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Radio Shack®

# Service Manual

26-1250

# TRS-80

## Daisy Wheel Printer — 410

Catalog Number: 26-1250

CUSTOM MANUFACTURED FOR RADIO SHACK, A DIVISION OF TANDY CORPORATION

## CONTENTS

# I. INTRODUCTION

The DAISY WHEEL PRINTER-410 is a Serial Impact Printer which uses a Micro CPU (abbreviated to CPU) as the main controller with electronic components for the electronic drive control.

Mechanically, the DAISY WHEEL PRINTER-410 uses motors and magnets which are powered from separate individual power sources.

This Service Manual serves as a guide for serving and repairing the DAISY WHEEL PRINTER-410; however, this printer should be repaired by an authorized Radio Shack technician only. If the warranty seals on any Radio Shack computer product are broken, Radio Shack reserves the right to refuse to service the equipment or to void any remaining warranty on the equipment.

# II. SPECIFICATIONS

## 1. General

| | |
|---|---|
| Printing Speed | 25 characters per second |
| Carriage Return Speed | 1000ms per 13.6 inches |
| Line Feed Speed | 4 inches per second |
| Printing Pitch | 1/10 inch, 1/12 inch, Proportional Spacing |
| Line Feed Pitch | 1/6 inch, 1/12 inch |
| Font | 124 character positions on daisy wheel with detent. |
| Wheel | Courier 10 (Catalog Number-26-1430) |
| Character per line | 136 characters at 10 pitch mode<br>163 characters at 12 pitch mode |
| Impression Control | Three levels available: H, M, L |
| Print Wheel Life | 40 million characters |
| Ribbon Life | Nominal 270,000 characters; may vary according to the text printed (Multistrike carbon ribbon)<br>Nominal 1,600,000 characters (Fabric ribbon) |
| Data | 8 parallel data and 1 strobe |
| Code | Modified ASCII |
| Temperature Ranges | |
| Operating | 41° to 95°F (+5° to +35°C) |
| Storage | −40° to 158°F (−40° to +70°C) |
| Relative Humidity | |
| Operating | 20 - 90% RH (No condensation) |
| Storage | 5 - 95% RH (No condensation) |
| Paper | |
| Weight | Total weight: 40.70 to 127.9 grams/$m^2$<br>Total weight: 52.33 to 127.9 grams/$m^2$<br>(Auto Paper Feed)<br>One ply : 40 grams/$m^2$ max. |
| Size | Width: 16.54" (420mm) max.<br>length: 3.34" (84.7mm) min. |
| Ribbon | Multistrike carbon ribbon (Catalog Number-26-1419)<br>Fabric ribbon (Catalog Number-26-1449) |
| Size | 8.15" x 23.35" x 13.07"<br>207mm x 593mm x 332mm (HWD) |
| Power Requirements | 120V AC, 50/60Hz, 100W maximum<br>220V AC, 50Hz for European and Australian models |
| Weight | 35.3 lbs (16 kg) (with including internal Power Supply and printer cover) |

Optional bi-directional tractor is available (Catalog Number-26-1459)

The DAISY WHEEL PRINTER-410 consists of a mechanism unit and electronic circuits to control it. The mechanism unit is the portion that performs mechanical motions among motions of the printer, and each mechanism has an independent driver.

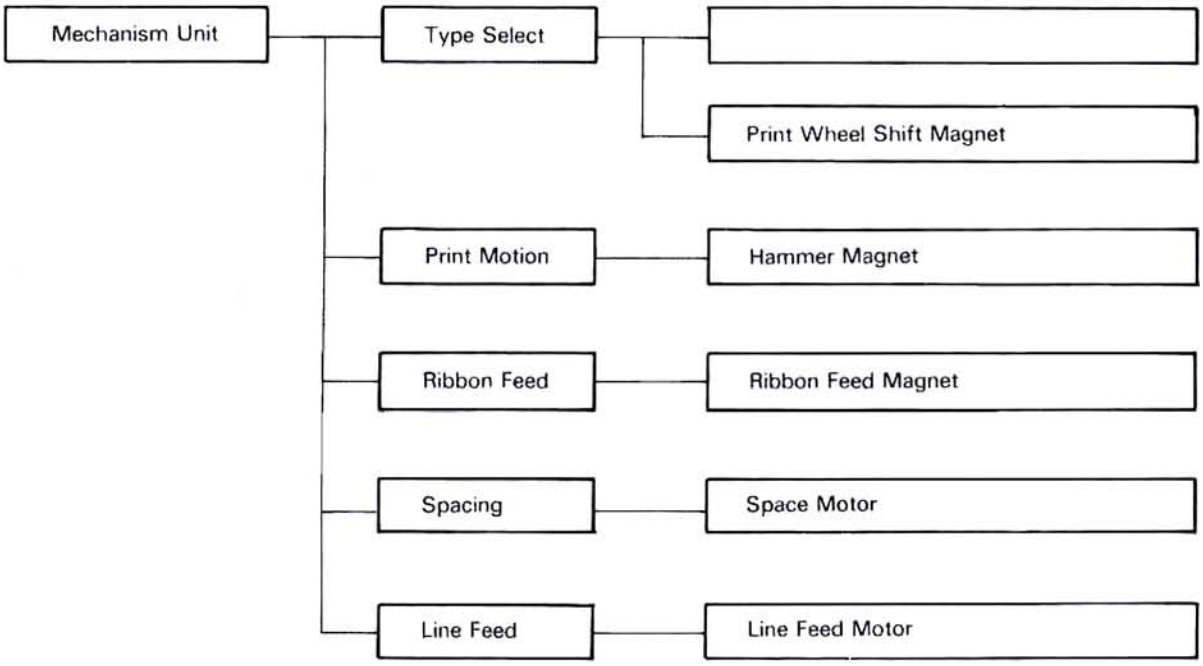



**Figure 2-1. Block Diagram**

The electronic circuits control the mechanism unit and the printer interface by using microprocessors (8748, 8749) for main control.
The electronic circuits are divided into the digital circuits, which have the interface as the nucleus, and the analog circuits, which drive motors and magnets of the mechanism unit.

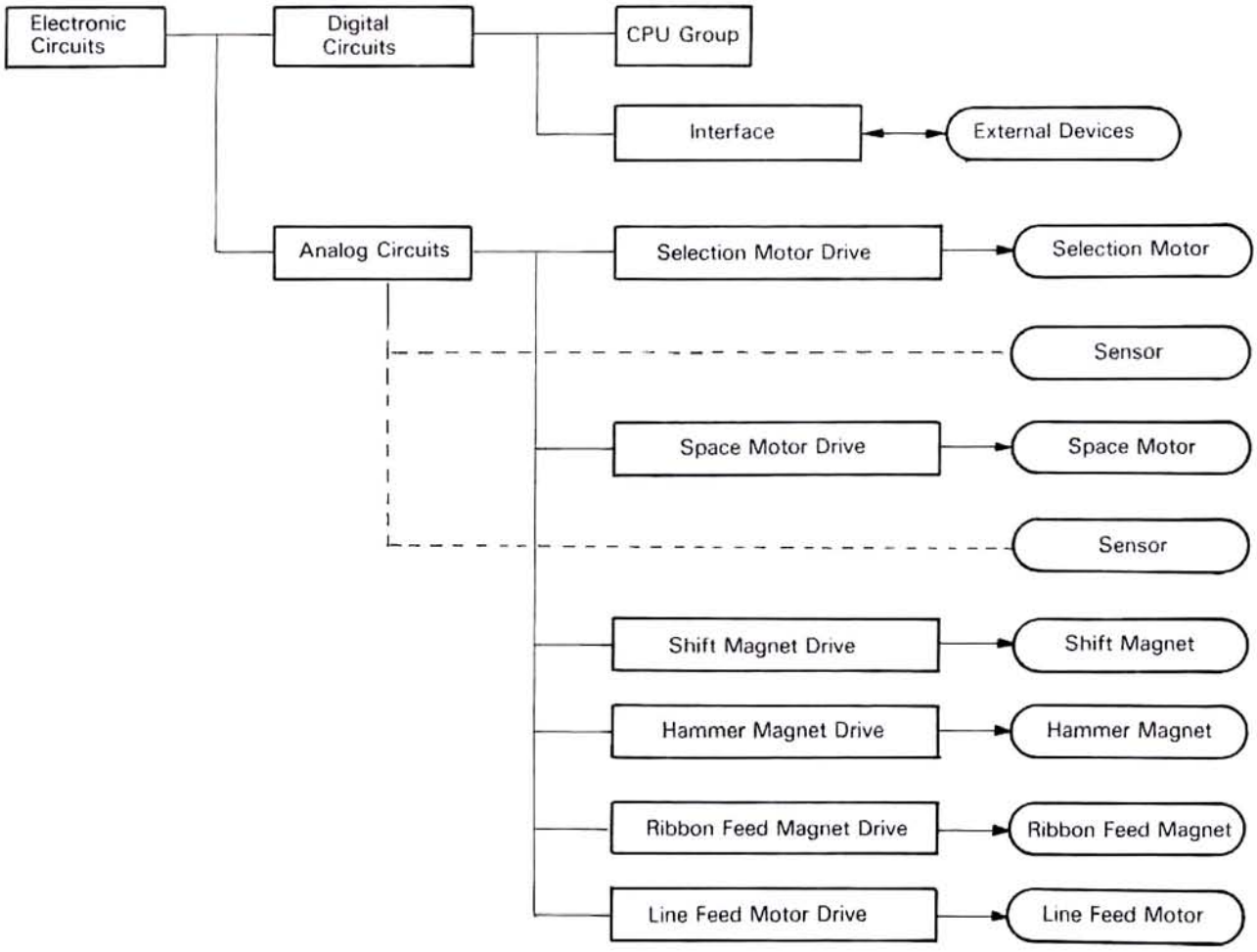
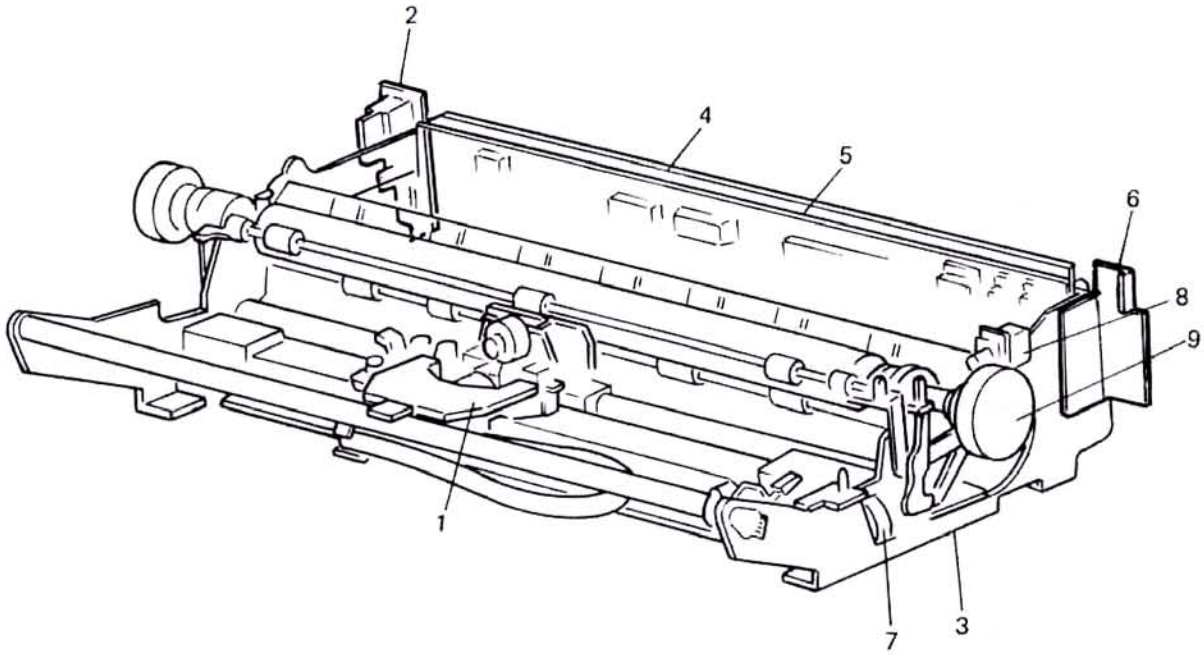



**Figure 2-2. Composition of Electronic Circuits**

The DC servo motors are used as the selection motor and the space motor.
The motor rotating angles are detected by sensors, located behind the motors, and are then fed back to the analog circuits via the amp circuits.




| No. | Name | Description |
|---|---|---|
| 1 | Carriage | Print block including selection motor, ribbon feed magnet, shift magnet, etc. |
| 2 | Power Bracket | AC switch & fuse |
| 3 | Built-in Power Unit | Built-in power unit is packaged. |
| 4 | Radiation Board | Radiates heat of elements. |
| 5 | Interface Board | Interface & Control board. |
| 6 | Interface Bracket | Parallel Interface connector. |
| 7 | Space Motor | Causes the carriage to move to the right or left. |
| 8 | Cover Open Switch | Detects cover open state. |
| 9 | Platen | Print platen. |

**Figure 2-3. Location of Components**

## 2. CARRIAGE UNIT

### 2-1. Type selector

The type selector is located in the carriage, and it performs the motions of rotation and up and down of the print wheel.

(1) Rotation of print wheel
Rotation of the print wheel is performed by the selection motor used as the driver.

(2) Up and down of print wheel
The print wheel is moved up and down by the shift magnet and the shift arm.

### 2-2. Method of Type Selection

For selection of a character on the print wheel, the print wheel is stopped in the print position, a comparison is made with the input code, the direction of rotation and the number of steps of rotation are determined, and then the motor is run.

The print wheel does not rotate beyond 180°, instead it rotates in the direction that is closer to the position to be printed next. (Short cut).

An example of rotation of the print wheel is described below.

Example: Alternate print of F and Y

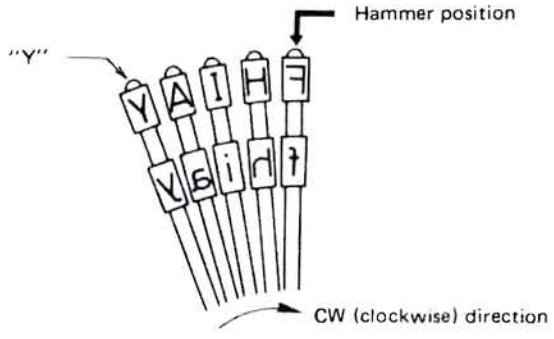



**Figure a.**

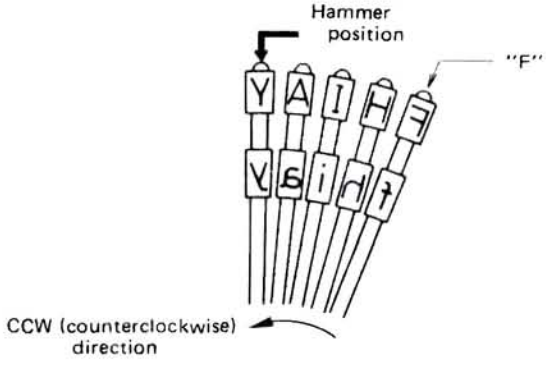


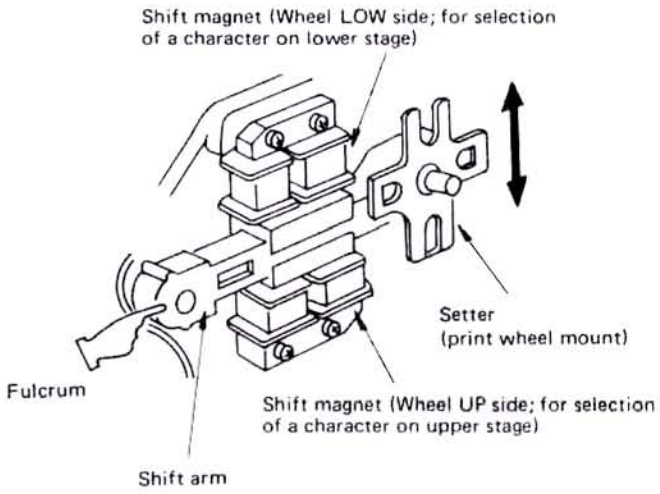

**Figure b.**

Assume that the print wheel is still in the state where "F" is located in the hammer position.

1) For printing "Y", the selection motor is run equivalent to four fingers in clockwise direction, the print wheel is stopped so that finger "Y" is located in the hammer position and then print is made by the motion of the hammer. Fig. a → b.
2) For printing "F" next, the selection motor is run equivalent to four fingers in counterclockwise direction, the print wheel is stopped so that finger "F" is located in the hammer position and then print is made by the motion of the hammer. Fig. b → a.

The print wheel does not rotate beyond 180° because it rotates in the direction that is closer to the print position as described above.

## 2-3. Up and Down of Print Wheel




The print wheel used in Daisy Wheel Printer-410 is a double daisy wheel. Characters are divided into upper and lower stages. The reason why characters are divided into two stages is that many characters may be provided on a wheel of small diameter. Therefore, the print wheel moves up and down at the time of printing depending on whether a character in the upper stage or lower stage is selected.

The print wheel is mounted to the setter as shown in Figure 2-4. The shift arm is a fulcrum with mark. Shift magnets are provided on upper and lower sides. Selection of the shift arm is made when either one of these shift magnets is driven.

**Figure 2-4. Print Wheel Mounting**

## 2-4. Joint Mechanism (Oldham's Joint)

Type selection, rotation, and vertical motion of the print wheel are performed simultaneously with different drivers. The selection motor is fixed, but the print wheel moves up and down. Therefore, a joint mechanism (Oldham's joint) is provided between the motor and the shift arm assembly. See Figures 2-5 and 2-6.

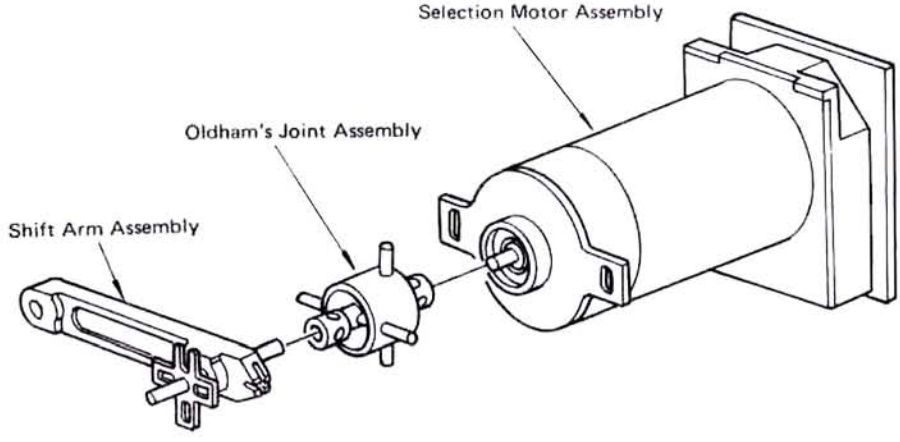



**Figure 2-5. Type Selection Assembly**

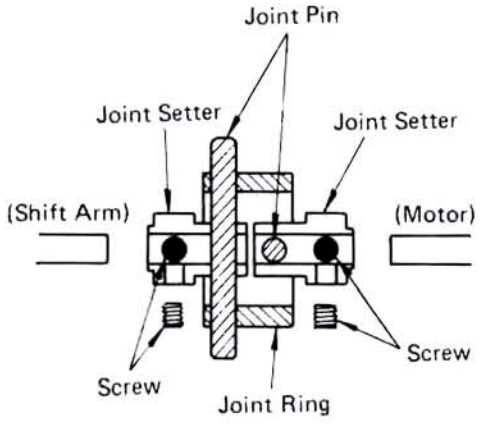



**Figure 2-6. Oldham's Joint Assembly**

## 2-5. Print Motion (Hammer Mechanism)

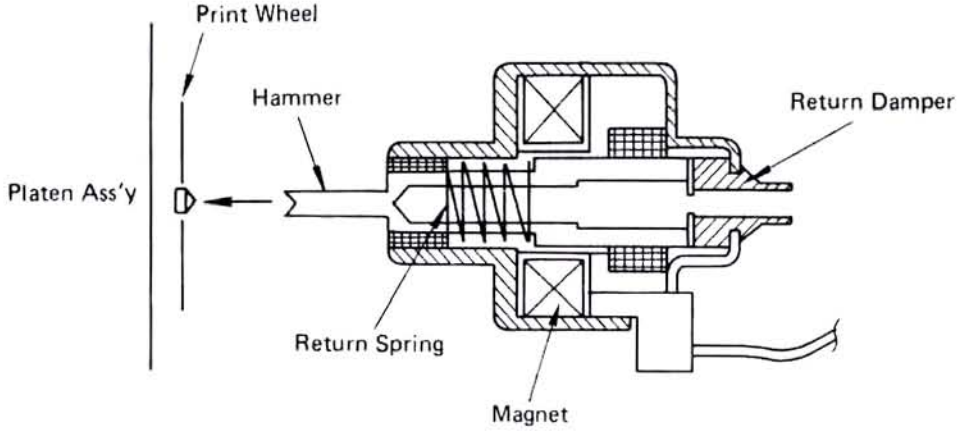



**Figure 2-7. Hammer Mechanism**

Refer to Figure 2-7 throughout the following description of the hammer mechanism.
The print wheel must stop at a certain selected character before the hammer magnet is driven.
The Hammer is then activated by the magnet. On impact, the hammer moves towards the character and platen.
The hammer returns, due to the tension of the return spring which is inside of the hammer assembly and stops at the return damper.

## 2-6. Ribbon Feed Mechanism

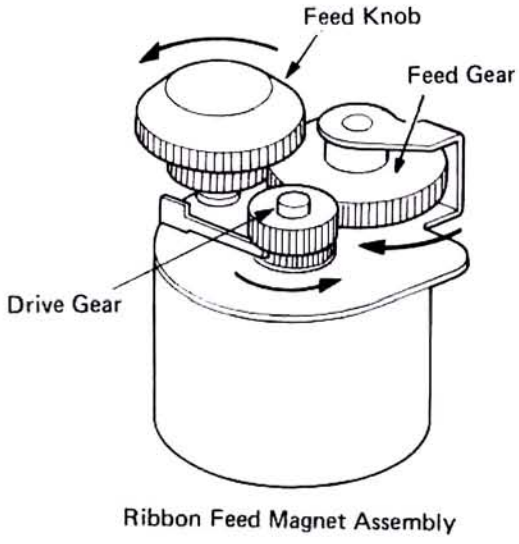



**Figure 2-8. Ribbon Feed Mechanism**

A rotary magnet is used as the driving source for the ribbon feed mechanism shown in Figure 2-8. The counterclockwise rotation of this rotary magnet is transmitted to the ribbon cartridge through the drive grear and feed gear assembly. The feed pin contains a spring for making positive connection of the feed pin with the feed gear of the ribbon cartridge.

## 3. FRAME UNIT

The motions of the frame unit are spacing and line feed.

### 3-1. Carriage Movement - Space Motion

The space motor is used as the driver, and moves the carriage base, which supports the carriage, to the right or left on the space wire. See Figure 2-9. The space wire is a single-wire system.

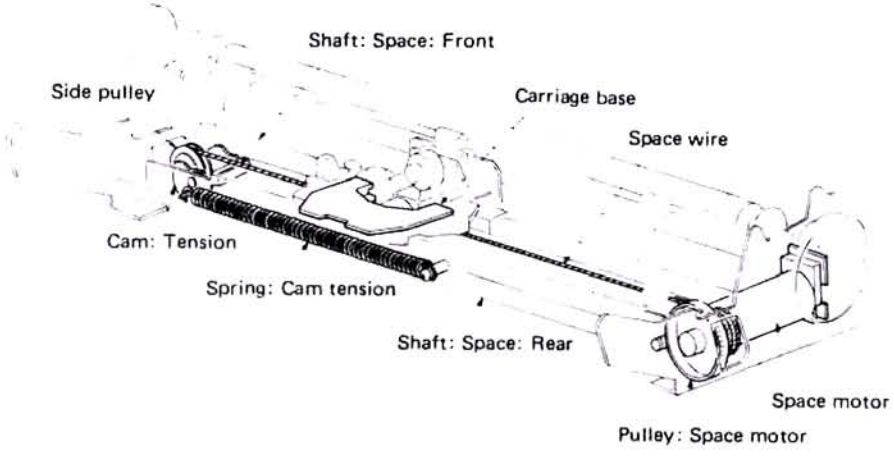
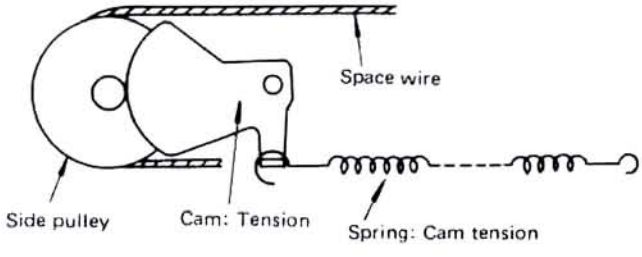



**Figure 2-9. Carriage Mechanism**




Tension is applied to the space wire by applying a force to cause an idle pulley to move outward with the spring and cam as shown on the left so that the space wire will not come off the side pulley.

**Figure 2-10. Tension Example**

## 3-2. Line Feed

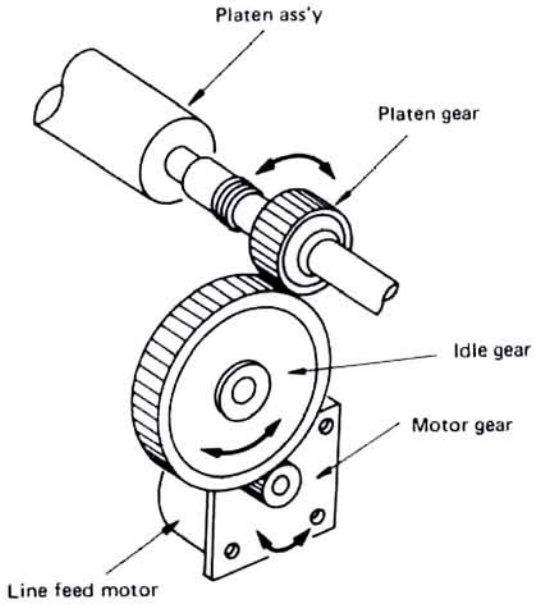



**Figure 2-11. Line Feed Assembly**

Line feed motion is the result of the line feed motor which is used as the driver. Its rotation causes the motor gear coupled with the motor shaft to rotate which causes the idle gear to turn which in turn, rotates the platen gear.
Line feed is made in either the LF direction or the BLF direction. The direction of the line feed is changed by reversing the rotation direction of the motor.

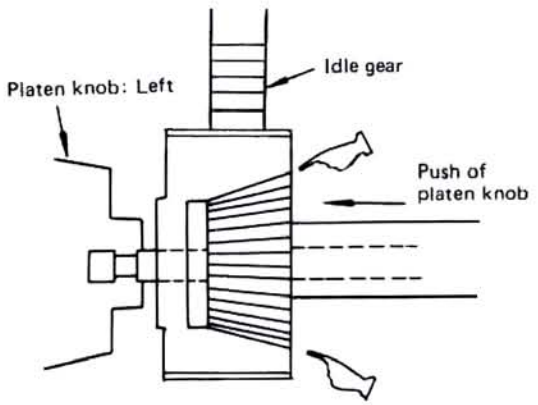



**Figure 2-12. Platen Release**

Release of the platen is made at the platen clutch as shown in Figure 2-12. When the platen knob (right) is pushed inward, the platen becames free as the engagement in the section with  marks is off.

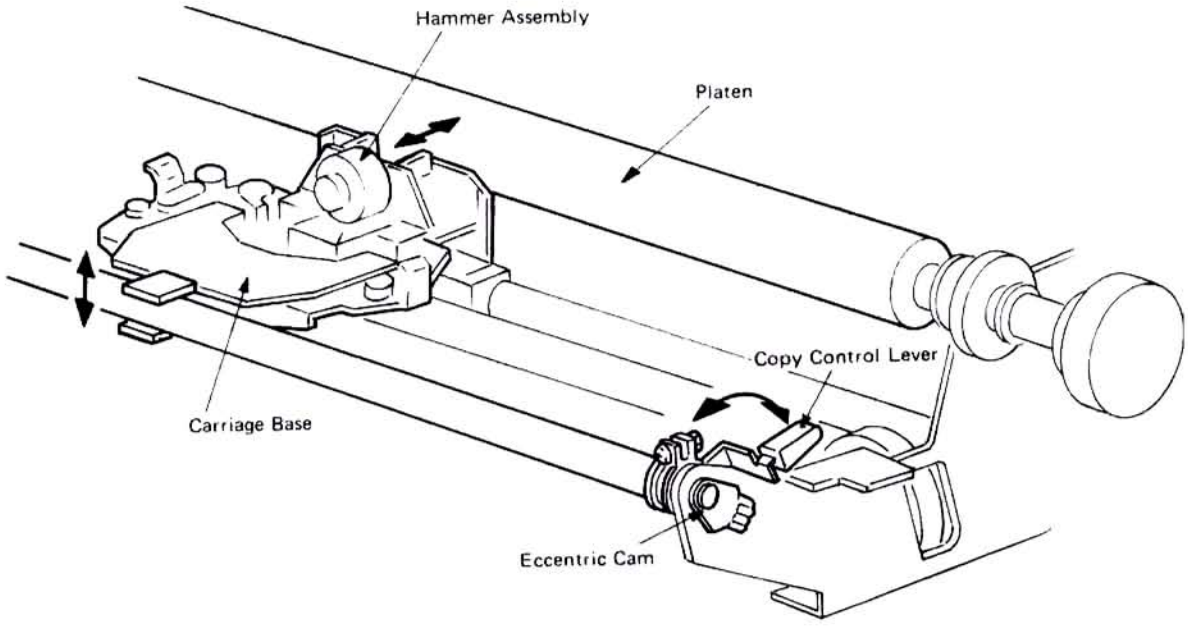



**Figure 2-13. Carriage Base Movement**

For copy control, the copy control lever can be adjusted to move the carriage base assembly up or down. This movement changes the distance between the tip of the hammer assembly and the platen.

## 4. MOTORS AND SENSORS

Three motors are used on the DAISY WHEEL PRINTER-410. Two of the motors are DC servo motors and are used for print wheel selection and spacing. The third, a pulse motor, works as the line-feed motor, all three motors can rotate either clockwise or counterclockwise.

Photo sensors detect the rotation angles of the print wheel selection and the spacing motors and determine the resolution of these motors. This task is accomplished due to the manner of installation of the sensor. See Figure 2-14.

A sensor disk is mounted on the motor's rotating shaft. The Feedback waveform is obtained with the quantity of light received by photo sensing elements when this disk is rotated.

NOTE: Do not remove the sensor board.

### 4-1. Magnet Drive

There are three kinds of magnets used within the DAISY WHEEL PRINTER-410: hammer, shift, and ribbon feed.

A more detailed description of these magnets and the motors and sensors can be found in Section III, Circuit Description.

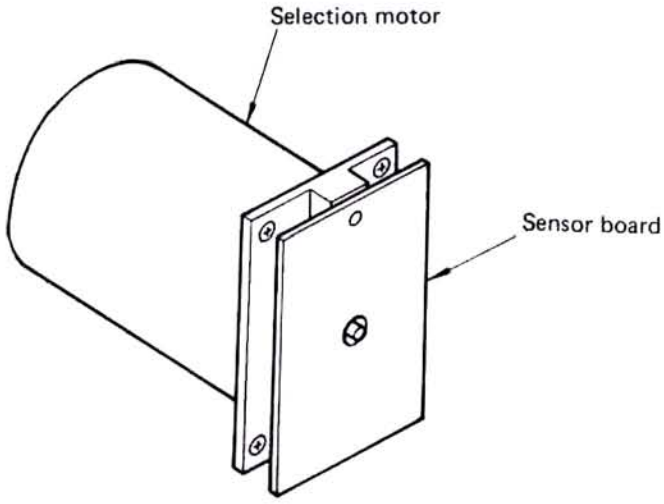



**Figure 2-14. Location of sensor for selection motor**

## 5. POWER SOURCE AND POWER SOURCE MONITORING

DC power is supplied by the power unit for the DAISY WHEEL PRINTER-410.

### 5-1. Power Source Specifications

| DC voltage | Regulation |
|---|---|
| + 5V | ± 5% |
| +15V | ±10% |
| −15V | ±10% |

**Table 2-1. DC Voltages**

The ±15 volt supplies are used for driving motors, magnets, and elements in the analog circuit. The +5 volt supply is used for the digital circuit.

### 5-2. Power Source Monitoring

DC voltage is monitored at Power On, during operation of the printer, and at Power Off.

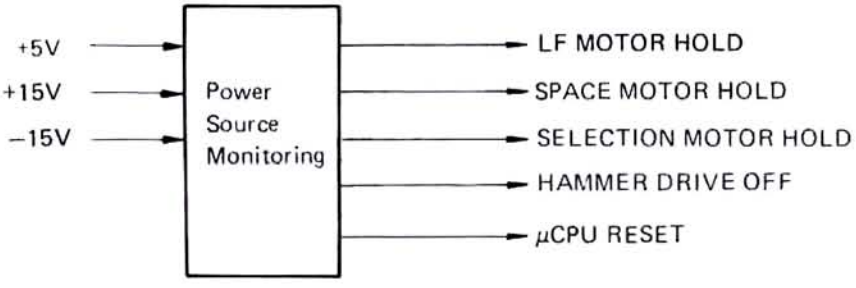



**Figure 2-15. Power Monitoring**

When the power source monitor circuit is actuated, motors are turned off, the hammer drive goes off and the microprocessor (μCPU) is reset.

## 6. INTERFACE

The DAISY WHEEL PRINTER-410 operates through the exchange of signals which correspond to the interface specifications of the external control unit.

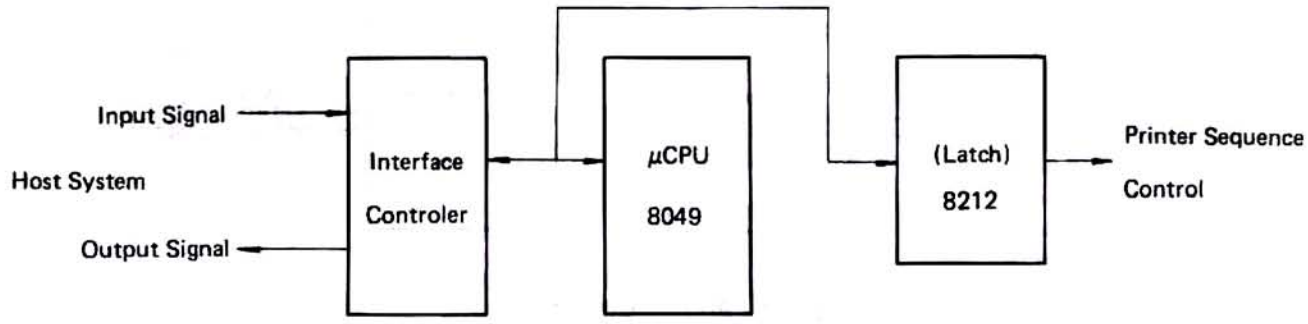



**Figure 2-16. Interface Configuration**

# III. CIRCUIT DESCRIPTION

## 1. GENERAL DESCRIPTION

The circuits of the printer are divided into three blocks as shown in Figure 3-1.

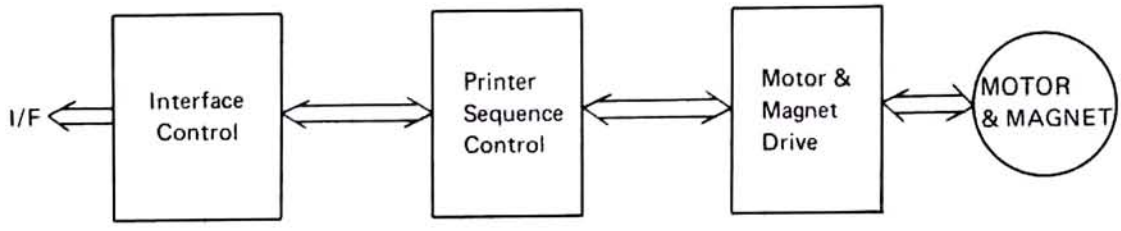


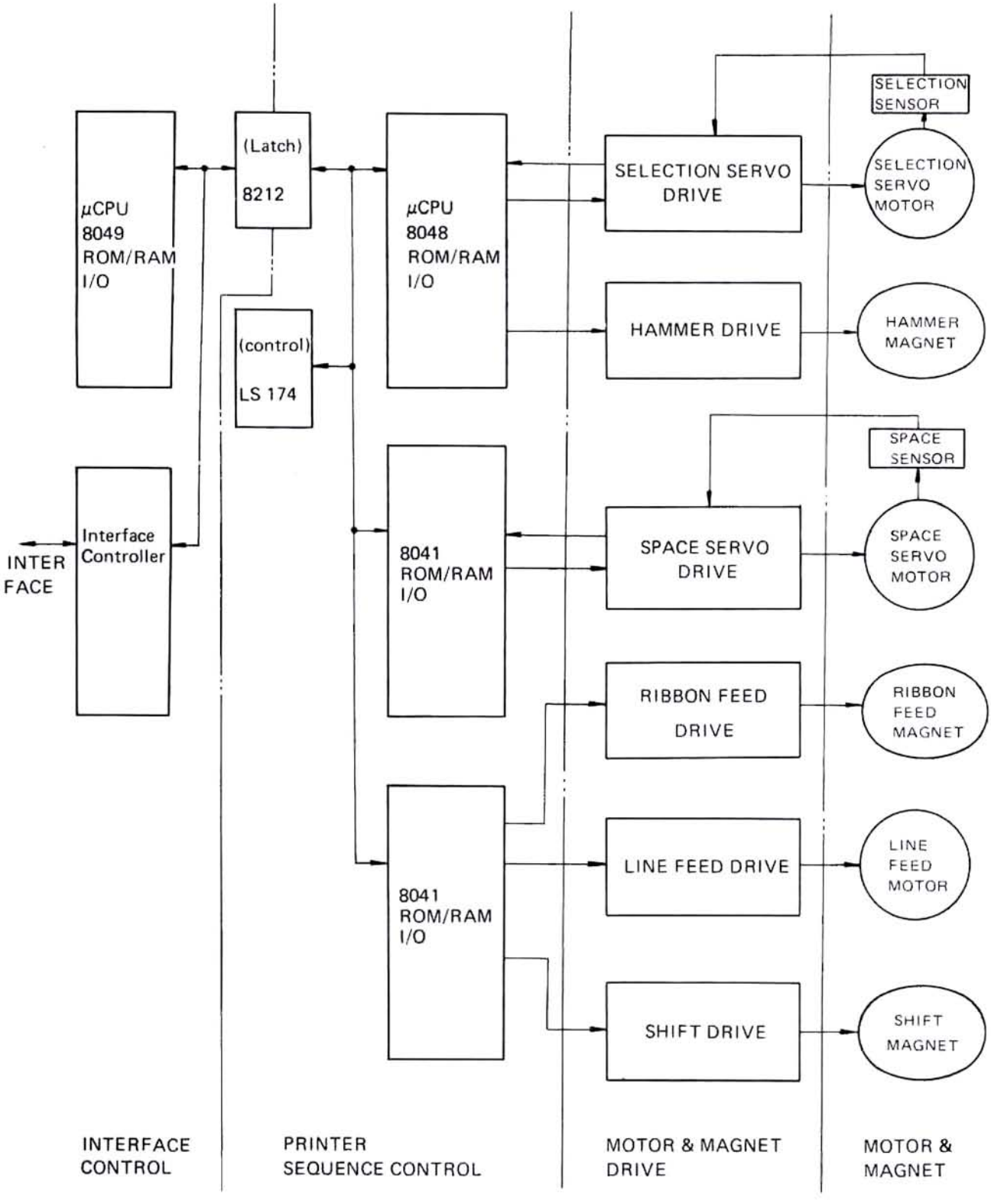

**Figure 3-1. Printer Circuits**

a. Interface control
This circuit controls the section that communicates with the external equipment, and at the same time, feeds data to the printer sequence control circuit.

b. Printer sequence control
This circuit sets and controls the moving distance, speed, etc. of each motor and magnet in accordance with data from the interface control.

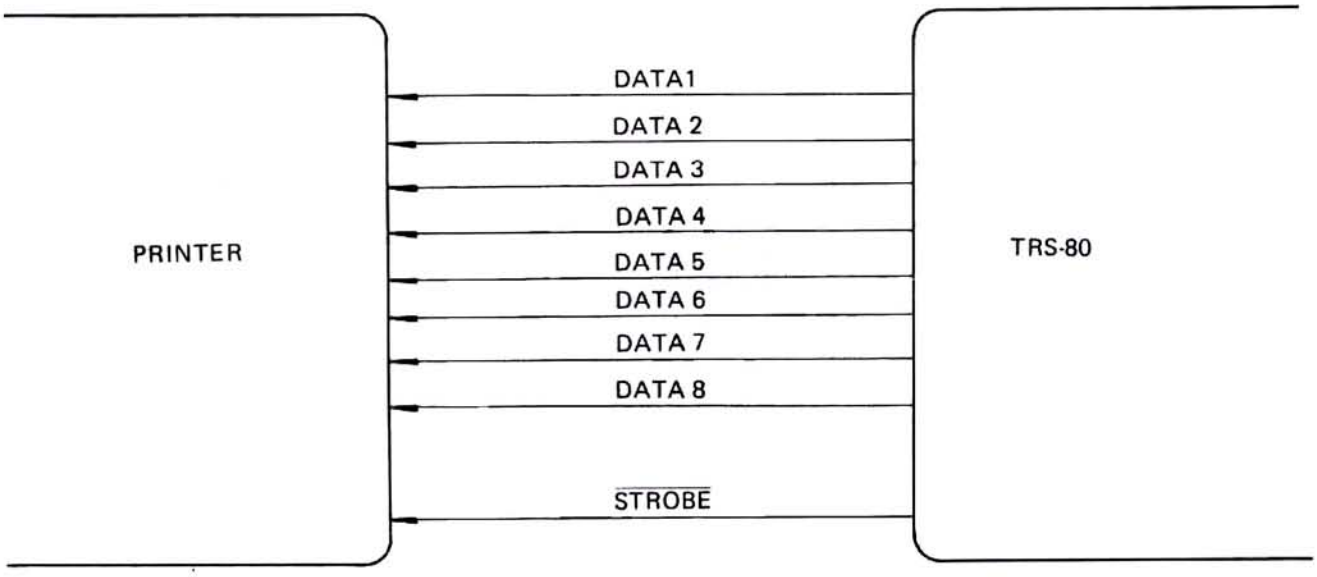
c. Motor and magnet drive
This circuit causes each motor and magnet to operate by the specified moving distance, speed, etc. received from the printer sequence control.

## 2. BLOCK DIAGRAM



## 3. INTERFACE CONTROL

### 3-1. Input/Output Pin Signals




* Ground not shown.

**Figure 3-2. Input Pin Signals**

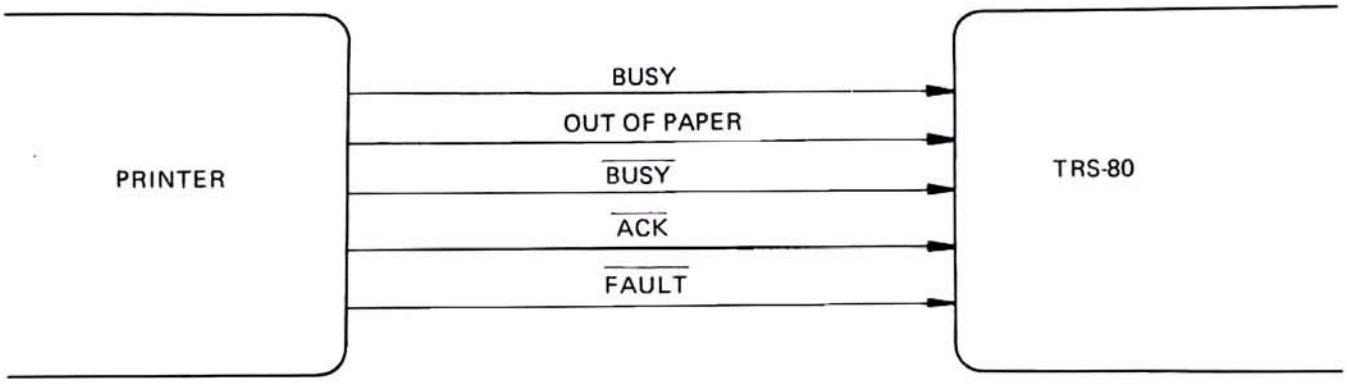
Description of Each Input Signal:

DATA LINES (DATA 1 – DATA 8)

Eight inputs provide information for printing. The printer will ignore any invalid code applied.

$\overline{\text{STROBE}}$

This is a sampling signal for data lines, providing instruction signals for printing.




* Ground not shown.

**Figure 3-3. Output Print Signals**

Description of Each Output Signal:

BUSY

Busy conditions: Data is in buffer
Initial state
Off line mode
Error state
Ribbon fault
Cover open

Ready condition: States other then those above
Cover close state

OUT OF PAPER

No function. This line is always "O" signal.

$\overline{\text{BUSY}}$

This signal is the logical inverse of BUSY.

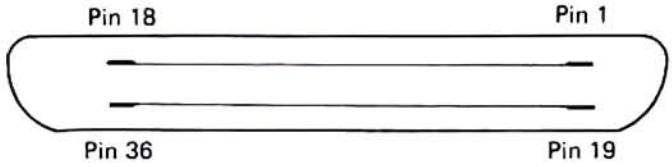
$\overline{\text{ACK}}$

This signal indicates Printer is no longer busy.

$\overline{\text{FAULT}}$

This signal indicates the Printer is in Error state or in Ribbon Fault state.

## 3-2. Interface Signal Pin Assignments




| Pin | Signal Name | Pin | Signal Name |
|---|---|---|---|
| 1 | $\overline{\text{STROBE}}$ | 19 | GND |
| 2 | DATA 1 | 20 | GND |
| 3 | DATA 2 | 21 | GND |
| 4 | DATA 3 | 22 | GND |
| 5 | DATA 4 | 23 | GND |
| 6 | DATA 5 | 24 | GND |
| 7 | DATA 6 | 25 | GND |
| 8 | DATA 7 | 26 | GND |
| 9 | DATA 8 | 27 | GND |
| 10 | $\overline{\text{ACK}}$ | 28 | GND |
| 11 | BUSY | 29 | GND |
| 12 | OUT OF PAPER | 30 | GND |
| 13 | $\overline{\text{BUSY}}$ | 31 | N.C. |
| 14 | GND | 32 | $\overline{\text{FAULT}}$ |
| 15 | GND | 33 | GND |
| 16 | GND | 34 | N.C. |
| 17 | GND | 35 | N.C. |
| 18 | +5 VDC | 36 | N.C. |

NOTE:
- N.C. pins are pulled up to +5 VDC through a 4.7K resistor.
- Pin 18 provides +5 VDC to the TRS-80 (less than 80mA of current).

**Table 3-1. Interface Signal Pin Assignments.**

## 3-3. Input-Output Interface Timing Considerations

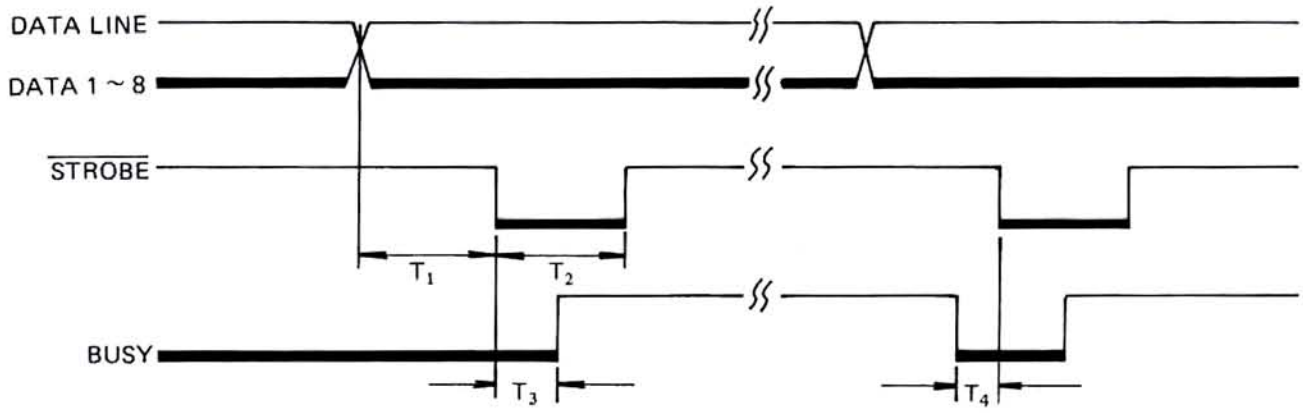
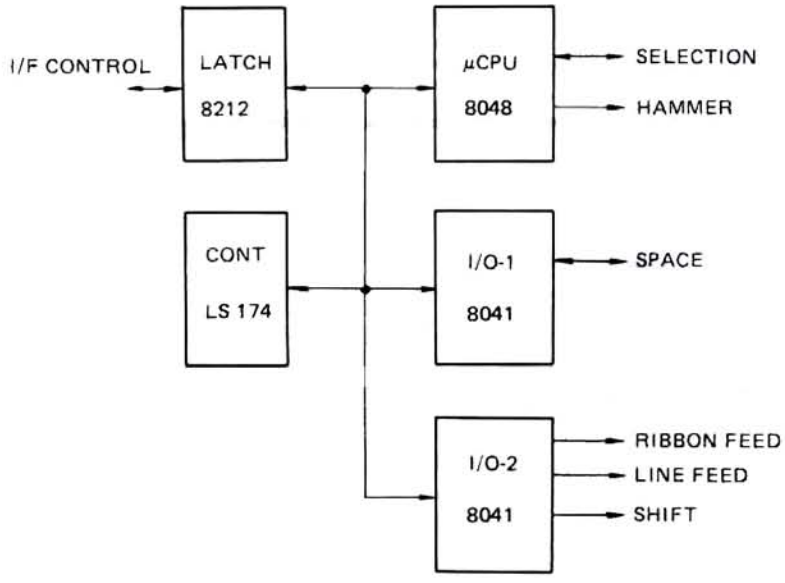



**Figure 3-4. Input-Output Interface Timing Diagram**

$T_1$: $\geq$ 0ns
$T_2$: $\geq$ 1$\mu$s
$T_3$: $\leq$ 160ns
$T_4$: $\leq$ 200ns

## 4. PRINTER SEQUENCE CONTROL

This circuit converts data from the interface control sections into directions for each motor and magnet.




LATCH: Latches data (character, paper feed data, etc.) from the interface control.

CONT: Selects I/O-1 or -2 in accordance with the control from the μCPU.

μCPU: Reads data set in LATCH (8212) and controls each I/O port (I/O ports of μCPU, I/O-1, I/O-2) in accordance with the kind of data. Directions for selection and hammering motions are made through the I/O port of this μCPU.

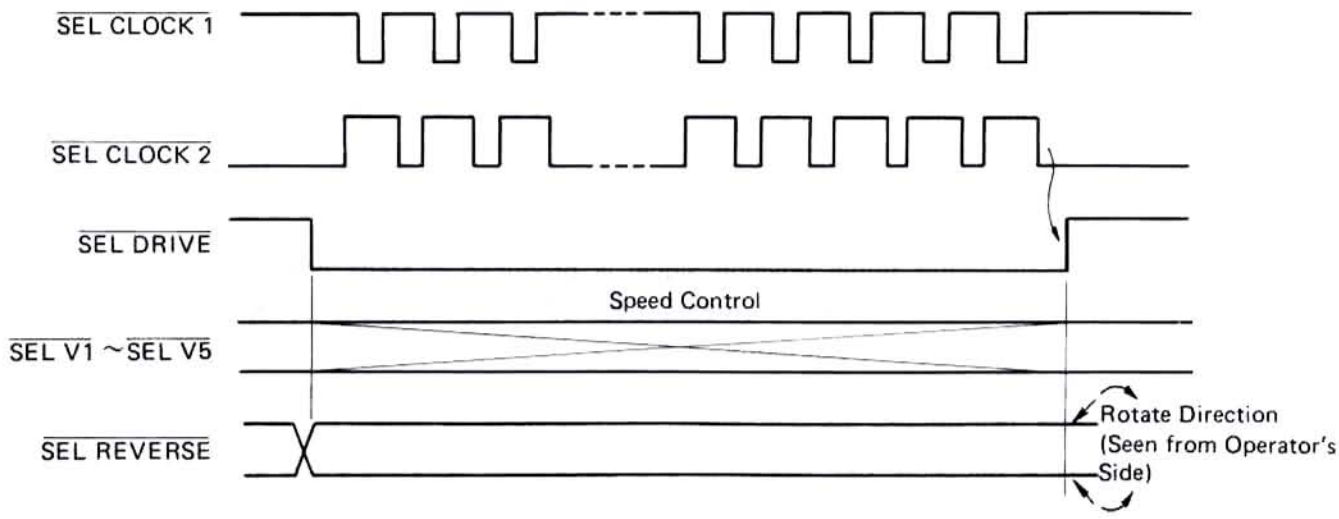
I/O-1: Directions for space motion are made at this I/O port.

I/O-2: Directions for ribbon end, line feed and print wheel shift motions are made at this I/O port.

## 4-1. Selection Motor

(1) Ordinary Motions

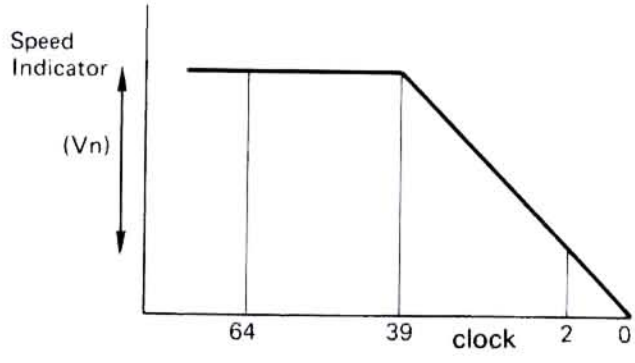
The timing diagrams for controlling the selection motor are shown below.




A. $\overline{\text{SELV1}} \sim \overline{\text{SELV5}}$

These signals make up the speed indicator (Vn) to the selection motor.

Speed indicator (Vn) changes, as shown below, in accordance with the moving value (number of clocks) of the selection motor.




The speed indicator (Vn) is set by $\overline{\text{SELV1}} \sim \overline{\text{SELV5}}$ in binary values.

B. $\overline{\text{SEL CLOCK1}}$, $\overline{\text{SEL CLOCK2}}$

$\overline{\text{SEL CLOCK1}}$: Timing for counting selection motor sensor signals; 1 clock per step. (Deactivation is valid.)

$\overline{\text{SEL CLOCK2}}$: $\overline{\text{SEL DRIVE}}$ is changed to "HIGH" level by deactivation of the final clock.

C. $\overline{\text{SEL REVERSE}}$

Directs rotating direction of the selection motor.

"HIGH" → Forward direction (clockwise as viewed from the operator)

"LOW" → Backward direction (counterclockwise as viewed from the operator)

D. $\overline{\text{SEL DRIVE}}$

Selection motor drive signal; "LOW" level is in motion.

E. $\overline{\text{SEL HOME}}$

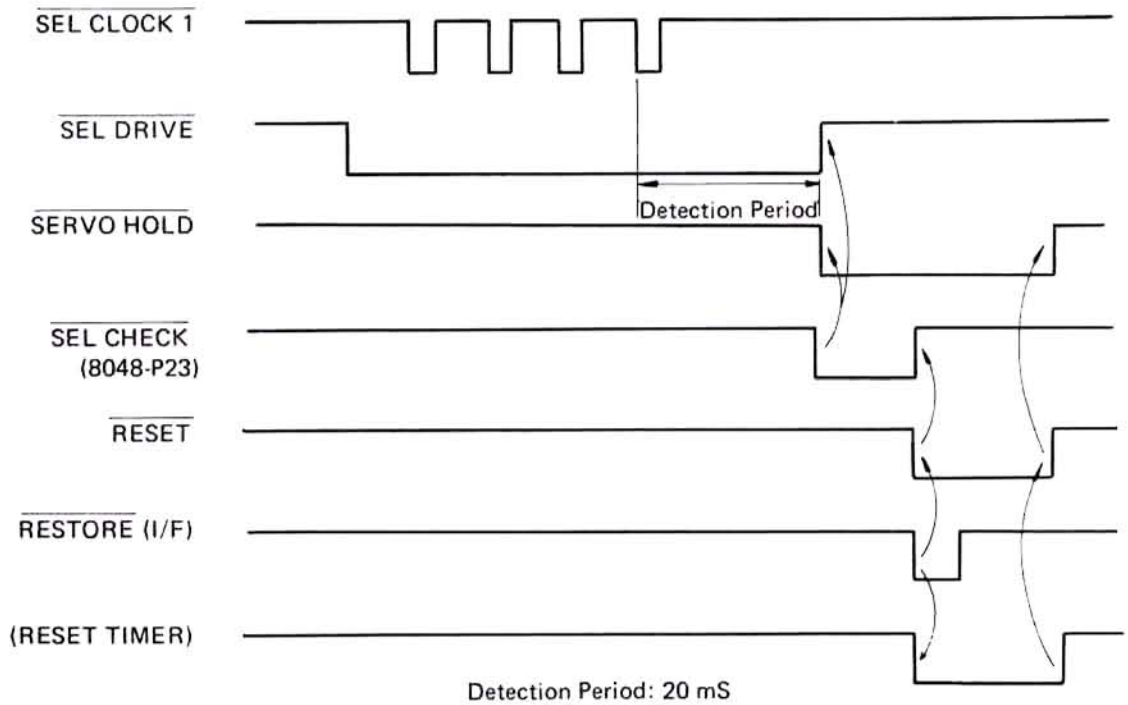
The selection motor home position signal is produced 4 steps before the mechanical home position of the print wheel when it is turned in the forward direction (clockwise).

F. Ordinary motions of selection motor:

The present position is stored and a comparison is made with the print wheel position to be reached. The rotating direction and number of steps are computed to turn the motor in the shortest direction. $\overline{\text{SEL REVERSE}}$ and $\overline{\text{SELV1}}$ ~ $\overline{\text{SELV5}}$ are set and the motor is caused to run by $\overline{\text{SEL DRIVE}}$.

(2) Clock Detection and Reset During Motion.

Selection error




Detection Period: 20 mS

A. It is judged as an error when SEL CLOCK1 does not arrive in the state where SEL DRIVE is of "LOW" level. Detection occurs for 20 ms after deactivation of a clock.

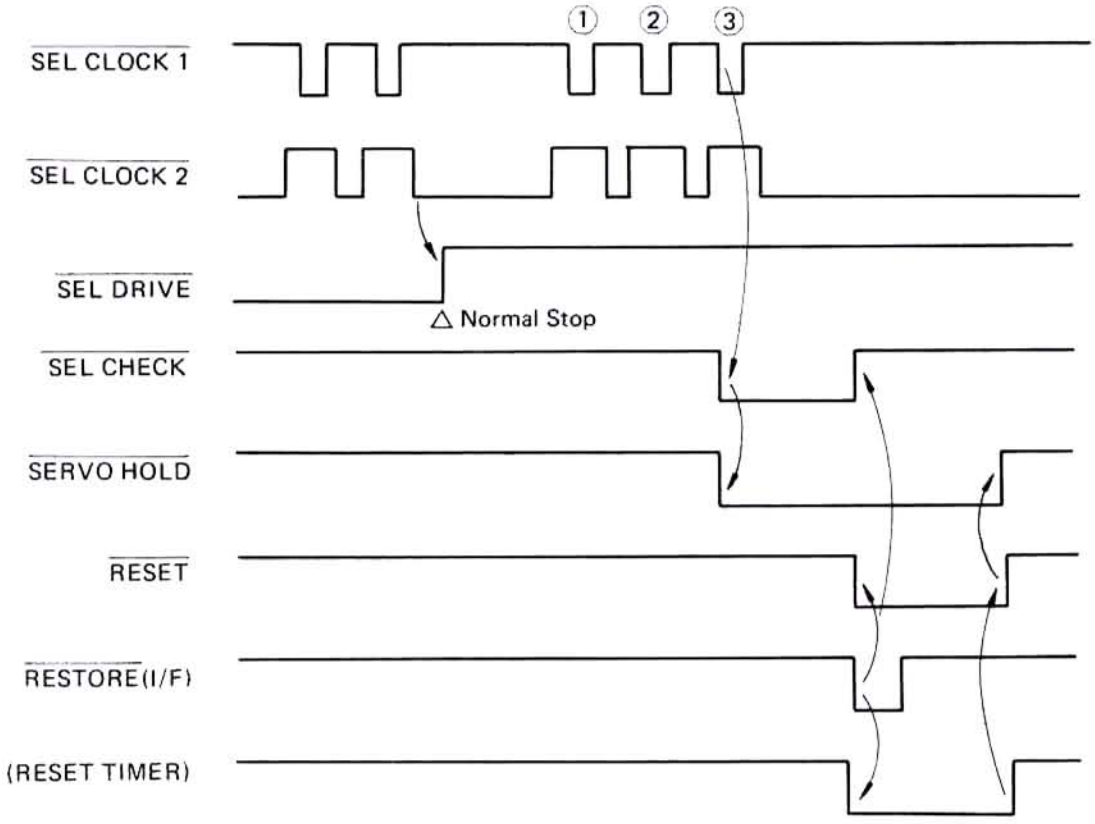
B. When an error has been detected, SEL DRIVE is changed to "HIGH" level, the motor's excitation is discontinued. SEL CHECK is changed to "LOW" level, SERVO HOLD is changed to "LOW" level, and I/F's CHECK is changed to "LOW" level.

C. SEL CHECK is changed to "HIGH" level by deactivation of I/F's RESTORE, and after time-out of the reset timer, RESET and SERVO HOLD are also changed to "HIGH" levels.

D. After completion of reset, the printer will make a restore motion.

E. If no SEL CLOCK1 comes from the beginning, detection is made for 20 ms from deactivation of SEL DRIVE, and it is considered as a error.

g and Reset During



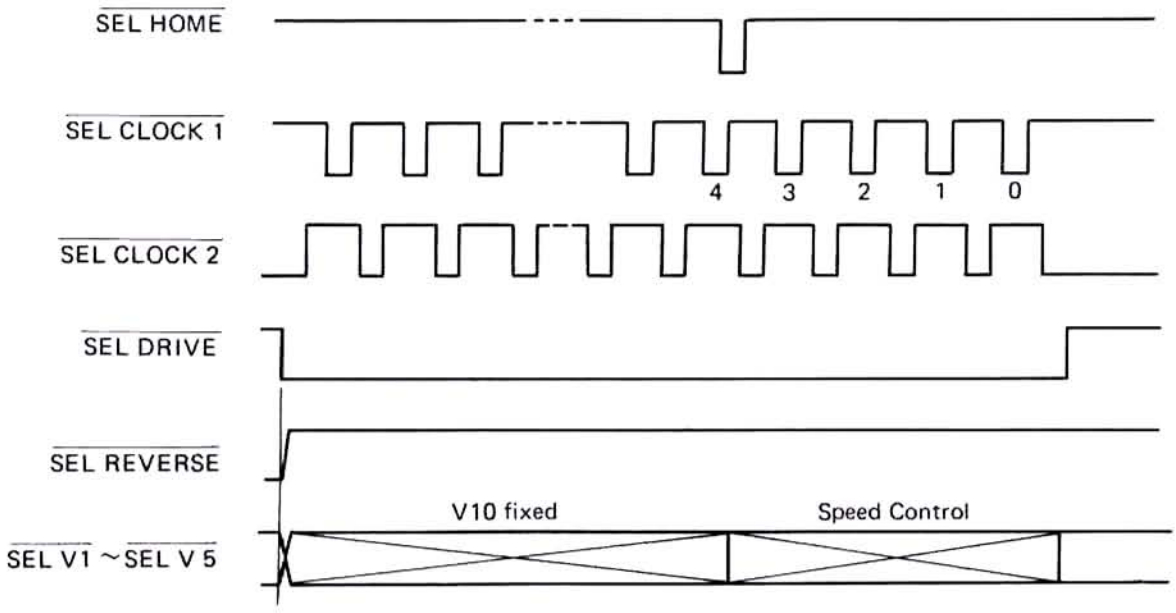

A. An error is detected when SEL CLOCK1 occurs three times after SEL DRIVE was changed from "LOW" level to "HIGH" level (stop).

B. SEL CHECK is changed to "LOW" level by deactivation of the third SEL CLOCK1 in the state where SEL DRIVE is of "HIGH" level. Also, I/F's CHECK and SERVO HOLD are changed to "LOW" level and motor's excitation is discontinued.

C. SEL CHECK is changed to "HIGH" level by deactivation of I/F's RESTORE, and after time-out of the reset timer, RESET and SERVO HOLD are changed to "HIGH" level.

D. After completion of reset, the printer makes a restore motion.

(4) Restore Motion

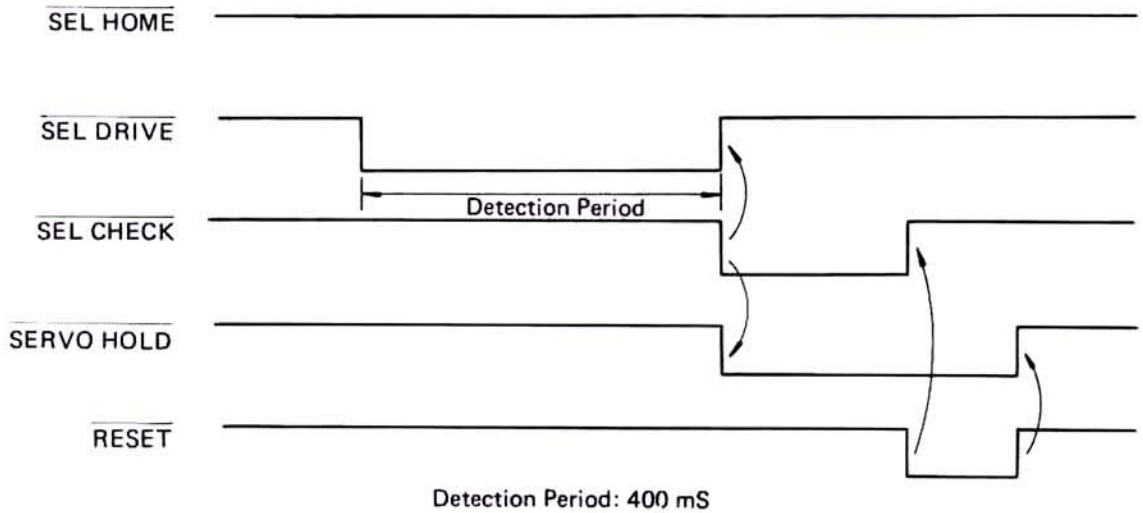



A. The print wheel starts rotating in the forward direction at a fixed speed when $\overline{\text{SEL REVERSE}}$ is set in "LOW" level, $\overline{\text{SELV1}}$ ~ $\overline{\text{SELV5}}$ are set at speed indicator V10, and $\overline{\text{SEL DRIVE}}$ is set in "LOW" level.

B. When $\overline{\text{SEL HOME}}$ is detected, four steps are made in the forward direction, and the motor then stops.

C. The restore motion ends with this position as the home position.

(5) Monitoring of Restore Error



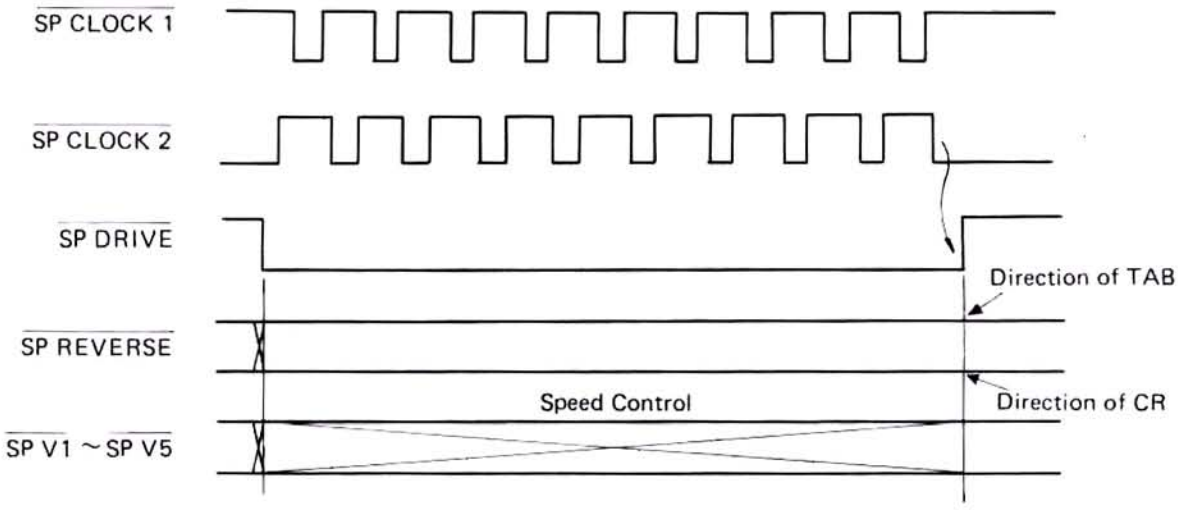

Detection Period: 400 mS

A. An error is detected when SEL HOME does not occur for 400 ms after deactivation of SEL DRIVE in a restore motion.
B. SEL CHECK is changed to "LOW" level by time monitoring. SERVO HOLD is also changed to "LOW" level and excitation of the motor is discontinued.
C. SEL CHECK is changed to "HIGH" level by deactivation of RESET, and SERVO HOLD is changed to "HIGH" level by activation of RESET.
D. Monitoring of time of ordinary motion is made after detection of SEL HOME.

## 4-2. Space Motor

(1) Ordinary Motions

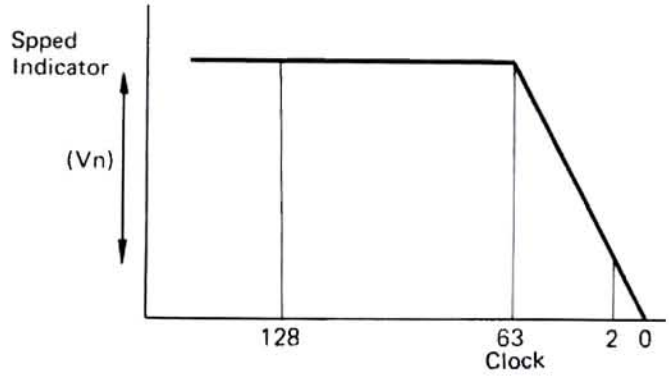
The timing diagrams for controlling the space motor are shown below.




A. $\overline{SPV1} \sim \overline{SPV5}$

$\overline{SPV1} \sim \overline{SPV5}$ are signals which make speed indicator (Vn) to the space motor.

Speed indicator (Vn) changes, as shown below, in accordance with the moving value (number of clocks) of the space motor.




The speed indicator (Vn) is set by $\overline{SPV1} \sim \overline{SPV5}$ in binary values.

B. $\overline{\text{SP CLOCK1}}$, $\overline{\text{SP CLOCK2}}$

$\overline{\text{SP CLOCK1}}$: Timing for counting space motor sensor signals; 2 clock per step (1/120"). (Deactivation is valid.)

$\overline{\text{SP CLOCK2}}$: $\overline{\text{SP DRIVE}}$ is changed to "HIGH" level by deactivation of the final clock.

C. $\overline{\text{SP REVERSE}}$

Dictates rotating direction of the space motor.

"HIGH" → Forward direction (toward TAB)

"LOW" → Backward direction (toward CR)

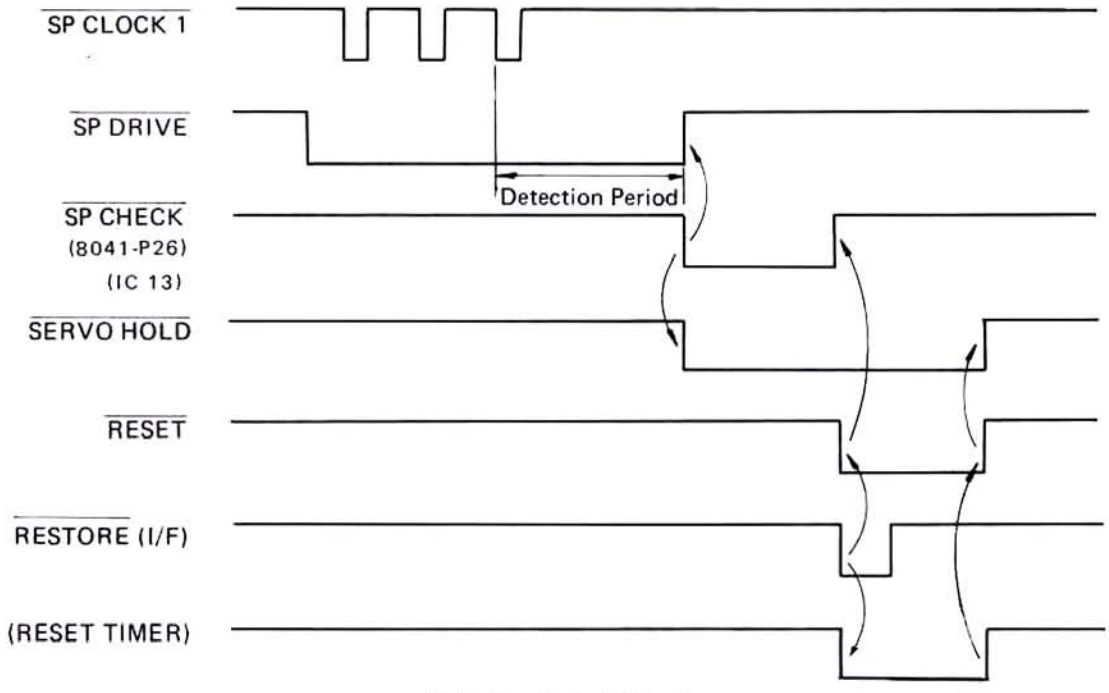
D. $\overline{\text{SP DRIVE}}$

Space motor drive signal; "LOW" level is in motion.

E. Ordinary motions of space motor

$\overline{\text{SP REVERSE}}$ and $\overline{\text{SPV1}}$ ~ $\overline{\text{SPV5}}$ are controlled by the number of steps and the direction to be moved. The motor is caused to operate by $\overline{\text{SP DRIVE}}$.

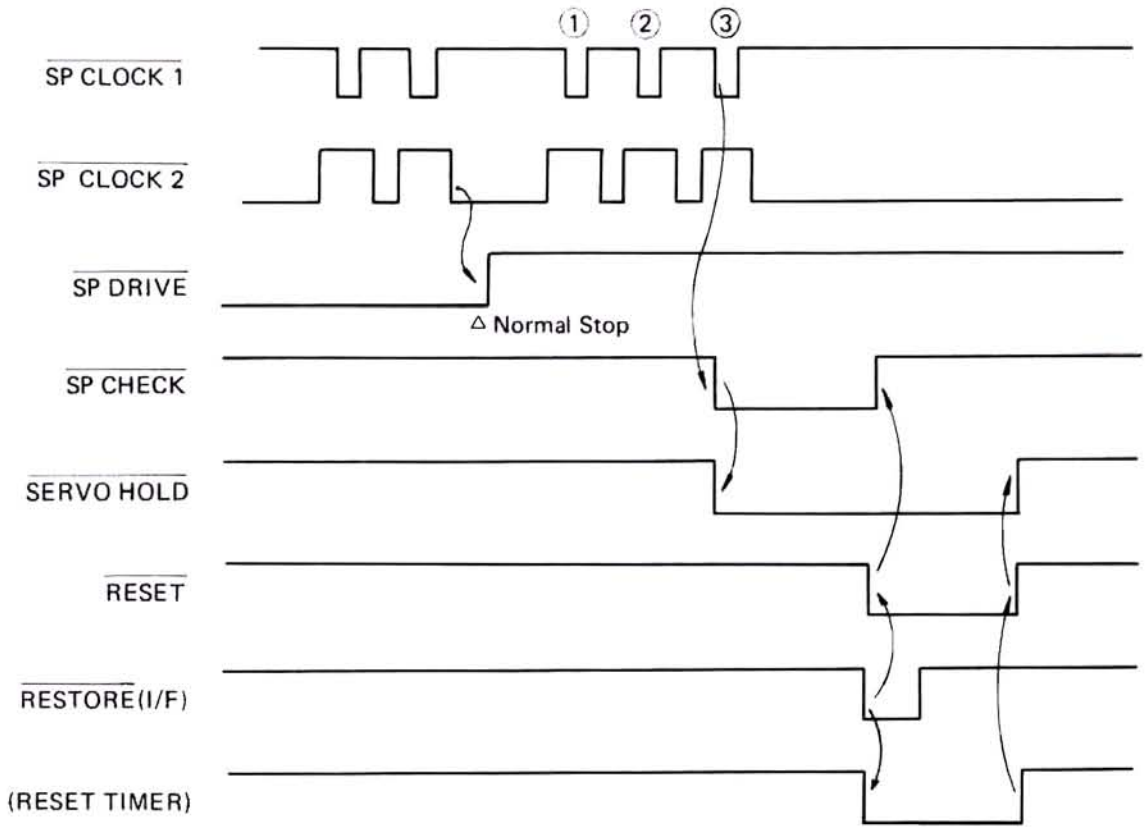
(2) Clock Detection and Reset During Motion




Detection Period: 80 mS

A. Judgement is made as an error when SP CLOCK1 does not arrive in the state where SP DRIVE is "LOW".
   Detection occurs for 80 ms after deactivation of a clock.
B. When an error has been detected, SP CHECK is changed to "LOW", SP DRIVE is changed to "HIGH", SERVO HOLD is changed to "LOW", and excitation of the motor is discontinued. I/F's CHECK is also changed to "LOW".
C. SP CHECK is changed to"HIGH" by deactivation of I/F's RESTORE. RESET and SERVO HOLD are also changed to "HIGH" after time-up of the reset timer.
D. After completion of reset, the printer will make a restore motion.
E. If no SP CLOCK1 comes from the beginning, detection is made for 80 ms after deactivation of SP DRIVE and judgement is made as error.

(3) Clock Detection and Reset During Suspension of Motion




A. An error is detected when SP CLOCK1 occurs three times after SP DRIVE was changed from "LOW" to"HIGH" (stop).

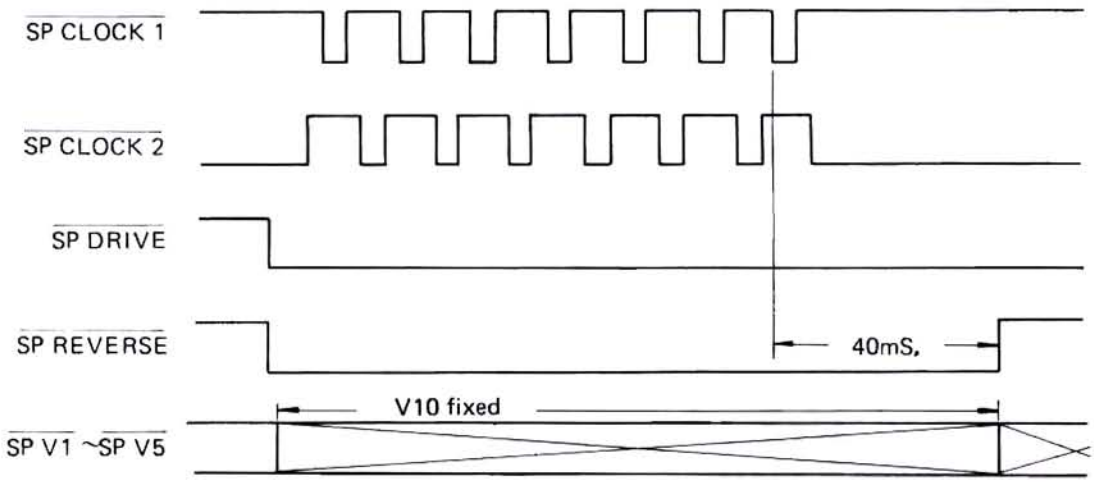
B. SP CHECK is changed to "LOW" by deactivation of the third SP CLOCK1 in the state where SP DRIVE is of a "HIGH" level.
I/F's CHECK and SERVO HOLD are changed to "LOW" and excitation of the motor is discontinued.

C. SP CHECK is changed to a "HIGH" level by deactivation of I/F's RESTORE, and after time-up of the reset timer, RESET and SERVO HOLD are also changed to "HIGH".

D. After completion of reset, the printer will make a restore motion.

(4) Restore Motions

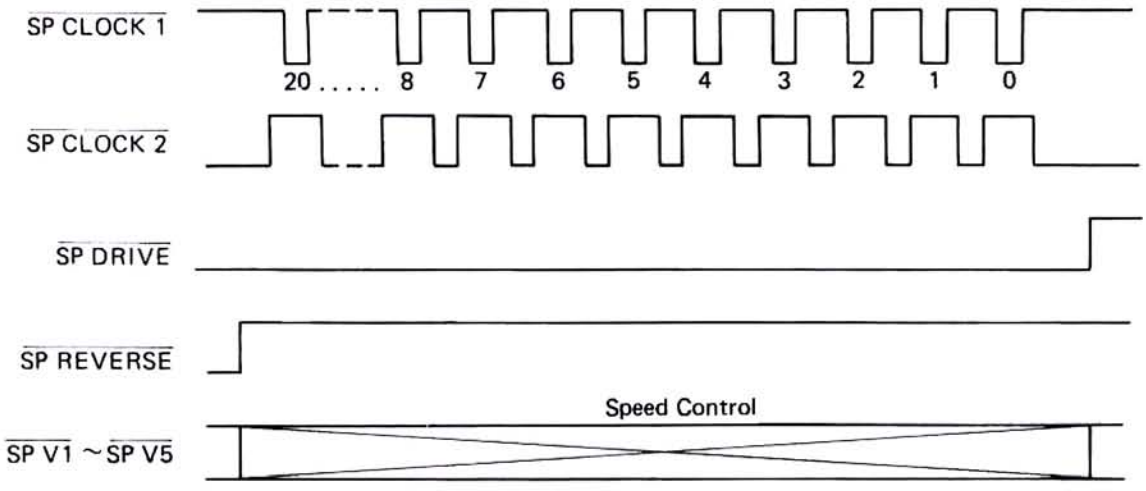
1) First motion




A. SP REVERSE is changed to "LOW", SPV1 ~ SPV5 are set at speed V10, and SP DRIVE is changed to "LOW".
The carriage moves backward (CR direction) at a fixed speed and collides against the left end.

B. Time monitoring of 40 ms is made after deactivation of the final clock. If no clock appears during this period, SP REVERSE is changed to "HIGH" and a transition is made to the second motion.

2) Second motion

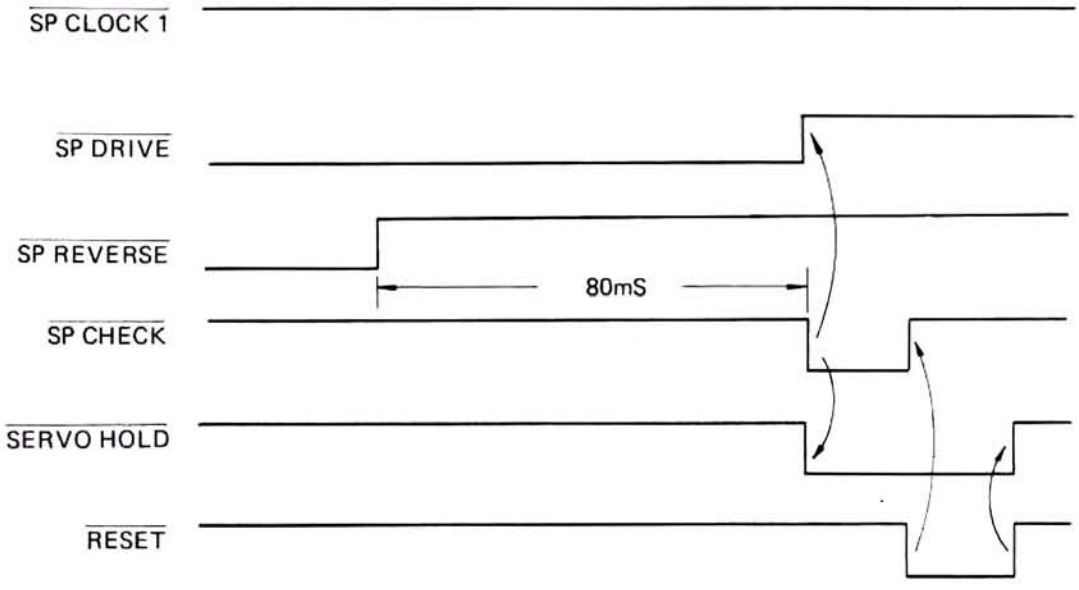



A. The carriage moves forward (TAB direction) 21 clock and then stops after speed indicator control.

B. The restore motion ends with this position as the home position.

C. If the carriage is located at the left end from the beginning, the second motion only is performed.

(5) Detection of Restore Error




A. An error is detected if no SP CLOCK1 occurs for 80 ms after SP REVERSE is changed from "LOW" to "HIGH" in the second restore motion.

B. After detection, SP CHECK is changed to "LOW", SP DRIVE is changed to "HIGH", SERVO HOLD is changed to "LOW", and excitation of the motor is discontinued.

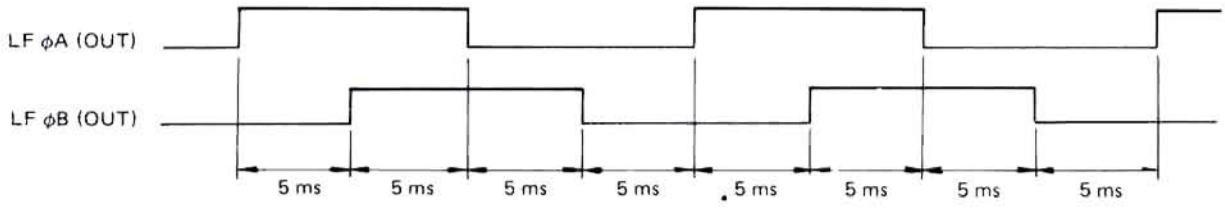
C. SP CHECK is changed to "HIGH" by deactivation of RESET, and SERVO HOLD is changed to "HIGH" by activation of RESET.

D. Clock monitoring of ordinary motion is made after detection of SP CLOCK1.

## 4-3. Line Feed Motor

The line feed motor is a pulse motor. Its functions are line feed in a forward direction and line feed in a backward direction.

(1) LF direction (forward)

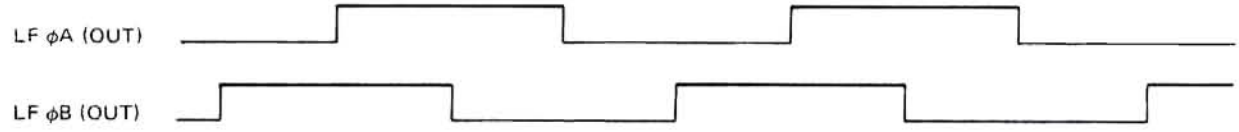



(a) LFφA and LFφB phase switching cycle is 5 m-sec between them.

(b) The line feed motor is controlled with switching made between φA and φB.

**Figure 3-5. LF Output Waveforms**

(2) BLF direction (backward)



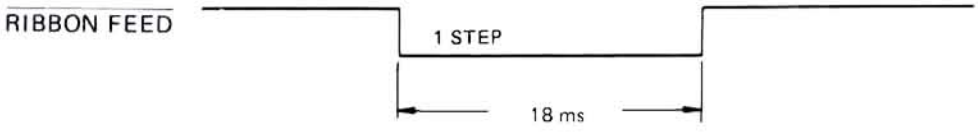

(a) LFφA and LFφB phase switching cycle is 5 m-sec between them.

**Figure 3-6. BLF Output Waveforms**

## 4-4. Ribbon Feed Magnet

A rotary magnet is used as the ribbon feed magnet.

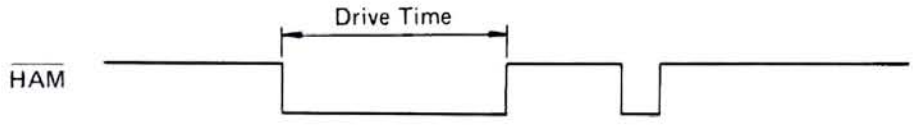
The rotating direction is fixed (counterclockwise).




(a) The standard number of steps of the ribbon feed magnet per character is 1. It is 6 only for underline and double underline.

## 4-5. Hammer Magnet

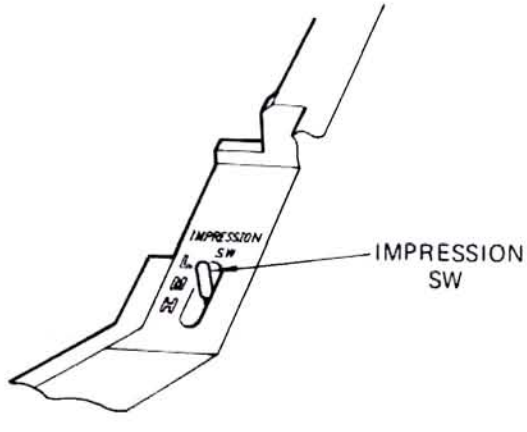
The hammer magnet is controlled.




The drive time of the hammer magnet is controlled by the impression switch setting (3 positions) and by the character on the print wheel. See Table 3-1.

| IMP SW | | | | | DRIVE TIME |
|---|---|---|---|---|---|
| | $\overline{\text{IMPH(IN)}}$ | (L) | (H) | (H) | |
| | IMPL(IN) | (H) | (H) | (L) | |
| | STATE | (H) | (M) | (L) | |
| IMPRESSION LEVEL | HAM 7 | (6) | | | Long drive time |
| | HAM 6 | (5) | (6) | | |
| | HAM 5 | (4) | (5) | (6) | |
| | HAM 4 | (3) | (4) | (5) | |
| | HAM 3 | (2) | (3) | (4) | |
| | HAM 2 | (1) | (2) | (3) | |
| | HAM 1 | | (1) | (2) | |
| | HAM 0 | (0) | (0) | (0) (1) | Short drive time |

**Table 3-1. Hammer Magnet Drive Times**



## 4-6. Shift Magnet

Two shift magnets, upper and lower, are used for shifting the print wheel up or down. Drive current is supplied with the SHIFT DRIVE signal (see Figure 3-7), and after switching of the magnet is made, a hold current is fed with the SHIFT LOWER signal.

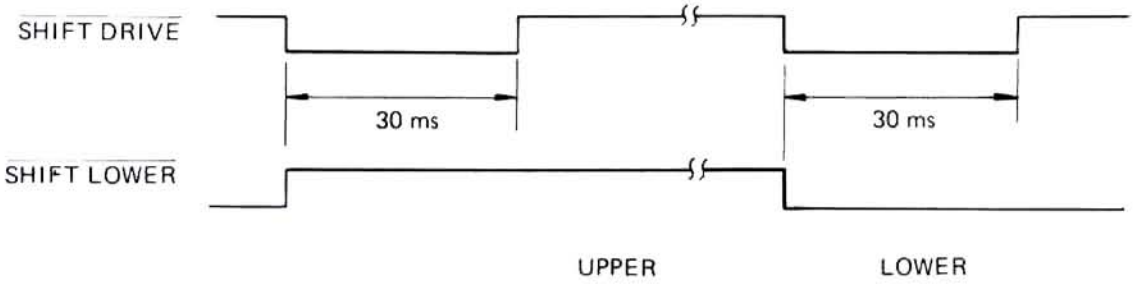



**Figure 3-7. Shift Magnet Timing Diagram**

## 4-7. Others

(1) Reset sequence

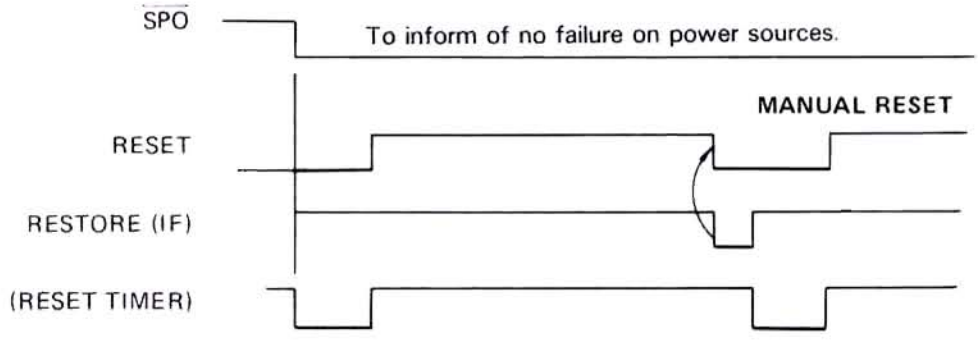
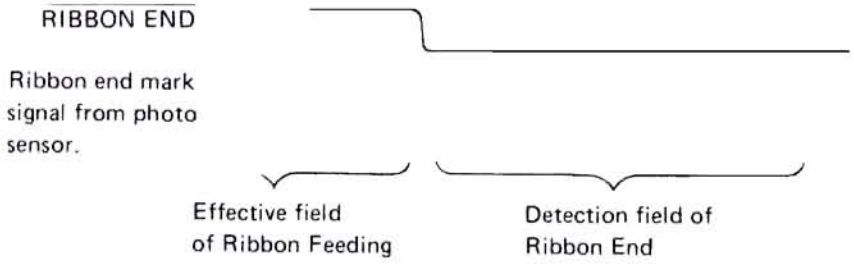
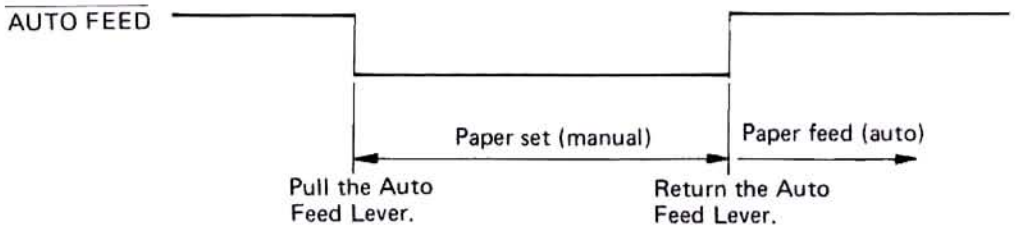



**Figure 3-8. Power Monitoring Timing Diagram**

**(2) Ribbon End**

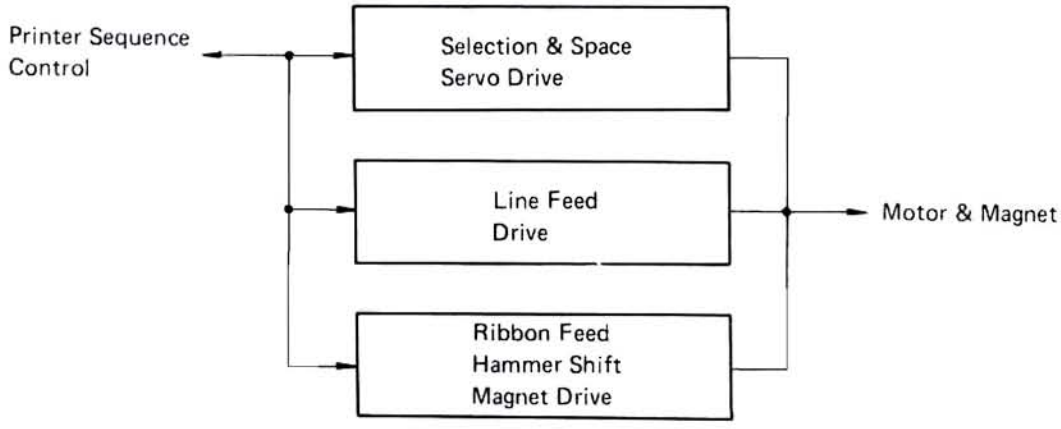



**(3) Auto Feed**



## 5. MOTOR AND MAGNET DRIVE

This circuit block converts designated motion directions into analog signals to operate each motor and magnet.




○ Selection/Space Servo Drive
Motion directions are converted into motor drive signals which cause the print wheel selection and the space motors to operate.

○ Line Feed Drive
Line feed motion directions are converted into a pulse motor drive signal causing the motor to operate.

○ Ribbon Feed/Hammer/Shift Magnet Drive
Ribbon feed/hammer/shift motion directions are converted into magnet drive signals which cause the magnets to operate.

## 5-1. Selection/Space Servo Drive

(1) Photo Sensors and Amplifiers

A. Structure

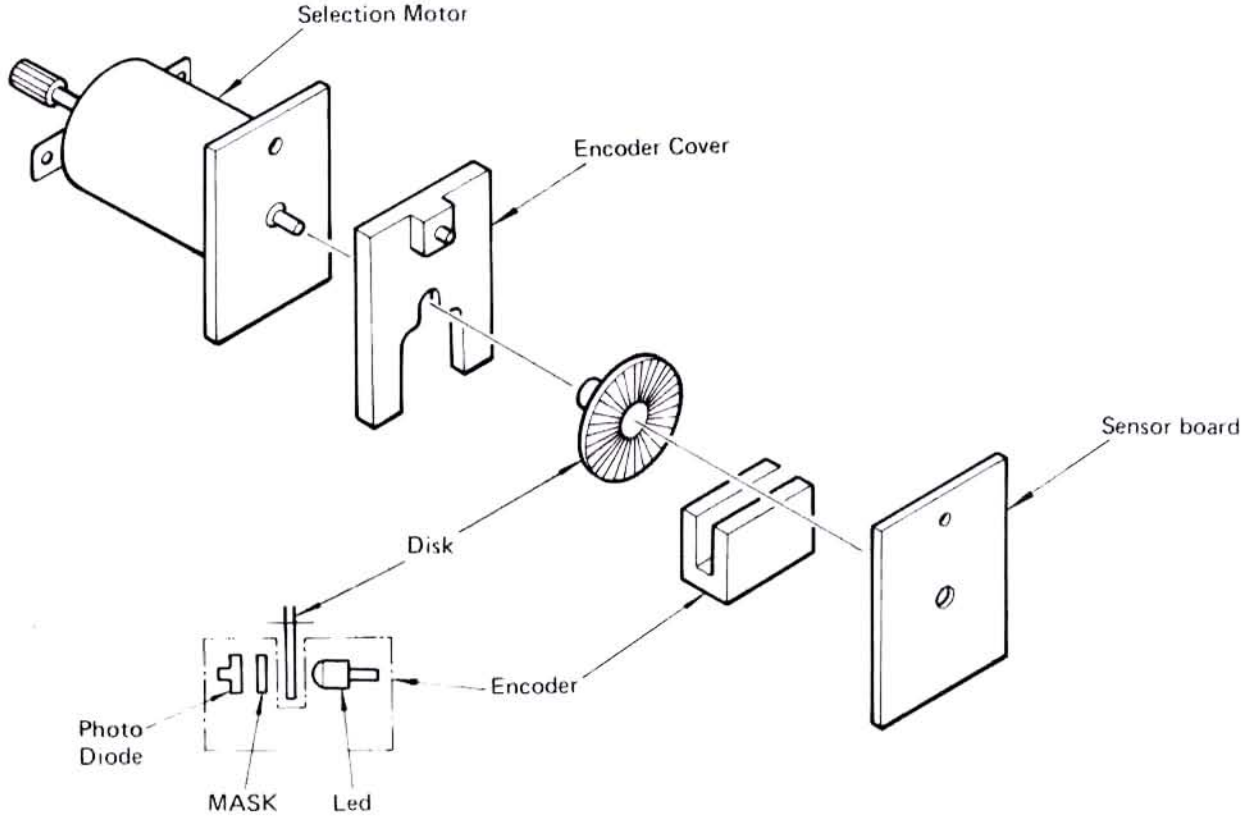



**Figure 3-9. Exploded view of sensor for selection motor**

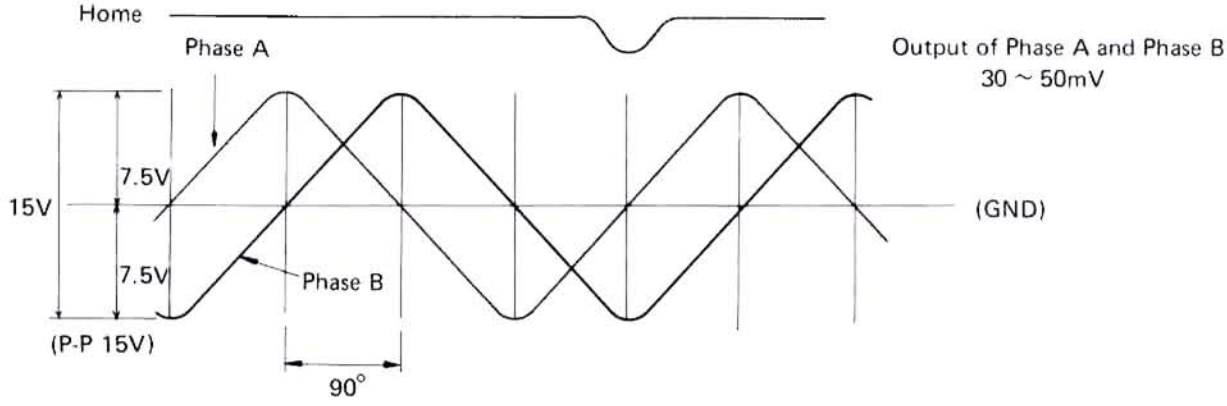
The sensor for the selection motor is composed of the parts shown in Figure 3-9. The Photo diode of this sensor is equipped with four photo sensing elements.

1 Phase A → Sine waveform
2 Phase B → Sine waveform
} provided with 90° phase difference

3 Clear → Temperature compensation

4 HOME → Home position

The output waveforms of Phase A, Phase B and HOME are as follows.




The sensor for the space motor is identical to that described above with the exception of the output waveform HOME, which is not used.

B. Outputs of photo sensing elements

The outputs of photo sensing elements vary by the quantity of light received from the LED.

The output waveforms are changed to sine waveforms by means of a slotted mask.

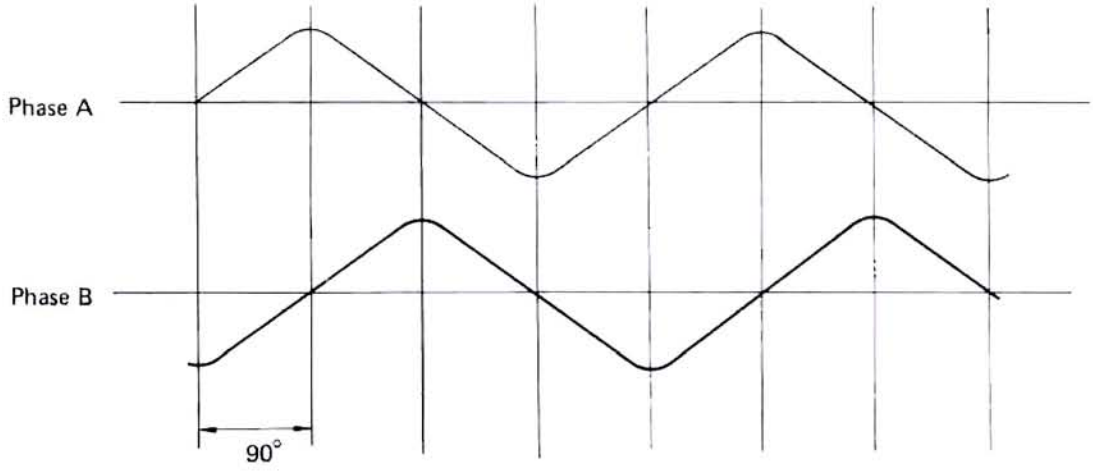



**Figure 3-10. Output Waveforms of Photo Element**

The sine waveforms of the photo sensing element outputs are used for monitoring the rotation angle and speed.

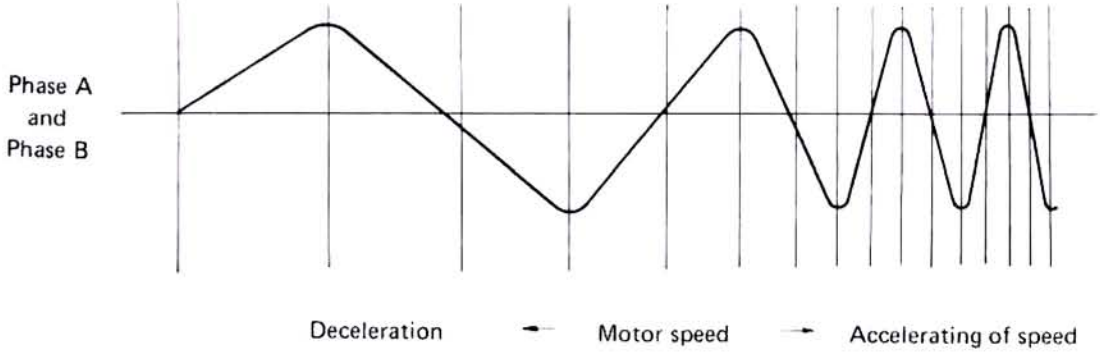



**Figure 3-11. Motor Speed Change on Waveforms**

The waveforms of Phase A and Phase B become as shown in Figure 3-11 when the motor speed changes.

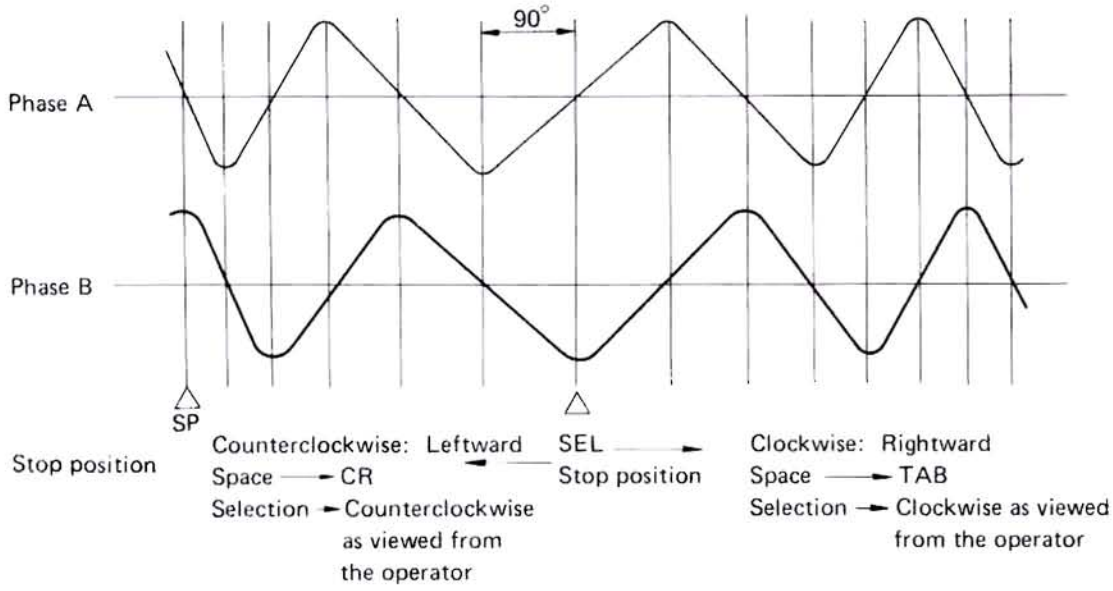



**Figure 3-12. Effects of Motor Rotation on Photo Sensor Waveforms**

The 90° phase difference between Phase A and Phase B is reversed by the direction of rotation of the motor. See Figure 3-12.

Each photo sensing elements output is 30 ~ 50 milivolts. This output is amplified and then used as the controlling signal for the analog circuit.

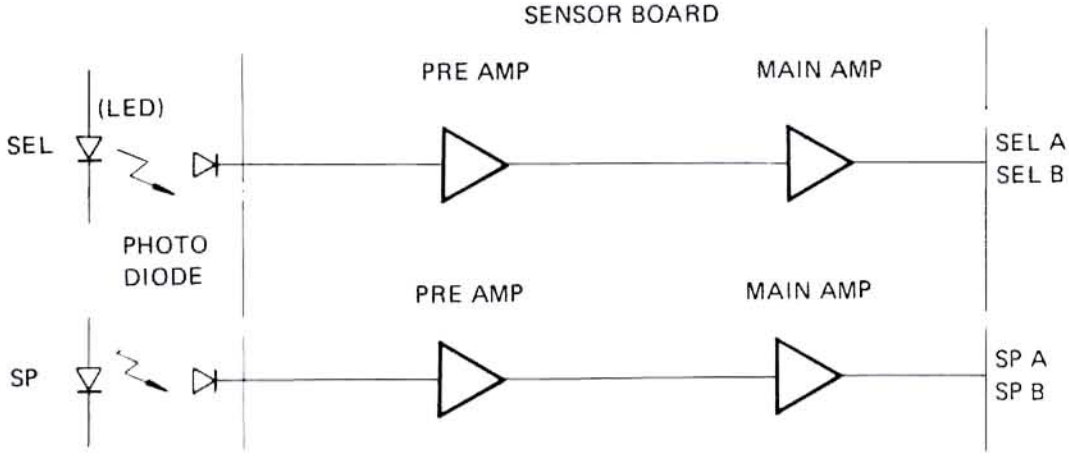
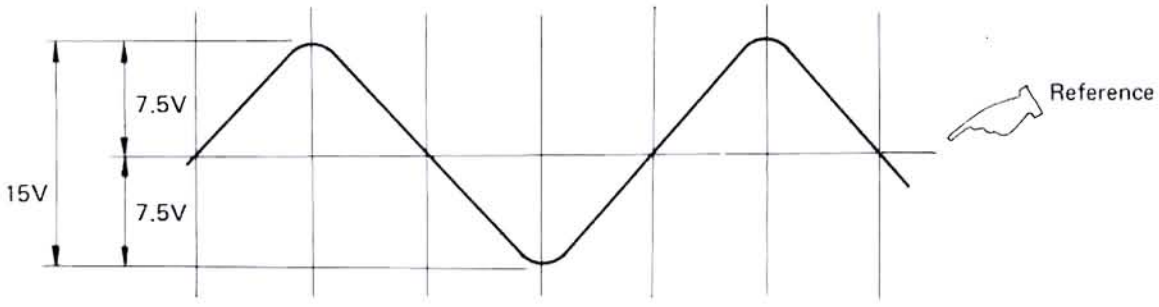



**Figure 3-13. Amplification of Photo Sensor Output**

Each photo diode's output is amplified by a pre-amplifier and is then further amplified with a main amplifier.

The output waveform of a main amplifier is as follows for both selection and space.




P.P 15V (±7.5V to the reference)

**Figure 3-14. Main Amplifier Waveforms**

C. Compensation of outputs

1) Temperature compensation

The outputs of photo sensing elements are reduced when temperature rises. When this reduction occurs amplifier outputs are also reduced and servo control is adversely affected.

Temperature compensation prevents this reduction of the photo sensing element outputs and keeps these outputs at a fixed level.

Outputs of photo sensing elements include a clear output (dummy) besides the Phase A and Phase B outputs. When photo sensing element outputs of Phase A and Phase B are reduced, the photo sensing element output of clear is also reduced. The curve of the clear output is considered to be the same as those of Phase A and Phase B.

When the LED efficiency drops, the current fed to the LED is increased in correspondence to the drop in efficiency, and thus outputs of photo sensing elements of Phase A and Phase B are kept fixed. See Figure 3-15.

LED efficiency → (efficiency drop) → increase of LED current → increase of light emission of LED.

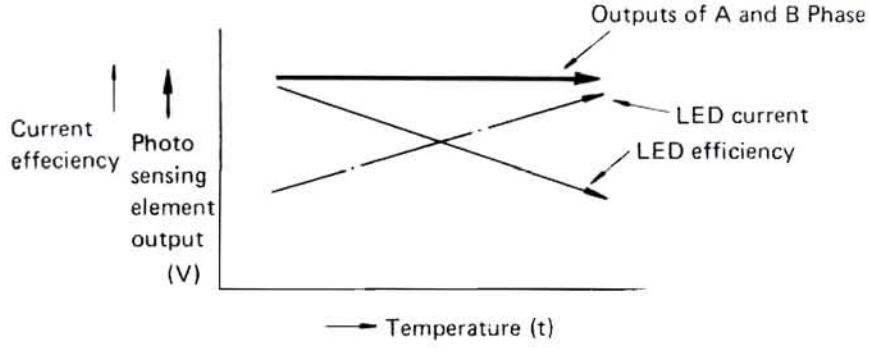



**Figure 3-15. Temperature Compensation**

The temperature compensation circuits are located on the power board. Sensors and amplifiers of the same type are used for selection and space.

(2) Servo motor control

Control of the two DC servo motors is identical; however, this control is illustrated and described below using the selection motor as the example.

A. Speed indicator -X-

The CPU compares the input code with the present print wheel position, and then determines the number of steps to be moved and the rotating direction. The digital circuits produce $\overline{\text{SELV1}}$ ~ $\overline{\text{SELV5}}$, $\overline{\text{SEL REVERSE}}$ and $\overline{\text{SEL DRIVE}}$ as outputs.

The speed is indicated to the servo motor by $\overline{\text{SELV1}}$ ~ $\overline{\text{SELV5}}$. Refer to Figure 3-16.

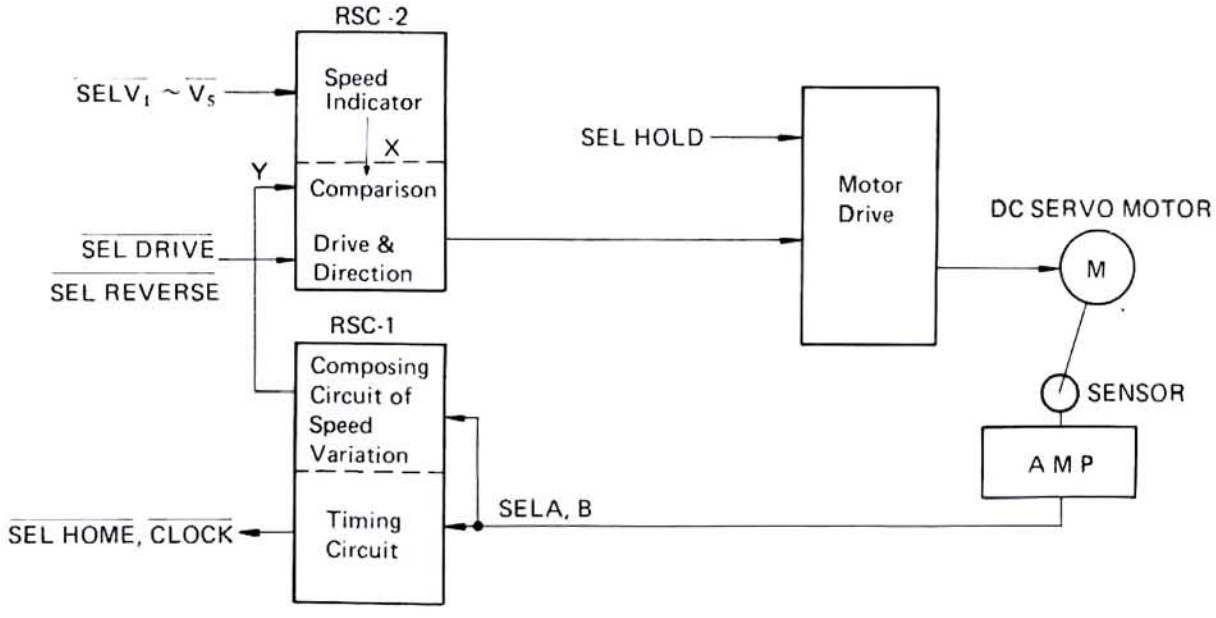



**Figure 3-16. Example of Selection Motor Control**

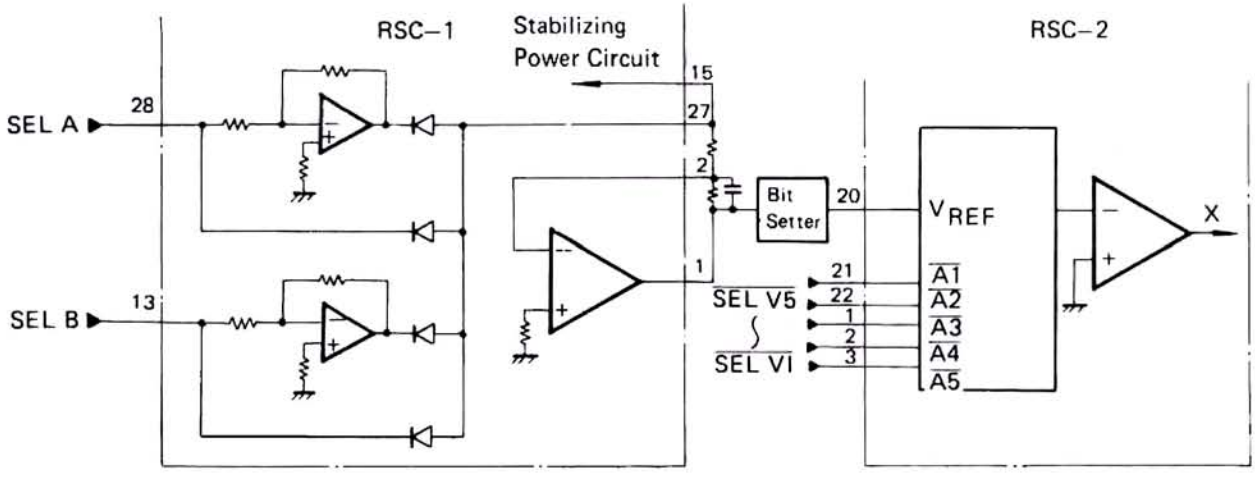



**Figure 3-17. Speed Indicator X**

The reference voltage is produced by SELA and SELB, and output X is obtained from this reference voltage and SELV1 – SELV5. See Figure 3-17.
The bit setter makes adjustment of the reference voltage.

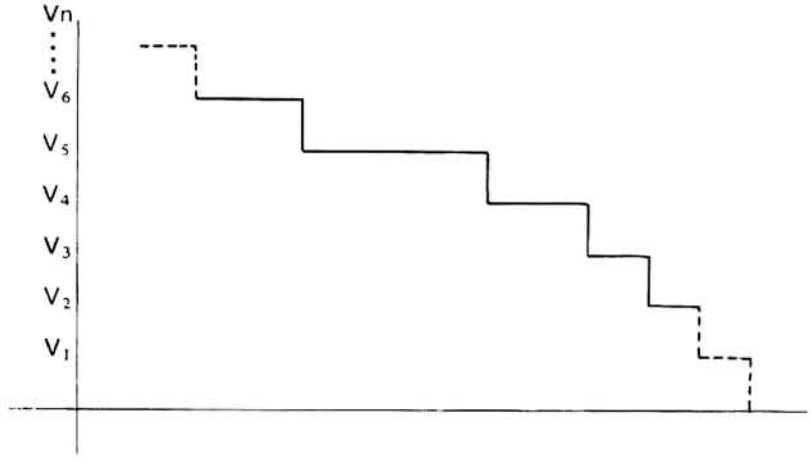



**Figure 3-18. Output X Waveform**

The waveform of X shown in Figure 3-18.

B. Speed variation -Y-

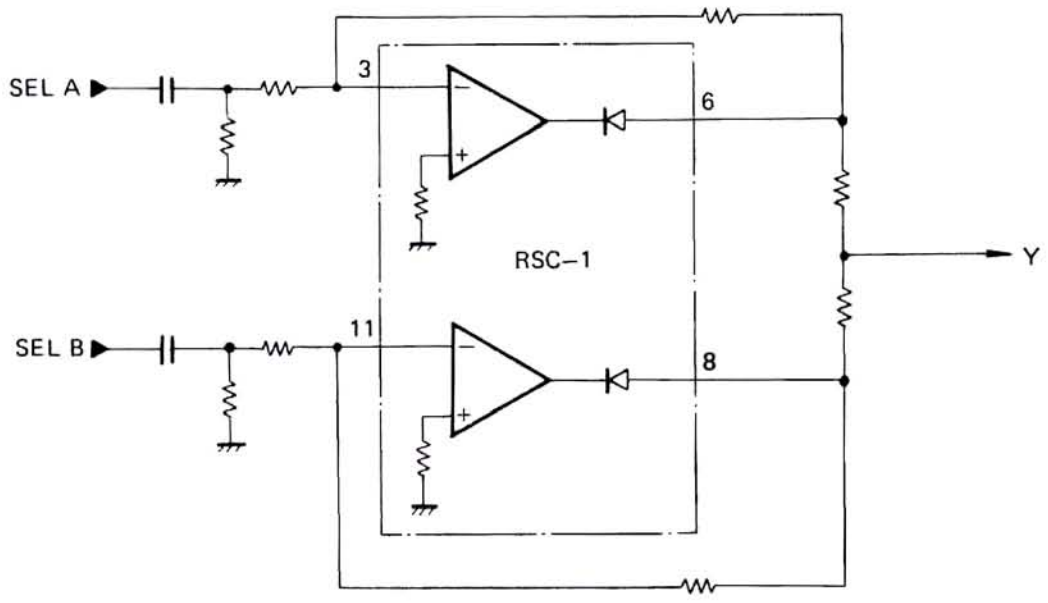



**Figure 3-19. Speed Variation Y**

The Y waveform is produced by the circuit shown in Figure 3-19 by using feedback waveforms SELA and SELB. The produced waveform is compared to two operational amplifiers and differentiating circuit waveforms in Figure 3-20.

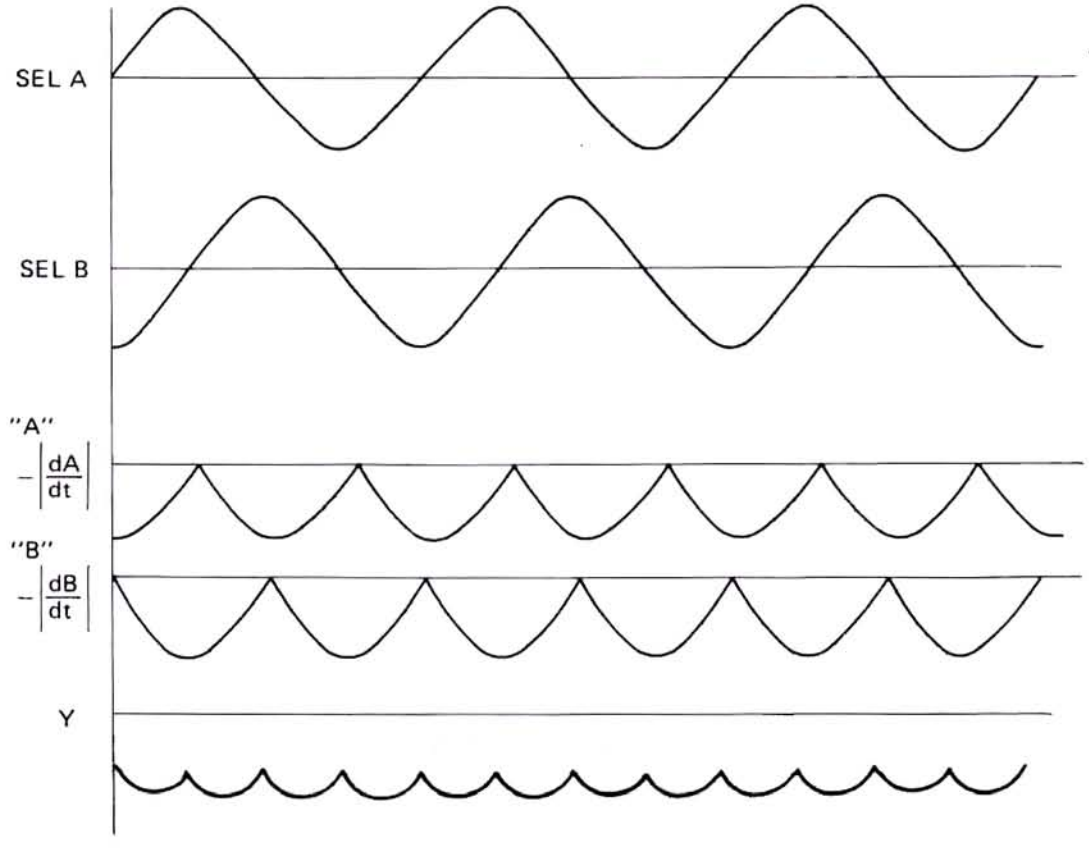



**Figure 3-20. Comparison of Y Waveform**

The waveform of Y is represented by the bold line.

C. Combining X and Y

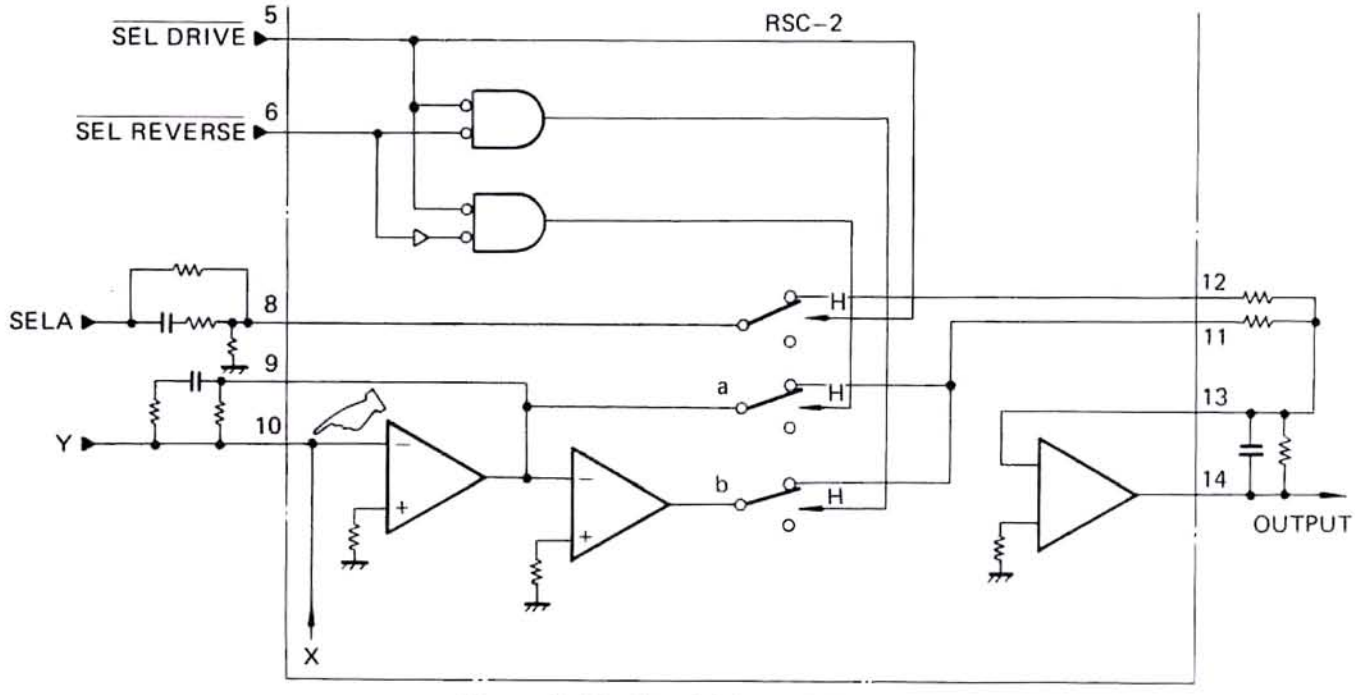



**Figure 3-21. Combining of X and Y**

Waveform X and waveform Y are combined at in Figure 3-21, and are classified into two kinds of waveforms, forward and backward, by the operational amplifier.
Selection of forward waveform or backward waveform is made by SEL REVERSE, which is the signal for directing wheel rotating direction.

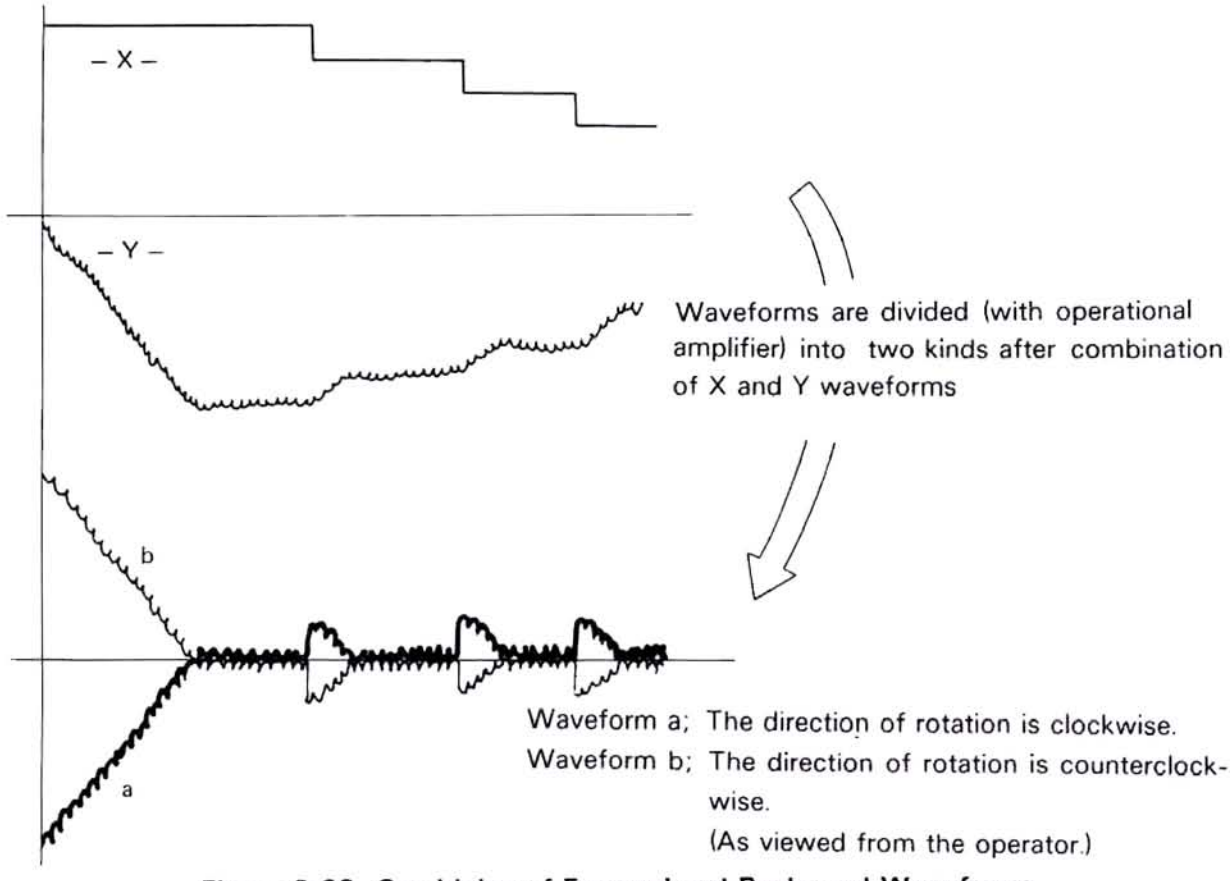



**Figure 3-22. Combining of Forward and Backward Waveforms**

Selection of the waveform is made by switching SEL REVERSE signal.
The direction of rotation of the selection motor is also commanded by this waveform.

D. Selection motor drive

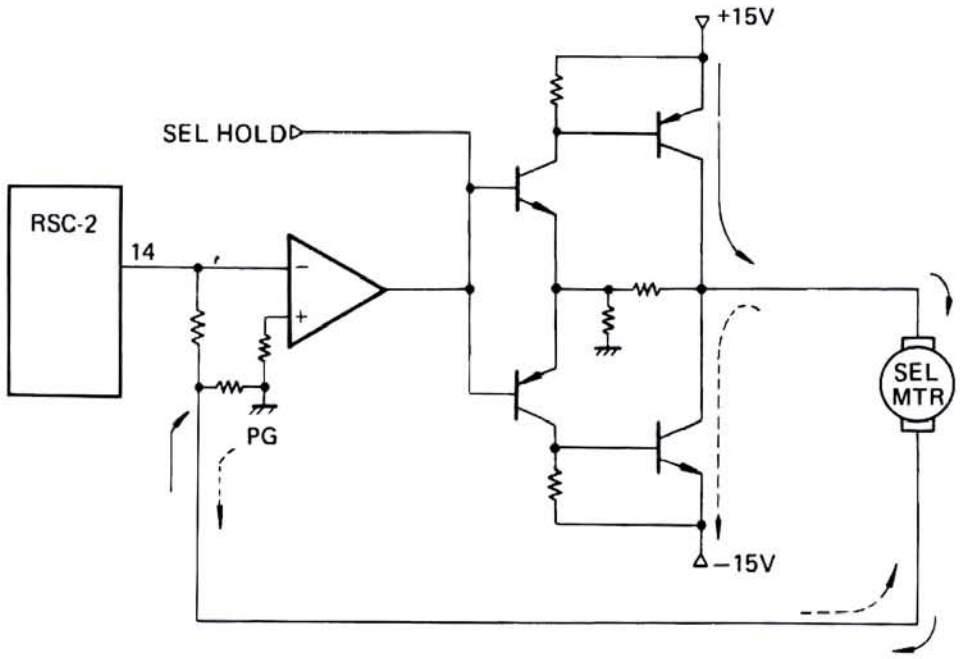



**Figure 3-23. Selection Motor Rotation**

The waveform selected by $\overline{\text{SEL REVERSE}}$ after combination of waveforms X and Y is used for selection motor drive.

The rotating direction of the selection motor is determined by the direction of the current that flows through the motor with PG (power ground) as the common line. See Figure 3-23.

The selection motor drive current can be turned off by using the $\overline{\text{SEL HOLD}}$ signal.

E. Feedback clock

It is necessary to feed the rotational position of the servo motor to the CPU during its motion.

The signals used for this purpose are feedback pulses (clocks).

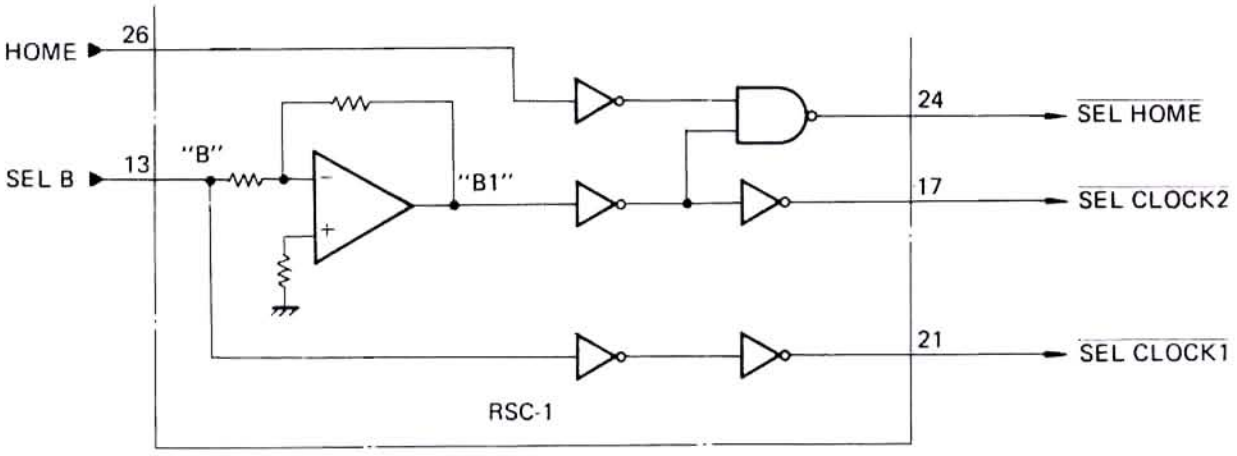



**Figure 3-24. Feedback Pulses**

SELB waveform and reversed SELB waveform are used for feedback pulses. ($\overline{\text{SEL CLOCK1}}$, $\overline{\text{SEL CLOCK2}}$)

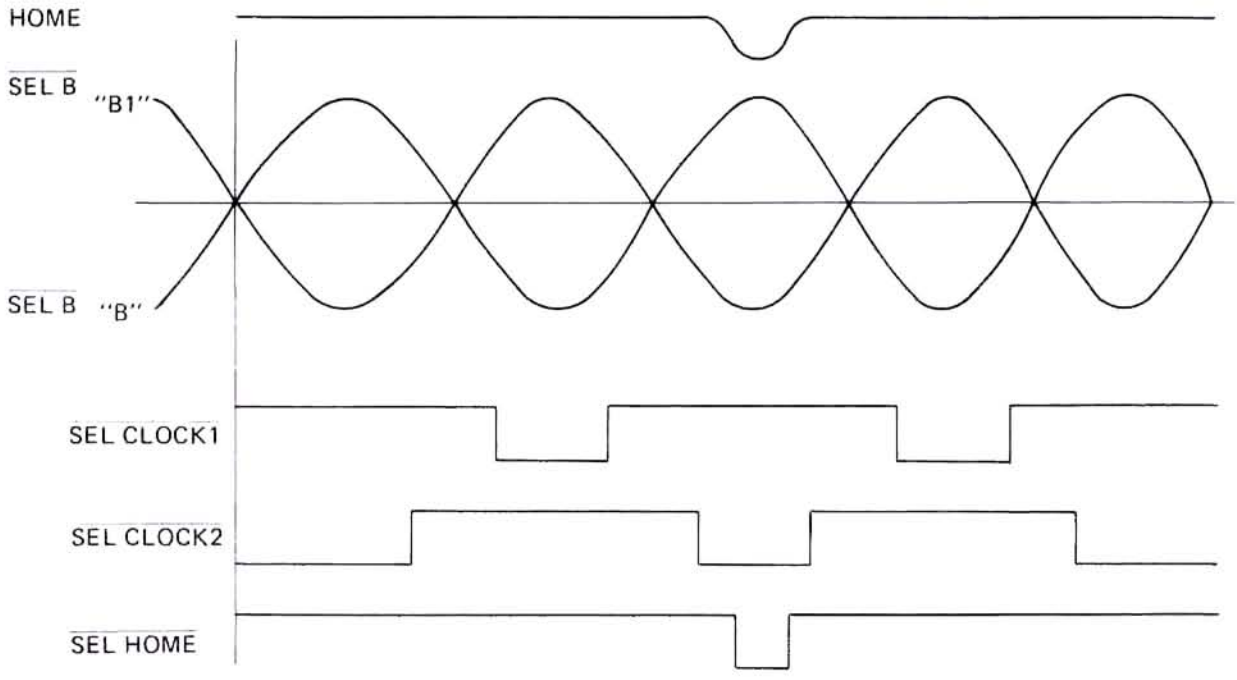



**Figure 3-25. Feedback Pulses Waveforms**

SEL HOME is the signal for detection of the home position. (Used at the occasion of re-store motion.)

No home signal is used for the space motor.

F. Motor stop

The servo motor stop (detent) mode is as follows. The speed of the selection motor changes to V1 level at deactivation of the final $\overline{\text{SELCLOCK1}}$. Refer to Figure 3-26.

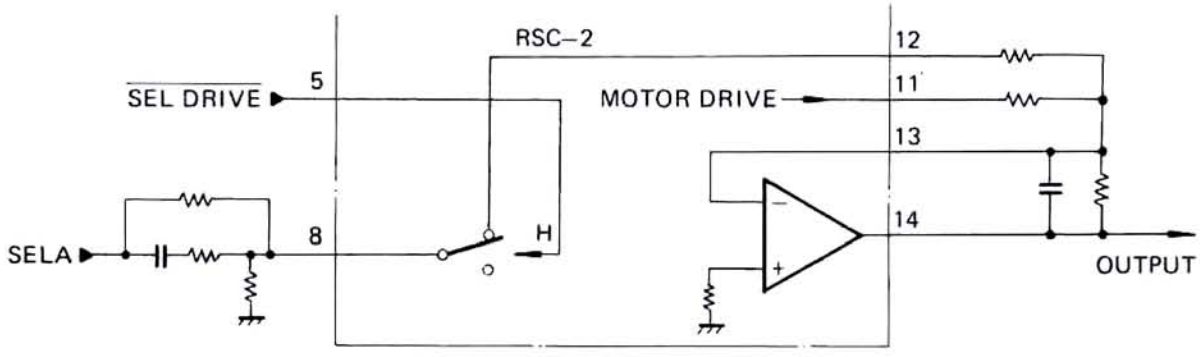



**Figure 3-26. Motor Stop Circuit**

The CPU then changes $\overline{\text{SEL DRIVE}}$ to "HIGH" level at deactivation of $\overline{\text{SEL CLOCK2}}$, and stop (detent) mode is produced thereafter. For detent after the stop (detent) mode, SELA waveform is input to motor drive.

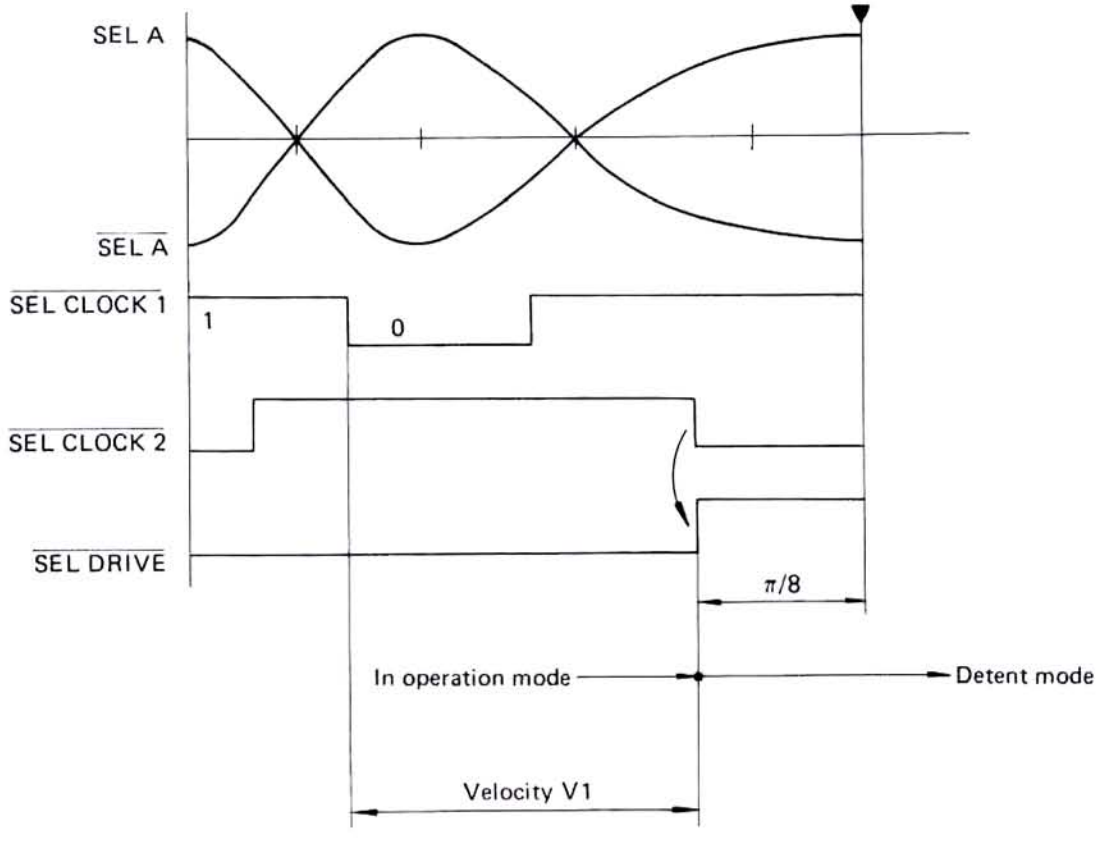


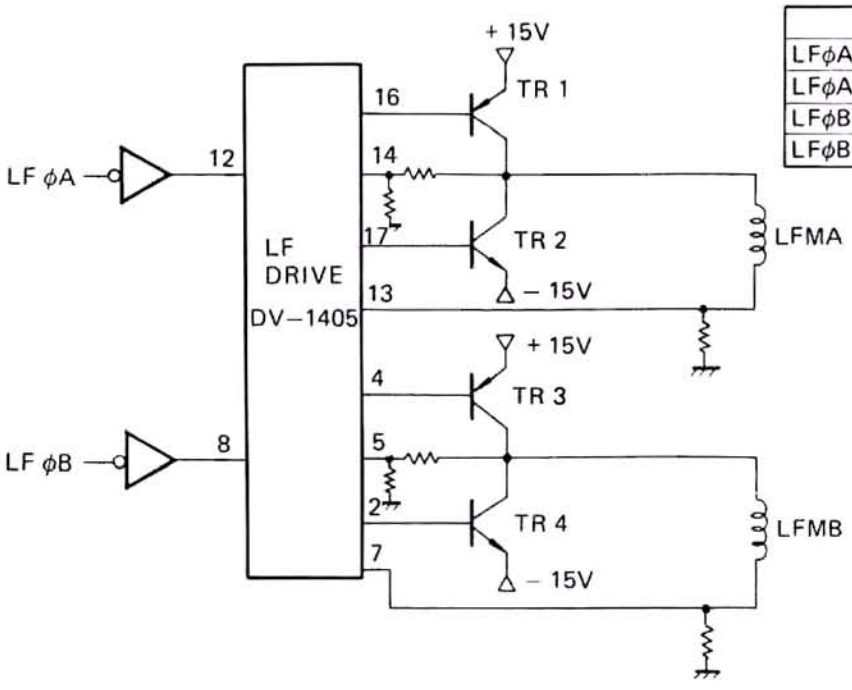

**Figure 3-27. Motor Stop Waveforms**

The stop mode of the space motor is the same as that of the selection motor.

## 5-2. Line feed drive

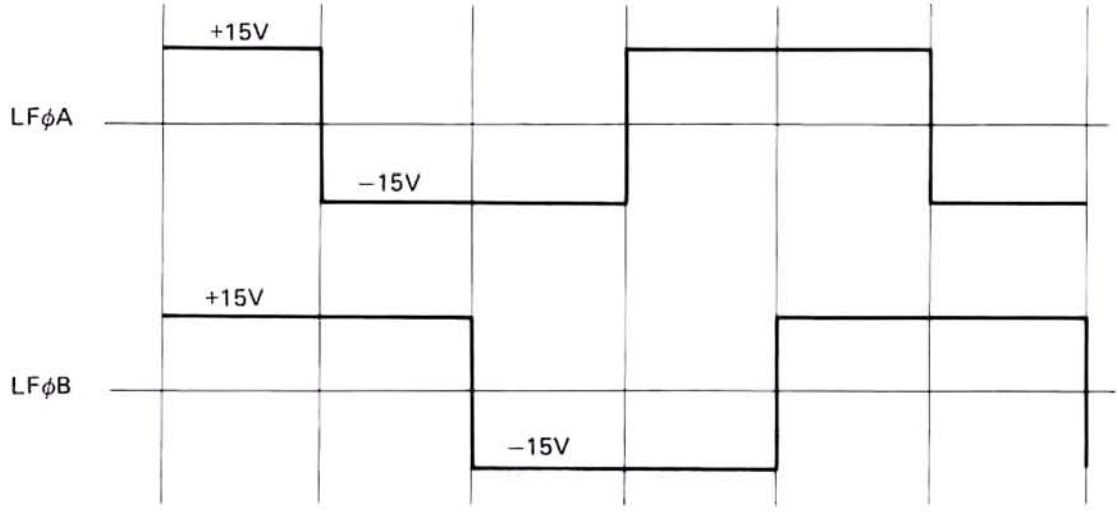
The pulse motor is used as the line-feed motor. This motor can run in either a forward or backward direction. The direction is changed by switching pulses of LF$\phi$A and LF$\phi$B.

The LF$\phi$A and LF$\phi$B outputs from the digital circuit are input to the LF drive circuit. The motor runs with the direction of the current fed to the motor coils, LFMA and LFMB. See Section 6, Major Integrated Circuits, for more information on the LF Drive DV-1405 chip.




| | $TR_1$ | $TR_2$ | $TR_3$ | $TR_4$ |
|---|---|---|---|---|
| LF$\phi$A = HIGH | ON | OFF | – | – |
| LF$\phi$A = LOW | OFF | ON | – | – |
| LF$\phi$B = HIGH | – | – | ON | OFF |
| LF$\phi$B = LOW | – | – | OFF | ON |

**Figure 3-28. LF Drive Circuit**



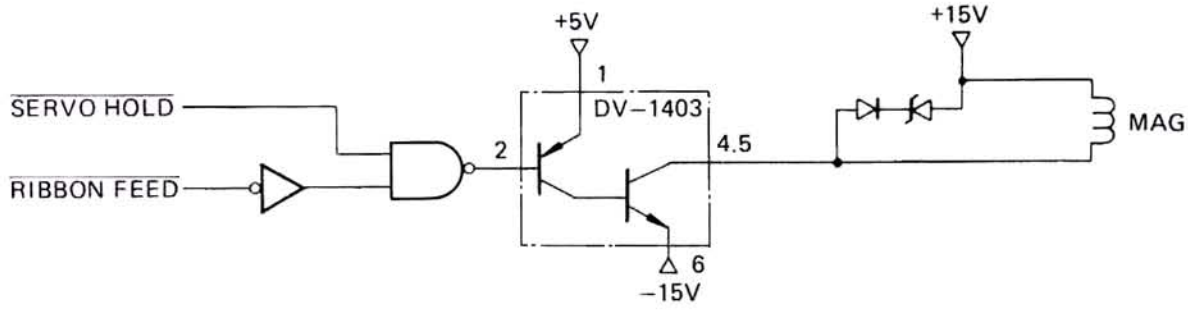

The waveforms shown above are of foward direction.

**Figure 3-29. Output Waveforms**

## 5-3. Ribbon Feed/Shift/Hammer Drive

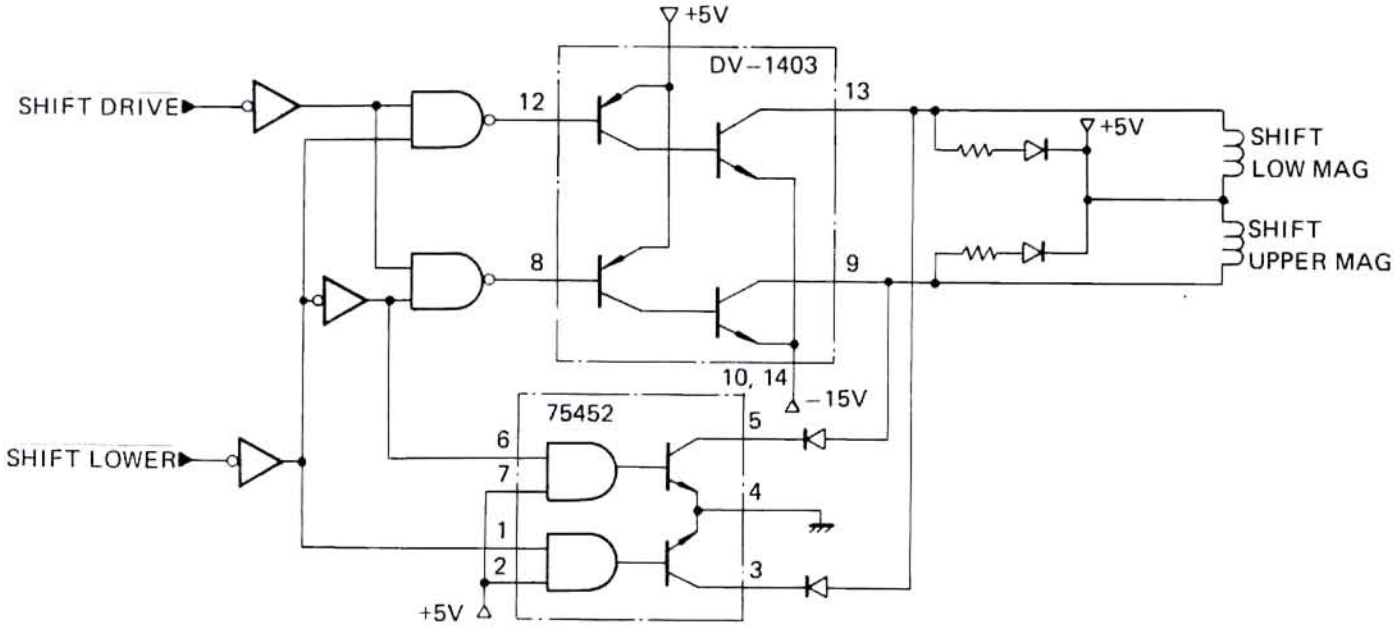
Magnets are used for ribbon feed (rotary magnet), print wheel shift, and hammer.

(1) Ribbon feed drive




A rotary magnet is used for ribbon feed drive. The magnet is driven by current fed from a transistor in the DV-1403 by means of the $\overline{\text{RIBBON FEED}}$ signal.

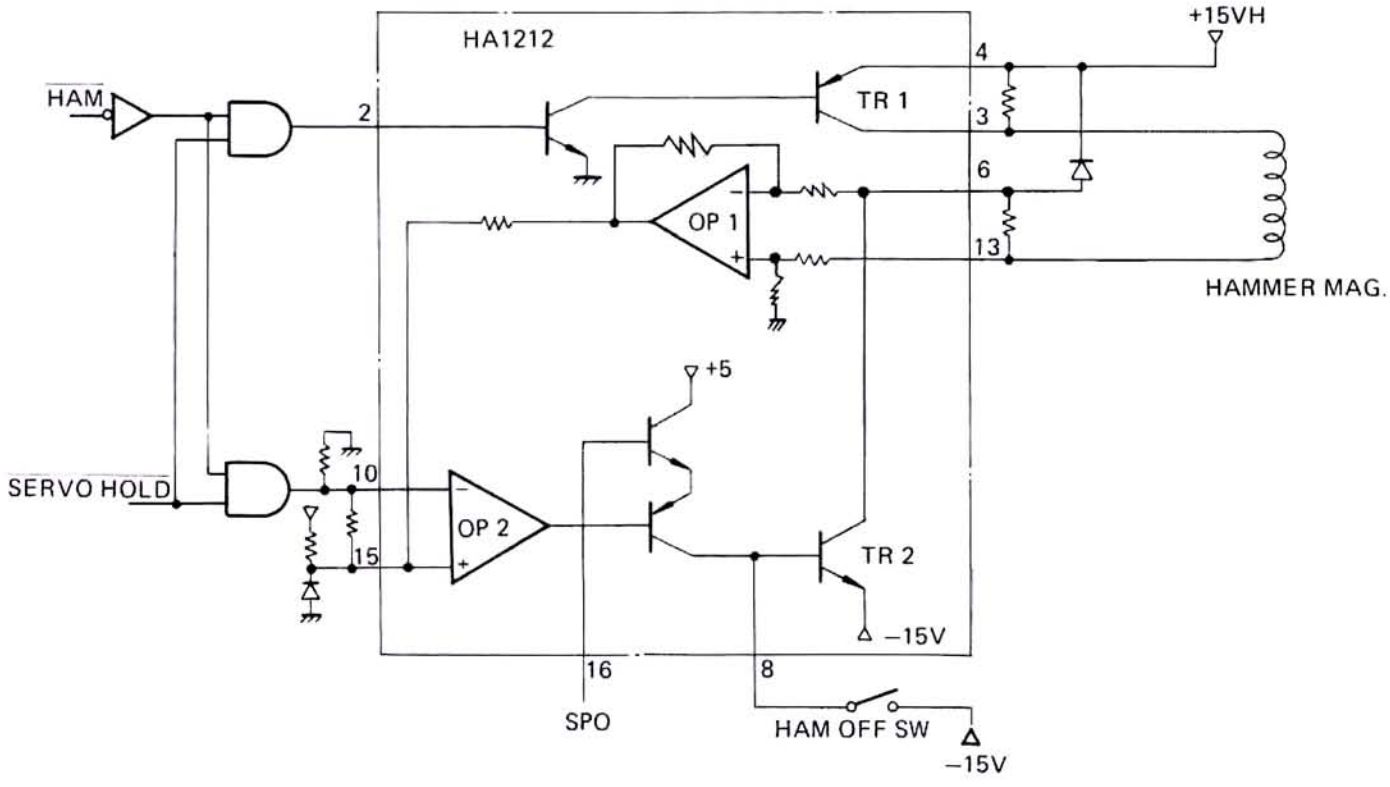
(2) Print wheel shift drive




Two shift magnets (upper and lower) are used for upward and downward shift of the print wheel.

High power drive current is fed (30V drive) to the magnet by $\overline{\text{SHIFT DRIVE}}$. The shift arm is then held by a holding current fed by the $\overline{\text{SHIFT LOWER}}$ signal.

(3) Hammer drive




$\overline{\text{HAM}}$ causes transistor TR1 to be turned on for the drive time selected by the microprocessor. Transistor TR2 is also turned ON by $\overline{\text{HAM}}$ input to comparator OP2, then current is fed to the hammer magnet.

The voltage of the hammer current is detected by operational amplifier OP1, the hammer current during hammer drive is compared with the reference voltage of OP2 by means of the feedback signal of OP2. TR2 controls the hammer current.

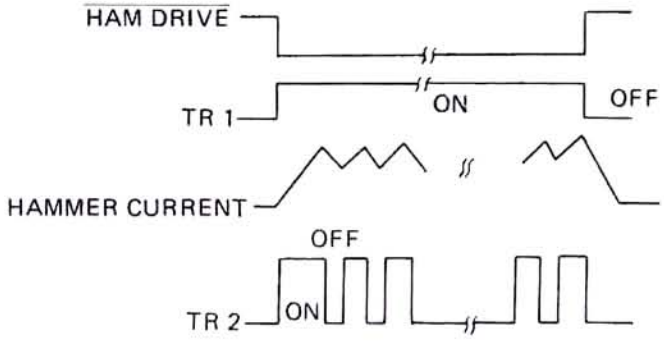
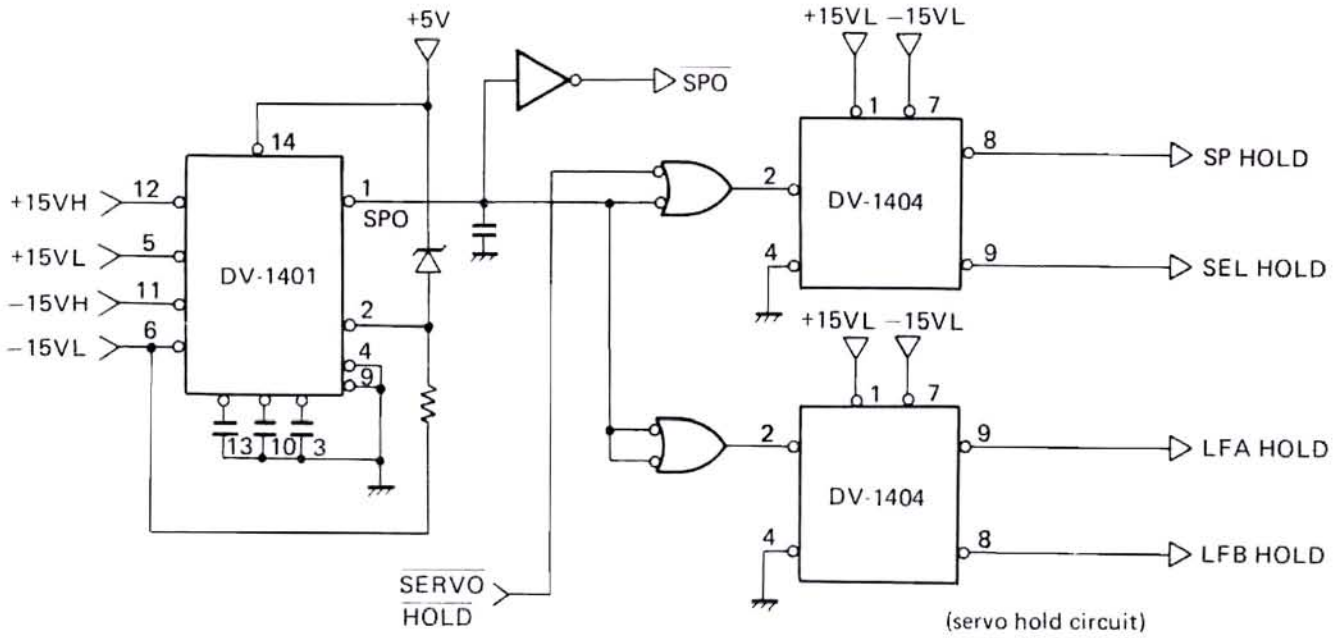



**Figure 3-30. Hammer Magnet Circuit Waveforms**

## 5-4. Voltage Monitor and Servo Hold




(Voltage monitor circuit)

(servo hold circuit)

(1) Voltage monitor circuit

SPO becames "HIGH" when each voltage rises to the specified level. SPO stands for System Power On. This signal indicates whether power is supplied to the printer or not. (Indication is made by lighting of an LED on the control board.)

After Power On, the voltage which rose the latest among +15V, −15V and +5V is detected and the output is changed to SPO (HIGH).

When the voltage of any system goes beyond the specified range in the Power On state, the SPO output is changed to "LOW" level. (See Section 6, Major Integrated Circuits, for information on the DV-1401.)

(2) Servo hold circuit

When the input of 74LS26 becames "LOW", the level on the output side becames "HIGH". (SP HOLD, SEL HOLD and LF HOLD are drawn in.)

When $\overline{\text{CHECK}}$ becomes "LOW" (detected as an abnormality to the printer), excitation of the space and selection motors and of the hammer is discontinued.

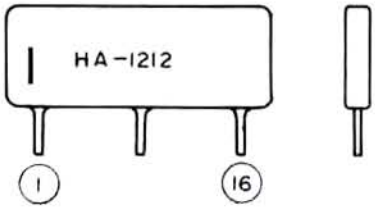
At the time of power ON, the space, selection and line feed motors and the hammer are not excited until the logic system is stabilized.

(See Section 6 for information regarding the DV-1404.)

## 6. MAJOR INTEGRATED CIRCUITS

The majority of integrated circuits (IC's) used in the printer are of general-purpose. The Large Scale Integration Chips (LSIs) for the analog circuits are described in this section.

### 6-1. HA1212 (HAMMER DRIVE)



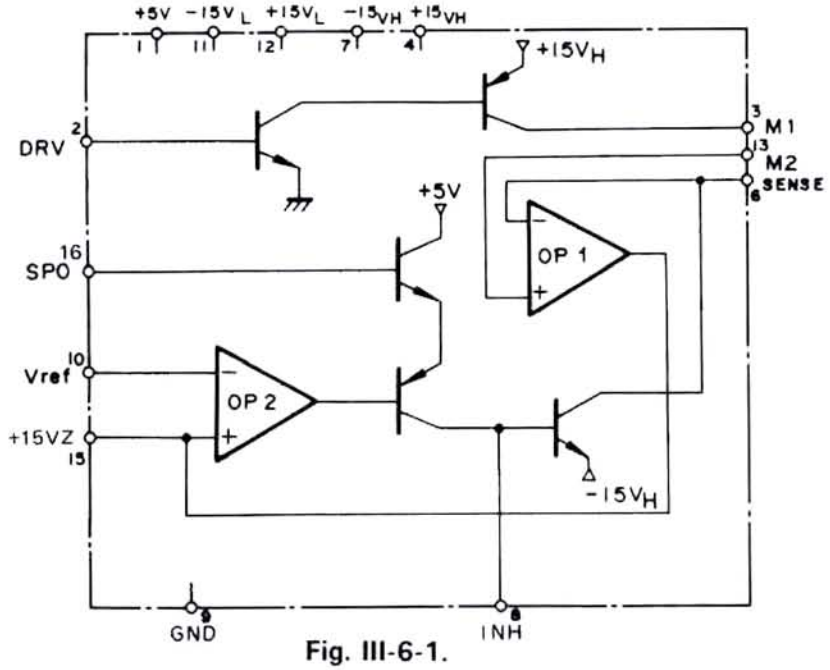
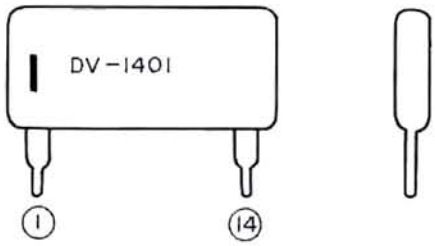
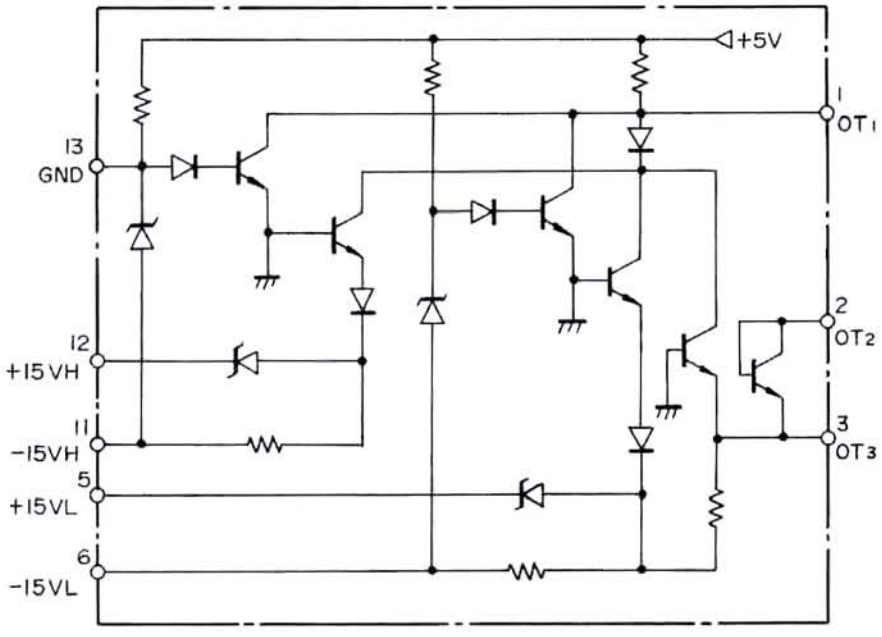




Fig. III-6-1.

| Pin No. | Signal Name | Description |
|---|---|---|
| 1 | +5V | |
| 2 | DRV | Magnet drive signal |
| 3 | M1 | Magnet drive (+) |
| 4 | +15VH | |
| 5 | NC | |
| 6 | SENSE | Magnet drive (−) |
| 7 | −15VH | |
| 8 | INH | Magnet hold signal |
| 9 | GND | |
| 10 | Vref | |
| 11 | −15VL | |
| 12 | +15VL | |
| 13 | M2 | Magnet drive (feedback) |
| 14 | NC | |
| 15 | +15VZ | Reference voltage |
| 16 | SPO | System power ON |

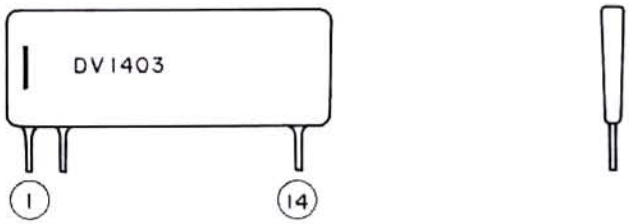
## 6-2. DV-1401 (POWER MONITOR)

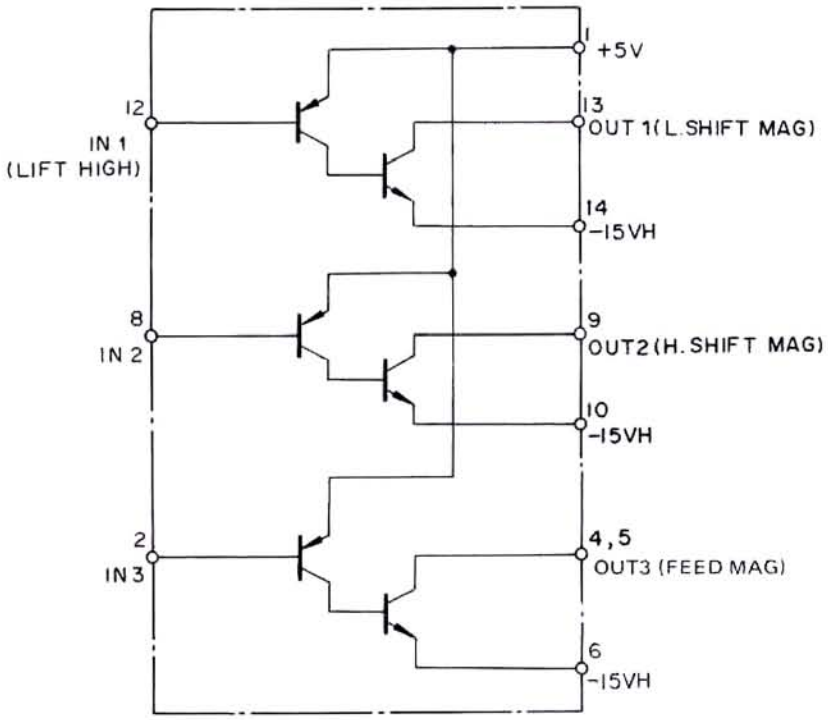



| Pin No. | Signal Name | Description |
|---|---|---|
| 1 | $OT_1$ | Output Terminal 1 |
| 2 | $OT_2$ | Output Terminal 2 |
| 3 | $OT_3$ | Output Terminal 3 |
| 4 | GND | |
| 5 | +15VL | +15 Volt Sensing Input |
| 6 | −15VL | −15 Volt Sensing Input |
| 7 | NC | Not Connected |
| 8 | NC | Not Connected |
| 9 | GND | |
| 10 | GND | |
| 11 | −15VH | −15 Volt Sensing Input |
| 12 | +15VH | +15 Volt Sensing Input |
| 13 | GND | |
| 14 | +5V | Supply Voltage |

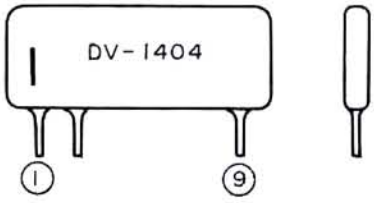
## 6-3. DV1403 (MAGNET DRIVER)

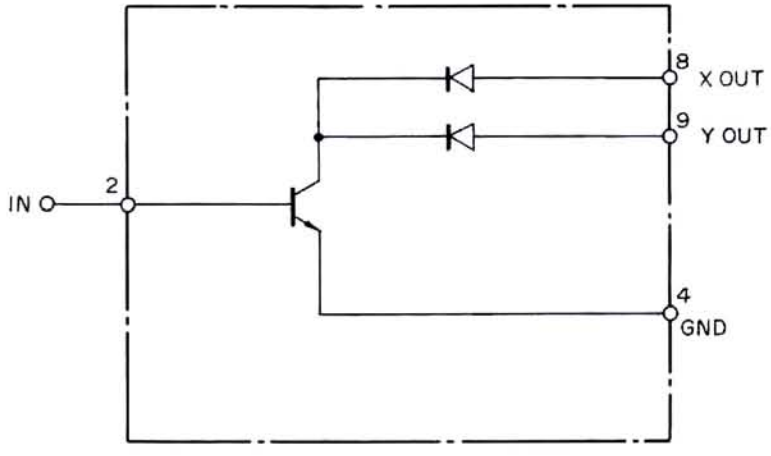



| Pin No. | Signal Name | Description |
|---|---|---|
| 1 | +5V | |
| 2 | $IN_3$ | Input Terminal 3 |
| 3 | NC | Not Connected |
| 4 | $OT_3$ | Output Terminal 3 (FEED MAG) |
| 5 | $OT_3$ | Output Terminal 3 (FEED MAG) |
| 6 | −15VL | |
| 7 | NC | Not Used |
| 8 | $IN_2$ | Input Terminal 2 |
| 9 | $OT_2$ | Output Terminal 2 (H.SHIFT MAG) |
| 10 | −15VH | |
| 11 | NC | Not Used |
| 12 | $IN_1$ | Input Terminal 1 |
| 13 | $OT_1$ | Output Terminal 1 (L.SHIFT MAG) |
| 14 | −15VH | |

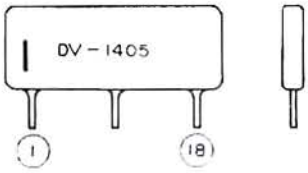
## 6-4. DV1404 (SERVO HOLD)

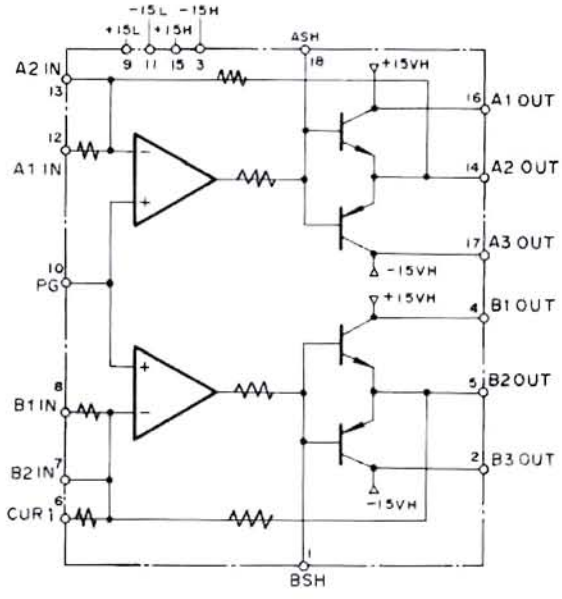



| Pin No. | Signal Name | Description |
|---|---|---|
| 1 | +15VL | |
| 2 | IN | Input Terminal 1 |
| 3 | N·C | Not Connected |
| 4 | GND | |
| 5 | N·C | Not Connected |
| 6 | N·C | Not Connected |
| 7 | −15VL | |
| 8 | X OUT | X-Signal Output Terminal |
| 9 | Y OUT | Y-Signal Output Terminal |

## 6-5. DV-1405 (LF DRIVE)




| Pin No. | Signal Name | Description |
|---|---|---|
| 1 | BSH | LF MT-B servo hold |
| 2 | B3 OUT | LF MT-B drive pulse signal (backward) |
| 3 | −15VH | |
| 4 | B1 OUT | LF MT-B drive pulse signal (forward) |
| 5 | B2 OUT | |
| 6 | CUR 1 | |
| 7 | B2 IN | LF MT-B feedback signal |
| 8 | B1 IN | LF$\phi$B pulse signal |
| 9 | +15VL | |
| 10 | PG | |
| 11 | −15VL | |
| 12 | A1 IN | LF$\phi$A pulse signal |
| 13 | A2 IN | LF MT-A feedback signal |
| 14 | A2 OUT | |
| 15 | +15VH | |
| 16 | A1 OUT | LF MT-A drive pulse signal (forward) |
| 17 | A3 OUT | LF MT-A drive pulse signal (backward) |
| 18 | ASH | LF MT-A servo hold |

# IV. POWER SUPPLY UNIT

## 1. GENERAL DESCRIPTION OF THE PRODUCT

### 1-1. General Description

This power supply unit is a compact and light-weight DC stabilizing power supply which uses a switching system to drive the DAISY WHEEL PRINTER-410.

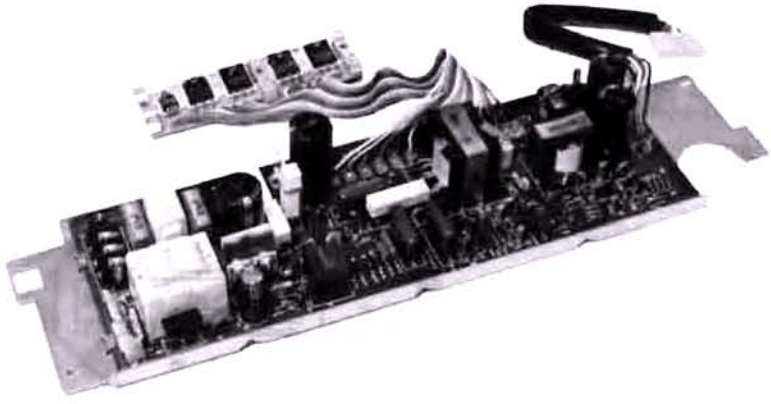
Main features:

(1) Allows switching between 100 volt and 200 volt systems via jumper connector.

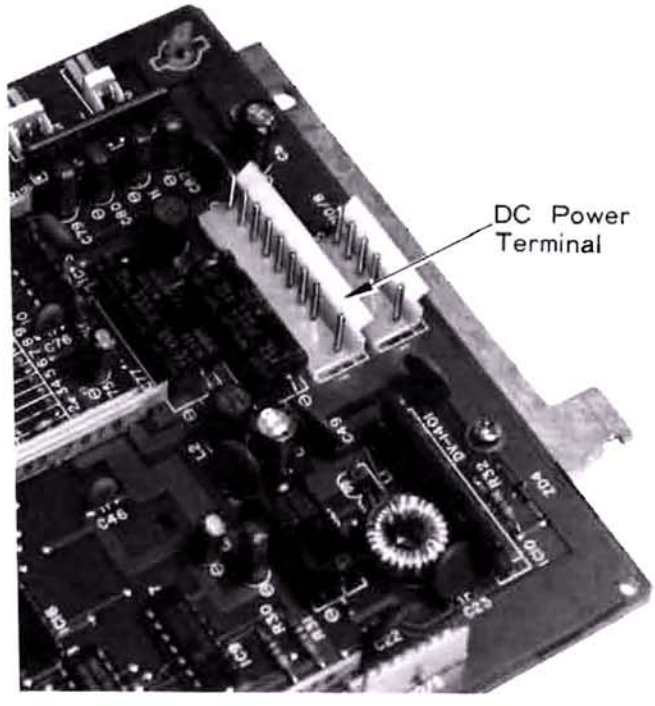
(2) Three regulated output voltages: +5V, +15V, −15V.

## 2. EXTERNAL APPEARANCE

### 2-1. Dimensions and External Appearance of Universal Power Supply Unit



### 2-2. External Appearance of Control Board Assembly



## 3. METHOD OF SWITCHING OF EXTERNAL POWER SUPPLY

The external power supply power input can be switched between a 100 volt system and a 200 volt system by moving the jumper plug on the PC Board. To use the 100 volt system, place the jumper plug on the 100V terminals (marked by a in Figure 4-1). No jumper plug should be on the 200V terminals. For the 200 volt system, place the jumper plug on the 200V terminals (marked by a in Figure 4-1). No jumper plug should be on the 100V terminals.

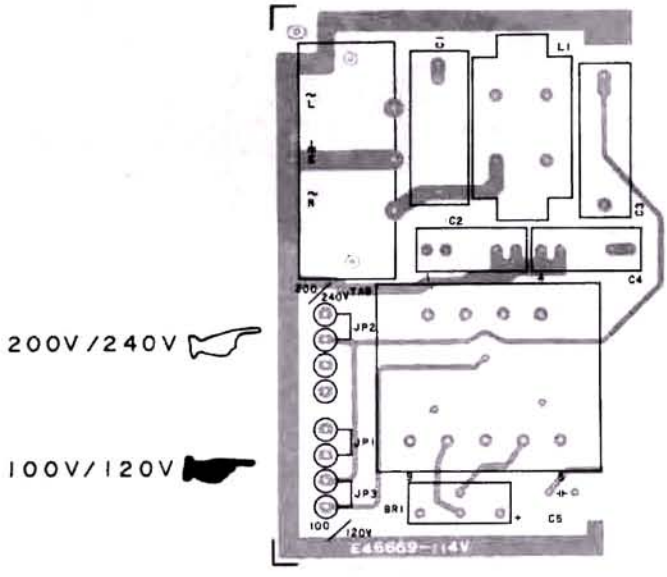



**Figure 4-1. 100V/200V System Connections**

## 4. OUTPUT VOLTAGE

### 4-1. Output Voltage Rating

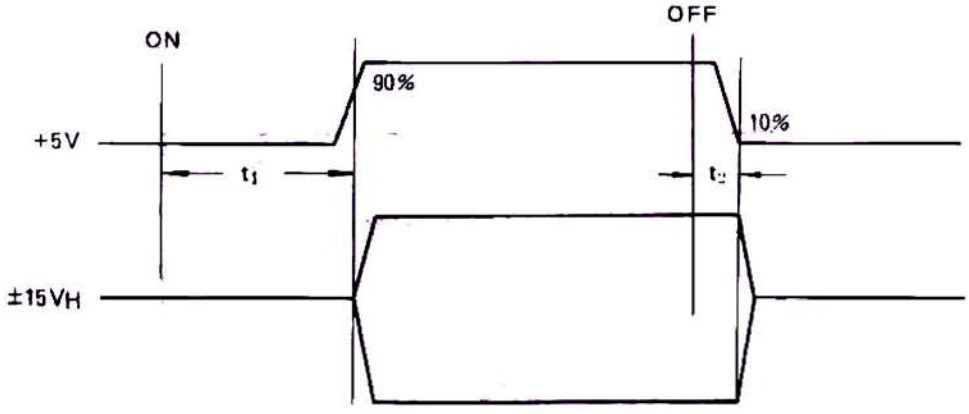
| Power supply | +5V | +15V | −15V |
|---|---|---|---|
| Application | Logic | Mechanism drive | Mechanism drive |
| Output voltage | +5V ±5% DC | +15V ±10% DC | −15V ±10% DC |
| Output | Continuous rating 3.3A or less | Continuous rating 3.5A or less | Continuous rating 3.5A or less |
| Range of load variation | 0.8 ~ 3.3A | 0.2 ~ 3.5A 30% at duty cycle 18 ms | 0.1 ~ 3.5A 30% at duty cycle 18 ms |
| Ripple voltage | 50mVp-p | – | – |
| Noise voltage | 100mVp-p | 300mVp-p | 300mVp-p |

Note 1: The above values are applicable to the case where an adjustment has been to 5.05 ±0.05 volts under maximum load (within rated load).

### 4-2. Output Terminal List

| | | |
|---|---|---|
| Pin No. | 1 | GND |
| | 2 | +5V |
| | 3 | +5V |
| | 4 | GND |
| | 5 | −15V |
| | 6 | −15V |
| | 7 | GND |
| | 8 | +15V |
| | 9 | +15V |

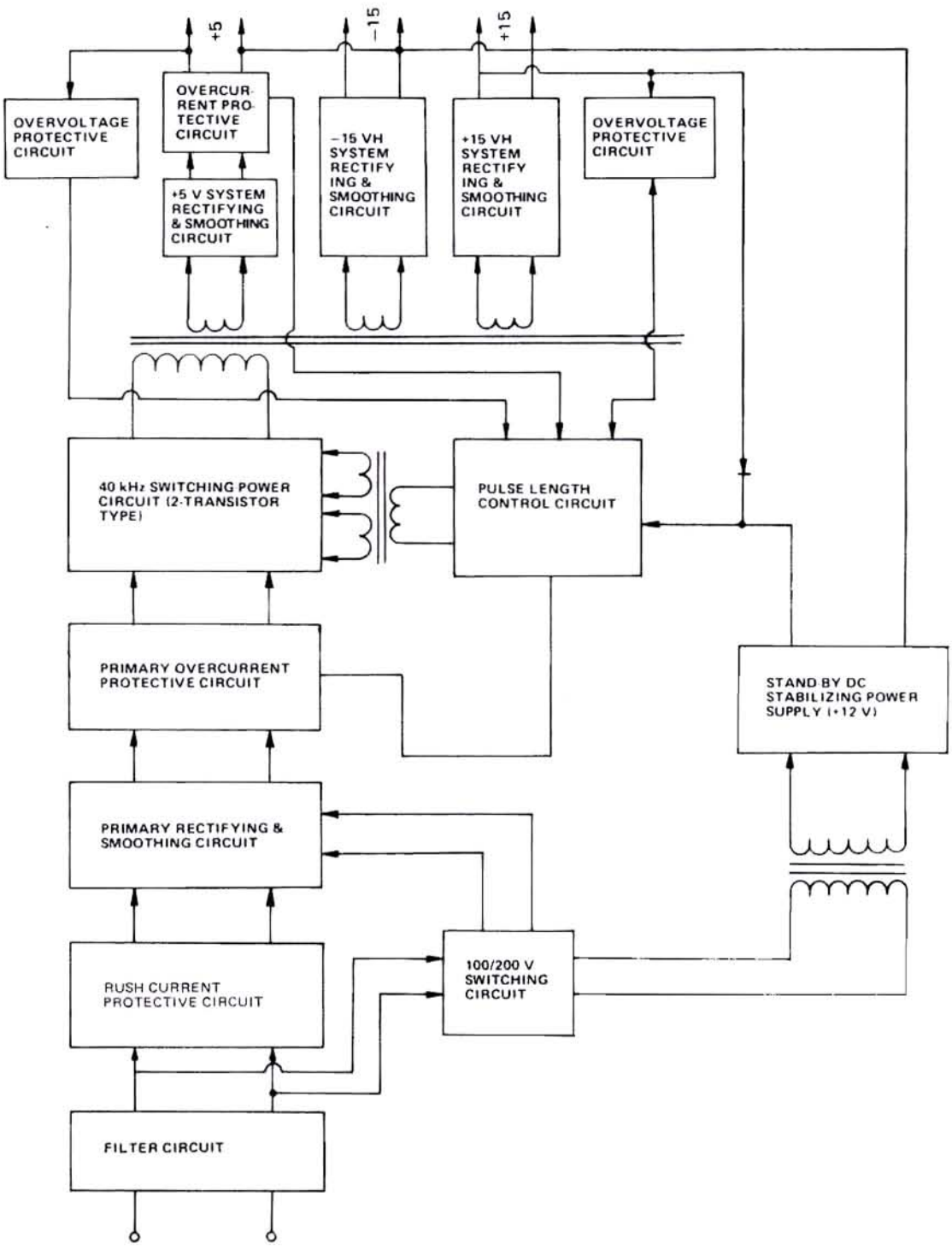
## 4-3. Output DC Power Sequence




0 < t1 < 500 m-sec
0 < t2 < 500 m-sec

# 5. DESCRIPTION OF CIRCUIT OPERATION

## 5-1. Block Diagram



## 5-2. Filter Circuit

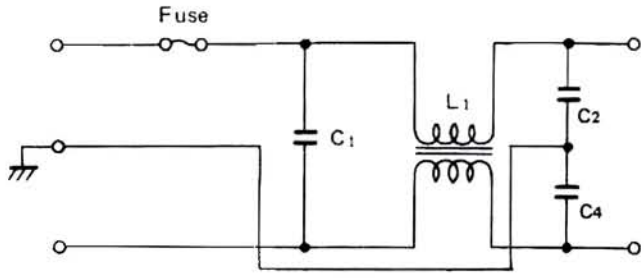



**Figure 4-2. Filter Circuit**

The common mode noise and normal mode noise that inflow/outflow from/to the AC line are reduced by filters L and C.

## 5-3. Rush Current Protective Circuit

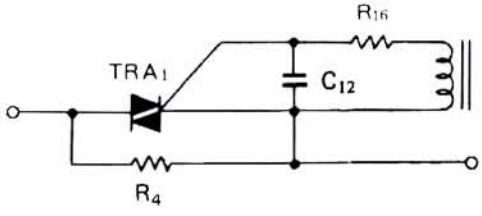
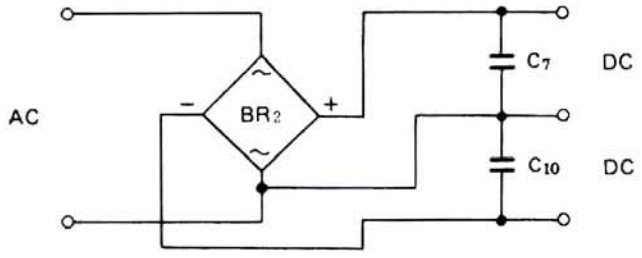


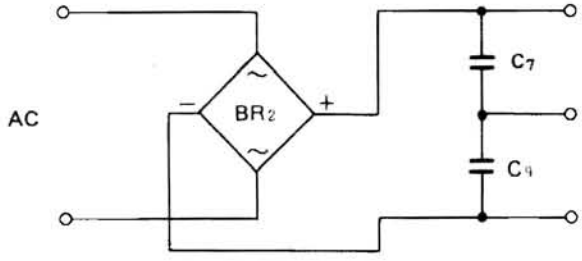

Figure 4-3. Rush Current Protective Circuit

The rush current generated at the time of Power On is controlled to 20 Amps (standard value) or less by $R_4$. Switching operation begins with a signal from the pulse length control circuit. Triac $TRA_1$ is turned by the induced voltage from the transformer, and current flows through $TRA_1$ during operation in steady state.

## 5-4. Primary Side Rectifying and smoothing Circuit




100 V system




200 V system

**Figure 4-4. Rectifying and Smoothing Circuit (Primary)**

Rectification is made by bridge $BR_2$ and smoothing is made by $C_7$ and $C_{10}$. Double voltage rectification is made when 100V is selected by 100V/200V switching circuit.

## 5-5. Primary Side Overcurrent Protective Circuit

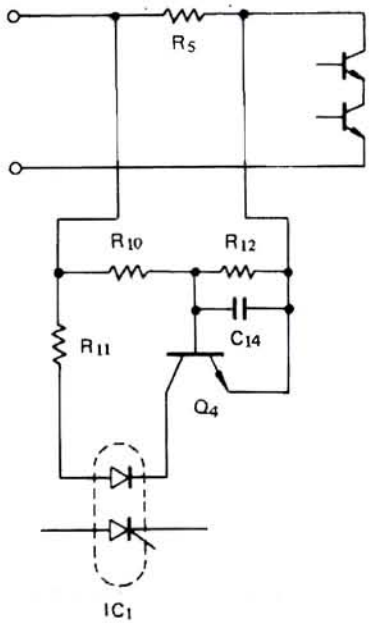



**Figure 4-5. Overcurrent Protective Circuit**

Oscillation of the control circuit is stopped when $Q_4$ is turned and $IC_1$ turned with potential difference between both ends of $R_5$ detected.

## 5-6. 40 kHz Switching Power Circuit (2-transistor type; half-bridge system)

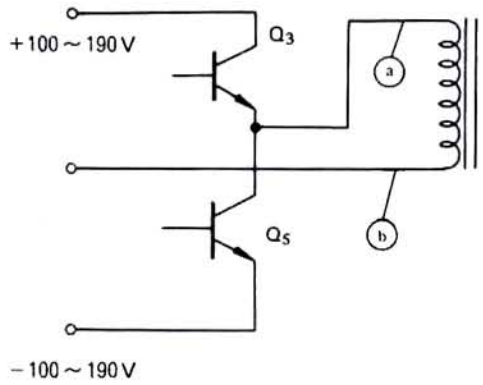



**Figure 4-6. Switching Power Circuit**

DC voltages of two systems, i.e., + and −, are converted into 40 kHz switching signals by means of $Q_3$ and $Q_5$.

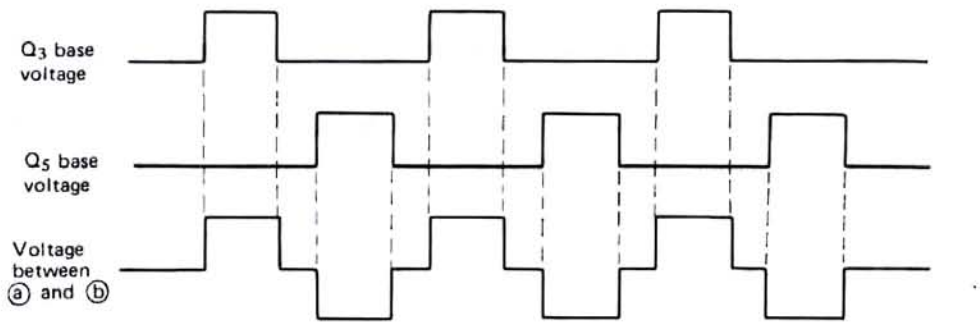



**Figure 4-7. Switching Operation**

## 5-7. Secondary Side Rectifying and Smoothing Circuit (+5V, ±15V)

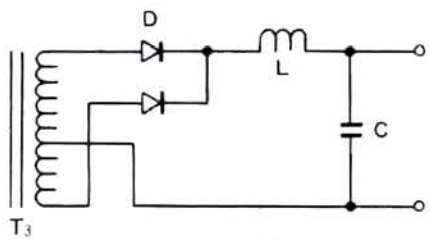



**Figure 4-8. Rectifying and Smoothing Circuit (Secondary)**

The high frequency voltage generated by the switching circuit is stepped down by $T_3$, rectified by two diodes and is then smoothed by L and C.

## 5-8. Overvoltage Protective Circuit (+5V system, +15V system)

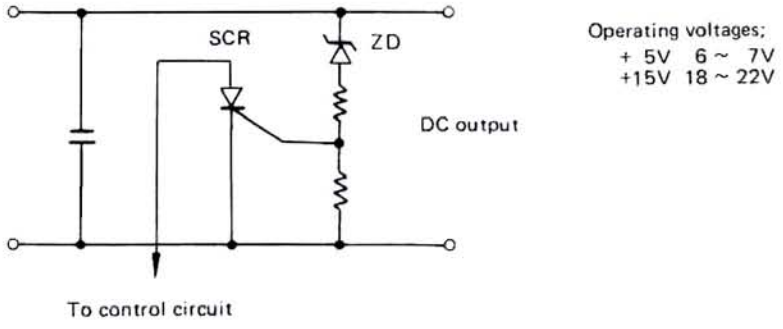



**Figure 4-9. Overvoltage Protective Circuit**

Generation of overvoltage in the DC output is prevented by this overvoltage protective circuit. If the DC output exceeds the standard value, a voltage is generated at the gate of the SCR causing the rectifier to turn on and send an oscillation stop signal to the control circuitry.

## 5-9. Overcurrent Protective Circuit (+5V)

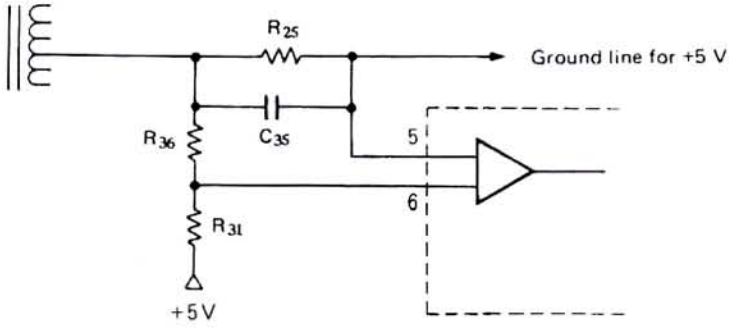
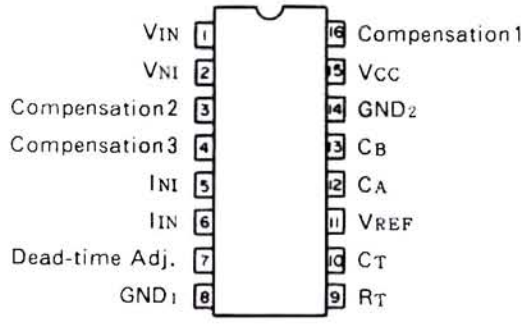



**Figure 4-10. Overcurrent Protective Circuit**

When an overcurrent is produced due to shorting of the output in the +5V system, is detected by $R_{25}$. The operation point of this circuit is determined by $R_{36}$ and $R_{31}$.

## 5-10. Pulse Length Control Circuit

The switching pulse length is controlled by the switching regulator control chip $IC_2$ ($\mu$PC1042C). The pin arrangement and a block diagram of this IC are shown in Figures 4-11 and 4-12.




Pin arrangement
(Top View)

**Figure 4-11. $\mu$PC1042C Pin Arrangement (Top View)**

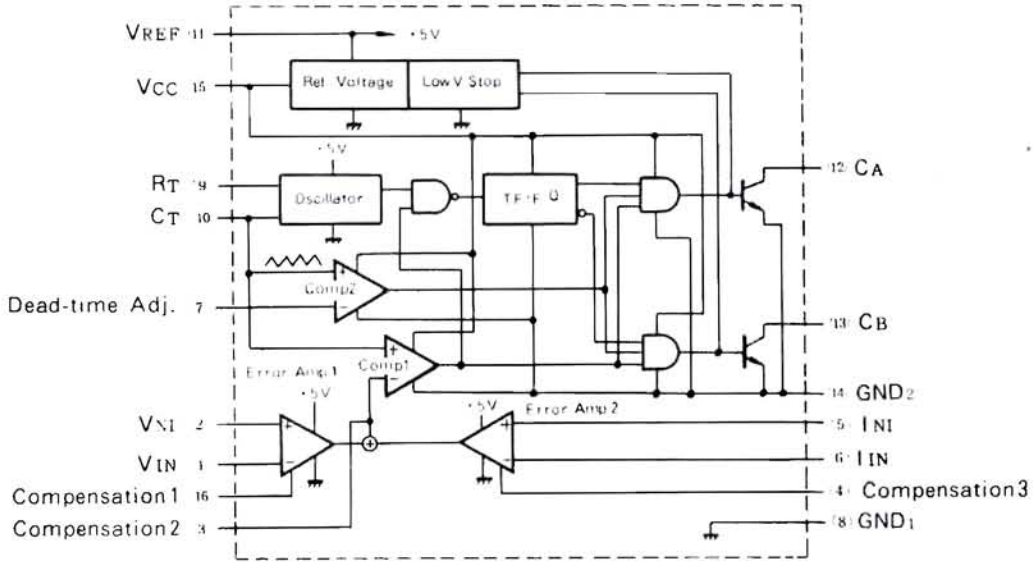



**Figure 4-12. $\mu$PC1042C Block Diagram**

The output voltage of the +5V system enters $IC_2$ via pin 1, 2 and controls on-duty lengths of pin 13 and pin 12.

Pin 7 specifies the dead time, and its voltage is usually around 1.8V. Although Pin 7's voltage is +5V immediately after start, it gradually approaches 1.8V by means of $R_{32}$ and $C_{33}$.

A slow start is made possible by this provision.

## 5-11. Stand-by DC Stabilizing Power Supply

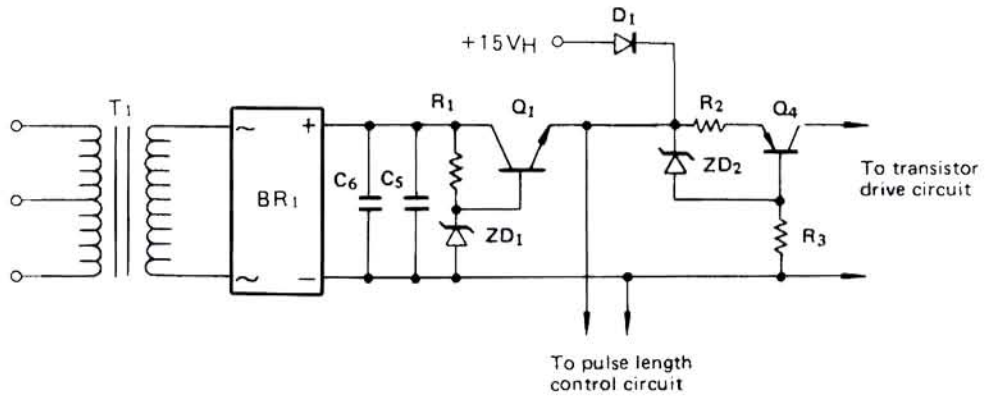



**Figure 4-13. DC Stabilizing Power Supply**

The voltage stepped down by $T_1$ is rectified and smoothed by $BR_1$ and $C_6$. The voltage then becomes stabilized by means of $Q_1$ and is supplied to the pulse length control circuit.
The voltage is supplied to the transistor drive circuit through this circuit at the time of power on. The voltage of $+15V_H$ system is supplied to the transistor drive circuit through $D_1$ during operation in steady state.

## 6. CIRCUIT DIAGRAM

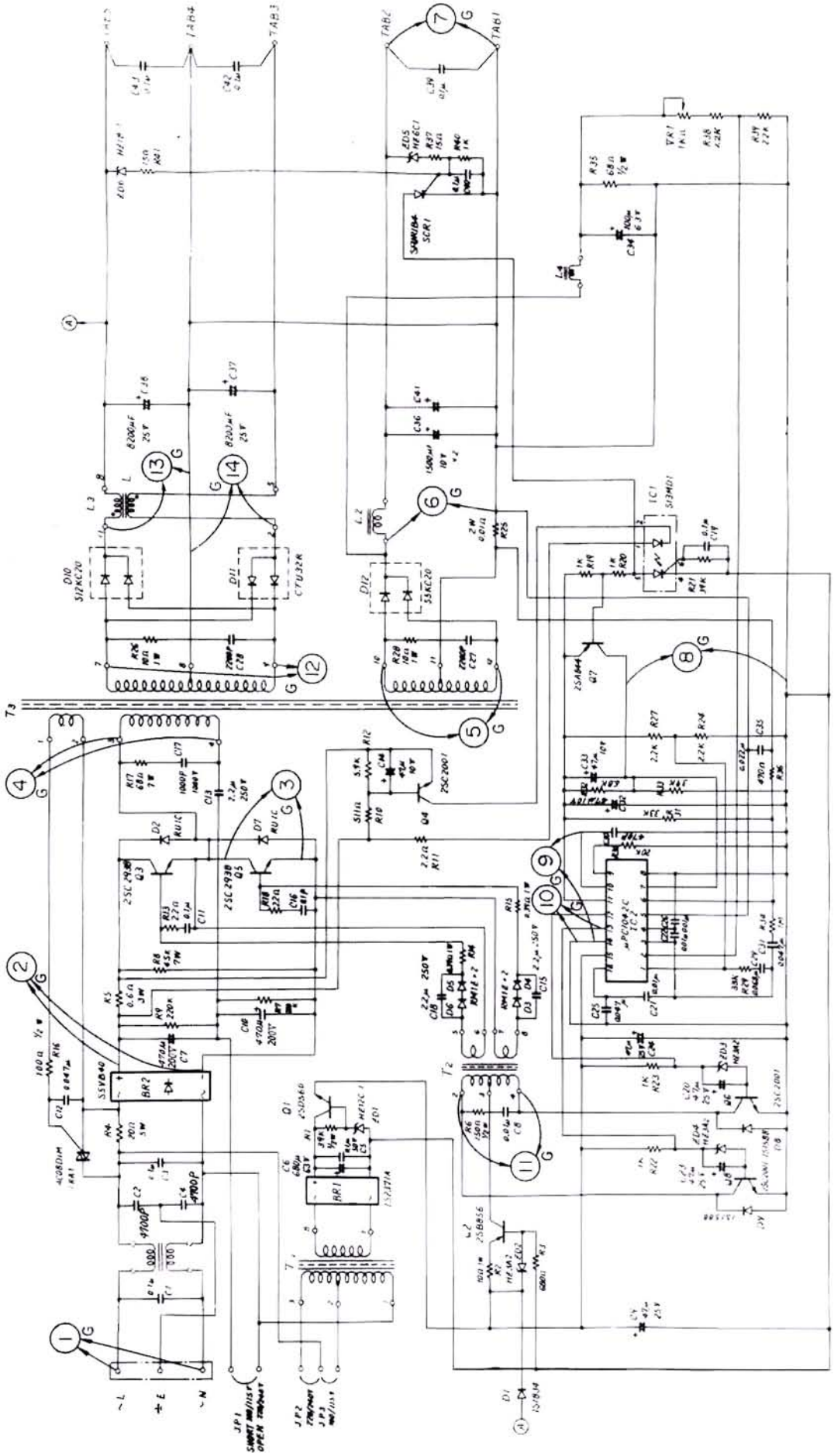
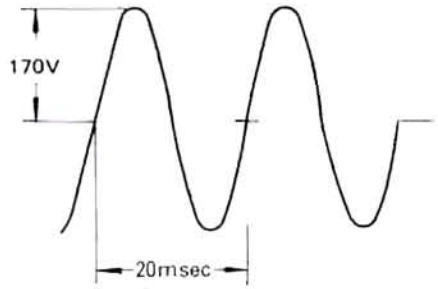


Figure 4-14. Power Supply Schematic Diagram

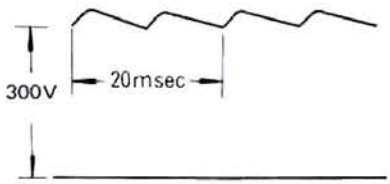
## 7. WAVEFORMS AT VARIOUS POINTS OF THE CIRCUIT DIAGRAM (with input of 120V AC, 50Hz, with rated load)

Figures in circles represent measuring points marked in the circuit diagram.

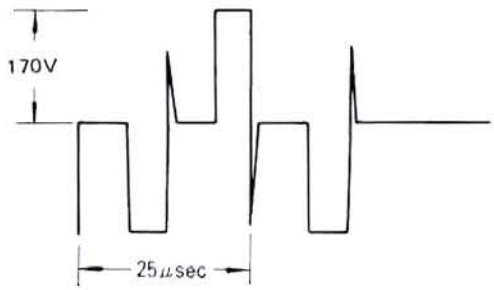
① AC input waveform



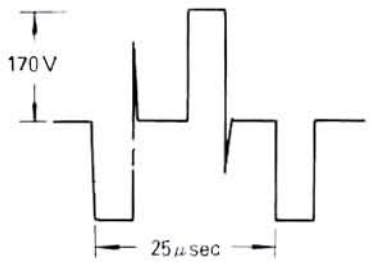

② Waveform after rectification by $BR_2$



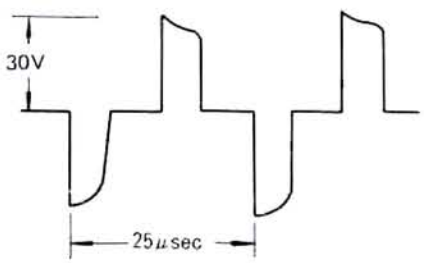

③ Between collector and emitter of primary switching transistor $Q_5$



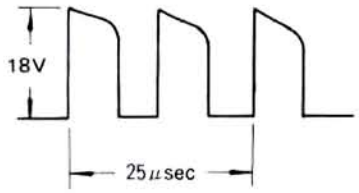

④ Between pin 3 and pin 4 of high frequency transformer $T_3$



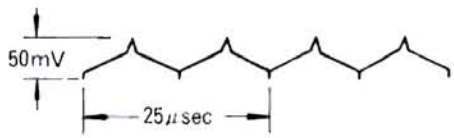

⑤ Between pin 10 and pin 12 of high frequency transformer $T_3$



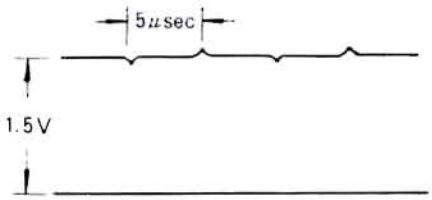

⑥ Rectified waveform of +5V system



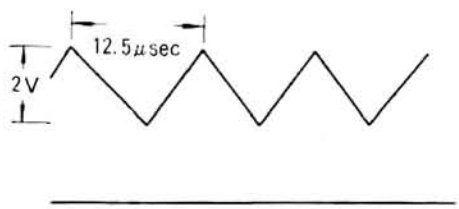

⑦ Output waveform of +5V system



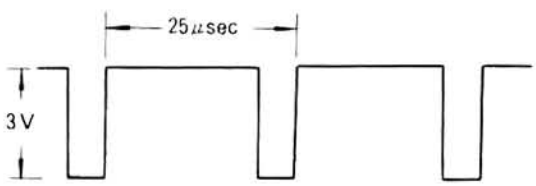

⑧ Waveform at pin 7 of $IC_2$



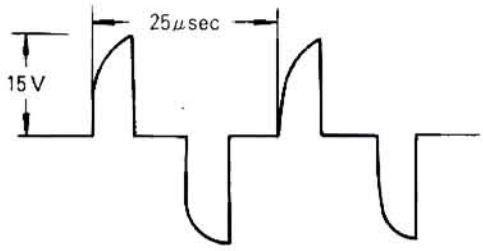

⑨ Waveform at pin 10 of $IC_2$



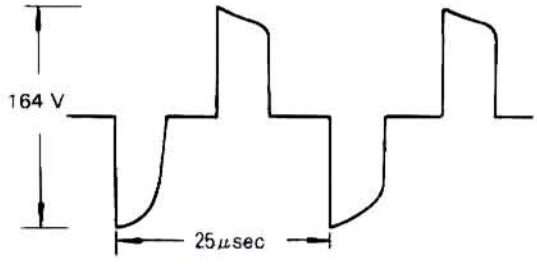

⑩ Wave form at pin 13 of $IC_2$



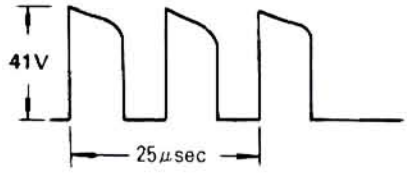
(11) Waveform between pin 2 and pin 4 of pulse transformer $T_2$



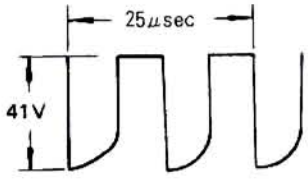

(12) Waveform between pin 7 and pin 9 of high frequency transformer $T_3$




(13) Rectified waveform of +15V system




(14) Rectified waveform of −15V system



# V. REPLACEMENT PROCEDURES

## 1. REPLACEMENT OF CARRIAGE ASSEMBLY

### 1-1. Removal of the Carriage

1) Remove the ribbon cartridge and the print wheel.
2) Remove the carriage cover.
3) Disconnect the 3 connectors on the carriage base.
   (Cut the tie wraps.)
4) Loosen carriage pivot fixing screws on both sides of the carriage and remove the pivots.
   (Use an Allen wrench M3.)
5) Remove the carriage.

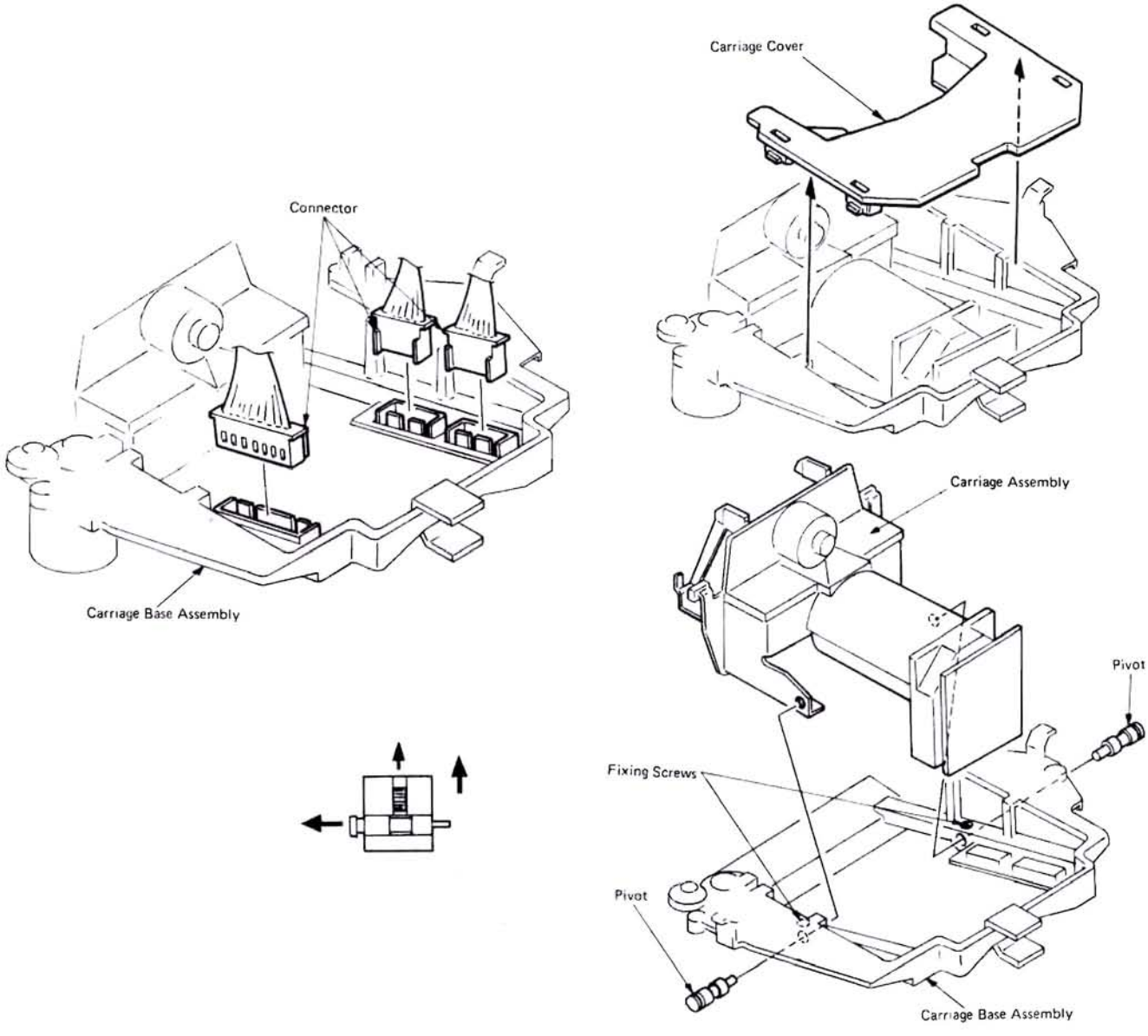



**Figure 5-1. Carriage Removal**

## 1-2. Mounting the Carriage

1) Place the carriage on the carriage base.
2) Insert the carriage pivots into their places, fix the carriage by hooks and tighten the locking screws.
3) Connect connectors on the carriage base. (Bind the cable with tie wraps.)
4) Mount the carriage cover.
5) Mount the ribbon cartridge and the print wheel.

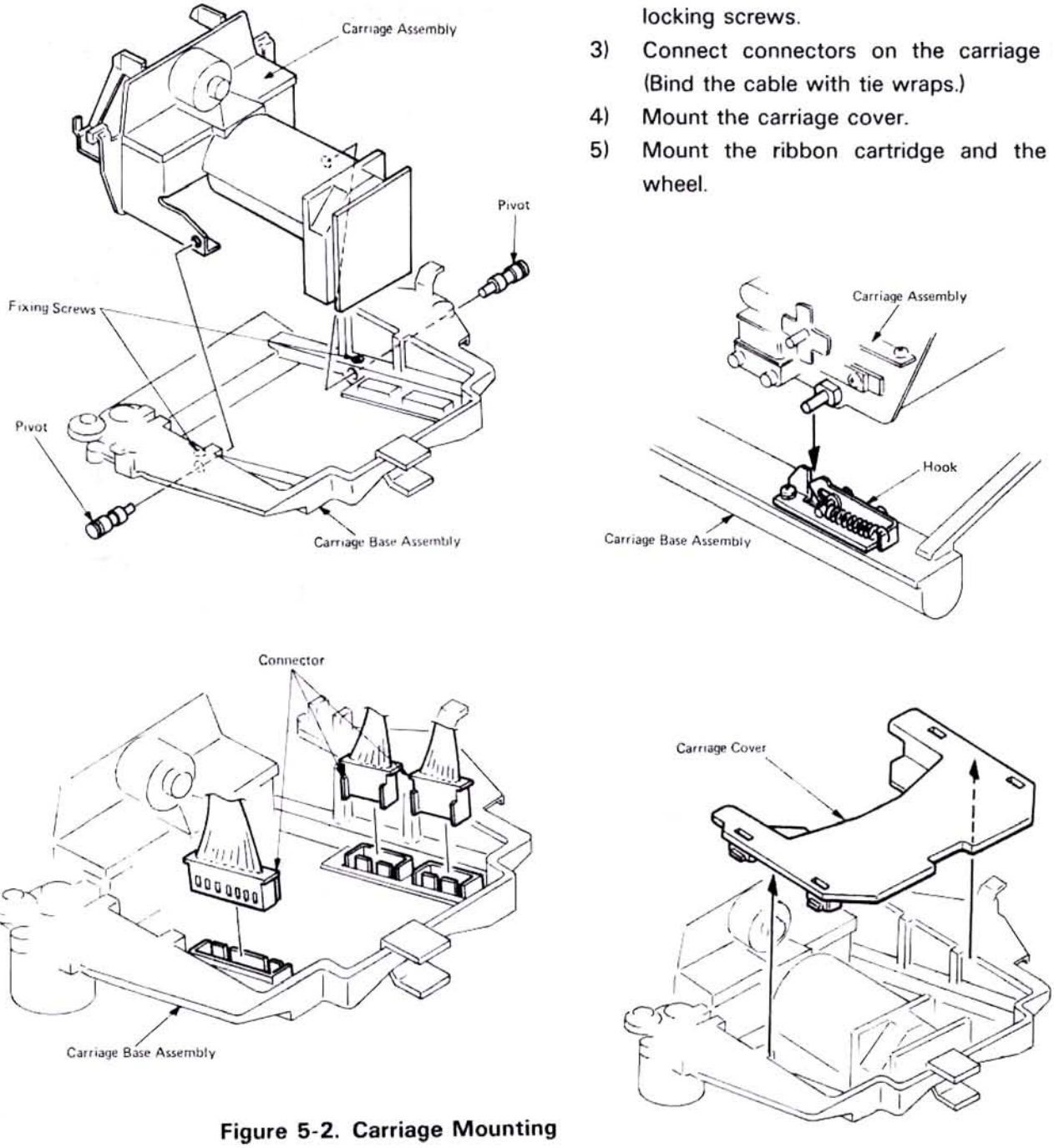


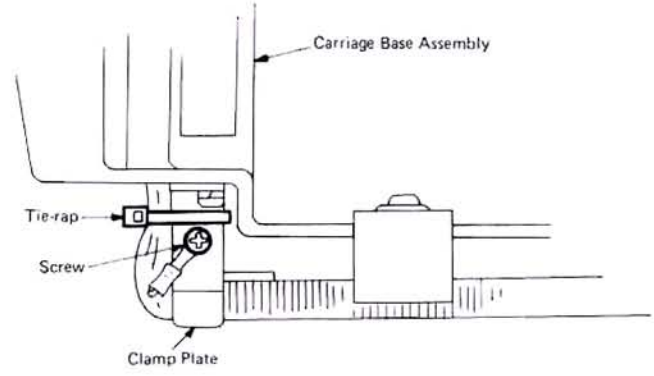

**Figure 5-2. Carriage Mounting**

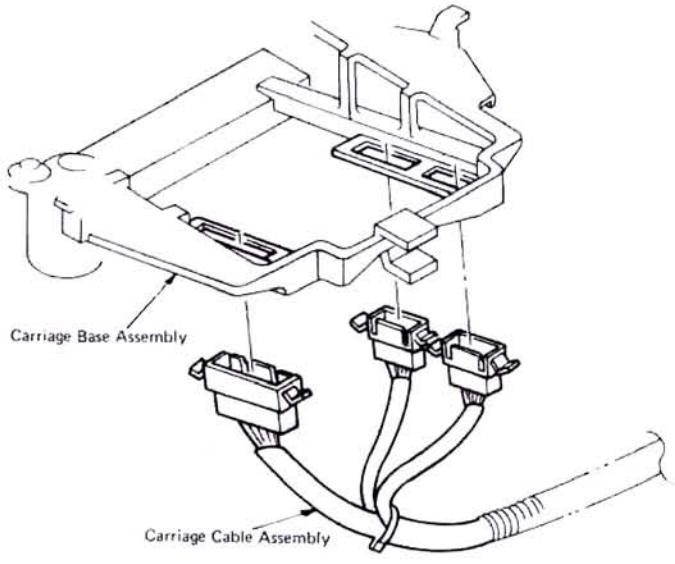
## 1-3. Checks after replacement

1) After completion of replacement of the carriage, adjust the vertical position of the carriage and the selection speed in accordance with the adjusting procedures in Section VI.
2) Perform printing test for final check.

## 2. REPLACEMENT OF CARRIAGE BASE

### 2-1. Removal of the carriage base




1) Remove the carriage in accordance with carriage removal procedures in paragraph 1-1.
2) Disconnect the carriage cable after removing the screw and cutting the tie-wrap.
3) Loosen the two screws on the fixing plate space shaft.
4) Slide and remove the space shaft from the frame, and remove the carriage base from the space shaft.
   (Do not lose the stoppers, felts, and shims for adjustment of vertical position of the carriage base.)

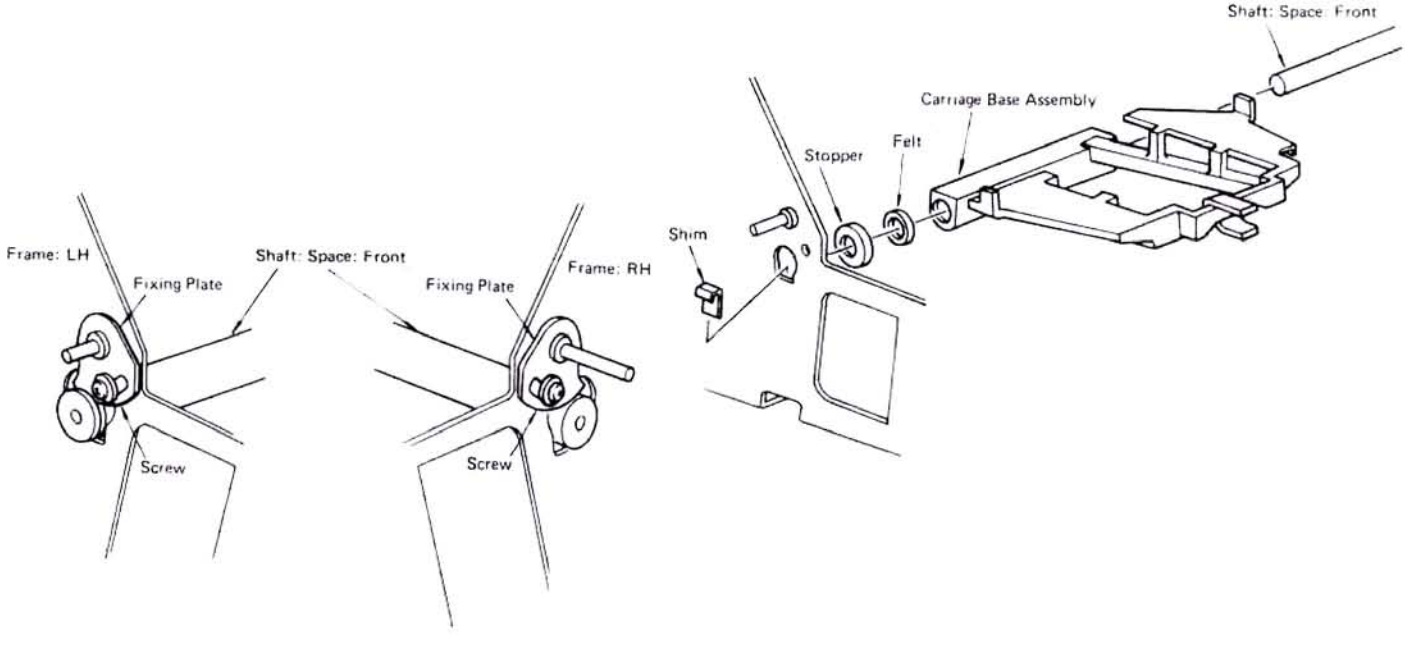



**Figure 5-3. Carriage Base Removal**

## 2-2. Mounting the carriage base

1) Insert the shaft into the frame.
2) Mount the stoppers, felts and shims for adjustment of vertical position of the carriage base. (RH and LH; 2pcs)
3) Fix the space shaft by means of the fixing plate.
4) Attach the carriage cable to the carriage base, fix it to the fixing plate and bind it with a tie wrap.
5) Mount the carriage in accordance with the carriage replacing procedures.

NOTE: After replacement of the carriage base, adjust the vertical position of the carriage base and the speed in accordance with the adjusting procedures in Section VI.

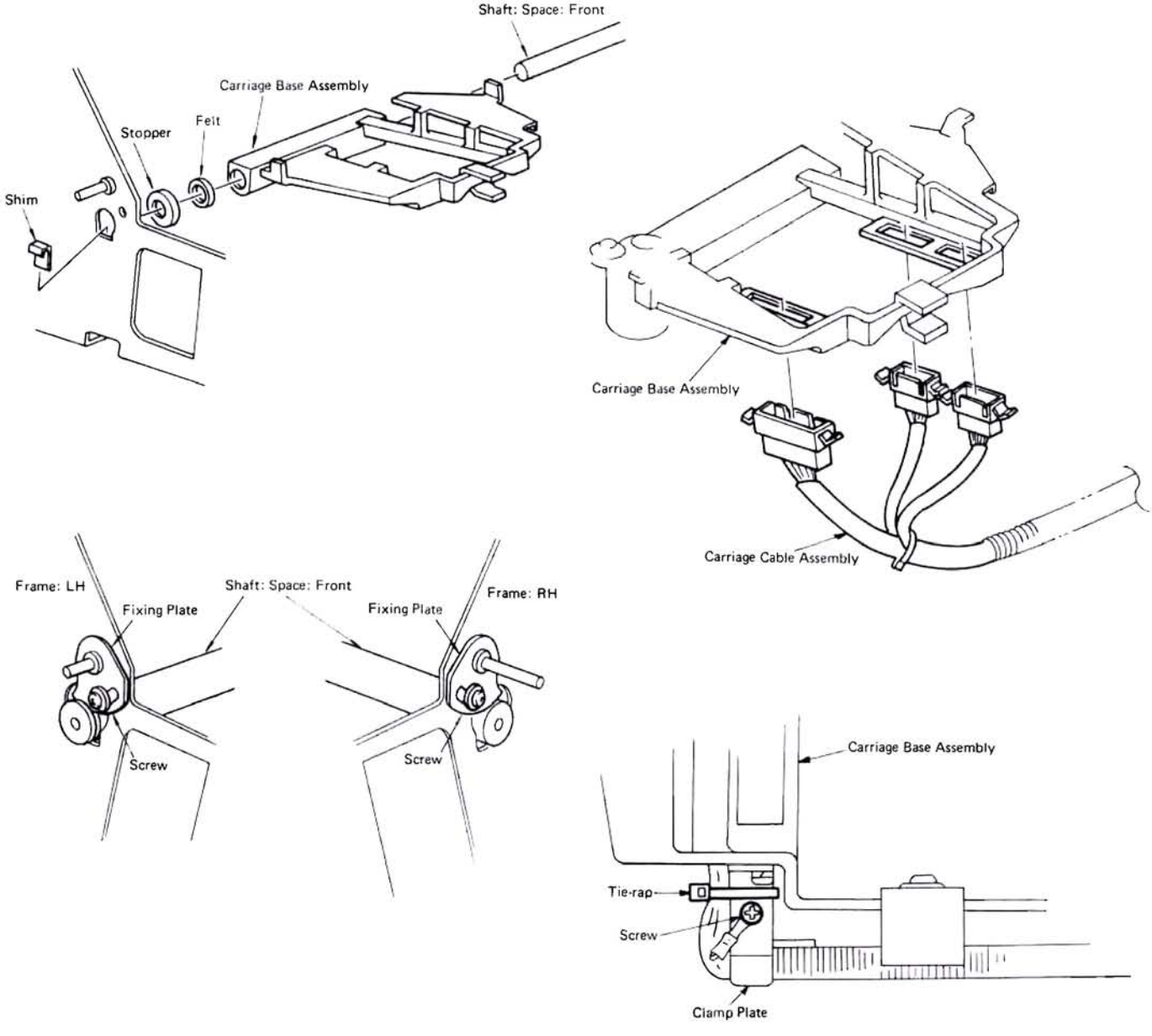



**Figure 5-4. Carriage Base Mounting**

## 3. REPLACEMENT OF THE SPACE WIRE

### 3-1. Removal of the space wire

1) Remove the carriage assembly in accordance with the carriage assembly replacement procedures.
2) Loosen the space wire lock screw (located under the carriage assembly).
3) Remove the space wire spring from the spring hook and loosen the cam.
4) Disconnect the space wire by pushing the pulley toward right side.

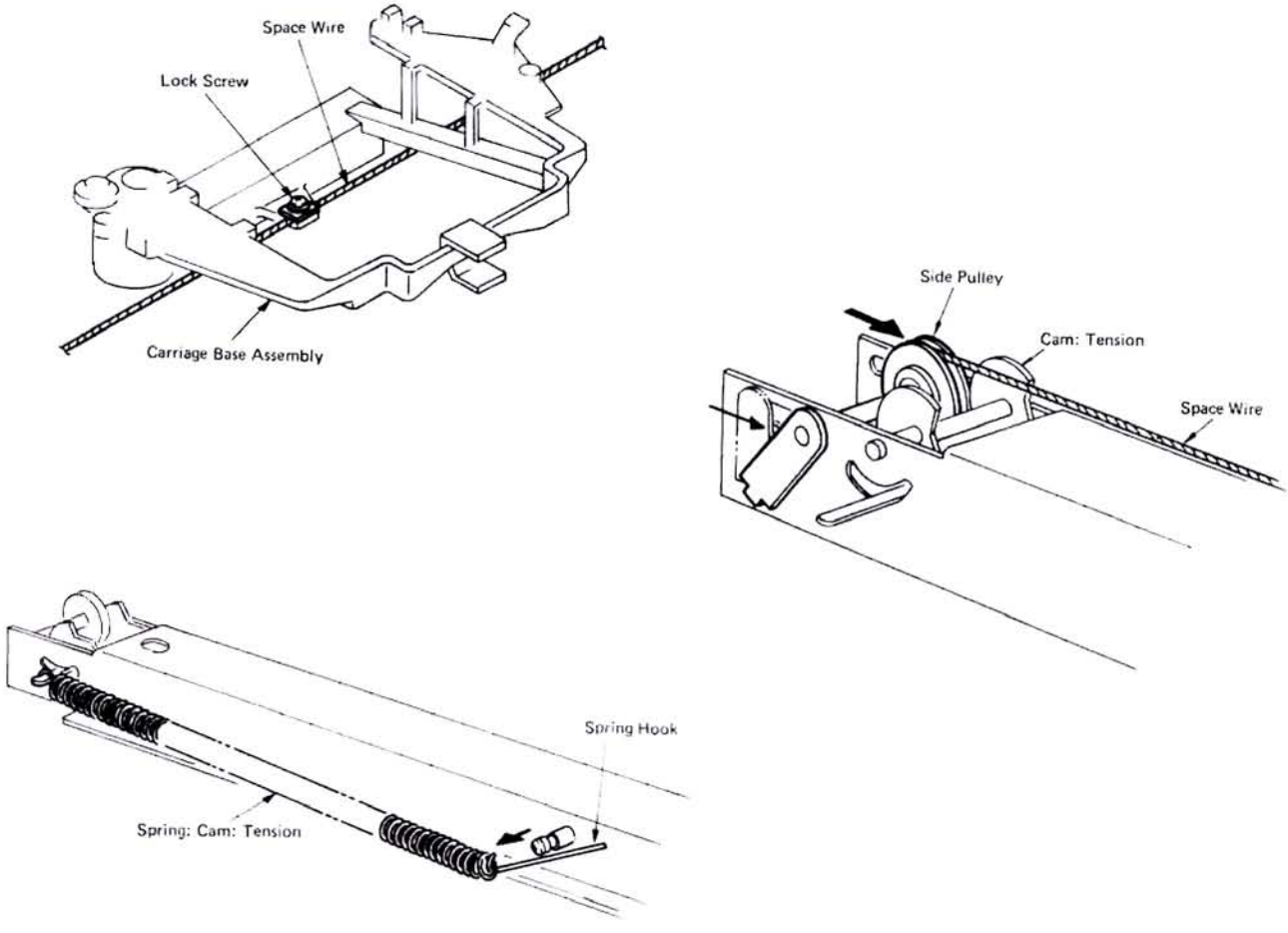



**Figure 5-5. Space Wire Removal**

### 3-2. Mounting of the space wire

1) Install the space wire through the lower side of the frame and wind it from the bottom side of the space motor pulley (counterclockwise).
2) After winding the wire five turns, hook it onto the pulley and attach one end of the wire to the front side of the pulley.
3) Rotate the space motor gear (clockwise) one turn.
4) Hook the space motor spring onto the cam.
5) Move the carriage base leftward to the position where the gear has been rotated by one turn, and fix the space wire with the space wire fixing screw.
6) Cause the wire to fit by moving the carriage base right and left a number of times.
7) Mount the carriage assembly in accordance with the replacement procedures.

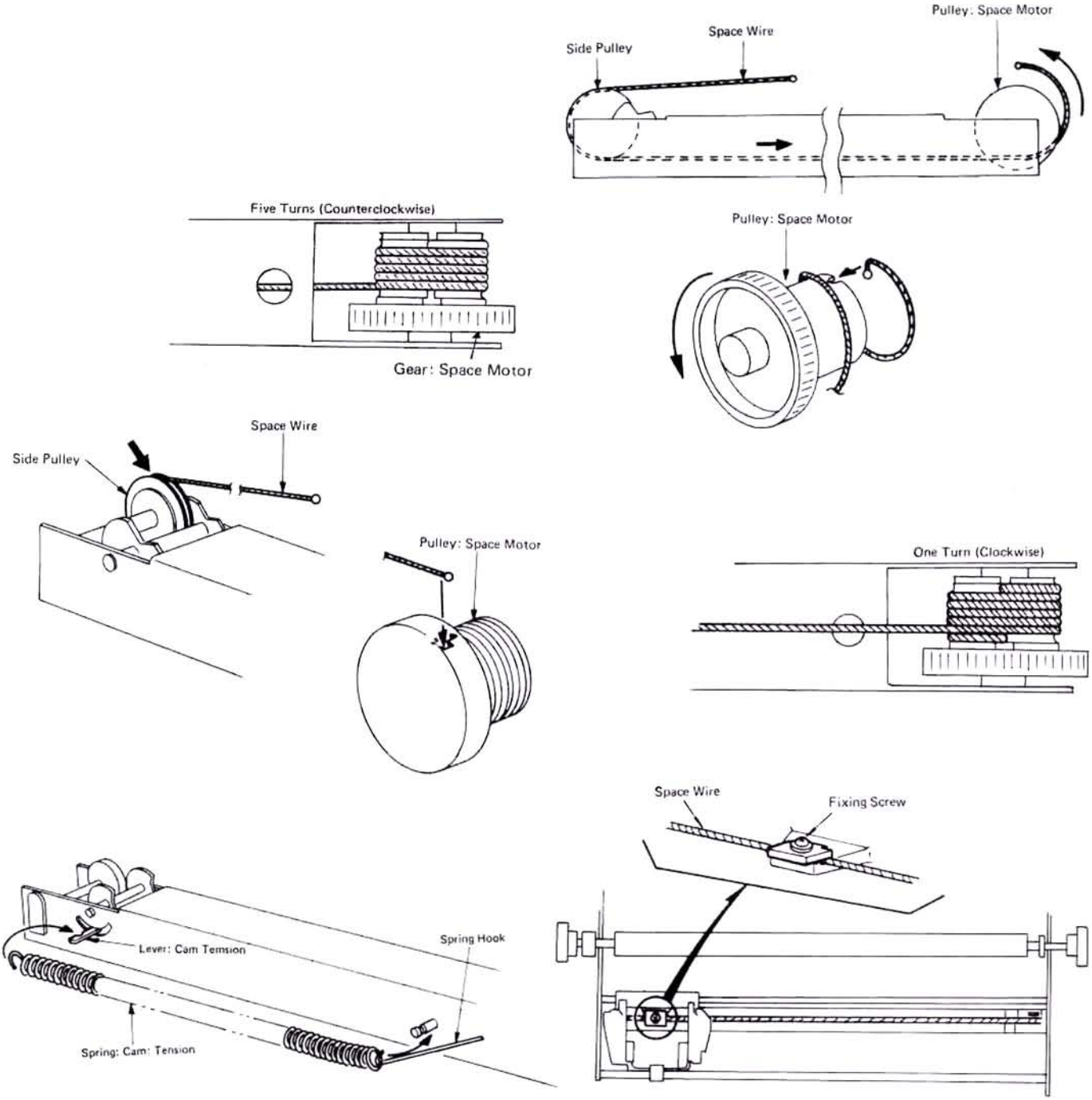



**Figure 5-6. Space Wire Mounting**

## 4. REPLACEMENT OF THE CONTROL BOARD

### 4-1. Removal of the Control Board

1) Remove the power transistor assembly fixing screws.
2) Remove the PCB fixing screws, turn down the PCB, disconnect all connectors, and remove the board.

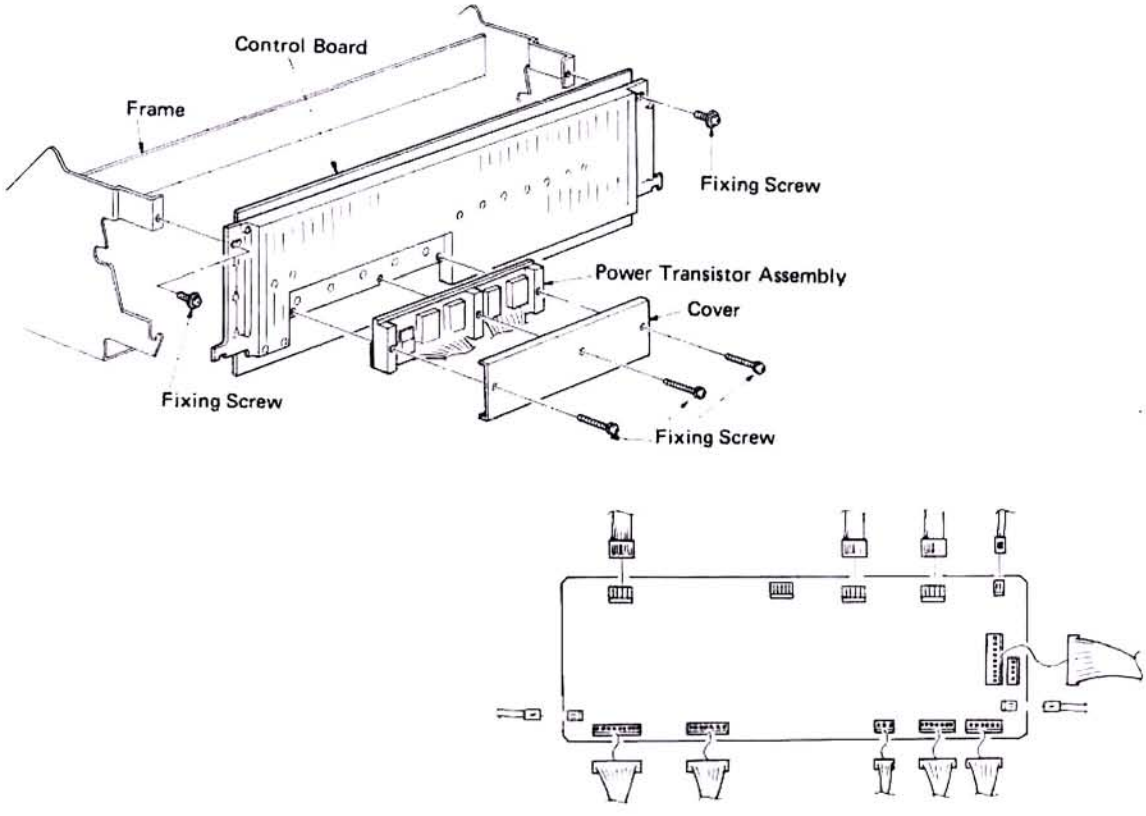



**Figure 5-7. Control Board Removal**

## 4-2. Mounting the Control Board

1) Attach all connectors to the PCB and fix the Board to the frame by tightening the PCB fixing screws. (Locate the power transistor assembly outside at this occasion from the lower side of the PCB.)

2) Mount the power transistor assembly to the PCB.

Note: After replacement of the Board, adjust the selection and space speeds in accordance with the adjusting procedures in section VI.

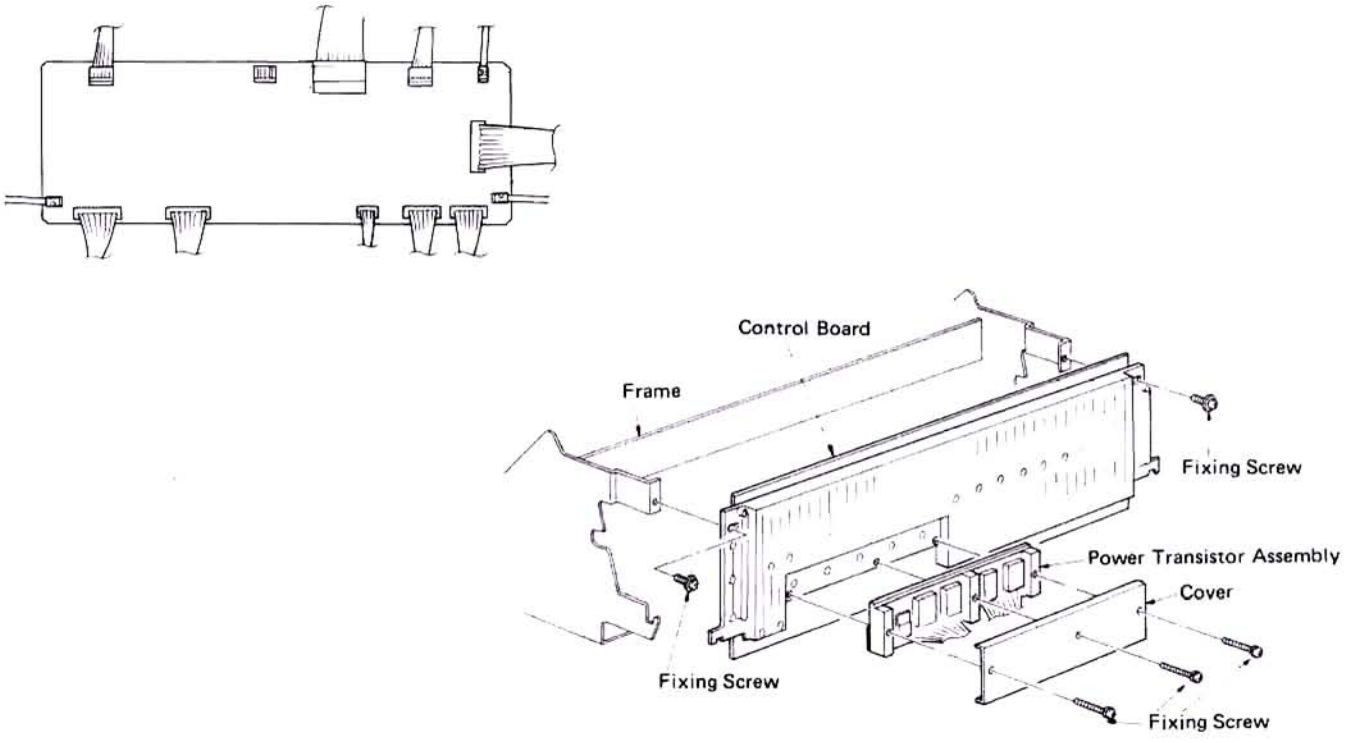
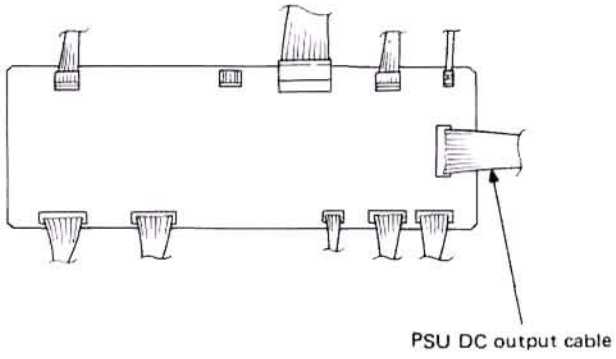



**Figure 5-8. Control Board Mounting**

## 5. REPLACEMENT OF THE POWER SUPPLY UNIT

### 5-1. Removal of the Power Supply Unit (PSU)

1) Remove the Control PC Board in accordance with the Control Board replacement procedure; however, when removing the connectors, remove only the Power Supply DC output cable. (CN 0/7)
2) Remove the Power Supply fixing screw from the left-hand side (looking from the rear) of the unit. Loosen the screw on the right-hand side of the unit by inserting a cross-tip screwdriver through the PSU protector. Do not remove the screw on the right-hand side.
3) Remove the AC input cable fixing screw on the PSU.
4) Slide the PSU backwards slightly and remove it while lifting up on the unit.



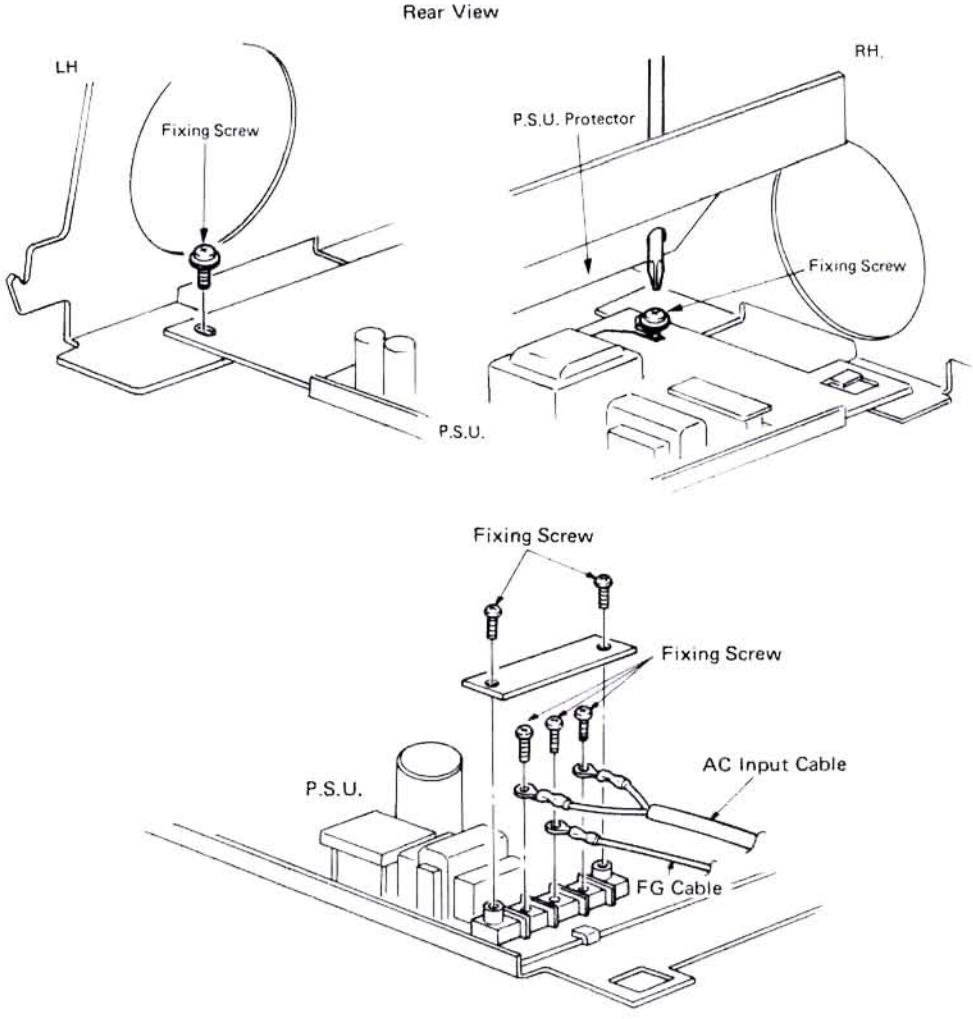
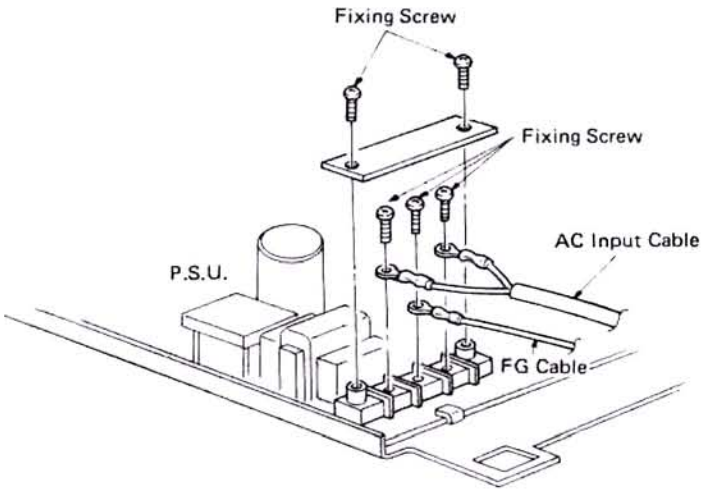




**Figure 5-9. PSU Removal**

## 5-2. Mounting of Power Supply Unit (PSU)

1) Attach the AC input cable with the fixing screws.
2) Fit the PSU to the tacking screw on the right-hand side, slide the unit towards the front and tighten the fixing screws on both the right-hand side and left-hand side.
3) Reconnect the PSU DC output cable to the Control Board.
4) Mount the PCB in accordance with the Control Board replacement procedures.

NOTE: Exercise care in the position of the 100/200V select connector at the time of mounting of the PSU.



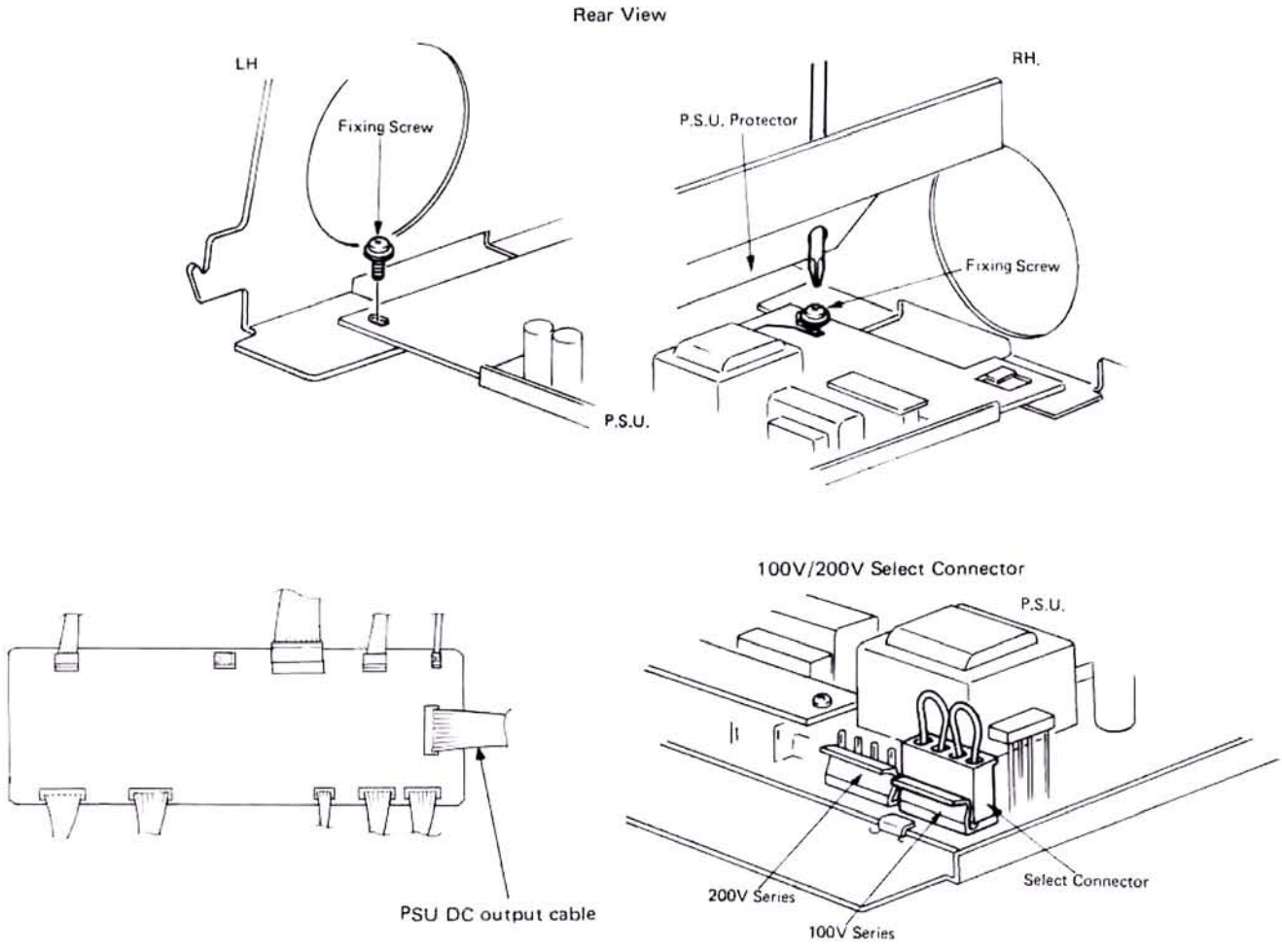




**Figure 5-10. PSU Mounting**

## 6. REPLACEMENT OF THE SPACE MOTOR

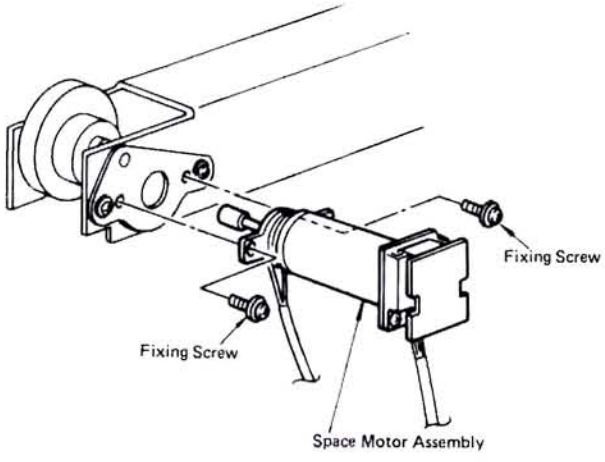



**Figure 5-11. Space Motor Replacement**

### 6-1. Removal of the space motor

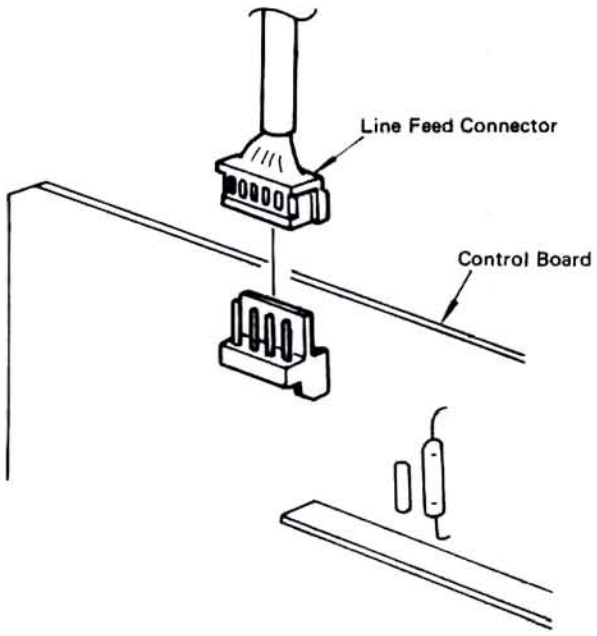
1) Remove the PCB in accordance with the Control Board replacement procedures.
2) Remove the two space motor fixing screws and remove the space motor.

### 6-2. Mounting of the space motor

1) Mount space motor to the frame using the fixing screws.
2) Attach connectors and mount the PCB in accordance with the Control Board replacements procedures.

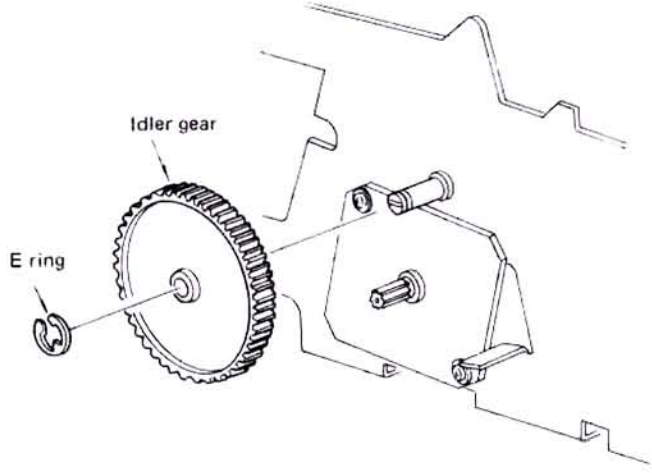
NOTE: After replacement of the motor, adjust the space speed in accordance with the adjusting procedures in Section VI.

## 7. REPLACEMENT OF LINE FEED MOTOR




### 7-1. Removal of Line Feed Motor

1) Disconnect LF connector from the Control Board. (CN 0/9)
2) Remove the E ring fastening the idler gear, and remove the gear.
3) Remove the two fixing screws and remove the Line Feed Motor. (Do not miss out the spacers.)



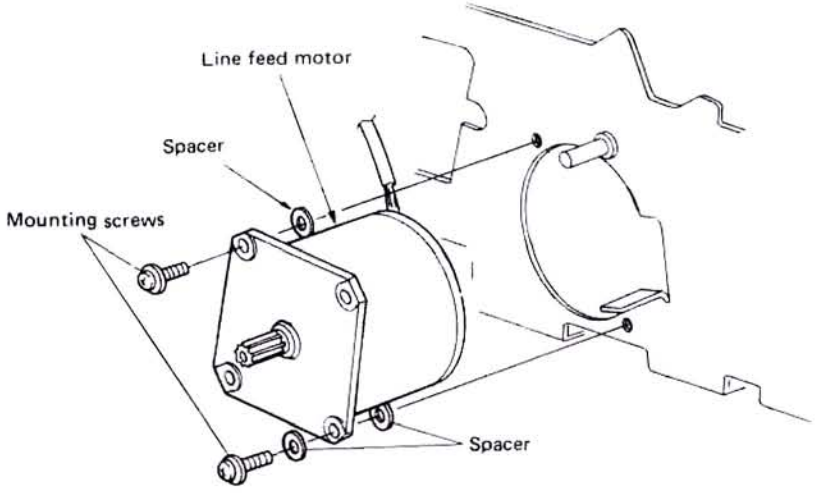
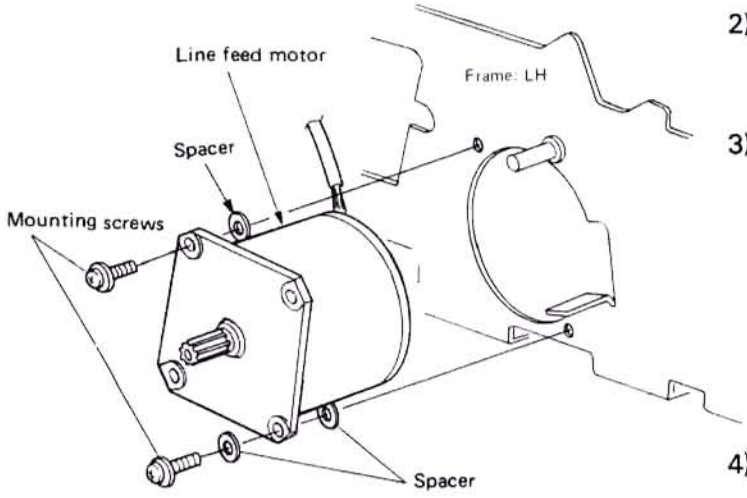
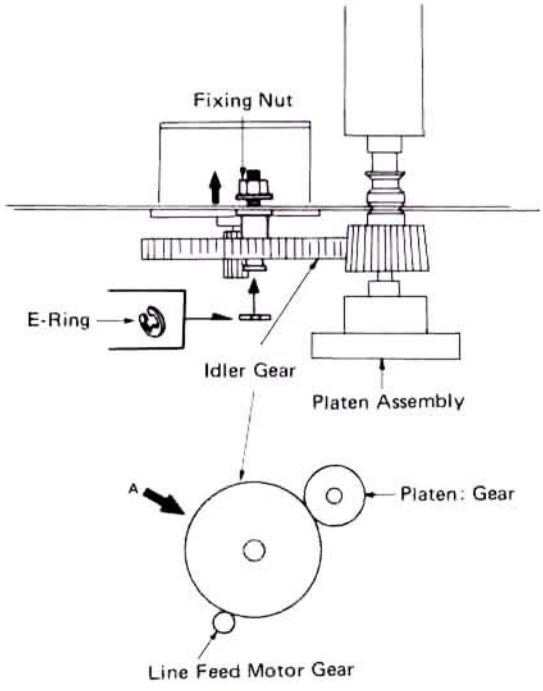




**Figure 5-12. LF Motor Removal**

### 7-2. Mounting of the Line Feed Motor

1) Mount the line feed motor to the frame using the two fixing screws.
2) Loosen the idler shaft fixing nut, mount the idler gear to the shaft, and replace the E ring.
3) Set the platen. Adjust the position of the idler gear by moving the shaft in the frame hole. Tighten the nut so that no backlash is present in one rotation of the idler gear. (Make connection while pushing the idler gear in the direction of the arrow.) Assure that there is no backlash after final tightening.
4) Reconnect the LF connector to the Controller Board.



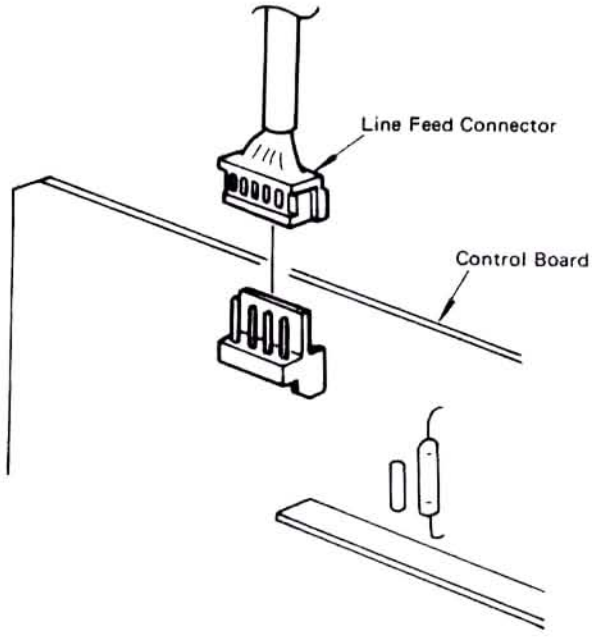




**Figure 5-13. LF Motor Mounting.**

## 8. REPLACEMENT OF HAMMER ASSEMBLY

### 8-1. Removal of Hammer Assembly

1) Remove the ribbon cartridge and the print wheel.
2) Remove the selection motor cover.
3) Remove the selection motor protector.
4) Disconnect the connector (4P) in the carriage and remove terminal pins (2 pins for hammer). (Cut the tie wrap.)
5) Remove the hammer protector.
6) Remove the hammer assembly fixing screws and remove the hammer assembly.

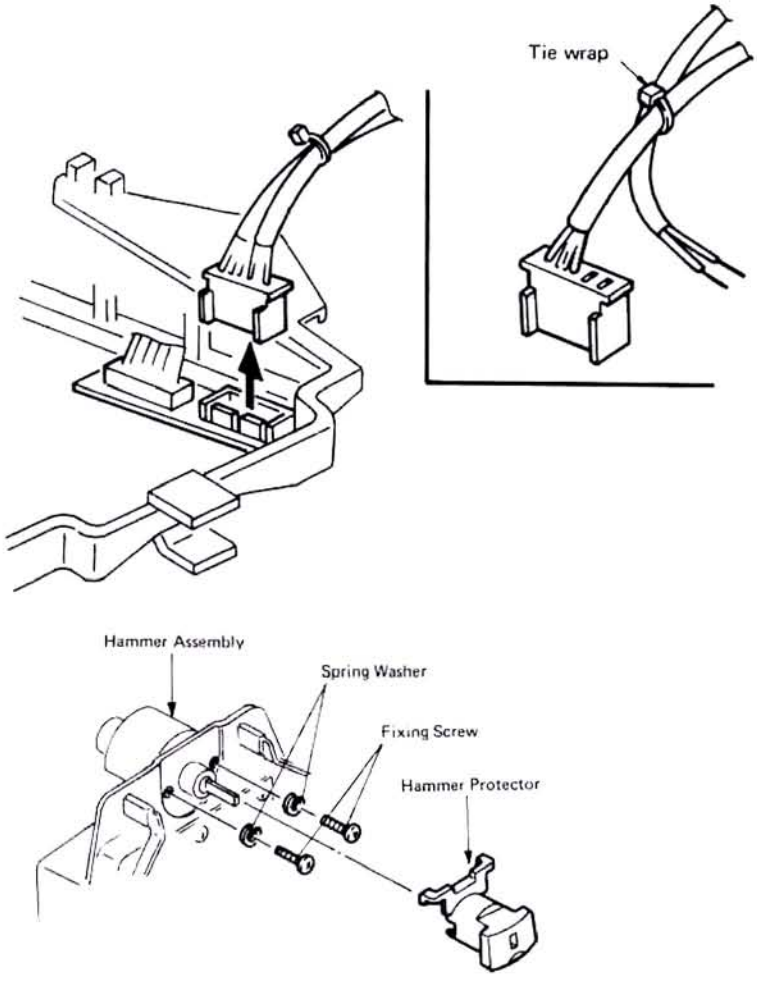



**Figure 5-14. Hammer Ass'y Removal**

## 8-2. Mounting of Hammer Assembly

1) Fix the hammer assembly by tightening fixing screws.
2) Mount the hammer protector.
3) Attach terminal pins to the connector and connect the connector. (Bind the cable with a tie wrap.)
4) Mount the selection motor protector.
5) Mount the selection motor cover.
6) Mount the print wheel and the ribbon cartridge.

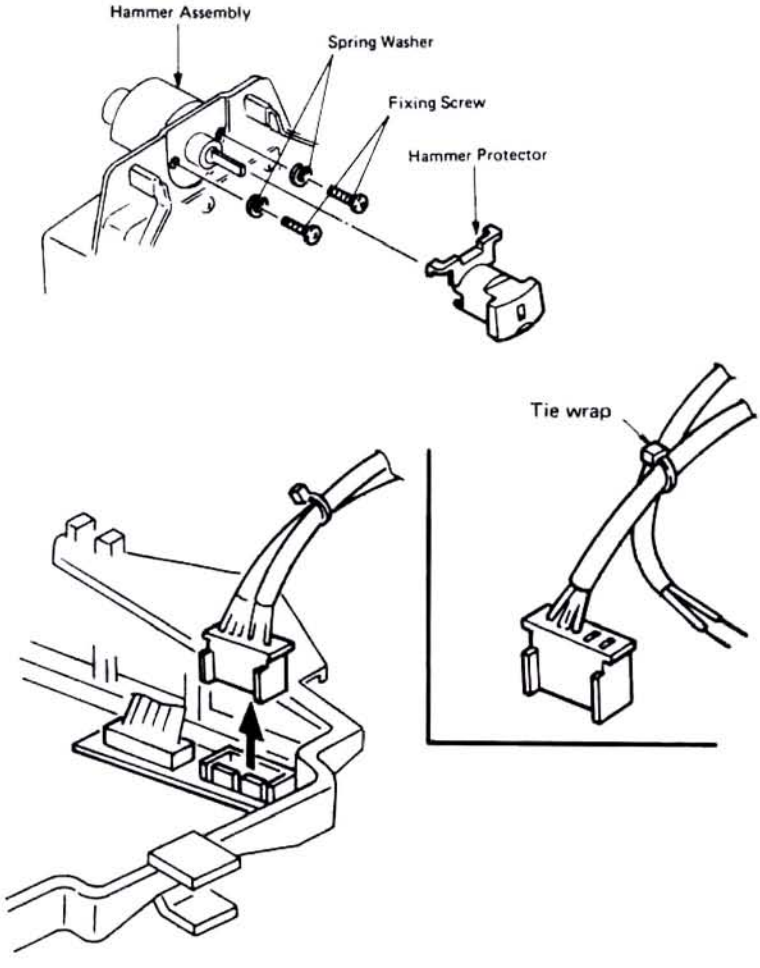



**Figure 5-15. Hammer Ass'y Mounting**

# VI. ADJUSTMENT PROCEDURES

## 1. ADJUSTMENT OF PLATEN GAP

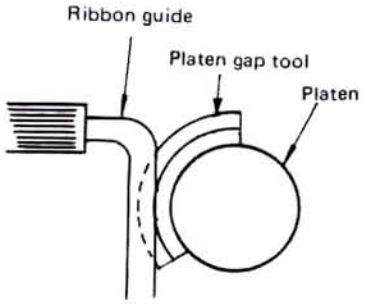



**Figure 6-1.**

(Measurement)

- Remove the ribbon cartridge, print wheel and card holder. Attach a platen gap tool to the platen.
  Check if the Platen Gap Tool: 0.96 passes through the gap between the platen and ribbon guide, and if the Platen Gap Tool: 1.06 does not pass the gap.

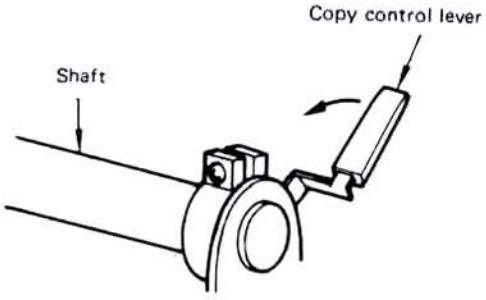



**Figure 6-2.**

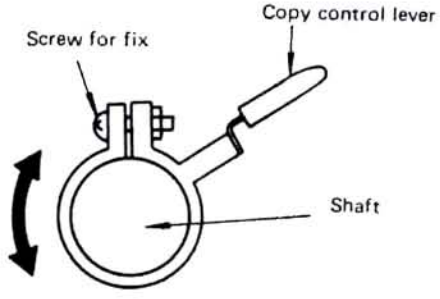



**Figure 6-3.**

(Adjustment)

- Place the platen gap tool at the center of the platen. Loosen the copy control lever lock screw (See Figure 6-3) and make adjustment by moving the lever back and forth.

(Notes)

- Set the copy control lever in the foremost position. (See Figure 6-2.)
- Take measurement and adjustment at the center of the platen.
- Measure and adjustment right hand and left hand ribbon guides together. One or both should be in this position.

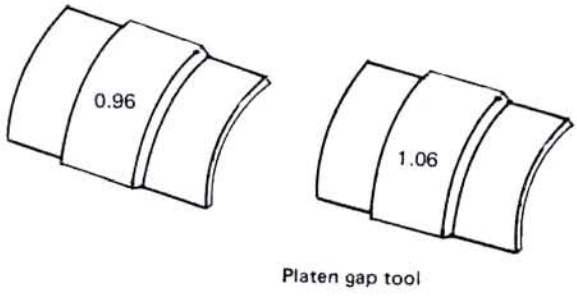



**Figure 6-4.**

## 2. VERTICAL ADJUSTMENT OF THE CARRIAGE

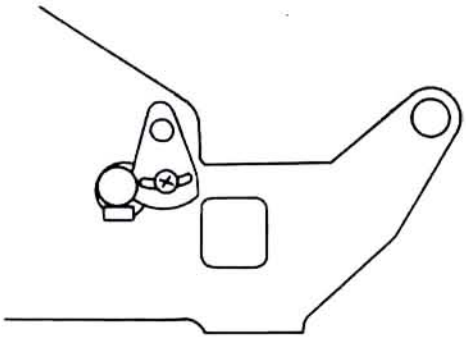
Adjustment shim

(Measurement)

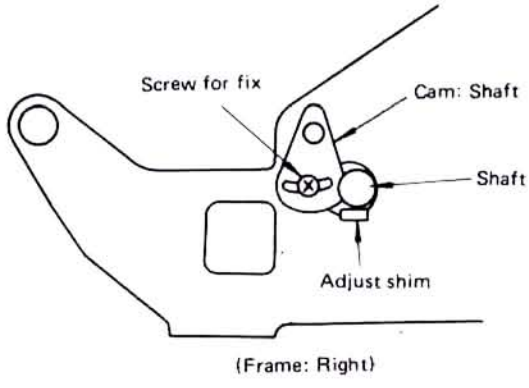
- Cause the printer to print all characters (by the self test mode).
- Printed characters should be free from light and shade between upper side and lower side.

(Adjustment)

- Loosen the cam shaft lock screws and make an adjustment by inserting or extracting adjust shims as described below. Make the adjustment at the right- or left-hand frame, see Figure 6-5.
- Remove one adjust shim if the upper side is lighter.
- Add one adjust shim if the lower side is lighter.



(Frame: Left)




(Frame: Right)

**Figure 6-5.**

## 3. ADJUSTMENT OF BACKLASH OF LINE FEED MOTOR

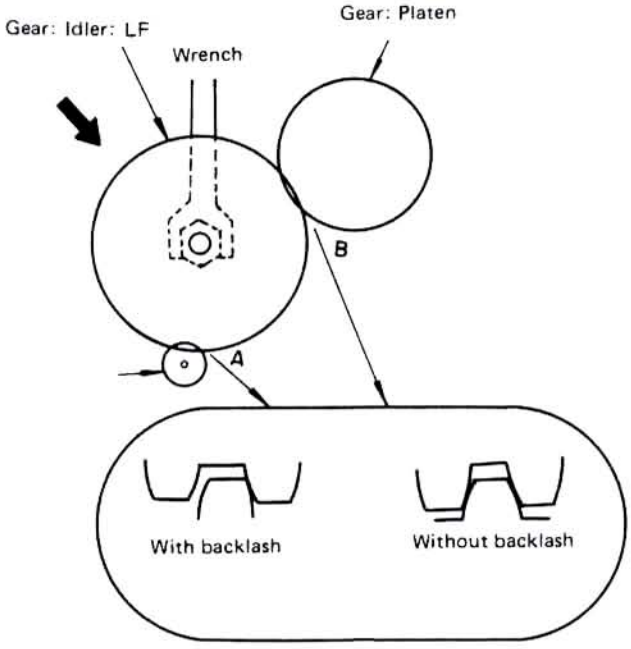



**Figure 6-6.**

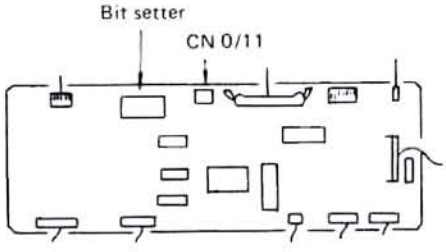
(Measurement)

- Take the measurement with the power switch in the OFF position.
- Fix the platen with one hand while rotating the drive gear back and forth with the other and check the backlash. See Figure 6-6. (Take the measurement at both part A and part B.)
- Rotate the platen by one return and there should be a point at which there is no backlash.

(Adjustment)

- Loosen the line feed gear idler fixing screw, force the gear away from the dirction of the arrow in Figure 6-6, and tighten the fixing screw with a spanner and a slot screwdriver.

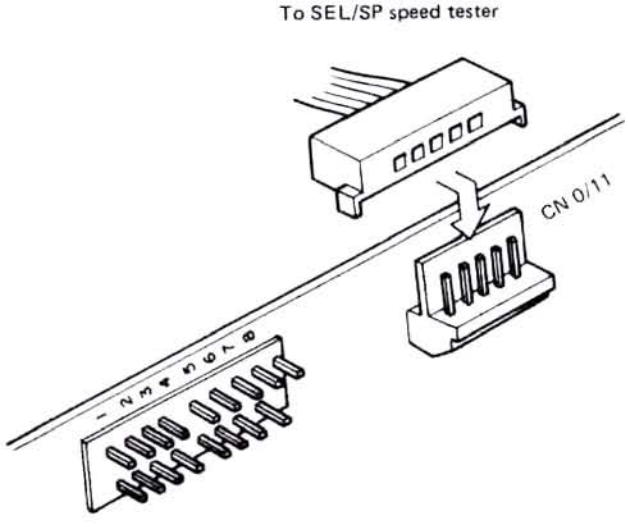
## 4. SPEED ADJUSTMENT OF SELECTION AND SPACE MOTOR




### 5-1. Adjustment Using SEL/SP Speed Tester

(Measurement)

- Connect the connector to CN 0/11 of the control board for connection to the SEL/SP speed tester.
- Turn ON the power for the printer.
- Set the SEL/SP select switch of the tester in SEL position.
- Set bit set switches BS1/5 to 4/8 of the tester as matched with bit setter BS1 to 4 on the control board.
- Turn ON the test switch for the tester. (The printer makes 180° selection 18 times, "H" printing 136 times, restores and then stops.)
- The result is satisfactory if tester's OK lamp flickers. If NG lamp flickes, adjustment is required. (In the case of NG, memorize the lamp conditions of BS1/5 to 4/8.)



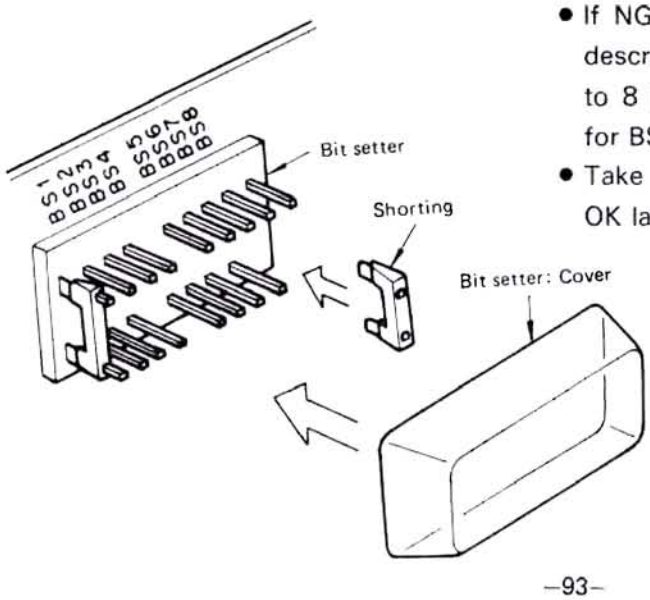

- Next, set tester's bit set switches BS1/5 to 4/8 as matched with BS5 to 8 on the control board.
- Turn the SEL/SP select switch of the tester to SP position.
- The result is satisfactory if tester's OK lamp flickers. If NG lamp flickers, adjustment is required.

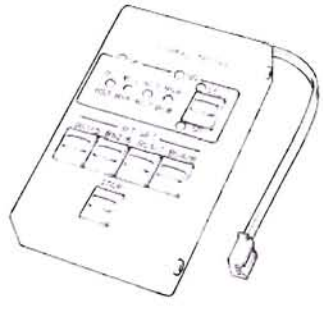
(Note)

- Do not connect or disconnect tester's connector in the state where the power for the printer is ON.
- Check on SEL side and SP side may be made in any order.

(Adjustment)

- If NG lamp flickers as a result of the measurement described above, attach a short pin to bit setter BS1 to 8 in correspondence to the lit lamp out of those for BS1/5 to 4/8.
- Take measurement once again and assure that the OK lamp flickers.



## 5-2. Adjustment Using Synchroscope

(1) Speed adjustment of selection and space motor

| | |
|---|---|
| 1 | GND |
| 2 | TEST |
| 3 | +5V |
| 4 | SEL DRIVE |
| 5 | SP DRIVE |

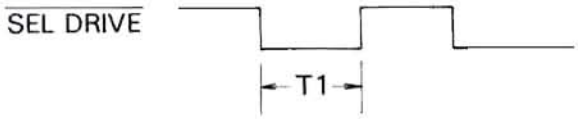
CN 0/11

(synchroscope)

CHA . . . . . SEL DRIVE (Pin 4 of CN 0/11)
CHB . . . . . SP DRIVE (Pin 5 of CN 0/11)
GND . . . . . GND (Pin 1 of CN 0/11)

A. Selection motor

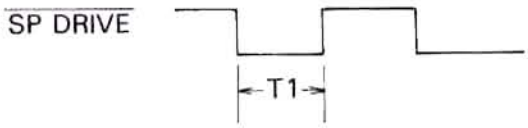
The standard value of the speed is as follows in the state where the print wheel is rotated by 180°.




T1 = 43.0 ± 0.6 msec
(at the normal temperature)

B. Space motor

The standard value of the speed is as follows in 12/120" space continuous motions.

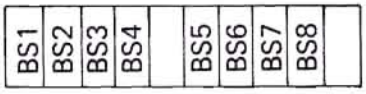



12/120" space × 136 mean time
T1 = 27.0 ± 0.6 msec
(at the normal temperature)

C. Bit setter

The bit setter on the control board is as shown below.

Bit setter




BS1-BS4: Used for speed adjustment of selection motor.
BS5-BS8: Used for speed adjustment space motor.

Turn on the test switch and measure the waveform at beginning of test print (wheel 180° rotation and "H" continuous printing). If the measured value does not satisfy the standard value, remove short pins of bit setter and carry out the following adjustment.

| | | msec (typ) |
|---|---|---|
| SEL | BS1 | 0.92 |
| | BS2 | 1.84 |
| | BS3 | 3.68 |
| | BS4 | 7.36 |
| SP | BS5 | 0.67 |
| | BS6 | 1.34 |
| | BS7 | 2.68 |
| | BS8 | 5.36 |

When short pin are attached, time values are reduced by values indicated above.

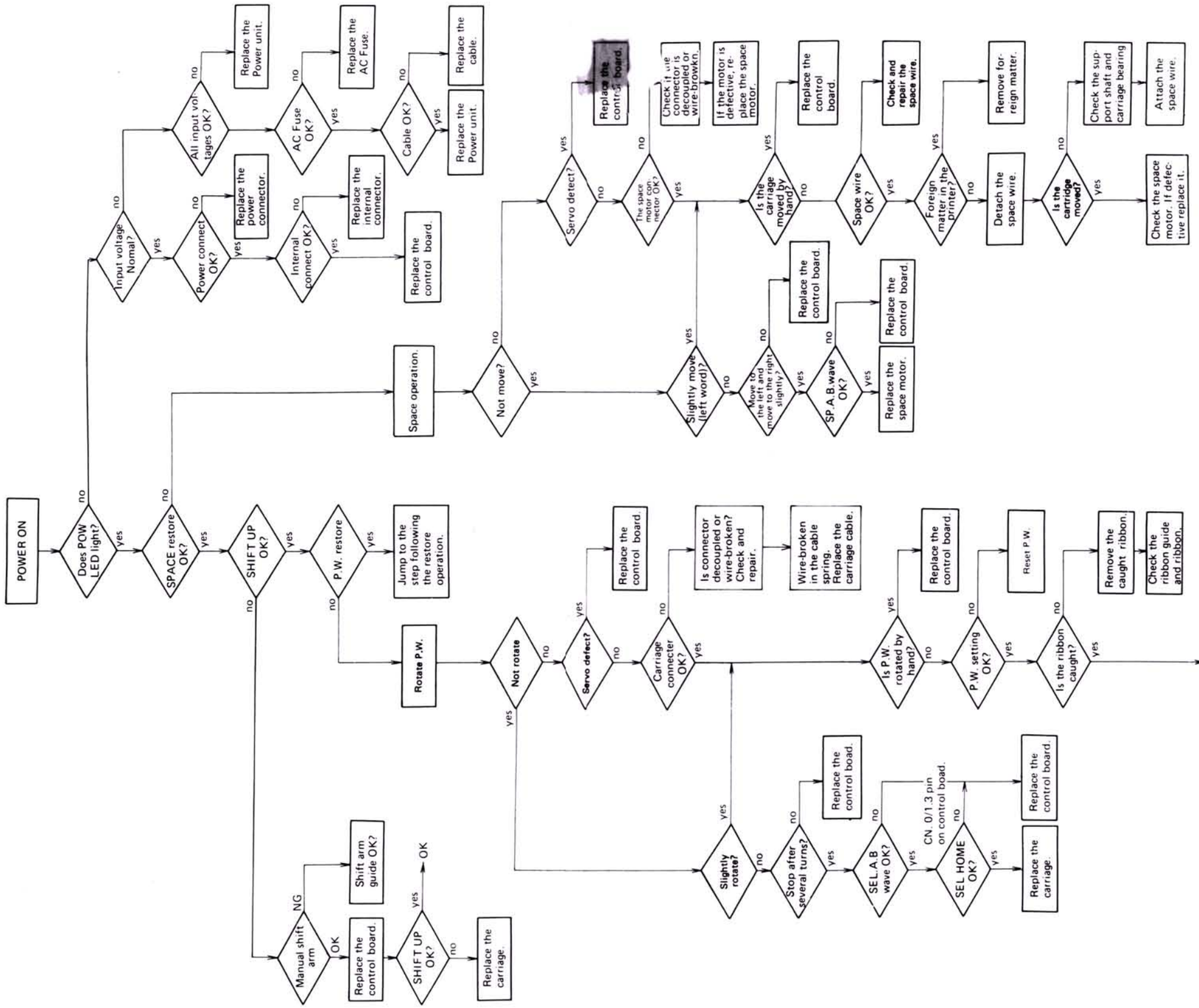
Adjustment: Remove short pins and measure the waveform.

Ex.) Measured value: 55.5 msec
Standard value: 43.0 msec ±0.6
55.5 − 43.0 = 12.5 msec
= 7.36 + 3.68 + 1.84 = 12.88
(BS4) (BS3) (BS2)

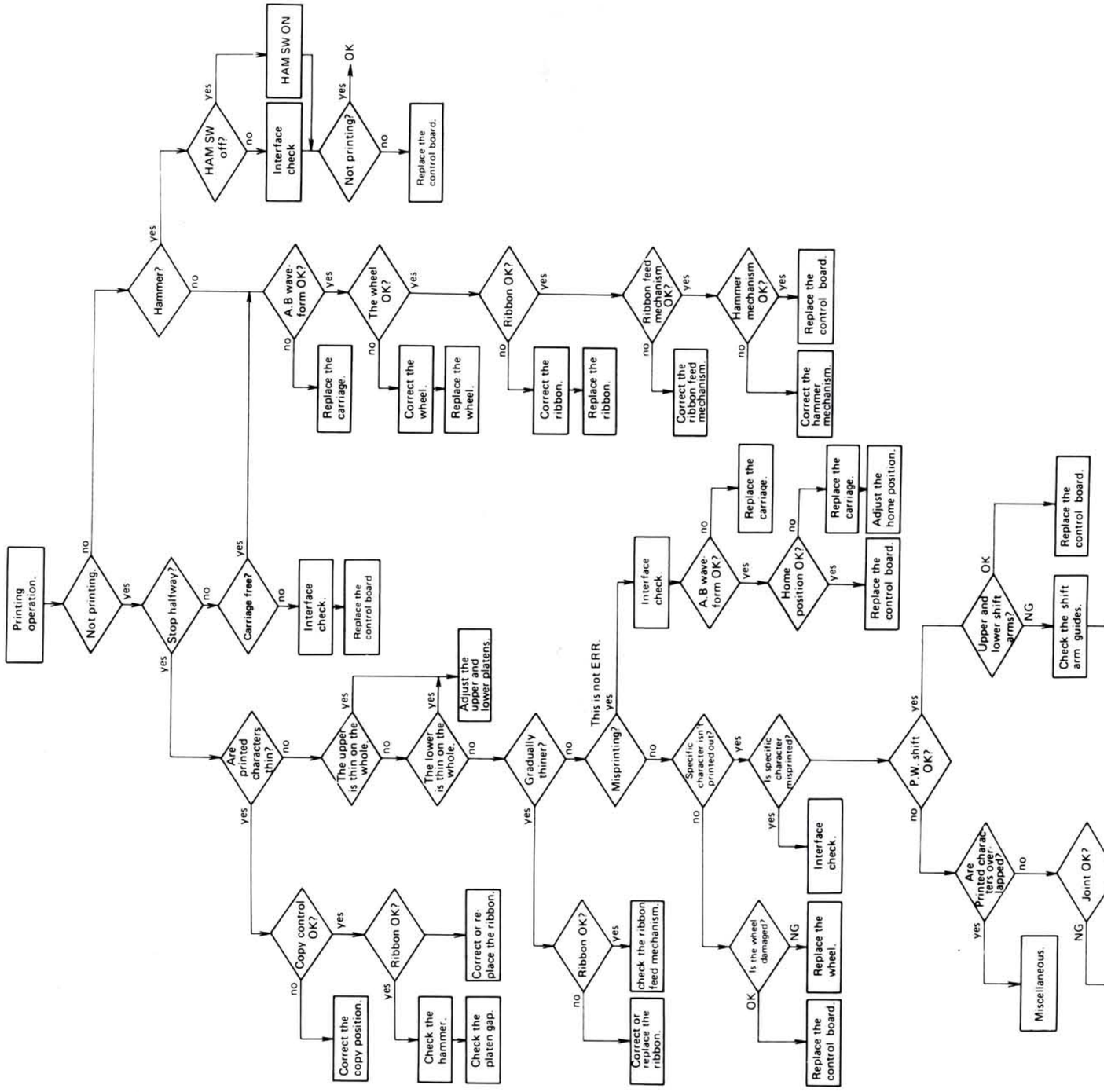
- Attach short pins to bit setter BS2, 3 and 4. Take measurement once again, and it is judged as satisfactory if the standard value is satisfied. Carry out adjustment for the space motor in the same manner.

# VII. TROUBLESHOOTING

## 1. FAULTS AT POWER-ON (RESTORE) TIME

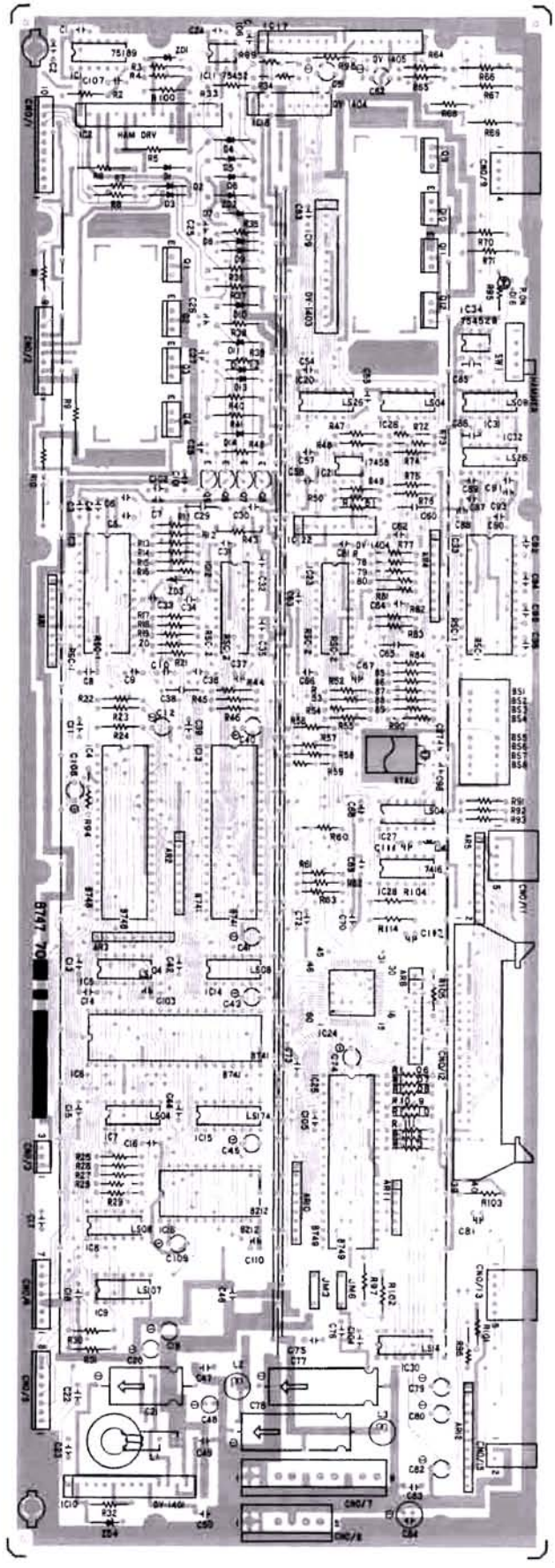


## 2. FAULTS IN OPERATION

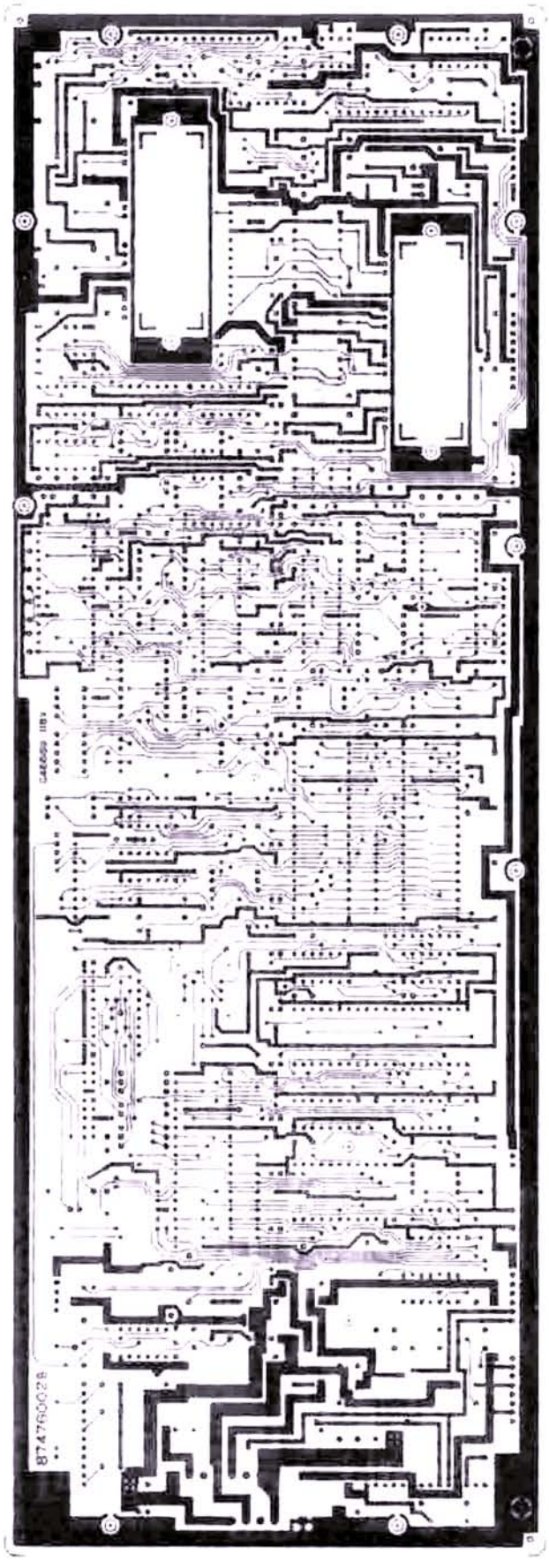


# VIII. PRINTED CIRCUIT BOARD

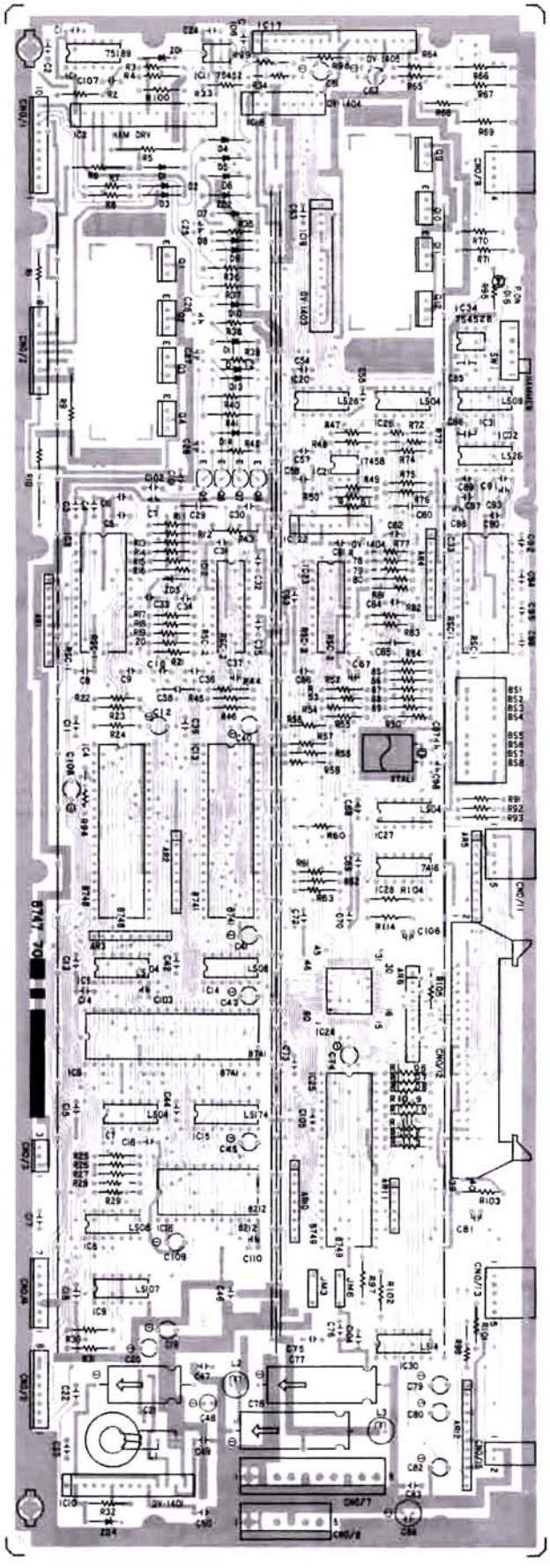
**Control Board Ass'y 1 (Top View) First 2,500 units only.**



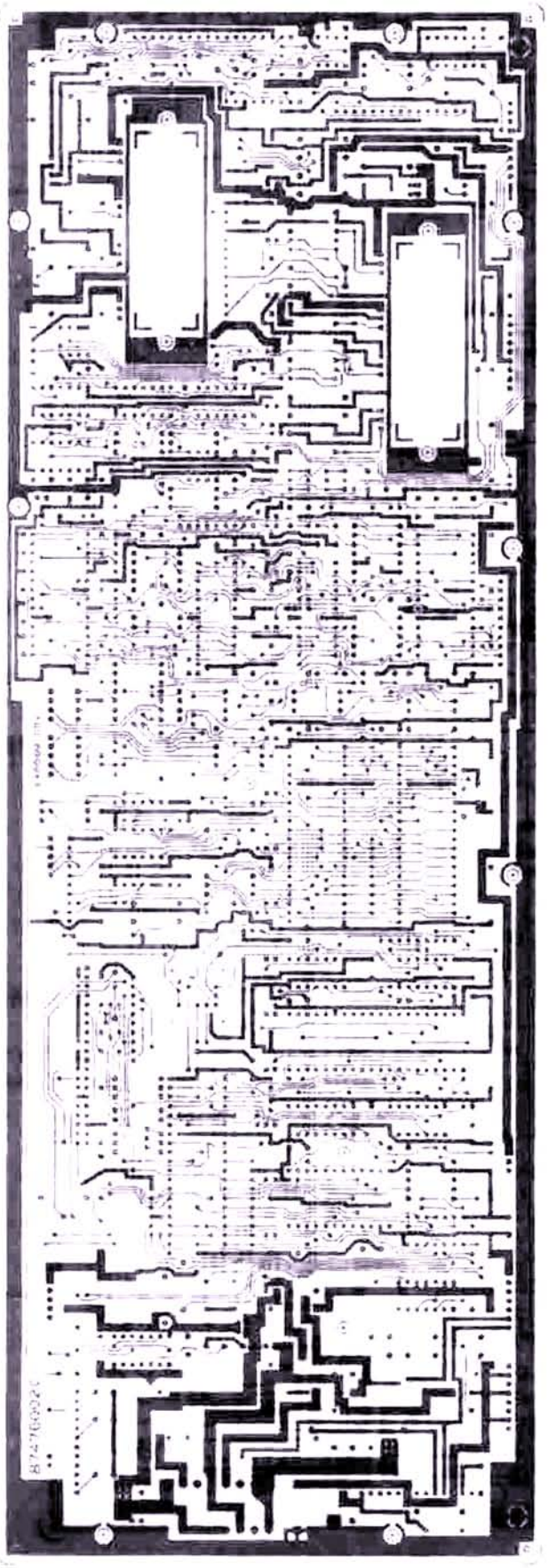
**Control Board Ass'y 1 (Bottom View) First 2,500 units only.**



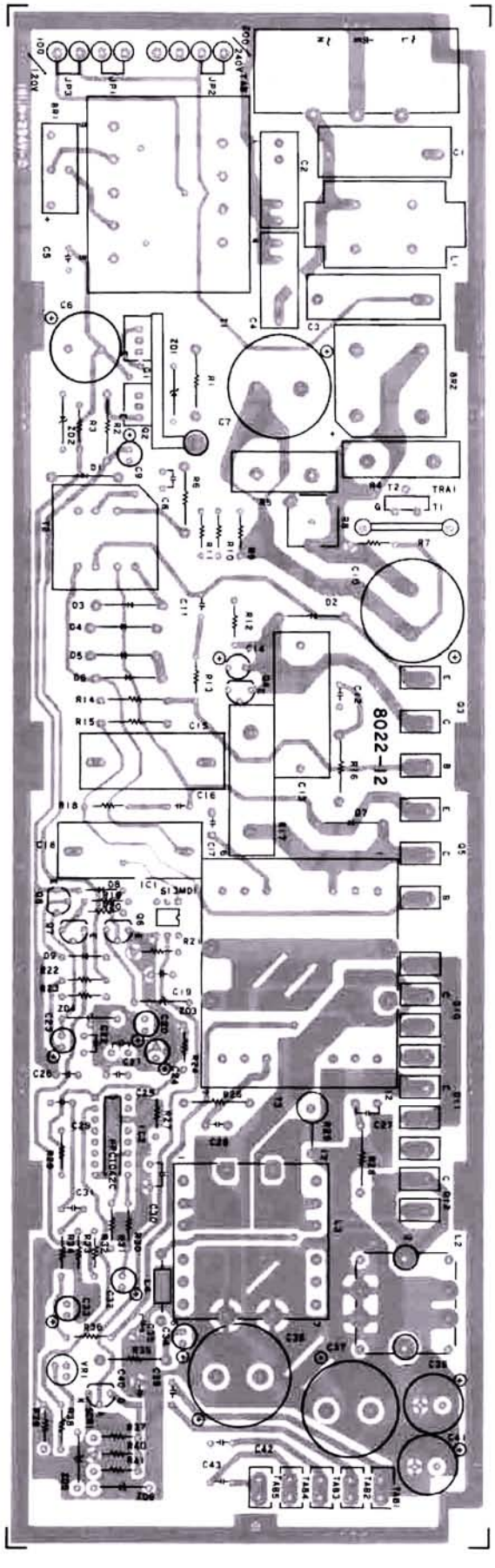
**Control Board Ass'y 2 (Top View) 2,501st unit and on.**



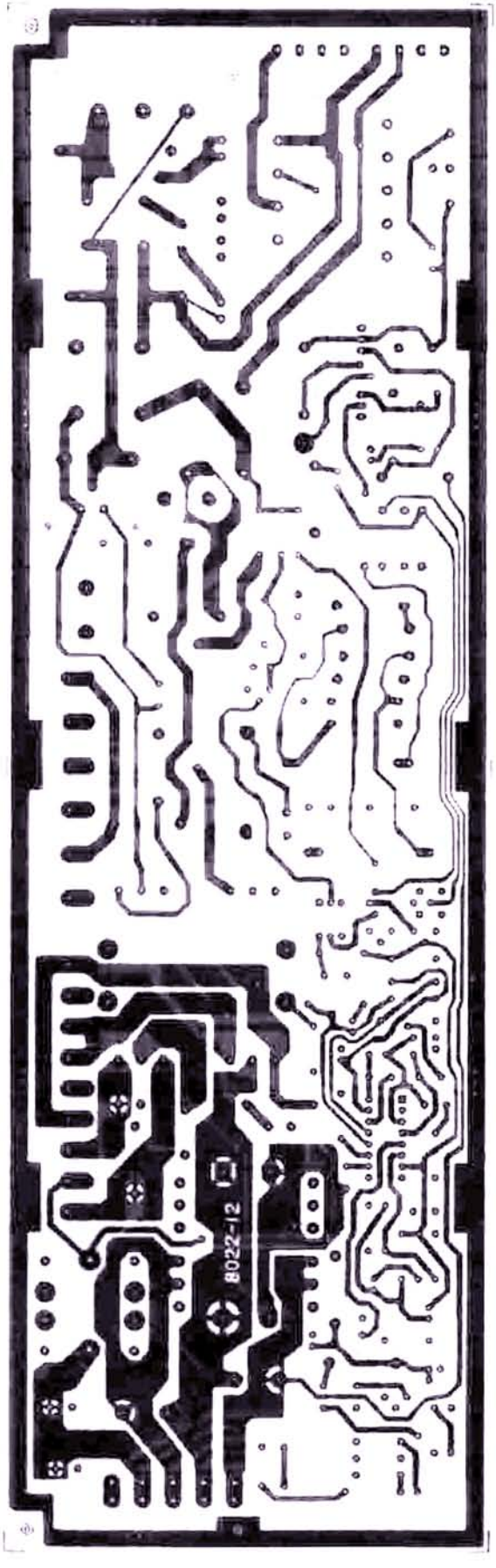
**Control Board Ass'y 2 (Bottom View) 2,501 unit and on.**



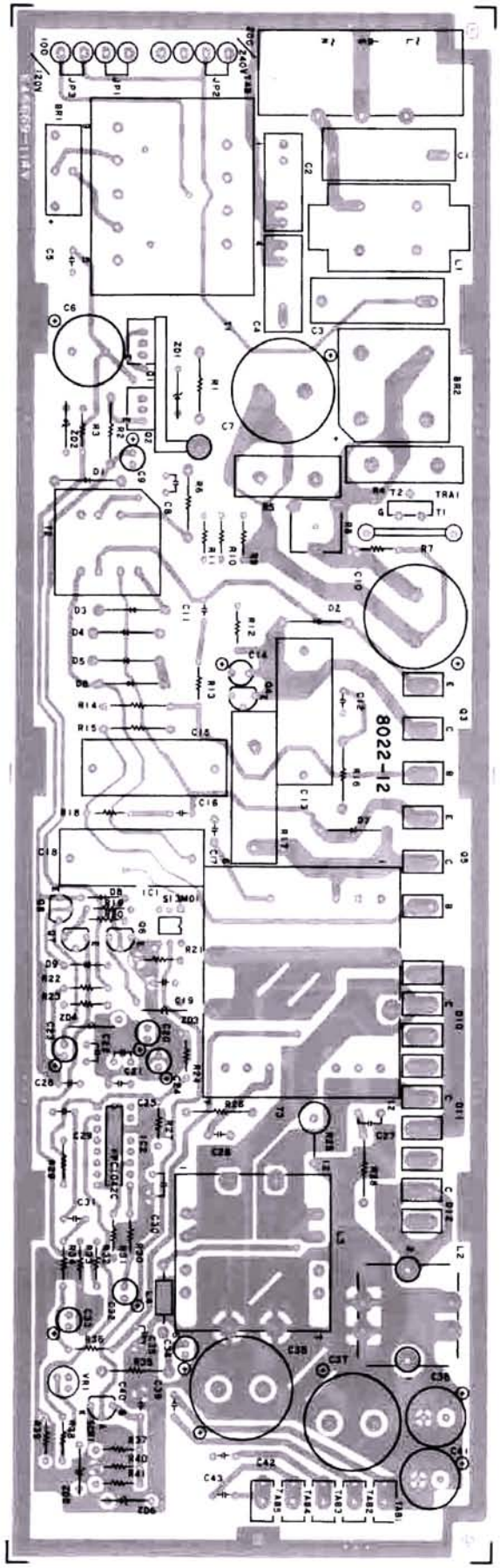
**Power Supply Board Ass'y 1 (Top View) First 8,000 units only.**



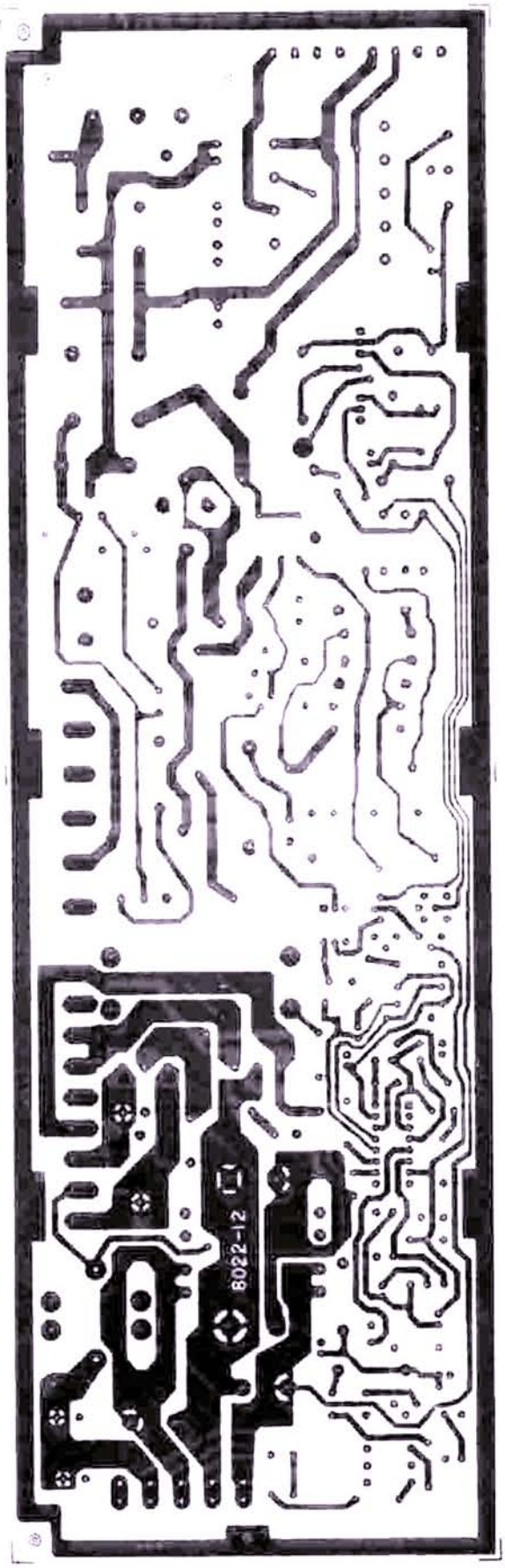
**Power Supply Board Ass'y 1 (Bottom Biew) First 8,000 units only.**



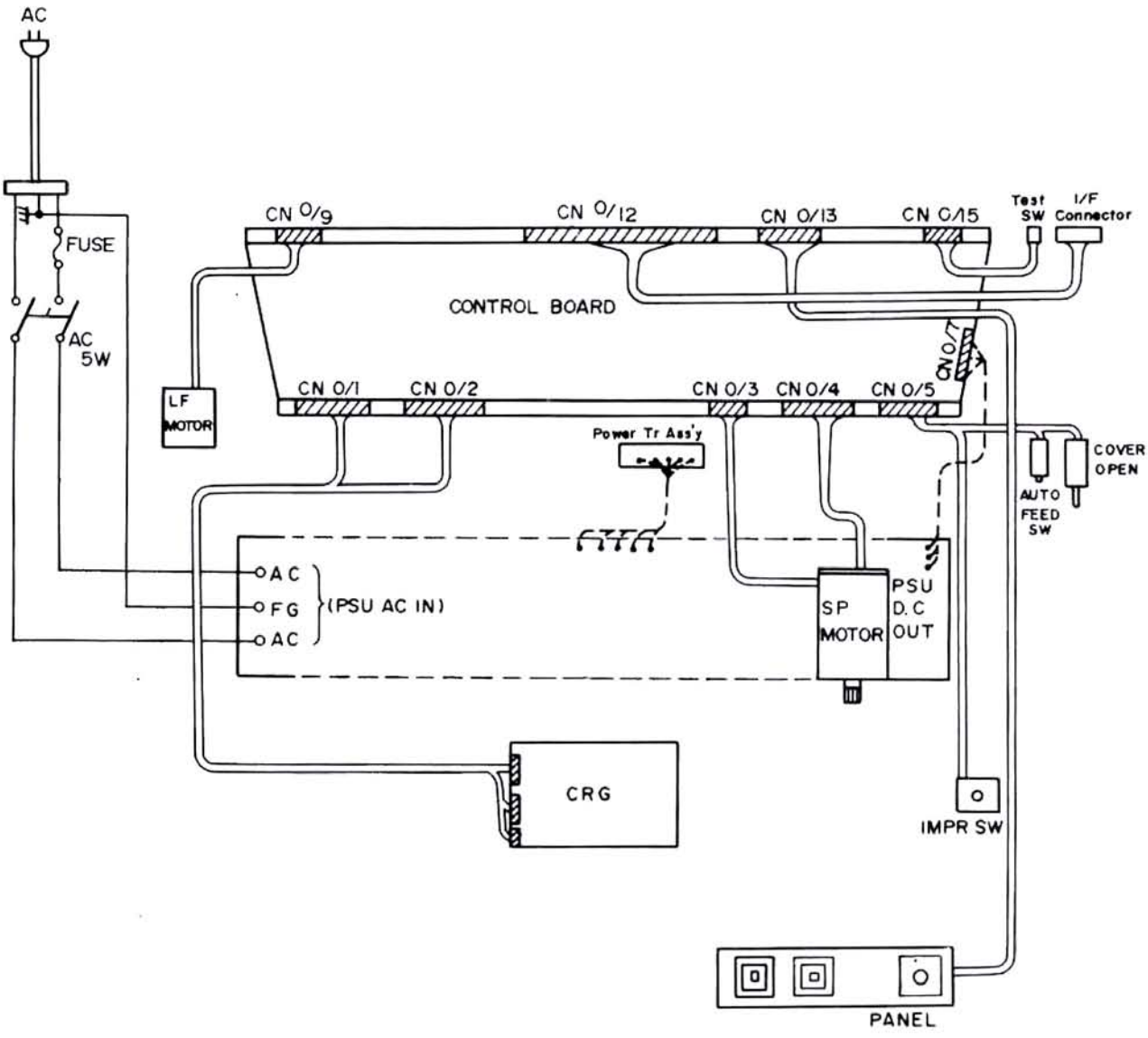
**Power Supply Board Ass'y 2 (Top View) 8,001 unit and on.**



**Power Supply Board Ass'y 2 (Bottom Biew) 8,001 unit and on.**



# IX. WIRING DIAGRAM

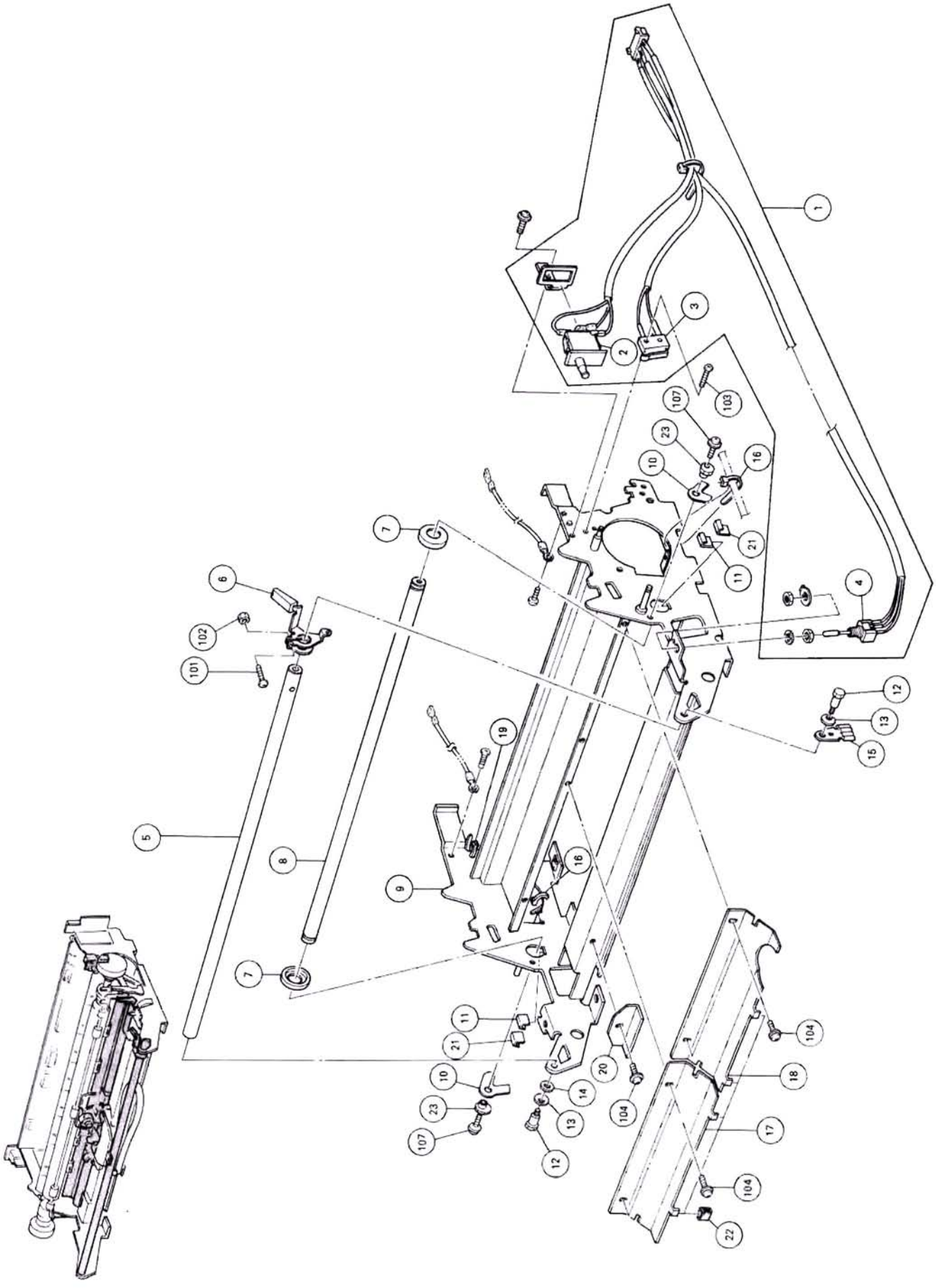


**NOTE**

# X. EXPLODED VIEWS

# PARTS LIST

MAIN FRAME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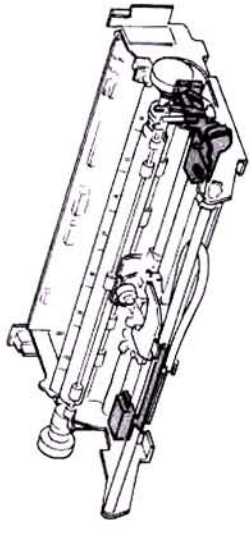
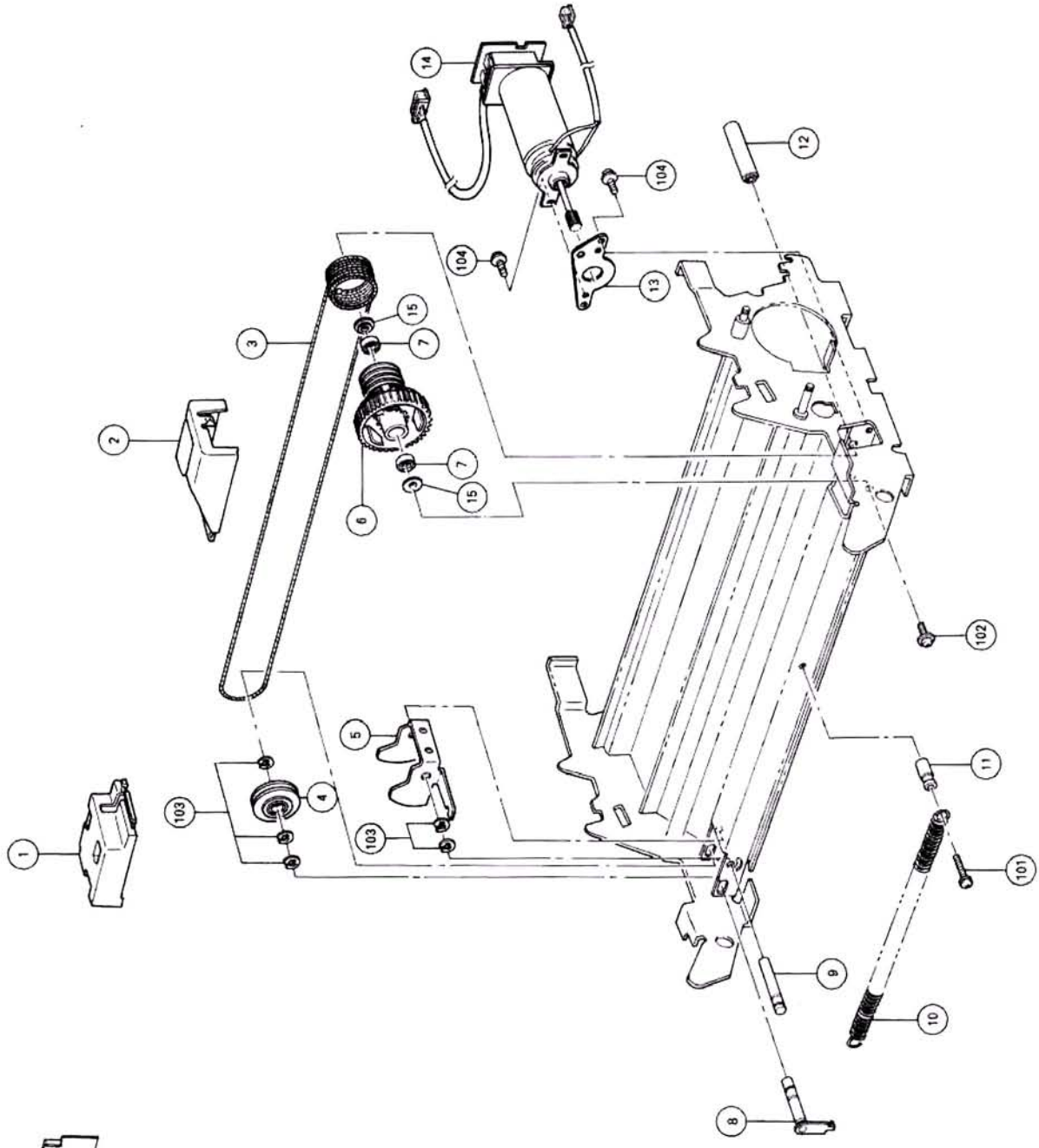
101
102
103
104
107

## MAIN FRAME

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| 001 | CABLE ASSEMBLY : IMP-AF-CO SW | AW-2884 | 87476516 | 1 |
| 002 | SWITCH · CHEAT INTERLOCK | AS-2796 | 12040823 | 1 |
| 003 | MICRO SW : E63-10A, H-003 | AS 2797 | 12041115 | 1 |
| 004 | TOGGLE SWITCH : JT4007 | AS-2798 | 12041157 | 1 |
| 005 | SHAFT : SPACE . REAR | ART-4423 | 87471119 | 1 |
| 006 | LEVER : COPY CONTROL ASSEMBLY | ART-4424 | 87471017 | 1 |
| 007 | STOPPER . CARRIER | AHC-1805 | 87471132 | 2 |
| 008 | SHAFT : SPACE : FRONT | ART-4420 | 87471137 | 1 |
| 009 | FRAME ASSEMBLY | | 87471040 | 1 |
| 010 | CLAMP : PLATE SHAFT | | 87471146 | 2 |
| 011 | ADJUST SPACER | AHC-1803 | 87471079 | 2 |
| 012 | SCREW : COPY CONTROL | AHD-2455 | 87471039 | 2 |
| 013 | SPRING . COPY CONTROL | ARB-7598 | 87471027 | 2 |
| 014 | WASHER COPY CONTROL | AHD-7258 | 87471038 | 1 |
| 015 | DETENT : COPY CONTROL | AHC-1804 | 87471034 | 1 |
| 016 | TIE-RAP | AHC-0623 | 11050042 | 2 |
| 017 | PSU PROTECTOR : LH | ART4418 | 87471082 | 1 |
| 018 | PSU PROTECTOR : RH | ART4419 | 87471083 | 1 |
| 019 | CLIP : CABLE | AHC-1801 | 11050090 | 1 |
| 020 | CLAMP : CABLE | AHC-1802 | 87471095 | 1 |
| 021 | ADJUST SPACER : I | | 87471099 | 2 |
| 022 | PAD : PSU PROTECTOR | | 87471059 | 4 |
| 023 | LOCK NUT | | 87471147 | 2 |
| 101 | SCREW · M3 x 12 (100 PCS/1 SET) | AHD2478 | 03130120B | 1 |
| 102 | NUT M3 (100 PCS/1 SET) | AHD7256 | 07110030B | 1 |
| 103 | SCREW M2 3 x 10 (100 PCS/1 SET) | AHD2461 | 08011195 | 1 |
| 104 | SCREW : M3 x 6 (100 PCS/1 SET) | | 08011166 | 5 |
| 107 | SCREW . M3 x 8 (100 PCS/1 SET) | | 09503008B | 2 |

SPACE MECHANISM

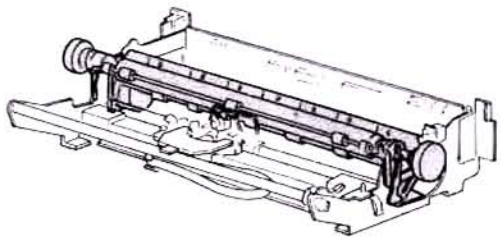


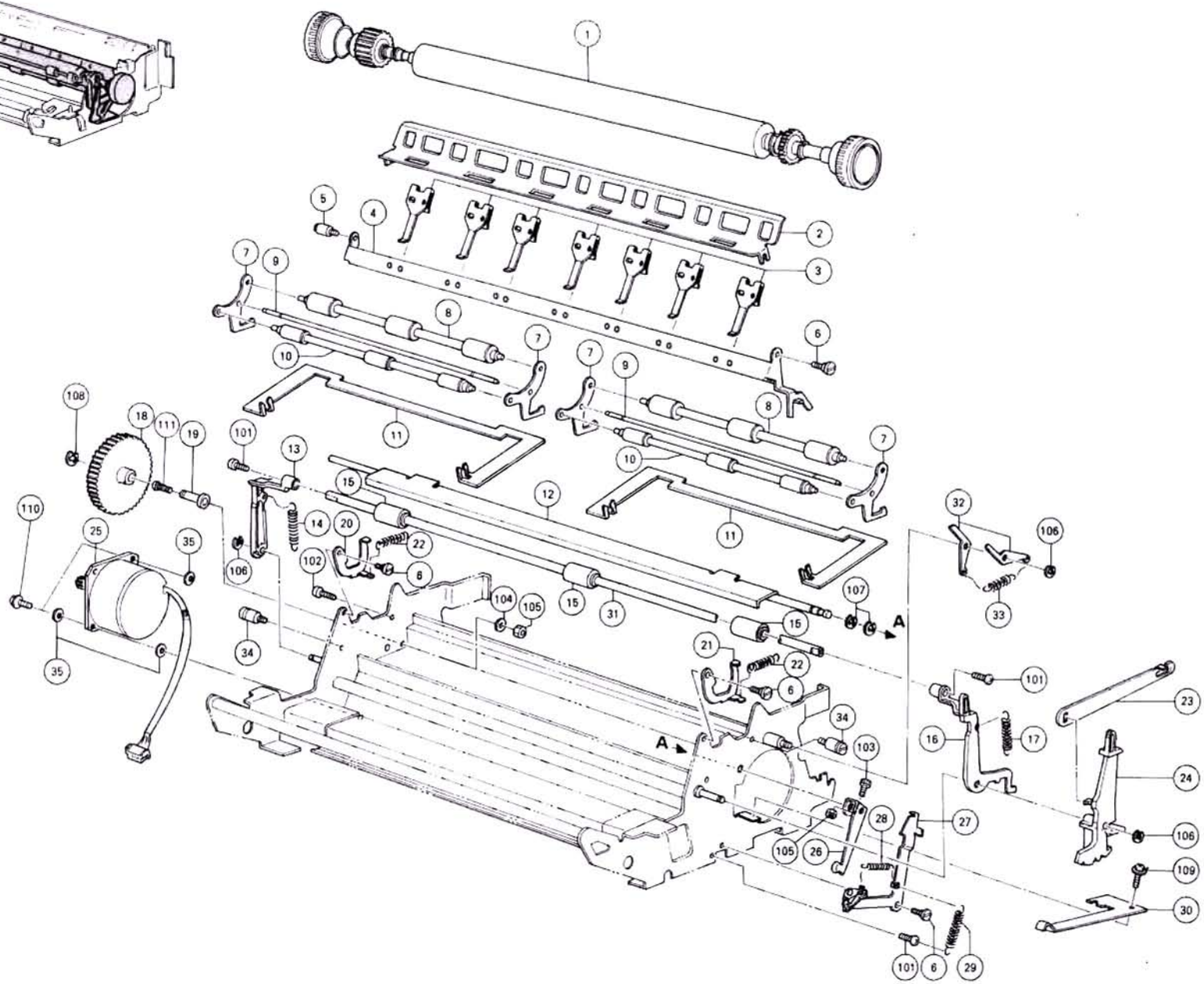


## SPACE MECHANISM

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| 001 | COVER : SIDE PULLEY | ART4416 | 87471136 | 1 |
| 002 | COVER : GEAR PULLEY | ART4417 | 87471135 | 1 |
| 003 | SPACE WIRE ASSEMBLY | AW-2883 | 87471114 | 1 |
| 004 | SIDE PULLEY ASSEMBLY | ARA-0467 | 87471111 | 1 |
| 005 | CAM : TENSION | ARA-0468 | 87471113 | 1 |
| 006 | PULLEY : SPACE MOTOR | ARA-0469 | 87471130 | 1 |
| 007 | SUPPORTER | ART-4413 | 87471105 | 2 |
| 008 | SHAFT : IDLER | ART-4414 | 87471108 | 1 |
| 009 | SHAFT CAM | ART-4415 | 87471112 | 1 |
| 010 | SPRING : CAM TENSION | ARB-7597 | 87471124 | 1 |
| 011 | STUD : REINFORCEMENT PLATE | AHC-1800 | 87471122 | 1 |
| 012 | SHAFT : PULLEY | ART-4411 | 87471106 | 1 |
| 013 | PLATE : MOTOR : 1 | ART-4412 | 87471141 | 1 |
| 014 | SPACE MOTOR & ENCODER ASSEMBLY (NON-REPAIRABLE ASS'Y) | AM-4698 | 87471365 | 1 |
| 015 | COLLAR : GEAR PULLEY | | 87471140 | 2 |
| 101 | SCREW : M3 x 12 (100 PCS/1 SET) | AHD2458 | 09503012B | 1 |
| 102 | SCREW . PHILIPS FRANGE : M3 x 5 (100 PCS/1 SET) | AHD2459 | 09603005B | 1 |
| 103 | RING : RETAINING . 6MM (100 PCS/1 SET) | AHD7264 | 07200060E | 5 |
| 104 | SCREW : M3 x 6 (100 PCS/1 SET) | | 08011166 | 2 |

PAPERFEED MECHANISM

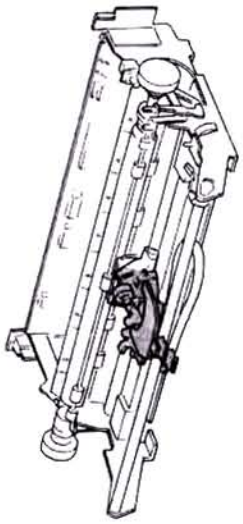




## PAPER FEED MECHANISM

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| 001 | PLATEN ASSEMBLY | ART-4407 | 87473350 | 1 |
| 002 | DEFLECTOR | ART-4408 | 87473016 | 1 |
| 003 | RESISTER PAWL | ART-4409 | 87473020 | 7 |
| 004 | HOLDER : RESISTER PAWL | ART-4410 | 87473019 | 1 |
| 005 | STUD · PAWL LEVER | AHC-1799 | 87473210 | 1 |
| 006 | SCREW : LATCH LEVER | AHD-2477 | 87473004 | 4 |
| 007 | BRACKET . FEED ROLLER | ART4406 | 87473006 | 4 |
| 008 | FEED ROLLER . REAR | ARA-0466 | 87473001 | 2 |
| 009 | SHAFT : PRESSURE | ART4405 | 87473007 | 2 |
| 010 | FEED ROLLER · FRONT | ARA-0465 | 87473003 | 2 |
| 011 | STOPPER : FEED ROLLER | ART-4402 | 87473008 | 2 |
| 012 | RESET ARM | ART-4403 | 87473013 | 1 |
| 013 | BAIL LEVER : L | ART-4404 | 87473018 | 1 |
| 014 | SPRING : PAPER BAIL · LH | ARB-7596 | 87473128 | 1 |
| 015 | BAIL ROLLER : PAPER | ARA-0464 | 87473033 | 3 |
| 016 | LEVER : BAIL . R | ART-4401 | 87473017 | 1 |
| 017 | SPRING : PAPER BAIL | ARB-7595 | 87473121 | 1 |
| 018 | GEAR IDLER : LF | ARA-0463 | 87473153 | 1 |
| 019 | SHAFT IDLER | | 87473137 | 1 |
| 020 | LATCH LEVER . LH | ART-4399 | 87473005 | 1 |
| 021 | LATCH LEVER : RH | ART-4400 | 87473032 | 1 |
| 022 | SPRING : LATCH LEVER | ARB-7594 | 87473120 | 2 |
| 023 | LEVER : RESISTER | ART-4396 | 87473207 | 1 |
| 024 | LEVER · AUTO FEED | ART-4397 | 87473030 | 1 |
| 025 | MOTOR : LF | | 87473154 | 1 |
| 026 | ARM : RELEASE | ARA-0461 | 87473026 | 1 |
| 027 | RESET ARM ASSEMBLY | ARA-0462 | 87473201 | 1 |
| 028 | SPRING : PENDULUM | ARB-7591 | 87473123 | 1 |
| 029 | SPRING : ARM | ARB-7592 | 87473125 | 1 |
| 030 | SPRING : AUTO FEED | ARB-7593 | 87473208 | 1 |
| 031 | SHAFT : PAPER BAIL | ART-4395 | 87473012 | 1 |
| 032 | ARM . MICRO SWITCH | ARA-0460 | 87473211 | 2 |
| 033 | SPRING . MICRO SW | ARB-7590 | 87473124 | 1 |
| 034 | STUD SPRING LEVER | AHC-1798 | 87473134 | 2 |
| 035 | SPACER . LF MOTOR | | 87473135 | 3 |
| 101 | SCREW : PHILIPS PAN HEAD : M3 x 6 (100 PCS/1 SET) | AHD2392 | 03130060B | 3 |
| 102 | SCREW : M3 x 12 (100 PCS/1 SET) | AHD2478 | 03130120B | 1 |
| 103 | BOLT : HEXAGON : M4 x 14 (100 PCS/1 SET) | | 05940140E | 1 |
| 104 | WASHER : FLAT : 4MM (100 PCS/1 SET) | AHD8543 | 07010040B | 1 |
| 105 | NUT : HEXAGON : M4 (100 PCS/1 SET) | AHD7224 | 07100040B | 2 |
| 106 | RING : RETAINING : 3MM (100 PCS/1 SET) | AHE0035 | 07200030E | 3 |
| 107 | RING : RETAINING : 5MM (100 PCS/1 SET) | AHE0036 | 07200050E | 2 |
| 108 | RING : RETAINING : 6MM (100 PCS/1 SET) | AHD7264 | 07200060E | 1 |
| 109 | SCREW : M3 x 6 (100 PCS/1 SET) | | 08011166 | 1 |
| 110 | SCREW : M4 x 12 (100 PCS/1 SET) | | 09604012B | 2 |
| 111 | SCREW : M4 x 30 (100 PCS/1 SET) | | 03140300B | 1 |

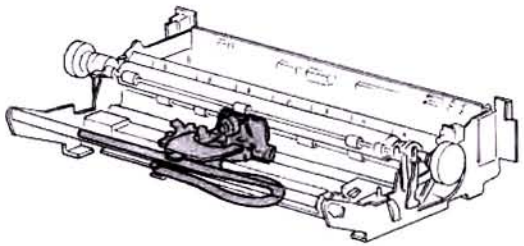
CARRIAGE BASE ASSEMBLY

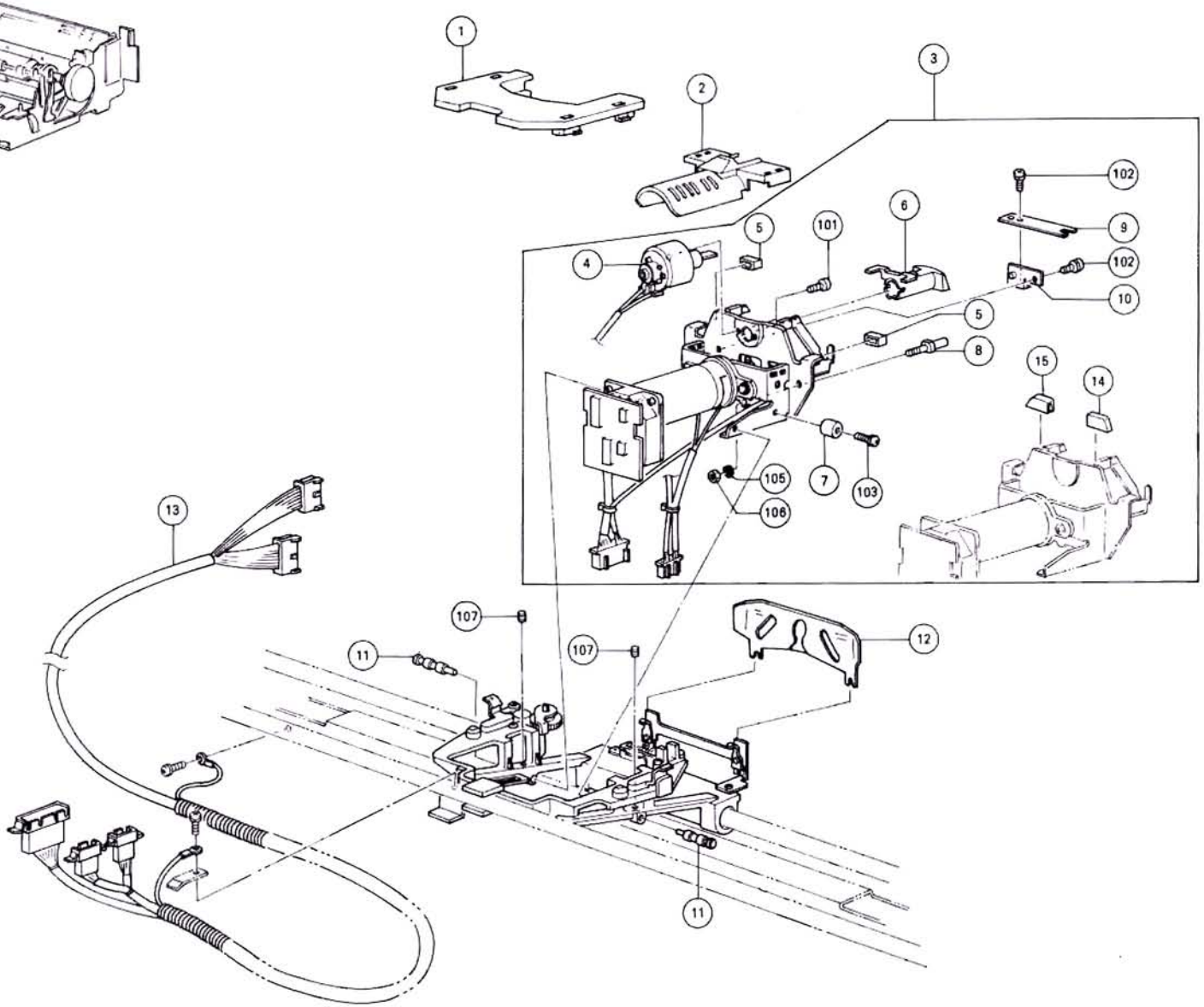


## CARRIAGE BASE ASSEMBLY

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| 001 | CARRIAGE BASE ASSEMBLY | | 87472031 | 1 |
| 002 | RIBBON FEED ASSEMBLY | ART-4392 | 87472340 | 1 |
| 003 | FRAME . CARRIER | ART-4387 | 87472033 | 1 |
| 004 | CLAMP . CARTRIDGE : L | AHC-1792 | 87472200 | 1 |
| 005 | CLAMP : CARTRIDGE . R | AHC-1793 | 87472201 | 1 |
| 006 | SPRING . CARRIAGE SET | ARB-7588 | 87472013 | 1 |
| 007 | HOOK : CARRIAGE SET ASSEMBLY | ART-4386 | 87472005 | 1 |
| 008 | WIRE CLAMP | AHC-1790 | 87472014 | 1 |
| 009 | DAMPER CARTRIDGE | AHC-1791 | 87472203 | 2 |
| 010 | FELT COVER : R | ART-4385 | 87471138 | 1 |
| 011 | FELT COVER . L | ART-4384 | 87471139 | 1 |
| 012 | FELT | AHC-1789 | 87471129 | 2 |
| 013 | PCB ASSEMBLY · PHOTO SENSOR | AX-9277 | 87477031 | 1 |
| 014 | BRACKET : CARD GUIDE | ART-4383 | 87472001 | 1 |
| 015 | SPRING · CARD GUIDE | ARB-7587 | 87472004 | 2 |
| 016 | PLATE : CLAMP | AHC-1787 | 87472029 | 1 |
| 017 | CLAMP : CARRIER CABLE | AHC1788 | 87472028 | 1 |
| 018 | SUPPORTER . REAR | ART-4382 | 87471126 | 1 |
| 019 | DRIVE GEAR ASSEMBLY · R/F (NON-REPAIRABLE ASS'Y) | ARA-0459 | 87472345 | 1 |
| 020 | RATCHET ASSEMBLY (NON-REPAIRABLE ASS'Y) | ART-4381 | 87472330 | 1 |
| 021 | CE RING | AHC-1786 | 87472343 | 1 |
| 022 | KNOB : RIBBON FEED | AK-5101 | 87472342 | 1 |
| 023 | COVER : ROTARY MAG | ART-4380 | 87472344 | 1 |
| 024 | SPRING . LIFT | | 87472022 | 1 |
| 101 | SCREW : PHILIPS PAN HEAD . M3 x 6 (100 PCS/1 SET) | AHD2392 | 03130060B | 8 |
| 102 | SCREW : PHILIPS SUNK HEAD : M3 x 6 (100 PCS/1 SET) | AHD2471 | 03230060B | 1 |
| 104 | RING : RETAINING : 3MM (100 PCS/1 SET) | AHE0035 | 07200030E | 1 |
| 105 | SCREW : M3 x 6 (100 PCS/1 SET) | AHD2475 | 03130500B | 1 |
| 106 | WASHER · PHILIPS SCREW WITH LOCK . M3 x 6 (100 PCS/1 SET) | | 09503006B | 8 |
| 107 | SCREW · M3 x 14 (100 PCS/1 SET) | | 08011202 | 2 |
| 108 | SCREW · M3 x 8 (100 PCS/1 SET) | | 08011167 | 3 |

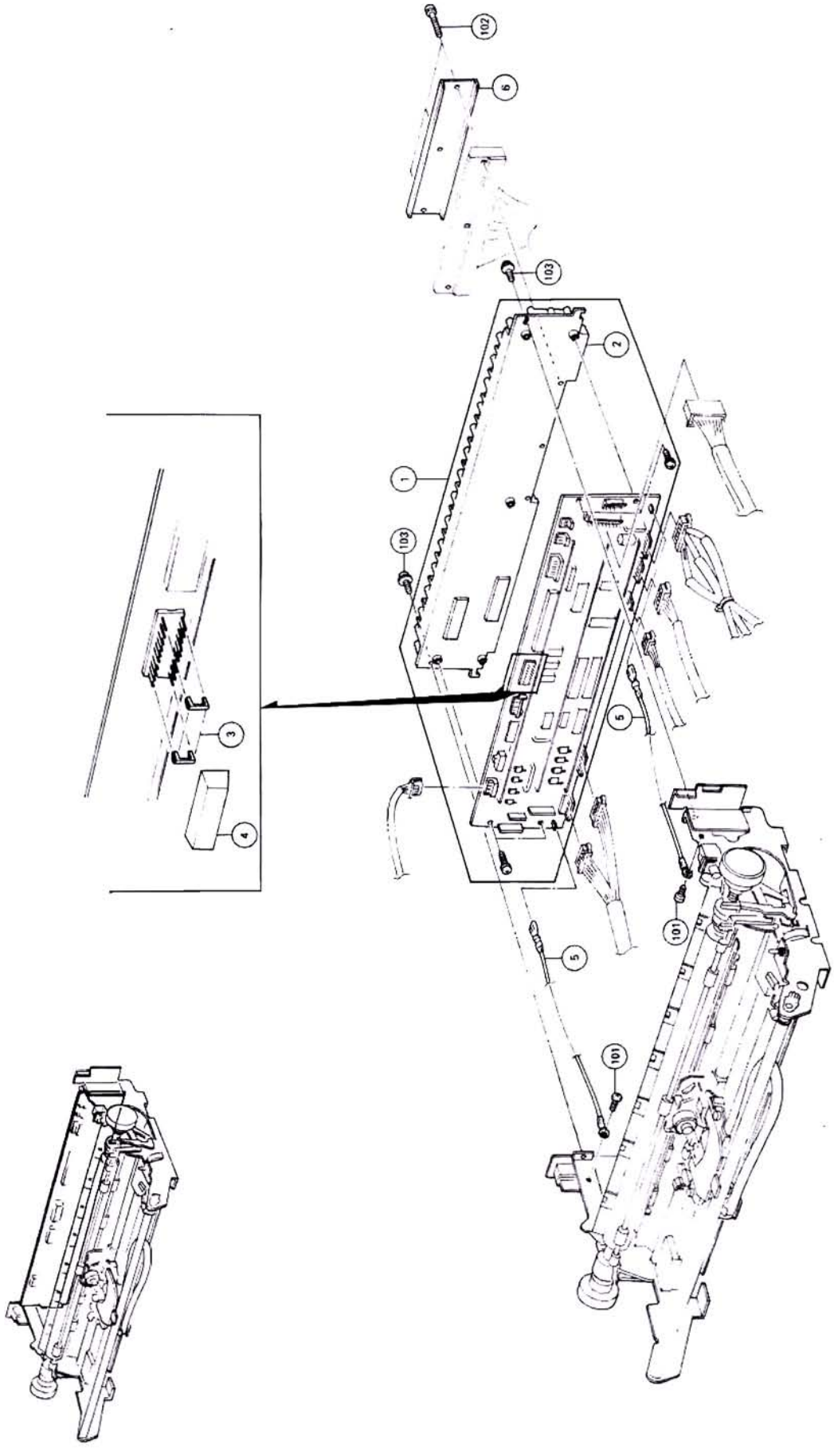
CARRIAGE ASSEMBLY





## CARRIAGE ASSEMBLY

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| 001 | COVER : CARRIAGE | ART-4393 | 87472021 | 1 |
| 002 | MOTOR COVER | ART-4394 | 87472020 | 1 |
| 003 | CARRIAGE SUB ASSEMBLY | AXX-5037 | 87472130 | 1 |
| 004 | HAMMER ASSEMBLY (NON-REPAIRABLE ASS'Y) | ART-4391 | 87472600 | 1 |
| 005 | RIBBON STOPPER | AHC-1794 | 87472126 | 2 |
| 006 | WHEEL PROTECTOR | AHC-1795 | 87472110 | 1 |
| 007 | COLLAR · STOP | AHC-1796 | 87472111 | 1 |
| 008 | CARRIAGE LOCK | AHC-1797 | 87472012 | 1 |
| 009 | SPRING : SHIFT | ARB-7589 | 87472710 | 2 |
| 010 | STOPPER : BRACKET | ART-4388 | 87472125 | 1 |
| 011 | PIN · PIVOT | ART-4389 | 87472011 | 2 |
| 012 | CARD HOLDER ASSEMBLY | ART-4390 | 87454738 | 1 |
| 013 | CARRIAGE CABLE ASSEMBLY | AW-2882 | 87476506 | 1 |
| 014 | COVER : PLATE : RIGHT | | 87472128 | 1 |
| 015 | COVER : PLATE : LEFT | | 87472129 | 1 |
| 101 | SCREW · M2.5 x 4 (100 PCS/1 SET) | | 08011201 | 2 |
| 102 | SCREW · M3 x 6 (100 PCS/1 SET) | | 08011188 | 2 |
| 103 | SCREW : M3 x 10 (100 PCS/1 SET) | AHD2476 | 09503010B | 1 |
| 105 | WASHER : SPRING (100 PCS/1 SET) | AHD8628 | 07030030B | 1 |
| 106 | NUT : HEXAGON · M3 (100 PCS/1 SET) | AHD7225 | 07100030B | 1 |
| 107 | SCREW . HEXAGON HEADLESS SET : M3 x 3 (100 PCS/1 SET) | AHD2469 | 05530030E | 2 |




PCB ASSEMBLY

## PCB ASSEMBLY CONTROL BOARD (MECHANISM)

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| 001 | PCB ASSEMBLY : CONTROL BOARD | AX-9276 | 87477050 | 1 |
| 002 | HEAT SINK | | 87471058 | 1 |
| 003 | BIT SETTER : SHORT RECEPTACLE | AHC-1785 | 11031029 | 8 |
| 004 | BIT SETTER . COVER | ART-4379 | 11031030 | 1 |
| 005 | CABLE ASSEMBLY PCB-FG | AW-2881 | 87476508 | 2 |
| 006 | COVER . TRANSISTOR | ART4378 | 87471052 | 1 |
| 101 | SCREW : PHILIPS PAN HEAD . M4 x 6 (100 PCS/1 SET) | AHD2396 | 03140060B | 2 |
| 102 | SCREW · PHILIPS PAN HEAD : M3 x 10 (100 PCS/1 SET) | | 03130100B | 3 |
| 103 | SCREW . M3 x 6 (100 PCS/1 SET) | AHD2460 | 09603006B | 2 |

## PCB ASSEMBLY : CONTROL BOARD (ELECTRICAL)

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| | PCB ASSEMBLY : CONTROL BOARD | AX-9276 | 87477050 | 1 |
| | **RESISTORS** | | | |
| R1 | 180Ω ±5% 1/4W : CARBON FILM | AN0144EEC | 16114181 | 1 |
| R2 | 4.7KΩ ±5% 1/4W : CARBON FILM | AN0247EEC | 16114472 | 1 |
| R3 | 2.61KΩ ±1% 1/8W : RES. | AN0662BEE | 16012813 | 1 |
| R4 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R5 | 0.5Ω ±1% 2W . WINDING | AN0010BHH | 16000912 | 1 |
| R6 | 5.1Ω ±5% 1W : METAL FILM | AN0048EGE | 16000337 | 1 |
| R7 | 20Ω ±5% 1/4W : CARBON FILM | AN0077EEC | 16114200 | 1 |
| R8 | 20Ω ±5% 1/4W · CARBON FILM | AN0077EEC | 16114200 | 1 |
| R9 | 0.2Ω ±3% 1W : WINDING | AN0002DGH | 16000910 | 1 |
| R10 | 0.2Ω ±3% 1W : WINDING | AN0002DGH | 16000910 | 1 |
| R11 | 22KΩ ±2% 1/4W : CARBON FILM | AN0311CEC | 16013824 | 1 |
| R12 | 39KΩ ±2% 1/4W : CARBON FILM | AN0330CEC | 16013825 | 1 |
| R13 | 1KΩ ±2% 1/4W : CARBON FILM | AN0196CEC | 16012777 | 1 |
| R14 | 39KΩ ±2% 1/4W : CARBON FILM | AN0330CEC | 16013825 | 1 |
| R15 | 180KΩ ±5% 1/4W . CARBON FILM | AN0387EEC | 16114184 | 1 |
| R16 | 680Ω ±5% 1/4W : CARBON FILM | AN0183EEC | 16114681 | 1 |
| R17 | 7.5KΩ ±5% 1/4W : CARBON FILM | AN0266EEC | 16114752 | 1 |
| R18 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R19 | 270KΩ ±5% 1/4W : CARBON FILM | AN0402EEC | 16114274 | 1 |
| R20 | 3.9KΩ ±2% 1/4W : CARBON FILM | AN0237CEC | 16012778 | 1 |
| R21 | 100Ω ±5% 1/4W · CARBON FILM | AN0132EEC | 16114101 | 1 |
| R22 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R23 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R24 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R25 | 1KΩ ±5% 1/4W . CARBON FILM | AN0196EEC | 16114102 | 1 |
| R26 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R27 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R28 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R29 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R30 | 1KΩ ±5% 1/4W . CARBON FILM | AN0196EEC | 16114102 | 1 |
| R31 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R32 | 1.5KΩ ±5% 1/4W : CARBON FILM | AN0206EEC | 16114152 | 1 |
| R33 | 1.96KΩ ±1% 1/4W : METAL FILM | AN0663BEE | 16221961 | 1 |
| R34 | 18KΩ ±5% 1/4W · CARBON FILM | | 16114183 | 1 |
| R35 | 470Ω ±5% 1/4W : CARBON FILM | AN0169EEC | 16114471 | 1 |

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| R36 | 220Ω ±5% 1/2W : CARBON FILM | AN0149EFC | 16116221 | 1 |
| R37 | 270Ω ±5% 1/2W : CARBON FILM | AN0155EFC | 16116271 | 1 |
| R38 | 470Ω ±5% 1/4W : CARBON FILM | AN0169EEC | 16114471 | 1 |
| R39 | 470Ω ±5% 1/4W : CARBON FILM | AN0169EEC | 16114471 | 1 |
| R40 | 220Ω ±5% 1/2W : CARBON FILM | AN0149EFC | 16116221 | 1 |
| R41 | 270Ω ±5% 1/2W : CARBON FILM | AN0155EFC | 16116271 | 1 |
| R42 | 470Ω ±5% 1/4W : CARBON FILM | AN0169EEC | 16114471 | 1 |
| R43 | 4.3KΩ ±2% 1/4W : CARBON FILM | AN0243CEC | 16012782 | 1 |
| R44 | 470KΩ ±5% 1/4W : CARBON FILM | AN0423EEC | 16114474 | 1 |
| R45 | 15KΩ ±5% 1/4W : CARBON FILM | AN0297EEC | 16114153 | 1 |
| R46 | 4.7KΩ ±5% 1/4W : CARBON FILM | AN0247EEC | 16114472 | 1 |
| R47 | 2.2KΩ ±5% 1/4W : CARBON FILM | AN0216EEC | 16114222 | 1 |
| R48 | 22.1KΩ ±1% 1/4W : METAL FILM | | 16222212 | 1 |
| R49 | 1KΩ ±2% 1/4W : CARBON FILM | AN0196CEC | 16012777 | 1 |
| R50 | 100KΩ ±5% 1/4W : CARBON FILM | AN0371EEC | 16114104 | 1 |
| R51 | 2.2KΩ ±5% 1/4W : CARBON FILM | AN0216EEC | 16114222 | 1 |
| R52 | 7.5KΩ ±2% 1/4W : CARBON FILM | AN0266CEC | 16012783 | 1 |
| R53 | 7.5KΩ ±5% 1/4W : CARBON FILM | AN0266EEC | 16114752 | 1 |
| R54 | 4.7KΩ ±5% 1/4W : CARBON FILM | AN0247EEC | 16114472 | 1 |
| R55 | 470KΩ ±5% 1/4W : CARBON FILM | AN0423EEC | 16114474 | 1 |
| R56 | 120Ω ±5% 1/4W : CARBON FILM | AN0375EEC | 16114121 | 1 |
| R57 | 240Ω ±5% 1/4W : CARBON FILM | | 16114241 | 1 |
| R58 | 475Ω ±1% 1/4W : METAL FILM | | 16224750 | 1 |
| R59 | 953Ω ±1% 1/4W : METAL FILM | | 16229530 | 1 |
| R60 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R61 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R62 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R63 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R64 | 3KΩ ±5% 1/4W : CARBON FILM | | 16114302 | 1 |
| R65 | 18KΩ ±5% 1/4W : CARBON FILM | | 16114183 | 1 |
| R66 | 0.47Ω ±5% 1W : METAL FILM | AN0593EGE | 16000239 | 1 |
| R67 | 0.47Ω ±5% 1W : METAL FILM | AN0593EGE | 16000239 | 1 |
| R68 | 150Ω ±5% 1/4W : CARBON FILM | AN0142EEC | 16114151 | 1 |
| R69 | 150Ω ±5% 1/2W : CARBON FILM | AN0142EEC | 16116151 | 1 |
| R70 | 150Ω ±5% 1/4W : CARBON FILM | AN0142EEC | 16114151 | 1 |
| R71 | 150Ω ±5% 1/2W : CARBON FILM | AN0142EEC | 16116151 | 1 |
| R72 | 100KΩ ±5% 1/4W : CARBON FILM | AN0371EEC | 16114104 | 1 |
| R73 | 1KΩ ±2% 1/4W : CARBON FILM | AN0196CEC | 16012777 | 1 |
| R74 | 16.5KΩ ±1% 1/4W : METAL FILM | | 16221652 | 1 |

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| R75 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R76 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R77 | 7.5KΩ ±5% 1/4W : CARBON FILM | AN0266EEC | 16114752 | 1 |
| R78 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R79 | 270KΩ ±5% 1/4W : CARBON FILM | AN0402EEC | 16114274 | 1 |
| R80 | 1KΩ ±2% 1/4W : CARBON FILM | AN0196CEC | 16012777 | 1 |
| R81 | 180KΩ ±5% 1/4W : CARBON FILM | AN0387EEC | 16114184 | 1 |
| R82 | 100Ω ±5% 1/4W : CARBON FILM | AN0132EEC | 16114101 | 1 |
| R83 | 3.9KΩ ±2% 1/4W : CARBON FILM | AN0237CEC | 16012778 | 1 |
| R84 | 39KΩ ±2% 1/4W : CARBON FILM | AN0330CEC | 16013825 | 1 |
| R85 | 39KΩ ±2% 1/4W : CARBON FILM | AN0330CEC | 16013825 | 1 |
| R86 | 22KΩ ±2% 1/4W : CARBON FILM | AN0311CEC | 16013824 | 1 |
| R87 | 180Ω ±5% 1/4W : CARBON FILM | AN0144EEC | 16114181 | 1 |
| R88 | 360Ω ±5% 1/4W : CARBON FILM | AN0519EEC | 16114361 | 1 |
| R89 | 715Ω ±1% 1/4W : METAL FILM | | 16227150 | 1 |
| R90 | 1.43KΩ ±1% 1/4W : METAL FILM | | 16221431 | 1 |
| R91 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R92 | 220Ω ±5% 1/4W : CARBON FILM | AN0149EEC | 16114221 | 1 |
| R93 | 560Ω ±5% 1/4W : CARBON FILM | AN0176EEC | 16114561 | 1 |
| R94 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R95 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R96 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R97 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R98 | 3KΩ ±5% 1/4W : CARBON FILM | | 16114302 | 1 |
| R99 | 33Ω ±5% 1/4W : CARBON FILM | AN0324EEC | 16114330 | 1 |
| R100 | 33Ω ±5% 1/4W : CARBON FILM | AN0324EEC | 16114330 | 1 |
| R101 | 150Ω ±5% 1/4W : CARBON FILM | AN0142EEC | 16114151 | 1 |
| R102 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R103 | 4.7KΩ ±5% 1/4W : CARBON FILM | AN0247EEC | 16114472 | 1 |
| R104 | 4.7KΩ ±5% 1/4W : CARBON FILM | AN0247EEC | 16114472 | 1 |
| R105 | 3.3KΩ ±5% 1/4W : CARBON FILM | | 16114332 | 1 |
| R106 | 3.3KΩ ±5% 1/4W : CARBON FILM | | 16114332 | 1 |
| R107 | 3.3KΩ ±5% 1/4W : CARBON FILM | | 16114332 | 1 |
| R108 | 3.3KΩ ±5% 1/4W : CARBON FILM | | 16114332 | 1 |
| R109 | 3.3KΩ ±5% 1/4W : CARBON FILM | | 16114332 | 1 |
| R110 | 3.3KΩ ±5% 1/4W : CARBON FILM | | 16114332 | 1 |
| R111 | 3.3KΩ ±5% 1/4W : CARBON FILM | | 16114332 | 1 |
| R112 | 3.3KΩ ±5% 1/4W : CARBON FILM | | 16114332 | 1 |
| R113 | 3.3KΩ ±5% 1/4W : CARBON FILM | | 16114332 | 1 |

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| R114 | 120Ω ±5% 1/4W : CARBON FILM | AN0375EEC | 16114121 | 1 |
| AR1 | EXB-L88511G : ARRAY | ARX-0309 | 87476700 | 1 |
| AR2 | 10KΩ 1/8W 8 ELEMENTS : ARRAY | ARX0201 | 16013540 | 1 |
| AR3 | 1KΩ ±10% 8 ELEMENTS : ARRAY | ARX0200 | 16022591 | 1 |
| AR4 | EXB-L88511G : ARRAY | ARX-0309 | 87476700 | 1 |
| AR5 | 4.7KΩ 1/8W 9 ELEMENTS : ARRAY | ARX-0310 | 16017180 | 1 |
| AR6 | 4.7KΩ 1/8W 9 ELEMENTS : ARRAY | ARX-0310 | 16017180 | 1 |
| AR10 | 10KΩ 1/8W 8 ELEMENTS : ARRAY | ARX0201 | 16013540 | 1 |
| AR11 | 10KΩ 1/8W 5 ELEMENTS : ARRAY | ARX-0311 | 16017192 | 1 |
| AR12 | 1K/150Ω : ARRAY | ARX-0308 | 87476702 | 1 |
| | **CAPACITORS** | | | |
| C1 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C2 | 8200PF ±20% 50V : FILM | ACC822MJMP | 16060872 | 1 |
| C3 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C4 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C5 | 1000PF ±10% 50V : CERAMIC | ACC102KJCP | 16060874 | 1 |
| C6 | 1000PF ±10% 50V : CERAMIC | ACC102KJCP | 16060874 | 1 |
| C7 | 470PF ±10% 50V : CERAMIC | ACC471KJCP | 16060688 | 1 |
| C8 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C9 | 1000PF ±10% 50V : CERAMIC | ACC102KJCP | 16060874 | 1 |
| C10 | 1000PF ±10% 50V : CERAMIC | ACC102KJCP | 16060874 | 1 |
| C11 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C12 | 10μF ±20% 16V : ELECTROLYTIC | ACC106MDAP | 16041098 | 1 |
| C13 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C14 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C15 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C16 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C17 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C18 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C19 | 10μF ±20% 16V : ELECTROLYTIC | ACC106MDAP | 16041098 | 1 |
| C20 | 22μF ±20% 10V : ELECTROLYTIC | ACC226MCAP | 16041099 | 1 |
| C21 | 47μF 50V : ELECTROLYTIC | ACC476ZJAP | 16040329 | 1 |
| C22 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C23 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C24 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C25 | 150PF ±10% 50V : CERAMIC | ACC151KJCP | 16060352 | 4 |
| C26 | 150PF ±10% 50V : CERAMIC | ACC151KJCP | 16060352 | 1 |

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| C27 | 150PF ±10% 50V : CERAMIC | ACC151KJCP | 16060352 | 1 |
| C28 | 150PF ±10% 50V : CERAMIC | ACC151KJCP | 16060352 | 1 |
| C29 | 0.022μF ±2% 100V : POLYPROPYLENE | ACC223GLHP | 16060838 | 1 |
| C30 | 0.1μF ±20% 25V : CERAMIC | ACC104MFCP | 16060904 | 1 |
| C31 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C32 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C33 | 1000PF ±10% 50V : CERAMIC | ACC102KJCP | 16060874 | 1 |
| C34 | 6800PF ±2% 100V : POLYPROPYLENE | ACC682GLHP | 16060837 | 1 |
| C35 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C36 | 3300PF ±10% 50V : FILM | ACC332KJMP | 16060869 | 1 |
| C37 | 68PF ±5% 50V : CERAMIC | ACC680JJCP | 16060323 | 1 |
| C38 | 0.022μF ±2% 100V : POLYPROPYLENE | ACC223GLHP | 16060838 | 1 |
| C39 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C40 | 10μF ±20% 16V : ELECTROLYTIC | ACC106MDAP | 16041098 | 1 |
| C41 | 10μF ±20% 16V : ELECTROLYTIC | ACC106MDAP | 16041098 | 1 |
| C42 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C43 | 10μF ±20% 16V : ELECTROLYTIC | ACC106MDAP | 16041098 | 1 |
| C44 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C45 | 10μF ±20% 16V : ELECTROLYTIC | ACC106MDAP | 16041098 | 1 |
| C46 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C47 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C48 | 22μF -10 to +50% 25V : ELECTROLYTIC | ACC226WFAP | 16040322 | 1 |
| C49 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C50 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C51 | 0.22μF ±10% 50V : ELECTROLYTIC | ACC564KJAP | 16041133 | 1 |
| C52 | 0.22μF ±10% 50V : ELECTROLYTIC | ACC564KJAP | 16041133 | 1 |
| C53 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C54 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C55 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C57 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C58 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C60 | 0.022μF ±2% 100V : POLYPROPYLENE | ACC223GLHP | 16060838 | 1 |
| C61 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C62 | 6800PF ±2% 100V : POLYPROPYLENE | ACC682GLHP | 16060837 | 1 |
| C63 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C64 | 3300PF ±10% 50V : FILM | ACC332KJMP | 16060869 | 1 |
| C65 | 0.022μF ±2% 100V : POLYPROPYLENE | ACC223GLHP | 16060838 | 1 |
| C66 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C67 | 68PF ±5% 50V : CERAMIC | ACC680JJCP | 16060323 | 1 |

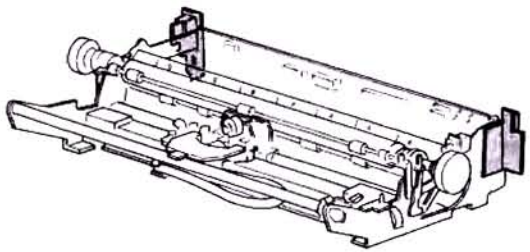
| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| C68 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C69 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C70 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C72 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C73 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C74 | 10μF ±20% 16V : ELECTROLYTIC | ACC106MDAP | 16041098 | 1 |
| C75 | 0.1μF -20 to +80% 25V . CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C76 | 0.01μF -20 to +80% 50V . CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C77 | 220μF -10 to +50% 25V ELECTROLYTIC | ACC227WFAP | 16040356 | 1 |
| C78 | 220μF -10 to +50% 25V ELECTROLYTIC | ACC227WFAP | 16040356 | 1 |
| C79 | 10μF ±20% 16V : ELECTROLYTIC | ACC106MDAP | 16041098 | 1 |
| C80 | 10μF ±20% 16V : ELECTROLYTIC | ACC106MDAP | 16041098 | 1 |
| C81 | 33PF 50V · CERAMIC | | 16060522 | 1 |
| C82 | 10μF ±20% 16V : ELECTROLYTIC | ACC106MDAP | 16041098 | 1 |
| C83 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C84 | 22μF -10 to +50% 25V : ELECTROLYTIC | ACC226WFAP | 16040322 | 1 |
| C85 | 0.01μF -20 to +80% 50V . CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C86 | 0.01μF -20 to +80% 50V : CERAMIC | ACC1032ZJCP | 16060879 | 1 |
| C87 | 0.1μF -20 to +80% 25V . CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C88 | 470PF ±10% 50V : CERAMIC | ACC471KJCP | 16060688 | 1 |
| C89 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C90 | 0.1μF -20 to +80% 25V : CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C91 | 1000PF ±10% 50V : CERAMIC | ACC102KJCP | 16060874 | 1 |
| C92 | 1000PF ±10% 50V : CERAMIC | ACC102KJCP | 16060874 | 1 |
| C93 | 470PF ±10% 50V · CERAMIC | ACC471KJCP | 16060688 | 1 |
| C94 | 1000PF ±10% 50V : CERAMIC | ACC102KJCP | 16060874 | 1 |
| C95 | 1000PF ±10% 50V : CERAMIC | ACC102KJCP | 16060874 | 1 |
| C96 | 0.1μF ±20% 25V : CERAMIC | ACC104MFCP | 16060904 | 1 |
| C97 | 22PF ±10% 50V . CERAMIC | ACC220KJCP | 16060346 | 1 |
| C98 | 22PF ±10% 50V : CERAMIC | ACC220KJCP | 16060346 | 1 |
| C101 | 3300PF ±10% 50V · FILM | ACC332KJMP | 16060869 | 1 |
| C102 | 3300PF ±10% 50V · FILM | ACC332KJMP | 16060869 | 1 |
| C103 | 470PF ±10% 50V . CERAMIC | ACC471KJCP | 16060688 | 1 |
| C104 | 8200PF ±20% 50V : FILM | ACC822MJMP | 16060872 | 1 |
| C105 | 0.1μF -20 to +80% 25V . CERAMIC | ACC104ZFCP | 16060876 | 1 |
| C106 | 1000PF ±10% 50V . CERAMIC | ACC102KJCP | 16060874 | 1 |
| C107 | 1000PF ±10% 50V · CERAMIC | ACC102KJCP | 16060874 | 1 |

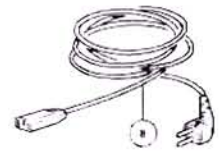
| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| C108 | 10μF ±20% 16V : ELECTROLYTIC | ACC106MDAP | 16041098 | 1 |
| C109 | 10μF ±20% 16V : ELECTROLYTIC | ACC106MDAP | 16041098 | 1 |
| C110 | 470PF ±10% 50V : CERAMIC | ACC471KJCP | 16060688 | 1 |
| C112 | 100PF ±5% 50V CERAMIC | | 16060853 | 1 |
| | **CONNECTORS** | | | |
| CN0/1 | 10P : 171825-0 | AJ-7219 | 11001095 | 1 |
| CN0/2 | 9P · 171825-9 | AJ-7220 | 11001094 | 1 |
| CN0/3 | 3P : 171825-3 | AJ-7221 | 11001090 | 1 |
| CN0/4 | 7P : 171825-7 | AJ-7222 | 11030832 | 1 |
| CN0/5 | 8P : 171825-8 | AJ-7223 | 11030773 | 1 |
| CN0/7 | 9P : 5277-09A | AJ-7224 | 11031023 | 1 |
| CN0/8 | 5P · 5277-05 | AJ-7225 | 11031022 | 1 |
| CN0/9 | 4P : 171826-4 | AJ-7226 | 11021172 | 1 |
| CN0/11 | 5P · 171826-5 | AJ-7227 | 11021173 | 1 |
| CN0/12 | 40P : FCN-705P040-AU/N | AJ-7229 | 11031118 | 1 |
| CN0/13 | 5P : 171826-5 | AJ-7227 | 11021173 | 1 |
| CN0/15 | 2P : 171826-2 | AJ-7228 | 11030779 | 1 |
| | **INDUCTORS** | | | |
| L1 | CHOKING COIL 30μH : SF-T8-30S | ACA8126 | 12010039 | 1 |
| L2 | CHOKING COIL 82μH FS0810-820K | ACA8272 | 12010057 | 1 |
| L3 | CHOKING COIL 82μH : FS0810-820K | ACA8272 | 12010057 | 1 |
| | **I.C.'S** | | | |
| IC1 | TTL IC : SN75189AN | AMX4509 | 14070825 | 1 |
| IC2 | HYBRID IC : HAM DRV : HA1212 | AMX-5232 | 87476820 | 1 |
| IC3 | ANALOG IC RSC-1 | AMX-5231 | 87476805 | 1 |
| IC4 | MASK ROM . COM MASTER : 8048 | | 87476827 | 1 |
| IC5 | TTL IC : SN74LS04N | | 14070539 | 1 |
| IC6 | MASK ROM : COM LF · 8041 | AMX-5235 | 87476823 | 1 |
| IC7 | TTL IC : SN74LS04N | | 14070539 | 1 |
| IC8 | TTL IC : SN74LS08N | AMX3698 | 14070621 | 1 |
| IC9 | TTL IC . SN74LS107N | AMX3703 | 14070710 | 1 |
| IC10 | HYBRID IC : POW MONITOR DV-1401 | AMX4681 | 87456706 | 1 |
| IC11 | TTL IC : SN75452P | AMX-3573 | 14070354 | 1 |

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| IC12 | ANALOG IC · RSC-2 | AMX-5238 | 87476806 | 1 |
| IC13 | MASK ROM : COM SP : 8041 | AMX-5234 | 87476822 | 1 |
| IC14 | TTL IC · SN74LS08N | AMX3698 | 14070621 | 1 |
| IC15 | TTL IC : SN74LS174N | AMX3565 | 14070700 | 1 |
| IC16 | TTL IC : 8212 | | 14080287 | 1 |
| IC17 | HYBRID IC : LF DRV DV-1405 | AMX4518 | 87456705 | 1 |
| IC18 | HYBRID IC · SERVO HOLD DV-1404 | AMX4517 | 87456707 | 1 |
| IC19 | HYBRID IC : MAG DRV DV-1403 | AMX4516 | 87456704 | 1 |
| IC20 | TTL IC : SN74LS26N | | 14071127 | 1 |
| IC21 | HA17458 · OP AMP | AMX4979 | 14080098 | 1 |
| IC22 | HYBRID IC · SERVO HOLD DV-1404 | AMX4517 | 87456707 | 1 |
| IC23 | ANALOG IC · RSC-2 | AMX-5238 | 87476806 | 1 |
| IC24 | LSI : A5X02-001 | AMX-5230 | 87476800 | 1 |
| IC25 | MASK ROM TANDY : 8049 | AMX-5236 | 87476865 | 1 |
| IC26 | TTL IC : SN74LS04N | | 14070539 | 1 |
| IC27 | TTL IC : SN74LS04N | | 14070539 | 1 |
| IC28 | TTL IC : SN7416N | | 14070175 | 1 |
| IC30 | TTL IC : SN74LS14N | AMX4526 | 14070760 | 1 |
| IC31 | TTL IC : SN74LS09N | AMX4510 | 14070836 | 1 |
| IC32 | TTL IC : SN74LS26N | | 14071127 | 1 |
| IC33 | ANALOG IC . RSC-1 | AMX-5231 | 87476805 | 1 |
| IC34 | TTL IC : SN75452P | AMX-3573 | 14070354 | 1 |
| | **DIODES** | | | |
| D1 | RGP10A | ADX1455 | 14020306 | 1 |
| D2 | 1S1588 . SILICON | ADX1304 | 14010611 | 1 |
| D3 | 1S1588 · SILICON | ADX1304 | 14010611 | 1 |
| D4 | 1N4001 | ADX1221 | 14020305 | 1 |
| D5 | 1N4001 | ADX1221 | 14020305 | 1 |
| D6 | 1N4001 | ADX1221 | 14020305 | 1 |
| D7 | 1N4001 | ADX1221 | 14020305 | 1 |
| D8 | 1S1588 · SILICON | ADX1304 | 14010611 | 1 |
| D9 | 1S1588 : SILICON | ADX1304 | 14010611 | 1 |
| D10 | 1N4001 | ADX1221 | 14020305 | 1 |
| D11 | 1N4001 | ADX1221 | 14020305 | 1 |
| D12 | 1S1588 · SILICON | ADX1304 | 14010611 | 1 |
| D13 | 1S1588 : SILICON | ADX1304 | 14010611 | 1 |
| D14 | 1N4001 | ADX1221 | 14020305 | 1 |

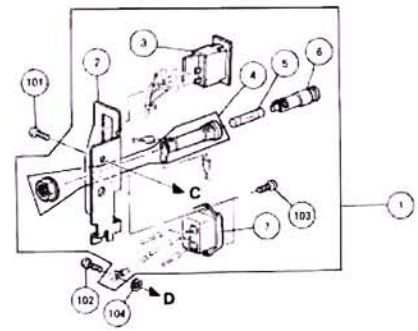
| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| D16 | TLR102 | ADX0496 | 14030034 | 1 |
| ZD1 | HZ5C1 . ZENER | ADX1451 | 14020299 | 1 |
| ZD2 | RD10FB : ZENER | ADX-1785 | 14010805 | 1 |
| ZD3 | RD9.1EB3 : ZENER | ADX1453 | 14010784 | 1 |
| ZD4 | RD4.7EB1 · ZENER | ADX1452 | 14010783 | 1 |
| | **TRANSISTORS** | | | |
| Q1 | TIP125 | AMX4466 | 14010233 | 1 |
| Q2 | TIP120 | AMX4195 | 14010232 | 1 |
| Q3 | TIP125 | AMX4466 | 14010233 | 1 |
| Q4 | TIP120 | AMX4195 | 14010232 | 1 |
| Q5 | 2SA844C | AA2SA844C | 14000258 | 1 |
| Q6 | 2SC1345 | AA2SC1345 | 14000288 | 1 |
| Q7 | 2SA844C | AA2SA844C | 14000258 | 1 |
| Q8 | 2SC1345 | AA2SC1345 | 14000288 | 1 |
| Q9 | 2SB596-Y | AA2SB596Y | 14010096 | 1 |
| Q10 | 2SD526-Y | AA2SD526Y | 14010091 | 1 |
| Q11 | 2SB596-Y | AA2SB596Y | 14010096 | 1 |
| Q12 | 2SD526-Y | AA2SD526Y | 14010091 | 1 |
| | **MISCELLANEOUS** | | | |
| BS1-8 | BIT SETTER : BASE | | 11031031 | 1 |
| SW1 | SLIDE SWITCH : SS-12ZP-03P | AS1467 | 12040882 | 1 |
| | TAB TERMINAL 61907-1 | AHC0242 | 11000984 | 2 |
| XTAL1 | CRYSTAL OSCILLATOR 6MHZ . NC18C | AMX-5228 | 15030026 | 1 |

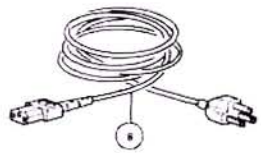
POWER BRACKET ASSEMBLY &
I/F BRACKET ASSEMBLY

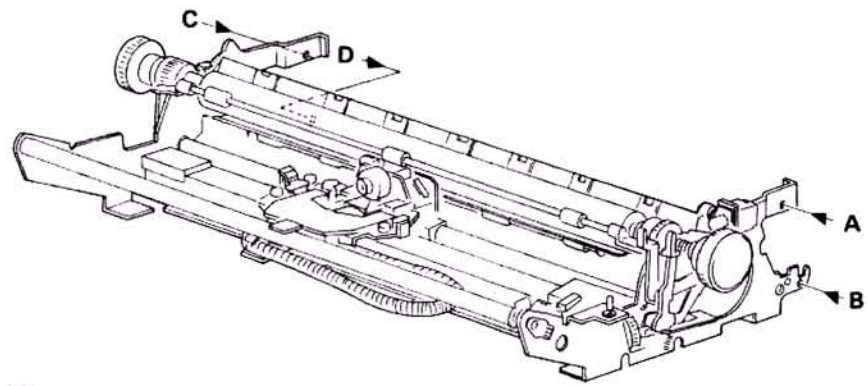




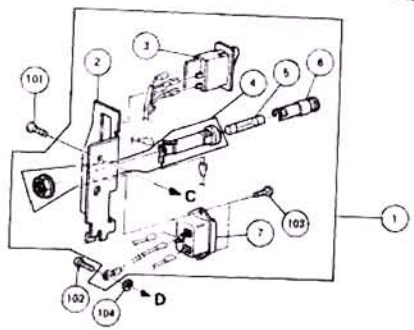
200 V Series

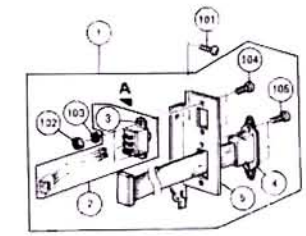





100 V Series



## I/F BRACKET ASSEMBLY

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| 001 | CN BRACKET ASSEMBLY | | 87471012 | 1 |
| 002 | I/F CABLE ASSEMBLY | AW-2888 | 87476524 | 1 |
| 003 | TEST SW ASSEMBLY | AS-2802 | 87476525 | 1 |
| 004 | SLIDE SWITCH (TEST SWITCH) | AS-2803 | 12040429 | 1 |
| 005 | CN BRACKET | ART4426 | 87471097 | 1 |
| 101 | SCREW : PHILIPS PAN HEAD : M3 x 6 (100 PCS/1 SET) | | 03130060B | 1 |
| 102 | NUT : HEXAGON : M2.5 (100 PCS/1 SET) | AHD7257 | 07100025B | 2 |
| 103 | WASHER : 2.6MM (100 PCS/1 SET) | AHD7263 | 07030026B | 2 |
| 104 | SCREW : M2.5 x 6 (100 PCS/1 SET) | AHD2456 | 08000090 | 2 |
| 105 | SCREW : M3 x 8 (100 PCS/1 SET) | | 09503008B | 2 |

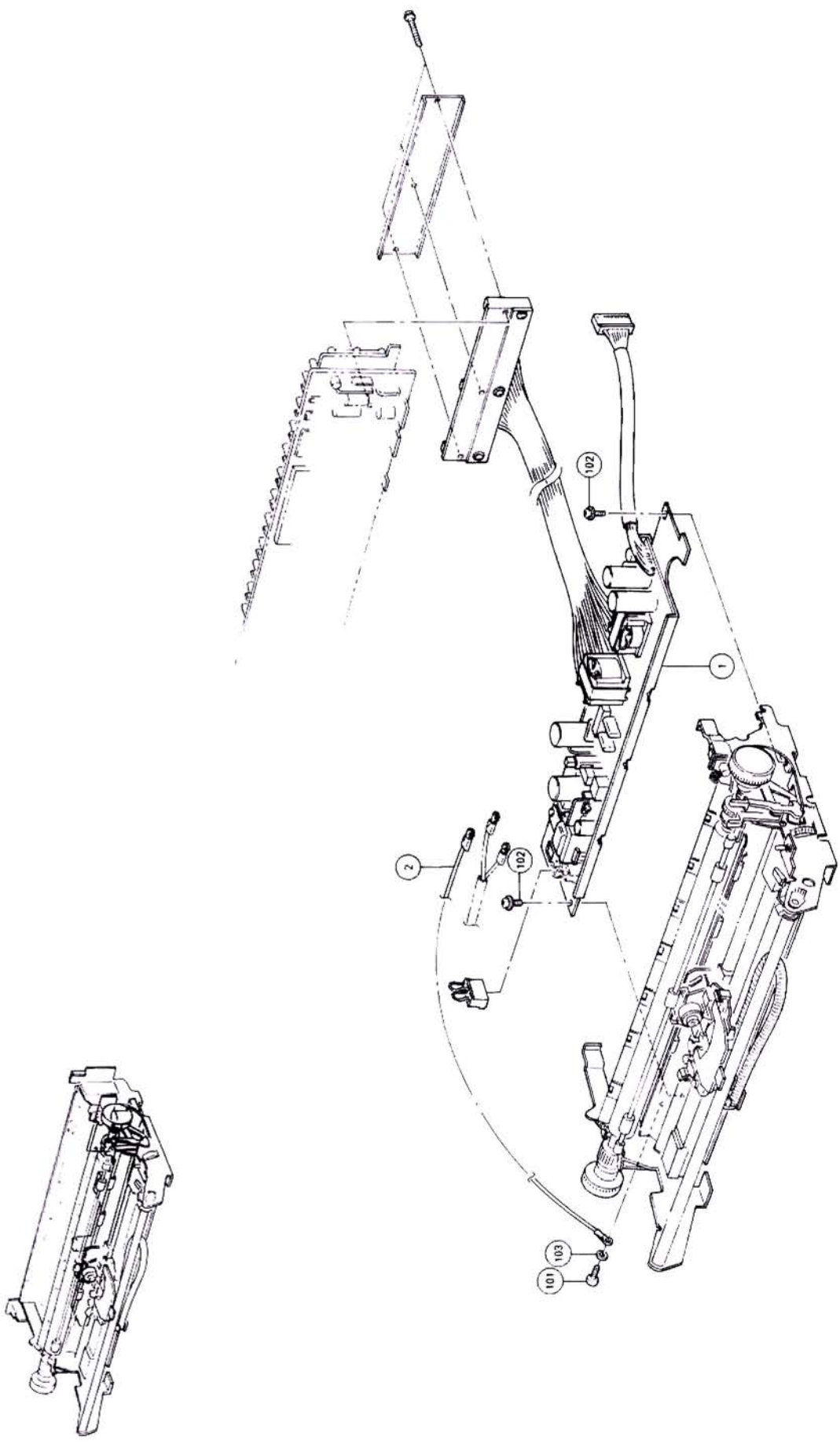
## POWER BRACKET ASSEMBLY : 100V SW

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| 001 | POWER BRACKET ASSEMBLY : 100V SW | | 87471014 | 1 |
| 002 | BRACKET : POWER | ART-4428 | 87471077 | 1 |
| 003 | SWITCH : ROCKER : 250V 16A | AS-2801 | 87476707 | 1 |
| 004 | HOLDER : FUSE | AHF-1250 | 11040301 | 1 |
| 005 | FUSE : ST6 125V 2A | AHF-1251 | 11070087 | 1 |
| 006 | FUSE CAP | AHF-1252 | 11040289 | 1 |
| 007 | FILTER : NOISE : FN323-3/01 | ACA8271 | 16020900 | 1 |
| 008 | AC CABLE : 125V 10A | AW-2887 | 88510676 | 1 |
| 101 | SCREW : PHILIPS PAN HEAD : M3 x 6 (100 PCS/1 SET) | AHD2392 | 03130060B | 1 |
| 102 | SCREW : PHILIPS PAN HEAD : M4 x 6 (100 PCS/1 SET) | AHD2396 | 03140060B | 1 |
| 103 | SCREW : M3 x 8 (100 PCS/1 SET) | | 09503008B | 2 |
| 104 | WASHER : 4MM (100 PCS/1 SET) | AHD7260 | 07040040B | 1 |

## POWER BRACKET ASSEMBLY : 200V SW

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| 001 | POWER BRACKET ASSEMBLY : 200V SW | | 87471060 | 1 |
| 002 | BRACKET : POWER | ART-4428 | 87471077 | 1 |
| 003 | SWITCH : ROCKER : 250V 16A | AS-2801 | 87476707 | 1 |
| 004 | HOLDER : FUSE | AHF-1250 | 11040301 | 1 |
| 005 | FUSE : ST6 2A | | 11070325 | 1 |
| 006 | FUSE CAP | | 11040311 | 1 |
| 007 | FILTER : NOISE : FN323-3/01 | ACA8271 | 16020900 | 1 |
| 008 | AC CABLE : 250V 6A | | 88510677 | 1 |
| 101 | SCREW : PHILIPS PAN HEAD : M3 x 6 (100 PCS/1 SET) | AHD2392 | 03130060B | 1 |
| 102 | SCREW : PHILIPS PAN HEAD : M4 x 6 (100 PCS/1 SET) | AHD2396 | 03140060B | 1 |
| 103 | SCREW : M3 x 8 (100 PCS/1 SET) | | 09503008B | 2 |
| 104 | WASHER : 4MM (100 PCS/1 SET) | AHD7260 | 07040040B | 1 |

POWER SUPPLY UNIT



## POWER SUPPLY UNIT (MECHANISM)

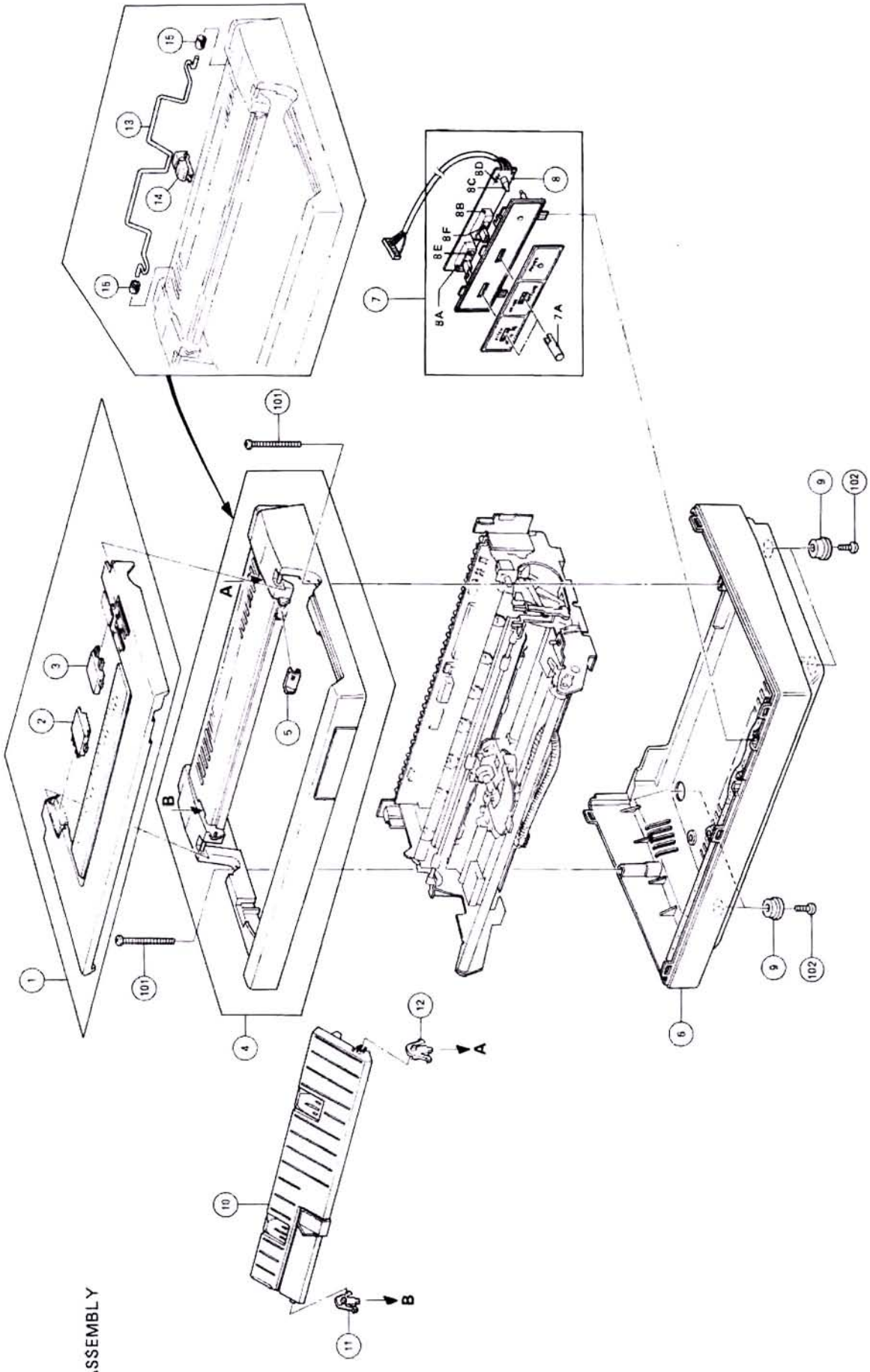
| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| 001 | POWER SUPPLY UNIT | AX-9278 | 80227014 | 1 |
| 002 | CABLE : PSU-FG | AW-2886 | 87476504 | 1 |
| 101 | SCREW : PHILIPS PAN HEAD : M4 x 6 (100 PCS/1 SET) | AHD2396 | 03140060B | 1 |
| 102 | SCREW : M3 x 6 (100 PCS/1 SET) | AHD2460 | 09603006B | 2 |
| 103 | WASHER : 4MM (100 PCS/1 SET) | AHD7260 | 07040040B | 1 |

## POWER SUPPLY UNIT (ELECTRICAL)

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| | POWER SUPPLY UNIT | AX-9278 | 80227014 | 1 |
| | **RESISTORS** | | | |
| R1 | 3.9KΩ ±5% 1/2W : CARBON FILM | AN0237EFC | 16116392 | 1 |
| R2 | 10Ω ±5% 1W : OXIDE METAL | AN0063EGE | 16000386 | 1 |
| R3 | 680Ω ±5% 1/4W : CARBON FILM | AN0183EEC | 16114681 | 1 |
| R4 | 20Ω ±10% 5W : CEMENT | AN0077FKF | 16000437 | 1 |
| R5 | 0.6Ω ±10% 3W : CEMENT | AN0641FJF | 16000436 | 1 |
| R6 | 150Ω ±5% 1/2W : CARBON FILM | AN0142EFC | 16116151 | 1 |
| R7 | 220KΩ ±5% 1/4W : CARBON FILM | AN0396EEC | 16114224 | 1 |
| R8 | 45KΩ ±10% 7W : CEMENT | AN0339FLF | 16000439 | 1 |
| R9 | 220KΩ ±5% 1/4W : CARBON FILM | AN0396EEC | 16114224 | 1 |
| R10 | 511Ω ±1% 1/4W : METAL | AN0642BEE | 16225110 | 1 |
| R11 | 2.2Ω ±5% 1/4W : CARBON FILM | AN0032EEC | 16114229 | 1 |
| R12 | 5.9Ω ±1% 1/4W : METAL | AN0643BEE | 16225901 | 1 |
| R13 | 2.2Ω ±5% 1/4W : CARBON FILM | AN0032EEC | 16114229 | 1 |
| R14 | 0.39Ω ±5% 1W : METAL | AN0006FGE | 16011154 | 1 |
| R15 | 0.39Ω ±5% 1W : METAL | AN0006FGE | 16011154 | 1 |
| R16 | 100Ω ±5% 1/2W : CARBON FILM | AN0132EFC | 16116101 | 1 |
| R17 | 68Ω ±10% 7W : CEMENT | AN0111FLF | 16000438 | 1 |
| R18 | 2.2Ω ±5% 1/4W : CARBON FILM | AN0032EEC | 16114229 | 1 |
| R19 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R20 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R21 | 39KΩ ±5% 1/4W : CARBON FILM | AN0330EEC | 16114393 | 1 |
| R22 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R23 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R24 | 2.2KΩ ±5% 1/4W : CARBON FILM | AN0216EEC | 16114222 | 1 |
| R25 | 0.01Ω ±10% 2W : CEMENT | AN0640FHF | 16000435 | 1 |
| R26 | 10Ω ±5% 1W : OXIDE METAL | AN0063EGE | 16000386 | 1 |
| R27 | 2.2KΩ ±5% 1/4W : CARBON FILM | AN0216EEC | 16114222 | 1 |
| R28 | 10Ω ±5% 1W : OXIDE METAL | AN0063EGE | 16000386 | 1 |
| R29 | 33KΩ ±5% 1/4W : CARBON FILM | AN0324EEC | 16114333 | 1 |
| R30 | 20KΩ ±5% 1/4W : CARBON FILM | AN0306EEC | 16114203 | 1 |
| R31 | 33KΩ ±5% 1/4W : CARBON FILM | AN0324EEC | 16114333 | 1 |
| R32 | 6.8KΩ ±5% 1/4W : CARBON FILM | AN0262EEC | 16114682 | 1 |
| R33 | 3.9KΩ ±5% 1/4W : CARBON FILM | AN0237EEC | 16114392 | 1 |
| R34 | 1MΩ ±5% 1/4W : CARBON FILM | AN0445EEC | 16114105 | 1 |
| R35 | 68Ω ±5% 1/2W : CARBON FILM | AN0111EFC | 16116680 | 1 |
| R36 | 470Ω ±5% 1/4W : CARBON FILM | AN0169EEC | 16114471 | 1 |
| R37 | 15Ω ±5% 1/4W : CARBON FILM | AN0074EEC | 16114150 | 1 |
| R38 | 1.2KΩ ±5% 1/4W : CARBON FILM | AN0199EEC | 16114122 | 1 |
| R39 | 2.2KΩ ±5% 1/4W : CARBON FILM | AN0216EEC | 16114222 | 1 |
| R40 | 1KΩ ±5% 1/4W : CARBON FILM | AN0196EEC | 16114102 | 1 |
| R41 | 15Ω ±5% 1/4W : CARBON FILM | AN0074EEC | 16114150 | 1 |
| VR1 | 1KΩ ±20% 1/2W : VARIABLE | AP7244 | 16018052 | 1 |
| | **CAPACITORS** | | | |
| C1 | 0.1μF AC 250V : METALIZED PAPER | ACC104MRMP | 16050084 | 1 |
| C2 | 4700PF AC 250V : METALIZED PAPER | ACC472MRMP | 16050083 | 1 |
| C3 | 0.1μF AC 250V : METALIZED PAPER | ACC104MRMP | 16050084 | 1 |
| C4 | 4700PF AC 250V : METALIZED PAPER | ACC472MRMP | 16050083 | 1 |
| C5 | 0.01μF -20 to +80% 50V : FILM | ACC104ZJCP | 16060658 | 1 |
| C6 | 680μF ±20% 63V : ELECTROLYTIC | ACC687MJAP | 16041118 | 1 |
| C7 | 470μF ±20% 200V : ELECTROLYTIC | | 16041228 | 1 |
| C8 | 0.01μF ±10% 50V : FILM | ACC103KJGP | 16060531 | 1 |
| C9 | 47μF ±20% 25V : ELECTROLYTIC | ACC476MFAP | 16040999 | 1 |
| C10 | 470μF ±20% 200V : ELECTROLYTIC | | 16041228 | 1 |
| C11 | 0.01μF -20 to +80% 50V : FILM | ACC104ZJCP | 16060658 | 1 |
| C12 | 0.047μF ±10% 50V : FILM | ACC473KJGP | 16060385 | 1 |
| C13 | 2.2μF ±10% 250V : FILM | ACC225KRMP | 16060787 | 1 |
| C14 | 47μF ±20% 10V : ELECTROLYTIC | ACC476MCAP | 16040982 | 1 |
| C15 | 2.2μF ±10% 250V : FILM | ACC225KRMP | 16060787 | 1 |
| C16 | 0.01μF -20 to +80% 50V : FILM | ACC104ZJCP | 16060658 | 1 |
| C17 | 0.001μF ±10% 1KV : CERAMIC | ACC102KXCP | 16060469 | 1 |
| C18 | 2.2μF ±10% 250V : FILM | ACC225KRMP | 16060787 | 1 |
| C19 | 0.01μF -20 to +80% 50V : FILM | ACC104ZJCP | 16060658 | 1 |
| C20 | 4.7μF ±20% 25V : ELECTROLYTIC | ACC475MFAP | 16040995 | 1 |
| C21 | 0.01μF ±10% 50V : FILM | ACC103KJGP | 16060531 | 1 |
| C22 | 0.01μF ±10% 50V : FILM | ACC103KJGP | 16060531 | 1 |
| C23 | 4.7μF ±20% 25V : ELECTROLYTIC | ACC475MFAP | 16040995 | 1 |
| C24 | 47μF ±20% 25V : ELECTROLYTIC | ACC476MFAP | 16040999 | 1 |
| C25 | 0.047μF ±10% 50V : FILM | ACC473KJGP | 16060385 | 1 |
| C26 | 0.01μF ±10% 50V : FILM | ACC103KJGP | 16060531 | 1 |
| C27 | 2200PF -20 to +80% 1KV : CERAMIC | ACC222ZXCP | 16060782 | 1 |
| C28 | 2200PF -20 to +80% 1KV : CERAMIC | ACC222ZXCP | 16060782 | 1 |
| C29 | 0.01μF ±10% 50V : FILM | ACC103KJGP | 16060531 | 1 |

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| C30 | 470PF ±5% 50V : CERAMIC | ACC471JJCP | 16060524 | 1 |
| C31 | 0.047μF ±10% 50V · FILM | ACC473KJGP | 16060385 | 1 |
| C32 | 47μF ±20% 10V · ELECTROLYTIC | ACC476MCAP | 16040982 | 1 |
| C33 | 47μF ±20% 10V : ELECTROLYTIC | ACC476MCAP | 16040982 | 1 |
| C34 | 100μF ±20% 6.3V : ELECTROLYTIC | ACC107MBAP | 16040863 | 1 |
| C35 | 0.022μF ±10% 50V : FILM | ACC223KJCP | 16060262 | 1 |
| C36 | 1500μF ±20% 10V : ELECTROLYTIC | ACC158MCAP | 16041119 | 1 |
| C37 | 8200μF ±20% 25V : ELECTROLYTIC | ACC828MFAP | 16041125 | 1 |
| C38 | 8200μF ±20% 25V : ELECTROLYTIC | ACC828MFAP | 16041125 | 1 |
| C39 | 0.01μF -20 to +80% 50V : FILM | ACC104ZJCP | 16060658 | 1 |
| C40 | 0.01μF -20 to +80% 50V : FILM | ACC104ZJCP | 16060658 | 1 |
| C41 | 1500μF ±20% 10V · ELECTROLYTIC | ACC158MCAP | 16041119 | 1 |
| C42 | 0.01μF -20 to +80% 50V : FILM | ACC104ZJCP | 16060658 | 1 |
| C43 | 0.01μF -20 to +80% 50V : FILM | ACC104ZJCP | 16060658 | 1 |
| | **INDUCTORS** | | | |
| L1 | LINE FILTER . 1μH 3A | ACA8270 | 88510681 | 1 |
| L2 | CHOKING COIL : 47μH 8.2A | ACA8235 | 88510689 | 1 |
| L3 | CHOKING COIL · 160μH 5A | ACA8236 | 88510690 | 1 |
| L4 | CHOKING COIL · 1000μH · SPO406-102M | ACA8269 | 12010056 | 1 |
| | **TRANSISTORS** | | | |
| Q1 | 2SD560 | AA2SD560 | 14010133 | 1 |
| Q2 | 2SB856C | AA2SB856C | 14010218 | 1 |
| Q3 | 2SC2938 | AA2SC2938 | 14010207 | 1 |
| Q4 | 2SC2001-L | AA2SAC2001L | 14000280 | 1 |
| Q5 | 2SC2938 | AA2SC2938 | 14010207 | 1 |
| Q6 | 2SC2001-L | AA2SAC2001L | 14000280 | 1 |
| Q7 | 2SA844C | AA2SA844C | 14000258 | 1 |
| Q8 | 2SC2001-L | AA2SAC2001L | 14000280 | 1 |
| | **I.C.'S** | | | |
| IC1 | IC : RELAY · S13MD1 | AMX4975 | 14030220 | 1 |
| IC2 | IC . μPC1042C | AMX4976 | 14080215 | 1 |

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| | **DIODES** | | | |
| D1 | 1S1834 : SILICON | ADX1524 | 14010780 | 1 |
| D2 | 0.2A 1KV : RU1C : FIRST RECOVERY | ADX1693 | 14010796 | 1 |
| D3 | 0.8A 200V : RMIZ : SILICON | ADX1701 | 14020380 | 1 |
| D4 | 0.8A 200V : RMIZ . SILICON | ADX1701 | 14020380 | 1 |
| D5 | 0.8A 200V : RMIZ SILICON | ADX1701 | 14020380 | 1 |
| D6 | 0.8A 200V : RMIZ SILICON | ADX1701 | 14020380 | 1 |
| D7 | 0.2A 1KV : RU1C : FIRST RECOVERY | ADX1693 | 14010796 | 1 |
| D8 | 1S1588 · SILICON | ADX1304 | 14010611 | 1 |
| D9 | 1S1588 : SILICON | ADX1304 | 14010611 | 1 |
| D10 | 200V 12A : S12KC20 : FIRST RECOVERY | ADX1695 | 14020386 | 1 |
| D11 | 200V 12A : CTU-32R : FIRST RECOVERY | ADX1694 | 14020412 | 1 |
| D12 | 200V 5A : S5KC20 : FIRST RECOVERY | ADX1375 | 14020385 | 1 |
| ZD1 | HZ12C-1 : ZENER | ADX1697 | 14020384 | 1 |
| ZD2 | HZ3A-2 · ZENER | ADX1696 | 14020368 | 1 |
| ZD3 | HZ3A-2 : ZENER | ADX1696 | 14020368 | 1 |
| ZD4 | HZ3A-2 ZENER | ADX1696 | 14020368 | 1 |
| ZD5 | HZ6C-1 : ZENER | ADX1698 | 14020322 | 1 |
| ZD6 | 1.2W 18V . HZ18-3 : ZENER | ADX1530 | 14010791 | 1 |
| BR1 | BRIDGE RECTIFIER : 100V 1A . 1S2371 | ADX1699 | 54667730 | 1 |
| BR2 | BRIDGE RECTIFIER : 400V 6A . S5VB40 | ADX1526 | 14020328 | 1 |
| SCR1 | THYRISTOR · 100V 100mA : SFOR1B41 | ADX1525 | 14050110 | 1 |
| TRA1 | TRYACH : 400V 8A : AC08DIM | ADX1700 | 14050118 | 1 |
| | **MISCELLANEOUS** | | | |
| T1 | POWER TRANS | ATA0944 | 88510688 | 1 |
| T2 | PULSE TRANS. | ATB0455 | 54657520 | 1 |
| T3 | HF TRANSFORMER | ATB-0465 | 88510698 | 1 |
| | TERMINAL PLATE : 3P | AJ6991 | 11010327 | 1 |
| | CONNECT BOARD | | 11030575 | 2 |
| | DC CABLE | AW-2885 | 80225032 | 1 |




COVER ASSEMBLY

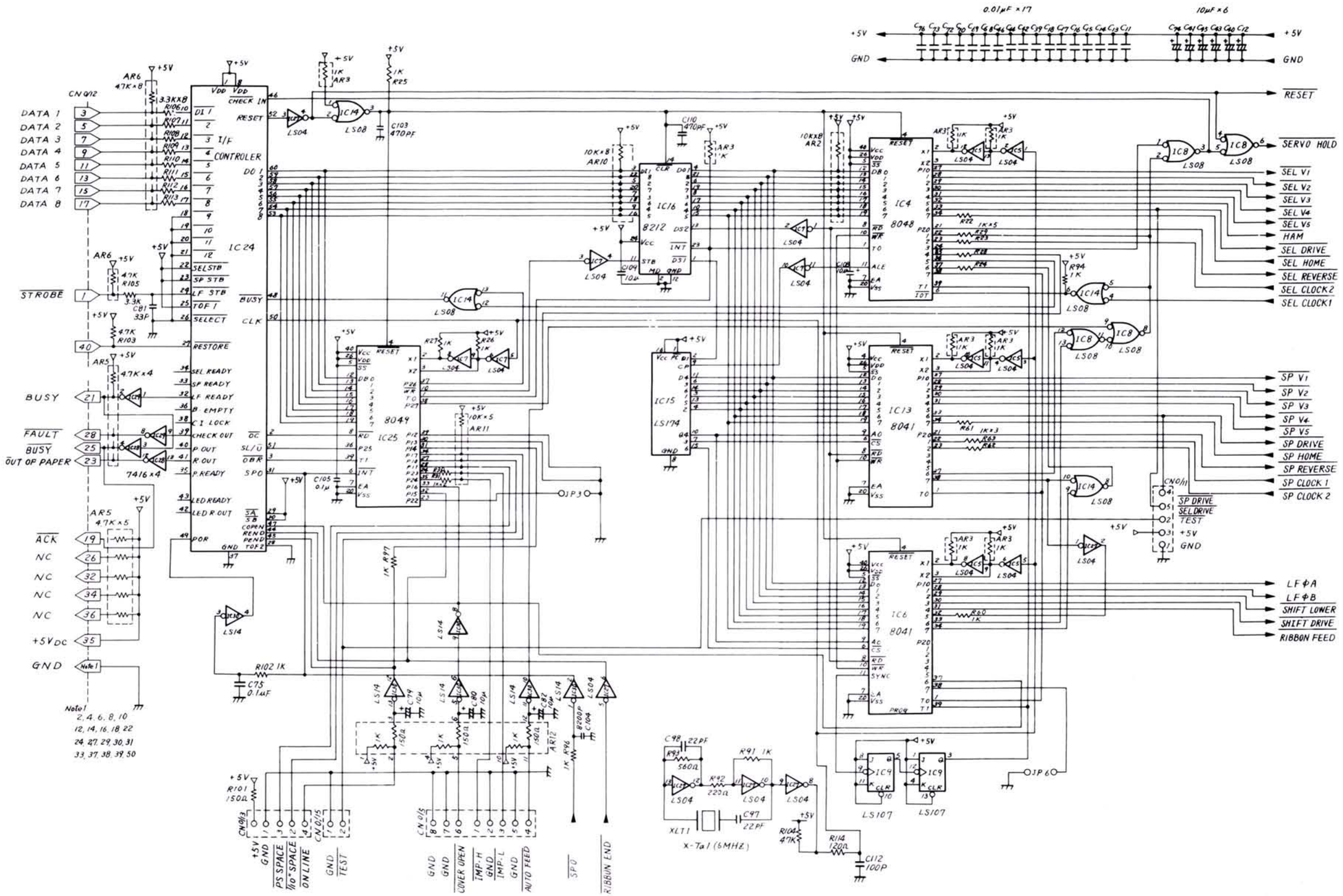
## COVER ASSEMBLY

| REF NO. | DESCRIPTION | RS LOCATION | MANUFACTURER PART NUMBER | Q'TY |
|---|---|---|---|---|
| 001 | FRONT COVER | AZ-6745 | 87474107 | 1 |
| 002 | SHELTER : PLATE : L | AHC-1810 | 87474033 | 1 |
| 003 | SHELTER : PLATE : R | AHC-1811 | 87474034 | 1 |
| 004 | COVER : TOP | AZ-6744 | 87474108 | 1 |
| 005 | GUIDE : PAPER | AHC-1809 | 87474008 | 1 |
| 006 | COVER : BASE | AZ6742 | 87474109 | 1 |
| 007 | OPERATION PANEL ASSEMBLY | AZ-6743 | 87474110 | 1 |
| 007A | SWITCH (OPERATION PANEL) | | 87474039 | 2 |
| 008 | PCB ASSEMBLY : PANEL BOARD | AX-9279 | 87477032 | 1 |
| 008A | SWITCH : SLIDE : J-S5078 (PANEL BOARD) | | 87476877 | 1 |
| 008B | SWITCH : SLIDE : J-S5425 (PANEL BOARD) | | 87476876 | 1 |
| 008C | LED : BR5534S (PANEL BOARD) | AL1290 | 14030156 | 1 |
| 008D | CARBON FILM RES : 150Ω ±5% 1/4W (PANEL BOARD) | | 16114151 | 1 |
| 008E | SHEET : SWITCH : A (BIG) | | 87474050 | 1 |
| 008F | SHEET : SWITCH : B (SMALL) | | 87474051 | 1 |
| 009 | FOOT : RUBBER | AF1214 | 87471087 | 4 |
| 010 | LETER GUIDE ASSEMBLY | ART-4425 | 87474510 | 1 |
| 011 | ADAPTER : SL & LG : L | AHC-1807 | 87474517 | 1 |
| 012 | ADAPTER : SL & LG : R | AHC-1808 | 87474516 | 1 |
| 013 | BAR : TOP COVER | | 87474018 | 1 |
| 014 | HOLDER | | 87474019 | 1 |
| 015 | CAP | | 87474052 | 2 |
| 101 | SCREW : PHILIPS PAN HEAD : M4 x 50 (100 PCS/1 SET) | AHD2465 | 03140500B | 2 |
| 102 | SCREW : M4 x 8 (100 PCS/1 SET) | AHD2473 | 09604008B | 4 |

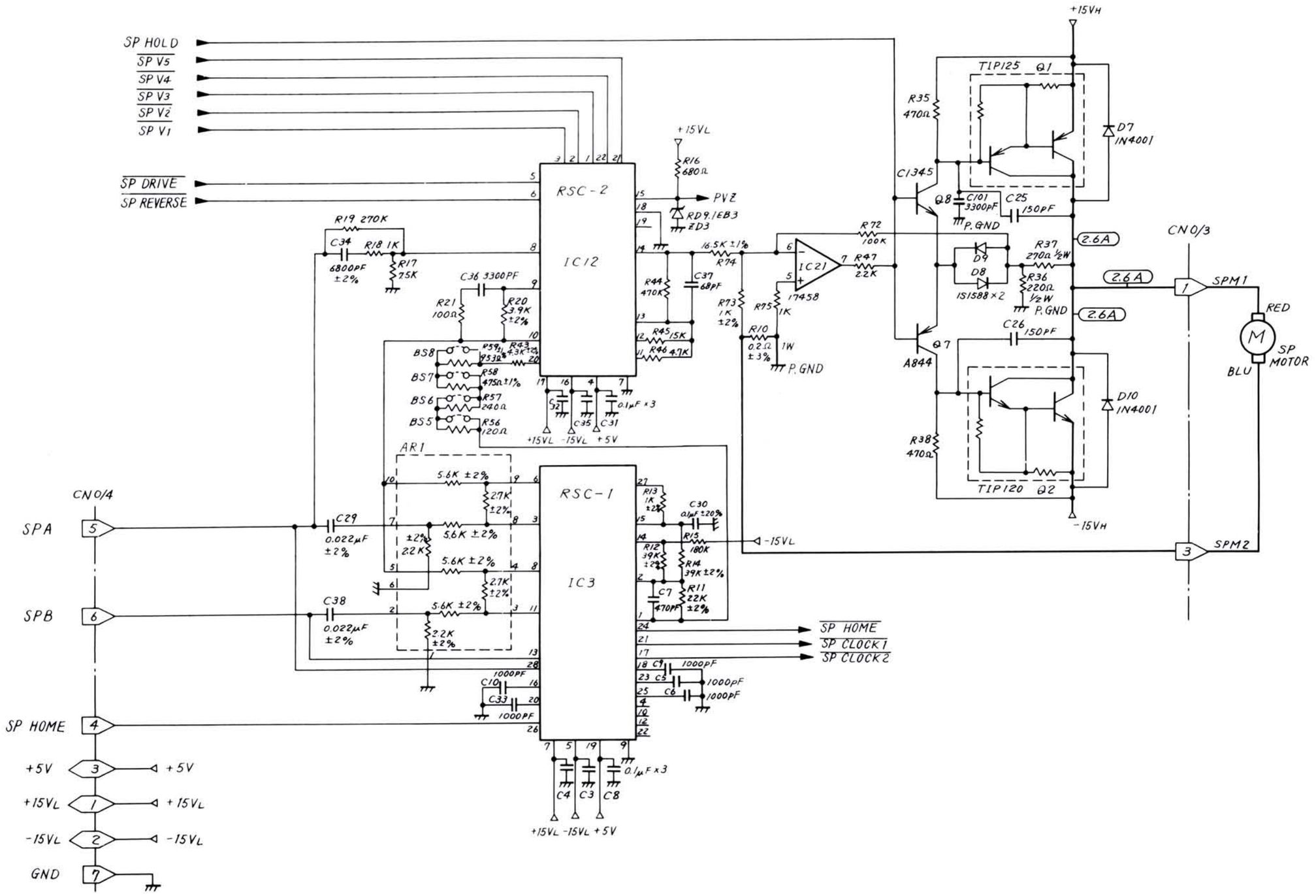


NOTE

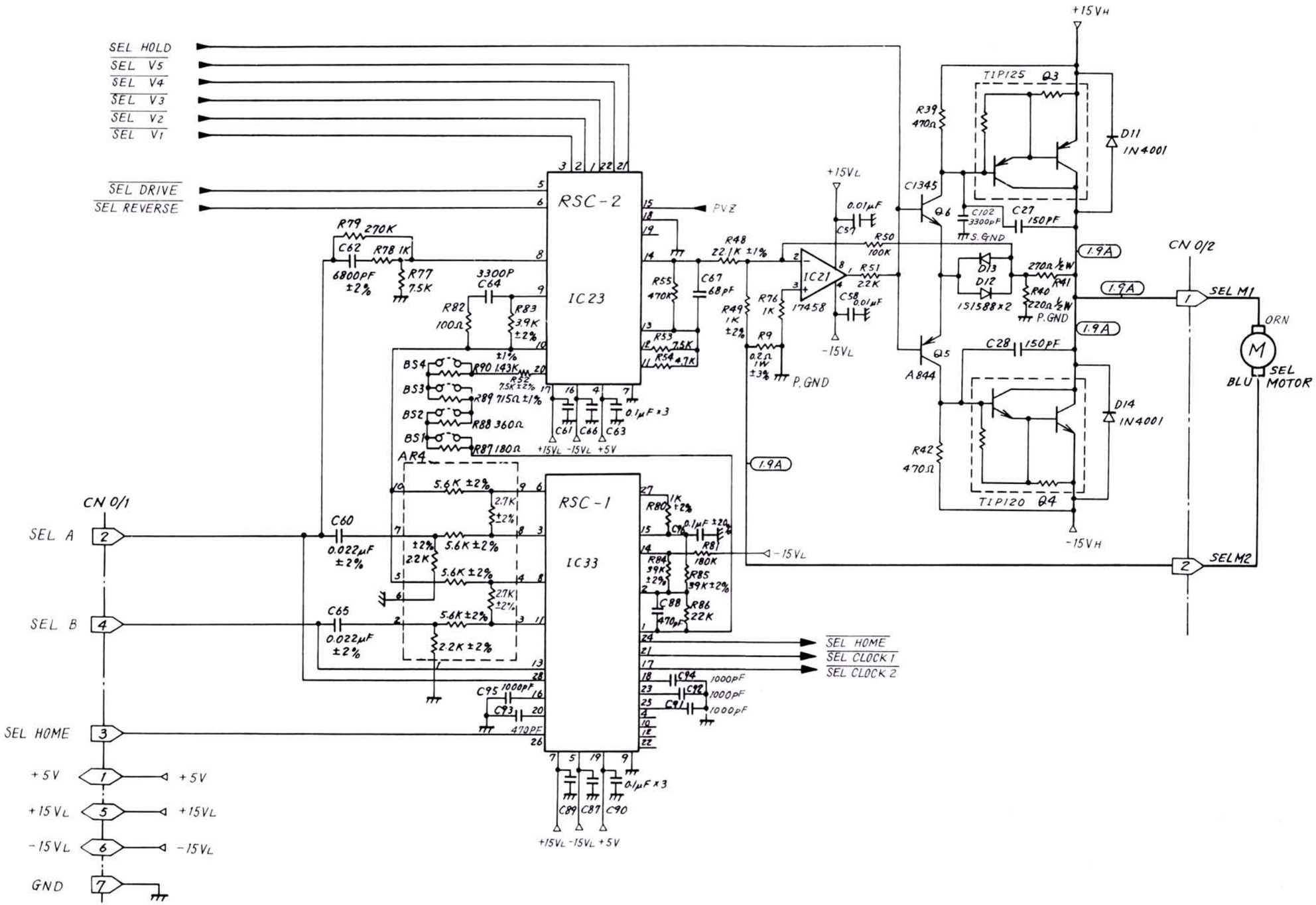
# XI. SCHEMATIC DIAGRAMS
## PCB: CONTROL BOARD LOGIC (1/5)



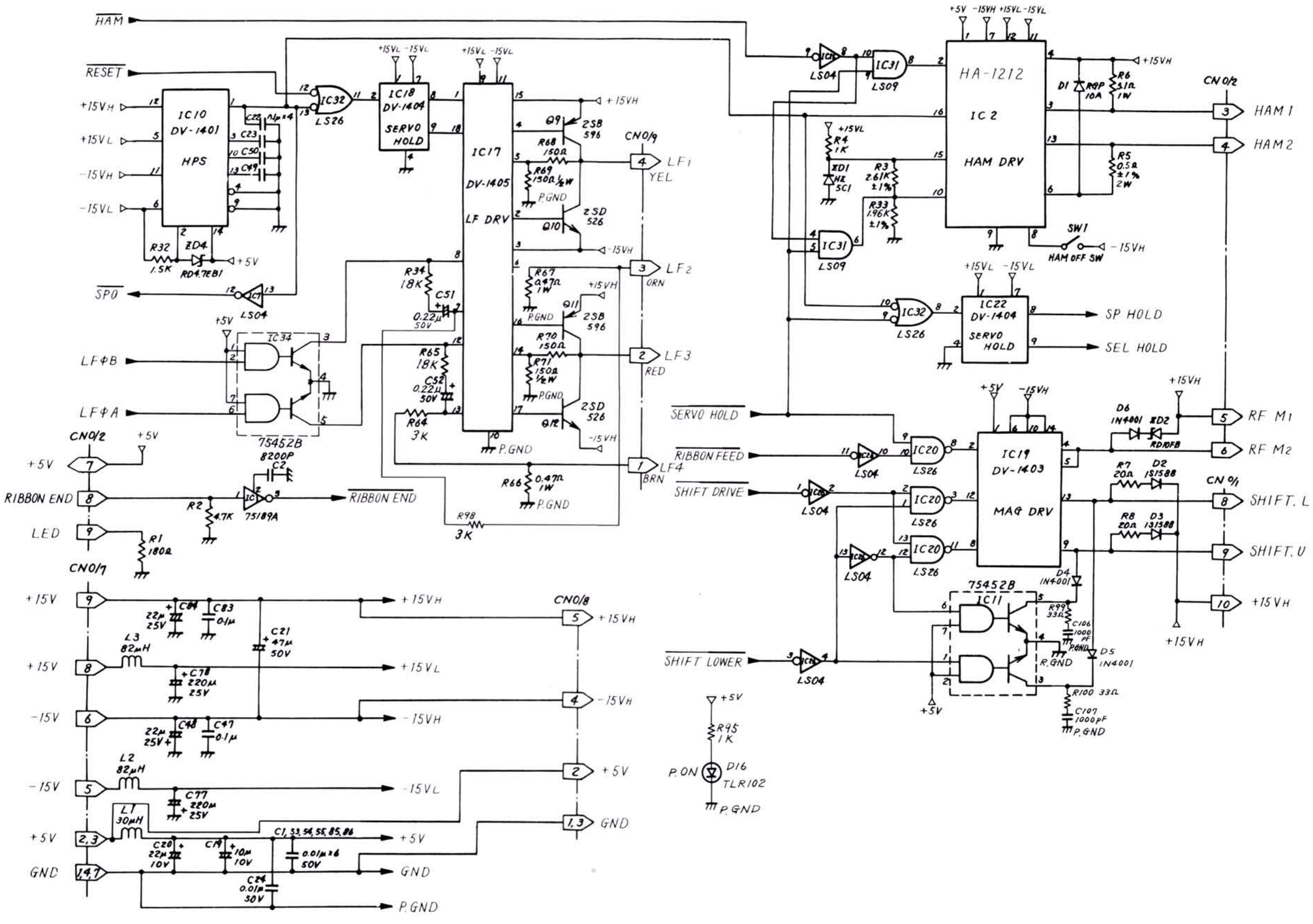
## PCB: CONTROL BOARD LOGIC (2/5)



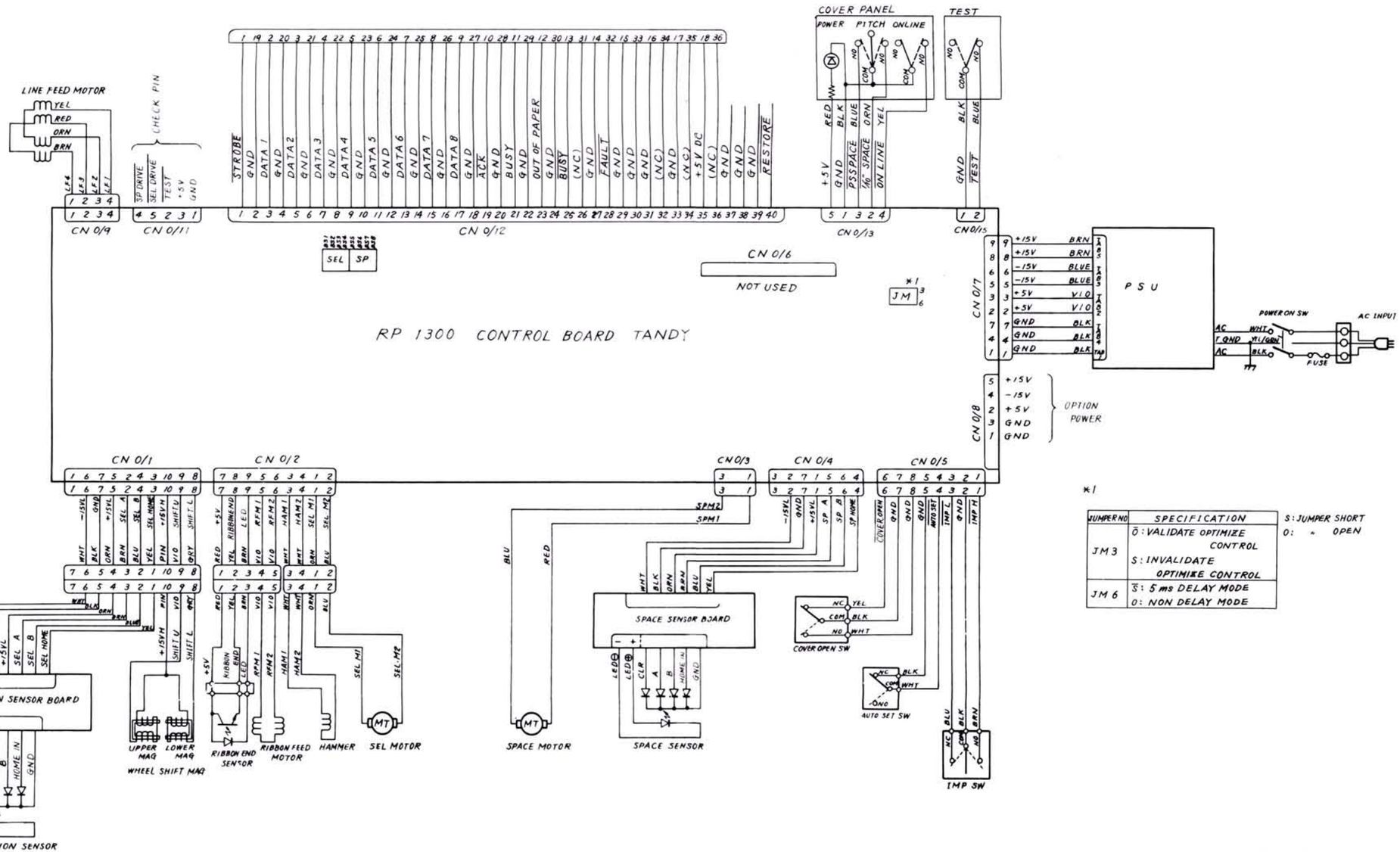
## PCB: CONTROL BOARD LOGIC (3/5)



## PCB: CONTROL BOARD LOGIC (4/5)



# PCB: CONTROL BOARD LOGIC (5/5)




×1

| JUMPER NO | SPECIFICATION | S: JUMPER SHORT<br>O: " OPEN |
|---|---|---|
| JM 3 | $\bar{O}$: VALIDATE OPTIMIZE CONTROL<br>S: INVALIDATE OPTIMIZE CONTROL | |
| JM 6 | $\bar{S}$: 5 ms DELAY MODE<br>O: NON DELAY MODE | |

**NOTE**

RADIO SHACK, A DIVISION OF TANDY CORPORATION

U.S.A.: FORT WORTH, TEXAS 76102
CANADA: BARRIE, ONTARIO L4M 4W5

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