

**WANG**

3305

## **WANG DAISY PRINTER**

**Models:**

**2281W/WC**

**5541W/WC**

**6581W/W-1/WC/WC-1**

## PREFACE

This manual provides the information needed to install, operate and maintain WANG Daisy Printers (Models 2281W/WC, 5541W/WC, 6581W/W-1 and 6581WC/WC-1). It is intended to be used as a guide by customer engineers who require detailed information about the daisy printers operation.

The manual is written to reflect the recommended service/replacement level of subassemblies and printed-circuit boards by trained/qualified customer engineers.

Certain mechanical adjustments (print wheel home, carriage movement left and right and print wheel rotation clockwise and counterclockwise) require the use of the Diagnostic Display Board when the printer has been modified with new microcode, manual adjustment procedures are provided in applicable paragraphs. The Diagnostic Display is also used to troubleshoot electronic failures.

Oscilloscope trace representations are idealized waveforms. Due to the source of these waveforms, variations may be observed on individual printers in actual practice.

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**CHAPTER**

**1**

**INTRO-  
DUCTION**

## CHAPTER 1

## INTRODUCTION

1.1 SCOPE

This technical manual contains the information needed by trained Wang Customer Engineers to assist them in successfully installing and maintaining Wang Daisy Printer Models 41W/41WC, 81W/81WC and 81W-1/81WC-1 (see Figure 1-1). These printers are used with the following systems:

Models 6581W/WC and 6581W-1/WC-1 - 928 System, OIS and VS

Models 2281W/WC - 2200 System

Models 5541W/WC - System 5

1.2 SYSTEM DESCRIPTION

The Wang Models 81W/W-1/81WC/WC-1 and 41W/41WC are microprocessor-controlled, medium speed, bidirectional Daisy printers. They are available in either a standard size platen (Models 81W/81W-1/41W) or a wide platen (Models 81WC/81WC-1/41WC). Utilizing a 96-character Daisy print wheel; the standard printers are capable of receiving print commands containing both upper and lower case letters, numbers, and symbols and then printing them at speeds up to 35 characters per second. They can generate output in either a 10 pitch (up to 132 characters per line), 12 pitch (up to 158 characters per line) or 15 pitch (OIS and VS only) up to 198 characters per line. The wide platen models can output in 10-pitch at 180 characters per line, in 12-pitch at 216 characters per line and in 15 pitch (OIS and VS only) at 270 characters per line.

The print ribbons used in the printers are housed in snap-in cartridges for quick and simple replacement. Ribbon drive is by means of a processor-controlled drive system and a stepper motor.

The print head mechanism tilts away from the platen, making it easy to change the print wheel. The print-wheel drive system rotates the wheel up to 180 degrees in either direction. The print-wheel rotational velocity is a function of the distance to be traveled with the wheel stopping just before each print-hammer stroke. The print-wheel control logic computes the shortest distance and selects the direction of print-wheel rotation to place the next character in front of the print hammer as quickly as possible.

The printers are designed to replace the previously used daisy printers in the 2200 and Word Processing systems. The printer chassis is designed to accommodate interface boards for all applications.

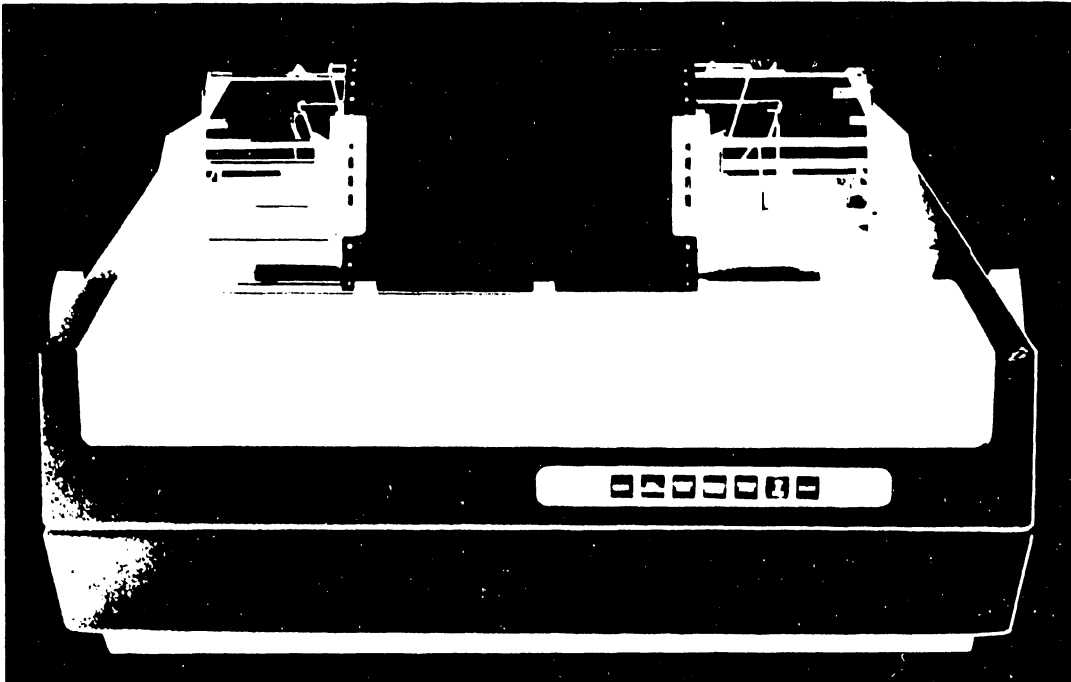


FIGURE 1-1 WANG DAISY PRINTER

### 1.3 SPECIFICATIONS FOR THE MODEL 5541W DAISY PRINTER

Speed .....	35 characters per second (average)
Character set .....	96 characters
Maximum Line Width .....	10 pitch: 132 characters per line 12 pitch: 158 characters per line
Paper Width .....	3.5 in. (8.9 cm) minimum 13.0 in. (33.0 cm) maximum
Paper Thickness .....	0.027 in. (0.069 cm): 5 copies in addition to the original
Printer Size:	
Height .....	9.0 in. (22.9 cm)
Height with Forms Feeder ...	12.5 in. (31.7 cm)
Width .....	25.0 in. (63.5 cm)
Depth .....	19.5 in. (49.5 cm)
Approximate Net Weight .....	70 lbs (31.5 kg)
Fuses .....	3.0A (SB) for 115 Vac 1.5A (SB) for 230 Vac 4.0A (SB) for Carriage Motor (located on PCB 7364)
Power Requirements .....	115 or 230 Vac $\pm$ 10% 50 or 60 Hz $\pm$ 1 Hz 300 watts
Temperature .....	50 <sup>o</sup> F to 80 <sup>o</sup> F (10 <sup>o</sup> to 27 <sup>o</sup> C)
Relative Humidity .....	35% to 65%, noncondensing

1.4 SPECIFICATION FOR THE MODEL 5541WC WIDE CARRIAGE PRINTER

Speed .....	35 characters per second (average)
Character set .....	96 characters
Maximum Line Width .....	10 pitch: 180 characters per line 12 pitch: 216 characters per line
Paper Width .....	3.5 in. (8.9 cm) minimum 20.5 in. (52.0 cm) maximum
Paper Thickness .....	0.027 in. (0.069 cm): 5 copies in addition to the original
Printer Size:	
Height .....	9.0 in. (22.9 cm)
Height with Forms Feeder ...	12.5 in. (31.7 cm)
Width .....	28.75 in. (73.0 cm)
Depth .....	19.5 in. (49.5 cm)
Approximate Net Weight .....	70 lbs (31.5 kg)
Fuses .....	3.0A (SB) for 115 Vac 1.5A (SB) for 230 Vac 4.0A (SB) for Carriage Motor (located on PCB 7364)
Power Requirements .....	115 or 230 Vac $\pm$ 10% 50 or 60 Hz $\pm$ 1 Hz 300 watts
Temperature .....	50 <sup>o</sup> F to 80 <sup>o</sup> F (10 <sup>o</sup> to 27 <sup>o</sup> C)
Relative Humidity .....	35% to 65%, noncondensing

### 1.5 SPECIFICATIONS FOR THE MODELS 6581W, 6581W-1 AND 2281W DAISY PRINTERS

Speed .....	35 characters per second (average)
Character set .....	96 (86 for the 2281W) characters
Maximum Line Width .....	10 pitch: 132 characters per line 12 pitch: 158 characters per line 15 pitch: 198 characters per line (OIS and VS only)
Paper Width .....	3.5 in. (8.9 cm) minimum 13.0 in. (33.0 cm) maximum
Paper Thickness .....	0.027 in. (0.069 cm): 5 copies in addition to the original
Printer Size:	
Height .....	9.0 in. (22.9 cm)
Height with Forms Feeder ...	12.5 in. (31.7 cm)
Width .....	25.0 in. (63.5 cm)
Depth .....	19.5 in. (49.5 cm)
Approximate Net Weight .....	70 lbs (31.5 kg)
Fuses .....	3.0A (SB) for 115 Vac 1.5A (SB) for 230 Vac 4.0A (SB) for Carriage Motor (located on PCB 7364)
Power Requirements .....	115 or 230 Vac $\pm$ 10% 50 or 60 Hz $\pm$ 1 Hz 300 watts
Temperature .....	50 <sup>o</sup> F to 80 <sup>o</sup> F (10 <sup>o</sup> to 27 <sup>o</sup> C)
Relative Humidity .....	35% to 65%, noncondensing

1.6 SPECIFICATIONS FOR THE MODELS 6581WC, 6581WC-1 AND 2281WC

Speed .....	35 characters per second (average)
Character set .....	96 (86 for the 2281WC) characters
Maximum Line Width .....	10 pitch: 180 characters per line 12 pitch: 216 characters per line 15 pitch: 270 characters per line (OIS and VS only)
Paper Width .....	3.5 in. (8.9 cm) minimum 20.5 in. (52.0 cm)
Paper Thickness .....	.027 in. (0.069 cm): 5 copies in addition to the original
Printer Size:	
Height .....	9.0 in. (22.9 cm)
Height with Forms Feeder ...	12.5 in. (31.7 cm)
Width .....	28.75 in. (73.0 cm)
Depth .....	19.5 in. (49.5 cm)
Approximate Net Weight .....	70 lbs (31.5 kg)
Fuses .....	3.0A (SB) for 115 Vac 1.5A (SB) for 230 Vac 4.0A (SB) for Carriage Motor (located on PCB 7364)
Power Requirements .....	115 or 230 Vac $\pm$ 10% 50 or 60 Hz $\pm$ 1 Hz 300 watts
Temperature .....	50 <sup>o</sup> F to 80 <sup>o</sup> F (10 <sup>o</sup> to 27 <sup>o</sup> C)
Relative Humidity .....	35% to 65%, noncondensing



## 1.7 WANG STANDARD AND WIDE PLATEN PRINTER FEATURES

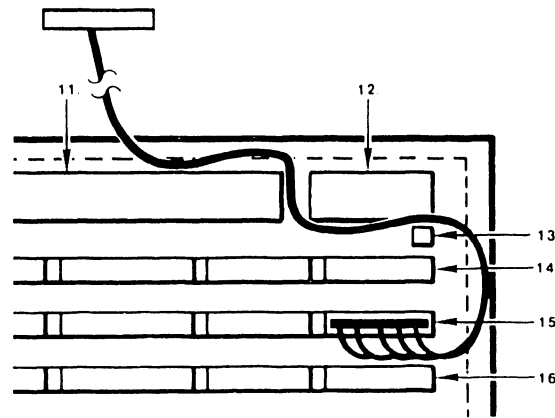
- . Removable Daisy character wheel for varied font and pitch applications.
- . High-quality print registration.
- . 96 characters: upper case, lower case, and special characters comprising a full ASCII set (86 characters for the 2281W/WC).
- . Selectable character density and pitch using pitch selector with 10-pitch, 12-pitch or 15-pitch (OIS and VS only) Daisy character wheels.
- . 132 or 158 character full-line buffer allowing CPU and printer operations to overlap; accelerating data transit (on the 2200 system only).
- . Programmable underscoring for highlighting key words.
- . The Top-Of-Form feature for 2200 systems defaults to 66 lines unless modified by HEX code. The TOP-OF-FORM feature for WP/OIS/VS systems is defined by print menu selection.
- . Adjustable platen position for variable form thickness.
- . Snap-in ribbon cartridges. Multi strike, Single strike driven by a spike drive mechanism and Fabric, used in single strike mode, driven by a gear enclosed in the cartridge.
- . Deselection while preserving data print buffer. This feature allows for adjustments, form changes, and ribbon cartridge replacements without data loss.
- . Standard CPU interface.

## 1.8 PRINTED CIRCUIT BOARD GENERAL INFORMATION

Table 1-1 lists the chassis, PCB's and cables used in the printers for various system configurations. Figure 1-2 shows the printed circuit board locations for the different system configurations.

## 1.9 MOTHERBOARD INFORMATION

Only one motherboard (WPN 210-7462) is used in all versions of the Wang Daisy Printer. BNC and TNC connectors are standard on all motherboards. For parallel I/O cable interfacing (5541W/WC), a female cable (WPN 220-3069) is mounted to the chassis then internally connected to the top of interface PCA 210-7449 or 210-7449-1 as shown in 19, Figure 1-2. For the 2200 system using 7443-1B, 7309A or 7726A PCB's an I/O cable (WPN 220-0161) is inserted into the right most connector of the memory slot (nearest the fan), routed to the right and then in front of the ON/OFF switch, along the rear panel and out through the cutout in the rear panel to the system as shown below:



In addition to the above printers, the serial I/O systems use the following interface boards:

7348	CPU/DL
7547A	16K Memory or
7847A	64K Memory
7446	I/O Board

A combination CPU and memory board is used in the 2200 and WPS 5 Systems. In these systems, an I/O cable connects the printer to the system.

DESCRIPTION	W.L. #	MODEL USE
1. Platen Assembly	279-5120 279-5120-1	(81W/81W-1/41W) (81WC/81WC-1/41WC)
2. Carriage Assembly	279-5127	(2281W/WC, 5541W/WC, 6581W/W-1/WC/WC-1)
3. Connector J3		(2281W/WC, 5541W/WC, 6581W/W-1/WC/WC-1)
4. Connector J2		(2281W/WC, 5541W/WC, 6581W/W-1/WC/WC-1)
5. Keyboard Cable & Connector J5		(2281W/WC, 5541W/WC, 6581W/W-1/WC/WC-1)
6. Motherboard	210-7462	(2281W/WC, 5541W/WC, 6581W/W-1/WC/WC-1)
7. Chassis Connector J4		(2281W/WC, 5541W/WC, 6581W/W-1/WC/WC-1)
8. Chassis Connector J7		(2281W/WC, 5541W/WC, 6581W/W-1/WC/WC-1)
9. Chassis Connector J8		(2281W/WC, 5541W/WC, 6581W/W-1/WC/WC-1)
10. Chassis Connector J6		(2281W/WC, 5541W/WC, 6581W/W-1/WC/WC-1)
11. Power Supply Regulator	210-7364A	(2281W/WC, 5541W/WC, 6581W/W-1/WC/WC-1)
12. On/Off Switch/Filter/Fuse		(2281W/WC, 5541W/WC, 6581W/W-1/WC/WC-1)
13. Chassis Connector J1		(2281W/WC, 5541W/WC, 6581W/W-1/WC/WC-1)
14. Printer I/O	210-7309A 210-7309A 210-7443-1B 210-7446 210-7449 210-7449-1 210-7636 210-7726A 210-7736	(2281WC) (2281W/WC) TSF Option I/O (2281W) (6581W/W-1/WC/WC-1) (5541W/WC) (5541W/WC) TSF Option I/O (6581W/W-1/WC/WC-1) TSF Option I/O (2281W) ENV. FEED./TSF I/O (6581W/W-1) ENF. FEED./TSF I/O
15. 16K RAM PTR. Memory 64K RAM PTR. Memory	210-7547A 210-7847A	(6581W/WC) (6581W-1/WC-1)
16. CPU/Data Link	210-7348A	(6581W/W-1/WC/WC-1)
17. Printer Control	210-7361A	(2281W/WC, 5541W/WC, 6581W/W-1/WC/WC-1)
18. Servo Control	210-7360	(2281W/WC, 5541W/WC, 6581W/W-1/WC/WC-1)
19. Printer Internal I/O Cable	220-3069	(5541W/WC)

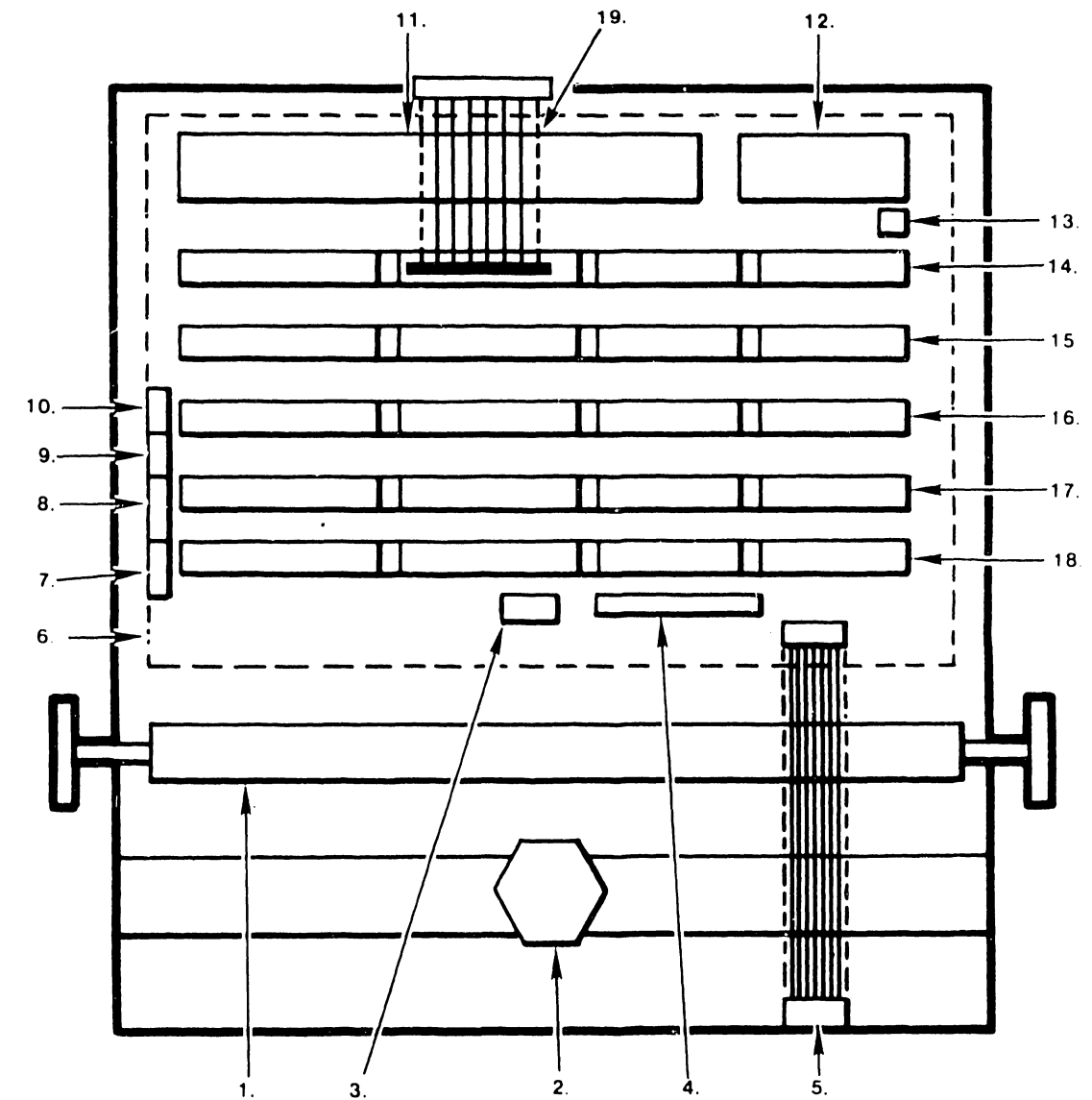


FIGURE 1-2 WANG DAISY PRINTERS PCB  
AND CONNECTOR CONFIGURATION

TABLE 1-1  
DAISY PRINTER CONFIGURATION SUMMARY

The printers identified in left column consist of the appropriate final mechanical assembly \*1 plus the following chassis, cables, and boards.

MODEL NO	CHASSIS W/O PCB's	SERVO 210-7360	CONTROLLER 210-7361A	POWER SUPPLY 210-7364A	CPU 210-7348A	MEM 210-7547A	IO 210-7446	IO 210-7449	IO 210-7443-1B	MOTHER BD 210-7462	KEYBOARD 210-7570	ENV. FEED/TSF IO 210-7736 *2	TSF OPTION *2	I/O CABLES	CHASSIS WITH PCB's
2281W 50 HZ	270-0559-1	X	X	X					X	X	210-7570	210-7726A	210-7309A	220-0161	279-5332
2281W 60 HZ	270-0559	X	X	X					X	X	210-7570	210-7726A	210-7309A	220-0161	279-5228
2281WC 50 HZ	270-0560-1	X	X	X					210-7309A	X	210-7570		210-7309A	220-0161	279-5230
2281WC 60 HZ	270-0560	X	X	X					210-7309A	X	210-7570		210-7309A	220-0161	279-5231
6581W 50 HZ	270-0559-1	X	X	X	X	X	X			X	210-7365-1	X	210-7636	220-0148	279-5210
6581W-1 50 HZ	270-0559-1	X	X	X	X	210-7847A	X			X	210-7365-1	X	210-7636	220-0148	279-5284
6581W 60 HZ	270-0559	X	X	X	X	X	X			X	210-7365-1	X	210-7636	220-0148	279-5209
6581W-1 60 HZ	270-0559	X	X	X	X	210-7847A	X			X	210-7365-1	X	210-7636	220-0148	279-5283
6581WC 50 HZ	270-0560-1	X	X	X	X	X	X			X	210-7365-1		210-7636	220-0148	279-5211
6581WC-1 50 HZ	270-0560-1	X	X	X	X	210-7847A	X			X	210-7365-1		210-7636	220-0148	279-5286
6581WC 60 HZ	270-0560	X	X	X	X	X	X			X	210-7365-1		210-7636	220-0148	279-5212
6581WC-1 60 HZ	270-0560	X	X	X	X	210-7847A	X			X	210-7365-1		210-7636	220-0148	279-5285
5541W 50 HZ	270-0559-1	X	X	X					X	X	210-7365-1		210-7449-1	220-0198	279-5215
5541W 60 HZ	270-0559	X	X	X					X	X	210-7365-1		210-7449-1	220-0198	279-5213
5541WC 50 HZ	270-0560-1	X	X	X					X	X	210-7365-1		210-7449-1	220-0198	279-5214
5541WC 60 HZ	270-0560	X	X	X					X	X	210-7365-1		210-7449-1	220-0198	279-5216

\*1 W 279-5136  
WC 279-5136-1

\*2 To prepare printer for accessory operation. These I/O boards are substituted for the standard I/O board.

# **CHAPTER**

## **2**

# **INSTALLATION AND INITIAL CHECKOUT**

## CHAPTER 2

## INSTALLATION AND INITIAL CHECKOUT

2.1 SCOPE

This section provides Wang customer engineers with the information required to remove the daisy printer from its shipping container and perform the initial checkout procedures. Included in this section are descriptions of the controls and indicators.

2.2 INSTALLATION2.2.1 PRELIMINARY UNPACKING

Upon receipt of the printer, inspect the shipping container for signs of damage during shipment such as crushed or torn edges. If there is any evidence of damage, report it to Wang Laboratories, Inc. and the shipper immediately. If no damage has been noticed proceed with the unpacking procedures.

2.2.2 UNPACKING

The Wang printer is simply packed, using instapacks and polybags within the Wang cartons. Remove all the instapack and the four shipping bolts. Do not attempt to remove the four white bumpers (22a, Figure 9-2) as they permanently secured to the bottom pan (22b, Figure 9-2). Lift the printer free from the carton and remove tape strips securing the main cover and paper rack. The cables and accessories (contained in Jiffy bags) must be carefully removed. Check the entire unit for damage before attempting to power up.

## NOTE:

Refer Chapter 9 for location of shipping bolts and covers.

2.2.3 INITIAL PRINTER INSPECTION

Use the following procedure to inspect the printer before connecting it to a power source.

1. Remove top cover by loosening the four lock screws. Two are located at the rear lower corners and the remaining two screws are located under the access cover on each side of the lower front.
2. Remove the cover by lifting up the back and then sliding the cover off. It may be necessary to remove upper cover first.
3. Open the access cover and disconnect the keyboard ribbon connector.

4. Remove keyboard from cover and attach to ribbon cable removed in step 3. above.
5. Remove all packing material from the carriage and interior of printer. Cut and remove tyewrap securing carriage to side frame.
6. Check that the required PCB's are installed in the appropriate locations as listed in Table 1-1 and shown in Figure 1-2.
7. Check all printed circuit boards for proper seating by removing and re-seating.
8. Check PCB switch position settings and jumpers as shown in Figures 2-1 through 2-7.
9. Check that all cable connections are correct and secure (refer to Chapter 8).
10. Be sure that there are no obstructions to the free movement of the carriage, print wheel and fan.
11. Check that the metal tabs of the paper deflector do not contact the platen and that they are equally spaced away from the platen. Improper tab spacing will make paper insertion difficult.

2.2.4 PRELIMINARY ELECTRICAL CHECKOUT

```

*****
*                               WARNING                               *
*                               *                                     *
* IF IMPROPERLY WIRED OR IF A MALFUNCTION IN THE                   *
* SERVO CONTROL BOARD OCCURS, THE PRINT HEAD WILL                   *
* SLAM AGAINST SIDES OF PRINTER WITH FORCE                           *
* SUFFICIENT TO CAUSE PERSONAL INJURY AND/OR DAMAGE                 *
* TO THE PRINTER. BEFORE ENERGIZING PRINTER, CHECK                   *
* THAT MOTOR CONNECTIONS TO SERVO BOARD (7360) ARE                   *
* CORRECT (CABLE 1 WITH RED WIRE ON BOTTOM TO J1 AND                   *
* CABLE 2 WITH BLUE WIRE ON BOTTOM TO J2 AS SHOWN                     *
* IN FIGURE 2-8) AND THAT THE BOARD IS SEATED PROPERLY.             *
* SEE FIGURE 1-2 FOR PCB LOCATIONS. KEEP HANDS AWAY                 *
* FROM THE SIDES OF PRINTER.                                         *
*                               *                                     *
*****

```

1. Connect the printer power cord to a standard 110 Vac or 230 Vac outlet depending upon input-power set up.
2. Set the main AC power ON/OFF switch to ON. This switch is located on the rear power panel.
3. Check that the cooling fans are operating and the front panel indicators are on. If the printer is not energized, check/replace the main fuse located adjacent to the ON/OFF switch on the rear panel.

4. Using a digital voltmeter, check the following printer operating voltages, adjusting them as required. See Figure 2-8 for voltage test point and adjustment locations.

MEASUREMENT LOCATION	ADJUSTMENT & LOCATION	VOLTAGE	TOLERANCE/ SETTING
7360	R10 7364A	+5VR	+5.10V
7360	NONE	-12V	-11.76V to -12.24V
7360	NONE	+12V	+11.76V to +12.24V
TEST CONN. J3-9	R259 7360	+0.60V	+0.60V
TEST CONN. J3-12	R264 7360	+2.15V	+2.15V

When the voltages are at their proper levels, set the main power ON/OFF switch OFF. Disconnect ribbon connector from keyboard, reinstall keyboard, reconnect ribbon connector to keyboard, replace top cover and tighten the four lock screws.



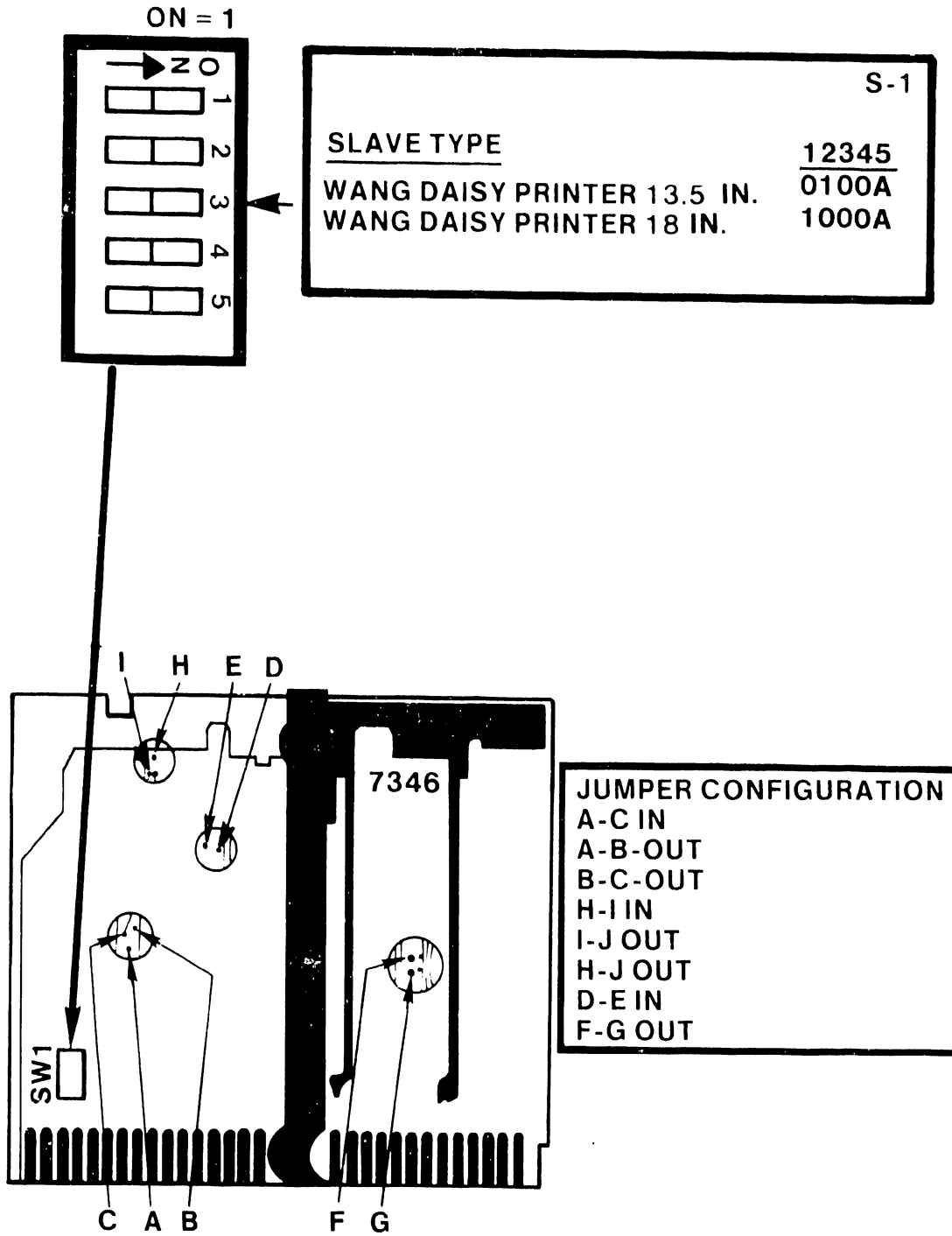
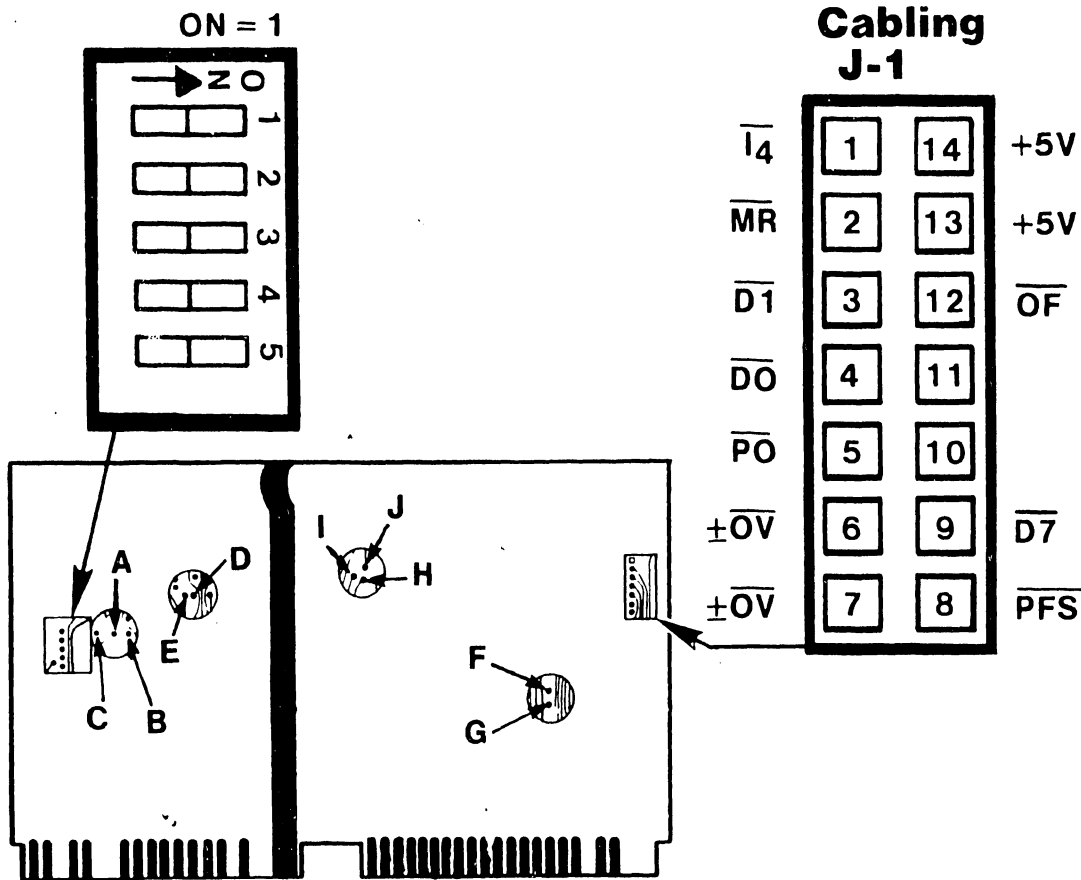


FIGURE 2-1 6581W/W-1/WC/WC-1 PCB 7346 (NOW PCB 7446) SWITCH SETTINGS/JUMPERS

<b>S-1</b>	
<b>SLAVE TYPE</b>	<b>12345</b>
WANG DAISY PRINTER 13.5 IN.	0100A
WANG DAISY PRINTER 18 IN.	1000A



**Jumpers**

JUMPERS	IN	OUT
H-I	DAISY PTR	PUNCH LP.
D-E	LINE PTR., PUNCH	DAISY PTR.
A-C	L.F. PTR. DAISY PTR.	PUNCH
A-B	PUNCH	LINE PTR, DAISY PTR.
G-F	DAISY PTR.	LINE PTR. PUNCH MATRIX
H-J	PUNCH L.P.	DAISY PTR.

FIGURE 2-2 6581W/W-1/WC/WC-1 PCB 7446 SWITCH SETTINGS/JUMPERS

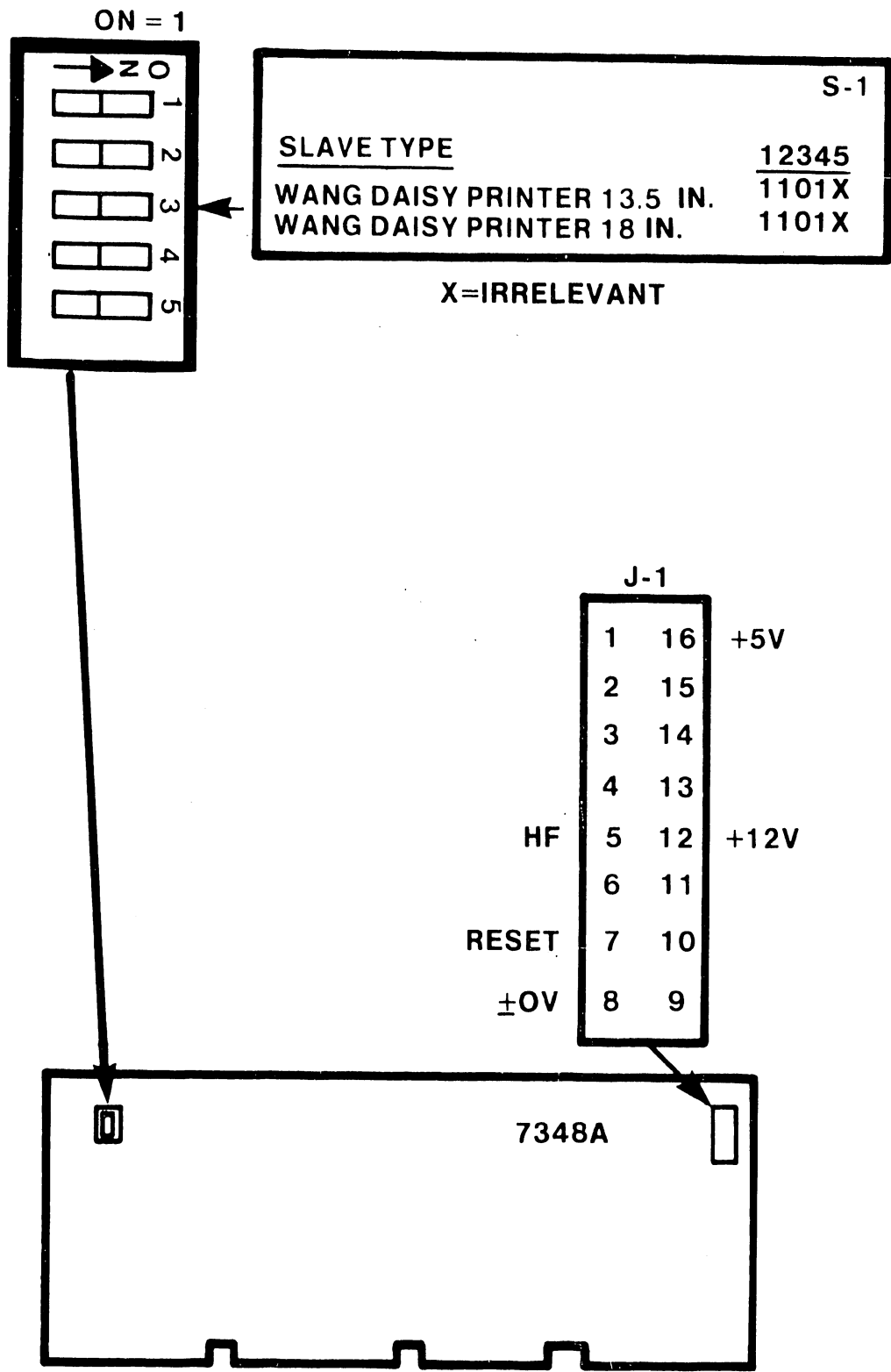


FIGURE 2-3 6581W/W-1/WC/WC-1 PCB 7348A SWITCH SETTINGS

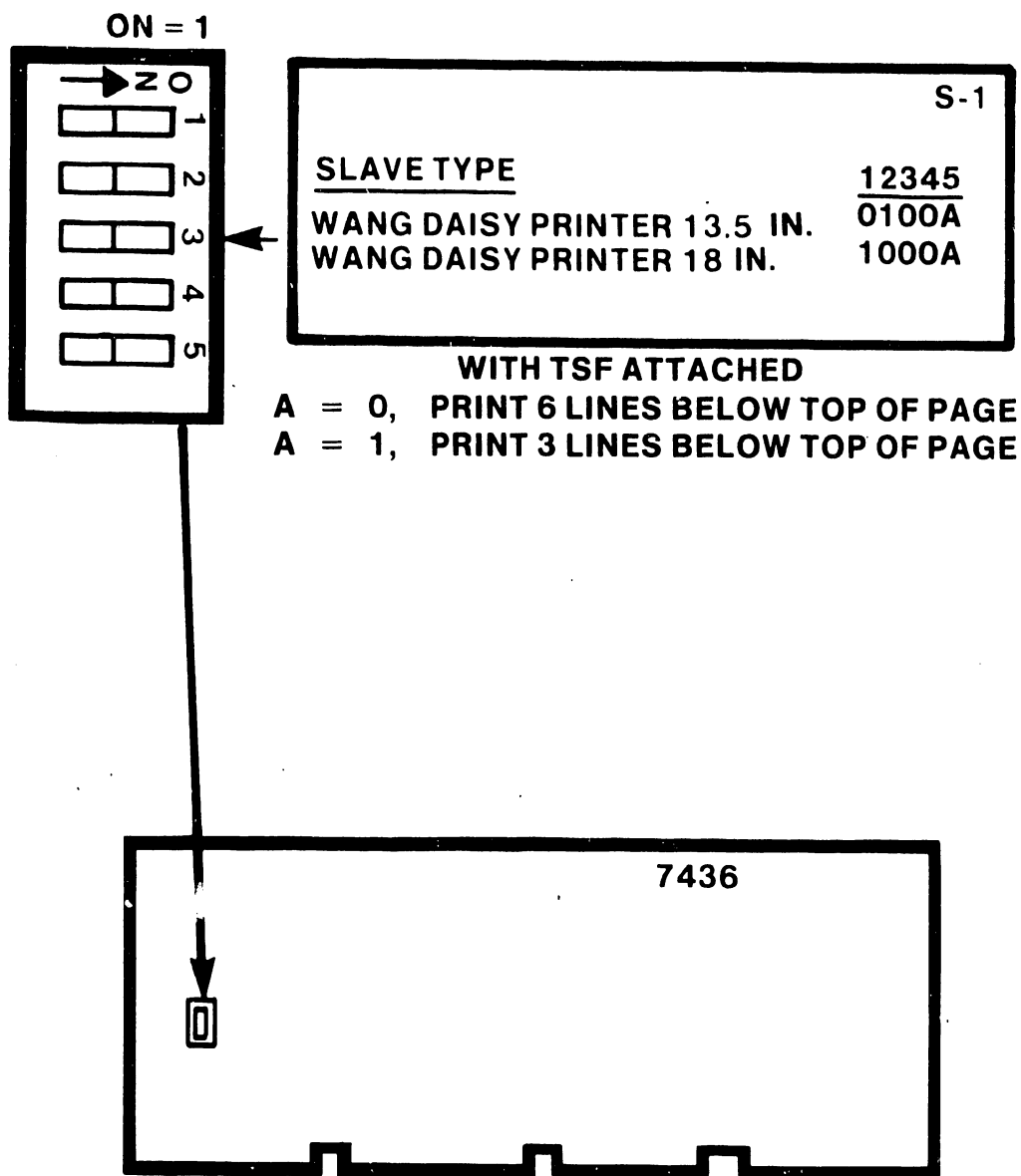


FIGURE 2-4 6581W/W-1/WC/WC-1 PCB 7436 (NOW PCB 7636) SWITCH SETTINGS

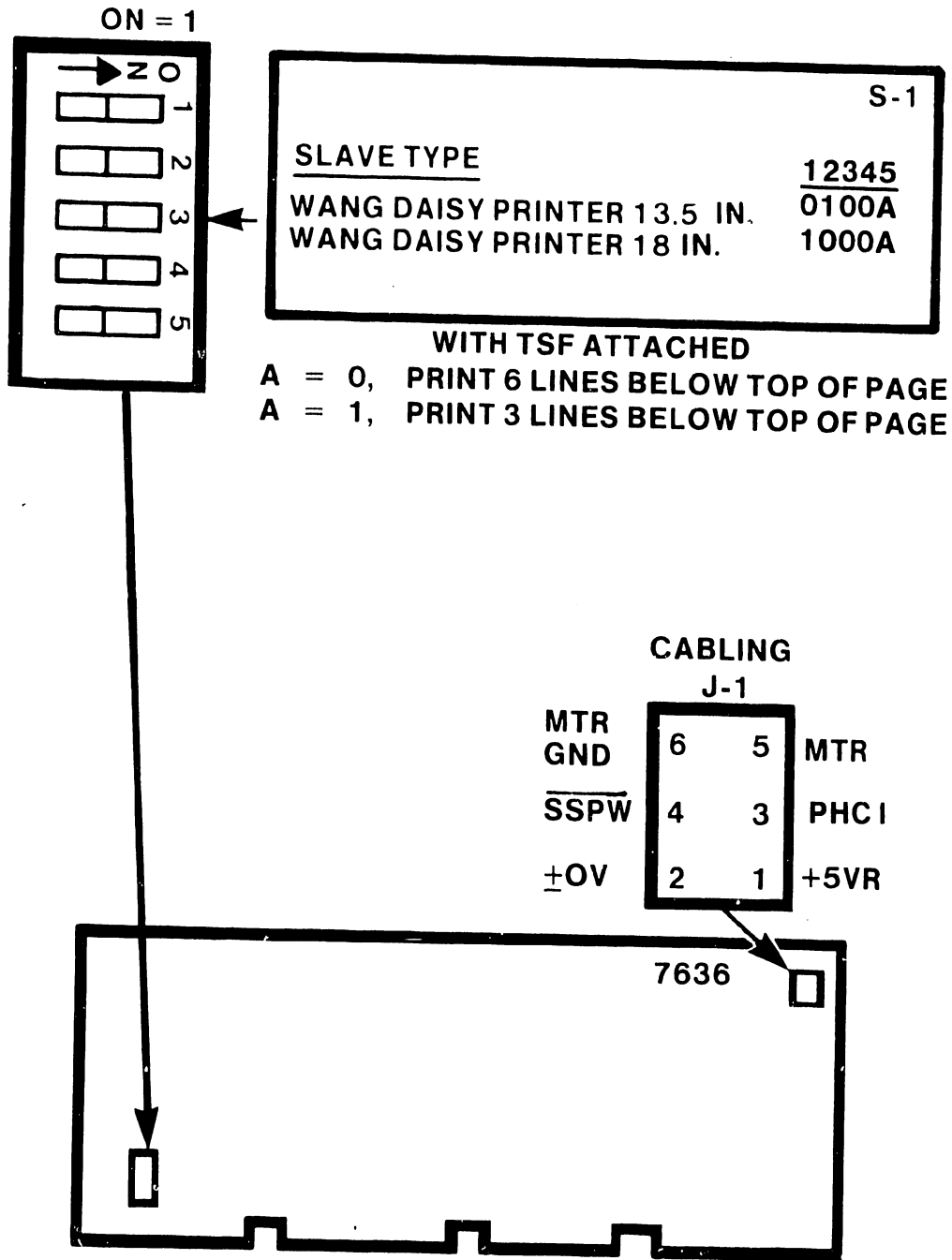


FIGURE 2-5 6581W/W-1/WC/WC-1 PCB 7636 SWITCH SETTINGS

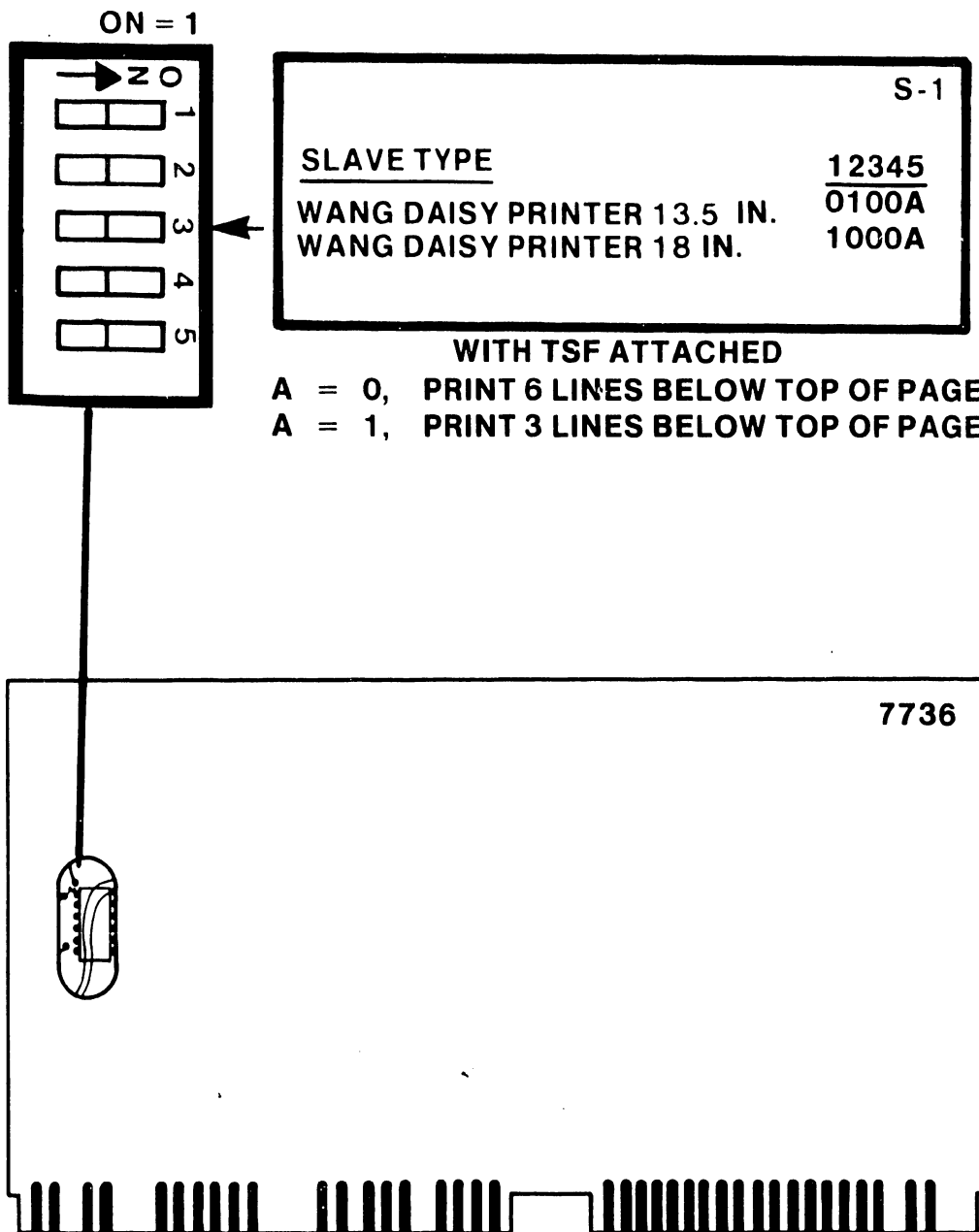


FIGURE 2-6 6581W/W-1 PCB 7736 SWITCH SETTINGS

### Jumper Configurations

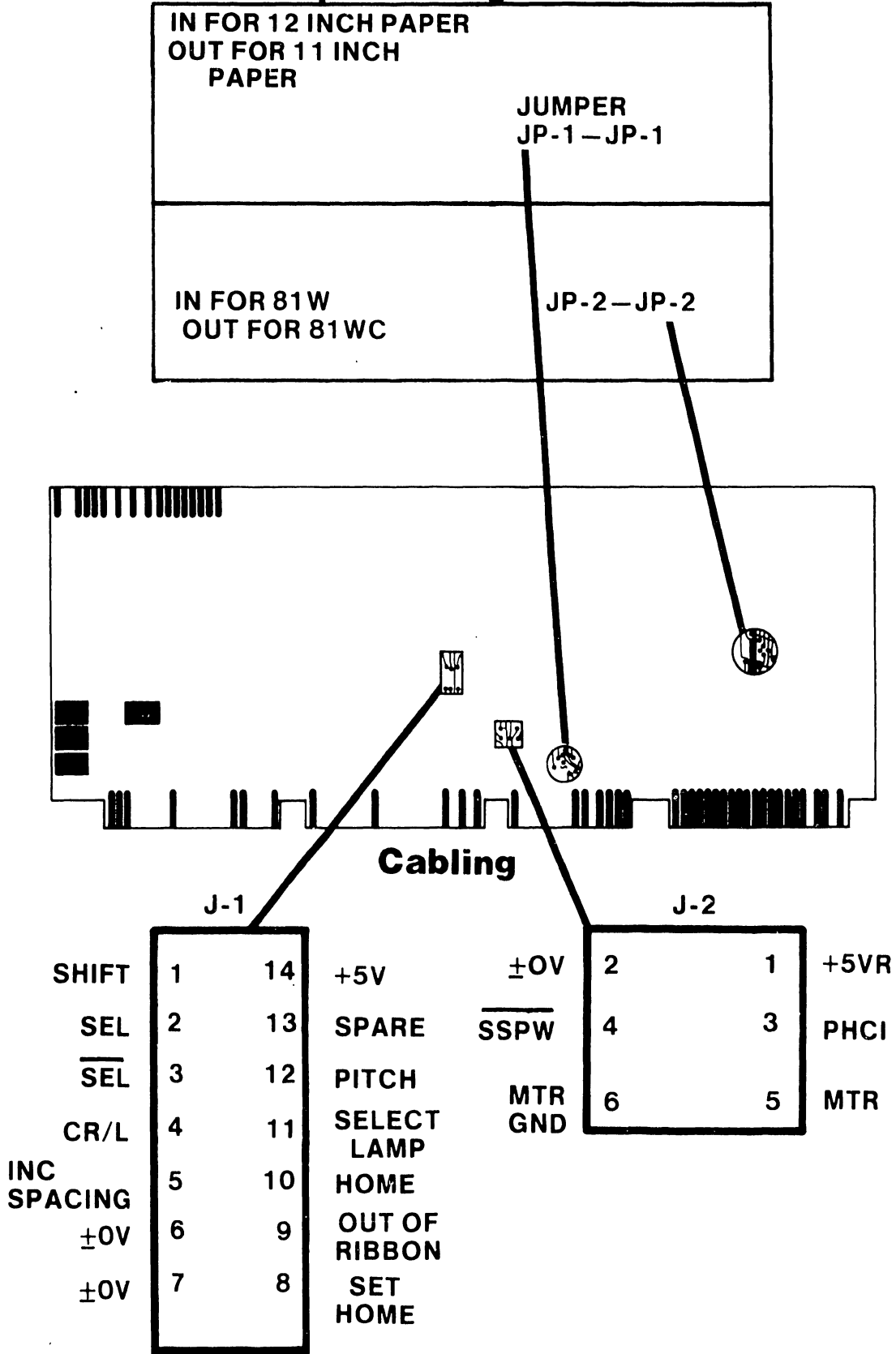
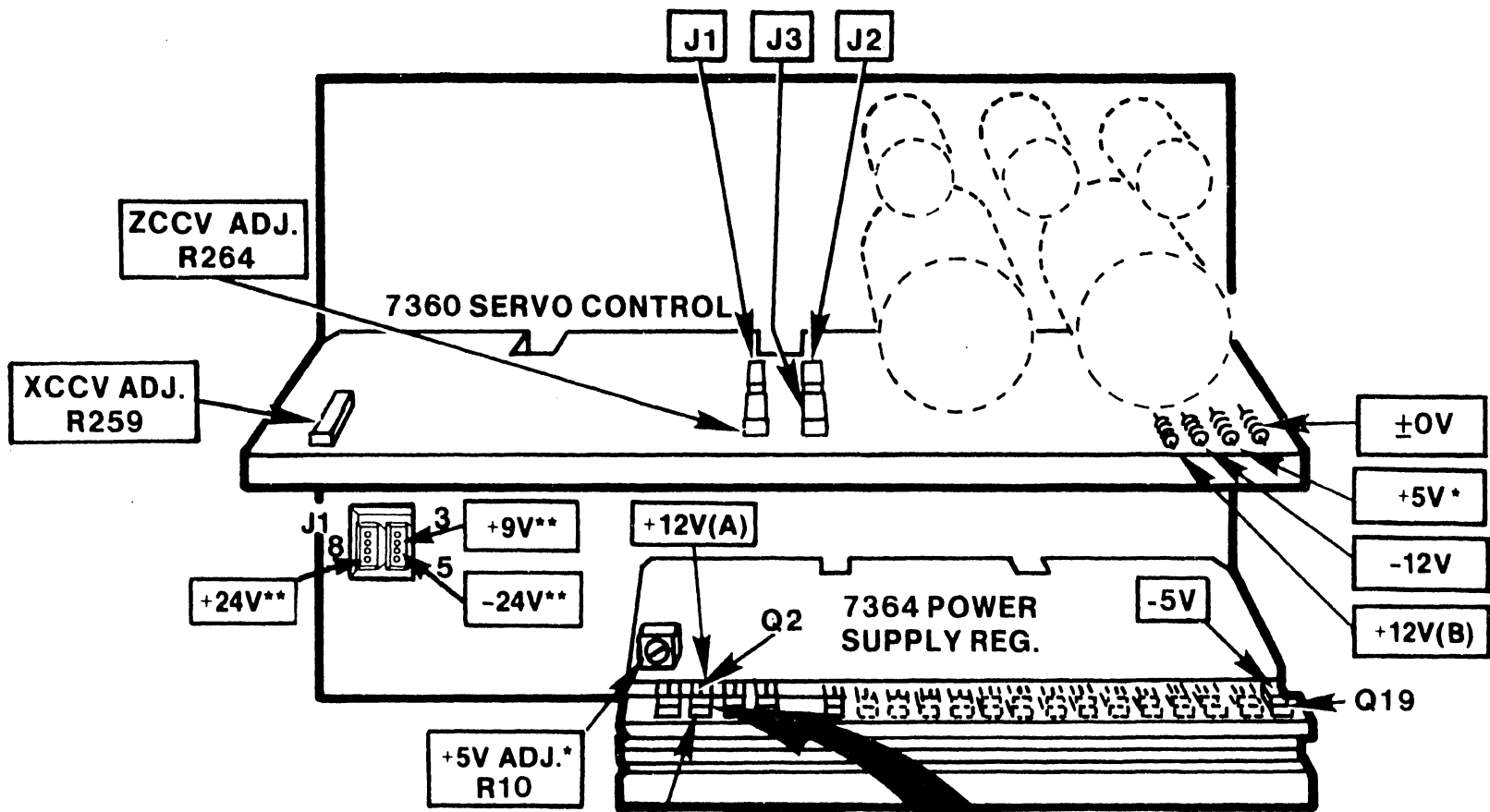


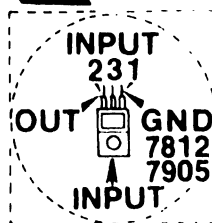
FIGURE 2-7 2281W/WC PCB 7309 JUMPER CONFIGURATIONS (2200 SYSTEMS ONLY)

FIGURE 2-8 VOLTAGE TEST POINTS AND ADJUSTMENT LOCATIONS



NOTES: \*\* +5 CONTROLS  
 + 12 (B) AND -12  
 \*\* UNREGULATED  
 VOLTAGE, NOMINAL VALUE

Q1 MAY NOT BE  
 PRESENT ON  
 MORE RECENT  
 HEAT SINKS





### 2.3 PRINT WHEEL UNPACKING AND INSTALLATION/REPLACEMENT

1. Carefully remove the Daisy print wheel from its shipping container.
2. Open the printer front access cover to expose the carriage assembly.
3. Using the print-wheel release lever on the side of carriage, unlock the print-head assembly and tilt it away from the platen to expose the print wheel hub (see Figure 2-9).
4. Place print wheel on motor shaft while lining up the alignment slot with the key protruding adjacent to the hub. Push wheel down until it is properly seated on hub.
5. Tilt the print head back into position until it locks in place.

### 2.4 RIBBON CARTRIDGE INSTALLATION/REPLACEMENT

1. Remove ribbon cartridge from its shipping container and inspect it for possible damage.
2. If the ribbon is loose, turn the take-up knob on the cartridge clockwise until the ribbon is taut.
3. Open the access cover by gently lifting the front of the cover up.
4. Slide the exposed portion of the ribbon down between the guide posts and the card guide as shown in Figure 2-10.
5. Snap the ribbon cartridge into place by gently pushing it down until the ribbon take-up mechanism snaps into place.
6. To remove ribbon cartridge, move ribbon take-up mechanism release arm to the left as shown in Figure 2-10.
7. Gently lift ribbon cartridge off carriage assembly.

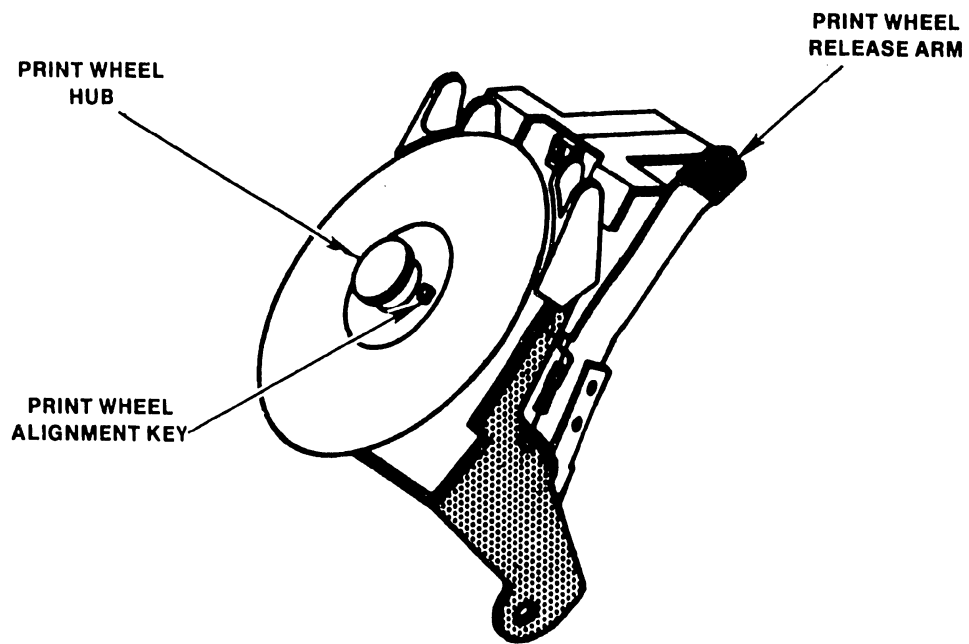


FIGURE 2-9 DAISY PRINT WHEEL

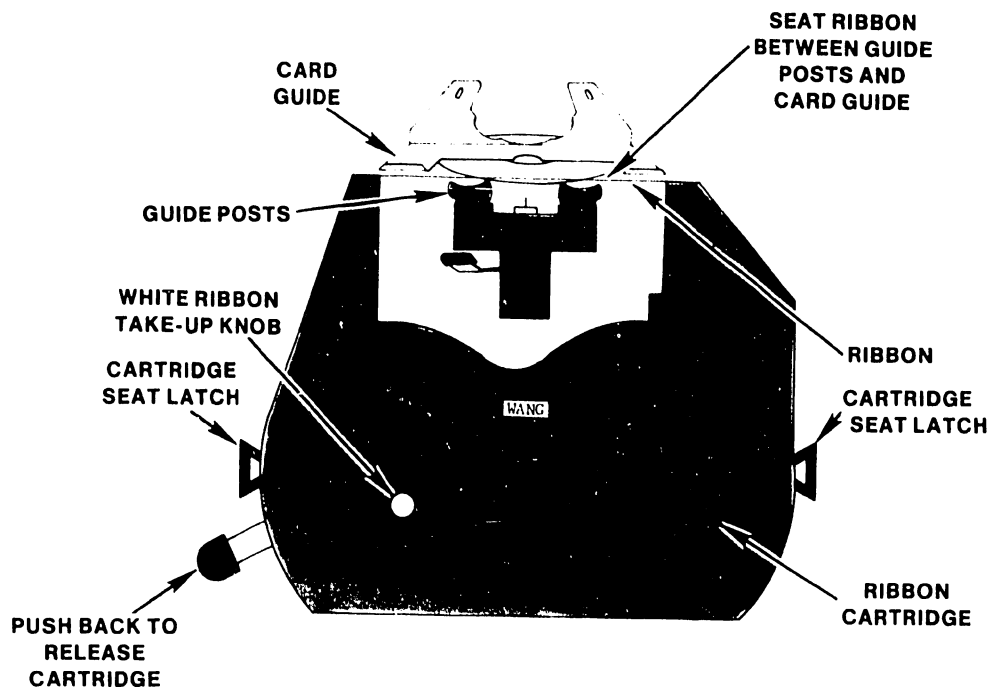
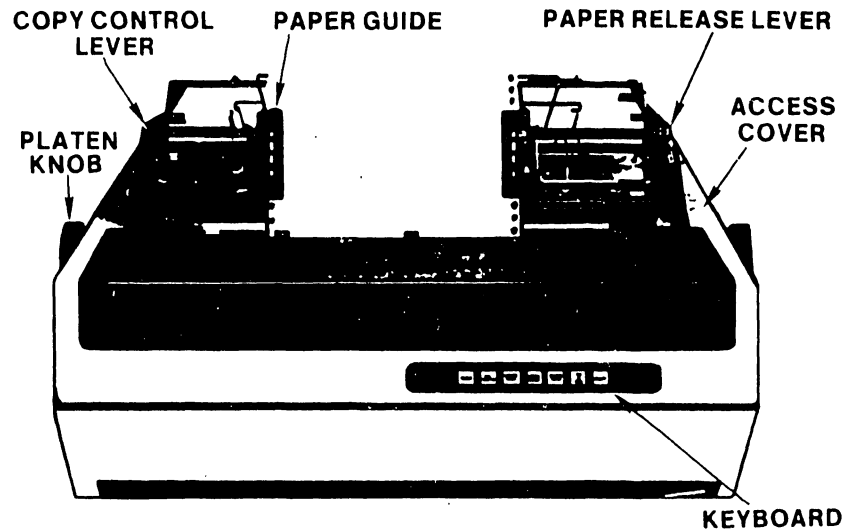


FIGURE 2-10 RIBBON CARTRIDGE REMOVAL/INSTALLATION

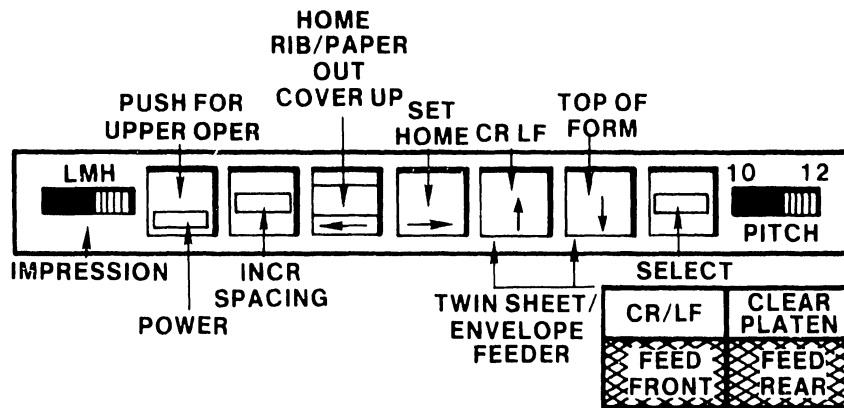
2.5 OPERATOR CONTROLS AND INDICATORS

2.5.1 Front Panel Controls and Indicators

The following controls and indicators, located on the front panel as shown in Figure 2-11, control the basic operations of the printer.



2281W/WC



6581W/W-1/ WC/WC-1 & 5541W/WC

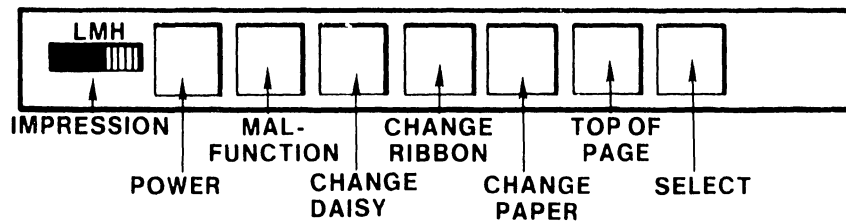


FIGURE 2-11 DAISY PRINTER FRONT CONTROLS AND INDICATORS

The following controls and indicators are on the Models 41W/41WC, 81W/81WC and 81W-1/81WC-1. (See Figure 2-11)

**IMPRESSION CONTROL (L - M - H):** This switch provides three levels of print intensity to accommodate print wheel font and form variations. Low is used for light printing to extend the life of the more delicate type fonts. Medium is used for most normal work. High is used for printing multiple copies.

**POWER Indicator Lamp:** Illuminates when power is on.

**MALFUNCTION:** Indicates a system malfunction. A RESTORE command (press SELECT switch or set POWER switch OFF and then ON) is required to continue.

**SELECT Indicator/Switch** Illuminates and allows input to the printer when selected. The operator can interrupt programmed control by manually deselecting. In the Word Processing applications, if the unit is deselected while printing and then the TOP-OF-PAGE switch is depressed, the paper will advance and then reprint the entire page. If the SELECT switch is again depressed without depressing the TOP OF PAGE switch, the printer will begin printing with the next character in the program. In the 2200 systems, regardless of any switch depression, the printer will begin printing with the next character in the program. When deselected, both carriage and print wheel motors are disabled allowing them to be physically moved as required. Also, if the SELECT lamp is lit and there have not been any print queues for approximately 60 seconds the carriage and print wheel motors are disabled allowing them to be moved by hand.

The following controls and indicators are on the 2281W/WC printer only (see Figure 2-11):

COVER OPEN            Illuminates when the cover is open or not seated properly. The arrow indicates carriage return to the right when key is depressed.

RIBBON OUT:           Indicates when the ribbon supply is exhausted. The arrow indicates carriage return to the left when key is depressed.

PAPER OUT:            Lights when a new supply of paper is needed.

RETURN:                When depressed, returns carriage (printer not selected).

TOP OF FORM:          Advances paper to the top of the next form page.

PITCH CONTROL:        This two-position switch determines which pitch (10 or 12) is being used by the printer.

The following controls and indicators are on both the Word Processing Systems and VS systems:

CHANGE DAISY:         This indicator is under software control, it illuminates when a change in a Daisy wheel is required as determined by document requirements as inserted by operator.

CHANGE RIBBON:        This indicator has a dual function; it illuminates when the ribbon supply is exhausted, and also illuminates when the cover interlock is open (cover open or not seated properly).

CHANGE PAPER:         When lit, indicates paper supply is out on tractor feed units. Depress SELECT switch to print out remaining lines on the last form of the previous paper supply. Reload paper as described in paragraph 3.2 and depress SELECT switch to continue printing.

TOP OF PAGE:          Advances paper to the top of the next page. The switch is disabled while the unit is printing. Printing will continue when printer is selected.

#### 2.5.2 ADDITIONAL CONTROLS

In addition to the controls and indicators previously described, there are two additional controls used on the WANG DAISY (81W/WC) printers. They are the Copy Control Lever and the Paper Release Lever. They are shown in Figure 2-11.

COPY CONTROL LEVER:    This lever is located on the top, left-side of the printer. It allows the operator to manually adjust the platen position for paper thickness including multiple forms up to six parts.

PAPER RELEASE LEVER: This lever (located on the top right side of printer) opens the paper-feed rollers and deflector, thus aiding in the insertion and alignment of paper.

NOTE

The Paper Release Lever must be in the forward position when using the Tractor Feed Device.

2.5.3 REAR POWER PANEL

The Rear Power Panel, located on the rear of the printer, contains the main fuse, an AC power ON/OFF rocker switch, the AC line cord, and the I/O BNC and TNC connectors (see Figure 2-12). Also shown are the cable connectors provided for connecting a twin sheet feeder (TSF) and/or an envelope feeder (EF) as shown in Figure 2-12.

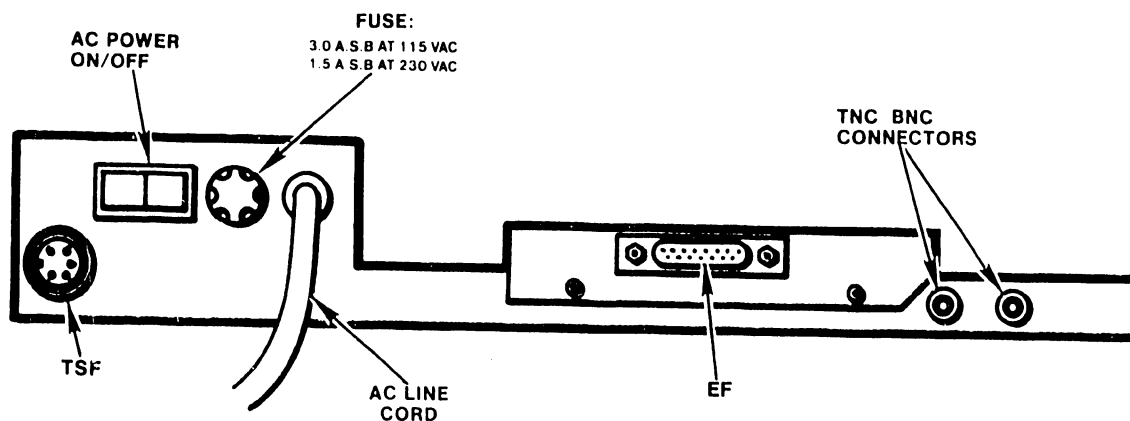


FIGURE 2-12 DAISY PRINTER REAR POWER PANEL

**CHAPTER**

**3**

**OPERA-  
TION**

## CHAPTER 3

## OPERATION

3.1 INTRODUCTION

The major operations to be performed by the operator are: loading paper, adjusting for paper thickness, selecting and installing print wheels, selecting and installing ribbon cartridges and selecting print hammer intensity.

The operation of the printer keyboard is discussed in Installation, Chapter 2.

3.2 OPERATIONS

Paper loading is done by inserting the paper down behind the platen (paper must go between paper-out stop bail and paper-out sensors) and rolling the platen by hand to bring the paper around and up front (as is done with a standard typewriter). When pulled forward, the paper bail aids in forcing the paper over the top of the platen to the rear. The right-hand release lever may be pulled forward to allow paper alignment by the operator. After paper is aligned, the paper release lever is returned to its normal operating position, except when using the tractor feed.

The operator can adjust the copy control lever for the type of printing to be performed. This lever should be fully forward for printing on single sheets of paper. As the paper thickness increases, as with multiple carbon forms or thicker paper, the lever is moved to the rear.

The copy control lever must be in its fully forward position when printing on single sheets of paper using carbon ribbons. If the lever is not fully forward in this situation, it is likely that the carbon ribbons will break.



The impression control switch provides three levels of print intensity to accommodate font variations as well as multiple copy printing.

H-for High (used with multiple forms)

M-for Medium (used for most normal work)

L-for Low (used for light printing to extend the life of the more delicate fonts.

Print-wheel insertion and ribbon carbon insertion are described in Chapter 2, paragraphs 2.3 and 2.4, respectively.

Operation of keyboard controls and indicators is described in Chapter 2, paragraph 2.5.

### 3.3 REFERENCE MANUALS

For user information refer to the following documents:

MODEL NO.	DOCUMENT NO.	SYSTEM USED WITH
2281W	700-5744A	2200
2281WC	700-6255	2200
5541W	700-4790D	SYSTEM 5
5541WC	700-4789D	SYSTEM 5
6581W/ 6581W-1	700-5176B	928, OIS AND VS
6581WC/ 6581WC-1	700-5138D	928, OIS AND VS

**CHAPTER**

**4**

**THEORY**

**OF**

**OPERA-**

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## CHAPTER 4

## THEORY OF OPERATION

4.1 GENERAL DESCRIPTION (See Figure 4-1)

The Wang Daisy printer is a microprocessor-controlled device which responds to print commands received from a host computer through an I/O interface. When the microprocessor receives a print command; it directs carriage, print wheel, paper, ribbon, and print hammer movements to carry out the command.

A DC Servomotor moves the carriage assembly. The servomotor can rotate in either direction at variable speeds. It can be stopped at any of 120 discrete positions contained within each inch of travel of the carriage.

The microprocessor specifies the direction and length of movement, while the carriage servomotor and it's drive circuits move the carriage in accordance with these specifications. Servo feedback loops monitor the progress of the movement and provide signals that adjust motor speed as required to fulfill these specifications. When the servo feedback circuits detect that the carriage has reached the specified position and has stopped, they produce a detent signal that holds the carriage in that position.

Another DC Servomotor moves the print wheel. This motor has operating characteristics and controls almost identical to those of the carriage motor. It can be positioned at any of 96 discrete positions that correspond to the number of characters on the print wheel. The microprocessor specifies direction of movement and distance; while the servo feedback loops monitor progress, adjust motor speed and provide detent.

Stepping motors are used for paper movements and ribbon movements. These are much less complex than print wheel and carriage movements, consequently, the control circuitry is also less complex. The paper feed motor can rotate in either direction as specified by the microprocessor, but the ribbon feed motor rotates only in a single direction.

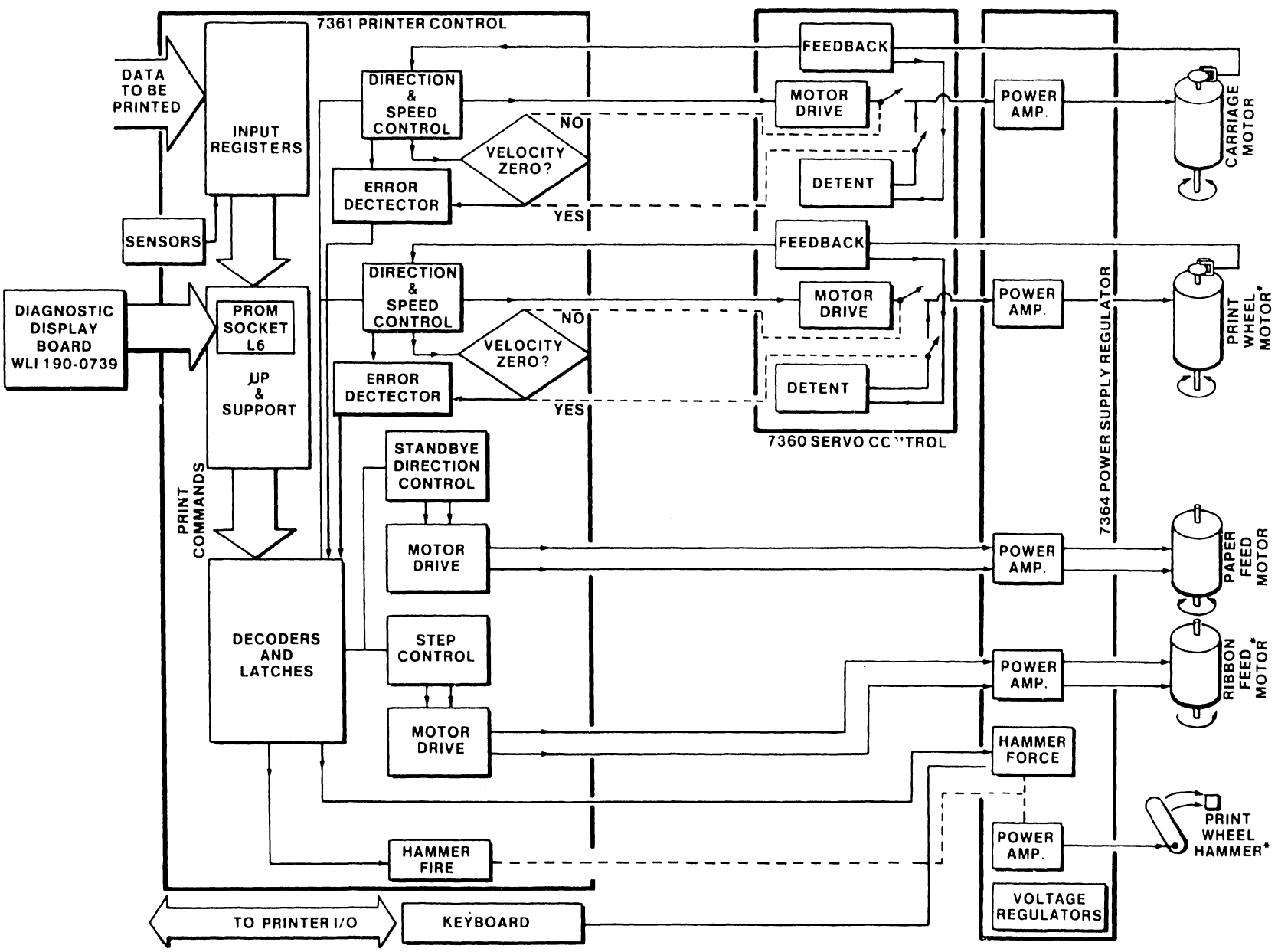


FIGURE 4-1 PRINTER FUNCTIONAL BLOCK DIAGRAM

The print hammer is solenoid-operated. The striking force range of the hammer is manually selected from the keyboard to suit the type of print wheel and the material being printed on. Within the selected range, the microprocessor varies the striking force to suit the particular character being printed.

#### 4.1.1 PRINTER PC BOARDS, MAJOR COMPONENTS AND THEIR FUNCTIONS

Three PC boards contain the circuits that carry out the functions described above. All models of the Wang Daisy Printer contain the following PC boards:

- 7361 Printer Controller
- 7360 Servo Control
- 7364 Power Supply Regulator

Each printer is also equipped with an interface for the system with which it will be used. Also, the customer engineer is provided with a Diagnostic Display PC Board (WLI# 190-0739) which is used for mechanical adjustments and alignments and to display error codes during testing (refer to Chapter 7 for it's use during testing).

##### 4.1.1.1 7361 PRINTER CONTROLLER

The 7361 Printer Controller Board receives control commands and data to be printed from the host system through an interface. The commands are latched into input registers from which they are retrieved and interpreted by the microprocessor. The microprocessor then generates five movement commands and distributes them to a series of decoders and registers that drive the control circuits.

The carriage and print wheel motor circuits are nearly identical. The microprocessor loads initial instructions for direction and distance into the counters of the control circuits; but once movement begins, control of the movement proceeds automatically without intervention by the microprocessor.

During the course of the movement, the speed control circuit continuously monitors feedback signals from the 7360 Servo Control board to determine the progress. The speed of movement is gradually reduced, so that it will be zero when the motors have reached their specified positions. The velocity zero circuit monitors the movement to determine the point at which the movement is finished. When that point is reached, velocity zero causes the detent circuit to be energized. Error detection circuits are then used to detect motor overshoot and, if necessary, reposition the motor to the correct position.

The error detection circuits monitor the outputs of the Print Wheel and Carriage Drive Motor Encoders (XP1, XP2, ZP1, ZP2) to determine if there is any additional movement after the position counters have been decremented to zero. If an overshoot does occur, the error detection circuit (Print Wheel or Carriage Drive) will cause the firmware to issue a retry to the particular motor to reposition to the proper position and if no further error occurs it will continue printing. Should the retry fail, it will repeat the same retry for two additional times and then issue a INOB command to recalibrate the motor encoder LED compensating circuit and attempt to print again. If again after three additional retries the print was unsuccessful, the firmware will cause the MALFUNCTION lamp to be lit and shut the printer down. A Power ON/OFF or SELECT switch depression is required to turn off the MALFUNCTION lamp. The successful error retries will be transparent to the operator unless the printer is being watched by the operator at the time the retries occur.

The paper feed and ribbon feed motor circuits are very similar. Since the paper feed motor rotation is bi-directional, its control circuit provides for directional as well as stepping control, while the ribbon feed motor control circuit provides stepping control only. The step and direction control circuits generate the appropriate paper feed motor signals in response to directions received from the microprocessor. The MOTOR DRIVE circuits increase the power level of the two-phase stepping motor signals, and drive a power amplifier located on the 7364 Power Supply Regulator Board. As previously stated, the ribbon feed motor control circuits are the same as the paper feed motor circuits except for directional control.

For each stroke of the print hammer, the microprocessor provides a hammer force signal appropriate for the character to be printed. The hammer force signal is fed to the hammer force circuits located on the 7364 Power Supply Regulator board. In addition, the microprocessor provides a signal to the hammer fire circuits. The hammer fire circuits enable the hammer force circuits on the 7364 Power Supply Regulator board.

#### 4.1.1.2 7360 SERVO CONTROL

The 7360 Servo Control board contains the motor drive, detent, and feedback processing circuits for both the carriage motor, and the print wheel motor. It also contains the circuitry that generates power reset signal used on the Printer Control and I/O boards. The motor drive circuits respond to signals from the direction and speed control circuits on the 7361 Printer Control board, and also to return signals from the feedback processing circuits. The motor drive circuit then provide signals of appropriate voltage and polarity to the power drivers located on the 7364 Printer Regulator board.

The detent circuits provide feedback-derived signals that hold motors when they have reached their specified positions. Note that the motors receive either motor drive or detent signals at any given time, but not both at the same time. Signals from the 7361 Printer Control board provide motor drive or detent signals to the motors.

Photoelectric devices, working in conjunction with slotted encoder disks on the motor shafts, produce three feedback signals from each servomotor. After processing by the feedback processing circuits, the three signals provide exact motor position and speed information to the control circuits. One of the feedback signals specifies a reference "Home" position, the second and third provide motor position information.

#### 4.1.1.3 PRINTER REGULATOR 7364

The 7364 Printer Regulator board contains five voltage regulators (+5VR, -5V, -12V, +12VA, and +12VB). The +12VB regulated output is used on all

printer boards with the exception of the I/O boards which use the +12VA regulated output. The Printer Regulator also contains the paper, ribbon, hammer, print wheel and carriage final drive circuits.

IMPRESSION Control, a user function provided by a front panel keyboard switch, is actually a level adjustment for the hammer impression voltage regulator. The +5VR regulator provides the only adjustable supply voltage.

#### 4.1.1.4 FRONT PANEL KEYBOARD AND SENSORS

The printer functions require either local sensing or operator control. End-of-Ribbon, Multi-Strike Ribbon, Paper Out, Carriage Home and Cover Open conditions must be sensed and the signals fed back to the microprocessor on the Printer Control board. Other functions such as Select, Top-of-Page, and Impression Control are initiated by switch-generated signals from the Front Panel Keyboard. These signals are fed to the I/O Interface and the Printer Regulator board. Keyboard indicator lamps are driven by circuits on the I/O Interface.

#### 4.1.1.5 MOTORS

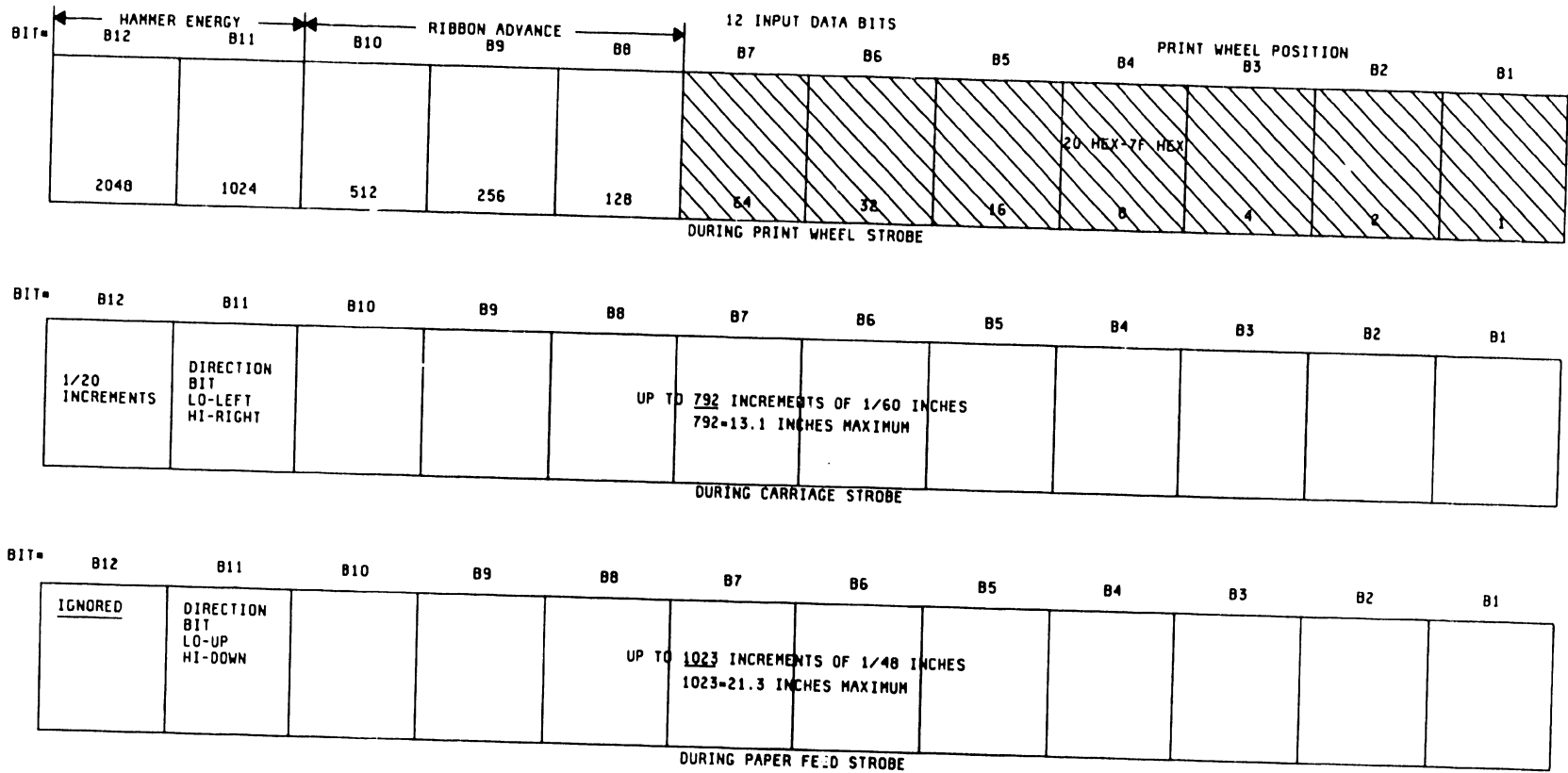
Both DC Servomotors and Stepping Motors are used in the printer. Servomotors are used for the print wheel and carriage movements, while stepping motors are used for ribbon and paper movements.

#### 4.1.2 TYPICAL INTERFACE PC BOARDS AND THEIR FUNCTIONS

The Printer Control board 7361 accepts parallel data-to-be-printed in the form of 12-bit data words along with a number of different control signals. In the basic configuration, the printer is not compatible with all possible host systems. Some systems provide instructions and data to be printed in serial form, while others provide it in parallel, but in different formats (see Figures 4-2 and 4-4). The printer achieves universal compatibility through the use of specially designed interfaces. These interfaces convert



FIGURE 4-2 TWELVE-BIT SERIAL INPUT DATA WORD TO WP, OIS AND VS SYSTEMS



12-BIT SERIAL INPUT DATA WORD TO WP, OIS AND VS SYSTEMS

4-7

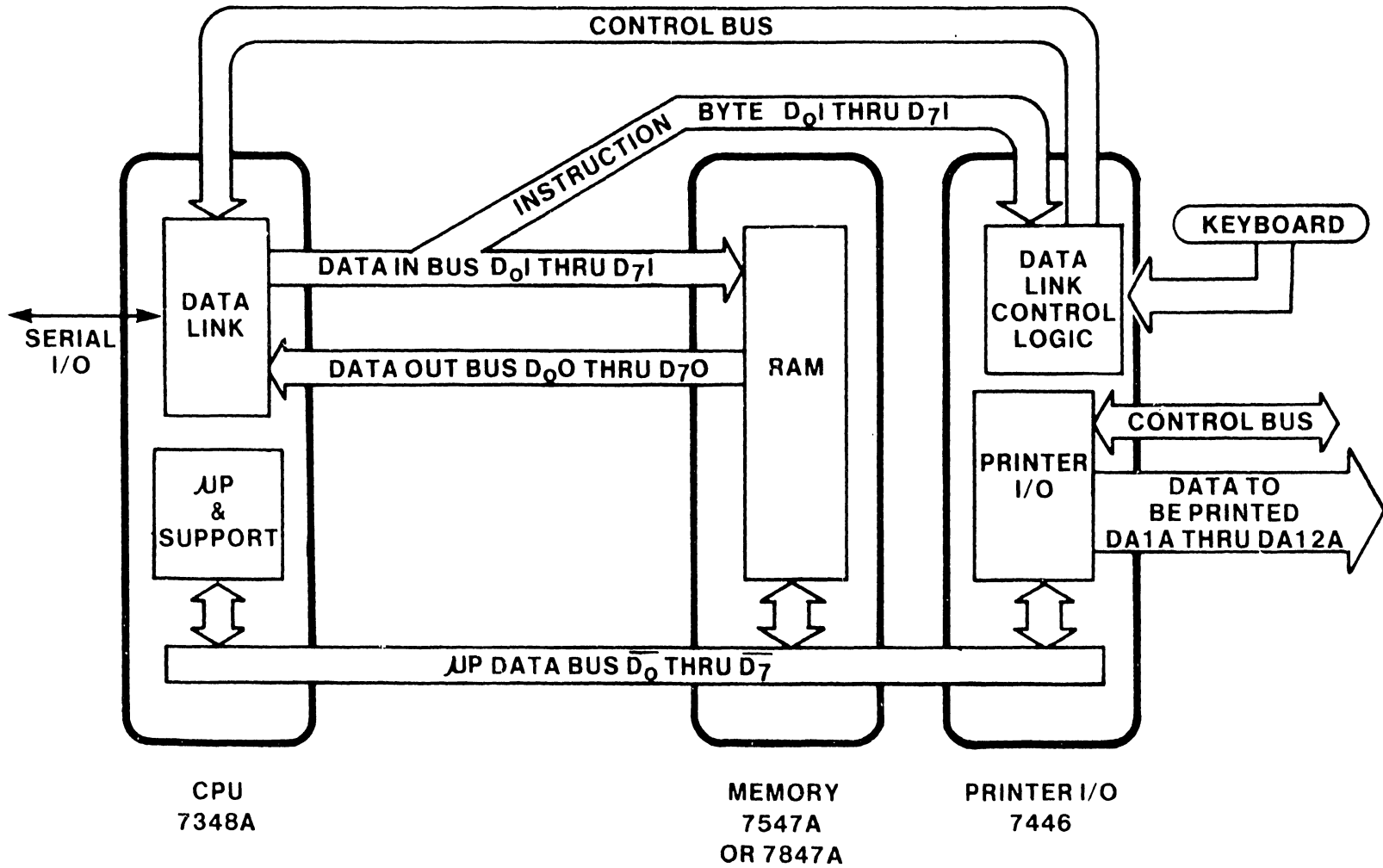


FIGURE 4-3 SERIAL INTERFACE FOR WP, OIS AND VS SYSTEMS

the data and control format of the host system to match the requirements of the printer.

Several accessory options are available for use with the printer. The use of each of these options requires some modification of the interface. There is such a large number of interface combinations available that it is impractical to detail all of them in this manual. However, a general description of three typical interface configurations is provided in the following paragraphs.

#### 4.1.2.1 SERIAL INTERFACE FOR WP, OIS, AND VS APPLICATIONS

A typical serial interface for use with WP, OIS, and VS applications is shown in figure 4-3. The standard interface uses the following three PC boards (refer to table 1-1 for specific configurations):

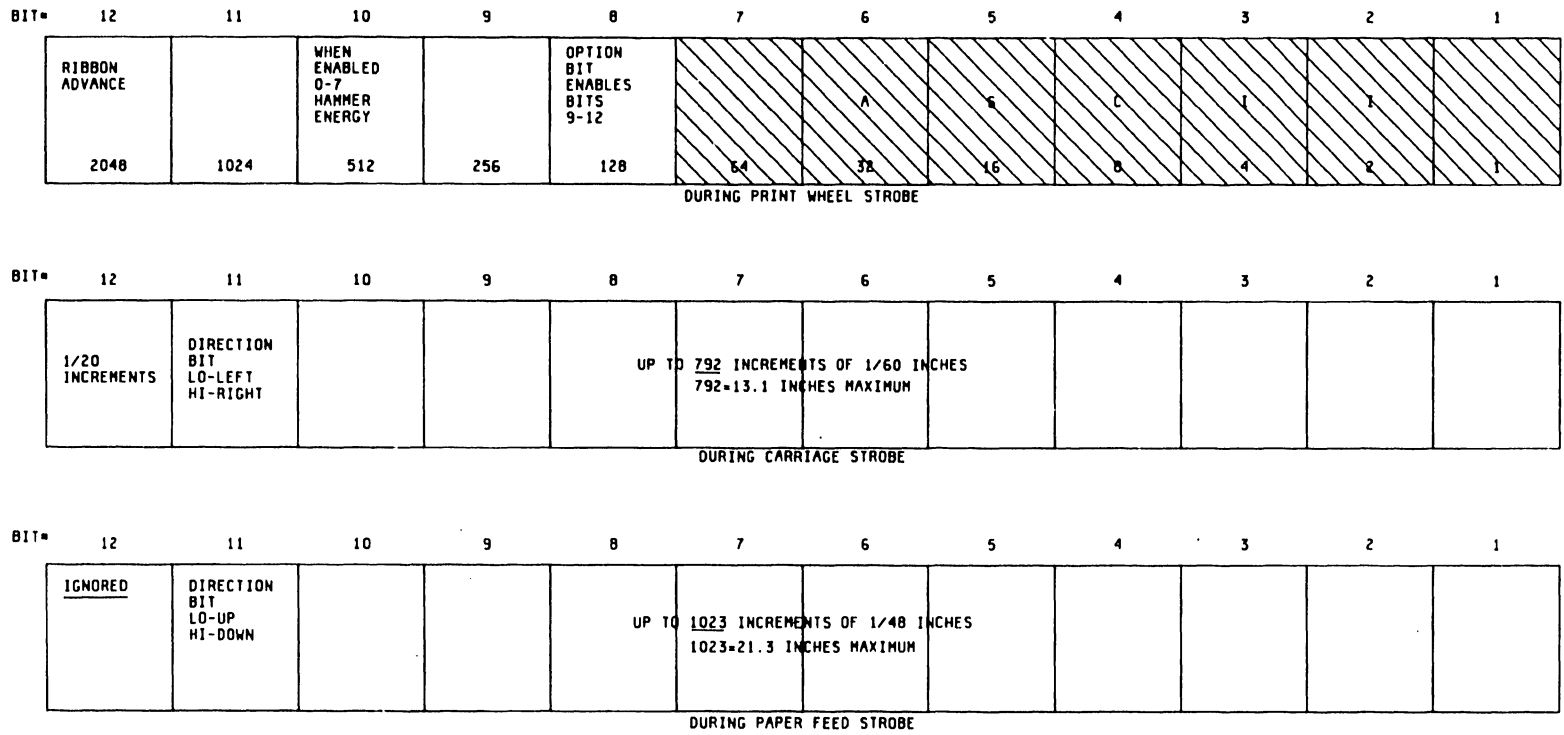
7348 CPU and Data Link  
7547 or 7847 RAM Memory  
7446 Printer I/O

The Data Link receives and transmits serial data and status (see figure 4-2) between the host system and the interface. It also performs serial-to-parallel and parallel-to-serial conversions, feeds instruction bytes to the Data Link Control Logic on the Printer I/O board, and loads data bytes into RAM memory by Direct Memory Access techniques. Once data is loaded into memory it becomes accessible to the Microprocessor.

The Microprocessor and its support devices control the parallel transmission of data and control signals between the interface and the Printer I/O board 7361, including handshaking signals.

The Printer Interface (PCB's) circuits reformat data transferred from memory by the microprocessor. They also respond to user commands from the front panel keyboard, decode status information, drive indicator lamps and provide miscellaneous logic functions not otherwise provided for.

FIGURE 4-4 TWELVE-BIT PARALLEL INPUT DATA WORD TO 2200 SYSTEMS AND SYSTEM 5



12-BIT PARALLEL INPUT DATA WORD TO 2200 SYSTEMS AND SYSTEM 5

#### 4.1.2.2 PARALLEL INTERFACE FOR 2200 SYSTEMS

A typical parallel interface used with 2200 Systems is shown in Figure 4-5. The interface is contained on one PC board (refer to Table 1-1 for the correct configuration).

The host computer loads 8-bit parallel data (see Figure 4-4) into Registers and Bus Drivers from which it can be retrieved by the Microprocessor. The Microprocessor operates under control of a routine stored in the PROM section of memory and manages the intermediate storage of data in the RAM section of memory. In addition, the Microprocessor controls reformatting of data to 12-bit words for transmission to the Printer Control, processes user commands from the front panel Keyboard and transmits handshaking signals back to the host computer.

#### 4.1.2.3 PARALLEL INTERFACE FOR SYSTEM 5 WITH TWIN SHEET FEEDER

A typical parallel interface used with System 5 installations is shown in Figure 4-6. System 5 provides data and control (see Figure 4-4) in the format required by the printer. No additional processing is required. However, use of the twin sheet feeder accessory requires a control interface and motor drive circuits. These are provided on the Twin Sheet Feeder Control board 7449 (refer to table 1-1 for correct configurations).

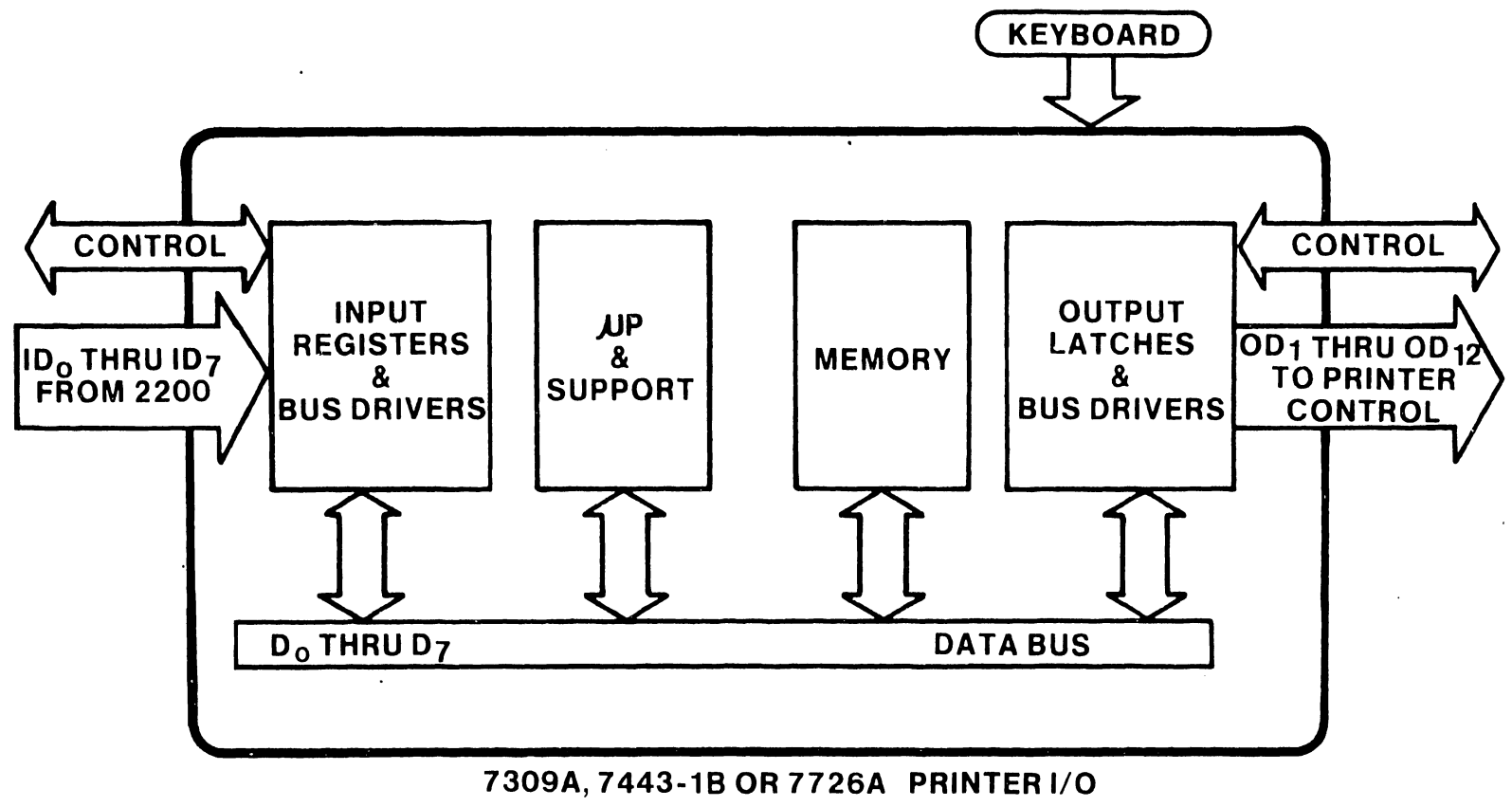


FIGURE 4-5 PARALLEL INTERFACE USED WITH THE 2200 SYSTEM

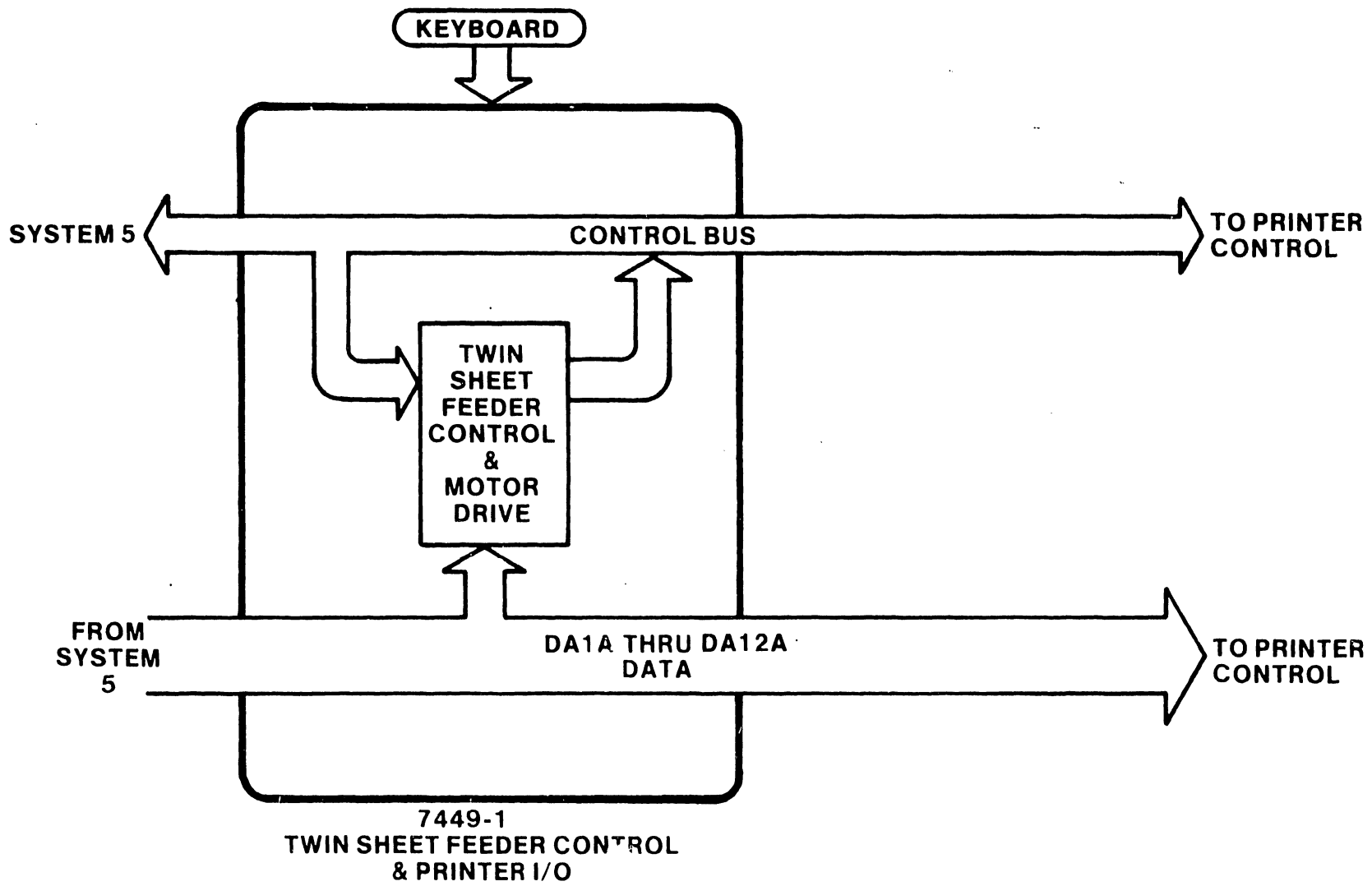


FIGURE 4-6 PARALLEL INTERFACE USED WITH SYSTEM 5

## 4.2 DETAILED DESCRIPTION

Refer to the overall printer block diagram (Figure 4-7), the schematics located in chapter 8 and block diagrams called out in the text during the following discussions. Schematic grids are called out for ease in location of the chips on the schematics.

Within the following text, negative signals are not barred to indicate polarity. Where signal levels are of prime importance, 1's and 0's and highs and lows, are used to indicate circuit action. The schematics in chapter 8 shows the signals barred.

### 4.2.1 POWER ON SEQUENCE (SEE FIGURE 4-8)

When power is applied to the unit, one-shot L46A (B,1/7360-1) generates a PWR RES pulse at pin 7 and a POWER RESET pulse at pin 6. The PWR RES pulse is applied to Printer Control board (E,4/7361-1) and inputted to AND gate L1-2 (D,5/7361-1) whose pin 3 output gates the 8080A clock generator (L37) at pin 2 generating RESET pulse at pin 1. The RESET pulse is applied to 8080A L2-12 forcing it into a reset state. Also, the clock generator RESET output, through inverter L20 (C,3/7361-1) is applied to AND gate L43 (C,2/7361-1) to generate master reset pulse MR. This MR pulse clears L38 (D,3/7361-1), L54 (D,2/7361-1), L43A (A,11/7361-1), L53 (A,10/7361-1), L52 (B,9/7361-1), L47 (C,8/7361-2), L62 (E,2/7361-2), L33 (D,2/7361-2), L65 (C,2/7361-2), and L32 (B,2/7361-2). The L46A-6 output is shaped and inverted at L50-12 to generate POWER RESET which resets the printer I/O boards.

PWR RES is also applied to AND gate L45-10 (E,3/7361-1) which generates POWER ON PRIME at output L45-8. This gate is inverted by L37-5,6 (D,4/7360-1) and becomes POP which clears UP/DN counters L28 (G,4/7360-1), L26 (F,4/7360-1), L43 (G,6/7360-1), and L41 (F,6/7360-1). It also clears UP/DN counters L40 (G,6/7360-2), L38 (F,6/7360-2), L25 (G,4/7360-2), and L23 (F,4/7360-2).



FIGURE 4-7 OVERALL PRINTER BLOCK DIAGRAM

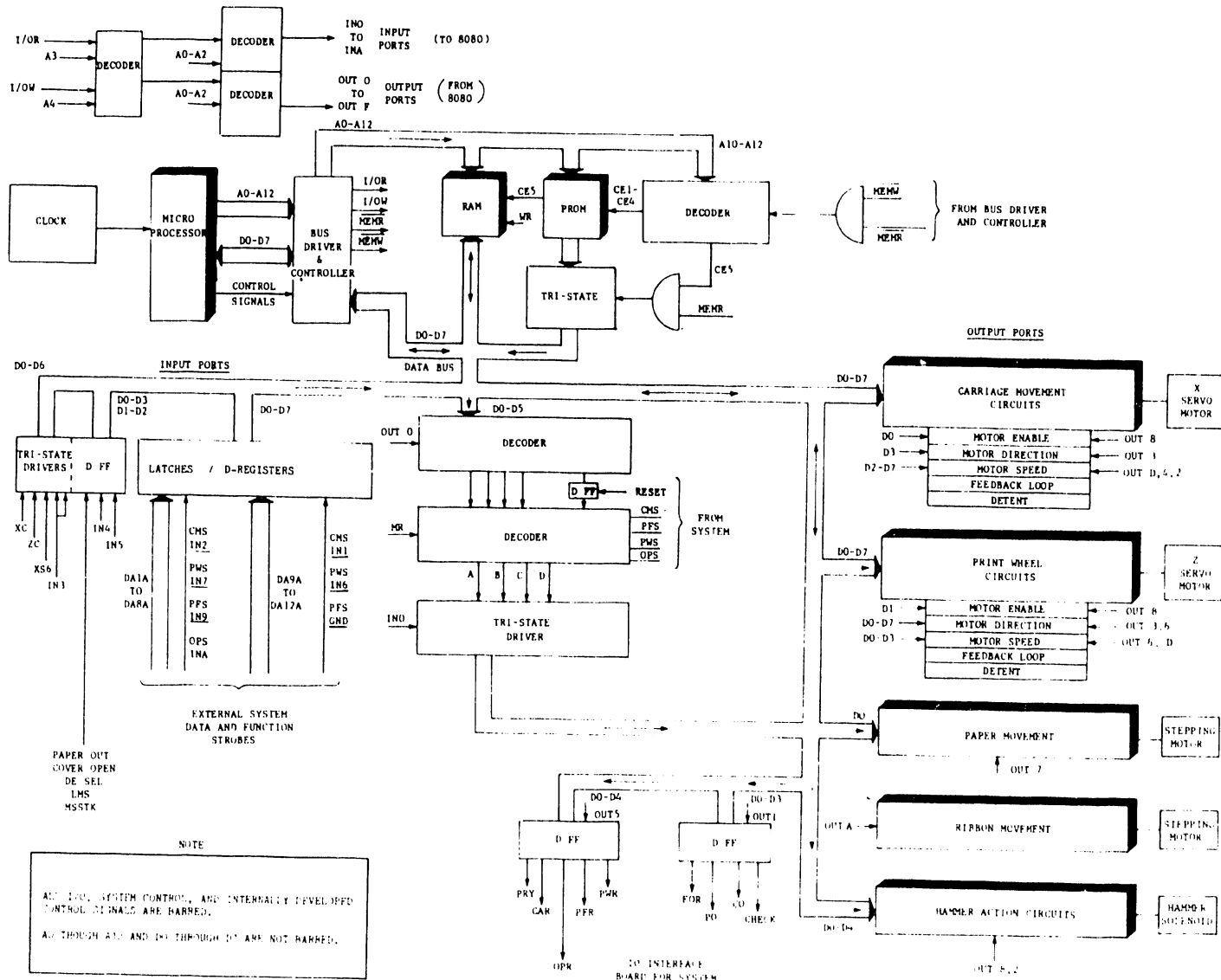
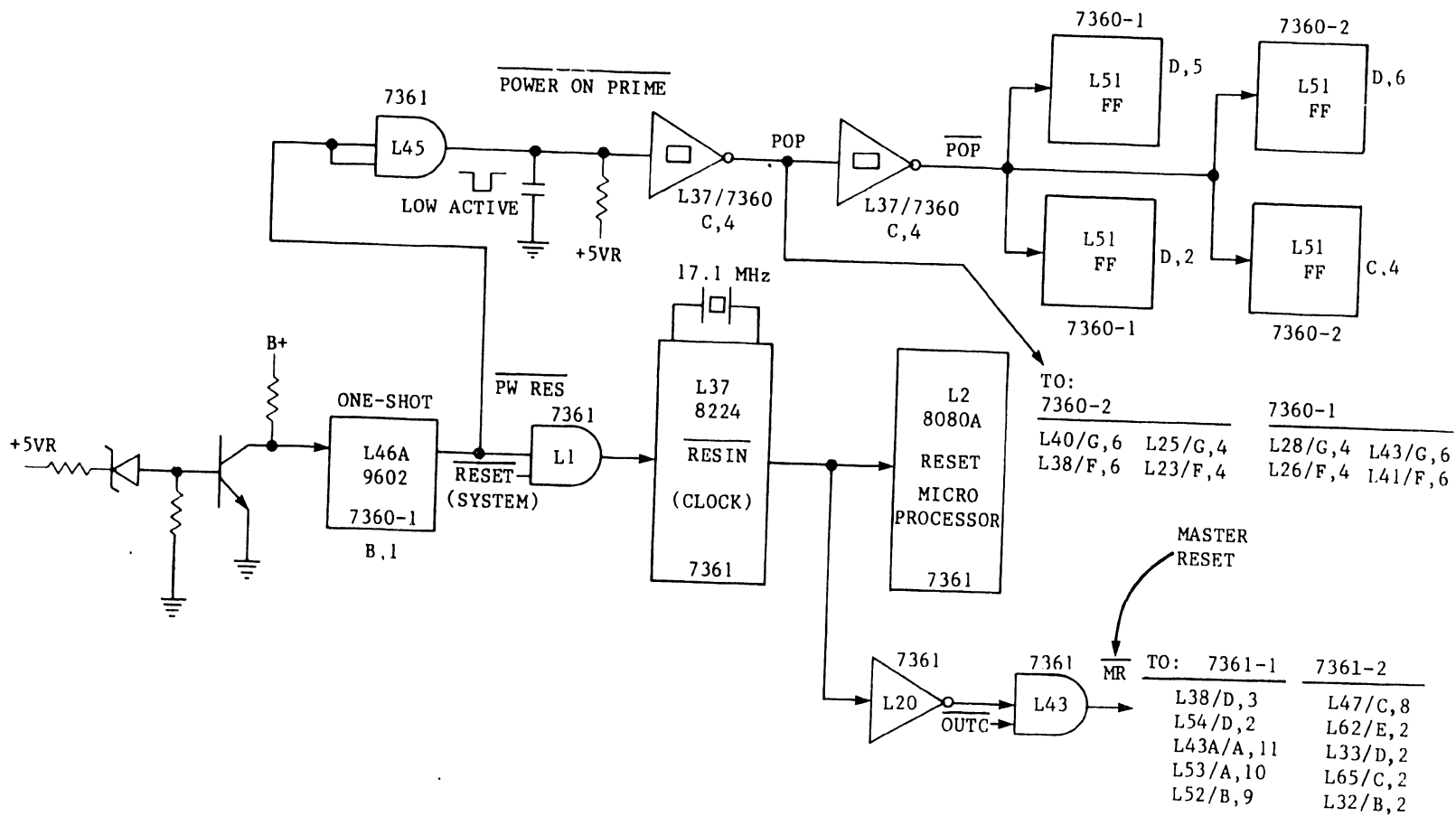


FIGURE 4-8 POWER ON SEQUENCE



POP is inverted by L37-9,8 (D,4/7360-1) and clears FFs L51-11,12 (D,5/7360-1) and L51-6,7 (D,2/7360-1). Also, POP clears FFs L51 (D,6/7360-2) and L51 (C,4/7360-2).

When the 8080A L2 (A,5/7361-1) is reset, either from a power-up sequence or a RESET signal from the external system source, it's program counter is set to address 0000 HEX.

The first three thousand bits of memory, L9, L8 and L7 (G,2 - G3/7361-1) are PROM loaded. The next one thousand bits of memory are reserved for the Diagnostic Display board WLI# 190-0739.

#### 4.2.2 LED/LDD CURRENT MONITORING CIRCUIT (SEE FIGURE 4-9)

Because of the duplication of this circuit in channels A and B of both the X and Z axis, only channel A for X axis will be discussed. The theory shown here can be substituted for the remaining channels. (X corresponds to carriage-motor movement and Z corresponds to print-wheel movement. XA and XB are two channels producing sine waves 90 degrees out-of-phase with respect to each other and both are part of X motor circuit).

The LED (Light Emitting Diode) current monitoring circuit will essentially regulate the output of the LDD's at 4V peak-to-peak. This compensates for the differences in LED's/LDD's as well as their degradation because of age.

During the power-on restore or an LED recalibration of the carriage, a voltage (less than 4Vpp) will be applied to amplifier L2-3 (E,7/7360-2). As the carriage encoder disk rotates and the carriage moves, a sine wave (XSA) will be developed at L2-3 by the LED/LDD combination mounted on the carriage motor. This sine wave is amplified by L2 and input to amplifiers L2-7 and L32-3 (D,7/7360-2). Clamping diodes in the output of L2-9 will square the sine wave so that the Schmitt trigger input L52-13 (E,6/7360-2) will be at TTL levels.



## NOTE

L52-12 was set to a "1" state by  
POP clearing L-51 (D,6/7360-2).

The output of L52-11 (E,6/7360-2) through inverter L53-10 (BK4) inputs up-counter L40 (G,6/7360-2) and in turn it's carry output L40-12 inputs up counter L38-5. As the counters count up, the current supplied to XLEDA (LED on motor) through inverter L39 (G,6/7360-2) increases generating more light in the output of the LED.

As current is increased through the LED, the LDD output voltage at L2-3 (E,8/7360-2) is also increased. The amplitude of the output L2-1 continues to increase until comparator L32-1 squares off the sine wave and resets FF L51. This disables Schmitt trigger L52 so that no more clock pulses (BK4) will be gated to the up-counters (L40,L38), allowing the correct amount of current to continually flow through the LED.

## NOTE

Each count in the up-counters (L40,L38) places different inverters (L39) in parallel. Because these inverters feed the carriage LED, the current through the LED will increase until the associated LDD generates the required voltage to reset the FF L51 (D,6/7360-2) and stop the count in the up-counters.

At this time, the voltage at L32-3 will be 4Vpp, the required voltage to drive L3-3 (E,5/7360-2) in the feedback loop.

#### 4.2.3 8080A CPU STRUCTURE (SEE SCHEMATIC 7361-1 AND FIGURE 4-7)

The 8080A CPU structure for the printers consists of seven major functions:

- a. L2 8080A Microprocessor (B,6/7361-1)
- b. L37 Clock Generator (C,5/7361-1)
- c. L17 Controller and Data Bus Driver (A,5/7361-1)
- d. L18 and L3 Address Bus Driver (A,7/7361-1)
- e. L4 and L5 RAM Memory (G,6/7361-1)
- f. L6 through L9 PROM Memory (G,3/7361-1)
- g. I/O communications to interface and operator

##### 4.2.3.1 MEMORY ACCESSING

The printer memory is a combination of PROM and RAM memories. The PROM memory consists of four PROM sockets, L6 through L9. Only L8 and L9 are loaded. RAM memory consists of two 1K-by-4-bit chips, L4 and L5 which are used to develop 1K by 8-bit of RAM storage.

The Binary-to-Decimal decoder L19 (F,7/7361-1) is used to select RAM or PROM memory. By decoding A10, A11, A12 and the ANDed output of MEMR and MEMW gate L1-8 (A,4/7361-1), L19 produces CE1 through CE5. CE5 selects the RAM memories and C1 through C4 select various PROMs. The A<sub>0</sub> through A<sub>9</sub> bits address the locations within the memories.

##### 4.2.3.2 MEMORY READ

When L17-24 (A,4/7361-1) goes low, it indicates a memory read (MEMR). This pulse is input to OR gate L11 (E,2/7361-1) which will enable Data Bus Drivers L40 and L21 (F,1/7361-1). If PROM memory is addressed at this time by A<sub>0</sub> through A<sub>9</sub> and the chip is enabled by L19, PROM memory will be output onto the bus and read by the 8080A.

The above sequence is the technique used for the 8080A to fetch it's instructions, and to receive data for processing during one of it's machine cycles as described in the following example.

RAM reading by the 8080A is performed when L19 selects the RAMs (CE5), (MEMW is high) and the RAM's location is selected by A0 through A9. The 8080A reads D0 through D3 from L5 and D4 through D7 from L4, to form a 1K X 8-bit memory.

#### NOTE

During RAM read, CE5 will be LOW disabling a Bus output from L40 and L21. This LOW is inverted and ORed before being applied to L40 and L21.

#### 4.2.3.3 MEMORY WRITE

The printer only writes into the RAM memories. During a memory write operation the 8080A L2-18 output will go low forcing the output of AND gate L1-6 (D,4/7361-1) to go low. This will enable the RAMs for the function of writing. L19 decoder will select the RAMs, and address lines A<sub>0</sub>-A<sub>9</sub> will access the location in the RAMs memory where the write operation by the 8080A will take place. D0 through D3 writes into L5 and D4-D7 writes into L4.

#### 4.2.3.4 I/O COMMAND DECODING

Input/Output read and write (I/OR and I/OW respectively) enable commands are derived from the 8080A Controller L17 and address bits. A<sub>3</sub> and A<sub>4</sub>. Input signals to the 8080A are controlled by L41 and L25 decoders. Output signals from the 8080A are controlled by L10 and L26 decoders.

#### 4.2.3.5 IN COMMAND GENERATION

L17-25 goes LO to develop an I/OR pulse. This in turn enables inputs 1A and 1B of decoder L22 (C,7/7361-1). When the 1A and 1B inputs are HI and LO respectively, outputs 4 and 5 will also be HI and LO respectively. L22-5 output goes to the input of decoder L41-12 (F,8/7361-1). With a LO on L41-12, address bits  $A_0$  through  $A_2$  (binary digits) are able to produce a decimal output count range of up to eight. Specifically, the output decimal count produces and represents commands IN08, IN09, IN0A. During this counting interval, L25 decoder is inhibited by placing a HI on it's pin 12.

To generate IN00 through IN07 commands, only the input (A3) of L22 decoder need to be inverted. The L25 decoder will be enabled to count up to eight, representing IN00 through IN07 commands.

#### IN COMMANDS

IN	00	Strobes Input Port
IN	01	HI Byte X-Data (DA9A through DA12A)
IN	02	LO Byte X-Data (DA1A through DA8A)
IN	03	X and Z Home Position Status
IN	04	Error Status (Cover Open)
IN	05	Left Margin and Ribbon Type
IN	06	HI Byte Z Data
IN	07	LO Byte Z Data
IN	08	HI Byte Y Data
IN	09	LO Byte Y Data
IN	0B	Generate POP to Recalibrate LED/LDD's



#### 4.2.3.6 OUT COMMAND GENERATION

L17-27 output goes LO to develop an I/OW pulse. This in turn enables inputs 2A and 2B of decoder L22 (C,7/7361-1). When the 2A and 2B inputs are LO, a LO on pin 12 of decoder L10 (D,6/7361-1) enables the output of the decoder. The binary address bits  $A_0$  through  $A_2$  form a decimal count at the output of L10 representing OUT00 through OUT07 commands. To generate OUT08 through OUT0F commands, only address bit  $A_3$  has to be changed. Then decoder L26 output will represent OUT08 through OUT0F commands.

#### OUT COMMANDS

OUT	00	Reset Strobe Controls
OUT	01	Output Error Status
OUT	02	Motor Function Execution Signal
OUT	03	HI Byte and Direction X - Data
OUT	04	LO Byte X Data
OUT	05	Z, Y and Z Ready Status
OUT	06	Z Data and Direction
OUT	07	Y Output Strobe
OUT	08	X, Y, and Z Motor Power and Ribbon Lift
OUT	09	Hammer Force
OUT	0A	Ribbon Motion Strobe
OUT	0B	Clear X and Z Position Counters
OUT	0C	Clear MR Latch
OUT	0D	Y Holding Voltage
OUT	0E	M Booster
OUT	0F	Enable Strobes from I/O

#### 4.2.3.7 COMMANDS FROM EXTERNAL SOURCE

The 8080A Microprocessor accepts 6 commands and 12 data bits from an external source. The commands are:

- a. OPS - Option Strobe
- b. RESET - External Reset
- c. CMS - Carriage-Motion Strobe
- d. PFS -Paper-Feed Strobe
- e. PWS - Print-Wheel Strobe
- f. DA1A through DA12A - 12 data bits

#### 4.2.4 CARRIAGE MOVEMENT (SEE FIGURES 4-10 AND 4-11)

When an external system issues a command to the printer, data bits DA1A through DA12A must be on the external data bus and settled before their clocking strobes are sent to the printer to pass the information on to the 8080A Microprocessor.

In the following discussion, a carriage-movement command will be described. However, a print-wheel command could be substituted for the carriage-movement command because both are handled similarly by the 8080A chip as shown in Figure 4-12. Refer to the appropriate schematics during the following description.

Data bits DA1A through DA12A are input to latch L57 (F,11/7361-1) and D type register L42 (E,11/7361-1) from the external system. (Refer to schematic 7361-1.) After the data bits have settled on the external bus, the system sends CMS to OR gate L51A-1 (B,11/7361-1). L51A-3 goes LO producing a pulse called CMS (Carriage Motion Strobe). CMS strobes L57 and L42 (F,11/7361-1). Also, CMS sets latch L53 (A,10/7361-1) causing a HI output at pin 15. When the 8080A issues an IN00 command through it's decoders, the output of L53-15 will be put on the data bus through bus driver L36-3 as data bit D0. After the 8080A microprocessor processes the word D0 through D5, it will know that a carriage-movement command has been issued by the external source.

After the 8080A has processed the input word, it will issue an IN01 to L42 (E,11/7361-1) (the signals on L42 will have had time to settle). This will then put the high byte of data (DA9A-DA12A) on the bus for the 8080A to accept. After the 8080A has processed the high byte of data, it will then issue an IN02 command at L57-1 (G,11/7361-1). This IN02 command then puts the LO byte of data (DA1A-DA8A) onto the data bus for 8080A processing.

There are five major functional circuits to control the movement of the carriage (similar circuits control the print-wheel movement). They are: motor drive (enable), motor direction, motor speed, carriage-motion feedback loop and detent.

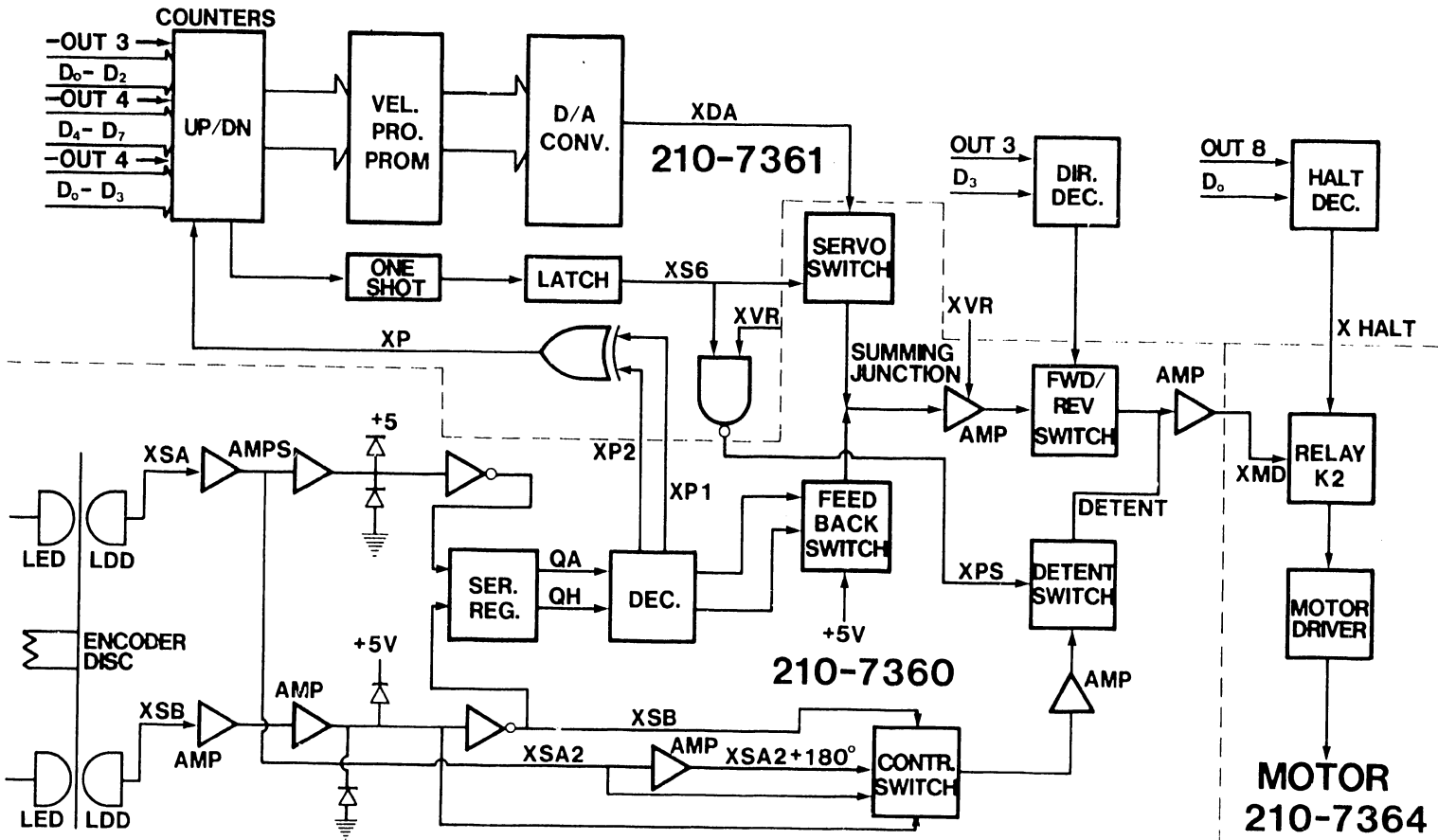
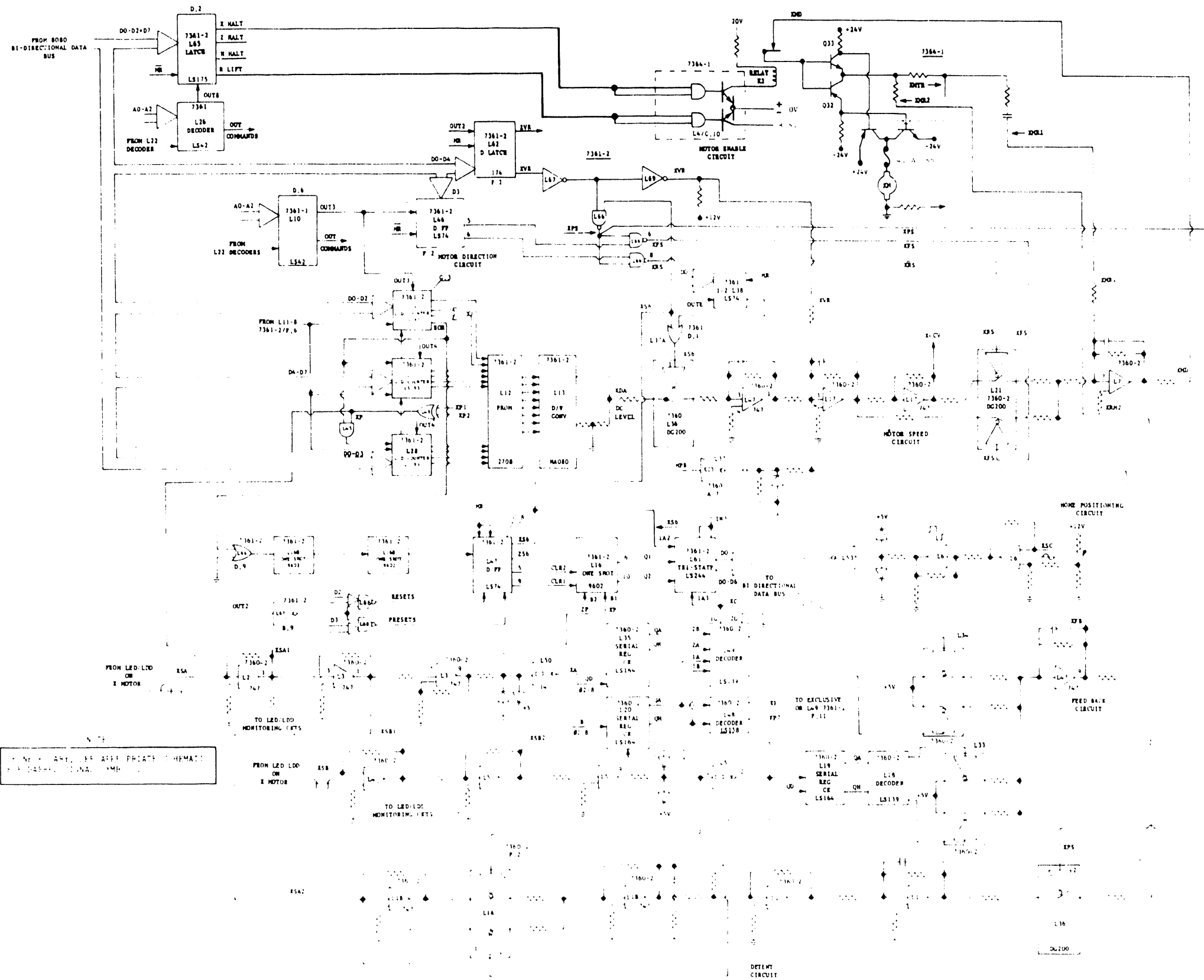


FIGURE 4-10 CARRIAGE MOVEMENT FUNCTIONAL BLOCK DIAGRAM



FROM LED LDD ON Z MOTOR

FIGURE 4-11 CARRIAGE MOVEMENT SYSTEM DIAGRAM

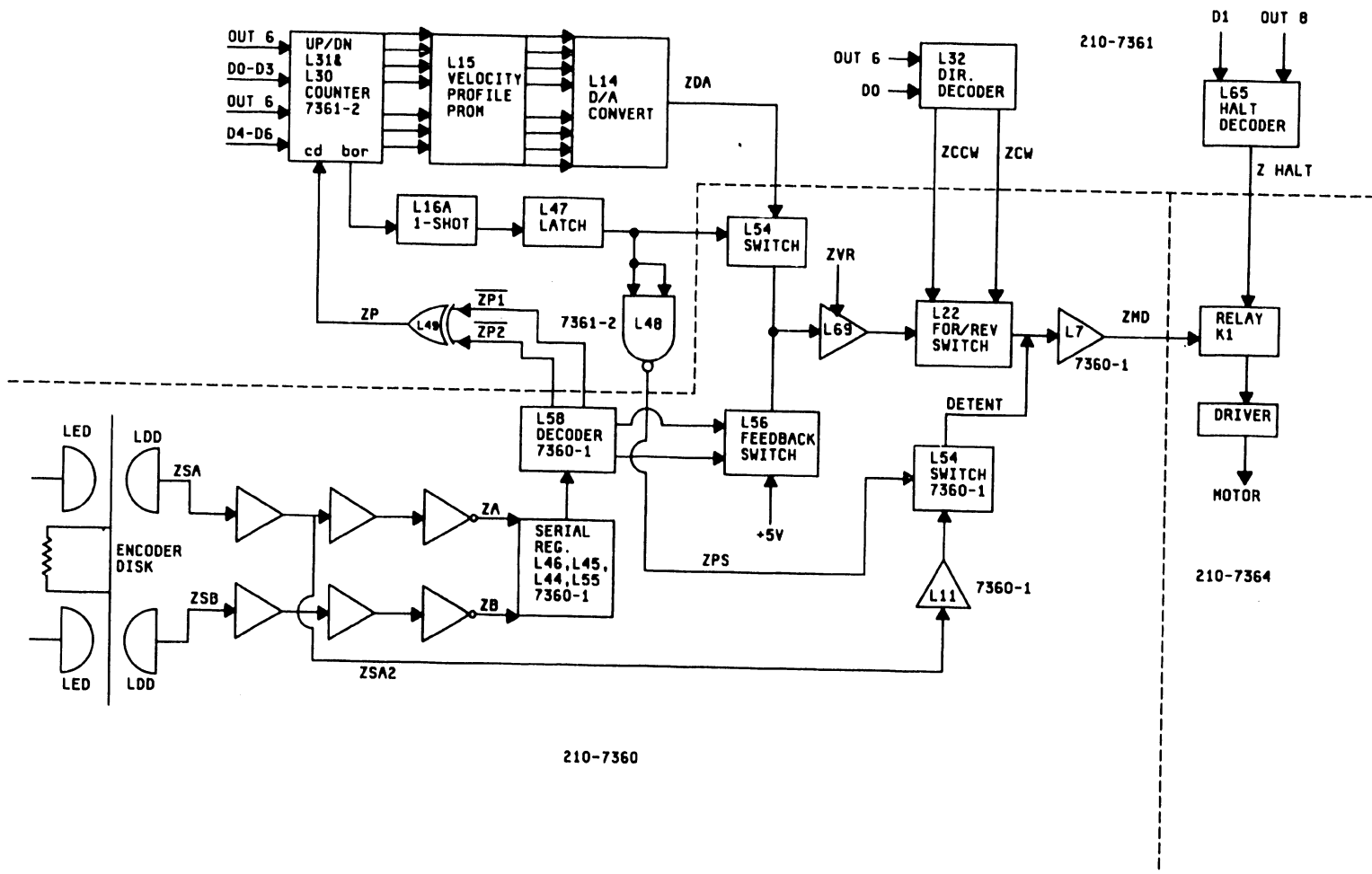


FIGURE 4-12 PRINT WHEEL MOVEMENT FUNCTIONAL BLOCK DIAGRAM

#### 4.2.4.1 MOTOR ENABLE CIRCUIT

From the processed data, the 8080A (through addressing and decoding) generates an OUT08 at L26 (C,6/7361-1) along with data bit D0 (HI). OUT08 enables L65 (C,2/7361-2) so that pin 4 being HI (D0) produces the signal XHALT at pin 2. (Top left-hand corner of figure 4-11.)

XHALT (C,11/7364-1) inputs to Relay Driver L4 (C,10/7364-1) which energizes relay K2 (D,10/7364-1). This applies the output of L7 XMD amplifier to the motor-enable circuits, Q33 and Q32 (C,9/7364-1). The amplitude and polarity of the XMD signal will determine motor speed and direction, respectively.

#### 4.2.4.2 MOTOR DIRECTION CIRCUIT

After the 8080A has enabled the X-Motor Relay K2, it causes L10 (D,6/7361-1) to generate an OUT03 command. OUT03 command clocks D-type FF L46 (G,2/7361-2) enabling direction bit D3 from the 8080A to set or reset the outputs of L46-5,6. The outputs of L46 produce one of two signals XFS (forward) or XRS (reverse) at NAND gates L66-6,8.

XFS or XRS will enable one side of switch L21 (B,4/7360-2) at pin 1 or 2. The outputs of L21 are applied to amplifier L7 whose output is XMD which drives X motor (B,9/7364-1) through relay K2 and drivers Q33 and Q32 (C,10,9/7364-1). Relay K2 is in either a forward or reverse direction depending upon the polarity of the output of switch

L21 (inputs to the switch are opposite polarities). OUT03 also enables up/down counter L29 (G,4/7361-2) and loads it with data bits D0 through D2 which will determine speed along with L27 and L28 up/down counters.

#### 4.2.4.3 MOTOR RESTORE CIRCUIT

OUT02 command clocks L62 (E,2/7361-2) which outputs signal XVR (top middle left of block diagram) through an inverter L67-10 to L66-11. XVR is also applied to inverter L69 which inputs XVR to summing op-amp L17, providing restore velocity.

#### 4.2.4.4 MOTOR SPEED CIRCUIT

After the 8080A has enabled the X motor to run in a given direction and loaded the HI byte of X data, it will cause an OUT04 command to be generated at L10 (D,6/7361-1) and data bits D0 through D7 to go active .

The OUT04 command loads counters L28 and L27 (G,5/7361-2) with data bits D0 through D7. The outputs of counters L28, L27 and L29 are applied to PROM L12 (F,5/7361-2). This total up count represents the distance required to move the carriage from it's present position to a new position established by the parent system input and the processing of the 8080A.

PROM L12 is input or addressed by counters L28, L27 and L29 causing the selected deceleration program contained in PROM L12 to be placed on output pins 9 through 17. This output from the PROM then feeds digital-to-analog converter L13 (E,4/7361-2) whose analog signal will determine the speed of the carriage-X servo motor.

After the 8080A sets the initial velocity of the X motor, it causes an OUT02 pulse to be generated at the L10-3 (D,6/7361-1) output with the data-bit D3 HI.

OUT02 (Figure 4-11) is inverted by L67 (B,10/7361-2). OUT02 and D3 at NAND gate L68 (B,9/7361-2) develop a zero output at pin 8 which pre-sets "D" latch L47 (C,8/7361-2). The output of latch L47 (pin 8) goes LOW, producing XS6.

Signal XS6 will close switch L36 (B/7/7360-2) and is applied to OR gate L37A (D,1/7361-1) generating MBP (carriage motor boost). Signal XS6 is also applied to NAND gate L66-11 which enables either XFS OR XRS. Either signal XFS (forward) or XRS (reverse) energize their appropriate section of switch L21 (B,4/7360-2) to provide the correct direction of movement of carriage motor. The output of switch L21 is amplified by L7 (B,2/7360-2) which outputs the amplifier resultant signal XMD through relay K2 (C,10/7364-1) to provide control bias on complementary transistors Q33 and Q32 which drive the X servo motor to move the carriage.

#### 4.2.4.5 CARRIAGE MOTION FEEDBACK

As the carriage moves in one direction or the other, AC sine wave XSA (bottom left of block diagram) is produced (by the LED/LDD encoder on X motor) at the input of op-amp L2-3 (E,7/7360-2). The output of the op-amp L2-1 is applied to op-amp L3-3 (E,5/7360-2) where the AC signal from the encoder is amplified and applied to L3-7. The output of L3-9 is a square wave whose voltage is clamped to +5V or 0V by diodes D41 and D42 (G,10/7360-2) respectively.

After clamping, the XSA square wave is input to Schmitt trigger inverter L50-3 (F,10/7360-2). The output of the inverter is signal XA and is applied to the input of serial register L35 (F,10/7360-2) which is clocked by signal QD. The QA output of L35 follows the XA input, along with clocking input QD. After seven QD clock pulses, the QA output is reflected at the QH output, pin 13. See Figure 4-13 for the Feedback Loop and Waveforms.

#### NOTE

"QD is basically derived from phase 2 of the 8080A clock. Phase 2 is applied to decade counter L31 (G,10/7360-1). QA is called the B output of L31 and occurs on the first phase 2 input. QD output occurs eight pulses later.



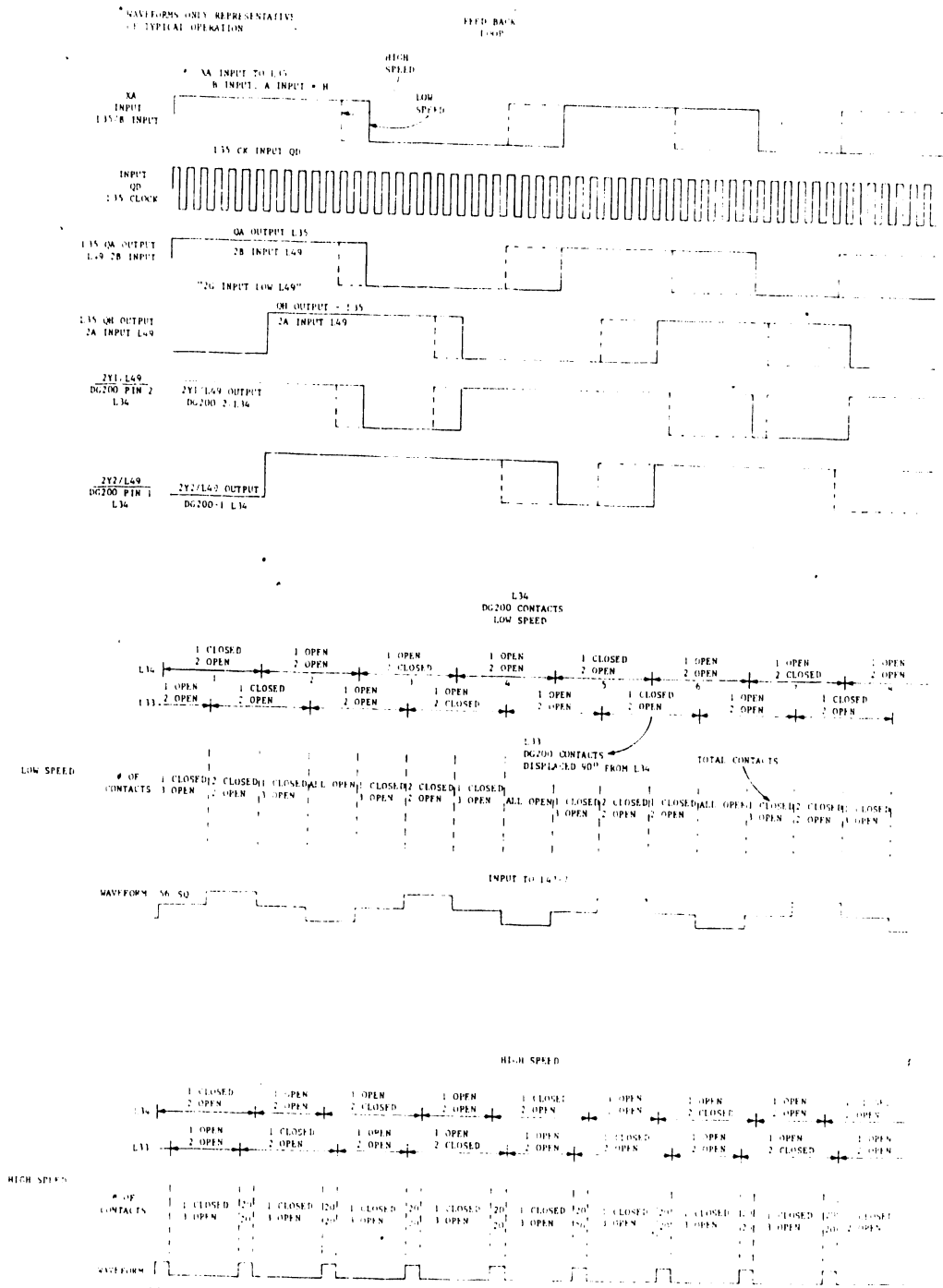


FIGURE 4-13 FEEDBACK LOOP WAVEFORMS

Serial shift register L35-3 and -13 outputs are input to decoder L49-13 and 14 respectively (E,8/7360-2). Decoder L49-11 and -10 outputs are applied to switch L34-2 and 1 (C,9/7360-2) respectively. Serial shift register L-19-3 and 13 outputs are applied to decoder L18-13 and 14 respectively. Decoder L18-10 and 11 outputs are applied to switch L33-1 and 2 respectively.

As switches L34 and L33 are turned on, the sum of their switches is fed to op-amp L47-7 (C,8/7360-2). The output of L47-9 feeds the summing point L17-3 where the velocity command from L47-1 is also applied. The feedback signal ensures a constant carriage speed for a given input command.

After the sine wave passes through L4 (D,5/7360-2) and becomes a squarewave through L5-9 (D,2/7360-2), it is input to L50 (D,10/7360-2) which provides an inverted input to serial register L20-2 (D,10/7360-2). This serial shift register is clocked by the signal "B" at L20-8 and is a derivative of phase 2 of the clock. (See note in paragraph 4.2.4.5).

The QA output of serial register L20 will follow its signal B-input at the time of clock pulses "B". After seven more clock pulses, the QH output of L20 will reflect the QA output. The outputs of shift register L20 are input to line driver L48 (F,8/7360-2) which provides output signals XP1 and XP2.

#### NOTE

It is during clock pulses 2 through 6, that the outputs of line driver L48 are opposite.

XP1 and XP2 feed an exclusive-OR gate L49-1,2 (F,11/7361-2). When an L49 output occurs, it clocks down counters L28, 27, and 29 (G,5/- 7361-2). As the count is lowered, the address to PROM L12 is changed, causing a lower voltage at the output of D/A converter L13 (E,4/7361-2).

The borrow bit L29-13 will go low when the count in the counters is equal to zero. This enables the output of NOR gate L44 (D,9/7361-2) to fire one-shot L16B (D,9/7361-2). The output of the second-half of L16B clocks "D" FF L47 which provides a HI output at pin 8. This in turn changes the signal XS6 to the inactive state (HI). This action disables switch L36 (C,7/7360-2) which removes signal XDA from amplifier chain and through L66 gates XFS and XRS (I,G/7361-2) deactivate direction switch L21 (4B/7360-2) to remove the input to amplifier L7 (B,2/7360-2).

When L47 (C,8/7361-2) was clocked by the borrow output of L29 (G,4/7361-2) through L44 and L16B, L47-9 provided a low signal output. A low input to one-shot L16 (D,6/7361-2) provides a clear output on pin 6. This is then applied to tri-state line-driver L61 (E,10/7361-2). When the 8080A (7361) issues a IN3 command to L61 pins 1 and 19, data bit D0 will inform the 8080A that the carriage movement is complete.

#### 4.2.4.6 CARRIAGE DETENT

As the carriage moves an AC sine wave XSB is produced (by the LED/LDD encoder on X motor) at the input to op-amp L4-3 (D,5/7360-2). This sine wave is displaced by  $90^{\circ}$  with respect to XSA and like XSA it's frequency is indicative of carriage speed. Detent on the other hand is a motor stop. For instance, the carriage must be briefly stopped during the period when the daisy character is being imprinted against the ribbon and platen to produce printing.

XS6 feeds L66 (G,2/7361-2) enabling signal XPS which turns on switch L36-2 (B,5/7360-2) activating the detent amplifier chain by connecting amplifier L1-9 (B,6/7360-2) to the XMD amplifier L7 (B,2/7360-2) which drives the X-motor control circuits.

The input to this chain of amplifiers is an amplified version of XSA called XSA2 coming from amplifier L3-1 (E,5/7360-2). This XSA2 signal is applied to switch L1A-9 (A,9/7360-2) directly and through inverter op-amp L1B-9 (A,10/7360-2) to L1-4. See Figure 4-14 for Detent Waveforms.

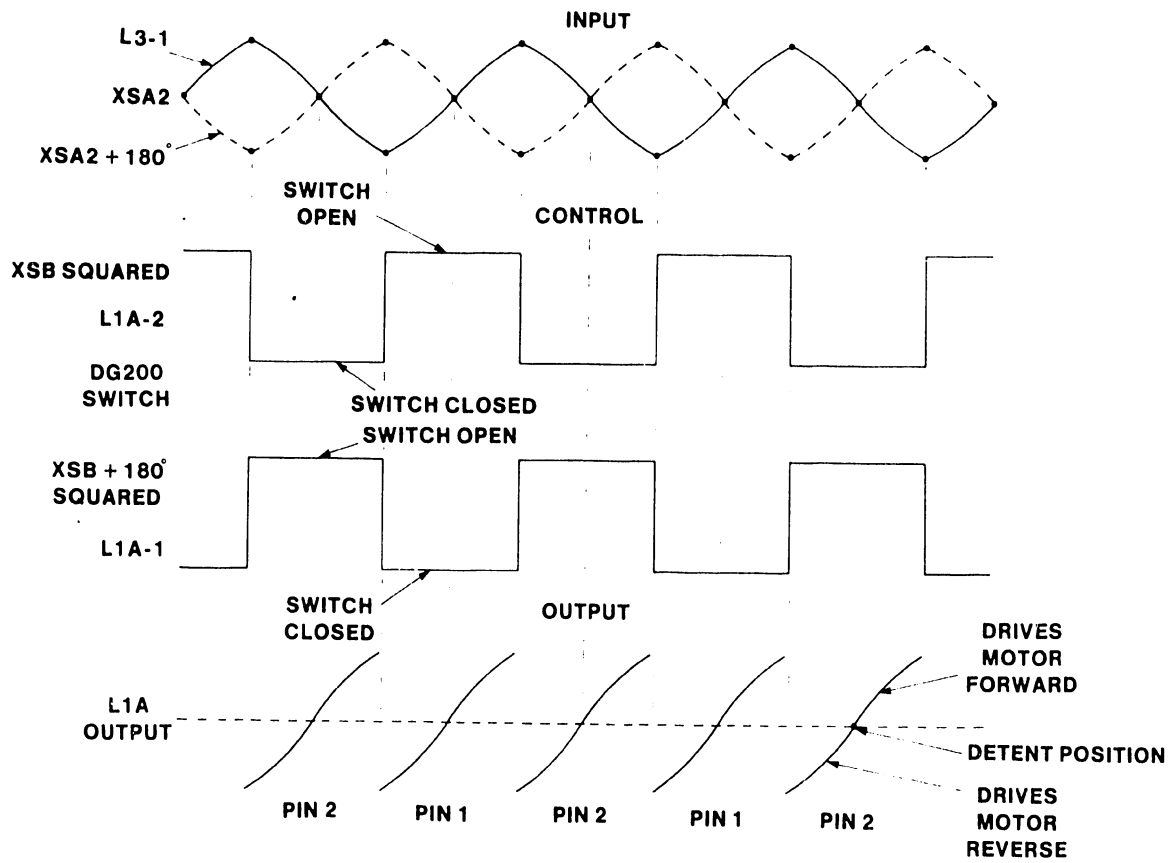


FIGURE 4-14 DETENT WAVEFORMS

Switch L1A-1,2 switching control signals are 180° out-of-phase and are derived from the XSB squarewave out of L5-9 (D,2/7360-2) and Schmitt trigger/inverter L50-2. As a consequence, L1A can pass the XSA2 input signal when the switch control voltages are HI or LO, generating the detent waveform.

After three stages of amplification the resultant signal is input to switch L36-4 (B,5/7360-2) which is controlled by XPS (this control signal was enabled by XS6). The output of L36-5 is then applied to op-amp L7 which provides the detent signal to the X-servo motor circuits.

NOTE

The X servomotor is detented as XSA2 goes through zero.

4.2.4.7 MACHINE IPL SEQUENCE (CARRIAGE AND PRINT WHEEL HOME) SEE FIGURES 4-15 AND 4-16 AND SCHEMATICS 7361-2 AND 7360-2

The home position of the carriage is the left-hand margin at zero. When the printer's power is first applied, the printer does not know where the carriage is located. To determine it's position, the 8080A issues a series of commands designed to place the carriage in it's home-reference position regardless of it's location before power was applied. The sequence is as follows:

1. An OUT02 command with data bit D1 active generates the signal XVR at L62-5.
2. XVR is changed from +5V at the input to inverter L67-11 to +12V at the output of inverter L69-4.
3. XVR is then applied to the input of amplifier L17-3 to drive the carriage X motor at the restore velocity.
4. The 8080A drives the carriage to the right by sending an OUT03 command with data bit D3 active creating the signal XFS at L66-6.

FIGURE 4-15 CARRIAGE HOME POSITION SEQUENCE BLOCK DIAGRAM

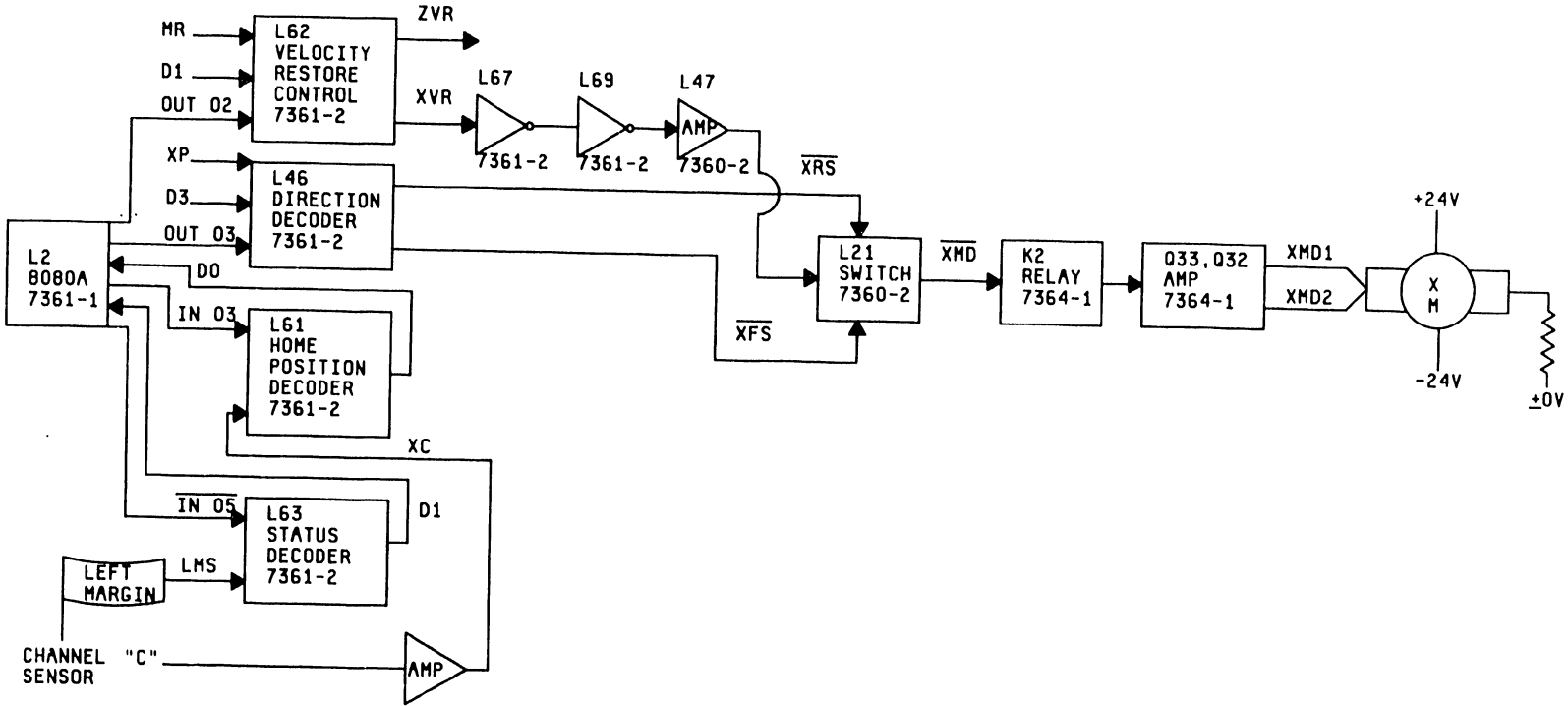
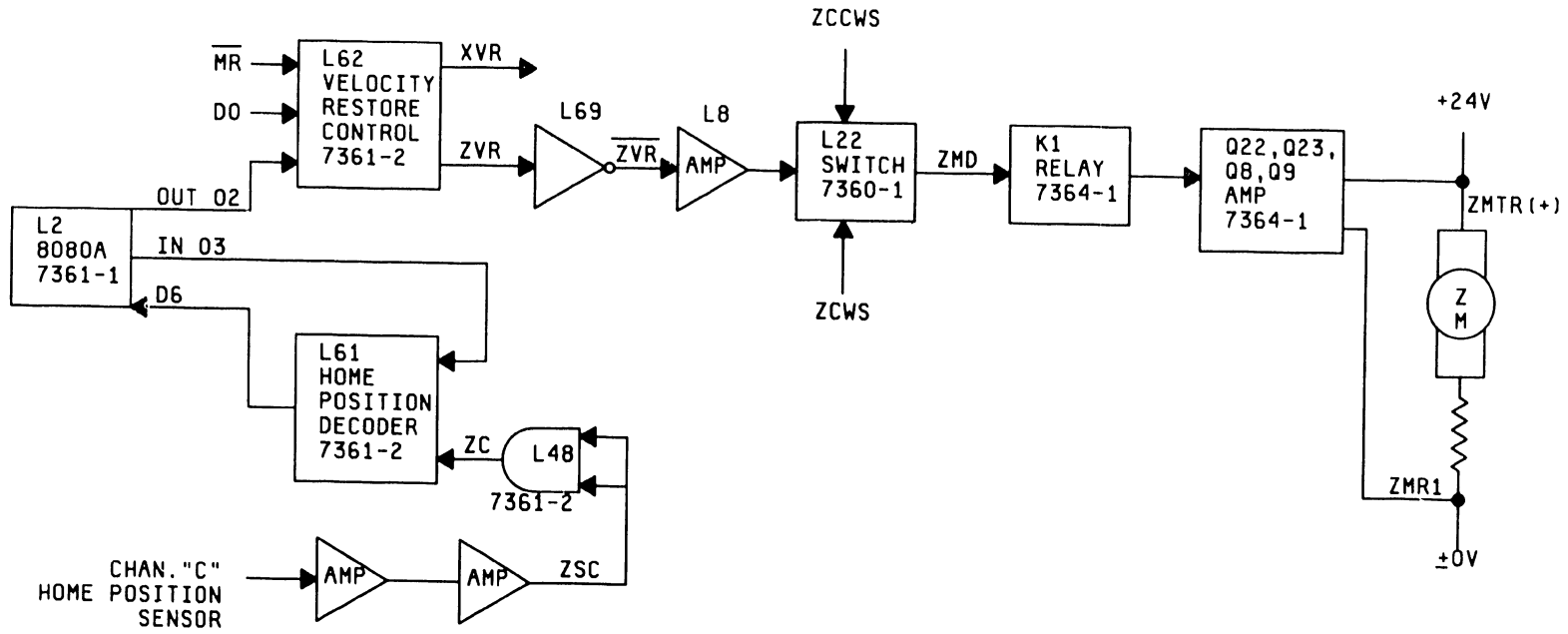


FIGURE 4-16 PRINT WHEEL HOME POSITION SEQUENCE BLOCK DIAGRAM



5. XFS switches XVR through switch L21-8 to drive amplifiers L7-9 which is the driving voltage for the carriage system.
6. Home position on the Wang print-wheel is the lower case letter "o". This is found by a series of commands issued by the 8080A CPU at power up time. These commands are:
  - a. A: OUT02 command applied to the clock input L62-9 with data bit D0 active generates signal ZVR at L62-2 (see 7361-2).
  - b. ZVR is inverted first at L67-4 and then at L69-10.
  - c. ZVR is applied to the input of amp L8-3 causing the print wheel to spin at a restore velocity.
  - d. The print wheel will continue to spin until the Z motor C-channel is sensed through the elongated slot in the encoder disk at L16-3 ZSC.
  - e. ZSC is inverted to form signal ZC at L54A-3 (G,9/7360-1).
  - f. ZC is applied to the input of L61-13 (E,11/7361-2).
  - g. ZC will cause data bit D5 to go active during an IN03 command informing the 8080A that the print-wheel has found home. At this time the 8080A will issue an OUT02 to L62-9 to clock ZVR on and enable ZPS.
7. The 8080A issues an OUT03, switching the state of data bit D3 to generate XRS at L66-8.
8. XRS changes the state of the restore voltage through switch L21, causing the carriage to move toward the left side of the printer.
9. The carriage will continue to move to the left side of the machine until the metal flag on the carriage activates an left margin sensor on the left side, creating a signal LMS at the input to L63-12.



10. The 8080A detects that the carriage has reached the left margin by strobing L63-11 with command IN05 until data bit D1 becomes active. Then it switches the states of XRS and XFS, moving the carriage to the right one position at a time until four "C" channels are detected. This movement from the left margin sensor to the fourth "C" channel is done at normal operating speed in one character increments, not at restore velocity. This accounts for the different sound heard when the carriage is locating the "C" channel.
11. A "C" channel is detected when an elongated slot on the X motor encoder disk activates the X motor "C" channel causing a LOW at the output of amplifier L6-9 signal XC.
12. The signal XC is input to L-61 pin 6 and is detected by the 8080A by strobing with IN03 commands waiting for data bit D0 to become active.
13. An OUT02 command with data bit 1 active generates the signal XVR at L62-5.
14. XVR is changed from +5V at the input to inverter L67-11 to +12V at the output of inverter L69-4.
15. XVR is then applied to the input of amplifier L17-3 to drive the carriage X motor at the restore velocity.
16. The 8080A drives the carriage to the right by sending an OUT03 command with data bit D3 active creating the signal XFS at L66-6.
17. XFS switches XVR through switch L21-8 to drive amplifiers L7-9 which is the driving voltage for the carriage system.
18. The 8080A issues an OUT03, switching the state of data bit D3 to generate XRS at L66-8.
19. XRS changes the state of the restore voltage through switch L21, causing the carriage to move toward the left side of the printer.

20. The carriage will continue to move to the left side of the machine until the metal flag on the carriage activates the left margin sensor on the left side, creating a signal LMS at the input to L63-12.
21. The 8080A detects that the carriage has reached the left margin by strobing L63 with command IN05 until data bit D1 becomes active. Then it switches the states of XRS and XFS, moving the carriage to the right one position at a time until a "C" channel is detected. This movement from the left margin sensor to the first "C" channel is done at normal operating speed in one character increments, not at restore velocity. This accounts for the different sound heard when the carriage is locating the "C" channel.
22. A "C" channel is detected when an elongated slot on the X motor encoder disk activates the X motor "C" channel causing a LOW at the output of amplifier L6-9 signal XC.
23. The signal XC is input to L-61 pin 6 and is detected by the 8080A by strobing with IN03 commands waiting for data bit D0 to become active.
24. At this time the carriage (center of print wheel motor shaft), if properly adjusted, is positioned 2.150 inches from the inside of the left side frame.

#### 4.2.4.8 BOOSTER POSITION VOLTAGE

In order to overcome the inertia of the carriage, a signal MPB (A,7/7360-2) is initially input to amplifier L17 (B,5/7360-2).

4.2.5 PRINT WHEEL ERROR DETECTION (SEE FIGURE 4-17 AND SCHEMATIC 7361A-2 AND 7360-1)

NOTE

The print wheel and the carriage error detection circuits are identical in operation.

When the print wheel fails to stop or positions incorrectly (travels to far) this circuit detects the error and informs the 8080A. The 8080A then corrects the print wheel overtravel by performing restore sequences.

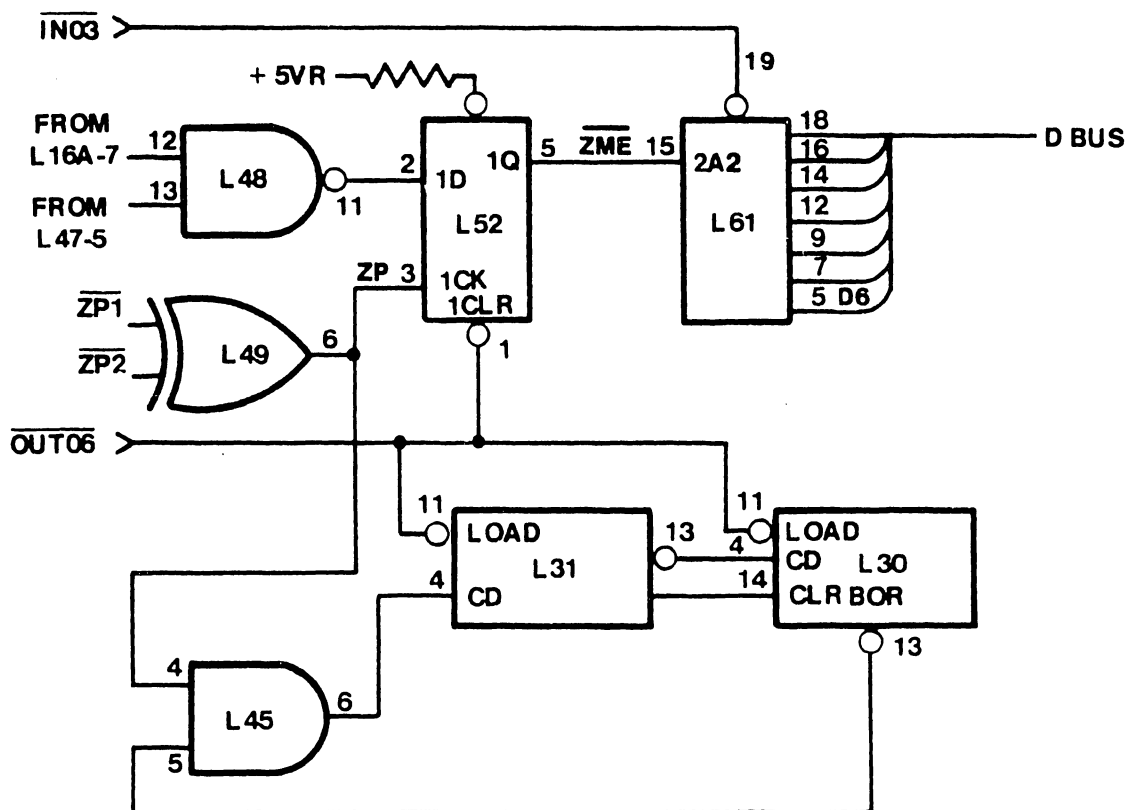


FIGURE 4-17 PRINT WHEEL ERROR DETECTION CIRCUIT

When the final count of print wheel movement (ZP1 or ZP2) is reached, the borrow output of L30-13 is applied through NOR gate L44-4 (C,9/7361A-2) to the input of one shot L16A-4 (D,5/7361A-2). The output of one shot L16A-7 (D,5/7361A-2) is applied through NAND gate L48-11 to the D input of L52-2. The clock of L52-3 (ZP) is the XOR'd output L49-6 of signals ZP1 and ZP2 (the signals that count characters). If any more clock pulses (ZP) occur after the D input of L52-2 was gated high, then it's lQ output (L52-5) ZME switches active (high) indicating an error condition.

The 8080A is informed of the error condition by applying the L52-5 active (high) output ZME to tri-state output line driver L61-15. The 8080A initiates the sequence to generate IN03 commands at L25-4 (E,8/7361A-1) which searches for data bit D6 high at L61-5 (E,10/7361A-2). When the 8080A determines data bit D6 is active (high) it places data bit D0 active (high) on the data bus and initiates the sequence to generate OUT 02 commands. The OUT 02 commands clock D flip flop L62-9 (E,2/7361A-2) with data bit D0 high on L62-3 (F,2/7361A-2) 1D input to generate ZVR (Z motor velocity restore signal). ZVR is inverted first by L67 (C,3/7361A-2) and then by L69 (A,6/7361A-2). The L69-10 output is then applied first to summing op-amp L8-3 (B,5/7360-1). The L8-1 output is then applied either to switch L22-9 (C,4/7360-1) or to op-amp L8-7 (B,5/7360-1) whose L8-9 output is applied to switch L22-4 (B,4/7360-1) depending on the direction the Z motor is to turn. The output of switch L22-8 (CCW) or -5 (CW) is then amplified by L7-1 (C,3/7360-1) to generate the Z motor drive (ZMD) signal. When in Detent (printer in process of printing a character), the borrow output of print wheel movement counter L-30-13 (F,4/7361A-2) is inverted by NOR gate L44-4 (C,9 7361A-2) to trigger first one shot L16A-4 (D,4/7361A-2) whose L16A-6 output then triggers one shot L16A-11 (D,4/7361A-2). One shot L16A-9 clocks D flip flop L47-3 (C,8/7361A-2) whose L47-5 output through NAND gate L48-11 (C,4/7361A-2) provides a high to D flip flop L52-2 (B,5/7361A-2). If a ZP pulse occurs after the L30-13 (F,7/7361A-2) Borrow output went high, L52-5 switches high generating a ZME pulse indicating a Z motor error condition. This monitors any movement of the print wheel as a clock pulse ZP will be generated causing the 8080A to detect an error condition.

When the error condition has been corrected, the 8080A initiates the sequence to generate an OUT 06 which is applied to the clear input of D flip flop L52-1 to clear the error condition.

#### NOTE

If the error detectors on Printer Controller board 7361 detect three consecutive retries, then the above sequence will be repeated and the carriage and print wheel will be returned to their proper positions to attempt three additional retries before lighting the MALFUNCTION lamp.

#### 4.2.6 RIBBON MOVEMENT (SEE FIGURE 4-18 AND SCHEMATICS 7361A AND 7364A)

The two-phase ribbon feed stepper motor is required to rotate in only one direction to advance the ribbon. The 8080A causes the required number of OUT0A commands to be generated by BCD to Decimal Out Command Decoder L26-3 (C,6/7361A). These commands clock Johnson Counter L34 (A,9/7361A) on their rising edges to generate a two-bit sequential digital signal. These two-phase stepping control signals consist of four different binary codes (pulse patterns) 0, 2, 3, 1 at outputs L34-5, -9. Each voltage level change from 0 to 1 of the 0, 2, 3, 1 binary coded pulse pattern causes the ribbon motor shaft to move one step. After being amplified by line-driver L70 (A,9/7361A), these stepping control signals (RMDB and RMDA) are applied to the Power Supply Regulator PCB 7364A.

Signal RMDA turns transistors Q28 and Q29 (E,6/7364A) on-and-off and RMDB turns transistors Q30 and Q31 (E,4/7364A) on-and-off. These outputs, in turn, through driver transistors start and stop the ribbon advance stepping motor as directly commanded by the 8080A.

#### 4.2.7 PAPER MOVEMENT (SEE FIGURE 4-19 AND SCHEMATICS 7361A AND 7364A)

The two-phase paper feed stepper motor is required to rotate in two directions in order to move the paper one half character space above and below the line of printed text for printing subscripts and superscripts. Therefore, it's control circuitry must provide both directional as well stepping control signals.

The 8080A causes the required number of OUT07 commands to be generated by BCD to Decimal Out Command Decoder L10-9 (D,6/7361A). The OUT07 Commands are applied to the clock input of Johnson Counter L35-9 (A,7/7361A). These commands clock Johnson Counter L35-9 on their rising edges to generate a two-phase four step switching sequence (two-bit sequential digital signals). Data bit D0 controls direction. These two-phase stepping signals consist of four different binary code patterns shifted by 90 degrees. The count sequence determines the direction of rotation of the stepping motor. A count sequence of 0, 2, 3, 1 provides rotation in one direction, while a sequence of 0, 1, 3, 2 reverses the direction of rotation. This count sequence is determined by the binary state of data bit D0. Data bit D0 applied to the inputs of two exclusive OR gates L49-9, -12 (A,8/7361A) along with the 1Q, L35-10 output to L49-13 and the 2Q, L35-6 output to L49-10 provide the D inputs to the Johnson Counter. When the binary state of data bit D0 changes, the count sequence changes as described above causing the direction of rotation of the feed motor to reverse. These stepping control signals are amplified by line driver L71 (A,5/7361A) whose two outputs (YMDA and YMDB) are applied to Power Supply Regulator PCB 7364A.

Signal YMDA turns transistors Q24 and Q25 on-and off while YMDB turns transistors Q26 and Q27 on-and-off. These signals through driver transistors cause the Y-stepping motor to rotate in a CW or CCW direction causing paper movement in terms of line feed.

FIGURE 4-18 RIBBON ADVANCE BLOCK DIAGRAM

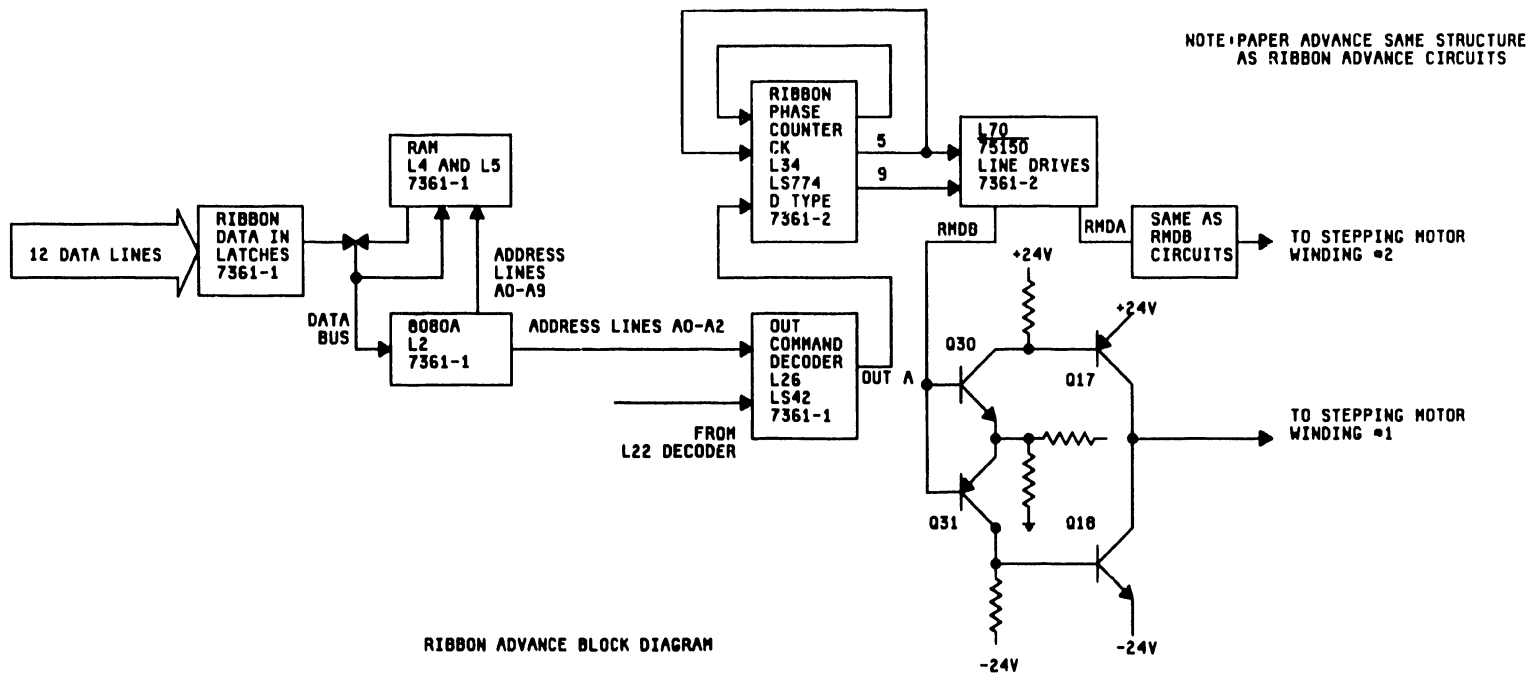
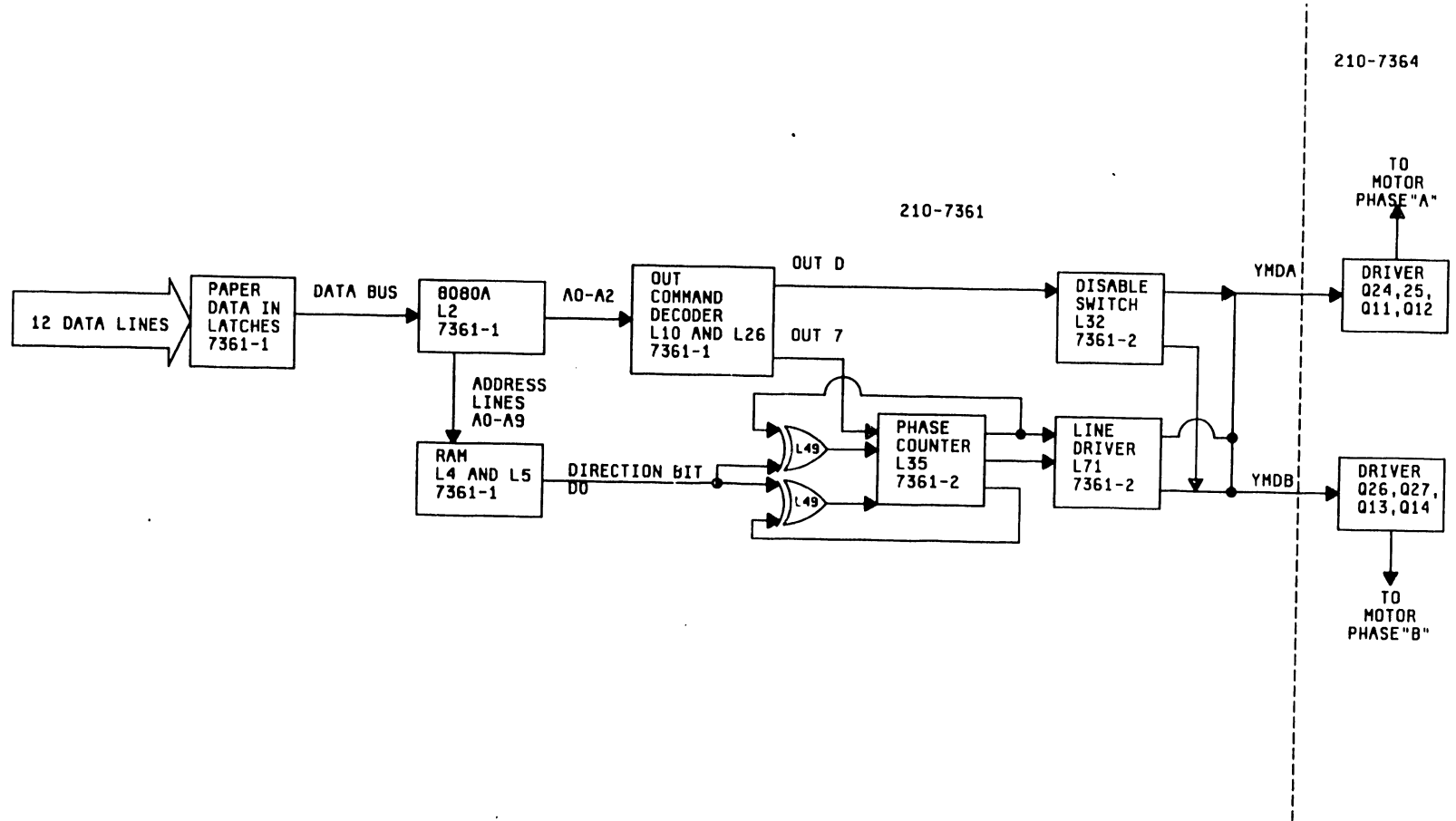


FIGURE 4-19 PAPER MOVEMENT BLOCK DIAGRAM





#### 4.2.8 HAMMER FORCE CIRCUIT (SEE FIGURE 4-20 AND SCHEMATICS 7361A AND 7364A)

The IMPRESSION control on the printer control panel provides three different bias levels (LIP, MIP and HIP) to the hammer force circuit. These different bias levels are required to compensate for different print fonts, normal print fonts and paper and multiple copies.

In order to prevent embossing paper during printing, the force applied to the hammer must differ for the various characters and letters. For example, characters such as a period will emboss the paper if they are hit with the same force as a letter M. The 8080A microprocessor generates data bits D0 through D3 along the sequence for the OUT09 command which provide the bias levels for the different letters and characters.

Hammer impression levels (LIP, MIP and HIP) provide the inputs to voltage regulator L6 whose V OUT level (L6-6) provides the bias to Q6 (F,1/7364A-1). The Q6 output is coupled to Q5 (C,1/7364A-1) whose output HAM+ provides the hammer force voltage to the hammer coil.

The 8080A generates data bits D0 through D3 and initiates the sequence to generate an OUT09 command. Data bits D0 through D3 are applied to L33 (D,2/7361A-2) and clocked by OUT09 to generate PT1 through PT4. PT1 through PT4 are applied to L2 and L5 (D,3/7364-1) to generate the four different hammer-energy signals. These signals are applied through diodes D13 through D16 to hammer-driver amplifier Q5 (C,1/7364A-1) which activates the hammer when HF and H HALT are active to enable printing.

Data bit D4 applied to L62-13 (E,2/7361A-2) is clocked by OUT02 at L62-9 to generate the hammer fire level signal HF. The HF control signal is applied through Q34 (B,2/7364A-1) L2 and L5 (C,3/7364A-1) with one of the PT1 through PT4 signals. Data bit D2 from the 8080A applied to L65-12 (C,2/7361A-2) and the OUT08 command applied to L65-9 generate the H HALT signal at L65-11 (active when high ) which determines when the hammer circuits will be enabled. H (Halt) high turns on Q35 (E,2/7364A-1) whose output is applied to the noninverting input of L6-3 (F,2/7364A-1) to enable the fire and energy circuits Q6 and Q5 (F,C,1/7364A-1).

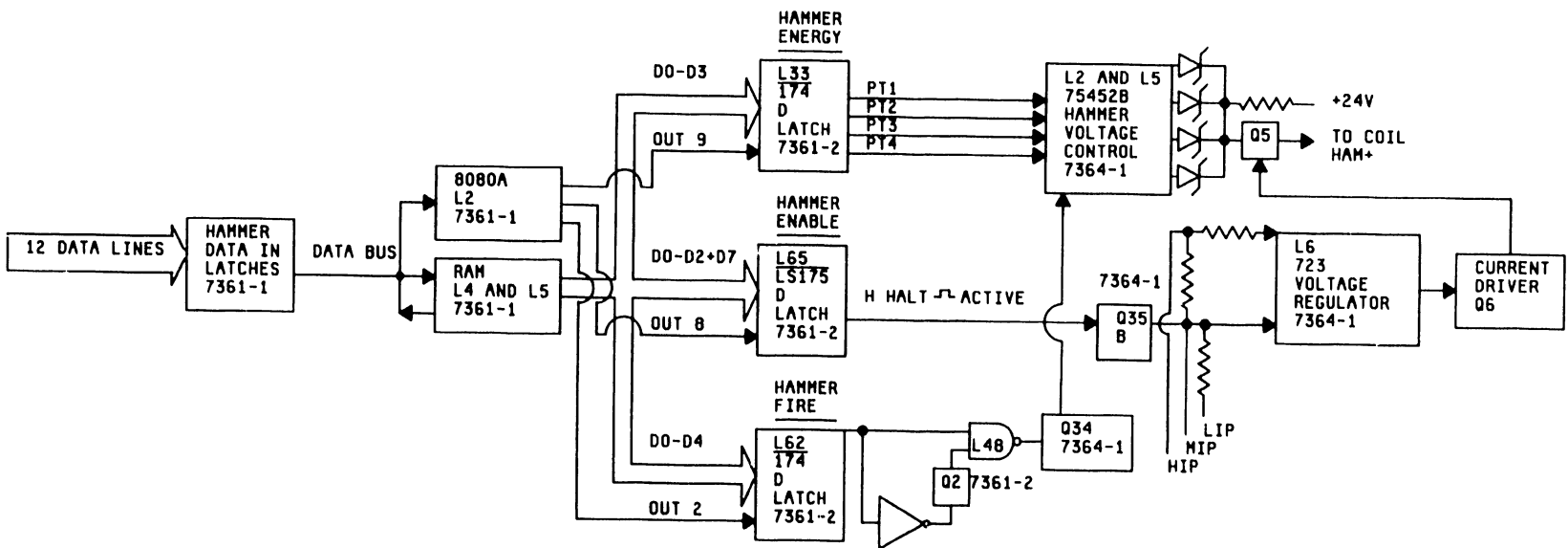


FIGURE 4-20 HAMMER CIRCUIT BLOCK DIAGRAM

**CHAPTER**

**5**

**CHECKS**

**AND**

**ADJUST-**

**MENTS**

## CHAPTER 5

## CHECKS AND ADJUSTMENTS

5.1 INTRODUCTION

This section contains both the electrical and mechanical adjustments for the Model 41W/41WC, 81W/81WC and 81W-1/81WC-1 printers. The removal and replacement procedures for major mechanical assemblies are contained in Chapter 9. The adjustments are arranged in the required order of performance for complete alignment of the printer.

Prior to the removal and replacement of suspected mechanical components as described in Chapter 9, the mechanical assembly in question should be checked for proper adjustment as described in this chapter. Should the adjustment check reveal out-of-tolerance operation, the corresponding adjustment procedure must be performed in the exact order of the procedure. Should adjustment fail to correct the problem, assembly or part removal and replacement (as described in Chapter 9) may be necessary.

Adjustment and/or alignment procedures must be performed after the replacement or repair of a given mechanical assembly or part (Chapter 9).

5.2 PREREQUISITE PROCEDURES

1. Platen adjustments are to be performed with a platen installed whose surface is in good condition, free from wear and other defects.
2. To perform most of the procedures, the top cover will have to be removed. The cover must be removed as follows:

## NOTE

All figure references in this paragraph are to Figure 9-2.

- a. Remove platen.
- b. Lift up the front access cover (6).
- c. Loosen the two Phillips head screws located at lower-rear corners and the two screws located at lower front under access cover.
- d. Disconnect the keyboard ribbon cable from keyboard (15).
- e. Remove cover (12) by lifting the rear of the cover and sliding it forward.
- f. Remove keyboard assembly (15) from cover (12) and reattach the ribbon cable to the keyboard (15).

5.3 TEST EQUIPMENT AND SPECIAL TOOLS REQUIRED

<u>WLI NO.</u>	<u>DESCRIPTION</u>
727-0081	Dual Trace Oscilloscope
727-0125	Digital Voltmeter
726-9753	Push Pull Gauge (3 pound)
190-0739	Diagnostic Display Board
210-6569	Universal Cable Tester
726-9688	Jack Screw Adjusting Tool
726-9730	Daisy Special Tools (Wang and Hy-type)
580-0152	Print Wheel Gauge (Alignment Disk)
655-0274	Button (Disk Holder)
726-9727	Platen Gauge (0.095")
726-9687	Eccentric Wrench
726-9726	Pin Gauge (0.060"/0.030")
726-9686	Carriage Home Position Gauge

5.4 POWER SUPPLY VOLTAGES

Using a digital voltmeter, check the following printer operating voltages:

<u>VOLTAGE</u>	<u>TOLERANCE</u>	<u>BOARD</u>	<u>CONNECTOR/JACK</u>	<u>ADJUSTMENT</u>
+5VR	+5.09 to 5.11	7360	Conn. 4 Y/21	R10 (F,4/7364)*
+12VB	+12.24 to +11.76	7360	Conn. 2 S/15	None
-12V	-12.24 to -11.76	7360	Conn. 3 Z/22	None
-5V	-4.90 to -5.10	7360	Conn. 4 X/20	None
+5CL	+4.90 to +5.10	7462	J1-2	None
+24V	+23.90 to +24.10	7462	J1-8	None
-24V	-23.90 to -24.10	7462	J1-5	None
+9V	+8.90 to +9.10	7462	J1-3	None
+6V	+5.90 to +6.10	7462	J1-1	None
+12VA	+12.24 to +11.76	7364A	Conn. 1-J/8	None
+15V	+14.90 to +15.10	7364A	Conn. 1-E/5	None
-5V	-4.90 to -5.10	7364A	Conn. 3 S/15	None
+0.60V	+0.60V (XCCV)	7360	Test Conn. J3-9	R259 (7360)
+2.15V	+2.15V (ZCCV)	7360	Test Conn. J3-12	R264 (7360)

\*Adjustment is physically located on the upper right-hand corner of the 210-7364A PCB. If any of the above voltages are not within specified tolerances replace the 210-7364A PCB. If still unable to measure correct voltages check motherboard and associated components using standard troubleshooting procedures.

## NOTE

If the +5VR supply potentiometer R10 on the 210-7364 board is adjusted or any PCB's replaced, the following adjustments must be performed using the digital voltmeter:

Adjust XCCV offset voltage potentiometer R259 on the 210-7360 board for 0.60V at test connector J3-9.

Adjust ZCCV offset voltage potentiometer R264 on the 210-7360 board for 2.15V at test connector J3-12.

## 5.5 PRINT-WHEEL ENCODER PHASE ALIGNMENT CHECK

The phase alignment for the print-wheel encoder must be performed when replacement or maintenance has been performed on the print head and when the alignment has been found out-of-tolerance during an adjustment check. If the printer has been modified for use of Diagnostic Display Board WLI # 190-0739, the print wheel can be moved CW or CCW by use of DIP switch settings called out in the check and adjustment procedures and shown in Figure 5-1. If the printer is not modified, use the manual procedures outlined in this Chapter to cause the print wheel to rotate CW and CCW.

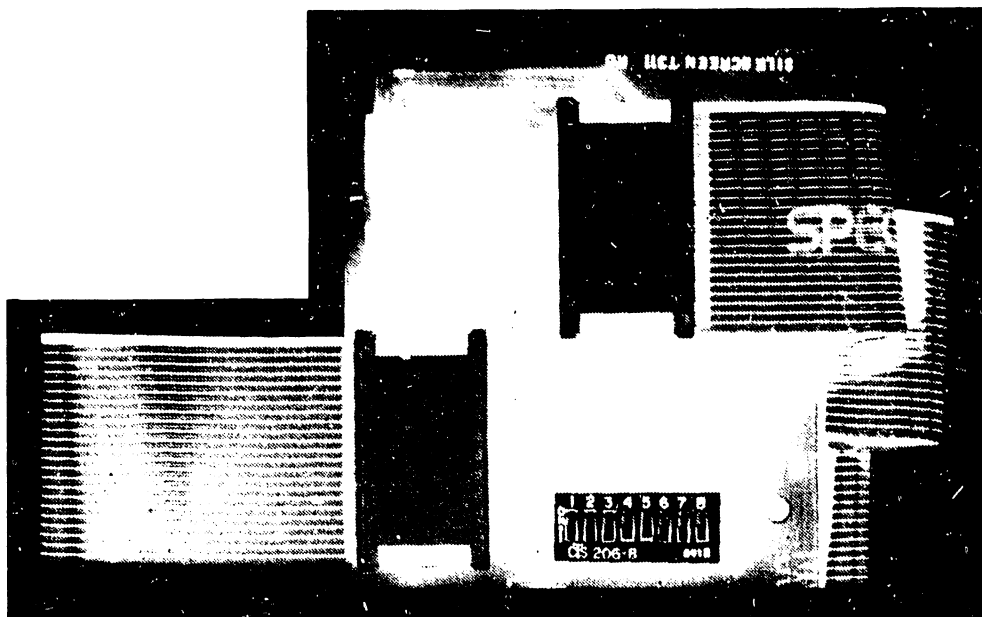


FIGURE 5-1 DIAGNOSTIC DISPLAY BOARD WLI # 190-0739

### 5.5.1 VOLTAGE AND WAVEFORM CHECKS

#### NOTE

Universal Cable Tester PCB 210-6569 is helpful but not necessary to extend the J3 test connector test points for connecting oscilloscope probes when performing checks and adjustments.

1. Remove power from printer.
2. Set the dual trace oscilloscope as follows:

Voltage = 1V/div.  
 Coupling = DC  
 Time base = 1ms/div.

## NOTE

If oscilloscope cannot be internally triggered on sine waves then connect external trigger input to square wave at L15-9 (210-7360 PCB) for Z axis and L5-9 (210-7360 PCB) for X axis.

## NOTE

If the printer has been modified for use of the Diagnostic Display Board WLI # 190-0739 to make mechanical alignments, perform steps 3. through 14. If not modified go to step 15.

3. Insert Diagnostic Display Board cable connector into spare PROM socket L6 on 210-7361-A board.
4. Set Diagnostic Display Board DIP switch # 1 to ON and all the remaining seven DIP switches to OFF (see Figure 5-1).

```

*****
*                               *
*                CAUTION        *
*                               *
* DO NOT USE CUSTOMER'S GOOD PRINT WHEEL *
* FOR THESE TESTS AS DAMAGE COULD RESULT. *
*                               *
*****

```

5. With a print wheel (preferably metal) installed, set the printer POWER switch ON. Observe that Diagnostic Display Board HEX indicators display a code of FE and the print wheel spins in a CW direction at restore velocity.
6. On the servo board (210-7360), check that signals ZSA1 (L12-1) and ZSB1 (L14-1) are a 0V to -4V pp sine wave (see Figure 5-3). Test points are also located on test connector J3 on top middle of servo board 210-7360 (see Figure 5-2).
7. If the 0V to -4Vpp signal is present, continue on to step 8. below. If signal is not present, then either servo board 210-7360 or the LED Assembly is inoperative.

8. Connect oscilloscope channel A probe to signal ZSA1. Connect oscilloscope channel B probe to signal ZSB1. Adjust position of signal ZSB1 so that its positive peak is at middle of the total (positive and negative) vertical displacement of the channel A signal on graticule of oscilloscope as shown in Figure 5-4.
9. Check and note position of 90 degree phase adjustment.
10. Set the printer POWER switch to OFF. Set DIP switch # 2 on the Diagnostic Display Board to ON and the remaining seven DIP switches to OFF.

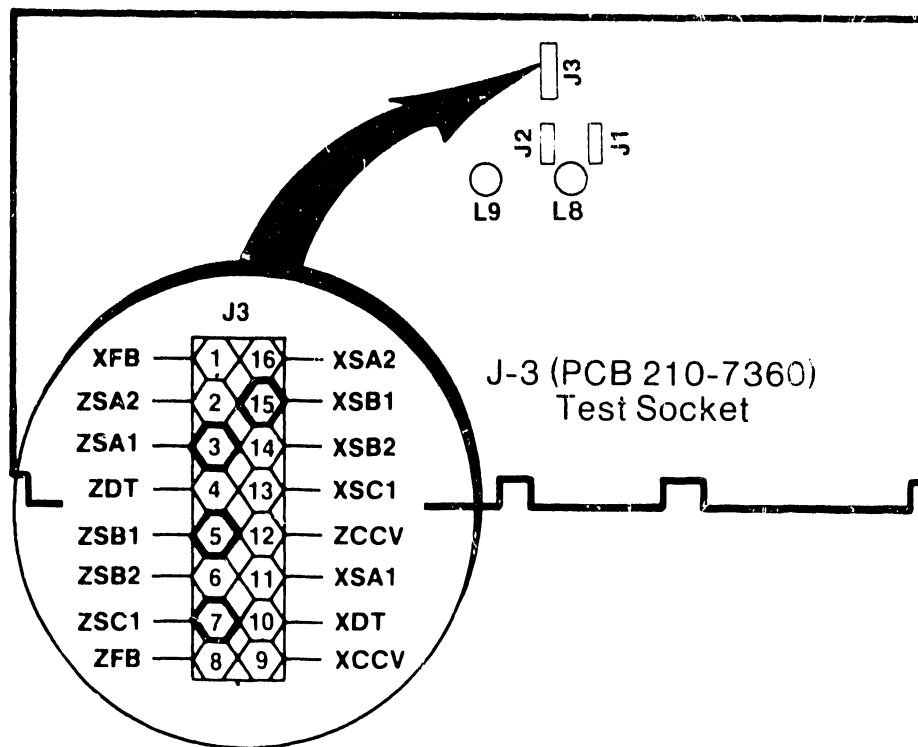


FIGURE 5-2 TEST CONNECTOR J3 (LOCATED ON PCB 210-7360)

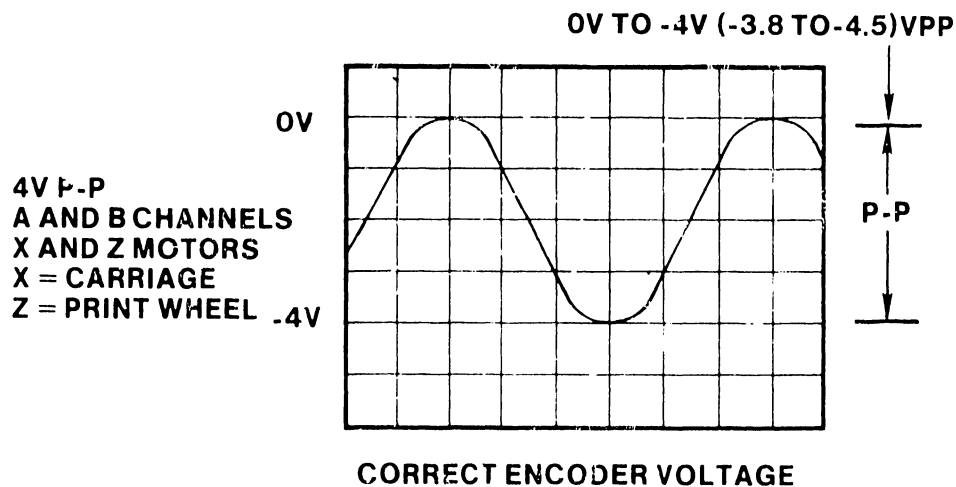
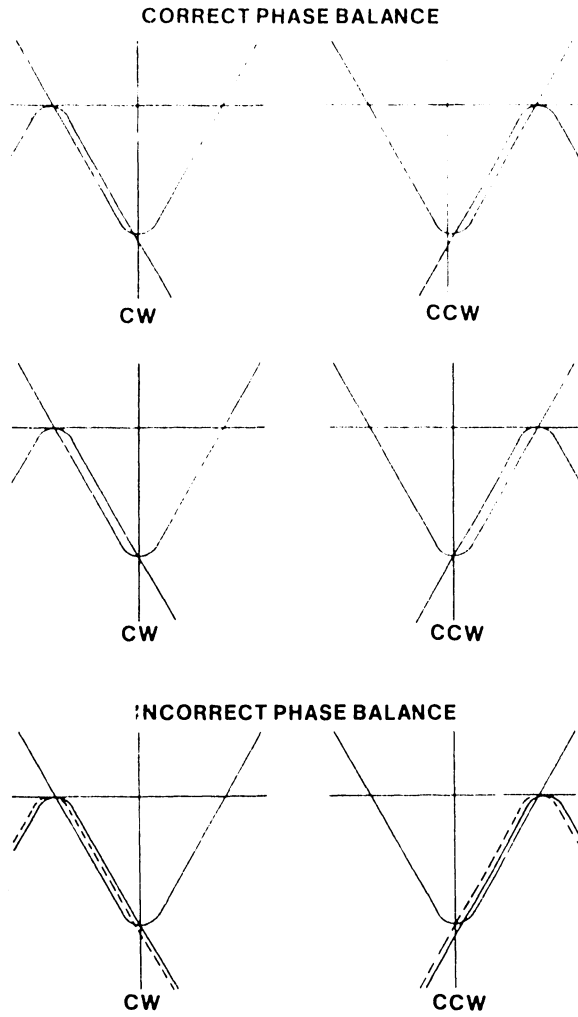


FIGURE 5-3 PRINTER HEAD PHASE ALIGNMENT





NOTE

Broken line waveform indicates a second type of incorrect phase balance.

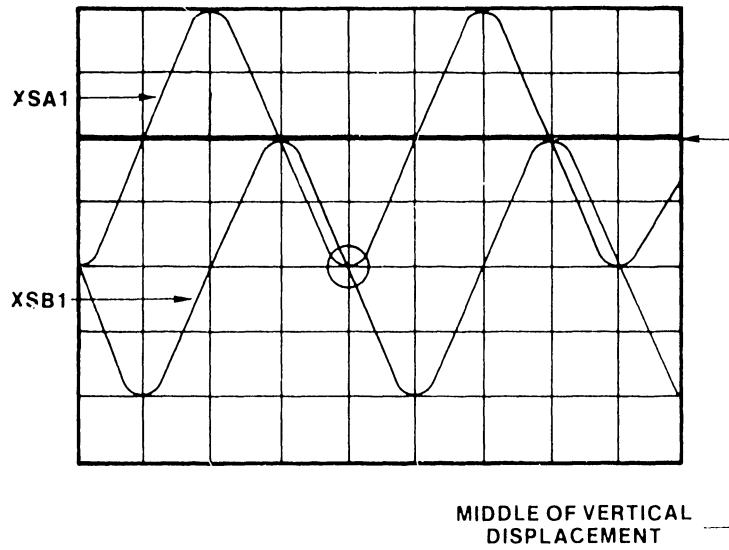


FIGURE 5-4 CORRECT ENCODER PHASING

11. Set the printer POWER switch to ON. Observe the Diagnostic Display Board HEX indicators display a code of FD and the print wheel spins in a CCW direction at restore velocity.
12. Recheck the 90 degree phase adjustment as described in steps 8. and 9. above.
13. If the phasing is equally balanced in both directions (the crossover point on the oscilloscope is either aligned with the vertical center line or equally distant from the imaginary center line) there is no need for further adjustment.
14. If phasing is not aligned with the vertical center line or equally balanced in step 13. above, perform the procedure contained in paragraph 5.5.2.

#### NOTE

If the printer has not been modified for use of the Diagnostic Display Board, perform steps 15. through 33.

15. Disconnect connector J3 on the chassis (carriage drive servomotor connection) or remove fuse on 7364A PCB.
16. Manually position carriage in middle of platen.
17. With print wheel installed, set POWER switch to ON.
18. Insert a piece of opaque material between LED and LDD of the left-margin sensor to cause the print wheel to spin in a clockwise direction.
19. On the servo board (210-7360), check that signals ZSA1 (L12-1) and ZSB1 (L14-1) are a 0V to -4V pp sine wave (see Figure 5-3). Test points are also located on test connector J3 on top middle of servo board 210-7360 (see Figure 5-2).
20. If the 0V to -4Vpp signal is present, continue on to step 21. below. If signal is not present, then either servo board 210-7360 or the LED/LDD Assembly is inoperative.
21. Connect oscilloscope channel A probe to signal ZSA1. Connect oscilloscope channel B probe to signal ZSB1. Adjust position of signal ZSB1 so that its positive peak is at middle of the total (positive and negative) vertical displacement of the channel A signal on graticule of oscilloscope as shown in Figure 5-4.
22. Check and note position of 90 degree phase adjustment.
23. Set the printer POWER switch to OFF.

24. Remove clamping plate from side of flex cable bracket on carriage assembly.
25. Remove print wheel connector from flex cable (M receptacle) and reinstall in a reversed position to cause the print wheel motor to run in a counterclockwise direction.
26. Set POWER switch to ON, press the printer SELECT switch and observe that the print wheel now turns in a counterclockwise direction.

```

*****
*                                     *
*                               CAUTION                               *
*                                     *
* PRINT WHEEL COULD GO INTO HIGH SPEED SPIN. CHANGE *
* TIME BASE ON OSCILLOSCOPE TO OBSERVE WAVEFORM. *
*                                     *
*****
    
```

27. Recheck the 90 degree phase adjustment as described in steps 21. and 22. above.
28. If the phasing is equally balanced in both directions (the crossover point on the oscilloscope is either aligned with the vertical center line or equally distant from the imaginary center line) there is no need for further adjustment.
29. If phasing is not at the same point or equally balanced in step 21. above, perform the procedure contained in paragraph 5.5.2.
30. Remove power from printer and reinstall connector J3 on the motherboard or replace fuse on 7364A PCB (carriage drive servomotor power).
31. Remove and reconnect the print wheel motor connector at flex cable (M receptacle) in the proper position (so it turns in clockwise direction) after completing checks.
32. Replace clamping plate on the side of the ribbon cable bracket.
33. Remove opaque material from between LED and LDD of left margin sensor.

5.5.2 PHASE ADJUSTMENT

1. Set the printer POWER switch to OFF.
2. Remove the two screws (35y) and black cover (35e) from the print-wheel encoder (see Figure 9-7).
3. Loosen the two housing mounting screws (see Figure 5-5).

## NOTE

If the printer has been modified for use of the Diagnostic Display Board WLI # 190-0739 to make mechanical alignments, perform steps 4. through 14. If not, modified go to step 15.

4. Insert Diagnostic Display Board cable connector into spare PROM socket L6 on 210-7361-A board.
5. Set Diagnostic Display Board DIP switch # 1 to ON and all the remaining seven DIP switches to OFF.
6. With a print wheel (preferably metal) installed, set the printer POWER switch ON. Observe that Diagnostic Display Board HEX indicators display a code of FE and the print wheel spins in a CW direction at restore velocity.
7. As the print wheel rotates in a clockwise direction, adjust the "jack screw" (see Figure 5-5) using the jack screw adjusting tool (W.L.# 726-9688) or an appropriate flat blade screwdriver inserted thru the access holes in the printer base to move the encoder bracket up or down until the proper phase shift balance is attained. Phasing must be equally balanced in both directions (the crossover point on the oscilloscope is either aligned with the vertical center line or equally distant from the imaginary center line as shown in Figure 5-4).
8. Set the printer POWER switch to OFF, Diagnostic Display Board DIP switch # 2 to ON and all the remaining seven DIP switches to OFF.
9. With a print wheel (preferably metal) installed, set the printer POWER switch ON. Observe that Diagnostic Display Board HEX indicators display a code of FD and the print wheel spins in a CCW direction at restore velocity.
10. As the print wheel rotates in a counter clockwise direction, adjust the "jack screw" if required (see Figure 5-5) using the jack screw adjusting tool (W.L.# 726-9688) or an appropriate flat blade screwdriver inserted thru the access holes in the printer base to move the encoder bracket up or down until the proper phase shift balance is attained. Phasing must be equally balanced in both directions (the crossover point on the oscilloscope is either aligned with the vertical center line or equally distant from the imaginary center line as shown in Figure 5-4).
11. Tighten the housing mounting screws (Figure 5-5).
12. Recheck the phase balance as described in paragraph 5.5.1. Repeat, if necessary, paragraph 5.5.2, steps 3. through 11.
13. Set printer POWER switch to OFF and remove the Diagnostic Display Board cable connector from spare PROM socket L6 on the 210-7361-A board.

14. Using the two screws (35y), reinstall the black cover (35e) on the print wheel encoder (see Figure 9-7).

## NOTE

If the printer has not been modified for use of the Diagnostic Display Board, perform steps 15. through 30.

15. Insert a piece of opaque material between LED and LDD of the left-margin sensor to cause the print wheel to spin in a clockwise direction.
16. Disconnect connector J3 on the chassis (carriage drive servomotor power) or remove fuse on 7364A PCB and set printer POWER switch to ON.

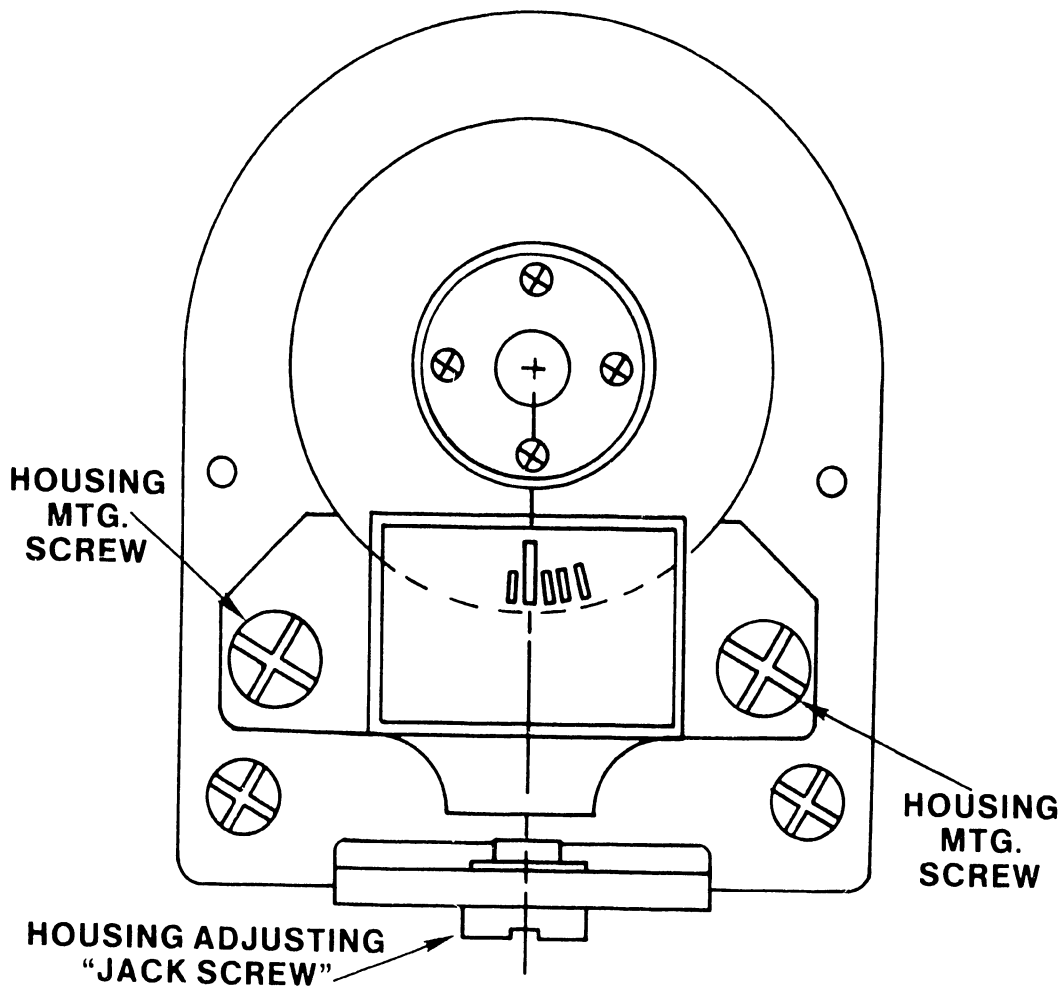


FIGURE 5-5 PRINT WHEEL/CARRIAGE DRIVE ENCODER PHASE ALIGNMENT

17. As the print wheel rotates in a clockwise direction, adjust the "jack screw" (see Figure 5-5) using the jack screw adjusting tool (W.L.# 726-9688) or an appropriate flat blade screwdriver inserted thru the access holes in the printer base to move the encoder bracket up or down until the proper phase shift balance is attained. Phasing must be equally balanced in both directions (the crossover point on the oscilloscope is either aligned with the vertical center line or equally distant from the imaginary center line as shown in Figure 5-4).
18. Set the printer POWER switch to OFF.
19. Remove clamping plate from side of flex cable bracket on carriage assembly.
20. Remove print wheel connector from flex cable (M receptacle) and reinstall in a reversed position to cause the print wheel motor to run in a counterclockwise direction.
21. Set the printer POWER switch to ON and observe that the print wheel rotates in a counterclockwise direction.

```

*****
*                                     *
*                               CAUTION *
*                                     *
* PRINT WHEEL COULD GO INTO HIGH SPEED SPIN. CHANGE *
* TIME BASE ON OSCILLOSCOPE TO OBSERVE WAVEFORM. *
*                                     *
*****

```

22. As the print wheel rotates in a counter clockwise direction, adjust the "jack screw" (see Figure 5-5) if required using the jack screw adjusting tool (W.L.# 726-9688) or an appropriate flat blade screwdriver inserted thru the access holes in the printer base to move the encoder bracket up or down until the proper phase shift balance is attained. Phasing must be equally balanced in both directions (the crossover point on the oscilloscope is either aligned with the vertical center line or equally distant from the imaginary center line as shown in Figure 5-4).
23. Tighten the housing mounting screws (Figure 5-5).
24. Recheck the phase balance as described in paragraph 5.5.1. Repeat, if necessary, paragraph 5.5.2, steps 17. through 23.
25. Set printer POWER switch to OFF.
26. Using the two screws (35y), reinstall the black cover (35e) on the print wheel encoder (see Figure 9-7).
27. Remove opaque material from between LED and LDD left margin sensor.
28. Reinstall connector J3 on motherboard (carriage drive servomotor power) or replace fuse on 7364A PCB.

29. Reinstall print wheel motor connector (M receptacle) in proper position so that it turns in a clockwise direction.
30. Reinstall connector clamping plate on side of carriage.

## 5.6 PRINT-WHEEL-HOME ADJUSTMENT (C CHANNEL)

The print-wheel-home adjustment is required when the print-wheel motor assembly has been replaced or when maintenance is performed on the encoder assembly. This procedure consists of a coarse and a fine adjustment. If the printer has been modified for use of Diagnostic Display Board WLI # 190-0739, the print wheel can be moved to home position (C Channel) by use of DIP switch settings called out in the check and adjustment procedures and shown in Figure 5-1. If the printer is not modified, applying power will cause the print wheel to move to home.

### 5.6.1 HOME POSITION CHECK

#### NOTE

The new microcode causes both the print wheel and carriage drive motors to enter a "sleep" state during periods of inactivity (power is removed from their drive motors). Therefore, these modified printers must use the Diagnostic Display Board when performing checks and adjustments.

1. Set printer POWER switch to OFF.

#### NOTE

If the printer has been modified for use of the Diagnostic Display Board WLI # 190-0739 to make mechanical alignments, perform steps 2. through 6. If not modified go to step 7

2. Insert Diagnostic Display Board cable connector into spare PROM socket L6 on 210-7361-A board.
3. Set Diagnostic Display Board DIP switch # 3 to ON and all the remaining seven DIP switches to OFF (see Figure 5-1).
4. With a print wheel installed (customers usual style of print wheel), set the printer POWER switch ON. Observe that Diagnostic Display Board HEX indicators display a code of FB and the print wheel holds at home position as described in step 5. below. Should you manually move the wheel away from the home position the wheel will recover to home position by firmware control.

5. Check that the letter "o" is in front of the hammer which when depressed must be centered on the petal indicating that the coarse home-position alignment for channel "C" is satisfactory. This check will vary from printer-to-printer depending on wear and the fine adjustment procedure provided in paragraph 5.6.3.

## NOTE

If the lower case "o" is more than one character off the vertical center line, adjust as described in paragraph 5.6.2.

If the lower case "o" is less than one character off the vertical center line, adjust as described in paragraph 5.6.3.

6. Set printer POWER switch to OFF and remove the Diagnostic Display Board cable connector from spare PROM socket L6 on the 210-7361-A PCA.

## NOTE

If the printer has not been modified for use of the Diagnostic Display Board, perform steps 7. through 9.

7. Set the printer POWER switch to ON.
8. Check that the letter "o" is in front of the hammer which when depressed must be centered on the petal indicating that the coarse home-position alignment for channel "C" is satisfactory. This check will vary from printer-to-printer depending on wear and the fine adjustment procedure provided in paragraph 5.6.3.

## NOTE

If the lower case "o" is more than one character off the vertical center line, adjust as described in paragraph 5.6.2.

If the lower case "o" is less than one character off the vertical center line, adjust as described in paragraph 5.6.3.

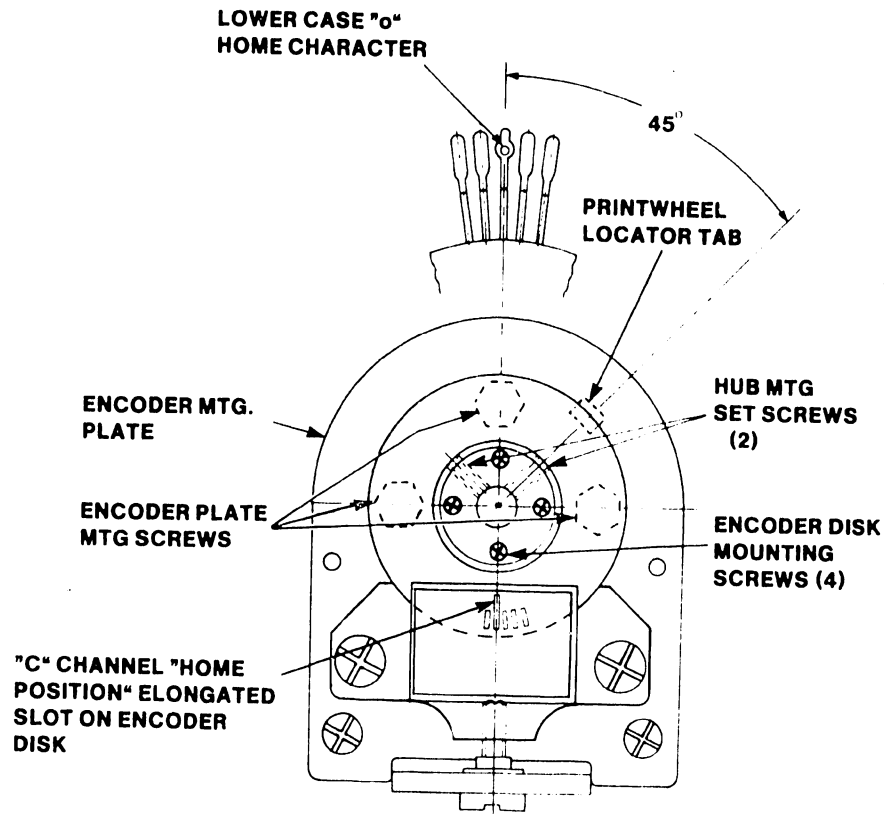
9. Set the printer POWER switch to OFF.

#### 5.6.2 PRINT WHEEL HOME COARSE ADJUSTMENT

1. Set the printer POWER switch to OFF.
2. Remove the two screws (35y) and black encoder cover (35e) (see Figure 9-7).



3. Locate the elongated slot on the encoder disk (see Figure 5-6).
4. With a pencil or pen draw a line from the elongated slot to the center of the disk.
5. Rotate the disk until the elongated slot and the drawn line are vertically positioned as indicated Figure 5-6.
6. Be sure that the encoder mounting plate is vertically positioned. This will ensure mid-range position for the performance of the fine home adjustment procedure.
7. Loosen four Philips-head mounting screws securing the encoder disk to the hub (see Figure 5-6).
8. While holding disk in place, rotate daisy print-wheel until the lower case "o" lines up with the hammer (see Figure 5-6) and then tighten the four encoder disk mounting screws.



**NOTE**

When the elongated slot on the encoder disk is correctly positioned in the space between the LED and LDD as shown, the letter "o" (lower-case) is in front of the hammer indicating home-position alignment for channel "C" is satisfactory.

FIGURE 5-6 PRINT WHEEL HOME ALIGNMENT

### 5.6.3 PRINT WHEEL HOME FINE ADJUSTMENT (See Figure 5-6)

1. Set printer POWER switch to OFF.

#### NOTE

If the printer has been modified for use of the Diagnostic Display Board WLI # 190-0739 to make mechanical alignments, perform steps 2. through 10. If not modified go top step 11.

2. Insert Diagnostic Display Board cable connector into spare PROM socket L6 on 210-7361-A board.
3. Set Diagnostic Display Board DIP switch # 3 to ON and all the remaining seven DIP switches to OFF (see Figure 5-1).
4. With a print wheel installed (customers usual style of wheel), set the printer POWER switch ON. Observe that Diagnostic Display Board HEX indicators display a code of FB and the print wheel holds at home position as described in step 5. below. Should you manually move the wheel away from the home position the wheel will recover to home position by firmware control.

#### NOTE

Lower-case "o" must be less than one character from center line. If not, repeat the procedure contained in paragraph 5.6.2.

5. Loosen the three hex-head screws (encoder plate mounting screws shown in Figure 5-6) that fasten the encoder plate to the motor assembly (use 3/16 open end wrench).
6. Move the encoder plate until the lower case "o" is in front of and slightly to the left of the hammer face as shown in Figure 5-6.
7. Tighten the three encoder plate mounting screws (Figure 5-6).
8. Repeat home position check procedure contained in paragraph 5.6.1 and repeat as necessary steps 5., 6 and 7. above.
9. Set printer POWER switch to OFF and remove the Diagnostic Display Board cable connector from spare PROM socket L6 on the 210-7361-A board.
10. Using two screws (35y), reinstall black cover (35e) on print wheel encoder (Figure 9-7).

## NOTE

If the printer has not been modified for use of the Diagnostic Display Board, perform steps 11. through 20.

11. Set the printer POWER switch to OFF.
12. Disconnect Carriage Drive Servo Motor Connector J3 from Chassis or remove fuse from 7364A PCB.
13. Set the printer POWER switch to ON.

## NOTE

Lower-case "o" must be less than one character from center line. If not, repeat the procedure contained in paragraph 5.6.2.

14. Loosen the three hex-head screws (encoder plate mounting screws shown in Figure 5-6) that fasten the encoder plate to the motor assembly (use 3/16 open end wrench).
15. Move the encoder plate until the lower case "o" is in front of and slightly to the left of the hammer face as shown in Figure 5-6.
16. Tighten the three encoder plate mounting screws (Figure 5-6).
17. Repeat home position check procedure contained in paragraph 5.6.1 and repeat as necessary steps 14., 15 and 16. above.
18. Set the printer POWER switch to OFF.
19. Connect carriage drive servo motor connector J3 to chassis or replace fuse on 7364A PCB.
20. Using two screws (35y), reinstall black cover (35e) on print wheel encoder (Figure 9-7).

#### 5.7 CARRIAGE DRIVE MOTOR ENCODER PHASE ALIGNMENT

This alignment procedure is required when the carriage motor has been replaced or when the carriage drive motor encoder has been repaired. If the printer has been modified for use of Diagnostic Display Board WLI # 190-0739, the carriage can be moved in both directions at restore velocity for encoder phase adjustments by use of DIP switch settings called out in the check and adjustment procedures and shown in Figure 5-1. If the printer is not modified, an alternate method of moving the carriage is required.

5.7.1 VOLTAGE AND WAVEFORM CHECKS

## NOTE

If the printer has been modified for use of the Diagnostic Display Board WLI # 190-0739 to make mechanical alignments, perform steps 1. through 10. If not modified go to step 11.

1. Set printer POWER switch to OFF.
2. Insert Diagnostic Display Board cable connector into spare PROM socket L6 on 210-7361-A board.
3. Set Diagnostic Display Board DIP switches # 1 and # 2 to ON and all the remaining six DIP switches to OFF (see Figure 5-1).
4. With a print wheel installed, set the printer POWER switch ON. Observe that Diagnostic Display Board HEX indicators display a code of FC and the carriage moves in both directions at restore velocity.

5. Set the dual trace oscilloscope as follows:

Voltage = 1V/div.  
Coupling = DC  
Time base = 1ms/div.

## NOTE

If oscilloscope cannot be internally triggered on sine waves then connect external trigger input to square wave at L15-9 (210-7360 PCB) for Z axis and L5-9 (210-7360 PCB) for X axis.

6. Using the oscilloscope, check that signals XSA1 (L2-1) and XSBI (L4-1) on the servo PCB (210-7360) are a 0V to -4V pp amplitude sine wave (see Figure 5-3).
7. Connect oscilloscope channel A to signal XSA1 and channel B to signal XSBI (see Figures 5-2 and 5-3).
8. Using the oscilloscope adjustment controls for channel B, position the positive peak of signal XSBI to the middle of the vertical displacement of signal XSA1 (see Figure 5-4). Also, check that the phase shift in both directions of carriage movement is equally balanced.
9. If the phase shift is incorrect proceed with the adjustments in paragraph 5.7.2.

10. If the phase shift is correct, set printer POWER switch to OFF and remove the Diagnostic Display Board cable connector from spare PROM socket L6 on the 210-7361-A board.

## NOTE

If the printer has not been modified for use of the Diagnostic Display Board, perform steps 11. through 20.

11. Set the printer POWER switch to OFF.
12. Disconnect carriage drive servomotor connector J3 from chassis or remove fuse from 7364A PCB.
13. Install a print wheel and set the printer POWER switch to ON.
14. Set the dual trace oscilloscope as follows:

Voltage = 1V/div.  
Coupling = DC  
Time base = 1ms/div.

## NOTE

If oscilloscope cannot be internally triggered on sine waves then connect external trigger input to square wave at L15-9 (210-7360 PCB) for Z axis and L5-9 (210-7360 PCB) for X axis.

15. Move carriage back and forth by hand or as described in NOTE below:

## NOTE

Set POWER switch to OFF. The desired way to cause the carriage movement required in step 15. above is to reconnect servomotor connector J3 or replace fuse. Set POWER switch to ON. Then queue a document that has a character at position 1 and in the last position of each line of the page with tabs between them and a return at end of each line. Repeat each line as required. This procedure provides an even movement of the carriage.

16. Using the oscilloscope, check that signals XSA1 (L2-1) and XSB1 (L4-1) on the servo PCB (210-7360) are a 0V to -4V pp amplitude sine wave (see Figure 5-3).
17. Connect oscilloscope channel A to signal XSA1 and channel B to signal XSB1 (see Figures 5-2 and 5-3).

18. Using the oscilloscope adjustment controls for channel B, position the positive peak of signal XSBI at the middle of the vertical displacement of signal XSA1 (see Figure 5-4). Also, check that the phase shift in both directions of carriage movement is equally balanced.
19. If the phase shift is incorrect proceed with the adjustments in paragraph 5.7.2.
20. If the phase shift is correct, reconnect the carriage drive servomotor connector J3 to the chassis or replace fuse on the 7364A PCB

### 5.7.2 ADJUSTMENT OF PHASE SHIFT

#### NOTE

If the printer has been modified for use of the Diagnostic Display Board WLI # 190-0739 to make mechanical alignments, perform steps 1. through 19.

1. Set printer POWER switch to OFF.
2. Remove two pan head screws (four on wide carriage) and slide chassis toward rear (limited by cable length).
3. Remove the two screws (15) and black cover (2) from the carriage encoder (see figure 9-6).
4. Loosen the two housing mounting screws (See Figure 5-5).
5. Slide chassis forward.
6. Insert Diagnostic Display Board cable connector into spare PROM socket L6 on 210-7361-A board.
7. Set Diagnostic Display Board DIP switches # 1 and # 2 to ON and all the remaining six DIP switches to OFF (see Figure 5-1).
8. With a print wheel installed, set the printer POWER switch ON. Observe that Diagnostic Display Board HEX indicators display a code of FC and the carriage moves in both directions at restore velocity.
9. Set the dual trace oscilloscope as follows:
  - Voltage = 1V/div.
  - Coupling = DC
  - Time base = 1ms/div.

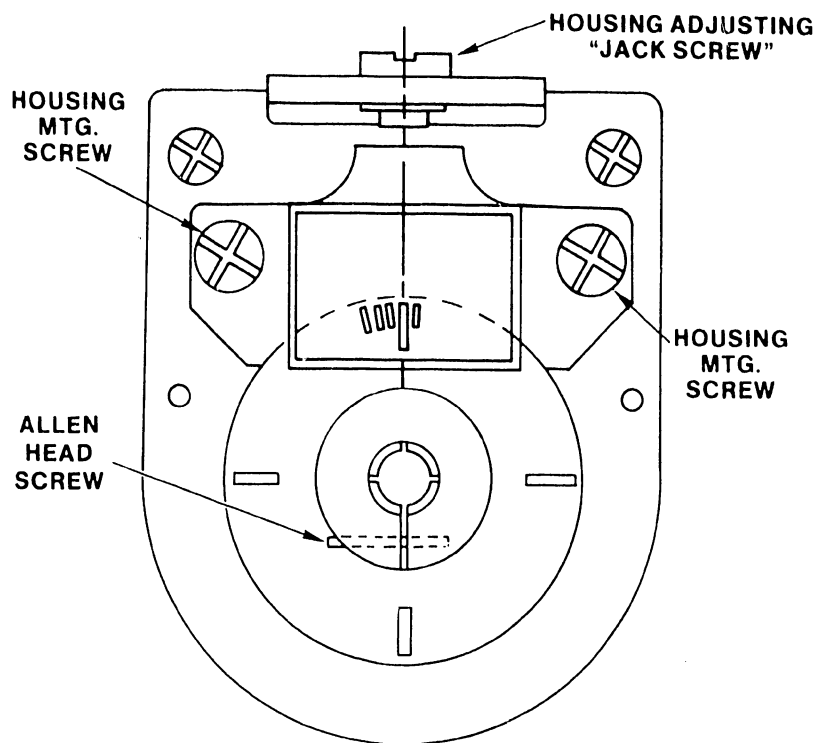


FIGURE 5-7 CARRIAGE DRIVE MOTOR HOME ALIGNMENT

NOTE

If oscilloscope cannot be internally triggered on sine waves then connect external trigger input to square wave at L15-9 (210-7360 PCB) for Z axis and L5-9 (210-7360 PCB) for X axis.

10. Connect oscilloscope channel A to signal XSA1 and channel B to signal XSB1 (see Figures 5-2 and 5-3).
11. Adjust the "jack screw" on the encoder until the phase shift is balanced in both directions (See Figures 5-5 and 5-4).
12. Tighten the two housing mounting screws (Figure 5-5).
13. Recheck the phase shift balance as described in paragraph 5.7.1.
14. Readjust if necessary as described in steps 9., 10., and 11. above.
15. Set the printer POWER switch to OFF.
16. Slide chassis toward rear (limited by cable length).
17. Using the two screws (15), reinstall the black cover (2) on carriage encoder (Figure 9-6).

18. Slide chassis forward into correct location and secure with the two pan head screws (four on wide carriage).
19. Remove the Diagnostic Display Board cable connector from spare PROM socket L6 on the 210-7361-A board and disconnect the oscilloscope.

## NOTE

If the printer has not been modified for use of the Diagnostic Display Board, perform steps 20. through 35.

20. Set the printer POWER switch to OFF.
21. Disconnect carriage drive servomotor connector J3 from chassis or remove fuse from 7364A PCB.
22. Remove two pan head screws (four on wide carriage) and slide chassis toward rear (limited by cable length).
23. Remove the two screws (15) and black cover (2) from the carriage encoder (see figure 9-6).
24. Loosen the two housing mounting screws (See Figure 5-5).
25. Slide chassis forward.
26. Set the printer POWER switch to ON again and steadily move the carriage assembly back and forth or as described in NOTE below.

## NOTE

Set POWER switch to OFF. The desired way to cause the carriage movement required in step 26. above is to reconnect servomotor connector J3 or replace fuse. Set POWER switch to ON. Then queue a document that has a character at position 1 and in the last position of each line of the page with tabs between them and a return at end of each line. Repeat each line as required. This procedure provides an even movement of the carriage.

27. Adjust the "jack screw" on the encoder until the phase shift is balanced in both directions (See Figures 5-5 and 5-4).
28. Tighten the two housing mounting screws (Figure 5-5).
29. Recheck the phase shift balance as described in paragraph 5.7.1.
30. Readjust if necessary as described in steps 26., 27., 28. and 29. above.
31. Set the printer POWER switch to OFF.



32. Slide chassis toward rear (limited by cable length).
33. Using the two screws (15), reinstall the black cover (2) on carriage encoder (Figure 9-6).
34. Slide chassis forward into correct location and secure with the two pan head screws (four on wide carriage).
35. Reconnect J3 connector (carriage drive servomotor) or replace fuse and disconnect the oscilloscope.

## 5.8 CARRIAGE HOME POSITION CHECK/ALIGNMENT

This procedure consists of setting the center of the print wheel motor shaft 2.150 inches from the inside of left side frame of the printer and adjusting the carriage encoder for proper "C" channel position (Carriage home position).

### 5.8.1 CARRIAGE "C" CHANNEL HOME CHECK

1. Set the printer POWER switch to OFF.
2. Disconnect carriage drive servomotor connector J3 from the chassis (or remove fuse from 7364A PCB) AND disconnect the print-wheel motor connector from flex cable (M receptacle) on the right side of the carriage.
3. Connect oscilloscope probe to L6-1 (G,8/7360-2) or signal XSC1 J3-13 on R3 boards with test connector J3 (Figure 5-2). Set oscilloscope controls as follows:
  - Time base = 1ms/div.
  - Voltage = 1v/div.
  - Auto Trigger
4. Install carriage home position gauge (WL# 726-9686) as shown in Figure 5-9 and apply power to printer.
5. The "C" channel signal should be at its lowest point on the oscilloscope display. Also, there should be 2.150 in. between the print-wheel motor shaft center and the inside of left side frame (Figure 5-9).
6. If "C" channel signal is not at its lowest point on the oscilloscope display, proceed to the adjustment procedure contained in paragraph 5.8.2.
7. Recheck "C" channel home position for correct adjustment as described in step 5. above.
8. Set printer POWER switch to OFF.

9. Install carriage drive servomotor connector J3 in chassis (or replace fuse on 7364A PCB) AND replace print wheel motor connector in flex cable (M receptacle) on right side of carriage.
10. Set printer POWER switch to ON.
11. Using a six inch steel rule, measure the distance from the inside of left side frame to the center of print wheel motor shaft:
  - a. If the measurement is less than 2.10" or greater than 2.20" perform the procedures contained in paragraph 5.8.2.
  - b. If the measurement falls between 2.10" and 2.20" perform the procedures contained in paragraph 5.8.3.
12. If step 5. above was correct, set printer POWER switch to OFF, remove carriage home position gauge, reconnect carriage drive servomotor connector J3 to the chassis (or replace fuse on 7364A PCB) AND reconnect the print-wheel motor connector to the flex cable (M receptacle) on the right side of the carriage.

#### 5.8.2 ADJUSTMENT (COARSE)

Adjustment for correct carriage-home position is required, if carriage drive motor has been replaced or adjustment (2.150" from center of print wheel motor shaft to inside left side frame) is off greater than 0.050".

1. Set the printer POWER switch to OFF.
2. Remove two pan head screws (four on wide carriage) and slide chassis toward rear.
3. Remove two screws (15) and black cover (2) from carriage encoder (see Figure 9-6).
4. Place small hole of gauge (WL# 726-9686) on print-wheel shaft. Place cutout end of gauge over left platen mounting plate of printer as shown in Figure 5-9.
5. Slide chassis forward into correct position.
6. Disconnect carriage drive servomotor connector J3 from the chassis (or remove fuse from 7364A PCB) AND disconnect the print-wheel motor connector from flex cable (M receptacle) on the right side of the carriage.
7. Connect oscilloscope probe to L6-1 (G,8/7360-2) or signal XSC1 on R3 boards with test connector J3 (Figure 5-2). Set oscilloscope controls as follows:
  - Time base = 1ms/div.
  - Voltage = 1v/div.
  - Auto Trigger
8. Set the printer POWER switch to ON.

9. Loosen the Allen head screw (Figure 5-6) on encoder hub.

```

*****
*
*                               CAUTION                               *
*
* IN MAKING THE ADJUSTMENT, BE SURE THE ENCODER DISK              *
* IS NOT MOVED IN OR OUT ALONG THE SHAFT. VISUALLY                *
* CHECK THAT THE ENCODER DISK DOES NOT RUB AGAINST                *
* THE MASK. A SMALL SPACE, 0.003 INCH MAX. BETWEEN                *
* MASK AND ENCODER WHEEL, IS NECESSARY SO THAT LIGHT              *
* DISTORTION DOES NOT OCCUR AS IT WOULD WITH A LARGE              *
* SPACE (SEE FIGURE 5-8).                                          *
*
*****
    
```

10. While observing oscilloscope, slowly rotate encoder disk until the signal goes to lowest point.

NOTE

The carriage home position is set correctly when the baseline on the oscilloscope is at the lowest amplitude.

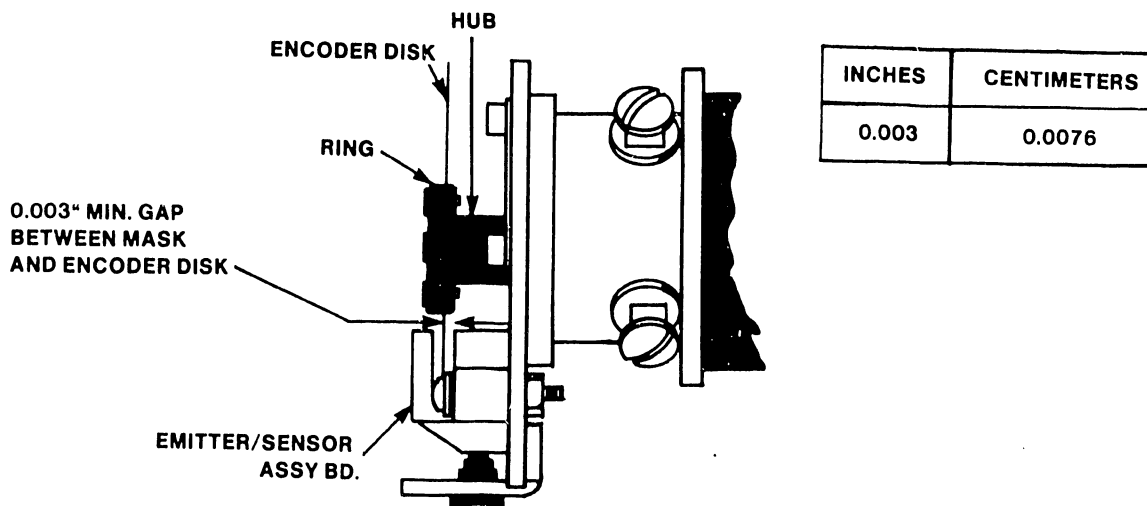
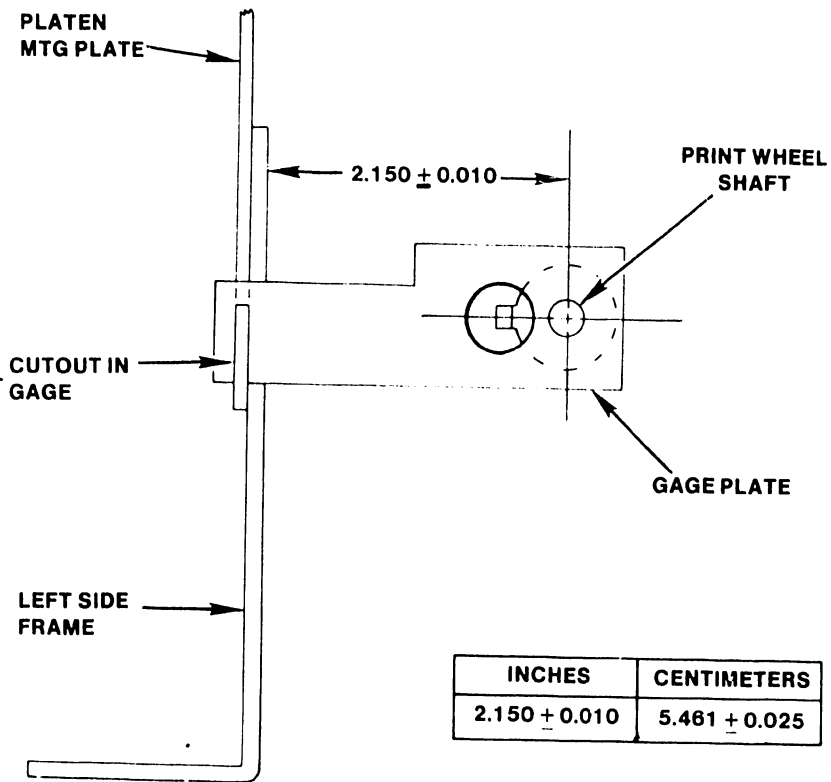
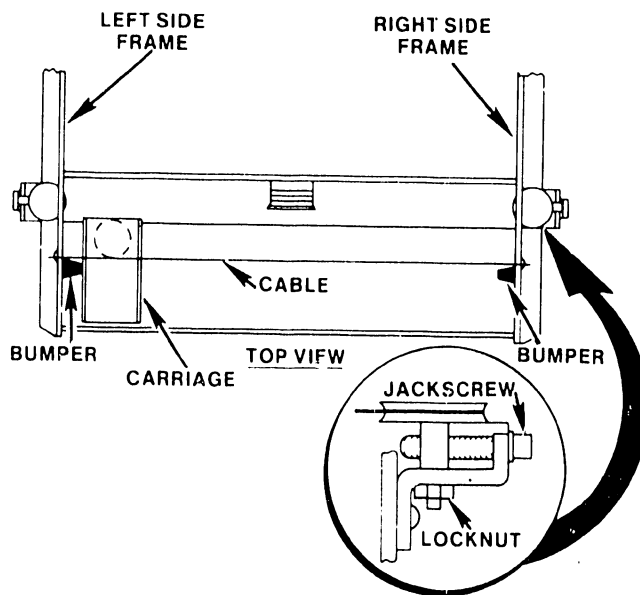


FIGURE 5-8 SPACE BETWEEN ENCODER DISK AND MASK



COARSE



FINE

FIGURE 5-9 CARRIAGE HOME POSITION (LEFT MARGIN ADJUST)

11. Check for 0.003 in. (max.) clearance between encoder disk and mask (see Figure 5-8).
12. Tighten the two hub mounting Allen-head screws while holding the hub, disk and shaft in place (Figure 5-6).
13. Set printer POWER switch OFF.
14. Slide chassis toward rear (limited by cable length).
15. Using two screws (15) reinstall black cover (2) on encoder (Figure 9-6).
16. Slide chassis forward into correct location and secure with the two pan head screws (four on wide carriage).

### 5.8.3 ADJUSTMENT (FINE)

#### NOTE

This adjustment can only be accomplished when units have two adjustable pulleys.

1. Set the printer POWER switch to ON.
2. Loosen two lock nuts (one under each pulley shown in Figure 5-9).
3. Adjust jack screw (see Figure 5-9) of each pulley, in/out while using 6 inch steel rule to obtain 2.150 inch measurement from inside of left side frame to center of print wheel motor shaft (see Figure 5-9).
4. Tighten two lock nuts (one under each pulley shown in Figure 5-9).
5. Recheck measurement obtained in step 3. above. Repeat steps 2., 3. and 4. if measurement is out of tolerance.

### 5.9 ARMATURE TO LAMINATION SURFACES FLUSH CHECK AND ADJUSTMENT

#### 5.9.1 CHECK (See Figure 5-10)

To check the alignment of the armature, remove the ribbon cartridge and print-wheel. Inspect the alignment of the hammer armature with respect to the face of the lamination. Check that both surfaces are flush as shown in Figure 5-10 by moving armature against lamination face.

### 5.9.2 ADJUSTMENT (See Figure 5-10)

1. Tighten armature insert screw.
2. Loosen the two coil assembly mounting screws.
3. Push armature arm forward toward coil assembly and hold in place.
4. Move the coil assembly until the lamination face is flush with hammer armature surface.
5. Tighten the two coil assembly mounting screws while holding armature and coil in place.
6. Recheck and perform adjustment if necessary.

### 5.10 ARMATURE TO LAMINATION GAP (See Figure 5-10)

#### 5.10.1 CHECK

Using wire gauge (WL #726-9726) check for 0.030 in. gap between hammer armature and coil lamination at top of lamination as shown in Figure 5-10.

#### 5.10.2 ADJUSTMENT

1. Loosen lock nut on armature stop eccentric screw while holding eccentric screw in place.
2. Using wire gauge (WL #726-9726), adjust eccentric until 0.30 in. gap between the hammer armature and coil lamination is obtained.
3. Tighten eccentric lock nut while holding eccentric screw in position.
4. Recheck 0.030 in gap between hammer armature and lamination. If out of adjustment repeat steps 1., 2. and 3. above.

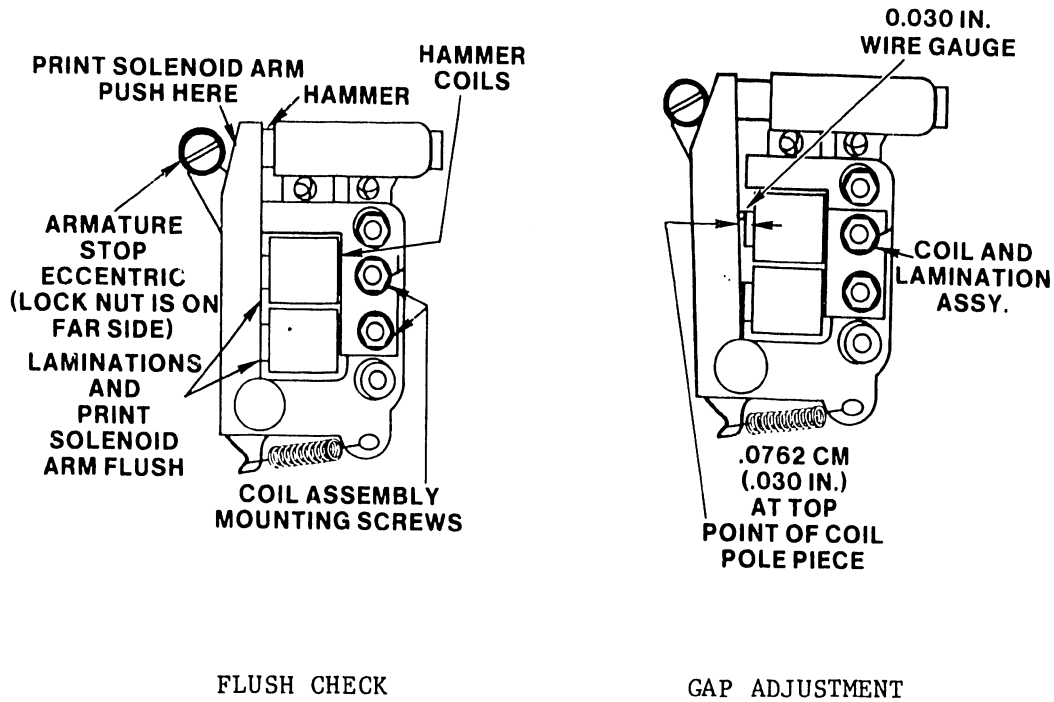


FIGURE 5-10 ARMATURE TO LAMINATION ADJUSTMENTS

5.11 PRINT HAMMER TO BACK OF PRINT WHEEL PETAL CHECK/ADJUSTMENT  
(Figure 5-11)

NOTE

Hammer housing must be aligned so that top of hammer is in line with top of print wheel petal (See Figure 5-18). To correct a misalignment, loosen the two screws holding hammer housing bracket (see Figure 5-18) and move bracket and housing up or down to align the top of the hammer and petal.

5.11.1 CHECK

1. To check for the 0.060 in. gap between the front of the print hammer and the back surface of the print wheel petal ensure that:
  - a. The hammer is back against the armature.
  - b. The armature is back against the bumper stop.
  - c. Print wheel gauge (WL #580-0152) with raised surface toward hub of print wheel motor or a known good daisy print wheel is installed on the printer.
2. Using wire gauge (WL #726-9726) or a feeler gauge check for the 0.060" clearance as shown in Figure 5-11.

5.11.2 ADJUSTMENT

1. Loosen the two yoke assembly hex socket head mounting screws attaching yoke assembly to the disk motor casting as shown in Figure 5-11.
2. Using wire gauge (WL #726-9726) or feeler gauge adjust the yoke assembly in or out for a 0.060" clearance as shown in Figure 5-11.

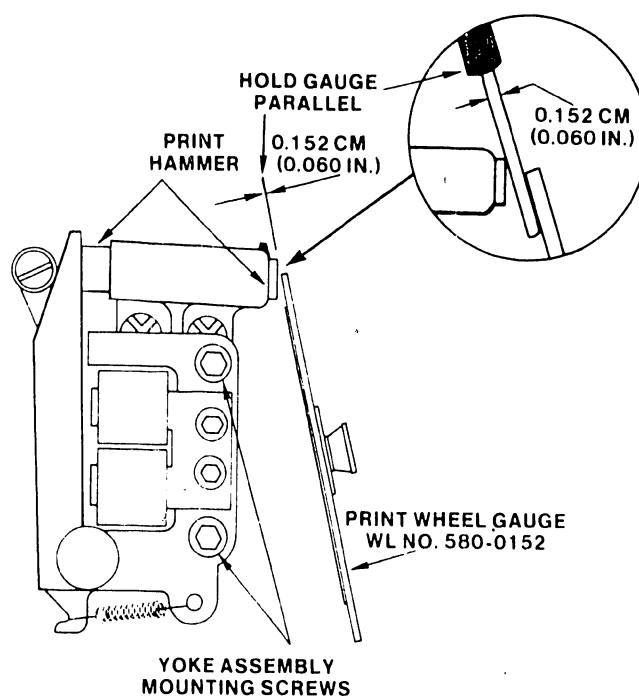


FIGURE 5-11 PRINT HAMMER TO BACK OF PRINT WHEEL PETAL



3. Tighten the two yoke assembly mounting screws and repeat paragraph 5.11.1 step 2. to check that the 0.060" clearance was not changed when tightening these screws.
4. If the 0.060" clearance was changed repeat steps 1. and 2. above as many times as necessary to obtain this clearance after tightening the two yoke assembly mounting screws.

## 5.12 PRINT WHEEL PETAL TO PLATEN CHECK/ADJUSTMENT

### 5.12.1 CHECK

#### NOTE

It is mandatory that the latch pivot eccentric be set as shown in Figure 5-12 prior to the performance of the following check procedure.

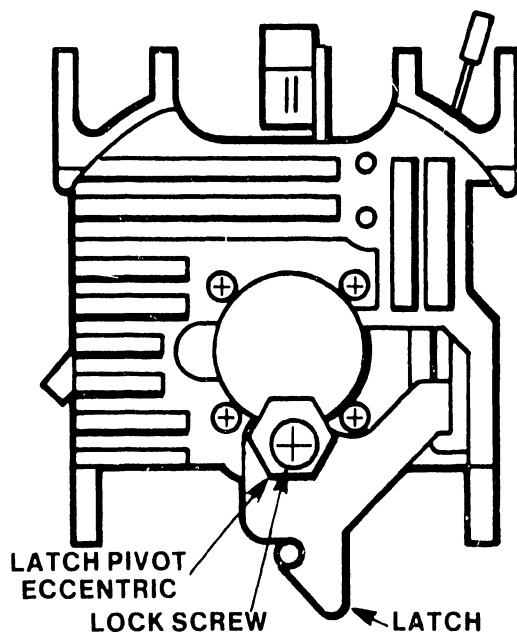


FIGURE 5-12 LATCH PIVOT ECCENTRIC SETTING

1. Set printer POWER switch to OFF.
2. Install print wheel gauge (WL #580-0152) as shown in Figure 5-13.
3. Push print wheel yoke assembly forward to printing position.

4. Set copy control lever (Figure 2-11) in full forward position.
5. Slide carriage assembly to extreme left.
6. Install platen gauge (WL #726-9727) on platen as shown in Figure 5-13.
7. Manually rotate platen down so that tip of platen gauge just goes below edge of print wheel gauge as shown in Figure 5-13. There should be zero clearance between the platen, platen gauge, and print wheel gauge.
8. Slide carriage assembly to extreme right.
9. Manually rotate platen down so that tip of platen gauge just goes below edge of print wheel gauge as shown in Figure 5-13. There should be zero clearance between the platen, platen gauge, and print wheel gauge.
10. If either of these checks reveal an out of tolerance condition as described above, perform adjustment procedure contained paragraph 5.12.2.

#### 5.12.2 ADJUSTMENT

1. Set printer POWER switch to OFF.
2. Install print wheel gauge (WL #580-0152) as shown in Figure 5-13.
3. Push print wheel yoke assembly forward to printing position.
4. Set copy control lever (Figure 2-11) to full forward position.
5. Slide carriage assembly to extreme left.
6. Install platen gauge (WL #726-9727) on platen as shown in Figure 5-13.
7. Manually rotate platen down so that tip of platen gauge just goes below edge of print wheel gauge as shown in Figure 5-13. If there is not zero clearance between the platen, platen gauge, and print wheel gauge, proceed to step 8.
8. Loosen the two horizontal platen adjusting plate locking screws (see Figure 5-14).
9. While holding horizontal adjusting eccentric with an eccentric nut wrench (WL #726-9687) or a 7/16" open end wrench, loosen the horizontal eccentric locking screw (see Figure 5-14).
10. Adjust horizontal eccentric (see Figure 5-14) to obtain zero clearance between the platen, platen gauge, and print wheel gauge.

11. Tighten horizontal eccentric locking screw (see Figure 5-14).
12. Tighten the two platen adjusting plate locking screws (see Figure 5-14).
13. Slide carriage assembly to extreme right.
14. Install platen gauge (WL #726-9727) on platen as shown in Figure 5-13.
15. Manually rotate platen down so that tip of platen gauge just goes below edge of print wheel gauge as shown in Figure 5-13. If there is not zero clearance between the platen, platen gauge, and print wheel gauge, proceed to step 16.
16. Loosen the two horizontal platen adjusting plate locking screws (see Figure 5-14).
17. While holding horizontal adjusting eccentric with an eccentric nut wrench (WL #726-9687) or a 7/16" open end wrench, loosen horizontal eccentric locking nut (see Figure 5-14).
18. Adjust horizontal eccentric to obtain zero clearance between the platen, platen gauge, and print wheel gauge.

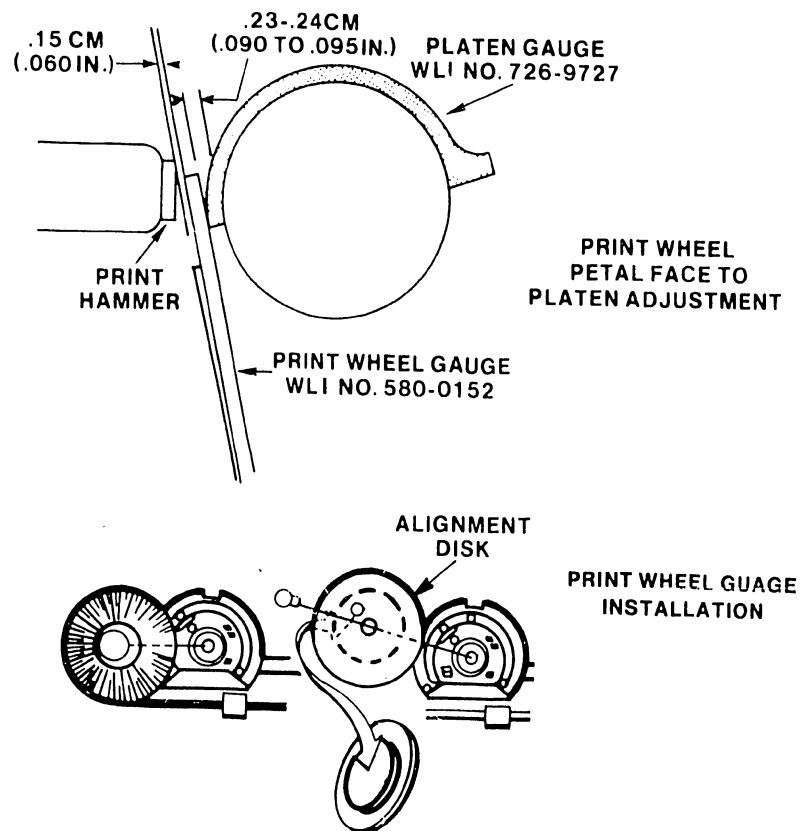
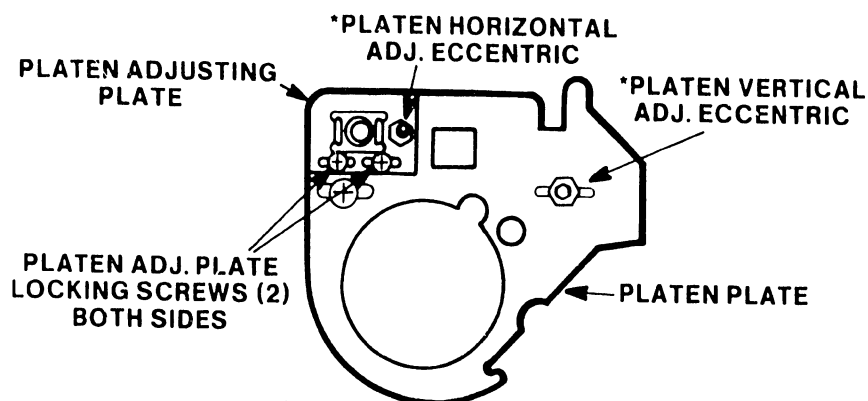


FIGURE 5-13 PRINT WHEEL GAUGE INSTALLATION AND PRINT WHEEL  
PETAL FACE TO PLATEN ADJUSTMENT



## NOTE

Adjustment eccentrics are shown in their nominal positions. They must never be reversed (180) from the positions shown.

FIGURE 5-14 PLATEN ADJUSTMENTS AND LOCKING SCREWS

19. Tighten horizontal eccentric locking nut.
20. Tighten two platen adjusting plate locking screws.
21. Slide carriage assembly to extreme left position.
22. Manually rotate platen down so that tip of platen gauge just goes below edge of print wheel gauge as shown in Figure 5-13. There must be zero clearance between the platen, platen gauge, and print wheel gauge.
23. Repeat above adjustment procedure (steps 1. through 22.) as many times as required if step 22. above is out of tolerance.

### 5.13 CARD GUIDE ALIGNMENT (INITIAL SETUP) (Figure 5-15)

1. Move copy control lever (Figure 2-11) to full forward position.
2. Loosen the two card guide mounting bracket screws.
3. Position the card guide mounting bracket as far forward toward the platen as possible.
4. Tighten the two card guide mounting bracket screws.
5. Loosen the two card guide mounting nuts.

6. Raise or lower card guide to align contact point as shown in Figure 5-15.
7. Secure card guide to card guide mounting bracket with two mounting nuts.
8. Verify that sufficient clearance exists between the platen and card guide and between the card guide and ribbon guide posts so that a sheet of copy grade bond paper can be moved freely between both of them.

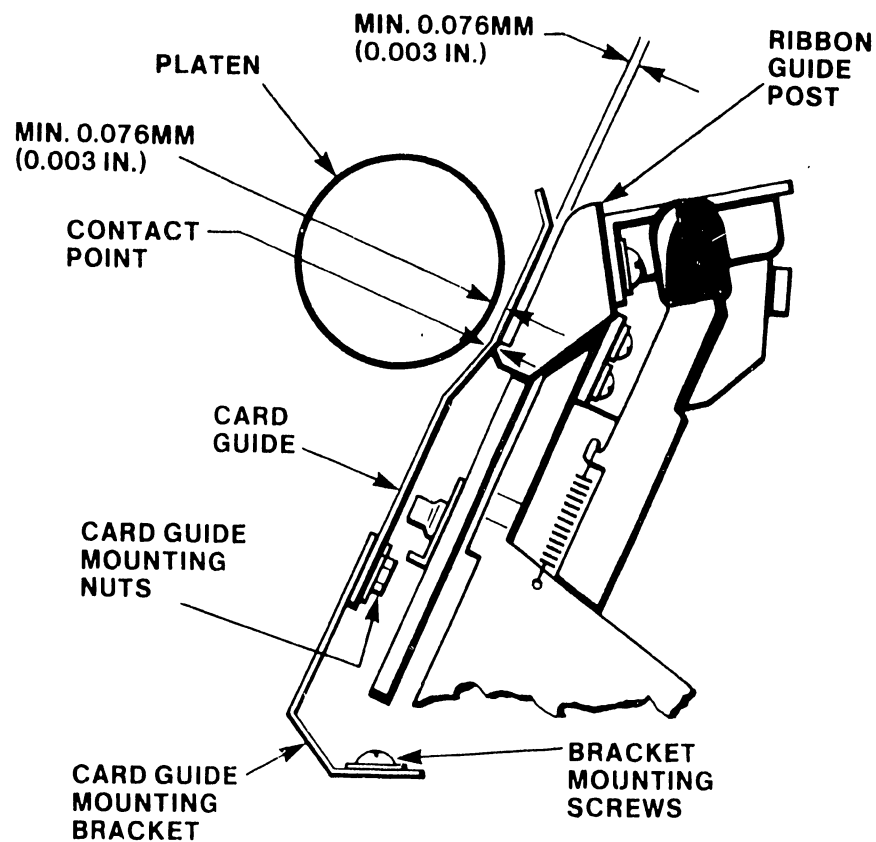


FIGURE 5-15 CARD GUIDE ALIGNMENT (INITIAL)

```

*****
*                                     *
*                               CAUTION *
*                                     *
*   IN THE FOLLOWING STEP, ONLY FINGERS MAY BE USED TO *
*   RE-FORM THE CARD GUIDE.  MECHANICAL TOOLS DAMAGE *
*   CARD GUIDE CAUSING UNNECESSARY REPLACEMENT. *
*                                     *
*****

```

9. If either of these clearances are not correct it will be necessary to form the card guide as required using only fingers.

#### 5.14 PLATEN HEIGHT CHECK/ADJUSTMENT (Figure 5-16)

##### 5.14.1 CHECK

To check for correct platen height adjustment run a sample print out of several lines containing the characters H, I, Z, 8, S and underscores as shown in Figure 5-16.

Proper assessment of print quality requires that the print sample used for the evaluation be obtained under standardized conditions. Tests should be made with a new print wheel (customers normal style print wheel) and ribbon that is in good condition and properly adjusted. The impression control should be set at low (L) position if the 210-7364A PCB is at REV 6 or higher. If the 210-7364A PCB is at REV 5 or lower it will be necessary to set impression control to medium (M) position.

The print quality should be equal density and have sharp edge definition as shown in the following example (a). Examples (b), (c), (d), and (e) are of inferior quality

##### 5.14.2 ADJUSTMENT

Example (b) - indicates that an adjustment for platen "too low" may be required. Perform vertical eccentric adjustment procedure as follows:

1. Loosen the vertical eccentric screw while holding the vertical eccentric with a 7/16" open end wrench (see Figure 5-14).
2. Using the 7/16" open end wrench, adjust the vertical eccentric (the platen) up so the characters are of even density on both the top and bottom of the characters on both ends of the platen (see figure 5-14).
3. Tighten the vertical adjustment eccentric locking hex head screw while holding the vertical eccentric nut with 7/16" open wrench (see Figure 5-14).

(A)	(B)	(C)	(D)	(E)
<b>H</b>	<b>H</b>	<b>H</b>	<b>H</b>	<b>H</b>
<b>I</b>	<b>I</b>	<b>I</b>	<b>I</b>	<b>I</b>
<b>Z</b>	<b>Z</b>	<b>Z</b>	<b>Z</b>	<b>Z</b>
<b>8</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>8</b>
<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>	<b>S</b>
<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>

FIGURE 5-16 PRINT EXAMPLES

Example (c) - indicates that an adjustment for platen "too high" is required. Perform vertical eccentric adjustment procedure as follows:

1. Loosen the vertical eccentric screw while holding the vertical eccentric with a 7/16" open end wrench (see Figure 5-14).
2. Using the 7/16" open end wrench, adjust the vertical eccentric (the platen) down so the characters are of even density on both the top and bottom of the characters on both ends of the platen (see figure 5-14).
3. Tighten the vertical adjustment eccentric locking hex head screw while holding the vertical eccentric nut with 7/16" open wrench (see Figure 5-14).

Examples (d) and (e) - indicate that a print wheel home adjustment may be required. Perform procedure contained in paragraph 5.11.1 and 5.11.2.

Print out several lines of H's after making adjustments to check results. Make sure the lock nuts are tight after making each adjustment.

#### 5.14.3 RECHECK OF PRINT WHEEL PETAL TO PLATEN ADJUSTMENT

Perform the procedure contained in paragraph 5-12 and then recheck paragraph 5.14.1 and repeat paragraph 5.14.2 if necessary.

#### 5.15 CARD GUIDE ALIGNMENT (FINAL)

##### 5.15.1 CHECK

1. To check for correct card guide alignment, start (queue and select) printing out a line of the letter upper case "M" and deselect the printer prior to completing the line.
2. If the printer has been modified for use of Diagnostic Display Board WLI # 190-0739, move the carriage by hand to check the character placement in the cutouts of the card guide. The bottom line of the character must be even with or slightly above the bottom edge of the cutouts in the card guide as shown in Figure 5-17 (within 0.000 to 0.005 in). If the bottom edge of the characters are not within tolerance, perform the adjustment procedure contained in paragraph 5.15.2.
3. If the printer has not been modified for use of Diagnostic Display Board WLI # 190-0739 perform the following procedure:
  - a. Remove the 4.0 A (SB) fuse from the 7364A PCB using an insulated tool.



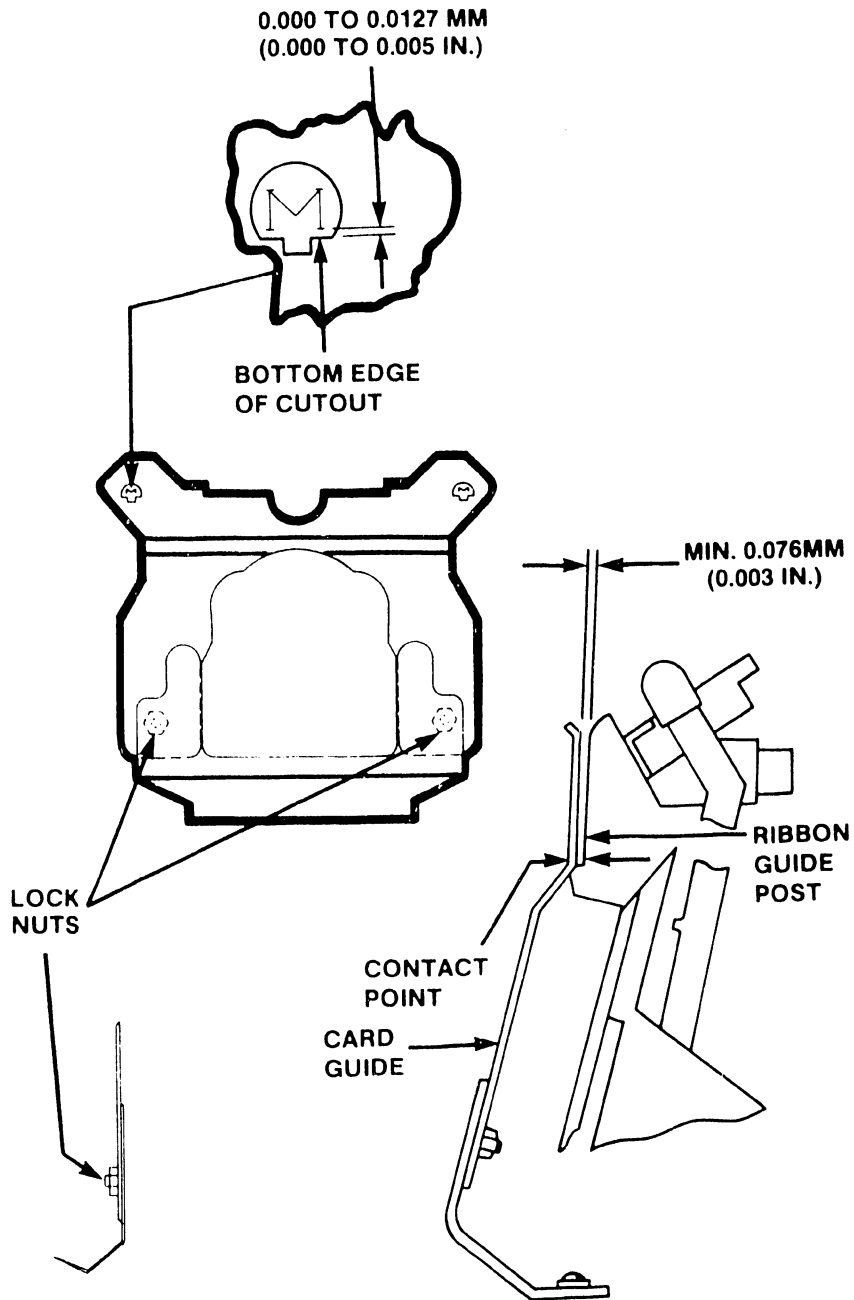


FIGURE 5-17 CARD GUIDE ALIGNMENT (FINAL)

- b. Move the carriage by hand to check the character placement in the cutouts of the card guide. The bottom line of the character must be even with or slightly above the bottom edge of the cutouts in the card guide as shown in Figure 5-17 (within 0.000 to 0.005 in). If the bottom edge of the characters are not within tolerance, perform the adjustment procedure contained in paragraph 5.15.2.

#### 5.15.2 ADJUSTMENT

1. Move copy control lever (Figure 2-11) to full forward position.
2. Loosen the two card guide mounting nuts (Figure 5-15).
3. Align the card guide as shown in Figure 5-17.
4. While holding the card guide in its adjusted position (Figure 5-17), tighten the two card guide mounting nuts (Figure 5-15).

#### NOTE

The bend in card guide (see Figure 5-15) must rest on the projections of the ribbon guide posts. Should the projections be severely worn it will be necessary to replace the carriage assembly (WL # 279-5127).

5. Set printer POWER switch to OFF.
6. Replace the 4.0 A (SB) fuse on the 736A PCB

#### 5.16 PRINT HAMMER ANGLE CHECK/ADJUSTMENT

For proper printing of characters the print hammer should strike the print wheel petal evenly as shown in Figure 5-18.

##### 5.16.1 CHECK

1. Move copy control lever (Figure 2-11) to full forward position.
2. Push the print wheel hammer forward against the print wheel petal. As the character face comes in contact with the platen, the hammer (top and bottom, left and right sides) should be flush with the back of the print petal (see Figure 5-18 for examples).

##### 5.16.2 ADJUSTMENT

1. Loosen three hammer housing mounting screws (Figure 5-18).

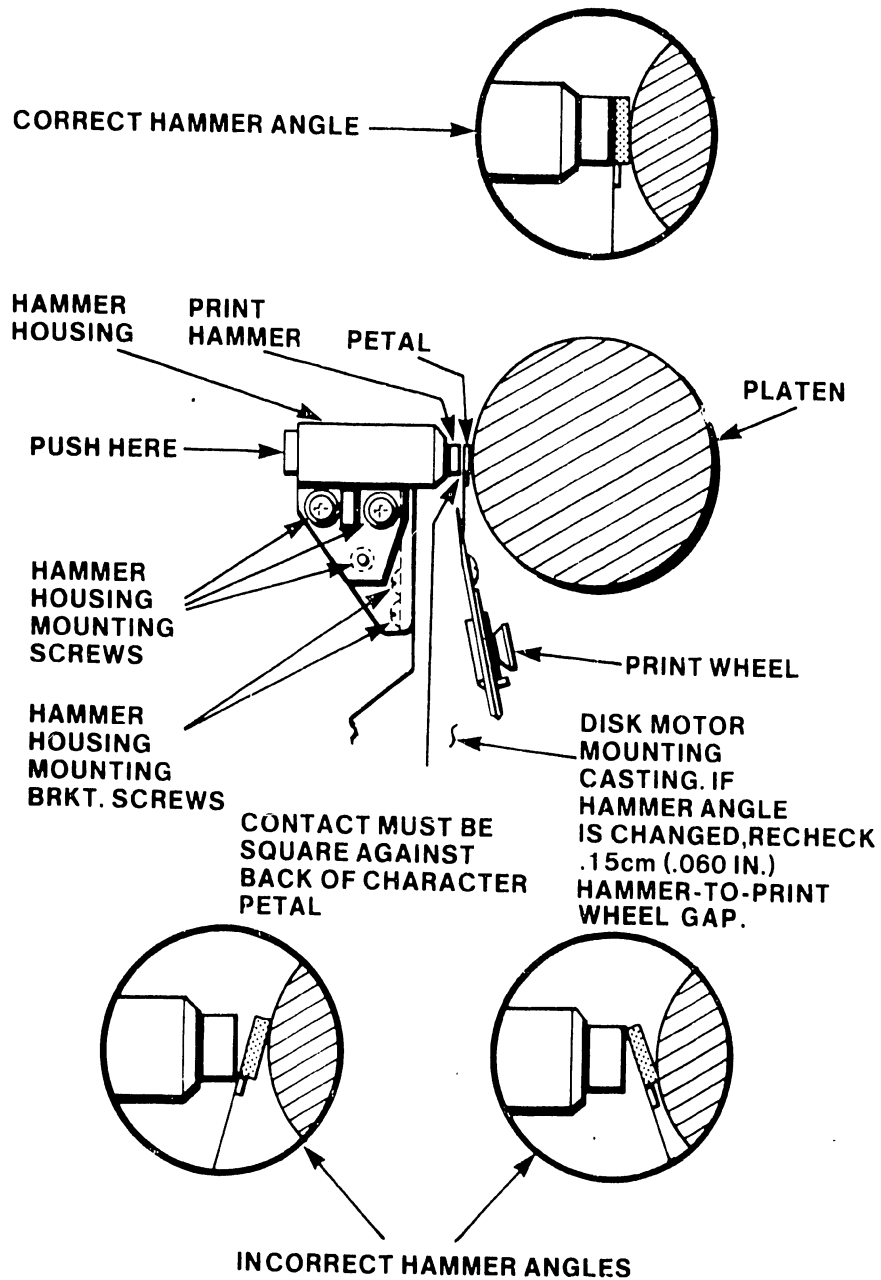


FIGURE 5-18 PRINT HAMMER ANGLE ADJUSTMENT

## NOTE

Top edge of print hammer must be even or below top edge of print wheel petal.

2. Adjust print hammer housing up or down to obtain proper alignment of print hammer to print wheel petal as described in paragraph 5.15.1.
3. Tighten three hammer housing mounting screws (Figure 5-18).
4. Repeat paragraph 5.11.
5. Run sample print evaluation.

5.17 MOTOR PINION, MOTOR PINION IDLER AND PLATEN VERNIER GEAR BACKLASH CHECKS/ADJUSTMENTS

```

*****
*
*                CAUTION                *
*
*  BEFORE MAKING BACKLASH ADJUSTMENTS, THE PLATEN *
*  HEIGHT AND DEPTH SHOULD BE CHECKED TO BE WITHIN *
*  SPECIFIED LIMITS (SEE PARAGRAPH 5-14).         *
*
*****

```

5.17.1 MOTOR PINION TO MOTOR PINION IDLER GEAR (See Figure 5-19)

a. CHECK

1. With the platen removed, hold the motor pinion stationary while moving the motor pinion idler gear back and forth to determine amount of backlash.
2. Check this backlash throughout 360° rotation of the motor pinion idler gear for minimum amount.
3. With this minimum backlash there must be no binding of the gear train.
4. If there is excessive backlash, perform the adjustment procedure contained in paragraph 5.17.1b. below.
5. If the backlash is within tolerance replace the platen.

b. ADJUSTMENT

1. Loosen locking nut on motor pinion idler gear.
2. Adjust eccentric nut to achieve minimum backlash without binding throughout 360° rotation of the motor pinion idler gear.
3. Tighten motor pinion idler gear locking nut while holding eccentric nut with wrench to prevent movement.
4. Recheck for minimum backlash without binding throughout 360° rotation of the motor pinion idler gear. Readjust as required and replace platen.

5.17.2 MOTOR PINION IDLER GEAR TO PLATEN VERNIER GEARa. CHECK

Check for minimum backlash between the motor pinion idler gear and the platen vernier gear with no binding throughout movement.

b. ADJUSTMENT

1. Loosen the two motor mounting screws and the pivot screw as shown in Figure 5-19.
2. Adjust paper feed motor assembly up or down to achieve minimum backlash without binding as described in 5.17.2.a and hold in place.
3. Tighten the two motor mounting screws and the pivot screw.
4. Recheck as described in paragraph 5.17.2.a.

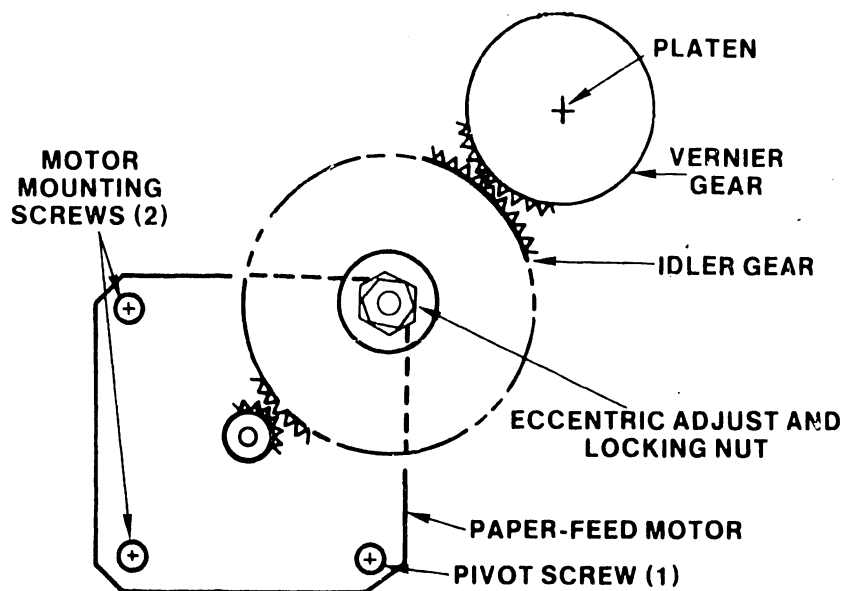


FIGURE 5-19 GEAR ALIGNMENT

## 5.18 PAPER DEFLECTOR CHECK/ADJUSTMENT (Figure 5-20)

### 5.18.1 CHECK

Remove the paper deflector from the printer. Lay the paper deflector curved side down on a flat surface, the deflector should lay flat for its entire length. Then while holding the platen and paper deflector in your hand, place the deflector's curved surface over the platen and check for any gaps between the deflector fingers and the platen.

### 5.18.2 ADJUSTMENT

If any bows or gaps were detected during the adjustment check, the paper deflector will require a forming adjustment to remove the gaps or bows from the deflector. A replacement of the paper deflector may be necessary if it becomes impossible to straighten the paper deflector or if it has any creases in it. The replacement deflector will need to be checked for proper alignment prior to its installation.

The locator tabs should be formed so there is minimum side to side movement of the paper deflector, and the paper feed rollers are centered in the paper deflector cutouts.

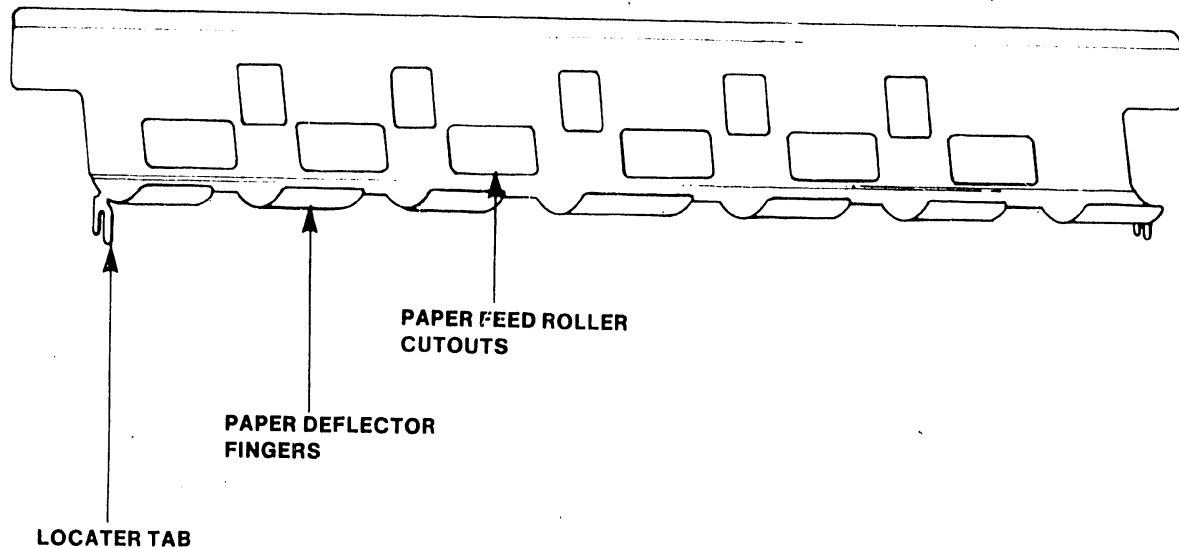


FIGURE 5-20 PAPER DEFLECTOR ASSEMBLY

#### 5.19 PAPER OUT SWITCH CHECK/ADJUSTMENT

##### 5.19.1 CHECK

The paper out switch is set to operate between 0.050 in. and 0.080 in. when the paper release lever is forward. To check, first place a 0.050 in. feeler gauge between the switch actuator and the paper-out detecting bracket, the switch should not operate. Replace the 0.050 in. gauge with a 0.080 in. feeler gauge and the switch should now activate.

##### 5.19.2 ADJUSTMENT

To adjust the paper out switch, set the paper release lever to the forward or released position. Then loosen the two paper out switch mounting screws shown in Figure 5-21. Adjust the paper out switch so a standard sheet of paper activates the switch causing the change paper indicator to extinguish. When the paper is removed the indicator should illuminate.

#### NOTE

When the paper release lever is in the forward position, the paper-out sensors should just touch the deflector. When the lever is back, the sensor should be even with or just below the deflector. Should they require adjustment, first make over adjustment with clevis and then carefully bend each sensor until proper position is obtained without damaging the paperout detecting bracket.

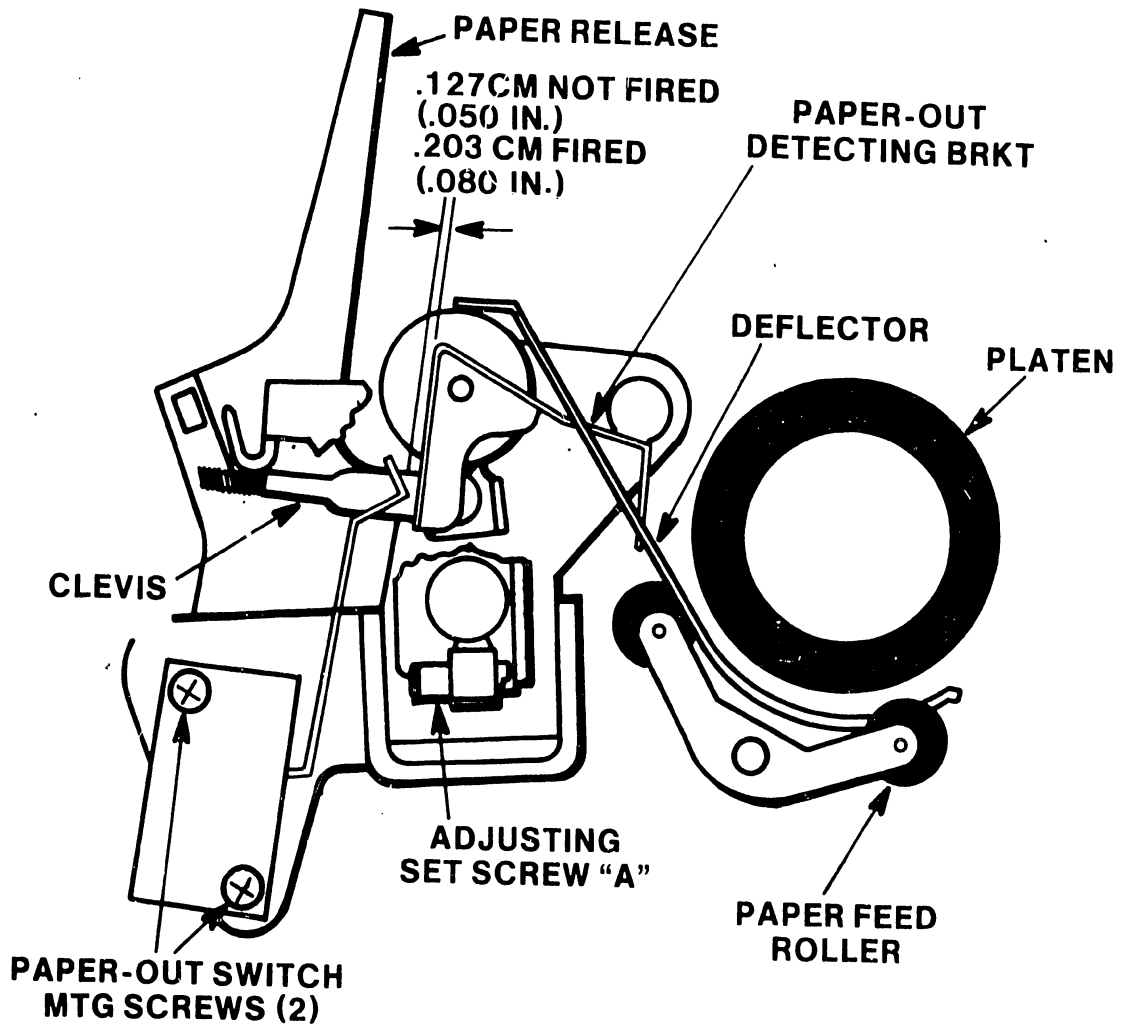


FIGURE 5-21 PAPER OUT SWITCH



## 5.20 PAPER FEED ROLLER ADJUSTMENT

### 5.20.1 ADJUSTMENT CHECK

A 0.055 in. to 0.080 in. gap should be present between all the paper feed rollers and the platen when the paper release lever is in the full forward or released position as shown in Figure 5-22. There should also be equal pressure applied by each of the paper feed rollers when the pressure release lever is placed back to the rear position.

### 5.20.2 ADJUSTMENT

There are three different revisions of U channel assemblies installed in printers in the field. They can be identified and adjusted as follows:

1. All tension adjustments are performed the same on all three revision U channel assemblies increasing or decreasing the spring tension, by positioning the tension spring in the desired detent position.
2. FIRST REVISION, all feed roller mounting arms are pinned to a common shaft. The 0.055 to 0.080 in. gap is adjusted with the adjusting set screw A in Figure 5-22. Individual adjustment of each roller will require forming of their respective arms.
3. SECOND REVISION, all the feed roller arms are individually adjustable to obtain the 0.055 to 0.080 in. paper feed roller to platen adjustment. Overall adjustment should be first obtained by adjusting set screw A. Then make individual adjustment of feed roller mounting arms by means of the screw and nut assembly on each arm as shown in Figure 5-22.
4. THIRD REVISION, only one of the feed roller mounting arms is pinned to the shaft, the others are individually adjusted by means of a screw and nut assembly located at each arm. The 0.055 to 0.080 in. gap for the fixed arm is performed first by means of the set screw A in Figure 5-22. The others are then adjusted to 0.055 to 0.080 in. by means of the screw and nut assembly located on the remaining arms.

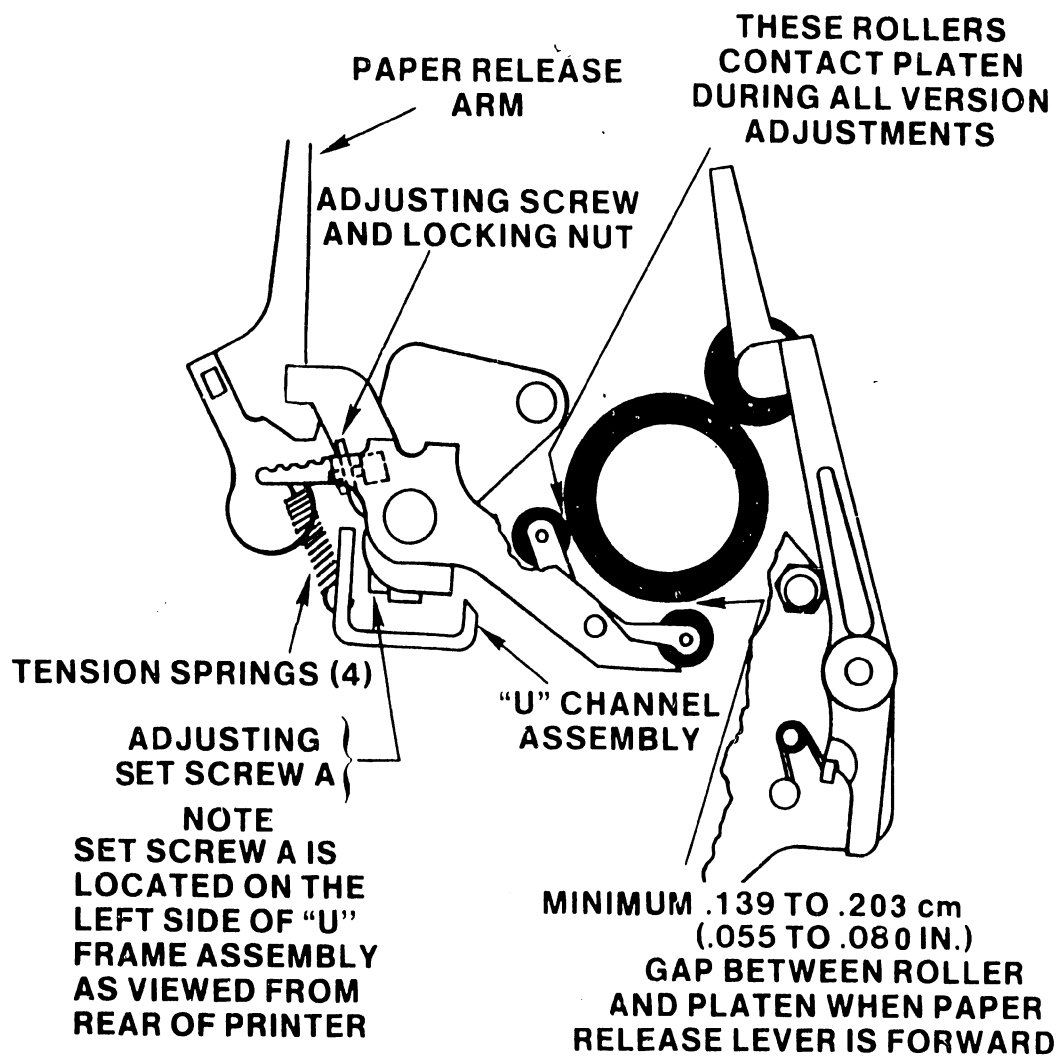


FIGURE 5-22 PAPER FEED ROLLER ADJUSTMENT

5.21 CARRIAGE CORD TENSION CHECK/ADJUSTMENT (Figure 5-23)

5.21.1 CHECK

1. Set printer POWER switch to OFF.
2. Slide carriage to the extreme left side.

```

*****
*
*                               CAUTION                               *
*   SCALE WLI # 726-9753 (A THREE (3) POUND SCALE) MUST           *
*   BE USED TO PERFORM THIS ADJUSTMENT.  USE OF ANY OTHER         *
*   SCALE, INCLUDING SIX-POUND SCALES COMMONLY FOUND IN           *
*   THE FIELD, CAUSES ERRONEOUS READINGS.                          *
*
*****

```

3. Place push-pull gauge WLI # 726-9753 against front cable opposite carriage motor drum. Push until gauge shoulder touches guide rail. Check that gauge pressure is equal to 2 lbs-4 oz. If not, perform the adjustment procedure contained in paragraph 5.21.2.

5.21.2 ADJUSTMENT

```

*****
*
*                               CAUTION:                             *
*   DO NOT LOOSEN LOCK NUT MORE THAN TWO TURNS AS THIS           *
*   COULD CAUSE THE ENTIRE CABLE TO RELEASE.                      *
*
*****

```

1. Loosen lock nut under right side of pulley mounting bracket and turn jack screw for proper tension (gauge pressure of 2 lbs-4 oz). Retighten lock nut.
2. Test for correct tension by printing test lines of characters as shown in paragraph 7.2.1. All characters must print in precisely same place in either direction.
3. Check left margin adjustment and readjust if necessary as described in paragraph 5.8.

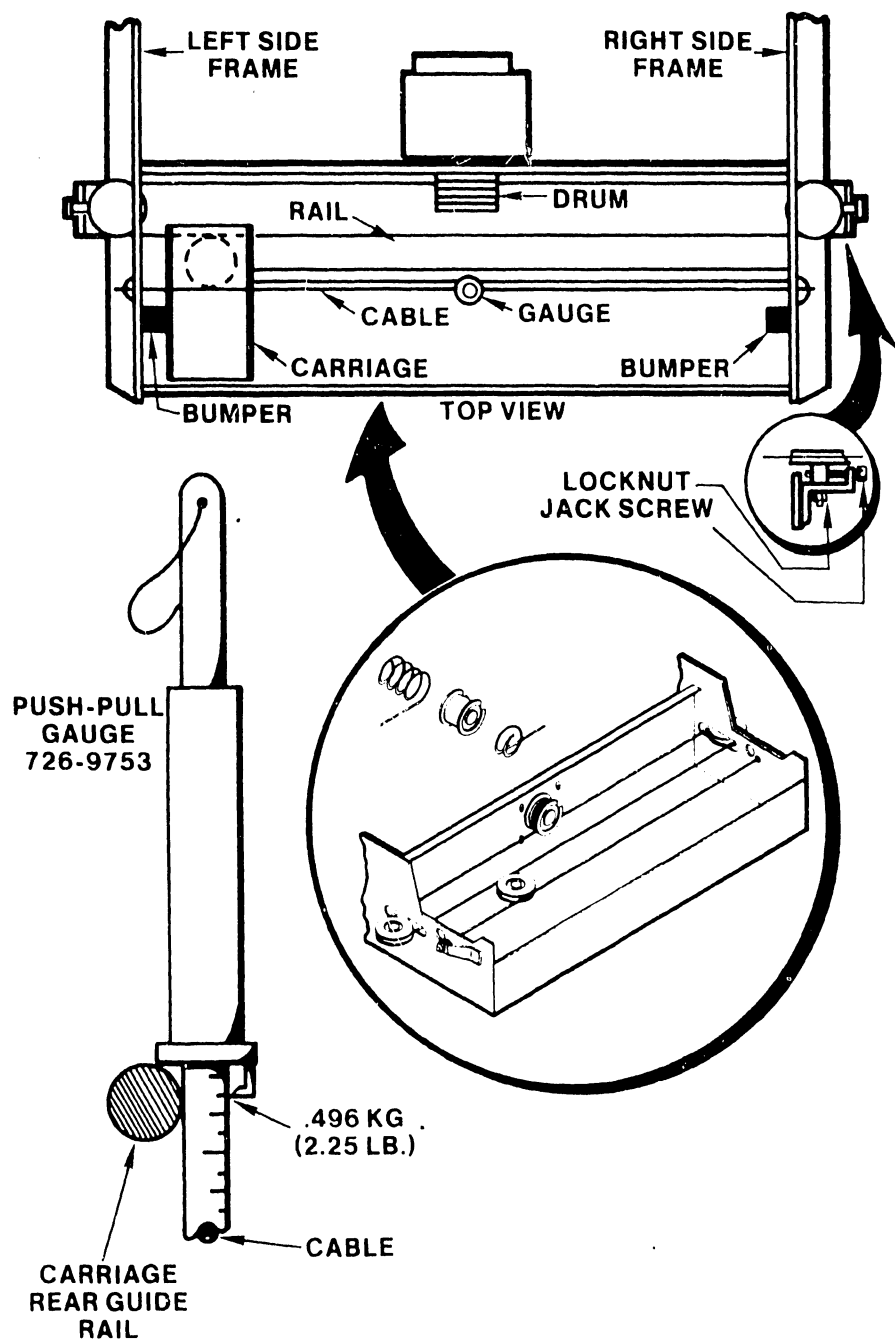


FIGURE 5-23 CABLE TENSION ADJUSTMENT

5.22 RIBBON CHECK/ADJUSTMENTS

The following six adjustments should be checked periodically to ensure proper operation of the ribbon cartridge, and ribbon platform.

5.22.1 RIBBON HEIGHT

5.22.1.1 CHECK

To check for correct ribbon height, print several underscored characters. Measure the distance between the edge of the ribbon and the underscore. This distance should be 0.032 in. minimum to 0.040 in. maximum as shown below or the upper case characters must be centered on the ribbon.

5.22.1.2 ADJUSTMENT

1. To adjust for proper ribbon height, loosen the three screws and one nut post under ribbon-cartridge platform. Tilt platform until correct position is obtained and it is level. Then tighten screws and nut post.

```

*****
*                                                                 *
*                                                                 *
*                                                                 *
*                                                                 *
*           CAUTION                                             *
*                                                                 *
*           BE SURE BOTH SIDES MOVE UP (OR DOWN) THE SAME AMOUNT. *
*                                                                 *
*                                                                 *
*****

```

2. The nominal ribbon height as shown in Figure 5-25 is where the lower edge of the ribbon is in line with disk motor mounting casting at cutouts 1 and 2.

```

*****
*                                                                 *
*                                                                 *
*           CAUTION                                             *
*                                                                 *
*           WHEN ADJUSTING RIBBON PLATFORM HEIGHT ENSURE THAT *
*           MICROSWITCH DOES NOT COME IN CONTACT WITH FIXED *
*           BEARING OF CARRIAGE ASSEMBLY.                       *
*                                                                 *
*                                                                 *
*****

```

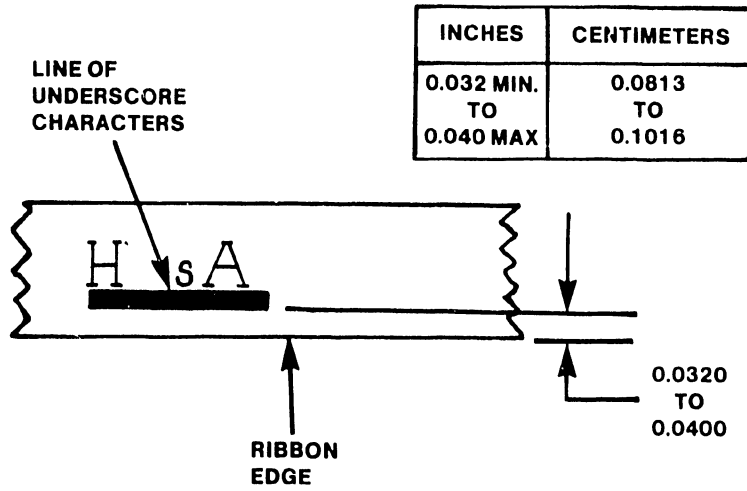


FIGURE 5-24 RIBBON HEIGHT WITH PRINTED CHARACTERS

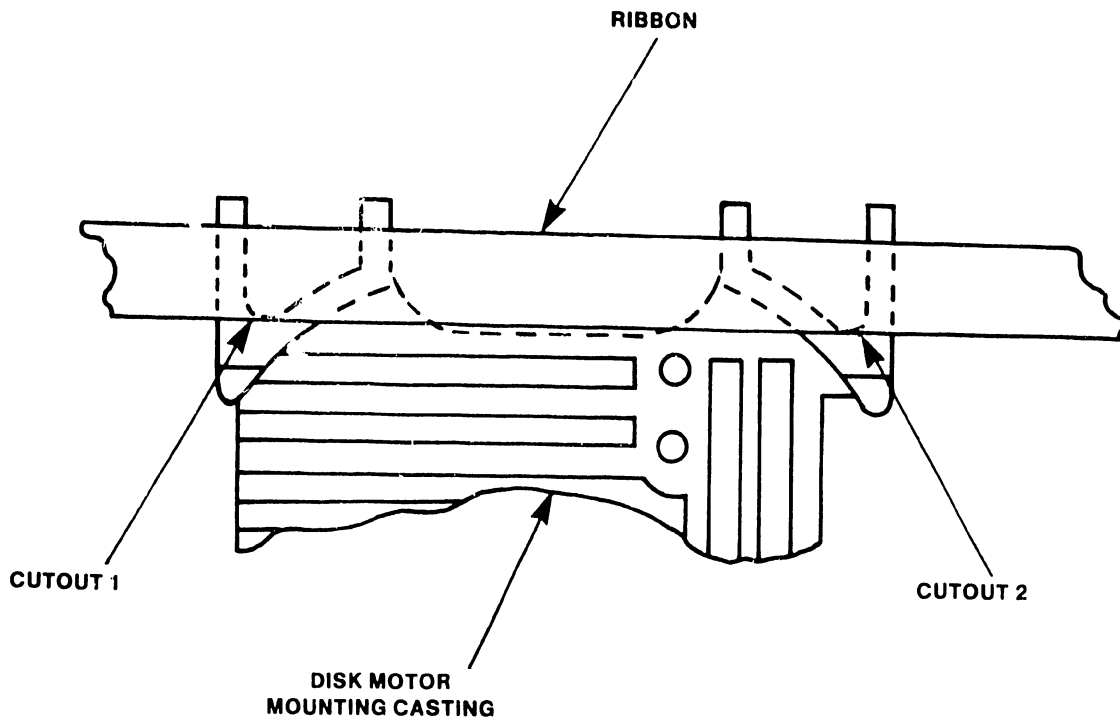


FIGURE 5-25 NOMINAL RIBBON HEIGHT

## 5.22.2 RIBBON TAKE UP MECHANISM

### 5.22.2.1 CHECK

For proper ribbon take up operation, the gear train shown in Figure 5-26 should mesh properly without slippage and the release mechanism should move freely without binding.

### 5.22.2.2 ADJUSTMENT

1. To adjust for proper mesh between the motor drive gear and the idler gear, loosen the two drive plate mounting screws and move the motor drive gear towards the idler gear to mesh as tight as possible without binding. While holding gears in tight mesh, tighten the two drive plate mounting screws.
2. To adjust for proper operation of release mechanism, loosen the two release mechanism adjusting screws and move guide plate to allow freedom of movement. Then tighten release mechanism adjusting screws.

## 5.22.3 CARTRIDGE RELEASE MECHANISM ADJUSTING SCREW

### 5.22.3.1 CHECK

The ribbon take up mechanism is held in the disengaged position by the release latch shown in Figure 5-26. It is activated by the ribbon cartridge when it is installed. The height of the screw should be set to operate the mechanism only when slight downward pressure is used after the cartridge is installed on the cartridge clips. If the screw is too high, the mechanism will trip before the ribbon is properly inserted. If the screw is set too low the mechanism will bind or not release at all.

### 5.22.3.2 ADJUSTMENT

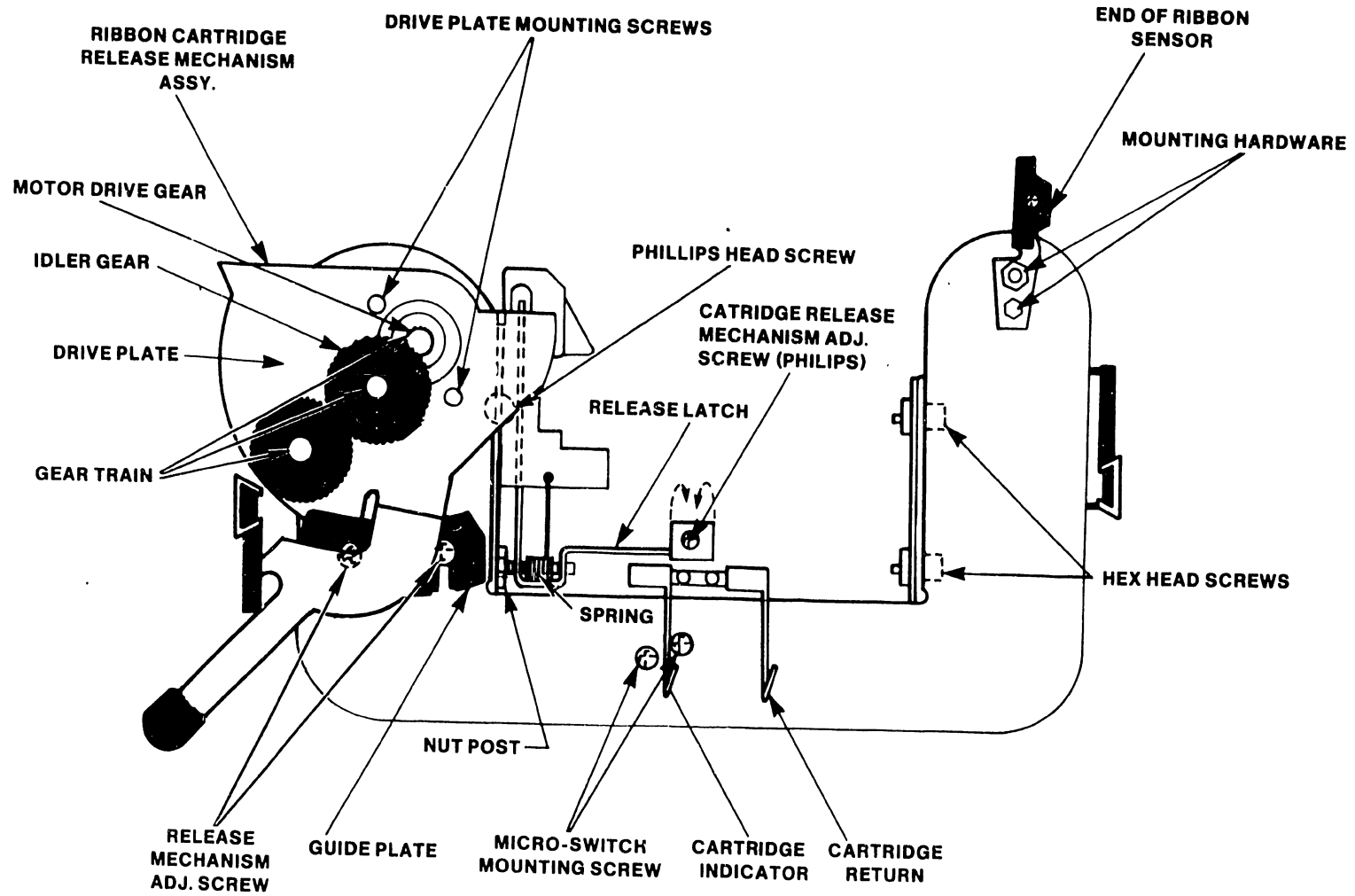
To change the height of the cartridge release mechanism adjusting screw, adjust screw up or down until the desired height is obtained.

## 5.22.4 END-OF-RIBBON SENSOR ADJUSTMENT (MECHANICAL)

### 5.22.4.1 CHECK

The end of ribbon sensor is mounted on the ribbon platform as shown. Its position is set for maximum reflection and spaced as shown in Figure 5-27.

FIGURE 5-26 RIBBON PLATFORM





#### 5.22.4.2 ADJUSTMENT

1. To adjust the position of sensor, loosen the mounting hardware and adjust for maximum reflection.
2. Then tighten mounting hardware as shown in Figure 5-26 without causing physical interference with cutout in ribbon cartridge.

#### 5.22.5 END-OF-RIBBON SENSOR CHECK (ELECTRICAL)

With a ribbon cartridge that has been used up and the end-of-ribbon sensor material in the aperture of the ribbon cartridge (see Figure 5-27), place this cartridge on the ribbon platform properly. Attempt to print a document. The ribbon out lamp should light and the printer will stop. If the ribbon out light does not light and the printer fails to stop, the ribbon out sensor or associated wiring is possibly defective.

#### 5.22.6 CARTRIDGE INDICATOR

##### 5.22.6.1 CHECK

The cartridge indicator is used to determine which of two types of ribbons are being used: the multi-strike or single strike (carbon or fabric). When a multi-strike ribbon is installed, the cartridge is designed to activate the micro-switch and slow down the ribbon motor. When a single strike ribbon is installed, a cutout in the bottom of the cartridge allows the switch to remain open and the ribbon motor operates at the normal speed. After printing several characters, remove ribbon and check spacing between characters on ribbon. With a multistrike ribbon, the characters will be overlapping while with a single strike ribbon, the characters will be separated.

##### 5.22.6.2 ADJUSTMENT

The ribbon take up microswitch may be adjusted by loosening the two Philips-head mounting screws and moving the switch to desired position. Then tighten mounting screws.

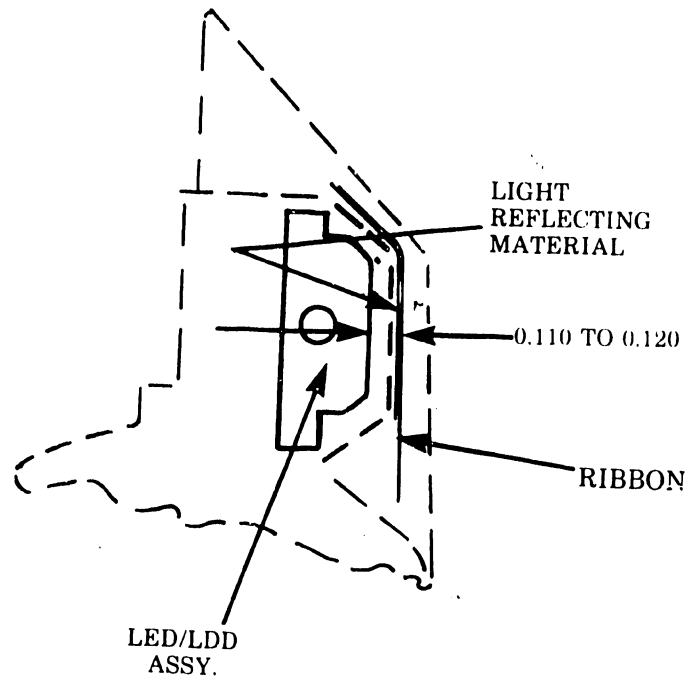


FIGURE 5-27 END-OF-RIBBON SENSOR

**CHAPTER**

**6**

**TROUBLE-  
SHOOTING**

## CHAPTER 6

## TROUBLESHOOTING

During the performance of the procedures contained in the following troubleshooting flowcharts (Figures 6-1 through 6-9) the following assumptions are made to simplify the procedures:

1. The printer was previously functional.
2. The printer cabinet has been removed and the keyboard has been connected to the chassis cable.
3. The printer is not now connected to a system.
4. A visual check has been completed checking for loose connections or hardware, all PCB's are properly seated and the power supply voltages have been adjusted if necessary.
5. In all instances where it is necessary to set the printer POWER switch to OFF to perform repairs, it is assumed the POWER switch will be set to ON to complete the procedure.
6. In all instances when unable to determine the failure, connect another good printer to the system with the same print job to eliminate the possibility of software problems.
7. Ensure that there are no obstructions to the free movement of print wheel, carriage and fan.
8. Ensure that PCB switch settings and jumpers are as shown in Figures 2-1 through 2-7.
9. All adjustments referenced in the troubleshooting flowcharts are to the adjustments contained in Chapter 5.

```

*****
*
*                               *
*                               *
*                               *
*   ALWAYS WAIT 60 SECONDS AFTER SHUTTING DOWN *
*   POWER BEFORE REMOVING A PCB TO ALLOW VOLTAGE *
*   TO DRAIN OFF TO PREVENT DAMAGE TO CONTACTS. *
*                               *
*                               *
*****

```

## NOTE

Always adjust the +5 VR potentiometer R10, XCCV offset voltage potentiometer R259 and ZCCV offset voltage potentiometer R264 after replacing PCB'S. It is also necessary to readjust R259 and R264 above after the +5 VR potentiometer R10 has been adjusted.

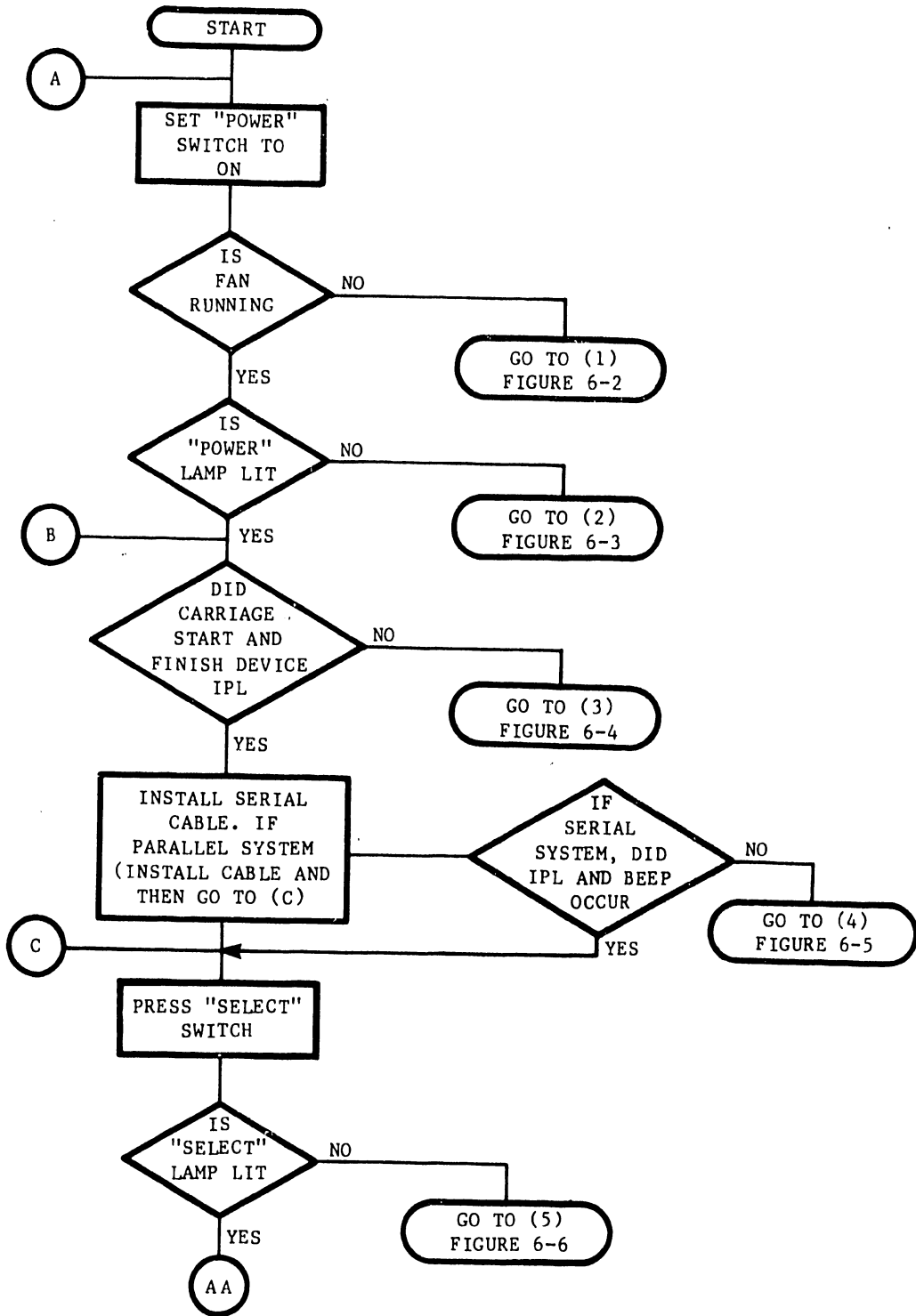


FIGURE 6-1 OVERALL PRINTER TROUBLESHOOTING FLOW DIAGRAM (SHEET 1 OF 2)

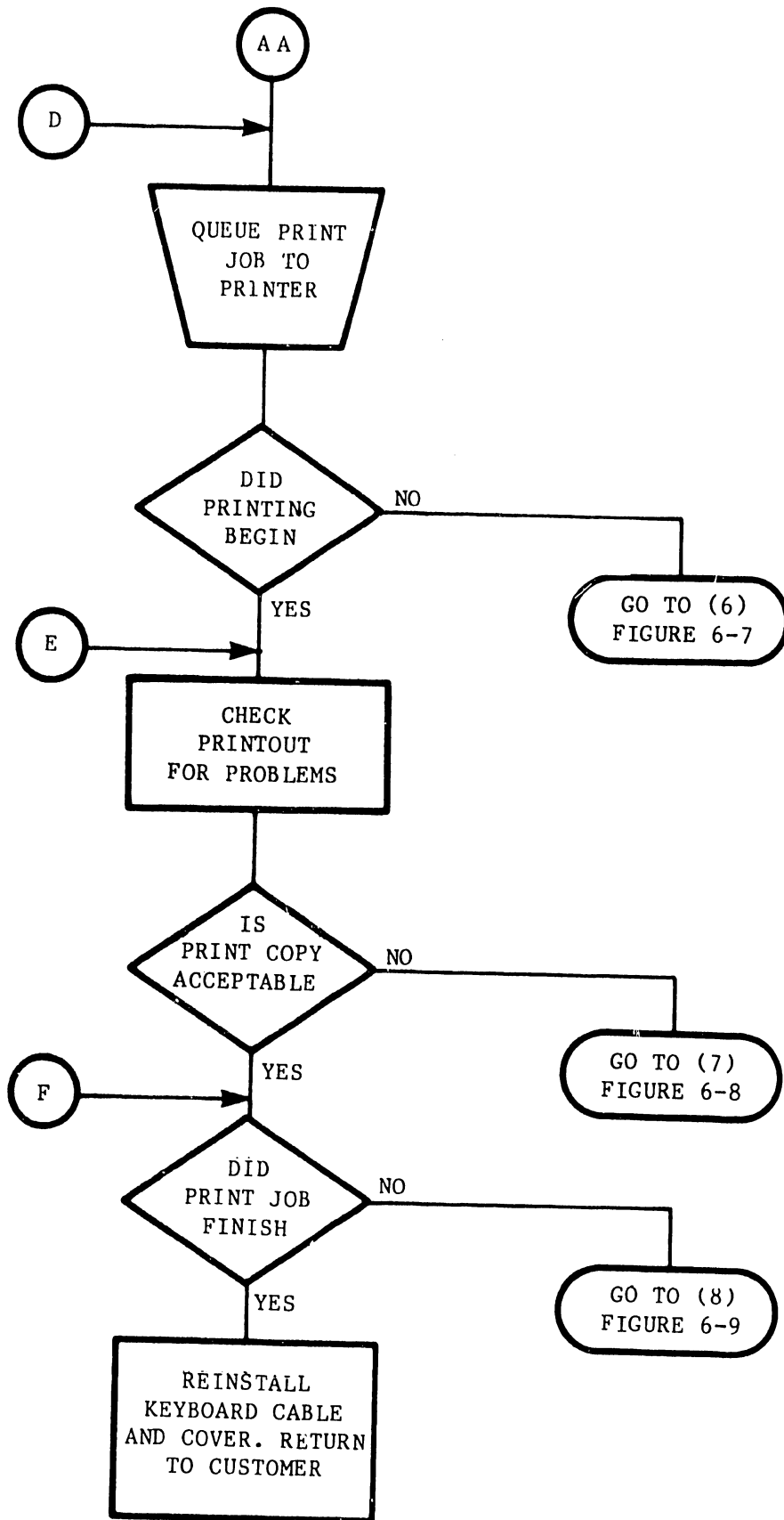


FIGURE 6-1 OVERALL PRINTER TROUBLESHOOTING FLOW DIAGRAM (SHEET 2 OF 2)

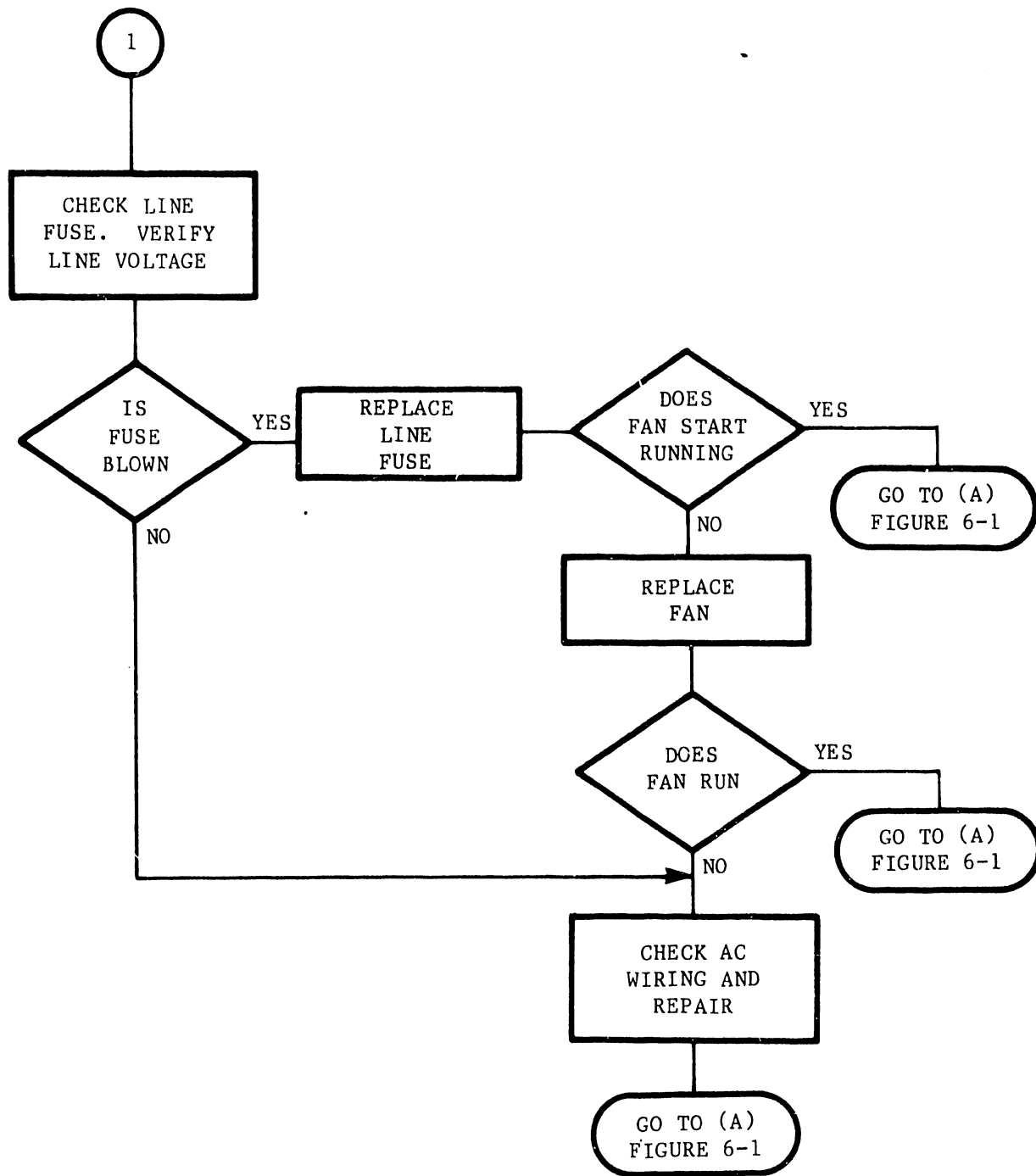


FIGURE 6-2 EXTERNAL POWER MALFUNCTIONS

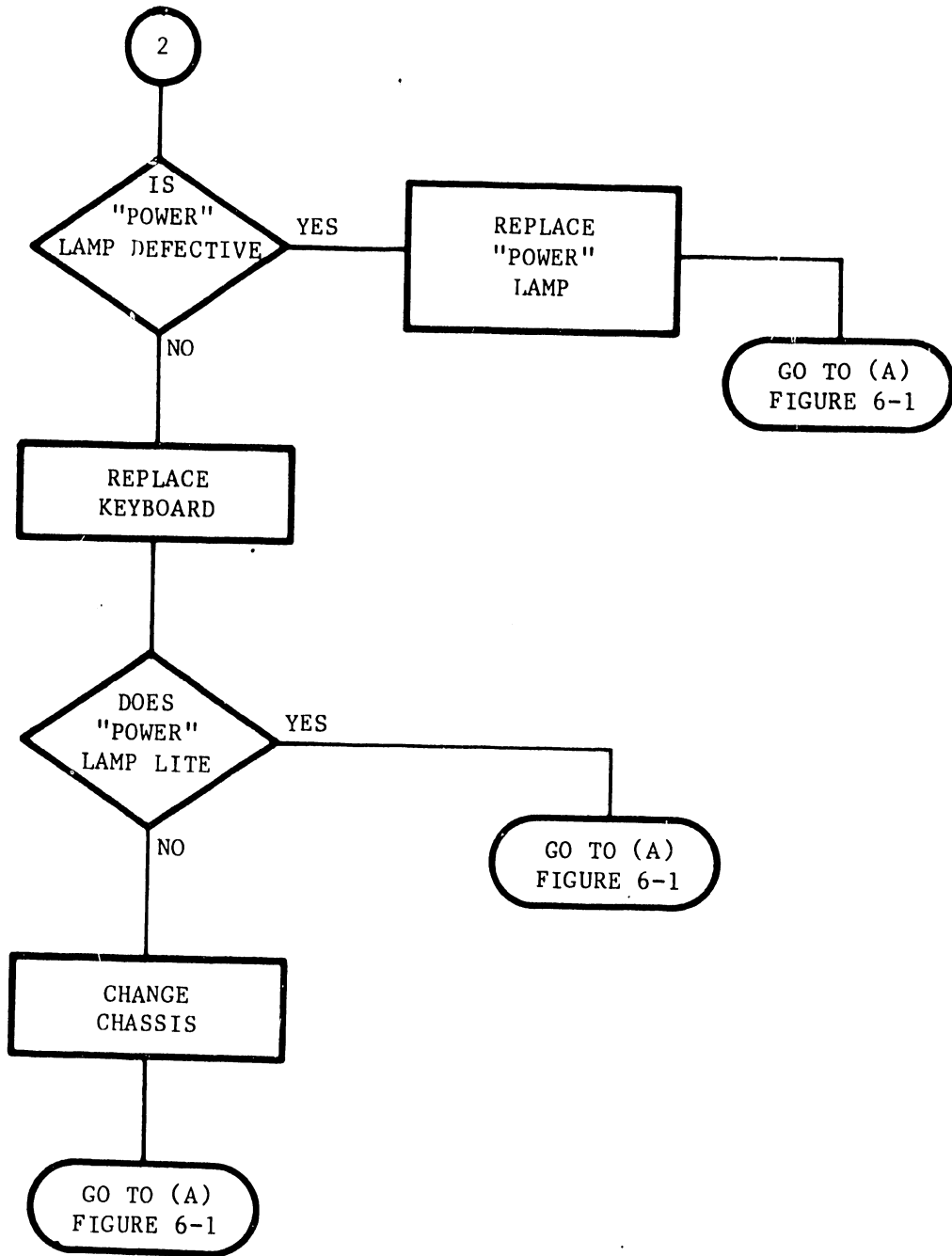


FIGURE 6-3 INTERNAL POWER MALFUNCTIONS



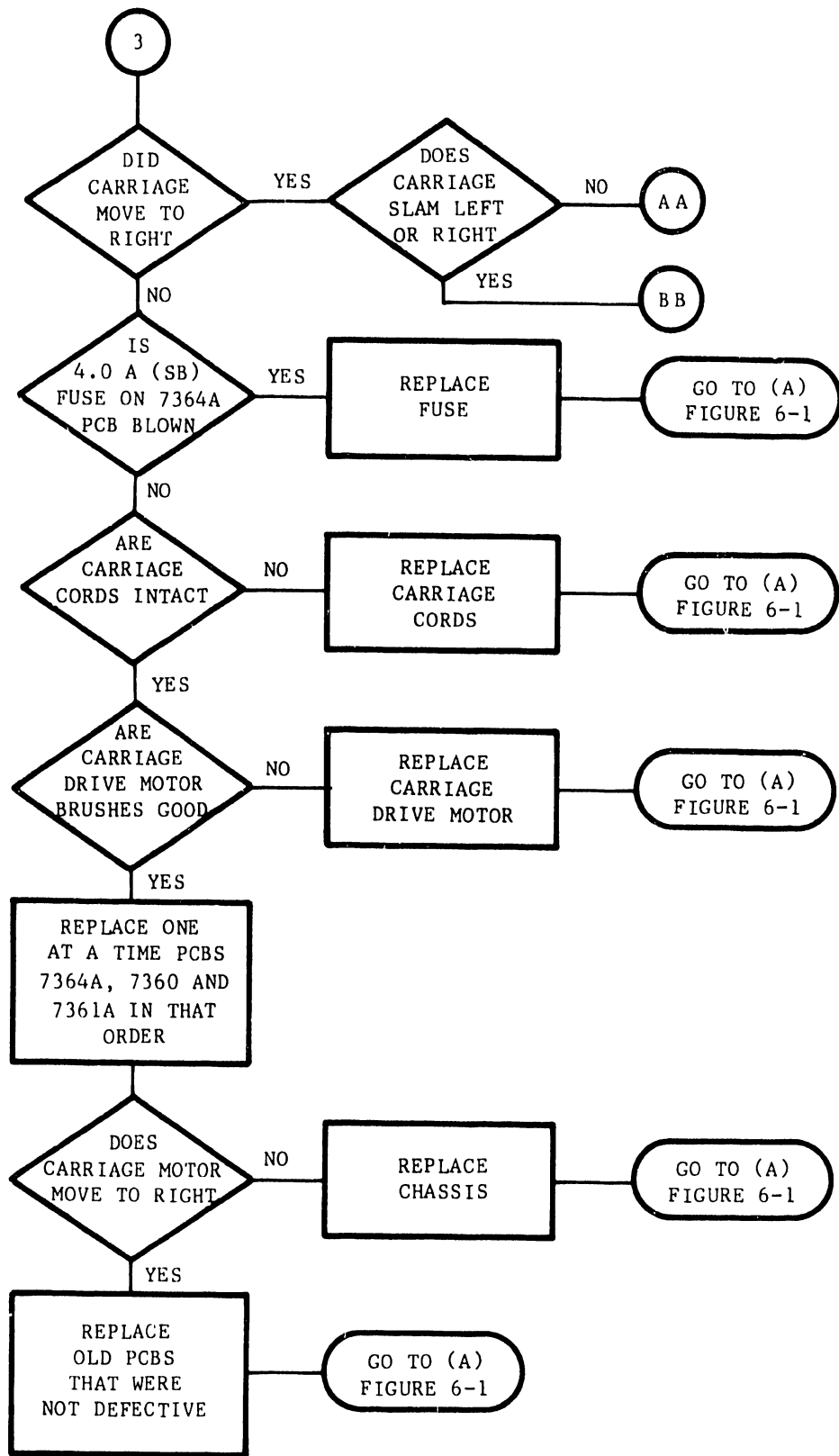


FIGURE 6-4 DEVICE IPL MALFUNCTIONS (SHEET 1 OF 7)

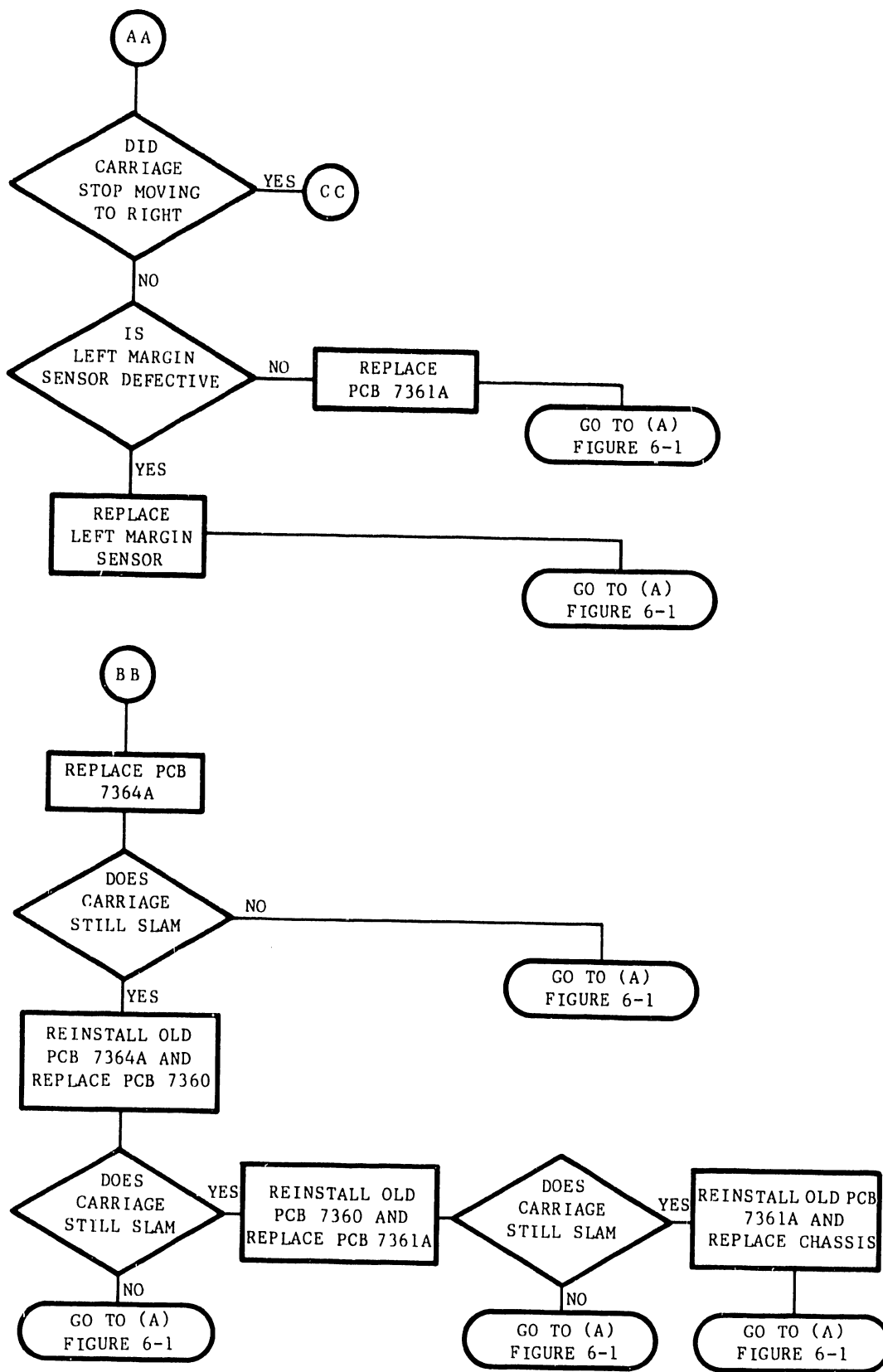


FIGURE 6-4 DEVICE IPL MALFUNCTIONS (SHEET 2 OF 7)

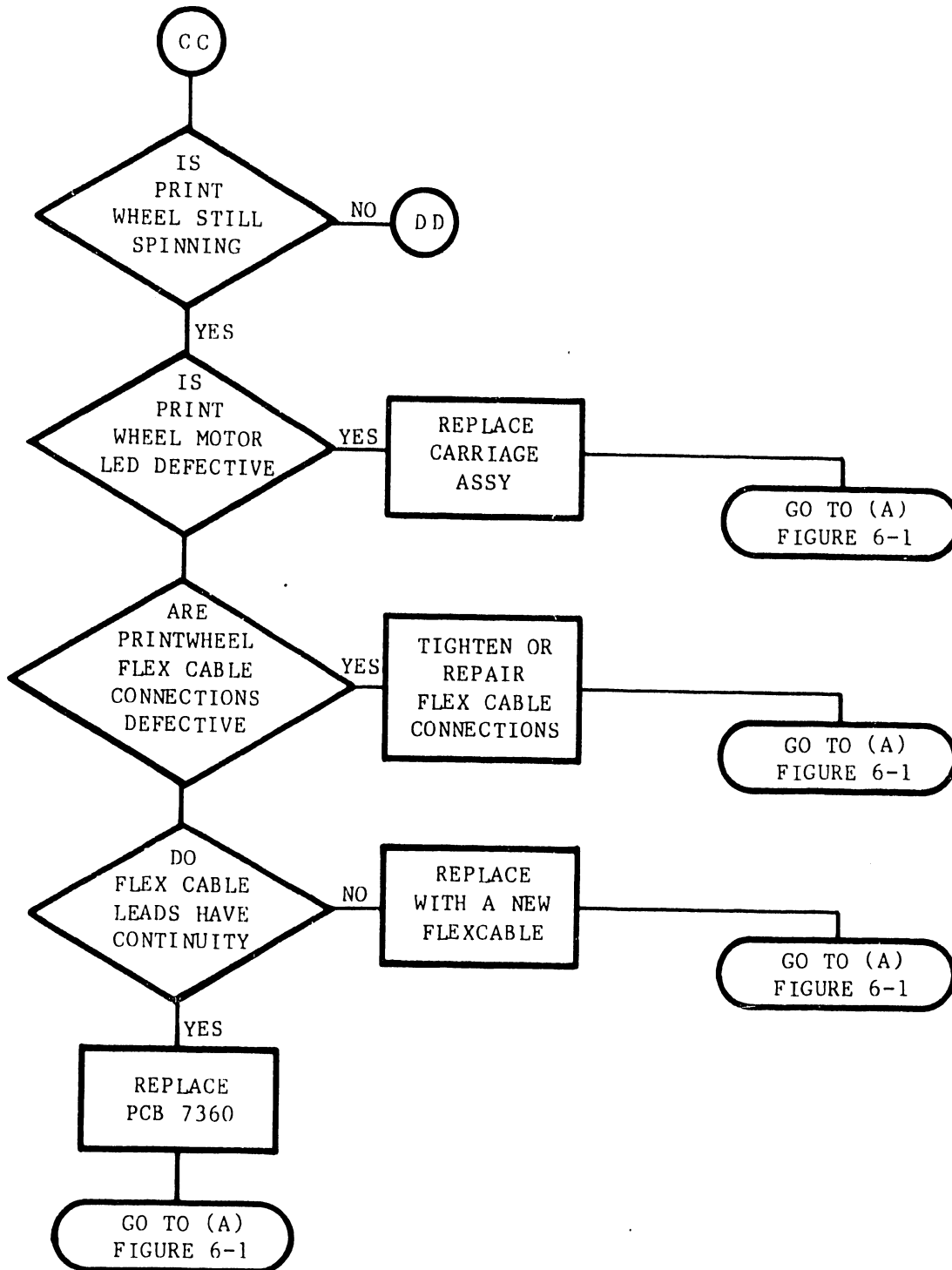


FIGURE 6-4 DEVICE IPL MALFUNCTIONS (SHEET 3 OF 7)

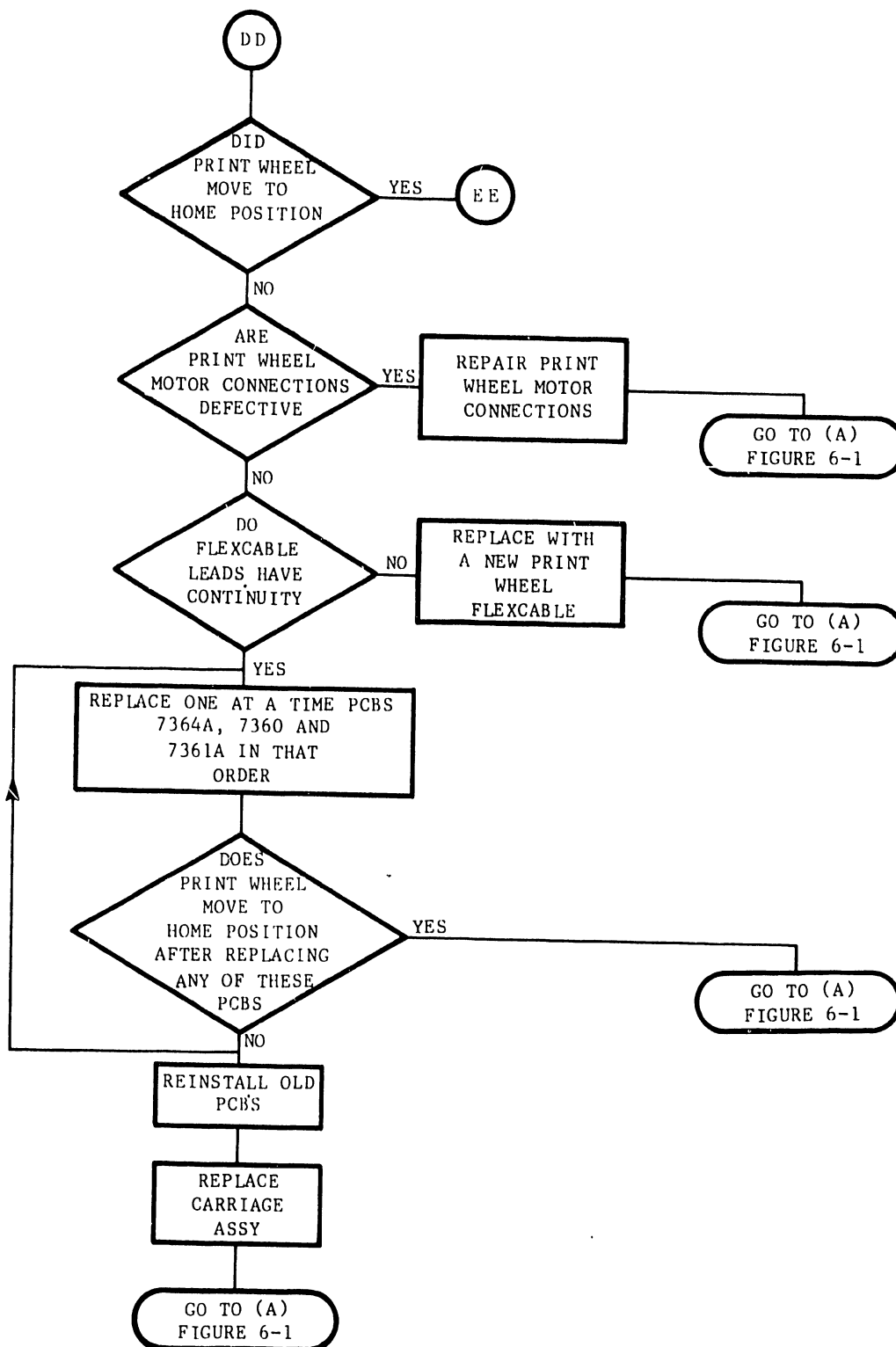


FIGURE 6-4 DEVICE IPL MALFUNCTIONS (SHEET 4 OF 7)

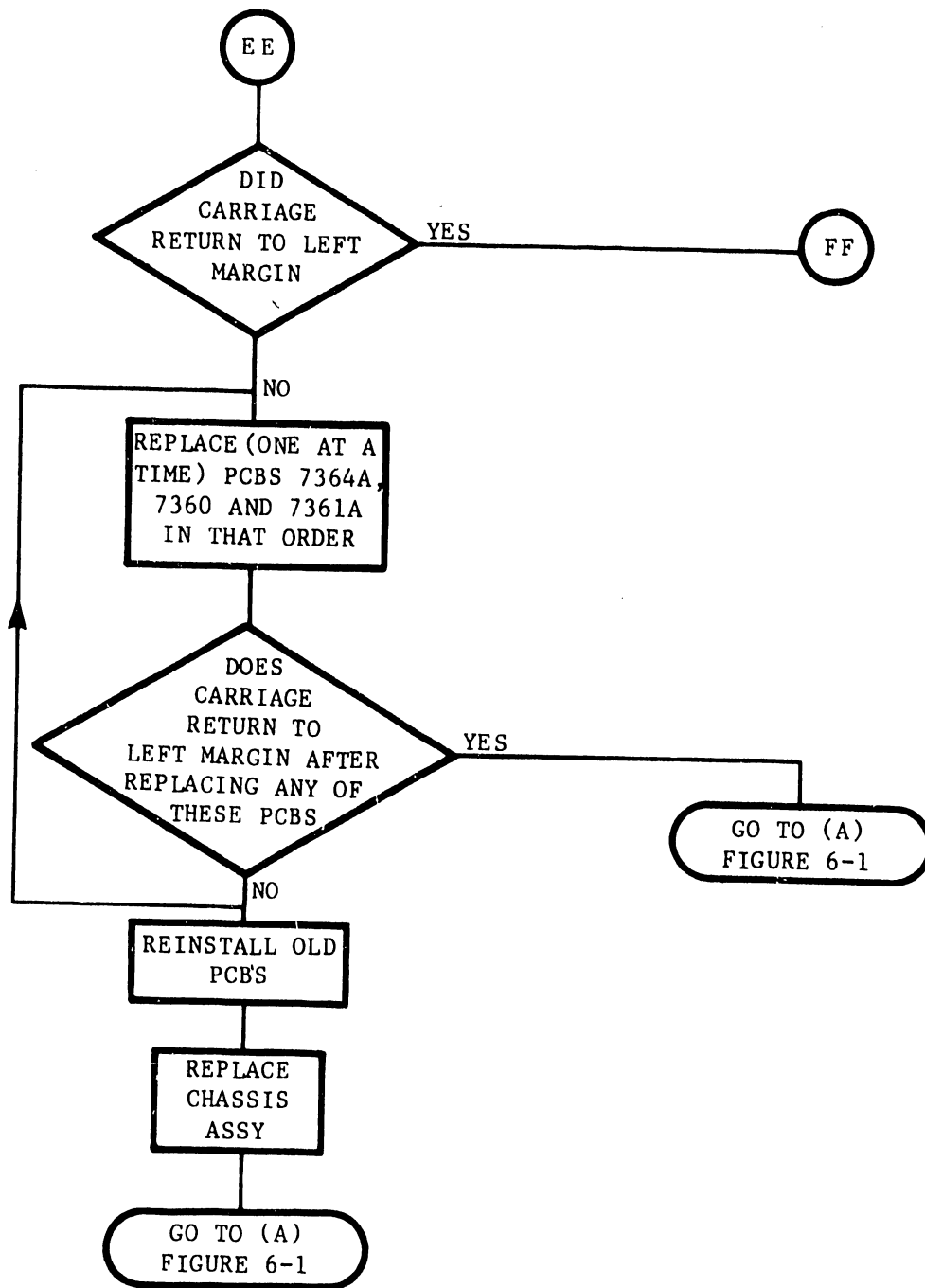


FIGURE 6-4 DEVICE IPL MALFUNCTIONS (SHEET 5 OF 7)

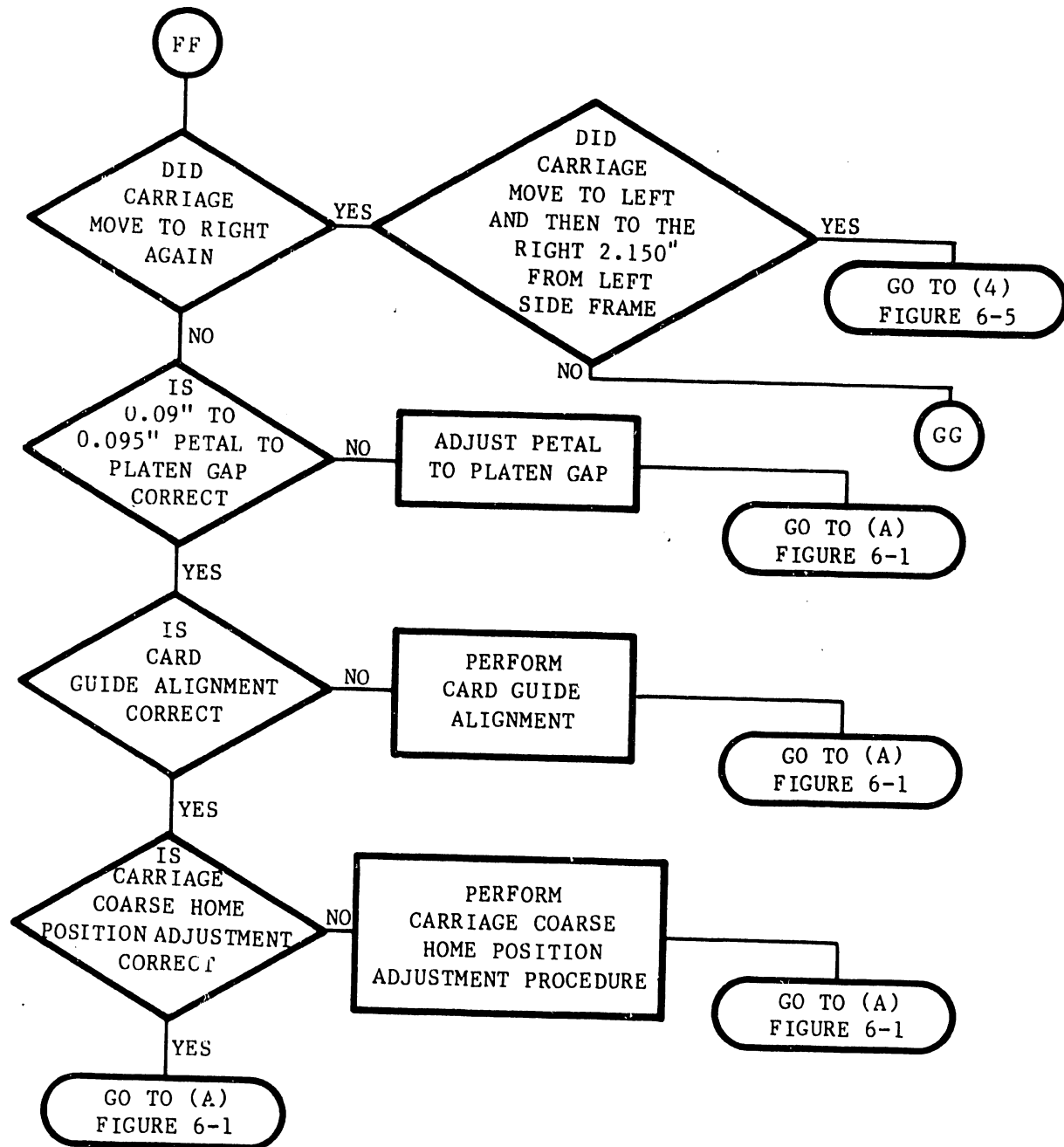


FIGURE 6-4 DEVICE IPL MALFUNCTIONS (SHEET 6 OF 7)

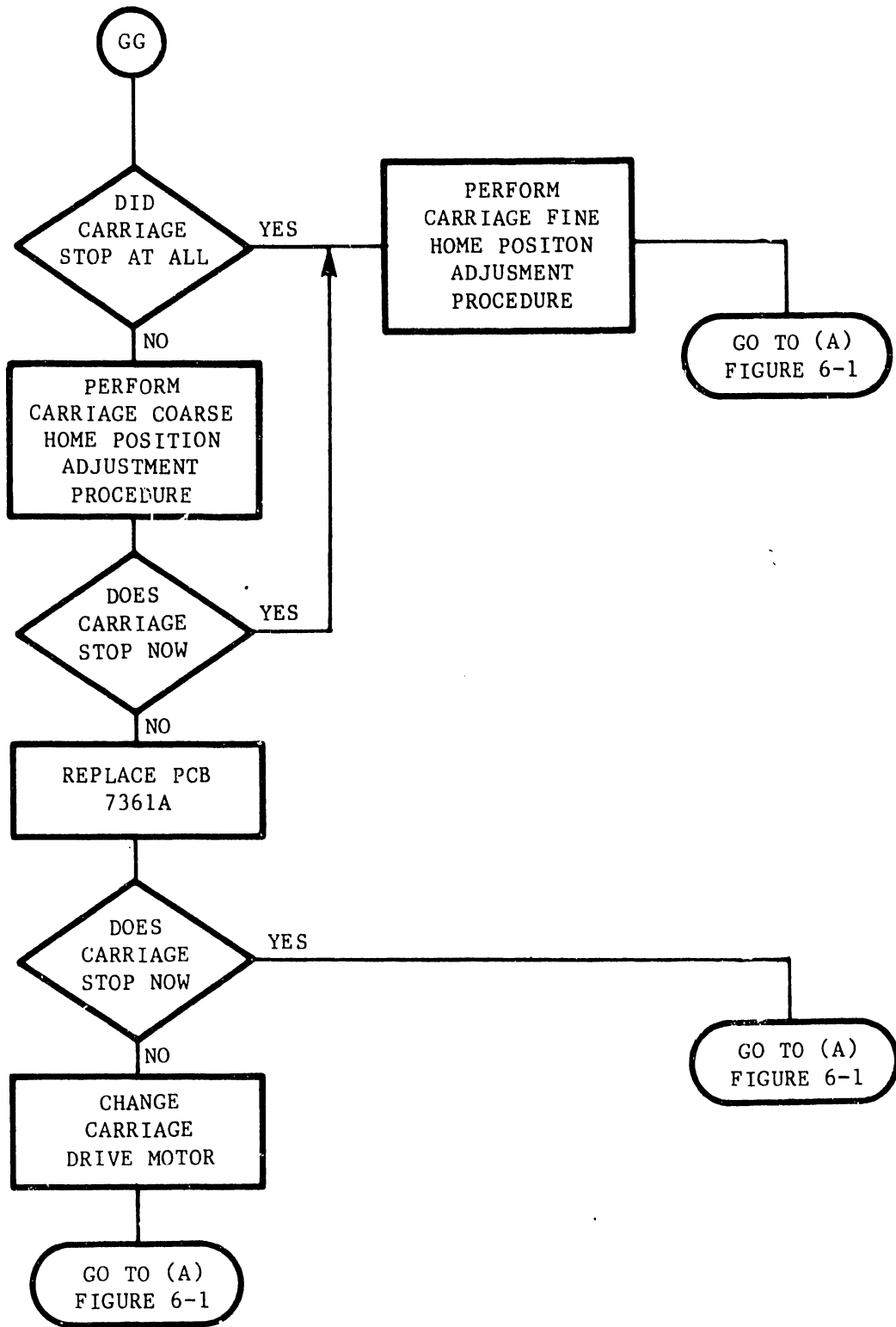


FIGURE 6-4 DEVICE IPL MALFUNCTIONS (SHEET 7 OF 7)

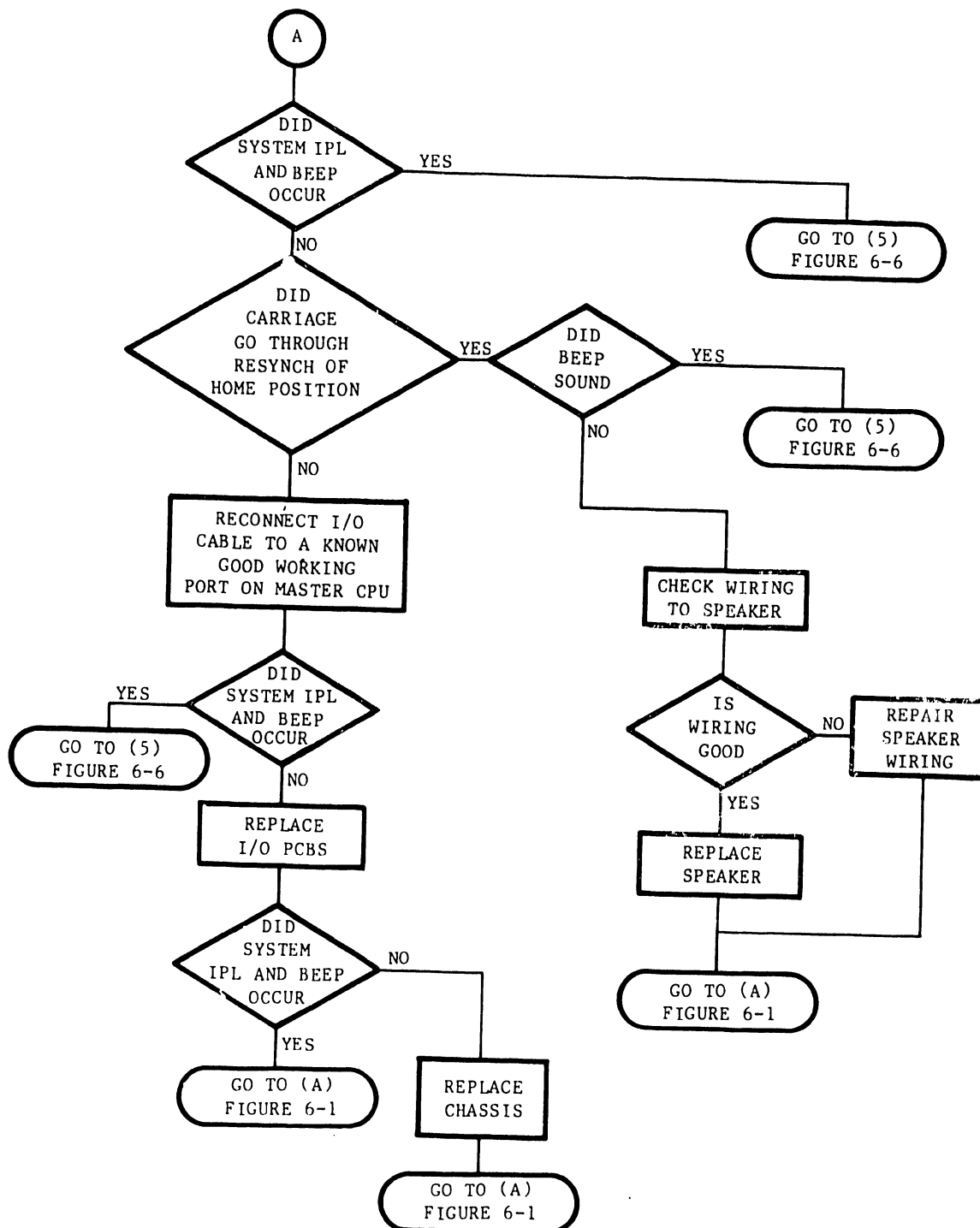


FIGURE 6-5 SYSTEM IPL MALFUNCTIONS



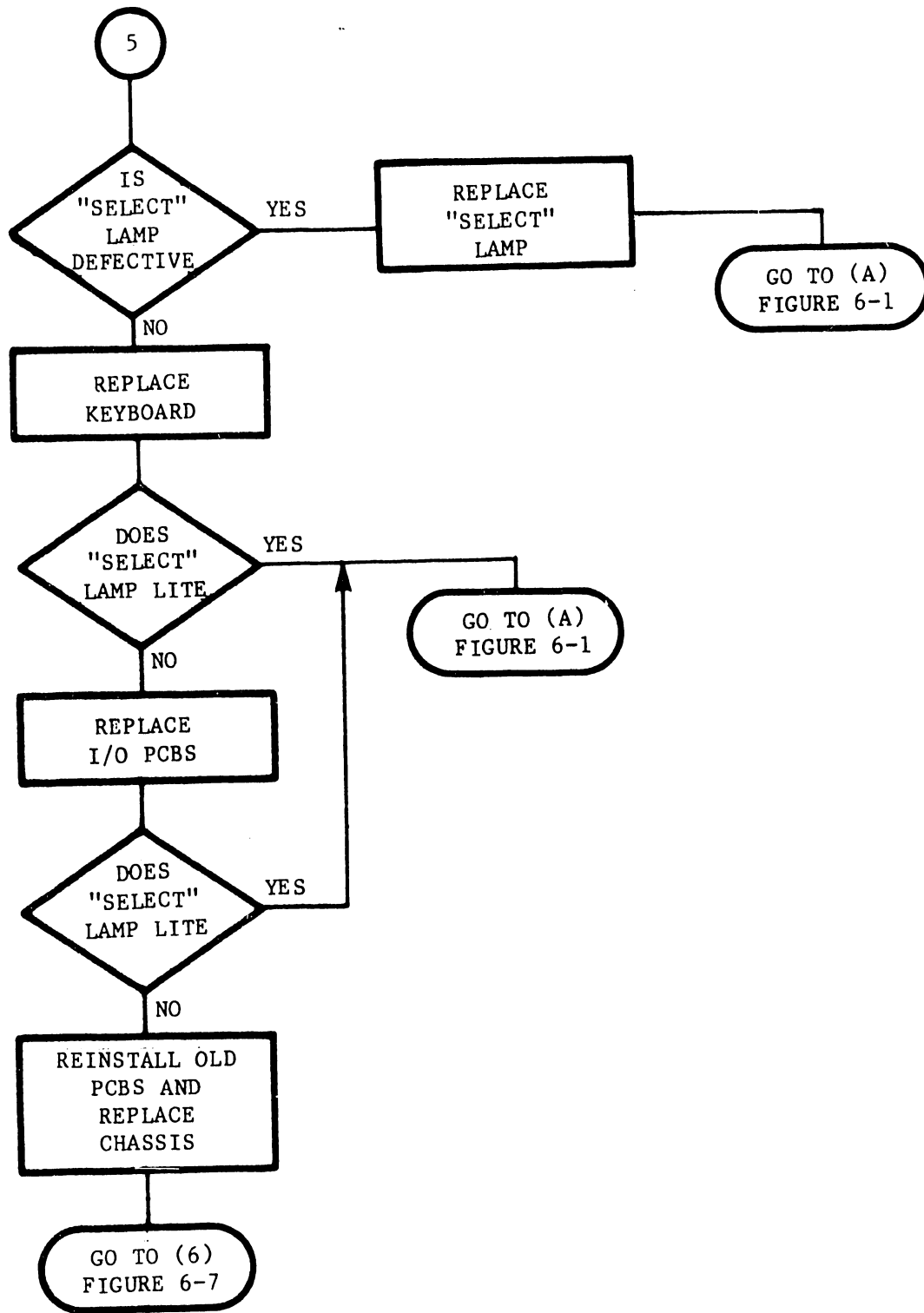


FIGURE 6-6 I/O SELECTION MALFUNCTIONS

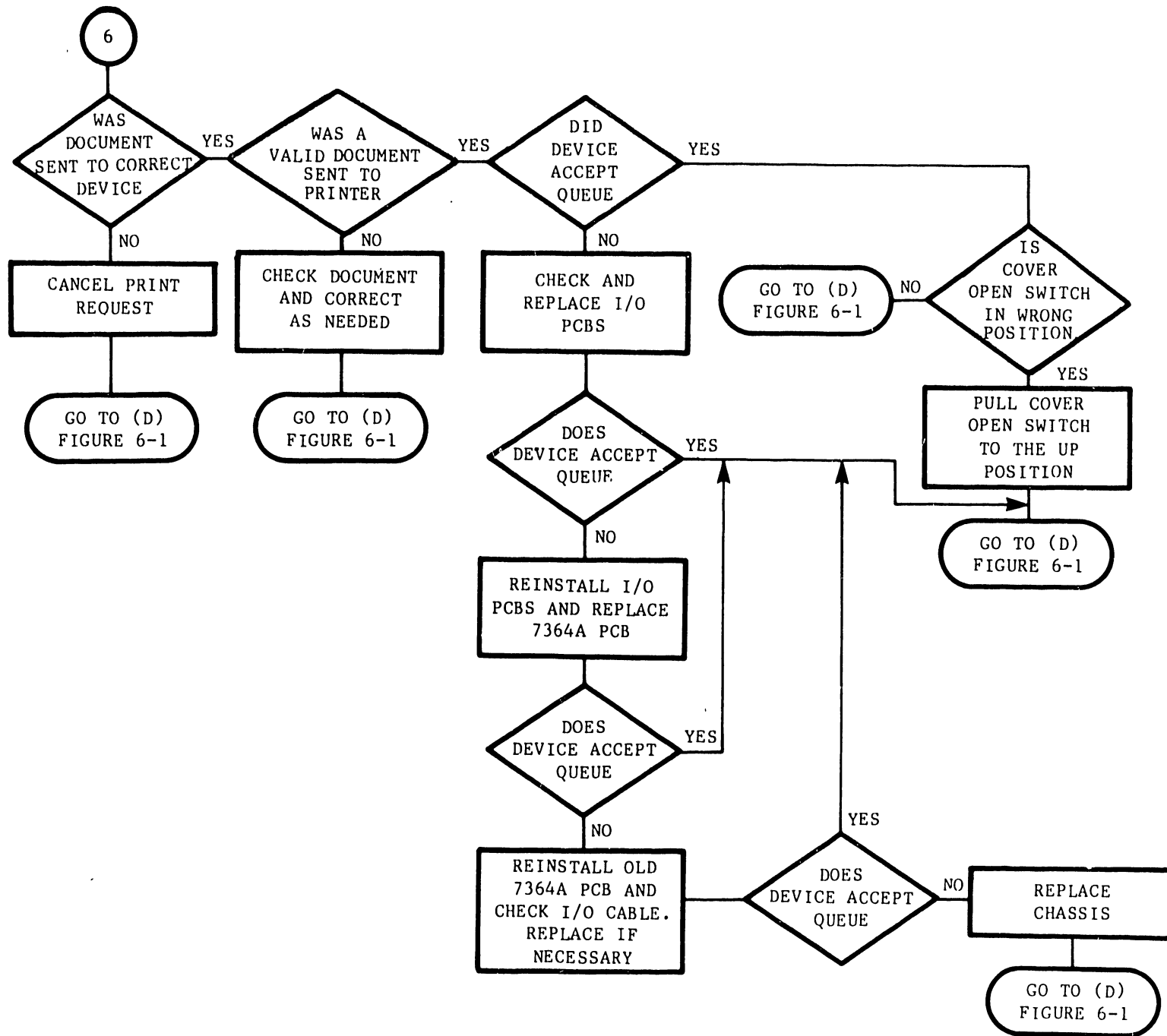
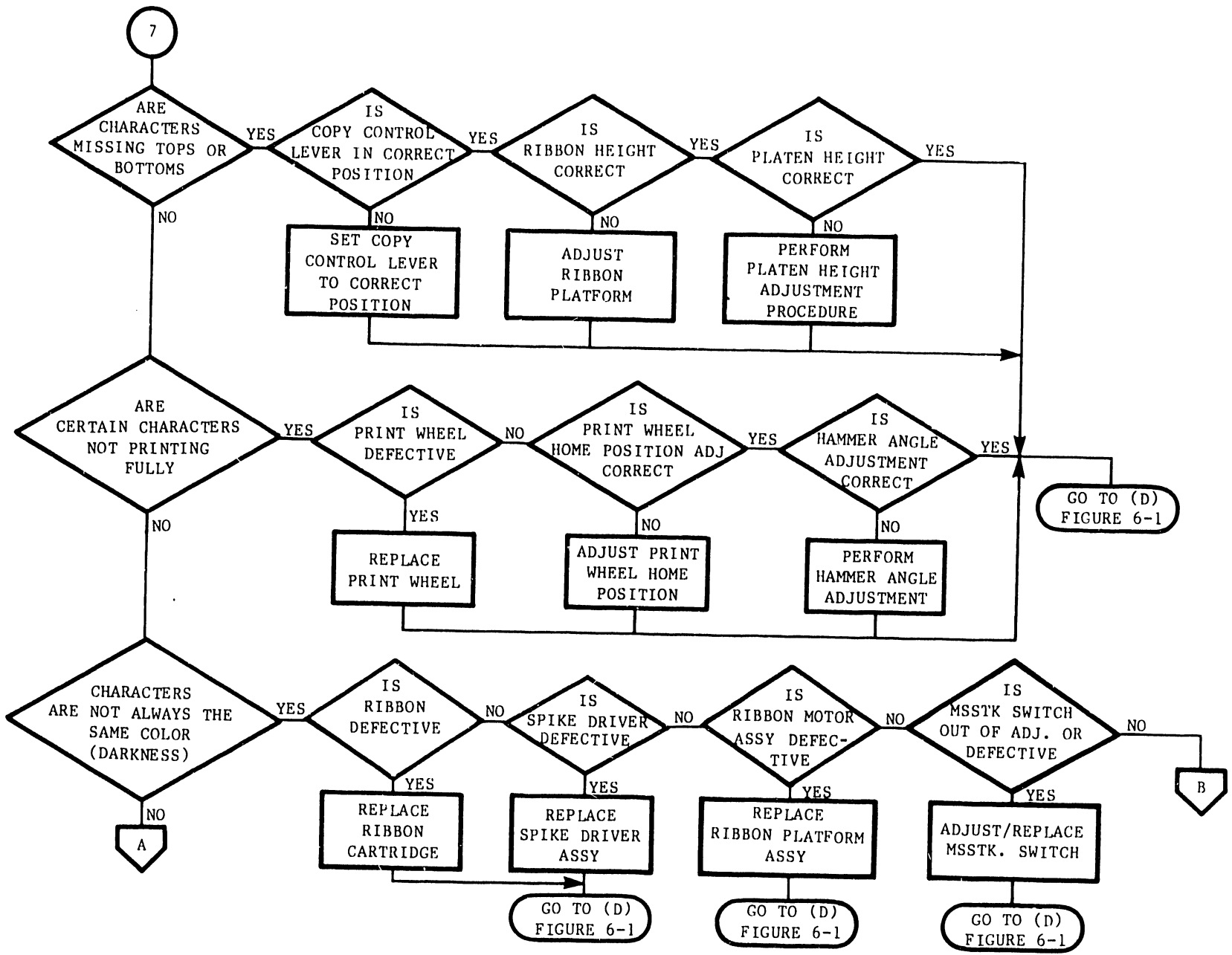


FIGURE 6-7 PRINT START MALFUNCTIONS

FIGURE 6-8 PRINT QUALITY MALFUNCTIONS (SHEET 1 OF 3)



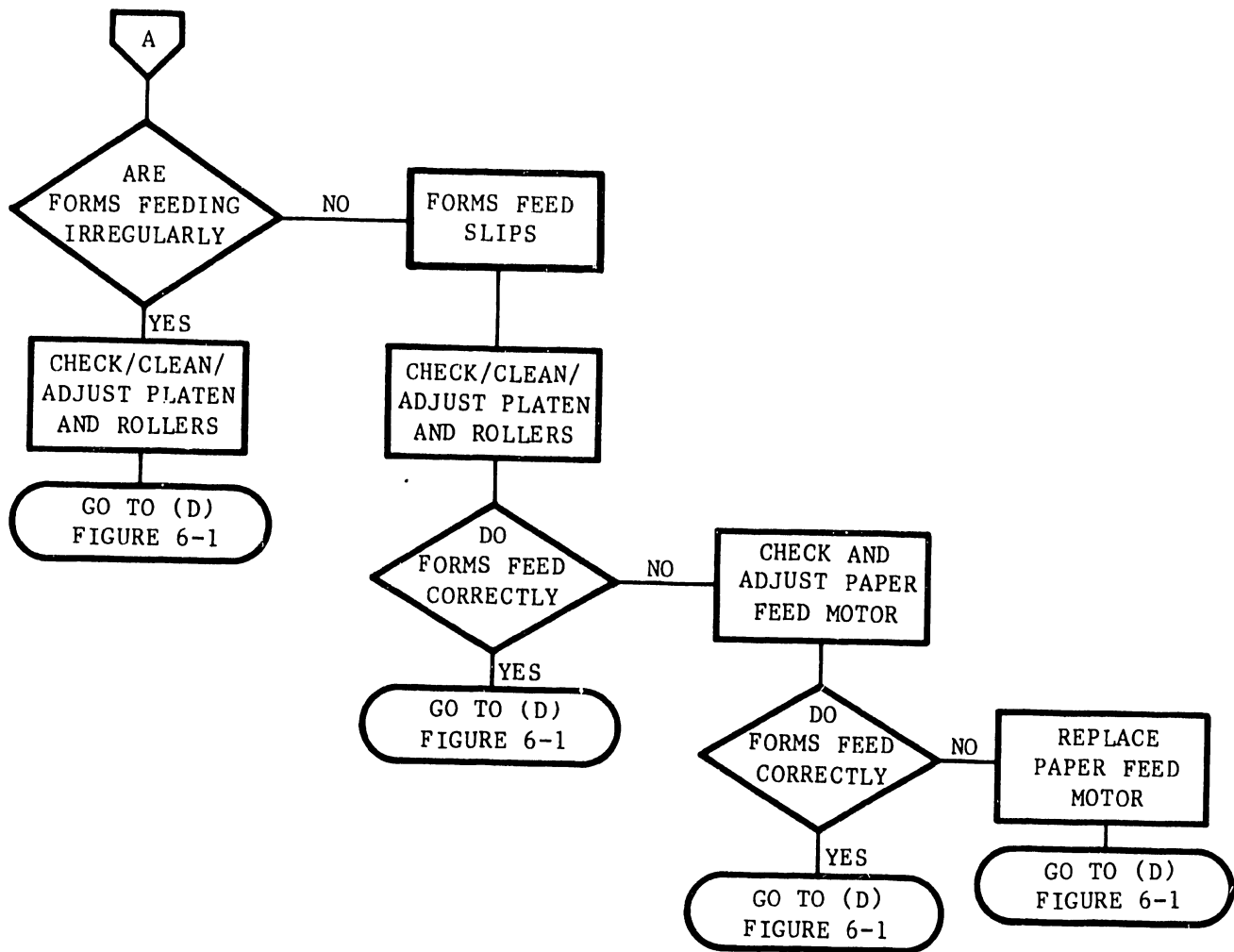


FIGURE 6-8 PRINT QUALITY MALFUNCTIONS (SHEET 2 OF 3)

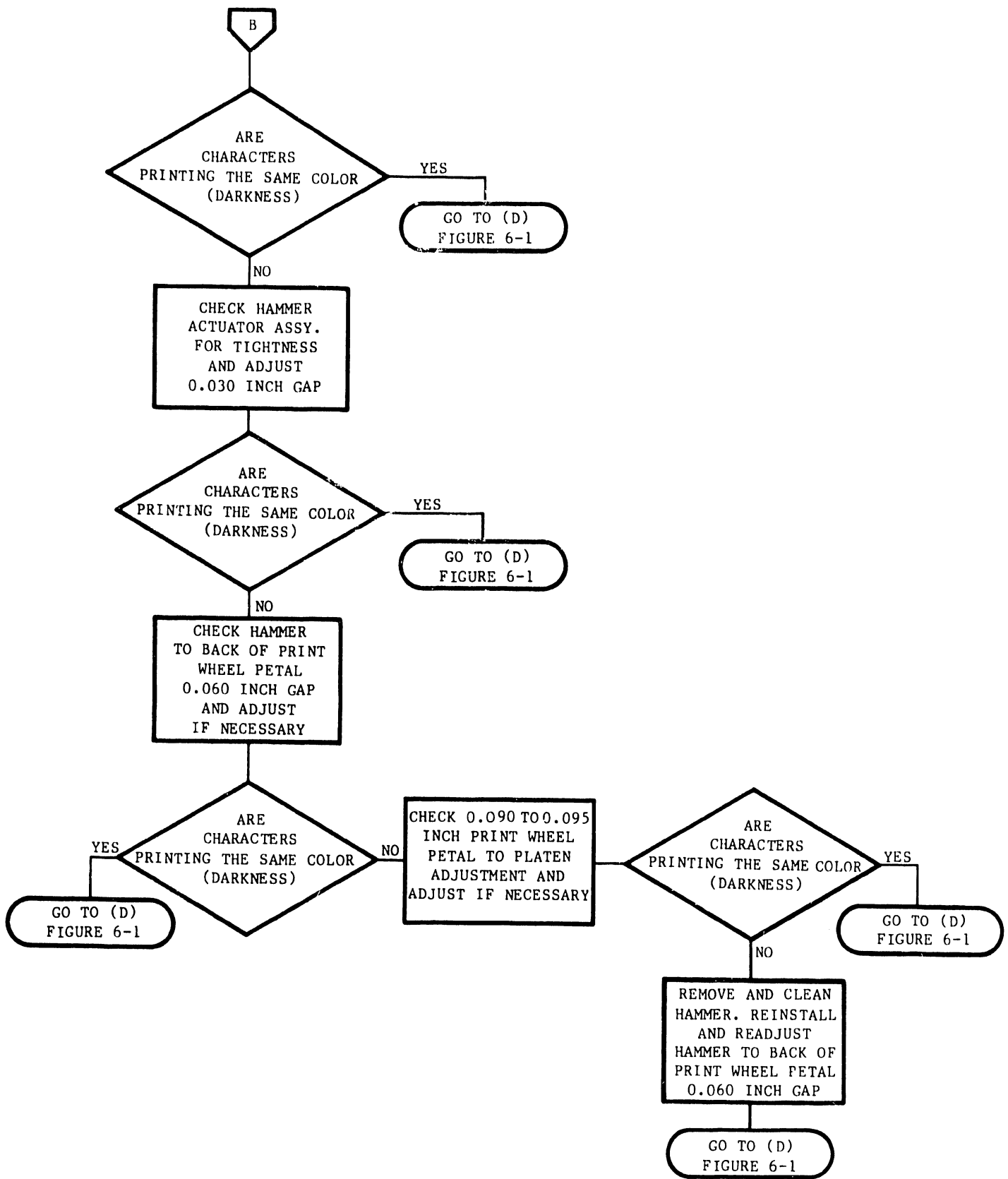


FIGURE 6-8 PRINT QUALITY MALFUNCTIONS (SHEET 3 OF 3)

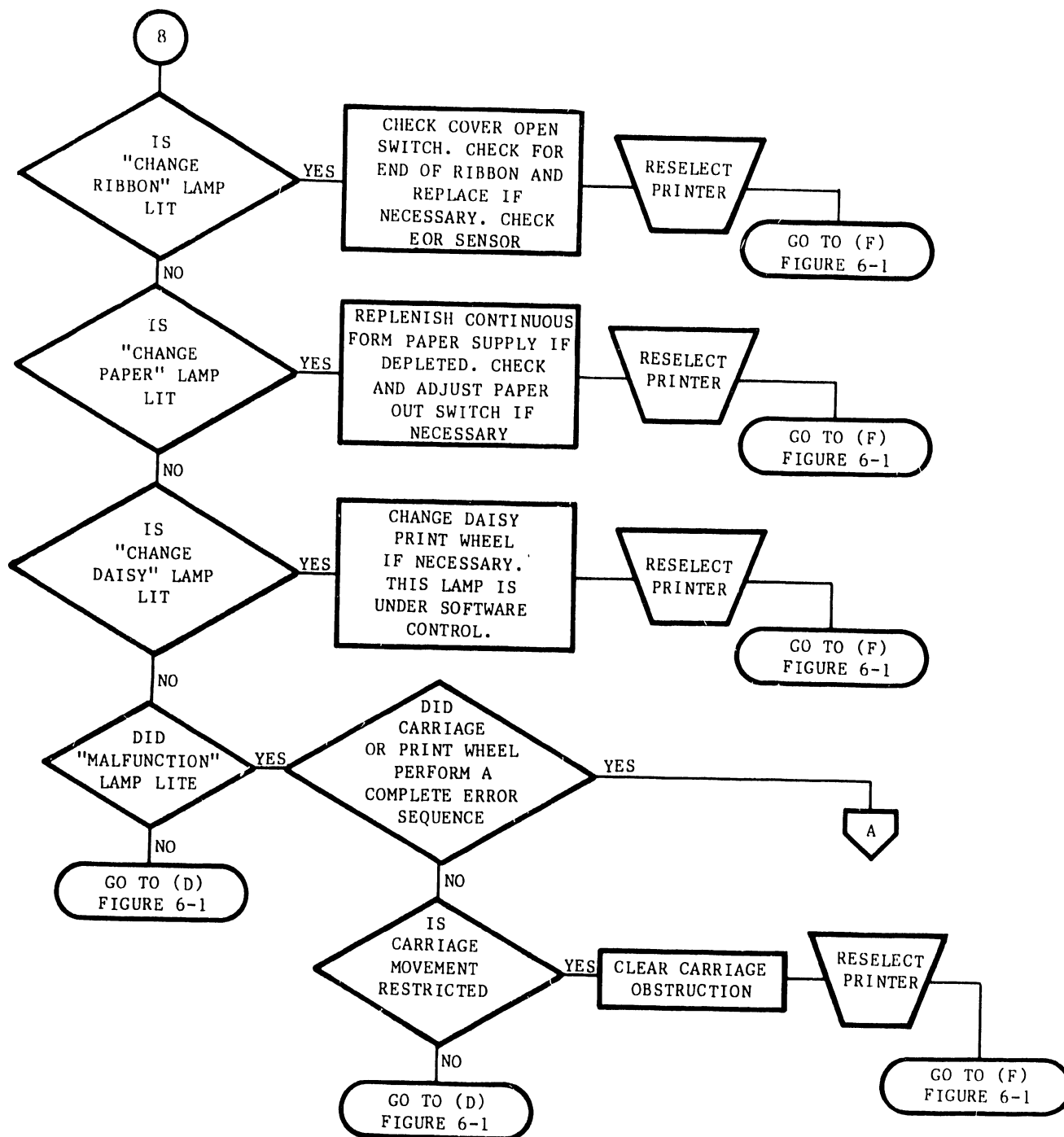


FIGURE 6-9 PRINT COMPLETION MALFUNCTIONS (SHEET 1 OF 2)

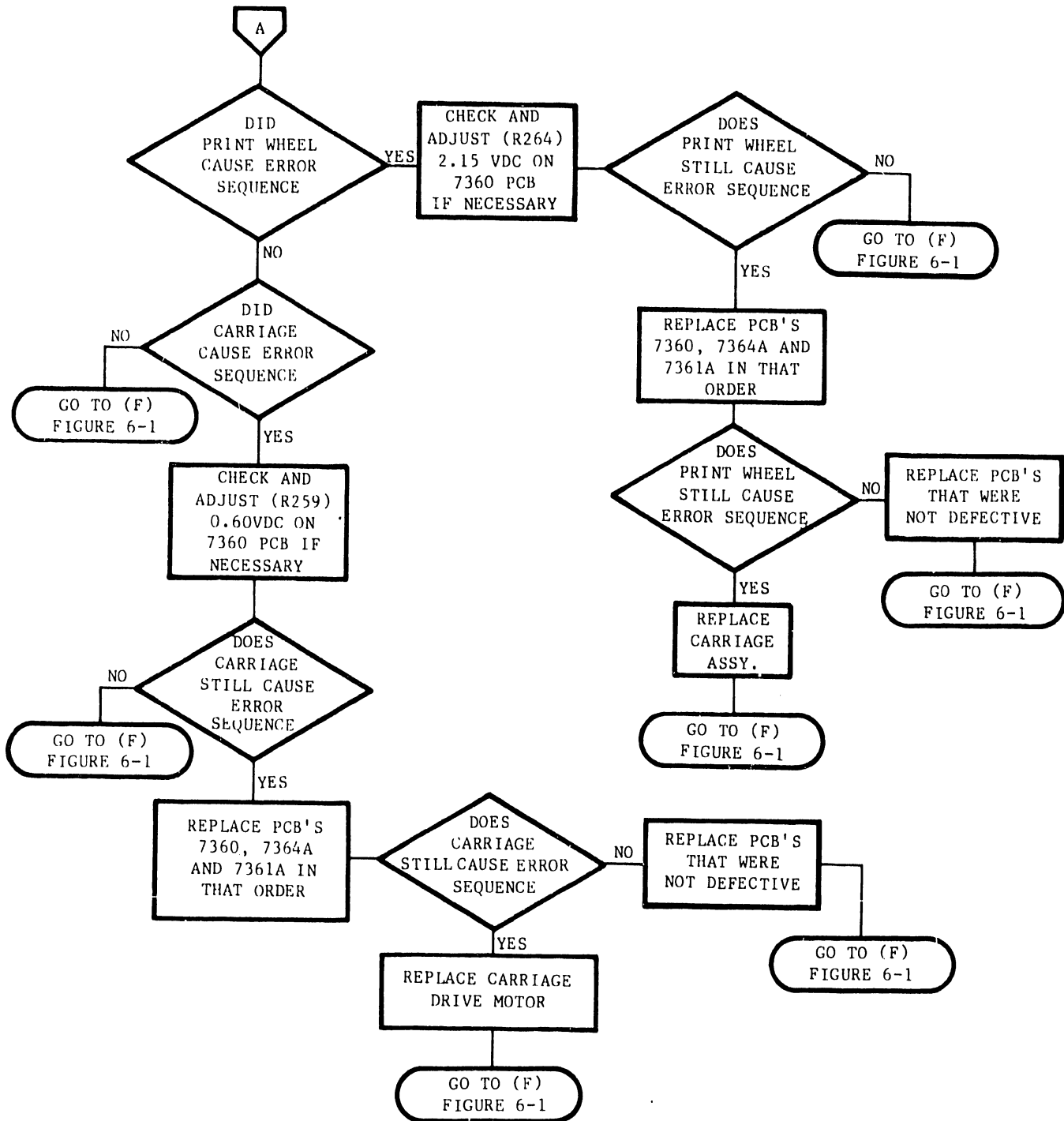


FIGURE 6-9 PRINT COMPLETION MALFUNCTIONS (SHEET 2 OF 2)

# **CHAPTER**

## **7**

# **PREVENTIVE MAINTENANCE AND DIAGNOSTIC**



CHAPTER 7  
PREVENTIVE MAINTENANCE  
AND  
DIAGNOSTICS

7.1 PREVENTIVE MAINTENANCE

The recommended preventive maintenance is normal cleaning and inspection every six months, each 500 hours of operation or present service call, whichever occurs first. The printer will need a visual inspection, cleaning, and minimal lubrication. Normal time required to perform these procedures should not exceed 15 minutes.

7.1.1 CLEANING AND INSPECTION

1. Set printer POWER switch to OFF and open or remove covers.
2. Thoroughly inspect the printer for signs of wear and loose or broken hardware. Check the platen for looseness or wobble. Check the carriage system for looseness, wobble, or accumulations of foreign materials on rail which might cause uneven carriage movement. Check the carriage drive cable system for wear.
3. Remove the platen, paper deflector, ribbon cartridge and print wheel. Inspect these parts for signs of wear.
4. Clean the printer thoroughly using alcohol-saturated cleaning pads and wipers. Remove accumulations of paper residue, ink, dust, etc., with special attention to carriage rails and pulley groves.
5. Clean the platen, platen pressure rollers, and paper bail rollers with a good platen cleaner which does not damage rubber products (such as Fedron Platen Cleaner). Do not use alcohol on these items.

7.1.2 LUBRICATION

Use #10 weight oil and IBM No. 23 grease for lubrication of the printer.

7.1.2.1 CARRIAGE SYSTEM

Lubricate the various parts of the cleaned and inspected printer according to the following schedule. DO NOT exceed the amounts recommended. Too much lubrication can be more harmful than none at all.

1. Clean both carriage rails with alcohol pads.
2. Remove two plastic retainers for felt wipers on carriage. Saturate felt wipers with #10 weight oil. Reinstall retainers.

3. Apply 4 or 5 drops of oil on either side of the carriage and move carriage back and forth on the carriage rail to distribute the oil on the rail.
4. Clean any debris from the ribbon take up mechanism.
5. Using a cloth or brush wipe away debris from the hammer actuator. If the hammer is extremely dirty, remove the hammer stop eccentric and then the hammer. Clean the hammer and remove the plastic hammer caps and grease lightly. Replace the plastic hammer caps, the hammer and the hammer stop eccentric. Readjust hammer to back of print wheel petal gap as described in paragraph 5.11.

```

*****
*                                     *
*           CAUTION                   *
*                                     *
* DO NOT OIL PARTS IN STEP 6. BELOW. *
*                                     *
*****

```

6. Grease should be applied lightly to all moving surfaces of the copy control lever, paper release lever and both side frame eccentrics.

## 7.2 DIAGNOSTICS

### 7.2.1 GENERAL

Diagnostic programs have been written for all Wang systems using Daisy Printers as follows:

<u>WLI NO.</u>	<u>TITLE</u>
702-0056A	Single Channel Diagnostic Rev.2.1
702-0074	On-Line Diagnostic Rev.2.1
702-0079	Diagnostic for 2200
702-0001A	Diagnostic for System 5
732-0002B	Diagnostic for SVP/2200 Systems

However, if a diagnostic program is unavailable check the printed copy for the following points:

1. Spacing: A row of uppercase "H"'s will show if any spacing problems are present in your machine.
2. Typical Sentence: "The quick brown fox...". This sentence uses all the alphabet in a random order.
3. P/W worst case: "I, E, H, X"
4. Line of underscores.

- 5. Line of underscored words.
- 6. Six line feeds equal to one inch.

The following printed lines of characters, letters and numerals provide a reasonable test of print quality:

```

abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
1234 12345
1234 12345
1234 12345
1234 12345
1234 12345
1234 12345
1234 12345
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx

```

```

o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauauau  slslslslslslslslslslslslslslsl
o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauauau  slslslslslslslslslslslslslslsl
o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauauau  slslslslslslslslslslslslslslsl
o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauauau  slslslslslslslslslslslslslslsl
o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauauau  slslslslslslslslslslslslslslsl
o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauauau  slslslslslslslslslslslslslslsl
o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauauau  slslslslslslslslslslslslslslsl
o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauauau  slslslslslslslslslslslslslslsl

```

```

abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxyz*****ABCDEFGHIJKLMNopRstuvwx
1234 12345
1234 12345
1234 12345
1234 12345
1234 12345
1234 12345
1234 12345

```

```

abcdefghijklmnopqrstuvwxy*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxy*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxy*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxy*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxy*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxy*****ABCDEFGHIJKLMNopRstuvwx
abcdefghijklmnopqrstuvwxy*****ABCDEFGHIJKLMNopRstuvwx

```

```

o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauau  slslslslslslslslslslslslslsl
o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauauau  slslslslslslslslslslslslslsl
o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauauau  slslslslslslslslslslslslslsl
o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauauau  slslslslslslslslslslslslslsl
o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauauau  slslslslslslslslslslslslslsl
o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauauau  slslslslslslslslslslslslslsl
o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauauau  slslslslslslslslslslslslslsl
o-o-o-o-o-o-o-o-o-o-o-o-o-o-o  auauauauauauauauauauauauauauau  slslslslslslslslslslslslslsl

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iiiiiiiiiiiiiiiiiiiiiiiiiiiiiii  iiiiiiiiiiiiiiiiiiiiiiiiiiiiiii  iiiiiiiiiiiiiiiiiiiiiiiiiiiiii
iiiiiiiiiiiiiiiiiiiiiiiiiiiiiii  iiiiiiiiiiiiiiiiiiiiiiiiiiiiiii  iiiiiiiiiiiiiiiiiiiiiiiiiiiiii

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7.2.2 DIAGNOSTIC DISPLAY BOARD (WLI 190-0739)

The Diagnostic Display Board is used for both diagnosing electronic failures and to assist field personnel in performing mechanical adjustments (print wheel home, carriage left and right and print wheel clockwise and counterclockwise adjustments).

7.2.2.1 USE IN DIAGNOSING ELECTRONIC FAILURES

The following procedure describes the use of the Diagnostic Display Board to troubleshoot electronic failures in the daisy printers.

1. Insert Diagnostic Display Board cable connector into spare PROM socket L6 on 210-7361-A board.
2. Set the eight Diagnostic Display Board DIP switches to OFF.
3. Set POWER switch ON and then press SELECT switch on printer control panel.
4. Observe the Diagnostic Display Board HEX indicators for the error codes and probable faults listed in table 6-1.

TABLE 7-1  
 ERROR CODES AND PROBABLE FAULTS

ERROR CODE	DESCRIPTION AND PROBABLE FAULT
00.	Normal Operation
FF.	Detent Removed from Print Wheel and Carriage (Sleep)
01.	RAM FAILURE (L4 or L5)
02.	Prom L9 Questionable
03.	Prom L8 Questionable
04.	Prom L7 Questionable
06.	Z MOTOR ERROR-Replace 210-7361-A
07.	X MOTOR ERROR-Replace 210-7361-A
10.	CHECK FLAGS NOT SET Check X & Z motors
11.	Z FLAG SET-Check Z motor drive
12.	X FLAG SET-Check X motor drive
13.	BOTH X AND Z FLAGS SET-Check X & Z motors
38.	FF COMMAND TO 8080 traps to 0038H in memory
82.	X FAULT ERROR AFTER RETRIES FAILED-Check XCCV for 0.60V (R259 Pot Adjustment on 210-7360 PCB)
83.	Z FAULT ERROR AFTER RETRIES FAILED-Check ZCCV for 2.15V (R264 Pot Adjustment on 210-7360 PCB)

#### 7.2.2.2 USE FOR MECHANICAL ADJUSTMENTS

The use of the Diagnostic Display Board to assist field personnel when performing mechanical adjustments (print wheel home, carriage movement left and right, and print wheel rotation clockwise and counterclockwise for adjusting the appropriate encoders) is required when the printer has been modified with the new microcode and is described in the individual adjustment procedures contained in Chapter 5.

**CHAPTER**

**8**

**SCHEM-**

**ATICS**

THE SCHEMATICS, WHEN AVAILABLE, ARE ON THE LAST FICHE IN THIS SET.

# **CHAPTER**

## **9**

# **DISASSEMBLY PROCEDURES AND ILLUSTRATED PARTS LIST**



## CHAPTER 9

## DISASSEMBLY PROCEDURES AND ILLUSTRATED PARTS LIST

9.1 INTRODUCTION

The disassembly procedures contained in paragraph 9.2 are to be accomplished using the parts lists and exploded view drawings contained in paragraph 9.3. The parts lists are located on the 8 1/2" X 11" apron of each exploded view drawing. When the parts lists are too large for the apron alone they are contained on the page facing the exploded view drawing and its apron so that the part numbers can be readily identified with the exploded view drawing folded out. Also, this 8 1/2" X 11" apron allows viewing the exploded view drawings (folded out) while performing the disassembly procedures contained in paragraph 9.2.

9.2 DISASSEMBLY PROCEDURES

All of the following removal and replacement procedures assume that the printer cover has been removed.

9.2.1 CARRIAGE ASSEMBLY

## NOTE

All figure references in this paragraph are to Figure 9-1 unless otherwise noted.

A. REMOVAL

1. Slide carriage assembly (8) midway between left side frame and center of printer.

2. Remove two screws holding cable spring(s) (7) and remove cable spring(s).
3. Secure the two carriage cords (1, 5) at the two tension pulleys (6, 9) to prevent unwrapping of cords from drive motor pulley (3).
4. Remove carriage cords from pulley (34, Figure 9-7) below carriage assembly.
5. Remove connector clamp plate (37, Figure 9-7), disconnect all connectors to flex cable and remove flex cable bracket (38, Figure 9-7) from carriage assembly.
6. Remove two screws (each) (41, Figure 9-3) holding the shafts (42, Figure 9-3) in place.
7. Remove front shaft (42, Figure 9-3).
8. Remove carriage assembly and shaft (42, Figure 9-3).
9. Remove shaft (42, Figure 9-3) from carriage assembly.
10. Remove ribbon platform assembly (279-5150) from carriage assembly unless platform assembly is being replaced with carriage assembly.

B. REPLACEMENT

NOTE

When installing a new carriage assembly, be sure to install items (33) and (1) on item (9) of Figure 9-7 before installing shaft (42, Figure 9-3).



4. Secure the flex cable bracket (38, Figure 9-7) to the carriage bracket (4, Figure 9-7) with two pan head screws (36, Figure 9-7) being sure to secure the black ground wire lug (39, Figure 9-7) under the rear screw. Be sure that the flex cable bracket extension will enter the cutout in the leftside frame without interference.
  
5. Replace carriage cords (1, 5) (now secure at the two tension pulleys (6, 9) on carriage pulley assembly (10) located below the carriage assembly (10) as follows:
  - a. Loop carriage cord (1) around upper groove of carriage assembly pulley (10).
  
  - b. Bring cord (1) to left through hole (11) in left side frame and using a pair of vise grip pliers pull cord (1) to allow placement of retainer (end-of-cord) into notch (11) in left side frame.
  
  - c. Loop carriage cord (5) around lower groove of carriage assembly pulley (10).
  
  - d. Bring cord (5) to right through hole (12) in right side frame and using a pair of vise grip pliers pull cord (5) to allow placement of retainer (end-of-cord) (12) into notch in right side frame.
  
  - e. Again using vise grip pliers pull retainer (end of left cord (1)) away from side frame sufficiently to allow cord spring (7) to be placed behind the retainer (7). Place second cable spring (7) behind first, if printer has two, as described above.
  
  - f. Secure cord spring(s) (7) with two screws (7) to left side frame.

- g. Install ribbon platform assembly (279-5150) using release latch (33, Figure 9-10) and spring (32, Figure 9-10) removed from old carriage assembly on new carriage assembly.
  - h. Reinstall six flex cable connectors.
  - i. Secure excess wire harness to front portion of flex cable bracket with a cable tie allowing sufficient play so that wires do not rub against metal surfaces.
  - j. Replace connector clamping plate (37, Figure 9-7) on flex cable bracket (38, Figure 9-7).
6. Perform all the adjustment procedures contained in Chapter 5.

#### 9.2.2 CARRIAGE CORD REPLACEMENT

##### NOTE

All Figure references in this paragraph are to Figure 9-1.

1. Remove two screws (7) holding cable spring(s) (7) and remove cable spring(s).
2. Move carriage assembly (8) to extreme right of printer.

##### NOTE

The left carriage cord is always installed first.

3. Insert end-of-left-cord (1) into back retaining notch (2) on carriage drive servomotor hub (3) and start to wind cord (1) from bottom to left on the hub (3) by turning hub counterclockwise.
4. Loop carriage cord (1) around left tension pulley (6).
5. Turn hub (3) counterclockwise while holding end-of-cord (1) taut and making sure cord turns (1) are wound tightly on hub (3).
6. While holding cord (1) taut, move carriage assembly pulley (10) to left to allow the cord (1) to be looped over and placed in top groove of pulley and secure end-of-cord (1) in notch (11) in left side frame.
7. Continue to turn carriage drive servomotor hub (3) counterclockwise until carriage assembly pulley (10) moves to it's left most position.
8. Insert end of right carriage cord (5) into front notch (4) on carriage drive servomotor hub (3) and start to wind the cord (5) bottom to right on the hub (3) one half to one turn without turning hub (3).
9. Loop carriage cord (5) around right tension pulley (9).
10. Loop carriage cord (5) around lower groove of carriage assembly pulley (10).
11. Bring cord (5) to right through hole (12) in right side frame and using a pair of vise grip pliers pull end-of-cord (5) to allow placement of retainer into notch (12) in right side frame.
12. Again using vise grip pliers pull retainer (end-of-left-cord (1)) away from side frame sufficiently to allow cord spring (7) to be placed behind the retainer (7). Place second cable spring (7) behind first, if printer has two, as described above.

13. Secure cord spring(s) (7) with two screws (7) to left side frame.
14. Perform the checks and the adjustment procedures contained in paragraphs 5.8 and 5.21.

### 9.2.3 RIBBON PLATFORM

#### A. REMOVAL

1. Remove clamping plate (37, Figure 9-7).
2. Loosen the two hex head screws (Figure 5-26) on the right side of the carriage assembly frame below the ribbon platform.
3. Loosen phillips head screw (Figure 5-26) on left side of carriage assembly frame.
4. Loosen nut post (Figure 5-26).
5. Lift ribbon platform (Figure 5-26) from carriage assembly and remove the two connectors from the flex cable assembly (38, Figure 9-7).

#### B. REPLACEMENT

#### NOTE

Before attempting replacement of the ribbon platform, ensure that the two hex head screws, nut post and phillips head screw shown in Figure 5-26 are loose enough to allow the ribbon platform to slide onto the carriage bracket.

1. Install ribbon platform onto carriage bracket (4, Figure 8-7) and then tighten the two hex head screws, the nut post and the phillips head screw shown in Figure 5-26.
2. Replace the two connectors on the flex cable assembly receptacles (38, Figure 9-7).
3. Perform the checks and adjustments contained in paragraph 5.22.

#### 9.2.4 CHASSIS

##### A. REMOVAL

1. Remove two screws at left and right rear of standard printer chassis or four screws (two on left and two on right) of wide carriage chassis securing either one to printer frame.
2. Slide chassis partially to the rear.
3. Remove all necessary interconnecting cables.
4. Remove chassis from printer.

##### B. REPLACEMENT

1. Slide chassis partially forward into printer.
2. Reconnect all previously removed cables to their appropriate receptacles.
3. Slide chassis all the way forward into the printer and secure to printer frame with two screws at left and right rear for standard printer chassis or four screws, two on left and two on right, for wide carriage printer chassis.



4. Adjust +5VR supply as described in paragraph 5.4.

#### 9.2.5 CARRIAGE DRIVE MOTOR

##### A. REMOVAL

1. Remove two screws (7, Figure 9-1) holding cable spring(s) (7) and remove cable spring(s).
2. Remove carriage cords (1, 5, Figure 9-1) from pulley (10, Figure 9-1) below carriage assembly.
3. Remove carriage cords (1, 5) from carriage drive servomotor hub (3).
4. Remove connectors from servo board (WL #210-7360) and J3 on the chassis.
5. Remove two screws one at left and one at right rear of standard printer chassis or four screws (two on left and two on right) of wide carriage chassis securing either one to printer frame.
6. Slide chassis partially to the rear.
7. Remove four screws (13, Figure 9-1) holding carriage drive servo motor (35, Figure 9-3) to frame.
8. Remove carriage drive servomotor (35, Figure 9-3) with hub (3, Figure 9-1) attached from the rear of the printer.

##### B. REPLACEMENT

1. Slide carriage drive servomotor (35, Figure 9-3), with hub (3, Figure 9-1) attached, into place in the printer and secure with four screws (13, Figure 9-1).

2. Slide chassis forward and secure with two screws one at left and one at right rear of standard printer chassis or four screws two on left and two on right of the wide carriage chassis.
3. Replace two connectors to servo board (WL #210-7360) and the connector to J3 on the chassis.
4. Move carriage assembly (8) to extreme right of printer.

NOTE

The left carriage cord is always installed first.

5. Insert end-of-left-cord (1) into back retaining notch (2) on carriage drive servomotor hub (3) and start to wind cord (1) from bottom to left on the hub (3) by turning hub counterclockwise.
6. Loop carriage cord (1) around left tension pulley (6).
7. Turn hub (3) counterclockwise while holding end-of-cord (1) taut and making sure cord turns (1) are wound tightly on hub (3).
8. While holding cord (1) taut, move carriage assembly pulley (10) to left to allow the cord (1) to be looped over and placed in top groove of pulley and secure end-of-cord (1) in notch (11) in left side frame.
9. Continue to turn carriage drive servomotor hub (3) counterclockwise until carriage assembly pulley (10) moves to it's left most position.

10. Insert end of right carriage cord (5) into front notch (4) on carriage drive servomotor hub (3) and start to wind the cord (5) bottom to right on the hub (3) one half to one turn without turning hub (3).
11. Loop carriage cord (5) around right tension pulley (9).
12. Loop carriage cord (5) around lower groove of carriage assembly pulley (10).
13. Bring cord (5) to right through hole (12) in right side frame and using a pair of vise grip pliers pull end-of-cord (5) to allow placement of retainer into notch (12) in right side frame.
14. Again using vise grip pliers pull retainer (end-of-left-cord (1)) away from side frame sufficiently to allow cord spring (7) to be placed behind the retainer (7). Place second cable spring (7) behind first, if printer has two, as described above.
15. Secure cord spring(s) (7) with two screws (7) to left side frame.
16. Perform the checks and adjustment procedures contained in paragraphs 5.7, 5.8 and 5.21.1.

9.2.6 COPY CONTROL LEVER (See Figure 9-3)

A. REMOVAL

1. Loosen set screw on lever (39).
2. Loosen eccentric bearing set screw and remove eccentric bearing (32) from left end of copy control shaft (34).
3. Slide shaft (34) to right to remove copy control lever (39).

B. REPLACEMENT

1. Slide copy control shaft (34) to the left thru hole in copy control spring (38), thru hole in copy control lever (39) and thru collar in left side frame.
2. Slide eccentric bearing (32) over end of copy control shaft (34) and secure to the flat surface on the shaft with set screw (33).

## NOTE

Set screw securing eccentric bearing to end of copy control shaft is not aligned with set screw of copy control lever.

3. Tighten set screw securing copy control lever (39) to flat portion of copy control shaft (34).

9.2.7 PAPER RELEASE LEVER (See Figure 9-3)A. REMOVAL

1. Remove spring (46) from paper release arm pivot stud (49g) and the notch in paper release cam follower (14, Figure 9-4).
2. Remove the 'C' clip (49p) from right side of paper out bracket link (49e) and disconnect clevis (49f) from paper out bracket lever (15, Figure 9-4).
3. Remove 'C' clip (49n).

4. Lift paper release cam follower (14, Figure 9-4) up and out of the path of paper release lever (49b).
5. Move paper release lever (49b) to the rear and then slide paper release lever to the left to remove from paper release arm pivot stud (49g).
6. Remove paper out bracket link (49e) from paper release lever (49b).

#### B. REPLACEMENT

1. Slide paper out bracket link (49e) into hole in paper release lever (49b).
2. Slide paper release lever (49b) onto paper release arm pivot stud (49g).
3. Install 'C' clip (49p) onto paper out bracket link (49e) on the right side of the paper release lever (49b) and connect clevis (49f) to paper out bracket lever (15, Figure 9-4).
4. Secure paper release lever (49b) to paper release arm pivot stud (49g) with 'C' clip (49n).
5. Return paper release cam follower (14, Figure 9-4) to its original position and replace spring (46) between paper release arm pivot stud (49g) and the notch in the paper release cam follower (14, Figure 9-4).
6. Lubricate cam surface of paper release arm where paper release follower cam (14, Figure 9-4) contacts its surface (Refer to Paragraph 7.1.2).

9.2.8 PAPER FEED MOTOR

## NOTE

All figure references in this paragraph are to Figure 9-3 unless otherwise noted.

A. REMOVAL

1. Press LH and RH platen latches (50c, 49d) and remove platen (Figure 9-11).
2. Remove two motor mounting screws and pivot screw (Figure 5-19).
3. Disconnect paper feed motor (50e1) harness connector from chassis receptacle J4.
4. Slide paper feed motor (50e1), with drive gear and idler gear attached, to the left to remove.

B. REPLACEMENT

1. Install paper feed motor (50e1) with drive gear and idler gear (50e2) attached, from the left through L.H. platen plate (50a) and printer frame.
2. Secure paper feed motor (50e1) to L.H. platen plate (50a) and printer frame with two motor mounting screws and pivot screw (Figure 5-19).
3. Connect paper feed motor (50e1) harness connector to chassis receptacle J4.

4. Press L.H. and R.H. platen latches (50c, 49d) and insert platen into notches in L.H. and R.H. platen plates (50a) and (49a). Release both platen latches.
5. Perform all check and adjustment procedures contained in paragraph 5.17.

9.2.9 'U' CHANNEL ASSEMBLY

NOTE

All figure references in this paragraph are to Figure 9-4 unless otherwise noted.

A. REMOVAL

1. Press LH and RH platen latches (50c, 49d, Figure 9-3) and remove platen (Figure 9-11).
2. Remove paper scale (16).
3. Remove paper deflector (45).
4. Unhook two springs (44) at both ends of roller arm mounting channel (5).
5. Remove two mounting screws at both ends of roller arm mounting channel (5) securing it to L.H. and R.H. platen plates (50a, 49a, Figure 9-3).
6. Remove two pan head screws, lockwashers, flatwashers, the nut plate (43) and the paper out switch (42) from paper out switch bracket (41).

7. Disconnect clevis pin (49f, Figure 9-3) from paper out lever bracket (15).
8. Lift 'U' channel assembly from printer.

#### B. REPLACEMENT

1. Place 'U' channel assembly in position in the printer.
2. Secure roller mounting channel (5) to the L.H. and R.H. platen plates (50a, 49a, Figure 9-3) with two screws at each end.
3. Connect clevis pin (49f, Figure 9-3) to paper out lever bracket (15).
4. Secure paper out switch (42) to paper out detect switch bracket (41) with two pan head screws, lockwashers, flatwashers and the nut plate (43).
5. Hook two springs (44) one at each end of roller arm mounting channel (5).
6. Replace paper deflector (45).
7. Replace paper scale (16).
8. Press L.H. and R.H. platen latches (50c, 49d, Figure 9-3) and insert platen into notches in L.H. and R.H. platen plates (50a, 49a, Figure 9-3). Release both platen latches.
9. Perform all check and adjustments contained in paragraphs 5.19 and 5.20.



9.2.10 HEAD CABLE ASSEMBLYA. REMOVAL (Figure 9-7)

1. Remove connector clamping plate (24).
2. Disconnect all connectors to flex cable.
3. Remove two screws securing flex cable bracket (23) to right frame of carriage assembly (1).
4. Remove the two screws securing the flex cable clamp(s).
5. Unplug flex cable connector at chassis receptacle J2 and remove flex cable from printer.

B. REPLACEMENT (Figure 9-7)

1. Using old flex cable as a template, bend new flex cable at same location and then apply triangular shaped insulator removed from old flex cable to new flex cable.
2. Connect flex cable connector at chassis receptacle J2.
3. Using the two screws secure the flex cable clamp(s) to the printer frame.
4. Secure the flex cable bracket (38, Figure 9-7) to the carriage bracket (4, Figure 9-7) with two pan head screws (36, Figure 9-7) being sure to secure the black ground wire lug (39, Figure 9-7) under the rear screw. Be sure that the flex cable bracket extension will enter the cutout in the leftside frame without interference.
5. Reconnect all connectors to flex cable (40).

6. Secure clamping plate (37) to flex cable bracket (38) with two screws (36).
7. Run functional tests.

## 9.3 ILLUSTRATED PARTS LIST

This paragraph contains the parts list and each associated exploded view drawing. The parts lists are located on the 8 1/2" X 11" apron of the exploded view drawing (when too large for the apron alone they start on the facing page and finish on the apron). This allows the user to view the folded out exploded view drawing while performing removal and replacement procedures and identifying part numbers. Each parts list contains the exploded view drawing title, figure number and assembly number when applicable. The following is a list of the exploded view drawings:

FIGURE	TITLE	PAGE NO.
9-2	COVERS	9-21
9-3	FRAMES	9-23/-24
9-4	'U' CHANNEL ASSEMBLY	9-25/-26
9-5	CHASSIS ASSEMBLY	9-27/-28
9-6	CARRIAGE DRIVE MOTOR ASSEMBLY	9-29
9-7	CARRIAGE ASSEMBLY	9-31
9-8	PRINT WHEEL ENCODER MOUNTING	9-32
9-9	PRINT YOKE AND BEARING ASSEMBLY	9-33/-34
9-10	RIBBON PLATFORM ASSEMBLY	9-35/-36
9-11	PLATEN ASSEMBLY	9-37/-38
9-12	TRACTOR FEED ASSEMBLY	9-39/-40

9.3.1 COVERS (SEE FIGURE 9-2)  
(NO ASSEMBLY PART NO.)

ITEM NO.	PART NO.	DESCRIPTION
1	458-0474	COVER RACK (81W/41W)
	458-0475	COVER RACK (81WC/41WC)
2	461-3348	EDGE GUIDE ROD (81W/41W)
	461-3349	EDGE GUIDE ROD (81WC/41WC)
3	465-1669	EDGE GUIDE SPRING
4	452-4057	EDGE GUIDE
5	458-0578	CENTER WELDMENT WRAP (81W/41W)
	458-0577	CENTER WELDMENT WRAP (81WC/41WC)
6	451-2947	FRONT TOP COVER (81W/41W)
	451-2948	FRONT TOP COVER (81WC/41WC)
7	651-0240	ACCESS COVER CATCH
8	462-0322	BAR CLIP SPACER
9	449-0215	ROLL COVER (WITH CLIPS)
	449-0214	ROLL COVER WITH CLIPS (USED WITH TSF OR TRACTOR FEED)
10	478-0430	CENTER WRAP CLIP PIN
11	655-0231	BUMPER
12	451-2949	TOP COVER (81W/41W)
	451-2950	TOP COVER (81WC/41WC)
13	451-4702	COVER HINGE BRKT
14	451-2183	KEYBOARD COVER (METAL)
	478-0503	KEYBOARD COVER (MOLDED)
15	271-1141-1	KEYBOARD ASSY.
	271-1212	KEYBOARD ASSY. (2281W/WC)
16	452-2352	FINISH PLATE
	452-2351	FINISH PLATE (2281W/WC)
17	458-0603	GROUND STRAP
18	655-0270	SHOCK MOUNT
19	650-9047	10-32 SCREW
20	653-6000	NO. 10 FLAT WASHER
21	651-0237	10 X 32 NUT CLIP
22	279-4028	BOTTOM COVER ASSY
22a	449-0293	SHIPPING STOP
22b	451-1237	BOTTOM PAN (81W/41W)
	451-1238	BOTTOM PAN (81WC/41WC)
22c	655-0205	WHITE BUMPER
23	451-4563	REAR RACK BRACKET (L.H.)
24	451-4564	REAR RACK BRACKET (R.H.)
25	458-0478	REAR RACK (81W/41W)
	458-0479	REAR RACK (81WC/41WC)
26	650-3174	6-32 X 1/2 KNURLED THUMB SCREW
27	279-5161	SILENCER (81W/41W)
	279-5162	SILENCER (81WC/41WC)
28	652-0020	1/4 X 20 FLANGE NUT

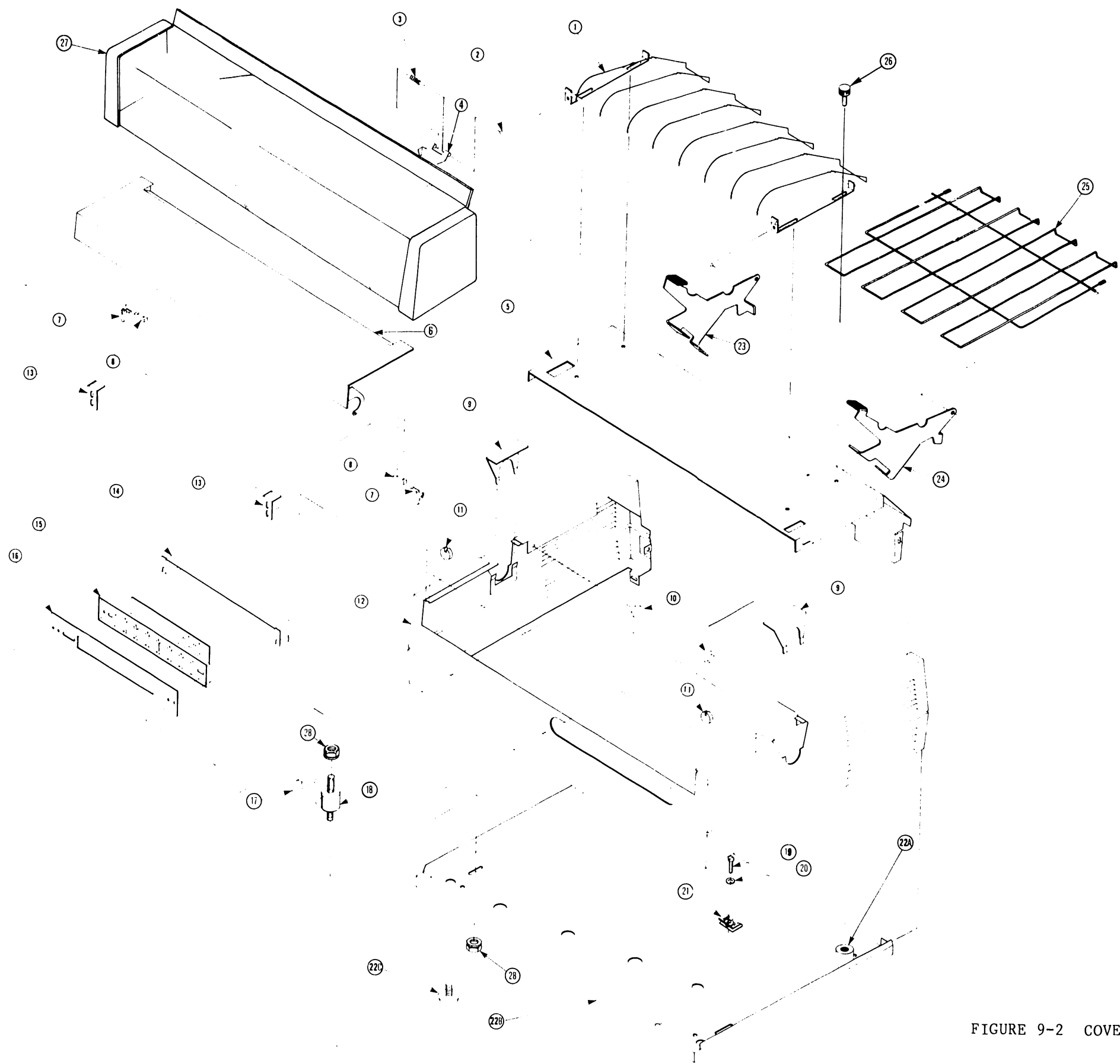


FIGURE 9-2 COVERS

## 9.3.2 FRAMES (SEE FIGURE 9-3)

(NO ASSEMBLY PART NO.)

ITEM NO.	PART NO.	DESCRIPTION
1	458-0832	LEFT SIDE FRAME
2	458-0833	RIGHT SIDE FRAME
3	451-1228	FRONT BASE TRAY (81W/41W)
	451-1229	FRONT BASE TRAY (81WC/41WC)
4	653-6001	NO. 10 LOCK WASHER
5	652-6000	NO. 10 NUT
6	653-6000	NO. 10 FLAT WASHER
7	650-4400	8-32 X 1 1/4 SOCKET CAP HEAD SCREW
8	451-4478	IDLER PULLEY BRKT
9	461-3292	IDLER PULLEY STUD
10	279-5112	IDLER PULLEY ASSY
11	651-1730	RETAINER RING
12	420-1038	CABLE (81W/41W)
	420-1039	CABLE (81WC/41WC)
13	449-0169	NUT RETAINER
14	478-0338	BASE TRAY MOUNTING NUT
15	650-6163	10-32 X 1/2 SOCKET HEAD CAP SCREW
16	461-3301	PAPER BAIL ROD (81W/41W)
	461-3320	PAPER BAIL ROD (81WC/41WC)
17	655-0242	CARRIAGE BUMPER
18	462-0246	SPACER
19	650-3200	6-32 X 5/8 PHILLIPS PAN HEAD SCREW
20	652-3005	6-32 NUT
21	650-2087	4-40 X 1/4 PHILLIPS PAN HEAD SCREW
22	458-0380	PAPER BAIL ARM (R.H.)
23	465-0938	PAPER BAIL SPRING TORTION
24	650-4080	8-32 X 1/4 PHILLIPS PAN HEAD SCREW
25	451-4724	SWITCH BRKT
26	325-0027	CHEAT SWITCH
27	650-4160	8-32 X 1/2 PHILLIPS PAN HEAD SCREW
28	650-4171	8-32 X 1/2 HEX HEAD SCREW
29	465-1646	PLATEN PLATE EXTENSION SPRING
30	653-4000	NO. 8 FLAT WASHER
31	452-4043	PLATEN PLATE COLLAR
32	461-3311	COPY CONTROL ECCENTRIC
33	650-4061	8-32 X 3/16 SOCKET SET SCREW
34	461-3299	SHAFT COPY CONTROL (81W/41W)
	461-3319	SHAFT COPY CONTROL (81WC/41WC)
35	279-5115	CARRIAGE DRIVE MOTOR ASSY (REFER TO PARAGRAPH 8.3.5)
36	400-1003	FAN
37	452-2574	FLEX CABLE CLAMP (REAR)
38	465-1649	COPY CONTROL SPRING
39	449-0171	COPY CONTROL LEVER
40	465-1654	CABLE SPRING
	465-1797	CABLE SPRING (ONE PIECE USE WITH NEW CARRIAGE CORDS ONLY)
41	650-9046	1/4 X 3/8 SHOULDER SCREW
42	461-3295	SHAFT (81W/41W)
	461-3322	SHAFT (81WC/41WC)

ITEM NO.	PART NO.	DESCRIPTION
43	458-0379	PAPER BAIL ARM (L.H.)
44	465-1071	PAPER BAIL ROLLER
45	452-2574	FLEX CABLE CLAMP
46	465-1665	SPRING
47	375-2107	SLOTTED OPTICAL SWITCH
48	451-4480	SWITCH BRKT.
49	279-5122	PLATEN PLATE ASSY (R.H.)
49a	452-0214	PLATEN PLATE (R.H.)
49b	449-0170	PAPER RELEASE KNOB
49c	451-4482	PLATEN HORIZ. ADJUSTING BRKT. (R.H.)
49d	458-0384	PLATEN LATCH (R.H.)
49e	458-0385	PAPER OUT BRACKET LINK
49f	461-3031	CLEVIS PIN
49g	461-3302	PAPER RELEASE KNOB PIVOT
49h	461-3309	PLATEN PLATE ECCENTRIC
49j	478-0426	PAPER BAIL STOP
49k	650-3202	6-32 X 5/8 SOCKET CAP SCREW
49l	650-4080	8-32 X 1/4 PHILLIPS PAN HEAD SCREW
49m	651-1712	RETAINER RING
49n	651-1719	RETAINER RING
49p	651-1752	RETAINER RING
49q	652-0029	8-32 LOCK NUT
49r	653-4000	NO. 8 FLAT WASHER
50	279-5124	PLATEN PLATE ASSY (L.H.)
50a	452-0213	PLATEN PLATE (L.H.)
50b	451-4481	PLATEN HORIZ ADJUSTING BRKT (L.H.)
50c	458-0383	PLATEN LATCH (L.H.)
50d	651-1712	RETAINER RING
50e	279-5126	PAPER FEED MOTOR ASSY
50e1	279-5145	PAPER FEED MOTOR AND PLUG ASSY
50e2	461-2023	IDLER GEAR
50e3	461-3306	IDLER GEAR STUD
50e4	461-3310	IDLER GEAR ECCENTRIC
50e5	652-6002	10-32 LOCK NUT
50e6	653-6000	NO. 10 FLAT WASHER

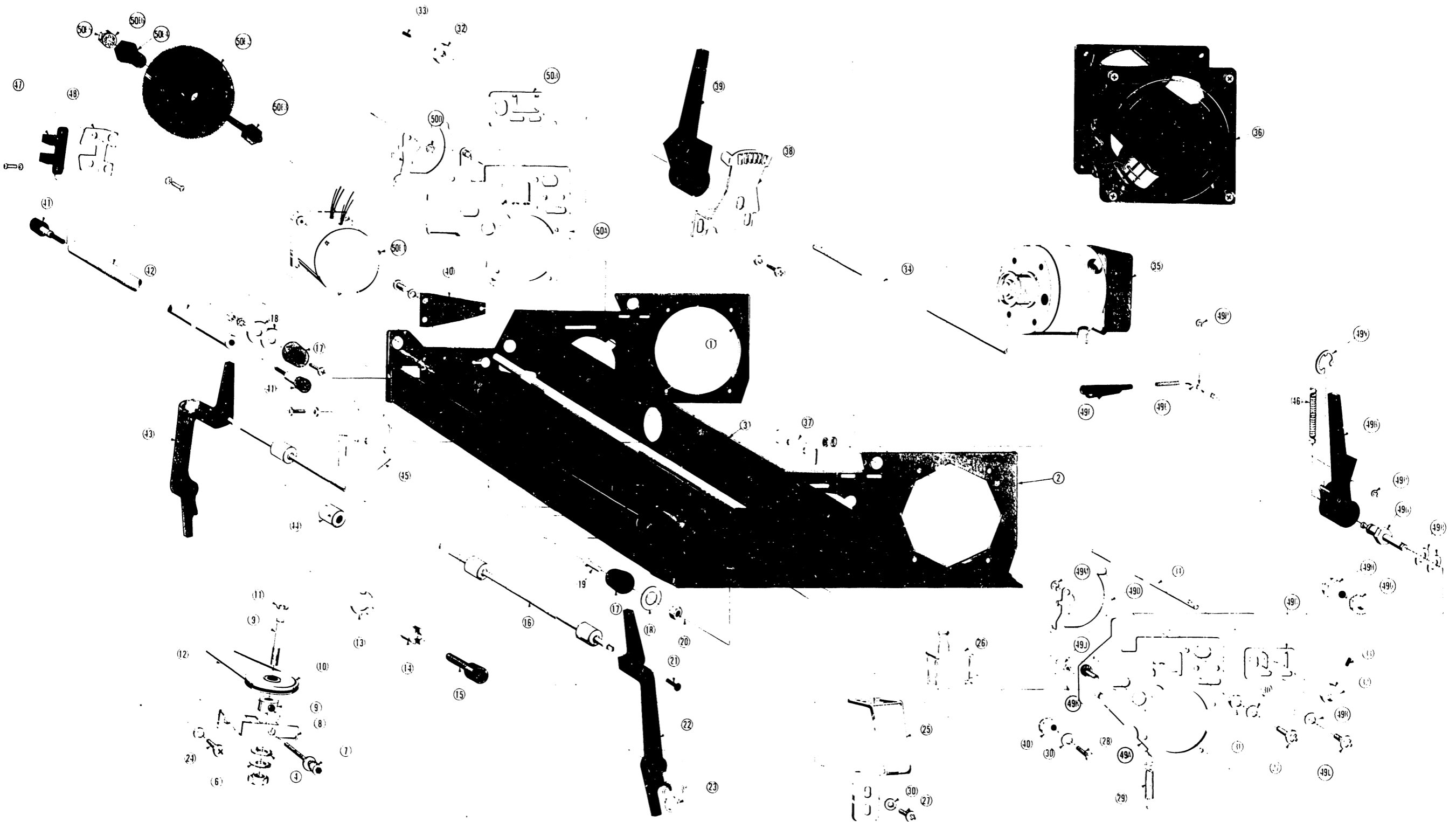


FIGURE 9-3 FRAMES



- 9.3.3 'U' CHANNEL ASSEMBLY 279-5117 (81W/41W) (SEE FIGURE 9-4)  
 'U' CHANNEL ASSEMBLY 279-5166 (81W/41W) item #39 not used  
 'U' CHANNEL ASSEMBLY 279-5117-1 (81WC/41WC)

ITEM NO.	PART NO.	DESCRIPTION
1	279-5118	ARM & ROLLER STUD ASSY L.H.
2	279-5118-1	ARM & ROLLER STUD ASSY R.H.
3	279-5119	ARM & GUIDE STUD ASSY L.H.
4	279-5119-1	ARM & GUIDE STUD ASSY R.H.
5	451-1943	ROLLER ARM MOUNT CHANNEL (81W/41W)
	452-2162	ROLLER ARM MOUNT CHANNEL (81WC/41WC)
6	451-4483	ROLLER ARM PIVOT BRKT
7	451-4485	CAM PLATE LOCATE BRKT L.H.
8	451-4486	CAM PLATE LOCATE BRKT R.H.
9	451-4493	PAPER OUT DETECT BRKT (81W/41W)
	451-4494	PAPER OUT DETECT BRKT (81WC/41WC)
10	451-4729	L.H. MOUNTING BRKT
11	451-4730	R.H. MOUNTING BRKT
12	451-7008	ROLLER ARM ADJUSTING BRKT
13	458-0377	FEED ROLLER MOUNTING ARM
14	458-0386	PAPER RELEASE CAM FOLLOWER
15	458-0396	PAPER OUT BRKT LEVER
16	458-0458	PAPER SCALE (81W/41W)
	458-0459	PAPER SCALE (81WC/41WC)
17	458-0600	TENSION SPRING
18	461-3277	PLATEN PRESSING ROLLER SHAFT
19	461-3305	FEED ARM PIVOT SHAFT (81W/41W)
	461-3324	FEED ARM PIVOT SHAFT (81WC/41WC)
20	461-3315	CAM ROD (81W/41W)
	461-3321	CAM ROD (81WC/41WC)
21	461-3317	CAM FOLLOWER STUD
22	461-3325	PAPER OUT BRKT PIVOT
23	462-0340	DEFLECTOR SPACER
24	465-0734	NYLON BEARING
25	465-1647	ROLLER ARM EXTENSION SPRING
26	650-0083	2-56 X 1/4 PHILLIPS PAN HEAD SCREW
27	650-2120	4-40X 3/8 PHILLIPS PAN HEAD SCREW
28	650-3040	6-32 X 1/8 SOCKET SET SCREW
29	650-4080	8-32 X 1/2 PHILLIPS PAN HEAD SCREW
30	650-4136	8-32 X 3/8 SET SCREW
31	650-4132	8-32 X 3/8 HEX HEAD SCREW
32	650-4173	8-32 X 1/2 HEX HEAD SCREW
33	651-1649	1/8 X 3/4 GROOVED PIN
34	651-1702	RETAINER RING
35	651-1712	RETAINER RING
36	651-1727	RETAINER RING
37	652-0029	8-32 LOCK NUT
38	652-0990	2-56 NUT
39	653-0042	NYLON WASHER (NOT USED ON 279-5166)
40	660-0577	SOUND DEADENER FOAM

RELATED COMPONENTS NOT PART OF ABOVE ASSEMBLIES

41	451-4492	PAPER OUT SWITCH BRKT
42	325-2460-M	PAPER OUT SWITCH
43	461-0103	NUT PLATE
44	465-1645	SPRING
45	453-0400	PAPER DEFLECTOR (81W/41W)
45	458-0466	PAPER DEFLECTOR (81WC/41WC) FOR USE WITH UNITS NOT HAVING ITEM #39
	458-0401	PAPER DEFLECTOR (81WC/41WC)

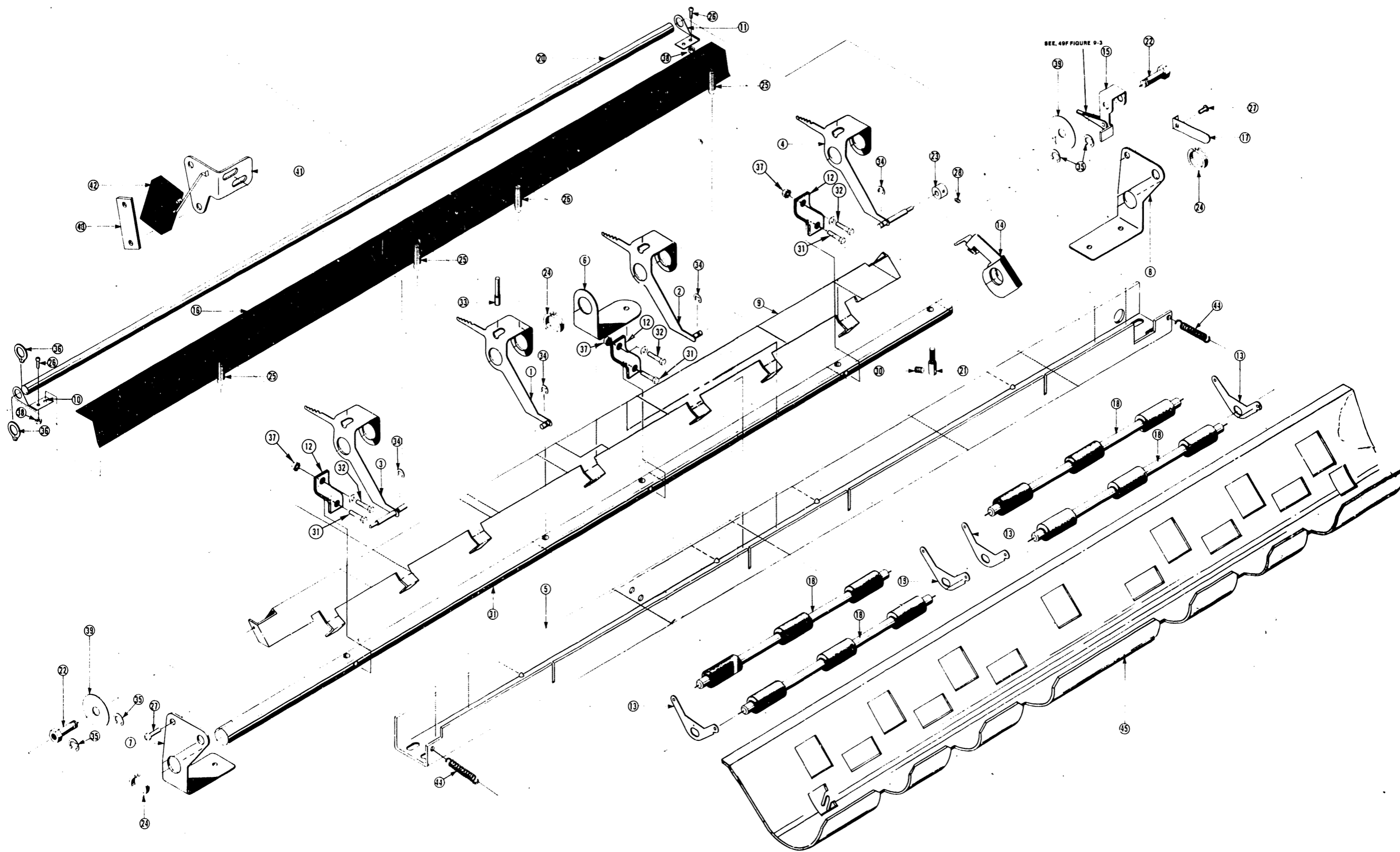


FIGURE 9-4 U CHANNEL ASSEMBLY

F9.3.4 CHASSIS ASSEMBLY (SEE FIGURE 9-5)

270-0559	(81W/41W) 60HZ
270-0559-1	(81W/41W) 50HZ
270-0560	(81WC/41WC) 60HZ
270-0560-1	(81WC/41WC) 50HZ

ITEM NO.	PART NO.	DESCRIPTION
1	300-3082	CAPACITOR
2	300-9027	CAPACITOR CLAMP
3	452-0035	SPEAKER GRILLE PLATTER
4	320-0300	SPEAKER
5	270-0578	FILTER SWITCH BOX ASSY
6	350-1036	BNC CONNECTOR
7	350-2078	TNC CONNECTOR
8		PART OF ITEM NOS. 6 & 7
9	451-1154	CHASSIS (81W/41W)
	451-1120	CHASSIS (81WC/41WC)
10	325-0021	ON/OFF SWITCH
11	300-9026	OVAL CAPACITOR CLAMP
12	300-3103	3uf 600 VAC CAPACITOR
13	270-3095	TRANSFORMER HARNESS ASSY (60HZ)
	270-3108	TRANSFORMER HARNESS ASSY (50HZ)
14	300-3075	CAPACITOR
15	300-9009	CAPACITOR BRKT
16	380-4005	3 LEG RECTIFIER
17	300-3078	8.2uf CAPACITOR
18	380-4006	4 LEG RECTIFIER
19	449-C304	PC BOARD HOLD DOWN CLAMP
20	325-2117	110/220 VAC SWITCH

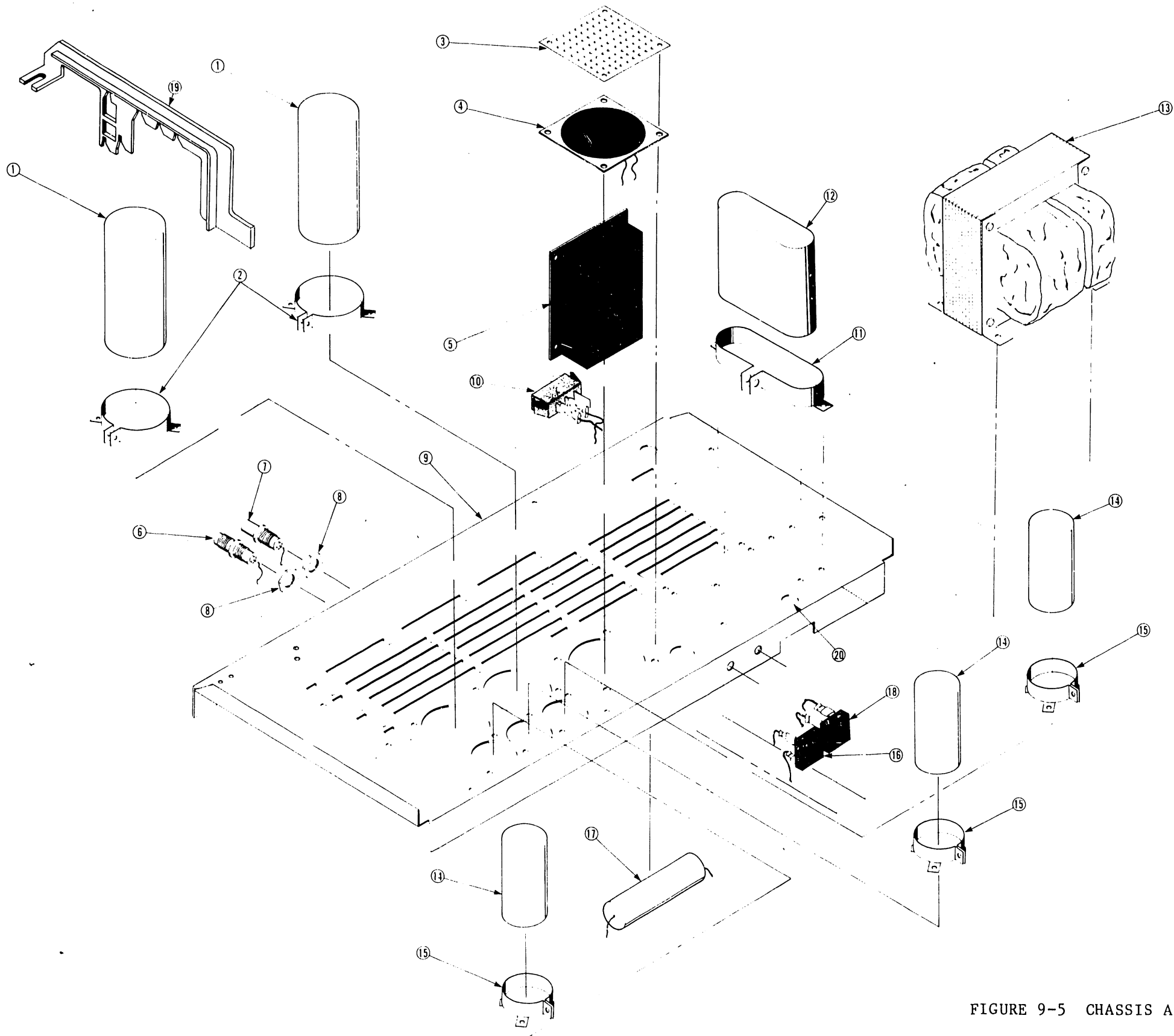


FIGURE 9-5 CHASSIS ASSEMBLY

9.3.5 CARRIAGE DRIVE MOTOR ASSEMBLY (SEE FIGURE 9-6)

(279-5115)

ITEM NO.	PART NO.	DESCRIPTION
1	380-0402	3 CHANNEL ENCODER "X" BLACK
2	449-0174	CARRIAGE ENCODER COVER
3	451-4496	ENCODER ADJ. BRKT
4	452-0070	ENCODER PLATE
5	452-2573	ENCODER HUB CLAMP
6	458-0375	ENCODER HUB CAP
7	461-1036	PRINT WHEEL ENCODER DISK
8	461-3298	ENCODER ADJ. SCREW
9	465-1062	ENCODER HUB
10	650-0007	0-80 X 5/16 SCREW
11	650-2087	4-40 X 1/4 SCREW
12	650-2160	4-40 X 1/2 SCREW
13	650-2168	4-40 X 1/2 SOCKET HEAD CAP SCREW (BLACK)
14	650-3130	6-32 X 3/8 TRUSS HEAD SCREWS
15	650-3319	6-32 X 1 PHILLIPS FLATHEAD SCREW
16	651-1753	RETAINER RING
17	653-2001	NO. 4 FLAT WASHER
18	653-3001	NO. 6 INT. T. LOCKWASHER
19	654-1215	GROMMET
20	656-0107	ENCODER SEAL
21	279-0411	MOTOR & HUB ASSY
21a	400-0034	CARRIER MOTOR
21b	478-0341	CARRIAGE DRUM
21c	651-1507	ROLL PIN
21d	(Part of Item 21a)	BRUSH RETAINER SCREW
21e	400-9012	BRUSH ASSY
21f	(Part of Item 21a)	BRASS RETAINER
21g	(Part of Item 21a)	BRASS SCREW
22	220-1177	CARRIAGE DRIVE MOTOR CABLE ASSY

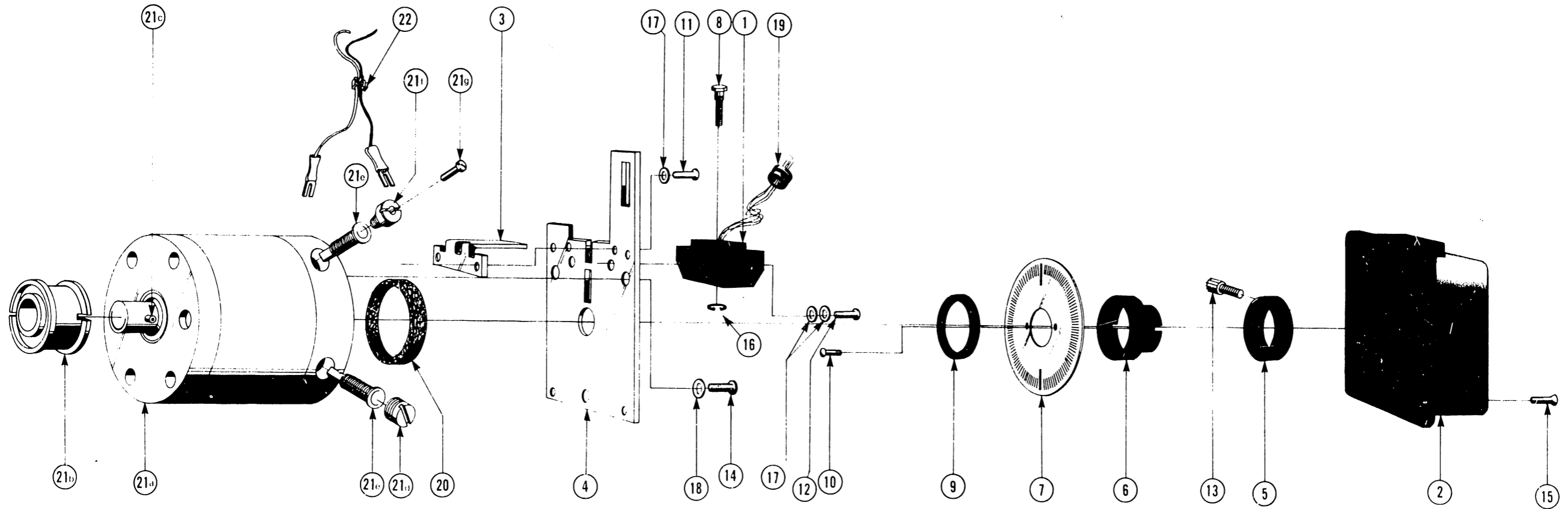


FIGURE 9-6 CARRIAGE DRIVE MOTOR ASSEMBLY

## 9.3.6 CARRIAGE ASSEMBLY (SEE FIGURE 9-7)

(279-5127)

ITEM NO.	PART NO.	DESCRIPTION
1	449-0168	FELT RETAINER
2	451-4495	CARD GUIDE MOUNTING BRKT
3	451-4640	BEARING MOUNTING BRKT
4	451-4732	CARRIAGE BRKT
5	452-0554	NUT PLATE
6	452-4044	CARD GUIDE
7	458-0399	CARRIAGE PHOTOCELL ACTUATOR
8	458-0521	SPRING HANGER
9	461-3289	CARRIAGE BEARING HOUSING
10	461-3293	DISK MOTOR PIVOT SHAFT
11	461-3323	BEARING HOUSING MOUNTING SCREW
12	465-0015	BALL BEARING
13	465-1702	SPRING
14	465-1711	WIRE SPRING
15	478-0388	BEARING BRKT MOUNTING STUD
16	478-0389	BEARING MOUNTING PIN
17	650-2087	4-40 X 1/4 PHILLIPS PAN HEAD SCREW
18	650-3061	6-32 X 3/16 PHILLIPS PAN HEAD SCREW
19	650-3080	6-32 X 1/4 PHILLIPS PAN HEAD SCREW
20	650-3100	6-32 X 5/16 PHILLIPS PAN HEAD SCREW
21	650-3132	6-32 X 3/8 TRUSS HEAD PHILLIPS SCREW
22	651-1702	RETAINER RING
23	651-1712	RETAINER RING
24	651-1727	RETAINER RING
25	651-1735	'C' RING
26	652-0029	8-32 LOCK NUT
27	652-2005	4-40 LOCK NUT
28	652-3005	6-32 LOCK NUT
29	653-2000	NO. 4 FLAT WASHER
30	653-3001	NO. 6 INT. T LOCKWASHER
31	654-1215	GROMMET
32	656-0013	'O' RING
33	656-0106	CARRIAGE SHAFT WIPER RING
34	279-5131	CARRIAGE PULLEY ASSY
35	279-5163	DAISY MOTOR MOUNT ASSY
35a	220-1179	DISK DRIVE MOTOR CABLE ASSY
35b	279-5129	PRINT YOKE & BEARING ASSY (SEE FIGURE 8-9)
35c	279-5135	DISK DRIVE MOTOR ASSY
35c.1	279-5202	HUB & TAB ASSY
35c.2	400-0036	PRINT WHEEL MOTOR
35c.3	651-1504	ROLL PIN
35d	380-0401	3 CHANNEL ENCODER 'Z' (GREY) (FOR MOUNTING HARDWARE SEE FIGURE 9-8)
35e	449-0245	DISK ENCODER COVER
35f	449-0331	COLUMN INDICATOR BRKT
35g	450-0144	DISK MOTOR MOUNT CASTING
35h	451-4484	HAMMER HOUSING MOUNTING BRKT
35i	451-4496	ENCODER ADJ. BRKT

ITEM NO.	PART NO.	DESCRIPTION
35j	452-0528	WASHER PLATE
35k	458-0571	DISK MOTOR LATCH
35l	461-1048	PRINT WHEEL ENCODER MOUNTING PLATE
35m	461-1049	PRINT WHEEL ENCODER DISK
35n	461-3283	PRINT HAMMER HOUSING
35p	461-3297	DISK MOTOR LATCH PIVOT ECCENTRIC
35q	461-3298	ENCODER ADJ. SCREW
35r	462-0296	DISK MOTOR SPACER
	or	
35r	462-0328	DISK MOTOR SPACER
35s	465-1117	ENCODER DISK MOUNTING HUB
35t	465-1746	HAMMER COMPRESSION SPRING (AFTER 1/81)
35u	478-0516	PRINT WHEEL ENCODER MOUNTING RING
35v	478-0708-M	PRINT HAMMER
35w	550-0067	BLACK CAP
35x	650-2082	4-40 X 1/4 PHILLIPS FLAT HEAD SCREW
35y	650-2241	4-40 X 3/4 PHILLIPS FLAT HEAD SCREW
35z	650-3092	6-32 X 1/4 PHILLIPS FLAT HEAD 100 DEG SCREW
35aa	650-3120	6-32 X 3/8 PHILLIPS PAN HEAD SCREW
35ab	650-3134	6-32 X 3/8 SOCKET CAP HEAD SCREW
35ac	650-3139	6-32 X 3/8 HEX HEAD SCREW
35ad	651-0041	4 X 5/16 SLOT HEX WASHER HEAD SCREW
35ae	653-2001	NO. 4 FLAT WASHER
35af	653-3000	NO. 6 FLAT WASHER
35ag	655-0257	DAISY WHEEL BUMPER

RELATED PARTS NOT PART OF ABOVE ASSEMBLIES

36	650-3160	6-32 X 1/2 PHILLIPS PAN HEAD SCREW
37	452-0077	CONNECTOR CLAMPING PLATE
38	451-4498	FLEX CABLE BRKT
39	220-1342	WIRE LUG ASSEMBLY
40	220-3042	HEAD CABLE ASSEMBLY



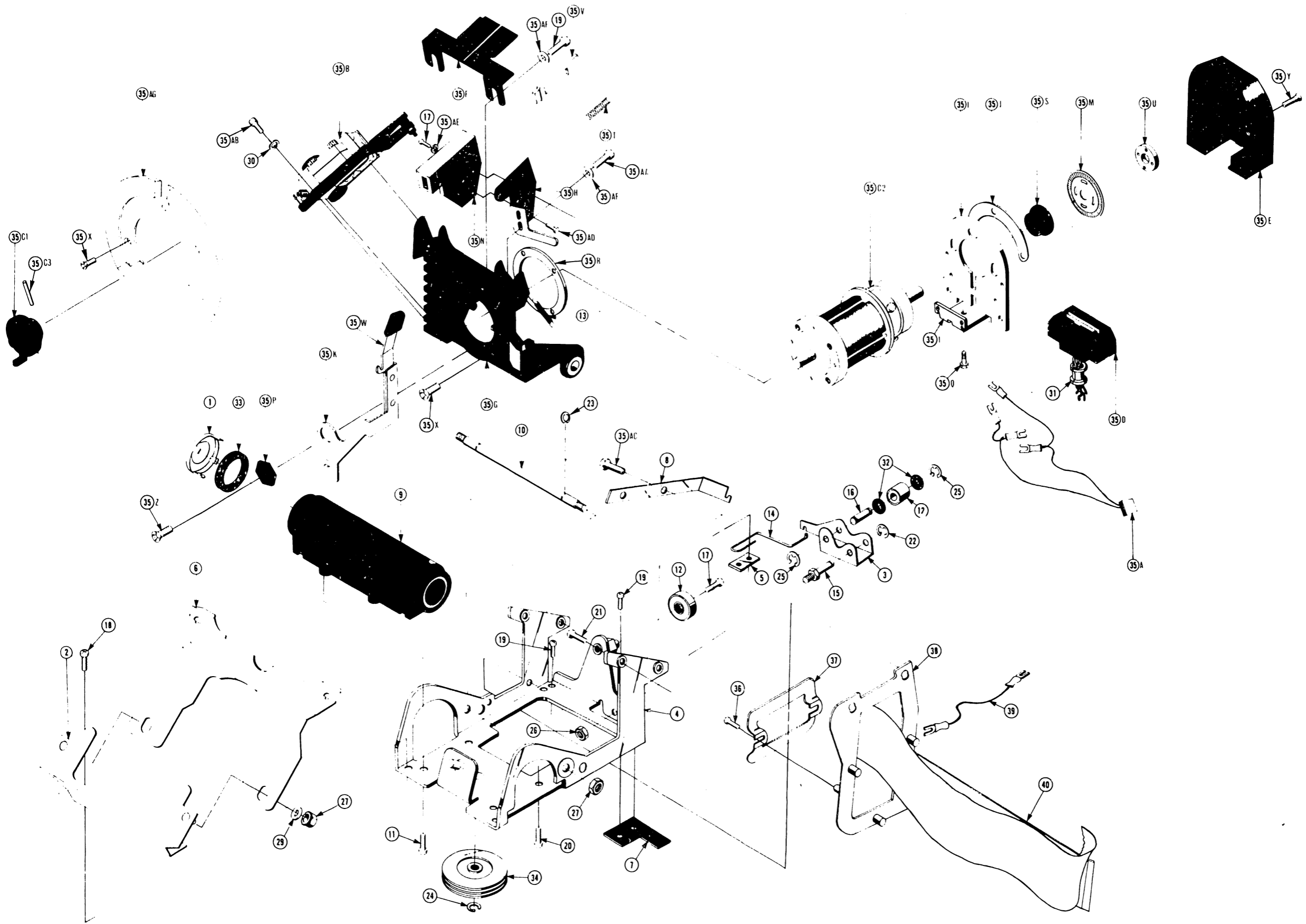


FIGURE 9-7 CARRIAGE ASSEMBLY

## 9.3.7 PRINT WHEEL ENCODER MOUNTING (SEE FIGURE 9-8)

(NO ASSEMBLY PART NO.)

ITEM NO.	PART NO.	DESCRIPTION
1	652-2000	NO. 4-40 NUT
2	653-2001	NO. 4 FLAT WASHER
3	380-0401	3 CHANNEL ENCODER 'Z' (GREY)
4	653-2002	NO. 4 LOCK WASHER
5	650-2160	4-40 X 1/2 PHILLIPS PAN HEAD SCREW
6	461-3298	JACK SCREW
7	651-1753	RETAINER RING
8	654-1215	GROMMET

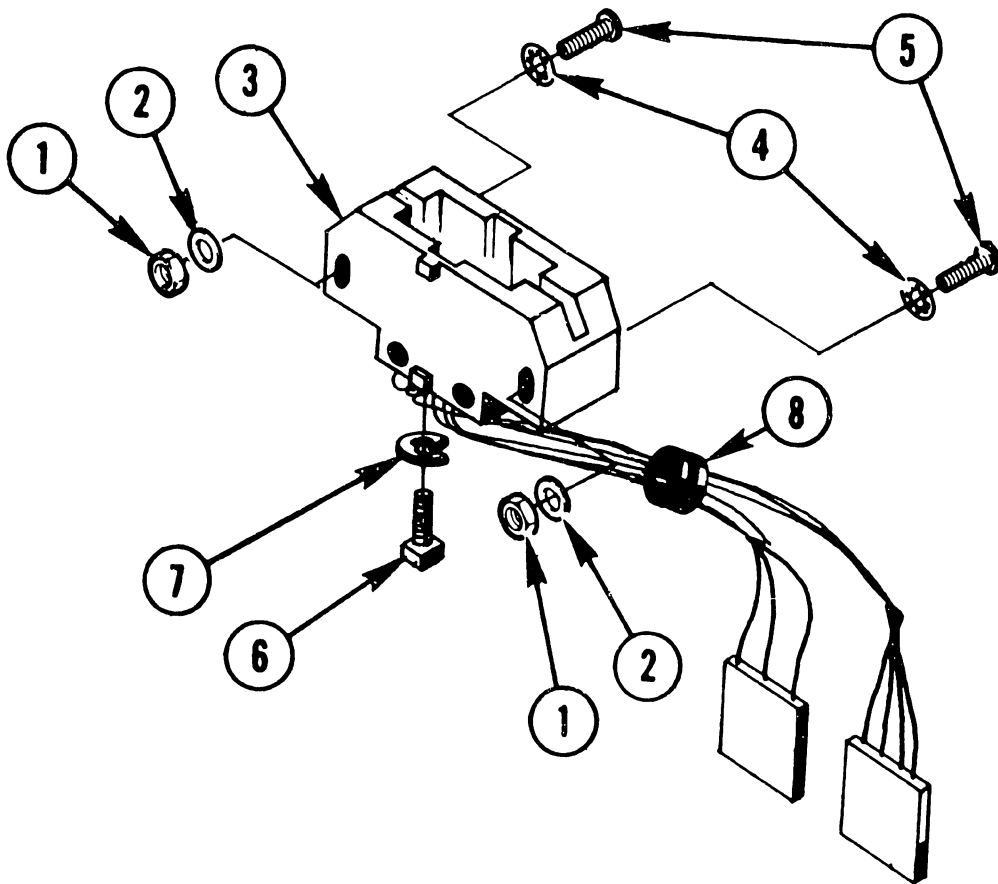


FIGURE 9-8 PRINT WHEEL ENCODER MOUNTING

9.3.8 PRINT YOKE AND BEARING ASSEMBLY (SEE FIGURE 9-9)  
(279-5129)

ITEM NO.	PART NO.	DESCRIPTION
1	450-0107	PRINT SOLENOID YOKE
2	458-0373	PRINT SOLENOID ARM
3	458-0586	LAMINATION STACK
4	461-3290	ARMATURE INSERT
5	461-3296	SOLENOID ARMSTOP ECCENTRIC
6	650-2081	4-40 X 1/4 PHILLIPS HEAD FLAT SCREW
7	650-3165	6-32 X 1/2 HEX CAP SCREW W/NYLOK
8	652-3005	6-32 LOCK NUT
9	653-3000	NO. 6 FLATWASHER
10	653-3001	NO. 6 LOCKWASHER
11	655-0014	CAPLUG
12	655-0244	PRINT ARM STOP BUMPER
13	279-5146	HAMMER SOLENOID & PLUG ASSY
13a	320-0055	PRINT SOLENOID COIL
13b	654-0105	CONNECTOR HOUSING
14	465-1660	ARM RETURN EXTENSION SPRING

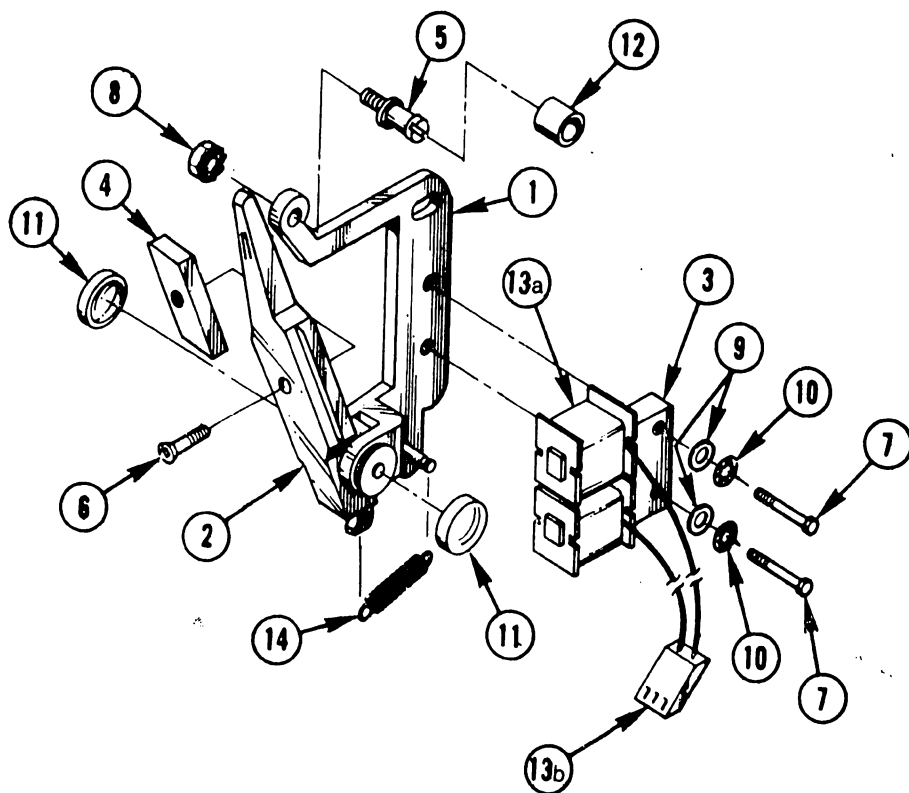


FIGURE 9-9 PRINT YOKE AND BEARING ASSEMBLY

9.3.9 RIBBON PLATFORM ASSEMBLY (See Figure 9-10)

(279-5150)

ITEM NO.	PART NO.	DESCRIPTION
1	325-2309	MICROSWITCH
2	375-2110-4	END-OF-RIBBON SENSOR
3	449-0165	DRIVER PLATE GUIDE
4	449-0167	MOTOR BUSHING
5	449-0172	CARTRIDGE CLIP
6	451-4499	END-OF-RIBBON SENSOR BRKT.
7	458-0397	RIBBON INDICATOR
8	458-0569	LOCK LATCH
9	461-0063	NUT PLATE
10	461-2024	DRIVER PLATE IDLER GEAR
11	461-3313	LEFT CARTRIDGE CLIP SHAFT
12	461-3314	RIGHT CARTRIDGE CLIP SHAFT
13	465-1652	RIBBON MOTOR SPRING
14	465-1657	CARTRIDGE RETURN & INDICATOR SPRING
15	465-1658	CARTRIDGE CLIP SPRING
16	478-0343	CARTRIDGE POSITION NUT
17	550-0067	BLACK CAP
18	650-0008	1-64 X 3/8 SCREW
19	650-0140	2-56 X 7/16 PHILLIPS PAN HEAD SCREW
20	650-2044	4-40 X 1/8 SOCKET CAP HEAD SCREW
21	650-2087	4-40 X 1/4 PHILLIPS PAN HEAD SCREW
22	651-1755	RETAINING RING
23	651-1756	RETAINING RING
24	651-1762	RETAINING RING
25	652-2005	4-40 LOCK NUT
26	653-2001	NO. 4 FLATWASHER
27	279-5132	PLATFORM ASSY
27a	458-0394	PLATFORM
27b	461-3326	CARTRIDGE SENSOR PIVOT BRACKET
27c	465-0823	CARTRIDGE CLIP HINGE (R.H.)
27d	465-0842	CARTRIDGE HINGE (L.H.)
28	279-5133	DRIVER PLATE ASSY
29	279-0468	SPIKE DRIVER ASSY
29a	458-0374	RIBBON DRIVER SPIKE
29b	462-0331	SPIKE DRIVER SPACER
29c	449-0458	DRIVER HUB
30	279-5147	RIBBON MOTOR & PLUG ASSY
31	220-1178	E.O.R. & RIBBON SELECT CABLE ASSY

RELATED COMPONENTS NOT PART OF ABOVE ASSEMBLY

32	478-0569	LATCH STUD
33	465-1686	SPRING
34	458-0570	RELEASE LATCH
35	650-2080	SELF LOCKING SCREW
36	651-1762	RETAINING RING

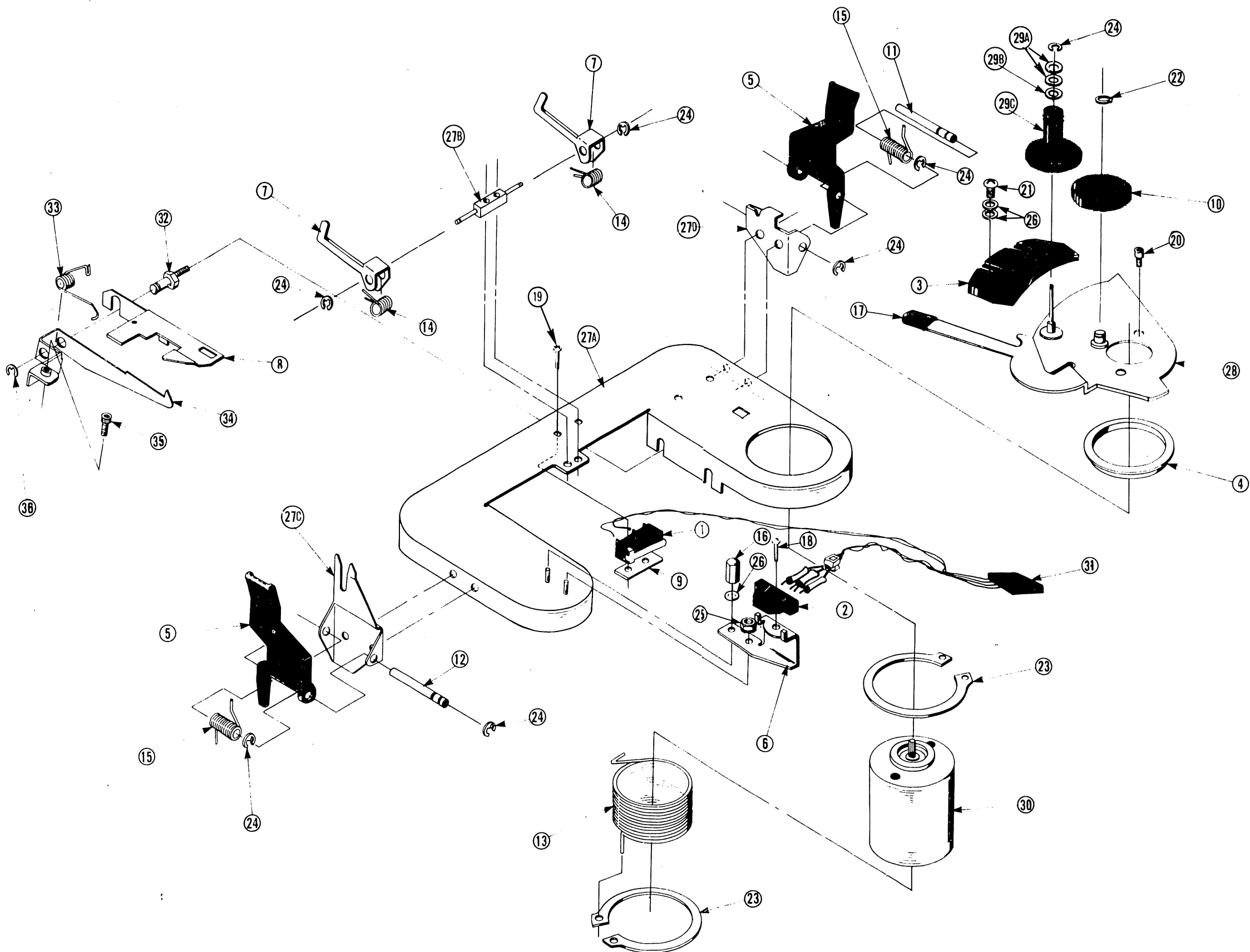


FIGURE 9-10 RIBBON PLATFORM ASSEMBLY

9.3.10 PLATEN ASSEMBLY 279-5120 (81W/41W) (SEE FIGURE 9-11)

PLATEN ASSEMBLY 279-5120-1 (81WC/41WC)

ITEM NO.	PART NO.	DESCRIPTION
1	449-0156	PLATEN KNOB
2	449-0157	VERNIER CONE
3	449-0219	PLATEN VERNIER KNOB
4	458-0381	PLATEN (81W/41W)
	458-0382	PLATEN (81WC/41WC)
5	461-2022	VERNIER GEAR
6	461-2046	TRACTOR FEED GEAR
7	465-0262	NEEDLE BEARING
8	465-1648	VERNIER CLUTCH SPRING
9	615-0266	DRESS KNOB DISK
10	650-5100	10-24 X 5/16 SOCKET SET SCREW
11	650-6061	10-32 X 3/16 SOCKET SET NYLOK SCREW
12	651-1744	RETAINER RING
13	653-0041	VERNIER WASHER
14	653-0046	PLATEN VERNIER WASHER
15	279-5121	LOCATOR BUSHING & BEARING ASSY
15a	465-0311	BEARING
15b	465-0733	PLATEN LOCATOR BUSHING

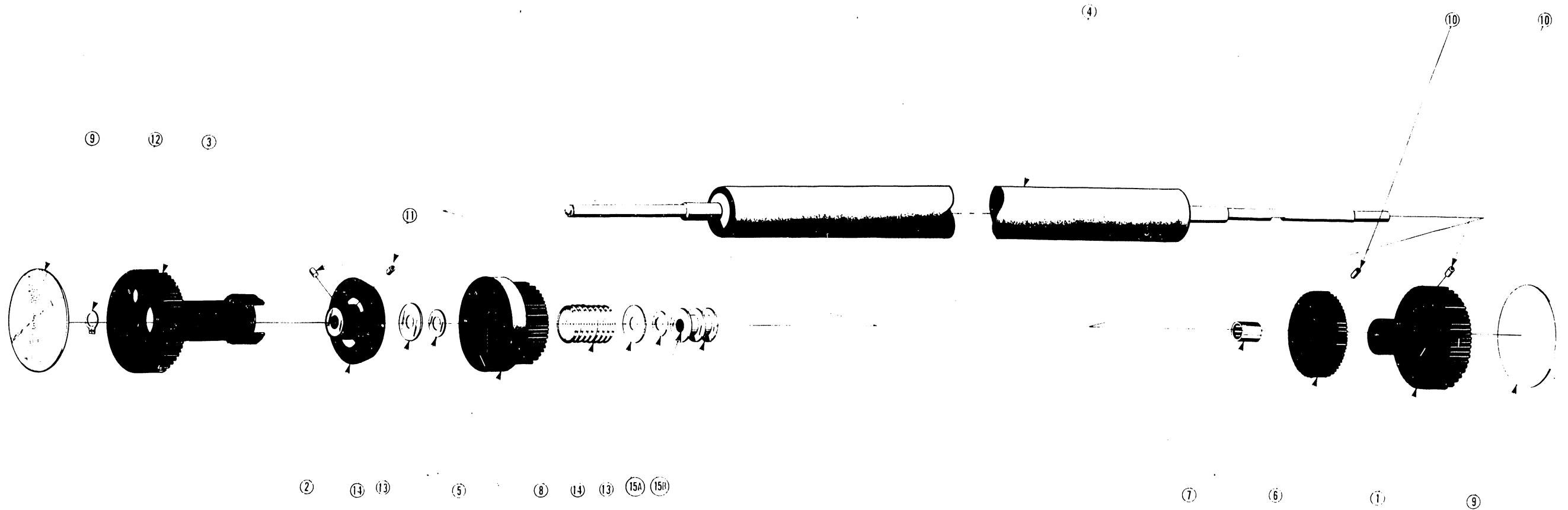


FIGURE 9-11 PLATEN ASSEMBLY

9.3.11 TRACTOR FEED ASSEMBLY 279-5159 (81W/41W) (SEE FIGURE 9-12)  
 TRACTOR FEED ASSEMBLY 279-5148 (81WC/41WC)

ITEM NO.	PART NO.	DESCRIPTION
1	279-5157	TRACTOR FEED FRAME (R.H.)
2	279-5158	TRACTOR FEED FRAME (L.H.)
3	451-2166	TRACTOR FEED COVER (L.H.)
4	451-2167	TRACTOR FEED COVER (R.H.)
5	458-0454	TRACTOR FEED RELEASE BUTTON
6	458-0455	PRESSURE ROLLER RELEASE
7	458-0456	TRACTOR FEED RELEASE ARM (L.H.)
	458-0457	TRACTOR FEED RELEASE ARM (R.H.)
8	458-0476	TOP RACK (81W/41W)
	458-0477	TOP RACK (81WC/41WC)
9	461-2025	TRACTOR FEED GEAR
10	461-2026	TRACTOR FEED GEAR
11	461-3346	TRACTOR FEED GUIDE ROD (81W/41W)
	462-3347	TRACTOR FEED GUIDE ROD (81WC/41WC)
12	461-3351	TRACTOR DRIVE ROD (81W/41W)
	461-3352	TRACTOR DRIVE ROD (81WC/41WC)
13	465-0013	BALL BEARING
14	465-0738	RELEASE ARM BUSHING
15	465-0939	SPRING
16	650-3130	6-32 X 5/8 PHILLIPS PAN HEAD SCREW
17	650-4084	8-32 X 1/4 FLANGE SCREW
18	650-4133	8-32 X 3/8 FLANGE SCREW
19	651-0003	6 X 3/8 SELF TAPPING SLOTTED SCREW
20	651-1732	RETAINER RING
21/22	725-1214	PAPER FEED TRACTORS (STOCKED AS A PAIR)



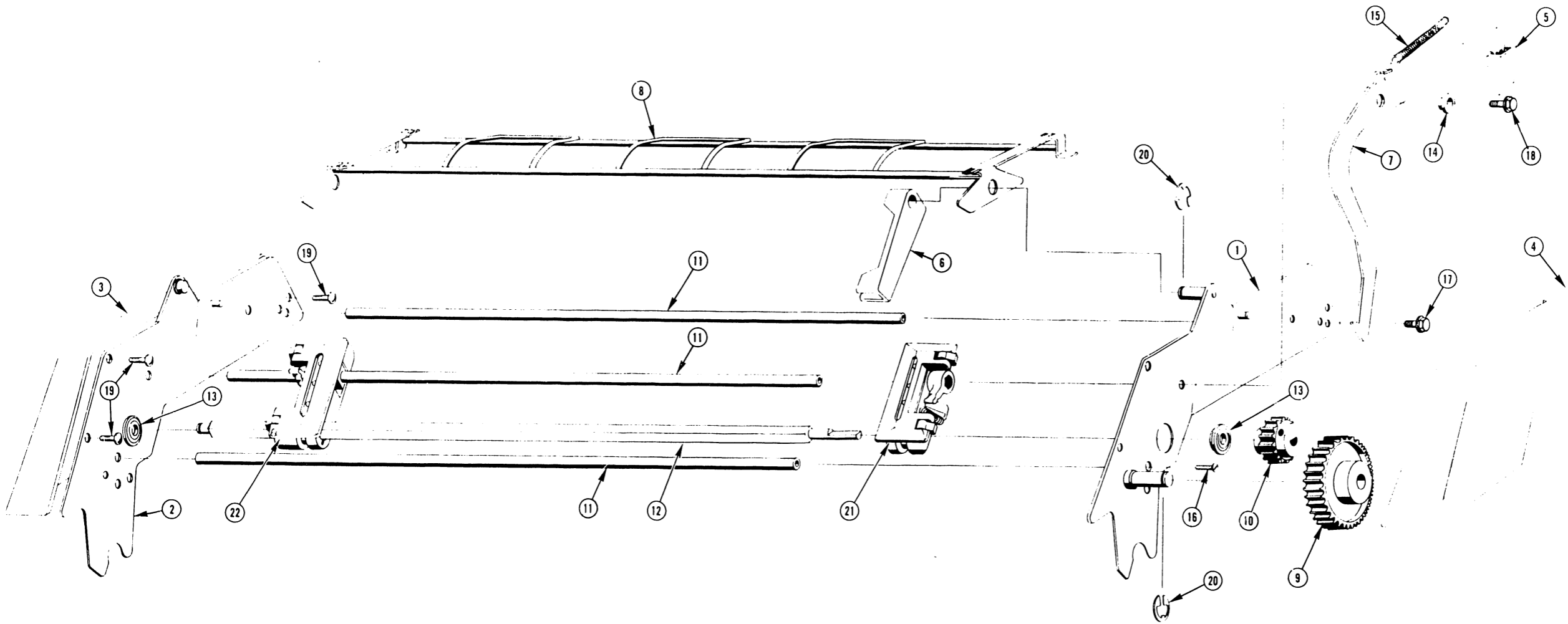


FIGURE 9-12 TRACTOR FEED ASSEMBLY

**APPENDIX**

**A**

**SIGNAL**

**MNEMON-**

**ICS**

## APPENDIX A

## SIGNAL MNEMONICS

<u>SIGNAL</u>	<u>DEFINITION</u>
A0-A15	Address Bus
CAR	Carriage Ready
CE	Chip Enable
CEP	Chip Enable Parallel
CHECK	Printer Malfunction Status
CMS	Carriage Motion Strobe
CO	Cover Open
D0-D7	Data Bus
DOI-D7I	Input Data Bus
D00-D70	Output Data Bus
DA1A-DA12A	Print Data Bus
DBIN	Data Bus In Clock
DESEL	Deselect
DIS	Data In Strobe
DLCL	Data Link Clear
DMA	Direct Memory Access
DMA R/W	DMA Read/Write
DMACE	DMA Chip Enable (Read)
DOL	Data Out Parallel Load (S/P Register)
DP8in	Parity Bit
DP8out	Parity Bit
EOR	End of Ribbon
FL	Fault Lamp
HAM(+)	Hammer Solenoid (+)
HAM(-)	Hammer Solenoid (-)
HF	Hammer Fire
HHALT	Hammer Enable
HIP	Hard Imprint Pressure
INO-INH	In Command Bus
INP	Input Instruction - Data Transfer In
INST	Instruction and Header Byte Decode Enable
INST R/B	Instruction Ready/Busy

3305	
IS	Instruction Start
LEDL	LED Load
LINE ERROR	Data Link Parity Error
LIP	Light Imprint Pressure
LMS	Left Margin Sense
MBP	Motor Booster Pulse
MEB IN	Memory Byte In Read Clock
MEM PAR	Memory Parity Bit (Data Link - Out)
MEM WO	Memory Write Status Bit
MIP	Medium Imprint Pressure
MR	Master Reset
MSSTK	Multi-Strike Ribbon
OPS	Option Strobe
OUT	Output Instruction
OUTO-OUTH	Out Commands
PAPER OUT	End Of Paper
PAR IN	Parity In From Data Link
PE	Parity Enable From Data In
PFR	Paper Feed Ready
PFS	Paper Feed Strobe
PL	Paper Out Lamp
PO	Paper Out
POWER RESET	Power Reset
PRY	Printer Ready
PROM	PROM Parity Error
PSL	Program Stop Lamp
PT1-PT4	Hammer Force
PWR	Print Wheel Ready
PWR ON PRIME	Power On Prime
PWR RES	Power Reset
PWS	Print Wheel Strobe
RC	Receive Complete
REC	Receive Mode
REC INT	Receive Interrupt
REF	RAM Refresh Signal
RESET	Reset 8080A
RESTART	Interrupt and Retry

RIBOUT	Ribbon Out
RL	Out of Ribbon Lamp
RLED	Ribbon LED
RLIFT	Ribbon Lift
RLS1	Ribbon Lift Solenoid
RLS2	Ribbon Lift Solenoid
RLT	Ribbon Lift
RMA	Forward Ribbon Motor
RMB	Reverse Ribbon Motor
RMDA	Forward Ribbon Drive
RMDB	Reverse Ribbon Drive
RMRA	Forward Ribbon Return
RMRB	Reverse Ribbon Return
SEL	Select/Deselect Printer
SL	Select Lamp
SPK	Speaker
SRCL	Serialization Register Clear
STATUS	Status request - Header Word Instruction
STCL	Clear Status Instruction
SYNC	Output 8080A Sync Clock
T1	Timing Pulse
TC	Write Transfer Instruction Clear
TCB	Read Transfer Instruction Clear
TOF	Top of Form
WR	Write Request
WRT	Data Link Power Up Clear
XB	Carriage B Channel
XC	Carriage C Channel
XDA	Carriage Command Voltage
XFS	Carriage Forward Switch
XHALT	Carriage Enable
XMD	Carriage Motor Drive
XMD1	Forward Carriage Motor Drive
XMD2	Reverse Carriage Motor Drive
XME	X Motor Error (overshoot detection)
XMR1	Forward Carriage Motor Return
XMR2	Reverse Carriage Motor Return

XMTR(+)	Carriage Motor
XP1	Carriage Position 1
XP2	Carriage Position 2
XPS	Carriage Position Switch
XRS	Carriage Reverse Switch
XS6	Carriage Command Switch
XVR	Carriage Velocity Restore
YMA	Forward Paper Feed Motor
YMB	Reverse Paper Feed Motor
YMDA	Forward Paper Feed Drive
YMDB	Reverse Paper Feed Drive
YMR1	Forward Paper Feed Motor Return
YMR1	Reverse Paper Feed Motor Return
ZB	Square Wave of ZSB
ZC	Daisy C Channel
ZCCWS	Daisy Counterclockwise
ZCWS	Daisy Clockwise
ZDA	Daisy Command Voltage
ZHALT	Daisy Enable
ZLEDA	Daisy LED Positioning Signal
ZLEDB	Daisy LED Positioning Signal
ZLEDC	Daisy LED Positioning signal
ZMD	Daisy Motor Drive
ZME	Z Motor Error (overshoot detection)
ZMR1	Daisy Motor
ZMR2	Daisy Motor Ground
ZMTR(+)	Daisy Motor (+)
ZP1	Daisy Position 1
ZP2	Daisy Position 2
ZPS	Daisy Position Switch
ZS6	Daisy Command Switch
ZSA	Daisy LED Channel A
ZSB	Daisy LED Channel B
ZSC	Daisy LED Channel C
ZVR	Daisy Velocity Restore
Ø1B	Timing Signal
Ø2B	Timing Signal

**CHAPTER**

**8**

**SCHEM-  
ATICS**

## CHAPTER 8

## SCHEMATICS

<u>FIG REF</u>	<u>DWG NO.</u>	<u>TITLE</u>
8-1		DAISY PRINTER INTERCONNECTION DIAGRAM
8-2		PCB 210-7263 CONNECTIONS AT CARRIAGE END OF RIBBON CABLE
8-3		HEAT SINK HARNESS
8-4		J-2 HEAD CABLE 220-3042 CONNECTIONS
8-5		RIBBON MOTOR HARNESS
8-6		EOR SENSOR HARNESS
8-7		HAMMER COILS HARNESS
8-8		PAPER FEED MOTOR HARNESS
8-9		LEFT MARGIN, COVER OPEN AND PAPER OUT SWITCH HARNESSES
8-10		PRINT WHEEL ENCODER HARNESSES
8-11		CARRIAGE ENCODER HARNESSES
8-12	7309	PRINTER/PLOTTER CONTROL (2281W and 2281WC WITH TSF)
8-13	7348	PRINTER CPU
8-14	7360	SERVO CONTROL BOARD
8-15	7361	PRINTER CONTROLLER BOARD
8-16	7364	PS REGULATOR
8-17	7365	DAISY PRINTER KEYBOARD
8-18	7443	DIABLO PRINTER/PLOTTER CONTROL (2281W)
8-19	7446	DAISY PTR DATA LINK
8-20	7449	PRINTER CONTROL (SYSTEM 5)
8-21	7462	MOTHERBOARD
8-22	7547	16K RAM PRINTER MEMORY
8-23	7549	SHARED PRINTER OPTION (SYSTEM 5)
8-24	7570	DAISY PRINTER KEYBOARD (2281W/WC)
8-25	7636	PTR I/O TWIN SHEET FEEDER CONTROL
8-26	7736	PTR I/O TWIN SHEET FEEDER/ENVELOPE FEEDER CONTROL
8-27	7726	2281W TSF/EF CONTROL
8-28	7847	64K RAM PRINTER MEMORY
8-29	220-3042	HEAD CABLE ASS'Y 81 AND 82



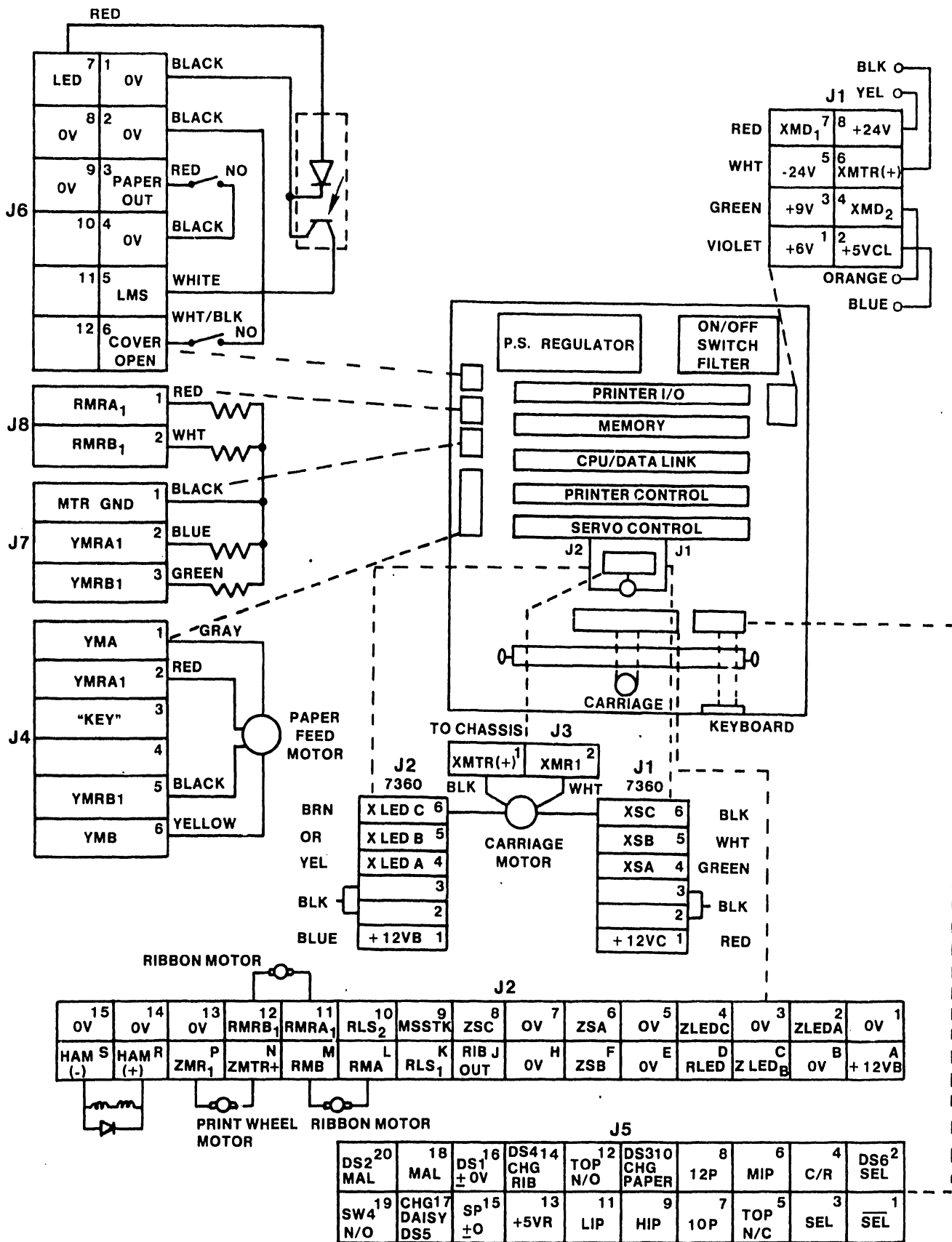


FIGURE 8-1 DAISY PRINTERS INTERCONNECTION DIAGRAM

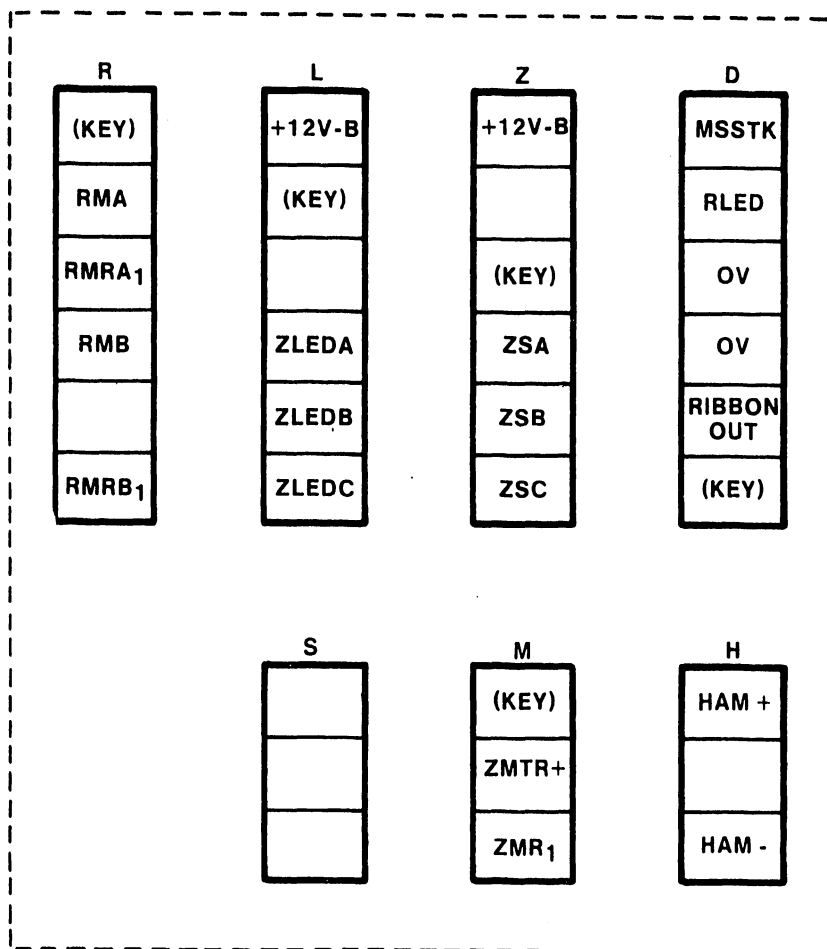


FIGURE 8-2 PCB WL# 210-7263 CONNECTIONS AT CARRIAGE END OF RIBBON CABLE

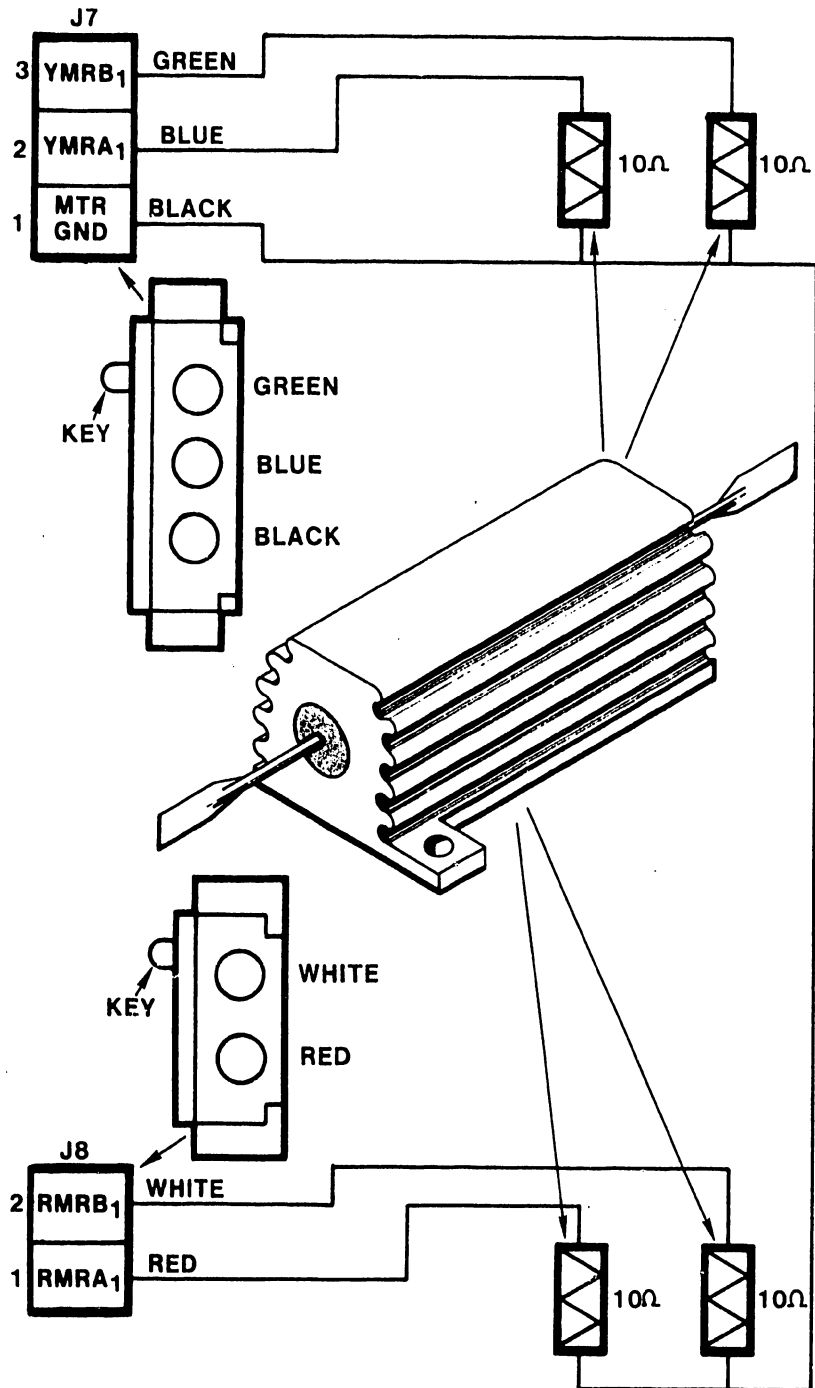


FIGURE 8-3 HEAT SINK HARNESS

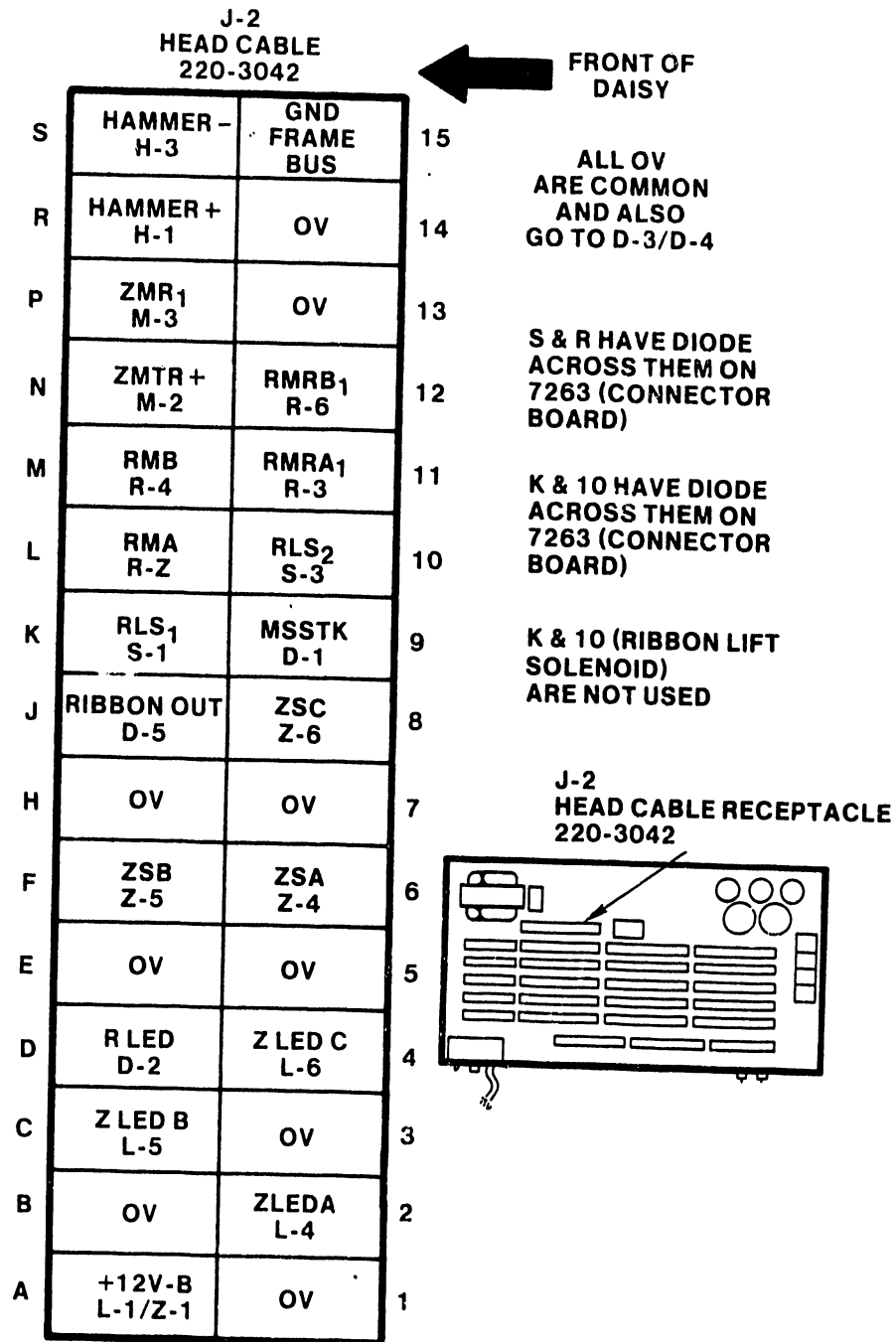


FIGURE 8-4 J-2 HEAD CABLE WL# 220-3042 CONNECTIONS

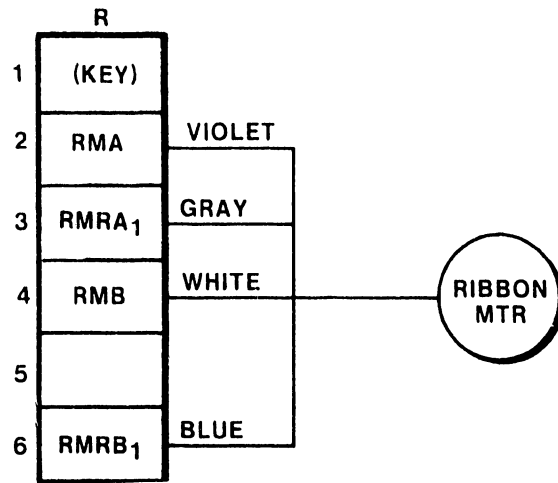


FIGURE 8-5 RIBBON MOTOR HARNESS

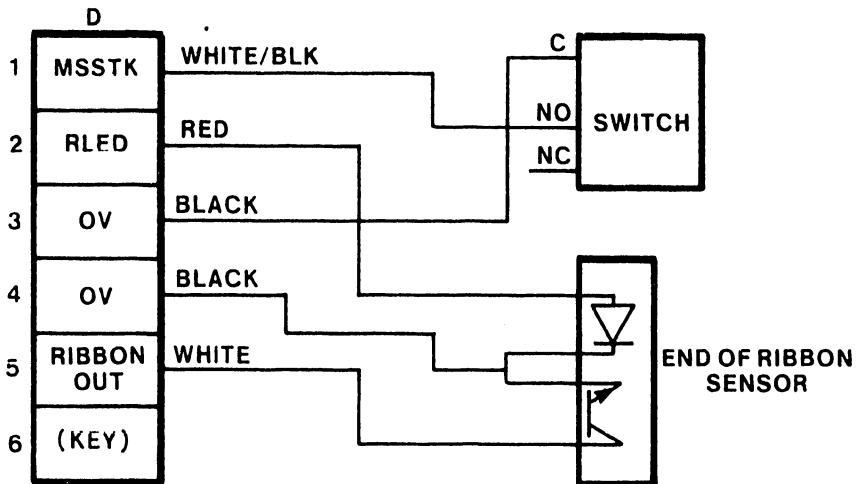


FIGURE 8-6 EOR SENSOR HARNESS

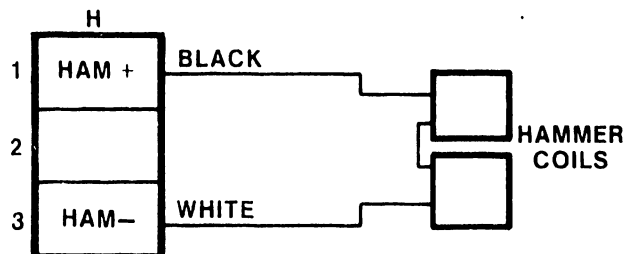


FIGURE 8-7 HAMMER COILS HARNESS

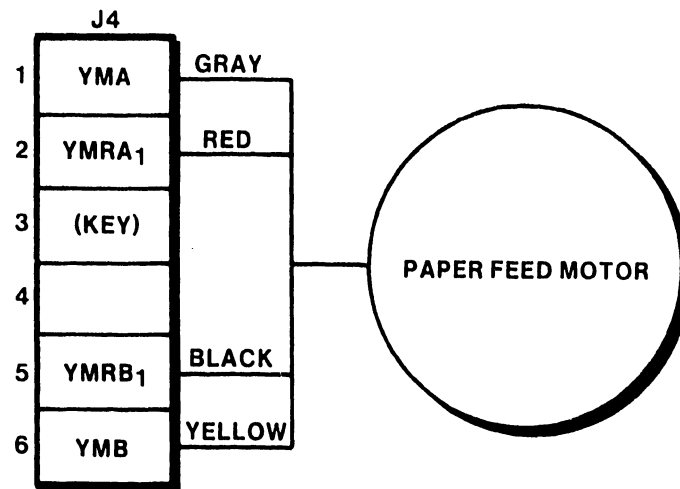


FIGURE 8-8 PAPER FEED MOTOR HARNESS

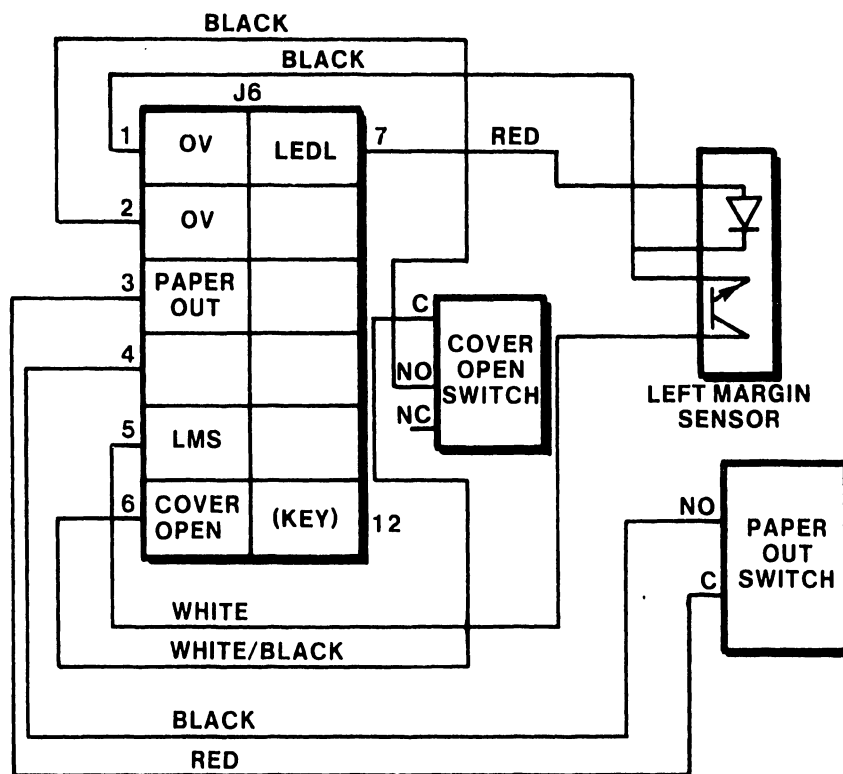


FIGURE 8-9 LEFT MARGIN, COVER OPEN AND PAPER OUT SWITCH HARNESSES

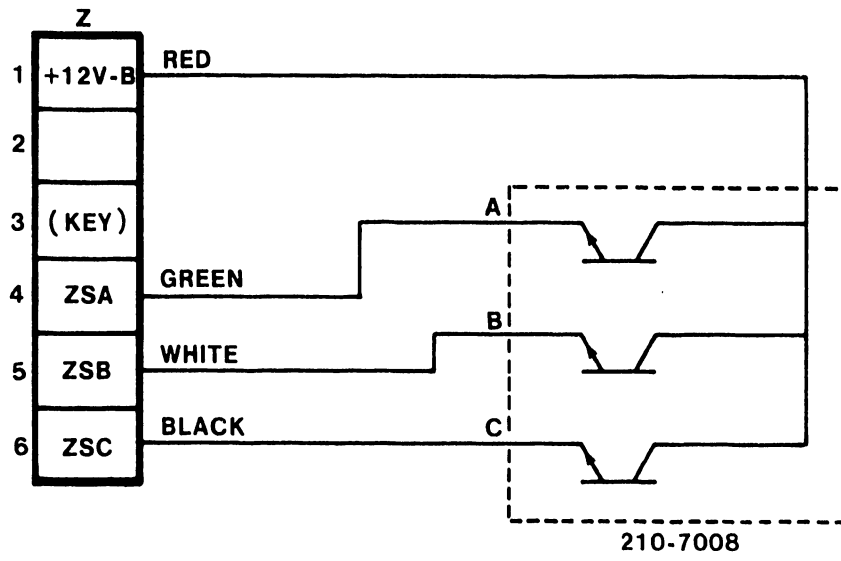
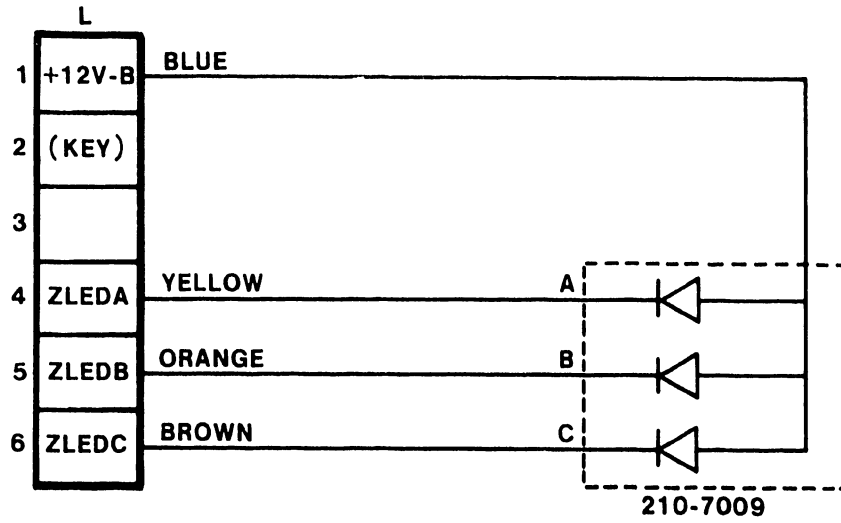


FIGURE 8-10 PRINT WHEEL ENCODER HARNESSES

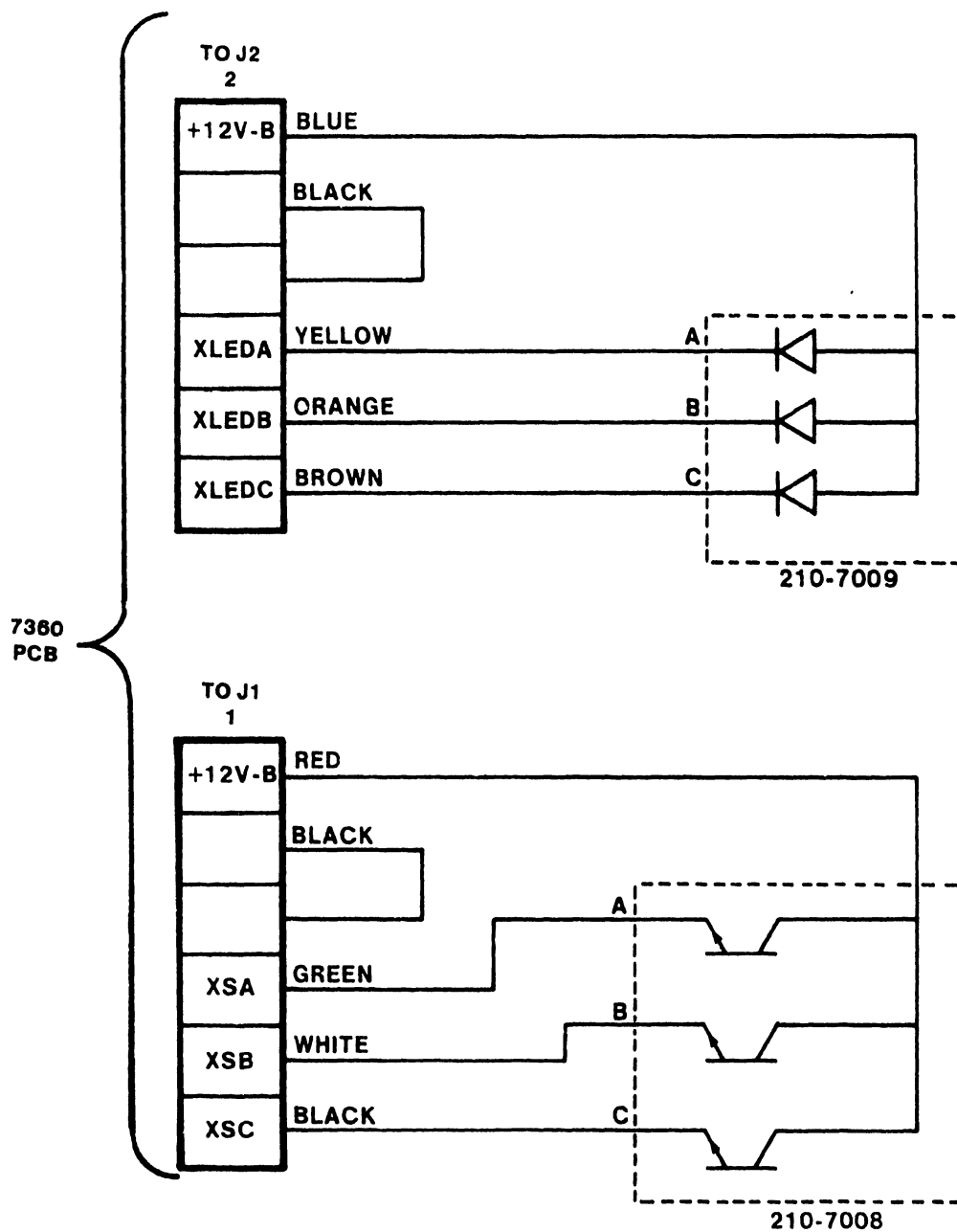


FIGURE 8-11 CARRIAGE ENCODER HARNESSSES





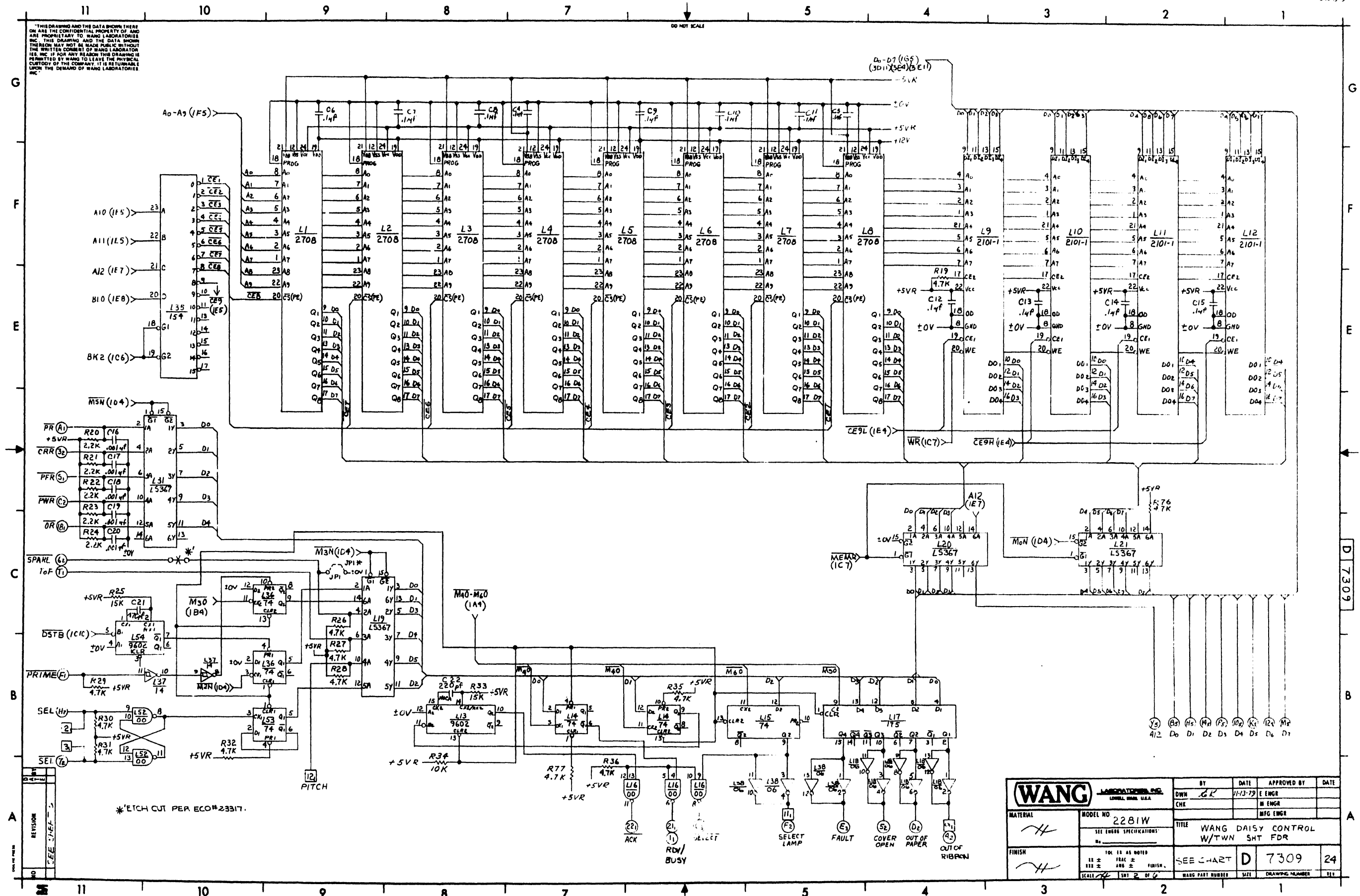


FIGURE 8-12 PRINTER/PLOTTER CONTROL WL# 7309 (2281W and 2281WC WITH TSF)  
(SHEET 2 OF 6)

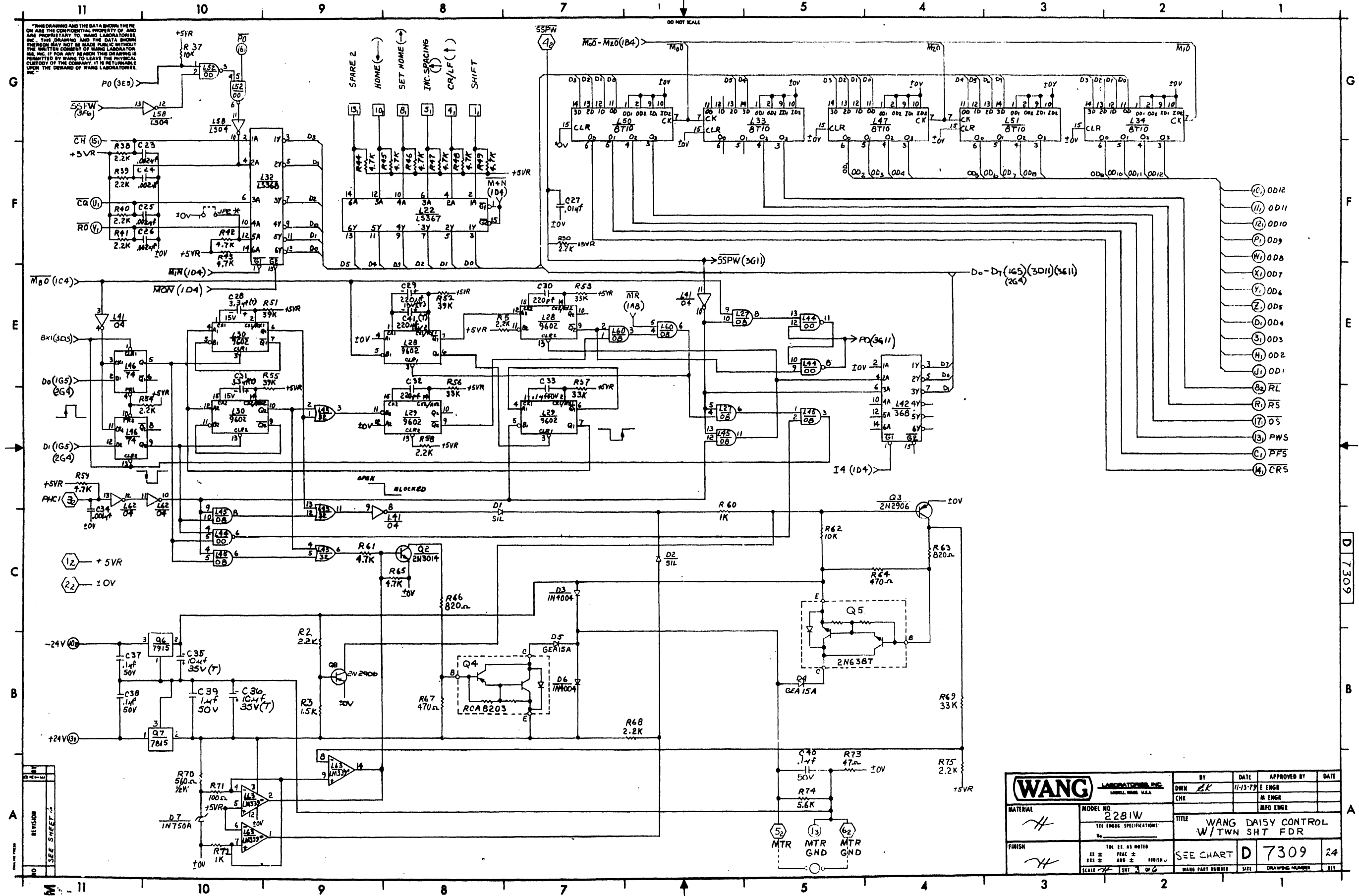
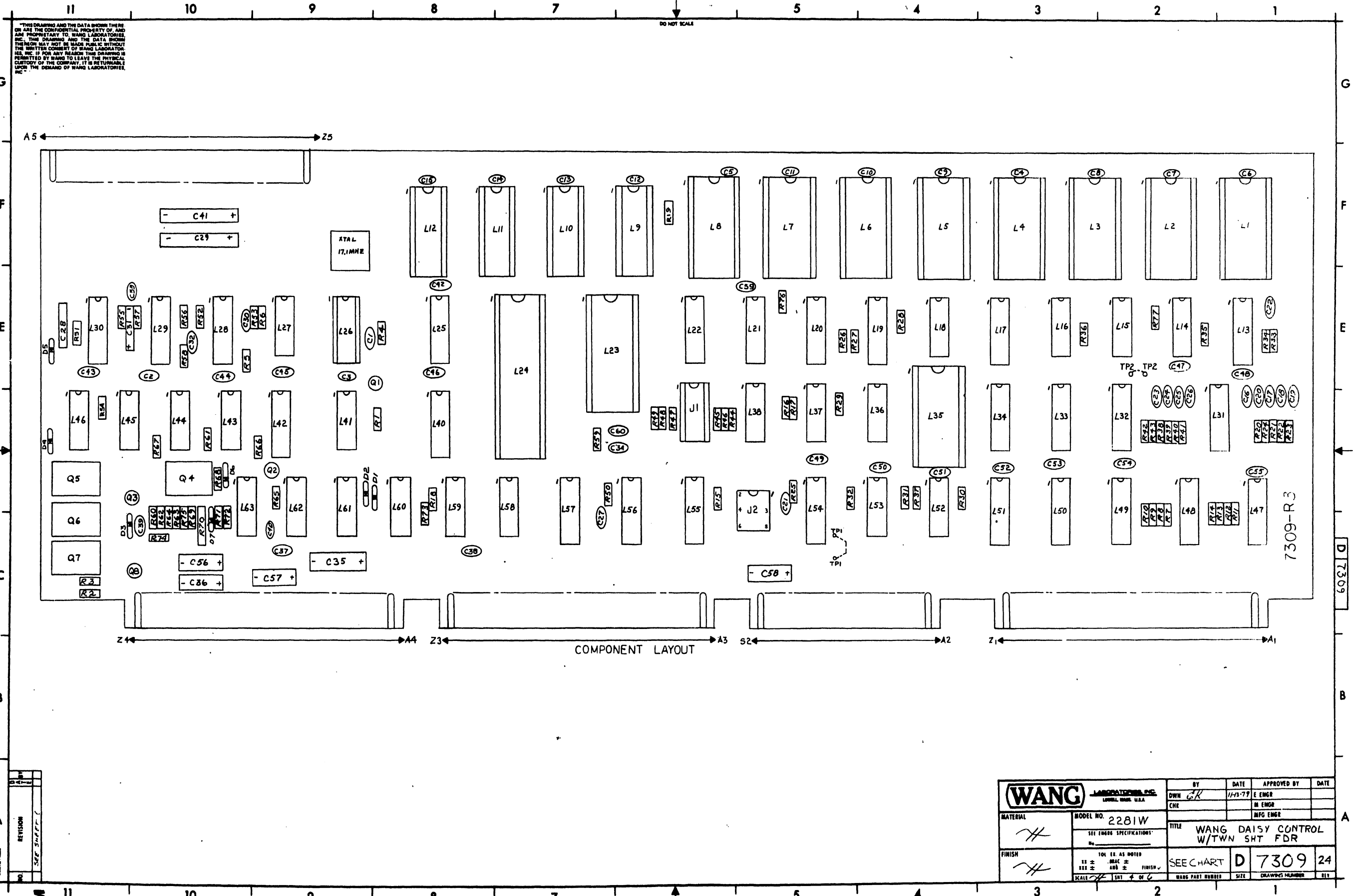


FIGURE 8-12 PRINTER/PLOTTER CONTROL WL# 7309 (2281W and 2281WC WITH TSF)  
(SHEET 3 OF 6)



NO.	REVISION
1	SEE SHEET C

<b>WANG</b> LABORATORIES, INC. LORAIN, MASS. U.S.A.		BY DWN	DATE 11-13-77	APPROVED BY E ENGR	DATE
MATERIAL /		MODEL NO. 2281W	TITLE WANG DAISY CONTROL W/TWN SHT FDR		
FINISH /		SEE CHART	D	7309	24
SCALE 1 SHT. 4 OF 6		WANG PART NUMBER	SIZE	DRAWING NUMBER	REV

FIGURE 8-12 PRINTER/PLOTTER CONTROL WL# 7309 (2281W and 2281WC WITH TSF)  
(SHEET 4 OF 6)

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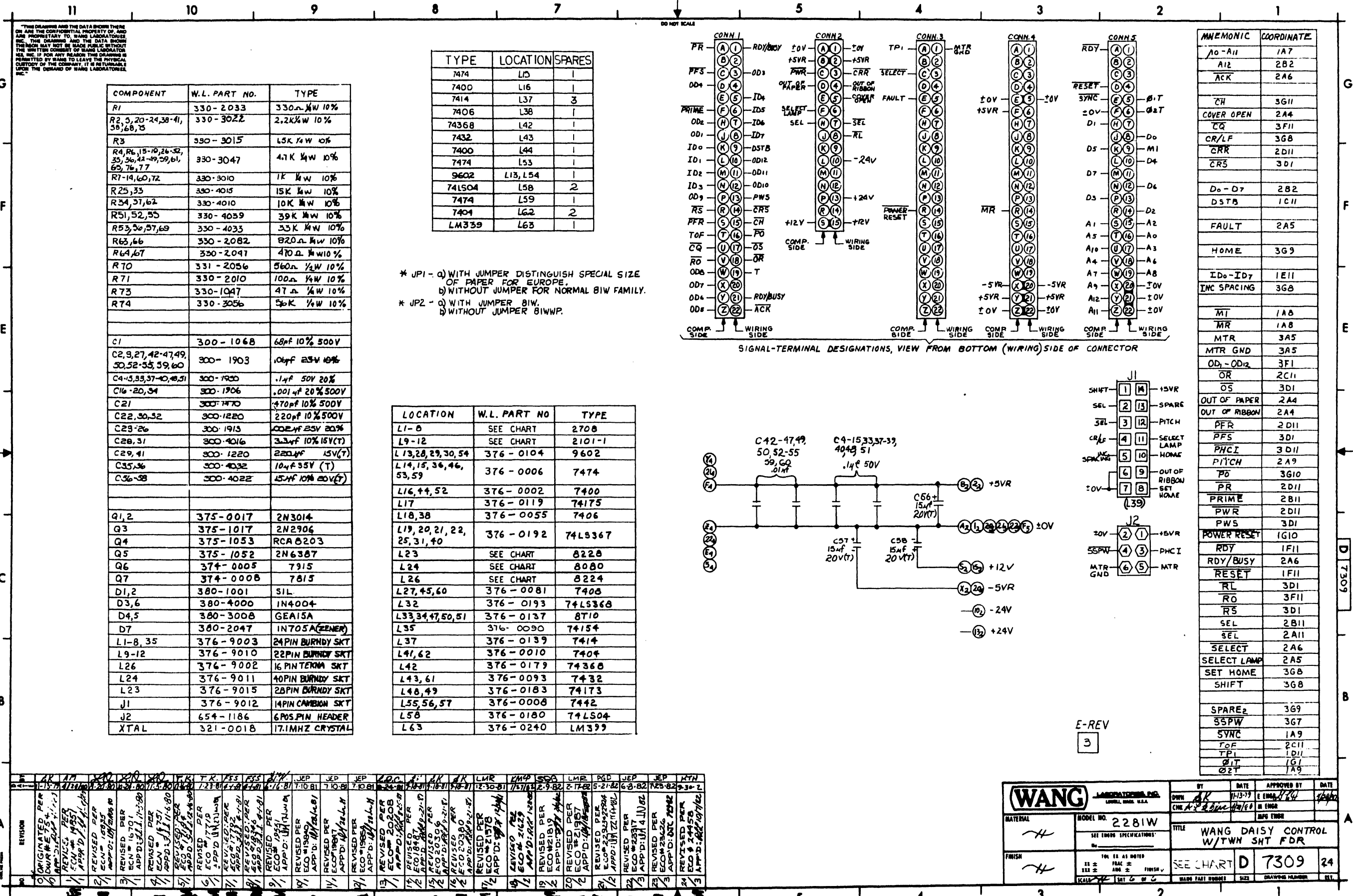
DO NOT SCALE

MODEL	210-209, 378 OR 377												
	209	210	L1	L3	L4	L5	L6	L7	L8	L9-12	L23	L24	L26
	7309	7309-A	378-2559-R7	378-2590-R7	378-2558-R7	378-2557-R7	378-2556-R7	378-2355-R7	378-2554-R7	377-0308	377-0338	377-0269	377-0337
2281WR/2281WCR	7309	7309-B	378-2734-R2	378-3096-R1	378-3095-R1	378-3094-R1	378-3093-R1	378-3092-R1	378-3091-R1	377-0308	377-0338	377-0269	377-0337
SWISS	7309	7309-C	378-2732-R3	378-3086-R3	378-3085-R3	378-3084-R3	378-3083-R3	378-3082-R3	378-3081-R3	377-0308	377-0338	377-0269	377-0337
AZERTY	7309	7309-D	378-2733-R2	378-3086-R3	378-3085-R3	378-3084-R3	378-3083-R3	378-3082-R3	378-3081-R3	377-0308	377-0338	377-0269	377-0337
UK	7309	7309-E	378-2734-R2	378-3086-R3	378-3085-R3	378-3084-R3	378-3083-R3	378-3082-R3	378-3081-R3	377-0308	377-0338	377-0269	377-0337
DUTCH	7309	7309-F	378-2735-R1	378-3086-R3	378-3085-R3	378-3084-R3	378-3083-R3	378-3082-R3	378-3081-R3	377-0308	377-0338	377-0269	377-0337
D/N	7309	7309-G	378-2736-R3	378-3086-R3	378-3085-R3	378-3084-R3	378-3083-R3	378-3082-R3	378-3081-R3	377-0308	377-0338	377-0269	377-0337
S/F	7309	7309-H	378-2737-R2	378-3086-R3	378-3085-R3	378-3084-R3	378-3083-R3	378-3082-R3	378-3081-R3	377-0308	377-0338	377-0269	377-0337
SPANISH	7309	7309-J	378-2738-R2	378-3086-R3	378-3085-R3	378-3084-R3	378-3083-R3	378-3082-R3	378-3081-R3	377-0308	377-0338	377-0269	377-0337
GERMAN	7309	7309-K	378-2731-R2	378-3086-R3	378-3085-R3	378-3084-R3	378-3083-R3	378-3082-R3	378-3081-R3	377-0308	377-0338	377-0269	377-0337
CANADIAN	7309	7309-L	378-2738-R1	378-3086-R3	378-3085-R3	378-3084-R3	378-3083-R3	378-3082-R3	378-3081-R3	377-0308	377-0338	377-0269	377-0337
GREEK/LATIN	7309	7309-M	378-2753	378-3086-R3	378-3085-R3	378-3084-R3	378-3083-R3	378-3082-R3	378-3081-R3	377-0308	377-0338	377-0269	377-0337

REV	DATE	BY	DESCRIPTION
1			

<b>WANG</b> LABORATORIES, INC. LORAIN, MASS. U.S.A.		BY DWN	DATE 4/16/81	APPROVED BY E ENGR	DATE
MATERIAL		CHK		H ENGR	
MODEL NO. 2281W		TITLE WANG DA-5Y CONTROL W/TWN SHT FDR			
FINISH		SEE CHART D		7309	24
SCALE 1:1		SHEET 5 OF 6		WANG PART NUMBER	DRAWING NUMBER

FIGURE 8-12 PRINTER/PLOTTER CONTROL WL# 7309 (2281W and 2281WC WITH TSF)  
(SHEET 5 OF 6)



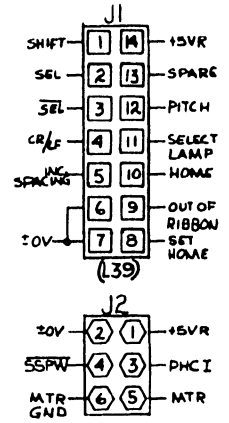
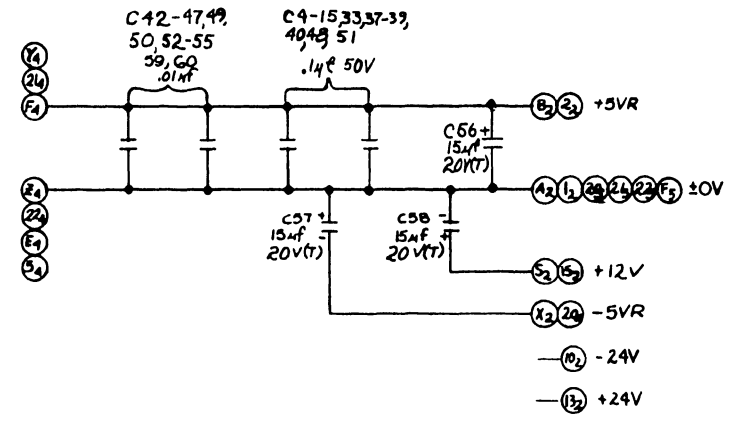
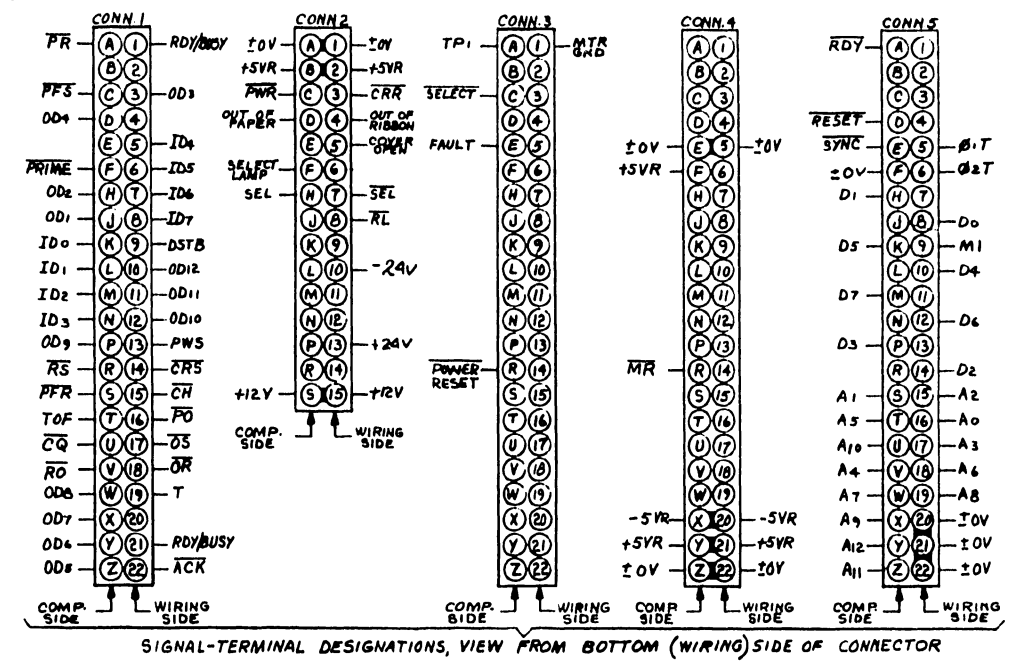
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COMPONENT	W.L. PART NO.	TYPE
R1	330-2033	330Ω 1/4W 10%
R2, 3, 20-24, 38-41, 58, 68, 75	330-302Z	2.2KΩ 1/4W 10%
R3	330-3015	15K 1/4W 10%
R4, R6, 15-19, 26-32, 35, 36, 42-49, 59, 61, 65, 76, 77	330-3047	4.7K 1/4W 10%
R7-14, 60, 72	330-3010	1K 1/4W 10%
R25, 33	330-4015	15K 1/4W 10%
R34, 37, 62	330-4010	10K 1/4W 10%
R51, 52, 55	330-4039	39K 1/4W 10%
R53, 56, 57, 69	330-4033	33K 1/4W 10%
R63, 66	330-2082	820Ω 1/4W 10%
R64, 67	330-2097	470Ω 1/4W 10%
R70	331-2056	560Ω 1/2W 10%
R71	330-2010	100Ω 1/4W 10%
R73	330-1047	47Ω 1/4W 10%
R74	330-3056	56K 1/4W 10%
C1	300-1068	68pF 10% 500V
C2, 9, 27, 42-47, 49, 50, 52-55, 59, 60	300-1903	10μF 25V 10%
C4-8, 33, 37-40, 48, 51	300-1900	1μF 50V 20%
C16-20, 34	300-1906	1001μF 20% 500V
C21	300-1970	470pF 10% 500V
C22, 30, 32	300-1220	220pF 10% 500V
C23-26	300-1913	100μF 25V 20%
C28, 31	300-4016	33μF 10% 15V(T)
C29, 41	300-1220	220μF 15V(T)
C35, 36	300-4032	10μF 35V (T)
C36-38	300-4022	15μF 10% 20V(T)
Q1, 2	375-0017	2N3014
Q3	375-1017	2N2906
Q4	375-1053	RCA 6203
Q5	375-1052	2N6387
Q6	374-0005	7915
Q7	374-0008	7815
D1, 2	380-1001	SIL.
D3, 6	380-4000	1N4004
D4, 5	380-3008	GEA15A
D7	380-2047	1N705A (ZENER)
L1-8, 35	376-9003	24PIN BURNDY SKT
L9-12	376-9010	22PIN BURNDY SKT
L26	376-9002	16PIN TERM SKT
L24	376-9011	40PIN BURNDY SKT
L23	376-9015	28PIN BURNDY SKT
J1	376-9012	14PIN CAMBION SKT
J2	654-1186	6POS PIN HEADER
XTAL	321-0018	17.1MHZ CRYSTAL

TYPE	LOCATION	SPARES
7474	L5	1
7400	L16	1
7414	L37	3
7406	L38	1
74368	L42	1
7432	L43	1
7400	L44	1
7474	L53	1
9602	L13, L54	1
74LS04	L58	2
7474	L59	1
7404	L62	2
LM339	L63	1

\* JP1 - Q) WITH JUMPER DISTINGUISH SPECIAL SIZE OF PAPER FOR EUROPE.  
 D) WITHOUT JUMPER FOR NORMAL 8 1/2" FAMILY.  
 \* JP2 - Q) WITH JUMPER 8 1/2".  
 D) WITHOUT JUMPER 8 1/2".

LOCATION	W.L. PART NO	TYPE
L1-8	SEE CHART	2708
L9-12	SEE CHART	2101-1
L13, 28, 29, 30, 54	376-0104	9602
L14, 15, 36, 46, 53, 59	376-0006	7474
L16, 44, 52	376-0002	7400
L17	376-0119	74175
L18, 38	376-0055	7406
L19, 20, 21, 22, 25, 31, 40	376-0192	74LS367
L23	SEE CHART	8220
L24	SEE CHART	8080
L26	SEE CHART	8224
L27, 45, 60	376-0081	7408
L32	376-0193	74LS368
L33, 34, 47, 50, 51	376-0137	8T10
L35	376-0090	74154
L37	376-0139	7414
L41, 62	376-0010	7404
L42	376-0179	74368
L43, 61	376-0093	7432
L48, 49	376-0183	74173
L55, 56, 57	376-0008	7442
L58	376-0180	74LS04
L63	376-0240	LM339



MNEMONIC	COORDINATE
A0-A11	1A7
A12	2B2
ACK	2A6
CH	3G11
COVER OPEN	2A4
CR	3F11
CR/LF	3G8
CRR	2D11
CR3	3D1
D0-D7	2B2
DSTB	1C11
FAULT	2A5
HOME	3G9
ID0-ID7	1E11
INC SPACING	3G8
MI	1A8
MR	1A8
MTR	3A5
MTR GND	3A5
OD1-OD12	3F1
OR	2C11
OS	3D1
OUT OF PAPER	2A4
OUT OF RIBBON	2A4
PER	2D11
PFS	3D1
PHCI	3D11
PITCH	2A9
PO	3G10
PR	2D11
PRIME	2B11
PWR	2D11
PWS	3D1
POWER RESET	1G10
RDY	1F11
RDY/BUSY	2A6
RESET	1F11
RL	3D1
RO	3F11
RS	3D1
SEL	2B11
SEL	2A11
SELECT	2A6
SELECT LAMP	2A5
SET HOME	3G8
SHIFT	3G8
SPARE <sub>2</sub>	3G9
SSPW	3G7
SYNC	1A9
ToF	2C11
TP1	1D11
Ø1T	1G1
Ø2T	1A9

<b>WANG</b> LABORATORIES, INC. LITTLE ROCK, ARK. U.S.A.		BY: <i>AK</i>	DATE: 11-13-79	APPROVED BY: <i>E. ENGEL</i>	DATE: 11-16-79
MATERIAL: <i>✓</i>	MODEL NO: 2281W	TITLE: WANG DAISY CONTROL W/TWH SHT FDR			
FINISH: <i>✓</i>	10% IS AS NOTED	SCALE: <i>D</i>	SHEET: <i>7309</i>	OF: <i>24</i>	DATE: <i>79</i>

FIGURE 8-12 PRINTER/PLOTTER CONTROL WL# 7309 (2281W and 2281WC WITH TSF)  
 (SHEET 6 OF 6)



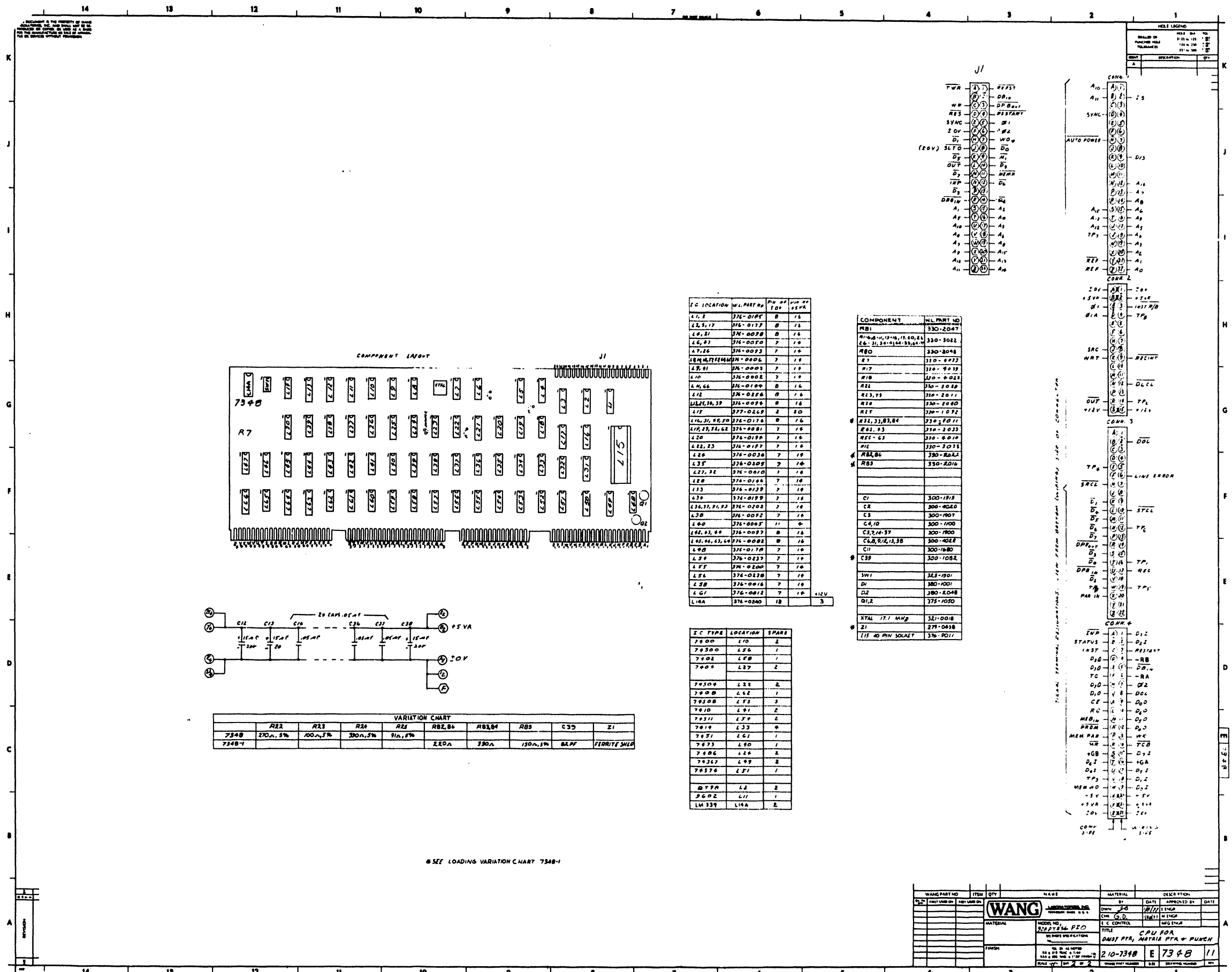
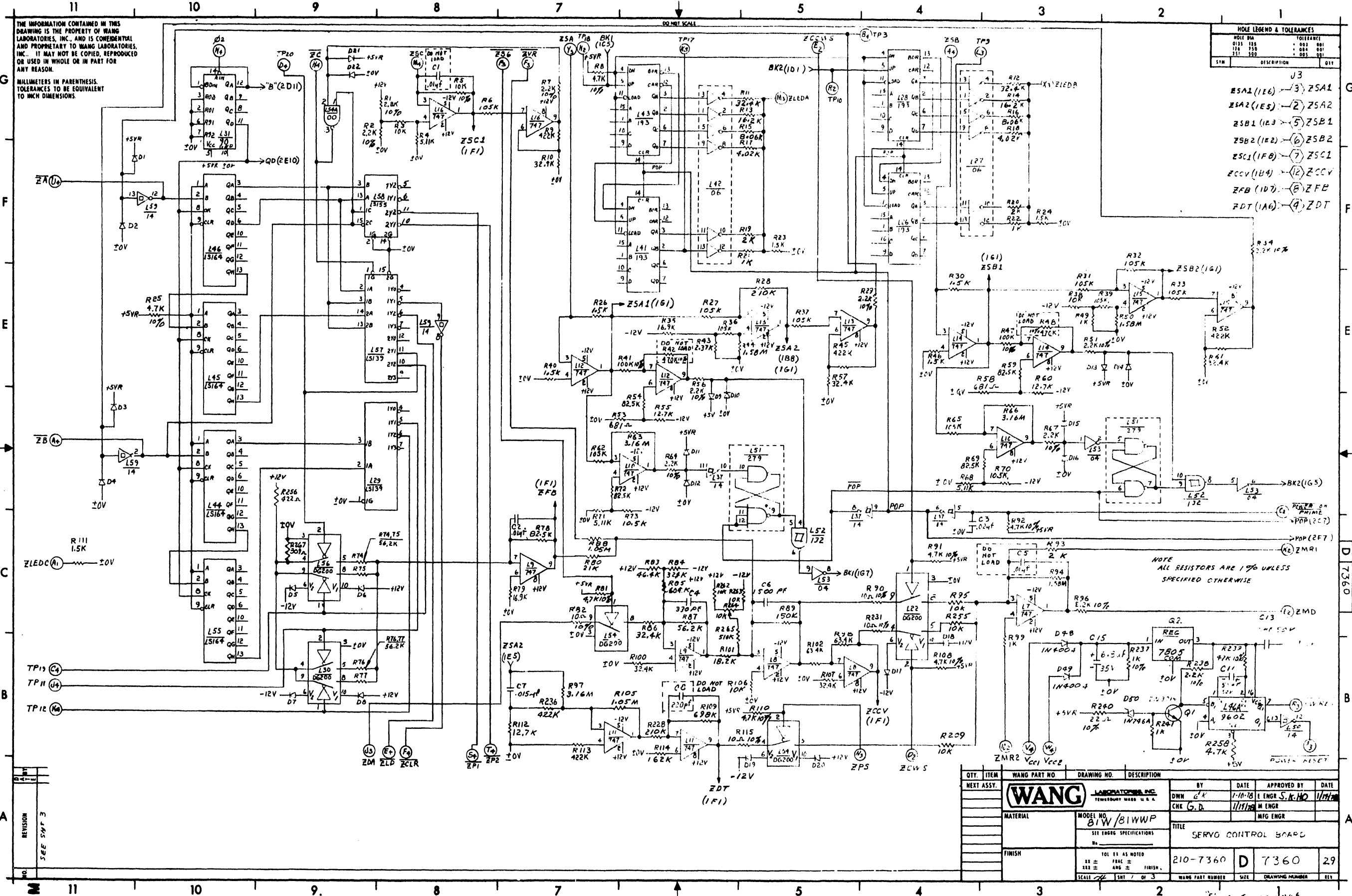


FIGURE 8-13 PRINTER CPU WL# 7348 (SHEET 2 OF 2)





**HOLE LEGEND & TOLERANCES**

HOLE DIA	TOLERANCE
0.125	±0.003
0.1875	±0.004
0.250	±0.005

**J3**

ZSA1 (1E6)	3	ZSA1
ZSA2 (1E5)	2	ZSA2
ZSB1 (1E3)	5	ZSB1
ZSB2 (1E2)	6	ZSB2
ZSC1 (1F8)	7	ZSC1
ZCCV (1B4)	12	ZCCV
ZFB (1D7)	8	ZFB
ZDT (1A6)	9	ZDT

NOTE  
ALL RESISTORS ARE 1% UNLESS  
SPECIFIED OTHERWISE

QTY.	ITEM	WANG PART NO.	DRAWING NO.	DESCRIPTION	BY	DATE	APPROVED BY	DATE
	NEXT ASSY.				DWN	1-10-78	ENGR. S. K. HO	1/11/78
					CHE	1/11/78	M ENGR.	

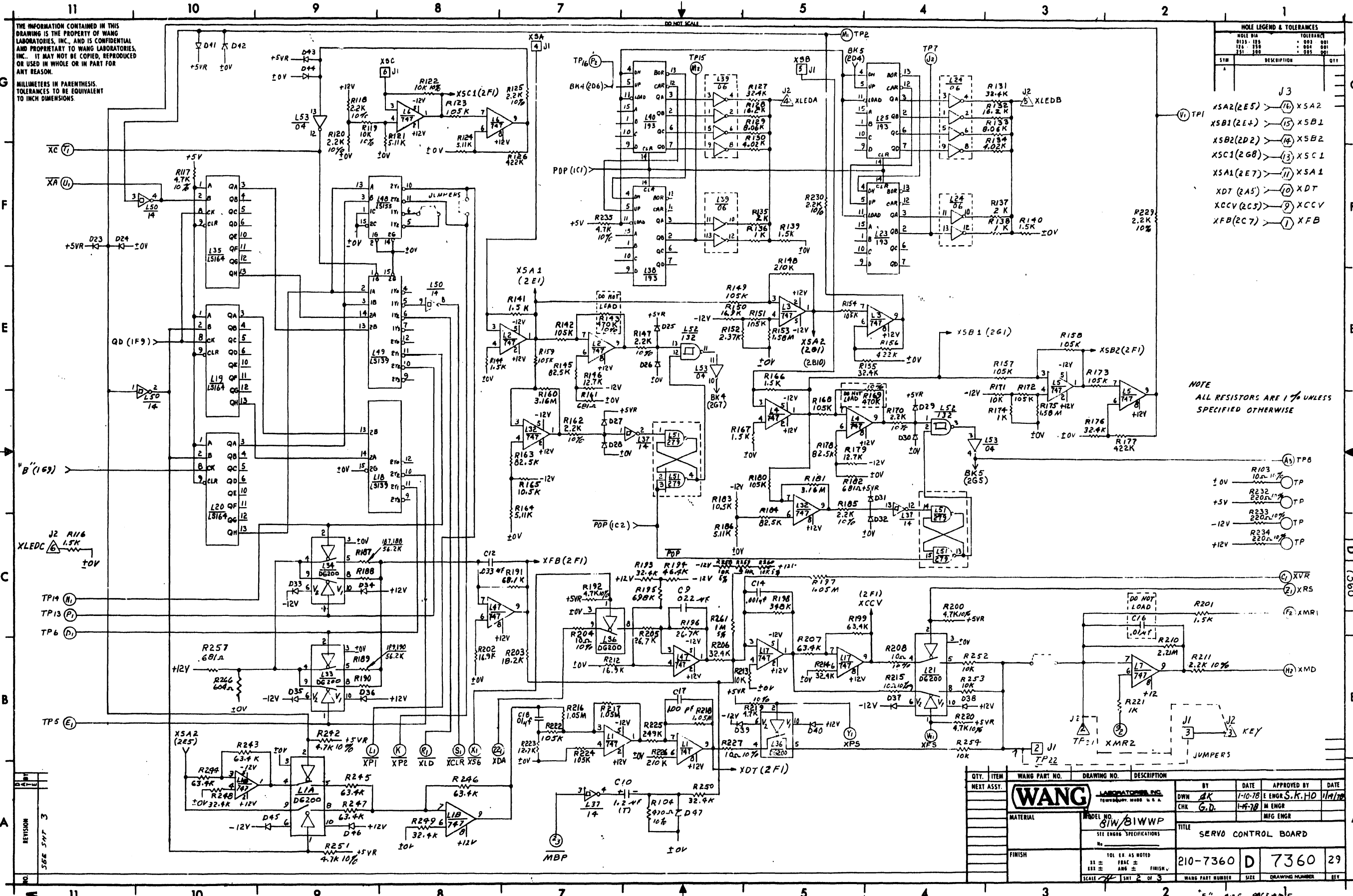
  

MATERIAL	MODEL NO.	TITLE
	B1W/B1WWP	SERVO CONTROL BOARD

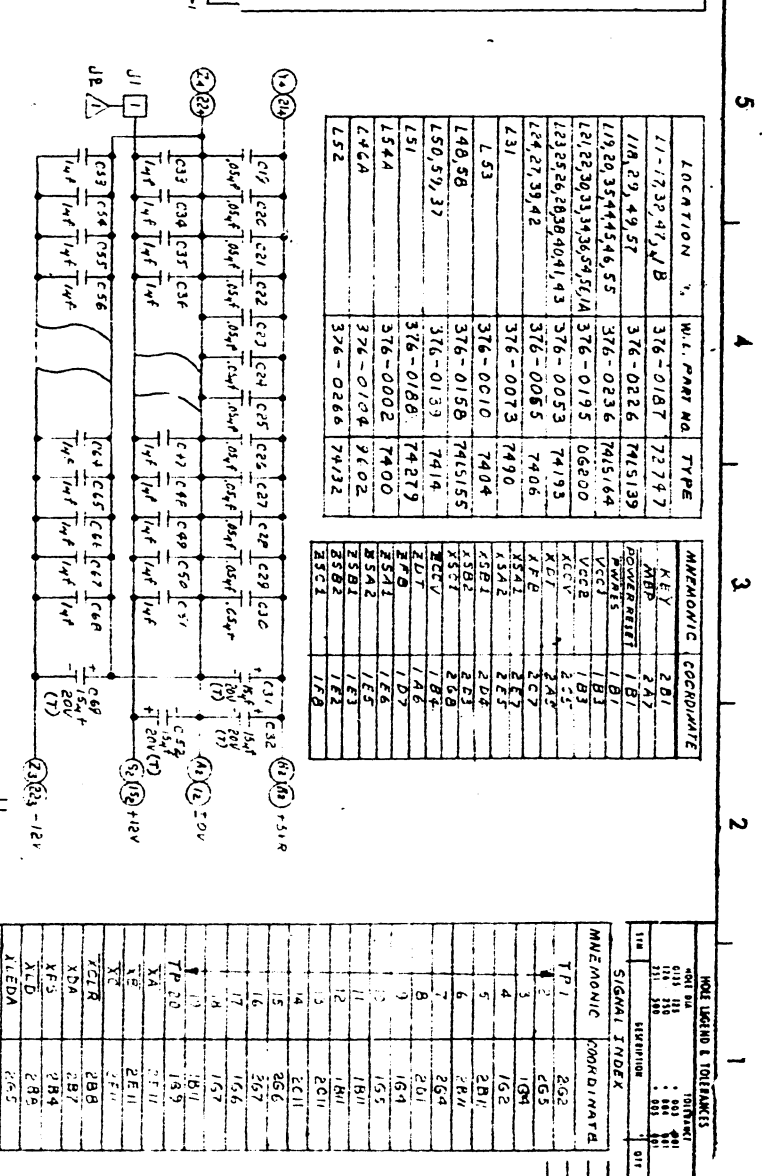
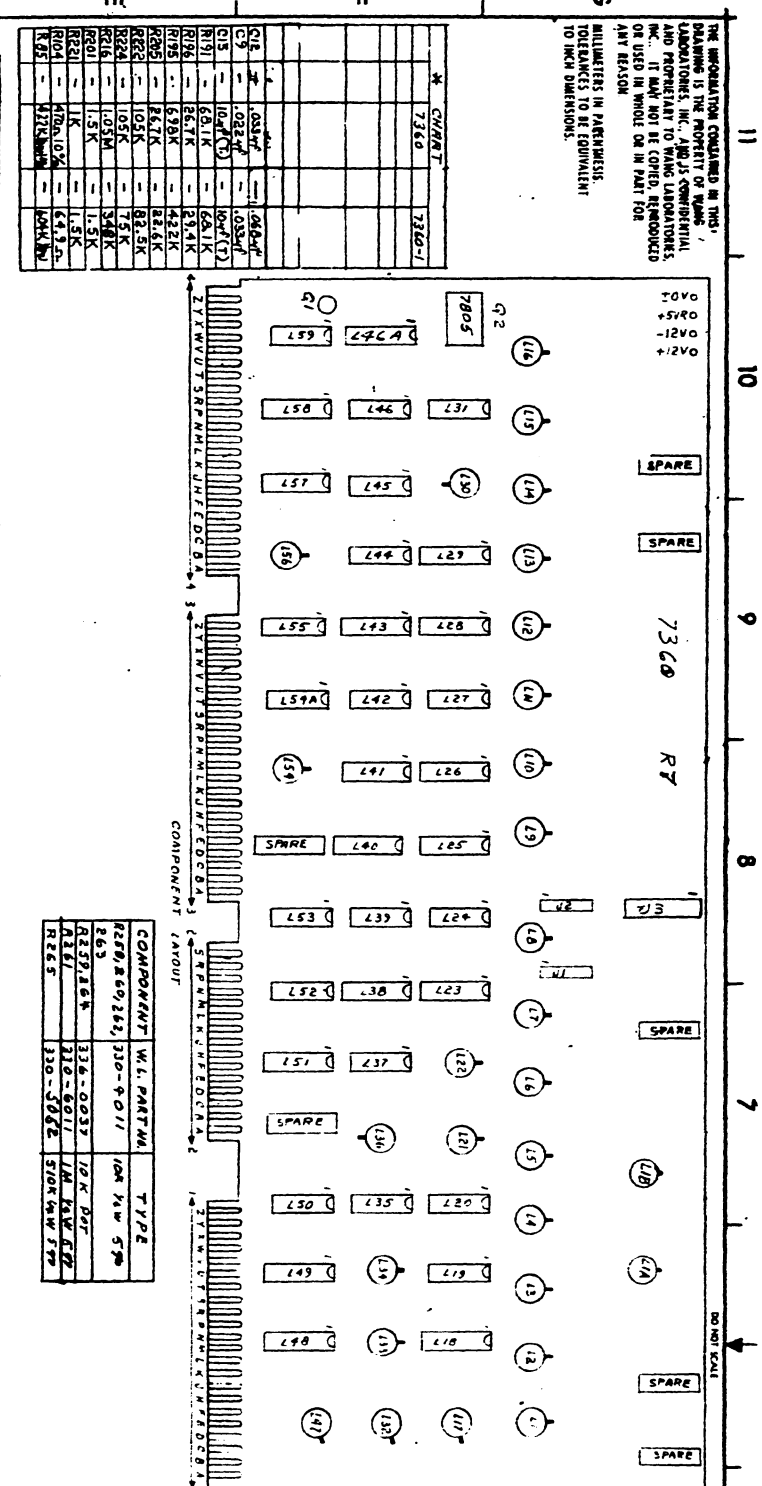
  

FINISH	SCALE	SIZE	DRAWING NUMBER
101 IS AS NOTED	1:1	D	7360

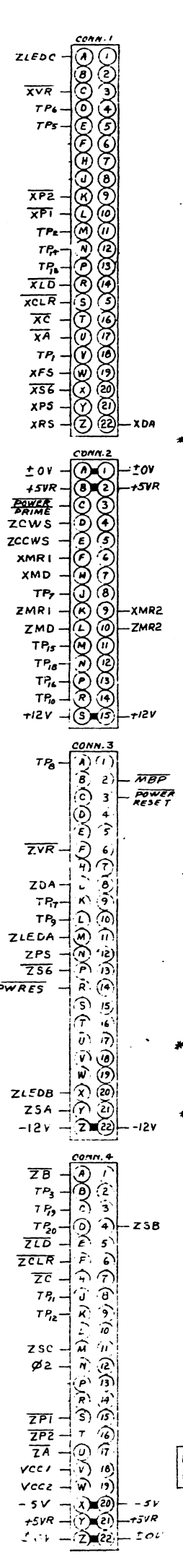
FIGURE 8-14 SERVO CONTROL BOARD WL# 7360 (SHEET 1 OF 3)



THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF WANG LABORATORIES, INC. AND IS CONFIDENTIAL AND PROPRIETARY TO WANG LABORATORIES AND SHOULD BE KEPT CONFIDENTIAL AND NOT USED IN WHOLE OR IN PART FOR ANY REASON WITHOUT THE WRITTEN CONSENT OF WANG LABORATORIES. TOLERANCES IN PARENTHESES UNLESS OTHERWISE SPECIFIED.



COMPONENT	W.L. PART NO.	TYPE
R266	333-0092	60K 1/2
R1, 2, 3, 7, 23, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000		



REV	DESCRIPTION	DATE	BY	CHK
0	ORIGINATED PER DWR E406 APP'D: 1-9-78			
1	REVISED PER ECN # 7857 APP'D: 1-14-78			
2	REVISED PER ECN # 8131 APP'D: 1-14-78			
3	REVISED PER ECN # 8309 APP'D: 1-14-78			
4	REVISED PER ECN # 8494 APP'D: 1-14-78			
5	REVISED PER ECN # 8693 APP'D: 1-14-78			
6	REVISED PER ECN # 8913 APP'D: 1-14-78			
7	REVISED PER ECN # 9177 APP'D: 1-14-78			
8	REVISED PER ECN # 9372 APP'D: 1-14-78			
9	REVISED PER ECN # 9525 APP'D: 1-14-78			
10	REVISED PER ECN # 9723 APP'D: 1-14-78			
11	REVISED PER ECN # 9912 APP'D: 1-14-78			
12	REVISED PER ECN # 9955 APP'D: 1-14-78			
13	REVISED PER ECN # 10795 APP'D: 1-14-78			
14	REVISED PER ECN # 10952 APP'D: 1-14-78			
15	REVISED PER ECN # 11714 APP'D: 1-14-78			
16	REVISED PER ECN # 11521 APP'D: 1-14-78			
17	REVISED PER ECN # 12023 APP'D: 1-14-78			
18	REVISED PER ECN # 13714 APP'D: 1-14-78			
19	REVISED PER ECN # 14796 APP'D: 1-14-78			
20	REVISED PER ECN # 15098 APP'D: 1-14-78			
21	REVISED PER ECN # 17717 APP'D: 1-14-78			
22	REVISED PER ECN # 20395 APP'D: 1-14-78			
23	REVISED PER ECN # 20931 APP'D: 1-14-78			
24	REVISED PER ECN # 21162 APP'D: 1-14-78			
25	REVISED PER ECN # 21167 APP'D: 1-14-78			
26	REVISED PER ECN # 22227 APP'D: 1-14-78			
27	REVISED PER ECN # 24189 APP'D: 1-14-78			
28	REVISED PER ECN # 25187 APP'D: 1-14-78			

FIGURE 8-14 SERVO CONTROL BOARD WL# 7360 (SHEET 3 OF 3)

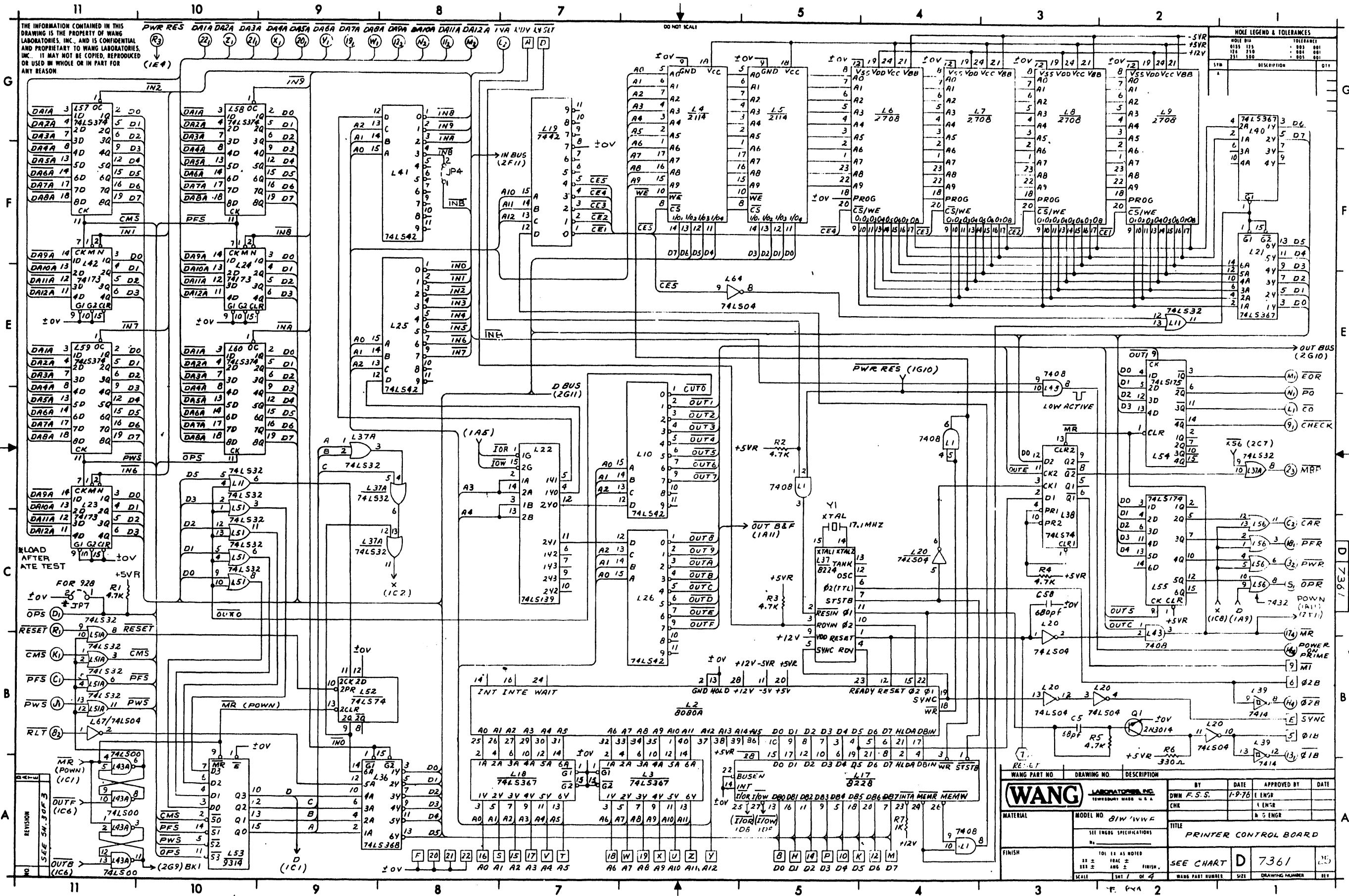


FIGURE 8-15 PRINTER CONTROLLER BOARD WL# 7361 (SHEET 1 OF 4)



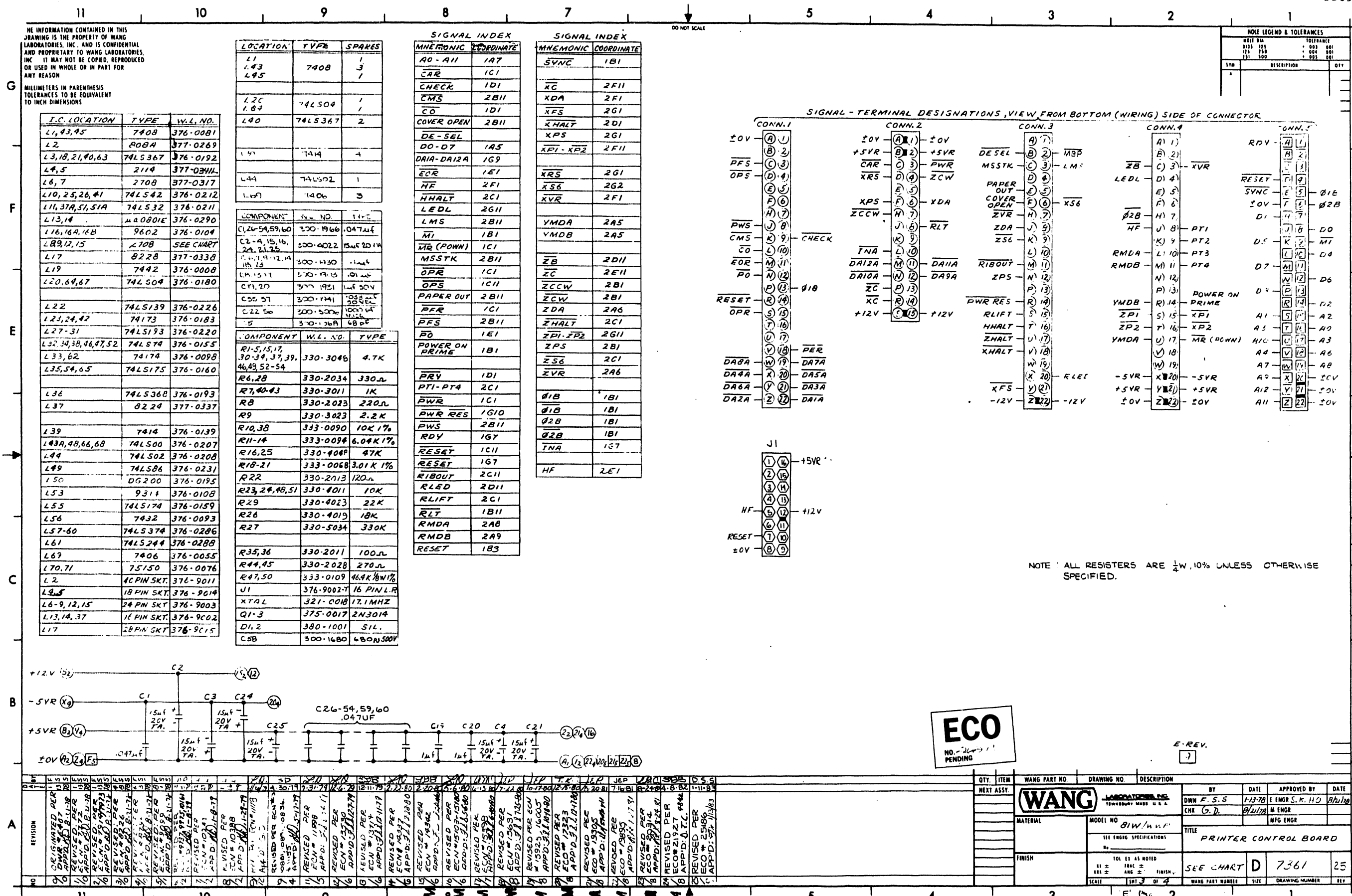
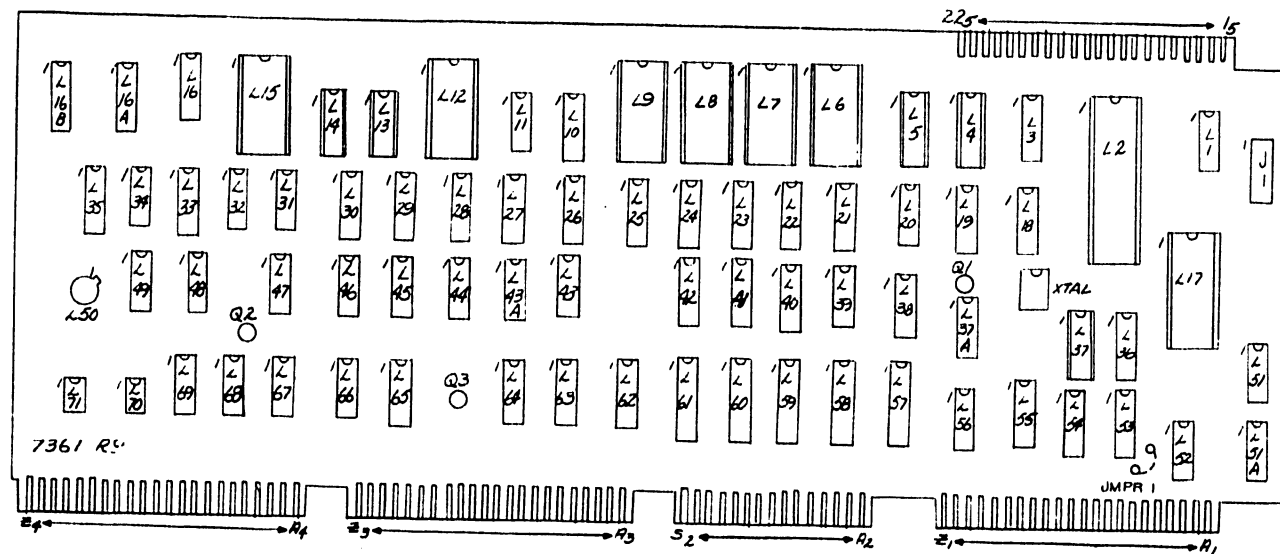


FIGURE 8-15 PRINTER CONTROLLER BOARD WL# 7361 (SHEET 3 OF 4)

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MODEL	210	209	L2	L4,5	L6	L7	L8	L9	L12	L13,14	L15	L17	L37
BIW	7361-A	7361	377-0269	377-0341-L	NOT USED	378-3181	378-3180	378-3189	378-2270	NOT USED	378-2271-R1	377-0338	377-0337
MICRO DIAG	7361-B	7361	377-0269	377-0341-L	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	377-0338	377-0337
LOGIC DIAG	7361-C	7361	377-0269	377-0341-L	NOT USED	NOT USED	378-3080-R1	378-3079-R1	378-2270	NOT USED	378-2271	377-0338	377-0337

<b>WANG</b> LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY	DATE	APPROVED BY	DATE
MATERIAL		DWN	2-27-80	E ENGR	
MODEL NO. 81W/WWP		CHK		M ENGR	
SEE ENGR SPECIFICATIONS		TITLE			
FINISH		PRINTER CONTROL BOARD			
TOL TO AS NOTED		SEE CHART	D	7361	25
SCALE 1/8" = 1"		WANG PART NUMBER	SIZE	DRAWING NUMBER	REV

FIGURE 8-15 PRINTER CONTROLLER BOARD WL# 7361 (SHEET 4 OF 4)





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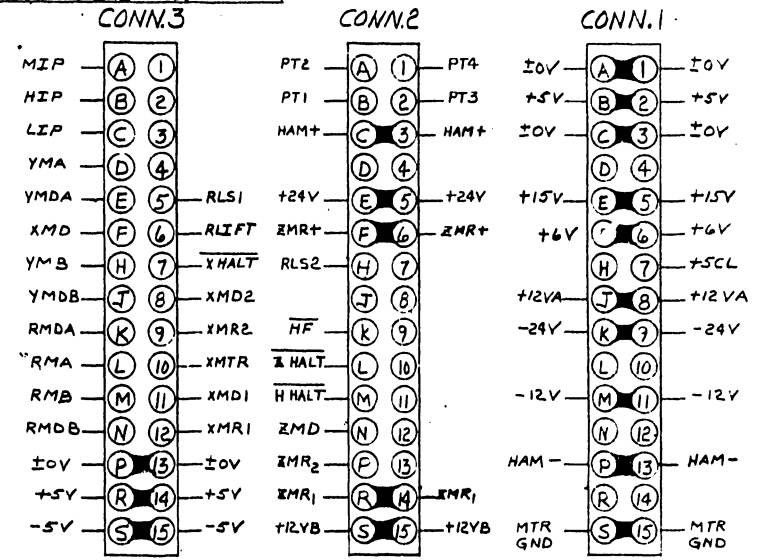
MILLIMETERS IN PARENTHESIS. TOLERANCES TO BE EQUIVALENT TO INCH DIMENSIONS.

HOLE LEGEND & TOLERANCES		
HOLE DIA	TOLERANCE	QTY
0125 - 155	+0.002	001
156 - 250	+0.004	001
251 - 300	+0.005	001

LOCATION	WL. PART NO.	GND	Vcc
L1,6	376-0046	5	
L2-5	376-0145	4	8

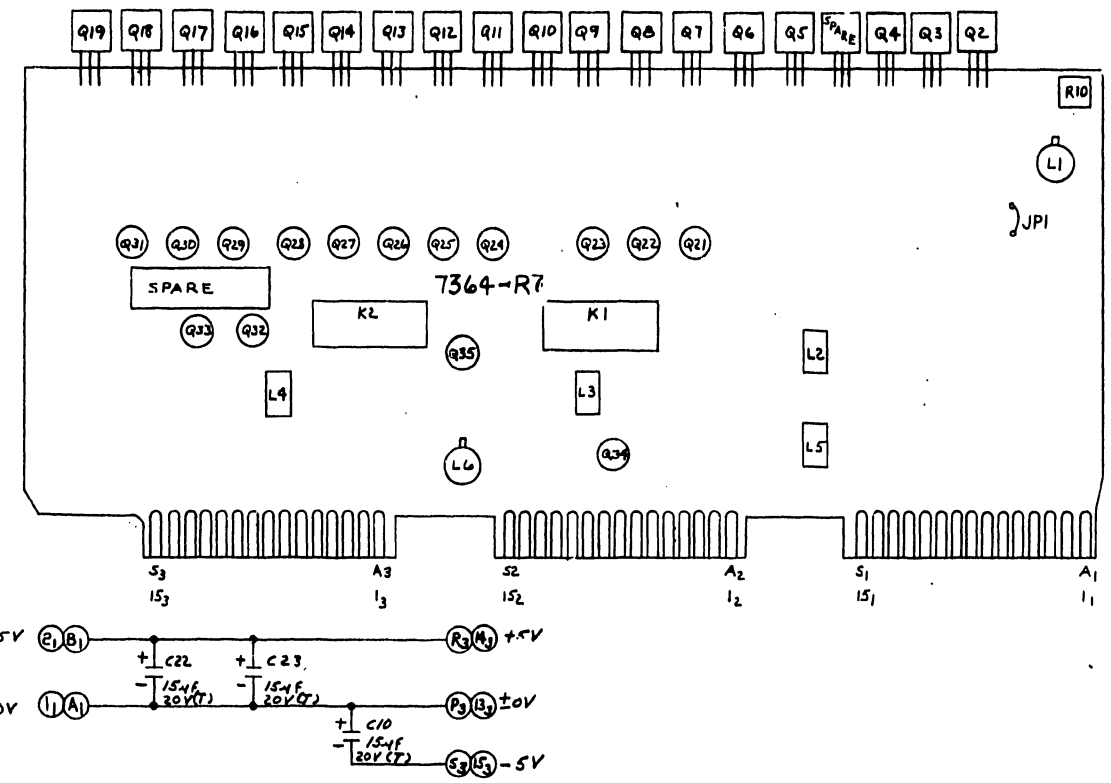
COMPONENT	WL. PART NO.	COMPONENT	WL. PART NO.
R1,37,43	331-2048	C24-31	300-1931
R48	334-0028	K1,2	320-0047
R4	330-3011	R38,58	330-3056
R5,39,60	330-4011	R15,16	333-0137
R6,59	331-3010	R17	333-0107
R7	330-3028	R19	333-0114
R8	330-3040	R20	333-0067
R9,18	330-2048	C1	300-3052
R11	330-3034	C13	300-1903
R12	330-4016	D14	380-2062
R13	330-2016	D15	380-2068
R23	330-2011	D16	380-2075
R14	333-0059	D18-21	380-4011
R30,56,57,61,64,65	330-3048	Q8	375-1134
R21,24,25,28,29,32,33,34,44,47,62	330-2023	Q9	375-1135
R22,26,30,34,40,45,63	331-2033	QX1	375-1132
R23,27,31,35,41,46	331-2015	QX2	375-1132
R42,49	331-1022		
R60	330-3013		
R51	331-3022		
R52	334-0000		
R10	336-1014		
R54,55	330-3023		
C2-4,8,11,21,32,6	300-4032		
*C5,7,9,24,12,14,15,17,18	300-1930		
C16	300-1470		
C19	300-2115		
C20	300-2110		
C10,22,23	300-4022		
D1	380-2039		
D2-12,17	380-4000		
D13	380-2033		
Q5	375-1053		
Q2,10	374-0035		
Q3,6	375-1052		
Q4	374-0040		
Q34,35	375-0017		
Q7	375-1034		
Q11,13,15,17	375-1058		
Q12,14,16,18	375-1051		
Q19	374-0002		
QX3	375-1046		
Q21,22,24,26,28,30,33	375-1027		
Q23,25,27,29,31,32	375-0018		

\* C24 IS LOADED ON 7364-1 ONLY



**ECO**  
NO. 2599  
PENDING 1/21/73

**ECO**  
NO. 2632  
PENDING 1/21/73



REV	DESCRIPTION	DATE	BY	APPROVED BY	DATE
1	SEE SMT 1				

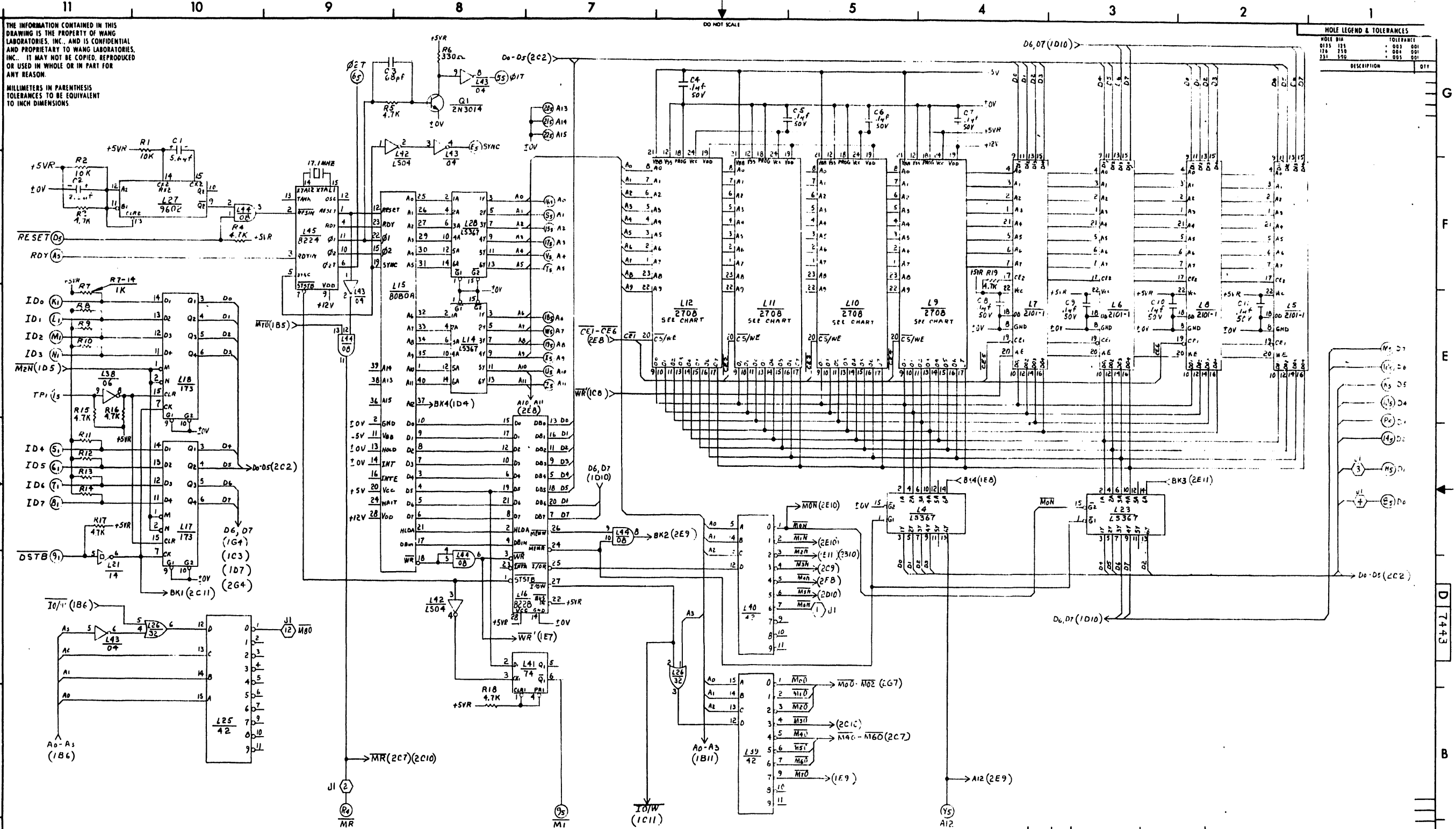
QTY.	ITEM	WANG PART NO.	DRAWING NO.	DESCRIPTION
	NEXT ASSY.			
	MATERIAL			
	FINISH			

<b>WANG</b> LABORATORIES, INC. TOWERSHIRE, MASS. U.S.A.	BY: <i>D.W.B.</i> DATE: 10-31-72	APPROVED BY: <i>S.K.H.</i> DATE: 1/13/73
MODEL NO. P/334 DW/BW/P 7500T	TITLE: PS REGULATOR	
SEE ENGR. SPECIFICATIONS	210-7364	D 7364
TOL. IS AS NOTED	SCALE: 1:1	SIZE: 17

FIGURE 8-16 PS REGULATOR WL# 7364 (SHEET 2 OF 2)





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MILLIMETERS IN PARENTHESIS TOLERANCES TO BE EQUIVALENT TO INCH DIMENSIONS.

HOLE LEGEND & TOLERANCES

HOLE DIA	TOLERANCE
0.15 - 0.30	± 0.005
0.31 - 0.45	± 0.007
0.46 - 0.60	± 0.009
0.61 - 0.75	± 0.011
0.76 - 0.90	± 0.013
0.91 - 1.05	± 0.015

REV	DESCRIPTION	DATE	BY	APPROVED BY
1	ISSUED FOR MANUFACTURE	1-7-78	WANG	WANG
2	REVISED TO CORRECT MANUFACTURING DEFECTS	1-10-78	WANG	WANG
3	REVISED TO CORRECT MANUFACTURING DEFECTS	1-10-78	WANG	WANG
4	REVISED TO CORRECT MANUFACTURING DEFECTS	1-10-78	WANG	WANG

QTY	ITEM	WANG PART NO	DRAWING NO.	DESCRIPTION
1	PCB	7443	2281W	DIABLO PRINTER/PLOTTER CONTROL
1	IC	74181	2281W	ALU
1	IC	74180	2281W	DEC
1	IC	74182	2281W	DEC
1	IC	74183	2281W	DEC
1	IC	74184	2281W	DEC
1	IC	74185	2281W	DEC
1	IC	74186	2281W	DEC
1	IC	74187	2281W	DEC
1	IC	74188	2281W	DEC
1	IC	74189	2281W	DEC
1	IC	74190	2281W	DEC
1	IC	74191	2281W	DEC
1	IC	74192	2281W	DEC
1	IC	74193	2281W	DEC
1	IC	74194	2281W	DEC
1	IC	74195	2281W	DEC
1	IC	74196	2281W	DEC
1	IC	74197	2281W	DEC
1	IC	74198	2281W	DEC
1	IC	74199	2281W	DEC
1	IC	74200	2281W	DEC
1	IC	74201	2281W	DEC
1	IC	74202	2281W	DEC
1	IC	74203	2281W	DEC
1	IC	74204	2281W	DEC
1	IC	74205	2281W	DEC
1	IC	74206	2281W	DEC
1	IC	74207	2281W	DEC
1	IC	74208	2281W	DEC
1	IC	74209	2281W	DEC
1	IC	74210	2281W	DEC
1	IC	74211	2281W	DEC
1	IC	74212	2281W	DEC
1	IC	74213	2281W	DEC
1	IC	74214	2281W	DEC
1	IC	74215	2281W	DEC
1	IC	74216	2281W	DEC
1	IC	74217	2281W	DEC
1	IC	74218	2281W	DEC
1	IC	74219	2281W	DEC
1	IC	74220	2281W	DEC
1	IC	74221	2281W	DEC
1	IC	74222	2281W	DEC
1	IC	74223	2281W	DEC
1	IC	74224	2281W	DEC
1	IC	74225	2281W	DEC
1	IC	74226	2281W	DEC
1	IC	74227	2281W	DEC
1	IC	74228	2281W	DEC
1	IC	74229	2281W	DEC
1	IC	74230	2281W	DEC
1	IC	74231	2281W	DEC
1	IC	74232	2281W	DEC
1	IC	74233	2281W	DEC
1	IC	74234	2281W	DEC
1	IC	74235	2281W	DEC
1	IC	74236	2281W	DEC
1	IC	74237	2281W	DEC
1	IC	74238	2281W	DEC
1	IC	74239	2281W	DEC
1	IC	74240	2281W	DEC
1	IC	74241	2281W	DEC
1	IC	74242	2281W	DEC
1	IC	74243	2281W	DEC
1	IC	74244	2281W	DEC
1	IC	74245	2281W	DEC
1	IC	74246	2281W	DEC
1	IC	74247	2281W	DEC
1	IC	74248	2281W	DEC
1	IC	74249	2281W	DEC
1	IC	74250	2281W	DEC
1	IC	74251	2281W	DEC
1	IC	74252	2281W	DEC
1	IC	74253	2281W	DEC
1	IC	74254	2281W	DEC
1	IC	74255	2281W	DEC
1	IC	74256	2281W	DEC
1	IC	74257	2281W	DEC
1	IC	74258	2281W	DEC
1	IC	74259	2281W	DEC
1	IC	74260	2281W	DEC
1	IC	74261	2281W	DEC
1	IC	74262	2281W	DEC
1	IC	74263	2281W	DEC
1	IC	74264	2281W	DEC
1	IC	74265	2281W	DEC
1	IC	74266	2281W	DEC
1	IC	74267	2281W	DEC
1	IC	74268	2281W	DEC
1	IC	74269	2281W	DEC
1	IC	74270	2281W	DEC
1	IC	74271	2281W	DEC
1	IC	74272	2281W	DEC
1	IC	74273	2281W	DEC
1	IC	74274	2281W	DEC
1	IC	74275	2281W	DEC
1	IC	74276	2281W	DEC
1	IC	74277	2281W	DEC
1	IC	74278	2281W	DEC
1	IC	74279	2281W	DEC
1	IC	74280	2281W	DEC
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1	IC	74291	2281W	DEC
1	IC	74292	2281W	DEC
1	IC	74293	2281W	DEC
1	IC	74294	2281W	DEC
1	IC	74295	2281W	DEC
1	IC	74296	2281W	DEC
1	IC	74297	2281W	DEC
1	IC	74298	2281W	DEC
1	IC	74299	2281W	DEC
1	IC	74300	2281W	DEC
1	IC	74301	2281W	DEC
1	IC	74302	2281W	DEC
1	IC	74303	2281W	DEC
1	IC	74304	2281W	DEC
1	IC	74305	2281W	DEC
1	IC	74306	2281W	DEC
1	IC	74307	2281W	DEC
1	IC	74308	2281W	DEC
1	IC	74309	2281W	DEC
1	IC	74310	2281W	DEC
1	IC	74311	2281W	DEC
1	IC	74312	2281W	DEC
1	IC	74313	2281W	DEC
1	IC	74314	2281W	DEC
1	IC	74315	2281W	DEC
1	IC	74316	2281W	DEC
1	IC	74317	2281W	DEC
1	IC	74318	2281W	DEC
1				

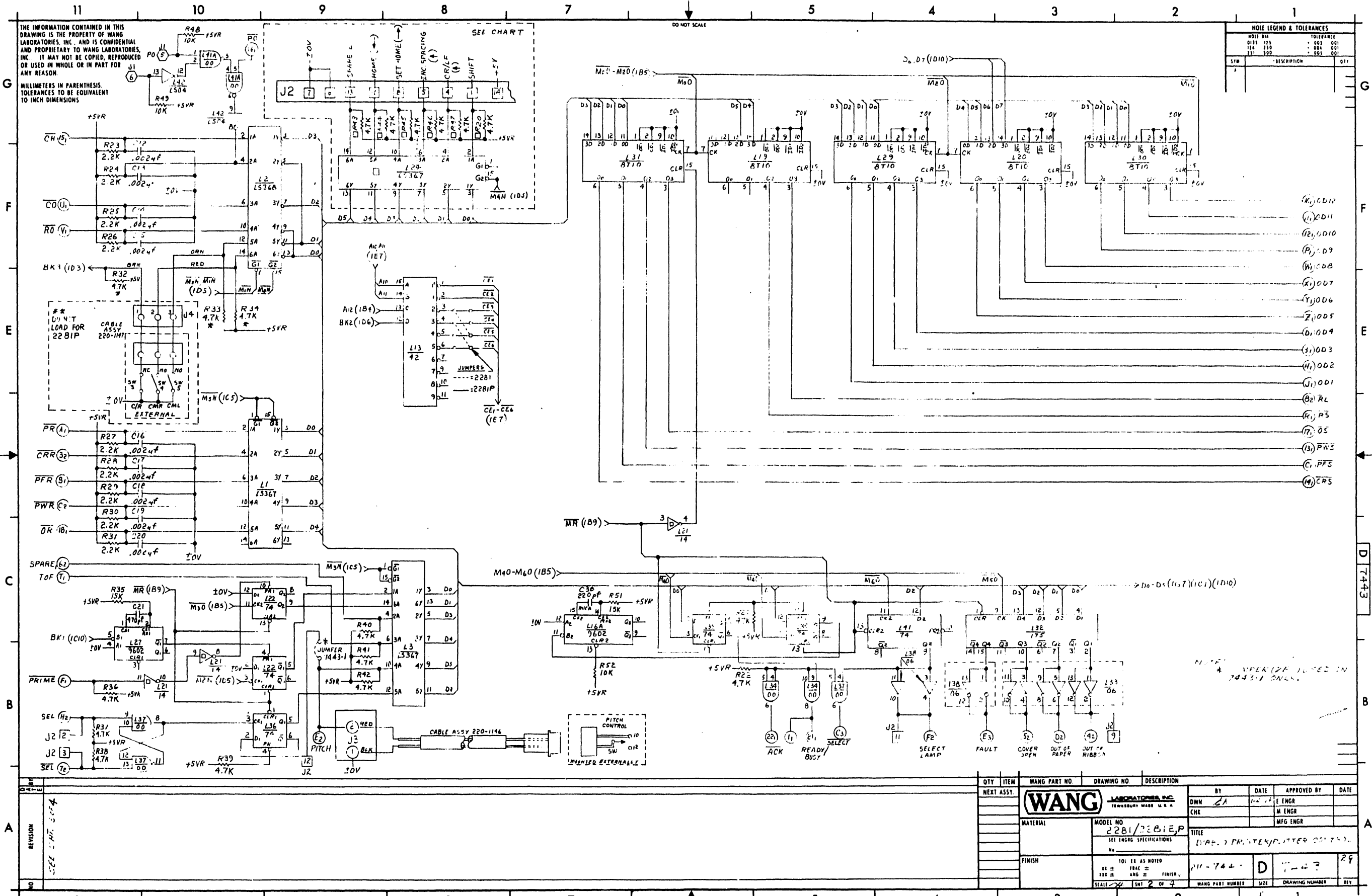
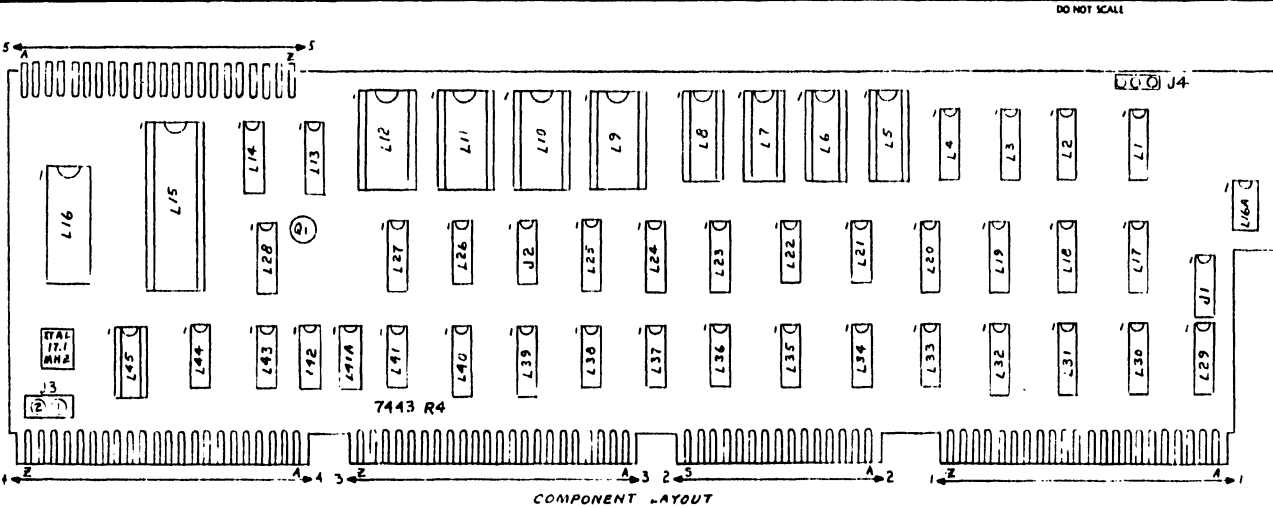


FIGURE 8-18 DIABLO PRINTER/PLOTTER CONTROL (2281W) WL# 7443 (SHEET 2 OF 4)

THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF WANG LABORATORIES, INC. AND IS CONFIDENTIAL AND PROPRIETARY TO WANG LABORATORIES, INC. IT MAY NOT BE COPIED, REPRODUCED OR USED IN WHOLE OR IN PART FOR ANY REASON.

MILLIMETERS IN PARENTHESES TOLERANCES TO BE EQUIVALENT TO INCH DIMENSIONS



LOCATION	W.L. PART NO.	TYPE
L1, 2, 23, 24, 28	376-0192	74LS367
L2	376-0193	74LS368
L5-B	377-0308	2101-1
L9-12	SEE CHART	2708
L13, 25, 39, 40	376-0008	7442
L15	377-0269	8080A
L16	377-0338	8228
L17, 18	376-0183	74173
L19, 20, 29-31	376-0137	8710
L21	376-0139	7414
L22, 35, 36, 41	376-0006	7474
L26	376-0093	7432
L27, 16A	376-0104	9602
L32	376-0119	74175
L33, 38	376-0055	7406
L34, 37A	376-0002	7400
L42	376-0180	74LS04
L43	376-0010	7404
L44	376-0081	7408
L45	377-0337	8224

COMPONENT	W.L. PART NO.	TYPE
Q1	375-0017	2N3014
Q1	375-9004	TRANSI-PAD
R1, 2, 48, 49, 52	330-4010	10K 1/4W 10%
R3, 4, 5, 17-22, 32-34, 36, 41	330-3047	4.7K 1/4W 10%
R6	330-2033	330Ω 1/4W 10%
R7-14	330-3010	1K 1/4W 10%
R23-31	330-3022	2.2K 1/4W 10%
R35, 51	330-4015	15K 1/4W 10%
C1	300-4017	5.6μF 35V
C2	300-4014	2.2μF 20V
C3	300-1068	68μF 500V
C4-11	300-1930	1μF 50V (H.FREQ)
C12-20	300-1913	.002μF 500V
C21	300-1470	470μF 500V
C22-33	300-1900	.05μF 12V
C34-37	300-4022	15μF 20V
XTAL	321-0018	17.1 MHz
L45	376-9002	16 PIN SOCKET
J1, 2	376-9012	14 PIN SOCKET
L5-B	376-9010	22 PIN SOCKET
L9-12	376-9003	24 PIN SOCKET
L15	376-9011	40 PIN SOCKET
C38	300-1220	220μF MICA
R50	332-1047	47Ω 1W
J3	220-1146	CABLE
J4	654-1193	HEADER ASS'Y

HOLE LEGEND & TOLERANCES		
HOLE DIA	TOLERANCE	
Ø13	±.003	ØØ1
Ø14	±.004	ØØ2
Ø15	±.005	ØØ3
Ø16	±.006	ØØ4
Ø17	±.007	ØØ5
Ø18	±.008	ØØ6
Ø19	±.009	ØØ7
Ø20	±.010	ØØ8
Ø21	±.011	ØØ9
Ø22	±.012	ØØ10
Ø23	±.013	ØØ11
Ø24	±.014	ØØ12
Ø25	±.015	ØØ13
Ø26	±.016	ØØ14
Ø27	±.017	ØØ15
Ø28	±.018	ØØ16
Ø29	±.019	ØØ17
Ø30	±.020	ØØ18
Ø31	±.021	ØØ19
Ø32	±.022	ØØ20
Ø33	±.023	ØØ21
Ø34	±.024	ØØ22
Ø35	±.025	ØØ23
Ø36	±.026	ØØ24
Ø37	±.027	ØØ25
Ø38	±.028	ØØ26
Ø39	±.029	ØØ27
Ø40	±.030	ØØ28
Ø41	±.031	ØØ29
Ø42	±.032	ØØ30
Ø43	±.033	ØØ31
Ø44	±.034	ØØ32
Ø45	±.035	ØØ33
Ø46	±.036	ØØ34
Ø47	±.037	ØØ35
Ø48	±.038	ØØ36
Ø49	±.039	ØØ37
Ø50	±.040	ØØ38
Ø51	±.041	ØØ39
Ø52	±.042	ØØ40
Ø53	±.043	ØØ41
Ø54	±.044	ØØ42
Ø55	±.045	ØØ43
Ø56	±.046	ØØ44
Ø57	±.047	ØØ45
Ø58	±.048	ØØ46
Ø59	±.049	ØØ47
Ø60	±.050	ØØ48
Ø61	±.051	ØØ49
Ø62	±.052	ØØ50
Ø63	±.053	ØØ51
Ø64	±.054	ØØ52
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Ø66	±.056	ØØ54
Ø67	±.057	ØØ55
Ø68	±.058	ØØ56
Ø69	±.059	ØØ57
Ø70	±.060	ØØ58
Ø71	±.061	ØØ59
Ø72	±.062	ØØ60
Ø73	±.063	ØØ61
Ø74	±.064	ØØ62
Ø75	±.065	ØØ63
Ø76	±.066	ØØ64
Ø77	±.067	ØØ65
Ø78	±.068	ØØ66
Ø79	±.069	ØØ67
Ø80	±.070	ØØ68
Ø81	±.071	ØØ69
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Ø83	±.073	ØØ71
Ø84	±.074	ØØ72
Ø85	±.075	ØØ73
Ø86	±.076	ØØ74
Ø87	±.077	ØØ75
Ø88	±.078	ØØ76
Ø89	±.079	ØØ77
Ø90	±.080	ØØ78
Ø91	±.081	ØØ79
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Ø95	±.085	ØØ83
Ø96	±.086	ØØ84
Ø97	±.087	ØØ85
Ø98	±.088	ØØ86
Ø99	±.089	ØØ87
Ø100	±.090	ØØ88
Ø101	±.091	ØØ89
Ø102	±.092	ØØ90
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Ø107	±.097	ØØ95
Ø108	±.098	ØØ96
Ø109	±.099	ØØ97
Ø110	±.100	ØØ98
Ø111	±.101	ØØ99
Ø112	±.102	ØØ100
Ø113	±.103	ØØ101
Ø114	±.104	ØØ102
Ø115	±.105	ØØ103
Ø116	±.106	ØØ104
Ø117	±.107	ØØ105
Ø118	±.108	ØØ106
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Ø123	±.113	ØØ111
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Ø125	±.115	ØØ113
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Ø127	±.117	ØØ115
Ø128	±.118	ØØ116
Ø129	±.119	ØØ117
Ø130	±.120	ØØ118
Ø131	±.121	ØØ119
Ø132	±.122	ØØ120
Ø133	±.123	ØØ121
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Ø169	±.159	ØØ157
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Ø202	±.192	ØØ190
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Ø204	±.194	ØØ192
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Ø207	±.197	ØØ195
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Ø210	±.200	ØØ198
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Ø230	±.220	ØØ218
Ø231	±.221	ØØ219
Ø232	±.222	ØØ220
Ø233	±.223	ØØ221
Ø234	±.224	ØØ222
Ø235	±.225	ØØ223
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Ø239	±.229	ØØ227
Ø240	±.230	ØØ228
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Ø242	±.232	ØØ230
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Ø274	±.264	ØØ262
Ø275	±.265	ØØ263
Ø276		

11 10 9 8 7 5 4 3 2 1

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DO NOT SCALE

210 = 209 + 378 or 377

MODEL	209	210	L12	L11	L10	L9	L5-B	L15	L16	L45	R20,32,34,43,47
2281/E	7443	7443A	378-2069-R2	378-2070-R2			377-0308	377-0269	377-0338	377-0337	330-3047
2281	7443	7443B	378-2133-R1	378-2134-R1			377-0308	377-0269	377-0338	377-0337	
2281-P	7443-1	7443-1A	378-2150-R7	378-2151-R7	378-2152-R7	378-2153-R7	377-0308	377-0269	377-0338	377-0337	
2281-P	7443-1	7443-1B	378-2458-R6	378-2459-R6	378-2460-R6	378-2461-R6	377-0308	377-0269	377-0338	377-0337	
2281-V	7443	7443-C	378-2217	378-2218			377-0308	377-0269	377-0338	377-0337	
DIAGNOSTIC	7443	7443-D	378-2223	378-2224			377-0308	377-0269	377-0338	377-0337	
SWED.	7443	7443-E		378-2238-R2	378-2239		377-0308	377-0269	377-0338	377-0337	
GERM.	7443	7443-F		378-2238-R2	378-2240-R1		377-0308	377-0269	377-0338	377-0337	
NOR/DAN.	7443	7443-G		378-2238-R2	378-2215		377-0308	377-0269	377-0338	377-0337	
U.K.	7443	7443-H		378-2238-R2	378-2443		377-0308	377-0269	377-0338	377-0337	
AZERTY	7443	7443-J		378-2453			377-0308	377-0269	377-0338	377-0337	
GERM.	7443	7443-K				378-2611	377-0308	377-0269	377-0338	377-0337	
SWED.	7443	7443-L				378-2615	377-0308	377-0269	377-0338	377-0337	
GERM.	7443	7443-M				378-2616	377-0308	377-0269	377-0338	377-0337	
NOR/DAN	7443	7443-N				378-2617	377-0308	377-0269	377-0338	377-0337	
DUTCH	7443	7443-P				378-2618	377-0308	377-0269	377-0338	377-0337	
DUTCH	7443	7443-R				378-2619	377-0308	377-0269	377-0338	377-0337	
AZERTY	7443	7443-S	378-2631-R1	378-2633-R1	378-2634-R2	378-2635-R1	377-0308	377-0269	377-0338	377-0337	
SWED. NON MVP	7443	7443-T	378-2631-R1	378-2633-R1	378-2634-R2	378-2634-R1	377-0308	377-0269	377-0338	377-0337	
SWED. MVP	7443	7443-U	378-2631-R1	378-2633-R1	378-2634-R2	378-2639-R1	377-0308	377-0269	377-0338	377-0337	
NOR/DAN NON MVP	7443	7443-V	378-2631-R1	378-2633-R1	378-2634-R2	378-2643-R1	377-0308	377-0269	377-0338	377-0337	
NOR/DAN MVP	7443	7443-W	378-2631-R1	378-2633-R1	378-2634-R2	378-2641-R1	377-0308	377-0269	377-0338	377-0337	
U.K.	7443	7443-X	378-2631-R1	378-2633-R1	378-2634-R2	378-2636-R1	377-0308	377-0269	377-0338	377-0337	
GE/AU NON MVP	7443	7443-Y	378-2631-R1	378-2633-R1	378-2634-R2	378-2642-R1	377-0308	377-0269	377-0338	377-0337	
GE/AU MVP	7443	7443-Z	378-2631-R1	378-2633-R1	378-2634-R2	378-2635-R1	377-0308	377-0269	377-0338	377-0337	
NL NON MVP	7443	7443-AA	378-2631-R1	378-2633-R1	378-2634-R2	378-2645-R1	377-0308	377-0269	377-0338	377-0337	
NL MVP	7443	7443-AB	378-2631-R1	378-2633-R1	378-2634-R2	378-2640-R1	377-0308	377-0269	377-0338	377-0337	
SWISS	7443	7443-AC	378-2632-R1	378-2635-R1	378-2634-R2	378-2637-R1	377-0308	377-0269	377-0338	377-0337	
MICRO DIAG.	7443	7443-AD	378-2503				377-0308	377-0269	377-0338	377-0337	
2281	7443	7443-AE				378-2677-R2	377-0308	377-0269	377-0338	377-0337	

REV	DATE	BY	DESCRIPTION

SEE SMT

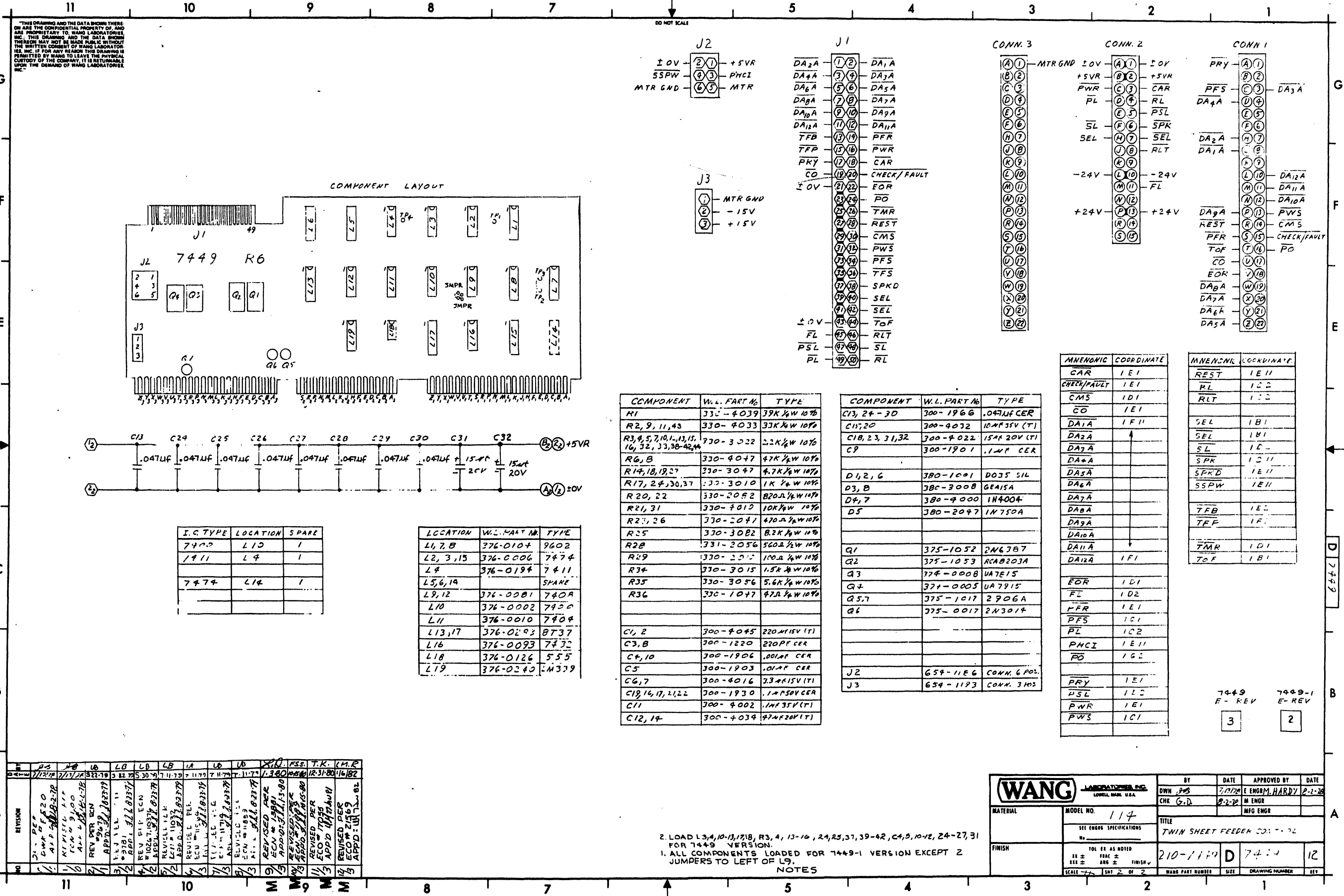
<b>WANG</b> LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY	DATE	APPROVED BY	DATE
MATERIAL		DWN	1-4-78	E ENGR	
MODEL NO. 2281/2281E, P		CNK		M ENGR	
FINISH		TITLE		MFG ENGR	
SEE ENGR SPECIFICATIONS		DIABLO PRINTER/PLOTTER CONTROL			
TOL. UNLESS NOTED		210-7443	D	7443	23
SCALE: 1/8" = 1"		WANG PART NUMBER		SIZE	DRAWING NUMBER

FIGURE 8-18 DIABLO PRINTER/PLOTTER CONTROL (2281W) WL# 7443 (SHEET 4 OF 4)

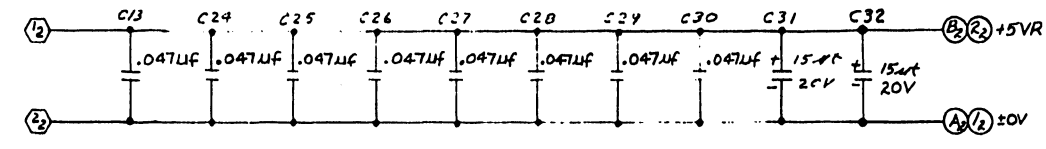
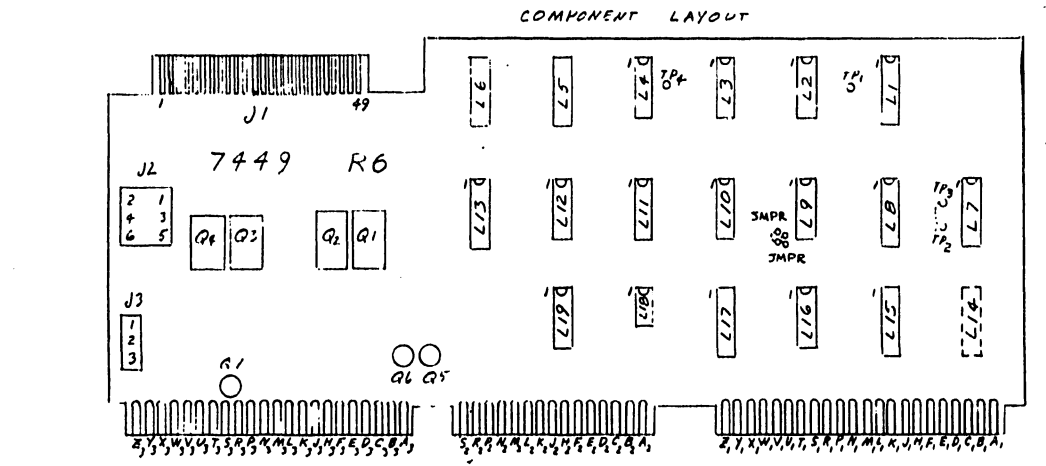
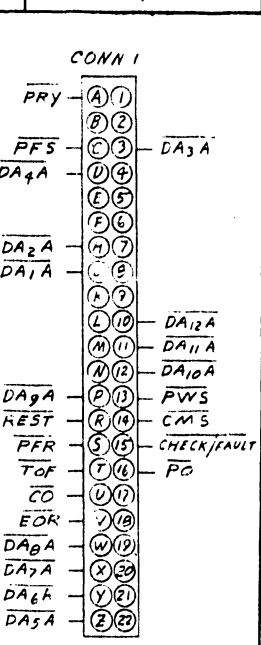
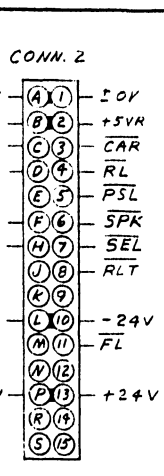
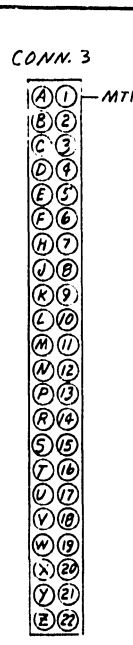
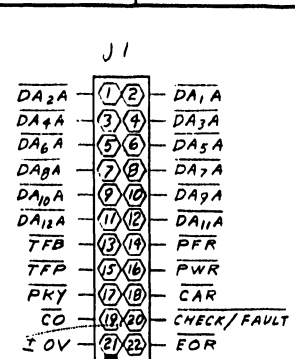
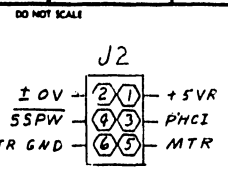








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IC TYPE	LOCATION	SPARE
7400	L10	1
7411	L4	1
7474	L14	1

LOCATION	W.L. PART NO.	TYPE
L1, 7, 8	376-0104	9602
L2, 3, 15	376-0006	7474
L4	376-0194	7411
L5, 6, 14		SPARE
L9, 12	376-0081	740A
L10	376-0002	7450
L11	376-0010	7404
L13, 17	376-0293	8T37
L16	376-0093	7474
L18	376-0126	555
L19	376-0240	LM339

COMPONENT	W.L. PART NO.	TYPE
R1	330-4039	39K 1/4W 10%
R2, 9, 11, 43	330-4033	33K 1/4W 10%
R3, 8, 5, 7, 10, 13, 15, 16, 32, 33, 38-42, 44	330-3022	2.2K 1/4W 10%
R6, B	330-4047	47K 1/4W 10%
R14, 18, 19, 27	330-3047	4.7K 1/4W 10%
R17, 24, 30, 37	330-3010	1K 1/4W 10%
R20, 22	330-2052	820 1/4W 10%
R21, 31	330-4019	10K 1/4W 10%
R23, 26	330-2047	470 1/4W 10%
R25	330-3082	8.2K 1/4W 10%
R28	331-2056	560 1/4W 10%
R29	330-2050	100 1/4W 10%
R34	330-3015	1.5K 1/4W 10%
R35	330-3056	5.6K 1/4W 10%
R36	330-1047	470 1/4W 10%
C1, 2	300-4045	220M 15V (T)
C3, B	300-1220	220PF CER
C4, 10	300-1906	.001M CER
C5	300-1903	.001M CER
C6, 7	300-4016	33M 15V (T)
C18, 16, 17, 21, 22	300-1930	.1M 35V (T)
C11	300-4002	.1M 35V (T)
C12, 14	300-4034	47M 20V (T)

COMPONENT	W.L. PART NO.	TYPE
C13, 24-30	300-1966	.047M CER
C15, 20	300-4032	10M 35V (T)
C18, 23, 31, 32	300-4022	15M 20V (T)
C9	300-1901	.1M CER
D1, 2, 6	380-1001	DO35 SIL
D3, B	380-3008	GEA15A
D4, 7	380-4000	1N4004
D5	380-2097	1N750A
Q1	375-1052	2N6387
Q2	375-1053	ACB203A
Q3	374-0008	UA7E15
Q4	371-0005	UA7915
Q5, 7	375-1017	2906A
Q6	375-0017	2N3014
J2	654-1166	CONN. 6 POS.
J3	654-1193	CONN. 3 POS.

MNEMONIC	COORDINATE
CAR	1E1
CHECK/FAULT	1E1
CMS	1D1
CO	1E1
DA1A	1F11
DA2A	
DA7A	
DA+A	
DAS A	
DA6A	
DA7A	
DAB A	
DA9A	
DA10A	
DA11A	
DA12A	1F1
EOR	1D1
FL	1D2
PFR	1E1
PFS	1C1
PL	1C2
PHCI	1E11
PO	1G2
PRY	1E1
PSL	1C2
PWR	1E1
PWS	1C1
REST	1E11
RL	1C2
RLT	1C2
SEL	1B1
SEL	1B1
SL	1C-
SPK	1C11
SPKD	1E11
SSPW	1E11
TFB	1E2
TFP	1F-
TMR	1D1
TOF	1B1

MNEMONIC	COORDINATE
REST	1E11
RL	1C2
RLT	1C2
SEL	1B1
SEL	1B1
SL	1C-
SPK	1C11
SPKD	1E11
SSPW	1E11
TFB	1E2
TFP	1F-
TMR	1D1
TOF	1B1

7449 E-REV 3  
7449-1 E-REV 2

REV	DATE	BY	APP'D	REVISION
1	1/27/78	JLB		INITIALS
2	1/27/78	JLB		REV PER ECN
3	1/27/78	JLB		REV PER ECN
4	1/27/78	JLB		REV PER ECN
5	1/27/78	JLB		REV PER ECN
6	1/27/78	JLB		REV PER ECN
7	1/27/78	JLB		REV PER ECN
8	1/27/78	JLB		REV PER ECN
9	1/27/78	JLB		REV PER ECN
10	1/27/78	JLB		REV PER ECN
11	1/27/78	JLB		REV PER ECN
12	1/27/78	JLB		REV PER ECN
13	1/27/78	JLB		REV PER ECN
14	1/27/78	JLB		REV PER ECN
15	1/27/78	JLB		REV PER ECN

NOTES  
2. LOAD L3, 4, 10, 13, 17, 18, R3, 4, 13-16, 24, 25, 37, 39-42, C4, 5, 10, 12, 24-27, 31 FOR 7449 VERSION.  
1. ALL COMPONENTS LOADED FOR 7449-1 VERSION EXCEPT 2 JUMPERS TO LEFT OF L9.

**WANG** LABORATORIES, INC. LOWELL, MASS. U.S.A.

BY: **ENG. HARDY** DATE: 2-1-78  
CHK: G.D. DATE: 2-2-78 M ENGR

MODEL NO. 114  
TITLE: TWIN SHEET FEEDER CO: 7449

FINISH: 210-114  
SCALE: 1:1  
SHEET 2 OF 2

FIGURE 8-20 PRINTER CONTROL (SYSTEM 5) WL# 7449 (SHEET 2 OF 2)







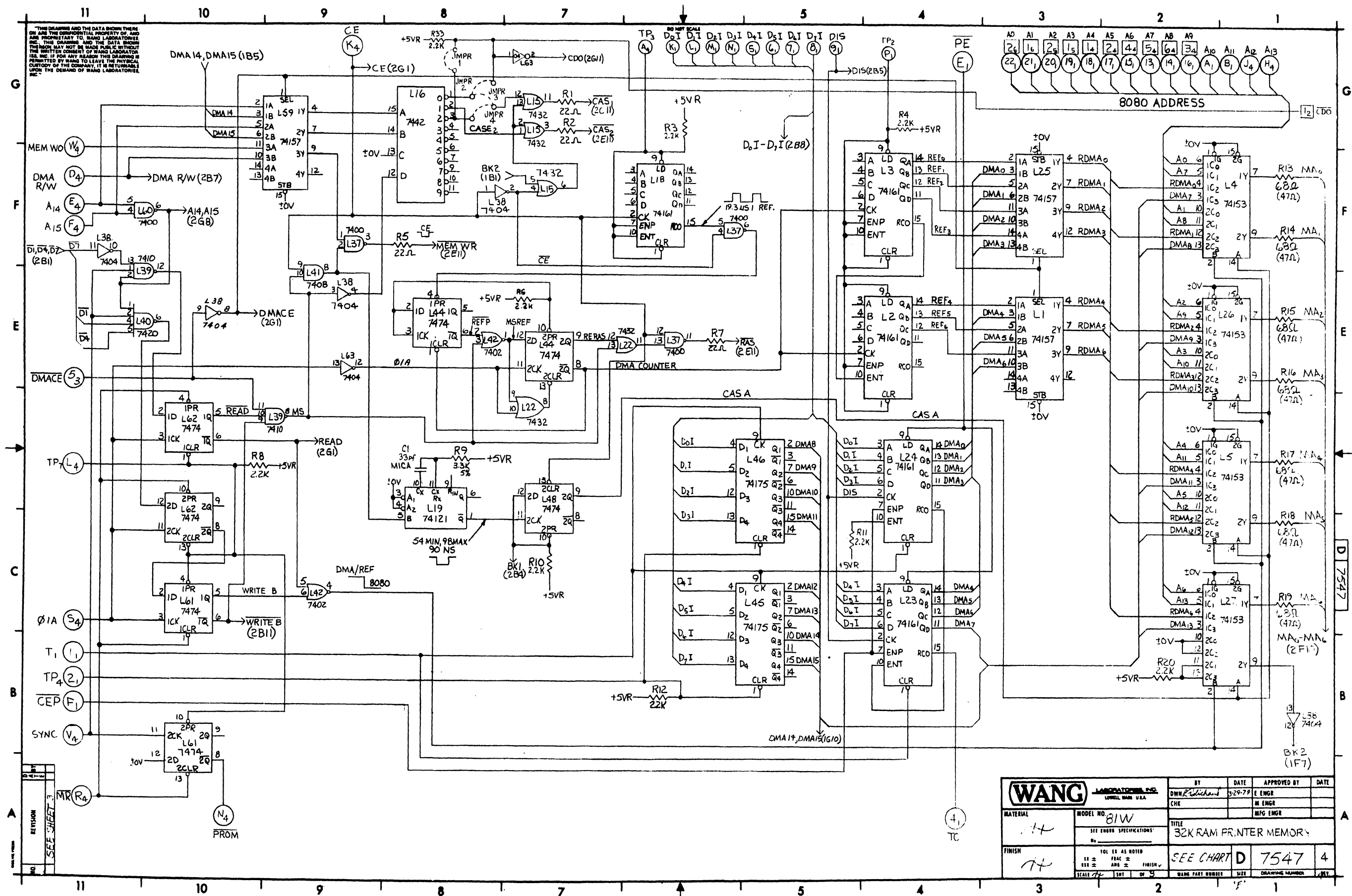


FIGURE 8-22 16K RAM PRINTER MEMORY WL# 7547 (SHEET 1 OF 3)

<b>WANG</b> LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY DWN R. [Signature]	DATE 3-29-79	APPROVED BY E ENGR	DATE
MATERIAL 74	MODEL NO. 81W	CHK		M ENGR	
SEE ENGR SPECIFICATIONS		TITLE 32K RAM PRINTER MEMORY			
FINISH 74	SCALE 7/8"	SHT 1	OF 9	SEE CHART D	7547 4
TOL IS AS NOTED		WANG PART NUMBER			
11 ±		FRAC ±		SIZE	
100 ±		ANG ±		DRAWING NUMBER	
SCALE		SHT		SIZE	

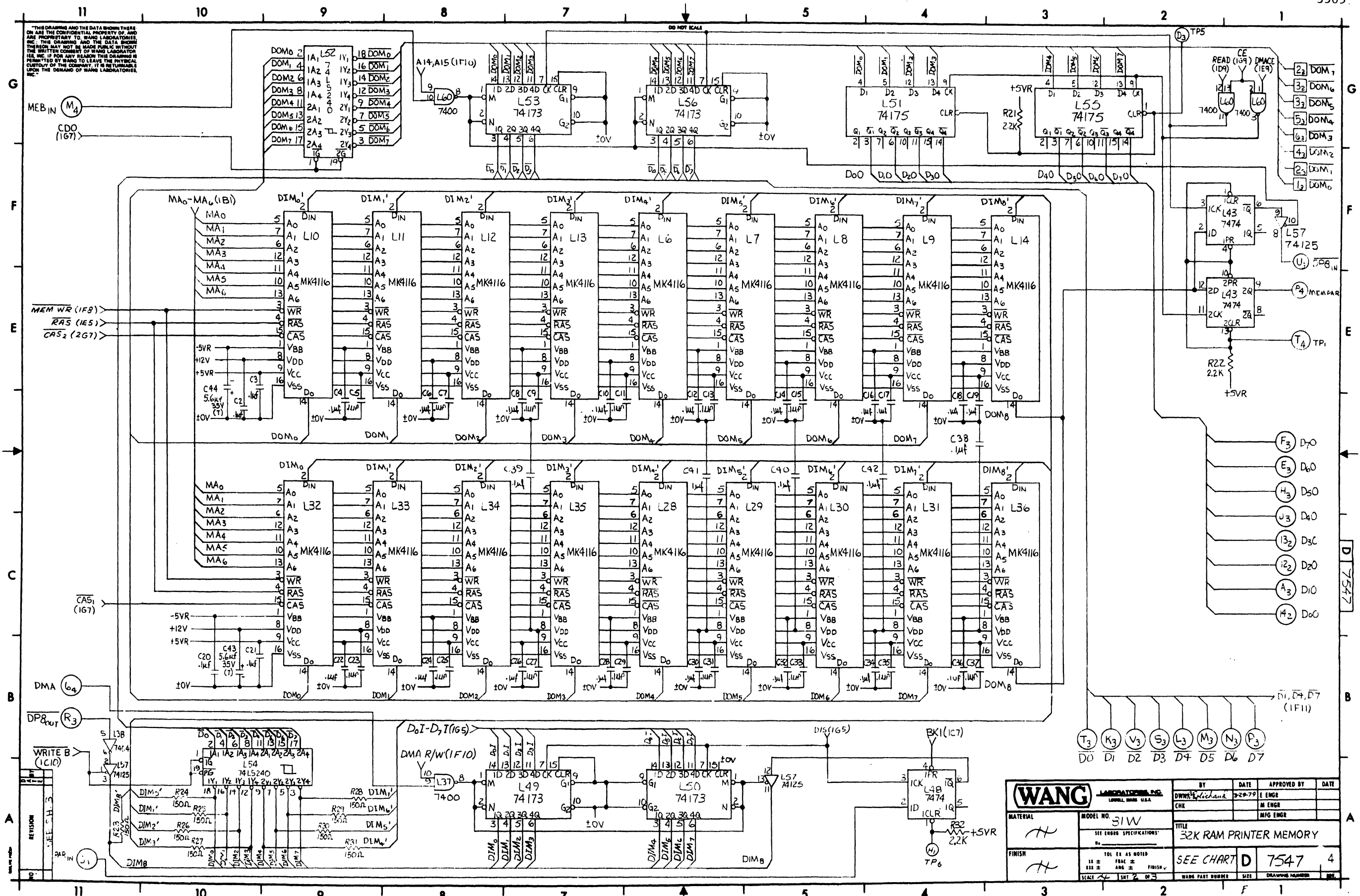


FIGURE 8-22 16K RAM PRINTER MEMORY WL# 7547 (SHEET 2 OF 3)



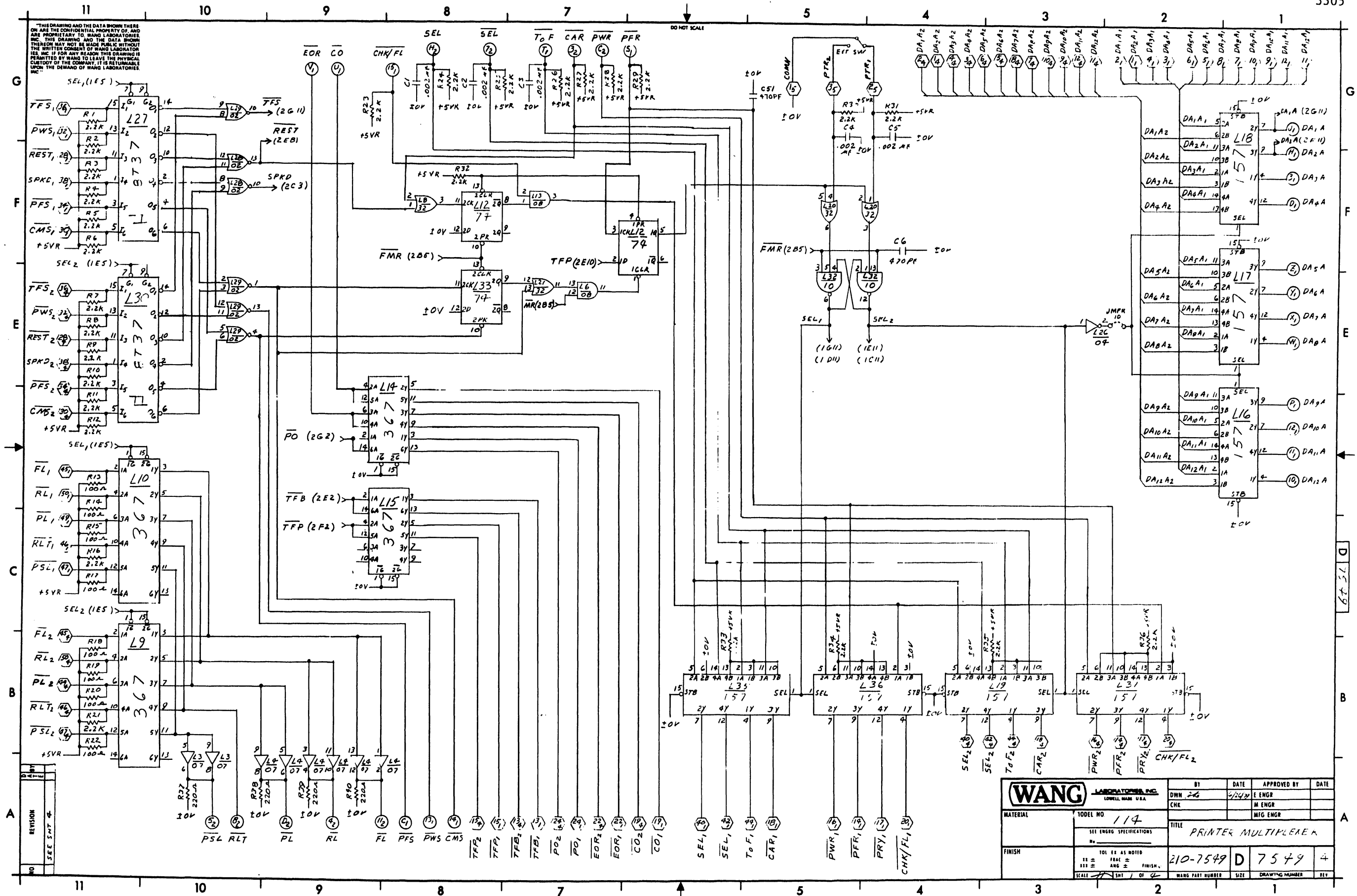
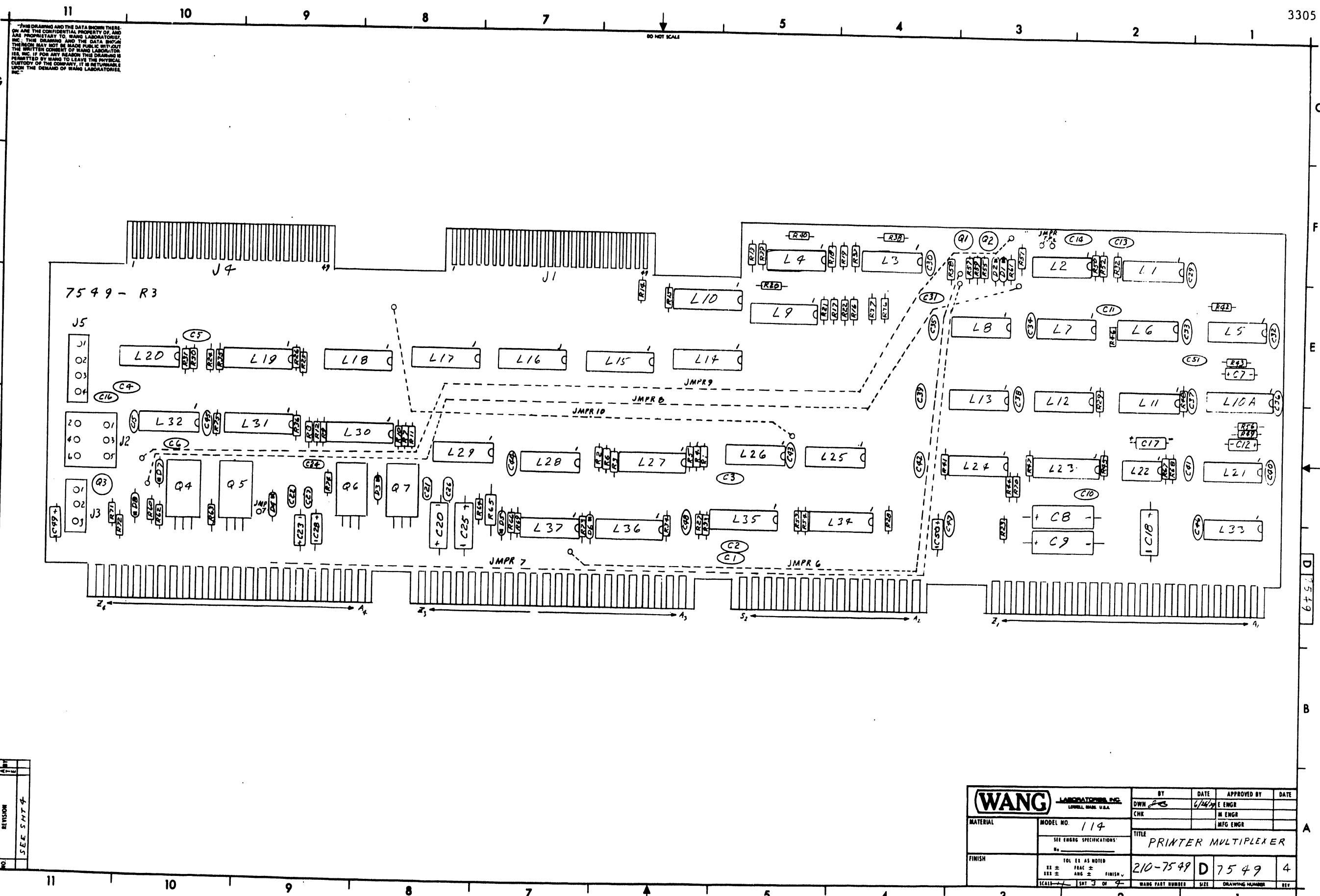


FIGURE 8-23 SHARED PRINTER OPTION (SYSTEM 5) WL# 7549 (SHEET 1 OF 4)







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DO NOT SCALE

NO.	REV.	DATE	BY

SEE SMT 4

<b>WANG</b> LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY	DATE	APPROVED BY	DATE
MATERIAL		OWN	6/24/74	E ENGR	
MODEL NO. 114		CHK		M ENGR	
SEE ENGR SPECIFICATIONS		TITLE			
FINISH		PRINTER MULTIPLEXER			
TOL. AS NOTED		210-7549	D	7549	4
FINISH		WANG PART NUMBER	SIZE	DRAWING NUMBER	REV.
SCALE: 1/8" = 1"		SMT 3 OF 4			

FIGURE 8-23 SHARED PRINTER OPTION (SYSTEM 5) WL# 7549 (SHEET 3 OF 4)

11 10 9 8 7 5 4 3 2 1

THIS DRAWING AND THE DATA SHOWN THEREON ARE THE CONFIDENTIAL PROPERTY OF WANG LABORATORIES, INC. AND PROPRIETARY TO WANG LABORATORIES, INC. THE DRAWING AND THE DATA SHOWN THEREON MAY NOT BE MADE PUBLIC WITHOUT THE WRITTEN CONSENT OF WANG LABORATORIES, INC. IF FOR ANY REASON THIS DRAWING IS TRANSMITTED BY WANG TO LEAVE THE PHYSICAL CUSTODY OF THE COMPANY, IT IS RETURNABLE UPON THE DEMAND OF WANG LABORATORIES, INC.

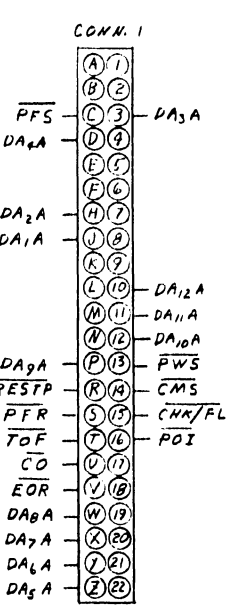
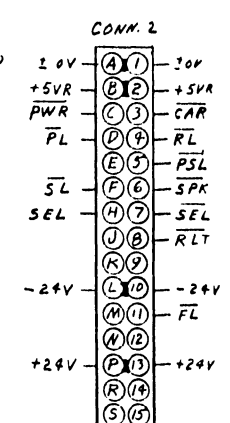
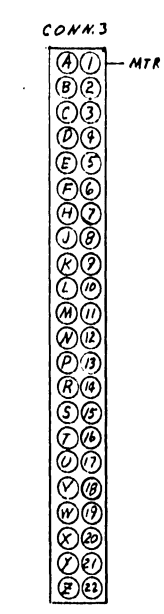
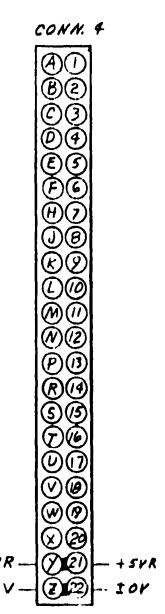
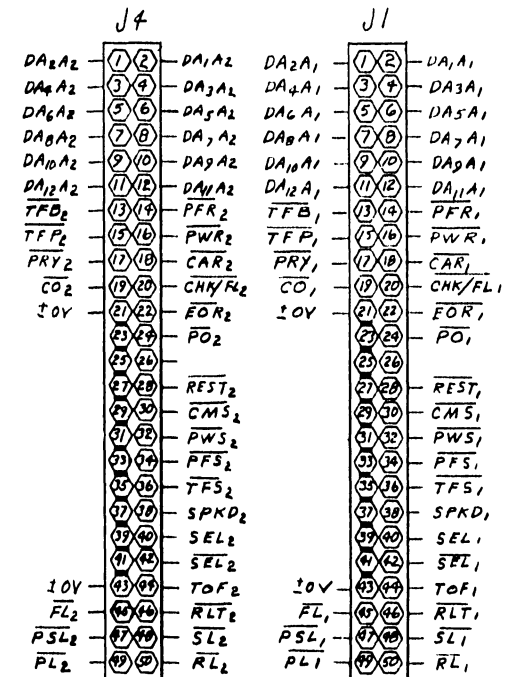
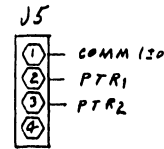
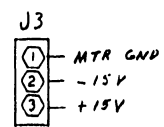
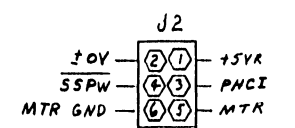


Table with columns MNEMONIC and COORDINATE. Lists various components and their locations, such as CAR (1G7), PNCI (2E11), PWR (1G7), PWS (1G11), PWS2 (1E11), PWR2 (1G7), PWS2 (1G11), PWS2 (1E11), PWR (1G7), PWS (1G11), PWS2 (1E11), PWR (1G7), PWS (1G11), PWS2 (1E11), PWR (1G7), PWS (1G11), PWS2 (1E11), PWR (1G7), PWS (1G11), PWS2 (1E11), PWR (1G7), PWS (1G11), PWS2 (1E11).

Table with columns LG. TYPE, LOC., and SPARE. Lists component types and locations like 7900 L11 1, 7902 L8B 2, 7404 L26 3, 7407 L3 4, 7410 L32 1, 7411 L7 2, 7432 L20 2, 7474 L33 1, 8737 L34 1, 7404 L25 3.

Table with columns LOCATION, W.L. PART NO., and TYPE. Lists component locations and part numbers like L1, 7 376-0194 7911, L2, 10A, 23 376-0104 9602, L3, 4 376-0056 7407, L5, 12, 24, 33 376-0006 7474, L6, 13 376-0081 7408, LB, 20, 21 376-0093 7432, L9, 10, 14, 15 376-0176 74367, L11 376-0002 7400, L16-19, 31, 33, 36 376-0082 79157, L22 376-0126 555, L25, 26 376-0010 7404, L27, 30, 34 376-0283 8737, L28, 29 376-0016 7402, L32 376-0003 7910, L37 376-0240 LM339.

Table with columns COMPONENT, W.L. PART NO., and TYPE. Lists component types and part numbers like C14 300-1901 1M12V CER, C17 300-4002 1M135V ITI, C18, 19 300-4020 45M15V ITI, C20, 25 300-4032 10M135V ITI, C21, 22, 24, 26, 27 300-1930 1M150V CER, C29-48 300-1900 105M12V CER, C23, 28, 49, 50 300-4022 15M120V ITI, C16 300-1903 01M125V CER, D1, 2, 6 380-1001 SIL, D3, 7 380-4000 1M4004, D4, 8 380-3008 A15A, D5 380-2047 1M750A 7V, Q1 375-0017 2N3014, Q2 375-1017 2N2906, Q3 375-1059 2N2907, Q4 375-1052 2N6387, Q5 375-1053 RCA 8203A, Q6 375-0008 AA7815, Q7 375-0005 AA7915, J2 654-1186 HEADER, 6 POS, J3 654-1193 HEADER, 3 POS, J5 654-1194 HEADER, 4 POS.

Table with columns COMPONENT, W.L. PART NO., and TYPE. Lists component types and part numbers like R1-12, 16, 21, 23-36, 41, 46, 49, 54, 59, 56, 70, 71, 77 330-3022 2.2K 1/4W 10%, R13-15, 11-20, 23, 46 330-2010 100K 1/4W 10%, R17-40 330-2022 220-2 1/4W 10%, R42 330-3027 2.7K 1/4W 10%, R43, 49 330-4047 47K 1/4W 10%, R44 330-4039 39K 1/4W 10%, R45, 50, 51, 76 330-4033 33K 1/4W 10%, R55, 67, 69 330-3010 1K 1/4W 10%, R57, 58, 64, 53 330-3047 4.7K 1/4W 10%, R59, 61 330-2002 820-2 1/4W 10%, R60 330-4010 10K 1/4W 10%, R62, 63 330-2047 470-2 1/4W 10%, R65 331-2056 560-2 1/4W 10%, R68 330-3002 0.2K 1/4W 10%, R12 330-3015 15K 1/4W 10%, R73 330-4012 12K 1/4W 10%, R74 330-3056 5.6K 1/4W 10%, R75 330-1047 47-2 1/4W 10%, C1-5 300-1913 1.002 45SMV CER, C6, 51 300-1470 470PF 50V CER, C7, 12 300-4016 3.34M 15V ITI, C8, 9, 10 300-4045 220PF 50V ITI, C13 300-1220 220PF 50V CER, C14, 15 300-1906 1.001A 50V CER.

Table with columns MNEMONIC and COORDINATE. Lists various components and their locations, such as SEL (1G8), SEL (1G8), SEL (1A7), SEL (1A7), SEL (1B7), SEL (1B7), SEL (2D1), SEL (2D1), SEL (2D1), SEL (2D1), SPK (2C1), SPK (1E11), SPK (1E11), SSPW (2E11), TFB (1A7), TFB (1A7), TFP (1A8), TFP (1A8), TFS (1G11), TFS (1E11), TOF (1G7), TOF (1A5), TOF (1B3), PNCI (2E11), PWR (1G7), PWR (1A5), PWR (1B3), PWS (1A8), PWS (1G11), PWS (1E11), REST (1E11), REST (1E11), REST (2A8), RL (1A9), RL (1D11), RL (1B11), PTR1 (1G4), PTR2 (1G5), PWR (1G7), PWR (1A5), PWR (1B3), PWS (1A8), PWS (1G11), PWS (1E11), REST (1E11), REST (1E11), REST (2A8), RL (1A9), RL (1D11), RL (1B11).

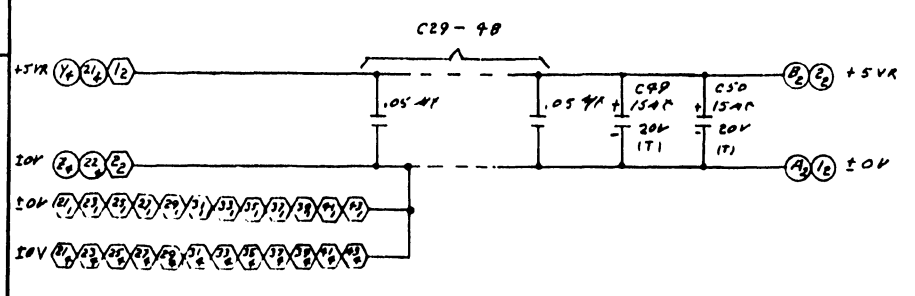
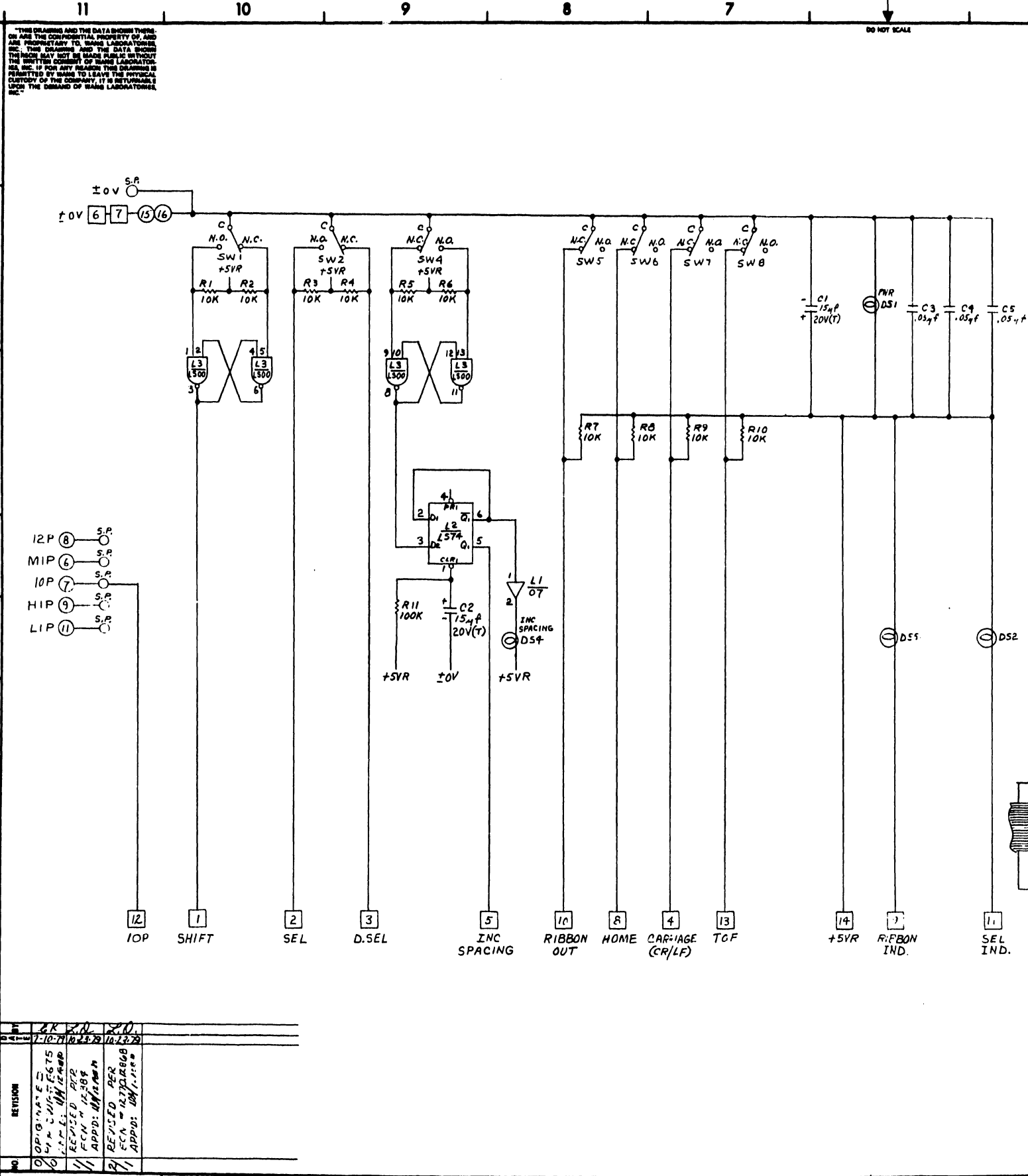


Table with columns REVISION, DATE, and DESCRIPTION. Lists revision history for the drawing.

WANG LABORATORIES, INC. drawing header form including fields for MATERIAL, MODEL NO. (114), TITLE (PRINTER MULTIPLEXER), FINISH, and various approval and date fields.

FIGURE 8-23 SHARED PRINTER OPTION (SYSTEM 5) WL# 7549 (SHEET 4 OF 4)

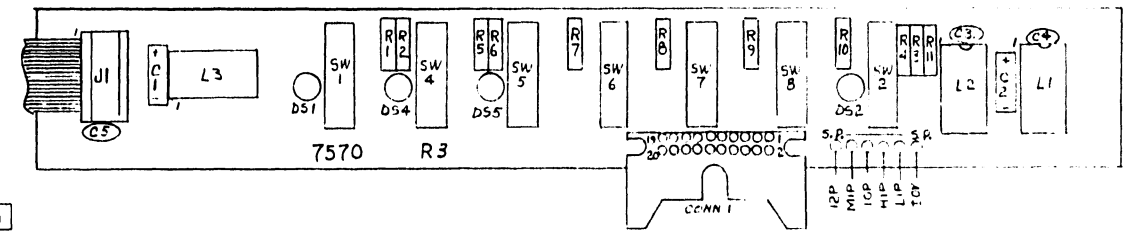
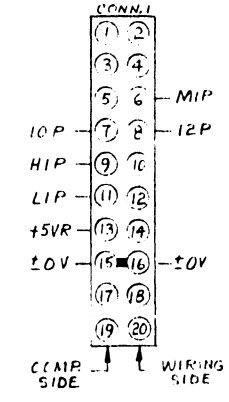
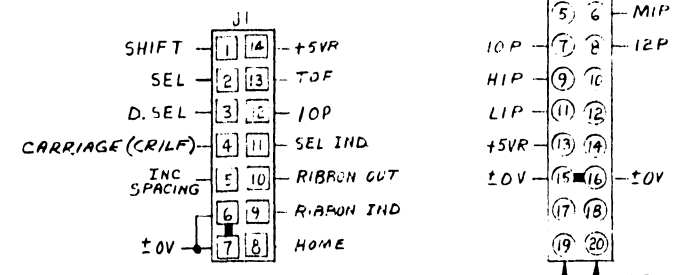


COMPONENT	W.L. PART NO.	TYPE
J1	220-3005	14 PIN CABLE
C1,2	300-4022	15 $\mu$ f 20V (T)
C3,4,5	300-1900	.05 $\mu$ f 12V CER.
SW1,2,4-8	325-2305	115M1 MICRO SW.
R1-10	330-4010	10K 1/4W 10%
R11	330-5010	100K 1/4W 10%
DS1,2,4,5	370-0015	AS15 CLEAR .AMP
CONN.1	654-0122	20 POS. HEADER

MNEMONIC	COORDINATE
CARRIAGE (CR/LF)	1B7
D SEL	1B9
HIP	1D11
HOME	1B8
INC SPACING	1B8
LIP	1D11
MIP	1D11
RIBBON IND.	1B6
RIBBON OUT	1B8
SEL	1B10
SEL IND.	1B5
SHIFT	1B10
TOP	1B7
10P	1D11
12P	1D11
+5VR	1B6
$\pm$ 0V	1F11

LOCATION	W.L. PART NO.	TYPE
L1	376-0056	7407
L2	376-0155	74LS74
L3	376-0207	74LS00

LOCATION	TYPE	SPARE
L1	7407	5
L2	74LS74	1



REV	BY	DATE	DESCRIPTION
1	WJ	10-23-73	REVISED PER ECN # 1270AB08
2	WJ	11-15-73	APPROX. 20/1.15.0

<b>WANG</b> LABORATORIES INC. LOCAL MADE USA		BY	DATE	APPROVED BY	DATE
MATERIAL		DWN	10-24-73	E ENGR	3/2/74
MODEL NO. 2281P		CHK	11/22/73	M ENGR	
SEE ENGR SPECIFICATIONS		TITLE			
FINISH		PLOTTER KEYBOARD			
TOL EX AS NOTED		210-7570		D	2
SCALE		SRT 1 OF 1		WANG PART NUMBER	SIZE

FIGURE 8-24 DAISY PRINTER KEYBOARD (2281W/WC) WL# 7570





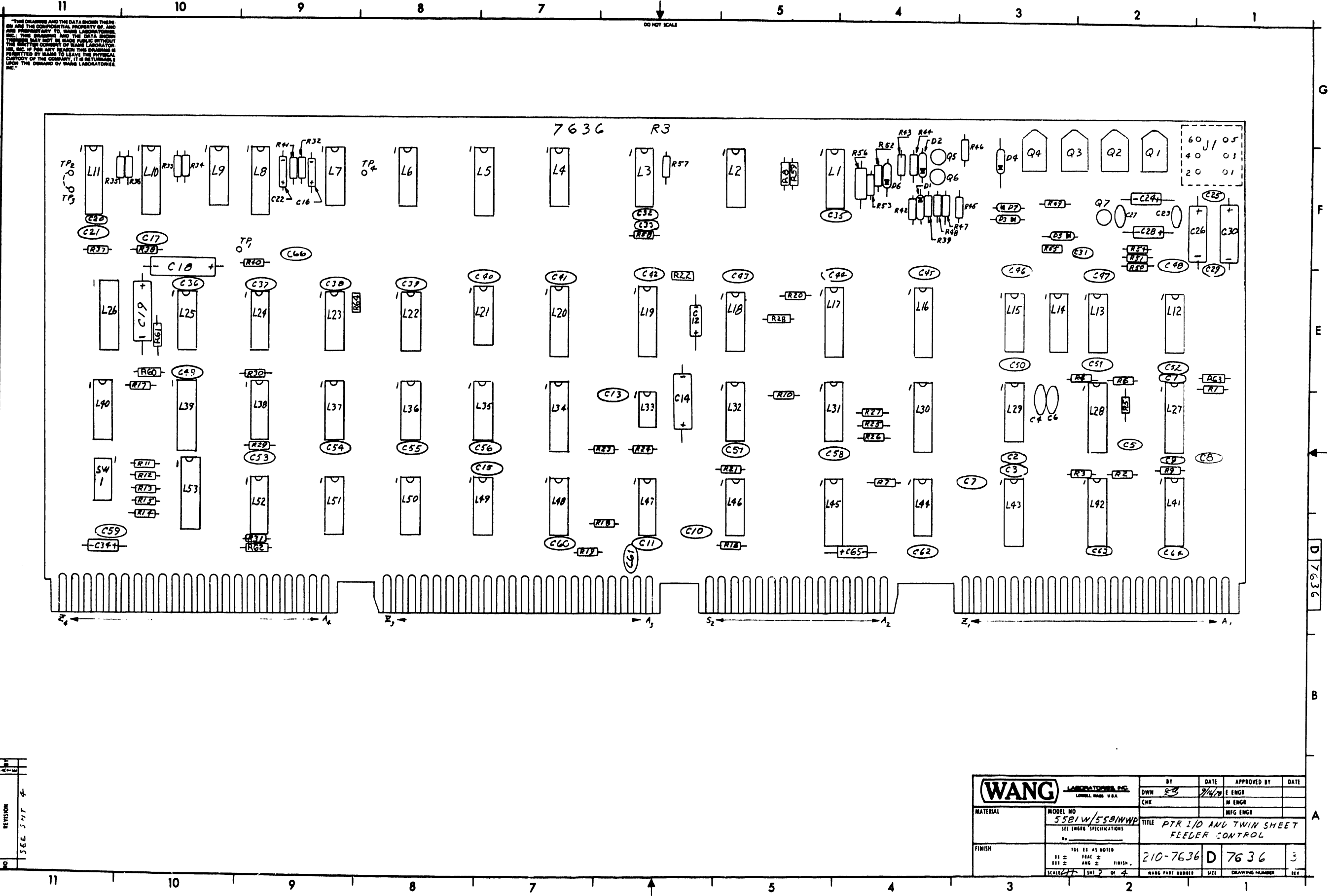


FIGURE 8-25 PTR I/O TWIN SHEET FEEDER CONTROL WL# 7636 (SHEET 3 OF 4)





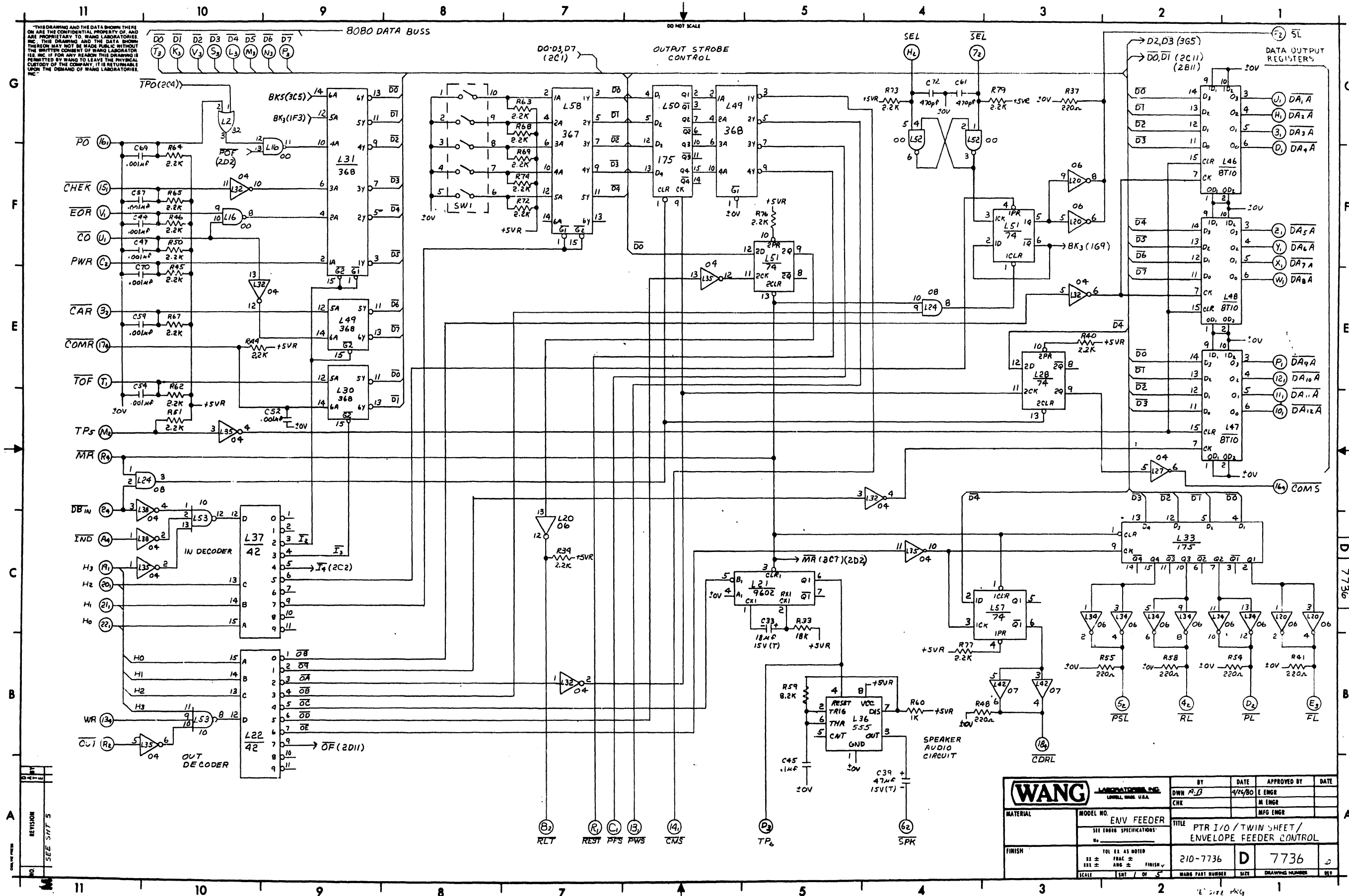


FIGURE 8-26 PTR I/O TWIN SHEET FEEDER/ENVELOPE FEEDER CONTROL WL# 7736 (SHEET 1 OF 5)

<b>WANG</b> LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY	DATE	APPROVED BY	DATE
MATERIAL		DWN A.B.	4/24/80	E ENGR	
MODEL NO. ENV FEEDER		CHK		M ENGR	
TITLE PTR I/O / TWIN SHEET / ENVELOPE FEEDER CONTROL				MFG ENGR	
FINISH		210-7736		D	7736
SCALE		SHT 1 OF 5		WANG PART NUMBER	SIZE

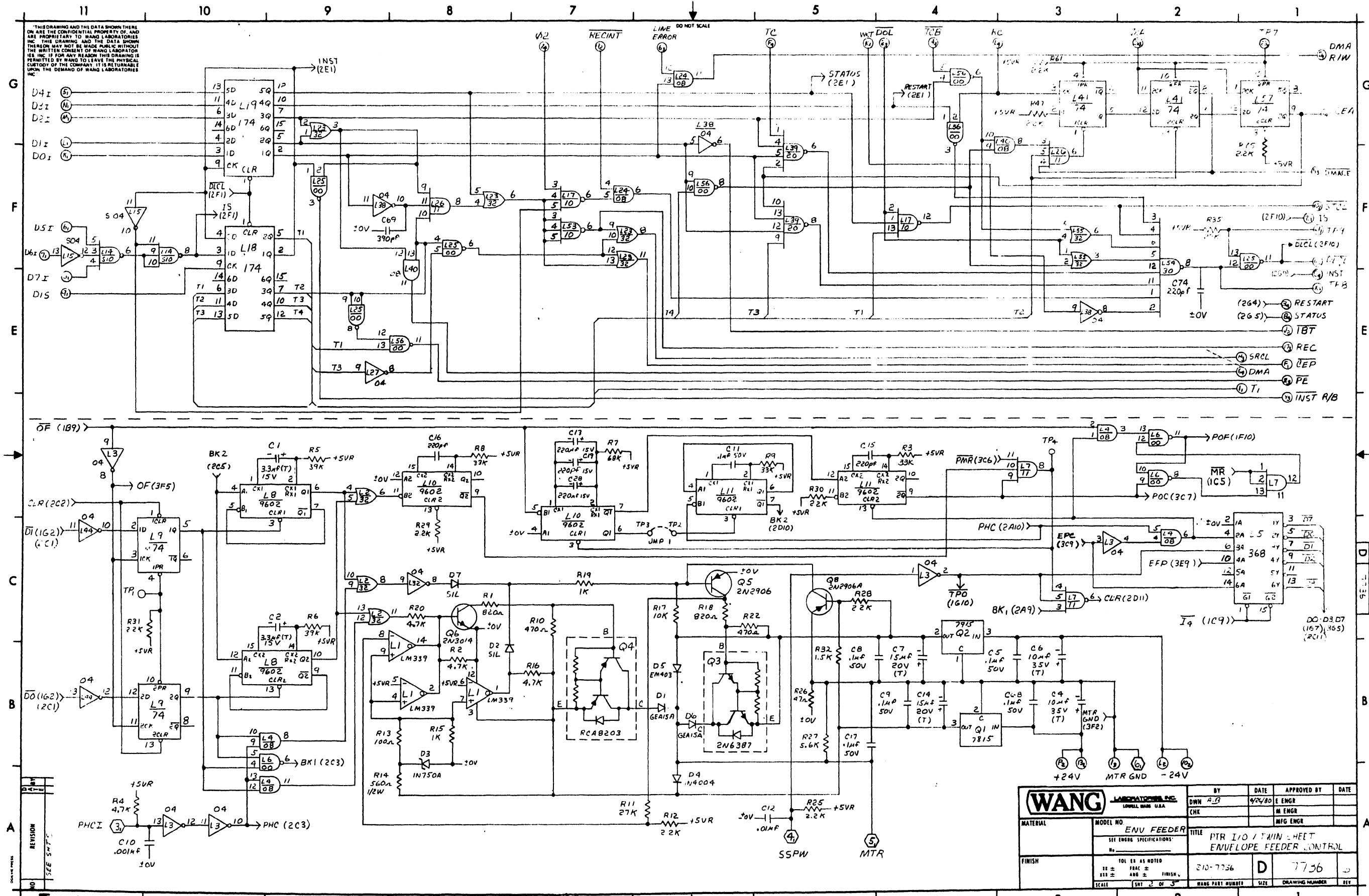


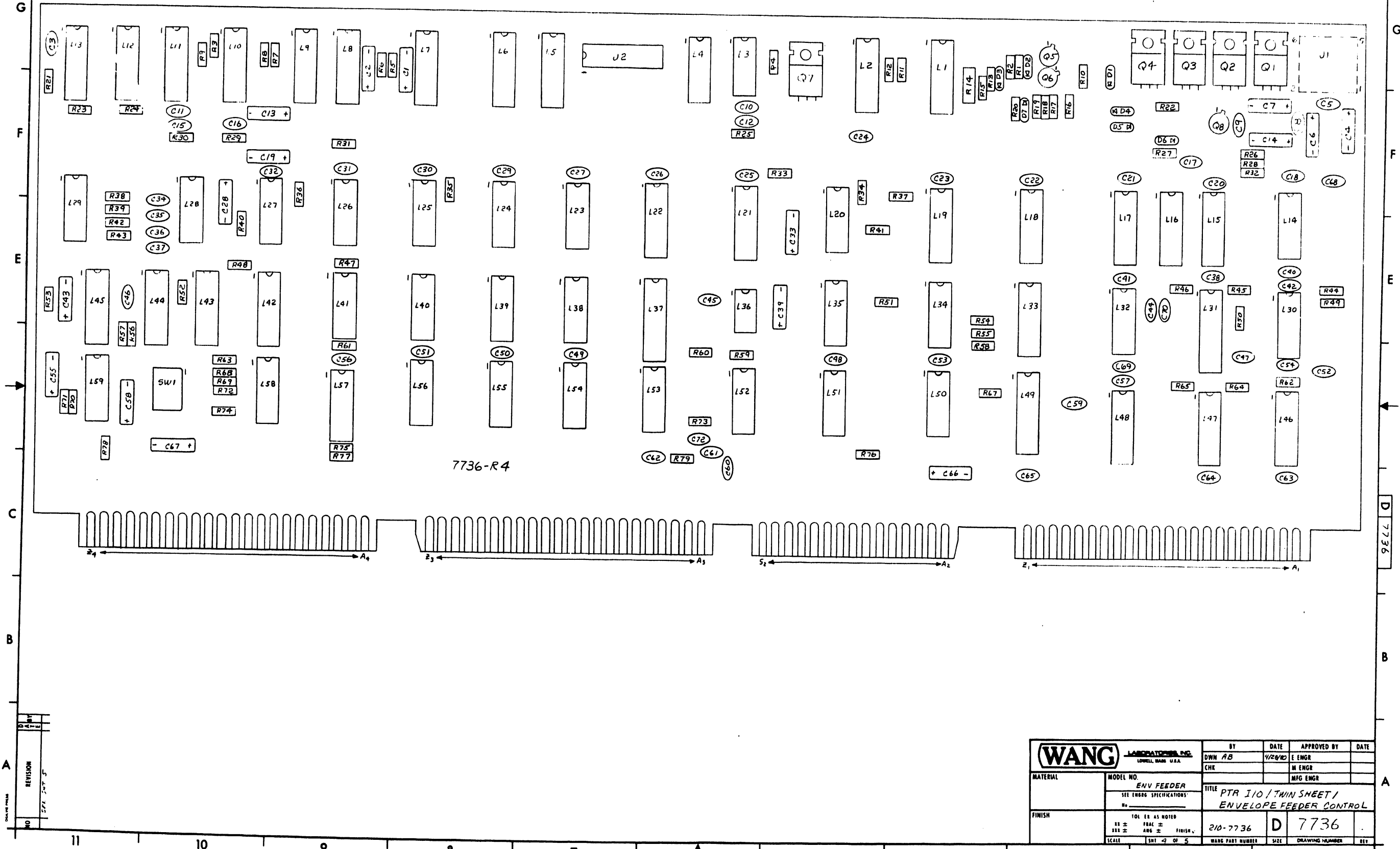
FIGURE 8-26 PTR I/O TWIN SHEET FEEDER/ENVELOPE FEEDER CONTROL WL# 7736

(SHEET 2 OF 5)



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DO NOT SCALE



7736-R4

NO	REVISION
1	2/11/77

<b>WANG</b> LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY DWN AB	DATE 9/24/70	APPROVED BY E ENGR	DATE
MATERIAL	MODEL NO. ENV FEEDER SEE ENGR SPECIFICATIONS	CHK		M ENGR	
				MFG ENGR	
TITLE PTR I/O / TWIN SHEET / ENVELOPE FEEDER CONTROL		210-7736		D	7736
FINISH TOL EX AS NOTED XX ± FRACTION ± XXX ± ANG ± FINISH		SCALE SHT 4 OF 5		WANG PART NUMBER	SIZE DRAWING NUMBER

FIGURE 8-26 PTR I/O TWIN SHEET FEEDER/ENVELOPE FEEDER CONTROL WL# 7736 (SHEET 4 OF 5)



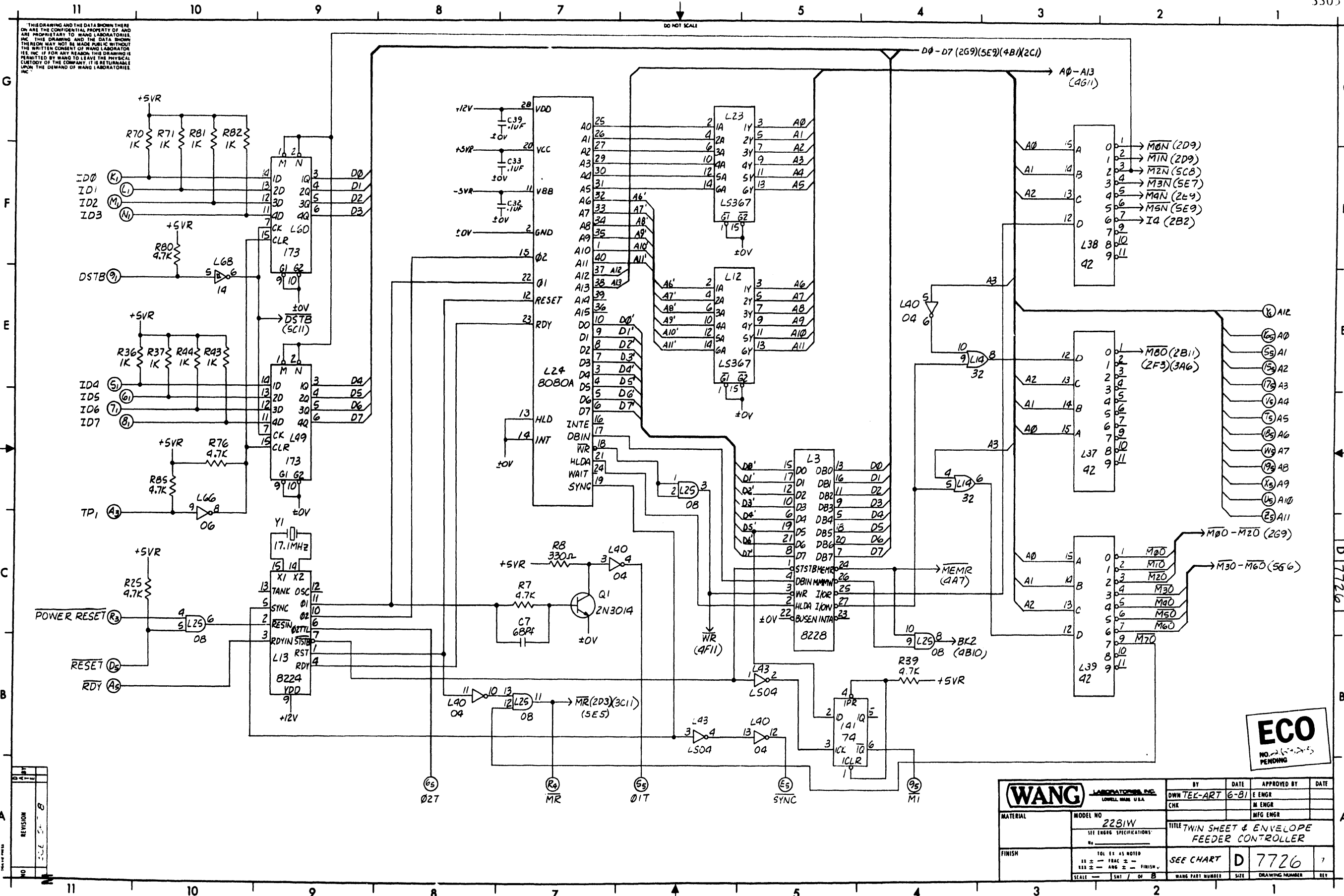


FIGURE 8-27 TSF/EF CONTROL (2281W) WL# 7726 (SHEET 1 OF 8)



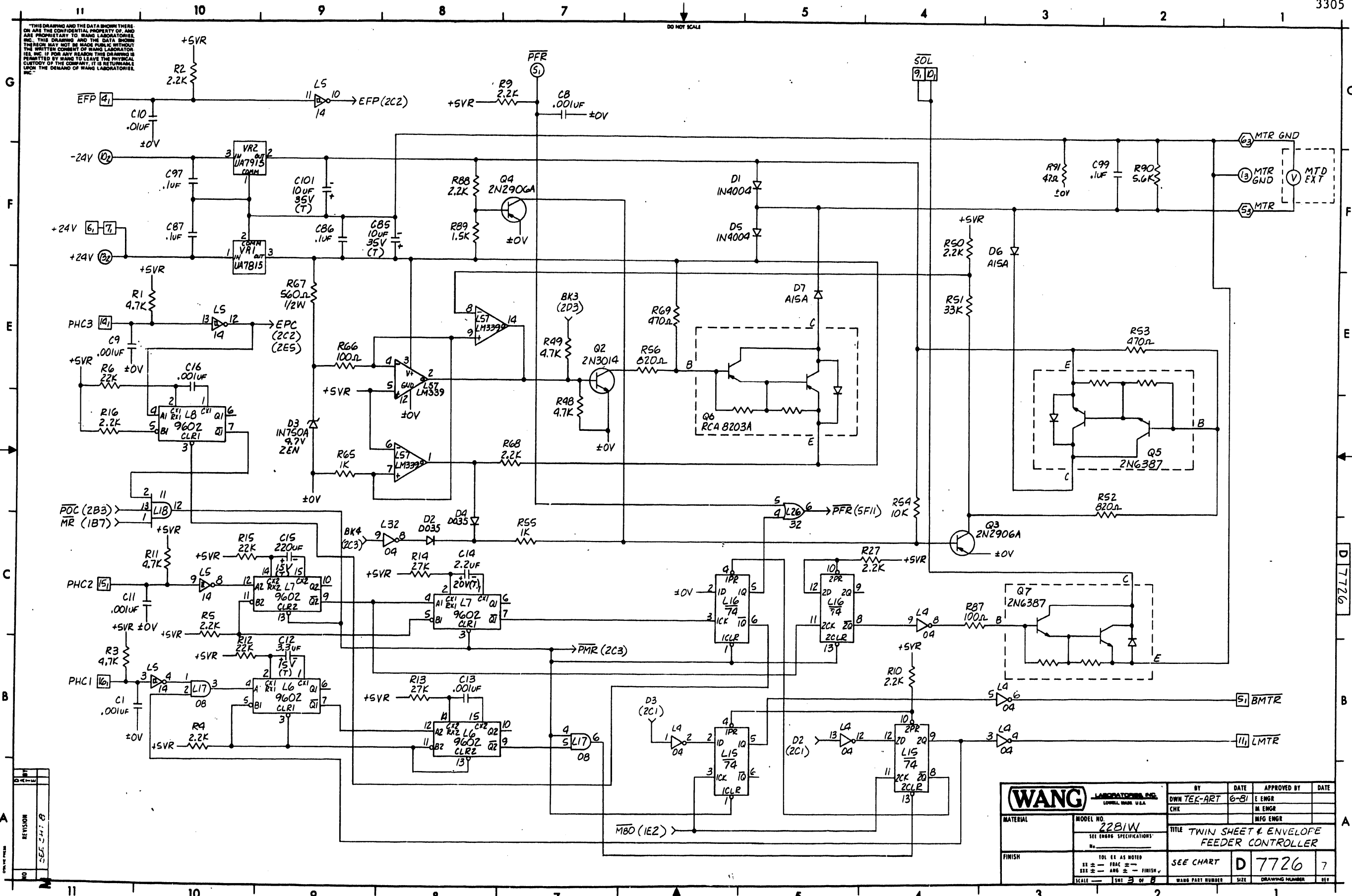
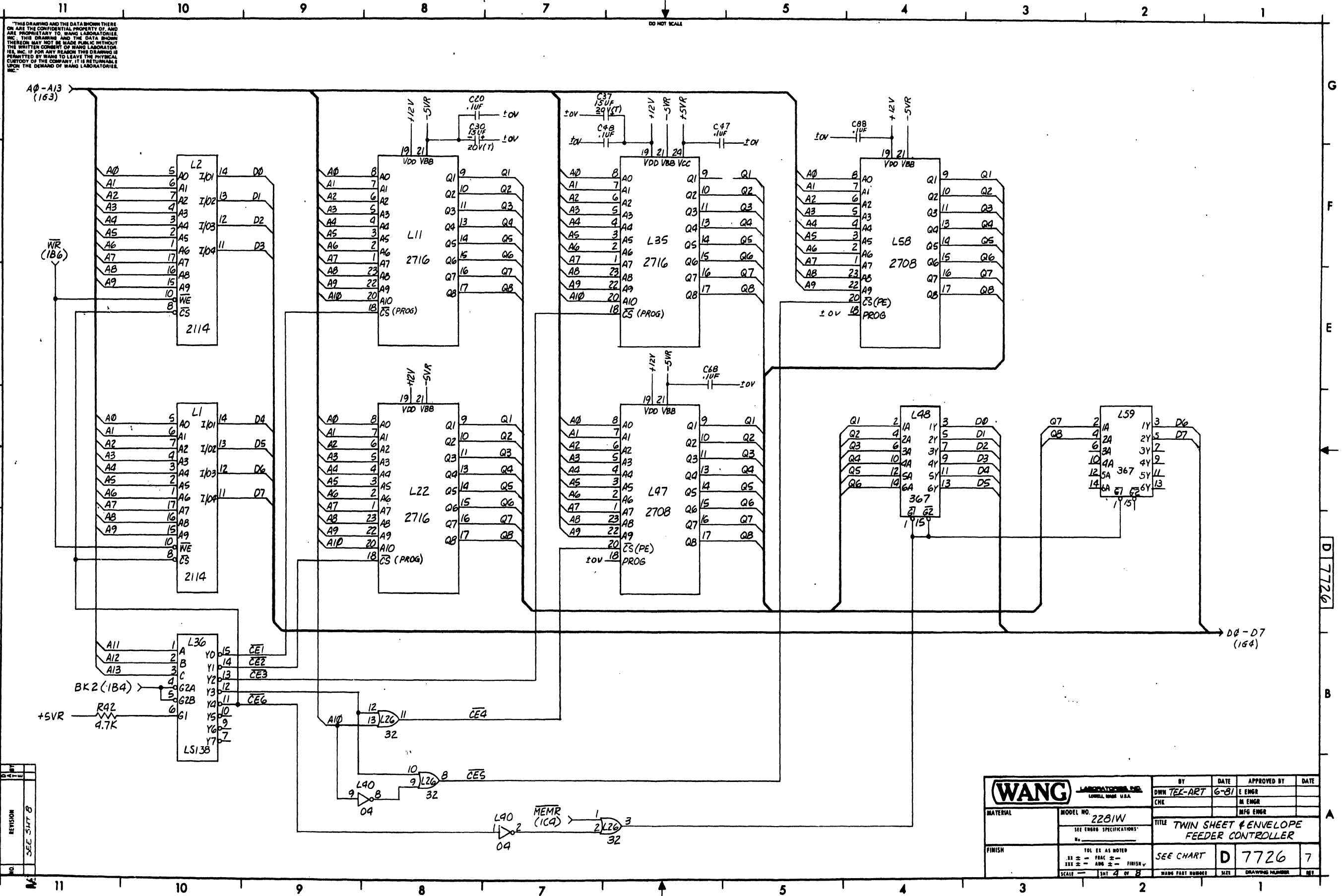


FIGURE 8-27 TSF/EF CONTROL (2281W) WL# 7726 (SHEET 3 OF 8)

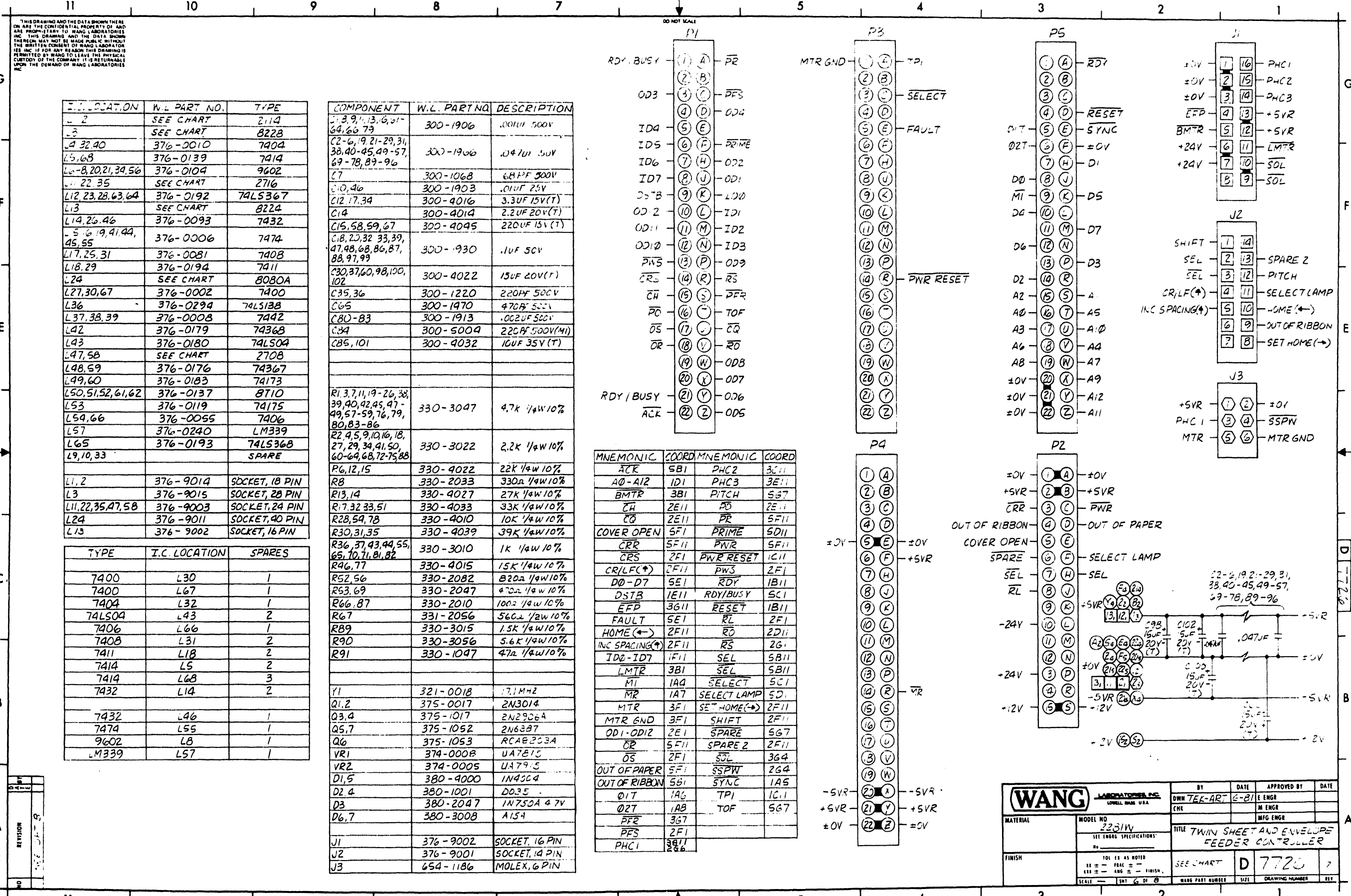




<b>WANG</b> LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY	DATE	APPROVED BY	DATE
MATERIAL		OWN TEL-ART	6-81	E ENGR	
MODEL NO. 2281W		CHK		M ENGR	
SEE ENGR SPECIFICATIONS		TITLE		MFG ENGR	
FINISH		TWIN SHEET & ENVELOPE FEEDER CONTROLLER			
101 IS AS NOTED		SEE CHART	D	7726	7
102 ± - FRAC ± -		WANG PART NUMBER		SIZE	DRAWING NUMBER
103 ± - ANG ± - FINISH		SCALE		SHT 4 OF 8	

FIGURE 8-27 TSF/EF CONTROL (2281W) WL# 7726 (SHEET 4 OF 8)





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I.C. LOCATION	W.L. PART NO.	TYPE
2	SEE CHART	2114
3	SEE CHART	8228
A 32,40	376-0010	7404
L5,68	376-0139	7414
L6-8,20,21,34,56	376-0104	9602
L22,35	SEE CHART	2716
L12,23,28,63,64	376-0192	74LS367
L13	SEE CHART	8224
L14,26,46	376-0093	7432
L5,6,19,41,44,45,55	376-0006	7474
L17,25,31	376-0081	7408
L18,29	376-0194	7411
L24	SEE CHART	8080A
L27,30,67	376-0002	7400
L36	376-0294	74LS138
L37,38,39	376-0008	7442
L42	376-0179	7436B
L43	376-0180	74LS04
L47,58	SEE CHART	2708
L48,59	376-0176	74367
L49,60	376-0183	74173
L50,51,52,61,62	376-0137	8710
L53	376-0119	74175
L54,66	376-0055	7406
L57	376-0240	LM339
L65	376-0193	74LS36B
L9,10,33		SPARE

TYPE	I.C. LOCATION	SPARES
7400	L30	1
7400	L67	1
7404	L32	1
74LS04	L43	2
7406	L66	1
7408	L31	2
7411	L18	2
7414	L5	2
7414	L68	3
7432	L14	2
7432	L46	1
7474	L55	1
9602	L8	1
LM339	L57	1

COMPONENT	W.L. PART NO.	DESCRIPTION
C1,3,9,13,16,21-64,66,79	300-1906	.001UF 500V
C2-6,19,21-29,31,38,40-45,49-57,69-78,89-96	300-1906	.047UF 50V
C7	300-1068	68PF 500V
C10,46	300-1903	.01UF 25V
C12,17,34	300-4016	3.3UF 15V(T)
C14	300-4014	2.2UF 20V(T)
C15,58,59,67	300-4045	220UF 15V(T)
C18,20,32,33,39,47,48,68,86,87,88,97,99	300-1930	.1UF 50V
C30,37,60,98,100,102	300-4022	15UF 20V(T)
C35,36	300-1220	220PF 500V
C65	300-1970	470PF 50V
C80-83	300-1913	.002UF 500V
C84	300-5004	220PF 500V(MI)
C85,101	300-4032	10UF 35V(T)
R1,3,7,11,19-26,38,39,40,42,45,47-49,57-59,76,79,80,83-86	330-3047	4.7K 1/4W 10%
R2,4,5,9,10,16,18,27,29,34,41,50,60-64,68,72-75,88	330-3022	2.2K 1/4W 10%
R6,12,15	330-4022	22K 1/4W 10%
R8	330-2033	330Ω 1/4W 10%
R13,14	330-4027	27K 1/4W 10%
R17,32,33,51	330-4033	33K 1/4W 10%
R28,54,78	330-4010	10K 1/4W 10%
R30,31,35	330-4039	39K 1/4W 10%
R36,37,43,44,55,65,70,71,81,82	330-3010	1K 1/4W 10%
R46,77	330-4015	15K 1/4W 10%
R52,56	330-2082	820Ω 1/4W 10%
R53,69	330-2047	470Ω 1/4W 10%
R66,87	330-2010	100Ω 1/4W 10%
R67	331-2056	560Ω 1/2W 10%
R89	330-3015	1.5K 1/4W 10%
R90	330-3056	5.6K 1/4W 10%
R91	330-1047	47Ω 1/4W 10%
Y1	321-0018	17.1MHZ
Q1,2	375-0017	2N3014
Q3,4	375-1017	2N2906A
Q5,7	375-1052	2N6387
Q6	375-1053	RCA8203A
VR1	374-0008	UA7815
VR2	374-0005	UA79-5
DI,5	380-4000	1N4304
D2,4	380-1001	DO35
D3	380-2047	1N750A 4.7V
D6,7	380-3008	A154
J1	376-9002	SOCKET, 16 PIN
J2	376-9001	SOCKET, 14 PIN
J3	654-1186	MOLEX, 6 PIN

MNEMONIC	COORD	MNEMONIC	COORD
ACK	5B1	PHC2	3C11
A0-A12	1D1	PHC3	3E11
BMTR	3B1	PITCH	5G7
CH	2E11	PD	2E11
CO	2E11	PR	5F11
COVER OPEN	5F1	PRIME	5D11
CRR	5F11	PWR	5F11
CRS	2F1	PWR RESET	1C11
CR/LF(←)	2F11	PWS	2F1
D0-D7	5E1	RDY	1B11
DSTB	1E11	RDY/BUSY	5C1
EEP	3G11	RESET	1B11
FAULT	5E1	RL	2F1
HOME(←)	2F11	RD	2D11
INC SPACING(←)	2F11	RS	2G1
ID0-ID7	1F11	SEL	5B11
LMTR	3B1	SEL	5B11
MI	1A4	SELECT	5C1
MR	1A7	SELECT LAMP	5D1
MTR	3F1	SET HOME(←)	2F11
MTR GND	3F1	SHIFT	2F11
OD1-OD12	2E1	SPARE	5G7
OR	5F11	SPARE 2	2F11
OS	2F1	SOL	3G4
OUT OF PAPER	5F1	SSPW	2G4
OUT OF RIBBON	5B1	SYNC	1A5
Q1T	1A6	TP1	1C11
Q2T	1A8	TOF	5G7
PFR	3G7		
PFS	2F1		
PHC1	3B11		

<b>WANG</b> LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY	DATE	APPROVED BY	DATE
MATERIAL	MODEL NO. 2281W SEE ENG'G SPECIFICATIONS	DWN TEL-ART	6-81	E ENGR	
FINISH	101 IS AS NOTED 11 = PRAC = FINISH 12 = ENG = FINISH	CHK		M ENGR	
TITLE TWIN SHEET AND ENVELOPE FEEDER CONTROLLER		SEE CHART		D 7726	7
SCALE 1/4" = 1"		WANG PART NUMBER		SIZE	DRAWING NUMBER

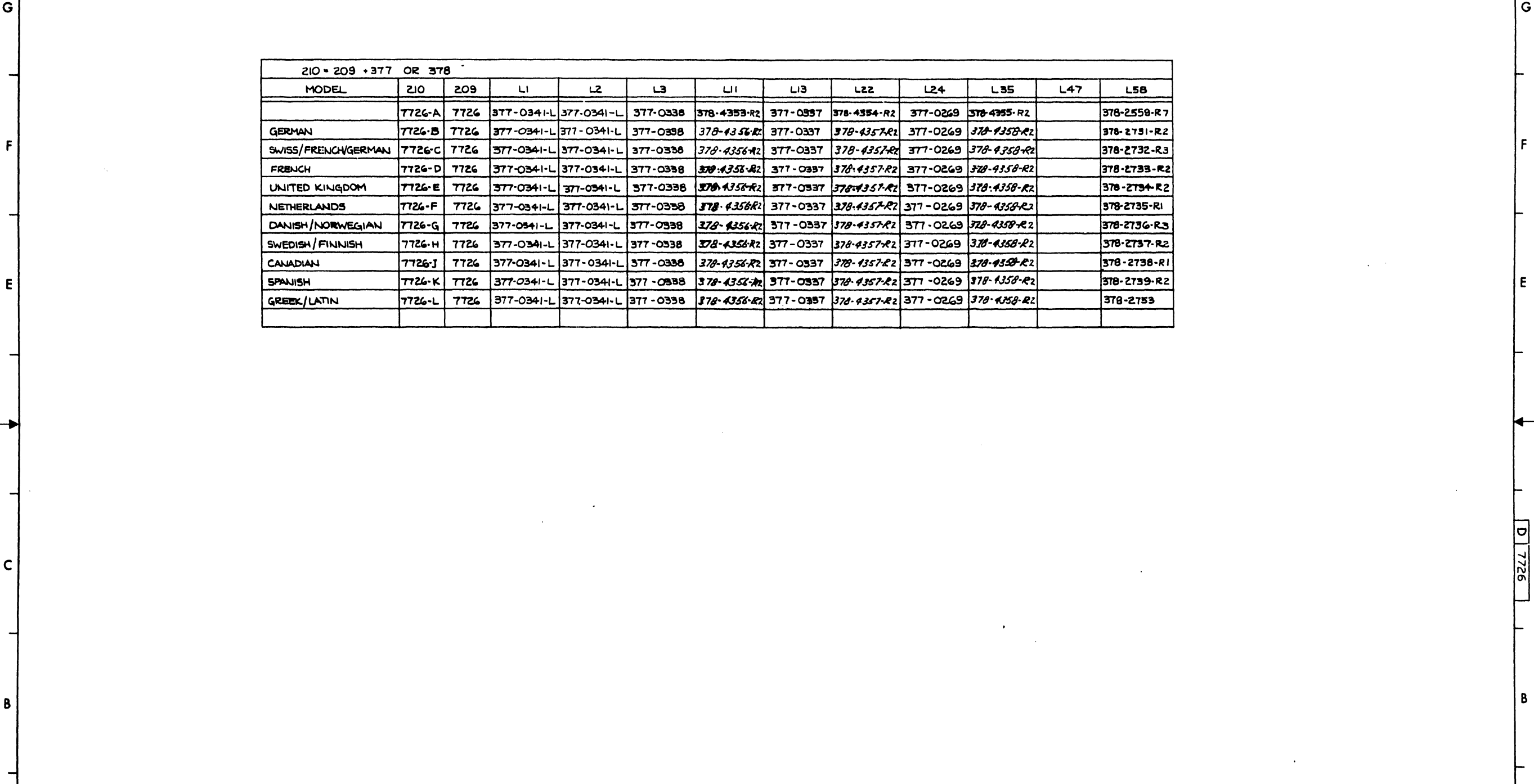
FIGURE 8-27 TSF/EF CONTROL (2281W) WL# 7726 (SHEET 6 OF 8)

11 10 9 8 7 5 4 3 2 1

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DO NOT SCALE

210 - 209 + 377 OR 378												
MODEL	210	209	L1	L2	L3	L11	L13	L22	L24	L35	L47	L58
	7726-A	7726	377-0341-L	377-0341-L	377-0338	378-4353-R2	377-0337	378-4354-R2	377-0269	378-4355-R2		378-2559-R7
GERMAN	7726-B	7726	377-0341-L	377-0341-L	377-0338	378-4356-R2	377-0337	378-4357-R2	377-0269	378-4358-R2		378-2731-R2
SWISS/FRENCH/GERMAN	7726-C	7726	377-0341-L	377-0341-L	377-0338	378-4356-R2	377-0337	378-4357-R2	377-0269	378-4358-R2		378-2732-R3
FRENCH	7726-D	7726	377-0341-L	377-0341-L	377-0338	378-4358-R2	377-0337	378-4357-R2	377-0269	378-4358-R2		378-2733-R2
UNITED KINGDOM	7726-E	7726	377-0341-L	377-0341-L	377-0338	378-4358-R2	377-0337	378-4357-R2	377-0269	378-4358-R2		378-2734-R2
NETHERLANDS	7726-F	7726	377-0341-L	377-0341-L	377-0338	378-4358-R2	377-0337	378-4357-R2	377-0269	378-4358-R2		378-2735-R1
DANISH/NORWEGIAN	7726-G	7726	377-0341-L	377-0341-L	377-0338	378-4356-R2	377-0337	378-4357-R2	377-0269	378-4358-R2		378-2736-R3
SWEDISH/FINNISH	7726-H	7726	377-0341-L	377-0341-L	377-0338	378-4356-R2	377-0337	378-4357-R2	377-0269	378-4358-R2		378-2737-R2
CANADIAN	7726-J	7726	377-0341-L	377-0341-L	377-0338	378-4356-R2	377-0337	378-4357-R2	377-0269	378-4358-R2		378-2738-R1
SPANISH	7726-K	7726	377-0341-L	377-0341-L	377-0338	378-4356-R2	377-0337	378-4357-R2	377-0269	378-4358-R2		378-2739-R2
GREEK/LATIN	7726-L	7726	377-0341-L	377-0341-L	377-0338	378-4356-R2	377-0337	378-4357-R2	377-0269	378-4358-R2		378-2753



D 7726

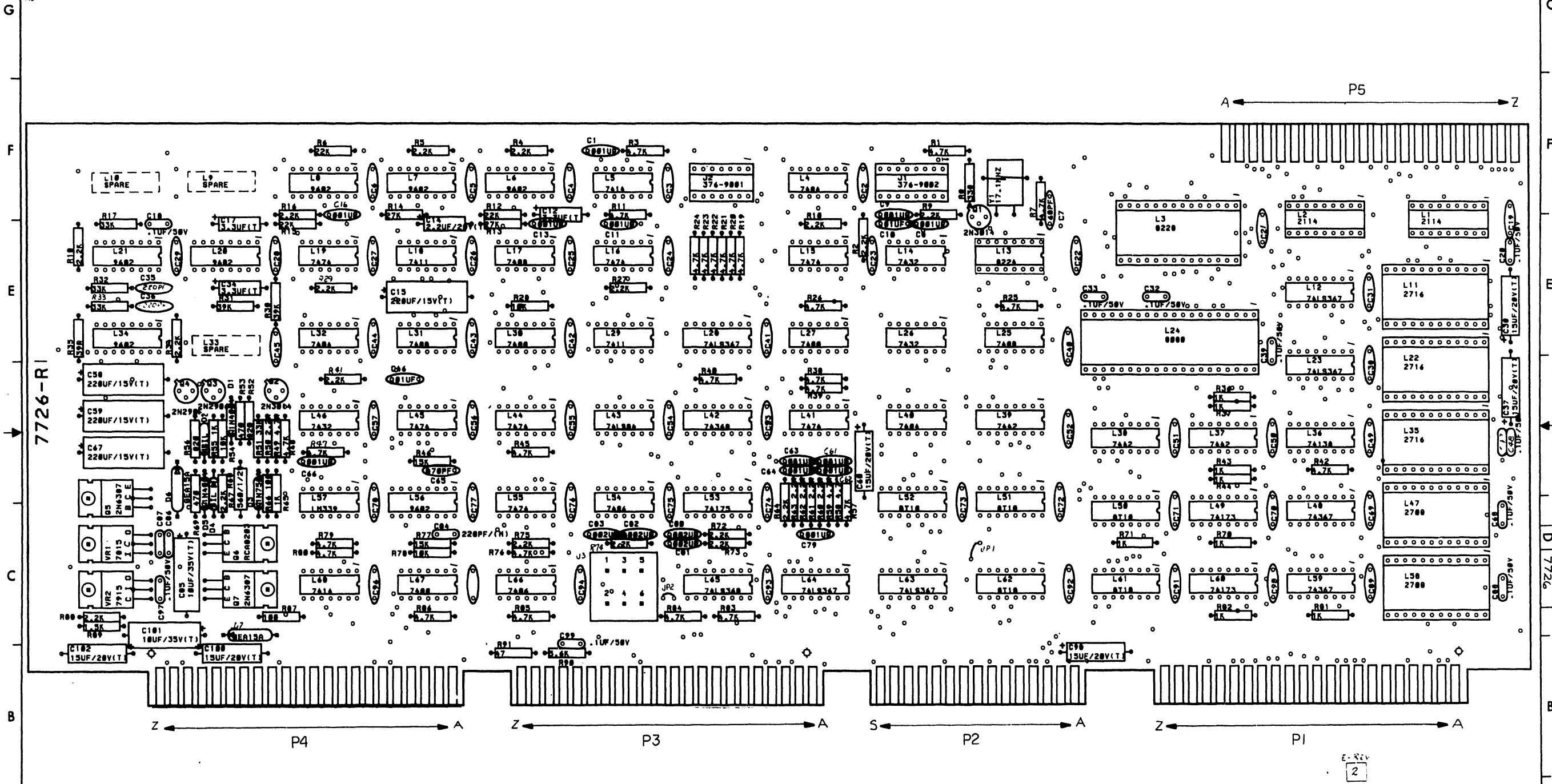
NO	REVISION
	SEE SHEET 8

<b>WANG</b> LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY DWN D. Smith	DATE 4-26-82	APPROVED BY M ENGR	DATE
MATERIAL	MODEL NO. 2281W SEE ENGR SPECIFICATIONS	TITLE TWIN SHEET & ENVELOPE FEEDER CONTROL			
FINISH	TOL EX AS NOTED XX ± FRAC ± XXX ± ANG ± FINISH	SEE CHART	D	7726	
SCALE 1/8" = 1"		WANG PART NUMBER	SIZE	DRAWING NUMBER	REV

FIGURE 8-27 TSF/EF CONTROL (2281W) WL# 7726 (SHEET 7 OF 8)

DO NOT SCALE

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7726-R1

NO	DATE	BY	REVISION
1	7-31-81	DWN	INITIAL PER
2	8-11-81	JEP	APPD
3	10-20-81	JEP	REVISED PER ECO #19789/20207
4	11-11-81	POD	APPD
5	12-3-81	POD	REVISED PER ECO #19868
6	1-11-82	POD	APPD
7	2-11-82	POD	REVISED PER ECO #24459
8	3-11-82	POD	APPD

<b>WANG</b> LABORATORIES, INC. SMALL WANG USA		BY DWN JEP	DATE 7-31-81	APPROVED BY E ENGR GLD	DATE 10-7-81
MATERIAL —	MODEL NO. 2281W	TITLE TWIN SHEET & ENVELOPE FEEDER CONTROLLER			
FINISH —	101 EE AS NOTED 111 ± 112 ± SCALE 1:1	MFG ENGR		D 7726	SIZE DRAWING NUMBER

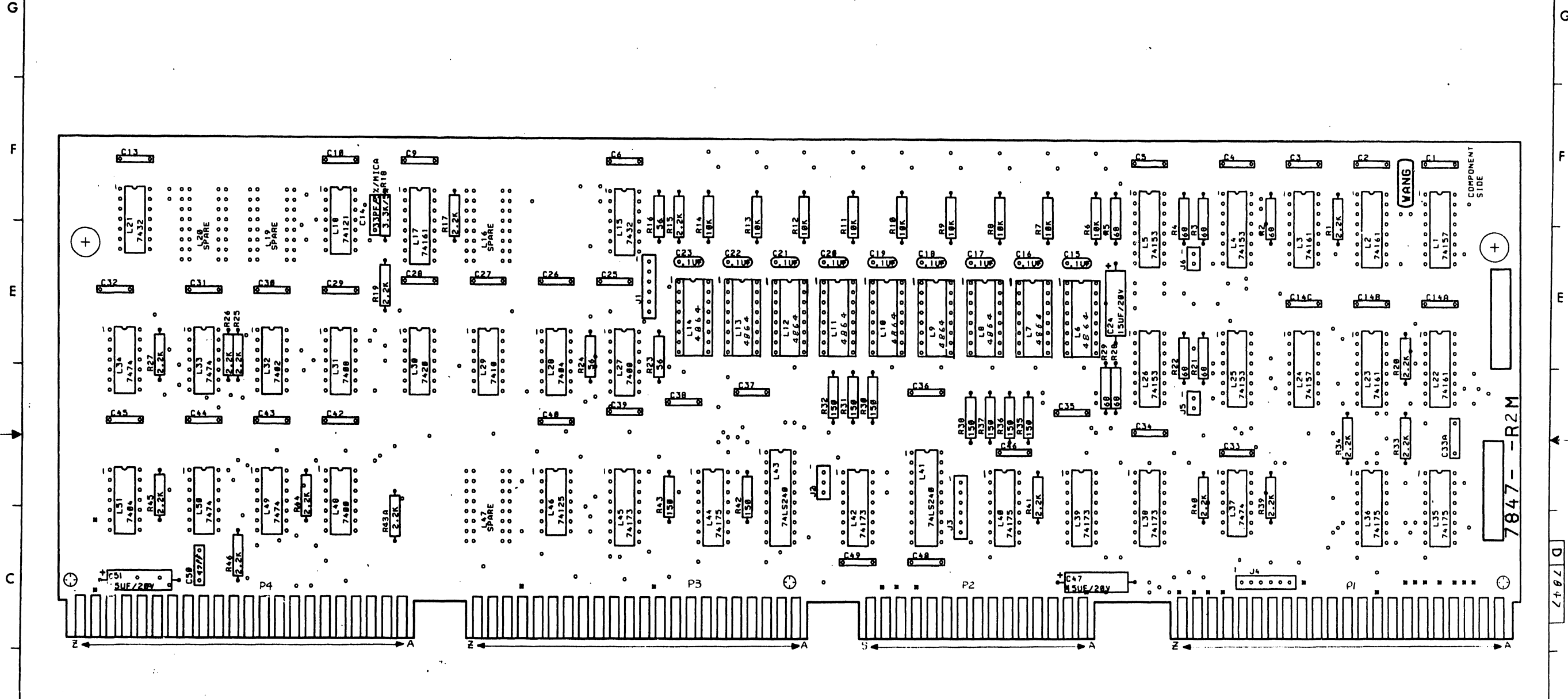
FIGURE 8-27 TSF/EF CONTROL (2281W) WL# 7726 (SHEET 8 OF 8)





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DO NOT SCALE



NOTES:  
 1. J1-J6 NOT LOADED  
 2. UNLESS OTHERWISE SPECIFIED  
 ALL CAPACITORS ARE .047µF

NO.	REVISION	DATE	BY
	SEE SHEET 4		

<b>WANG</b> LABORATORIES, INC. LOWELL, MASS. USA		BY DWM/RB	DATE 11-20-71	APPROVED BY E ENGR	DATE
MATERIAL		MODEL NO 61W		TITLE 64K RAM PRINTER MEMORY	
FINISH		SEE (HART D) 1847		DRAWING NUMBER 1847	

FIGURE 8-28 64K RAM PRINTER MEMORY, WL# 7847 (SHEET 3 OF 4)



THIS DRAWING AND THE DATA SHOWN THERE ON ARE THE CONFIDENTIAL PROPERTY OF WANG LABORATORIES, INC. THIS DRAWING AND THE DATA SHOWN THEREIN MAY NOT BE MADE PUBLIC WITHOUT THE WRITTEN CONSENT OF WANG LABORATORIES, INC. IF FOR ANY REASON THIS DRAWING IS PERMITTED BY WANG TO LEAVE THE PHYSICAL CUSTODY OF THE COMPANY, IT IS RETURNABLE UPON THE DEMAND OF WANG LABORATORIES, INC.

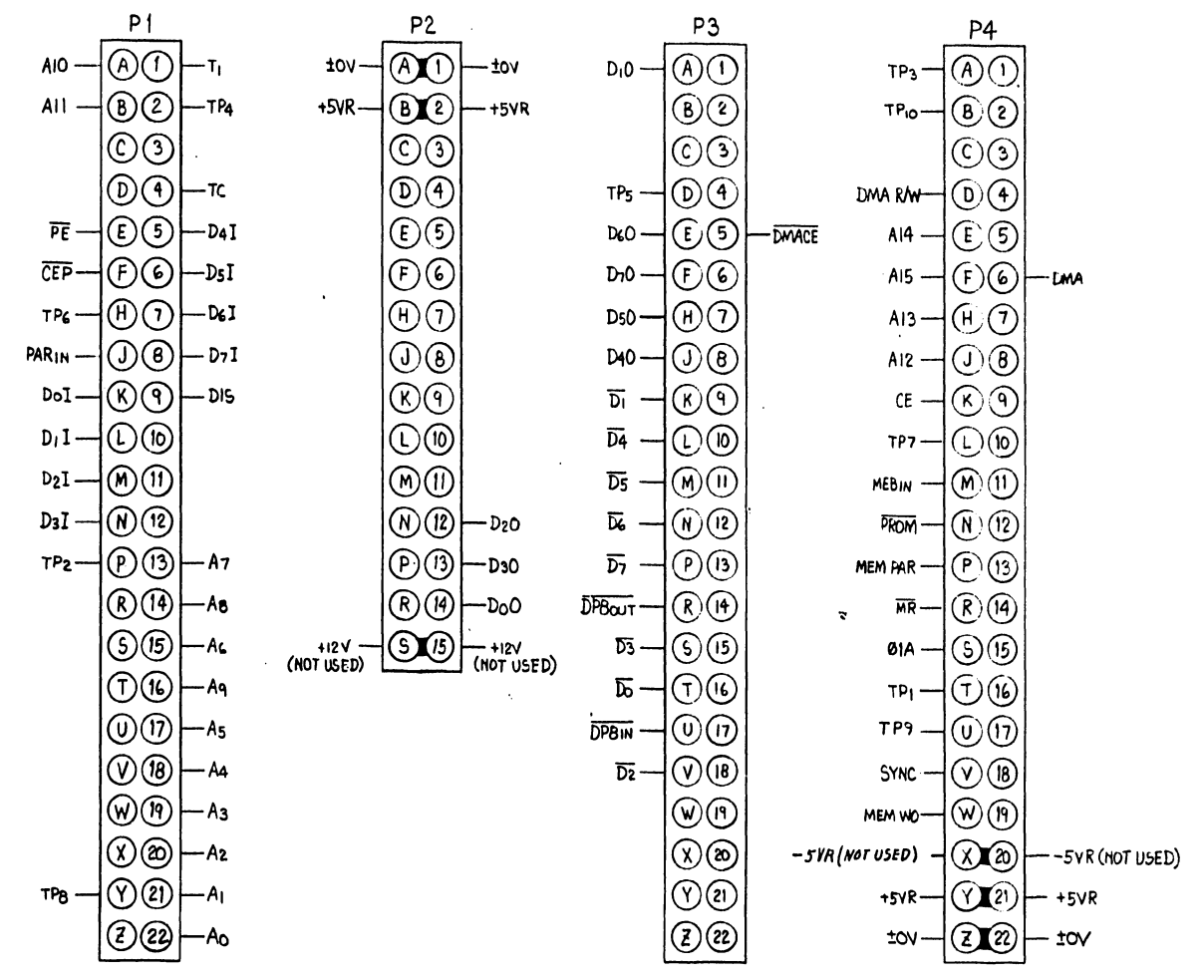
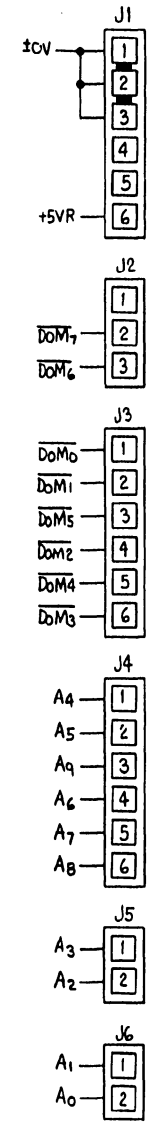
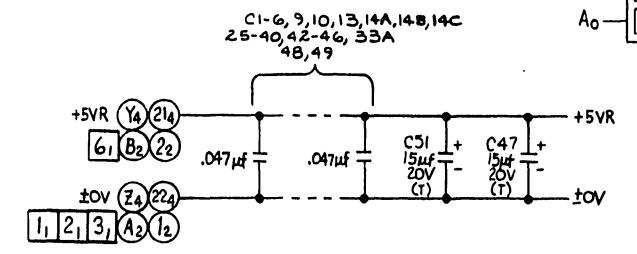
I.C. LOCATION	TYPE	W.L. PART NO.
L1, 24	74157	376-0082
L2, 3, 17, 22, 23	74161	376-0094
L6-14	HM4864-3	SEE CHART
L15, 21	7432	376-0093
L16, 19, 20, 47	SPARE	
L18	74121	376-0051
L4, 5, 25, 26	74153	376-0048
L27, 48	7400	376-0002
L28, 51	7404	376-0010
L29	7410	376-0003
L30	7420	376-0004
L31	7408	376-0081
L32	7402	376-0016
L33, 34, 37, 49, 50	7474	376-0006
L38, 39, 42, 45	74173	376-0183
L35, 36, 40, 44	74175	376-0119
L41, 43	7415240	376-0297
L46	74125	376-0324
L6-14	SKT. 16-PIN	376-1002

I.C. TYPE	LOCATION	SPARES
7400	L48	1
7402	L32	2
7404	L28	1
	L51	4
7410	L29	1
7420	L30	1
7432	L15	2
	L21	1
74125	L46	1

MNEMONICS	COORD.
A0-A15	1G4
CE	1F11
CEP	1B11
D0-D7	2C1
D0D-D7D	2D1
D15	1G5
DMA	2E11
DMACE	1F11
DMA R/W	1F11
D0I-D7I	1G7
D0M0-D0M7	2G1
DPBIN	2E1
DPBOUT	2D11
MEM IN	2G11
MEM PAR	2E1
MEM WO	1G11
MR	1C11
01A	1E11
PAR IN	2E11
PE	1G4
PROM	2B1
SYNC	1E11
T1	1B11
TC	1A4
TF1	2G3
TP2	1G5
TP3	1G8
TP4	1B11
TP5	2G5
TP6	2G5
TP7	1E11
TP8	1C11
TP9	1C11
TP10	1A11

COMPONENT	TYPE	W.L. PART NO.
R1, 15, 17, 19, 20, 25, 27, 33, 34, 39-41, 44-46, 48	2.2K, 1/4W, 10%	330-3022
R2-5, 21, 22, 28, 29	68Ω, 1/4W, 10%	330-1068
R6-14	10K, 1/4W, 10%	330-4010
R16, 23, 24	36Ω, 1/4W, 10%	330-1056
R18	3.3K, 1/4W, 5%	330-3034
R30-32, 35-38, 42, 43	150Ω, 1/4W, 10%	330-2015
C1-6, 3, 10, 13, 14A, 14B, 14C, 25, 40, 42-46, 33A, 18, 47	.047μf, 50V	300-1966
C14	33pf, 500V, 5%, MICA	300-5016
C15-23	.1μf, 50V	300-1930
C24, 47, 51	15μf, 20V, (T)	300-4022
C50	47PF, 500V	300-1047

210 = 209 + 377 OR 378
210    209    L6-14
7847-A    7847    377-0415



NOTES:  
 1. J1 - J6 ARE NOT LOADED  
 2. ALTHOUGH BOTH +12V AND -5V ARE NOT USED ON THIS BOARD, THEY ARE CONNECTED ON THE MOTHER BOARD.

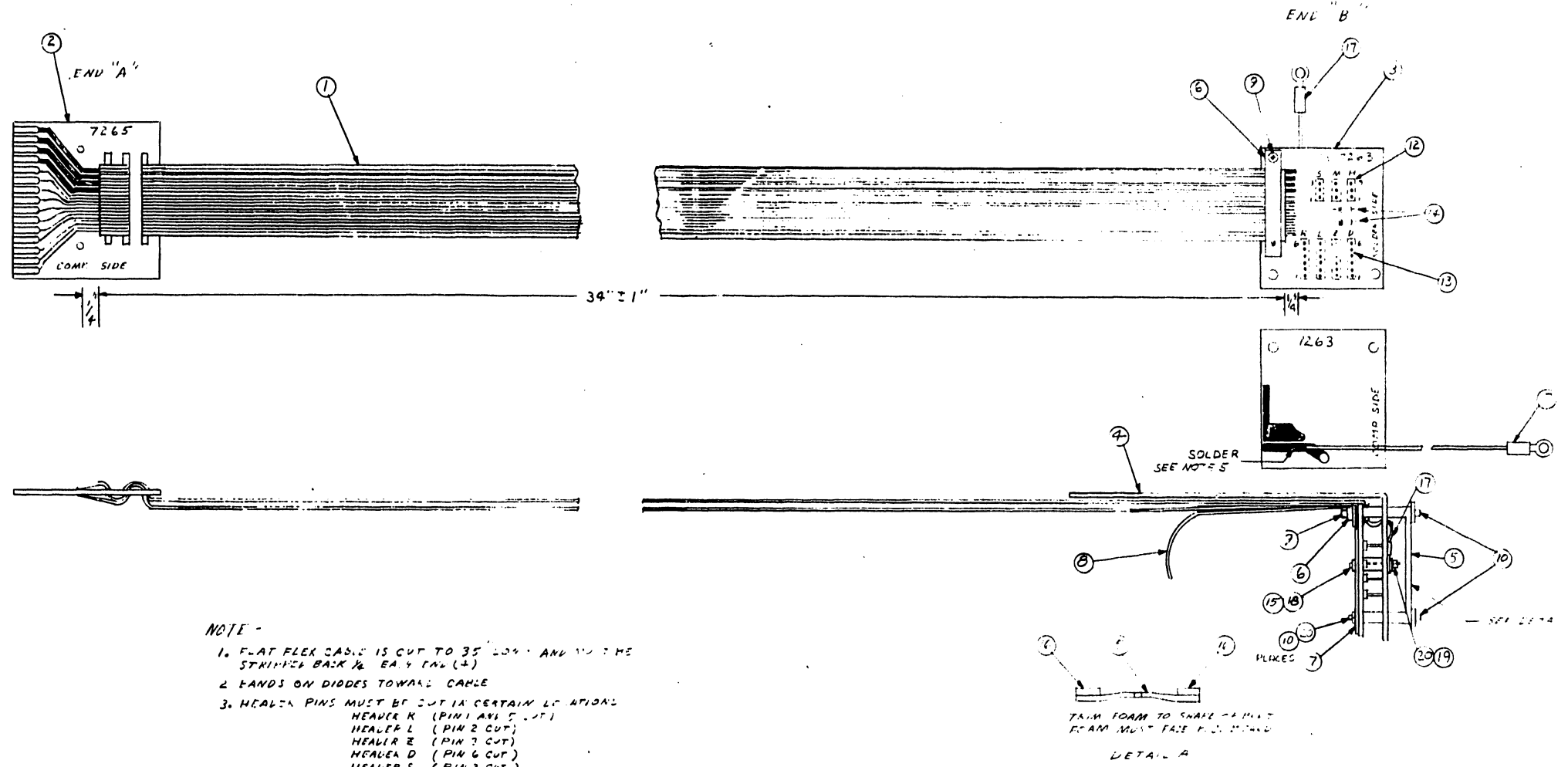
E-REV  
0

REV	DATE	BY	APP'D	DESCRIPTION
1	11-25-81	11-25-81		REV. PER DWR
2	1-11-82	1-11-82		REV. PER DWR
3	3-7-82	3-7-82		REV. PER DWR
4	4-20-82	4-20-82		REV. PER DWR

<b>WANG</b> LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY DWN P.B. [Signature]	DATE 11-28-81	APPROVED BY E ENGR A [Signature]	DATE 11-1-81
MATERIAL	MODEL NO 81W	TITLE 64K RAM PRINTER MEMORY			
FINISH	SEE CHART	D	7847	4	

FIGURE 8-28 64K RAM PRINTER MEMORY WL# 7847 (SHEET 4 OF 4)

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**NOTE -**

1. FLAT FLEX CABLE IS CUT TO 35" LONG AND THE STRIPPED BACK 1/8" EACH END (4)
2. HANDS ON DIODES TOWARD CABLE
3. HEADER PINS MUST BE CUT IN CERTAIN LOCATIONS  
 HEADER K (PIN 1 AND 5 CUT)  
 HEADER L (PIN 2 CUT)  
 HEADER R (PIN 7 CUT)  
 HEADER D (PIN 6 CUT)  
 HEADER S (PIN 2 CUT)  
 HEADER M (PIN 1 CUT)  
 HEADER H (NO HAS CUT)
4. CABLE ON END B MUST PROTRUDE THROUGH ITEM 6 TO GET MAXIMUM STRAIN RELIEF
5. SOLDER ITEM 17 TO NEW CHASSIS GROUND, SECURE RING LUG TO ITEM 18
6. WIRE ASSEMBLY ON END "B" MUST BE BROUGHT THROUGH INSIDE OF BRKT, SLIPPED ONTO ITEM 16 AND LOCKED ON WITH ITEM 19 AND 20.

WANG PART NO.	ITEM	QTY	NAME	DESCRIPTION
653-3000	20	3	WASHER FLAT #6	
652-0032	19	1	NUT KFDL #6	
650-3297	18	1	#6-32 x 1/2 PAN HD PHL MS	
220-1266	17	1	WIRE AND LUG ASSY	

WANG PART NO.	ITEM	QTY	NAME	DESCRIPTION
650-2082	16	2	FOAM TAIL	
657-6090	15	1	AREA TEST POINT	FLAT YELLOW
380-4000-R	14	2	IN 4004 RECTIFIER	EM402 (REEL)
654-0106	13	4	HEADER 100 6 POS	
654-0109	12	3	HEADER 100 3 POS	
650-31	11	4	6-32 x 1/2 PAN HD PHL MS	
650-2120	9	2	4-40 x 3/8 PAN HD PHL SENS	
452-4095	8	1	GUIDE FLEX CABLE	B6631-313
452-3545	7	1	SHIELD, MYLAR	B6631-319
452-2575	6	2	CLAMP PLATE, FLEX CABLE	B6631-274
452-0077	5	1	PLATE CONNECTOR CLAMPING	B6631-272
451-4498	4	1	BRACKET, FLEX CABLE	B6631-276
510-7263	3	1	PC BOARD 7263	
510-7265	2	1	P.C. BOARD 7265	
420-2066	1	1/R	FLAT FLEX CABLE	16 CONDUCTOR

NO.	REVISION	DATE	BY	APP'D.	DESCRIPTION
1	INITIAL	11/17/79	G.D.	LL	
2	REVISED PER	1/10/80	M	M	
3	REVISED PER	2/5/80	M	M	
4	REVISED PER	2/5/80	M	M	
5	REVISED PER	2/5/80	M	M	

<b>WANG</b> LABORATORIES, INC. LOWELL, MASS. U.S.A.		BY DWN	DATE 2-7-78	APPROVED BY E ENGR	DATE
MATERIAL		CHK		M ENGR	
MODEL NO. 710		TITLE HEAD CABLE ASSY 81 & 82			
FINISH		TOLERANCES AS NOTED UNLESS OTHERWISE SPECIFIED			
SCALE		DRAWING NUMBER 220-3042 D 679-271			

FIGURE 8-29 HEAD CABLE ASS'Y 81 AND 82 WL# 220-3042

**END**