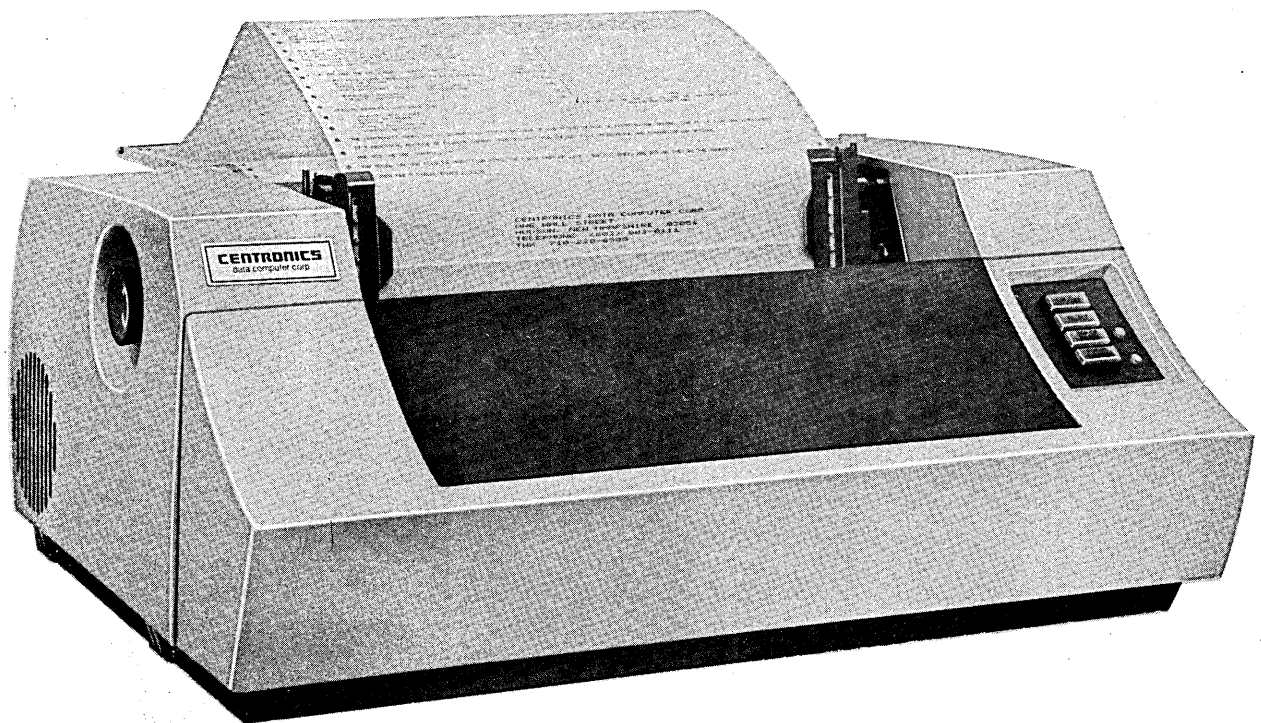


# TECHNICAL MANUAL

## MODEL 101 PRINTER



MAY 1978

Centronics No. 37400010 Rev. H

# CENTRONICS

data computer corp.

HUDSON, NEW HAMPSHIRE 03051

TELEPHONE (603) 883 - 0111

# TECHNICAL MANUAL

## MODEL 101 PRINTER

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**CENTRONICS**

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HUDSON, NEW HAMPSHIRE 03051

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## SECTION 1 INTRODUCTION

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

The manual is subdivided 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 - INSTALLATION, contains unpacking and installation instructions for the printer.
  - SECTION 3 - OPERATION, describes the use of all operator controls and indicators.
  - SECTION 4 - THEORY OF OPERATION, contains a detailed description of each major operation performed by the printer electronics, including flow charts, timing diagrams and circuit diagrams.
  - SECTION 5 - REMOVAL, REPLACEMENT AND ADJUSTMENT PROCEDURES, includes, step-by-step removal and replacement procedures of all major assemblies and sub-assemblies in the printer.
  - SECTION 6 - MAINTENANCE, includes electrical adjustments, preventive maintenance procedures, and a troubleshooting guide.
  - 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 parts lists for the mechanical portion of the printer.
- APPENDICES - (A) Signal Glossary  
(B) Parallel Interface Specifications

### 1.1 GENERAL DESCRIPTION (FIGURE 1-1)

The Model 101 printer is a medium speed impact printer which uses a 5 x 7 dot matrix for character generation.

The unit prints at a rate of 165 characters per second, which is approximately one full 132-character line per second (including carriage return time). Paper is sprocket-fed, and paper widths from 4 inches to 14-7/8 inches can be accommodated. The printer can produce one original and four copies. Standard print format consists of 10 characters per inch horizontally and 6 lines per inch vertically.



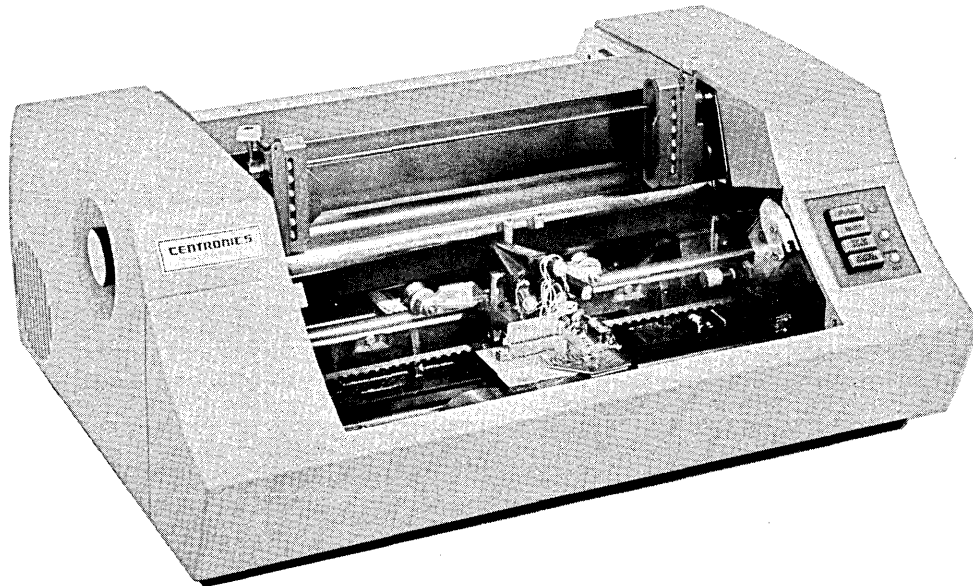


Figure 1-1. MODEL 101 PRINTER (FRONT COVER REMOVED)

## 1.2 LOGIC FLOW DIAGRAM (FIGURE 1-2)

The standard printer contains a 132-character buffer. For serial data inputs, optional serial interfaces allow data to be received at rates from 100 to 9600 baud. Several other optional interfaces are available as required by the user.

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 or form feed function. Vertical forms movement is hardware - controlled by a vertical format unit (VFU) which controls vertical spacing by monitoring two channels in a punched paper tape.

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

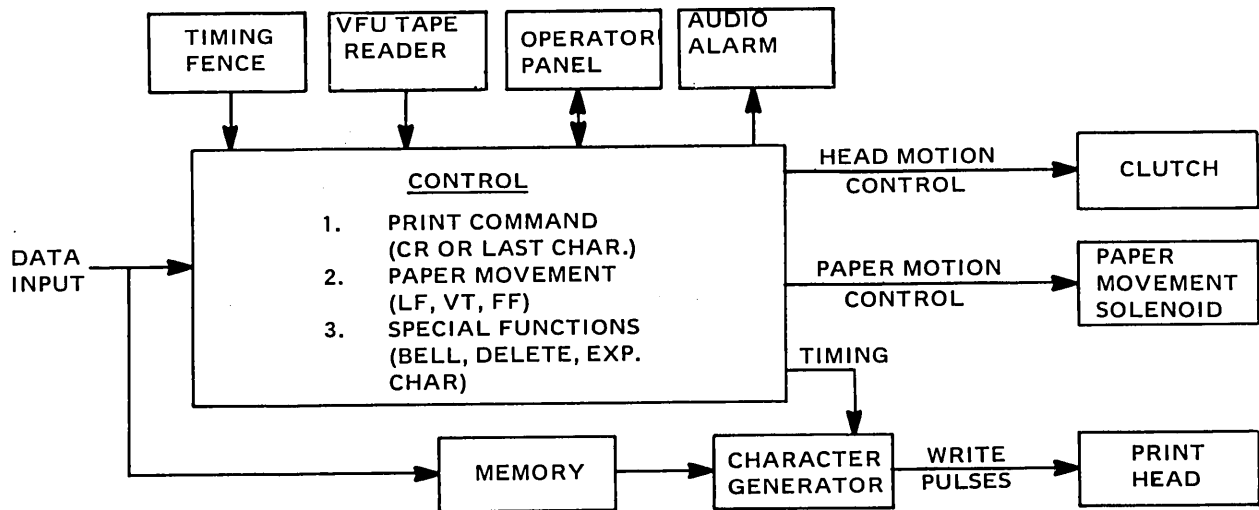


Figure 1-2. BASIC BLOCK DIAGRAM

### 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 bell, delete, etc.

#### 1.3.1 CHARACTER PRINTING (FIGURE 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. Character formations for the standard 64 ASCII set are shown in the Series 100 Operators Manual. Other available character sets are shown in Printer Character Sets brochure (No. C332-20).

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 wires pass through the correct holes 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 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.

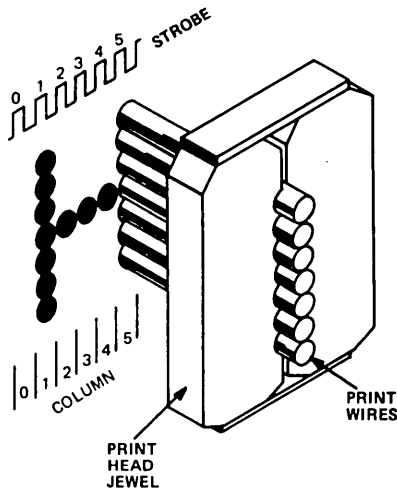


Figure 1-3. PRINTING THE LETTER (H)

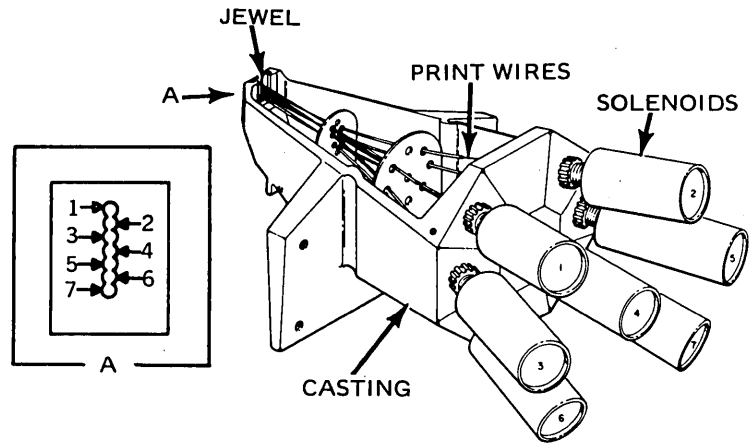


Figure 1-4. PRINT HEAD COMPONENTS

### 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.

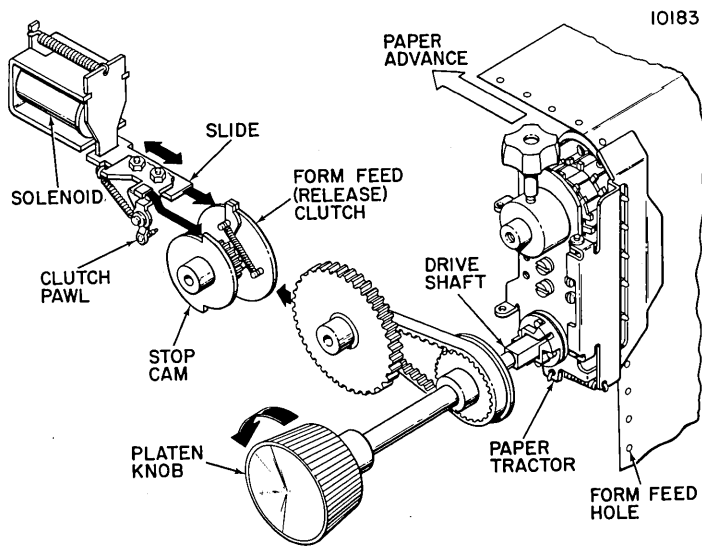


Figure 1-5. PAPER MOVEMENT MECHANISM

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 energizes 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 line feed solenoid is momentarily energized. Upon completion of the line feed command, a delay interval is generated. Allowing the clutch pawl and clutch mechanism to return home before another line feed is allowed.

Vertical forms movement is accomplished by continuously energizing the paper feed solenoid until a hole is detected in the Vertical Format Unit (VFU) paper tape. The paper tape uses two tracks: one used for Top of Form and the other 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.

## 1.4 SPECIFICATIONS SUMMARY

### Data Input

Data Format	7-bit parallel interface
Input Code	64-character ASCII
Data Rate	Up to 75,000 characters/second
Buffer	One-line character buffer
Input Gating	Data Strobe is normally gated with acknowledge of previous character Non-gated strobe available as an option.

### Printing

Printing Method	Impact, character-by-character
Dot Matrix	5 x 7
Elongated Characters	By line, via octal 016
Character Density	10 characters/inch (horizontally)
Print Format	132 characters/line (max.)
Print Rate	165 characters per second
Number of Copies	Prints original and up to four carbon copies.
Character Set	Standard 64-character ASCII, lower case prints as upper case. Optional sets available.

### Paper Advance

Slew Rate	4 inches/second
Vertical Format	6 lines/inch (Std.) 8 or 10 lines/inch (Opt.)
Vertical Format Control	2-channel VFU paper tape
Paper Entry	Rear Paper Feed
Paper Feed	Sprocket feed, adjustable to 14-7/8 inch paper
Auto Line Feed	Automatic line feed on carriage return
Bottom of Form (Opt.)	Controlled by VFU tape, causes paper to advance to top of form.

### Controls/Indicators

Switches	ON/OFF, SELECT, FORMS OVERRIDE, TOP OF FORM
Indicators	ON/OFF, SELECT, PAPER OUT
Manual Controls	Forms Thickness, Paper Advance Knob
Auto Motor Control (Opt.)	Drive motor automatically turns off and on as required by the incoming data.
Audio Alarm	Momentarily sounds a buzzer in response to a Bell code or paper empty condition.

## Physical/Environmental/Electrical

Height	11.4" (28.2 cm)
Depth	20" (50.8 cm)
Width	27.7" (70.3 cm)
Weight	118 lbs. (53.5 kg)
Temperature - Operating	40° F to 100° F (4° C to 37.5° C)
Storage	-40° F to 160° F (-40° C to 71° C)
Humidity- Operating	5 to 90% (no condensation)
Storage	0 to 95%
Input Voltage	115 VAC $\pm$ 10%, 60 Hz (Std.) 230 VAC $\pm$ 10%, 50 Hz (Opt.)

## Other Options

Serial Communications Interface  
Popular Parallel Computer Interfaces

## Ribbons

The printer uses a 1-inch nylon ribbon mounted on 3-inch diameter spools.  
The following four colors are available:

Black - Part No. 63002293-5001  
Red - Part No. 63002293-5002  
Green - Part No. 63002293-5003  
Blue - Part No. 63002293-5004

## NOTE

Centronics nylon ribbons are designed specifically for use in Centronics matrix printers. The fabric design and proprietary ink formulation ensures optimum print quality, as well as long print head and ribbon life. Centronics reserves the right to void the warranty with regard to any parts damaged through the use of non-qualified ribbons.

## Paper

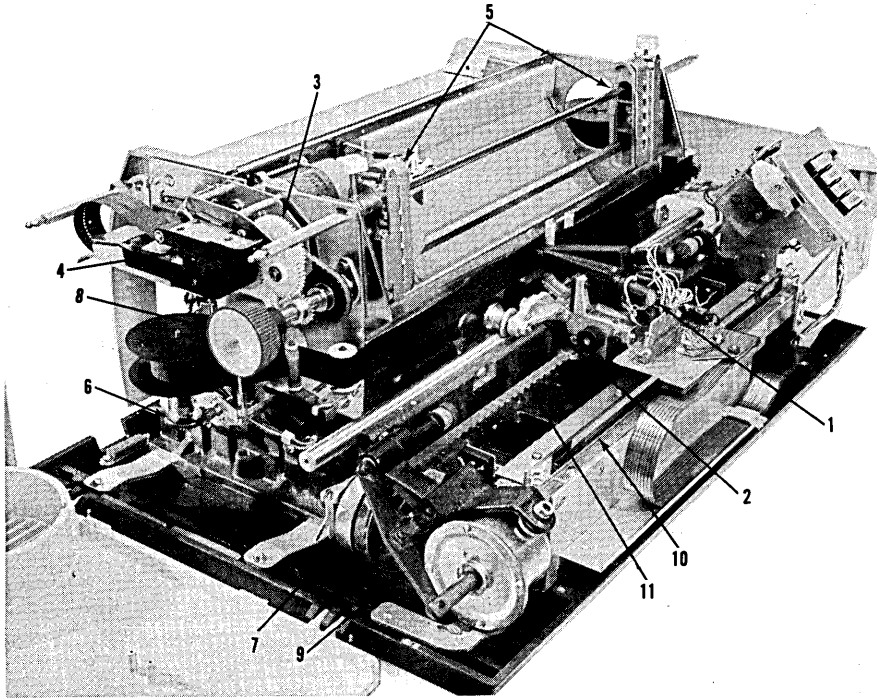
The printer uses continuous form paper with standard feed holes on each edge. Paper widths from 4 to 14-7/8 inches can be accommodated by the printer. Using multiple-part form, one original and up to 4 copies can be printed, all very legible. Paper weight specifications are as follows:

Single-Part Forms:	15 to 12 lb.
Multiple-Part Forms:	Original - 12 to 15 lb. Copies - 9 to 12 lb., last copy 15 lb. (Maximum of five parts)
Carbon Paper:	7¼ lb. with medium hardness

## 1.5 PHYSICAL DESCRIPTION

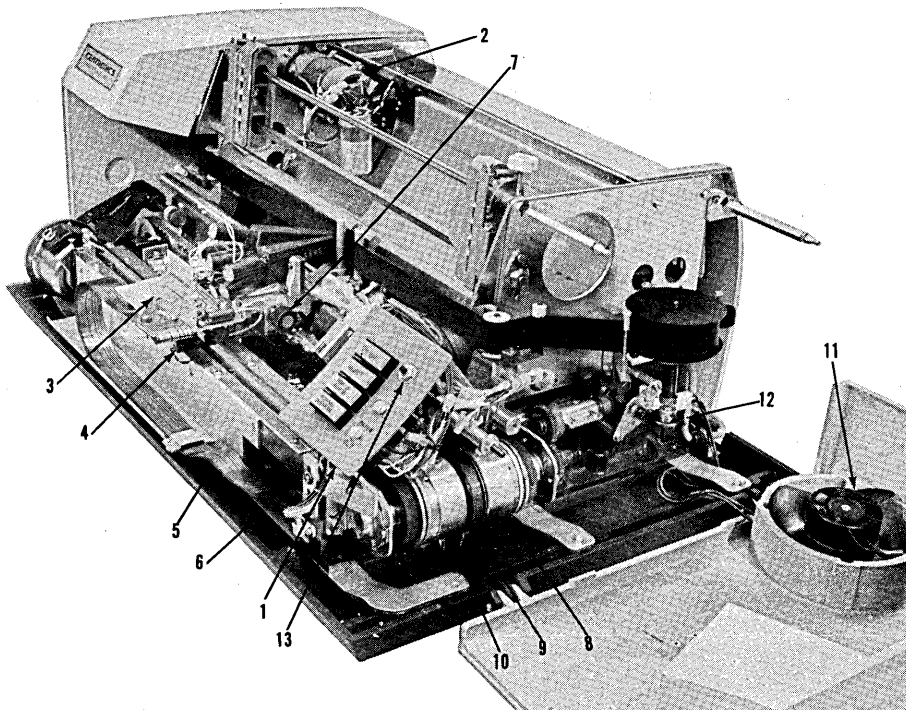
The printer is approximately 11.4" (28.9 cm) high by 20" (50.8 cm) deep by 27.7" (70.3 cm) wide, and weighs approximately 118 lbs. (53.5 kg.).

Figures 1-6 to 1-9 show various photographic views of the printer taken with the covers removed. All major assemblies and components are identified in the table below the photo.



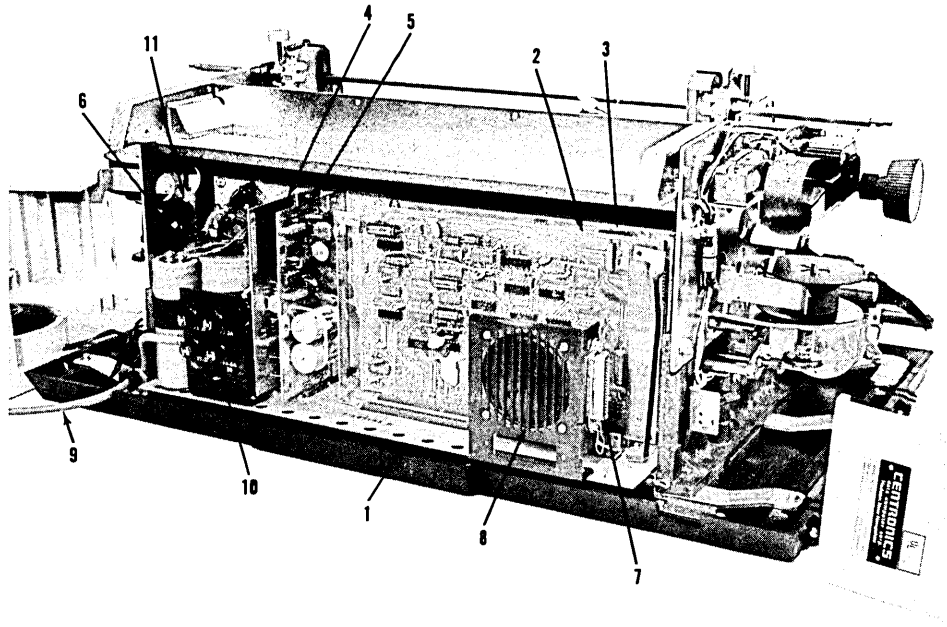
- |                        |                          |                |                     |
|------------------------|--------------------------|----------------|---------------------|
| 1. Print Head Assembly | 4. VFU Tape Reader       | 7. Spring Drum | 10. Timing Fence    |
| 2. Carriage      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

Figure 1-6. LEFT FRONT VIEW OF 101 PRINTER



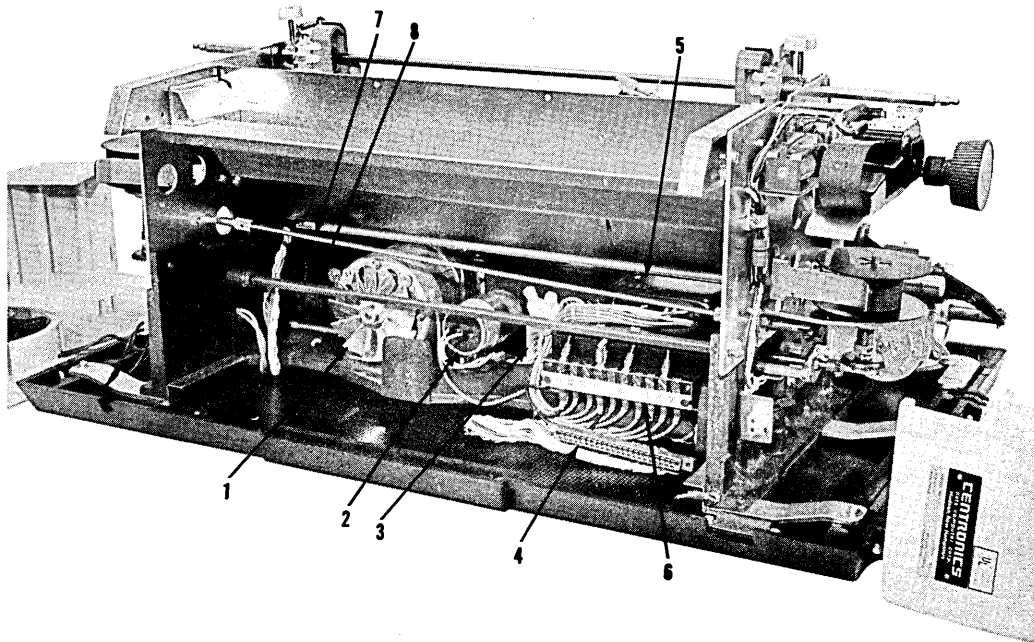
- |                                     |                             |                             |
|-------------------------------------|-----------------------------|-----------------------------|
| 1. Operator Control Panel           | 5. Ribbon Cable             | 9. Main Pulley & Drive Belt |
| 2. Form Feed Motor                  | 6. Power Driver Board       | 10. Reverse Clutch          |
| 3. Video Amplifier & Cable Assembly | 7. Penetration Control Knob | 11. Cooling Fan             |
| 4. Optic Block                      | 8. Forward Clutch           | 12. Ribbon Feed Mechanism   |

Figure 1-7. RIGHT FRONT VIEW OF 101 PRINTER



- |                       |                          |                    |                  |
|-----------------------|--------------------------|--------------------|------------------|
| 1. Electronics Cavity | 4. +5VDC Power Supply    | 7. Input Connector | 10. Fuses        |
| 2. Electronic Card 1  | 5. 12 VDC 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 101 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 101 (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 101 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.

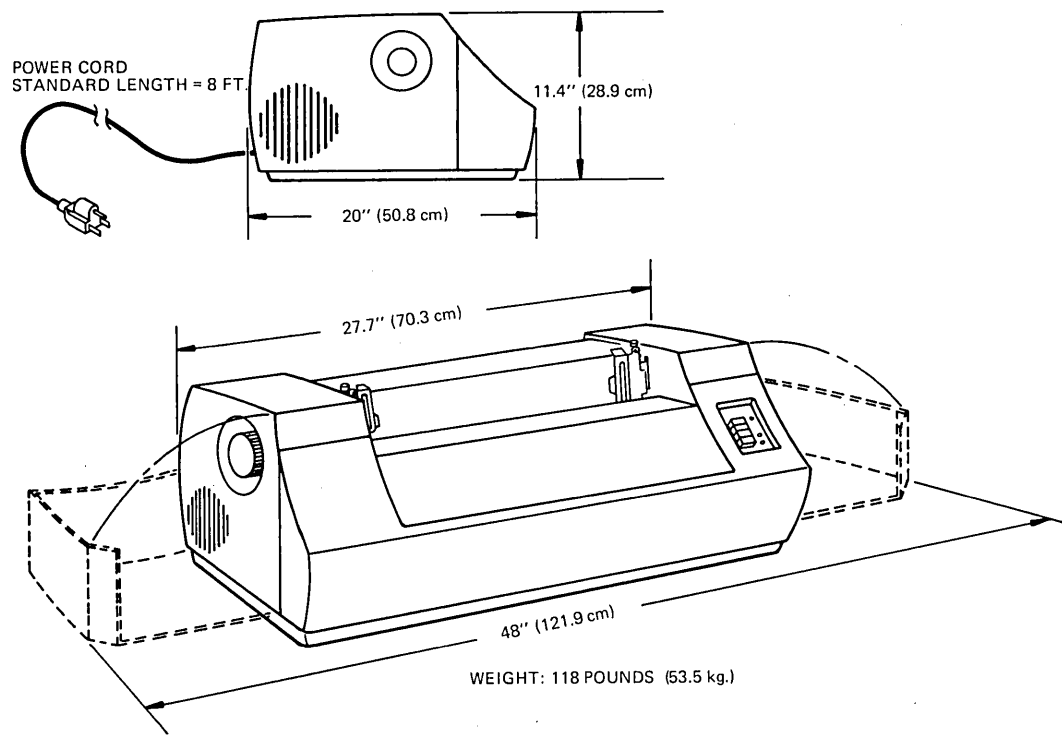


Figure 2-1. PRINTER DIMENSIONS

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

## 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, triplewalled cardboard. When properly strapped, the packing crate and printer is capable of fork lift operation with a seven-high stacking capability.

- (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.

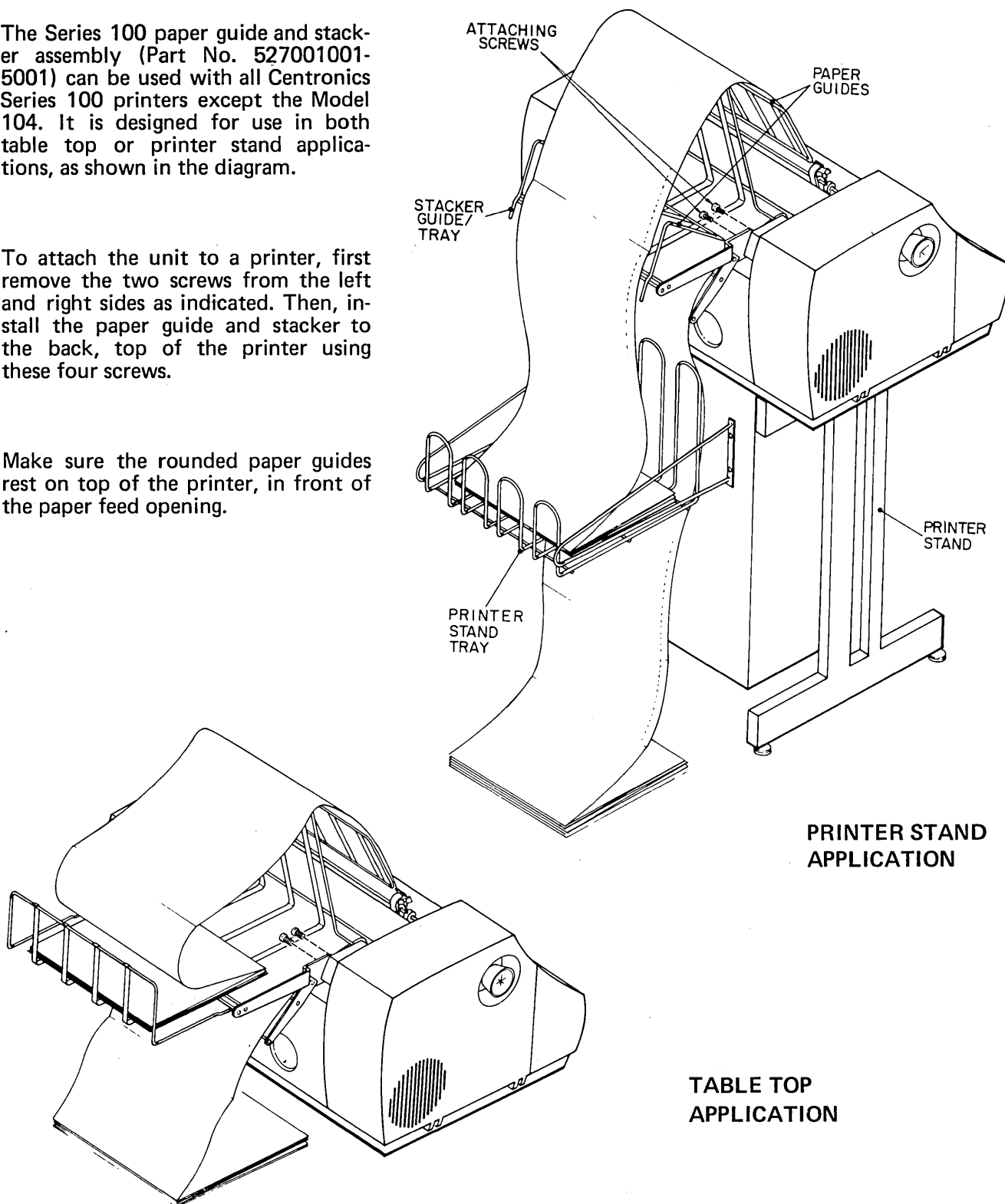
Shipped in a separate container is the paper guide and stacker assembly. Installation instructions for this assembly are included with the assembly and also in Section 2.3.

## 2.3 PAPER GUIDE AND STACKER ASSEMBLY

The Series 100 paper guide and stacker assembly (Part No. 527001001-5001) can be used with all Centronics Series 100 printers except the Model 104. It is designed for use in both table top or printer stand applications, as shown in the diagram.

To attach the unit to a printer, first remove the two screws from the left and right sides as indicated. Then, install the paper guide and stacker to the back, top of the printer using these four screws.

Make sure the rounded paper guides rest on top of the printer, in front of the paper feed opening.





# 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 101 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 101 printer and a flow chart of the overall printer operation are contained in Figures 4-1 and 4-2.

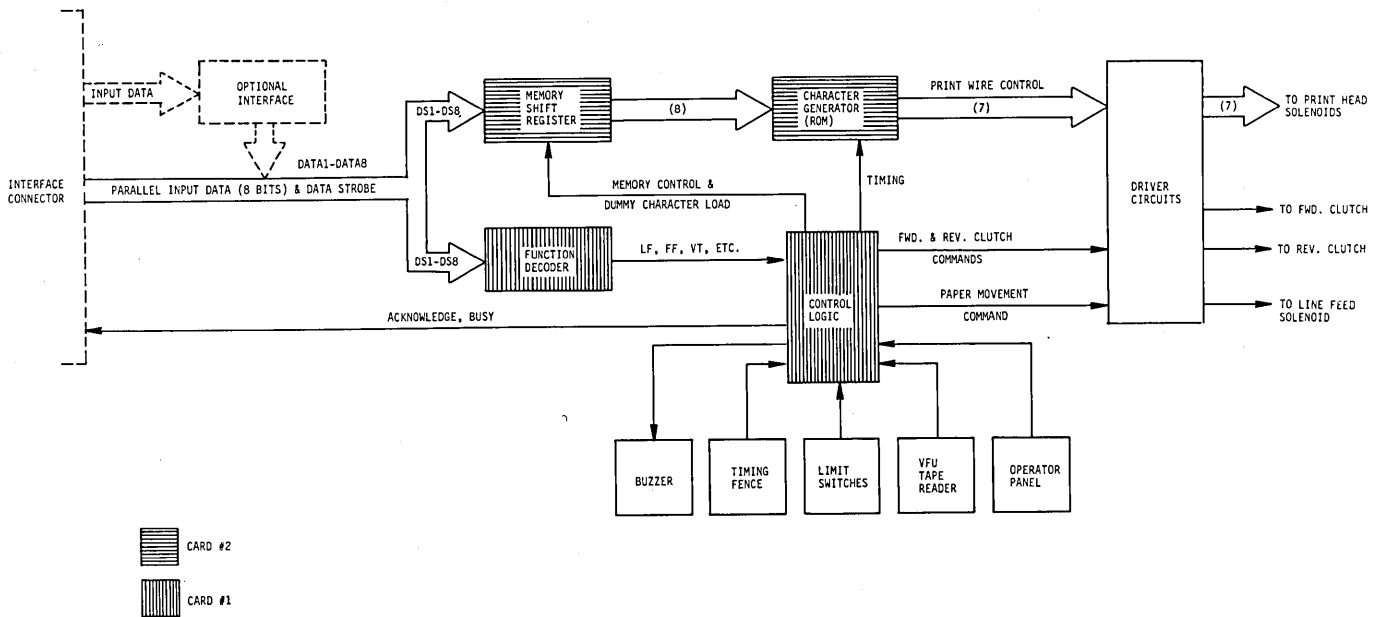


Figure 4-1. MODEL 101 FUNCTIONAL BLOCK DIAGRAM

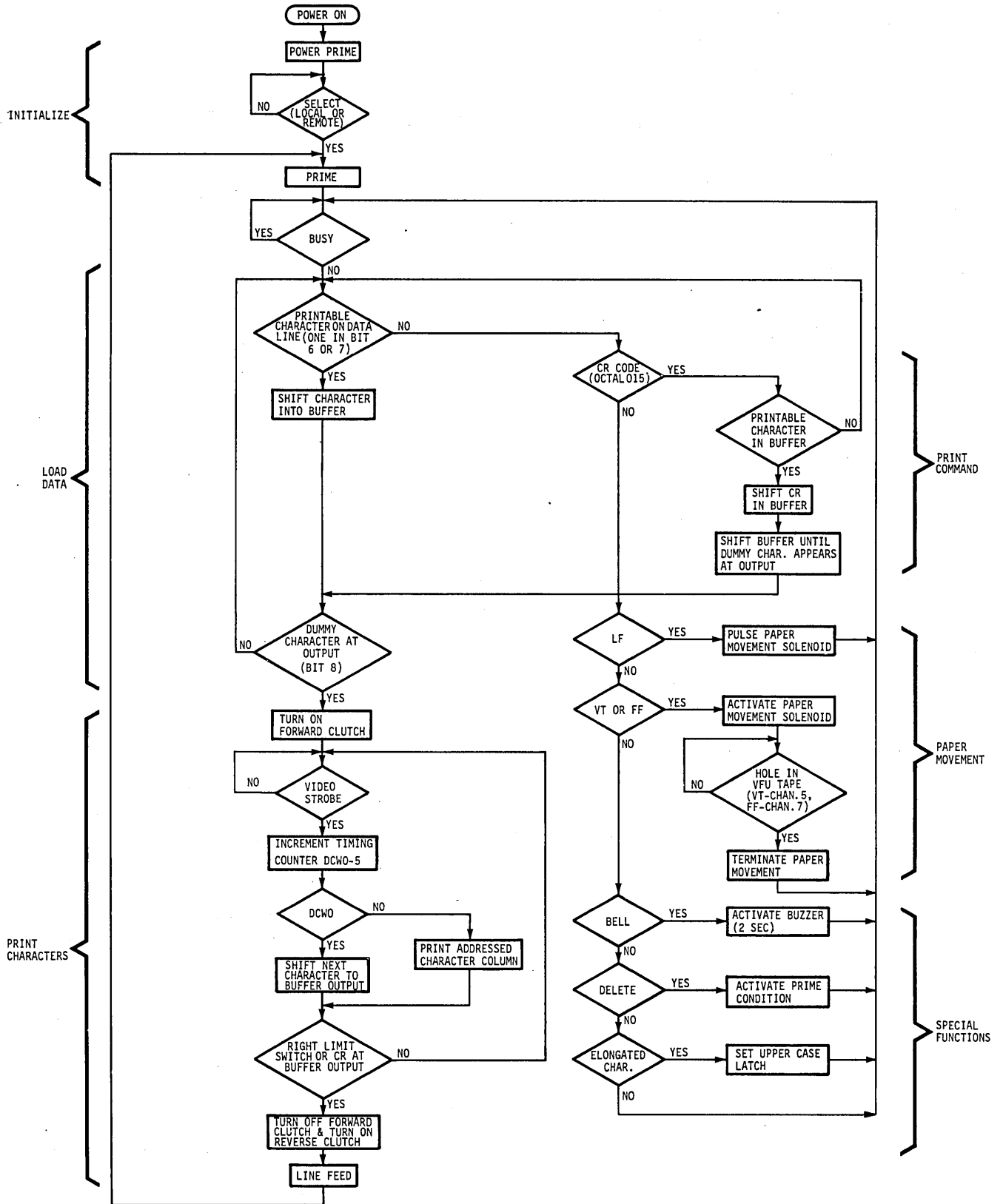


Figure 4-2. FUNCTIONAL FLOW CHART

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 (OSC) for the printer electronics is derived from a 100 KHz oscillator ME10. Capacitor C4 controls the frequency. Signal OSC is inverted to generate OSCXT for the interface connector and the optional interface board. Signal OSC is used on Card No. 1, signal OSC' is used on Cards No. 1 and No. 2.

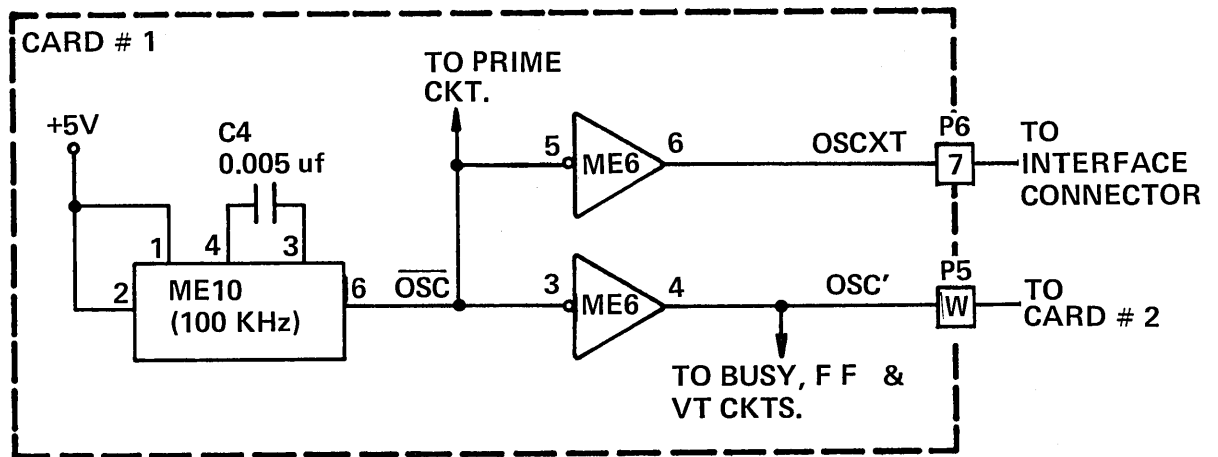


Figure 4-3. BASIC TIMING CIRCUIT

#### 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.

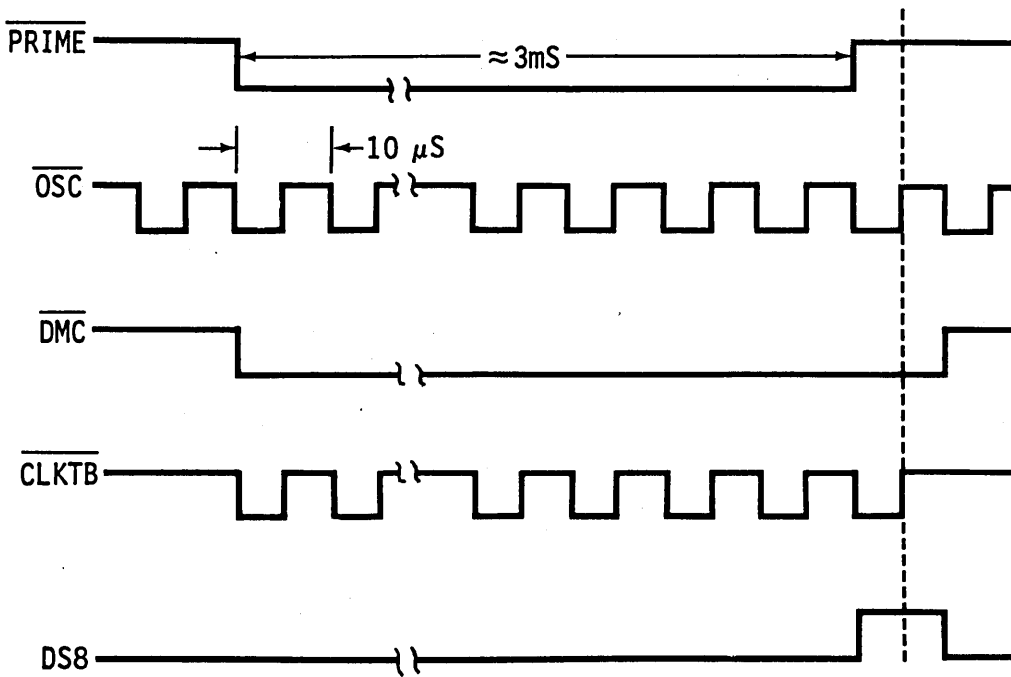


Figure 4-4. PRIME TIMING

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

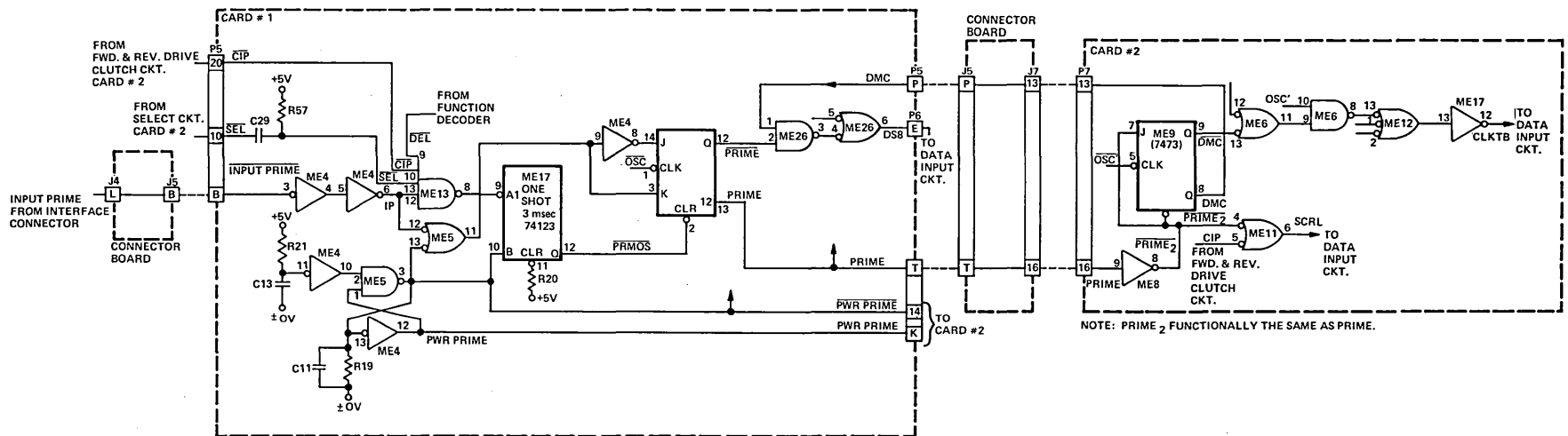


Figure 4-5. PRIME CIRCUIT

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  $\overline{\text{PWR PRIME}}$  is held low, causing a power prime condition.  $\overline{\text{PWR PRIME}}$  remains low until C13 charges to approximately +2V through R21. This generates a high at ME4-11 and a low at ME4-10. Before  $\overline{\text{PWR PRIME}}$  can go high, it must first charge capacitor C11, which keeps  $\overline{\text{PWR PRIME}}$  low an additional amount of time. The total duration of  $\overline{\text{PWR PRIME}}$  is approximately 100 milliseconds.

Signal  $\overline{\text{PWR PRIME}}$  ensures that the Select flip-flop and EOP latch are reset during power-up. Also for the duration of  $\overline{\text{PWR PRIME}}$ , 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, 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 ( $\overline{\text{PRMOS}}$ ).  $\overline{\text{PRMOS}}$  resets flip-flop ME22 causing PRIME. After the 3 millisecond PRMOS interval the next  $\overline{\text{OSC}}$  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 ( $\overline{\text{INPUT PRIME}}$ ) - When interface signal  $\overline{\text{INPUT PRIME}}$  goes low, the low IP allows the next OSC pulse to reset the PRIME flip-flop causing a Prime condition. When  $\overline{\text{INPUT PRIME}}$  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 by the SELECT switch on the front panel.

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 deselect state when power is first applied.

Similarly, the printer can be deselected by again pressing the SELECT switch.

While the printer is deselected, the low SEL signal generates a busy condition. 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.

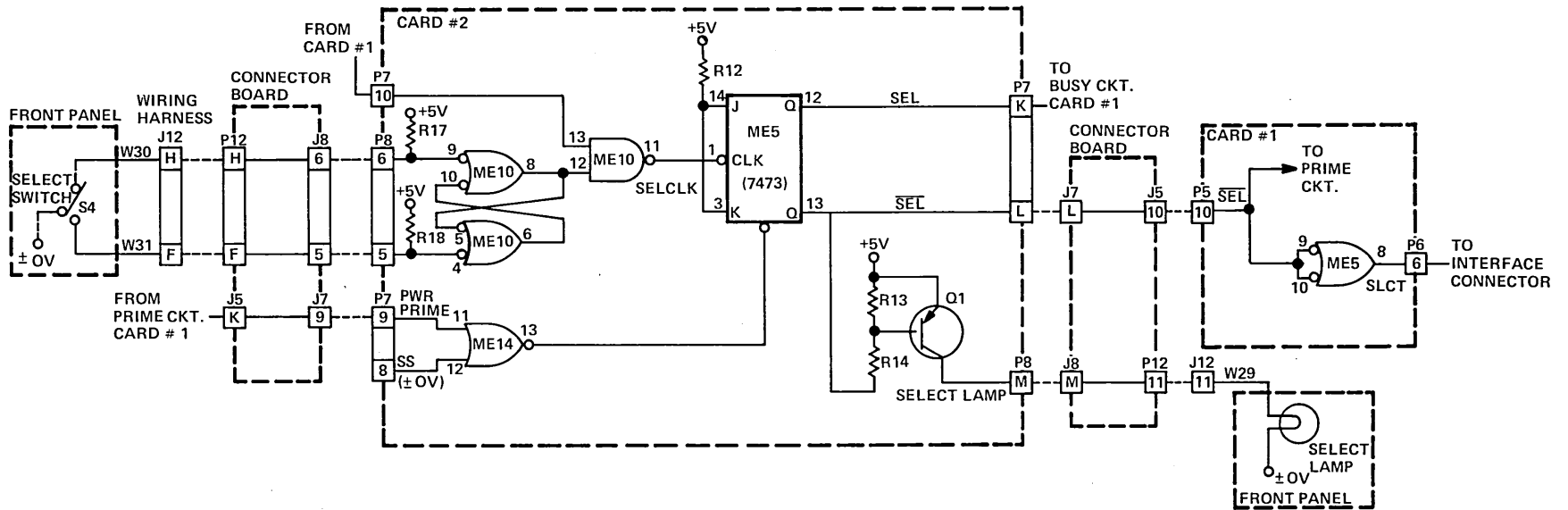


Figure 4-6. SELECT CIRCUIT

## 4.4 LOADING DATA

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

In general, the data transfer sequence consists of the input device placing the appropriate code on the data lines to printer and then generating a data strobe pulse. The printer, after a slight delay, responds with an acknowledge pulse. 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.

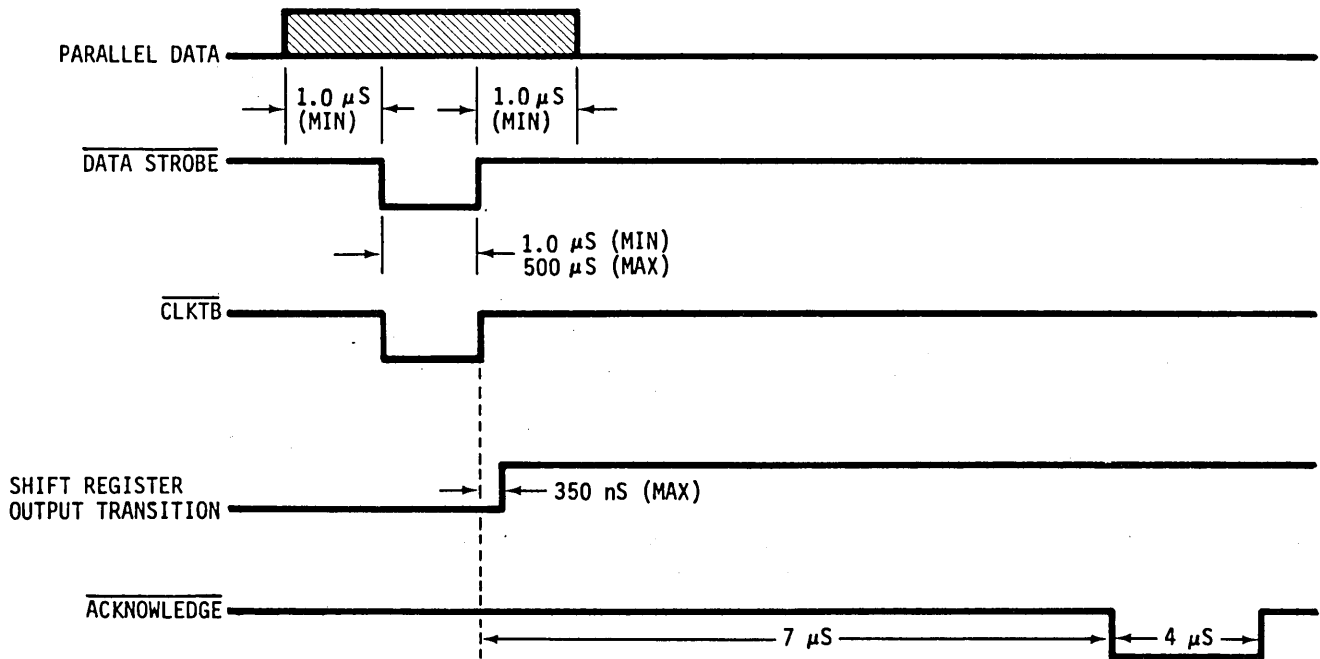


Figure 4-7. INPUT DATA TIMING - NO BUSY CONDITION

### 4.4.2 DATA STROBE

As shown in the timing diagram of Figure 4-7, the data lines must be stable at least 1.0 usec before and after DATA STROBE, and the DATA STROBE pulse must be at least 1.0 usec wide.

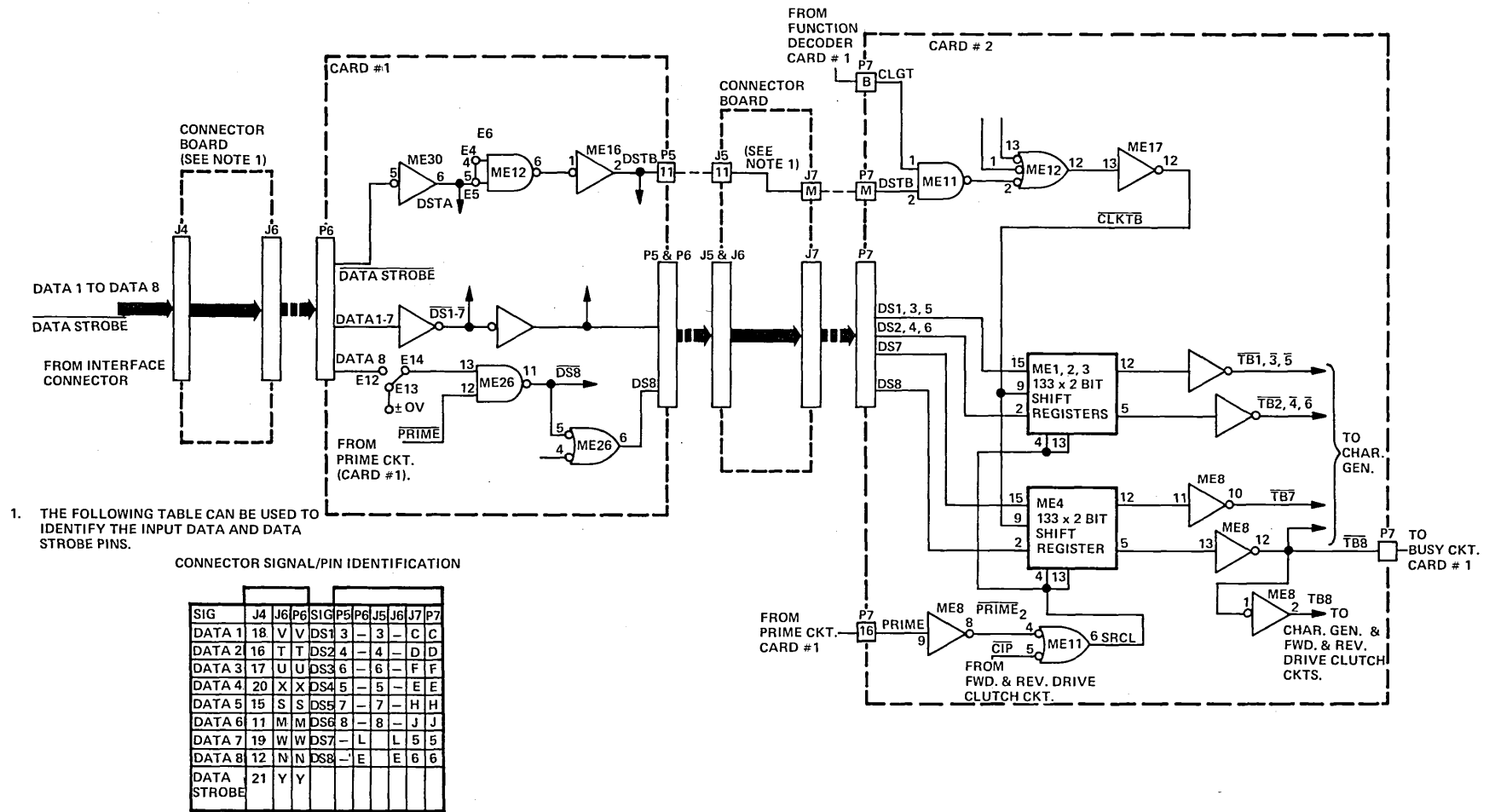


Figure 4-8. DATA INPUT CIRCUIT

#### 4.4.3 ACKNOWLEDGE (Figure 4-9)

The trailing edge of the data strobe (DSTB) triggers the  $\overline{\text{AKDLY}}$  one-shot generating a 7 usec  $\overline{\text{AKDLY}}$  pulse. 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 can be used by the interface device to send the next  $\overline{\text{DATA STROBE}}$  pulse to the printer.

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.

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 by SELECT switch (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 (DLYLF is low);
8. 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  $\overline{\text{OSC}}$  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.

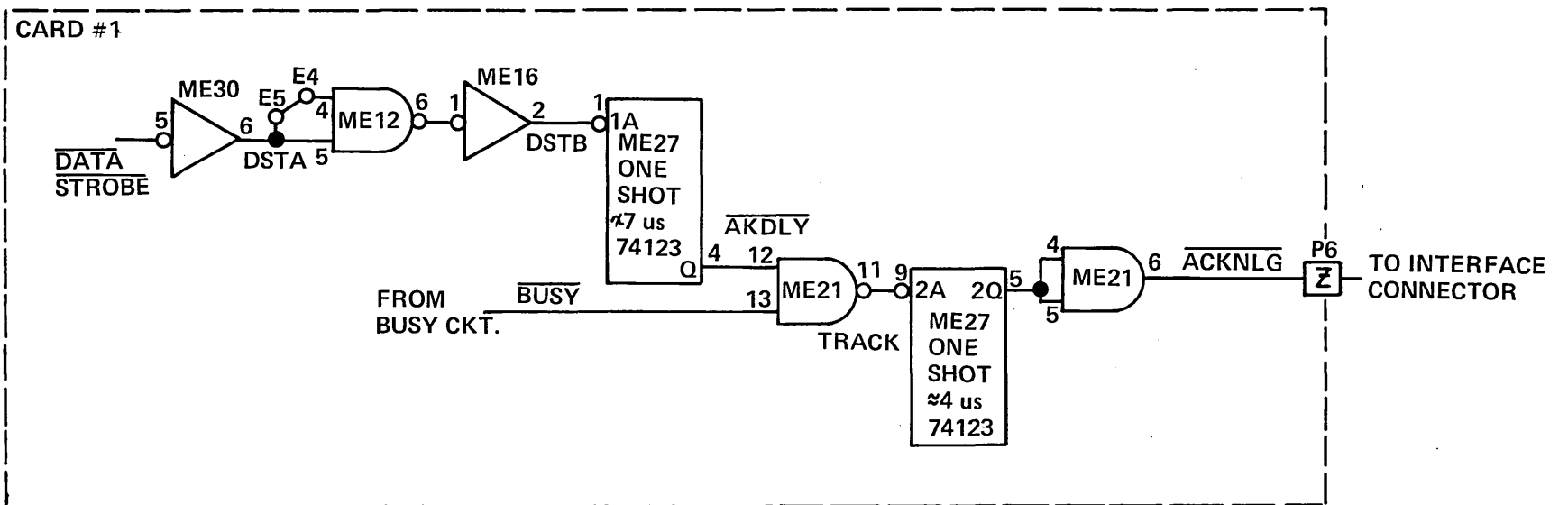
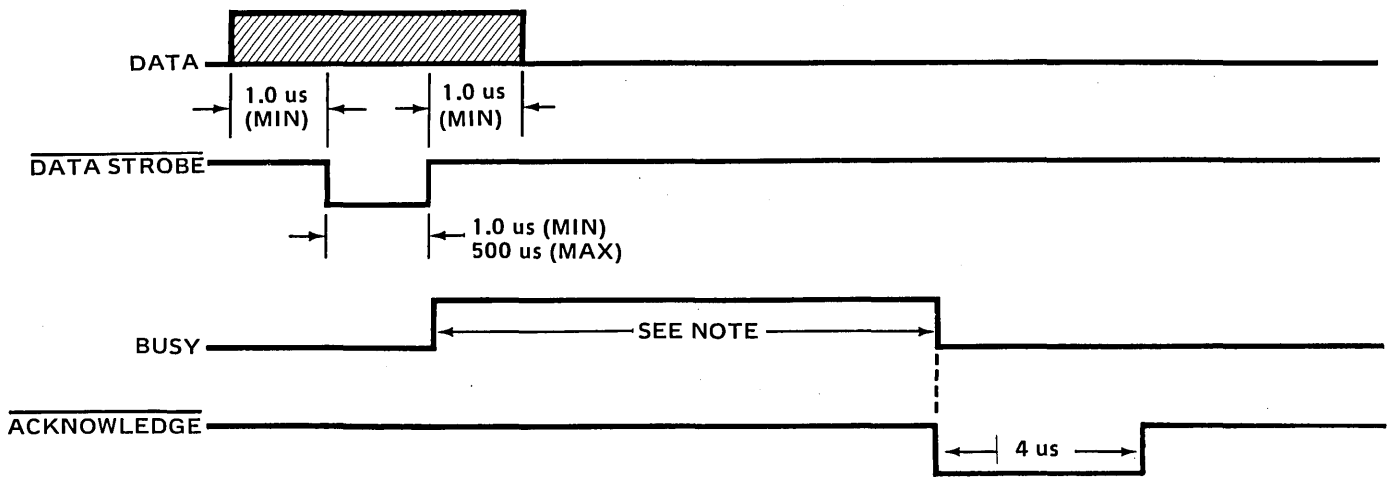


Figure 4-9. ACKNOWLEDGE CIRCUIT





**Note:**

Received Data	Octal Code	Duration of Busy
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 132 character in a line.	015	6 msec per character plus 270 msec max. return time
Delete	177	3 msec

Figure 4-10. INPUT DATA CAUSING BUSY

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 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 (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 FCCLK is set), then the CR code is stored in the shift register.

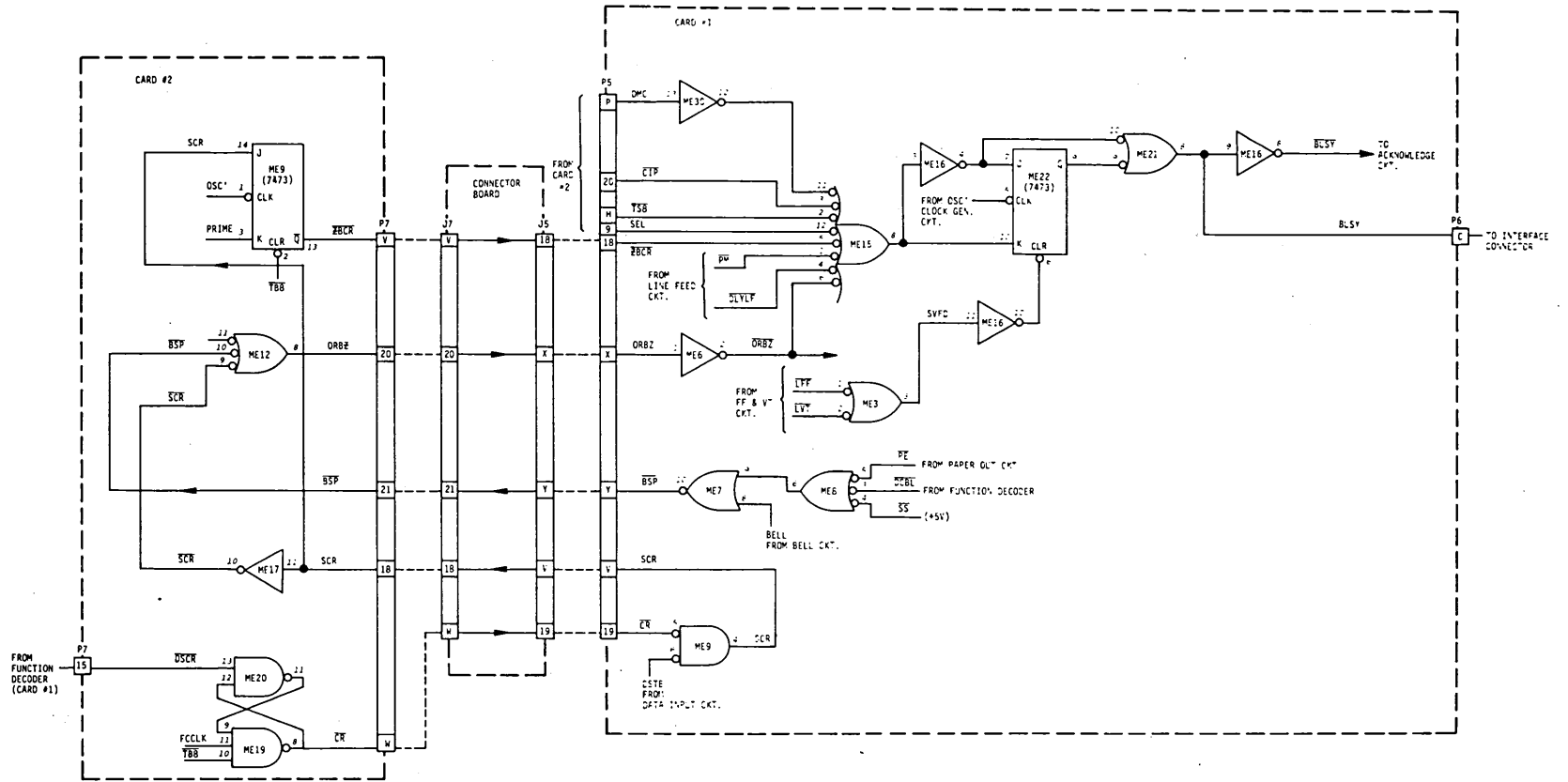


Figure 4-11. BUSY CIRCUIT

#### 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 # 1)

Function	Mnemonic	Octal Code	Printer Action
1. Carriage Return	$\overline{\text{DSCR}}$	015	Shifts the buffer until dummy character appears at the output and prints the line of characters.
2. Form Feed	$\overline{\text{FF}}$	014	Moves the paper until the next Top of Form hole in Channel 7 of the tape reader is detected.
3. Vertical Tab	$\overline{\text{VT}}$	013	Moves the paper until the next Vertical Tab hole in Channel 5 of the tape reader is reached.
4. Line Feed	$\overline{\text{DCLF}}$	012	Advances the paper one line.
5. Delete	$\overline{\text{DEL}}$	177	Reset the printer electronics.
6. Bell	$\overline{\text{DCBL}}$	007	Generates an audible tone, about two seconds in duration, in the speaker at rear of the printer.
7. Elongated Characters	$\overline{\text{UPSC}}$	016	Prints the line of characters as elongated characters (double width).

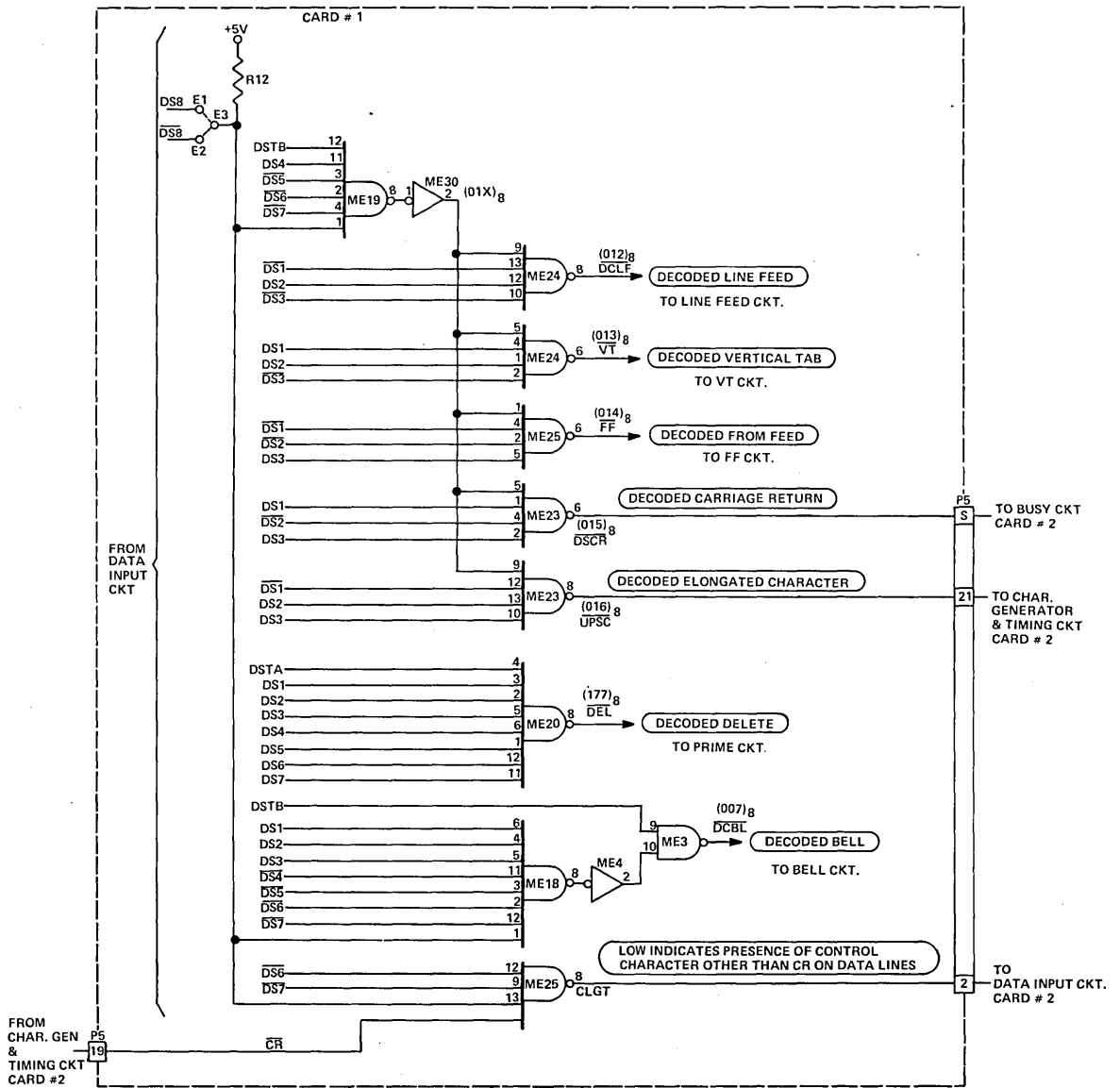


Figure 4-12 FUNCTION DECODER

## 4.5 CHARACTER PRINTING (Figure 4-13)

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

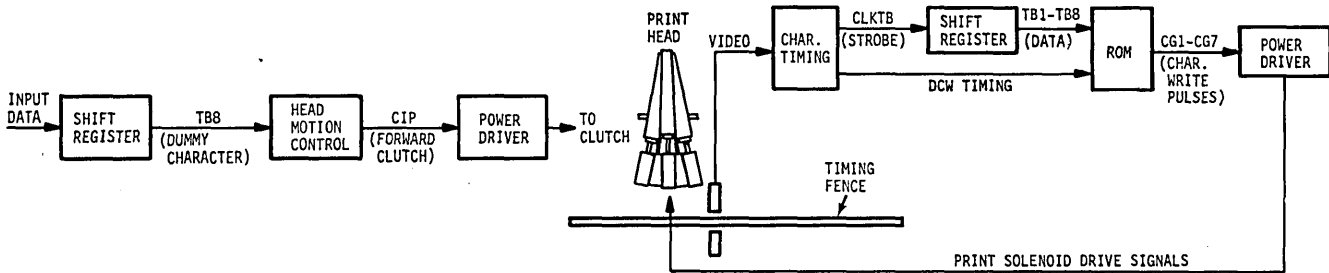


Figure 4-13. CHARACTER PRINTING BLOCK DIAGRAM

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 columns of dots in the printed character.

The logic uses one ROM (Read-Only-Memory) element for the complete 64-character set. The ROM defines the dot pattern for the five columns in the 5 x 7 character matrix. The 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 PRINTER 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 (ME9, Figure 4-11). This allows the OSC clock to generate CLKTB pulses, shifting the register until the dummy character appears at the output. A high TB8 (ME20, 1) indicates dummy character.

When TB8 goes high and the left limit switch is activated (RTPSW is high), a low  $\overline{CIP}$  signal is generated. The low  $\overline{CIP}$  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 ( $\overline{CIP}$ ) and the reverse clutch logic (CIR).

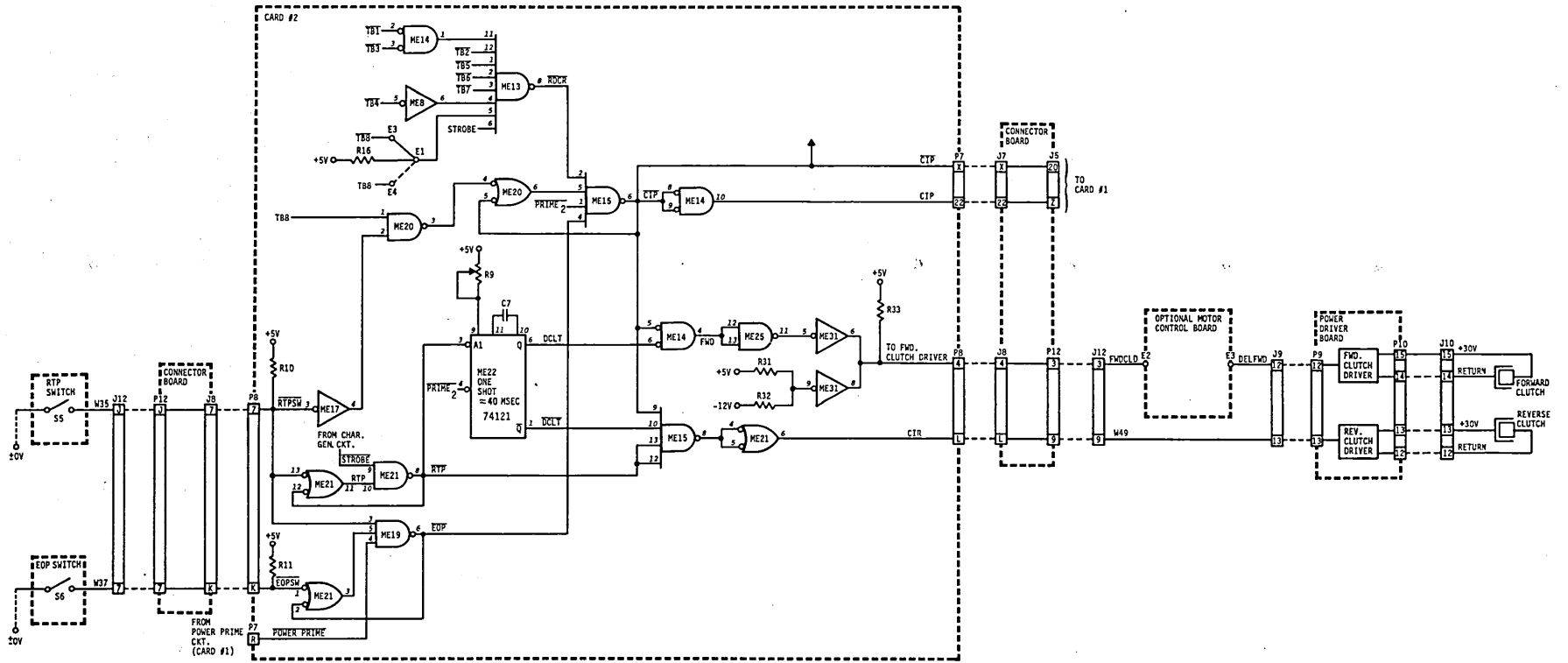


Figure 4-14. FORWARD AND REVERSE CLUTCH DRIVE CIRCUITS

#### 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. In normal character printing, STROBE is the basic timing signal.

##### 4.5.3.1 Video Amplifier (Figure 4-16)

The circuit used to generate and amplify the video signal is located on the video amplifier board attached to the print head carriage.

The video amplifier is comprised of a sensor and operational amplifier ME1. Refer to the schematic drawing number 63002669 in Section 7. The sensor converts light energy monitored through the timing fence into electrical energy. As the carriage moves, the light source is interrupted by opaque bars on the timing fence and generates a pulsating output. The positive output generated on each light signal is applied to the positive input of ME1. The signal is amplified by ME1 and provides a high output for each light signal. The duty cycle of VIDEO output is set by adjusting R4.

##### 4.5.3.2 Timing Signal (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 columns in the character matrix. The quiescent state of this strobe counter is DCW0 which corresponds to the space interval between character. 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 ROM (character generator).

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

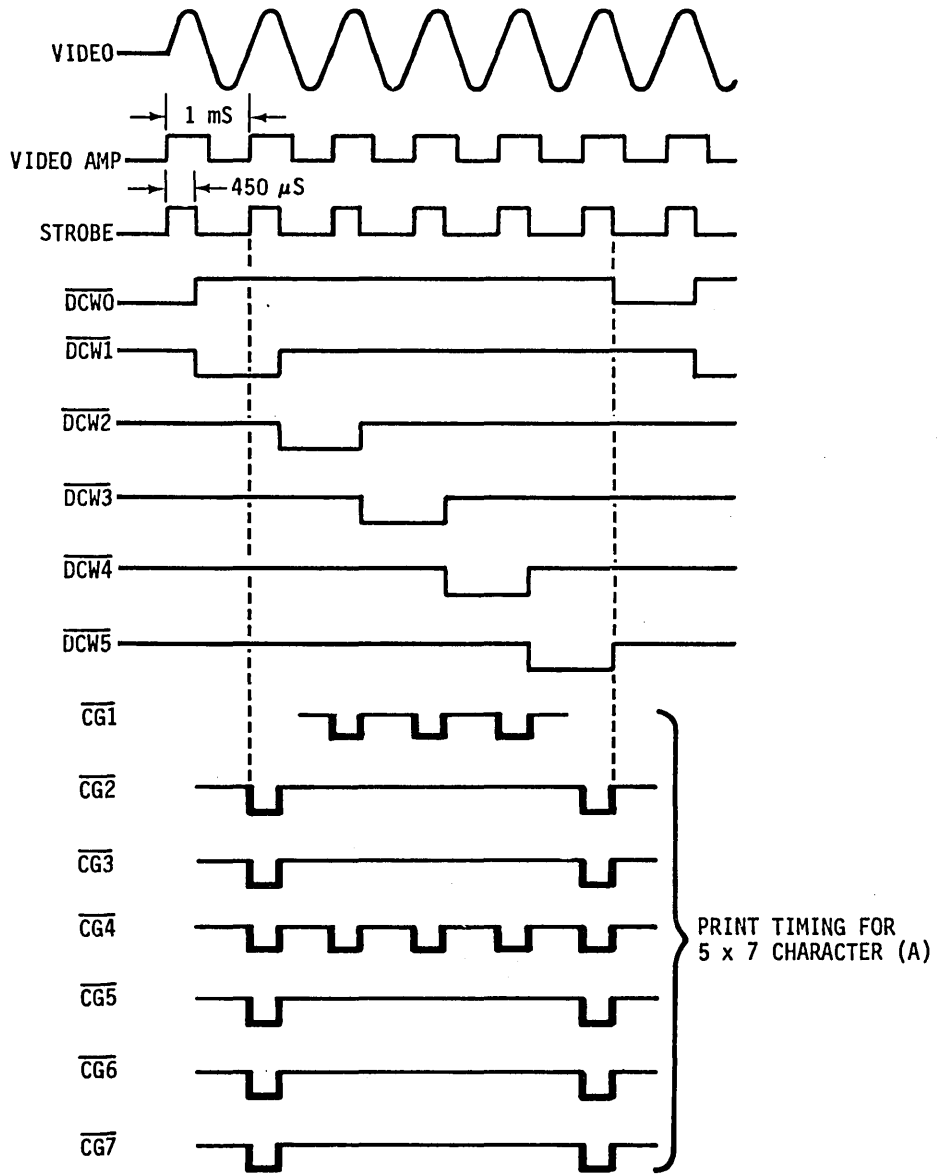


Figure 4-15. CHARACTER TIMING.



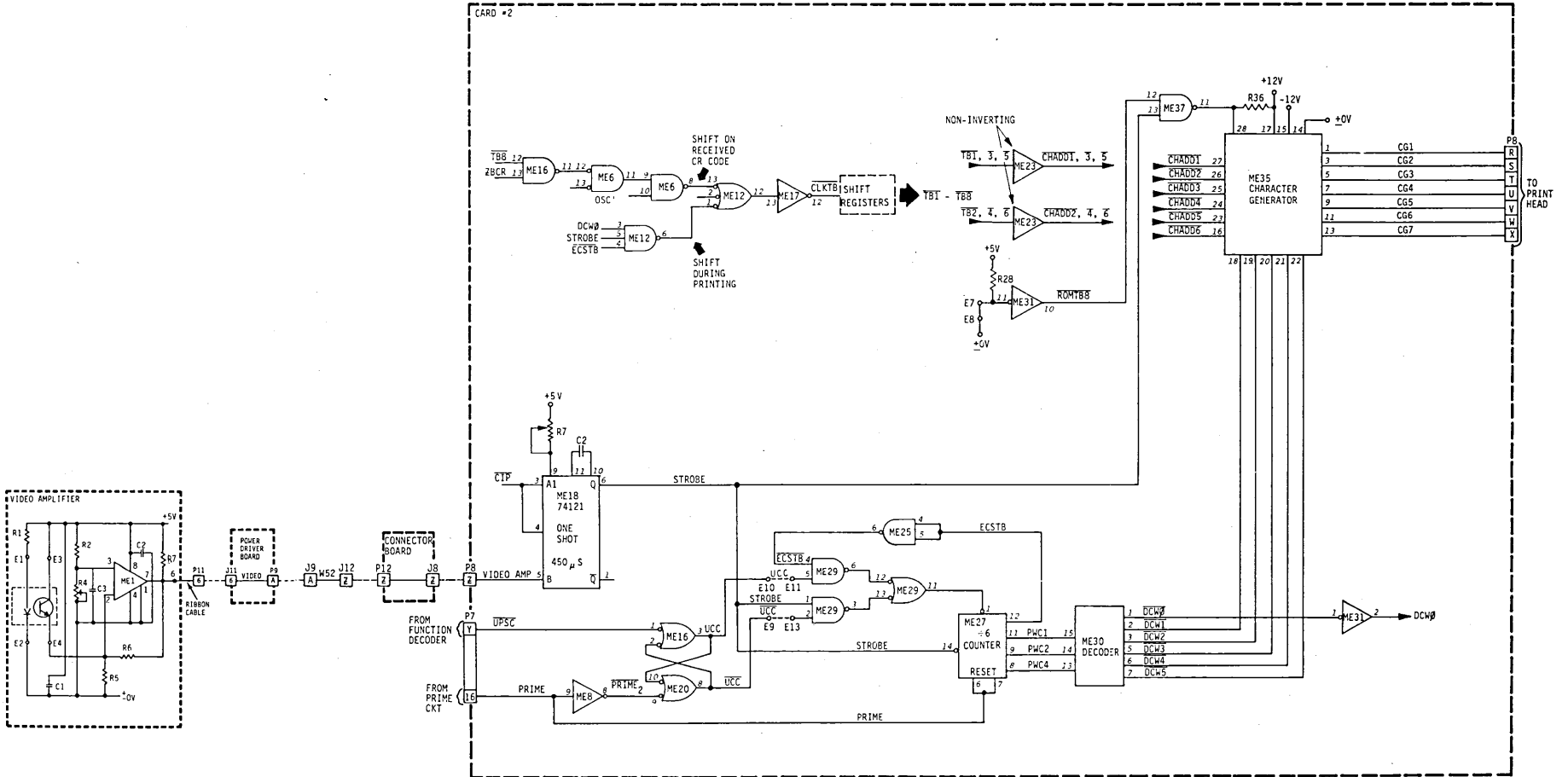


Figure 4-16 CHARACTER REGISTRATION AND TIMING CIRCUIT

#### 4.5.4 CHARACTER GENERATOR (ROM) - Figure 4-16

The logic board contains one ROM element in element location ME35. It provides outputs (i.e., columns 1,2,3,4,5) for up to 64 characters.

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

1. The character address - The standard 64 character ROM (ME35) is addressed by  $\overline{TB1}$ - $\overline{TB6}$  (CHADD1-CHADD6).
2. Column Address - Timing outputs  $\overline{DCW1}$ - $\overline{DCW5}$  specify the five columns in each 5 x 7 character matrix.
3. Timing - A low input to pin 28 of the ROM, gates the 7-bit dot configuration of the addressed character and column to the output of that ROM. This timing input is STROBE ANDed with  $\overline{ROMTB8}$ .  $\overline{ROMTB8}$  is always high allowing each STROBE pulse to gate the ROM output. The STROBE pulse provides the timing input for gating the 7-bit dot pattern to the print head solenoids.

For elongated character printing, the DCW timing signals are twice as long during elongated character mode, causing 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.

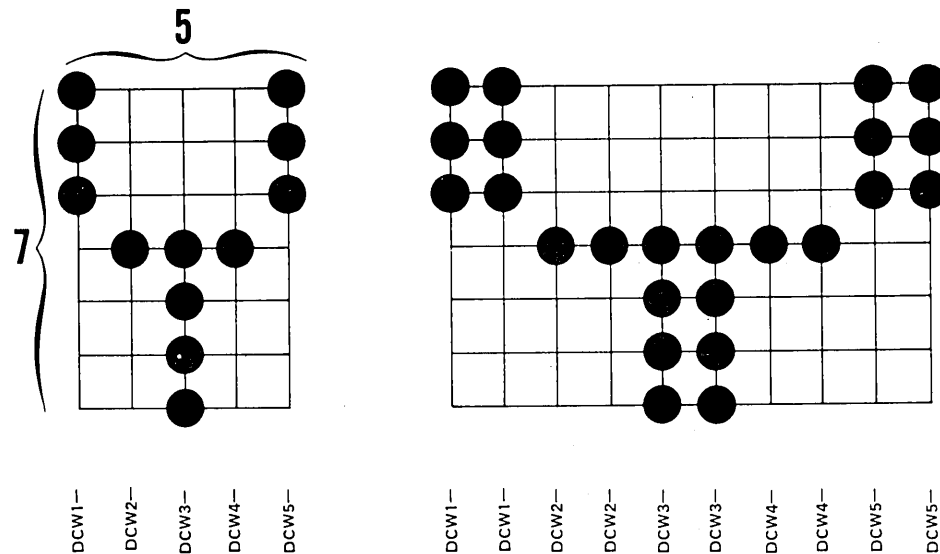


Figure 4-17. NORMAL AND ELONGATED CHARACTERS

The seven outputs from the ROM are applied to the Power Driver board as signals CG1-CG7.

#### 4.5.5 PRINT HEAD OPERATION (Figure 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.

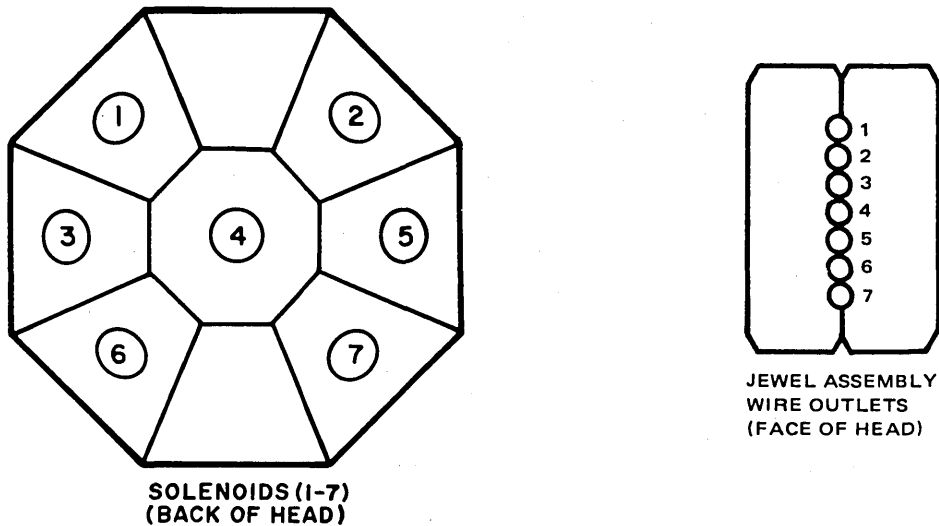


Figure 4-18. SOLENOID POSITIONS, 1 THROUGH 7

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 impact on the paper. Approximately 500 microseconds more are required for the wire to retract to its normal position.

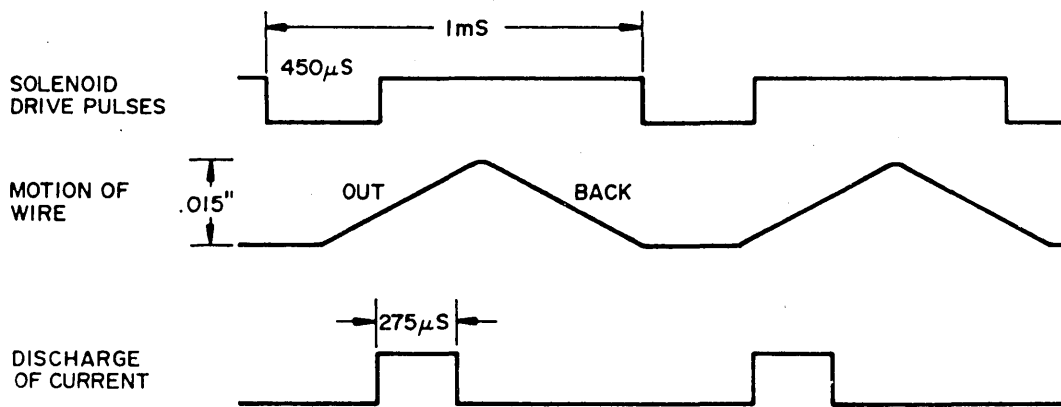


Figure 4-19. PRINT HEAD TIMING

#### 4.5.6 POWER DRIVER CIRCUIT

##### 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. This current flows into the base of Q3, turning it on. The current through Q3 then develops a positive level across R5. This level causes Q2 and Q1 to act as emitter followers, developing a voltage of approximately 3.8 volts 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.

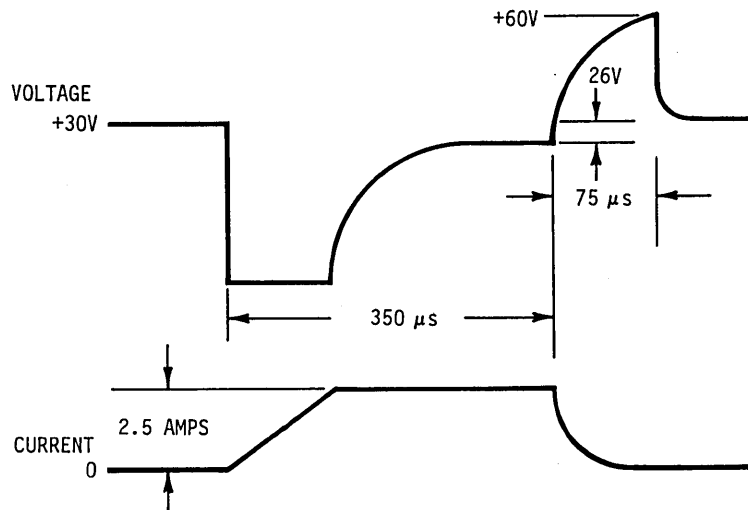


Figure 4-20. POWER DRIVER WAVEFORM

#### 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 CR39 through CR45 have their cathodes tied together and connected to the collector of Q33 and cathode of zener diode CR48. When the printer is turned on, the +5 volt supply prevents Q34 from conducting. This prohibits current from flowing through the voltage divider comprised of resistors R79 and R80. This prevents Q33 from conducting and applies the voltage developed across zener diode CR48 to the cathode of diodes CR39 through CR45. In this condition, diodes CR39 through CR45 cannot shunt current away from the solenoid drivers.

When the printer is shut off, it is characteristic that the 5 volt supply output drops before the 30 volt supply output. When this happens Q34 turns on and current flows through the voltage divider comprised of resistors R79 and R80. Q33 is turned on and shunts the zener diode CR48. This clamps the base of the first emitter follower of each solenoid driver 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 Q33 through diodes CR36, CR37 and CR38. Therefore, during power turn off, the clutches are released and paper movement is 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),  $\overline{CIP}$  goes high, turning off the forward clutch. The high  $\overline{CIP}$ : (1) generates a low  $\overline{CIR}$  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  $\overline{CIR}$  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  $\overline{CIR}$  instead of  $\overline{CIP}$ .

## 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, Timing; Figure 4-22 Circuit)

The line feed operation can be generated by any of the following two 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  $\overline{\text{DCLF}}$  pulse during data strobe, the trailing edge of which triggers the LF one-shot.

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

The low  $\overline{\text{LF}}$  generates PM, and if no paper time-out condition has occurred (PMTO 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. During both the LF and DLYLF intervals, the printer remains busy.

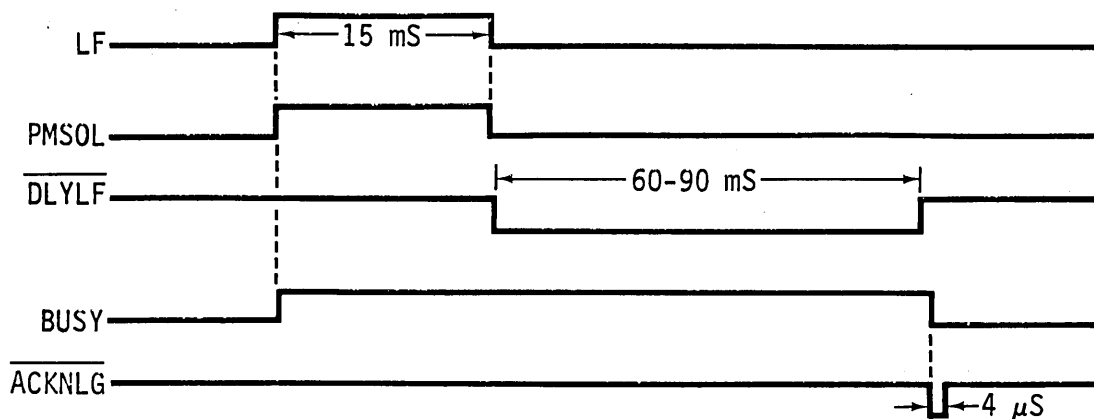


Figure 4-21. LINE FEED TIMING:

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

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

1. Receiving a form feed code (octal 014) - The decoder form feed signal  $\overline{\text{FF}}$  sets latch LFF which generates a high SVFD signal. SVFD allows the next OSC' to set the VFD flip-flop. The resulting low  $\overline{\text{VFD}}$  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  $\overline{\text{TOF}}$  signal which sets the LFF latch and generates PMSOL as described in (1) above.

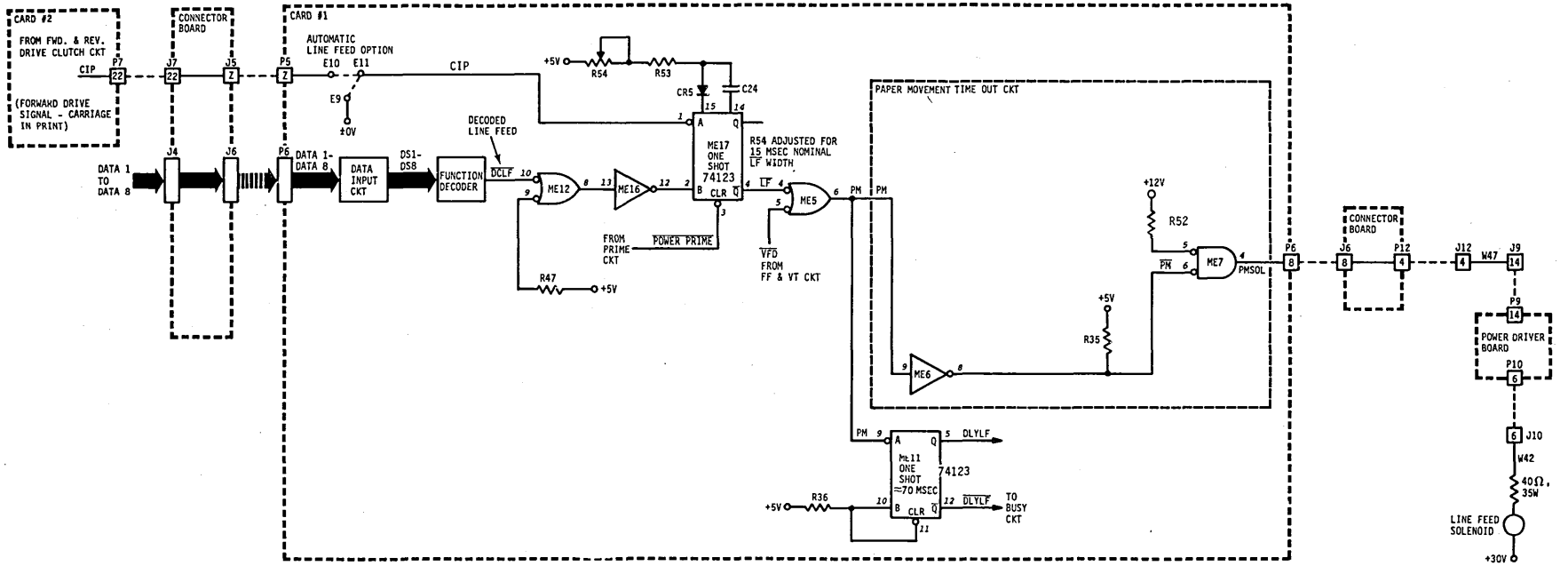


Figure 4-22. LINE FEED CIRCUIT

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 HL goes low. The low 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 milli-second 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.

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

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 allows the next OSC' to set the VFD Flip-flop. The resulting low 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 HL goes low. The low 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 milli-second 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.

#### 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.

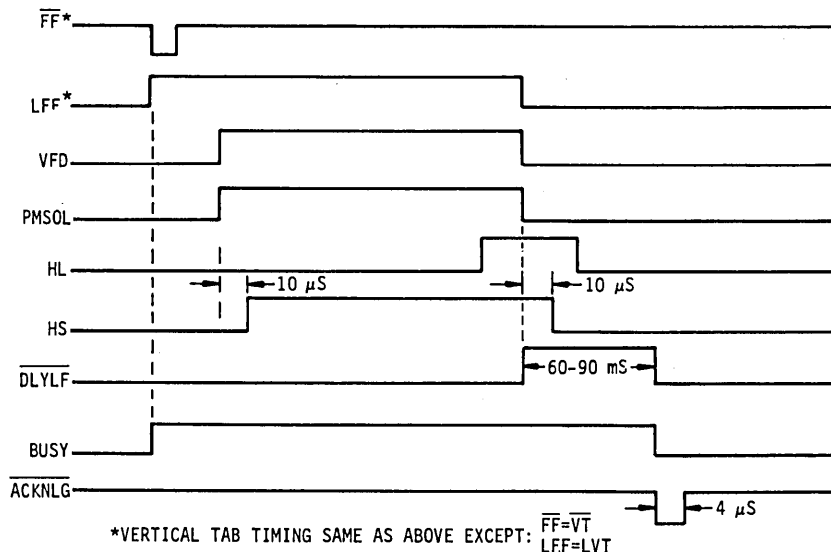


Figure 4-23. FORM FEED AND VERTICAL TAB TIMING



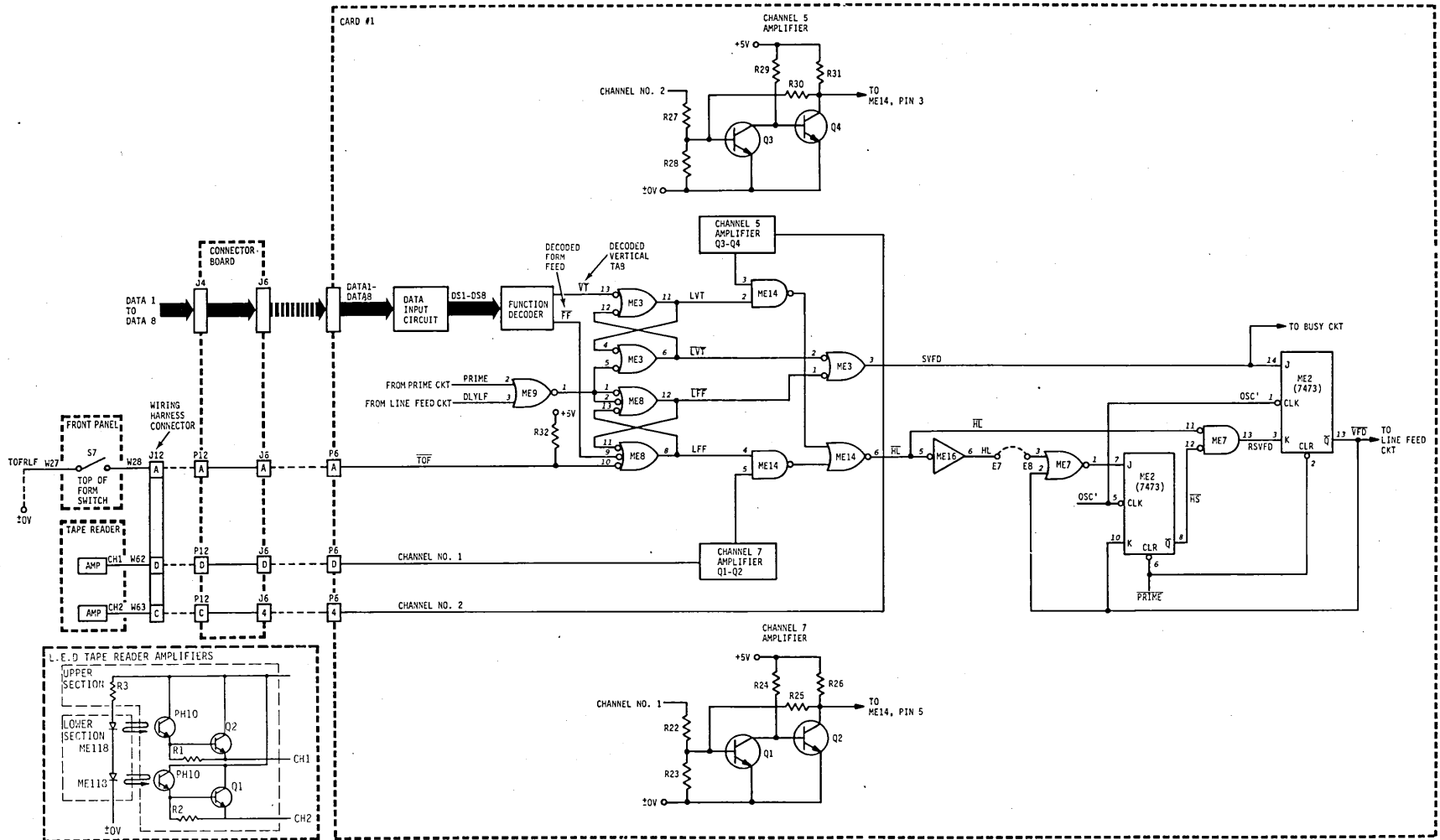


Figure 4-24. FORM FEED AND VERTICAL TAB CIRCUIT

#### 4.6.4.1 Vertical Format Control Tape Reader (Figure 4-24)

Since the circuits for the Form Feed and Vertical Tab tape reader channels are identical, only the Form Feed channel is described.

When light from the L.E.D. (ME118) is sensed by the photo transistor (PH10), the transistor begins to conduct. The current through the photo transistor creates a voltage drop across R1 and turns on emitter follower amplifier Q2 (2SC4580). The current from the emitter of the photo transistor is then amplified by Q2 and applied to the Form Feed (channel 7) amplifier on Electronic Card #1.

#### 4.6.4.2 Vertical Format Control Amplifiers (Figure 4-24)

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 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 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 flyback voltage then appears across CR24, which provides a current path until the magnet 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 (077) or detection of a paper empty condition (PE goes low) triggers the BELL one-shot: generating a 1 to 2 second BELL signal. This BELL signal turns on Q5 enabling multivibrator ME10. The 2 KHz output from ME10 is then applied to the speaker through Q6 and Q7 on Card 1. The speaker is located at the rear of the printer.

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

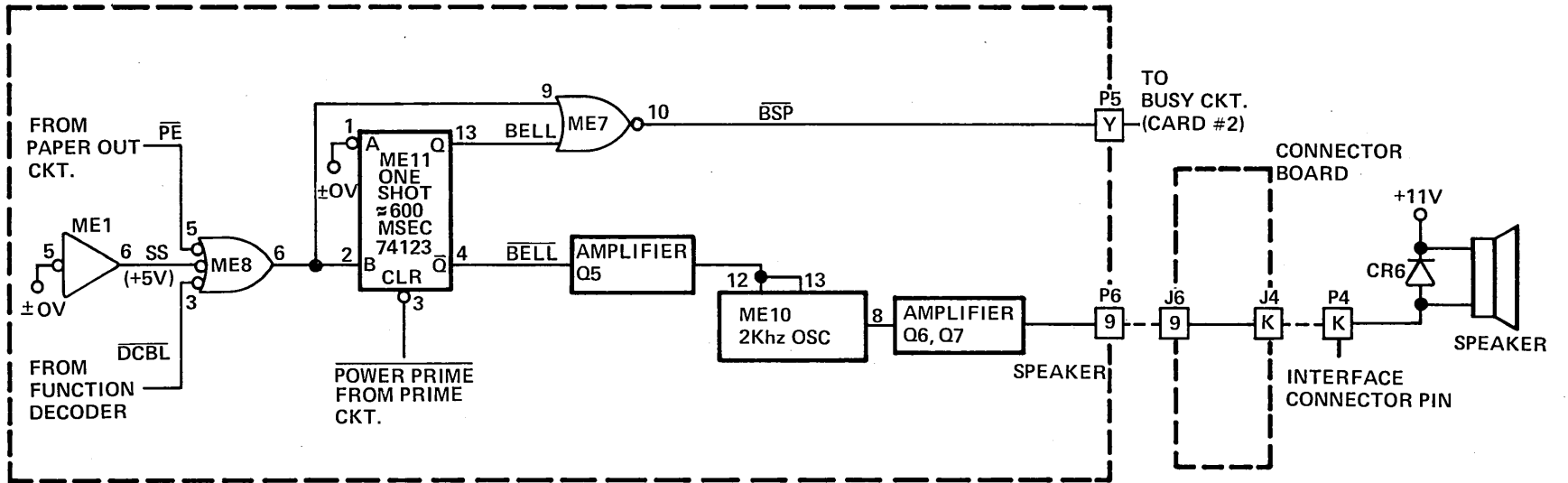


Figure 4-25. BELL CIRCUIT

## 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  $\overline{\text{DEL}}$  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.

## 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  $\overline{\text{PE}}$  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  $\overline{\text{PE}}$  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) - Figures 4-27, 28, 29

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, and Interconnection Diagram, Figure 4-13 and a timing diagram Figure 4-14).

One-shot ME3 generates a 9-second interval during which time 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 a 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.

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 M35, pin 8 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.

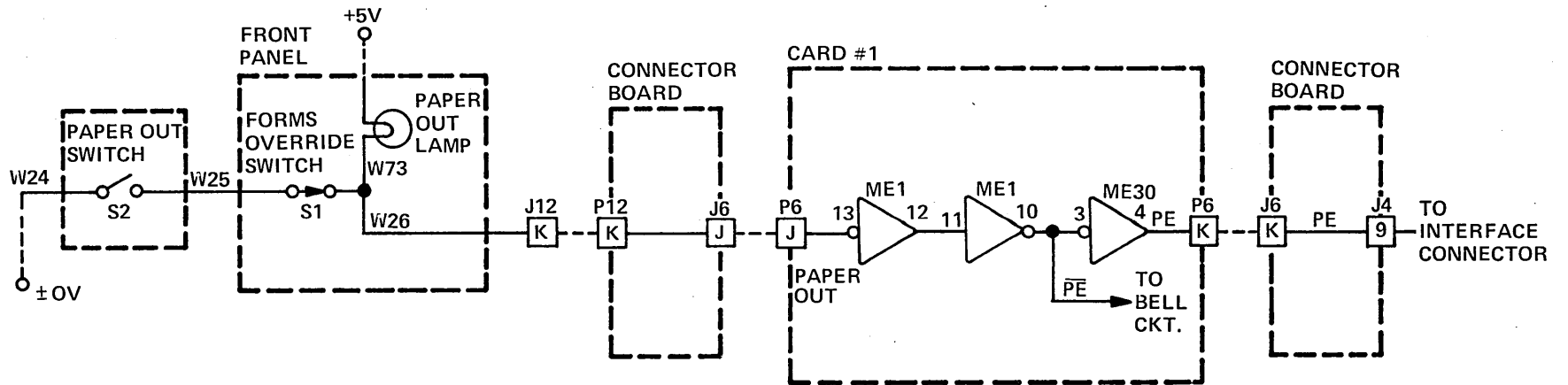


Figure 4-26. PAPER EMPTY

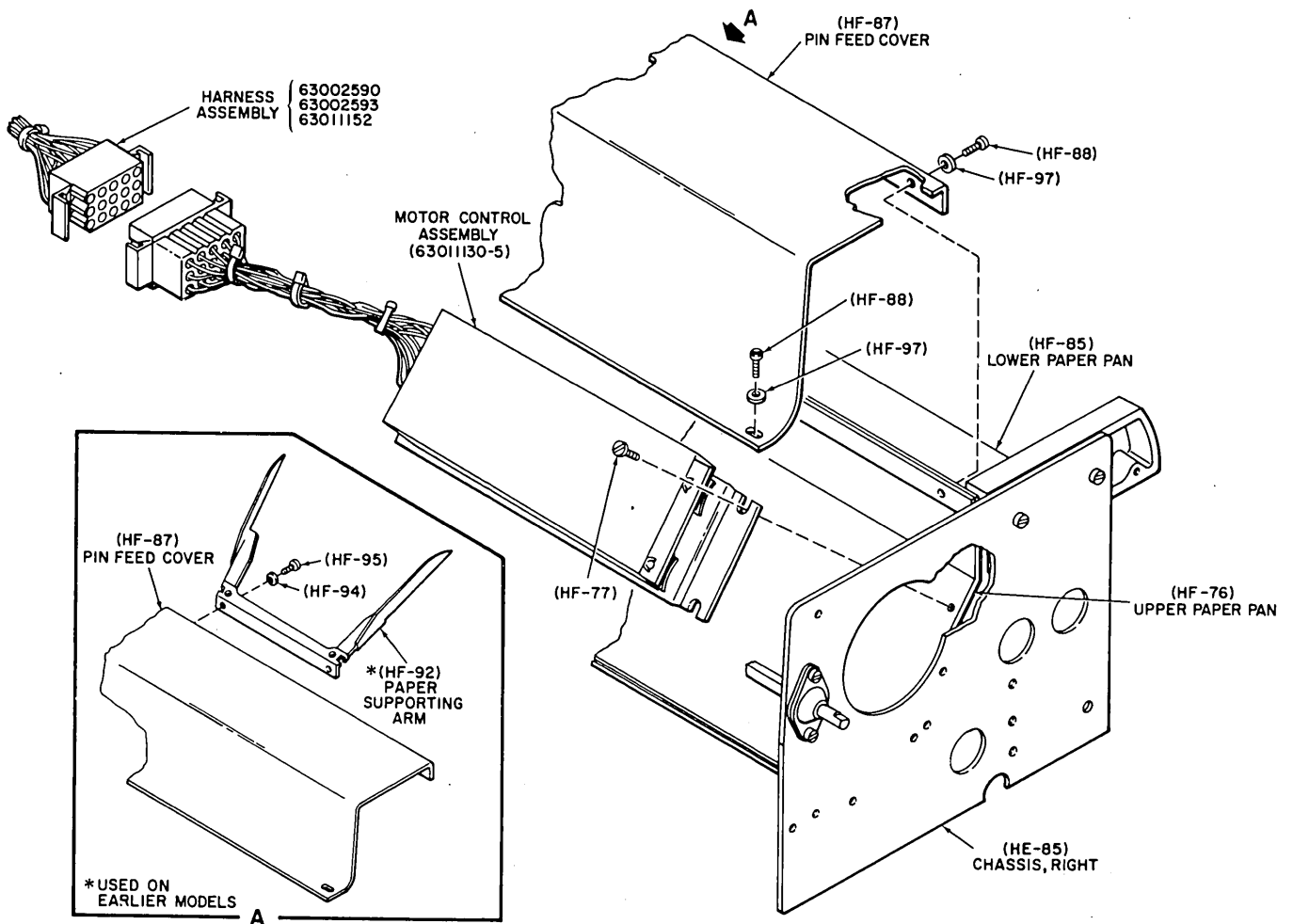


Figure 4-27. LOCATION OF MOTOR CONTROL CIRCUIT

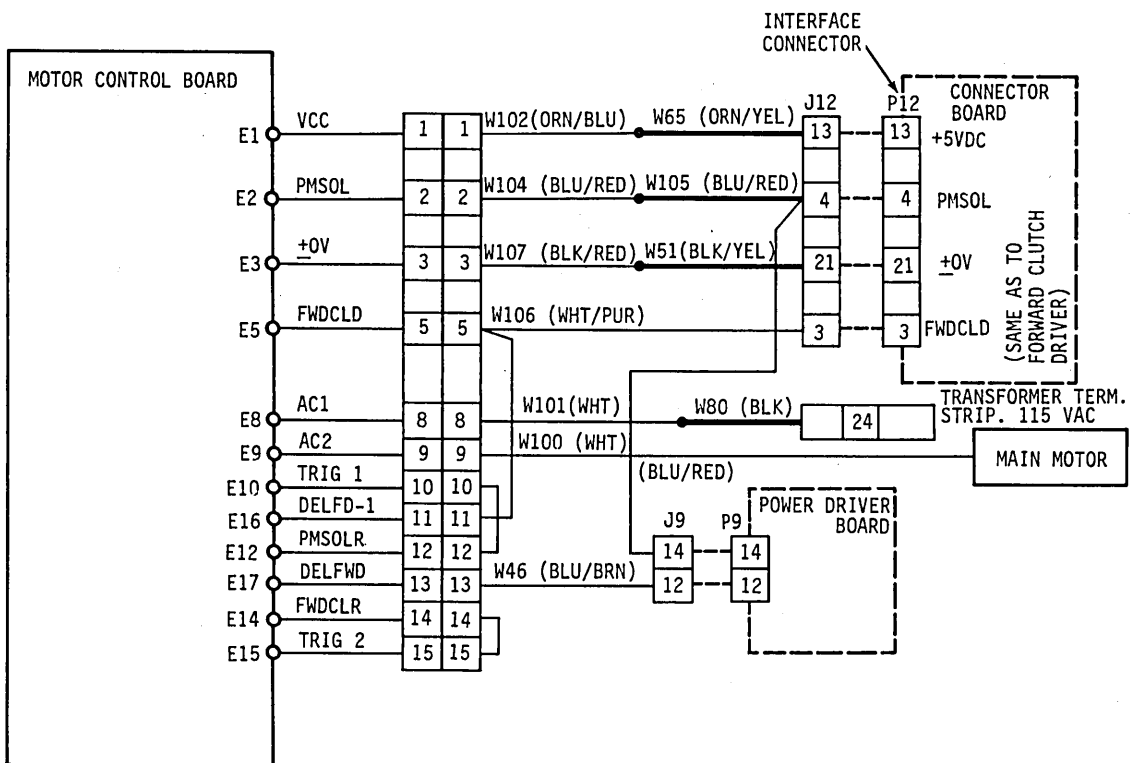


Figure 4-28. MOTOR CONTROL BOARD INTERCONNECTION DIAGRAM

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.

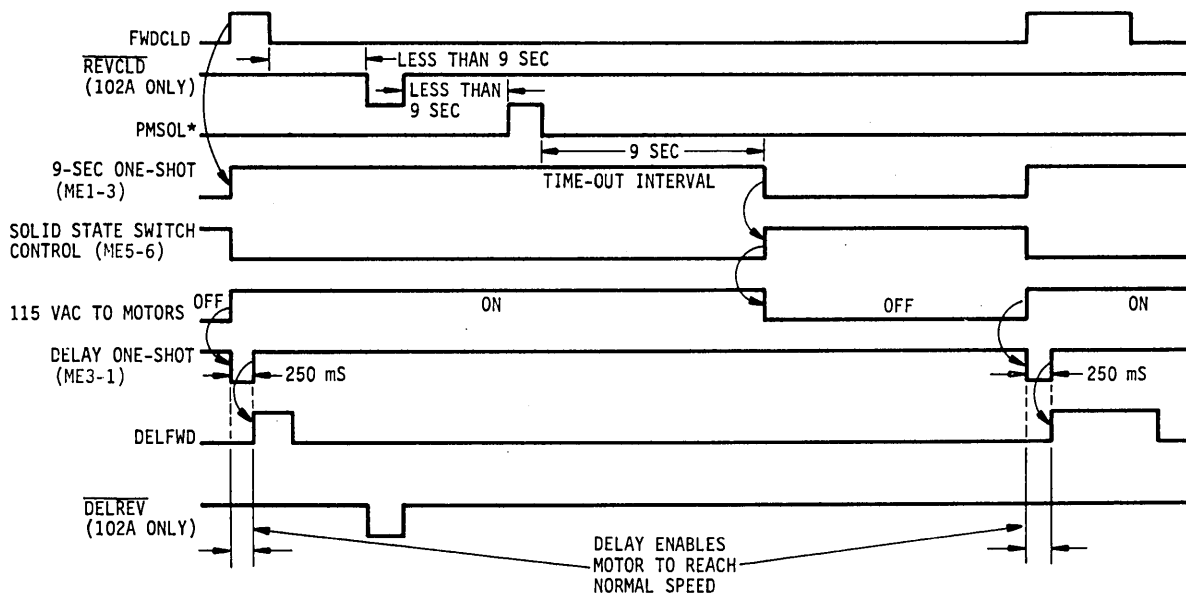
The above operation keeps repeating itself during the 9-second interval, switching Q1 from the OFF state to the ON state, for either polarity of voltage applied to the main terminals of Q1.

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 4 and 9. 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 ME2 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 ME3 times-out causing its output ME1, pin 3 to go low. This turns off ME1 by delivering a high to ME2, pin 2, which 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 ME3, 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 milliseconds 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

## 4.8 POWER SUPPLIES (Figure 4-30, Schematics - Section 7)

The complete power distribution circuit for the 101 is shown in Figure 4-30, from the primary input (115 VAC, 60Hz) 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, 60Hz. 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 multitap 50/60 Hz transformer (T1), for various input voltages (either 50 or 60Hz).

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

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 line filter located on the fuse bracket to the electronics cavity 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.

The secondary of the multitap transformer develops the following voltages:

35 VAC center-tapped  
26.5 VAC  
11 VAC

These voltages 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 No. 63011143)

The 11 VAC output from the secondary winding of the transformer is rectified by bridge rectifier CR1, CR2, CR3, CR4 and filtered by C1 located in the cavity. This filtered output is fused through F1 and regulated by regulator element ME1 which maintains the +5V output. Capacitors C4 and C5 provide additional filtering for high frequency transients that might appear at the output. Resistor R8 is a bleeder resistor allowing some current flow through the regulator keeping it in the active region.

Overvoltage protection is provided by components CR5, R7 and Q1. With the output at a normal +5V, Zener diode CR5 inhibits current flow through R7, holding the gate of SCR Q1 at ground. However, when the output voltage exceeds +6.8V, the Zener diode CR5 conducts, developing voltage across R7 and turning on SCR Q1. This shorts the input and blows fuse F1.



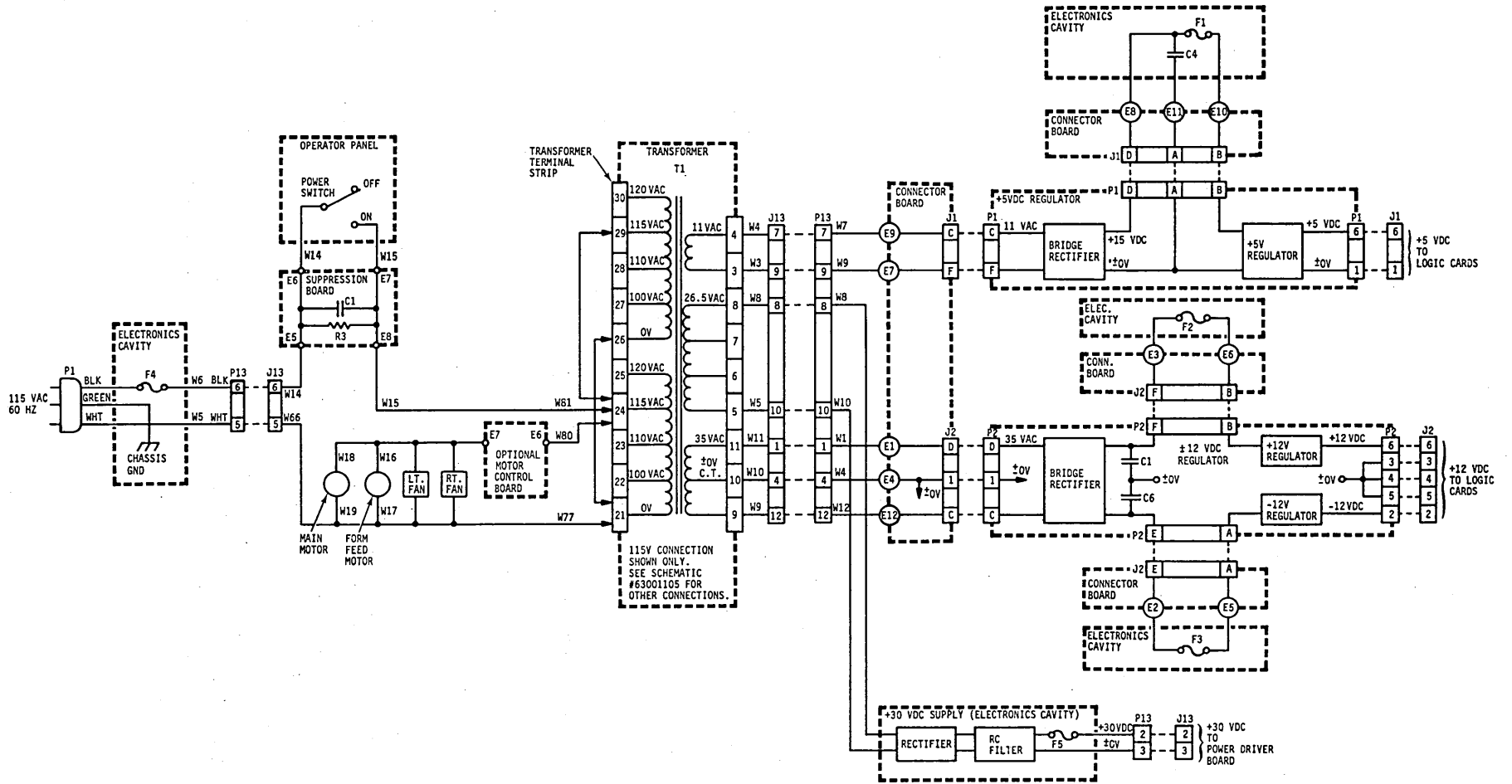


Figure 4-30. POWER DISTRIBUTION DIAGRAM

#### 4.8.2 +12V and -12V REGULATORS (Schematic No. 63002308)

The voltage generated by the 35 VAC center-tapped secondary winding of T1 is used as input 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, UNREGUALTED (Schematic No. 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 Series 101 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.

Section	Title	Figure Reference Parts Symbol
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	Figure 8-12

\*Part List only

#### 5.2.1 COVER (FIGURE A)

##### 5.2.1.1 Operation

All covers permit internal access to the printer, and are completely removable.

##### 5.2.1.2 Removal/Replacement Procedure (Refer to Figure 8-2)

1. Pull outward and down, left cover assembly (A-4) and right cover assembly (A-3).
2. Remove cover assembly, rear (A-7) by unscrewing from each side of cover, standoff (A-39) with internal lockwasher (A-41), nut (A-32) and ball stud (A-19).
3. Remove front cover assembly (A-5) by removing screws, flatwasher and split lockwashers at (A-26) (A-34) and (A-35). Remove at two corners: A-27, A-34 and A-35. Lift cover from frame (HE-1).

## CARRIAGE MECHANISM

### NOTE

Before removing front cover assembly, elevate top cover assembly (A-6) to clear printer head, and slide the front cover assembly forward to avoid damaging ribbon cables which are connected from the video amplifier board 63002668-4001 to the power driver board 63002242-4001 (Fig. 8-14).

4. Disconnect power cable (Refer Section 7, Electronic Cavity 63001105-1, item 9, and Fig. 8-2) from base (A-2) by removing screw, flatwasher and split lockwasher (A-25), (A-34), (A-35) and bracket (A-20).
5. Disconnect connector (A-16) from mating connector (HJ-46) at rear right on main frame (HE-1).
6. Remove screw (A-31) from ground strap (A-50).
7. To remove side covers (A-3, A-4), remove snap rings (A-21) and push, pins (A-14) through hinges.
8. To remove the base (A-2) from main frame, disassemble remaining hardware (four places) at (A-26), (A-34), (A-27) and lift main frame from base.
9. To reassemble, reverse order of disassembly beginning with step 8.

### 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 print head (HA-1) mounted on the carriage, is held 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 underside portion of the carriage. These parts are designed to absorb shock on the belt tension and linear alignment.

The ribbon guide roller (HA-5), mounted on the carriage and head bracket (70), holds the ribbon at proper position insuring proper tension on the ribbon while printing. Bracket (50) is a part of the video amplifier ass'y and supports the video circuitry for print registration in conjunction with the timing fence (Fig. 8-8/135).

#### 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 video amplifier and bracket (50) by removing screws, washers (55,56,57).
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 from ribbon guide roller (HA-5).

#### CAUTION

**AVOID DAMAGING LEFT REED SWITCH AND  
CASE (HE-78) WHEN CARRIAGE IS REMOVED  
FROM LEFT SIDE OF MACHINE IN NEXT STEP 5.**

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, 63) on shaft (A) (HA-59).  
NOTE: 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 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. 8-5) 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 (2.1-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 reverse clutch 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 8-4 AND FIGURE 8-5)

### 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 gear for forward clutch (HB-30) - pulley (HB-60) for forward clutch. Motor - intermediate pulley with gear (HB-22) - intermediate shaft with riveted pulley (146) - pulley (HB-60) for 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.

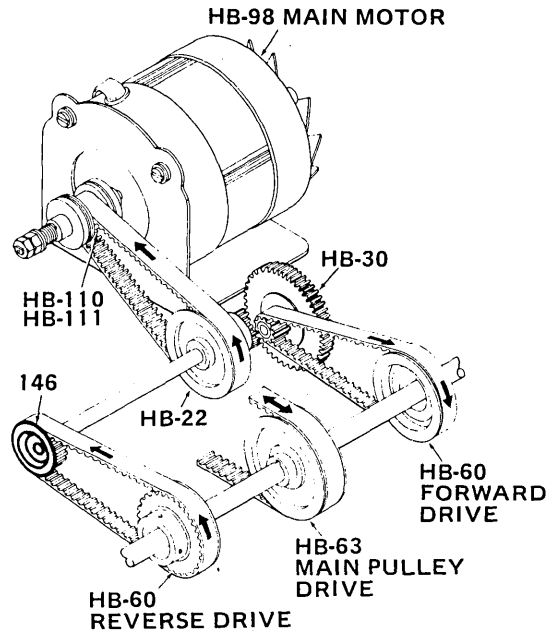


Figure 5-1. SERIES 101 DRIVE TRAIN

#### B. Clutch Alignment and Function (Fig. 8-5)

Alignment of clutches is as follows: Viewed from the front of the printer (right side), the order is reverse clutch assembly followed by forward clutch assembly. 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. 8-5, 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).



## DRIVING MECHANISM

### 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 adjusted 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).
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.6. through A.7. 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 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. Insulate wires, when motor is newly installed.
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. Insulate wires, when motor is newly installed.
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) at front of printer. Retain pulley and mounting hardware.

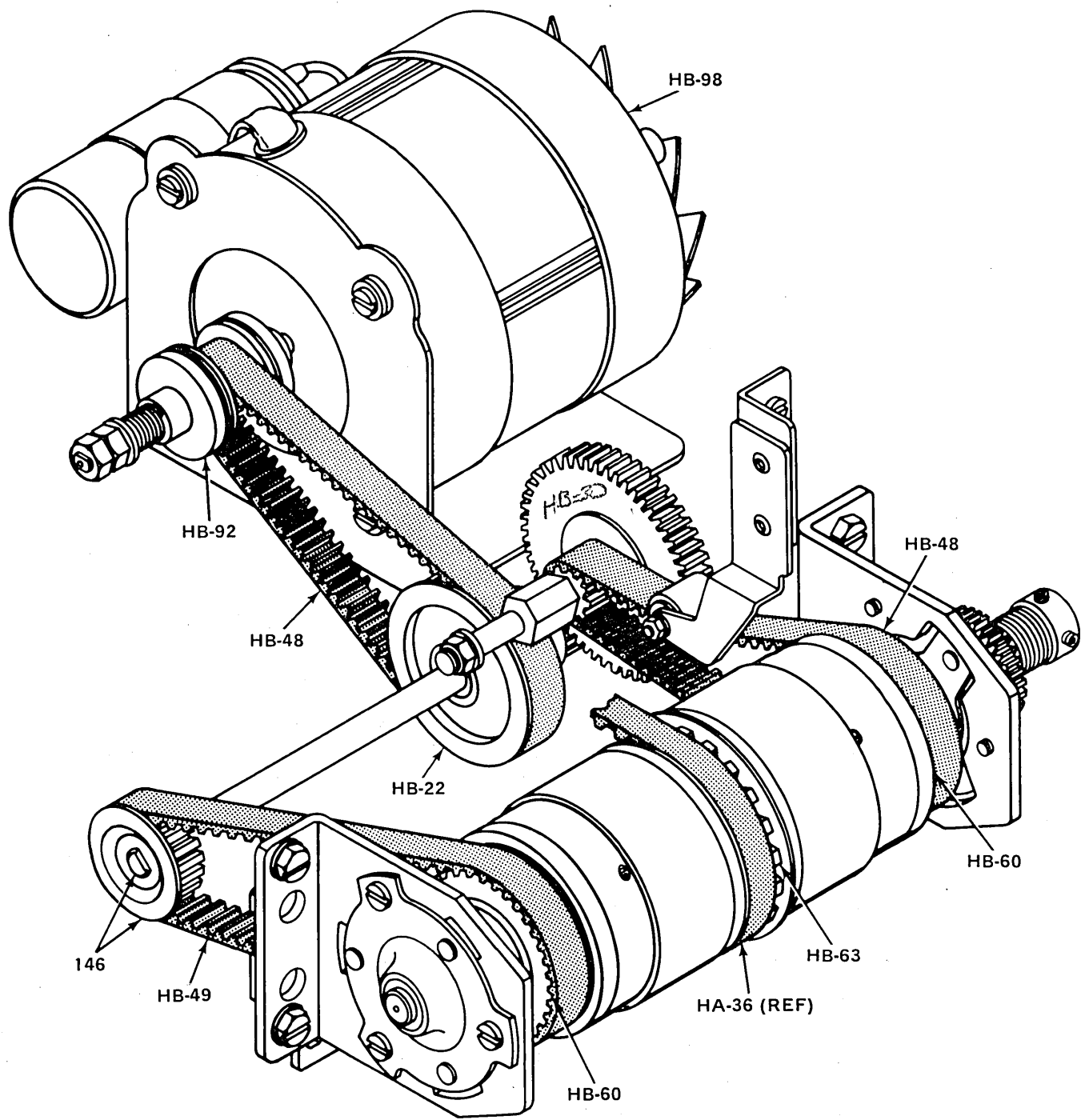


Figure 5-2. MAIN MOTOR DRIVE AND DRIVE BELT ARRANGEMENTS

## DRIVING MECHANISM

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

### NOTE

The following parts are to be added (in the order indicated, a through d), to the shaft of the motor 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-12).
- 1. Tighten nut (HB-112) so that spring coils squeeze together, but not overlapping. Tighten second check nut (HB-12).
  - 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 idle shaft (HB-27) is inserted so that belt fits over smaller gear of cluster 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. 8-4, part, 1, View A) 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.7. 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 (Fig. 8-4/146) 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. 8-5). 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. 8-5). 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 8-5).
- d. Slide main belt pulley (HB-63) off shaft. Retain key (HB-64).

## DRIVING MECHANISM

- e. For complete assembly replacement of forward and reverse clutches and main motor pulley, reverse step 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 (Fig. 8-4/146)

1. First, remove idle shaft (HB-27) with attached intermediate gear (HB-30) for forward clutch by removing nut and washer (HB-28, 29). Slide belt (HB-48) off the two-part gear (HB-30) prior to removal of the shaft (HB-27).
2. Loosen pulley (HB-22) on intermediate shaft (146) by loosening two set-screws (HB-23). Slide off pulley belt (HB-48).
3. Pull out riveted pulley and shaft (146) toward front of printer. This step will free pulley (HB-22) and felt washers (HB-24).

### 5.2.3.3 Adjustments

#### A. To Adjust Motor Pulley Driver (HB-92) (Motor Slip Clutch)

1. Torque of slip clutch is 33.3 oz-in. (0.944 Kgm-cm) through 97.2 oz-in. (2.75 Kgm-cm). Adjust by changing tension of spring (HB-93) with nuts (HB-112).
2. If compression of spring is increased beyond slip clutch limits, carriage accelerates, timing belt (HB-48) receives abnormal shock and squeaking noises will come from forward and rear clutches.

### NOTE

Make sure that there is no oil on surfaces of motor clutches (includes part of motor and motor driver HB-92).

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

Proper belt tension is obtained under the following conditions:

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.).

Adjustments 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 riveted pulley shaft (146) 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 (Fig. 5-3)
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 adjust 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 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 Fig. 5-4).

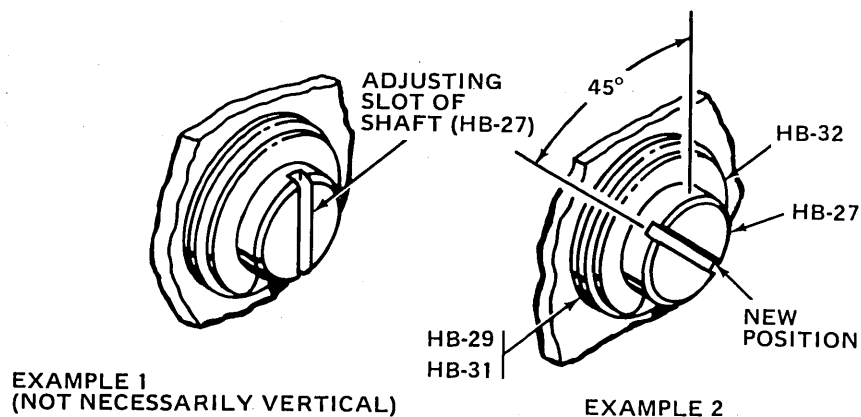


Figure 5-3. DETERMINING BACKLASH ADJUSTMENTS, SHAFT (HB-27)

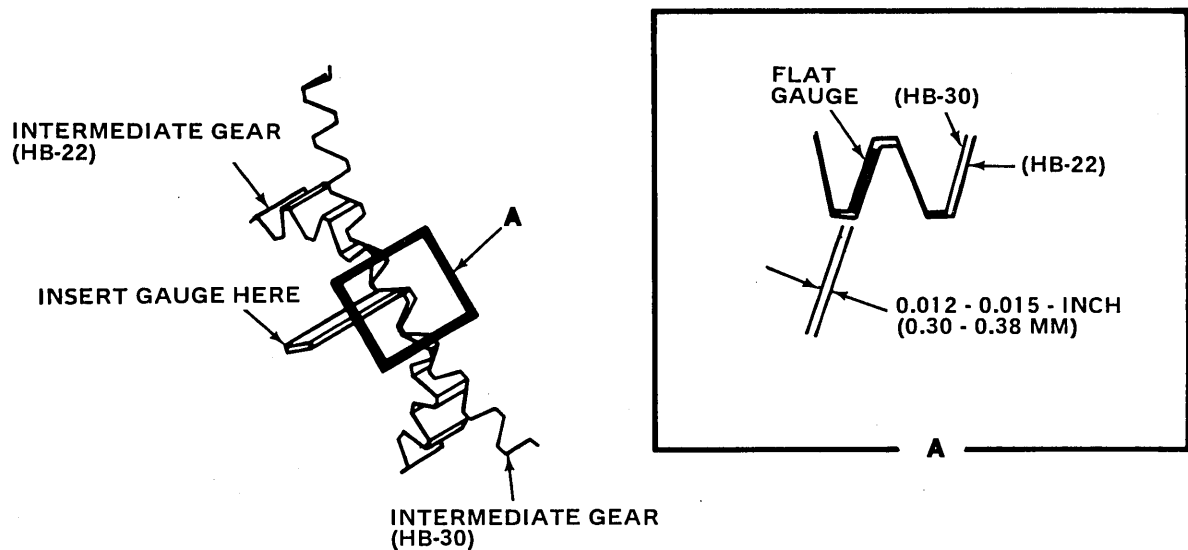


Figure 5-4. USE OF FEELER GAUGE FOR BACKLASH ADJUSTMENT, (HB-30, 22)

- d. When satisfactory movement of gear (HB-30) has been established, lock up nut and washers (HB-28, 29) with a 10 millimeter open-end wrench, while at the same time, holding correct adjusting screw position with screwdriver.
  - e. Complete re-assembly with the following steps:
    - 1) Add a few drops of Anderol No. 465 oil to eccentric idler shaft (HB-27) and on both felt washers (HB-31). (See Fig. 8-4).
    - 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-146) to forward and reverse clutches.
- D. Intermediate Shaft W/Pulley, Idle Shaft, Flat Washer Lubrication
1. Remove all external accessory covers.
  2. Remove cavity assembly 63001105-1 (Section 7 of manual).
  3. Remove power driver board assembly 63002242-4001 (See para. 5.2.13.2.D.).
  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 (146).
  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 bushing (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 (146) with Anderol No. 465 Oil prior to installation or replacement (See item 2, para. 6.3.C.).

F. Forward and Reverse Clutches (No Clutch Gap)

1. Since this section covers installation of new preload clutches (See Figure 8-5), 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. 5-5)

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.

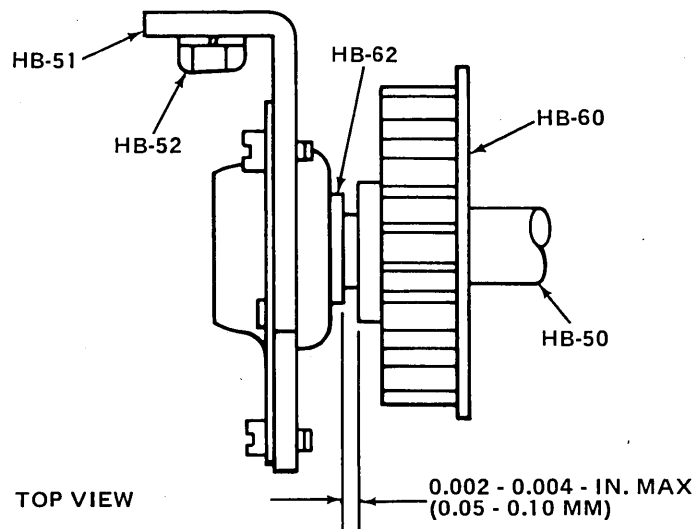


Figure 5-5. BUSHING END-PLAY ADJUSTMENT FOR PRELOAD CLUTCH SHAFT (HB-50)



## SPRING DRUM DAMPER

### 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. To adjust main spring tension, 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. Dampens 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 (Fig. 8-8/135). The timing fence is used to interrupt light through vertical slots for the optical pickup, single track head (Fig. 8-12/24 and Fig. 5-6).

### 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).
  2. Left chassis (HE-86) and right chassis (HE-85).
  3. Carriage stopper (HE-30).
  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. Flexible Timing Fence 63002440-1001 (Fig. 5-6).

**CAUTION**  
**IN ANY OPERATION INVOLVING TIMING**  
**FENCE, AVOID SURFACE CONTACT OR**  
**ABRASION TO EMULSION SIDE OF FENCE**  
**(SIDE MARKED, "RIGHT").**

## FRAME

1. Carefully remove video amplifier ass'y 63002668-4001 (Section 7) with attached optical pickup head 63002634-5003 (Fig. 5-6) from timing fence (135) by removing screws, washers (Fig. 8-3/55, 56, 57) holding the mounting bracket (See Fig. 8-3/50) to the carriage mechanism.
2. Loosen screws, washers (138,134) holding right-side clamp (136) to bracket (HE-54) on right side of printer frame (HE-1).
3. Unhook left side of flexible timing fence and remove from projection at back of clasp (133). Set timing fence aside.
4. To remove left-side clasp (133), remove two screws, washers (138, 134, 137) from left-side bracket (HE-55).
5. To remove right-side clamp (136), remove two screws, washers (138, 134) from right bracket (HE-54).
6. To re-install timing fence and video amplifier ass'y (with attached optical pick-up head), reverse order of disassembly of para. 5.2.6.2.B.1 through B.5. (Refer to para. 5.2.6.3.A.B. and C. for adjustments).

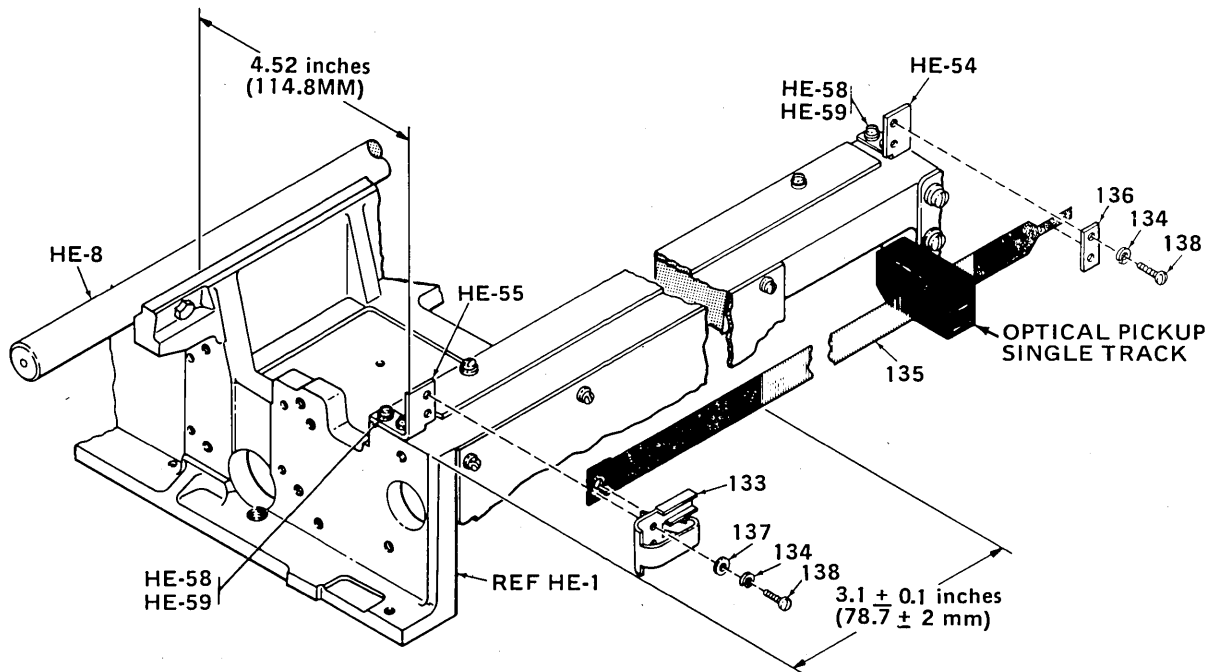


Figure 5-6. FLEXIBLE TIMING FENCE MOUNTING, SERIES 101

### 5.2.6.3 Adjustments

(The following paragraphs: A, B, C, should be done in sequence to combine all necessary and complete adjustments required for timing fence and video amplifier single track optional pick-up head).

- A. Positioning of Suspended Timing Fence (Flexible) for First Character Printout (Fig. 5-6)
  1. Loosen screws, washers (138, 134) on right-side clamp (136) and pull right end of tab of fence to the right so that the first window of fence is located  $3.1 \pm 0.1$  inches ( $78.7 \pm 2$  mm) from edge of printer casting (See Illustration, Fig. 5-6). (Note, that this dimension allows for a 5/8-inch nominal printout margin on the printing form).

## FORM FEED MECHANISM

2. When correct dimension has been applied, secure fence by tightening mounting hardware on the clamp (136).
- B. Establishing Fixed Parallelism for Suspended Timing Fence (Fig. 5-6).
1. Loosen screws, washers (HE-58, 59) on left and right brackets (HE-55, 54).
  2. From the front edge of guide bar (HE-8) measure 4.52 inches (114.8 mm) out to the left and right front edges of the positioned fence. Parallelism should be within 0.002-in. (0.05 mm) along entire length of fence. Tighten screws (HE-58) to maintain applied dimension.
- C. Single Track, Optical Pickup Assembly Alignment

**CAUTION**  
WHEN INSTALLING AND ADJUSTING VIDEO AMPLIFIER ASS'Y WITH MOUNTED OPTICAL HOUSING (FIG. 5-6) WITH RESPECT TO TIMING FENCE, AVOID SCRATCHING OF EMULSION ON TIMING FENCE (SIDE MARKED, "RIGHT").

1. Centering of Timing Fence in Slot of Optical Pickup (Fig. 5-7)  
With the optical housing normally in position on the video amplifier board 63002668-4001 (Section 7), guide mounted fence into slot of optics housing, but before tightening screws, washers (Fig. HA/55, 56, 57) on the video amplifier bracket (50) and carriage (HA-9), check the following:
  - a. Make sure fence is positioned in center of housing slot (Fig. 5-7).

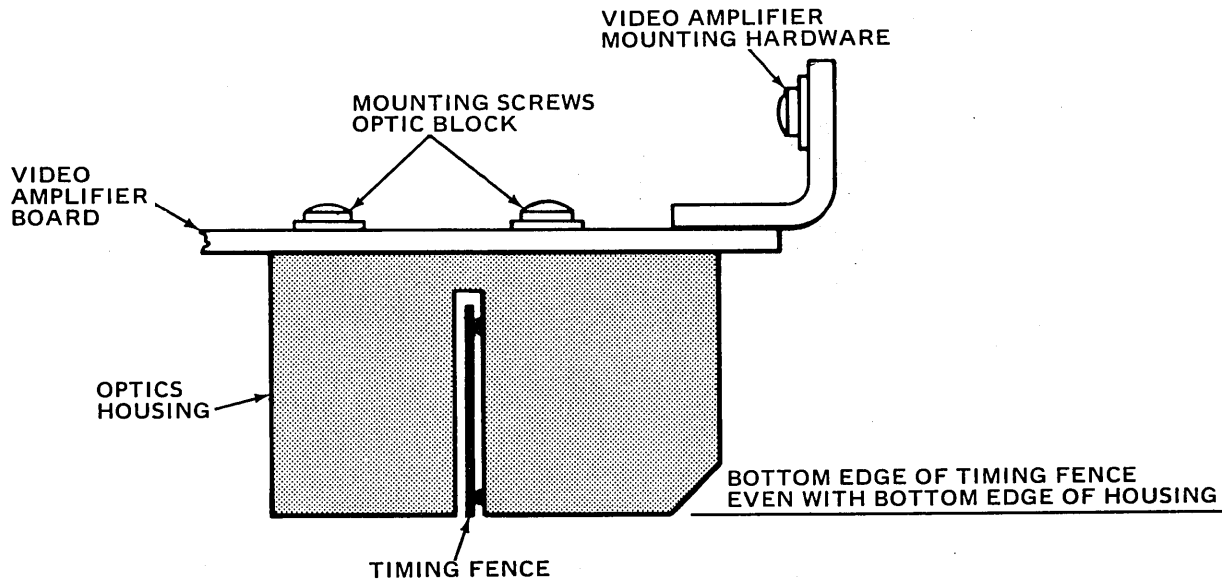


Figure 5-7. FENCE ADJUSTMENT AND OPTIC HOUSING

- b. If required, loosen mounting screws on video amplifier board (Fig. 5-7) and adjust optical housing so that fence is positioned in center line of the housing slot. Tighten screws.

## FRAME PAPER FEED MECHANISM

- c. Make sure that when the timing fence is positioned in the center line of the slot, the bottom of the fence is in the same plane with the bottom surface of the optical pickup housing (Fig. 5-7).
  - d. When conditions have been met at para. C.1.(a) through C.1.(c), tighten mounting screws and washers on video amplifier board (Fig. 5-7).
2. Vertical and Horizontal Alignment of Optic Housing (Fig. 5-8)
- a. Vertical  
Sight right side of optic housing and make sure of parallel alignment with respect to vertical timing fence slots. If required, loosen screws, washers (HA-55, 56, 57) holding the video amplifier board and bracket to maintain this alignment. Tighten screws, washers when vertical alignment is attained.
  - b. Horizontal  
If required, make sure screws, washers (HA-55, 56, 57) holding video amp. bracket (Fig. 8-2/50) are tight and slightly bend bracket up or down so that the bottom of the optic housing is parallel with printer base (bend metal portion of bracket only).
  - c. Re-check step 2.(a) above if step (b) was performed.

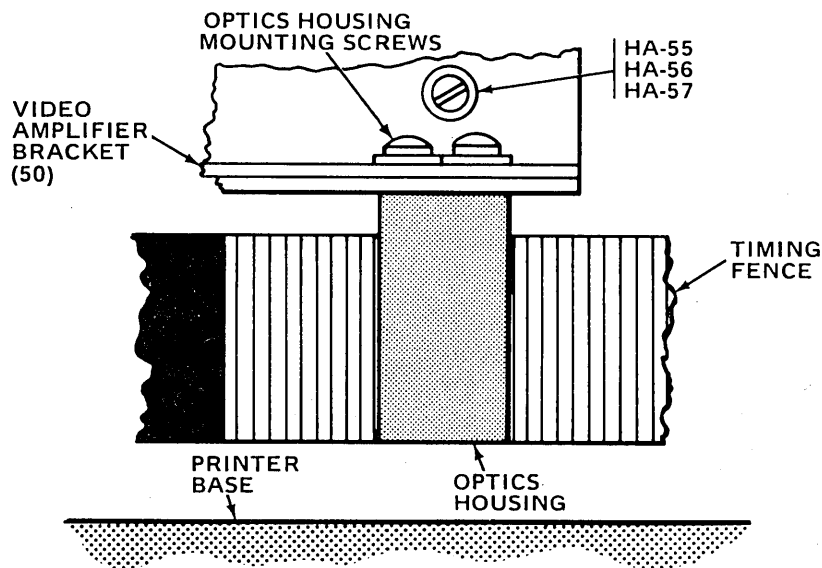


Figure 5-8. VERTICAL AND HORIZONTAL ALIGNMENT OF SINGLE CHANNEL OPTICS HOUSING

3. Carriage to Timing Fence Alignment Checkout
    - a. Move carriage to right margin by hand, and observe tracking of fence in housing slot.
    - b. Timing fence should be in the center line of the optic housing slot throughout full carriage movement (forward, and back to starting margin). If optic pickup travel is not uniformly parallel and vertical to centered timing fence, recheck para. 5.2.6.3.B. through C.
- D. Maintenance of Flexible Mylar Timing Fence  
Timing fence can be wiped clean using lint free, non-abrasive material.

**CAUTION: DO NOT USE ANY ORGANIC SOLVENTS.**

E. Static Adjustment/Limit (Reed) Switch (Figure 5-9)

Proper location of left-hand reed switch is approximately 1.07-inches (27.2 mm) to right from machined surface, where damper frame (HD-37) is mounted on frame (HE-1), to center of right-hand reed switch case itself.

Proper location of right-hand reed switch center of case is 3 to 5mm (0.12 to 0.20-in.) to right from last slit on timing fence assembly (Fig. 8-8/135, View C).

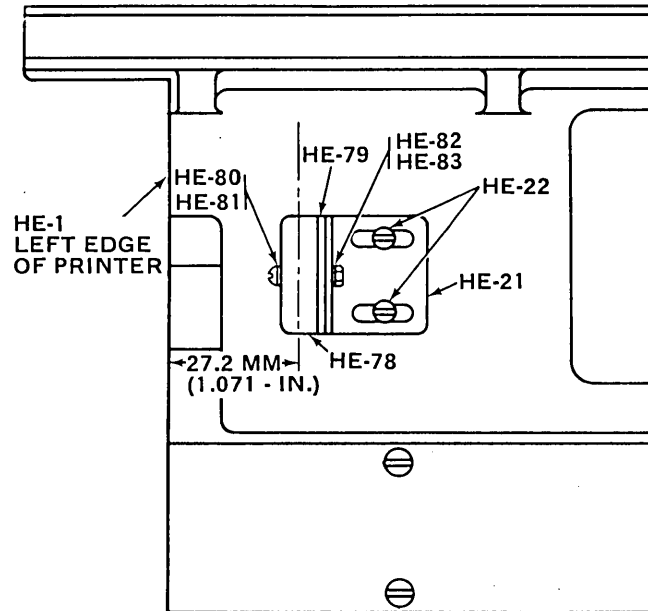


Figure 5-9. LOCATION OF LEFT REED SWITCH (TOP VIEW)

F. 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 printer capability.

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 that 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 units (Fig. 8-10/32) 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 on the paper drive shaft (HF-98) and allows upward and downward motion of paper.

## FRAME

### 5.2.7.2 Removal/Replacement Procedures

#### A. Paper Feed Knob (HF-99) (With Side Covers Down)

1. Pry out cap (HF-107) from knob.

#### **CAUTION**

**WHEN PERFORMING NEXT STEP 2, PARTS ARE UNDER SPRING TENSION, AND MAY SCATTER WHEN SNAP RING (HF-106) IS REMOVED.**

2. Remove snap ring (HF-106), collar (HF-103), spring (HF-104), knob (HF-99) and spring (HF-105).

#### B. Pin Feed Pulley (HF-14), FF Reader Gear (HF-16) And Paper Feed Drive Shaft (HE-98).

1. Refer to para. 5.2.7.2.A and remove paper feed knob and parts.
2. Remove snap ring (HF-6).
3. Loosen set-screws (HF-102) on coupler (HF-100).
4. Loosen set-screws (HF-15) on pin feed pulley (HF-14).
5. Remove coupler (HF-100), with sleeve (HF-101) and attached FF reader gear (HF-16).
6. Loosen locking knobs (HG-16) (left and right) at top of pin feed holders (HG-11/38).
7. Slide pin feed units apart and using a small slotted head screwdriver, loosen two small screws, lockwashers (HG-22, 23) located on set-plate (HG-21) of left or right pin feed units.
8. Remove holder, bushing and retainer (HF-2,3,4) supporting shaft (HE-98) on left and right side of printer by removing screws (HF-5).
9. 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).
10. Remove shaft to the right and out from the pin feed units (Fig. 8-10).
11. To install paper feed drive shaft (HF-98), reverse removal/replacement procedure in para. 5.2.7.2A and B. Note, that cap (HF-107) may require an adhesive to retain.

#### C. Guide Bar (HF-7) (For Pin Feed Units, HG)

(With side Covers in Down Position)

1. Remove left and right standoffs (Fig. 8-2/9, 10) (with studs 19).
2. Loosen two locking knobs (Fig. 8-10/16) on left and right pin feed units and slide both units to the right out of the way.
3. Loosen set-screw (HF-9) on collar (HF-8) of guide bar (HF-7) Slide collar to right.
4. Remove outside nut (HF-11) on right end of guide bar.
5. Remove screw (HF-10) supporting left end of guide bar. Slide bar with collar (HF-8) from two pin feed units (HF) to the left and out.

### 5.2.7.3 Adjustments

#### A. Paper Empty Switch (170) (Fig. 8-9)

1. Remove pin feed cover (HF-87).
2. Loosen mounting screws, nut, washers (HF-79, 80,81) holding switch to bracket (part of upper paper pan HF-76, back wall).
3. Pivot switch on lower slot of mounting bracket to meet the following conditions:

## PAPER FEED MECHANISM

- a. Actuator arm (part of switch) extends above on/off button of switch and downward through slot of upper paper pan into path of paper when paper is inserted normally (switch open, button in).
- b. Switch is closed when no paper exists (button out).
- c. Tighten mounting screws when conditions in para. 3.a. and 3.b. are met.
- d. Check wiring diagram 63002333 in Section 7 for detailed wiring of switch.

### 5.2.8 PIN FEED UNIT (FIGURE 8-8) HG

#### 5.2.8.1 Operation

Pin feed units, left and right, provide belt units (32) 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 upward, rotate clockwise. Pin feed units can be positioned laterally and are locked in position by locking knob (16). When paper is installed on the pin feed belt units, left and right (32), spring activated paper guide plates, left and right (12, 37) when closed, function to hold the paper on the belts. As paper moves over the individual links of the pin feed belts, a pin attachment guide (17) aligns the link pins with respect to paper contact resulting in an even motion of the pin feed belt.

Direct coupling of paper feed knob and paper feed shaft (HF-98) is accomplished by serrated portion of spring activated knob (HG-99) inserting into opposing serrated coupler (HF-100). When this occurs, while printer is operating, paper is moved by logic signals affecting function of the form feed mechanism (Refer to Figure HH).

Finally, a set-plate (21) is used to tighten on the paper feed drive shaft eliminating possible backlash affecting drive pins for print registration.

#### 5.2.8.2. Removal/Replacement Procedures

##### A. Left and Right Pin Feed Units (HG), (Fig. 8-10)

1. Perform removal/replacement procedures found in para. 5.2.7.2.A, B, and C to remove left and right pin feed assemblies.

##### NOTE

The following removal/replacement procedure (Fig. 5-10) applies to either a left or right pin feed unit. But where there is a part difference, key numbers will be indicated in the text so that the operation being applied will cover both units.

2. Orient unit so that spring (15) is at bottom of unit while being held in hand. Paper holder gate (12, 37) is closed.
3. Rotate belt (32) by hand, and locate two set-screws (27) between pins on drive pulley (26) for drive sleeve (24) at bottom of unit.
  - a. Insert a 1½ mm allen-wrench, and loosen two set-screws (27).



## PAPER FEED MECHANISM

4. Loosen two screws, washers (18, 19, 20) holding the pin attachment guide (17) on the pin feed holder (11, 38).
  - a. Open gate (12, 37) and slide pin attachment guide (17) outward so that when belt is compressed each side, the clearance between belt and guide is approximately ¼-in. (6.3 mm) (not critical).
5. Using a medium sized slotted head screwdriver, remove two screws, lockwashers, (34, 35) and plate nut (36) holding pin feed holder (11, 38) and belt guide (33) together.
6. Separate and remove belt guide (33) from remaining portion of pin feed unit. Keep sleeve (24) in position.
7. Remove two screws, lockwashers (29, 19, 30) and recessed nut (31) holding the idler slide (28) to the pin feed holder unit (11, 38). Keep sleeve (24) in position.
8. Lay unit on bench with gate (12, 37) open. The set plate (21) is facing downward, the sleeve (24) is projecting upward, (See Fig. 5-10). (Set plate is not shown).

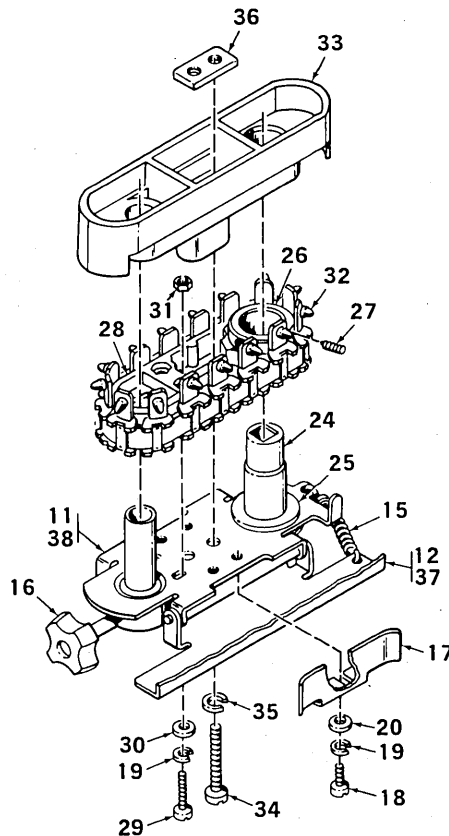


Figure 5-10. REMOVAL OF BELT (32) IDLER SLIDE (28), AND DRIVE PULLEY (26)

9. Remove the following three assembled parts together as one unit from sleeve (24); (1) belt (32), (2) idler slide (28) and (3) drive pulley (26). Note, that the drive pulley slides up over the sleeve (24) with the other two parts.
10. Remove spacer (25) from sleeve (24).
11. Lift up remaining pin feed holder unit (11), (38), from bench and remove sleeve (24) from pin feed holder (11, 38).

12. To re-assemble pin feed unit (left and right), reverse steps indicated at para. 5.2.8.2. A.1. through A.11.

**B. Paper Holder Gate (Left and Right) (12, 37) (Fig. 8-10)**

1. Remove paper holder gate from pin feed units, if required, with pin feed units in position on the printer.
  - a. Using spring removal tool, remove spring (15) located at bottom of paper holder gate when gate is closed.
  - b. Remove snap ring (14) at bottom of pin (13) on gate. Remove pin.
  - c. To replace gate, reverse order of disassembly B.1.a. through B.1.b.

**5.2.8.3 Adjustments**

**A. Paper Holder Gate (Left and Right) (12, 37) (Fig. 8-10)**

(Adjustment can be done with assembly mounted on printer).

1. Clearance between belt guide unit (33) and the paper holder gate, when closed, should be  $0.065 \pm 0.015$ -inch ( $1.65 \pm 0.4$  mm) to hold paper in place when printer is operating.
2. Adjust for clearance by bending right angle metal stopper at bottom of pin feed holder (11,38), (See Fig. 5-11).

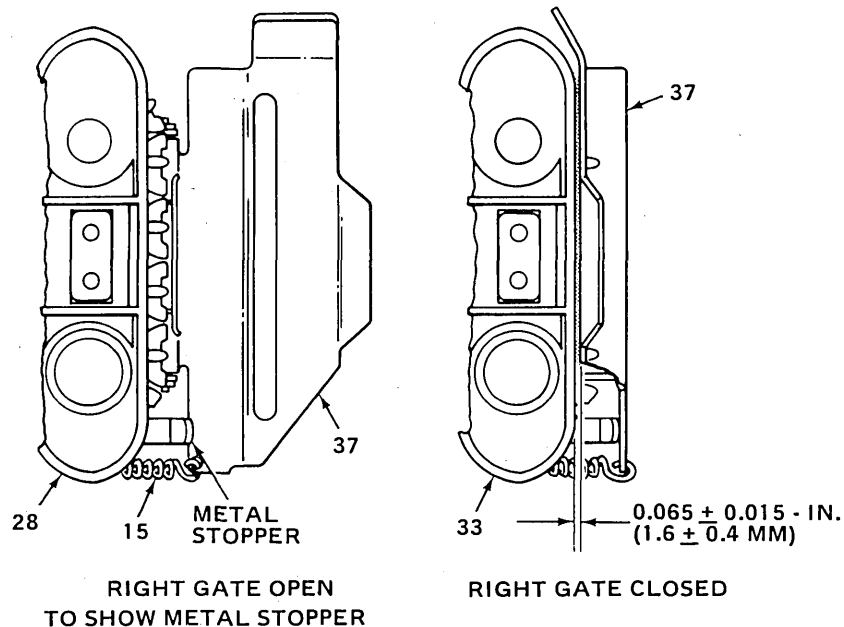


Figure 5-11. ADJUSTMENT FOR PAPER HOLDER GATE

**B. Pin Feed Stopper (5) (Maintaining 5/8-in. (15.9 mm) Nominal Paper Margin (Fig. 8-10)**

1. Loosen lock-knob (16) at top of pin feed holder (11) and slide out of the way on paper feed drive shaft (7).
2. Using a 2 mm allen-wrench, loosen set-screw (6) on stopper (5) located at left end of printer on paper feed drive shaft (7).
3. Maintain 0.2 in. (5 mm) dimension between stopper and left chassis frame (Ref. Fig. 8-10/86). Tighten screw, (See Fig. 5-12).

## PAPER FEED MECHANISM

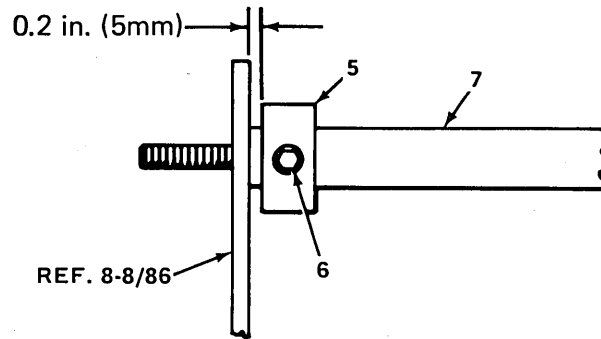


Figure 5-12. MAINTAINING 5/8-IN. (15.9 MM) NOMINAL PRINT MARGIN

4. Set left pin feed holder (11) flush to right side of stopper (5), and tighten lock-knob (16).
  5. Perform para. 5.2.6.3A for locating timing fence for operation, if required.
  6. Run a line of print, or more, and check for nominal 5/8-in. (15.9 mm) beginning print margin.
  7. Recheck fence dimension adjustment (step 5) if margin is not 5/8-in. (15.9 mm) nominal.
- C. Pin Attachment Guide (17) (Lift and Right) (Fig. 8-10), (Fig. 5-10)  
(Adjustment is required only if part becomes misaligned or replaced)
1. With paper gate closed (12, 37), loosen lock knob (16) at top of pin feed holder (11, 38) of left and right pin feed unit.
  2. Slide pin feed units out of the way, as required, and loosen two screws, washers (18, 19, 20) holding the pin attachment guide (17) on the pin feed holder.
  3. Open paper feed gate (12, 37) and move pin attachment guide so that it is completely inserted under mounting screws (18) and parallel with idler slide (28). Tighten screws, lockwashers.
- D. Set-Plate (21) for Paper Drive Slide Shaft (10) (Fig. 8-10)
1. Ensure that both halves of the set plate (21) contact the paper drive slide shaft to avoid backlash with respect to forward paper feed motion.
    - a. Using a small slotted head screwdriver, loosen two screws, lockwashers (22, 23) on one-half of the set plate (21) located on sleeve (24) of the pin feed unit (left).
    - b. Push set-plate against the shaft (10) and tighten screws, lockwashers.
    - c. Repeat steps in para. D1.a. and D.1.b., and adjust the other half of the set plate in the same manner.
    - d. Repeat steps in para. D.1.a. through D.1.c., and adjust the other set plate (11) for the right-hand pin feed unit.

### 5.2.9 FORM FEED MECHANISM (FIGURE HH)

#### 5.2.9.1 Operation

- A. Form Feed Torque Transmission  
Torque of form feed motor (HH-71) is transmitted via paper drive shaft (HF-98) to pin feed units for upward paper movement in the following manner:
1. Motor (HH-71) - motor gear (HH-12).

## PAPER FEED MECHANISM

2. FF Clutch Unit (contained between FF chassis, right) (100) 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. 8-9 (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 63002292-3001) are included in the form feed (FF) mechanism.
- C. Rotation of Clutch Cam and Pawl  
Upon receiving a signal for electronic logic, the solenoid (HH-84) in the form feed (FF) clutch and magnet unit (See Fig. 8-9) energizes and pulls in the clutch slide pawl (101) releasing the tab (part of FF clutch inside cam, HH-14) and FF clutch releasing pawl (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 (CLUTCH OFF) prior to incoming logic signals.
- D. Operation of Clutch Inside Cam (HH-14) with Paper Movement Solenoid Signal (PMSOL)  
As the clutch slide pawl (101) 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. Tape and Paper Movement - VT and FF Signal.  
During a form feed (FF) or Vertical Tab (VT) function, both paper and tape advance continuously until phototransistors (upper tape reader) are energized by light detection through the holes in the tape from the LED's (light emitting diodes) in the lower tape reader. Logic signals immediately deactivate the form feed solenoid controlling VFU tape movement as well as paper movement. The clutch slide pawl (101) returns to home position and holds both the tab on the rotating FF cam (HH-14) and the clutch releasing pawl (HH-95). Paper and tape cannot move until the solenoid is activated again by logic signal.
- 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 clutch slide pawl (101). At this point additional lines of print are activated by selective logic signals affecting paper movement.

### 5.2.9.2 Removal/Replacement Procedure

- A. Tape Reader Unit (Upper and Lower) 63002671-4001
1. Disconnect two connectors (P119, J119) at left side of printer (Front view). Refer to schematic 63002333-9001 in Section 7.
  2. Cut tie-wraps holding wire of line feed resistor (Fig. 8-8, HJ-62, View D).

3. Disconnect two small connectors (J120, P120) at left side of printer (front view). Wires are identified as brown/blue and red/blue. Refer to schematic 63002333-9001, Section 7.
4. Remove clamp, screw and flatwasher (Fig. 8-8/17, 64, 21) holding logic cable of upper tape reader 529419001-5001.
5. Cut nylon tied to threaded cross supports of FF left chassis (Fig. 8-11/2) releasing the tape reader logic harness.
6. Remove snap-ring (Fig. 8-11/68) releasing upper tape reader assembly from shaft (Fig. 8-11/66).
7. To remove tape reader unit, lower 528532001-5001 and upper tape reader together, remove two nuts and screws (Fig. 8-11/56, 55) holding lower tape reader to FF Chassis (Fig. 8-11/2).
8. To separate upper and lower tape readers, cut two wires (orange and black). Splice and insulate wires on new installation of readers.
9. To separate paper tape guide (Fig. 8-11/69) from chassis frame (Fig. 8-11/2), pivot upward and pull outward.
10. To install Tape Reader Unit 63002671-4001 (upper and lower) reverse order of removal, steps A.1. through A.9.

### 5.2.9.3 Adjustments

A. Gear With Stop Cam (HH-23) and Back Stopper (HH-74) (Refer to Figure 8-11 (HH) and Fig. 5-13).

When FF (form feed) clutch releasing pawl (HH-95) is not held by clutch slide pawl (101), 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 off-set and precedes the tab on the FF clutch inside cam (HH-14), strikes the underside of the clutch slide pawl (101) 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 adjustment must be made to the gear with stop cam (HH-23) to prevent counter-movement of paper. (Refer to Figure 5-13).

1. Set the back stop cam for correct working adjustment in the following manner:
  - a. Move slide (101) and armature (HH-33) by hand toward armature solenoid (HH-84).
  - b. While holding armature, rotate FF idle gear (HH-27) counterclockwise (clutch-on condition).
  - c. Release slide and armature so that cam (HH-14) and pawl (95) is held against the underside of the clutch slide pawl (101) (clutch off).
  - d. Make sure that when the tab of the cam and the pawl are against the slide pawl (101) (clutch-off condition) that the back stopper (HH-74) drops off the notched end of gear with stop cam (HH-23). Refer to next step for adjustments.
  - 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.

## FORM FEED MECHANISM

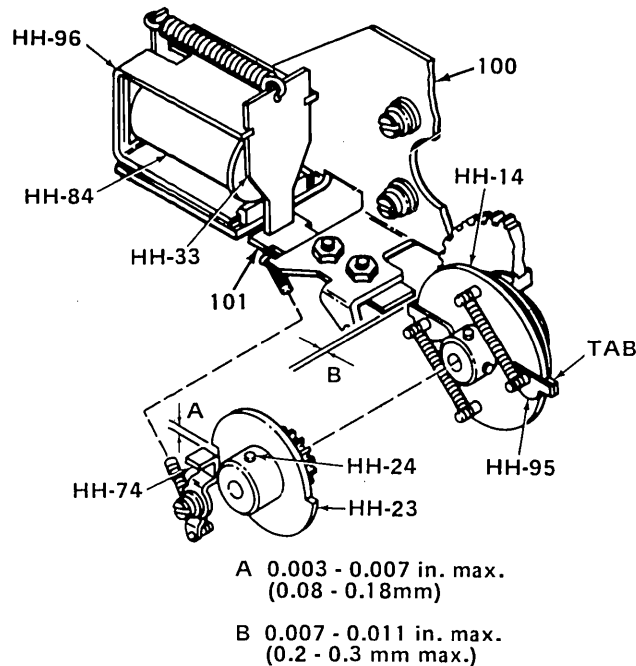


Figure 5-13. TWO ADJUSTMENTS, GEAR WITH STOP CAM (HH-23) AND INSIDE CAM (HH-14)

**B. Clutch, Inner Cam (HH-14) - Clutch Slide Pawl (101)** (Refer to Figure 5-13 and 8-11)

1. To adjust proper distance of clutch slide pawl (101) to hold raised tab on paper feed clutch, inner cam (HH-14) prior to line feed release, perform the following steps:
  - a. Loosen screws, washers (Fig. 8-9/86, 82) on clutch magnet frame (HH-96) mounted to paper feed chassis (100).
  - b. Slide magnet frame on paper feed chassis (100) slots so that the distance between clutch slide pawl (101) 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) (Fig. 8-11)**

1. The timing belt (HH-28) located between FF idle gear (HH-27) and pin feed pulley (HF-14) has the following adjustments:
  - a. Loosen three nuts (HH-70) holding right FF chassis (100) 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 (0.118-0.197-inch) when load of 100 grams (3.5 ounces) is applied on belt at mid-point between both pulleys.
  - c. Tighten three support nuts (HH-70) at right FF chassis (100) when proper tension has been applied.

## FORM FEED MECHANISM

### 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 while head is moving from left to right as clutch spring (HI-4) engages sleeve (HI-5) mounted on shaft (HB-50). 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 belt gear (HI-18) - sleeve (HI-20) - driving slide shaft A, (HI-103) - 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

Torque transmission route for left and right ribbon feed mechanism is determined by position of driving slide shaft A (HI-103) (Fig. 5-16) controlled with control spring (HI-39) (Fig. 5-18) and left and right reverse control lever (Fig. 5-18/90, 88).

Tension of ribbon is applied by ribbon holding plate (HI-137) 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 drive shaft A (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. 8-1) 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 (P-13) (Refer to Fig. 1-9/3).
6. Remove interface connector (J12) (See Fig. 7-13) from connector (P8) (part of electronic logic, connector board 63015104 (Section 7).

##### B. Ribbon Reversing Rod (Fig. HI)

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.

## RIBBON FEED MECHANISM

3. Loosen locking nut (HI-98) with a 7 millimeter (0.28-inch) open-end 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-137) 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-90,88) from left and 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.



## RIBBON FEED MECHANISM

### J. Ribbon Driving Shaft Assembly

1. To disassemble and remove 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. 8-5, 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 to 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-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 5-14)

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).
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. 5-14, and View A.

## RIBBON FEED MECHANISM

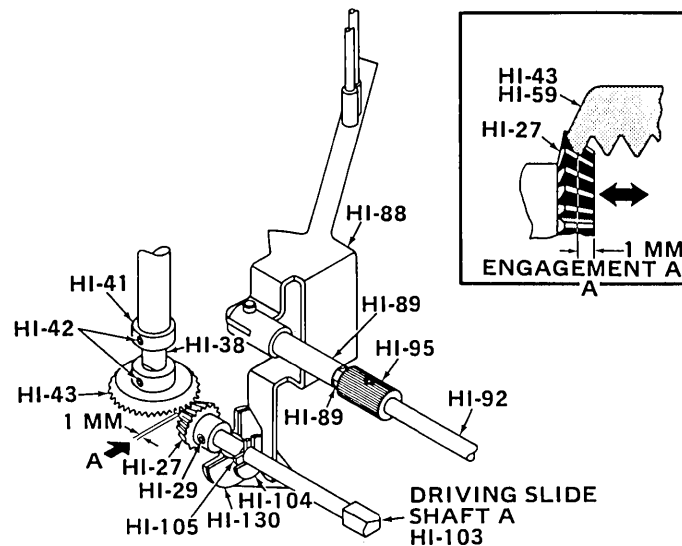


Figure 5-14. RIBBON FEED MECHANISM (REAR OF PRINTER, LEFT SIDE)

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

When engagement A (Figure 5-14) 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 5-15).

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 5-15). Tighten allen-head screws on bevel gear (HI-43, 59).

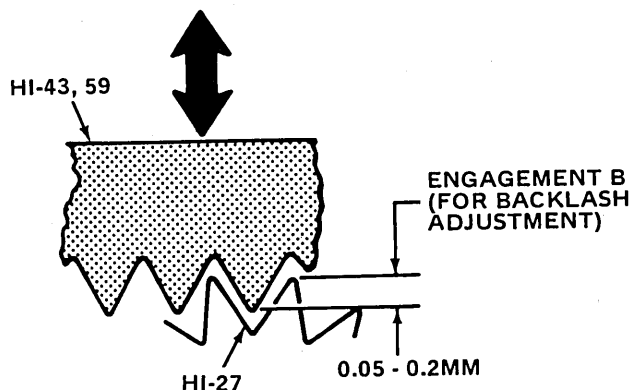


Figure 5-15. BACKLASH ADJUSTMENT, BEVEL GEAR (HI-43, 59)

## RIBBON FEED MECHANISM

### C. Driving Slide Shaft A (HI-103)

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

1. When engagement A and B of bevel gears has been made (Figure 5-14, 5-15), 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 5-16). Note that distance between bevel gear (HI-59) and bevel gear (HI-27) is also 3-4 mm.
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 to 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. 5-16).

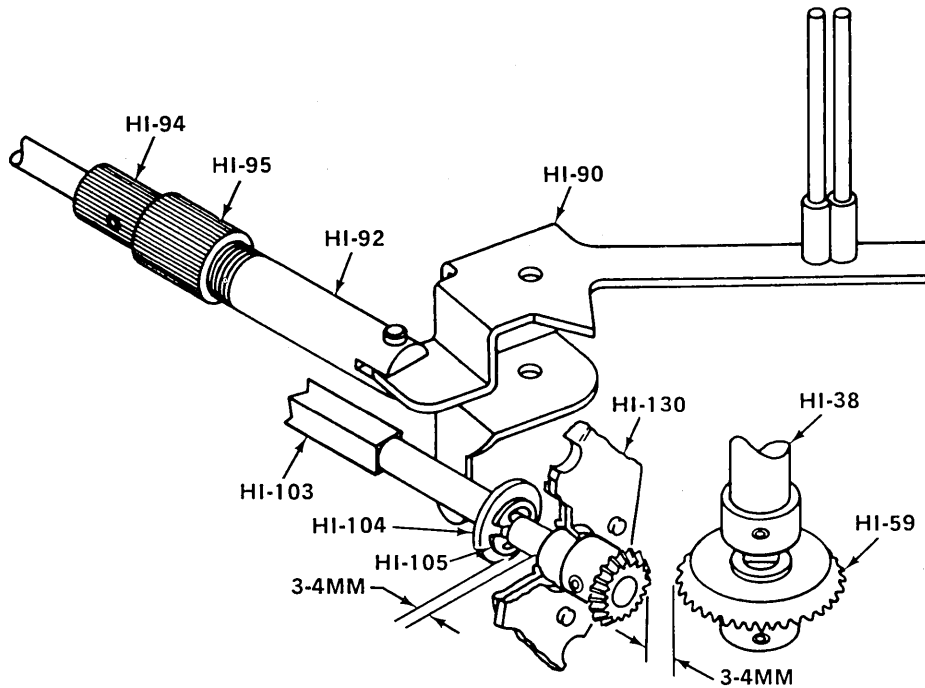


Figure 5-16. DRIVING SLIDE SHAFT A - ADJUSTMENT

### 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 to Figure 8-12).
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 5-17).
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).

## RIBBON FEED MECHANISM

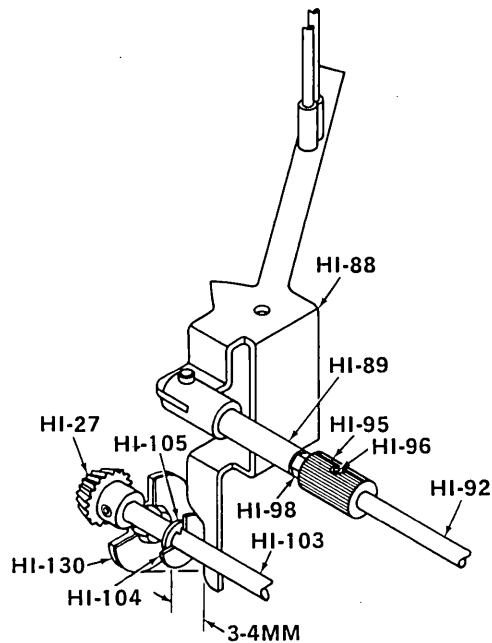


Figure 5-17. RIBBON REVERSING ROD ADJUSTMENT

### E. Control Spring (HI-39) - Ribbon Reverse Timing (Fig. 5-18)

1. When reverse control lever (HI-88) turns left by moving ribbon reversing shaft (HI-92) to left, and if Engagement A (Fig. 5-14) 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 flatwashers (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).

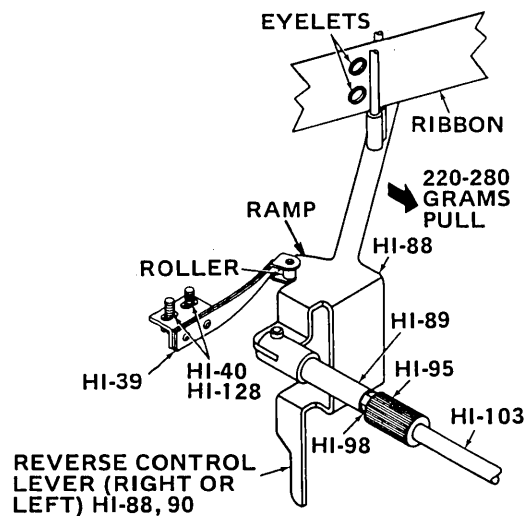


Figure 5-18. RIBBON REVERSE TIMING

## RIBBON FEED MECHANISM

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 5-18).
3. Re-check bevel gear (HI-27) (right) and bevel gear (HI-59) (right) to the same gap as indicated in para. 5.2.10.3. A.2 and B. to ensure proper ribbon reverse timing.

### 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. 5-18).

#### F. Clutch Gear and Driving Gear Engagement (Fig. 8-12, 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-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 spoolshaft (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.

## 5.2.12 PAPER STACKER AND GUIDE

Refer to Section 2.3

## 5.2.13 PRINT HEAD AND ASSOCIATED ASSEMBLIES (FIGURE 8-14)

### 5.2.13.1 Operation

- A. Print Head (4) and Solenoids (2)  
Acts as a guide to keep seven print wires in line as each one drives against the ribbon (solenoid fired) to form characters from dots.
- B. Carriage (10)  
Supports print head for full line of characters and returns to "home" position.
- C. Power Driver Board Ass'y (33)  
Supplies control signals to printer solenoids and forward and rear clutches for head movement from logic boards.
- D. Video Amplifier, PC Board Ass'y (101 Series)  
Amplifier and shapes video pulse with cables (29) carrying power driver outputs to the solenoids of head. Mounts to the carriage ass'y (10) via attached video amp. bracket (20).

### 5.2.13.2 Removal/Replacement Procedure

- A. Print Head (4)
  1. Refer to Section 5.2.1.2, steps 1 and 3, and remove covers.
  2. Release lock-knob (33) (Fig. 8-3) , and then rotate penetration knob (32) so that head moves to maximum travel away from platen (HE-4) (Fig. 8-8) allowing sufficient gap between print head and print ribbon.
  3. Unplug print head fingerboard connector (1) from video amplifier connector (16).
  4. Remove upper screws, washers (5,6,7) and lower screws, washers (8,6,7) holding the print head to print head support bracket (9). Use diagonal method of screw removal, e.g., upper left, lower right, upper right, lower left and remove head.
  5. To install print head, reverse removal/replacement procedure, and refer to Operator Manual, Series 100 for Forms Thickness Control prior to printing.
- B. Solenoid/s (2)
  1. Turn power off.
  2. Perform operation found in para. 5.2.13.2.A.1. through A.4 to remove print head.
  3. Cut tie-wraps of solenoid wires attached to print head fingerboard 63001039-4001.
  4. Unsolder two wires from the fingerboard (1) going to the solenoid/s (2) being replaced.
  5. Using a small, phillips-head screwdriver, remove the cover from the print head.
  6. Using a Centronics' spanner wrench, loosen the solenoid lock-nut (3) and remove solenoid and print wire together from print head.
  7. To replace solenoid/s reverse procedure para. B., steps 1. through 6.
- C. Carriage (10)
  1. Refer to removal/replacement procedure of para. B., 5.2.2.2.B to remove carriage.
- D. Power Driver Board Ass'y (33)  
(With front cover (Fig. 8-1/5 removed).)
  1. Unplug ribbon cable fingerboard (34) from power driver board connector (16).

2. Remove ribbon cables (29) and attached fingerboard (34) from cable clamp (38) by removing screw, washer nut (37, 6, 18) and removing clamp from cable tray (40) of power driver board.
3. To remove heatsink bracket and power driver board together, remove four metric screws (37) attached to front printer base frame (Ref. HE-1).

E. Video Amplifier, PC Board Ass'y (101 Series)

1. For removal of video amplifier board (15), attached cables (29), and attached bracket (20), first perform operation found at para. 5.2.13.2.D., steps 1 and 2 of this section to remove ribbon cables from power driver board (33).
2. Unplug print head fingerboard (1) from video amplifier connector (16).

**CAUTION**

**WHEN REMOVING THE VIDEO AMPLIFIER  
ASS'Y IN NEXT STEP (3), AVOID SURFACE  
CONTACT WITH TIMING FENCE (14).**

3. Remove video amplifier ass'y and cables by removing screws, washers (11,12,13) holding video amplifier bracket (20) to carriage mechanism (10).

**5.2.13.3 Adjustments (Fig. 8-14)**

A. Print Head (4)

Reverse steps found in para. 5.2.13.2. A.1. through A.5. to replace head.

B. Solenoid/s (2)

1. Perform removal/replacement procedures found in para. 5.2.13.2 B.1. through B.6.
2. Install new solenoid/s. Using flat object (feeler gauge, flat screwdriver, etc.) guide print wire into correct hole on the print head jewel. (Refer to Section 1, para. 1.3.1 for print wire configuration.
3. Using an eye loupe, verify that all print wires align flush with the front face of print head jewel (rotate solenoid in or out).
4. Tighten solenoid lock nut/s (3).
5. Re-solder new solenoid wires to fingerboard of print head.
6. Replace cover, and remount print head to carriage ass'y (Reverse steps of para. 5.2.13.2.A.1. through A.5. to replace print head).

C. Ribbon Cables (29)

1. To position ribbon cables for operating condition, loosen screws (37) on clamp (38) of power driver tray (40) at front of printer.
  - a. Move cables left or right so that when print head is operating normally the cables do not strike damper (Fig. HD), or that cables are not too tight between print head and tray clamp at starting position of head.
2. Secure cables, when adjusted properly, by tightening screws, washer and nuts (37, 6, 18) on clamp (38).

## SECTION 6

### MAINTENANCE

This section contains the following maintenance information:

Paragraph	Description
6.1	Electrical Adjustments
6.2	Mechanical Adjustments
6.3	Preventive Maintenance
6.4	Recommended Tools
6.5	Troubleshooting Guide

#### 6.1 ELECTRICAL ADJUSTMENTS (MODEL 101/101A)

All electrical adjustments are summarized in the following table and paragraph.

ITEM NO.	FUNCTION	SIGNAL NAME	ELEMENT-PIN	CARD #	ADJ. RESISTOR	PULSE WIDTH
1	Strobe Pulse	<u>STROBE</u>	ME 18-6	2	R7	450 usec
2	*Strobe Delay	<u>STBDLY</u>	ME 32-14	2	R51	500 usec
3	*Delayed Strobe Pulse	<u>DELSTB</u>	ME 32-5	2	R52	450 usec
4	Delayed Clutch Interval	<u>DCLT</u>	ME 22-6	2	R9	40 msec
5	Line Feed Pulse	<u>LF</u>	ME 17-14	1	R54	15 msec

\* 9 x 7 Only

##### 6.1.1 VIDEO AMPLIFIER ADJUSTMENT (SERIES 100)

1. Monitor voltage level at ME1 pin 2 with oscilloscope while moving carriage slowly to the right.
2. Voltage varies as optic block passes over light and opaque sections of timing fence. Record highest voltage level observed.
3. Monitor level at ME1 pin 3 and adjust R4 to set voltage at one-half level recorded at ME1 pin 2. This sets up reference level for proper output duty cycle.

#### 6.2 MECHANICAL ADJUSTMENTS

All mechanical adjustments are summarized in Section 5. Listed below are the mechanical assemblies where adjustments are required and the reference paragraph in Section 5 where the adjustment is described.

ITEM NO.	MECHANICAL ASSEMBLY	REFERENCE PARAGRAPH SECTION 5	REFERENCE FIGURE SECTION 8
1	Cover	5.2.1.3	8-2
2	Carriage Mechanism	5.2.2.3	8-3
3	Driving Mechanism	5.2.3.3	8-4, 8-5
4	Spring Drum	5.2.4.3	8-6
5	Damper	5.2.5.3	8-7
6	Frame	5.2.6.3	8-8
7	Paper Feed Mechanism	5.2.7.3	8-9
8	Pin Feed Unit	5.2.8.3	8-10
9	Form Feed Mechanism	5.2.9.3	8-11
10	Ribbon Feed Mechanism	5.2.10.3	8-12
11	Print Head and Associated Assemblies (Video Amplifier Bd., Power Driver Bd.)	5.2.13.3	8-14



## 6.3 PREVENTIVE MAINTENANCE (P.M.)

### A. Preventive Maintenance Procedures

The following P.M. procedures apply to the Series 101 printers.

1. Frequency of P.M. - 6 months
2. Time Required - ½ Hr. Approximately
3. Cleaning Material - Two Soft Clean Cloths  
Medium Bristle Cleaning Brush

### B. Recommended Tools

1. Refer to Section 6.5 of the Maintenance Section.

### C. Lubricants Recommended:

Kit, Lube 62000187-6001

Note: This kit contains  
item 1 through 4

- |  |               |                      |
|--|---------------|----------------------|
| 1. Lubricant, DTE OIL, Light                       | 30050005-0001 | 2 oz. plastic bottle |
| 2. Lubricant, SAE 10-30W                           | 30050002-0001 | 2 oz. plastic bottle |
| 3. Lubricant, RPVNTV WPG,<br>(Degreaser/Lubricant) | 20050009-0001 | 2 oz. can            |
| 4. Lubricant, grease<br>(Rheolube 723)             | 30050004-0001 | 11 oz. tube          |

### D. Preparation

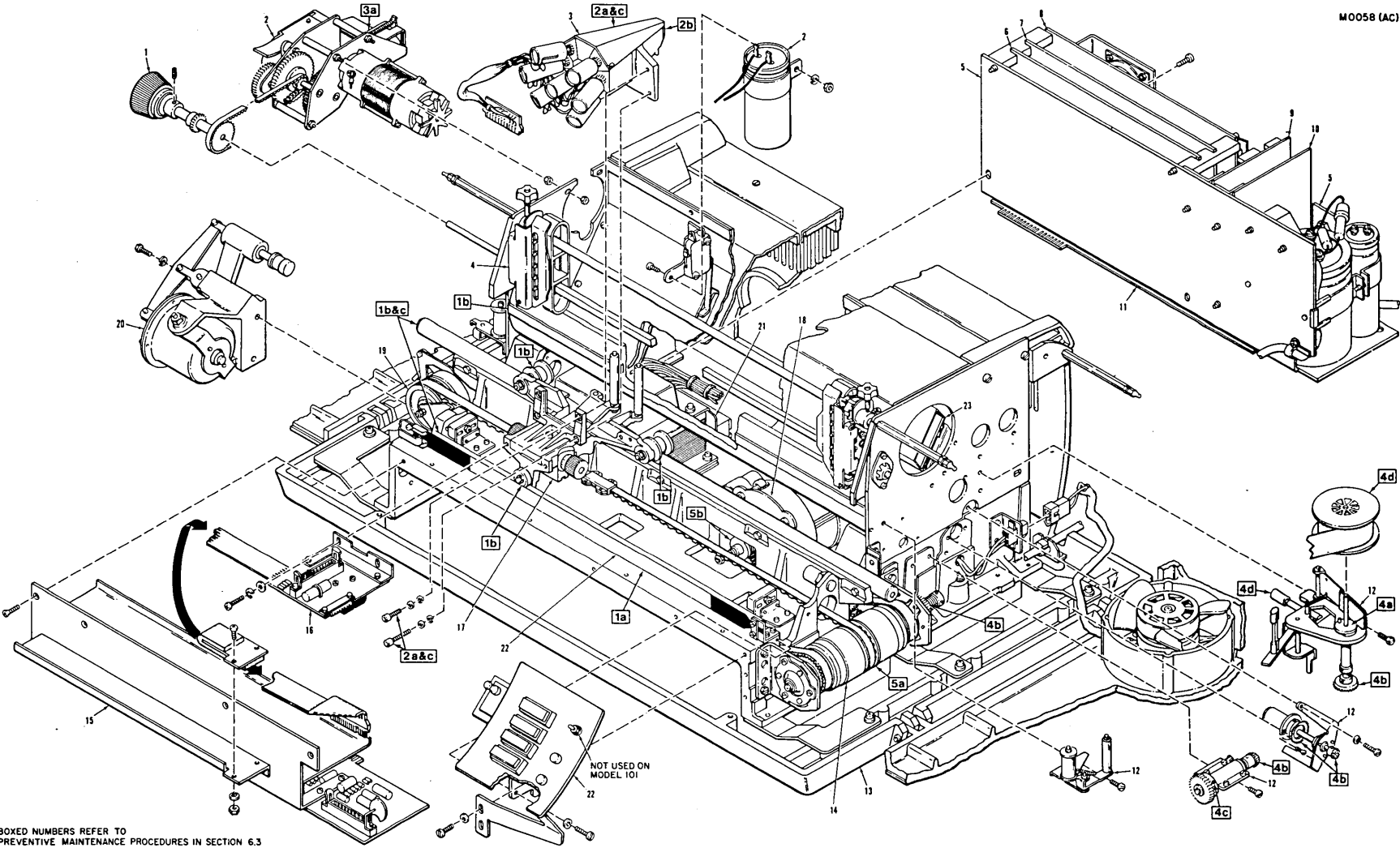
1. Obtain print sample prior to beginning P.M.
2. Clean printer with vacuum cleaner, if available.

#### NOTE

The following P.M. procedures are keyed to the printer assembly drawing shown in figure 6-1. Refer to that drawing for the location of assemblies specified within each procedure.

1. Carriage Assembly and Timing Fence
  - a. Using a soft, clean cloth, wipe both sides of timing fence.
  - b. Wipe the carriage guide bars, all rollers and guide plate.
  - c. Lightly lubricate guide bars using lightweight oil.
2. Print Head Assembly
  - a. Remove print head from carriage
  - b. Using an eye loupe, verify that print wires align flush with the face of the print head jewel. (Make sure that print wires are not recessed in the jewel.)
  - c. Re-mount print head on carriage assembly.
3. Paper Feed Assembly
  - a. Apply a drop of lightweight oil on the paper feed clutch gear and clutch slide pawl connected to the solenoid armature.
4. Ribbon Feed Assembly
  - a. Inspect ratchets, pawls, and springs for wear and mesh (left and right).
  - b. Clean and lubricate all gears and springs with grease as indicated.
  - c. Clean and lubricate all gears and springs with oil as indicated.
  - d. Verify that both ribbon spools rotate freely when ribbon releasers are in neutral position (neither spool engaged).
5. Drive Assembly
  - a. Inspect gears for proper mesh and wear.
  - b. Oil intermediate shaft and felt washer at forward and reverse bushings. (Use Anderol 465 Only).  
**NOTE: Avoid use of any lubricant on the forward and reverse clutch surfaces.**

M0058 (AC)



BOXED NUMBERS REFER TO PREVENTIVE MAINTENANCE PROCEDURES IN SECTION 6.3

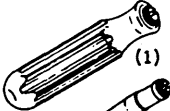
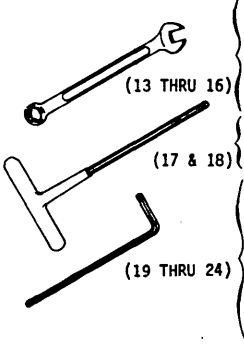

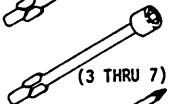
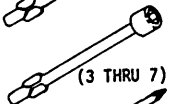
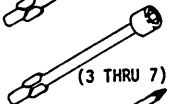
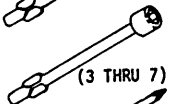
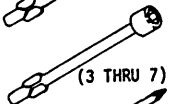
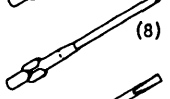

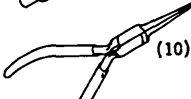

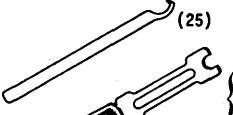
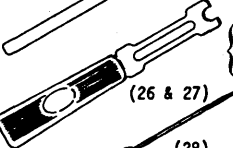
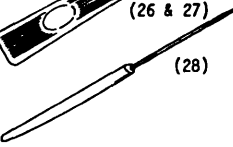
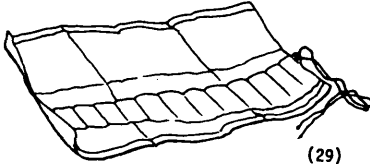
NOT USED ON MODEL 101

Figure 6-1. MODEL 101 MECHANICAL ASSEMBLER (PREVENTIVE MAINTENANCE REFERENCE DRAWING)

6.4 Recommended Tools

Rev. G

6-4

CENTRONICS data computer corp. HUDSON, NEW HAMPSHIRE U.S.A.		CENTRONICS TOOL KIT (63002399-6001)				
ITEM	DESCRIPTION	PART NUMBER		ITEM	DESCRIPTION	PART NUMBER
	1. Universal Handle	30600002-3001		13.	8 mm Combination Open End, Box Wrench	30600002-3012
	2. Extension 4-Inch	30600002-3002		14.	10 mm Combination Open End, Box Wrench	30600002-3013
	3. 4 mm Nut Driver	30600002-3003		15.	17 mm Combination Open End, Box Wrench	30600002-3014
	4. 5.5 mm Nut Driver	30600002-3004		16.	19 mm Combination Open End, Box Wrench	30600002-3015
	5. 7 mm Nut Driver	30600002-3005		17.	3/32-Inch "T" Handle Hex Key	30600002-3016
	6. 8 mm Nut Driver	30600002-3006		18.	5/32-Inch "T" Handle Hex Key	30600002-3017
	7. 10 mm Nut Driver	30600002-3007		19.	1/16-Inch Hex Key	30600002-3025
	8. Phillips Head Screwdriver	30600002-3009	20.	.050-Inch Hex Key	30600002-3024	
	9. Slotted Head Screwdriver	30600002-3008	21.	1.5 mm Hex Key	30600002-3020	
	10. Needle Nose Plier	30600002-3010	22.	2.0 mm Hex Key	30600002-3019	
	11. 5 x 5.5 mm Open End Wrench	30600002-3023	23.	2.5 mm Hex Key	30600002-3021	
	12. 6 x 7 mm Open End Wrench	30600002-3011	24.	3.0 mm Hex Key	30600002-3022	
				25.	Spanner Wrench	63003105-3001
				26.	4 mm Snap Ringer Holder	63002399-3018
				27.	5 mm Snap Ring Holder	63002399-3019
				28.	Spring Hook	63002399-3020
				29.	Tool Pouch	30600002-3018

# Troubleshooting Guide

CENTRONICS  
SERIES 101 PRINTERS  
SERVICE GUIDE

The following information is intended to aid service personnel in developing good service procedures and troubleshooting techniques of 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:

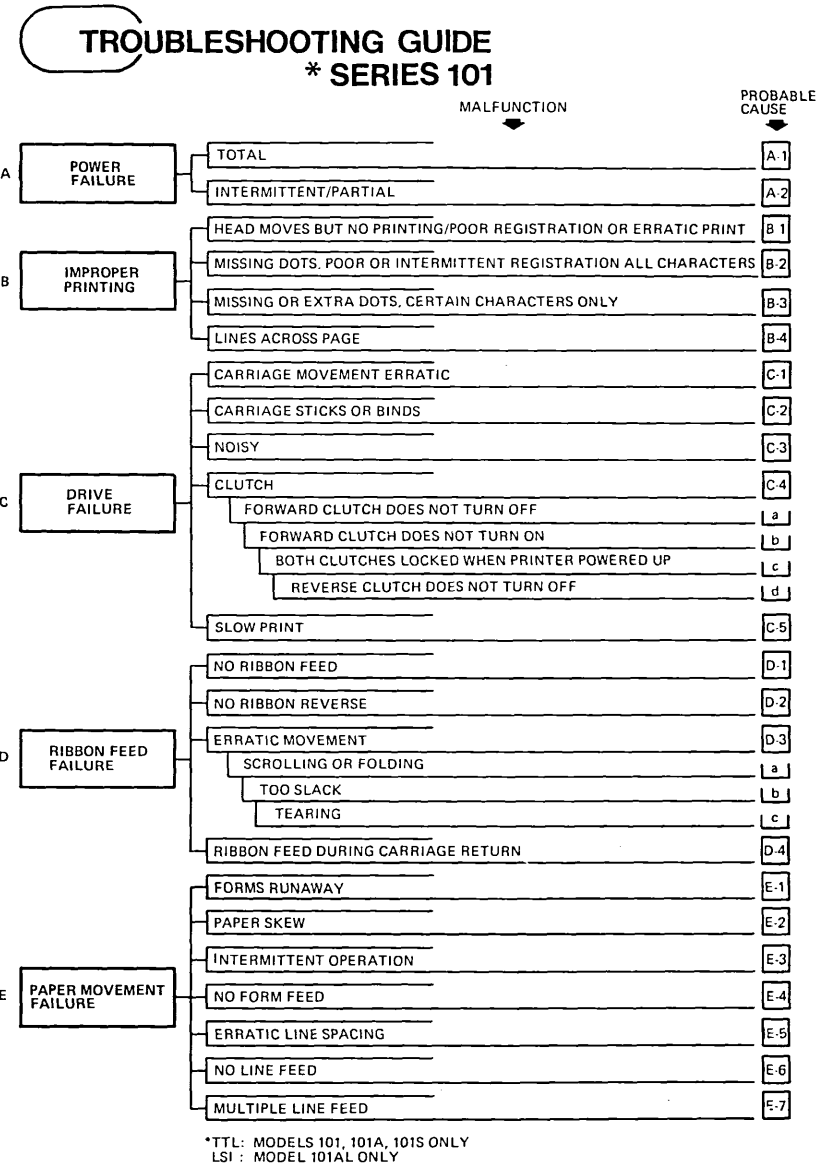
1. Verify that the timing fence is clean and that timing fence is centered properly in optic block.
2. Verify that the carriage guide bar is clean and free of caked-on dirt.
3. Verify proper tension on the main drive belt.
4. Verify smooth, free carriage motion.
5. Verify that the RTP and EOP switches 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 pin alignment on the pin-feed tractor units.

With printer power on:

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

G-5

Rev. G



**A. POWER FAILURE****A-1 TOTAL**

1. Damaged power cord.
2. Open AC line fuse.
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. IMPROPER PRINTING****B-1 HEAD MOVES BUT NO PRINTING/POOR REGISTRATION OR ERRATIC PRINT**

1. Dirty or defective timing fence.
2. Optic block out of adjustment.
3. Improper head position.
4. Defective Video amplifier.
5. Defective ribbon cable.
6. Defective LED's
7. Dirty board or cavity connectors.
8. Improper alignment of timing fence to optic slit.
9. Improper alignment of optics block.
10. Improper main belt tension.
11. Defective Logic board (TTL).
12. Defective Driver board.
13. Defective ±12V or +5V regulator (TTL).
14. Defective Electronic Card No. 2 (TTL).

**B-2 MISSING DOTS, POOR OR INTERMITTENT PIN REGISTRATION ALL CHARACTERS**

1. Improperly aligned, dirty or damaged timing fence.
2. Defective damper assembly.
3. Defective RTP or EOP switch.
4. Defective Video Amplifier.
5. Defective Ribbon Cable.
6. Dirty head connector or board contacts.
7. Defective Driver board.
8. Improper alignment of optics block.
9. Defective Logic board or fuses (LSI).
10. Defective Electronic Card No. 1 (TTL).
11. Defective Electronic Card No. 2 (TTL).
12. Improper print head position.
13. Improper adjustment of print head solenoid/s.

**B-3 MISSING OR EXTRA DOTS, CERTAIN CHARACTERS ONLY**

1. Defective ROM's.
2. Defective P.C. runs in character generator.
3. Improperly aligned dirty or scratched timing fence.

**B-4 LINES ACROSS PAGE**

1. Improperly installed print head cover.
2. Improper penetration adjustment.
3. Dragging print wires.
4. Defective ribbon cable.
5. Poor logic board/s to Drive board connection.
6. Defective Driver board.
7. Defective Logic board (LSI).
8. Defective Electronic Card No. 2 (TTL).

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

1. Improperly adjusted main drive belt.
2. Spring drum unwound or broken.
3. Main drive belt touching driver board cables.
4. Defective bushings.
5. Worn or missing teeth on main timing belt.
6. Defective RTP switch.
7. Defective motor pulley.
8. Improperly adjusted motor clutch plate.
9. Defective drive pulleys or gears.
10. Dirty carriage guide bar.

**C-2 CARRIAGE STICKS OR BINDS**

1. Optics block touching timing fence.
2. Drive belt too tight.
3. Clutch assembly and brackets too tight.
4. Spring drum too tight.
5. Reverse clutch not releasing.
6. 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 Logic board (LSI).
4. Defective Electronic Card No. 1 (TTL).
5. Defective Electronic Card No. 2 (TTL).
6. No video signal.
  - a. Defective Video Amplifier.
  - b. Defective optics block.
  - c. Defective ribbon cable.
  - d. Improperly adjusted optic block.
  - e. Dirty timing fence.

**C-4B Forward Clutch Does Not Turn On**

1. Defective -12V supply.
2. Defective Driver board.
3. Defective Logic board (LSI).
4. Defective Electronic Card No. 2 (TTL).
5. Dirty or loose board connectors.

**C-4C Both Clutches Locked When Printer Powered Up**

1. Improperly seated electronic boards.
2. Defective driver board.
3. Defective logic board (LSI).
4. Defective Electronic Card No. 2 (TTL).

**C-4D Reverse Clutch Does Not Turn Off**

1. Defective RTP switch (check continuity to cavity).
2. Defective driver board.
3. Defective logic board (LSI).

4. Defective Electronic Card No. 1 (TTL).
5. Defective Electronic Card No. 2 (TTL).
6. Dirty board or cavity connectors.

**C-5 SLOW PRINT**

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

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

1. Broken ribbon feed 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 (earlier 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 (earlier units).

**D-3C Tearing**

1. Improperly adjusted drive linkage.
2. Sticking solenoid wires.
3. Defective driver board.

**D-4 RIBBON FEED DURING CARRIAGE RETURN**

1. Broken clutch control on ribbon feed clutch gear.

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

1. Defective or missing VFU tape.
2. Defective VFU LED's.
3. Excessive gap between VFU upper and lower reader bracket.

4. Improper alignment of reader bracket LED's to tape holes.
5. Defective logic board (LSI).
6. Defective Electronic Card No. 1 (TTL).
7. Continuously energized solenoid.
  - a. Defective driver board.
  - b. Driver resistor shorted to bracket.
  - c. Defective Electronic Card No. 1 (TTL).
8. Clutch slide pawl movement restricted.

**E-2 PAPER SKEW**

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

**E-3 INTERMITTENT OPERATION**

1. Improperly adjusted platen knob.
2. See Erratic Line Spacing (E-5).

**E-4 NO FORM FEED**

1. Gear mesh too tight.
2. Form feed motor clutch roller/s binding (FF Clutch Inside Cam).
3. Defective driver board.
4. Defective logic board (LSI).
5. Defective Electronic Card No. 1 (TTL).
6. Defective form feed resistor.
7. Defective solenoid.
8. Defective ±12V supply.
9. Defective 30V unregulated supply.
10. Defective TOP OF FORM switch.

**E-5 ERRATIC LINE SPACING**

1. Excessive back stop pawl and cam mechanism play.
2. Improper upper and lower reader bracket gap.
3. Loosen set plate, paper drive slide shaft.

**E-6 NO LINE FEED**

1. Improperly adjusted form feed magnet.
2. Solenoid loose on pole (must be seated in bracket).
3. Gap between slide and paper feed clutch cam tab.
4. Defective Driver board.
5. Defective Logic board (LSI).
6. Defective Electronic Card #1 (TTL).
7. Improper Logic board jumpers (LSI).
8. Defective platen knob assembly.
9. Defective solenoid.
10. Defective form feed resistor or bad solder connection.
11. VFU belt worn or slipping.
12. Clutch slide pawl binding.

**E-7 MULTIPLE LINE FEED**

1. Improperly adjusted solenoid.
2. Defective solenoid armature spring.
3. Defective Driver board.
4. Defective Logic board (LSI).
5. Defective Electronic Card No. 1 (TTL).
6. Excessive line feed pulse width.
7. Clutch slide pawl binding.
8. Gap between slide and paper feed clutch inner cam tab.

## SECTION 7

### ELECTRICAL DRAWINGS AND LISTS OF MATERIALS

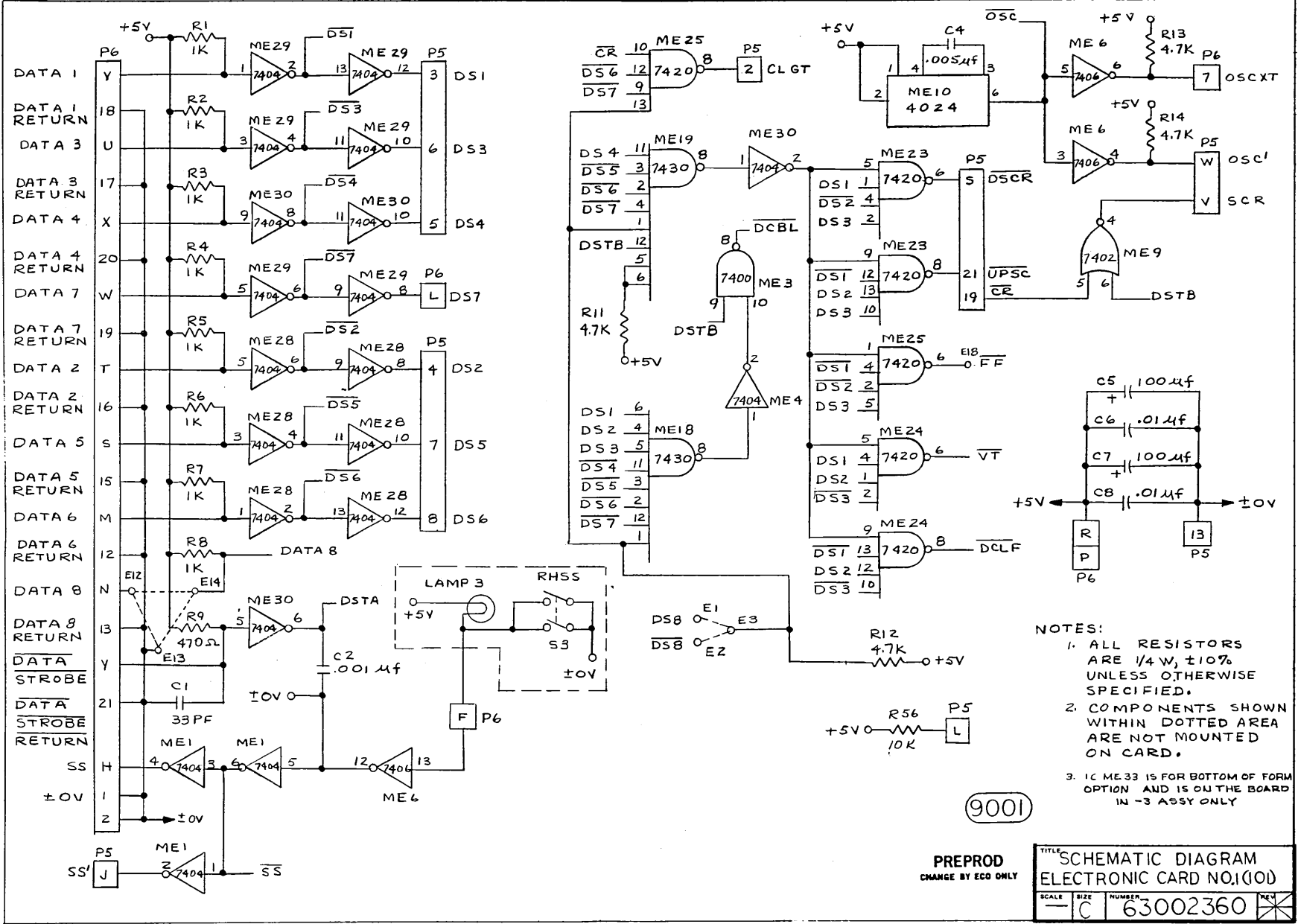
This section contains the schematic, wiring and assembly diagrams and lists of materials for all electronic assemblies in the Model 101.

The following is a list of drawings appearing in this section.

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7-1	Schematic Diagram, Electronic Card # 1 (Sheet 1 of 3)	7-3
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7-3	Schematic Diagram, Electronic Card # 1 (Sheet 3 of 3)	7-5
7-4	Schematic Diagram, Electronic Card # 2 (Sheet 1 of 2)	7-6
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7-23	Component Board Assembly, Video Amplifier	7-31
7-24	Component Board Assembly, Elapsed Time Indicator (Optional)	7-33
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- NOTES:
1. ALL RESISTORS ARE 1/4 W, ±10% UNLESS OTHERWISE SPECIFIED.
  2. COMPONENTS SHOWN WITHIN DOTTED AREA ARE NOT MOUNTED ON CARD.
  3. IC ME33 IS FOR BOTTOM OF FORM OPTION AND IS ON THE BOARD IN -3 ASSY ONLY

9001

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TITLE: SCHEMATIC DIAGRAM			
ELECTRONIC CARD NO. 100			
SCALE	SIZE	NUMBER	REV
C		63002360	

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

7-3

REV. E



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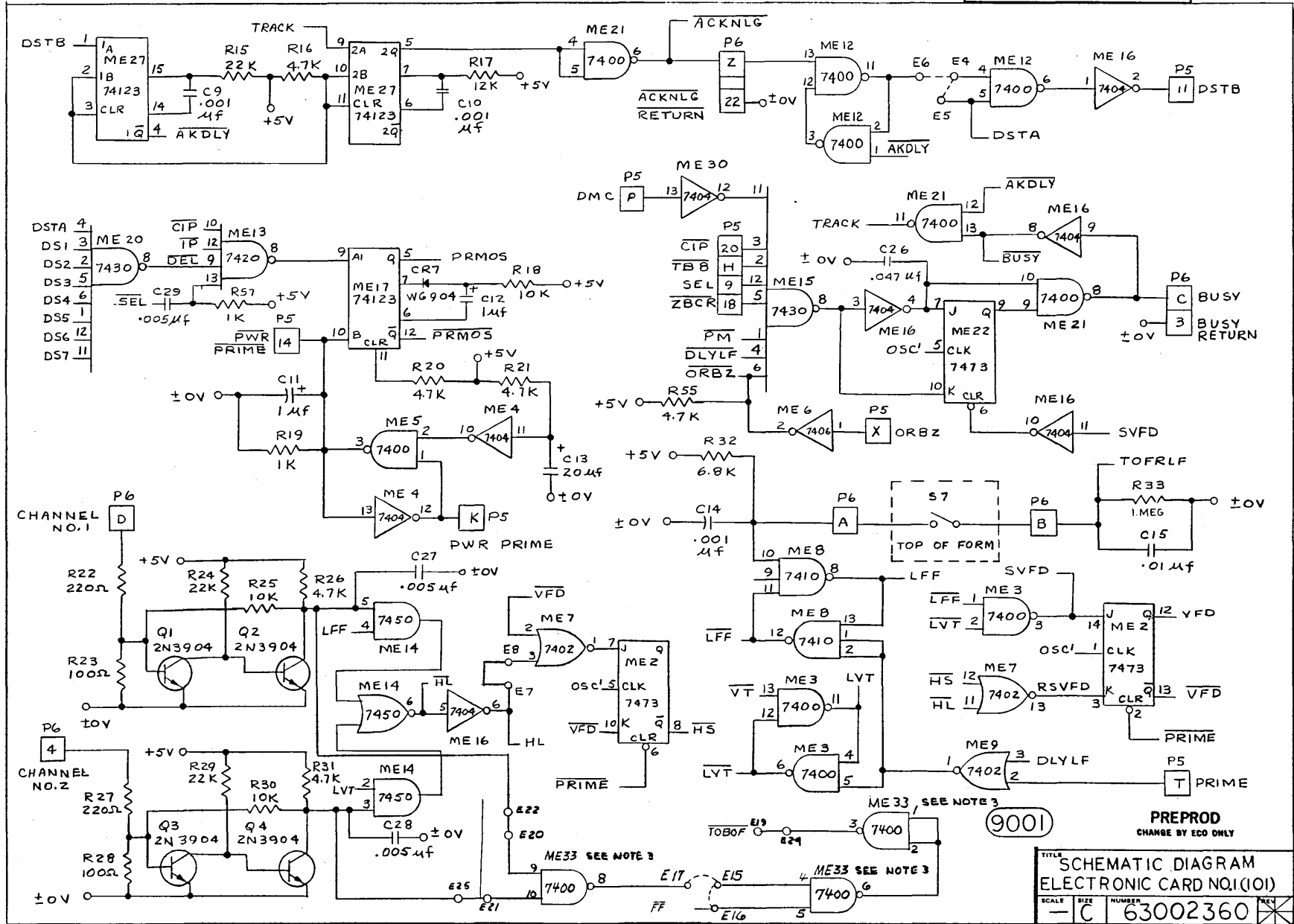


Figure 7-2. SCHEMATIC DIAGRAM, ELECTRONIC CARD #1 (SHEET 2 OF 3)

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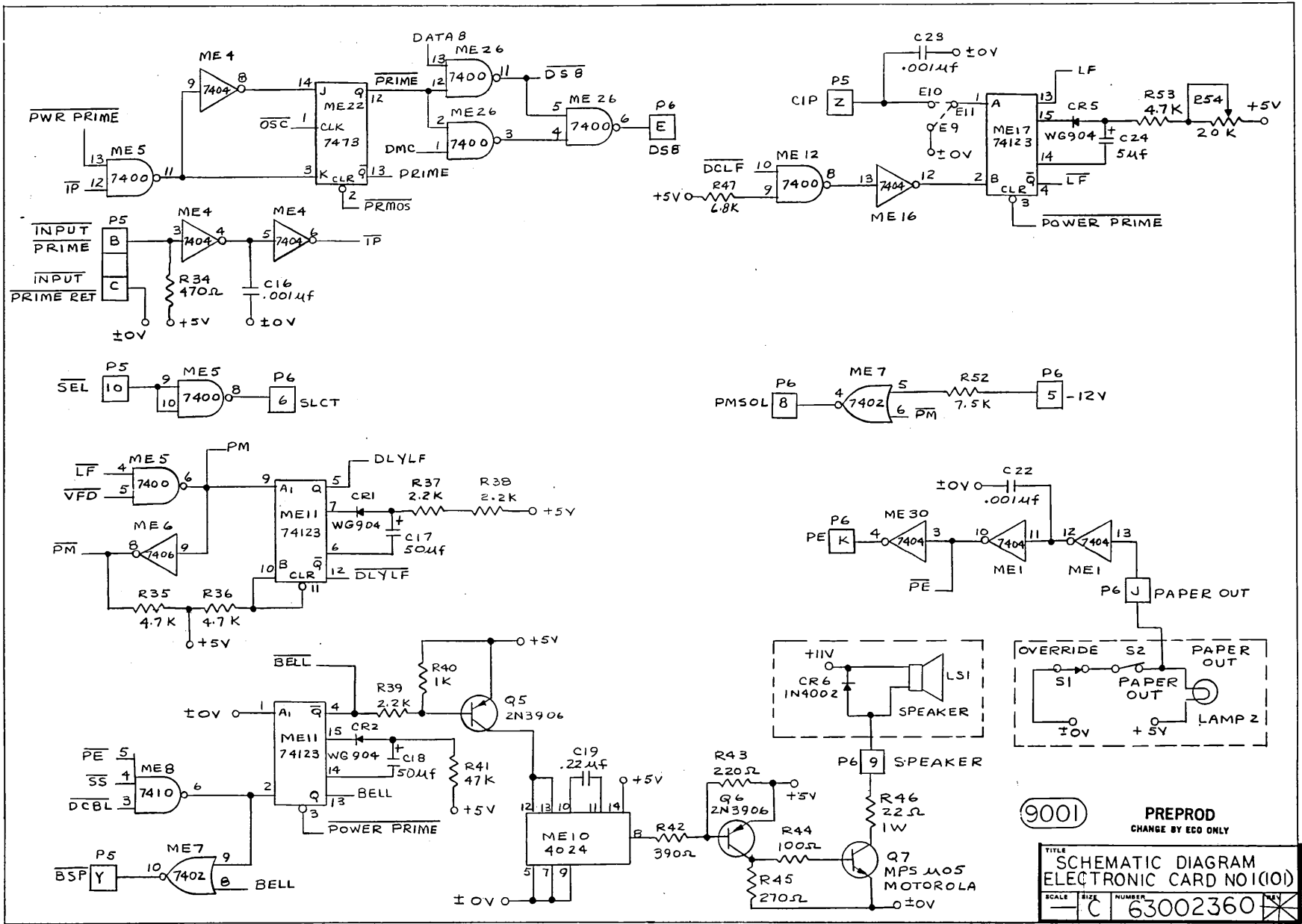


Figure 7-3. SCHEMATIC DIAGRAM, ELECTRONIC CARD #1 (SHEET 3 OF 3)

7-5

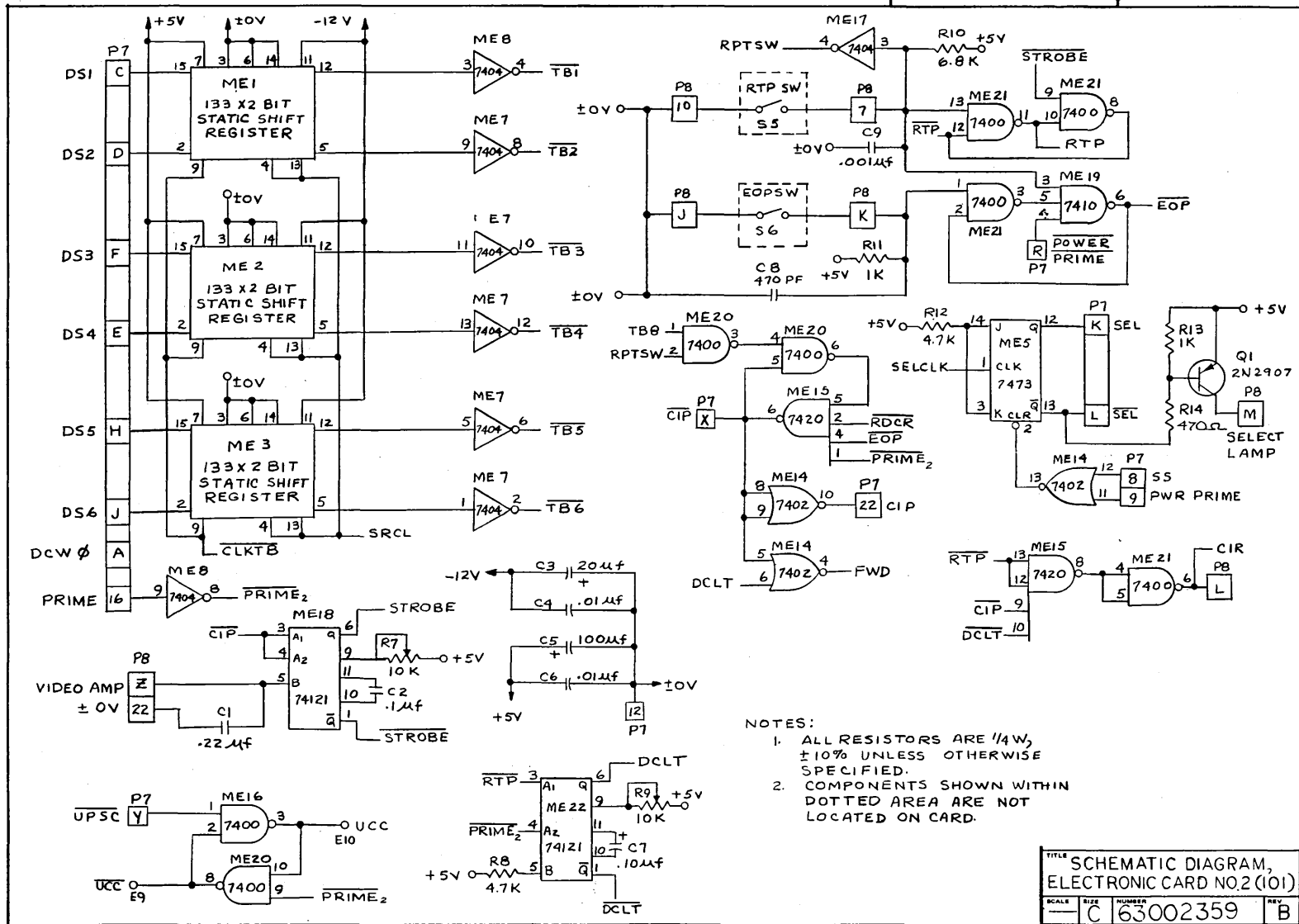
Rev. E

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TITLE  
SCHEMATIC DIAGRAM  
ELECTRONIC CARD NO1(10)

SCALE	SIZE	NUMBER	REV
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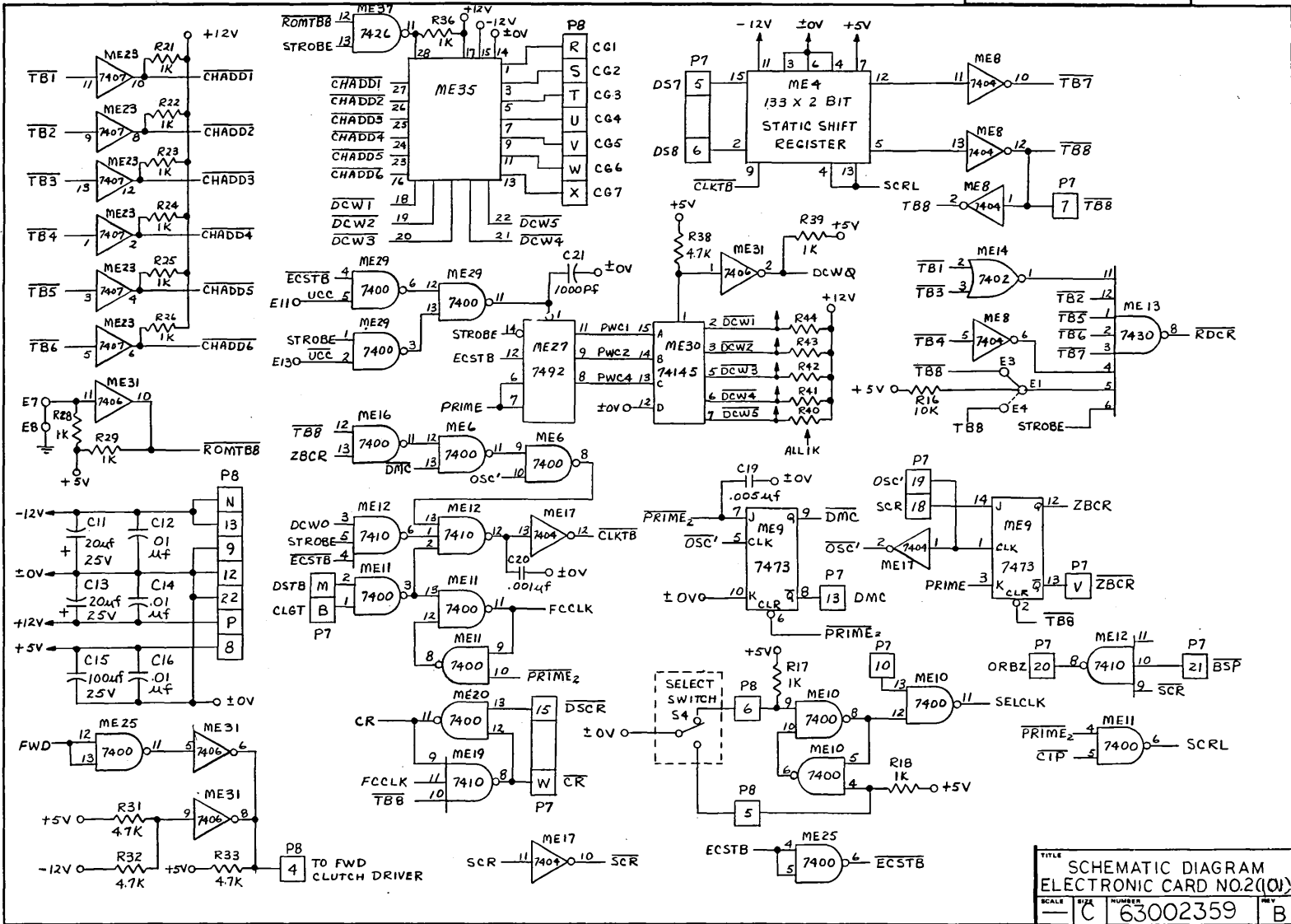


- NOTES:
1. ALL RESISTORS ARE 1/4W, ±10% UNLESS OTHERWISE SPECIFIED.
  2. COMPONENTS SHOWN WITHIN DOTTED AREA ARE NOT LOCATED ON CARD.

TITLE			SCHEMATIC DIAGRAM,		
ELECTRONIC CARD NO.2 (101)					
SCALE	SIZE	NUMBER	REV		
C		63002359	B		

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

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ELECTRONIC CARD NO.2(10)  
SCALE SIZE NUMBER REV  
C 63002359 B

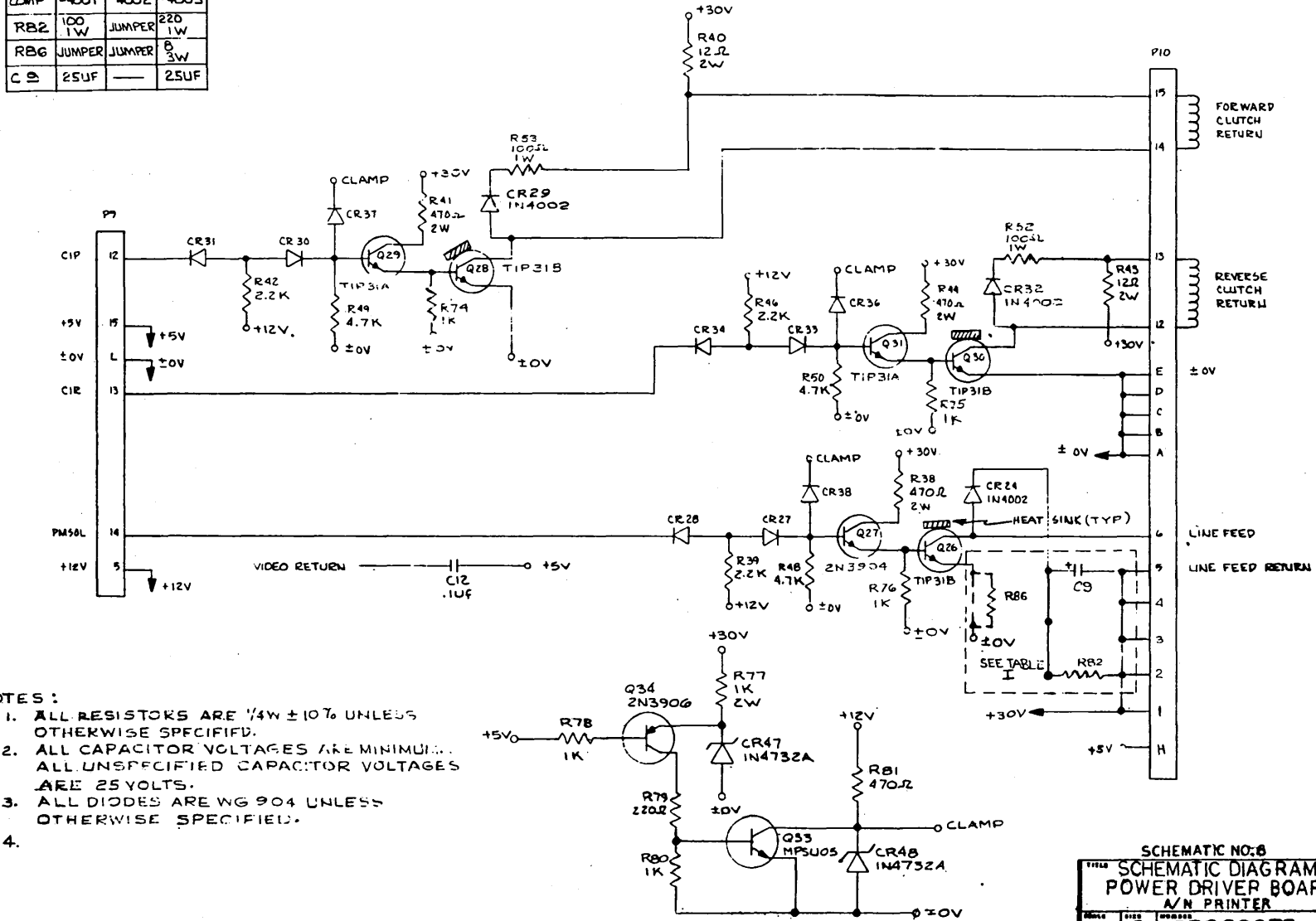
7-7

REV. D

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

THE INFORMATION CONTAINED HEREIN IS PROPRIETARY AND IS NOT TO BE RELEASED OR REPRODUCED WITHOUT WRITTEN PERMISSION OF CENTRONICS data computer corp.

COMP	-4001	-4002	-4003
RB2	100 1W	JUMPER	220 1W
RB6	JUMPER	JUMPER	6 3W
C9	25UF	—	25UF



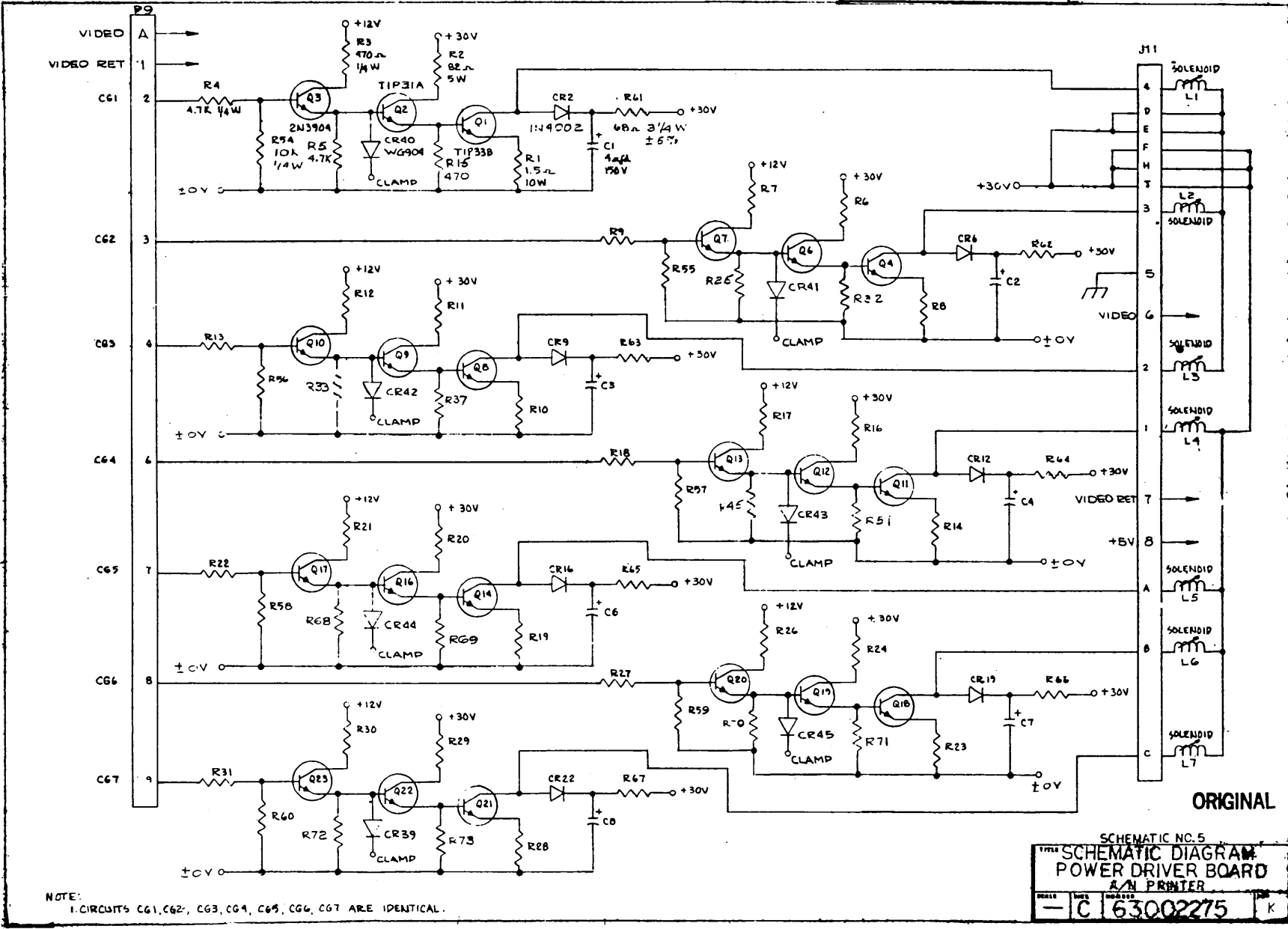
NOTES :

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.
- 4.

Figure 7-6. SCHEMATIC DIAGRAM, POWER DRIVER BOARD (SHEET 1 OF 2)

SCHEMATIC NO. 6  
 SCHEMATIC DIAGRAM,  
 POWER DRIVER BOARD  
 A/N PRINTER  
 C 63002275

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NOTE:  
1. CIRCUITS CG1, CG2, CG3, CG4, CG5, CG6, CG7 ARE IDENTICAL.

SCHEMATIC NO. 5  
**SCHEMATIC DIAGRAM**  
**POWER DRIVER BOARD**  
 A/N PRINTER

DATE	REV	ISSUED	BY
	C	63002275	K

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

7-9

REV. D

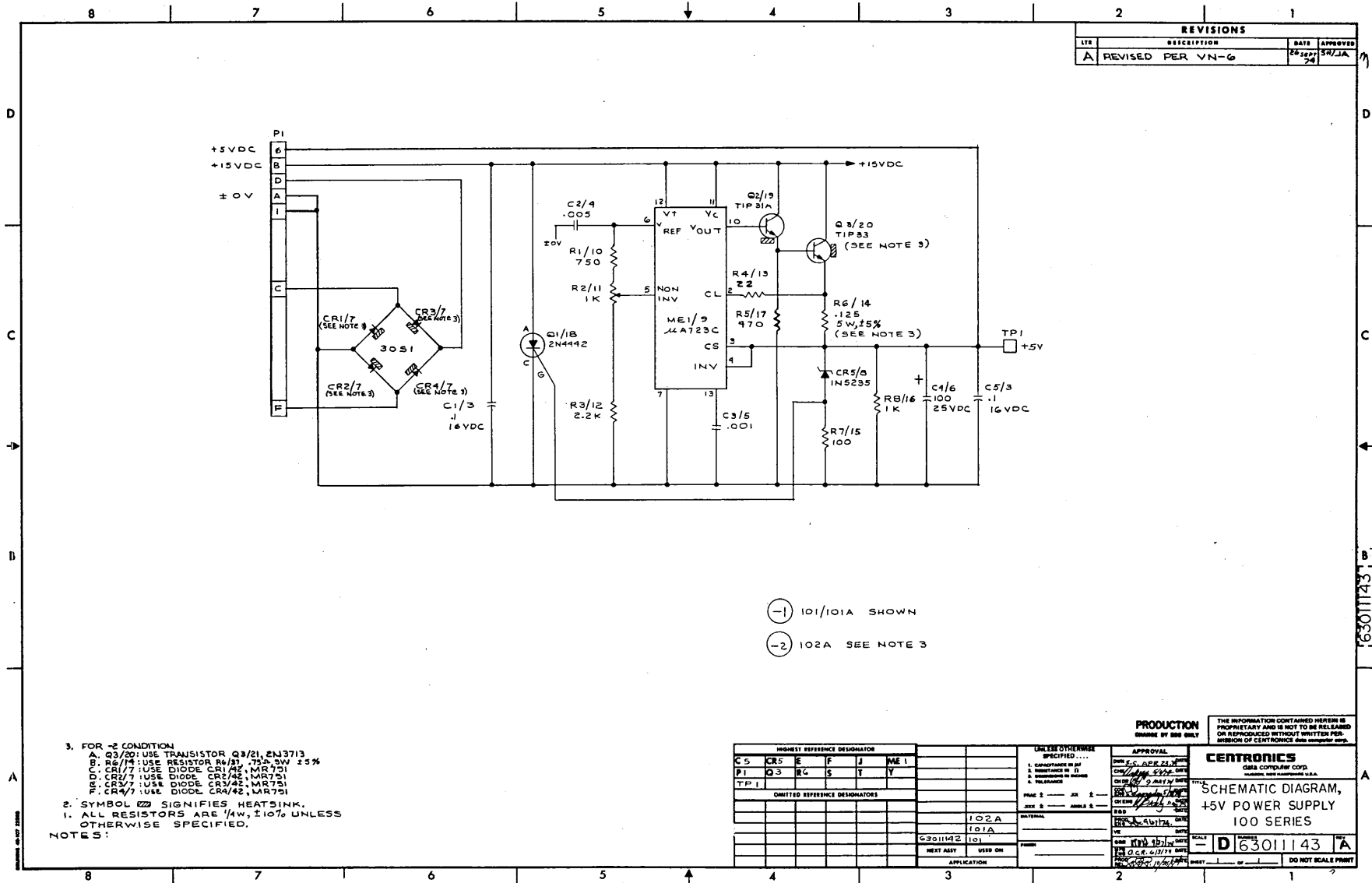


Figure 7-8. SCHEMATIC DIAGRAM, +5V VOLT REGULATOR

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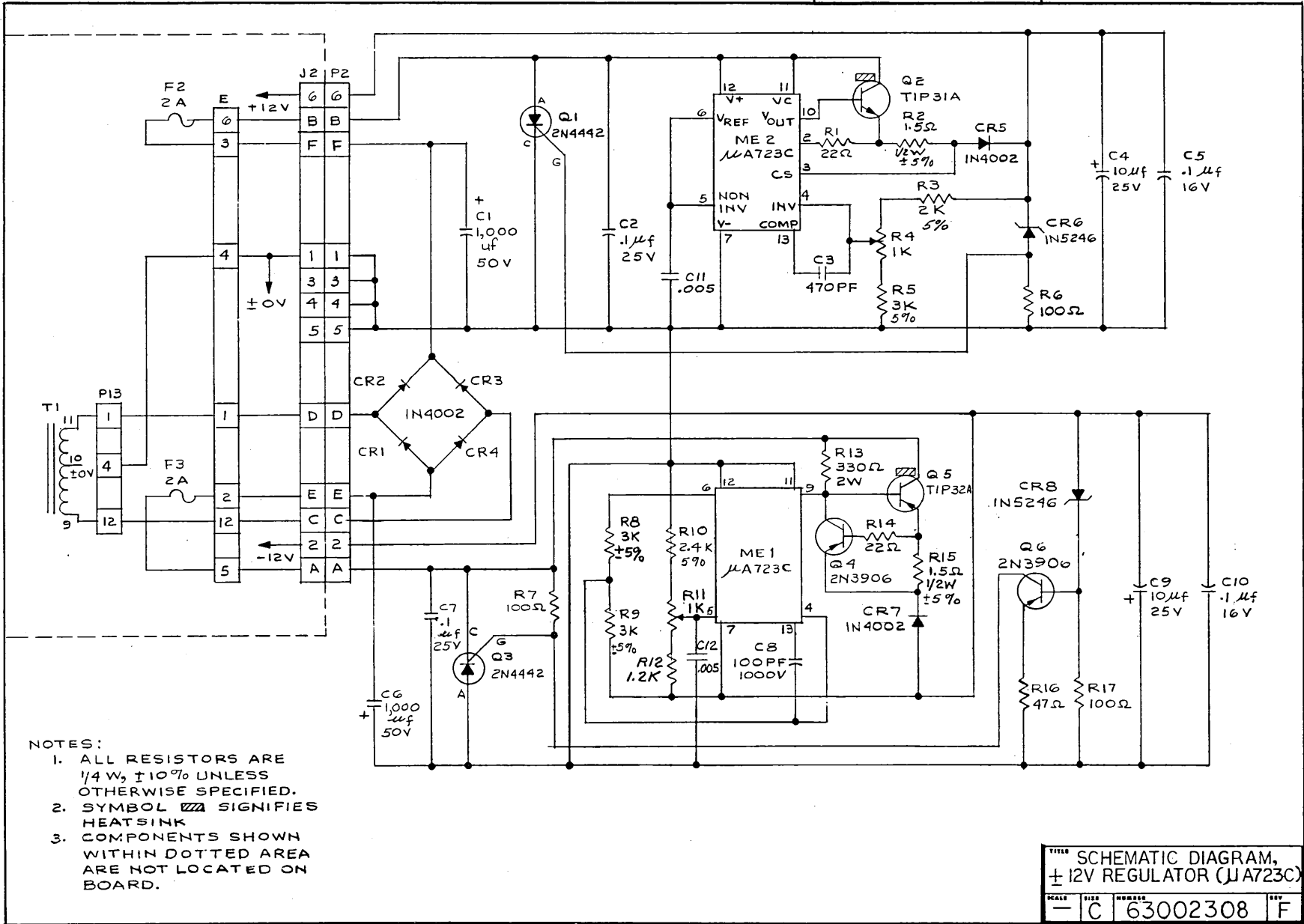


Figure 7-9. SCHEMATIC DIAGRAM, ±12V REGULATOR

7-11

REV. E



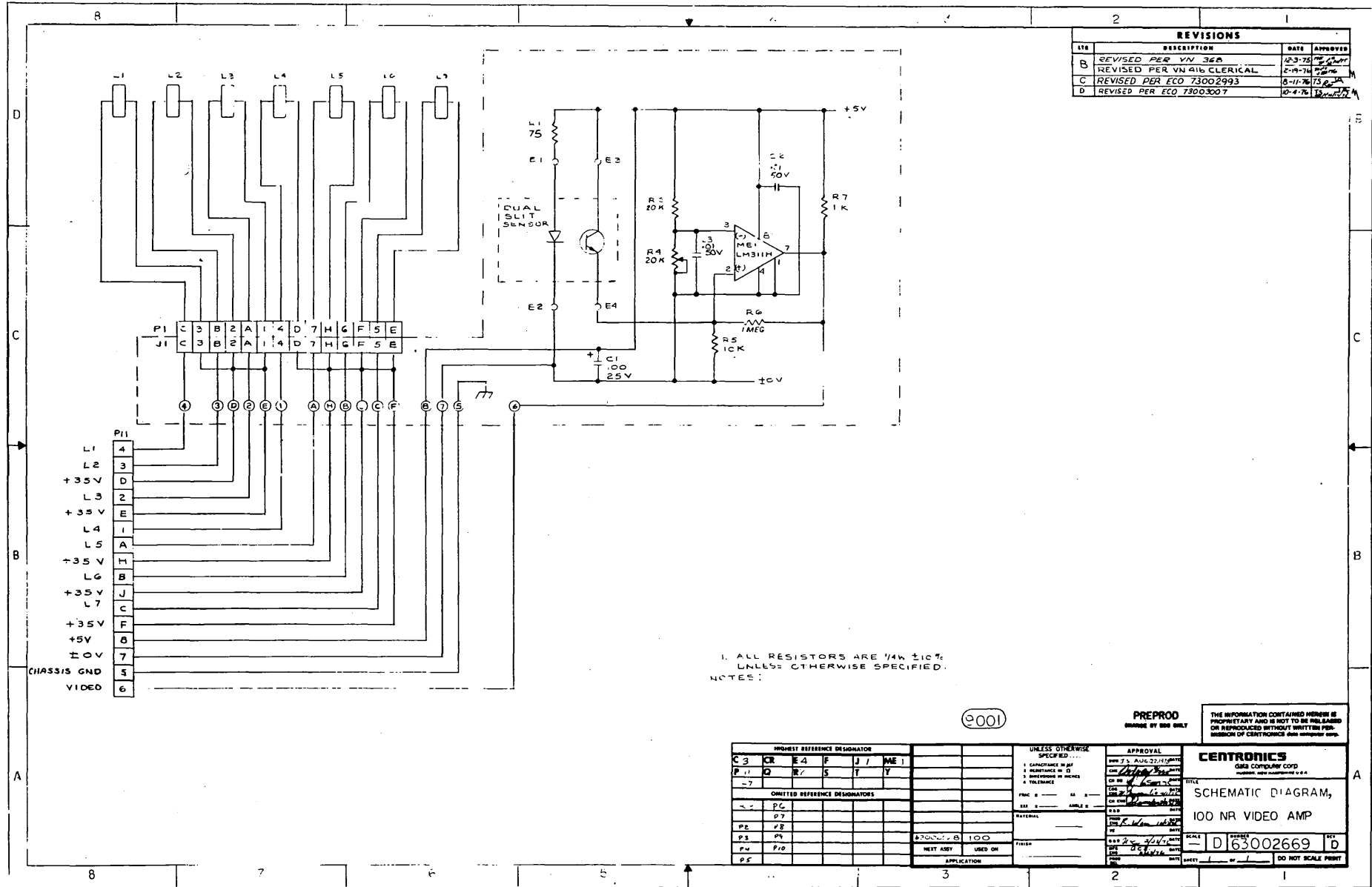
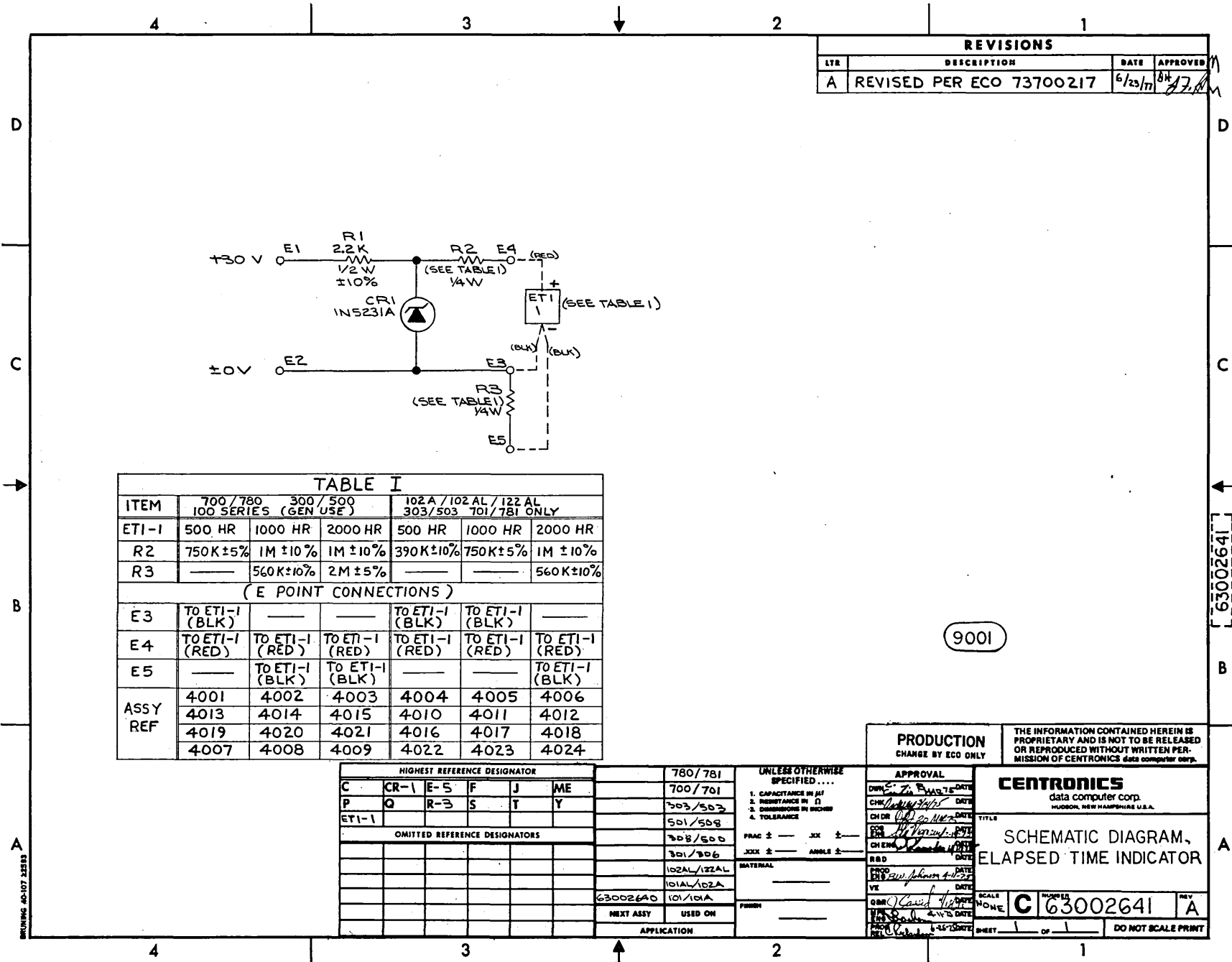


Figure 7-10. SCHEMATIC DIAGRAM, VIDEO AMPLIFIER

7-13

REV. F



REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	REVISED PER ECO 73700217	6/23/71	[Signature]

ITEM	700/780 100 SERIES		300/500 (GEN USE)		102A/102AL/122AL 303/503 701/781 ONLY	
	ETI-1	500 HR	1000 HR	2000 HR	500 HR	1000 HR
R2	750K±5%	1M±10%	1M±10%	390K±10%	750K±5%	1M±10%
R3	—	560K±10%	2M±5%	—	—	560K±10%

E POINT	700/780		300/500		102A/102AL/122AL	
	TO ETI-1 (BLK)	TO ETI-1 (RED)	TO ETI-1 (BLK)	TO ETI-1 (RED)	TO ETI-1 (BLK)	TO ETI-1 (RED)
E3	TO ETI-1 (BLK)	—	—	TO ETI-1 (BLK)	TO ETI-1 (BLK)	—
E4	TO ETI-1 (RED)	TO ETI-1 (RED)	TO ETI-1 (RED)	TO ETI-1 (RED)	TO ETI-1 (RED)	TO ETI-1 (RED)
E5	—	TO ETI-1 (BLK)	TO ETI-1 (BLK)	—	—	TO ETI-1 (BLK)

ASSY REF	700/780		300/500		102A/102AL/122AL	
	4001	4002	4003	4004	4005	4006
	4013	4014	4015	4010	4011	4012
	4019	4020	4021	4016	4017	4018
	4007	4008	4009	4022	4023	4024

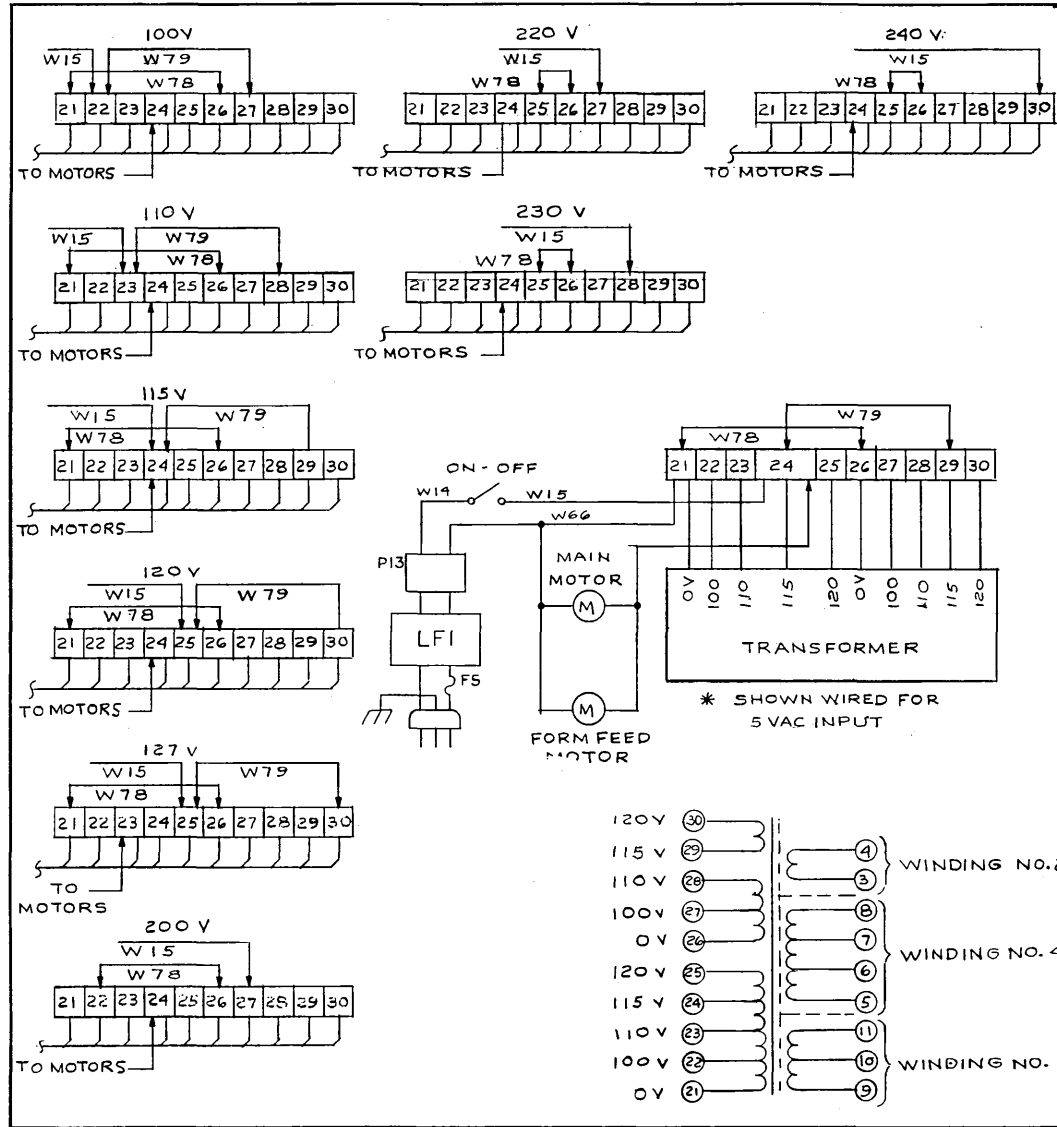
9001

<b>PRODUCTION</b> CHANGE BY ECO ONLY	THE INFORMATION CONTAINED HEREIN IS PROPRIETARY AND IS NOT TO BE RELEASED OR REPRODUCED WITHOUT WRITTEN PERMISSION OF CENTRONICS data computer corp.
<b>APPROVAL</b> DATE: 6/23/71 CHKD: [Signature] CHG: [Signature] RBD: [Signature] VE: [Signature] DATE: 6/23/71	<b>CENTRONICS</b> data computer corp. Hudson, New Hampshire U.S.A.
<b>TITLE</b> SCHEMATIC DIAGRAM, ELAPSED TIME INDICATOR	<b>NUMBER</b> 63002641
<b>SCALE</b> NONE	<b>REV</b> A
<b>SHEET</b> 1 OF 1	<b>DO NOT SCALE PRINT</b>

Figure 7-11. SCHEMATIC DIAGRAM, ELAPSED TIME INDICATOR (OPTIONAL)

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REVISIONS			
LYR	DESCRIPTION	DATE	APPROVED
A	REVISED AND REDRAWN. WIRE #8 OF 110V TIED TO PIN 27. NOTE 3B, 1.2A WAS 35.5VAC OR GREATER PER ECO NO. 73001002 S.S. 9-23-71 DWG NO. WAS 63001105. V.S. 4-3-72	25 <sup>th</sup> 71	D.P. 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 6: 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

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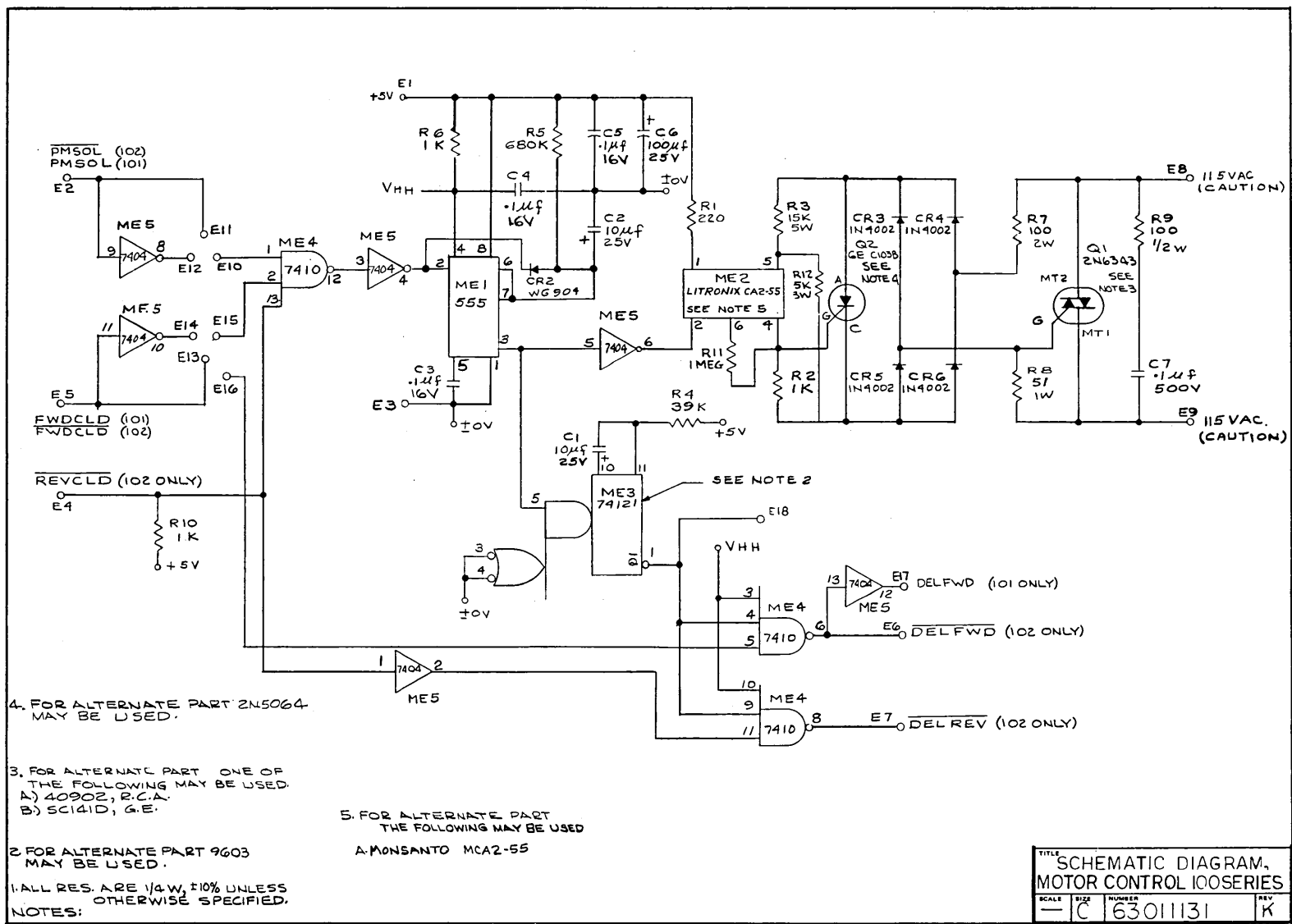
TITLE: MULTITAP 50/60 HZ TRANSFORMER

SCALE: C SIZE: 63001106 REV: C

DATE: JUL 14, 1971

Figure 7-12. SCHEMATIC DIAGRAM, MULTITAP TRANSFORMER 50/60 HZ

THE INFORMATION CONTAINED HEREIN IS PROPRIETARY AND IS NOT TO BE RELEASED OR REPRODUCED WITHOUT WRITTEN PERMISSION OF CENTRONICS data computer corp.



TITLE			
SCHEMATIC DIAGRAM, MOTOR CONTROL 100SERIES			
SCALE	SIZE	NUMBER	REV
-	C	63011131	K

Figure 7-13. SCHEMATIC DIAGRAM, MOTOR CONTROL

7-15

REV. D

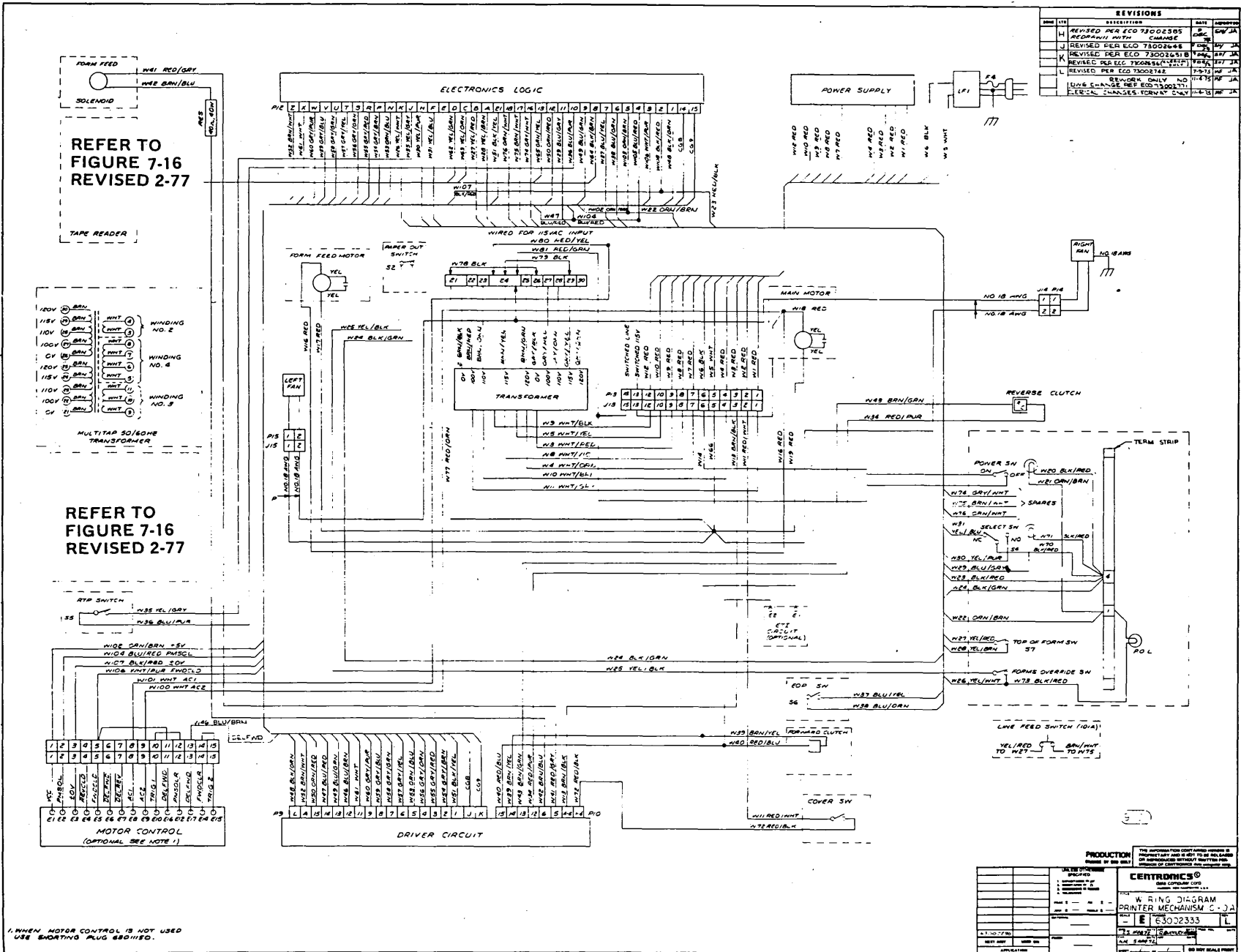
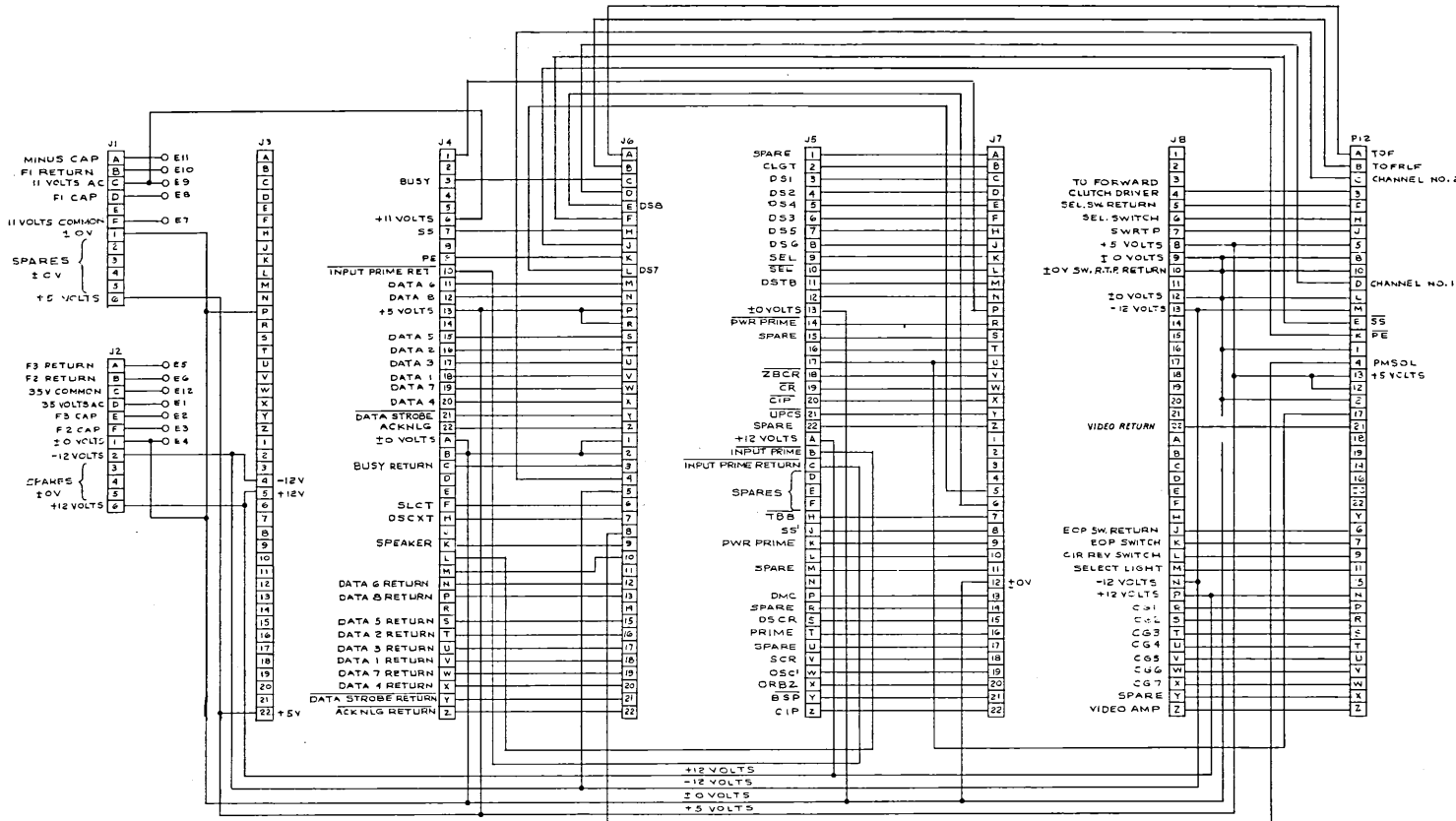


Figure 7-14. WIRING DIAGRAM, PRINTER MECHANISM

THE INFORMATION CONTAINED HEREIN IS UNCLASSIFIED AND IS NOT TO BE RELEASED OR REPRODUCED WITHOUT EXPRESS PERMISSION OF CENTRONICS AND ITS SUPPLIERS.

REVISIONS		
NO.	DESCRIPTION	DATE
1		



7-17

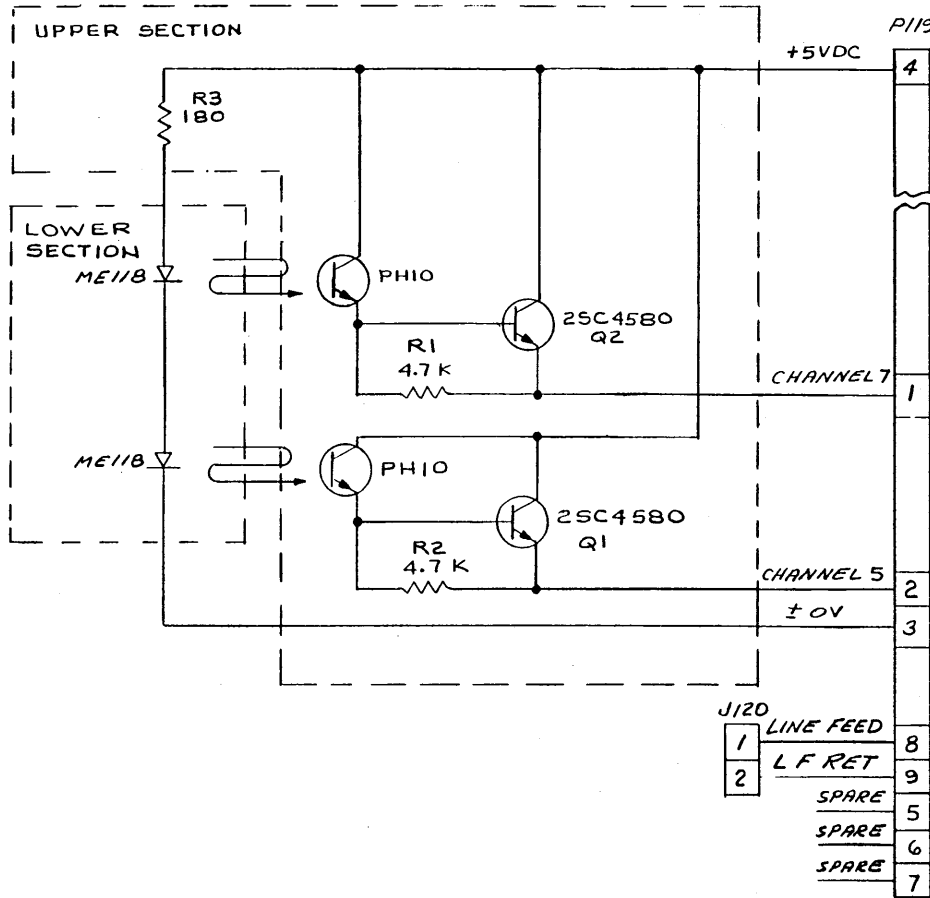
REFERENCE DRAWINGS:  
 CONNECTOR BOARD A35Y (D) 63002332  
 SCHEMATIC DIAGRAM (C) 63002307  
 SCHEMATIC DIAGRAM (C) 63002308  
 SCHEMATIC DIAGRAM (C) 63002359  
 SCHEMATIC DIAGRAM (C) 63002360

UNLESS OTHERWISE SPECIFIED...		<b>CENTRONICS</b> DATA COMMUNICATIONS CORP.	
INTERCONNECTION DIAGRAM, CONNECTOR BOARD (10)			
DATE	REV	63002330	B
C3002390	3000	DO NOT SCALE PRINT	

Figure 7-15. INTERCONNECTION DIAGRAM, CONNECTOR BOARD

REV. D

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	RELEASED TO PREPROD	9-75	



(9001)

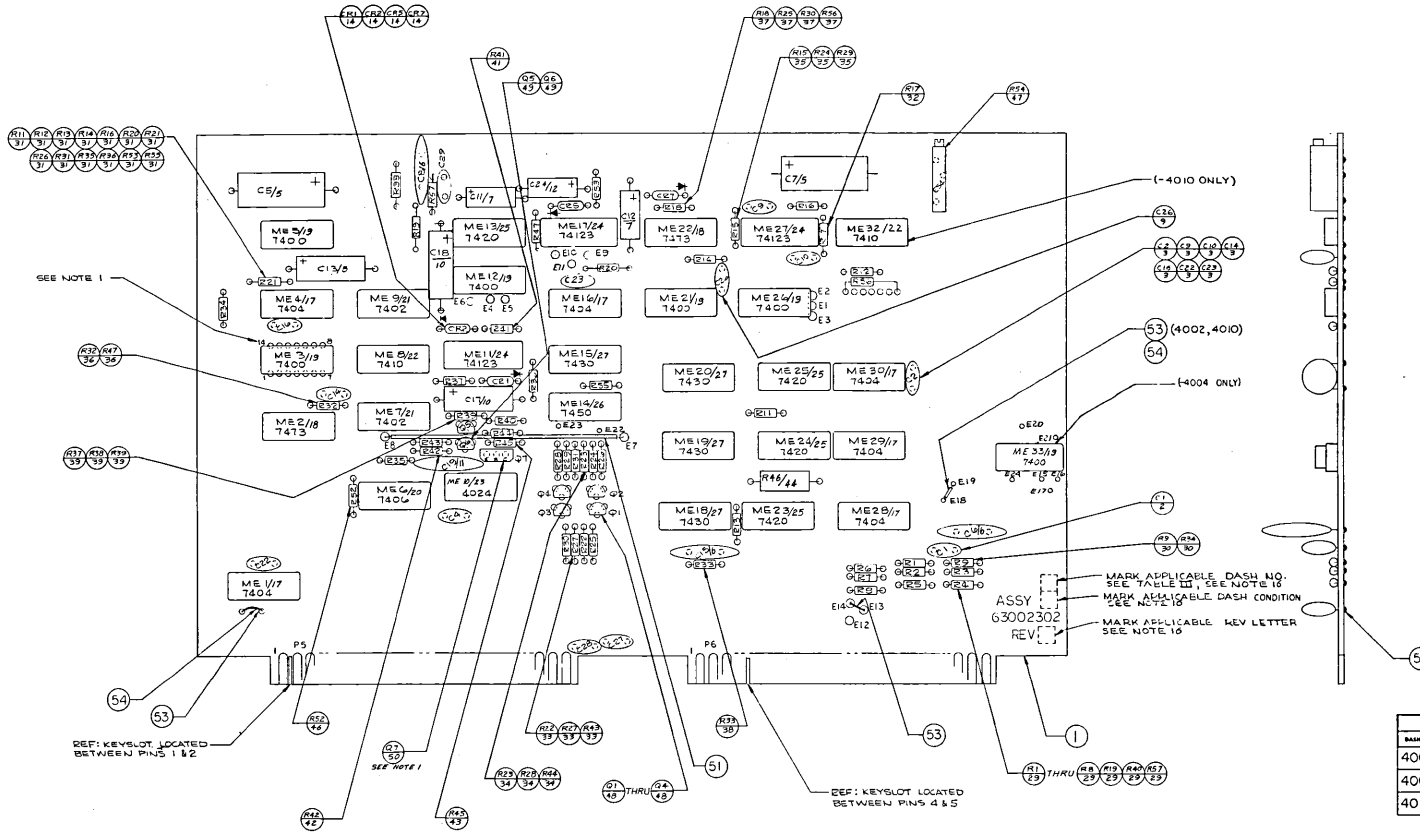
PREPROD  
CHANGE BY 808 ONLY

THE INFORMATION CONTAINED HEREIN IS PROPRIETARY AND IS NOT TO BE RELEASED OR REPRODUCED WITHOUT WRITTEN PERMISSION OF CENTRONICS data computer corp.

HIGHEST REFERENCE DESIGNATOR						UNLESS OTHERWISE SPECIFIED . . . .	APPROVAL		CENTRONICS data computer corp. HUDSON, NEW HAMPSHIRE U.S.A.
C	CR	E	F	J	ME		1. CAPACITANCE IN MF	DATE	
P	Q	R	S	T	Y	2. RESISTANCE IN Ω	DATE	SCHEMATIC DIAGRAM L.E.D. TAPE READER UNIT & CABLE ASSY	
OMITTED REFERENCE DESIGNATORS						3. DIMENSIONS IN INCHES	DATE		SCALE
						4. TOLERANCE	DATE	C 63002675	
						FAC. 2: — 32 2: —	DATE		SHEET 1 of 1
						32 2: — ANGLE 2: —	DATE	DO NOT SCALE PRINT	
						MATERIAL	DATE		
						FINISH	DATE		
						33002671 VFU KIT	DATE		
						NEXT ASSY USED ON	DATE		
						APPLICATION	DATE		

Figure 7-16. SCHEMATIC DIAGRAM, LED TAPE READER (OPTIONAL)

REVISIONS			
REV	DATE	DESCRIPTION	APPROVED
E2	4002	REPLACED REV E WITH CLERICAL CODE (ECO 73002663)	7-28-75
E3	4002	REVISED PER ECO 73002705	7-28-75
	4004	REVISED PER ECO 7301186 (CLERICAL)	4-26-76
	4002	REVISED PER ECO 75003001 (CLERICAL)	10-7-76
E3	4010	ADDED 4010 AT DEVELOPMENT PER RELEASE NOTICE 117	10/26/76
E3	4010	RELEASED TO PREPROD	11/17/76



NOTES:

1. PIN NUMBERS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON BOARD.
2. ADD JUMPER FROM PINS 1 & 2 TO PINS 4 & 5.
3. ADD JUMPER FROM PINS 1 & 2 TO GND.
4. ADD JUMPER FROM PINS 1 & 2 TO PINS 4 & 5.
5. ADD JUMPER FROM PINS 1 & 2 TO GND.
6. ADD JUMPER FROM PINS 1 & 2 TO PINS 4 & 5.
7. ADD JUMPER FROM PINS 1 & 2 TO GND.
8. ADD JUMPER FROM PINS 1 & 2 TO PINS 4 & 5.
9. ADD JUMPER FROM PINS 1 & 2 TO GND.
10. ADD JUMPER FROM PINS 1 & 2 TO PINS 4 & 5.
11. ADD JUMPER FROM PINS 1 & 2 TO GND.
12. ADD JUMPER FROM PINS 1 & 2 TO PINS 4 & 5.
13. ADD JUMPER FROM PINS 1 & 2 TO GND.
14. ADD JUMPER FROM PINS 1 & 2 TO PINS 4 & 5.
15. ADD JUMPER FROM PINS 1 & 2 TO GND.
16. 1/8" HIGH BLACK CHARACTER LOCATE APPROX AS SHOWN.

DASH NO.	JUMPER	CARD ASSY. REV. LEVEL
-Z	E G C	D
-A	E F C	D
-S	E F C	D
-6	D E G	D
-7	D E F	D

OPTION	JUMPER	IDENTIFICATION
E (REF)	E7 E8	VERTICAL FORMATTING ENABLE
F	E9 E11	AUTOMATIC LINE FEED DISABLE
G	E10 E11	AUTOMATIC LINE FEED ENABLE
C	E4 E5	DATA STROBE NOT GATED WITH ACKNOWLEDGE
D	E4 E6	DATA STROBE GATED WITH ACKNOWLEDGE

OPTION	JUMPER	FROM	TO
BOTTOM	OF	E18	E16
		E20	E22
FORM	OF	E21	E23
		E15	E17

DASH NO.	REVISION LEVEL	REMARKS
4002	E3	STD 101
4004	E3	STD 101 WITH BOTTOM OF FORM
4010	E3	STD 101 WITH DELETE/DELETE

REFERENCE DRAWINGS:  
 SCHEMATIC DIAGRAM - 63002360  
 NETWORK MASTER - 63001051 REV C4

UNLESS OTHERWISE SPECIFIED:  
 1. DIMENSIONS IN INCHES  
 2. DIMENSIONS IN MILLIMETERS  
 3. FINISHES  
 4. MATERIALS

THE INFORMATION CONTAINED HEREIN IS PROPRIETARY AND IS NOT TO BE RELEASED OR REPRODUCED WITHOUT WRITTEN PERMISSION OF CENTRONICS AND COMPANY INC.

**CENTRONICS**  
 DATA COMMUNICATIONS  
 COMPONENT BOARD ASSEMBLY  
 ELECTRONIC CARD NO. 101  
 21E 63002302

DO NOT SCALE PRINT

Figure 7-17. COMPONENT BOARD ASSEMBLY, ELECTRONIC CARD #1



LIST OF MATERIALS  
PC BD ASSY ELECT CD #1 101

ITEM	PART NO	DESCRIPTION	QTY
1	63001051-2001	PC BD AW ELECTRONIC CD#1 101A	1.0000
2	21330001-1001	CAP CER DISC 33PF 1KV 20%	1.0000
3	21102000-1001	CAP CER DISC 1000PF 1KV 20%	7.0000
4	21502001-1001	CAP CER DISC 5000PF 1KV 20%	4.0000
5	22107002-1001	CAP ELCTLT 100UF 25V -10+75%	2.0000
6	21103003-1001	CAP CER DISC .01UF 1KV 20%	3.0000
6A	21103004-1001	CAP TBAX GLASS .01UF 50V 20%	A/R
7	22105002-1001	CAP ELCTLT 1UF 25V -10+75%	2.0000
8	22206002-1001	CAP ELCTLT 20UF 25V -10+75%	1.0000
9	21473000-1001	CAP CER DISC .047UF 12V-20+50%	1.0000
10	22506002-1001	CAP ELCTLT 50UF 25V -10+75%	2.0000
11	21224000-1001	CAP CER DISC .22UF 12V -20+50%	1.0000
12	22505002-1001	CAP ELCTLT 5UF 16V -10+75%	1.0000
14	38100904-1001	SEMICOND DIODE TBAX 1N4148	4.0000
17	35474040-1001	IC HEX INVERTER 7404	6.0000
18	35474730-1001	IC DUAL J-K FLIP-FLOP 7473	2.0000
19	35474000-1001	IC QUADR NAND 2-INPUT 7400	5.0000
20	35474060-1001	IC HEX INVERTER BFR/DRVR 7406	1.0000
21	35474020-1001	IC QUADR NOR 2-INPUT 7402	2.0000
22	35474100-1001	IC TRIPLE NAND 3-INPUT 7410	1.0000
23	35440243-1001	IC VOLTAGE CONT MV MC4024P	1.0000
24	35474123-1001	IC DUAL MONOSTABLE MV 74123	3.0000
25	35474200-1001	IC DUAL NAND 4-INPUT 7420	4.0000
26	35474500-1001	IC DUAL AND-OR 2-INP 2-W 7450	1.0000
27	35474300-1001	IC SGL NAND 8-INPUT 7430	4.0000
29	41102926-1001	RES CARBON 1K OHM 1/4W 10%	11.0000
30	41471926-1001	RES CARBON 470 OHM 1/4W 10%	2.0000
31	41472926-1001	RES CARBON 4.7K OHM 1/4W 10%	13.0000
32	41123926-1001	RES CARBON 12K OHM 1/4W 10%	1.0000
33	41221926-1001	RES CARBON 220 OHM 1/4W 10%	3.0000
34	41101926-1001	RES CARBON 100 OHM 1/4W 10%	3.0000
35	41223926-1001	RES CARBON 22K OHM 1/4W 10%	3.0000
36	41682926-1001	RES CARBON 6.8K OHM 1/4W 10%	2.0000
37	41103926-1001	RES CARBON 10K OHM 1/4W 10%	4.0000
38	41105926-1001	RES CARBON 1MEG OHM 1/4W 10%	1.0000
39	41222926-1001	RES CARBON 2.2K OHM 1/4W 10%	3.0000
41	41473926-1001	RES CARBON 47K OHM 1/4W 10%	1.0000
42	41391926-1001	RES CARBON 390 OHM 1/4W 10%	1.0000
43	41271926-1001	RES CARBON 270 OHM 1/4W 10%	1.0000
44	41220016-1001	RES CARBON 22 OHM 1W 10%	1.0000
46	41752926-1001	RES CARBON 7.5K OHM 1/4W 10%	1.0000
47	46203381-1001	POT PC MTG 20K OHM 1W 10%	1.0000
48	38239040-1001	SEMICOND XSTR GP 2N3904	4.0000
49	38239060-1001	SEMICOND XSTR PNP GP 2N3906	2.0000
50	38300050-1001	SEMICOND XSTR NPN HV AMPL	1.0000
50A	38200311-1001	SEMICOND XSTR W/MICA TIP31A	A/R
51	39648505-0004-9	WIRE TYPE B 26AWG WHITE	A/R
52	30070000-0001	SOLDER 60/40 .032D WIRE	A/R
53	39610000-0005	WIRE UN-INSUL SOLID 22AWG	A/R
54	39690200-0020	TUBING PLSTC 20AWG ID NAT	A/R
55	31410247-2003	SOCKET IC 16PIN SLDR DIP .300W	1.0000
999	63001052-9001	PC BD DD ELECTRONIC CD#1 101A	A/R

7-21

REV. 9

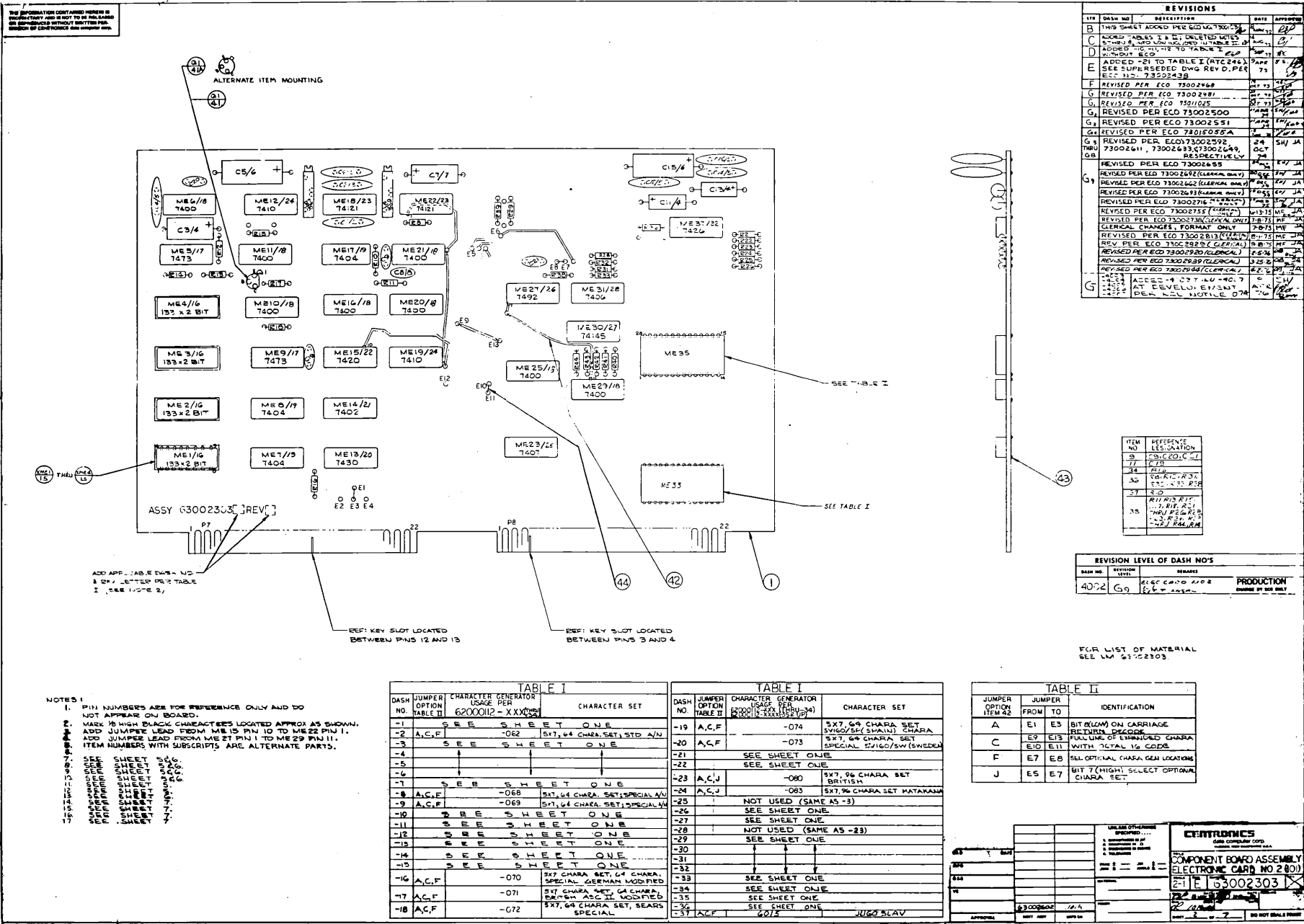


Figure 7-18. COMPONENT BOARD LOCATION, ELECTRONIC CARD #2

LIST OF MATERIALS  
PC BOARD ASSEMBLY  
ELECTRONIC CARD NO. 2  
(Ref: Ass'y No. 63002303, Rev. G9)

ITEM	PART NO.	NOMENCLATURE	QTY PER
1	63001054-2001	PC BD AW ELECTRONIC CARD #2	1
2	21224000-1001	CAP CERAMIC DISC .22UF 12V	3
3	21104001-1001	CAP CERAMIC DISC .1UF 16V	1
5	21103003-1001	CAP CERAMIC DISC .01UF 1KV	6
5A	21103004-1001	CAP CERAM GLASS SEAL .01UF 50V	A/R
6	22107002-1001	CAP ELECTROLYTIC 100UF 25V	2
7	22106002-1001	CAP ELECTROLYTIC 10UF 25V	1
8	21471003-1001	CAP CERAMIC DISC 470PF 1KV 20%	1
9	21102000-1001	CAP CERAMIC DISC .001UF 1KV	5
10	22206002-1001	CAP ELECTROLYTIC 20UF 25V	2
11	21502001-1001	CAP CERAMIC DISC .005UF 1KV	1
14	38100904-1001	DIODE WG904	2
15	31410001-2006	SOCKET 16 CONTACTS	4
16	35531131-1001	INTEGRATED CIRCUIT TMS3113	4
16A	35512800-1001	INTEGRATED CIRCUIT C2040	A/R
17	35474730-1001	INTEGRATED CIRCUIT 7473	2
18	35474000-1001	INTEGRATED CIRCUIT 7400	9
19	35474040-1001	INTEGRATED CIRCUIT 7404	3
20	35474300-1001	INTEGRATED CIRCUIT 7430	1
21	35474020-1001	INTEGRATED CIRCUIT 7402	1
22	35474200-1001	INTEGRATED CIRCUIT 7420	1
23	35474121-1001	INTEGRATED CIRCUIT 74121	2
24	35474100-1001	INTEGRATED CIRCUIT 7410	2
25	35474070-1001	INTEGRATED CIRCUIT 7407	1
26	35474920-1001	INTEGRATED CIRCUIT SN7492	2
27	35474145-1001	INTEGRATED CIRCUIT 74145	2
28	35474060-1001	INTEGRATED CIRCUIT 7406	1
29	35474123-1001	INTEGRATED CIRCUIT 74123	1
32	35474260-1001	INTEGRATED CIRCUIT SN7426	1
34	41103926-1001	RES CARBON 10 K 1/4W 10%	1
35	46103910-1001	POTENTIOMETER 10K 1W 10%	4
36	41472926-1001	RES CARBON 4.7 K 1/4W 10%	8
37	41682926-1001	RES CARBON 6.8 K 1/4W 10%	1
38	41102926-1001	RES CARBON 1 K 1/4W 10%	31
41	38229071-1001	TRANSISTOR A5T2907	1
41A	38229070-1001	TRANSISTOR 2N2907	A/R
42	39648505-0004-9	WIRE TYPE B 26AWG WHITE	A/R
43	30070000-0001	SOLDER	A/R
44	39610000-0005	WIRE BUSS #22AWG	A/R
REF	62000112-9001	CHAR GENERATOR LOCATION CHART	A/R
REF	63001055-9001	PC BD DD ELECTRONIC CARD #2	A/R
REF	63002316-9001	SCHEM DIAG ELECT CD#2 101A	A/R

7-23

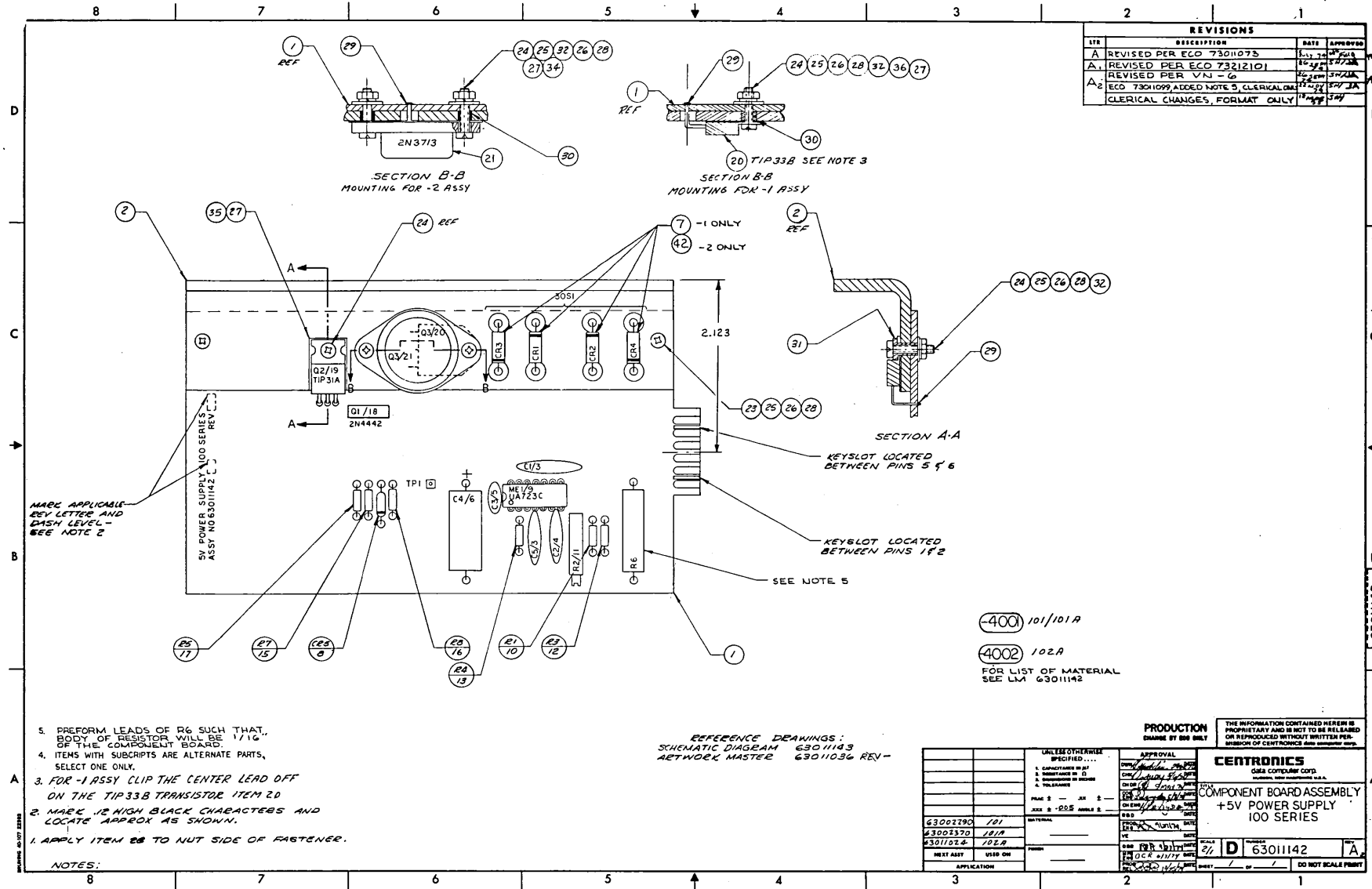
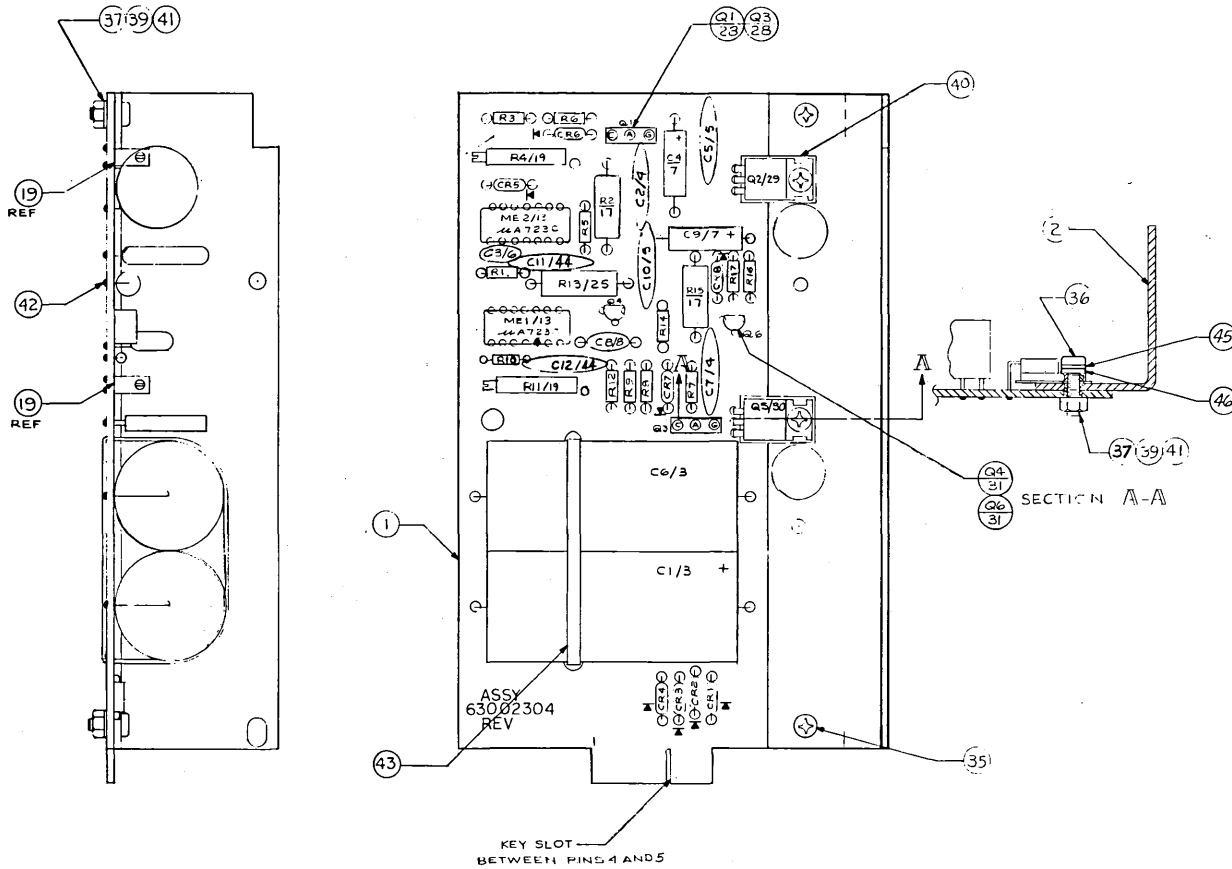


Figure 7-19. COMPONENT BOARD ASSEMBLY, +5 VOLT REGULATOR

REV. G

LIST OF MATERIALS  
 PC BOARD ASSEMBLY  
 +5V POWER SUPPLY  
 (Ref: Ass'y #63011142-4001, Rev. A2)

ITEM	PART NO.	NOMENCLATURE	QTY PER
1	63011036-2001	PC BD AW 5V PWR SUP 100 SER	1
2	63011144-2001	BRACKET HS 5V PWR SUP 100 SER	1
3	21104001-1001	CAP CERAMIC DISC .1UF 16V	2
4	21502001-1001	CAP CERAMIC DISC .005UF 1KV	1
5	21102000-1001	CAP CERAMIC DISC .001UF 1KV	1
6	22107002-1001	CAP ELECTROLYTIC 100UF 25V	1
7	38130901-1001	DIODE S1 RECTIFIER 30S1	4
7A	38130905-1001	DIODE RECTIFIER 3 AMP	A/R
8	38052350-1001	DIODE ZENER IN5235	1
9	35207233-1001	I C REGULATOR UA723CN	1
10	41751926-1001	RES CARBON 750 OHM 1/4W 10%	1
11	46102000-1001	POTENTIOMETER 1K 1/2W 10%	1
12	41222926-1001	RES CARBON 2.2 K 1/4W 10%	1
13	41220926-1001	RES CARBON 22 OHM 1/4W 10%	1
14	40127000-1001	RES CARBON .125 OHM 5W 5%	1
15	41101926-1001	RES CARBON 100 OHM 1/4W 10%	1
16	41102926-1001	RES CARBON 1 K 1/4W 10%	1
17	41471926-1001	RES CARBON 470 OHM 1/4W 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 4/40X3/8 PAN HD PHIL	2
24	34517167-2001	SCREW 4/40X1/2 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	A/R
28	30000000-0001	INSULATING VARNISH	A/R
29	30070000-0001	SOLDER	A/R
30	39690200-0009	TUBING TEFLON TFT 200 #9 NAT	A/R
31	35000004-2005	WASHER-NYLON INSULATOR #4X3/16	1
32	34912007-2001	WASHER #4 FLAT	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 SER	A/R
REF	63011143-9001	SCHEM DIAG 5V PWR SUP 100 SER	A/R



REFERENCE DRAWINGS:  
 SCHEMATIC: IASKANY 63002278  
 ARTWORK MASTER D63001048 REV E

REVISIONS			
LT#	DESCRIPTION	DATE	APPROVED
A	RELOCATED C7 PER ECO NO. 73001006. J.S. NOV. 22, 1971	11-27-71	[Signature]
B	ADDED POLARITY TO CR7 & CR8, ADDED ORIENTATION TO CR7 & CR8. ADDED ITEM 43 TO SECTION A-A. PER ECO NO. 73002355. J.S. JAN. 3, 1972	1/3/72	[Signature]
C	DELETED ITEM 43 FROM SECTION A-A. REV WAS C1. PER ECO NO. 73001017. J.S. FEB. 15, 1972	2/14/72	[Signature]
D	DELETED BALLOON AND ARROW OF ITEM 22. PER ECO NO. 73002371. J.S. FEB. 12, 1972	1/19/72	[Signature]
D1	REV. PER ECO 73002511	DEC 72	[Signature]
D2	REVISED PER ECO 73002545	2/2/73	[Signature]
E	REV PER ECO 73002541	2/2/73	[Signature]
E1	REVISED PER ECO 73002595	2/2/73	[Signature]
E2	CLERICAL CHANGES, FORMAT ONLY.	1/14/74	[Signature]
E3	REVISED PER ECO 73002916	1/16/76	[Signature]

ITEM NO.	REF	DES
4001/4201	10	CR6
11	11	CR1, 2, 3, 4, 5, 7
12	-	CR6, 8
16	16	R1, 14
18	-	R3
18	-	R3, 5
20	-	R5, 8, 9
20	-	R8, 9, 10
21	21	R6, 7, 17
23	-	R10
24	24	R12
26	26	R16

(4001) STD ±12V REGULATOR  
 (4002) ±15V-12V REGULATOR SYS 10/4300  
 FOR LIST OF MATERIAL SEE LM 63002304

THE INFORMATION CONTAINED HEREIN IS PROPRIETARY AND IS NOT TO BE RELEASED OR REPRODUCED WITHOUT WRITTEN PERMISSION OF CENTRONICS AND ITS EMPLOYEES.

QTY	SYM	PART NO.	DESCRIPTION	MATERIAL
			LIST OF MATERIALS	
			UNLESS OTHERWISE SPECIFIED...	
			1. CAPACITANCE IN μF	
			2. RESISTANCE IN Ω	
			3. DIMENSIONS IN INCHES.	
			4. TOLERANCE:	
			FRACTIONAL .XX 2-	
			DECIMAL .XX2	
63212152	MTA		DATE:	
63011124	3011		REV:	
63001103	3000		FINISH:	
			USED ON:	
DO NOT SCALE PRINT				

**centronics**  
data computer corp.

**COMPONENT BOARD ASSEMBLY**  
**+12V REGULATOR (UA223C)**

DATE: 2/10/73  
REV: 10  
PART NO: 63002304  
MATERIAL: E2

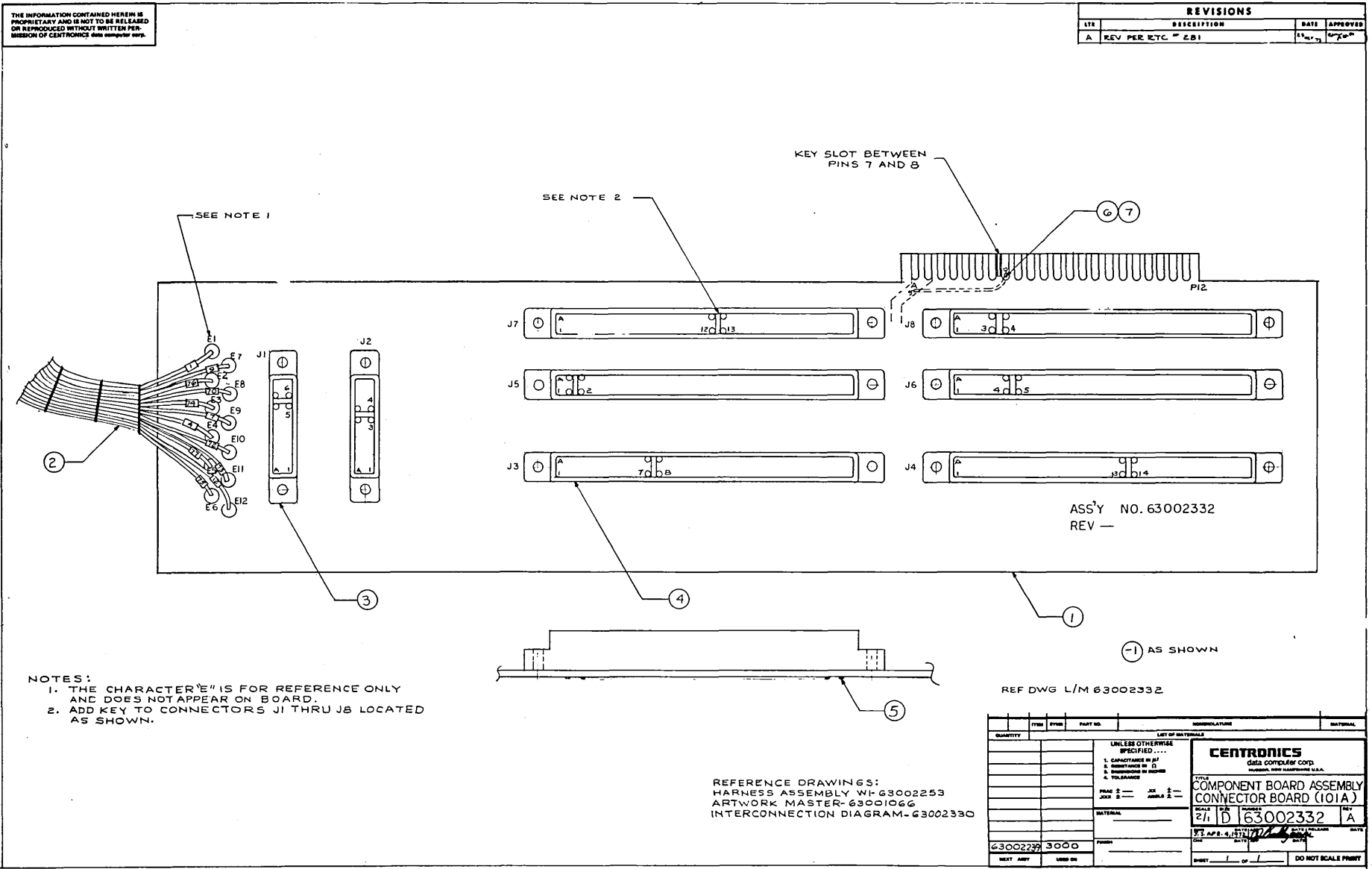
Figure 7-20. COMPONENT BOARD ASSEMBLY, +12V REGULATOR

LIST OF MATERIALS  
 PC BOARD ASSEMBLY  
 -12V REG. uA273C  
 (Ref: Ass'y #63002304-4001, Rev. E2)

ITEM	PART NO.	NOMENCLATURE	QTY PER
1	63001048-2001	PC BD AW 12V POWER SUPPLY	1
2	63002205-2001	BRACKET HEAT SINK	1
3	22108000-1001	CAP ELCTLT 1000UF 50V -10+75%	2
4	21104000-1001	CAP CER DISC .1UF 25V 20%	2
5	21104001-1001	CAP CER DISC .1UF 16V -20+80%	2
6	21471003-1001	CAP CER DISC 470PF 1KV 20%	1
7	22106002-1001	CAP ELCTLT 10UF 25V -10+75%	2
8	21101001-1001	CAP CER DISC 100PF 1KV 20%	1
11	38040020-1001	SEMICON D DIODE TBAX 1N4002	6
12	38052460-1001	SEMICON D DIODE TBAX 1N5246	2
12A	38052461-1001	SEMICON D DIODE TBAX 1N5246A	A/R
12B	38052462-1001	SEMICON D DIODE TBAX 1N5246B	A/R
13	35207233-1001	IC VOLTAGE REGULATOR 723	2
16	41220926-1001	RES CARBON 22 OHM 1/4W 10%	2
17	41158945-1001	RES CARBON 1.5 OHM 1/2W 5%	2
18	41202925-1001	RES CARBON 2K OHM 1/4W 5%	1
19	46102000-1001	POT PC MTG 1K OHM 1/2W 10%	2
20	41302925-1001	RES CARBON 3K OHM 1/4W 5%	3
21	41101926-1001	RES CARBON 100 OHM 1/4W 10%	3
23	41242925-1001	RES CARBON 2.4K OHM 1/4W 5%	1
24	41122926-1001	RES CARBON 1.2K OHM 1/4W 10%	1
25	41331026-1001	RES CARBON 330 OHM 2W 10%	1
26	41470926-1001	RES CARBON 47 OHM 1/4W 10%	1
28	38244420-1001	SEMICON D THYR PWR 2N4442	2
29	38200312-1001	SEMICON D XSTR W/MICA TIP31B	1
30	38200321-1001	SEMICON D XSTR PNP TIP32A	1
31	38239060-1001	SEMICON D XSTR PNP GP 2N3906	2
35	34517105-2001	SCR PNH REC 4-40X.31L SST	2
36	34517145-2001	SCR PNH REC 4-40X.44L SST	2
37	34815005-2001	WSHR LOCK INTL TOOTH #4 SST	4
39	34712005-2001	NUT HEX 4-40 X MDM THK SST	4
40	30050000-0001	COMPOUND THRM CNDCT SILICONE	A/R
41	30000000-0001	VARNISH INSULATING RED	A/R
42	30070000-0001	SOLDER 60/40 .032D WIRE	A/R
43	39690010-2005	STRAP CABLE ADJ LKG 2.0BDL	1
44	21502001-1001	CAP CER DISC 5000PF 1KV 20%	2
45	34900001-2001	WSHR FLAT #4X.25 OD	2
46	35000004-2001	WSHR SHOULDER #4X.031L NYL	2
REF	63001049-9001	PC BD DD 12V POWER SUPPLY	A/R
REF	63002308-9001	SCHEM DIAG 12V REG UA723C	A/R

Refer to the beginning of this section for possible changes not yet incorporated on this page.

7-27



QUANTITY	ITEM	REV	PART NO.	DESCRIPTION	MATERIAL
UNLESS OTHERWISE SPECIFIED....					
1. CAPACITANCE IN PF					
2. DIMENSIONS IN IN					
3. TOLERANCES IN INCHES					
FRAC 1/16 = 1/16    DEC ANGLE 3/4 = 3/4					
MATERIAL					
FINISH					
63002332	3000				
NEXT Assy	USED ON				

<b>CENTRONICS</b> data computer corp. HAWAII, NEW HAMPSHIRE U.S.A.	
TITLE <b>COMPONENT BOARD ASSEMBLY CONNECTOR BOARD (101A)</b>	
SCALE: 2 1/2" = 1"	REV: A
DATE: 11/1/73	BY: [Signature]
CHECKED: [Signature]	DATE: [Signature]
DRAWN: [Signature]	
DO NOT SCALE PRINT	

Figure 7-21. COMPONENT BOARD ASSEMBLY, CONNECTOR BOARD

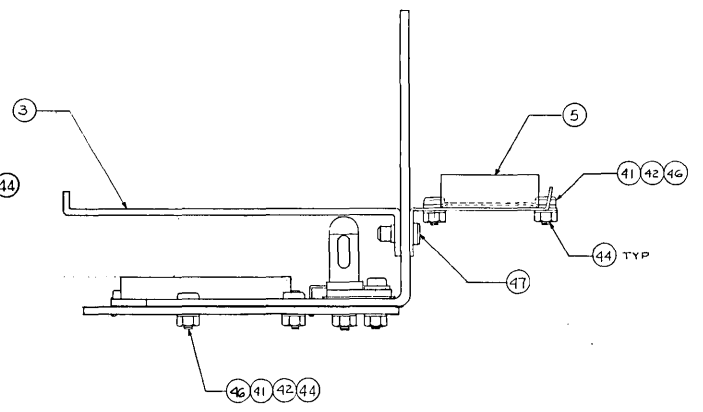
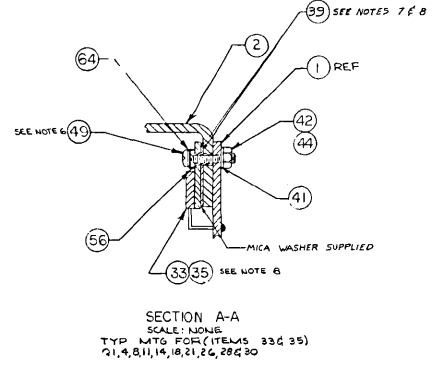
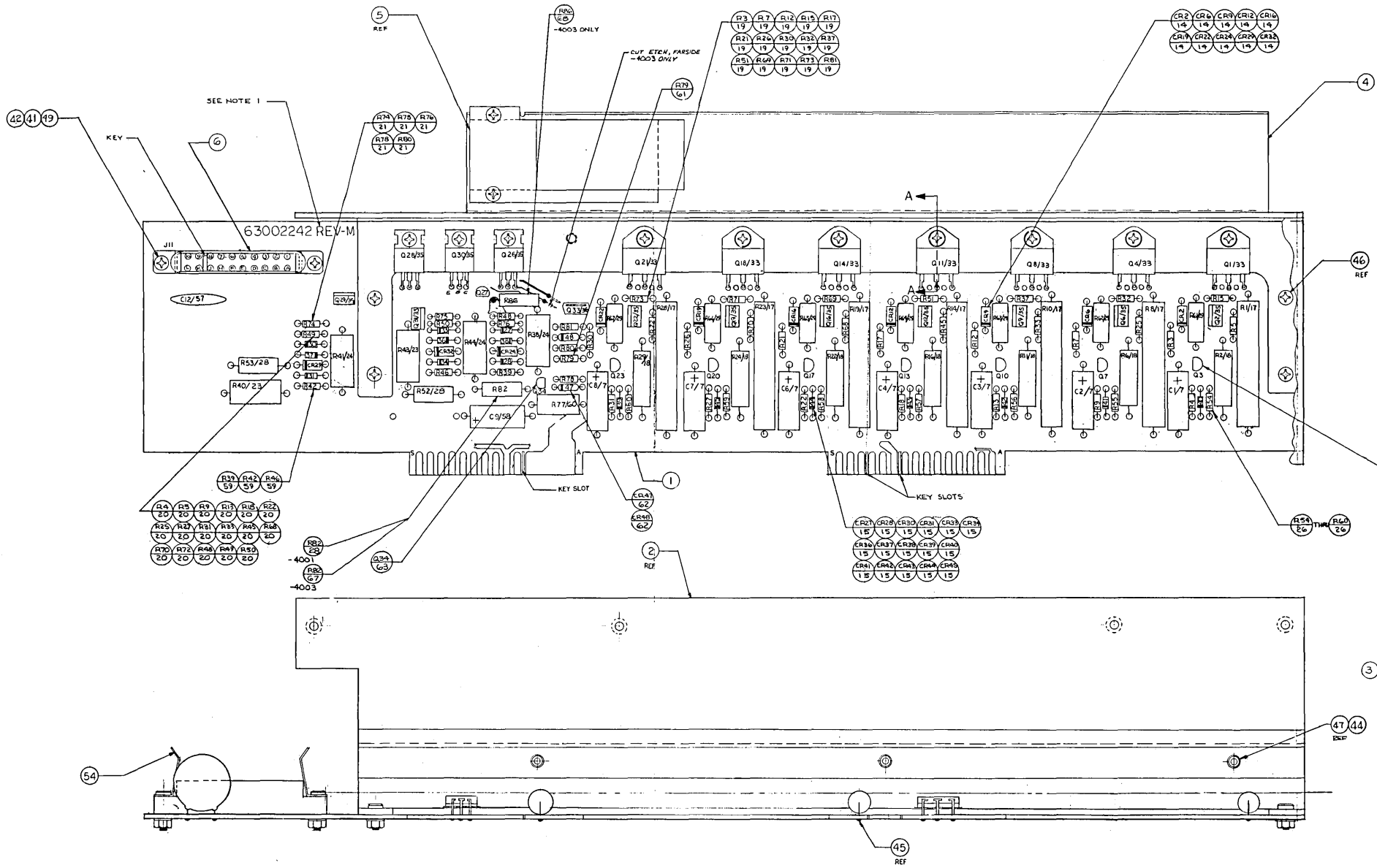
REV. D



LIST OF MATERIALS  
 PC BOARD ASS'Y  
 CONNECTOR CARD  
 (Ref: Ass'y #63002332-4001, Rev. A)

ITEM	PART NO.	NOMENCLATURE	QTY PER
1	63001066-2001	PC BD AW CONNECTOR CD 101/101A	1
2	63002253-4001	HARNESS ASSY W1	1
3	31230008-1001	CONNECTOR EDGE 12 PIN	2
4	31230037-1001	CONNECTOR EDGE 44 PIN	6
5	30070000-0001	SOLDER	A/R
6	39610000-0007	WIRE BUSS #18AWG	A/R
7	39690200-0018	TUBING TEFLON TFT 200 #18 NAT	A/R
REF	63001067-9001	PC BD DD CONNECTOR CD 101/101A	A/R
REF	63002330-9001	INTERCONNECTION DIAGRAM	A/R

REVISIONS				
REV	DASH NO	DESCRIPTION	DATE	APPROVED
M6	4001	CLERICAL CHANGES, FORMAT ONLY	5-22-75	MF JA
M5	4001	REVISED PER ECO 73022134	7-11-75	MF JA
A	4003	CREATED PER ECO 73022138		
M6	4001	REVISED PER ECO 73060226	12-16-75	MF JA
M7	4001			
A	4001	REVISED PER ECO 73002913	1-13-76	MF JA
M8	4002	REVISED PER ECO 73011139	7-9-76	MF JA
A3	4003			
M9	4001	REVISED PER ECO 73002909	8-17-76	MF JA
A3	4003			
ALL		REVISED PER ECO 73030299 (CLERICAL)	2-17-78	MF JA
M10	ALL	(ECO 73003126A)	2-4-77	MF JA
M11	ALL	(ECO 73700265)	2-4-77	MF JA
4002		DELETED PER ECO 73003187	4-5-78	MF JA



- NOTES:
- LOCATE CHARACTERS APPROXIMATELY AS SHOWN AND RUBBER STAMP IN BLACK .12 HIGH.
  - ALL WIREWOUND RESISTORS AND TANTALUM CAPACITORS TO HAVE LEADS PREFORMED SO BOBBS OF RESISTORS AND CAPACITORS WILL BE APPROX 1/16" ABOVE THE BOARD.
  - ALL OSC CAPACITORS TO HAVE LEADS PREFORMED SO NO DUREX COATING WILL ENTER HOLES ON P.C. BOARD.
  - 
  - 
  - TIGHTEN ALL TIP MTS SCREWS (ITEM 49) WITH A TORQUE TOOL PRE-SET TO 2 IN/LBS ±.5 IN/LBS TORQUE AT ASSEMBLY AND BEFORE ELECTRICAL TEST.
  - APPLY A THIN COAT OF ITEM 38 TO HEAT SINK (ITEM 2) PRIOR TO INSTALLATION OF MICA INSULATOR.
  - APPLY A THIN COAT OF ITEM 39 TO BASE OF Q1, 4, 8, 11, 9, 16, 21, 26, 28 & 30 (ITEMS 33 & 35) PRIOR TO MTO OF HEATSINK (ITEM 2)

REFERENCE DRAWINGS:  
SCHEMATIC DIAGRAM - C63002275  
ARTWORK MASTER 63002242 REV-C9

REVISION LEVEL OF DASH NO'S		
DASH NO.	REVISION LEVEL	REMARKS
4001	M11	
4003	M11	

FOR LIST OF MATERIAL  
SEE LM 63002242

UNLESS OTHERWISE SPECIFIED:  
1. DIMENSIONS IN INCHES  
2. DIMENSIONS IN MILLIMETERS  
3. TOLERANCE: .125 ± .005  
4. SURFACE FINISH: 32 ± .005  
5. FINISH: ANNEAL

DATE: 2/1/78  
BY: J. J. JACOBI  
CHECKED BY: J. J. JACOBI

3000  
REV: ANY  
COPY: 00

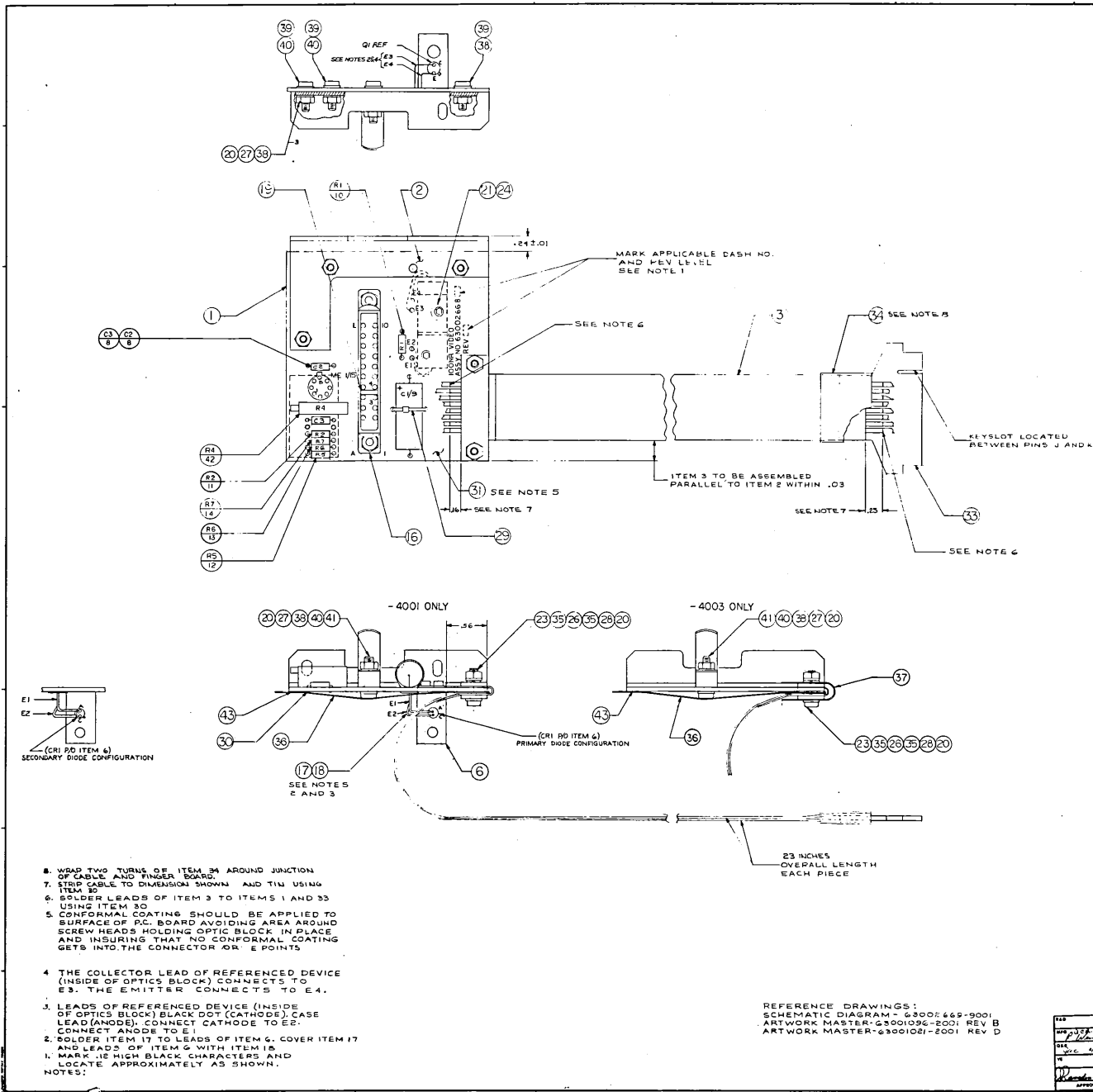
30 NOT SCALE PRINT

centronics  
data computer corp.  
COMPUTER BOARD ASSEMBLY  
DRIVER BOARD  
63002242

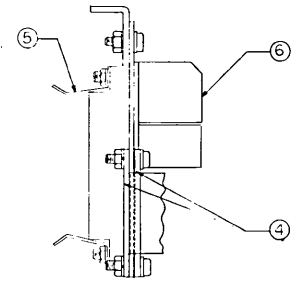
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OR REPRODUCED WITHOUT WRITTEN PER-  
MISSION OF CENTRONICS INC. WILMINGTON, DEL.

LIST OF MATERIALS  
PC BD ASSY DRIVER BOARD

ITEM	PART NO	DESCRIPTION	QTY
1	63001018-2001	PC BD AW POWER DRIVER BOARD	1.0000
2	63002200-2001	BRKT HEAT SINK DRIVER BOARD	1.0000
3	63002233-5001	SHIELD 101/101A	1.0000
4	63002234-2001	CABLE TRAY 101/101A	1.0000
5	63011159-5001	CLAMP ASSY	1.0000
6	31230011-1001	CONN EDGE 10POSN 2-ROW MDM	1.0000
7	22405002-1001	CAP ELCTLT 4UF 150V -10+50%	7.0000
8	39610000-0005	WIRE UN-INSUL SOLID 22AWG	A/R
9	39690200-0022	TUBING PLSTC 22AWG ID NAT	A/R
14	38040020-1001	SEMICON DIODE TBAX 1N4002	10.0000
15	38100904-1001	SEMICON DIODE TBAX 1N4148	16.0000
17	43158105-1001	RES WW 1.5 OHM 10W 5%	7.0000
18	43820055-1001	RES WW 82 OHM 5W 5%	7.0000
19	41471926-1001	RES CARBON 470 OHM 1/4W 10%	15.0000
20	41472926-1001	RES CARBON 4.7K OHM 1/4W 10%	17.0000
21	41102926-1001	RES CARBON 1K OHM 1/4W 10%	5.0000
23	41120026-1001	RES CARBON 12 OHM 2W 10%	2.0000
24	41471026-1001	RES CARBON 470 OHM 2W 10%	3.0000
26	34912087-2001	WSHR FLAT #4X.25 .032THK	10.0000
26	41103926-1001	RES CARBON 10K OHM 1/4W 10%	7.0000
28	41101016-1001	RES CARBON 100 OHM 1W 10%	3.0000
29	40680325-1001	RES WW 68 OHM 3.25W 5%	7.0000
33	38202648-1001	SEMICON XSTR PWR (33B) EP2648	7.0000
35	38200312-1001	SEMICON XSTR W/MICA TIP31B	12.0000
35A	38200311-1001	SEMICON XSTR W/MICA TIP31A	A/R
36	38300050-1001	SEMICON XSTR NPN HV AMPL	1.0000
37	38239040-1001	SEMICON XSTR GP 2N3904	8.0000
39	30050000-0001	COMPOUND THRM CNDCT SILICONE	A/R
41	34815005-2001	WSHR LOCK INTL TOOTH #4 SST	21.0000
42	34712005-2001	NUT HEX 4-40 X MDM THK SST	18.0000
44	30000000-0001	VARNISH INSULATING RED	A/R
45	30070000-0001	SOLDER 60/40 .032D WIRE	A/R
46	34517105-2001	SCR PNH REC 4-40X.31L SST	6.0000
47	34517125-2001	SCR PNH REC 4-40X.38L SST	3.0000
49	34517165-2001	SCR PNH REC 4-40X.50L SST	12.0000
54	63002300-2001	CLIP, P. C. BOARD	2.0000
56	35000004-2005	WSHR SHOULDER #4X.187L NYL	10.0000
57	21104000-1001	CAP CER DISC .1UF 25V 20%	1.0000
58	22256000-1001	CAP ELCTLT 25UF 12V -10+75%	1.0000
59	41222926-1001	RES CARBON 2.2K OHM 1/4W 10%	3.0000
60	41102026-1001	RES CARBON 1K OHM 2W 10%	1.0000
61	41221926-1001	RES CARBON 220 OHM 1/4W 10%	1.0000
62	38000004-1001	SEMICON DIODE TBAX 4.7V	2.0000
63	38239060-1001	SEMICON XSTR PNP GP 2N3906	1.0000
64	34912087-2001	WSHR FLAT #4X.25 .032THK	10.0000
999	63001019-9001	PC BD DD POWER DRIVER BOARD	A/R
999	63002275-9001	SCHEM DIAG PWR DRIVER BOARD	A/R



REVISIONS				
REV	DATE	DESCRIPTION	BY	APPROVED
A1	4/20/62	REVISED PER VN 308	18-76	
A	4/23/63	CREATED PER VN 308	18-76	
A1	4/20/61	REVISED PER VN 305	18-76	
A1	4/20/63	DELETED PER VN 303	18-76	
A1	4/20/61	REVISED PER VN 416	2-76	
A1	4/20/63	REVISED PER ECO 73002967	1-63	
A1	4/20/63	REVISED PER ECO 73002967	1-63	
A6	4/20/61	REVISED PER ECO 73002961	1-63	
A1	4/20/63	REVISED PER ECO 73002963	1-63	
A7	4/20/61	REVISED PER ECO 73003007	10-4-61	
A1	4/20/63	REVISED PER ECO 73003010	11-2-76	
A5	4/20/63	REVISED PER ECO 73003010	11-2-76	
A1	4/20/61	REVISED PER ECO 73003010	11-2-76	
A5	4/20/63	REVISED PER ECO 73003010	11-2-76	
A1	4/20/61	REVISED PER ECO 73003010	11-2-76	
B	4/20/61	REVISED PER ECO 73003119	11-2-76	



REVISION LEVEL OF DASH NO'S	
DASH NO.	REVISION LEVEL
4001	B
4003	B

FOR LIST OF MATERIAL SEE LM 63002668

- WELD TWO TURNS OF ITEM 34 AROUND JUNCTION OF CABLE AND FINGER BOARD.
  - STRIP CABLE TO DIMENSION SHOWN AND TIN USING ITEM 30.
  - SOLDER LEADS OF ITEM 3 TO ITEMS 1 AND 33 USING ITEM 30.
  - CONFORMAL COATING SHOULD BE APPLIED TO SURFACE OF P.C. BOARD AVOIDING AREA AROUND SCREW HEADS HOLDING OPTIC BLOCK IN PLACE AND INSURING THAT NO CONFORMAL COATING GETS INTO THE CONNECTOR OR E POINTS.
  - THE COLLECTOR LEAD OF REFERENCED DEVICE (INSIDE OF OPTICS BLOCK) CONNECTS TO E3. THE EMITTER CONNECTS TO E4.
  - LEADS OF REFERENCED DEVICE (INSIDE OF OPTICS BLOCK) BLACK DOT (CATHODE) CASE LEAD (ANODE) CONNECT CATHODE TO E2. CONNECT ANODE TO E1.
  - SOLDER ITEM 17 TO LEADS OF ITEM 6. COVER ITEM 17 AND LEADS OF ITEM 6 WITH ITEM 18.
  - MARK .12 HIGH BLACK CHARACTERS AND LOCATE APPROXIMATELY AS SHOWN.
- NOTES:

REFERENCE DRAWINGS:  
 SCHEMATIC DIAGRAM - G3007 649-9001  
 ARTWORK MASTER G3001096-2001 REV B  
 ARTWORK MASTER G3001096-2001 REV D

PREPROD

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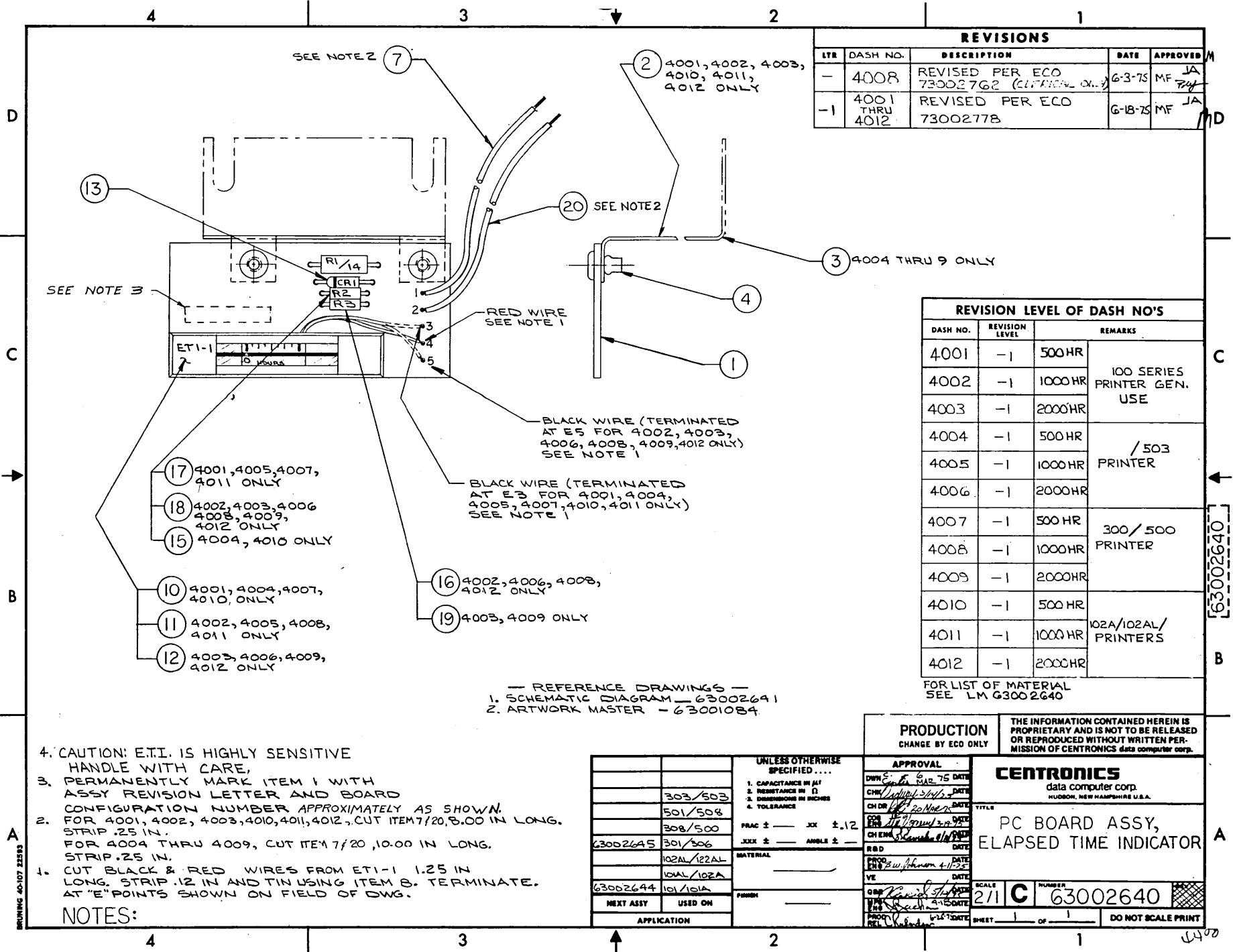
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Q3016/00	10/16/62	TESTED	UNPROVED
Q3016/00	10/16/62	TESTED	PROVED
Q3016/00	10/16/62	TESTED	PROVED
Q3016/00	10/16/62	TESTED	PROVED
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Q3016/00	10/16/62	TESTED	PROVED
Q3016/00	10/16/62	TESTED	PROVED
Q3016/00	10/16/62	TESTED	PROVED
Q3016/00	10/16/62	TESTED	PROVED

CENTRONICS®  
 100 NR VIDEO AMP  
 671 E 163002668

Figure 7-23. COMPONENT BOARD ASSEMBLY, VIDEO AMPLIFIER

LIST OF MATERIALS  
PC BD ASSY 100NR VIDEO AMP

ITEM	PART NO	DESCRIPTION	QTY
1	63001096-2001	PC BD AW VIDEO AMP 100 SER NR	1.0000
2	63508104-2001	BRACKET MTG VIDEO AMP BOARD	1.0000
3	39660029-0001	CABLE FLEXIBLE 8/C *	4.2000
4	63060116-5001	CLAMP ASSY	2.0000
5	63002300-2001	CLIP, P. C. BOARD	2.0000
6	63002634-5001	OPT PICKUP SINGLE TRK PHOTRANS	1.0000
8	21103004-1001	CAP TBAX GLASS .01UF 50V 20%	2.0000
9	22107002-1001	CAP ELCTLT 100UF 25V -10+75%	1.0000
10	41750926-1001	RES CARBON 75 OHM 1/4W 10%	1.0000
11	41203926-1001	RES CARBON 20K OHM 1/4W 10%	1.0000
12	41103926-1001	RES CARBON 10K OHM 1/4W 10%	1.0000
13	41105926-1001	RES CARBON 1MEG OHM 1/4W 10%	1.0000
14	41102926-1001	RES CARBON 1K OHM 1/4W 10%	1.0000
15	35203110-1003	IC VOLTAGE COMPARATOR 311	1.0000
16	31230011-1001	CONN EDGE 10POSN 2-ROW MDM	1.0000
17	39610000-0003	WIRE UN-INSUL SOLID 26AWG	A/R
18	39690200-0018	TUBING PLSTC 18AWG ID NAT	A/R
19	31240456-2002	KEY PLZ BETW CONTACT	1.0000
20	30000000-0001	VARNISH INSULATING RED	A/R
21	34104087-2001	SCR CAP HEX SOC 2-56X.25L	2.0000
23	34517167-2001	SCR PNH REC 4-40X.50L	2.0000
24	34902087-2001	WSHR FLAT #2X.25 .032THK	2.0000
26	34816007-2001	WSHR LOCK SPLIT #4	2.0000
27	34712005-2001	NUT HEX 4-40 X MDM THK SST	5.0000
28	34712007-2001	NUT HEX 4-40 X MDM THK	2.0000
29	39695231-2001	STRAP CABLE ADJ LKG .625BDL	1.0000
30	30070000-0001	SOLDER 60/40 .032D WIRE	A/R
31	30040000-0001	CONFORMAL COATING	A/R
33	63001021-2001	PC BD AW RIBBON CAB FINGER BD	1.0000
34	35060005-0001	TAPE TRANS REINF .75W X.006THK	A/R
35	34912087-2001	WSHR FLAT #4X.25 .032THK	4.0000
36	63011158-2001	SPACER, LARGE	1.0000
38	34815005-2001	WSHR LOCK INTL TOOTH #4 SST	6.0000
39	34517125-2001	SCR PNH REC 4-40X.38L SST	3.0000
40	34912085-2001	WSHR FLAT #4X.25 .032THK SST	4.0000
41	34517185-2001	SCR PNH REC 4-40X.56L SST	2.0000
42	46203381-1001	POT PC MTG 20K OHM 1W 10%	1.0000
43	35060020-0012	TAPE DBL-SIDE .75W X.0035THK	.2000
999	63001022-9001	PC BD DD RIBBON CAB FINGER BD	A/R
999	63001097-9001	PC BD DD VIDEO AMP 100 SER NR	A/R
999	63002669-9001	SCHEM DIAG VIDEO AMP 100 SERNR	A/R



REVISIONS				
LTR	DASH NO.	DESCRIPTION	DATE	APPROVED
-	4008	REVISED PER ECO 73002762 (CLIPPING ON...)	6-3-75	MF JA
-1	4001 THRU 4012	REVISED PER ECO 73002778	6-18-75	MF JA

REVISION LEVEL OF DASH NO'S			
DASH NO.	REVISION LEVEL	REMARKS	
4001	-1	500 HR	100 SERIES PRINTER GEN. USE
4002	-1	1000 HR	
4003	-1	2000 HR	
4004	-1	500 HR	/ 503 PRINTER
4005	-1	1000 HR	
4006	-1	2000 HR	300/500 PRINTER
4007	-1	500 HR	
4008	-1	1000 HR	102A/102AL/PRINTERS
4009	-1	2000 HR	
4010	-1	500 HR	
4011	-1	1000 HR	
4012	-1	2000 HR	

FOR LIST OF MATERIAL SEE LM G3002640

— REFERENCE DRAWINGS —  
 1. SCHEMATIC DIAGRAM - 63002641  
 2. ARTWORK MASTER - 63001084

<b>PRODUCTION</b> CHANGE BY ECO ONLY		THE INFORMATION CONTAINED HEREIN IS PROPRIETARY AND IS NOT TO BE RELEASED OR REPRODUCED WITHOUT WRITTEN PERMISSION OF CENTRONICS data computer corp.	
APPROVAL DWN <i>[Signature]</i> 6 MAR 75 DATE CHK <i>[Signature]</i> DATE CH DR <i>[Signature]</i> DATE FOR <i>[Signature]</i> DATE CH ENR <i>[Signature]</i> DATE RSD <i>[Signature]</i> DATE PROD ENR <i>[Signature]</i> DATE VPE <i>[Signature]</i> DATE GMR <i>[Signature]</i> DATE PROJ <i>[Signature]</i> DATE REL <i>[Signature]</i> DATE		<b>CENTRONICS</b> data computer corp. HUDSON, NEW HAMPSHIRE U.S.A. TITLE PC BOARD ASSY, ELAPSED TIME INDICATOR	
UNLESS OTHERWISE SPECIFIED .... 1. CAPACITANCE IN pF 2. RESISTANCE IN Ω 3. DIMENSIONS IN INCHES 4. TOLERANCE PRAC ± — JX ±.12 JXX ± — ANGLE ± —		SCALE 2/1 C NUMBER 63002640 SHEET 1 OF 1 DO NOT SCALE PRINT	

4. CAUTION: E.T.I. IS HIGHLY SENSITIVE HANDLE WITH CARE,  
 3. PERMANENTLY MARK ITEM 1 WITH ASSY REVISION LETTER AND BOARD CONFIGURATION NUMBER APPROXIMATELY AS SHOWN.  
 2. FOR 4001, 4002, 4003, 4010, 4011, 4012, CUT ITEM 7/20, 8.00 IN LONG. STRIP .25 IN.  
 FOR 4004 THRU 4009, CUT ITEM 7/20, 10.00 IN LONG. STRIP .25 IN.  
 1. CUT BLACK & RED WIRES FROM ETI-1 1.25 IN LONG. STRIP .12 IN AND TIN USING ITEM 8. TERMINATE AT "E" POINTS SHOWN ON FIELD OF DWG.

NOTES:

Figure 7-24. COMPONENT BOARD ASSEMBLY, ELAPSED TIME INDICATOR (OPTIONAL)

LIST OF MATERIALS  
ELAPSED TIME INDICATOR (OPTION)  
(Reference: 63002640, Rev. -1)

LM# 63002640-4001 (500 HR)

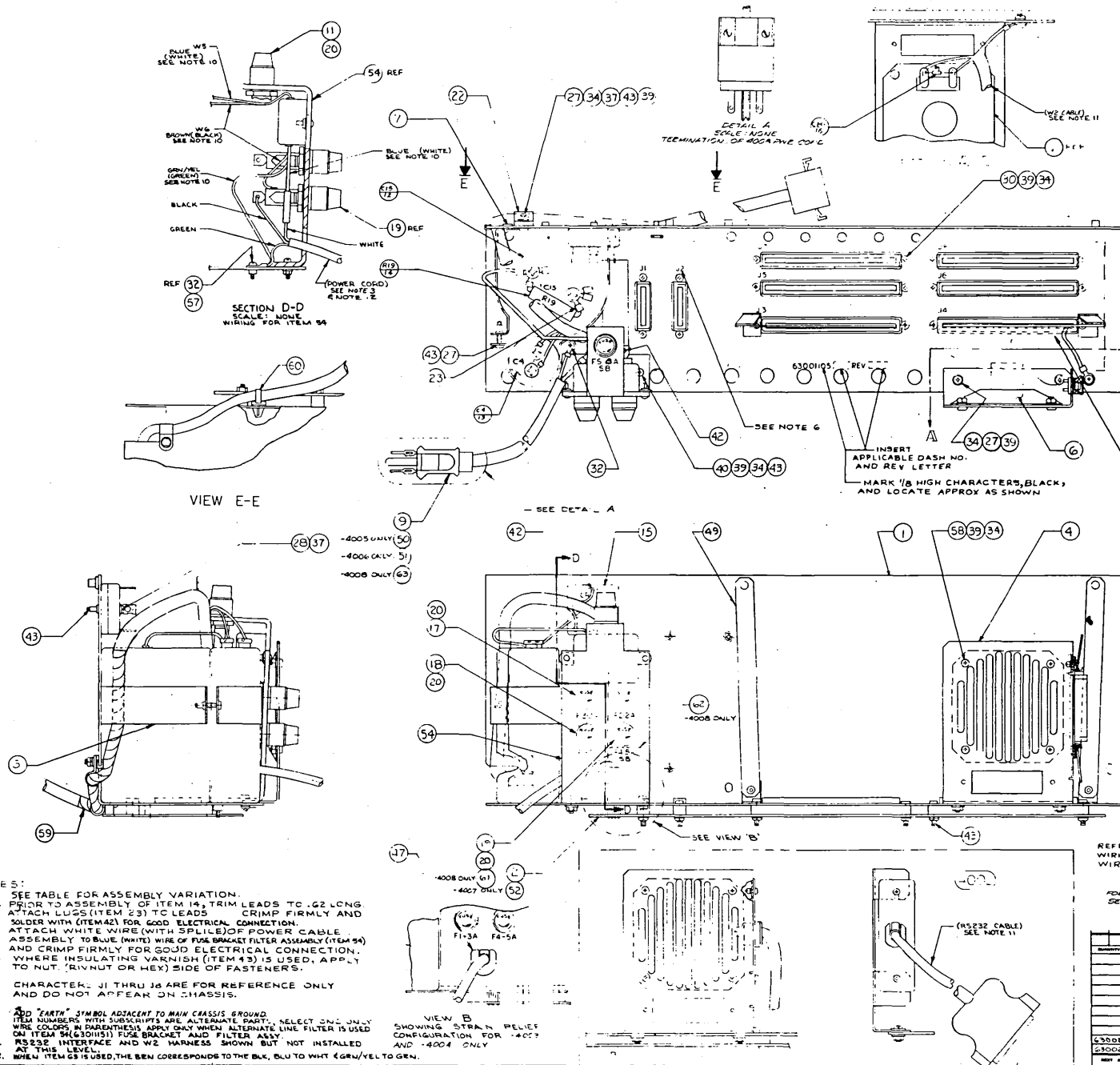
ITEM	PART NO.	NOMENCLATURE	QTY PER
1	63001084-2001	PC BD AW ETI GEN USE	1
2	63002643-2001	BRKT ETI BD 100 SERIES	1
4	33453421-2001	RIVET POP 1/8 DIA X 1/8 LG	2
7	39648505-0004-2	WIRE B-26 7/34 RED	A/R
8	30070000-0001	SOLDER	A/R
10	35811200-1001	ELAPSED TIME INDICATOR 500 HRS	1
13	38052311-1001	DIODE IN5231A	1
14	41222946-1001	RES 2.2K 1/2W 10%	1
17	41754925-1001	RES CARBON 750 K 1/4W 5%	1
20	39648505-0004-0	WIRE B-26 7/34 BLACK	A/R
REF	63001085-9001	PC BD DD ETI GEN USE	A/R
REF	63002641-9001	SCHEM DIAG ETI GEN USE	A/R

LM# 63002640-4002 (1000 HR)

ITEM	PART NO.	NOMENCLATURE	QTY PER
1	63001084-2001	PC BD AW ETI GEN USE	1
2	63002643-2001	BRKT ETI BD 100 SERIES	1
4	33453421-2001	RIVET POP 1/8 DIA X 1/8 LG	2
7	39648505-0004-2	WIRE B-26 7/34 RED	A/R
8	30070000-0001	SOLDER	A/R
11	35811200-1002	ELAPSED TIME INDICATOR 1000HRS	1
13	38052311-1001	DIODE IN5231A	1
14	41222946-1001	RES 2.2K 1/2W 10%	1
16	41564926-1001	RES 560K 1/4W 10%	1
18	41105926-1001	RES CARBON 1 MEG 1/4 W 10%	1
20	39648505-0004-0	WIRE B-26 7/34 BLACK	A/R
REF	63001085-9001	PC BD DD ETI GEN USE	A/R
REF	63002641-9001	SCHEM DIAG ETI GEN USE	A/R

LM# 63002640-4003 (2000 HR)

ITEM	PART NO.	NOMENCLATURE	QTY PER
1	63001084-2001	PC BD AW ETI GEN USE	1
2	63002643-2001	BRKT ETI BD 100 SERIES	1
4	33453421-2001	RIVET POP 1/8 DIA X 1/8 LG	2
7	39648505-0004-2	WIRE B-26 7/34 RED	A/R
8	30070000-0001	SOLDER	A/R
12	35811200-1003	ELAPSED TIME INDICATOR 2000HRS	1
13	38052311-1001	DIODE IN5231A	1
14	41222946-1001	RES 2.2K 1/2W 10%	1
18	41105926-1001	RES CARBON 1 MEG 1/4 W 10%	1
19	41205925-1001	RES 2MEG 1/4W 5%	1
20	39648505-0004-0	WIRE B-26 7/34 BLACK	A/R
REF	63001085-9001	PC BD DD ETI GEN USE	A/R
REF	63002641-9001	SCHEM DIAG ETI GEN USE	A/R



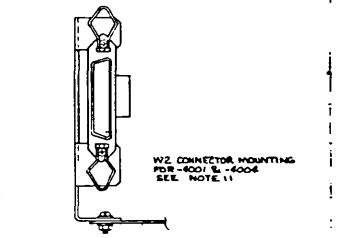
**REVISIONS**

REV	DASH NO	DESCRIPTION	DATE	APPROVED
		ALPHABETIC CHANGES FORMAT ONLY	6-21-75	
		REV PER ECJ7301122	7-18-75	
W	4001THRU 4007	REVISED PER ECD 130027M	8-28-75	
		REVISED PER ECD 13001505B	10-11-75	
		REVISED PER ECD 13004016	1-28-76	
		ADDED 4008 AT TERMINATION PWR CABLE RELEASE NOTICE		
		RELEASED TO PREP ROD		
		ADDED -4008THRU -4012 AT GCY PER RCL	7-16-76	
		NOTICE		
		REVISED PER ECD 13011206	11-11-76	

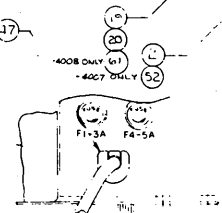
**WE CONN LATE -4005 ONLY**

**REVISION LEVEL OF DASH NOS**

DASH NO	REVISION LEVEL	DESCRIPTION
4001	Y	ITALIARD
4002	Y	H222
4002	Y	NIXDOF
4004	Y	BROTHER
4005	Y	P/CORD 110V TALL RENCH CAVITY
4006	Y	P/CORD 240V
4007	Y	B CHANNEL
4008	Y	101/01A FOREIGN PWR CORD
4009	-	CAVITY Assy
4010	-	ITALIARD (SEE 4001)
4011	-	ITALIARD (SEE 4001)
4012	-	CAVITY Assy



- NOTES:**
- SEE TABLE FOR ASSEMBLY VARIATION.
  - PRIOR TO ASSEMBLY OF ITEM 14, TRIM LEADS TO .62 LONG ATTACH LUGS (ITEM 23) TO LEADS. CRIMP FIRMLY AND SOLDER WITH (ITEM 42) FOR GOOD ELECTRICAL CONNECTION.
  - ATTACH WHITE WIRES (WITH SPLICES) OF POWER CABLE ASSEMBLY TO BLUE (WHITE) WIRE OF FUSE BRACKET FILTER ASSEMBLY (ITEM 54) AND CRIMP FIRMLY FOR SOUND ELECTRICAL CONNECTION. WHERE INSULATING VARNISH (ITEM 43) IS USED, APPLY TO NUT (RIVNUT OR HEX) SIDE OF FASTENERS.
  - CHARACTER J1 THRU J6 ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON CHASSIS.
  - ADD "EARTH" SYMBOL ADJACENT TO MAIN CHASSIS GROUND.
  - ITEM NUMBERS WITH SUBSCRIPTS ARE ALTERNATE PARTS. SELECT ONE ONLY. WIRE COLORS IN PARENTHESES APPLY ONLY WHEN ALTERNATE LINE FILTER IS USED ON ITEM 54(G301H5). FUSE BRACKET AND FILTER ASSY.
  - R522 INTERFACE AND W2 HARNESS SHOWN BUT NOT INSTALLED AT THIS LEVEL.
  - WHEN ITEM G3 IS USED, THE BRN CORRESPONDS TO THE BLK, BLU TO WHT & GRN/YEL TO GRN.



REFERENCE DRAWINGS:  
 WIRING DIAGRAM-G3002267  
 WIRING DIAGRAM-G3004104

FOR LIST OF MATERIAL  
 SEE LM 63001105

The information contained herein is restricted data and is not to be distributed outside the organization without the approval of the originator.

REV	DATE	DESCRIPTION

**CENTRONICS**  
 Data Computer Corp.  
 ELECTRONICS CAVITY ASSEMBLY, PRINTER  
 WE 163001105

63002370 3000  
 23002790 730 C

Figure 7-25. ELECTRONIC CAVITY ASSEMBLY



LIST OF MATERIALS  
ELECTRONIC CAVITY ASS'Y  
(Ref: Ass'y No. 63001105-4001, Rev. Y)

ITEM	PART NO.	NOMENCLATURE	QTY PER
1	63002227-5001	CHASSIS ASSY ELEC 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 8 OHM .5W 3.0SQ	1
7	33400000-2001	RIVET DOME HD MDRL .125D X.25L	2
9	63002252-4001	POWER CABLE ASSY W3	1
9A	63002494-4001	POWER CABLE ASSY W3 110V	A/R
11	39030012-1001	FUSE GL .25DIA 8A SLOW 1.25L	1
12	22229000-1001	CAP CYL 2200UF 50V -10+75%	1
13	22828000-1001	CAP CYL 8200UF 50V -10+75%	1
14	43471056-1001	RES WW 470 OHM 5W 10%	1
15	38125021-1001	DIODE BRIDGE	1
16	38040020-1001	SEMICON DIODE TBAX 1N4002	1
17	39030002-1001	FUSE GL .25DIA 2A 1.25L	2
18	39030011-1001	FUSE GL .25DIA 3A 250V 1.25L	1
19	39030004-1001	FUSE GL .25DIA 5A SLOW 1.25L	1
20	31350000-2001	FUSEHOLDER PNL MTG 250V 15A	5
22	36150001-2004	CLAMP CABLE .312D PLSTC	1
23	31460014-2003	TERM RING INSUL #10 22-18AWG	2
27	34517127-2001	SCR PNH REC 4-40X.38L	4
28	34517287-2001	SCR PNH REC 4-40X.87L	1
30	34517207-2001	SCR PNH REC 4-40X.62L	16
32	34527087-2001	SCR PNH REC 6-32X.25L	1
34	34712007-2001	NUT HEX 4-40 X MDM THK	25
37	34912007-2001	WSHR FLAT #4X.00 DD	2
39	34815007-2001	WSHR LOCK INTL TOOTH #4	25
40	34517107-2001	SCR PNH REC 4-40X.31L	2
42	30070000-0001	SOLDER 60/40 .032D WIRE	A/R
43	30000000-0001	VARNISH INSULATING RED	A/R
49	63011146-5001	STRAP BRKT ASSY 101/101A 102A	2
54	63011151-5002	FUSE BRKT & FLTR ASSY 101 SER	1
57	31460013-2001	TERM RING INSUL #6 16-14AWG	1
58	34517087-2001	SCR PNH REC 4-40X.25L	4
59	39620006-2003	WRAP HARNESS .18-1.5DIA PLSTC	.7
60	39690011-2002	STRAP CABLE SELF MTG 1.75BDL	1
REF	63002267-9001	WIRING DIAG ELECTRONICS CAVITY	A/R
REF	63004104-9001	WIRING DIAG ELECTRONICS CAVITY	A/R

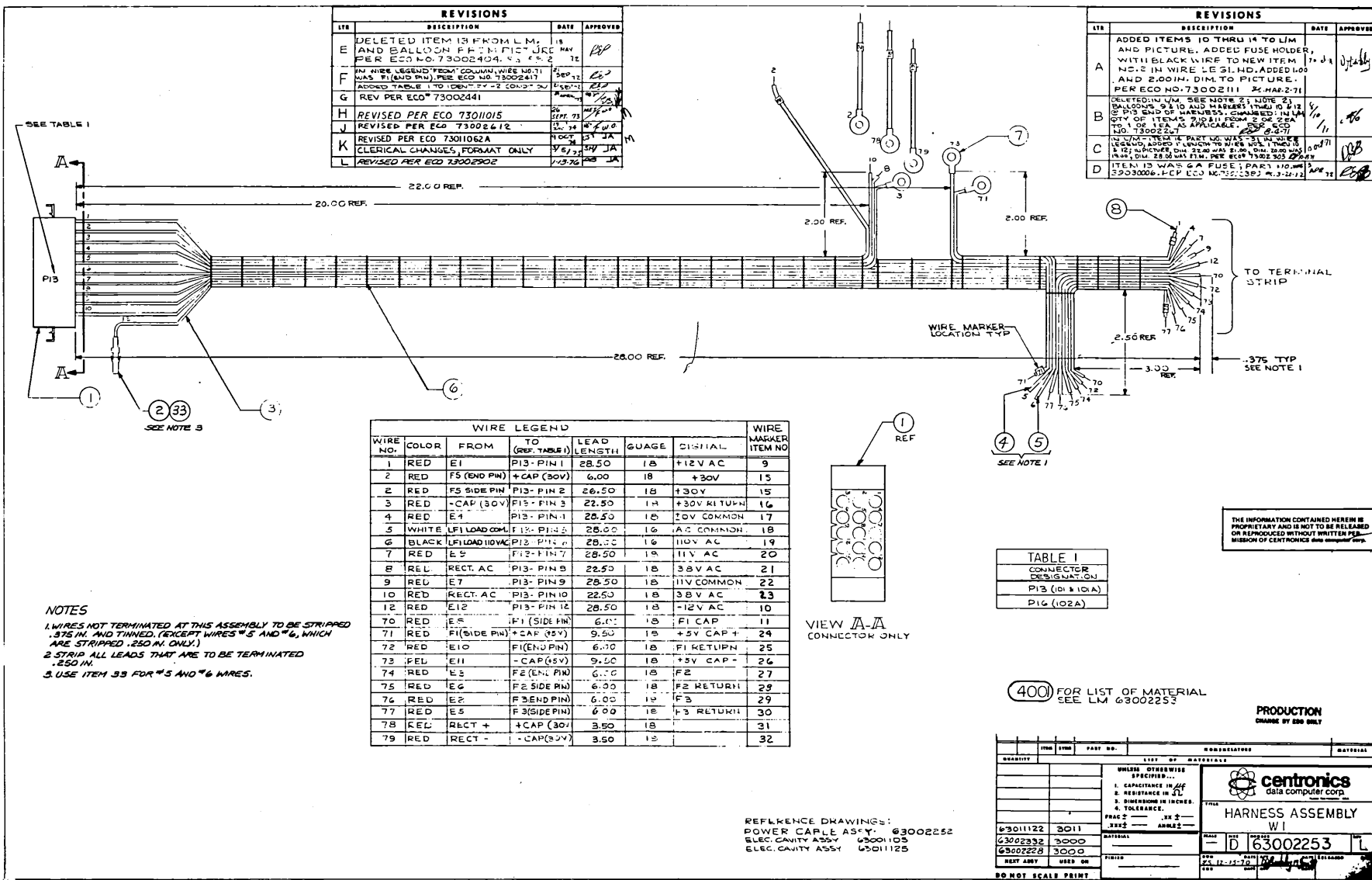
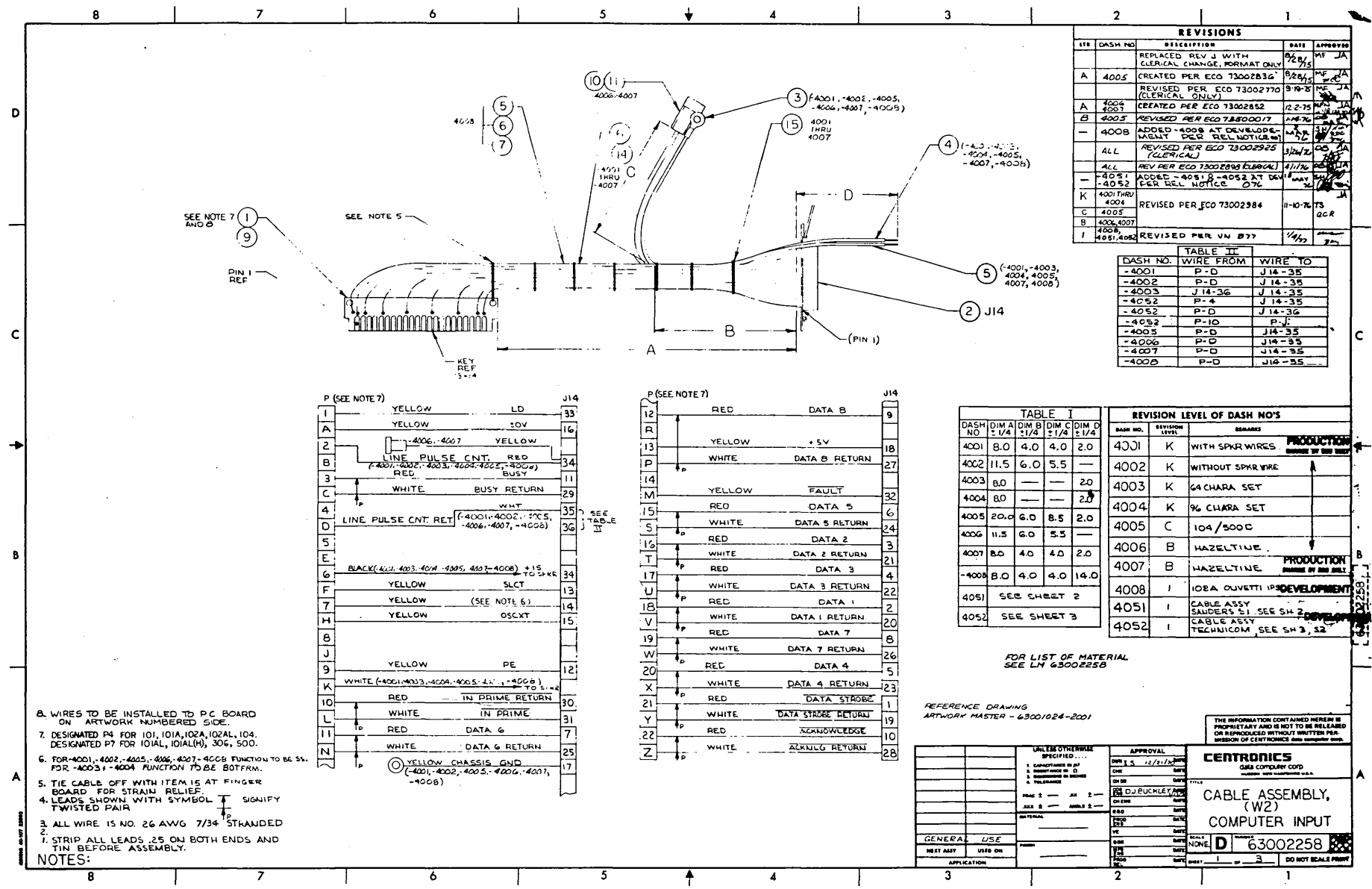


Figure 7-26. W1 HARNESS ASSEMBLY

LIST OF MATERIALS  
 HARNESS ASSEMBLY W1  
 (Ref: Ass'y #63002253-4001, Rev. L)

ITEM	PART NO.	NOMENCLATURE	QTY PER
1	31300007-1001	CONN PLUG W/EAR 15POSN .093	1
2	31240020-2004	CONTACT CRP SKT .093 22-18AWG	9
3	39640000-0008-2	WIRE TYPE E 18AWG RED	A/R
4	39640000-0009-9	WIRE TYPE E 16AWG WHITE	A/R
5	39640000-0009-0	WIRE TYPE E 16AWG BLACK	A/R
6	39690000-0002	TAPE LACING .06W X.01THK BLK	A/R
7	31460014-2003	TERM RING INSUL #10 22-18AWG	6
8	30070000-0001	SOLDER 60/40 .032D WIRE	A/R
9	36550002-3001	MARKER WIRE WRAP-AROUND	1
10	36550002-3012	MARKER WIRE WRAP	12
11	36550002-3070	MARKER WIRE WRAP	70
15	36550002-3002	MARKER WIRE WRAP-AROUND	2
16	36550002-3003	MARKER WIRE WRAP	3
17	36550002-3004	MARKER WIRE WRAP	4
18	36550002-3005	MARKER WIRE WRAP	5
19	36550002-3006	MARKER WIRE WRAP	6
20	36550002-3007	MARKER WIRE WRAP	7
21	36550002-3008	MARKER WIRE WRAP	8
22	36550002-3009	MARKER WIRE WRAP	9
23	36550002-3010	MARKER WIRE WRAP	10
24	36550002-3071	MARKER WIRE WRAP	71
25	36550002-3072	MARKER WIRE WRAP	72
26	36550002-3073	MARKER WIRE WRAP	73
27	36550002-3074	MARKER WIRE WRAP	74
28	36550002-3075	MARKER WIRE WRAP	75
29	36550002-3076	MARKER WIRE WRAP	76
30	36550002-3077	MARKER WIRE WRAP	77
31	36550002-3078	MARKER WIRE WRAP	78
32	36550002-3079	MARKER WIRE WRAP	79
33	31240020-2001	CONTACT CRP SKT .093 20-14AWG	2



REVISIONS			
ITER	DASH NO.	DESCRIPTION	DATE APPROVED
A	4005	REPLACED REV J WITH CIRCULAR CHANGE, FORMAT ONLY	5/21/75 MF JA
A	4004	REVISED PER ECO 73002834 (CIRCULAR ONLY)	9/28/75 MF JA
A	4004	REVISED PER ECO 73002770 (CIRCULAR ONLY)	9/19/75 MF JA
B	4005	CREATED PER ECO 73002852	12-2-75 MF JA
B	4005	REVISED PER ECO 73000077	1/26/76 MF JA
-	4005	ADDED -4005 AT DEVELOPMENT PER REL NOTICE (CIRCULAR)	4/1/76 MF JA
ALL	ALL	REVISED PER ECO 73002925 (CIRCULAR)	3/24/76 MF JA
ALL	ALL	REV PER ECO 73002938 (CIRCULAR)	4/1/76 MF JA
-	4051, 4052	ADDED -4051, -4052 AT DEVELOPMENT PER REL NOTICE (CIRCULAR)	11/17/76 MF JA
K	4004	REVISED PER ECO 73002984	11-10-76 MF JA
C	4005	REVISED PER UN 877	1/1/77 MF JA
B	4004, 4007	REVISED PER UN 877	1/1/77 MF JA

DASH NO.	WIRE FROM	WIRE TO
-4001	P-D	J14-35
-4002	P-D	J14-35
-4003	J14-36	J14-35
-4052	P-4	J14-35
-4052	P-D	J14-36
-4052	P-10	P-1
-4005	P-D	J14-35
-4006	P-D	J14-35
-4007	P-D	J14-35
-4008	P-D	J14-35

P (SEE NOTE 7)	WIRE COLOR	FUNCTION	J14
1	YELLOW	LD	33
A	YELLOW	SOV	16
2	YELLOW (-4006, -4007)	LINE PULSE CNT.	34
B	RED (-4001, -4002, -4003, -4004, -4005, -4006)	RED BUSY	11
3	WHITE	BUSY RETURN	29
C	WHITE	WHT	35
D	WHITE (-4001, -4002, -4005, -4006, -4007, -4008)	LINE PULSE CNT. RET.	36
E	BLACK (-4001, -4003, -4004, -4005, -4007, -4008)	+5V TO SHV	34
G	YELLOW	SLCT	13
F	YELLOW	(SEE NOTE 6)	14
H	YELLOW	OSCXT	15
I	YELLOW	PE	12
J	WHITE (-4001, -4003, -4004, -4005, -4007, -4008)	IN PRIME RETURN	30
K	RED	IN PRIME	31
L	RED	DATA G	7
M	WHITE	DATA G RETURN	25
N	YELLOW	CHASSIS GND (-4001, -4002, -4005, -4006, -4007, -4008)	17

P (SEE NOTE 7)	WIRE COLOR	FUNCTION	J14
12	RED	DATA B	9
R	YELLOW	+5V	18
13	WHITE	DATA B RETURN	27
P	YELLOW	FAULT	32
14	RED	DATA 5	6
M	WHITE	DATA 5 RETURN	24
S	RED	DATA 2	3
15	WHITE	DATA 2 RETURN	21
T	RED	DATA 3	4
17	WHITE	DATA 3 RETURN	22
U	RED	DATA 1	2
18	WHITE	DATA 1 RETURN	20
V	RED	DATA 7	8
19	WHITE	DATA 7 RETURN	26
W	RED	DATA 4	5
20	WHITE	DATA 4 RETURN	23
X	RED	DATA STROBE	1
21	WHITE	DATA STROBE RETURN	19
Y	RED	SCAN/NOLEDGE	10
22	WHITE	SCAN/NOLEDGE RETURN	10
Z	WHITE	ACK/NO RETURN	28

TABLE I					
DASH NO.	DIM A	DIM B	DIM C	DIM D	DIM E
4001	8.0	4.0	4.0	2.0	
4002	11.5	6.0	5.5		
4003	8.0		2.0		
4004	8.0		2.0		
4005	20.0	6.0	8.5	2.0	
4006	11.5	6.0	5.5		
4007	8.0	4.0	4.0	2.0	
4008	8.0	4.0	4.0	14.0	
4051	SEE SHEET 2				
4052	SEE SHEET 3				

REVISION LEVEL OF DASH NO'S			
DASH NO.	REVISION LEVEL	REMARKS	
4001	K	WITH SPKR WIRES	PRODUCTION
4002	K	WITHOUT SPKR WIRE	PRODUCTION
4003	K	64 CHARA SET	
4004	K	96 CHARA SET	
4005	C	104/500C	
4006	B	HAZELTINE	
4007	B	HAZELTINE	PRODUCTION
4008	I	IOBA OLIVETTI IP	DEVELOPMENT
4051	I	CABLE ASSY SANDER'S 51	DEVELOPMENT
4052	I	CABLE ASSY TECHNICOM, SEE SH 3, 32	DEVELOPMENT

FOR LIST OF MATERIAL SEE LN 63002258

REFERENCE DRAWING ARTWORK MASTER - 63001024-2001

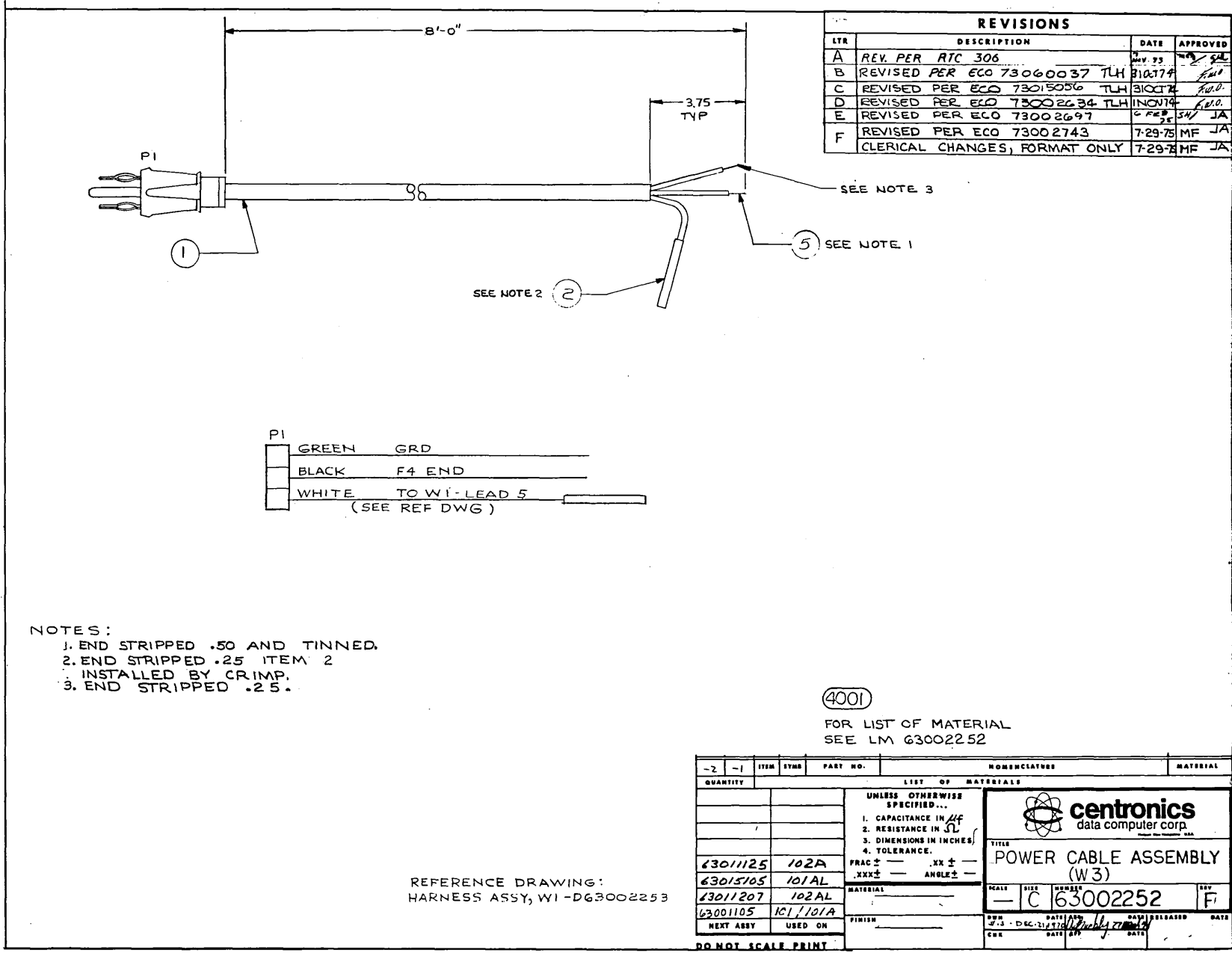
THE INFORMATION CONTAINED HEREIN IS PROPRIETARY AND IS NOT TO BE RELEASED OR REPRODUCED WITHOUT WRITTEN PERMISSION OF CENTRONICS DATA CORPORATION.

UNLESS OTHERWISE SPECIFIED...	APPROVAL	<b>CENTRONICS</b> DATA CORPORATION 300 N. ZEEB RD. FOLSOM, CA 95630
1. DIMENSIONS IN INCHES	DIM 1: 12/11/76	
2. DIMENSIONS IN MILLIMETERS	DATE	
3. DIMENSIONS IN METERS	DATE	
4. TOLERANCES	DATE	<b>CABLE ASSEMBLY, (W2)</b> <b>COMPUTER INPUT</b>
FRONT PANEL	DATE	
REAR PANEL	DATE	
INTERNAL	DATE	
GENERAL USE	DATE	PART NO. <b>D 63002258</b> REV. <b>D</b> QUANTITY <b>1</b> OF <b>3</b> DO NOT SCALE PRINT
TEST MAST	DATE	
USED ON	DATE	
APPLICATION	DATE	

Figure 7-27. W2 CABLE ASSEMBLY, COMPUTER INPUT

LIST OF MATERIALS  
 CABLE ASSEMBLY W2  
 (Ref: Ass'y #63002258-4001, Rev. K)

ITEM	PART NO.	NOMENCLATURE	QTY PER
1	63001024-2001	PC BD AW PARALLEL TIMER FIN BD	1
2	31310019-1016	CONN RCPT PNL 36POSN NON-PLZ	1
3	31460015-2003	TERM RING INSUL #8 26-22AWG	1
4	39648505-0004-0	WIRE TYPE B 26AWG BLACK	2.1
5	39648505-0004-9	WIRE TYPE B 26AWG WHITE	2
6	39648505-0004-4	WIRE TYPE B 26AWG YELLOW	11
9	30070000-0001	SOLDER 60/40 .032D WIRE	A/R
14	39660015-0001	CABLE ITW PR 26AWG	10.1
15	39695231-2001	STRAP CABLE ADJ LKG .625BDL	6
REF	63001025-9001	PC BD DD PARALLEL TIMER FIN BD	



REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	REV. PER RTC 306	Nov 73	[Signature]
B	REVISED PER ECO 73060037 TLH	8-10-74	[Signature]
C	REVISED PER ECO 73015056 TLH	3-10-74	[Signature]
D	REVISED PER ECO 73002634 TLH	11-10-74	[Signature]
E	REVISED PER ECO 73002697	6 FEB 75	MF JA
F	REVISED PER ECO 73002743	7-29-75	MF JA
	CLERICAL CHANGES, FORMAT ONLY	7-29-75	MF JA

- NOTES:
1. END STRIPPED .50 AND TINNED.
  2. END STRIPPED .25 ITEM 2
  3. INSTALLED BY CRIMP.
  3. END STRIPPED .25.

(4001)  
 FOR LIST OF MATERIAL  
 SEE LM 63002252

REFERENCE DRAWING:  
 HARNESS ASSY, W1-D63002253

-2	-1	ITEM	SYMB	PART NO.	QUANTITY	DESCRIPTION	MATERIAL
						UNLESS OTHERWISE SPECIFIED...	
						1. CAPACITANCE IN $\mu F$	
						2. RESISTANCE IN $\Omega$	
						3. DIMENSIONS IN INCHES	
						4. TOLERANCE.	
						FRAC $\pm$ — .XX $\pm$ —	
						XXX $\pm$ — ANGLE $\pm$ —	
						MATERIAL	
						FINISH	
						DATE	
						DATE	
						DATE	

TITLE <b>POWER CABLE ASSEMBLY (W3)</b>	
SCALE	SIZE
C	63002252
REV	F

Figure 7-28. W3 POWER CABLE ASSEMBLY

LIST OF MATERIALS  
POWER CABLE ASS'Y W3  
(Ref: Ass'y #63002252-4001, Rev. F)

ITEM	PART NO.	NOMENCLATURE	QTY PER
1	39620003-1001	CORD 3 COND 8 FT 18AWG W/PLUG	1
2	31460002-2003	SPLICE INSULATED 18-22 AWG	1
5	30070000-0001	SOLDER	A/R

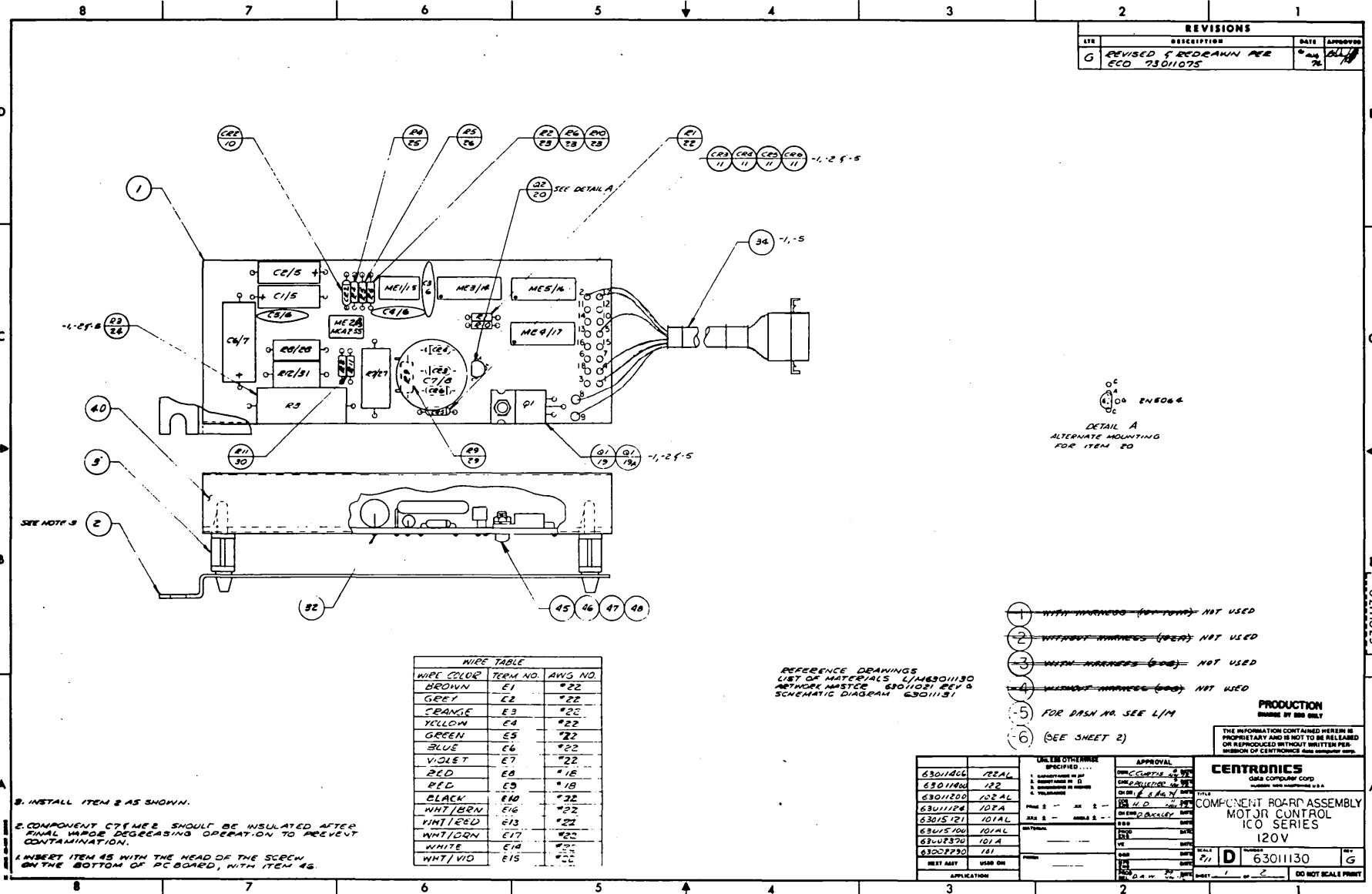


Figure 7-29. COMPONENT BOARD ASSEMBLY, MOTOR CONTROL (OPTIONAL)



LIST OF MATERIALS  
PC BOARD ASSEMBLY  
MOTOR CONTROL OPTION  
(Ref: Ass'y #63011130-4001, Rev. G)

ITEM	PART NO.	NOMENCLATURE	QTY PER
1	63011021-2001	PC BD AW MTR CTRL	1
2	63002380-2001	BRACKET MOUNTING	1
3	36600004-2004	STANDOFF LCBS-8 PLASTIC	4
5	22106002-1001	CAP ELECTROLYTIC 10UF 25V	2
6	21104001-1001	CAP CERAMIC DISC .1UF 16V	3
7	22107002-1001	CAP ELECTROLYTIC 100UF 25V	1
8	21104002-1001	CAP CERAMIC DISC .1UF 500V	1
10	38100904-1001	DIODE WG904	1
11	38040020-1001	DIODE S1 RECTIFIER IN4002	4
13	37220015-1001	PHOTOTRANSISTOR CA2-55	1
13A	37220016-1001	PHOTOTRANSISTOR MCA2-55	A/R
14	35474121-1001	INTEGRATED CIRCUIT 74121	1
15	35205550-1001	INTEGRATED CIRCUIT NE555	1
16	35474040-1001	INTEGRATED CIRCUIT 7404	1
17	35474100-1001	INTEGRATED CIRCUIT 7410	1
19	38200002-1001	TRANSISTOR SCR	1
19A	38200146-1001	TRANSISTOR SC146	A/R
20	38200001-1001	TRANSISTOR SCR	1
22	41221926-1001	RES CARBON 220 OHM 1/4W 10%	1
23	41102926-1001	RES CARBON 1 K 1/4W 10%	3
24	43153055-1001	RES WW 15K 5W 5%	1
25	41393926-1001	RES CARBON 39 K 1/4W 10%	1
26	41684926-1001	RES CARBON 680 K 1/4W 10%	1
27	41101025-1001	RES CARBON 100 OHM 2W 5%	1
28	41510015-1001	RES 51 OHM 1W 5%	1
29	41101946-1001	RES CARBON 100 OHM 1/2W 10%	1
30	41105926-1001	RES CARBON 1 MEG 1/4 W 10%	1
31	43502035-1001	RES WW 5K 3W 5%	1
32	30070000-0001	SOLDER	A/R
34	63011149-4001	HARNESS ASSEMBLY	1
35	63002590-4001	HARNESS ASSY RETROFIT 101 LONG	1
40	63011137-2001	COVER MTR CTRL	1
45	34517107-2001	SCREW 4/40X5/16 PAN HD PHIL	1
46	34912004-2001	WASHER #4 FLAT NYLON	1
47	30000000-0001	INSULATING VARNISH	A/R
48	34712007-2001	NUT HEX 4/40	1
REF	63011022-9001	PC BD DD MTR CTRL	A/R
REF	63011131-9001	SCHEM DIAGRAM MTR CTRL	A/R

7-45

REV. G

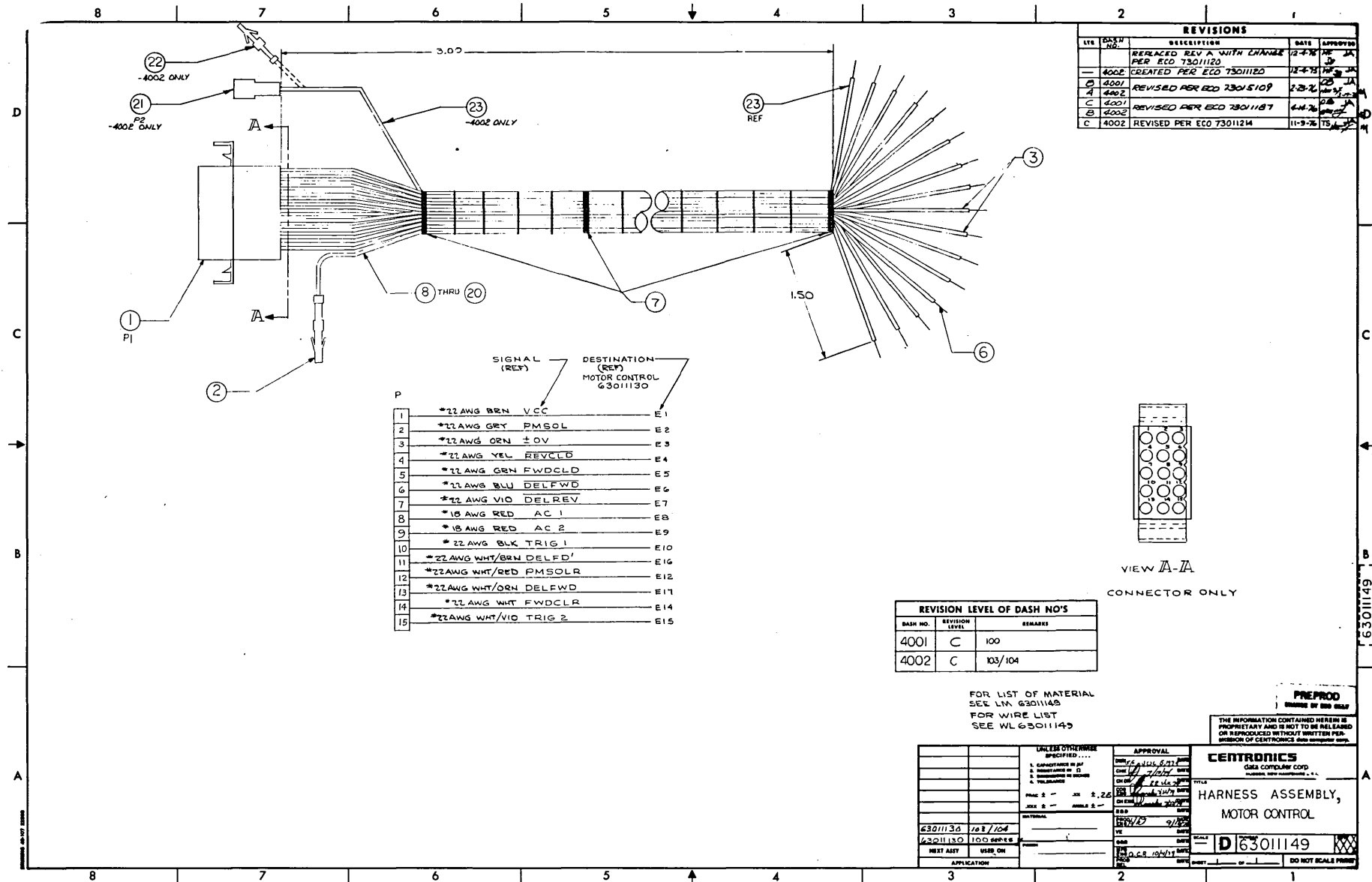


Figure 7-30. HARNESS ASSEMBLY, MOTOR CONTROL

LIST OF MATERIALS  
 HARNESS ASSEMBLY  
 (Ref: Ass'y #63011149-4001, Rev. C)

ITEM	PART NO.	NOMENCLATURE	QTY PER
1	31300007-1001	CONN PLUG W/EAR 15POSN .093	1
2	31240020-2004	CONTACT CRP SKT .093 22-18AWG	15
3	39648505-0008-2	WIRE TYPE B 18AWG RED	1
6	30070000-0001	SOLDER 60/40 .0320 WIRE	A/R
7	39695231-2001	STRAP CABLE ADJ LKG .625BDL	3
8	39648505-0006-1	WIRE TYPE B 22AWG BROWN	.5
9	39648505-0006-8	WIRE TYPE B 22AWG GRAY	.5
10	39648505-0006-3	WIRE TYPE B 22AWG ORANGE	.5
11	39648505-0006-4	WIRE TYPE B 22AWG YELLOW	.5
12	39648505-0006-5	WIRE TYPE B 22AWG GREEN	.5
13	39648505-0006-6	WIRE TYPE B 22AWG BLUE	.5
14	39648505-0006-7	WIRE TYPE B 22AWG VIOLET	.5
15	39648505-0006-91	WIRE TYPE B 22AWG WHT/BRN	.5
16	39648505-0006-92	WIRE TYPE B 22AWG WHT/RED	.5
17	39648505-0006-93	WIRE TYPE B 22AWG WHT/DRN	.5
18	39648505-0006-9	WIRE TYPE B 22AWG WHITE	.5
19	39648505-0006-97	WIRE TYPE B 22AWG WHT/VIO	.5
20	39648505-0006-0	WIRE TYPE B 22AWG BLACK	.5
REF	63011149-9001	WIRE LIST MOTOR CONTROL STD	

## SECTION 8

### DRAWINGS AND PARTS LISTS, MECHANICAL

This section contains drawings and parts lists for the major mechanical assemblies in the 101 Series printer. Two revision levels are shown on each mechanical drawing and parts list page:

1. **The page revision level**, located in the lower outside corner of any page, indicates at what revision of the manual that particular page was changed.
2. **The revision level of the drawing to the parts list** is located in the upper right-hand corner of the artwork. This revision method will start at AA and be updated on both the drawing and parts list whenever there is a change affected.

A reference number attached to each mechanical drawing and parts list is shown in the following example:

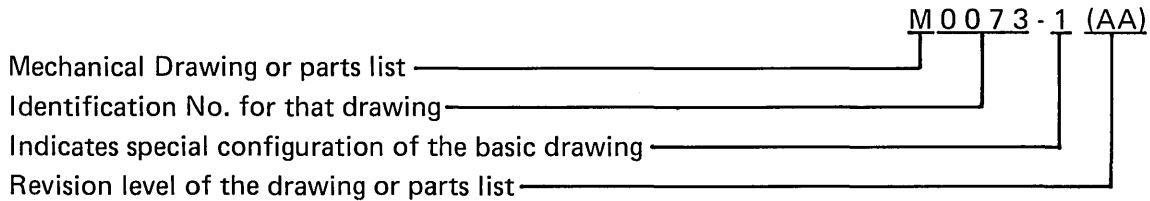
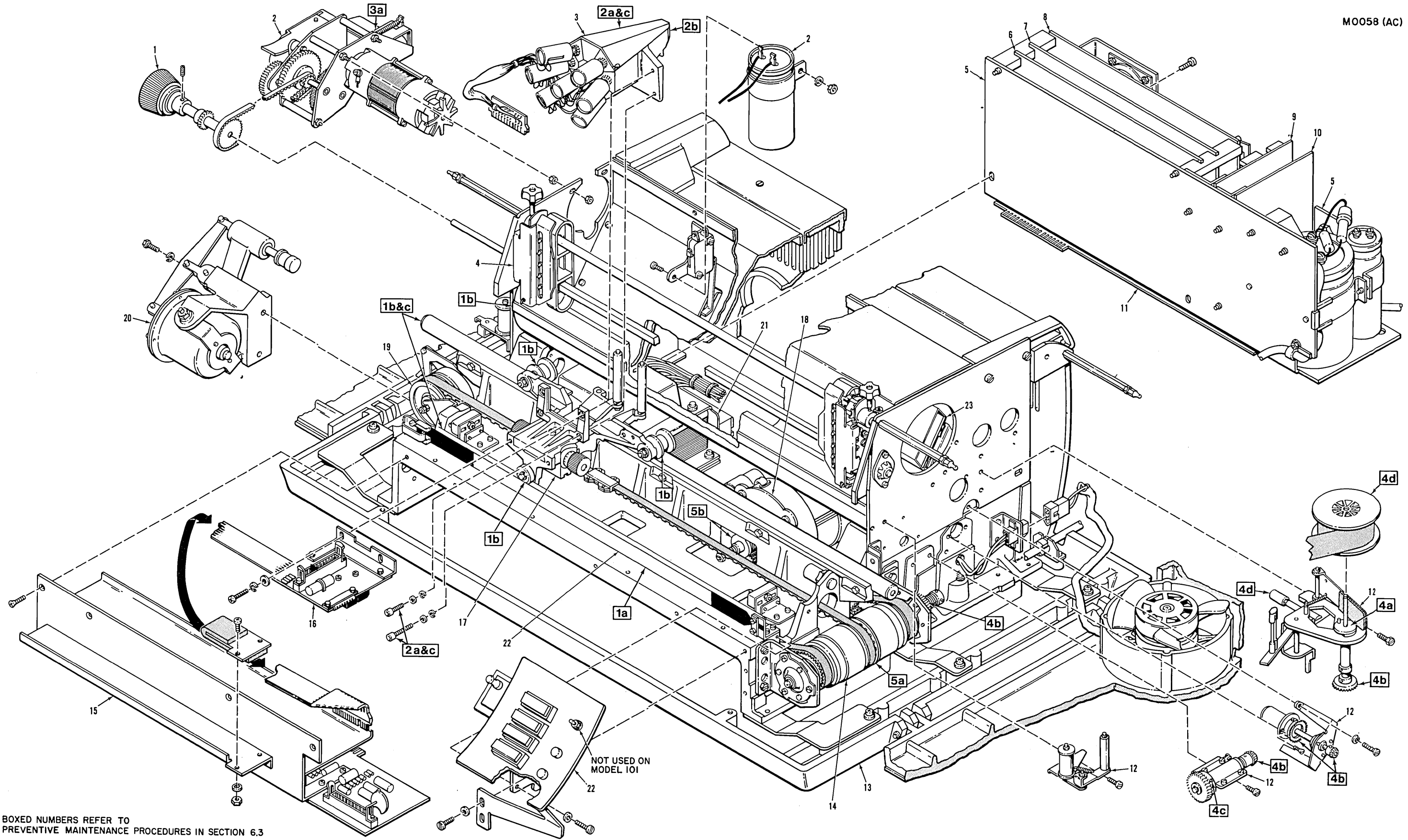


FIGURE	FIGURE DESIGNATION	DESCRIPTION
8-1	—	Mechanical Subassemblies, Series 101
8-2	A	Cover Assembly
8-3	HA	Carriage Mechanism
8-4	HB	Drive Mechanism, Part 1
8-5	HB	Driving Mechanism (Preload Clutches), Part 2
8-6	HC	Spring Drum
8-7	HD	Damper
8-8	HE	Frame
8-9	HF	Paper Feed Mechanism
8-10	HG	Pin Feed Units (Left and Right)
8-11	HH	Form Feed Mechanism
8-12	HI	Ribbon Feed Mechanism
8-13	HJ	Electrical Hardware (No drawing included)
8-14	—	Print Head and Associated Assemblies





BOXED NUMBERS REFER TO PREVENTIVE MAINTENANCE PROCEDURES IN SECTION 6.3

Figure 8-1. MECHANICAL SUBASSEMBLIES SERIES 101

Figure 8-1. MECHANICAL SUBASSEMBLIES, SERIES 101

M0058 (AC)

Reference Number	Figure	Part Name	Removal/Replacement
1	8-9	Paper Feed Mechanism (HF)	Para. 5.2.7.2.
2	8-11	Form Feed Mechanism (HH)	5.2.9.2
3	8-14	Print Head & Associated Ass'ys	5.2.13.2.A
4	8-10	Pin Feed Units (HG)	5.2.8.2.
5	7-25 (101/101A), 7-20 (101AL)	Electronics Cavity Ass'y	—
*6	7-17 (101/101A)	Electronic Card No. 1	—
*7	7-18 (101/101A)	Electronic Card No. 2	—
8	8-1, item 8 (101/101A), 7-13 (101AL)	Interface Card Option	—
*9	7-20 (101/101A), 101AL (None)	± 12-Volt Regulator	—
*10	7-19 (101/101A), 7-14 (101AL)	+5Volt Regulator	—
11	7-21 (101/101A), 7-18 (101AL)	Connector Board Ass'y	—
12	8-12	Ribbon Feed Mech. (HI)	5.2.10.2
13	8-2	Cover Ass'y (A)	5.2.1.2
14	8-5	Forward Reverse Clutches (Preload) (HB) (Part 2)	5.2.3.2.E
15	7-22 (101/101A), 7-16 (101AL)	Power Driver Board Ass'y	5.2.13.2.C
16	7-23 (101/101A), 7-17 (101AL)	Video Amplifier & Cable Ass'y	5.2.13.2.D
17	8-3	Carriage Unit (HA)	5.2.2.2.B
18	8-4	Driving Mechanism (HB) (Part 1)	5.2.3.2
19	8-6	Spring Drum (HC)	5.2.4.2
20	8-7	Damper (HD)	5.2.5.2
21	8-13	Electrical Accessories (HJ) (Includes Multitap Xformer)	5.2.11
22	8-8	Frame (HE)	5.2.6.2
23	7-29(101/101A), 7-19 (101AL)	Motor Control Ass'y 63011130-4005 (Series 101) with harness 63002593	—

\*NOTE: Items 6, 7, 9 and 10 is contained on single logic card 63015102 of Model 101AL (Figure 7-14,7-15).

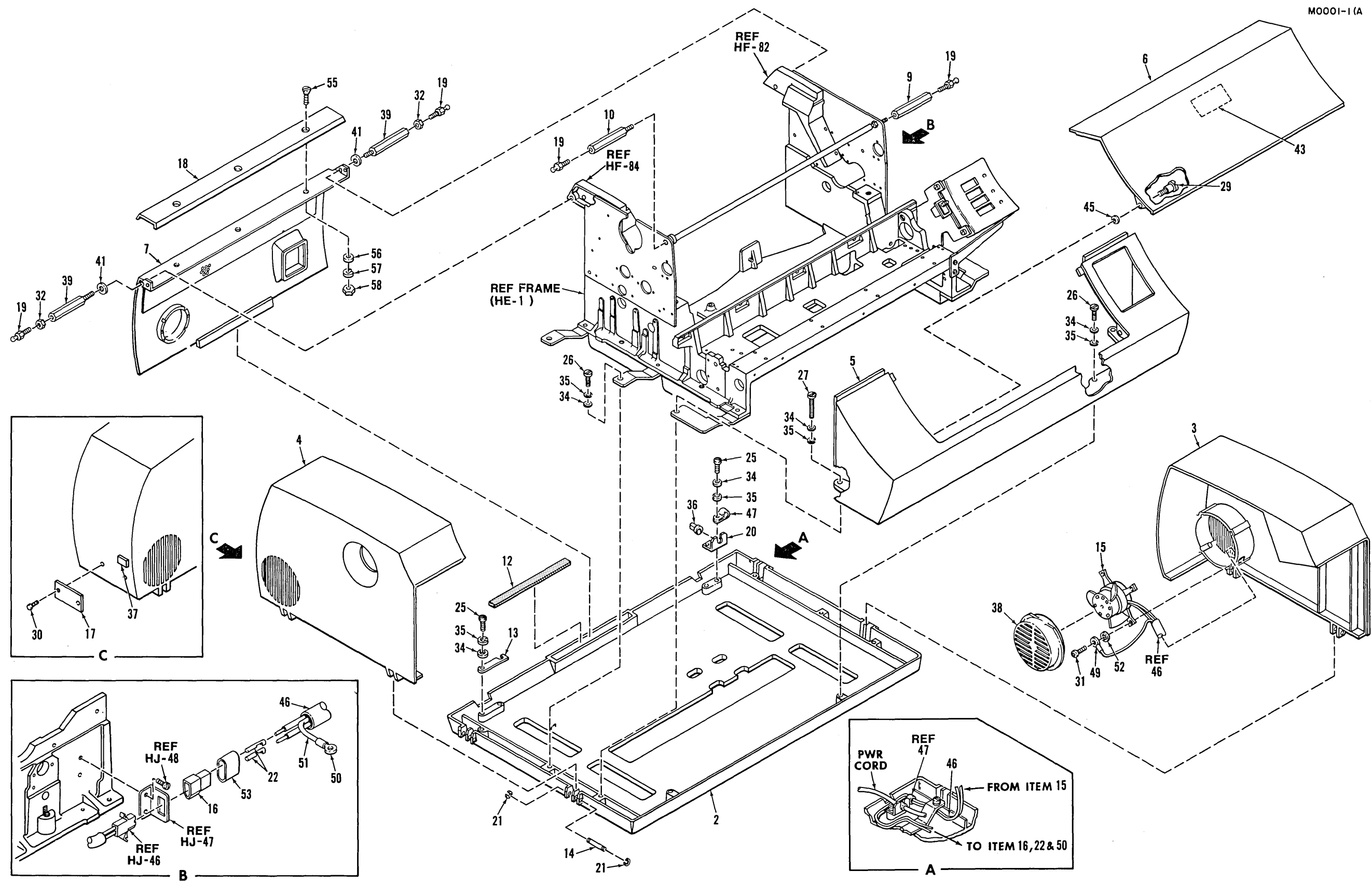


Figure 8-2. COVER ASSEMBLY - A



Figure A. COVER ASSEMBLY 63002354- XXXX

Item Number	Part Number	Description	Quantity
1	525151001-2001	Basic Printer Machine (Shown for Reference only).	1
2	63002334-xxxx	Cover Ass'y,Base (Non-Slotted)	1
3	63002336-xxxx	Cover Ass'y,Right	1
4	63002335-xxxx	Cover Ass'y, Left	1
5	63002337-xxxx	Cover Ass'y, Front	1
6	63002338-xxxx	Cover Ass'y, Top (Pivot)	1
7	63002339-xxxx	Cover Ass'y, Rear	1

The above Cover assembly sub-units are assembled with parts contained in the two following kits designated A and B (6001/6002).

Kit A. Cover Assembly Mounting Hardware 63002601-6001 (Rev. Level F)

9	63002356-2001	Standoff, Ball Stud	1
10	63002357-2001	Standoff, Ball Stud	1
13	63212244-5001	Cable Clamp Ass'y	1
16	31305451-1002	Connector, Plug 2-position w/ears	1
19	33164087-2001	Stud (0.187),ball (6-32 ext. THD)	4
20	63002371-2001	Bracket, Strain Relief	1
25	34527125-2001	Screw, 6-32 x 3/8-in. Ig., Pan Hd.	4
26	34527165-2001	Screw, 6-32 x 1/2-in. Ig, Pan Hd.	6
27	34527245-2001	Screw, 6-32 x 3/4-in. Ig, Pan Hd.	2
32	34722005-2001	Nut, 6-32, Hex	2
34	34922007-2001	Washer, No. 6, Flat	12
35	34828007-2001	Washer, No. 6, Split Lock	12
36	36150003-2001	Bushing, Clamp, Strain Relief (0.360 Dia.)	1
37	62000109-3001	Nameplate, UL	1
39	63002355-2002	Standoff, Ball Stud	2
45	34000071-2013	Washer, Flat, No. 10 x 0.3540D	2
46	39690001-0006	Sleeving, Shrink, 1/4-in. ID	AR
47	36150001-2005	Cable Clamp, 3/8	1
49	31460014-2001	Ring, Terminal, Insul, 22-18 AWG, 2 No. 6	2

M0001-1 (AB)

Item Number	Part Number	Description	Quantity
50	31460014-2003	Ring, Terminal, Insul,22-18 AWG,No.10	1
51	39648505-0008-5	Wire, Type B, 18 AWG, Green	AR
52	34815005-2001	Washer, Int Tooth, Lock, No. 4	1
53	39690001-0009	Sleeving Shrink, 3/4-in. ID, BLK.	AR

Kit B. Printer/Cover Assembly Hardware Kit 63002601-6002 (Rev. Level —)

12	63002324-2001	Rubber Pad	1
14	63002358-2001	Dowel Pin	4
15	32810000-2001	Fan	1
18	525513001-2001	Decorating Plate	1
21	33115103-2025	Ring, Retaining	8
22	31240020-2002	Pin, Terminal, Male	2
29	34000024-2001	Screw, 10-32,Shoulder	2
30	33723717-2010	Screw, 4-24 x 5/16-in. Lg, Pan Hd.,Self-Tap	2
31	33723717-2016	Screw, 4-24 x 1/2-in. Lg,Pan Hd.,Self-Tap	4
38	63002395-2001	Fan Guard	1
41	34932007-2001	Washer, Flat, No. 8	2
55	34312205-2001	Screw, 4-40 x 5/8-in. Flat/Phil/Hd.	3
56	34912005-2001	Washer, Flat, No. 4	3
57	34818005-2001	Washer, Split Lock, No. 4	3
58	34712005-2001	Nut, Hex, 4-40	3
17	62000179-6001	Kit, Serial No. Tag (Not an A or B Kit item) -- supplied with basic machine).	1
43	63002408-3001	Decal, Ribbon Change (Not an A or B kit item--supplied with basic machine).	1

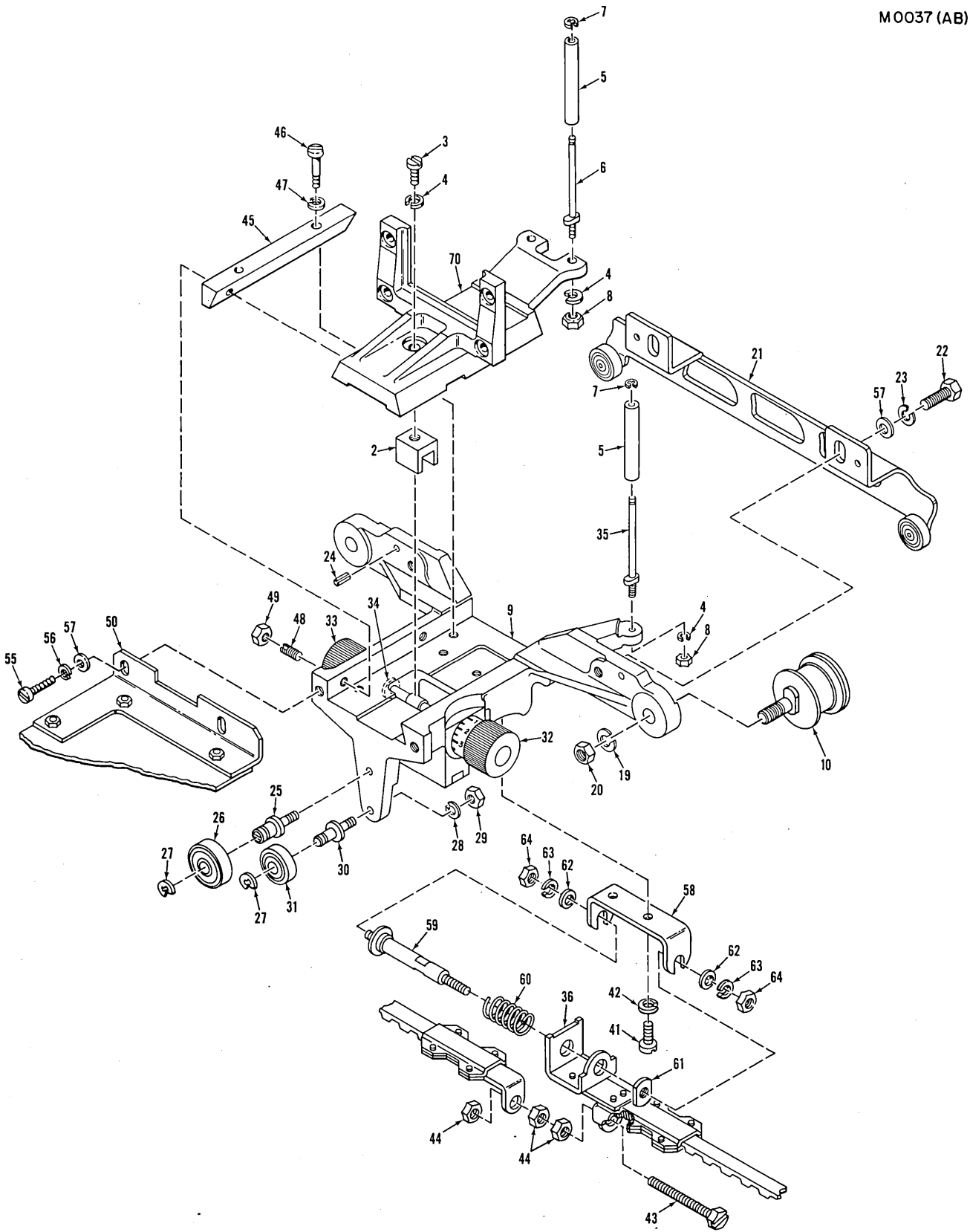


Figure 8-3. CARRIAGE MECHANISM – HA.

Figure HA. CARRIAGE MECHANISM

M0037 (AB)

Item Number	Part Number	Description	Quantity
HA-2	525002001-2001	Fork for head adjustment	1
HA-3	007400716-2001	Screw for HA-2	1
HA-4	028040247-2001	Spring washer for HA-3, 6, 35	3
HA-5	525003000-2001	Ribbon guide roller for head	2
HA-6	525004001-2001	Eccentric shaft for HA-5	1
HA-7	048020346-2001	Snap ring for HA-6, 35	2
HA-8	021400106-2001	Nut for HA-6, 35	2
	525005001-5001	Carriage Unit	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-9	525006001-5001	Carriage with control magnet	1
HA-10	525009001-2001	Guide roller unit (upper)	2
HA-19	028060247-2001	Spring Washer for HA-10	2
HA-20	021060106-2001	Nut for HA-10	2
HA-21	525016001-2001	Guide roller unit (lower)	1
HA-22	017061206-2001	Bolt for HA-21	2
HA-23	028060247-2001	Spring washer for HA-22	2
HA-24	047310642-2001	Spring pin for HA-21	2
HA-25	525020001-2001	Eccentric Axle for HA-26	1
HA-26	527242001-2001	Roller (upper) for HE-23	1
HA-27	048030346-2001	Snap ring for HA-25, 30	2
HA-28	028040247-2001	Spring washer for HA-25, 30	2
HA-29	021400106-2001	Nut for HA-25, 30	2
HA-30	525022001-2001	Axle for HA-31	1
HA-31	527243001-2001	Roller (lower) for HE-23	1
HA-32	525544001-2001	Head penetration knob	1
HA-33	525025001-2001	Head lock knob	1
HA-34	028040247-2001	Spring washer for HA-33	1
HA-35	525027001-2001	Shaft for HA-5	1
HA-36	525029001-5001	Main driving belt	1
HA-41	007300716-2001	Screw for HA-58	2
HA-42	028030247-2001	Spring washer for HA-41	2
HA-43	007064016-2001	Screw for HA-36	1
HA-44	021060106-2001	Nut for HA-43	3
HA-45	525047000-2001	Gib for HA-1	1
HA-46	007301416-2001	Screw for HA-45	2
HA-47	028030247-2001	Spring washer for HA-46	2
HA-48	011401016-2001	Set screw for HA-45	2
HA-49	021400106-2001	Nut for HA-48	2
50	63508104-2001	Bracket, Mtg., Video Amp. Board	1
HA-55	007400816-2001	Screw for item 50	2
HA-56	028040247-2001	Spring washer for HA-55	2
HA-57	025060236-2001	Flat washer for HA-22, 50	4
HA-58	525689001-2001	Holder (A) for HA-59	1
HA-59	525690001-2001	Shaft (A) for HA-36	1
HA-60	525716001-2001	Spring (S) for HA-36	1
HA-61	525691001-2001	Adjusting nut for HA-59	1
HA-62	025040236-2001	Flat washer for HA-59	2
HA-63	550719002-2001	Spring washer for HA-59	2
HA-64	021400106-2001	Nut for HA-59	2
70	529129001-2001	Head Bracket	1

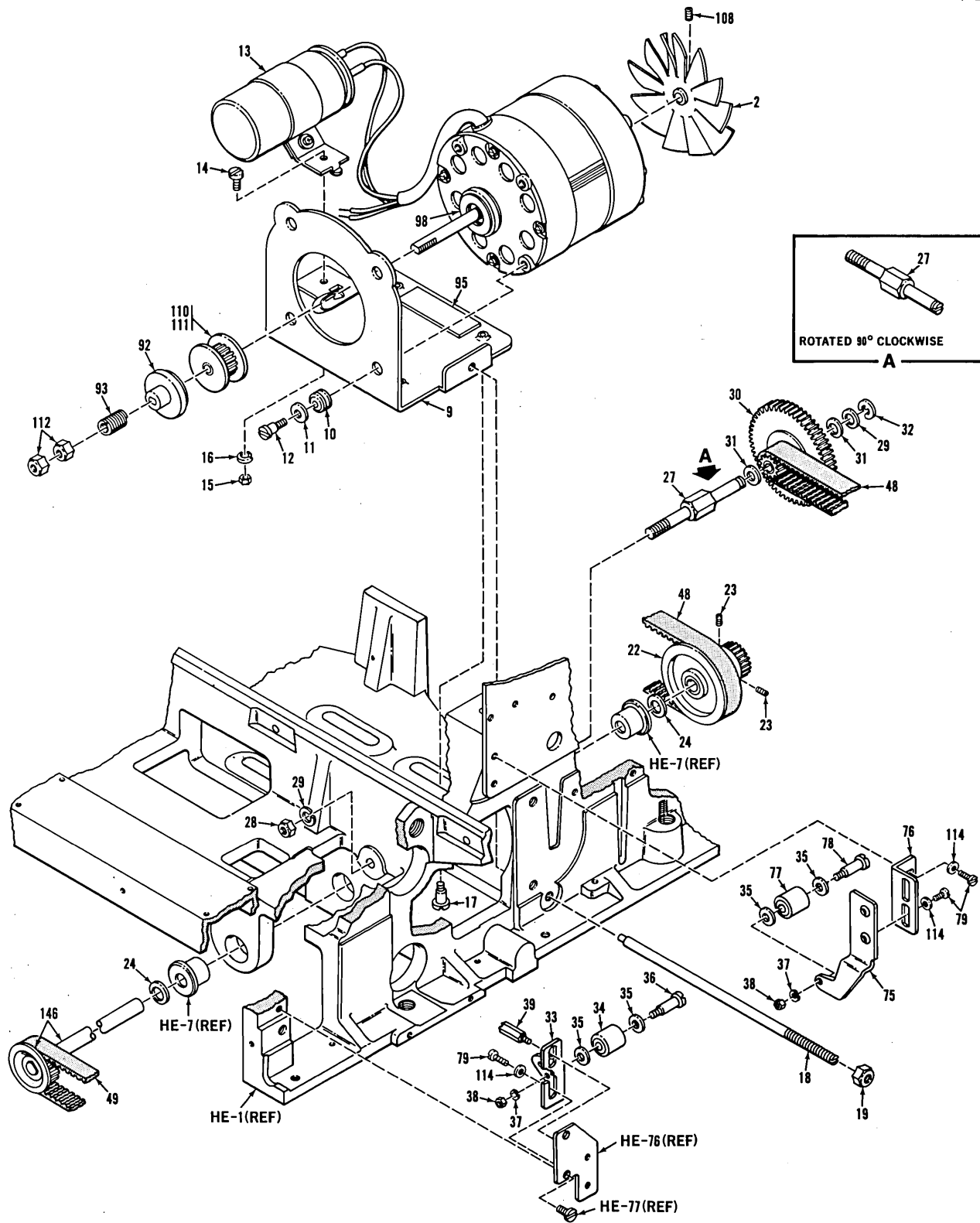


Figure 8-4. DRIVE MECHANISM – HB (PART 1), SERIES 101

Figure HB. DRIVE MECHANISM (PART 1)

M0003-1 (AB)

Item Number	Part Number	Description	Quantity
HB-2	527313001-5001	Main Motor Fan Blade, W/Set-Screw	1
HB-9	525059001-5001	Motor Bracket W/Pad	1
HB-10	510101001-2001	Grommet for HB-98	4
HB-11	510061001-2001	Washer for HB-10	4
HB-12	525063001-2001	Screw for HB-9	4
HB-13	525064001-1001	Capacitor Unit for HB-98	1
HB-14	007400716-2001	Screw for HB-13	1
HB-15	021400106-2001	Nut for HB-14	1
HB-16	028040247-2001	Spring Washer for HB-14	1
HB-17	525066001-2001	Screw for HB-9 and Frame	4
HB-18	525067001-2001	Adjusting bolt for HB-48	1
HB-19	021060106-2001	Nut for HB-18	1
HB-22	525069001-2001	Intermediate Pulley with Gear	1
HB-23	525745001-2001	Set-Screw for HB-22	2
HB-24	525071001-2001	Felt Washer for HB-146	2
HB-27	525075001-2001	Idle Shaft for HB-30	1
HB-28	021060106-2001	Nut for HB-27	1
HB-29	028060236-2001	Spring Washer for HB-27	1
HB-30	525076001-2001	Intermediate Gear for Forward Clutch	1
HB-31	525074001-2001	Felt Washer for HB-30	2
HB-32	048040346-2001	Snap Ring for HB-27	1
	525078001-5001	Tensioner Unit (Front)	1
		Note: This unit is assembled with parts covering from reference number HB-33 to HB-39.	
HB-33	525079001-2001	Tensioner Bracket (Front)	1
HB-34	525080001-2001	Tensioner	1
HB-35	511146001-2001	Felt Washer for HB-34	4
HB-36	525082001-2001	Axle for HB-34	1
HB-37	028030243-2001	Spring Washer for HB-36, 78	2
HB-38	021300106-2001	Nut for HB-36, 78	2
HB-39	525530001-2001	Screw for HB-33	1
HB-48	525672001-2001	Timing Belt (100XL)	2
HB-49	525671001-2001	Timing Belt (130XL)	1
HB	525741001-5001	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	525694001-2001	Tensioner Bracket (Rear) A	1
HB-76	525695001-2001	Tensioner Bracket (Rear) B	1
HB-77	525703001-2001	Tensioner (L)	1
HB-78	525696001-2001	Axle for HB-77	1
HB-79	007400616-2001	Screw for HB-75, 76	5
HB-92	525839001-2001	Motor Pulley Driver	1
HB-93	525749001-2001	Spring for HB-92	1
HB-95	525846001-2001	Cushion Rubber for HB-9	1
HB-98	525836001-5001	Main Motor W/Fan and Clutch Plate	1
HB-108	525748001-2001	Set-screw for HB-2	1
HB-110	527037001-5001	Motor Pulley (60Hz) (Metal)	1
HB-111	527035001-5001	Motor Pulley (50Hz) (Metal)	1
HB-112	021060306-2001	Nut for HB-93	1
HB-114	025040236-2001	Washer for HB-79	5
HB-146	529574001-2001	Intermediate Shaft W/Pulley (Riveted)	5

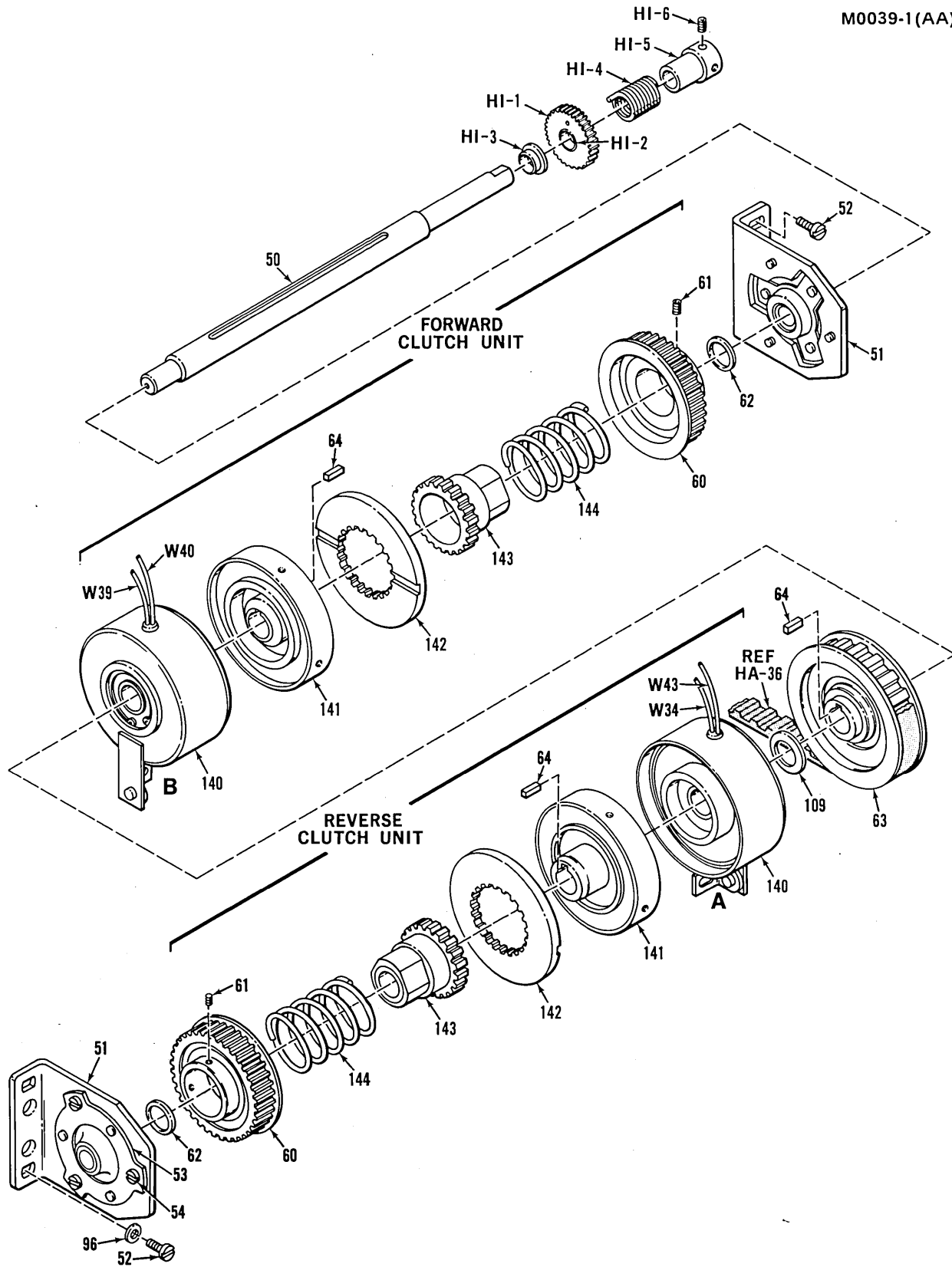


Figure 8-5. DRIVE MECHANISM (PRELOAD CLUTCHES) (PART 2), SERIES 101

Figure HB. DRIVE MECHANISM (PART 2)

M0039-1 (AA)

Item Number	Part Number	Description	Quantity
—	529202001-5001	Pre-load Clutch, Complete NOTE: This unit is assembled with parts covering stem No.'s 50, 60, 61, 63, 64, 109, including Pre-load Clutch Unit Sub. Ass'y (forward and reverse).	1
HB-50	525089001-2001	Shaft for Clutches (with keyway)	1
HB-51	525090001-5001	Bushing Bracket Ass'y	2
HB-52	525752001-2001	Screw for HB-51	4
HB-53	525092001-5001	Bushing Unit for HB-50	2
HB-54	007400616-2001	Screw for HB-53	6
HB-60	525711001-2001	Pulley for Forward and Reverse Clutch	2
HB-61	525744001-2001	Set-Screw for HB-60	4
HB-62	525102001-2001	Sleeve for HB-50	2
HB-63	525104001-2001	Pulley for Main Belt (HA-36)	1
HB-64	525103001-2001	Key for HB-63, 141	3
HB-96	025060236-2001	Washer for HB-52	4
HB-109	525923001-2001	Spacer for HB-140 (Reverse Clutch Side)	1
—	527378001-5001	Pre-Load Clutch Unit Sub. Ass'y (forward, reverse) NOTE: This unit is assembled with parts covering item no. 140, 141, 142, 143 and 144.	2
HB-140	525095001-2001	Clutch Field Ass'y	1
HB-141	527376001-2001	Drive Clutch Rotor	1
HB-142	527329001-2001	Splined Armature	1
HB-143	527328001-2001	Hub	1
HB-144	527327001-2001	Clutch Spring	1

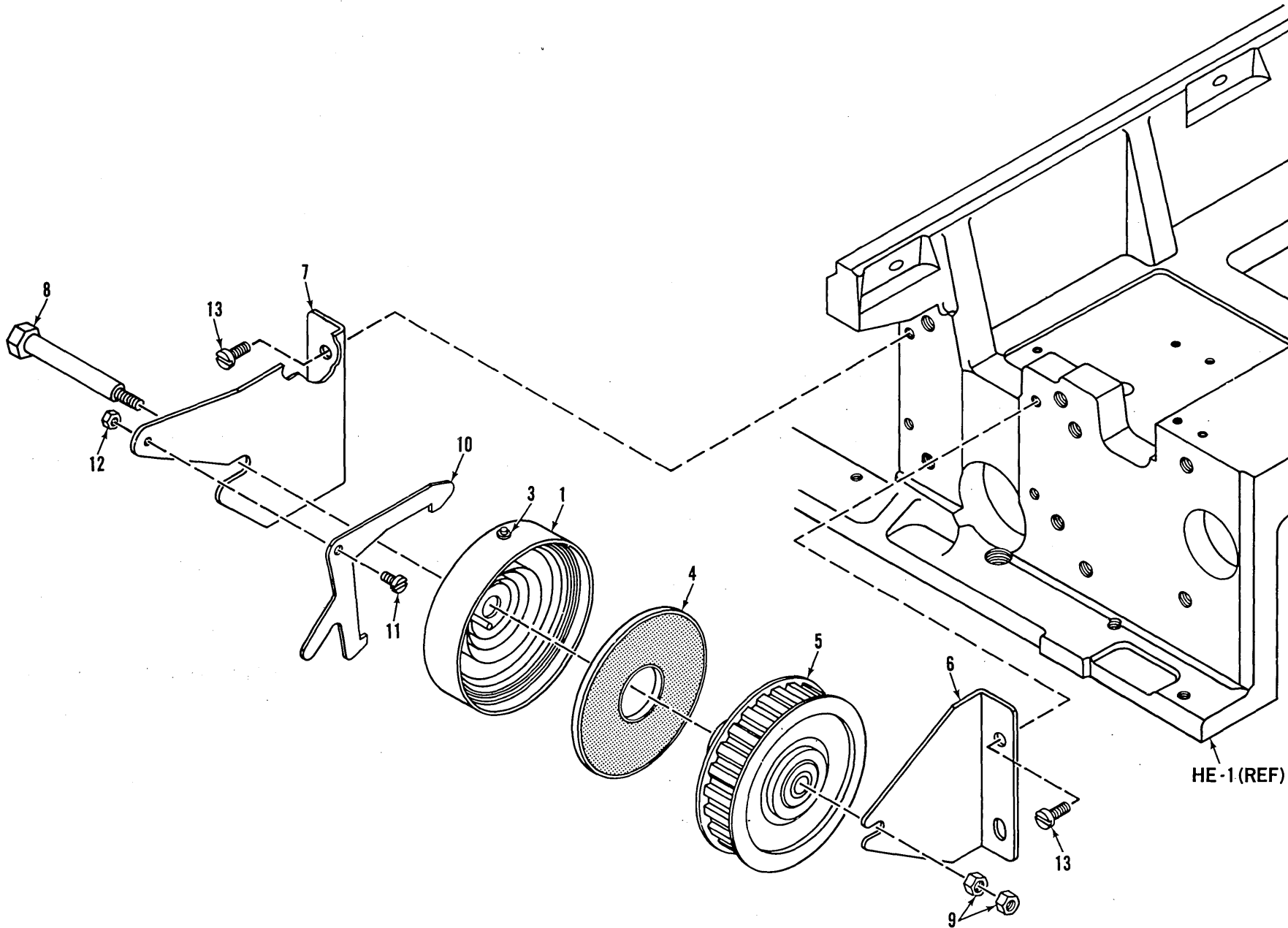


Figure 8-6. SPRING DRUM – HC



Figure HC. SPRING DRUM

M0035 (AA)

Item Number	Part Number	Description	Quantity	Item Number	Part Number	Description	Quantity
	525108001-5001	Spring drum complete unit	1	HC-6	525120001-2001	Bracket (front) for HC-1	1
		Note: This is assembled with parts covering reference number HC-1 and HC-3 through HC-13.		HC-7	525121001-2001	Bracket (rear) for HC-1	1
HC-1	525636001-5001	Spring drum W/main spring	1	HC-8	525119001-2001	Shaft for HC-1,5	1
HC-3	048015346-2001	Snap ring for HC-1	1	HC-9	021400106-2001	Nut for HC-8	2
HC-4	525637001-5001	Shielding plate for HC-1	1	HC-10	525122001-2001	Pawl for HC-1	1
HC-5	525115001-5001	Pulley for HC-1	1	HC-11	007300616-2001	Screw for HC-10	1
				HC-12	021300106-2001	Nut for HC-11	1
				HC-13	007400516-2001	Screw for HC-6 , 7	4

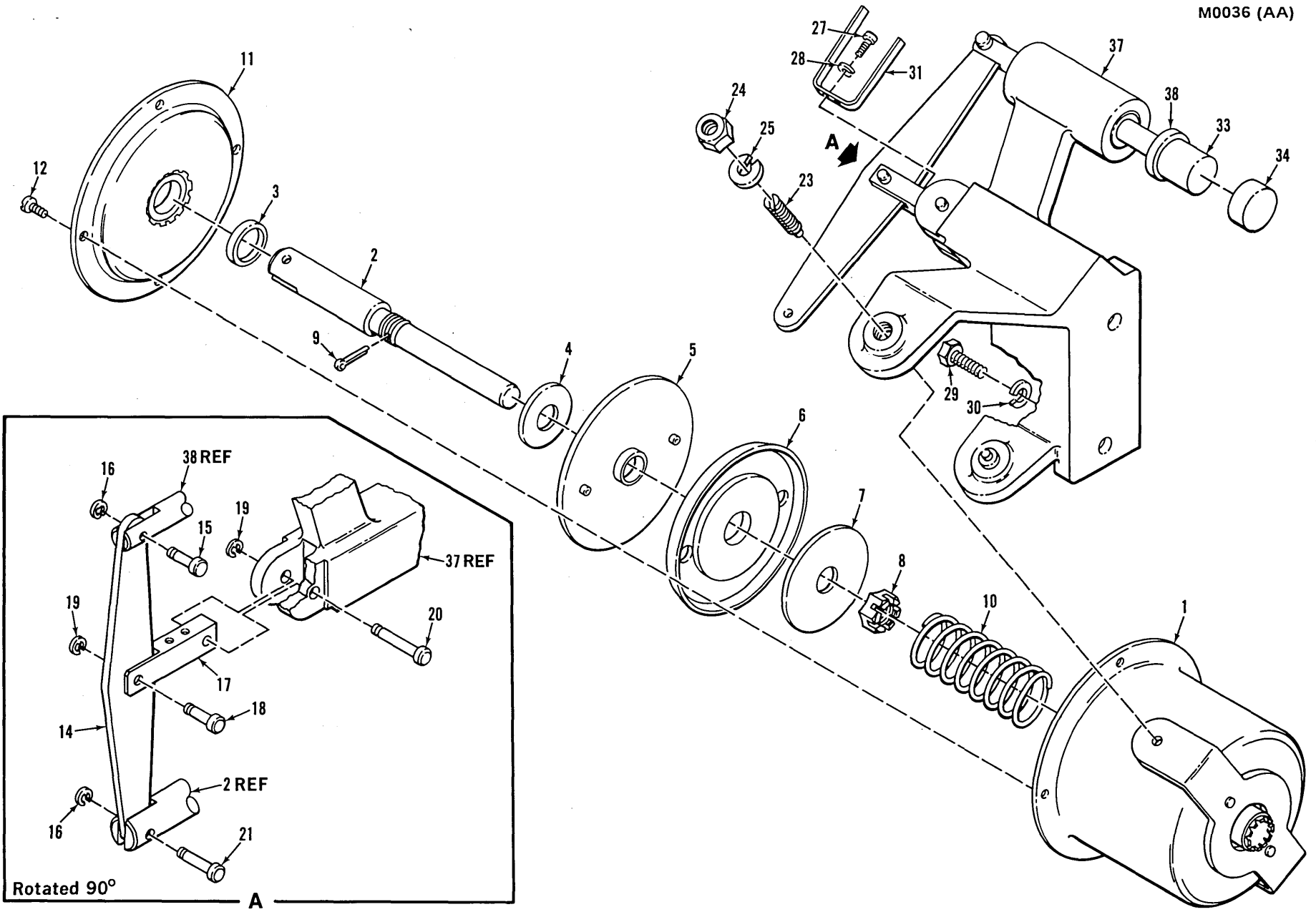


Figure 8-7. DAMPER — HD

8-15

Rev. F

Figure HD. DAMPER

M0036 (AA)

Item Number	Part Number	Description	Quantity	Item Number	Part Number	Description	Quantity
	527363001-5001	Damper complete unit	1	HD-20	525146001-2001	Pin for HD-17	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, HD-37 and HD-38.		HD-21	525147001-2001	Pin for HD-2, 14	1
HD-1	525124001-5001	Damper cylinder	1	HD-23	525148001-2001	Center screw for HD-1	1
HD-2	525128001-2001	Piston rod	1	HD-24	021060106-2001	Nut for HD-23	1
HD-3	525547001-3001	Cushion rubber for HD-4	1	HD-25	028060247-2001	Spring washer for HD-24	1
HD-4	025100236-2001	Washer for HD-2	1	HD-27	007300516-2001	Screw for HD-31	1
HD-5	525129001-2001	Piston	1	HD-28	028030247-2001	Spring washer for HD-27	1
HD-6	525130001-3001	Packing	1	HD-29	525149001-2001	Screw for HD-22	2
HD-7	525131001-2001	Steel Washer for HD-6.	1	HD-30	028060247-2001	Spring washer for HD-29	2
HD-8	525132001-2001	Nut for HD-7	1	HD-31	525661001-2001	Spring for HD-14	1
HD-9	045161806-2001	Split pin for HD-8	1		527318001-5001	Carriage stopper lever unit	1
HD-10	525133001-2001	Spring for HD-2	1			Note: This unit is assembled with the parts covering from reference number HD-33, HD-34, and HD-38.	
HD-11	525134001-5001	Lid for HD-11	4	HD-33	525669000-2001	Damper cushion for HD-32	1
HD-12	007300416-2001	Screw for HD-11	4	HD-34	525919001-2001	Cap for HD-33	1
HD-14	525142001-2001	Arm, Pivot	1	HD-37	527316001-5001	Frame for HD-1	1
HD-15	525143001-2001	Pin for the HD-14, 32	1	HD-38	527319001-2001	Carriage Stopper Lever	1
HD-16	048020346-2001	Snap ring for HD-15, 21	2				
HD-17	525144001-2001	Link for HD-14	1				
HD-18	525145001-2001	Pin for HD-14, 17	1				
HD-19	048030346-2001	Snap ring for HD-18, 20	2				

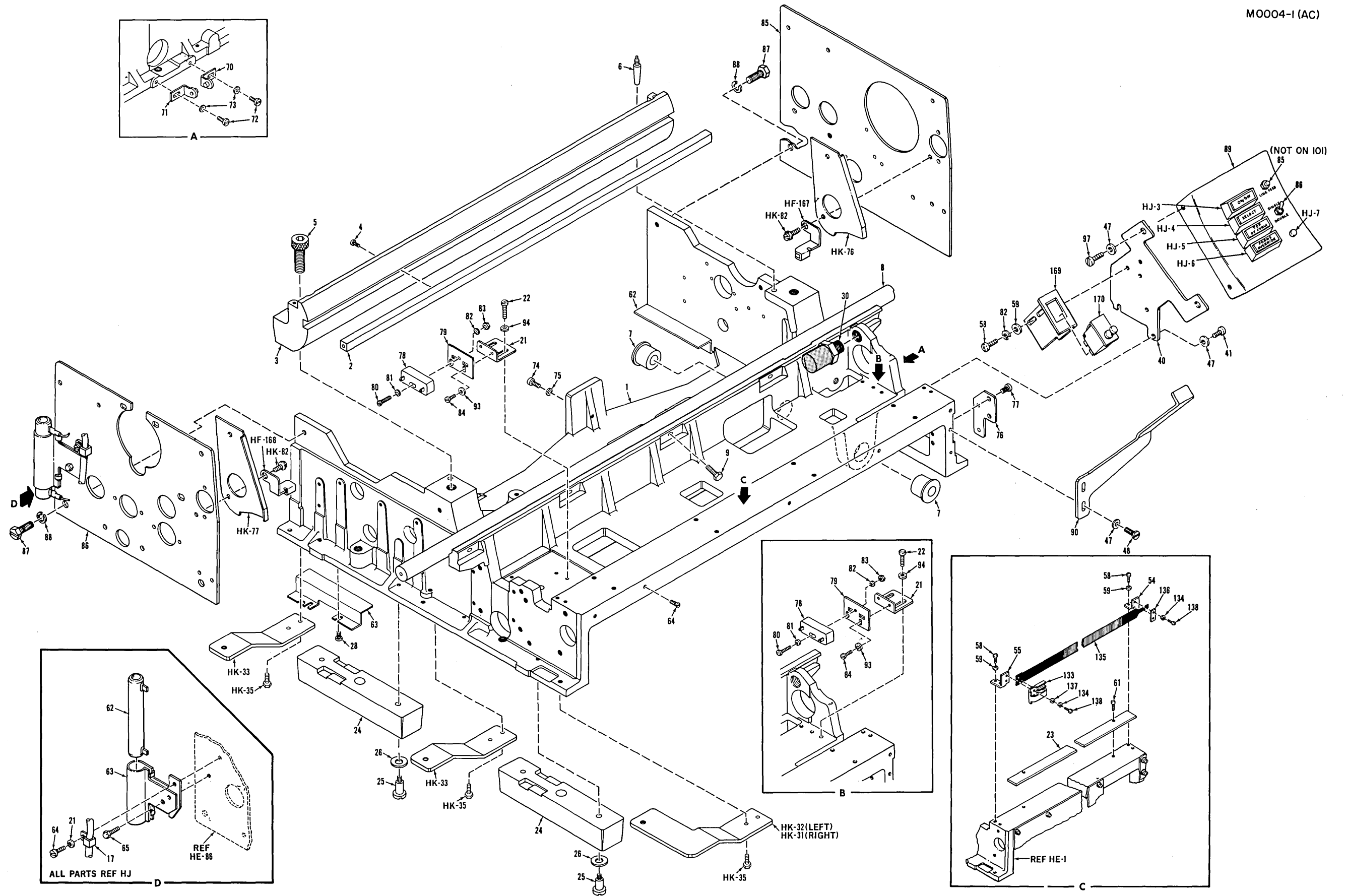


Figure 8-8. FRAME — HE

Figure HE. FRAME

M0004-1 (AC)

Item Number	Part Number	Description	Quantity	Item Number	Part Number	Description	Quantity
HE-1	525151001-5001	Frame	1	HE-81	025030133-2001	Washer for HE-78	1
HE-2	525762001-5001	Platen	1	HE-82	028030247-2001	Spring washer for HE-78, 171	1
HE-3	525761001-2001	Platen holder	1	HE-83	021300106-2001	Nut for HE-78	1
HE-4	007300716-2001	Screw for HE-2	9	HE-84	007300516-2001	Screw for HE-79	2
HE-5	018012826-2001	Bolt for HE-3	2	HE-85	525935001-2001	Chassis (right)	1
HE-6	525154001-2001	Locating bolt for HE-3	2	HE-86	525936001-2001	Chassis (left)	1
HE-7	525155000-2001	Bushing for HB-80	2	HE-87	525752001-2001	Bolt for HE-85, 86	4
HE-8	525866001-2001	Guide bar to carriage	1	HE-88	028060247-2001	Spring washer for HE-87	4
HE-9	017401416-2001	Bolt for HE-8	5	HE-89	525852001-2001	Operator panel (A)	1
HE-21	525169001-2001	Reed switch Holder	2	HE-90	525854001-2001	Support for HE-89	1
HE-22	007300716-2001	Screw for HE-21	4	HE-93	025030133-2001	Washer for HE-84	2
HE-23	525171001-2001	Guide plate for carriage	1	HE-94	025030236-2001	Washer for HE-22	2
HE-24	525181001-2001	Rubber feedt	4	HE-97	007400716-2001	Screw for HE-40	2
HE-25	525182001-2001	Screw for HE-24	8	133	63508140-2001	Clasp, timing fence	1
HE-26	025060335-2001	Washer for HE-25	8	134	34000032-2001	Lockwasher, 3 millimeters (alternate: 028030247)	4
HE-28	007300516-2001	Screw for HE-62, 63	4	135	63002440-1001	Flexible mylar timing fence	1
HE-30	527048001-5001	Carriage stopper right	1	136	63508106-1001	Clamp, timing fence	1
HE-40	525203001-2001	Operator panel holder	1	137	34000052-2001	Washer, flat, 3 millimeter (alternate: 025030236)	2
HE-41	007400616-2001	Screw for HE-40	2	138	34000048-2001	Screw, fill HD M3 P05 x 6mm lg. (alternate;001300716, MP3 x 7mm lg)	4
HE-47	025040235-2001	Washer for HE-48, 41, 97	6	The HK drawing has been deleted but the following parts have been retained for 100 Series Printers.			
HE-48	007401016-2001	Screw for HE-90	2	HK-31	525642001-2001	Cover, Holder (front right)	1
HE-54	525617001-2001	Bracket (right)	1	HK-32	525643001-2001	Cover, Holder (front, left)	1
HE-55	525616001-2001	Bracket (left)	1	HK-33	525644001-2001	Cover, Holder	4
HE-58	007300615-2001	Screw for HE-54, 169	4	HK-35	017501016-2001	Bolt for HK-31, 32, 33	12
HE-59	025030235-2001	Flat washer (M3) for HE-58	4	HK-76	525658001-2001	Cover, (right)	1
HE-61	001400713-2001	Screw for HE-23	4	HK-77	525659001-2001	Cover, (left)	1
HE-62	525647001-2001	Guide plate (right) for cavity	1	HK-82	527984001-2001	Screw for items HK-76,77 and HF-167, 168	2
HE-63	525648001-2001	Guide plate (left) for cavity	1	85	39092502-1001	Switch, pushbutton (SPST), Manual Line Feed	1
HE-64	005300814-2001	Screw for power driver board cavity	4	86	39092000-1001	Switch, toggle (SPDT), single/double Line feed, option	1
HE-70	525633001-5001	Clutch stop (right) (View A)	1	HF-167	527895001-2001	Pin feed cover holder (R)	1
HE-71	525631001-5001	Clutch stop (left) (View B)	1	HF-168	527896001-2001	Pin feed cover holder (L)	1
HE-72	007400616-2001	Screw for HE-70, 71	2	—	63002687-6001	Kit, Top Cover Switch	1
HE-73	025040236-2001	Washer for HE-72	2	Note: This kit is assembled with parts covering items 169, 170 HE-58, HE-59 and HE-82.			
HE-74	007400816-2001	Screw for cavity	2	HE-78	525721001-5001	Limit switch (reed) w/case	1
HE-75	028040247-2001	Washer for HE-74	2	HE-79	525725001-2001	Adjusting holder for HE-78	1
HE-76	525187001-2001	Holder for HB-33	1	HE-80	001301403-2001	Screw for HE-78	1
HE-77	007400616-2001	Screw for HE-76	2				
—	525720001-5001	Encased limit switch (reed) complete unit	2				
Note: This unit is assembled with parts including reference numbers HE-78 through HE-84, and HE-21, HE-22.							

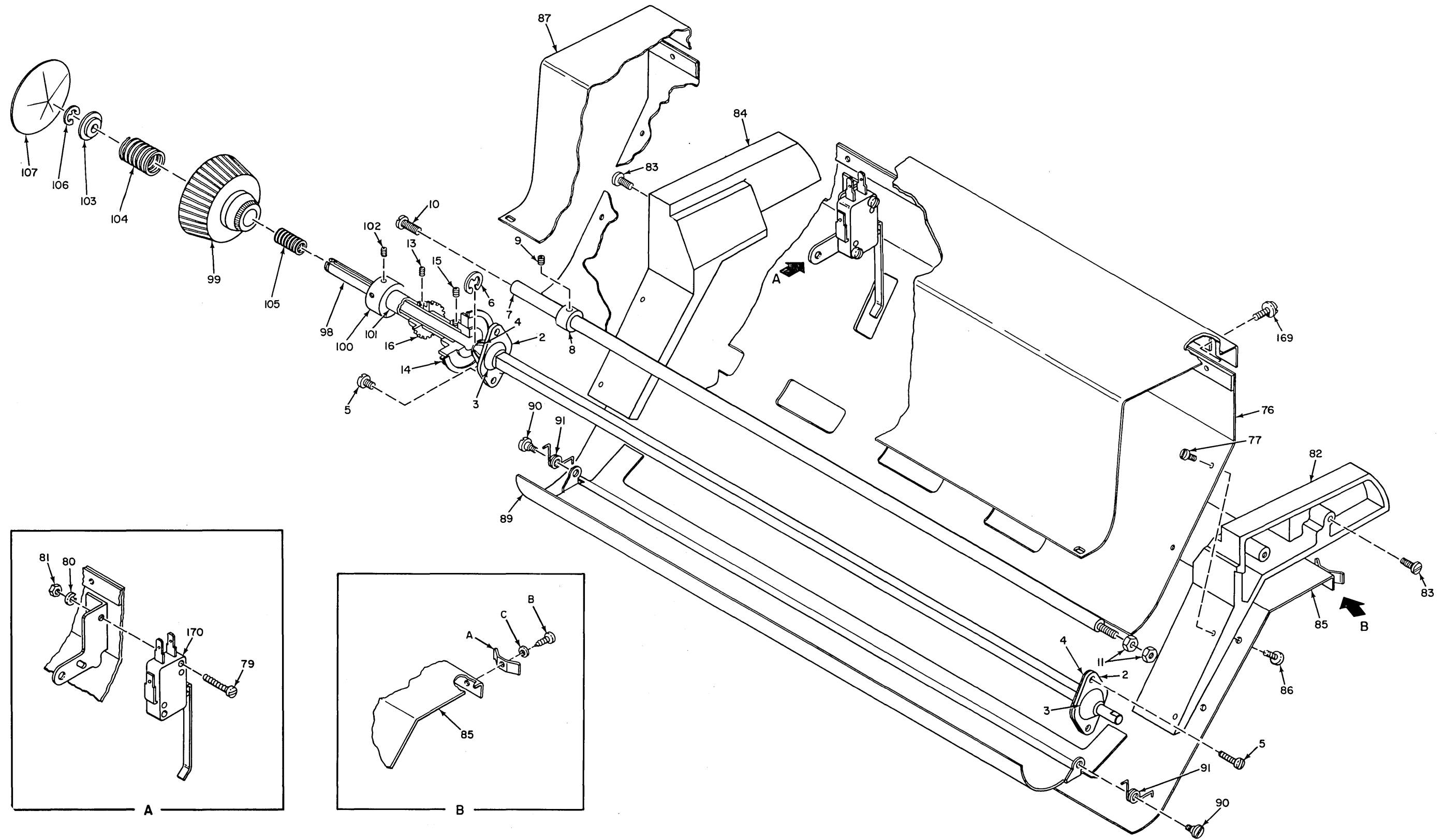
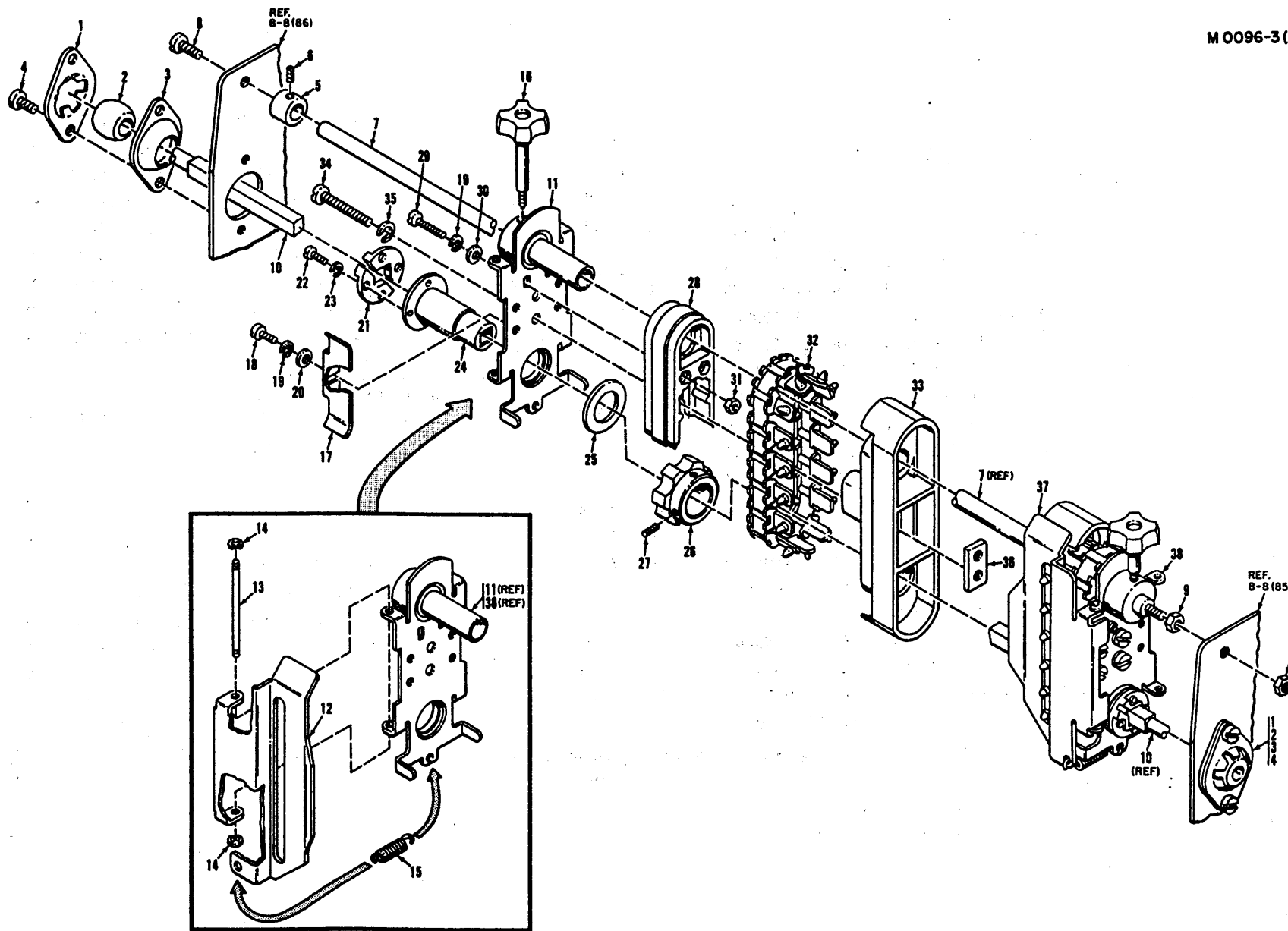


Figure 8-9. PAPER FEED MECHANISM – HF

Figure HF. PAPER FEED MECHANISM

M0005 (AC)

Item Number	Part Number	Description	Quantity
HF-2	525207001-2001	Holder for HF-3	2
HF-3	525208001-2001	Bushing for HF-98	2
HF-4	527981000-2001	Retainer for HF-3	2
HF-5	007400516-2001	Screw for HF-2, 4	4
HF-6	048050346-2001	Snap ring for HF-98	1
HF-7	525210001-2001	Guide bar for pin feed unit	1
HF-8	525551001-2001	Collar for pin feed unit	1
HF-9	525743001-2001	Set-screw for HF-8	1
HF-10	007401016-2001	Screw for HF-7	1
HF-11	021400106-2001	Nut for HF-7	2
HF-13	525747001-2001	Set-screw for HF-16	4
HF-14	525213001-2001	Pin feed Pulley	1
HF-15	525743001-2001	Set-screw for HF-14	2
HF-16	525215000-2001	FF reader gear	1
HF-76	525855001-5001	Paper pan (upper)	4
HF-77	007400816-2001	Screw for HF-76	4
HF-79	007021616-2001	Screw for item 170	2
HF-80	028020247-2001	Spring washer for HF-79	2
HF-81	021020106-2001	Nut for HF-79	2
HF-82	525273000-2001	Guide (right) for HF-77, 85	1
HF-83	007401016-2001	Screw for HF-82, 84	4
HF-84	525274000-2001	Guide (left) for HF77, 85	1
HF-85	525859001-5001	Paper pan (lower)	1
HF-86	007400816-2001	Screw for HF085	4
HF-87	525276001-2001	Pin feed cover	1
HF-89	525763001-5001	Paper pan (front)	1
HF-90	525278001-2001	Screw for HF-89	2
HF-91	525861001-2001	Spring for HF-89	2
HF-98	527081001-2001	Paper feed drive shaft	1
HF-99	525764001-2001	Paper feed knob	1
HF-100	525769001-2001	Coupler for HF-99	1
HF-101	525770001-2001	Sleeve for HF-100	1
HF-102	525748001-2001	Screw for HF-100	2
HF-103	525766001-2001	Collar for HF-99	1
HF-104	525767001-2001	Spring for HF-99	1
HF-105	525768001-2001	Spring for HF-99	1
HF-106	048040345-2001	Snap ring for HF-99 (4.0mm OD x 3.51 mm ID)	1
HF-107	525227001-2001	Decorative cap for HF-99	1
HF-108	025630236-2001	Washer for HF-79	2
A	529023000-2001	Clip, static ground	1
B	33723717-2010	Screw, Sheet metal, No. 4	1
C	34815005-2001	Washer, Internal, Lock	1
HF-111	529316001-6001	Platen knob kit	1
Note: This kit is assembled with parts covering from HF-98 through HF-107.			
HF-169	527975001-2001	Screw for item HF-87	4
HF-170	525272001-1001	Micro switch (paper empty) (with attached activator arm)	1



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Rev. F

Figure 8-10. PIN FEED MECHANISM (LEFT AND RIGHT) – HG



Figure HG. PIN FEED MECHANISM

M0096-3 (AA)

Item Number	Part Number	Description	Quantity	Ref. Symbol	Item Number	Part Number	Description	Quantity	Ref. Symbol
1	527981000-2001	Holder, Retainer (B)	2	HF-4	20	025030236-2001	Washer for item 8	4	—
2	525208001-2001	Bearing, Retainer (D)	2	HF-3	21	527415001-2001	Set Plate, Paper Drive Slide Shaft	4	HG-27
3	525207001-2001	Holder, Retainer (A)	2	HF-2	22	007029316-2001	Screw for item 21	8	—
4	007400515-2001	Screw for Items 1, 2, 3	4	HF-5	23	028020247-2001	Washer, lock, spring	8	—
5	525551001-2001	Pin Feed Stopper	1	HF-8	24	527406001-2001	Drive Sleeve	2	HG-26
6	525743001-2001	Set-screw for item 5	1	HF-9	25	527407001-2001	Spacer for item 26	2	HG-31
7	525210001-2001	Shaft, Guide, Paper Feed	1	HF-7	26	527408001-2001	Drive Pulley for item 24	2	HG-30
8	007401015-2001	Screw for item 7	1	HF-10	27	525747001-2001	Set-Screw for item 26	4	HG-32
9	021400105-2001	Nut for item 8	2	HF-11	28	527405000-2001	Idler Slide	2	HG-33
10	527081001-2001	Shaft, Paper Feed	1	HF-98	29	007301616-2001	Screw for item 28	4	—
<b>PIN FEED ASSEMBLY</b>					30	025030136-2001	Washer, Flat for item 29	4	—
—	527447001-5001	Pin Feed Unit (Left), Complete Note: This unit is assembled with parts covering item No. 11 through 36.	1	HG-52	31	021300106-2001	Nut for item 29	4	HG-36
					32	527449001-5001	Pin Feed Belt Unit	2	HG-38
					33	527793001-5001	Belt Guide Unit	2	HG-39
					34	007402806-2001	Screw for item 33	4	HG-40
11	527792001-5001	Holder, Pin Feed (left)	1	HG-53	35	028040247-2001	Washer, Lock, Spring for item 34	4	HG-41
12	527419001-2001	Gate, Paper Holder (left)	1	HG-54	36	527414001-2001	Plate Nut for item 34	2	HG-42
13	527418001-2001	Pin for item 12, 37	2	HG-48	37	527417001-2001	Gate, Paper Holder (right)	1	HG-47
14	048015346-2001	Snap-Ring for item 13	4	—	38	527448001-5001	Pin Feed Holder (right)	1	HG-25
15	527806001-2001	Spring for item 12, 37	2	HG-50	—	527446001-5001	Pin Feed Unit (right), complete	1	HG-24
16	527422001-2001	Knob, Locking (all models)	2	HG-51	Note: This unit is assembled with part numbers covering from items 13 through 38.				
17	527416001-2001	Guide, Pin Attachment	2	HG-43					
18	007309406-2001	Screw for item 17	4	—					
19	028030243-2001	Washer, lock, spring	8	—					

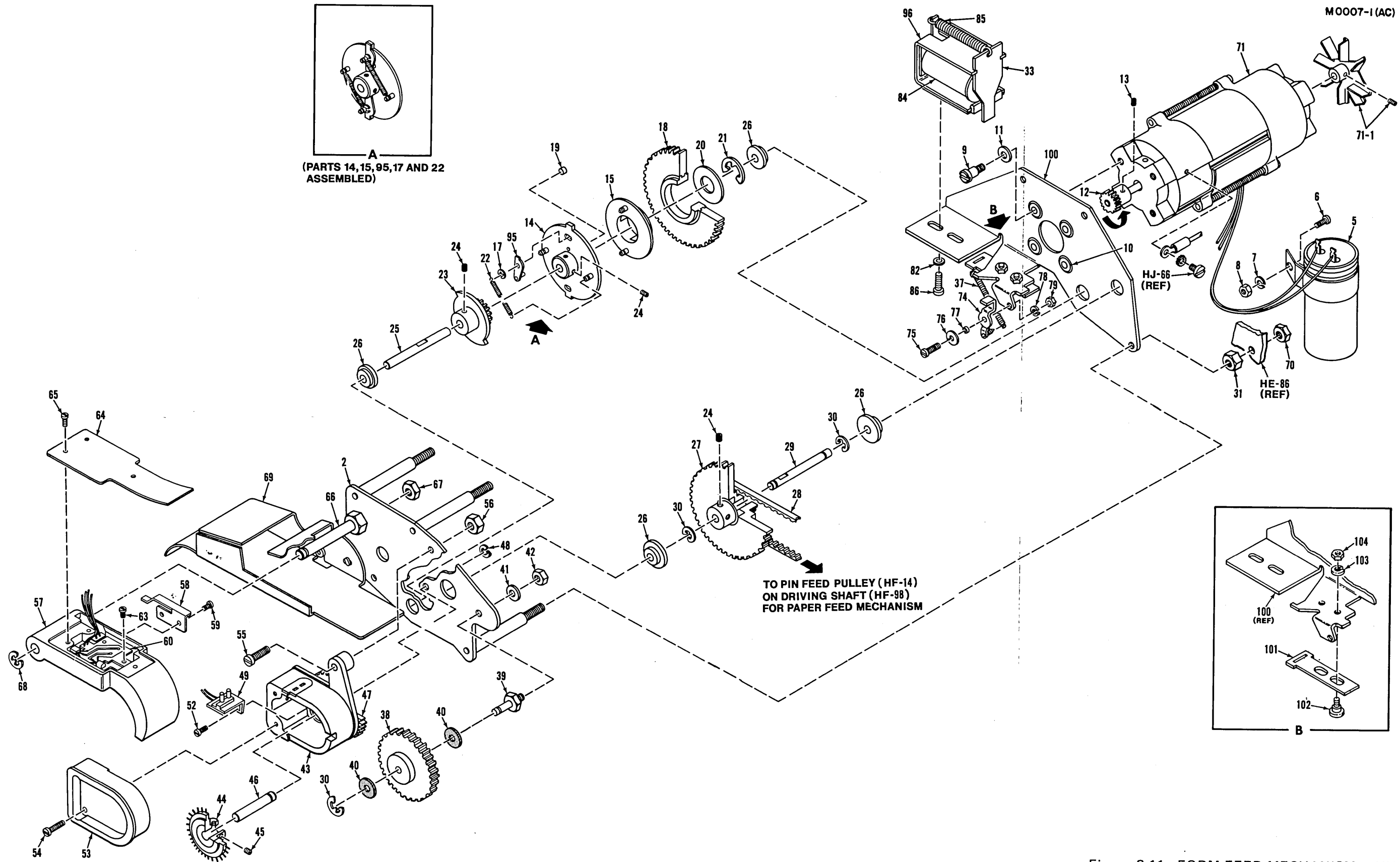
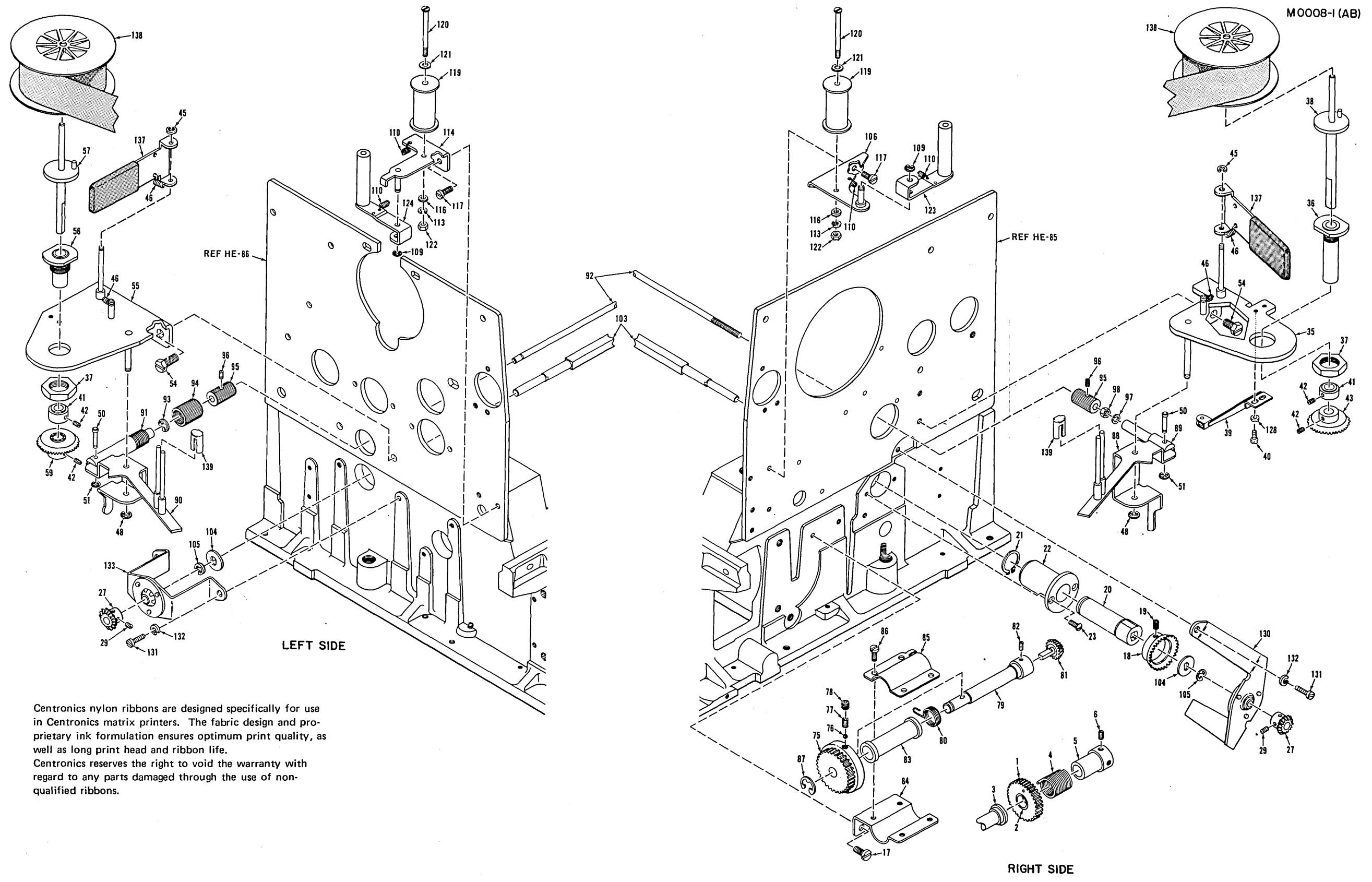


Figure 8-11. FORM FEED MECHANISM - HH

Figure HH. FORM FEED MECHANISM

M0007-1 (AC)

Item Number	Part Number	Description	Quantity	Item Number	Part Number	Description	Quantity	Item Number	Part Number	Description	Quantity
HH-0	529217001-6001	Form feed complete unit (light emitting diode) Note: This unit is assembled with parts covering from reference No. HH-2, HH-5 through HH-31 and HH-33, HH-37 through HH-49, HH-52 through 60, HH-63 through HH-71-1, and HH-74 through HH-80, HH-82 through HH-86, 95, HH-96 and 100 through 104.	1	HH-27	525344001-2001	FF idle gear	1	—	529419001-5001	Tape reader unit (upper) Note: This unit is assembled with parts covering from reference No. HH-57 to HH-60 and HH-63 to HH-65.	1
HH-2	525316001-2001	FF Chassis (left)	1	HH-28	525346001-2001	Timing belt (70XL) for HH-27	1	HH-57	525376001-2001	Reader bracket (upper)	1
HH-5	525323001-1001	Capacitor with bracket for HH-71	1	HH-29	525355001-2001	Shaft for HH-27	1	HH-58	525377001-2001	Plate spring for HH-57	1
HH-6	007400615-2001	Screw for HH-5, M4, 6mm lg. Flat/ Fil Hd.	1	HH-30	048040346-2001	Snap ring for HH-29, 39	3	HH-59	007300416-2001	Screw for HH-57	2
HH-7	028040247-2001	Spring washer for HH-6	1	HH-31	525356001-2001	Nut for HH- 2	3	HH-60	529386001-4001	Reader P/C board unit (upper)	1
HH-8	021400106-2001	Nut for HH-7	1	—	527032001-5001	FF clutch and magnet unit Note: This unit is assembled with parts covering from reference No. HH-33, HH-84, HH-85, and HH-76.	1	HH-63	007020416-2001	Screw for HH-60	2
HH-9	525326001-2001	Stud screw for HH-71	4	HH-33	525351001-2001	Armature for HH-96	1	HH-64	525388001-2001	Lid for HH-57	1
HH-10	510101001-2001	Rubber Grommet, for HH-71	4	HH-37	511091001-2001	Spring for backstopper	1	HH-65	007020416-2001	Screw for HH-64	3
HH-11	510061001-2001	Washer for HH-9	4	HH-38	525357001-2001	FF reader idle gear	1	HH-66	525389001-2001	Shaft for HH-57	1
HH-12	525328001-2001	FF motor gear	1	HH-39	525359001-2001	Shaft for HH-38	1	HH-67	021400106-2001	Nut for HH-66	1
HH-13	525743001-2001	Set-screw for HH-2	1	HH-40	511146001-2001	Felt washer for HH-38	2	HH-68	048040346-2001	Snap ring for HH-66	1
	525329001-5001	FF clutch unit Note: This unit assembled with parts covering from reference No. HH-14 to HH-22, HH-24 and 95.	1	HH-41	025040236-2001	Washer for HH-42	1	HH-69	525390001-2001	Tape guide	1
HH-14	525330001-5001	FF clutch inside cam	1	HH-42	021400106-2001	Nut for HH-39	1	HH-70	021400106-2001	Nut for form feed complete unit	3
HH-15	525333001-4001	FF clutch releaser	1	—	63002671-4001	Tape reader ass'y, light emitting diode, Metric Note: This two-part ass'y is made up of the following items: tape reader Unit, (lower) 528532001-5001, and Tape reader unit (upper) 529419001-5001	1	71	525319001-1001	FF motor/fan blade	1
HH-17	048020346-2001	Snap ring for HH-15, 16	2	HH-43	527172001-2001	Reader bracket (lower)	1	71-1	527314001-5001	Fan w/set - screw, FF motor	1
HH-18	525339001-2001	FF clutch gear	1	HH-44	525363001-2001	Sprocket for tape	1	HH-74	525753001-5001	Back stopper	1
HH-19	508532001-2001	Roller for HH-14	3	HH-45	525746001-2001	Set-screw for HH-44	2	HH-75	007300803-2001	Screw for HH-74	1
HH-20	525341001-2001	Guide for HH-19	1	HH-46	525365001-2001	Shaft for HH-44	1	HH-76	503092001-2001	Washer for HH-74	1
HH-21	048080346-2001	Snap ring for HH-20	1	HH-47	525366001-2001	Gear for HH-46	1	HH-77	525756001-2001	Collar for HH-74	1
HH-22	510062001-2001	Spring for HH-14, 16	2	HH-48	048030346-2001	Snap ring for HH-46	1	HH-78	028030247-2001	Spring washer for HH-74	1
HH-23	525342001-2001	Gear with stop cam	1	HH-49	528534001-4001	Reader, LED holder unit (lower)	1	HH-79	021300106-2001	Nut for HH-74	1
HH-24	525743001-2001	Set-screw for HH-14, 23, 27	6	HH-52	007020416-2001	Screw for HH-49	1	HH-82	025030236-2001	Washer for HH-83	2
HH-25	525354001-2001	Shaft for FF clutch	1	HH-53	525374001-2001	Lid for HH-43	1	HH-84	527027001-1001	Solenoid for HH-96	1
HH-26	525353001-2001	Bushing for HH-25, 28	4	HH-54	007301216-2001	Screw for HH-53	2	HH-85	527026001-2001	Spring (for HH-33)	1
				HH-55	007401416-2001	Screw for HH-43	2	HH-86	527249001-2001	Screw (for HH-96)	2
				HH-56	021400106-2001	Nut for HH-55	2	95	527853001-2001	FF clutch releasing pawl	2
								HH-96	527856001-1001	FF magnet (A) (air-gap)	1
								—	529861001-5001	P.F. Chassis Assembly Note: This unit is assembled with parts covering ref. No. 100 through 104.	1
								100	525902001-2001	FF Chassis , right	1
								101	525903001-2001	Clutch slide pawl for item 100	1
								102	529461001-2001	Screw, shoulder for item 101	2
								103	02830243-2001	Spring washer M3 for item 102	2
								104	021300105-2001	Nut, hex, M3 PO.5 for item 102	2



Centronics nylon ribbons are designed specifically for use in Centronics matrix printers. The fabric design and proprietary ink formulation ensures optimum print quality, as well as long print head and ribbon life. Centronics reserves the right to void the warranty with regard to any parts damaged through the use of non-qualified ribbons.

Figure 8-12. RIBBON FEED MECHANISM — HI  
8-25 Rev. F

Figure HI. RIBBON FEED MECHANISM

M0008-1 (AB)

Item Number	Part Number	Description	Quantity	Item Number	Part Number	Description	Quantity	Item Number	Part Number	Description	Quantity
HI-1	525391001-2001	Clutch gear	1	—	525446001-5001	Ribbon spool holder complete unit (left).	1	HI-96	525746001-2001	Set-screw for HI-95	2
HI-2	525392001-2001	Bushing for HI-1	1			Note: This part is assembled with parts reference No. HI-37, 41, 42, 44, 45, 46, 48, 50,51 and HI-55 through HI-59 and HI-90, 91.		HI-97	028040247-2001	Spring washer for HI-89	1
HI-3	525393001-2001	Spacer for HI-1	1					HI-98	021400106-2001	Nut for HI-89	1
HI-4	525394001-2001	Clutch spring	1	HI-55	525447001-5001	Ribbon spool holder (left)	1	HI-99	525667001-5001	Tension roller holder (right)	1
HI-5	525395001-2001	Sleeve for HI-4	1	HI-56	525450001-2001	Bearing for HI-57	1	HI-103	525730001-2001	Driving slide shaft A	1
HI-6	525744001-2001	Set-screw for HI-5	2	HI-57	525451001-5001	Ribbon spool shaft (left)	1	HI-104	525731001-2001	Washer for HI-103	2
HI-17	007400516-2001	Screw for HI-84	2	HI-59	525454001-2001	Bevel gear (left) for HI-57	1	HI-105	048050347-2001	Snap ring for HI-103	2
HI-18	525404001-2001	Driving bevel gear	1	—	525396001-5001	Driving shaft unit	1	—	525464001-5001	Guide roller unit (right)	1
HI-19	525743001-2001	Set-screw for HI-18	2			Note: This part assembled with parts covering reference No. HI-75 through HI-87.		HI-106	525465001-5001	Guide roller holder (right)	1
HI-20	525407001-2001	Sleeve for HI-19	1	HI-75	525398001-2001	Driving gear for HI-79	1	HI-109	048025346-2001	Snap ring for HI-106, 114	2
HI-21	048140145-2001	Snap ring for HI-20	1	HI-76	071039750-2001	Ball for HI-75	1	HI-110	512463001-2001	Spring for HI-106, 114,123,124	4
HI-22	525408001-2001	Bushing for HI-20	1	HI-77	525630001-2001	Spring for HI-76	1	HI-113	028030247-2001	Spring washer for HI-120	2
HI-23	005300814-2001	Screw for HI-22	2	HI-78	012500516-2001	Set-screw for HI-77	1	—	525475001-5001	Guide roller unit (left)	1
HI-27	525411001-2001	Bevel gear for HI-103	2	HI-79	525397001-2001	Driving shaft	1			Note: This part is assembled with parts covering reference HI-110 through HI-117, and HI-119 through HI-122	
HI-29	525746001-2001	Set-screw for HI-27	4	HI-80	525399001-2001	Clutch spring for HI-79	1	HI-114	525476001-5001	Guide roller holder (left)	1
—	525420001-5001	Ribbon spool holder complete unit (right)	1	HI-81	525400001-2001	Bevel gear for HI-79	1	HI-116	025030236-2001	Washer for HI-120	2
		Note: This unit is assembled with parts covering reference No. HI-35 through HI-51 and HI-88, HI-89.		HI-82	525748001-2001	Set-screw for HI-81	2	HI-117	007400516-2001	Screw for HI-106, 114	4
HI-35	525421001-5001	Ribbon spool holder (right)	1	HI-83	525401001-2001	Bushing for HI-79	1	HI-119	525932000-2001	Guide roller	2
HI-36	525426001-2001	Bearing for HI-38	1	HI-84	525402001-2001	Holder for HI-83	1	HI-120	525992001-2001	Screw for HI-119	2
HI-37	525427001-2001	Nut for HI-36, 56	2	HI-85	525403001-2001	Cover for HI-83	1	HI-121	025030336-2001	Washer for HI-119	2
HI-38	525429001-5001	Ribbon spool shaft (right)	1	HI-86	007300416-2001	Screw for HI-85	4	HI-122	021300106-2001	Nut for HI-120	2
HI-39	525441001-5001	Control spring for HI-88	1	HI-87	048070346-2001	Snap ring for HI-79	1	HI-123	527049001-5001	Tension lever unit (right)	1
HI-40	007300516-2001	Screw for HI-39	2	HI-88	525681001-5001	Reverse control lever (right)	1	HI-124	527202001-5001	Tension lever unit (left)	1
HI-41	525433001-2001	Collar for HI-57, 38	2	HI-89	525697001-2001	Connector (R.A.) for HI-92	1	HI-128	025030133-2001	Washer for HI-40	2
HI-42	525747001-2001	Set-screw for HI-41, 43, 59	8	HI-90	525682001-5001	Reverse control lever (left)	1	HI-130	527322001-2001	Holder for HI-103 (right)	1
HI-43	525434001-2001	Bevel gear (right) for HI-38	1	HI-91	525698001-2001	Connector (L.A.) for HI-92	1	HI-131	007400816-2001	Screw for HI-130 and HI-133	4
HI-45	048020346-2001	Snap ring for HI-137	2	HI-92	525700001-2001	Ribbon reversing rod	1	HI-132	028040247-2001	Washer, spring for HI-131	4
HI-46	512462001-2001	Spring for HI-137, 35, 55	4	HI-93	525700001-2001	Ribbon reversing rod	1	HI-133	527323001-2001	Holder for HI-103 (left)	1
HI-48	048025346-2001	Snap ring for HI-35, 55	2	HI-94	048030346-2001	Snap ring for HI-92	1	HI-137	526817001-6001	Ribbon holding plate ass'y (with Pad)	2
HI-48	048025346-2001	Snap ring for HI-35, 55	2	HI-94	525699001-2001	Coupler for HI-91	1	HI-138	63002293-5001XP	Twin ribbon spool ass'y 3-inches(Black)	2
HI-50	525440001-2001	Pin for HI-89, 91	2	HI-95	525702001-2001	Stopper for HI-89, 94	2	HI-139	63002294-2001	Cap for item HI-88, 90	2
HI-51	048020346-2001	Snap ring for HI-50	2								
HI-54	525541001-2001	Bolt for HI-35, 55	4								

Figure 8-13 ELECTRICAL HARDWARE HJ (No Illustration)

Item Number	Part Number	Description	Quantity
HJ-1	525733001-4001	Transformer unit (multitap)	1
HJ-2	007402216-2001	Screw for HJ-1 and frame	4
HJ-3	525492001-1001	ON/OFF switch (1820-RL-Molex)	1
HJ-4	525493001-1001	SELECT switch (1820-RL-Molex)	1
HJ-4A	37253790-1001	Lamp, (GE 379 equiv. -screw-base) 5-volt for HJ-3,4	1
HJ-5	525494001-1001	TOP OF FORM switch	1
HJ-6	525495001-1001	FORMS OVERRIDE switch	1
HJ-7	525496001-1001	Lamp for PAPER EMPTY, multiple purpose	2
HJ-8	525542000-2001	Clip for HJ-7	2
HJ-9	525564000-1001	*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	527234000-1001	Connector cover for item HJ-9	1
HJ-10	525548001-2001	Bracket for HJ-9	1
HJ-11	007400716-2001	Screw for HJ-10	2
HJ-12	028030247-2001	Spring washer for HJ-11	2
HJ-13	525862001-4001	Wire Harness	1
HJ-14	525558001-1001	Bushing for HJ-13	1
HJ-15	525565001-1001	Terminal (4P)	1
HJ-16	007300516-2001	Screw for HJ-15	1
HJ-17	120370001-2001	Holder for HJ-13 (A)	1
HJ-18	120679001-2001	Holder for HJ-13 (B)	3
HJ-19	525664000-2001	Holder for HJ-13 (No. 6)	4
HJ-21	025030236-2001	Washer for HJ-20	13
HJ-22	207216000-1001	Splicer (No. 2)	8
HJ-23	525570001-1001	Wire (W-66)	1
HJ-30	525674001-1001	Splicer cap (No. 3)	1
HJ-31	516218001-1001	Groundwire for transformer	2
HJ-32	515456001-1001	Groundwire for main motor	1
HJ-33	007400516-2001	Screw for HJ-31, 32	5
HJ-34	550719002-2001	External lock-washer for HJ-33	5
HJ-35	525675001-1001	Insulating tube (No. 7) for main motor capacitor	2
HJ-40	025040236-2001	Washer for HJ-18	1
HJ-41	340400001-2001	Nylon Band	7
HJ-42	525864001-2001	Cap for operation panel	1
HJ-43	525865001-2001	Spiral cord holder	1
HJ-44	525758000-2001	Cord holder for HJ-13 (No.5)	2
HJ-46	525924000-1001	Connector receptacle for cooling fan (for mating connector, see A-16) (Series 100)	1
HJ-47	525899001-2001	Bracket for HJ-46	1
HJ-48	007300516-2001	Screw for HJ-47	2
HJ-49	525975001-2001	Connector Holder	1
HJ-50	525898001-2001	Splicer cap (No. 8)	2
HJ-51	525896001-1001	Head wire for HJ-9, pin 13, W90	1
HJ-52	525897001-1001	Head wire for HJ-9, pin 15, W91	1
HJ-53	525894001-1001	Cooling fan wire No. 1 (from main frame harness)	1
HJ-54	525895001-1001	Cooling fan wire No. 2 (from main frame harness)	1
HJ-62	527029001-1001	Resistor 40 ohms, 40W, (for solenoid HH-84)	1
HJ-63	527028000-2001	Heat sink (for HJ-62)	1
HJ-64	007401016-2001	Screw (for HJ-18, 63)	13
HJ-65	017501016-2001	Bolt (for HJ-18, 63)	13
HJ-66	007400416-2001	Screw for gnd wire on HH-71	1

\*For Model 101AL, see 63015115 , Section 7



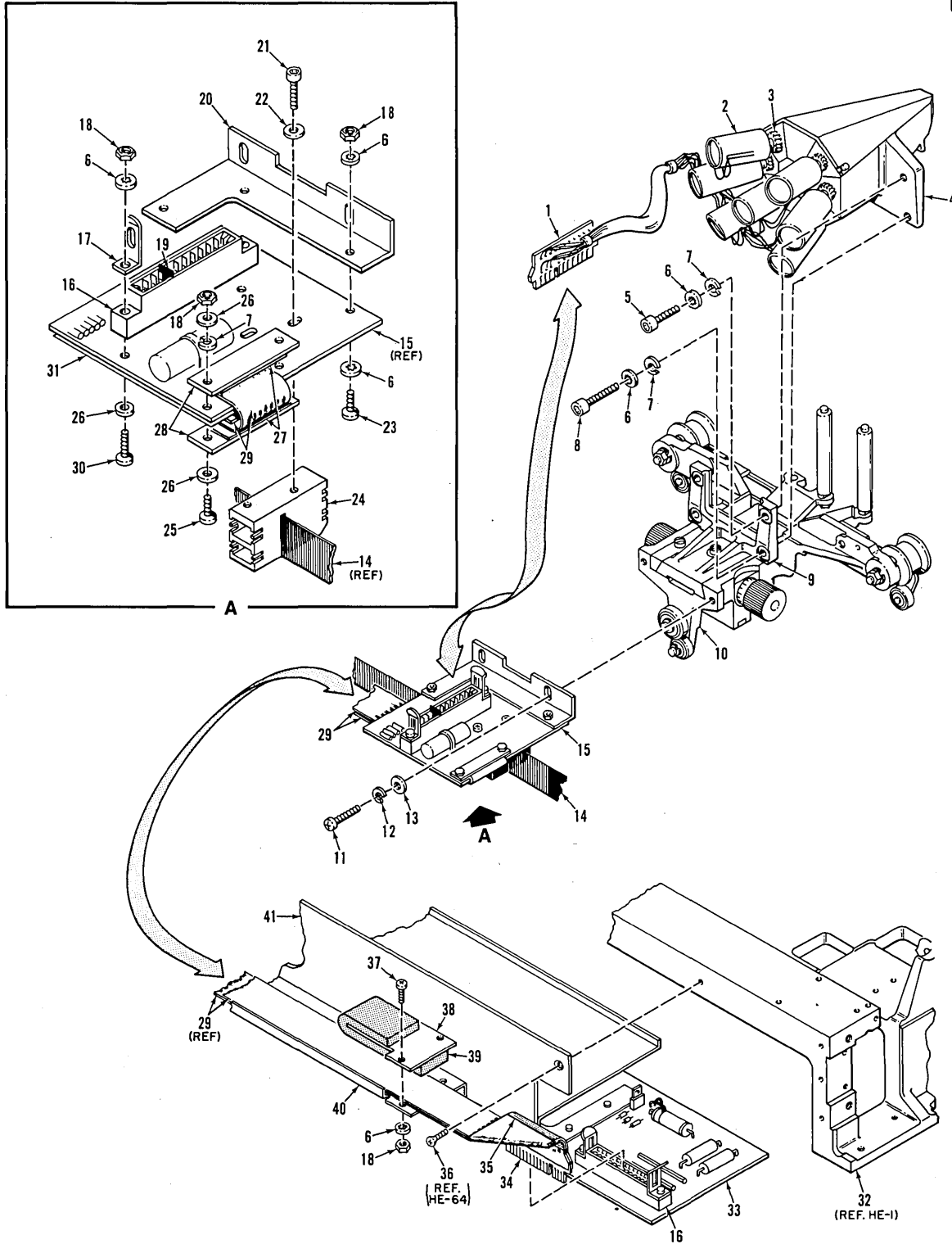


Figure 8-14. PRINT HEAD AND ASSOCIATED ASSEMBLIES



Figure 8-14. PRINT HEAD AND ASSOCIATED ASSEMBLIES

M0038 (AB)

Item Number	Part Number	Description	Quantity
—	63002437-4001	Print Head Ass'y 7 wire Ruby Note: This unit is assembled with items 1 through 4.	1
1	63001039-2001	Fingerboard, solenoid	1
2	63002476-4001	Solenoid ass'y (L1 through L7)	7
3	63002122-2001	Nut, locking, solenoid	1
4	63002462-4001	Head, subassembly	1
5	34114161-2001	Screw, hex, socket-cap, 4-40 x 1/2-in lg.	2
6	34815005-2001	Washer, lock, int. tooth No. 4	10
7	34818007-2001	Washer, lock, split, No. 4	6
8	34114201-2001	Screw, hex, socket-cap, 4-40 x 5/8-in. lg.	2
9	529129001-2001	Head bracket	1
10	525005001-5001	Carriage unit	1
11	007400815-2001	Screw, M4 x 8mm lg., F/Fil Hd.	2
12	028040247-2001	Washer, lock, spring, M4	2
13	025040235-2001	Washer, flat, M4	2
14	63002440-5001	Flexible mylar fence ass'y	1
—	63002668-4001	P.C. board ass'y 100NR, video amplifier Note: This unit is assembled with items 5 through 31.	1
15	63001096-2001	P.C. board, Video Amp. 100 Series NR	1
16	31230011-1001	Conn., edge, 10-position, 2-Row, Mdm	2
17	63002300-2001	Clip, P.C. board	2
18	34712005-2001	Nut, hex, 4-40	5
19	31240456-2001	Key, contact polarizing	1
20	63508104-2001	Bracket, Mtg., video amplifier bd.	1
21	34104087-2001	Screw, hex, socket-cap, 2-56 x 0.25-in. lg.	2
22	34902007-2001	Washer, flat, No. 2	2
23	34517125-2001	Screw, 4-40 x 0.38-in lg. Phil/Hd.	3
24	63002634-5001	Optical pickup, single track ass'y	1
25	34517167-2001	Screw, 4-40 x 0.50-in. lg.	2
26	34912007-2001	Washer, flat, No. 4	4
—	63060116-5001	Clamp Ass'y Note: This unit is assembled iwth items 27, 28	2
27	63060116-2003	Clamp	2
28	63060116-3002	Sponge, clamp	2
29	39660029-0001	Cable, Ribbon	4.2 Ft.
30	34517185-2001	Screw, 4-40 x 0.56-in. lg. Pan/Fil. Hd.	2
31	63011158-2001	Spacer, large	1
32	525151001-5001	Printer Frame (ref. HE-1)	1
—	63002242-4001	Comp. bd. ass'y, power driver bd. Note: This unit is assembled with items 16, 33, 38, 39, 40.	1
33	63001018-2001	PC board, power driver bd. .	1
34	63001021-2001	Finger board, ribbon cable	1
35	35060005-0001	Tape, reinforcing, 0.75W x 0.006-in.	A/R
36	005300814-2001	Screw, M3 x 8mm lg. (ref. HE-64)	4
37	34517105-2001	Screw, 4-40 x 5/16-in. lg. Pan/Phil	2
—	63011159-5001	Clamp ass'y Note: This unit is assembled with items 38, 39.	1
38	63011159-2001	Clamp	1
39	35060003-0253	Tape foam, 0.025thk x 1-in wide	0.4Ft
40	63002234-1001	Cable tray	1
41	63002200-2001	Bracket, Heat sink	1

\* Figure 8-14, is keyed to paragraph 5.2.13 and is a partial parts list used to show the removal/replacement of these four mechanically related assemblies only. See Section 7 for both the complete video amplifier Bd. 630002668-4001 and power driver bd. 63002242-4001. The complete carriage mechanism is shown in Figure 8-3.

## APPENDIX A

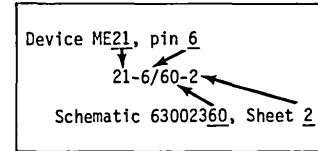
### Signal Glossary, Source and Destination Listing (for Model 101)

This appendix is keyed directly to the schematics found in Section 7. Signal mnemonics contained on those schematics are listed here in alphabetical order, along with source and destination(s) of each signal.

The purpose of this listing is to aid the reader in tracing the signal paths on the schematics. A few signal destinations are not listed, however, the locations necessary to orient the reader and help him find the signal paths are included.

Throughout this appendix, as in the manual text, a line (bar) over the signal name indicates an inverted function.

The following notation is used to identify the source and destination locations:



SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)	SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)
ACKNLG	Acknowledge - 4 $\mu$ sec pulse used to indicate the completion of the input of a character or the end of a functional operation.	21-6/60-2	Interface Connector	CLRTB	Clock pulse used to shift memory.	17-12/59-2	1-9/59-1, 2-9/59-1, 3-9/59-1, 4-9/59-2
AKDLY	Acknowledge Delay - 6.5 $\mu$ sec pulse used to give delay between the data strobe pulse and the acknowledge pulse.	27-4/60-2	21-12/60-2	CR	Carriage return - Signal used to indicate the input of a carriage return command.	20-11/59-2	19-9/59-2
BELL	A 2-sec pulse used to produce an audible tone in the speaker located at the rear of the printer.	11-4/60-3	10-12, 13/60-3 via Q5	$\overline{CR}$	Inverse of CR.	19-8/59-2	9-5/60-1, 25-10/60-1,
BELL	Inverse of $\overline{BELL}$	11-13/60-3	7-8/60-3	DATA1-DATAB	The 8 input data lines coming from the input device via the input connector to the printer.	P6-V, T, U, X, S, M, W, N/60-1	
$\overline{BSP}$	Special Busy - Signal created by a paper empty, safety switch, or bell condition that is used to cause a busy signal.	7-10/60-3	12-10/59-2	DATAB*	Level used to derive eighth input data bit DS8.	E12 to E14 or E13 to E14/60-1	26-13/60-3
BUSY	Printer busy status line indicating to the input device that printer is not ready to receive data.	21-8/60-2	16-9/60-2, Interface Connector	$\overline{DATA}$ STROBE	A 0.5 $\mu$ sec pulse used to clock data from the input device to the printer logic.	P6-Y/60-1	30-5/60-1
$\overline{BUSY}$	Inverse of BUSY	16-8/60-2	21-13/60-2	DCBL	Decoded bell code.	3-8/60-1	8-3/60-3
CG1-CG7	Character generator outputs 1-7 to the power driver board.	ME35/59-2	Driver Circuit	$\overline{DCLF}$	Decoded line feed code.	24-8/60-1	12-10/60-3
$\overline{CHADD1}$ - $\overline{CHADD6}$	Character address lines 1-6.	ME23/59-2	ME35/59-2	DCLT	Delayed Clutch - A 60-millisecond pulse used as a delay between turning on one clutch and turning off the other clutch when changing the direction of the print head.	22-6/59-1	14-6/59-1
CHANNEL NO. 1	Form feed channel.	Tape reader	14-5/60-2	$\overline{DCLT}$	Inverse of DCLT.	22-1/59-1	15-10/59-1
CHANNEL NO. 2	Vertical tab channel.	Tape reader	14-3/60-2	DCW0	Strobe counter decode output 0.	31-2/59-2	12-3/59-2
CIP	Carriage in Print - Signal used to drive the print head forward.	14-10/59-1	17-1/60-3	$\overline{DCW1}$ - $\overline{DCW5}$	Strobe counter decode outputs 1 to 5 (write pulses).	ME30/59-2	ME35/59-2
$\overline{CIP}$	Inverse of CIP.	15-6/59-1	15-9/59-1, 18-3/59-1, 11-5/59-2, 13-10/60-2, 15-3/60-2	DLYLF	Delay Line Feed - a 60-90 millisecond pulse following any paper movement command.	11-5/60-3	9-3/60-2
CIR	Carriage in Reverse - Signal used to drive the print head in reverse.	21-6/59-1	Power Driver Board	$\overline{DLYLF}$	Inverse of DLYLF.	11-12/60-3	15-4/60-2
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.	25-8/60-1	11-1/59-2	DMC	Insert dummy character.	9-8/59-2	30-13/60-2, 26-1/60-3
				$\overline{DMC}$	Inverse DMC.	9-9/59-2	6-13/59-2
				DS1	Input data bit 1.	29-12/60-1	1-15/59-1, 18-6/60-1, 20-3/60-2, 23-1/60-1, 24-4/60-1

\*If input is 7-bit data, then DATAB 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)
$\overline{DS1}$	Inverse of DS1.	29-2/60-1	29-13/60-1, 23-12/60-1, 24-13/60-1, 25-4/60-1
DS2	Input data bit 2.	28-8/60-1	1-2/59-1, 18-4/60-1, 23-13/60-1, 24-1/60-1, 24-12/60-1, 20-2/60-2
$\overline{DS2}$	Inverse of DS2.	28-6/60-1	28-9/60-1 23-4/60-1, 25-2/60-1
DS3	Input data bit 3.	29-10/60-1	2-15/59-1, 18-5/60-1, 23-2/60-1, 23-10/60-1, 25-5/60-1, 20-5/60-2
$\overline{DS3}$	Inverse of DS3.	29-4/60-1	29-11/60-1, 24-2/60-1, 24-10/60-1
DS4	Input data bit 4.	30-10/60-1	2-2/59-1, 19-11/60-1 20-6/60-2
$\overline{DS4}$	Inverse of DS4.	30-8/60-1	30-11/60-1, 18-11/60-1,
DS5	Input data bit 5.	28-10/60-1	3-15/59-1, 20-1/60-2
$\overline{DS5}$	Inverse of DS5.	28-4/60-1	28-11/60-1, 18-3/60-1, 19-3/60-1
DS6	Input data bit 6.	28-12/60-1	3-2/59-1, 20-12/60-2
$\overline{DS6}$	Inverse of DS6.	28-2/60-1	28-13/60-1, 25-12/60-1, 19-2/60-1, 18-2/60-1
DS7	Input data bit 7.	29-8/60-1	4-15/59-2, 20-11/60-2

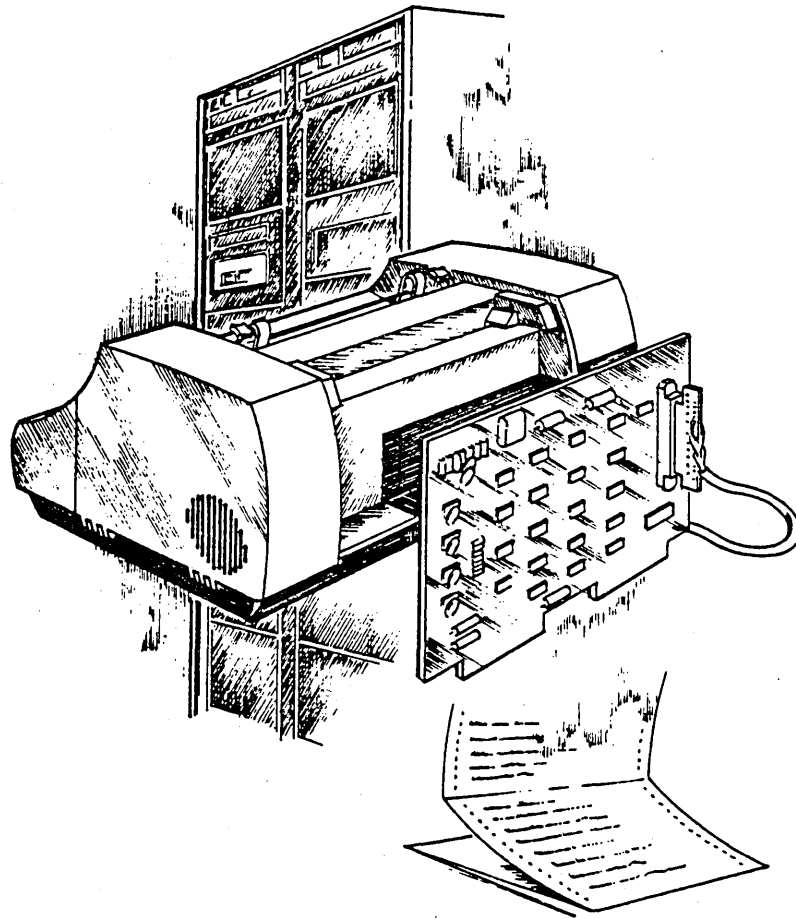
SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)
$\overline{DS7}$	Inverse of DS7.	29-6/60-1	29-9/60-1, 25-9/60-1, 19-4/60-1, 18-12/60-1
DS8	Input data bit 8.	26-6/60-3	4-2/59-2, E1/60-1
$\overline{DS8}$	Inverse of DS8.	26-11/60-3	26-5/60-3, E2, /60-1
$\overline{DSCR}$	Decoded carriage return (CR) code.	23-6/60-1	20-13/59-2
DSTA	Data Strobe A - the buffered data strobe signal from the interface connector, which is used to generate DSTB and as an input clock.	30-6/60-1	12-5/60-2, 20-4/60-2
DSTB	Data Strobe B - the data strobe used to clock the data to the printer logic from the input device.	16-2/60-2	27-1/60-2, 3-9/60-1, 9-6/60-1, 19-12/60-1, 11-2/59-2
ECSTB	Expanded character strobe.	27-12/59-2	25-4, 5 /59-2
$\overline{ECSTB}$	Inverse of ECSTB.	25-6/59-2	29-4/59-2 12-4/59-2
$\overline{EOP}$	End of Print - indicates that the right-hand limit switch has been activated by the carriage.	19-6/59-1	15-4/59-1
EOPSW	End of print switch.	EOP Switch	21-1/59-1
FCCLK	First Character Clock - indicates that at least one printable character has been received for that line.	11-11/59-2	19-11/59-2
$\overline{FF}$	Decoded form feed code.	25-6/60-1	8-9/60-2
FWD	Forward mode signal used to drive forward clutch.	14-4/59-1	25-12, 13 /59-2
HL	Punched hole indication from paper tape reader.	16-6/60-2	7-3/60-2 via E7 to E8.
$\overline{HL}$	Inverse of HL.	14-6/60-2	16-5/60-2, 7-11/60-2

SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)
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.	2-8/60-2	7-12/60-2
<u>INPUT PRIME</u>	Input Prime line from the interface connector.	P5-8/60-3	4-3/60-3
<u>IP</u>	Input Prime signal causing the printer electronics to be primed.	4-6/60-3	5-12/60-3, 13-12/60-2
<u>LF</u>	Line feed 15-millisecond pulse.	17-4/60-3	5-4/60-3
LFF	Form feed function.	8-8/60-2	8-13/60-2, 14-4/60-2
<u>LFF</u>	Inverse of LFF.	8-12/60-2	8-11/60-2, 3-1/60-2
LVT	Vertical tab function.	3-11/60-2	3-4/60-2, 14-2/60-2
<u>LVT</u>	Inverse of LVT.	3-6/60-2	3-12/60-2, 3-2/60-2
ORBZ	OR function of busy condition.	12-8/59-2	6-1/60-2
<u>ORBZ</u>	Inverse of ORBZ.	6-2/60-2	15-6/60-2
<u>OSC</u>	Oscillator timing - 100 KHz clock signal provides timing for printer operations.	10-6/60-1	6-3/60-1, 6-5/60-1, 22-1/60-3
OSC'	Inverse of <u>OSC</u> .	6-4/60-1	9-1/59-2, 6-10/59-2, 2-5/60-2, 22-5/60-2, 2-1/60-2
<u>OSC'</u>	Inverse of OSC	17-2/59-2	9-5/59-2
OSCXT	Timing signal for printer's interface boards.	6-6/60-1	P6-7/60-1, Interface connector
PE	Paper empty (out) signal indicating a paper out condition.	30-4/60-3	P6-K/60-3, Interface connector
<u>PE</u>	Inverse of PE.	1-10/60-3	30-3/60-3, 8-5/60-3
PM	Paper movement signal.	5-6/60-3	11-9/60-3, 6-9/60-3
<u>PM</u>	Inverse of PM.	6-8/60-3	11-10/60-3, 11-11/60-3, 7-6/60-3, 15-1/60-2

SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)
PMSOL	Paper movement solenoid - used to activate line feed solenoid during a line feed, form feed or vertical tab operation.	7-4/60-3	P6-8/60-3
PRIME	A 3-millisecond pulse used to prime or reset the printer electronics.	22-13/60-3	9-2/60-2, 8-9/59-1, 27-6 & 7/59-2, 9-3/59-2
<u>PRIME</u>	Inverse one of PRIME (Card #1).	22-12/60-3	26-2 & 12/60-3, 2-6/60-2, 2-2/60-2
<u>PRIME</u> <sub>2</sub>	Inverse two of PRIME (Card #2).	8-8/59-1	20-9/59-1, 22-4/59-1, 15-1/59-1, 11-4/59-2, 11-10/59-2, 9-6 & 7/59-2
<u>PRMOS</u>	Prime pulse.	17-12/60-2	22-2/60-3
PWC1	Pulse width count 1.	27-11/59-2	30-15/59-2
PWC2	Pulse width count 2.	27-9/59-2	30-14/59-2
PWC4	Pulse width count 4.	27-8/59-2	30-13/59-2
PWR PRIME	A 100-millisecond pulse generated by turning on power to the printer and used to initialize the printer electronics.	4-12/60-2	14-11/59-1
<u>PWR PRIME</u>	Inverse of PWR PRIME.	5-3/60-2	17-10/60-2, 4-13/60-2, 5-13/60-3, 11-3/60-3, 17-3/60-3, 19-4/59-1
<u>RDCR</u>	Re-decode carriage return.	13-8/59-2	15-2/59-1
<u>ROMTBB</u>	Enable signal used to select optional character sets by use of TBB.	31-10/59-2	37-12/59-2
RPTSW	Ready to print switch - output from left-hand limit switch signifying that carriage is at left-most position.	17-4/59-1	20-2/59-1
RTPSW	Ready to print switch.	RTP Switch	17-3/59-1, 21-13/59-1, 19-3/59-1
RSVFD	Signal used to terminate paper movement during a form feed or vertical tab function.	7-13/60-2	2-3/60-2
RTP	Ready to print - indicates that the left-hand switch has been activated by the carriage.	21-11/59-1	21-10/59-1

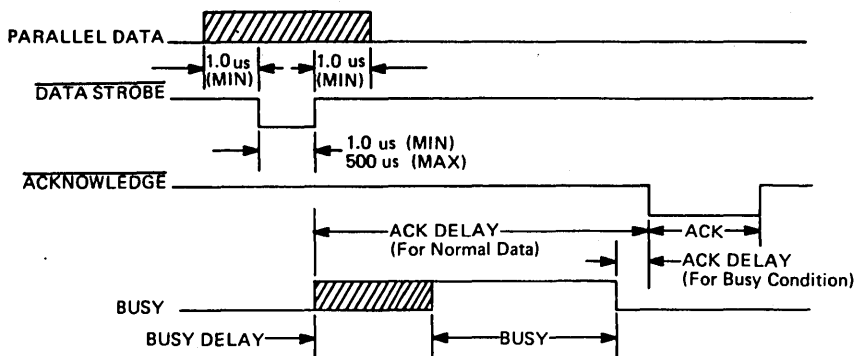
SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)	SIGNAL NAME	DESCRIPTION	SOURCE	DESTINATION(S)
$\overline{\text{RTP}}$	Inverse of RTP.	21-8/59-1	21-12/59-1, 15-12 & 13/59-1, 22-3/59-1	$\overline{\text{TB4}}$	Memory output bit 4.	7-12/59-1	23-1/59-2, 8-5/59-2
SCR	Decoded CR preceded by printable character.	9-4/60-1	17-11/59-2 9-14/59-2	$\overline{\text{TB5}}$	Memory output bit 5.	7-6/59-1	23-3/59-2, 13-1/59-2
$\overline{\text{SCR}}$	Inverse of SCR.	17-10/59-2	12-9/59-2	$\overline{\text{TB6}}$	Memory output bit 6.	7-2/59-1	23-5/59-2, 13-2/59-2
SEL	Select function.	5-12/59-1	15-12/60-2	$\overline{\text{TB7}}$	Memory output bit 7.	8-10/59-2	13-3/59-2
$\overline{\text{SEL}}$	Inverse of SEL.	5-13/59-1	5-9 & 10/60-3, 13-13/60-2	TB8	Memory output bit 8.	8-2/59-2	E14/59-2 20-1/59-1
SELCLK	Signal which toggles select flip-flop.	10-11/59-2	5-1/59-1	$\overline{\text{TB8}}$	Inverse of TB8.	8-12/59-2	8-1/59-2, 15-2/60-2, 19-10/59-2, 16-12/59-2, 9-21/59-2, 13-5/59-2
SELECT LAMP	Signal used to turn on select indicator lamp on front panel.	Q1/59-1	Select lamp on operator control panel.	TO FWD CLUTCH DRIVER	Signal used to energize forward clutch.	31-8/59-2	Clutch driver
SLCT	Select status line to interface connector.	5-8/60-3	Interface connector	TOFRLF	Signal used to activate top of form function.	0V, R33/60-2	8-10/60-2 via TOP OF FORM SW (S7)
SRCL	Signal used to clear shift registers by placing zeros in their input during a prime condition.	11-6/59-2	4-4 & 13/59-2, 3-4 & 13/59-1, 2-4 & 13/59-1, 1-4 & 13/59-1	TRACK	Xmit acknowledge pulse.	21-11/60-2	27-9/60-2
SS	Safety switch.	1-4/60-1	Interface connector	UCC	Upper case character mode selection signal.	16-3/59-1	20-10/59-1, 29-5/59-2
$\overline{\text{SS}}$ (+5V)	Inverse of SS.	1-6/60-1	1-3/60-1, 1-1/60-1, 8-4/60-3	$\overline{\text{UCC}}$	Inverse of UCC.	20-8/59-1	16-2/59-1, 29-2/59-2
SS' (±0V)	Inverse of $\overline{\text{SS}}$ .	1-2/60-1	14-12/59-1	$\overline{\text{UPSC}}$	Expanded character mode - command to print elongated characters.	23-8/60-1	16-1/59-1
STROBE	Print strobe (approximately 460 $\mu$ sec)-triggered by output of video amplifier and used to generate character address signals.	18-6/59-1	37-13/59-2, 29-1/59-2, 27-14/59-2, 12-5/59-2, 13-6/59-2	$\overline{\text{VFD}}$	Vertical format decode.	2-13/60-2	7-2/60-2, 2-10/60-2, 5-5/60-3
$\overline{\text{STROBE}}$	Inverse of STROBE.	18-1/59-1	21-9/59-1	VIDEO AMP	Video amplifier signal from video amplifier.	Video amplifier	18-5/59-1
SVFD	Signal used to set VFD flip-flop.	3-3/60-2	2-14/60-2, 16-11/60-2	$\overline{\text{VT}}$	Vertical tab decode.	24-6/60-1	3-13/60-2
$\overline{\text{TB1}}$	Memory output bit 1.	8-4/59-1	23-11/59-2, 14-2/59-2	ZBCR	Decoded carriage return.	9-12/59-2	16-13/59-2
$\overline{\text{TB2}}$	Memory output bit 2.	7-8/59-1	23-9/59-2, 13-12/59-2	$\overline{\text{ZBCR}}$	Inverse of ZBCR.	9-13/59-2	15-5/60-2
$\overline{\text{TB3}}$	Memory output bit 3.	7-10/59-1	23-13/59-2, 14-3/59-2				

APPENDIX B  
PARALLEL INTERFACE SPECIFICATIONS



All standard Centronics printers contain a common 7-bit parallel interface. An optional eighth bit is available, as required by the user. Detailed information describing the standard interface timing, signal descriptions, connectors and other specifications are contained in this appendix. The intent is to provide the user with the technical information required to interface directly to a standard Centronics printer, or if necessary to design a special interface to adapt the printer to a particular terminal. Note that specifications and descriptions within this appendix apply to Centronics standard RO printer models and do not necessarily apply to Centronics teleprinter models 308, 330, 508, 530 and 761.

## INTERFACE TIMING



NORMAL DATA INPUT TIMING

	101/101A/101S	101AL	102A	102AL	103	104	301	306	306C	3065C
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.	2.5-10 usec.	2.5-10 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.	2.5-5.0 usec.	2.5-5.0 usec.

BUSY CONDITION TIMING

	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.	0-1.5 usec.	0-1.5 usec.
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.	0-1.5 usec.	0-1.5 usec.
ACK DELAY	0	0-10 usec.	0	0-10 usec.	0-10 usec.	0-10 usec.	0-10 usec.	0-10 usec.	0-10 usec.	0-10 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.	2.5-5.0 usec.	2.5-5.0 usec.
BUSY DURATION:										
Line Feed	75-105 msec.	75-105 msec.	75-105 msec.	16 msec. (single LF) 75-105 msec. (multiple LF)	16 msec. (single LF) 51 msec. (double LF) 25-75 msec. (multiple LF)	10 msec. (single LF) 25 msec. (double LF) 70-77 msec. (multiple LF)	70-100 msec.	75-105 msec.	75-105 msec. (single LF)	35-50 msec.
Vertical Tab (1-inch)	300-310 msec.	300-310 msec.	300-310 msec.	300-310 msec.	125 msec.	125 msec.	160-200 msec.	300-310 msec.	300-310 msec.	155-170 msec.
Form Feed (11-inches)	3-3.5 sec.	3-3.5 sec.	3-3.5 sec.	3-3.5 sec.	1.4 sec.	1.4 sec.	1.5-2.0 sec.	3-3.5 sec.	3-3.5 sec.	1.40-1.42 sec.
Delete	3 msec.	100-400 usec.	3 msec.	100-400 usec.	160-400 usec.	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	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.	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	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 16 msec. LF	300 msec.	6 msec./char plus 70-100 msec. LF	8.4 msec./char plus 75-105 msec. LF	10/8.4/6.6/6.0 msec./char (10/12/15/16.5 cpi)	8.4 msec./char plus 35-50 msec. LF
(Return time-no busy)	(240 msec. max)	(240 msec. max)	(0)	(0)	(0)	(0)	(270 msec. max)	(270 msec. max)	(270 msec. max)	(270 msec. max)

NORMAL DATA INPUT TIMING

	500	501	503	588	500D	501D	588D	700	701
ACK DELAY	2.5-10 usec.	2.5-10 usec.	2.5-10 usec.	2.5-10 usec.	2.5-10 usec.	2.5-10 usec.	2.5-10 usec.	2.5-10 usec.	2.5-10 usec.
ACK	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.	2.5-5.0 usec.	2.5-5.0 usec.	2.5-5.0 usec.	2.5-5.0 usec.

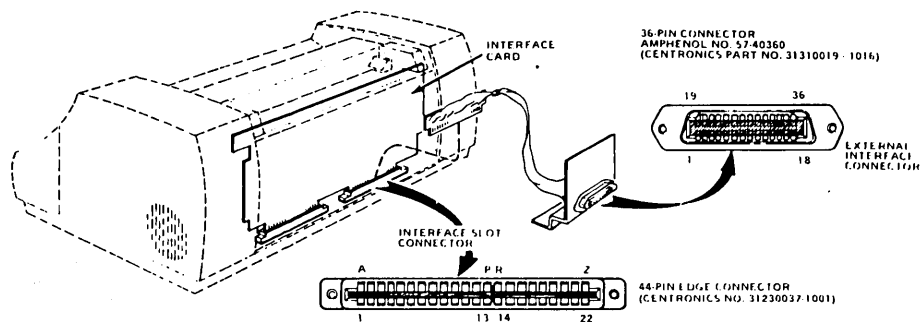
BUSY CONDITION TIMING

	0-1.5 usec.	0-1.5 usec.	0-1.5 usec.	0-1.5 usec.	0-1.5 usec.	0-1.5 usec.	0-1.5 usec.	0-1.5 usec.	0-1.5 usec.
BUSY DELAY	0-1.5 usec.	0-1.5 usec.	0-1.5 usec.	0-1.5 usec.	0-1.5 usec.	0-1.5 usec.	0-1.5 usec.	0-1.5 usec.	0-1.5 usec.
ACK DELAY	0-10 usec.	0-10 usec.	0-10 usec.	0-10 usec.	0-10 usec.	0-10 usec.	0-10 usec.	0-10 usec.	0-10 usec.
ACK	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.	2.5-5.0 usec.	2.5-5.0 usec.	2.5-5.0 usec.	2.5-5.0 usec.
BUSY DURATION:									
Line Feed	75-105 msec.	70-100 msec.	16 msec. (single LF) 51 msec. (double LF) 25-75 msec. (multiple LF)	75-105 msec.	20 msec.	20 msec.	20 msec.	75-105 msec.	75-105 msec.
Vertical Tab (1-inch)	300-310 msec.	160-200 msec.	125 msec.	300-310 msec.	20 msec.	20 msec.	20 msec.	240-270 msec.	240-270 msec.
Form Feed (11-inches)	3-3.5 sec.	1.5-2.0 sec.	1.4 sec.	3-3.5 sec.	20 msec.	20 msec.	20 msec.	2.07-2.11 sec.	2.07-2.11 sec.
Delete	100-400 usec.	100-400 usec.	160-400 usec.	100-400 usec.	100-400 usec.	100-400 usec.	100-400 usec.	100-400 usec.	100-400 usec.
Bell	0	0	0	0	0	0	0	0	0
Select*	100-400 usec.	100-400 usec.	100-400 usec.	100-400 usec.	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	Until printer is selected
Print Command	8.4 msec./char plus 75-105 msec. LF	6 msec./char plus 70-100 msec. LF	6 msec./char plus 16 msec. LF	11.3 msec./char plus 75-105 msec. LF	8.4/7 msec./char (10/12 cpi) +20 msec. LF	6 msec./char +20 msec. LF	11.3/9.4/6.9 msec./char (10/12/16.5 cpi) +20 msec. LF	16.7 msec./char	16.7 msec./char
(Return time-no busy)	(400 msec. max)	(400 msec. max)	(0)	(400 msec. max)	(400 msec. max)	(400 msec. max)	(400 msec. max)	2.2 sec (max)	(0)

\*No busy, if inhibit prime on select option is used.

## STANDARD INTERFACE SIGNALS

The following table describes the standard interface signals available at both the interface slot connector and the external interface connector of all Centronics Printers.



SIGNAL NAME	INTER-FACE CONN.	INTER-FACE SLOT	SOURCE	DESCRIPTION
(DATA STROBE)	Pin 1, 19	Pins 21, Y	Input Device	A 1.0 $\mu$ sec pulse (min.) used to clock data from the processor to the printer logic.
DATA 1	2, 20	18, V	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.
DATA 2	3, 21	16, T	Input Device	
DATA 3	4, 22	17, U	Input Device	
DATA 4	5, 23	20, X	Input Device	
DATA 5	6, 24	15, S	Input Device	
DATA 6	7, 25	11, N	Input Device	
DATA 7	8, 26	19, W	Input Device	
DATA 8	9, 27	12, P	Input Device	
ACKNLG	10, 28	22, T	Printer	Acknowledge pulse indicates the input of a character into memory or the end of a functional operation.
BUSY	11, 29	3, C	Printer	A level indicating that the printer cannot receive data. For conditions causing BUSY, refer to Busy Condition Timing Table.
PE	12	9	Printer	A level indicating that the printer is out of paper.
SLCT	13	F	Printer	A level indicating that the printer is selected.
$\pm$ OV	14	7	Printer	Signal ground (Formerly SS signal, older version)
OSCXT	15	H	Printer	A 100 KHz signal (Models 101, 101A, 102A, 101S) or 100-200 KHz signal (All other models).
$\pm$ OV	16	A		Signal ground
Chassis Gnd	17	—	Printer	Frame ground
+5V	18	13	Printer	+5 Volt power buss
(INPUT PRIME)	31, 30	L, 10	Input Device	A level which clears the printer buffer and initializes the logic. (Not in 101).
FAULT	32	M	Printer	A level that indicates a printer fault condition such as paper empty, light detect, or a deselect condition. (Not in 101).
Line Count Pulse	34, 35	2, D		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 except 306SC, 503).
Not Used	36			

### NOTES:

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

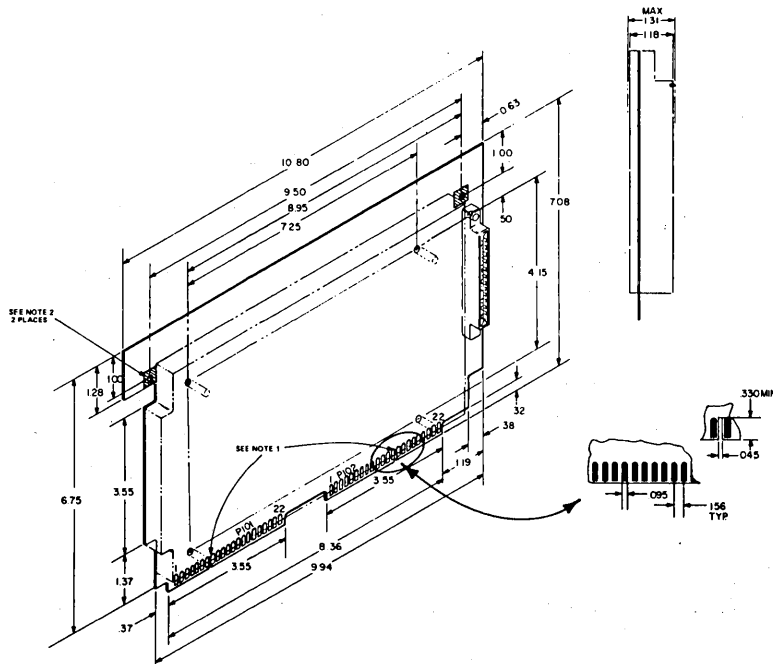


## INTERFACE SPECIFICATIONS

- INTERFACE ADAPTER:** All Centronics printers are designed to accept a special interface board. In some models, this interface slot is a standard feature. Other models must have an optional interface adapter to accommodate the interface card. Models which require this optional adapter are the 301, 306, 306C, 500, 501, 588, 700 and 701.
- INTERFACE SLOTS:** Models 102AL, 103, 104, 306SC and 503 have two interface slots. All other models have one slot.
- TOTAL AVAILABLE INTERFACE POWER:**
- +5 Volts  $\pm$  5% at 800 ma.
  - +12 Volts  $\pm$  10% at 200 ma.
  - 12 Volts  $\pm$  10% at 200 ma.
- INTERFACE CIRCUIT SPECIFICATIONS:**
- Voltage Levels:** 0V and +5V (nominal), TTL logic (SN7400 series)
- Logic Levels:** A logic ONE (or high) signal is defined as a voltage in the range of +2.4 Volts to +5 Volts, not to exceed a peak positive voltage of +5.5 Volts.  
A logic ZERO (or low) signal is defined as a voltage in the range of 0.0 Volt to +0.4 Volt, not to exceed a peak negative voltage of -.5 Volt.
- Current Requirements:** The printer interface can source up to 0.320 ma at +2.4 Volts for a high signal output, and sink up to 14 ma for a low output.  
Similarly, the sending device interface must be able to source 0.320 ma at +2.4 Volts for a high signal output and sink up to 14 ma for a low output.
- Line Termination:** The printer interface terminates input data lines DATA1 - DATA8 with 1000 ohms to +5 Volts, and control lines DATA STROBE and INPUT PRIME with 470 ohms to +5 Volts.
- MAXIMUM DISTANCE:** A local interface should be located no more than 10 feet from the printer, when using the standard printer interface circuits.
- PHYSICAL DIMENSIONS:** The diagram below shows the maximum envelope of a pc board which can be accommodated by the interface slot in all current Centronics printers. The Series 102 printers may, however, require a slight modification to accept this board. Depending on its depth, if the card is used in the 102A or in the second interface slot (nearest the speaker) of a 102AL, the speaker may have to be relocated to the fan housing.
- More detailed information on allowable dimensions for the interface board is contained on Centronics drawing 62000215.

3. ALL DIMENSIONS IN INCHES.
2. .50 x .50 AREA FREE OF COMPONENTS AND ETCH BOTH SIDES, 2 PLACES.
1. LOCATE KEYSLOTS AS FOLLOWS:  
CONNECTOR P101 BETWEEN PINS 7 AND 8.  
CONNECTOR P102 BETWEEN PINS 13 AND 14.

NOTES:



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**TECHNICAL OR CLERICAL ERRORS:**

(Specify Page Numbers)

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**SUGGESTIONS FOR IMPROVEMENT:**

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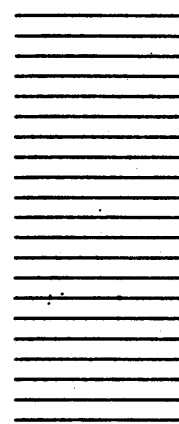
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