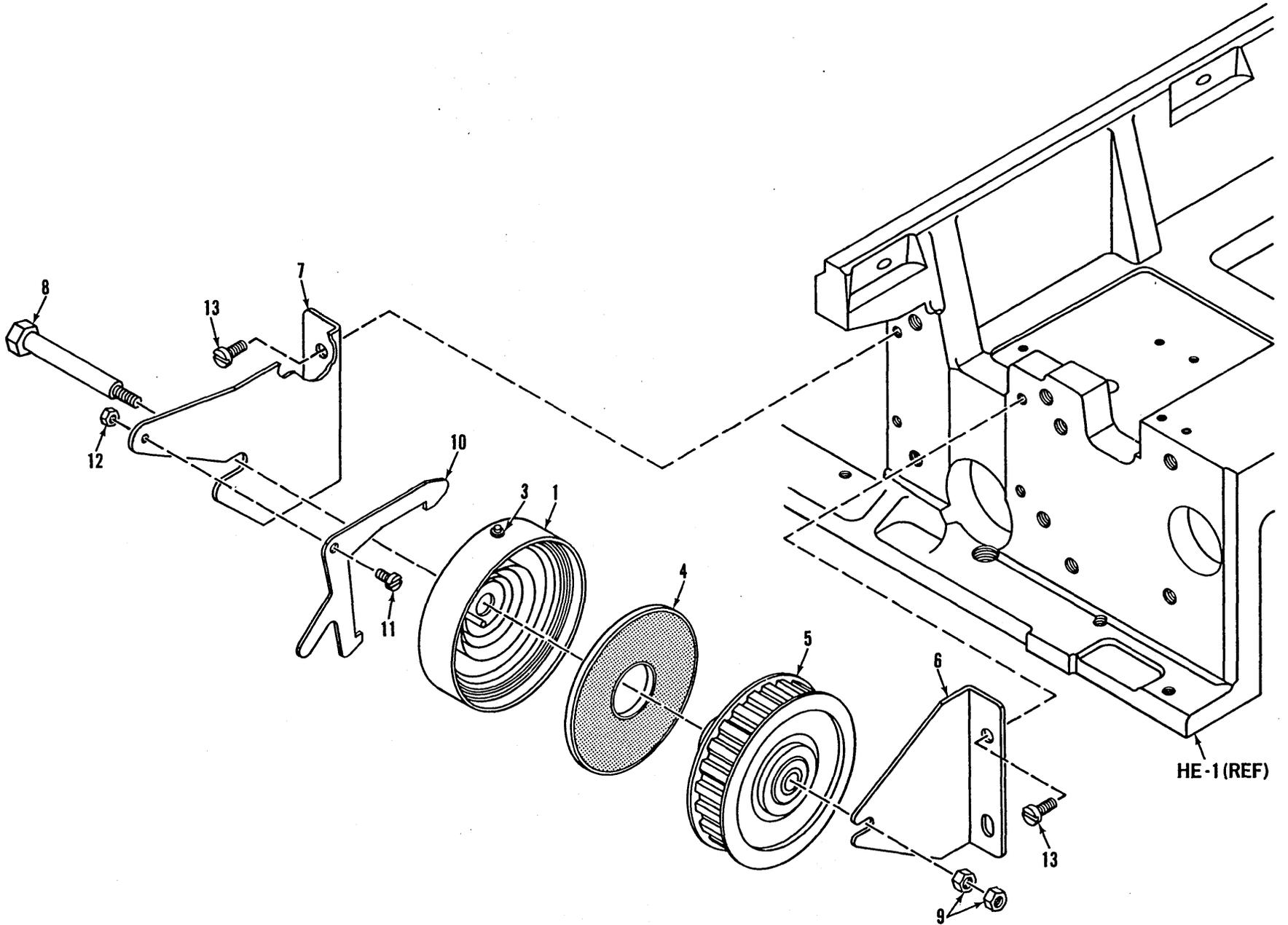


Figure 8-4. SPRING DRUM - HC

Figure HC - Spring Drum

Reference Number	Part Number.	Part Name	Quantity
	525108001	Spring drum complete unit	1
		Note: This is assembled with parts covering reference number HC-1 and HC-3 through HC-13.	
HC-1	525636001	Spring drum w/main spring	1
HC-3	048015346	Snap ring for HC-1	1
HC-4	525637001	Shielding plate for HC-1	1
HC-5	525115001	Pulley for HC-1	1
HC-6	525120001	Bracket (front) for HC-1	1
HC-7	525121001	Bracket (rear) for HC-1	1
HC-8	525119001	Shaft for HC-1, 5	1
HC-9	021400106	Nut for HC-8	2
HC-10	525122001	Pawl for HC-1	1
HC-11	007300616	Screw for HC-10	1
HC-12	021300106	Nut for HC-11	1
HC-13	007400516	Screw for HC-6, 7	4

REFER TO THE BEGINNING OF SECTION FOR POSSIBLE CHANGES NOT YET INCORPORATED ON THIS PAGE.

8-11

REV. A

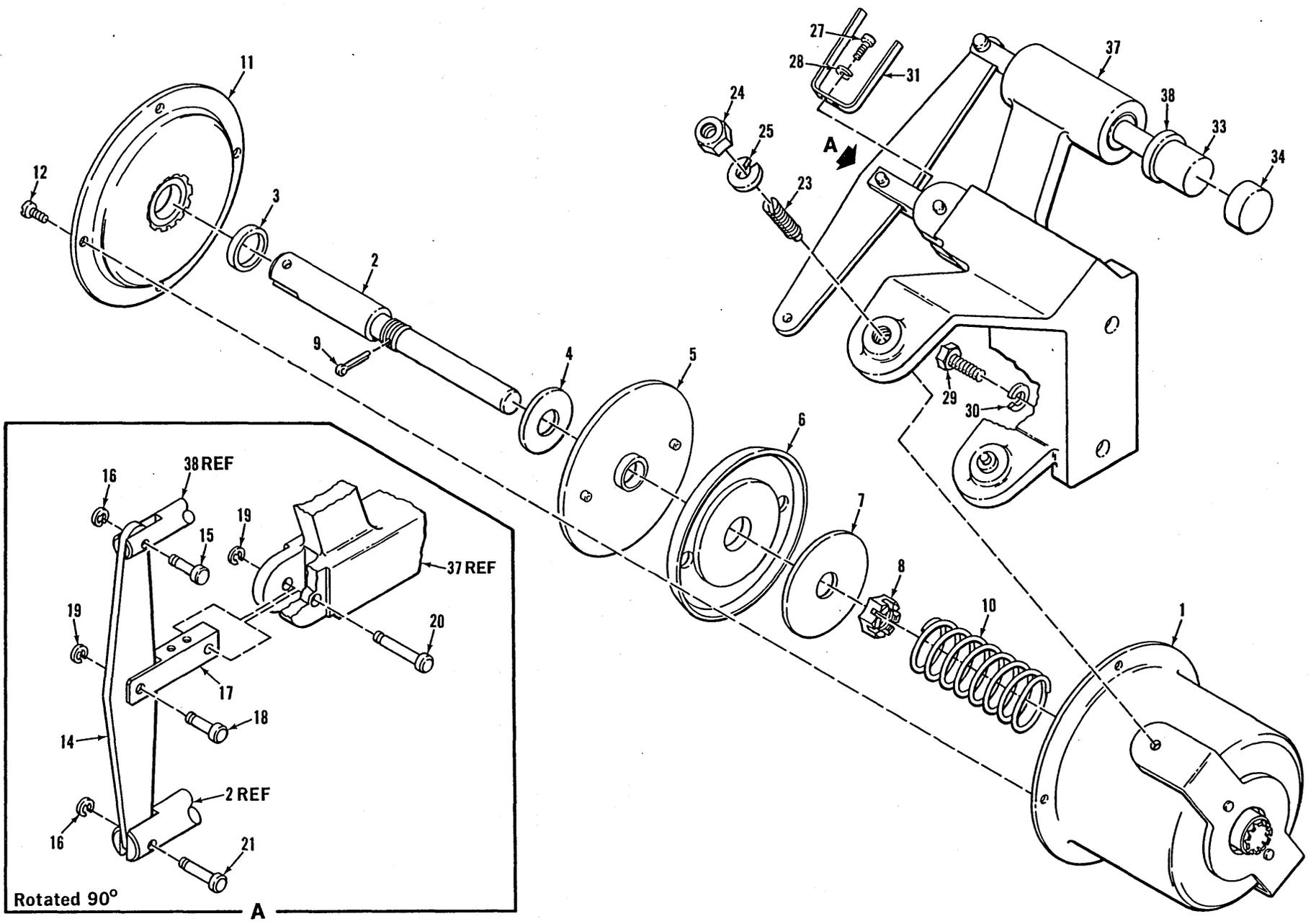


Figure 8-5. DAMPER - HD

Figure HD - Damper

Reference Number	Part Number	Part Name	Quantity
	527363001	Damper complete unit	1
		Note: This unit is assembled with the parts covering from reference number HD-1 to HD-12, HD-14 to HD-21, HD-23 to HD-25 and HD-27 through HD-34 and HD-37.	
HD-1	525124001	Damper cylinder	1
HD-2	525128001	Piston rod	1
HD-3	525547001	Cushion rubber for HD-4	1
HD-4	025100236	Washer for HD-2	1
HD-5	525129001	Piston	1
HD-6	525130001	Packing	1
HD-7	525131001	Steel Washer for HD-6	1
HD-8	525132001	Nut for HD-7	1
HD-9	045161806	Split pin for HD-8	1
HD-10	525133001	Spring for HD-2	1
HD-11	525134001	Lid for HD-11	4
HD-12	007300416	Screw for HD-11	4
HD-14	525142001	Pin for	1
HD-15	525143001	Pin for the HD-14, 32	1
HD-16	048020346	Snap ring for HD-15, 21	2
HD-17	525144001	Link for HD-14	1
HD-18	525145001	Pin for HD-14, 17	1
HD-19	048030346	Snap ring for HD-18, 20	2
HD-20	525146001	Pin for HD-17	1
HD-21	525147001	Pin for HD-2, 14	1
HD-23	525148001	Center screw for HD-1	1
HD-24	021060106	Nut for HD-23	1
HD-25	028060247	Spring washer for HD-24	1
HD-27	007300516	Screw for HD-31	1
HD-28	028030247	Spring washer for HD-27	1
HD-29	525149001	Screw for HD-22	2
HD-30	028060247	Spring washer for HD-29	2
HD-31	525661001	Spring for HD-14	1
	527318001	Carriage stopper lever unit	1
		Note: This unit is assembled with the parts covering from reference number HD-33, HD-34 and HD-38.	
HD-33	525669000	Damper cushion for HD-32	1
HD-34	525919001	Cap for HD-33	1
HD-37	527316001	Frame for HD-1	1
HD-38	527319001	Carriage Stopper Lever	1

Figure HE FRAME

Reference Number	Part Number	Part Name	Quantity	Reference Number	Part Number	Part Name	Quantity
HE-1	525151001	Frame	1	HE-64	005300814	Screw for power driver board cavity	4
HE-2	525762001	Platen	1	HE-65	525629001	Top cover switch	1
HE-3	525761001	Platen holder	1	HE-66	525651001	Switch cover for HJ-65	1
HE-4	007300716	Screw for HE-2	9	HE-67	007301816	Screw for HE-65, 66	2
HE-5	018102826	Bolt for HE-3	2	HE-68	021300106	Nut for HE-67	2
HE-6	525154001	Locating bolt for HE-3	2	HE-69	028030246	Spring washer for HE-67	2
HE-7	525155000	Bushing for HB-80	2	HE-70	525633001	Clutch stop (right)	1
HE-8	525866001	Guide bar to carriage	1	HE-71	525631001	Clutch stop (left)	1
HE-9	017401416	Bolt for HE-8	5	HE-72	007400616	Screw for HE-70, 71	2
HE-21	525169001	Reed Switch Holder	2	HE-73	025040236	Washer for HE-72	2
HE-22	007300716	Screw for HE-21	4	HE-74	007400816	Screw for cavity	2
HE-23	525171001	Guide plate for carriage	1	HE-75	028040247	Washer for HE-74	2
HE-24	525181001	Rubber feet	4	HE-76	525187001	Holder for HB-33	1
HE-25	525182001	Screw for HE-24	8	HE-77	007400616	Screw for HE-76	2
HE-26	025060335	Washer for HE-25	8		525720001	Encased Limit Switch (Reed) complete unit	1
HE-28	007300516	Screw for HE-62, 63	2			Note: This unit is assembled with parts including Reference Numbers HE-78 through HE-84 and HE-21, HE-22.	
HE-30	527048001	Carriage stopper right	1	HE-78	525721001	Limit switch (reed) w/case	2
HE-31	028120247	Spring washer for HE-30	1	HE-79	525725001	Adjusting holder for HE-78	2
HE-40	525203001	Operator panel holder	1	HE-80	001301403	Screw for HE-78	2
HE-41	007400616	Screw for HE-40	2	HE-81	025030133	Washer for HE-78	2
HE-43	525532001	Top cover stop	1	HE-82	028030247	Spring washer for HE-78	2
HE-44	525500001	Magnet for HE-43	1	HE-83	021300106	Nut for HE-78	2
HE-45	007300416	Screw for HE-43	2	HE-84	007300516	Screw for HE-79	4
HE-47	025040236	Washer for HE-48	4	HE-85	525935001	Chassis (right)	1
HE-48	007400516	Screw for HE-89, 90	4	HE-86	525936001	Chassis (left)	1
HE-54	525617001	Bracket (right) for C (View C)	1	HE-87	525752001	Bolt for HE-85, 86	4
HE-55	525616001	Bracket (left) for C (View C)	1	HE-88	028060247	Spring washer for HE-87	4
HE-58	007300616	Screw for HE-54, 55	4	HE-89	525852001	Operator panel (A)	1
HE-59	025030236	Washer for HE-58	4	HE-90	525854001	Support for HE-89	1
HE-61	001400713	Screw for HE-23	4	HE-93	025030133	Washer for HE-84	2
HE-62	525647001	Guide plate (right) for cavity	1	HE-94	025030236	Washer for HE-22	2
HE-63	525648001	Guide plate (left) for cavity	1	HE-96	025040236	Washer for HG-41	1
				A	63508140	Clasp	1
				B	34000032	Lockwasher, millimeter (alternate: 028030247)	4
				C	63002440-1	Flexible Mylar Timing Fence	1
				D	63508106-1	Clamp	1
				E	34000052	Washer, flat, 3 millimeter (alternate: 025030236)	2
				F	34000048	Screw, F111, HD MP3X6 mm lg (alternate: 001300716, MP3X7 mm lg)	4
						The HK drawing has been deleted but the following parts have been retained for Model 101/101A.	
				HK-31	525642001	Cover, Holder (Front Right)	1
				HK-32	525643001	Cover, Holder (front left)	1
				HK-33	525644001	Cover, Holder	4
				HK-35	017501016	Bolt for HK-31, 32, 33	12
				HK-76	525658001	Cover, (Right)	1
				HK-77	525659001	Cover, (Left)	1
				HK-78	007400516	Screw for HF-76, 77	2

Figure HF - Paper Feed Mechanism

Reference Number	Part Number	Part Name	Quantity
HF-2	525207001	Holder for HF-3	2
HF-3	525208001	Bushing for HF-98	2
HF-4	525209001	Retainer for HF-3	2
HF-5	007400516	Screw for HF-2, 4	4
HF-6	048050346	Snap ring for HF-98	1
HF-7	525210001	Guide bar for pin feed unit	1
HF-8	525551001	Collar for pin feed unit	1
HF-9	525743001	Set-screw for HF-8	1
HF-10	007401016	Screw for HF-7	1
HF-11	021400106	Nut for HF-7	2
HF-13	525747001	Set-screw for HF-12, 16	4
HF-14	525213001	Pin feed pulley	1
HF-15	525743001	Set-screw for HF-14	2
HF-16	525215000	FF reader gear	1
HF-76	525855001	Paper pan (upper)	4
HF-77	007400816	Screw for HF-76	4
HF-78	52723001	Paper Empty micro switch	1
HF-79	007021616	Screw for HF-78	2
HF-80	028020247	Spring washer for HF-79	2
HF-81	021020106	Nut for HF-79	2
HF-82	525273000	Guide (right) for HF-77, 85	1
HF-83	007401016	Screw for HF-82, 84	4
HF-84	525274000	Guide (left) for HF-77, 85	1
HF-85	525859001	Paper pan (lower)	1
HF-86	007400816	Screw for HF-85	4
HF-87	525276001	Pin feed cover	1
HF-88	007300516	Screw for HF-87	4
HF-89	525763001	Paper pan (front)	1
HF-90	525278001	Screw for HF-89	2
HF-91	525861001	Spring for HF-89	2
HF-97	025050236	Washer for HF-88	4
HF-98	527081801	Driving shaft for pin feed unit	1
HF-99	525764001	Paper feed knob	1
HF-100	525769001	Coupler for HF-99	1
HF-101	525770001	Sleeve for HF-100	1
HF-102	525748001	Screw for HF-100	2
HF-103	525766001	Collar for HF-99	1
HF-104	525767001	Spring for HF-99	1
HF-105	525768001	Spring for HF-99	1
HF-106	048040346	Snap ring for HF-99	1
HF-107	525227001	Cap for HF-99	1
HF-108	025630236	Washer for HF-79	2
HF-109	527238001	Actuator for Paper Empty micro-switch (HF-78)	1
A	30410004	Clip, static discharge	1
B	33723717-10	Screw, Sheet metal, No. 4	1
C	34815005	Washer, internal, Lock	1

REFER TO THE BEGINNING OF SECTION FOR POSSIBLE CHANGES NOT YET INCORPORATED ON THIS PAGE.

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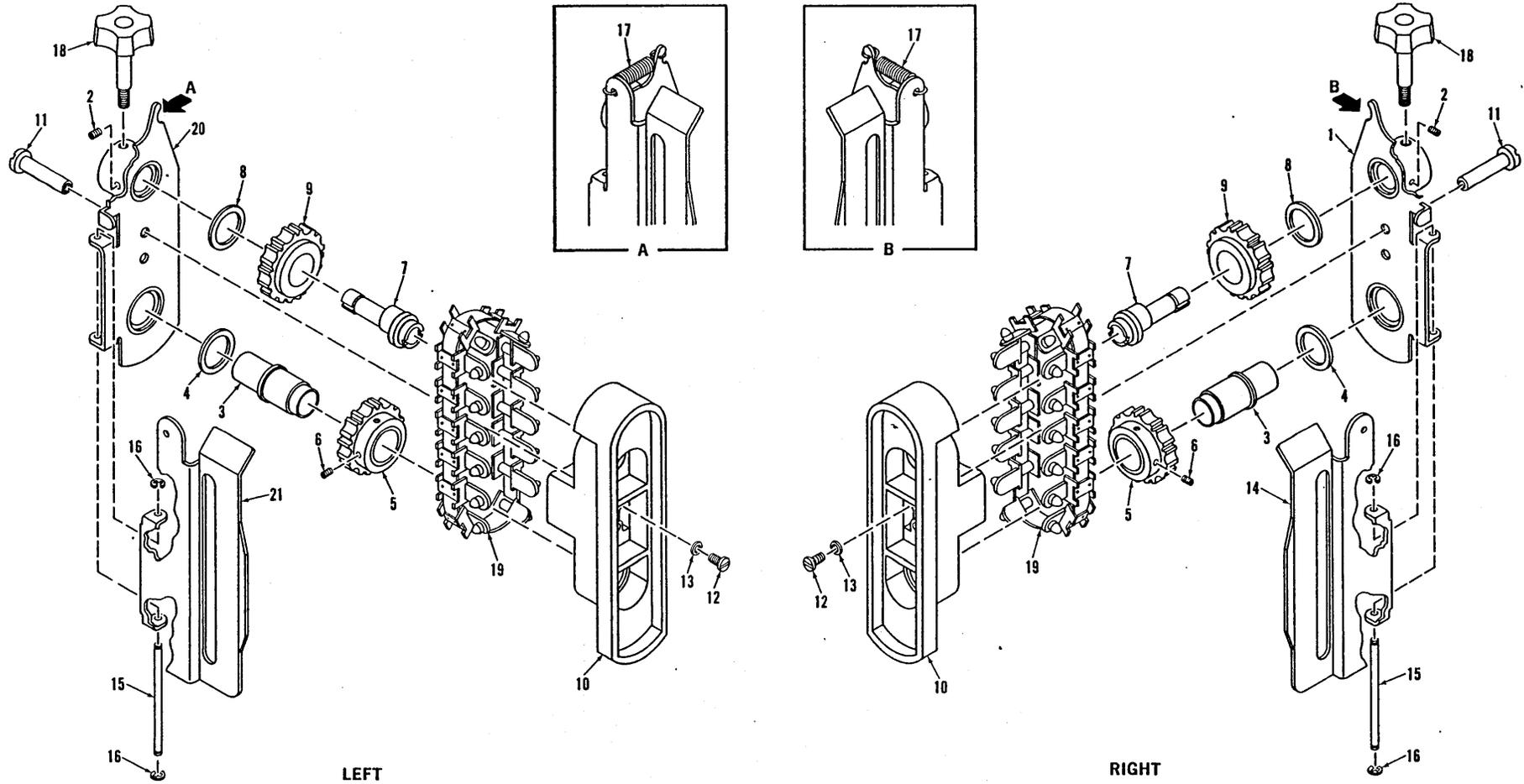


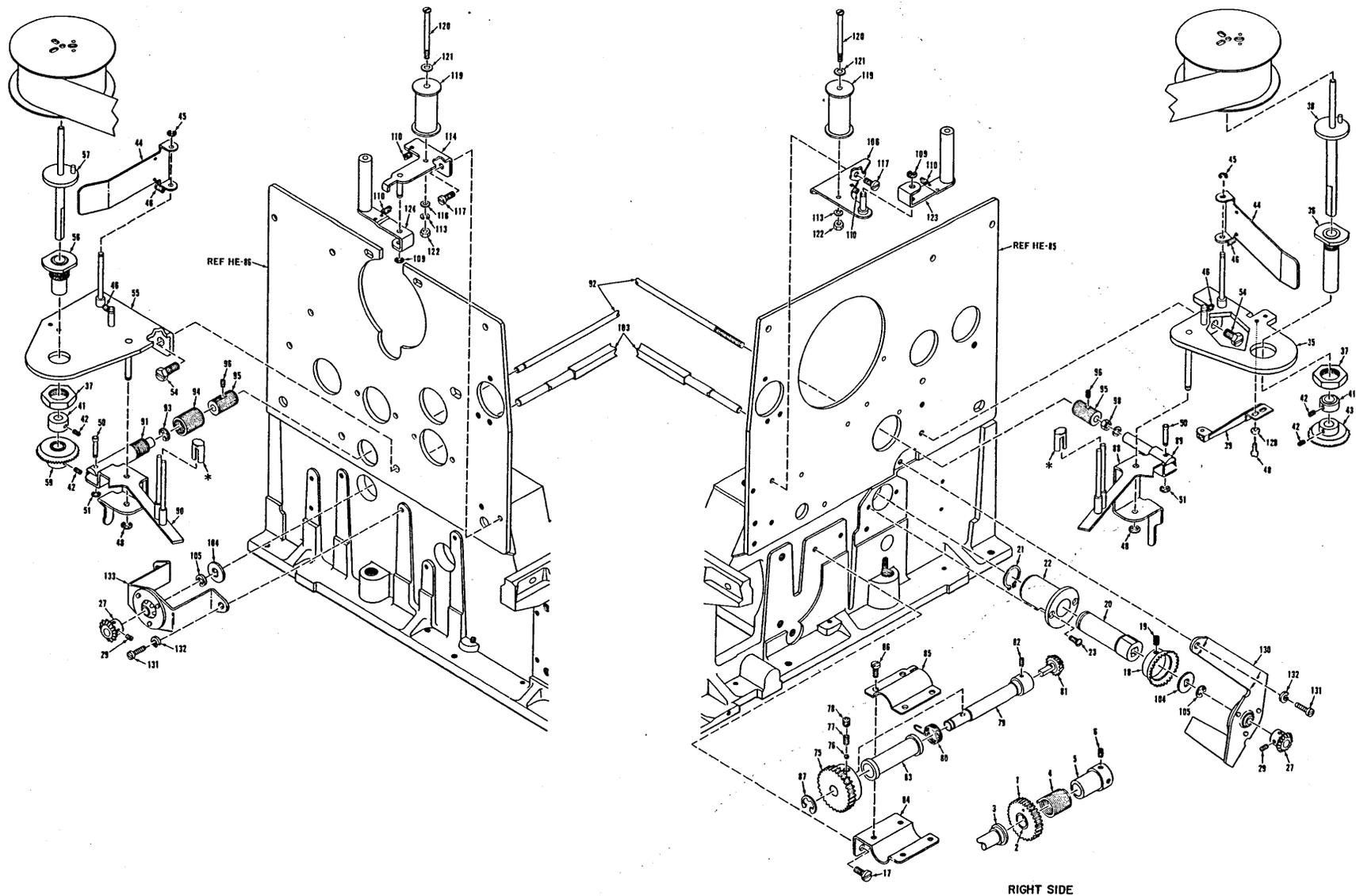
Figure 8-8. PIN FEED MECHANISM (LEFT & RIGHT) - HG

Figure HG - Pin Feed Mechanism

Reference Number	Part Number	Part Name	Quantity
	525280001	Pin feed unit (right) complete Note: This unit is assembled with parts covering from reference number HG-1 to HG-19.	1
HG-1	525281001	Pin feed holder (right)	1
HG-2	525747001	Set-screw for HG-7	2
HG-3	525287001	Driving sleeve	2
HG-4	525288001	Washer for HG-3	2
HG-5	525289001	Driving pulley for HF-3	2
HG-6	525746001	Set-screw for HG-5	4
HG-7	525290001	Eccentric sleeve for HF-1	2
HG-8	525291001	Driving pulley	2
HG-9	525292001	Driving pulley	2
HG-10	525294001	Guide for paper HG-19	2
HG-11	525295000	Stud for HG-1, 10	4
HG-12	025030236	Washer for HG-13	4
HG-13	001300716	Screw for HG-11	4
HG-14	525296001	Paper holding plate (right)	1
HG-15	525297001	Shaft for HG-14, 21	2
HG-16	048015346	Snap ring for HG-15	4
HG-17	525298001	Spring for HG-15	2
HG-18	525552001	Fixing knob	2
HG-19	525300001	Pin feed belt unit	2
	525304001	Pin feed unit (left) complete Note: This unit is assembled with parts covering from reference number HG-2 to HG-21, except HG-14.	1
HG-20	525305001	Pin feed holder (left)	1
HG-21	525309001	Paper Holding plate (left)	1

Figure HH - Form Feed Mechanism

Reference Number	Part Number	Part Name	Quantity	
	527241001	Form feed complete unit	1	
		Note: This unit is assembled with parts covering from reference number HH-2, HH-5 through HH-31, HH-33 to HH-35 and HH-37 through HH-83.		
HH-2	525316001	FF chassis (left)	1	
HH-5	525323001	Capacitor with bracket for HH-71	1	
HH-6	007400616	Screw for HH-5	1	
HH-7	028040247	Spring washer for HH-7	1	
HH-8	021400106	Nut for HH-7	1	
HH-9	525326001	Stud screw for HH-71	4	
HH-10	510101001	Cushion Rubber for HH-71	4	
HH-11	510061001	Washer for HH-9	4	
HH-12	525328001	FF Motor Gear	1	
HH-13	525743001	Set-screw for HH-2	1	
	525329001	FF clutch unit	1	
		Note: This unit is assembled with parts covering from reference number HH-14 to HH-22, HH-24 and HH-95.		
HH-14	525330001	FF clutch inside cam	1	
HH-15	525333001	FF clutch releaser	1	
HH-17	048020346	Snap ring for HH-15, 16	2	
HH-18	525339001	FF clutch gear	1	
HH-19	508532001	Roller for HH-14	3	
HH-20	525341001	Guide for HH-19	1	
HH-21	048080346	Snap ring for HH-20	1	
HH-22	510062001	Spring for HH-14, 16	2	
HH-23	525342001	Gear with stop cam	1	
HH-24	525743001	Set-screw for HH-14, 23, 27	6	
HH-25	525354001	Shaft for FF clutch	1	
HH-26	525353001	Bushing for HH-25, 28	4	
HH-27	525344001	FF idle gear	1	
HH-28	364000001	Timing belt for HH-27	1	
HH-29	525355001	Shaft for HH-27	1	
HH-30	048040346	Snap ring for HH-29, 39	3	
HH-31	525356001	Nut for HH-1, 2	3	
	525347001	FF clutch and magnet unit	1	
		Note: This unit is assembled with parts covering from reference number HH-33 to HH-35 and HH-80.		
HH-33	525351001	Armature for HH-96	1	
HH-37	511091001	Spring for backstopper	1	
HH-38	525357001	FF reader idle gear	1	
HH-39	525359001	Shaft for HH-38	1	
HH-40	511146001	Felt washer for HH-38	2	
HH-41	025040236	Washer for HH-42	1	
HH-42	021400106	Nut for HH-39	1	
	525360001	Tape reader unit (lower)	1	
		Note: This unit is assembled with parts covering from reference number HH-43 to HH-54.		
HH-43	527172001	Reader bracket (lower)	1	
HH-44	525363001	Sprocket for tape	1	
HH-45	525746001	Set-screw for HH-44	2	
HH-46	525365001	Shaft for HH-44	1	
HH-47	525366001	Gear for HH-46	1	
	048030346	Snap ring for HH-46	1	
	525367001	Reader lamp holder unit	1	
		Note: This unit is assembled with parts from reference number HH-49 to HH-51.		
	HH-49	525368001	Lamp holding P/C board	1
	HH-50	525372001	Lamp for reader	2
	HH-51	525373001	Lead wire for HH-49	2
	HH-52	007020416	Screw for HH-49	1
	HH-53	525374001	Lid for HH-43	1
	HH-54	007301216	Screw for HH-43, 53	2
	HH-55	007401416	Screw for HH-43	2
	HH-56	021400106	Nut for HH-55	2
		525375001	Tape reader unit (upper)	1
		Note: This unit is assembled with parts covering from reference number HH-57 to HH-65 and HH-73.		
	HH-57	525376001	Reader bracket (upper)	1
	HH-58	525377001	Plate spring for HH-57	1
	HH-59	007300416	Screw for HH-57, 58	2
		525378001	Reader P/C board unit	1
		Note: This unit is assembled with parts covering from reference number HH-60 to 62.		
	HH-60	525380001	P/C board for phototransistor	1
	HH-61	525383001	Phototransistor (MOTOROLA MRD 150-173)	2
	HH-62	525568001	Transistor for HH-61 (MOTOROLA 2N3904)	2
	HH-63	007020416	Screw for HH-60	2
	HH-64	525388001	Lid for HH-57	1
	HH-65	007020416	Screw for HH-64	3
	HH-66	525389001	Shaft for HH-57	1
	HH-67	021400106	Nut for HH-66	1
	HH-68	048040346	Snap ring for HH-66	1
	HH-69	525390001	Tape guide	1
	HH-70	021400106	Nut for form feed complete unit	3
	HH-71	525319001	FF motor with fan	1
	HH-71-1	527314C01	Fan w/set-screw	1
	HH-73	525660001	Blinder for HH-50	1
	HH-74	525753001	Back stopper	1
	HH-75	007300803	Screw for HH-74	1
	HH-76	503092001	Washer for HH-74	1
	HH-77	525756001	Collar for HH-74	1
	HH-78	028030247	Spring washer for HH-74	1
	HH-79	021300106	Nut for HH-74	1
	HH-81	525901001	FF chassis (right)	1
	HH-82	025030236	Washer for HH-83	2
	HH-84	527027001	Solenoid (for HH-96)	1
	HH-85	527026001	Spring (for HH-33)	1
	HH-86	527249001	Screw (for HH-96)	2
	HH-95	525336021	FF clutch releasing pawl	2
	HH-96	527856001	FF magnet (A) (air-gap)	1



REFER TO THE BEGINNING OF SECTION FOR POSSIBLE CHANGES NOT YET INCORPORATED ON THIS PAGE.

Figure 8-10. RIBBON FEED MECHANISM - HI

Figure HI - Ribbon Feed Mechanism

Reference Number	Part Number	Part Name	Quantity		Part Number	Part Name	Quantity
HI-1	525391001	Clutch gear	1	HI-85	525403001	Cover for HI-83	1
HI-2	525392001	Bushing for HI-1, 4	1	HI-86	007300416	Screw for HI-84, 85	4
HI-3	525393001	Spacer for HI-1	1	HI-87	048070346	Snap ring for HI-79	1
HI-4	525394001	Clutch spring	1	HI-88	525681001	Reverse control lever (right)	1
HI-5	525395001	Sleeve for HI-4	1	HI-89	525697001	Connector (R.A.) for HI-92	1
HI-6	525744001	Set-screw for HI-5	2	HI-90	525682001	Reverse control lever (left)	1
HI-17	007400516	Screw for HI-84	2	HI-91	525698001	Connector (L.A.) for HI-92	1
HI-18	525404001	Driving bevel gear	1	HI-92	525700001	Ribbon reversing rod	1
HI-19	525743001	Set-screw for HI-18, 20	2	HI-93	048030346	Snap ring for HI-92	1
HI-20	525407001	Sleeve for HI-19	1	HI-94	525699001	Coupler for HI-91	1
HI-21	048140146	Snap ring for HI-20	1	HI-95	525702001	Stopper for HI-89, 94	2
HI-22	525408001	Bushing for HI-20	1	HI-96	525746001	Set-screw for HI-95	2
HI-23	005300814	Screw for HI-22	2	HI-97	028040247	Spring washer for HI-89	2
HI-27	525411001	Bevel gear for HI-103	2	HI-98	021400106	Nut for HI-89	1
HI-29	525746001	Set-screw for HI-27	4	HI-99	525667001	Tension roller holder (right)	1
	525420001	Ribbon spool holder complete unit (right)	1	HI-100	525479001	Eccentric axle for HI-67	1
		Note: This part is assembled with parts covering reference number HI-35 through HI-51 and HI-88, 89.		HI-101	028030247	Spring washer for HI-100	1
HI-35	525421001	Ribbon spool holder (right)	1	HI-102	021300106	Nut for HI-100	1
HI-36	525426001	Bearing for HI-38	1	HI-103	525730001	Driving slide shaft A	1
HI-37	525427001	Nut for HI-36, 56	2	HI-104	525731001	Washer for HI-103	2
HI-38	525429001	Ribbon spool shaft (right)	1	HI-105	048050347	Snap ring for HI-103	2
HI-39	525441001	Control spring for HI-88	1		525464001	Guide roller unit (right)	1
HI-40	007300516	Screw for HI-39	2			Note: This part is assembled with parts covering reference number HI-106, HI-113, HI-119 thru HI-122.	
HI-41	525433001	Collar for HI-57	2	HI-106	525465001	Guide roller holder (right)	1
HI-42	525747001	Set-screw for HI-41, 43, 59	8	HI-109	048025346	Snap ring 106, 114	2
HI-43	525434001	Bevel gear (right) for HI-38	1	HI-110	512463001	Spring for HI-115	2
HI-44	525611001	Ribbon holding plate, w/pad	2	HI-113	028030247	Spring washer for HI-120	1
HI-45	048020346	Snap ring for HI-44	2		525475001	Guide roller unit (left)	1
HI-46	512462001	Spring for HI-44	2			Note: This part is assembled with parts covering reference HI-110 through HI-117 and HI-119 through HI-122.	
HI-48	048025346	Snap ring for HI-88, 90	2	HI-114	525476001	Guide roller holder (left)	1
HI-50	525440001	Pin for HI-89, 91	2	HI-116	025030236	Washer for HI-120	1
HI-51	048020346	Snap ring for HI-50	2	HI-117	007400516	Screw for HI-106, 114	4
HI-54	525541001	Bolt for HI-35, 55	4	HI-119	525932000	Guide Roller	2
	525446001	Ribbon spool holder complete unit (left)	1	HI-120	525992001	Screw for HI-119	2
		Note: This part is assembled with parts reference number HI-37, 41, 42, 44, 45, 46, 48, 50, 51 and HI-55 through HI-59 and HI-90, 91.		HI-121	025030336	Washer for HI-119	2
HI-55	525447001	Ribbon spool holder (left)	1	HI-122	021300106	Nut for HI-120	2
HI-56	525450001	Bearing for HI-57	1	HI-123	527049001	Tension lever unit (right)	1
HI-57	525451001	Ribbon spool shaft (left)	1	HI-124	527202001	Tension lever unit (left)	1
HI-59	525454001	Bevel gear (left) for HI-57	1	HI-128	025030133	Washer for HI-40	2
	525396001	Driving shaft unit	1	HI-130	527322001	Holder for HI-103 (right)	1
		Note: This part is assembled with parts covering reference number HI-75 through HI-87		HI-131	007400816	Screw for HI-130 and HI-133	4
HI-75	525398001	Driving gear for HI-79	1	HI-132	028040247	Washer, spring for HI-131	4
HI-76	071039750	Ball for HI-75	1	HI-133	527323001	Holder for HI-103 (left)	1
HI-77	525630001	Spring for HI-76	1	*	63002294	Cap (Part of HI-88 and HI-90)	2
HI-78	012500516	Set-screw for HI-77	1				
HI-79	525397001	Driving shaft	1				
HI-80	525399001	Clutch spring for HI-79	1				
HI-81	525400001	Bevel gear for HI-79	1				
HI-82	525748001	Set-screw for HI-81	2				
HI-83	525401001	Bushing for HI-79	1				
HI-84	525402001	Holder for HI-79	1				

Figure 8-11. Electrical Hardware (No Drawing Included) - HJ

Reference Number	Part Number	Part Name	Quantity
HJ-1	525733001	Transformer Unit (Multitap)	1
HJ-2	007402216	Screw for HJ-1 and frame	4
HJ-3	525492001	ON/OFF Switch (1820-RL-Molex)	1
HJ-4	525493001	SELECT Switch (1820-RL-Molex)	1
HJ-4A	37253790	Lamp, (GE 379 equiv.-screw-base) 5- volt for HJ-3, 4	1
HJ-5	525494001	TOP OF FORM Switch	1
HJ-6	525495001	FORMS OVERRIDE Switch	1
HJ-7	525496001	Lamp for PAPER EMPTY, multiple purpose	2
HJ-8	525542001	Clip for HJ-7	2
HJ-9	525564000	In-line connector (Molex 1375-P2) (See Item 1 for mating connector (P13) on LM of Harness Assembly (W1), Ref. Dwg. 63002253, Section 7)	1
HJ-9A	527234000	Connector cover for item HJ-9	1
HJ-10	525548001	Bracket for HJ-9	1
HJ-11	007400716	Screw for HJ-10	2
HJ-12	028030247	Spring washer for HJ-11	2
HJ-13	525862001	Wire Harness	1
HJ-14	525558001	Bushing for HJ-13	1
HJ-15	525565001	Terminal (4P)	1
HJ-16	007300516	Screw for HJ-15	1
HJ-17	120370001	Holder for HJ-13 (A)	1
HJ-18	120679001	Holder for HJ-13 (B)	3
HJ-19	525664000	Holder for HJ-13 (#6)	4
HJ-20	007301016	Screw for HJ-17, 18, 19	13
HJ-21	025030236	Washer for HJ-20	13
HJ-22	207216000	Splicer (#2)	8
HJ-23	525570001	Wire (W-66)	1
HJ-30	525674001	Splicer cap (#3)	1
HJ-31	516218001	Groundwire for transformer	2
HJ-32	515456001	Groundwire for main motor	1
HJ-33	007400516	Screw for HJ-31, 32	5
HJ-34	550719002	External lock-washer for HJ-33	5
HJ-35	525675001	Insulating tube (#7) for main motor capacitor	2
HJ-40	025040236	Washer for HJ-18	1
HJ-41	340400001	Nylon band	4
HJ-42	525864001	Cap for operation panel	1
HJ-43	525865001	Spiral cord holder	1
HJ-44	525758000	Cord holder for HJ-13 (#5)	2
HJ-46	525900000	Connector receptacle for cooling fan (for mating connector, see A-16)	1
HJ-47	525899001	Bracket for HJ-46	1
HJ-48	007300516	Screw for HJ-47	2
HJ-49	525899001	Connector holder	1
HJ-50	525898001	Splicer cap (#8)	2
HJ-51	525896001	Head wire for HJ-9, pin 13, W90	1
HJ-52	525897001	Head wire for HJ-9, pin 15, W91	1
HJ-53	525894001	Cooling fan wire #1 (from main frame harness)	1
HJ-54	525895001	Cooling fan wire #2 (from main frame harness)	1
HJ-62	527029001	Resistor 40 ohms, 40W, (for solenoid HH-84)	1
HJ-63	527028001	Heat Sink (for HJ-62)	1
HJ-64	007401016	Screw (for HJ-18, 63)	1
HJ-65	017501016	Bolt (for HJ-18, 63)	1
HJ-66	007400416	Screw for gnd wire on HH-71	1

REFER TO THE BEGINNING OF SECTION FOR POSSIBLE CHANGES NOT YET INCORPORATED ON THIS PAGE.

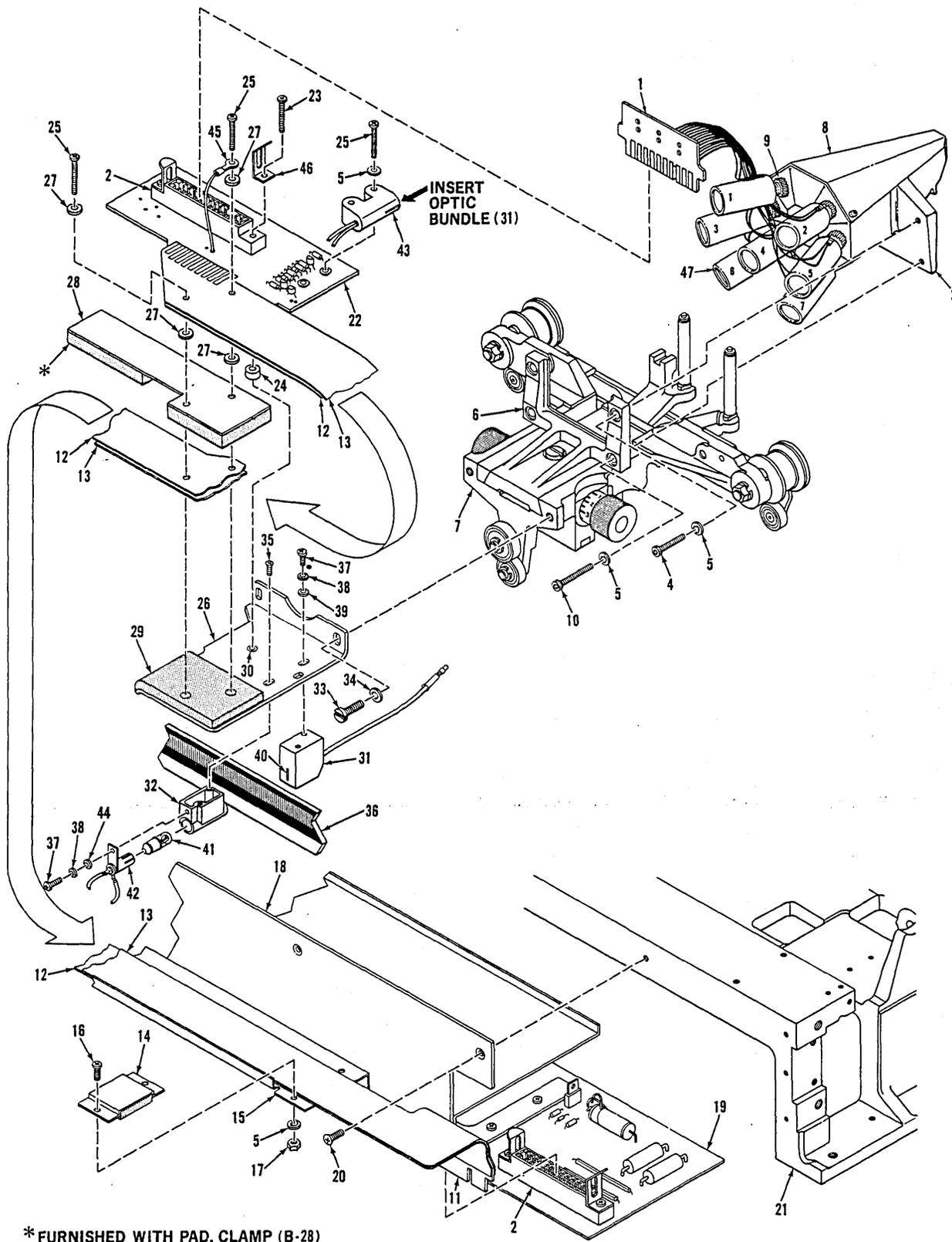


Figure 8-12. PRINT HEAD AND ASSOCIATED ASSEMBLIES (B)

REFER TO THE BEGINNING OF SECTION FOR POSSIBLE CHANGES NOT YET INCORPORATED ON THIS PAGE.

Figure 8-12 (B)* Print Head and Associated Assemblies

Reference Number	Part Number	Part Name	Quantity
B-1	63001040-1	Fingerboard, solenoid, 10 position	1
B-2	31230011	Connector P.C., 20 contact	2
B-3	63002437-1	D.R. Head Assembly (7-wire)	1
B-4	34114161	Screw, Hex, Socket, Cap (4-40 x 1/2 lg)	2
B-5	34815007	Washer, Lock, Int., No. 4	5
B-6	525001000 (HA-1)	Head Bracket	1
B-7	525005001	Carriage Unit	1
B-8	63002483-1	Cover, Print Head	1
B-9	63002122-1	Nut, Locking, Solenoid	1
B-10	34114201	Screw, Hex, Socket, Cap (4-40 x 5/8)	2
B-11	63001064-1	Connector, Fingerboard (Part of cables, HN-12, 13)	1
B-12	63002312-2	Ribbon Cable, Bottom	1
B-13	63002312-1	Ribbon Cable, Top	1
B-14	63002247-1	Cable Clamp Assembly	1
B-15	63002234-1	Cable Tray	1
B-16	34517105	Screw, Pan/Phil, (4-40 x 5/16)	2
B-17	34712007	Nut, Hex (4-40)	2
B-18	63002200-1	Bracket, Heat Sink	1
B-19	63002242-1	Comp. Board Ass'y, Power Driver	1
B-20	005300814	Screw (HE-64)	4
B-21	525151001	Frame (HE-1)	1
B-22	63002306	Video Amplifier Assembly	1
B-23	34517287	Screw, Pan/Phil, 4-40 x 7/8	1
B-24	36614406	Washer, Fibre (No. 6)	1
B-25	34517247	Screw, Pan/Phil, 4-40 x 3/4	3
B-26	525043001 (HE-50)	Bracket (Supports Lamp Ass'y, Fibre Optic Head, Flat Cable & Video Amp Board)	1
B-27	34000019	Washer, Fibre, No. 6	4
B-28	63992348-1	Pad Assy, Ribbon Cable	1
B-29	63002366-3	Sponge	1
B-30	34021111	Rivnut, No. 4-40	3
B-31	63002248-1	Fibre Optics Head (and bundle)	1
B-32	63002259-1	Lamp Housing	1
B-33	007400816 (HA-55)	Screw	2
B-34	028040247 (HA-56)	Lockwasher	2
B-35	34502087	Screw, Flat/Phil (2-56 x 1/2)	3
B-36	63002440	Timing Fence (Flexible) Ass'y	1
B-37	34507087	Screw, Pan/Phil (2-56 x 1/2)	3
B-38	34805007	Washer, Lock, Int., (No. 2)	2
B-39	34000018	Washer, Flat (No. 3)	2
B-40	63002248-1	Optic Slit (Part of Optics Head)	1
B-41	37253790 (GE379)	Lamp	1
B-42	63002598-1	Lamp Socket Assembly	1
B-43	63002257-1	Photocell Housing Ass'y	1
B-44	34902007	Washer, Flat (No. 2)	1
B-45	31460000-1	Ground Lug	1
B-46	63002300-1	Clip, P.C.	1
B-47	63002216-1	Solenoid Ass'y (1,1,2,3,4,5,6,7)	7

*This figure is keyed to paragraph 5.2.13 using a B as a symbol reference, and is a partial list used to show the removal/replacement of four assemblies only.

APPENDIX A SIGNAL GLOSSARY

This signal listing is keyed directly to the 101A printer schematic drawings. All signal mnemonics contained on those drawings are listed alphabetically with their source and destinations.

The following notation is used to identify the source and destination locations: 21-6/15-2 signifies element ME21, pin 6 located on schematic 63002315, sheet 2.

SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)
ACKNLG	Acknowledge - 4 usec pulse used to indicate the completion of the input of a character or the end of a functional operation.	21-6/15-2	Interface Connector 12-13/15-2
AKDLY	Acknowledge Delay - 6.5 usec pulse used to give delay between the data strobe pulse and the acknowledge pulse.	27-4/15-2	12-1/15-2 21-12/15-2
BELL	A 2-sec pulse used to produce an audible tone in the speaker located at the rear of the printer.	11-4/15-2	10-12 & 13/15-3 via Q5
BELL	Inverse of BELL.	11-13/15-3	7-8/15-3
BIN	Clock input to delayed strobe counter.	25-8/16-3	24-1/16-3
BSP	Special Busy - Signal created by a paper empty, safety switch, or bell condition that is used to cause a busy signal.	7-10/15-3	12-10/16-2
BUSY	Printer busy status line indicating to the input device that printer is not ready to receive data.	21-8/15-2	16-9/15-2, Interface Connector
BUSY	Inverse of BUSY.	16-8/15-2	21-13/15-2
CG1-CG7	Character generator outputs 1-7 to the power driver board.	ME33, 34, 35, 36/16-3	Power Drive Board
CHADD1- CHADD6	Character address lines 1-6.	ME23/16-3	ME33, 34, 35, 36/16-3
CHADD7	Character address line 7.	31-12/16-3	33-16/16-3, 34-16/16-3
CHANNEL NO. 1	Form feed channel.	Tape reader	14-5/15-2
CHANNEL NO. 2	Vertical tab channel.	Tape reader	14-3/15-2
CIP	Carriage in Print - Signal used to drive the print head forward.	14-10/16-1	17-1/15-3
CIP	Inverse of CIP.	15-6/16-1	15-9/16-1, 18-3/16-1, 11-5/16-2, 13-10/15-2, 15-3/15-2

SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)
CIR	Carriage in Reverse - Signal used to drive the print head in reverse.	21-6/16-1	Power Driver Board
CLGT	Clock Gate - Signal which determines whether the signal on the input buss is a valid non-format type of character for storage in the memory register.	25-8/15-1	11-1/16-2
CLKTB	Clock pulse used to shift memory.	17-12/16-2	1-9/16-1, 2-9/16-1, 3-9/16-1, 4-9/16-2
CR	Carriage return - Signal used to indicate the input of a carriage return command.	20-11/16-2	19-9/16-2
CR	Inverse of CR.	19-8/16-2	9-5/15-1, 25-10/15-1
DATA1- DATA8	The 8 input data lines coming from the input device via the interface connector to the printer.	P6-V, T, U, X, S, M, W, N/15-1	
DATA8*	Level used to derive eighth input data bit DS8.	E12 to E14 or E13 to E14/ 15-1	26-13/15-3
DATA STROBE	A 0.5 usec pulse used to clock data from the input device to the printer logic.	P6-Y/15-1	30-5/15-1
DCBL	Decoded bell code.	3-8/15-1	8-3/15-3
DCLF	Decoded line feed code.	24-8/15-1	12-10/15-3
DCLT	Delayed Clutch - A 60-milli-second pulse used as a delay between turning on one clutch and turning off the other clutch when changing the direction of the print head.	22-6/16-1	14-6/16-1
DCLT	Inverse of DCLT.	22-1/16-1	15-10/16-1
DCWØ	Strobe counter decode output Ø.	31-2/16-3	12-3/16-2, 24-6, 7/ 16-3

*If input is 7-bit data, then DATA8 is held at +0V by E13 to E14. If 8 bits are input, then E12 to E14 is used for passing the eighth bit from the input device.

SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)
$\overline{DCW1}$ - $\overline{DCW5}$	Strobe counter decode outputs 1 to 5 (write pulses).	ME30/16-3	ME33, 35/16-3
$\overline{DCW01}$ - $\overline{DCW05}$	Delayed strobe counter decode outputs 1-5.	ME28/16-3	ME34, 36/16-3
DELSTB	Delayed Strobe - 460 usec pulse used for half step timing in character matrix.	32-5/16-3	26-1/16-3
DLYLF	Delay Line Feed - A 60-90 milli-second pulse following any paper movement command.	11-5/15-3	9-3/15-2
\overline{DLYLF}	Inverse of DLYLF.	11-12/15-3	15-4/15-2
DMC	Insert dummy character.	9-8/16-2	30-13/15-2, 26-1/15-3
\overline{DMC}	Inverse DMC.	9-9/16-2	6-13/16-2
DS1	Input data bit 1.	29-12/15-1	1-15/16-1, 18-6/15-1, 20-3/15-2, 23-1/15-1, 24-4/15-1
$\overline{DS1}$	Inverse of DS1.	29-2/15-1	29-13/15-1, 23-12/15-1, 24-13/15-1, 25-4/15-1
DS2	Input data bit 2.	28-8/15-1	1-2/16-1, 18-4/15-1, 23-13/15-1, 24-1/15-1, 24-12/15-1, 20-2/15-2
$\overline{DS2}$	Inverse of DS2.	28-6/15-1	28-9/15-1, 23-4/15-1, 25-2/15-1
DS3	Input data bit 3.	29-10/15-1	2-15/16-1, 18-5/15-1, 23-2/15-1, 23-10/15-1, 25-5/15-1, 20-5/15-2
$\overline{DS3}$	Inverse of DS3.	29-4/15-1	29-11/15-1, 24-2/15-1, 24-10/15-1

SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)
DS4	Input data bit 4.	30-10/15-1	2-2/16-1, 19-11/15-1, 20-6/15-2
$\overline{DS4}$	Inverse of DS4.	30-8/15-1	30-11/15-1, 18-11/15-1,
DS5	Input data bit 5.	28-10/15-1	3-15/16-1, 20-1/15-2
$\overline{DS5}$	Inverse of DS5.	28-4/15-1	28-11/15-1, 18-3/15-1, 19-3/15-1
DS6	Input data bit 6.	28-12/15-1	3-2/16-1, 20-12/15-2
$\overline{DS6}$	Inverse of DS6.	28-2/15-1	28-13/15-1, 25-12/15-1, 19-2/15-1, 18-2/15-1
DS7	Input data bit 7.	29-8/15-1	4-15/16-2, 20-11/15-2
$\overline{DS7}$	Inverse of DS7.	29-6/15-1	29-9/15-1, 25-9/15-1, 19-4/15-1, 18-12/15-1
DS8	Input data bit 8.	26-6/15-3	4-2/16-2, E1/ 15-1
$\overline{DS8}$	Inverse of DS8.	26-11/15-3	26-5/15-3, E2/ 15-1
\overline{DSCR}	Decoded carriage return (CR) code.	23-6/15-1	20-13/16-2
DSTA	Data Strobe A - The buffered data strobe signal from the interface connector, which is used to generate DSTB and as an input clock for three functions: remote select, remote de-select and delete.	30-6/15-1	12-5/15-2, 20-4/15-2
DSTB	Data Strobe B - The data strobe used to clock the data to the printer logic from the input device.	16-2/15-2	27-1/15-2, 3-9/15-1, 9-6/15-1, 19-12/15-1, 11-2/16-2
ECSTB	Expanded character mode.	27-12/16-3	25-1, 4, 5/16-3

SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)
ECSTB	Inverse of ECSTB.	25-6/16-3	29-4/16-3, 12-4/16-2
\overline{EOP}	End of Print - Indicates that the right-hand limit switch has been activated by the carriage.	19-6/16-1	15-4/16-1
EOPSW	End of print switch.	EOP Switch	21-1/16-1, 6-1, 2/16-2
FCCLK	First Character Clock - Indicates that at least one printable character has been received for that line.	11-11/16-2	19-11/16-2
\overline{FF}	Decoded form feed code.	25-6/15-1	8-9/15-2
FWD	Forward mode.	14-4/16-1	25-12, 13/16-3
HL	Punched hole indication from paper tape reader.	16-6/15-2	7-3/15-2 via E7 to E8
\overline{HL}	Inverse of HL.	14-6/15-2	16-5/15-2, 7-11/15-2
HS	Signal generated to assure that a hole sensed by the tape reader for the last paper movement command will not be interpreted as a hole condition by the next paper movement command.	2-8/15-2	7-12/15-2
$\overline{INPUT PRIME}$	Input Prime line from the interface connector.	P5-B/15-3	4-3/15-3
\overline{IP}	Input Prime signal causing the printer electronics to be primed.	4-6/15-3	5-12/15-3, 13-12/15-2
LD	Light detect.	10-3/16-2	Interface connector
\overline{LD}	Inverse of light detect.	5-8/16-2	12-11/16-2, 13-4/15-3
\overline{LF}	Line feed 15-millisecond pulse.	17-4/15-3	5-4/15-3
LFF	Line feed function.	8-8/15-2	6-13/15-2, 14-4/15-2
\overline{LFF}	Inverse of LFF.	8-12/15-2	8-11/15-2, 3-1/15-2
LVT	Vertical tab function.	3-11/15-2	3-4/15-2, 14-2/15-2

SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)
\overline{LVT}	Inverse of LVT.	3-6/15-2	3-12/15-2, 3-2/15-2
ORBZ	OR function of busy condition.	12-8/16-2	6-1/15-2
\overline{ORBZ}	Inverse of ORBZ.	6-2/15-2	15-6/15-2
\overline{OSC}	Oscillator timing - 100 KHz clock signal provides timing for printer operations.	10-6/15-1	6-3/15-1, 6-5/15-1, 22-1/15-3
OSC'	Inverse of \overline{OSC} .	6-4/15-1	9-1/16-2, 6-10/16-2, 2-5/15-2, 22-5/15-2, 2-1/15-2
$\overline{OSC'}$	Inverse of OSC'.	17-2/16-2	9-5/16-2
OSCX	Timing signal for printer's interface boards.	6-6/15-1	P6-7/15-1, Interface Connector
PE	Paper empty (out) signal indicating a paper out condition.	30-4/15-3	P6-K/15-3 Interface Connector
\overline{PE}	Inverse of PE.	1-10/15-3	30-3/15-3, 8-5/15-3
PM	Paper movement signal.	5-6/15-3	11-9/15-3, 6-9/15-3, 6-11/15-3
\overline{PM}	Inverse of PM.	6-8/15-3	11-10/15-3, 11-11/15-3, 7-6/15-3, 15-1/15-2
PMSOL	Paper movement solenoid - Used to activate line feed solenoid during a line feed, form feed or vertical tab operation.	7-4/15-3	P6-8/15-3
PMTO	Paper movement time-out.	Q8/15-3	7-5/15-3
PRIME	A 3-millisecond pulse used to prime or reset the printer electronics.	22-13/15-3	9-2/15-2, 8-9/16-1, 27-6, 7/16-3, 9-3/16-2
\overline{PRIME} (Card #1)	Inverse of PRIME on Card #1.	22-12/15-3	26-2, 12/15-3, 2-6/15-2, 2-2/15-2
\overline{PRIME} (Card #2)	Inverse of PRIME on Card #2.	8-8/16-1	20-9/16-1, 22-4/16-1, 15-1/16-1, 11-4/16-2, 11-10/16-2, 9-6, 7/16-2

SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)
PRMOS	Prime pulse.	17-12/15-2	22-2/15-3
PWC1, PWC2, PWC4	Pulse Width Counts 1, 2, 4 - counter outputs used to generate timing for "full-step" character generator.	ME27/16-3	ME30/16-3
PWC01, PWC02, PWC04	Pulse Width Counts 1, 2, 4 - counter outputs used to generate timing for "half-step" character generator.	ME24/16-3	ME28/16-3
PWR PRIME	A 100-millisecond pulse generated by turning on power to the printer and used to initialize the printer electronics.	4-12/15-2	14-11/16-1
PWR PRIME	Inverse of PWR PRIME.	5-3/15-2	17-10/15-2, 4-13/15-2, 5-13/15-3, 11-3/15-3, 17-3/15-3, 19-4/16-1
RDCR	Ready carriage return.	13-8/16-2	15-2/16-1
REMSSEL	Remote select/deselect.	31-8/15-1	10-13/16-2
ROMTB8	Enable signal used to select optional character sets by use of TB8.	E7/16-3	37-4, 1/16-3
ROMTB8	Inverse of ROMTB8.	31-10/16-3	37-12, 9/16-3
ROME2	Gated strobe	26-11/16-3	37-2, 10/16-3
RPTSW	Ready to print switch - output from left-hand limit switch signifying that carriage is at left-most position.	17-4/16-1	20-2/16-1
RTPSW	Ready to print switch.	RTP Switch	21-13/16-1, 17-3/16-1, 19-3/16-1
RSVFD	Signal used to terminate paper movement during a form feed or vertical tab function.	7-13/15-2	2-3/15-2
RTP	Ready to print - indicates that the left-hand switch has been activated by the carriage.	21-11/16-1	21-10/15-1, 5-7/16-2 5-7/16-2

SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)
RTP	Inverse of RTP.	21-8/16-1	21-12/16-1, 15-12, 13/16-1, 22-3/59-1
SCR	Decoded CR preceded by printable character.	9-4/15-1	17-11/16-2, 9-14/16-2.
SCR	Inverse of SCR.	7-10/16-2	12-9/15-2
SEL	Select function.	5-12/16-1	15-12/15-2, 5-6/16-2
SEL	Inverse of SEL.	5-13/16-1	5-9, 10/69-3 13-13/60-2
SELCLK	Select function.	10-11/16-2	5-1/15-1
SELECT LAMP	Signal used to turn on select indicator lamp on front panel.	Q1/59-1	Select lamp on operator control panel.
SLCT	Select status line to interface connector.	5-8/15-3	Interface connector
SRCL	Signal used to clear shift registers by placing zeros in their input during a prime condition.	11-6/16-2	4-4, 13/16-2, 3-4, 13/16-1, 2-4, 13/16-1, 1-4, 13/16-1
SS	Safety switch.	1-4/15-1	Interface connector
SS (+5V)	Inverse of SS.	1-6/15-1	1-3/15-1, 1-1/15-1 8-4/15-3
SS' ($\pm 0V$)	Inverse of SS.	1-2/15-1	14-12/16-1
STROBE	Print strobe (approximately 460 usec) - triggered by output of video amplifier and used to generate character address signals.	18-6/16-1	12-5/16-2, 13-6/16-2, 37-13/16-3, 29-1/16-3, 27-14/16-3 32-2/16-3, 26-4/16-3
STROBE	Inverse of STROBE.	18-1/16-1	21-9/16-1
SVFD	Signal used to set VFD flip-flop.	3-3/15-2	2-14/15-2, 16-11/15-2
TBI	Memory output bit 1.	8-4/16-1	23-11/16-3, 14-2/16-2

SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)
TB2	Memory output bit 2.	7-8/16-1	23-9/16-3, 13-12/16-2
TB3	Memory output bit 3.	7-10/16-1	23-13/16-3, 14-3/16-2
TB4	Memory output bit 4.	7-12/16-1	23-1/16-3, 8-5/16-2
TB5	Memory output bit 5.	7-6/16-1	23-3/16-3, 13-1/16-2
TB6	Memory output bit 6.	7-2/16-1	23-5/16-3, 13-2/16-2
TB7	Memory output bit 7.	8-10/16-2	13-3/16-2, 31-13/16-3
TB8	Memory output bit 8.	8-2/16-2	20-1/16-1, E4/16-2
TB8	Inverse of TB8.	8-12/16-2	8-1/16-2, 15-2/15-2, 19-10/16-2, 16-12/16-2, 9-2/16-2, E3/16-2 31-3/16-3
TO FWD CLUTCH DRIVER	Signal used to energize forward clutch.	31-8/16-3	Clutch driver
TOFRLF	Signal used to activate top of form function.	0V, R33/60-2	8-10/60-2, via TOP OF FORM SW (S7), 12-9/15-3, via LINE FEED SW (S8)
TRACK	Track pulse.	21-11/15-2	27-9/15-2
UCC	Upper case character mode selection signal.	16-3/16-1	20-10/16-1, 29-5/16-2, 26-5/16-3, 25-2/16-3
UCC	Inverse of UCC.	20-8/16-1	16-2/16-1, 29-2/16-2, 26-2/16-3, 32-11, 3/ 16-3
UPSC	Expanded character mode - command to print elongated characters.	23-8/15-1	16-1/16-1
VFD	Vertical format decode.	2-13/15-2	7-2/15-2, 2-10/15-2, 5-5/15-3
VIDEO AMP	Video amplifier signal from video amplifier.	Video amplifier	18-5/16-1
VT	Vertical tab decode.	24-6/15-1	3-13/15-2
ZBCR	Decoded carriage return.	9-12/16-2	16-13/16-2
ZBCR	Inverse of ZBCR.	9-13/16-2	15-5/15-2

APPENDIX B
PARALLEL INTERFACE SPECIFICATION
FOR CENTRONICS PRINTERS

B.1. INTERFACE TIMING

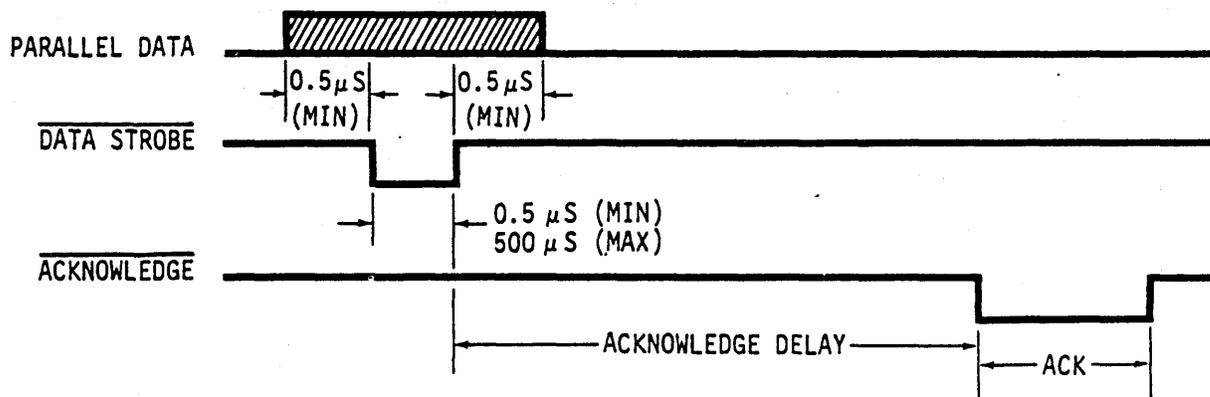
The single line buffer in each standard printer enables the printer to receive parallel data at a rate of up to 75,000 characters per second.

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

As a standard feature in all printers except the 101, data strobe is not recognized until the last character has been acknowledged (gated data strobe). As an option, however, data strobe can be recognized at any time.

Normal Data Input - No Busy

The diagram in Figure B-1 shows the timing involved in transferring data which does not cause a busy condition.

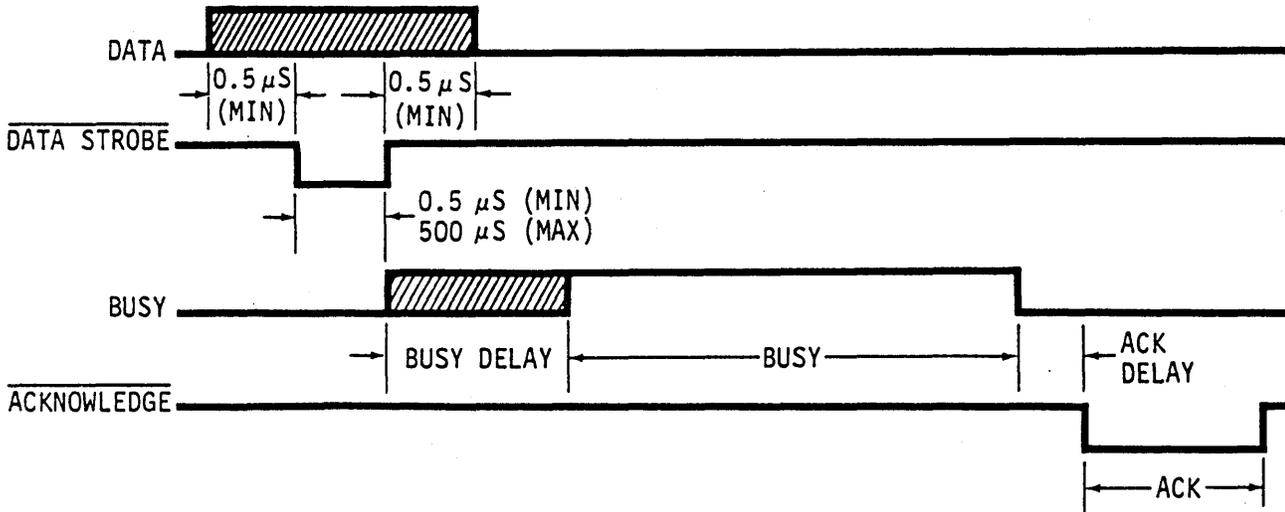


	101/101A/101S	101AL	102A	102AL	301	306	500	501
ACK DELAY	7 usec	2.5-10 usec	7 usec	2.5-10 usec	2.5-10 usec	2.5-10 usec	2.5-10 usec	2.5-10 usec
ACK	4 usec	2.5-5.0 usec	4 usec	2.5-5.0 usec				

Figure B-1. NORMAL DATA INPUT

Data Input Causing Busy

The diagram in Figure B-2 shows the interface timing involved in transferring any data which causes a busy condition in the printer.



	101/101A/101S*	101AL	102A	102AL	301	306	500	501
BUSY DELAY	0	0-1.5 usec	0	0-1.5 usec	0-1.5 usec	0-1.5 usec	0-1.5 usec	0-1.5 usec
ACK DELAY	0	0-10.0 usec	0	0-10.0 usec	0-10.0 usec	0-10.0 usec	0-10.0 usec	0-10.0 usec
ACK	4 usec	2.5-5.0 usec	4 usec	2.5-5.0 usec	2.5-5.0 usec	2.5-5.0 usec	2.5-5.0 usec	2.5-5.0 usec
BUSY								
Line Feed	75-105 msec	75-105 msec	75-105 msec	16 msec (single LF) 75-105 msec (multiple LF)	70-100 msec	75-105 msec	75-105 msec	70-100 msec
Vertical Tab (1-inch)	300-310 msec	300-310 msec	300-310 msec	300-310 msec	160-200 msec	300-310 msec	300-310 msec	160-200 msec
Form Feed (11-inches)	3-3.5 sec	3-3.5 sec	3-3.5 sec	3-3.5 sec	1.5-2.0 sec	3-3.5 sec	3-3.5 sec	1.5-2.0 sec
Delete	3 msec	100-400 usec	3 msec	100-400 usec	100-400 usec	100-400 usec	100-400 usec	100-400 usec
Bell	2 sec	0	2 sec	0	0	0	0	0
Select	3 msec	100-400 usec**	3 msec	100-400 usec**	100-400 usec**	100-400 usec**	100-400 usec**	100-400 usec**
Deselect	Until printer is selected	Until printer is selected	Until printer is selected	Until printer is selected	Until printer is selected	Until printer is selected	Until printer is selected	Until printer is selected
Print Command	6 msec/char plus 75-105 msec LF	6 msec/char plus 75-105 msec LF	470-500 msec (total)	410-415 msec (total)	6 msec/char plus 70-100 msec LF	8.4 msec/char plus 75-105 msec LF	8.4 msec/char plus 75-105 msec LF	6 msec/char plus 70-100 msec LF
(Return time-no busy)	(240 msec max)	(240 msec max)	(0)	(0)	(270 msec max)	(270 msec max)	(400 msec max)	(400 msec max)

*Vertical Tab and Form Feed durations for the 101S apply to 6 line/inch operation.
**No busy if inhibit prime on select option is used.

Figure B-2. BUSY CONDITION TIMING

B.2 PARALLEL INTERFACE SIGNALS

All standard Centronics printers are supplied with an Amphenol #57-40360, 36-pin interface connector (Centronics #31310019). The pin assignments, name, source and description for each interface signal are listed below.

<u>Parallel Interface Connector</u>	<u>Signal Name</u>	<u>Source</u>	<u>Description</u>
Pin 1, 19*	DATA STROBE	Input Device	A 0.5 usec pulse (min.) used to clock data from the processor to the printer logic.
2, 20	DATA 1	Input Device	Input data levels. A high represents a binary ONE, a low represents a ZERO. All printable characters (i.e., codes having a ONE in DATA 6 or DATA 7) are stored in the printer buffer. Control characters (i.e., codes having a ZERO in both DATA 6 and DATA 7), are used to specify special control functions. These codes are not stored in the buffer except when they specify a print command and are preceded by at least one printable character in that line.
3, 21	DATA 2	Input Device	
4, 22	DATA 3	Input Device	
5, 23	DATA 4	Input Device	
6, 24	DATA 5	Input Device	
7, 25	DATA 6	Input Device	
8, 26	DATA 7	Input Device	
9, 27	DATA 8	Input Device	
10, 28	<u>ACKNLG</u>	Printer	Acknowledge pulse indicates the input of a character into memory or the end of a functional operation.
11, 29	BUSY	Printer	A level indicating that the printer cannot receive data.
12	PE	Printer	A level indicating that the printer is out of paper.
13	SLCT	Printer	A level indicating that the printer is selected.
14	\pm OV	Printer	(Formerly SS signal older version)
15	CSCXT	Printer	A 100 KHZ (Models 101, 101A, 102A, 101S) or 100-200 KHZ (All other models)
16	\pm CV		
17	Chassis Gnd		
18	+5V		
31, 30	<u>INPUT PRIME</u>	Input Device	A level which causes the printer to be primed. (Not in 101)
32	<u>FAULT</u>	Printer	A level that indicates a paper empty, light detect, or a deselect condition. (Not in 101)
34	Line Count Pulse		Both sides of the line count switch appear at the interface connector. This switch is opened and closed during each line feed operation. A level delivered to the switch would be pulsed off and on each time a line feed operation is performed. (Series 300 and 500)
35	Line Count Pulse Return		(Series 300 and 500)
36	Not Used		

*Second pin number indicates twisted pair return (\pm OV).

**Active low signals are specified by a line over the signal name. Active high signals have no line.

B.3. BASIC SIGNAL SPECIFICATIONS

Logical TRUE

A high signal is defined as a logical TRUE or a logical ONE if it is in the range of +2.4 volts to +5.0 volts, not to exceed a peak positive voltage of 5.5 volts.

Logical FALSE

A low signal is defined as a logical FALSE or a logical ZERO if it is in the range of 0.0 volt to +0.4 volt, not to exceed a peak negative voltage of -0.5 volt.

Level

A signal which is present for two or more clock times or whose pulse width is not critical is defined as a level (e.g., the data inputs).

Pulse

A signal whose width is critical is defined as a pulse (e.g., DATA STROBE) and the width is specified. Pulse width is measured at +2.4 volt for a true condition and +0.4 volt for a false condition.

Delay Time

Delay time is defined as the interval between the specified signal at the receiving end of a cable and reference signal in the receiving unit. It is measured at the +2.4 volt point for a logical ONE and +0.4 volt for a logical ZERO.

Switching Time

Switching time is defined as the rise or fall of a signal, whichever is greater. It is specified between +0.4 volt and +2.4 volts. Maximum switching time for signals is 0.2 usec (not including set-up and hold times).

Current Requirements

For a high input signal to the printer, the input device must be able to source 0.320 milliamps at +2.4 volts. For a low input; the input device must be able to sink 14 milliamps.

For a high output from the printer, the printer can source up to 0.320 milliamps at +2.4 volts. For a low output, the printer can sink up to 14 milliamps.

Line Terminations

Data lines are terminated in the printer by 1000 ohms to +5 volts. DATA STROBE and INPUT PRIME lines are terminated by 470 ohms to +5 volts.

B.4. POWER INPUT AND GROUNDING SPECIFICATIONS

Input Voltage

Voltage requirements for the printer are:

115 VAC $\pm 10\%$, 60 Hz or,
230 VAC $\pm 10\%$, 50 Hz

The printer shall be independently connected to the primary power source by means of a 3-wire grounded outlet and shall contain conversion, regulation, and sequencing equipment required for correct performance.

The turn-on surge current in all Centronics printers takes the form of a decaying exponential waveform, with approximately a 250 millisecond time constant. The values of the initial surge current and the steady state operating current (with the printer not printing) are shown in the following table.

Model	Surge Current	Operating Current (with printer not printing)
101/101A	48 amps (max. peak to peak)	2.8 amps (RMS)
102A	52 amps (max. peak to peak)	3.3 amps (RMS)
306	28 amps (max. peak to peak)	2.3 amps (RMS)

Equipment Ground

The green wire (building ground) of a power cable for the printer shall be securely fastened to the frame. The white wire (neutral AC) shall not be grounded to the frame.

D.C. Ground

The return wire of the interconnecting line, twisted pair shall be grounded to the DC ground. This connection shall be made as close as practical to the signal source and load.

