AMSTRAD

DMP1 PRINTER

SERVICE MANUAL

Price: £5.00

[1] SPECIFICATIONS

a. PRINT SPECIFICATIONS

1.	Print method	Impact dot matrix (Seikosha's uni-hammer)
2.	Print direction	Unidirectional (left to right)
3.	Character matrix	5 (width) × 7 (Height) + 1 (Space)
4.	Characters	139 upper/lower case characters, numerals and symbols
5.	Character code	8-bit ASCII
6.	Dot spacing	1/60" (H) × 1/63" (V)
7.	Character pitch	10 characters/inch
8.	Character columns	80 columns/line (480 dot columns/line)
9.	Print speed	50 cps
10.	Linefeed spacing	6 lines/inch, 9 lines/inch
11.	Linefeed speed	10 lines/sec (at 6 lines/inch) 15 lines/sec (at 9 lines/inch)
12.	Graphics	Any combination of 7 dots in a vertical column
13.	Multiple copies	Two including original Thickness 0.15 mm or less.
14.	Paper width	4.5 to 10 inches acceptable

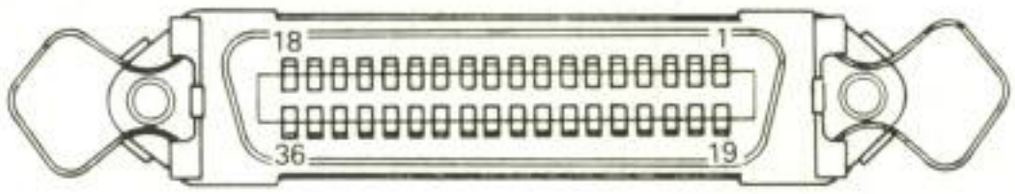
b. ENVIRONMENT

1.	Power requirements	220/240 VAC ± 10%, 50Hz
2.	Power consumption	25 watts (character printing) 10 watts (standby)
3.	Temperature	Operation 5°C to 40°C
4.	Humidity	20% to 80% (no condensation)

[2] INTERFACE

(1) Input connector on the printer and the signal pinout.

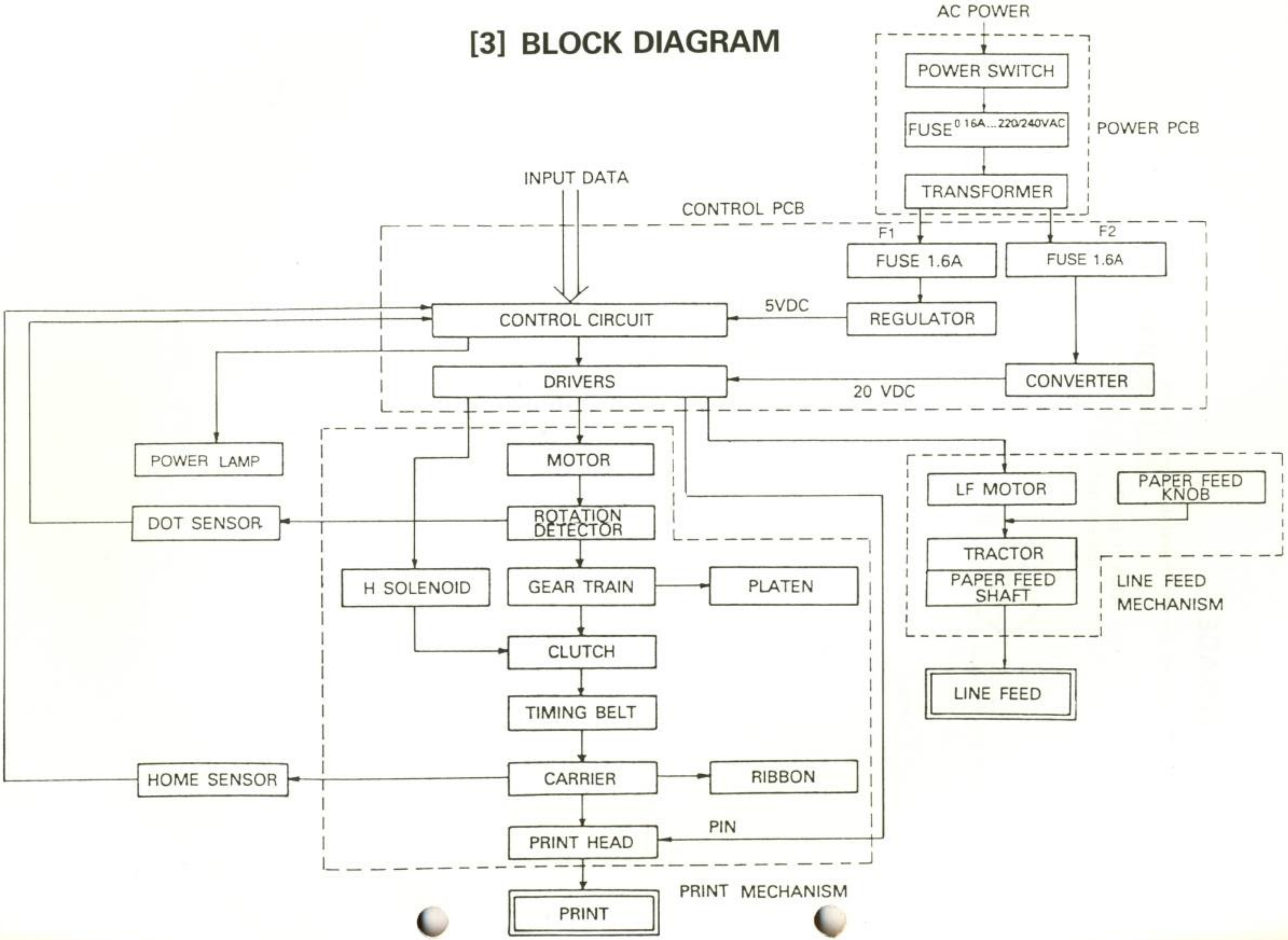
DDK 36 pin BAIL LOCK TYPE
(57LE-40360-270B-D3)



PIN	SIGNAL	IN/OUT	PIN	SIGNAL	IN/OUT
1	$\overline{\text{STROBE}}$	IN	19	GND	
2	DATA 1	IN	20	GND	
3	DATA 2	IN	21	GND	
4	DATA 3	IN	22	GND	
5	DATA 4	IN	23	GND	
6	DATA 5	IN	24	GND	
7	DATA 6	IN	25	GND	
8	DATA 7	IN	26	GND	
9	DATA 8	IN	27	GND	
10	$\overline{\text{ACK}}$	OUT	28	GND	
11	BUSY	OUT	29	GND	
12	LOW	OUT	30	GND	
13	NC		31	$\overline{\text{INITIAL}}$	IN
14	GND		32	$\overline{\text{ERROR}}$	OUT
15	GND		33	GND	
16	GND		34	NC	
17	CHASSIS GND		35	$\overline{\text{TEST}}$	IN
18	+5V 80MA Max.		36	NC	

NOTE 1.NC stands for no connection.
2. LOW is the LOW LEVEL output of 74LSO4.

[3] BLOCK DIAGRAM



Hammer Drive

[4] FLOWCHARTS

Main Flowchart

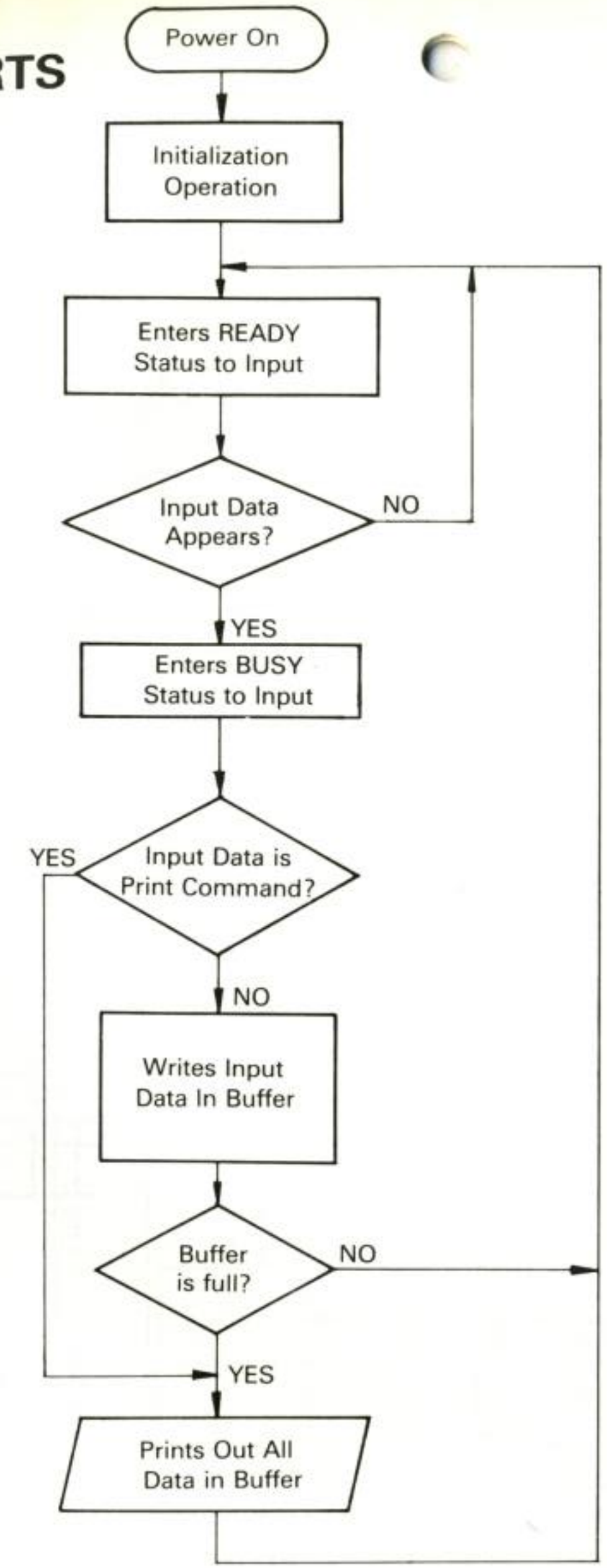
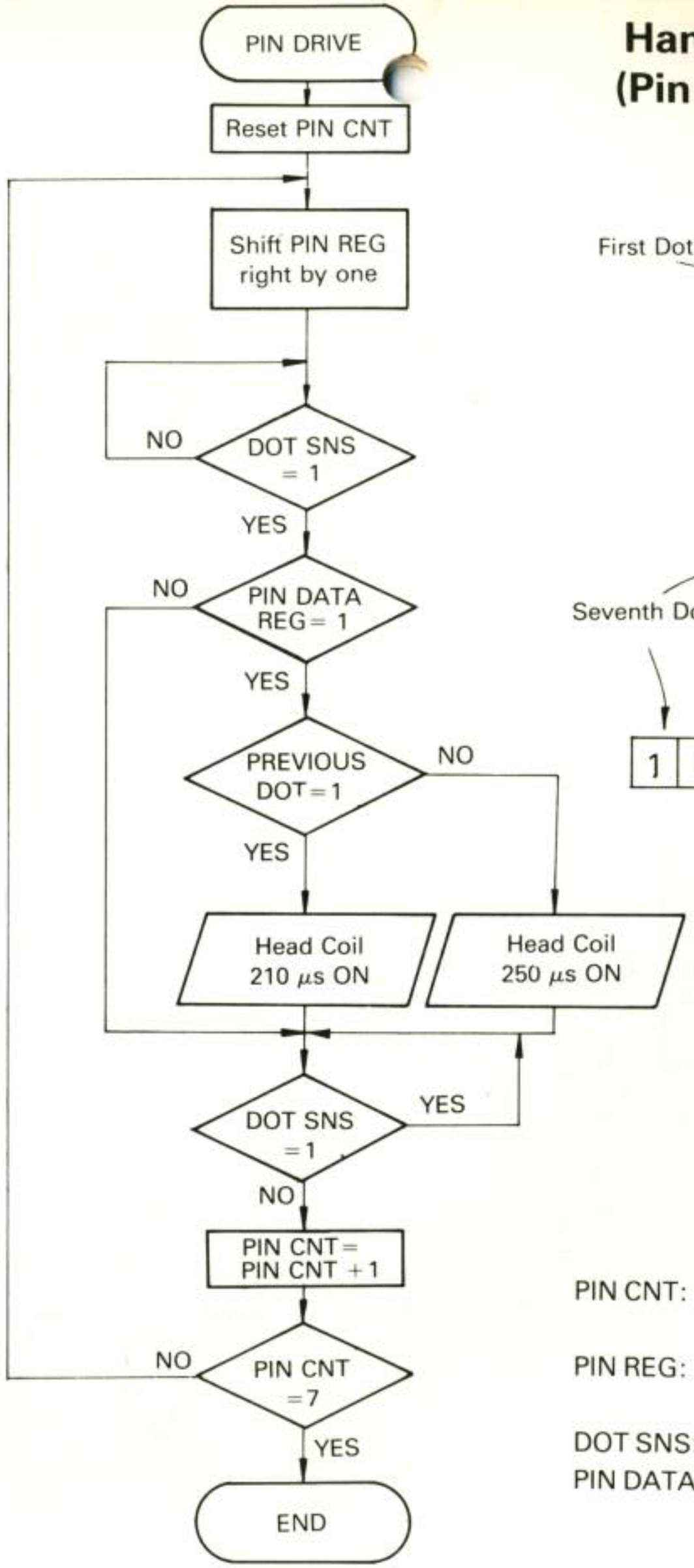


Figure 4–1



Hammer Drive (Pin Drive) Flowchart

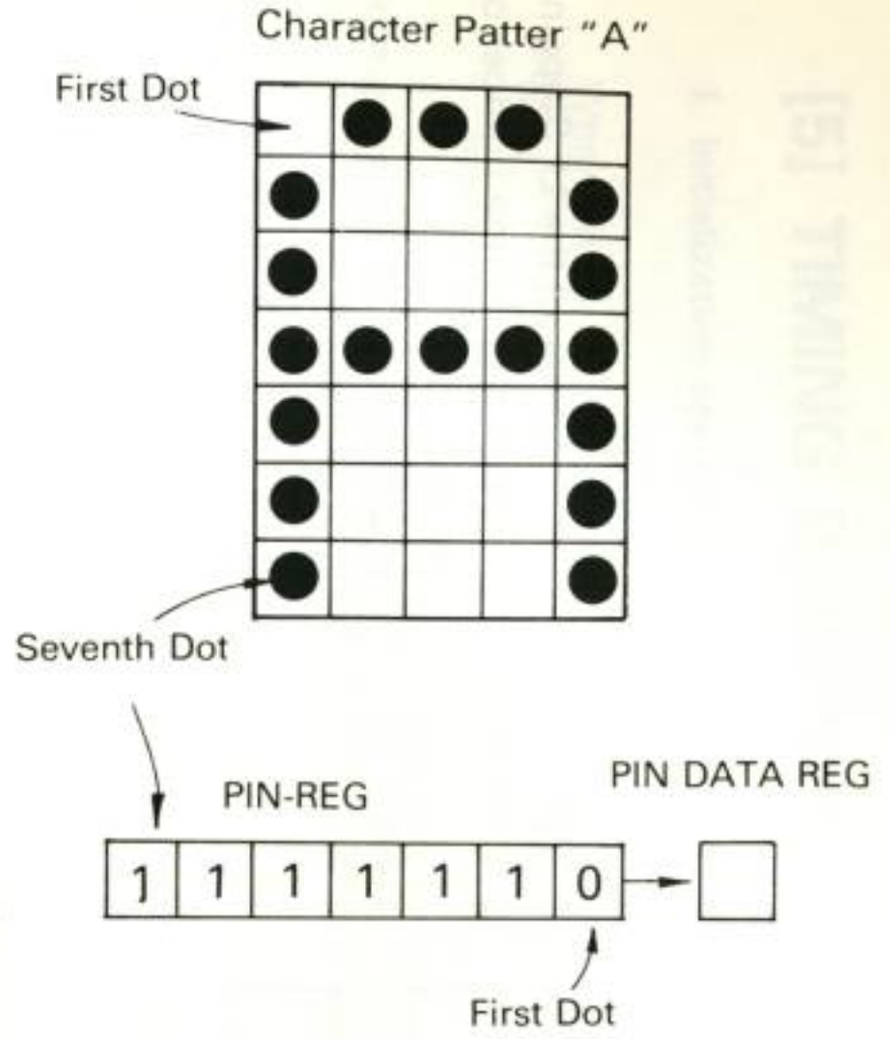
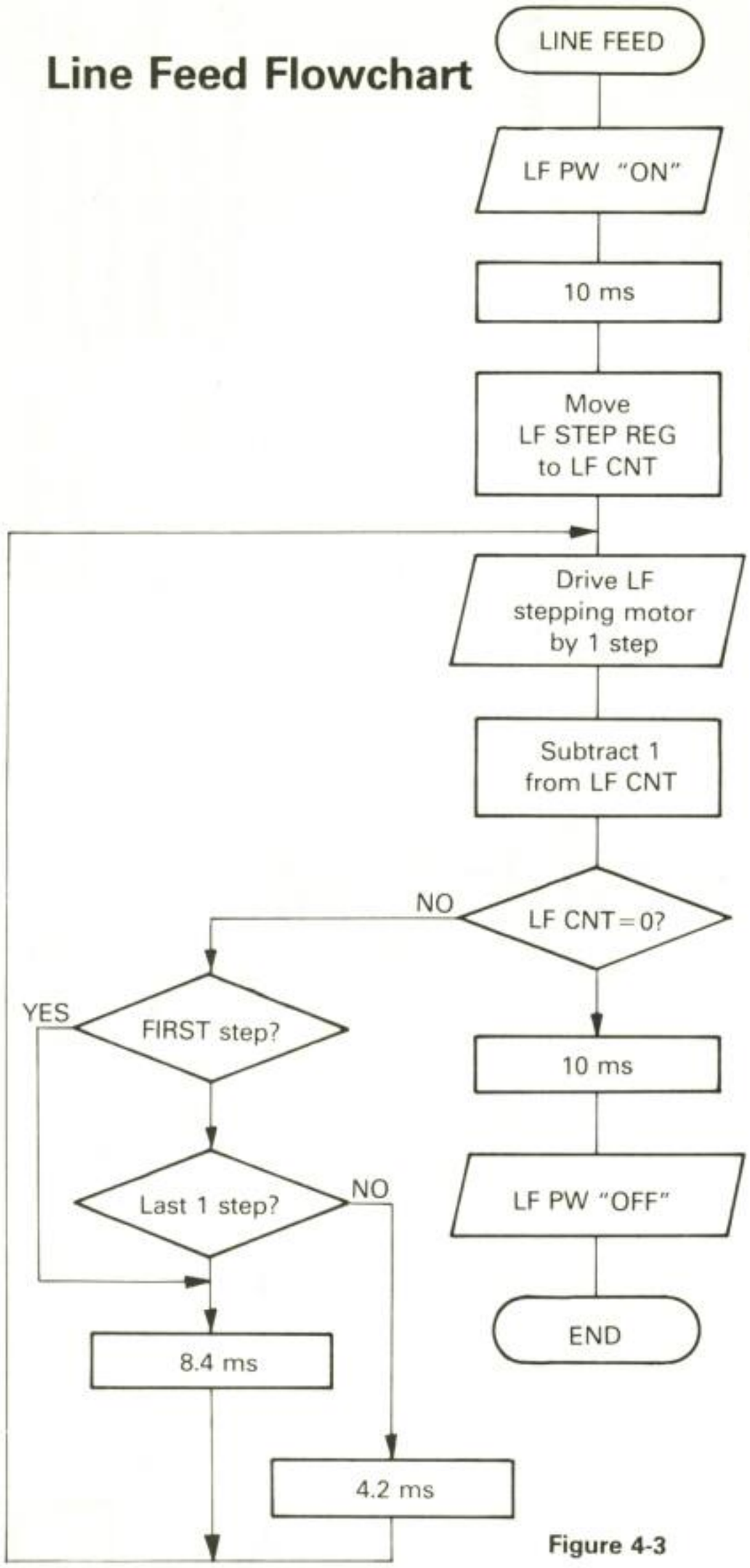


Figure 4–2

PIN CNT:	Counter for 1 column (7 dots) of character pattern
PIN REG:	Register storing 1 colum (7 dots) of character pattern
DOT SNS:	Timing signal for each dot
PIN DATA REG:	1 bit register for a dot to be printed

Line Feed Flowchart



LF CNT: Step counter of the LF Stepping motor

LF STEP REG: Register holding the number of steps per line feed.

LF PW: Power for the LF Stepping motor.

Figure 4-3

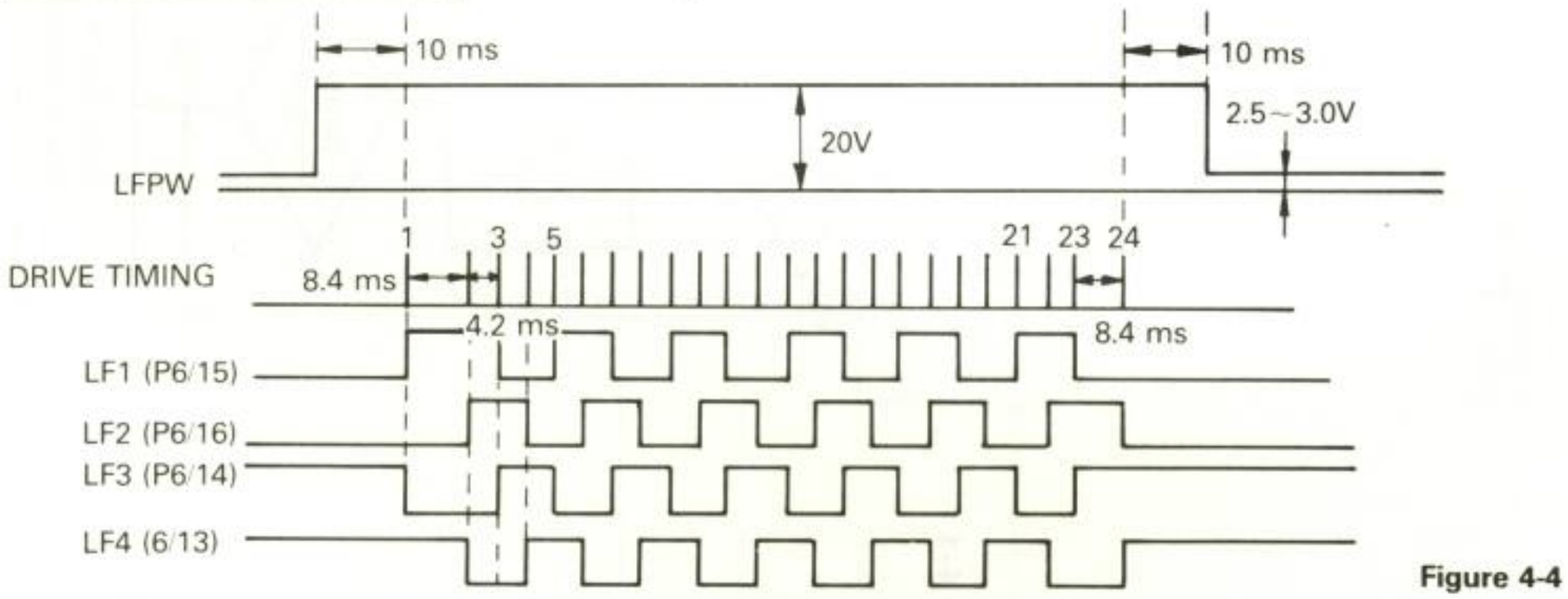


Figure 4-4

1/144 inch is the smallest unit of movement and occurs when the LF stepping motor is driven one step. 24 pulses of the DRIVE TIMING perform a line feed of $24 \times 1/144 = 1/6$ inch.

[5] TIMING DIAGRAM

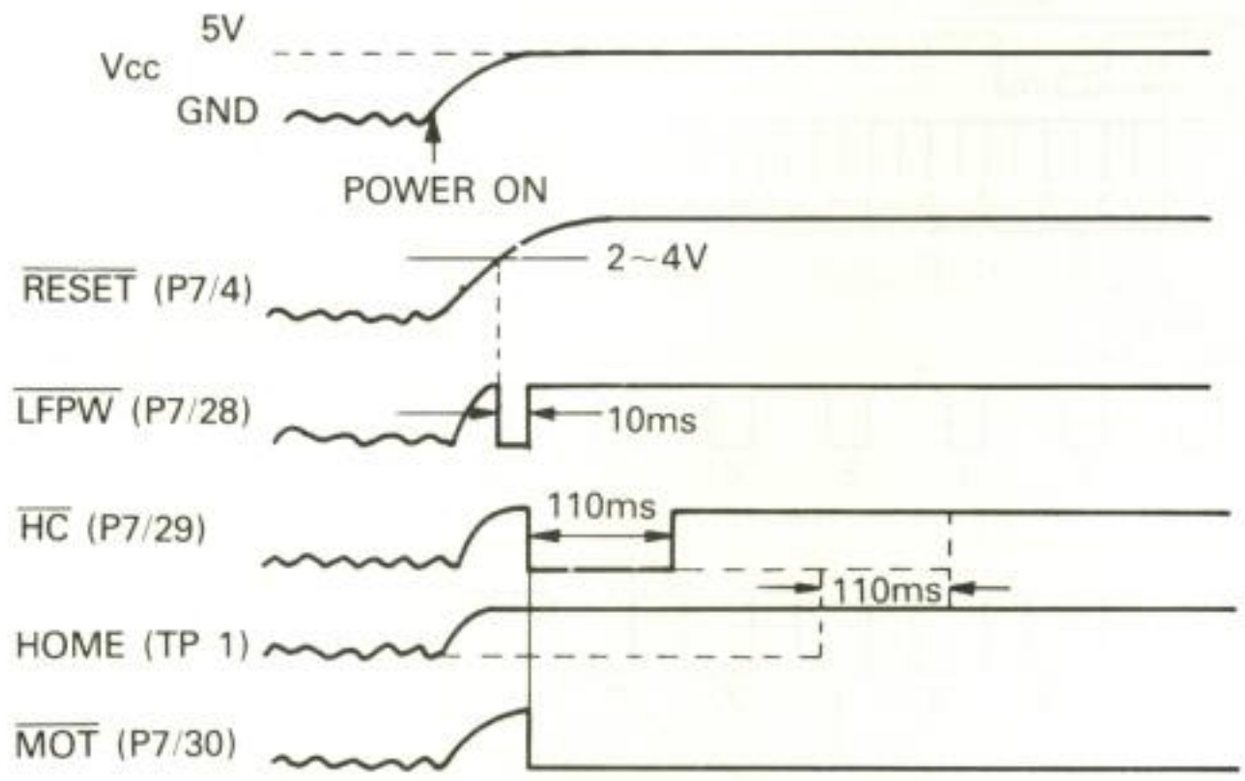
1. Initialization sequence

When power is applied or $\overline{RES}$ signal is input, the printer executes the following initialization.

1. Resets the control circuit.
2. Generates and stores a print start timing value by moving the print head twice.
3. Brings the print head back to the home position.

When power is applied, P 7/4 [Pin 4 of the CPU chip located at P 7] receives the $\overline{RESET}$ signal. The CPU is reset as long as this signal is LOW. The CPU is activated as soon as the $\overline{RESET}$ signal rises from LOW to HIGH.
First, in order to align the phase of the LF stepping motor, the LF1 (P6/2) and LF2 (P6/1) signals are both raised to HIGH and the LF3 (P6/3) and LF4 (P6/4) signals are brought LOW. The drivers (P6/15, 16) go LOW (ON) and the drivers (P3/13, 14) go HIGH (OFF). Then lowering the $\overline{LFPW}$ signal (P7/28) makes the driver (P6/12) go LOW and turns the GP-DR-2/3 ON so that $\overline{LFPW}$ rises to + 20V from the standby voltage (2.5V~3.0V). The $\overline{LFPW}$ signal (P7/28) is brought HIGH approximately 10 ms later. Thus the driver (P6/12) goes HIGH to return the $\overline{LFPW}$ to the standby voltage (2.5 ~3.0V).

Next, the CPU sets the $\overline{MOT}$ signal (P7/30) and $\overline{HC}$ signal (7/29) LOW which turns the driver (GP-DR-2/7) ON (LOW). When it is ON, the H solenoid is activated, which allows the recovery spring to return the print head to the home position. The HOME signal (TP 1), which is shaped from the output of the home sensor, is HIGH when the print head is at the home position, and LOW when it is away from the home position. After the CPU sets the $\overline{HC}$ signal LOW, it checks the HOME signal to see whether it is HIGH or LOW. If it is HIGH, the CPU will go to the next routine after about 110ms; if it is LOW, the CPU waits unitil it becomes HIGH and then about 110ms later, the CPU will go to the next routine. The next routine is to move the print head twice from the home position to approximately the 15th character column and back to the home position. During both movements, the $\overline{PIN}$ signal and the $\overline{LFPW}$ signal remain inactive. During the second movement, the CPU checks and stores the timing of the rising-edge of the HOME signal relative to the DOT signal (TP 2). This timing is used by the CPU to decide when to start printing.
The initialization sequence explained so far will also be executed when an $\overline{INITIAL}$ signal is input.



Dotted lines show the case when the print head is away from the home position.

Figure 5-1

2. Start of the printing operation

When printing starts, the CPU sets the $\overline{\text{MOT}}$ signal (P7/30) and the $\overline{\text{HC}}$ signal (P7/29) LOW. When the $\overline{\text{MOT}}$ signal goes LOW, the driver GP-DR-2/10 goes LOW (ON) causing the motor to rotate. Since the $\overline{\text{HC}}$ signal is LOW, the H solenoid is activated, which disengages the motor shaft from the print head carrier so that the motor can reach a constant speed before any movement of the print head occurs. After approximately 160ms, the $\overline{\text{HC}}$ signal is set HIGH, which causes the motor shaft and the print head carrier to engage, and allows the print head to be driven to the right. Next, the CPU waits to see if the print head leaves the home position by sampling the HOME signal. After confirming that the HOME signal has gone LOW, which means the print head carrier has moved out of the home position, the CPU checks the $\overline{\text{DOT}}$ signal in order to decide when to start printing. The $\overline{\text{DOT}}$ signal is a shaped output signal from the dot sensor and, as shown in the figure below, it comes in groups of 34 sequential pulses. When the HOME signal goes LOW, the CUP starts to count the number of dot pulses until the $\overline{\text{DOT}}$ signal stays HIGH for approximately 0.9ms. The CPU then compares this number with the number stored during initialization in order to decide when to start printing.

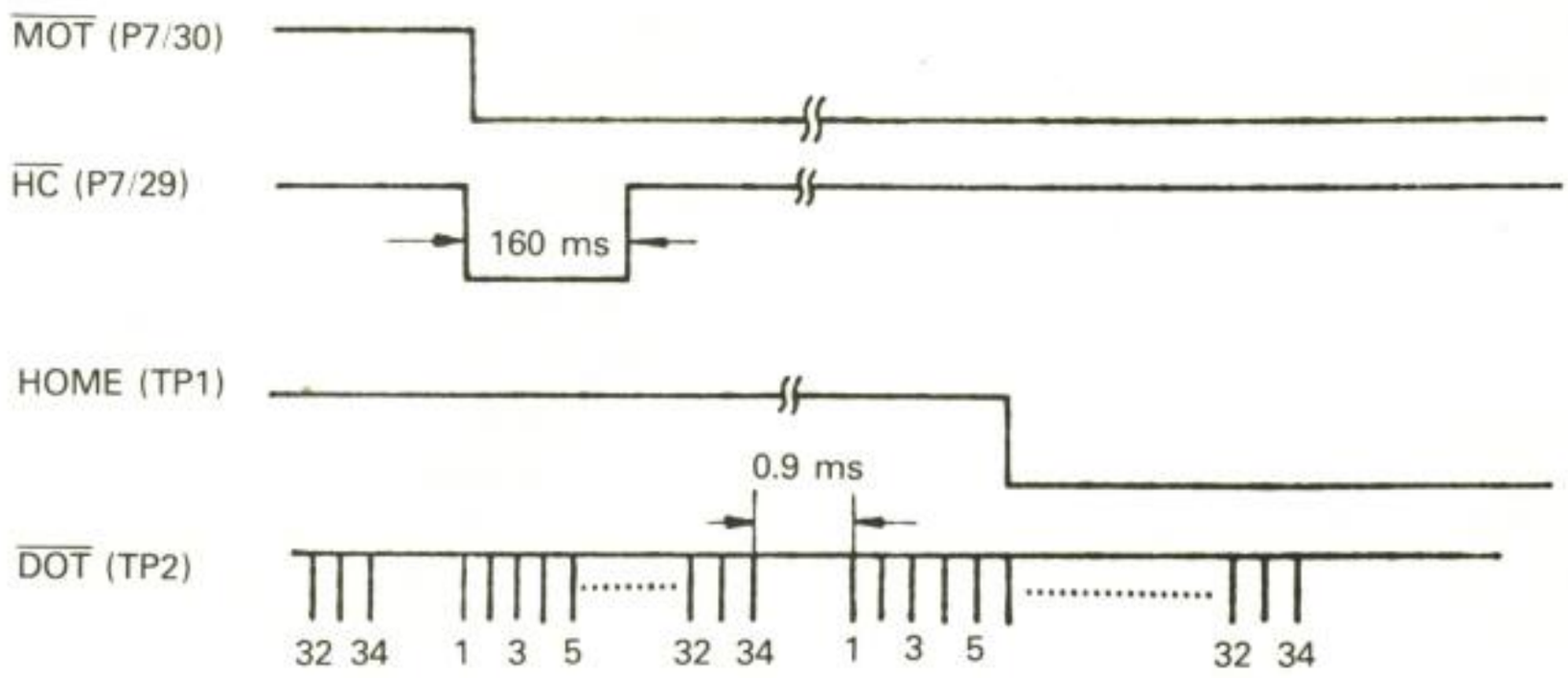


Figure 5-2

3. Printing operation

The CPU synchronizes the $\overline{\text{PIN}}$ signal (P7/27) to the $\overline{\text{DOT}}$ signal. The $\overline{\text{PIN}}$ signal is for driving the print hammer. When it goes LOW, the driver goes LOW (ON) to activate a print hammer to print a dot.

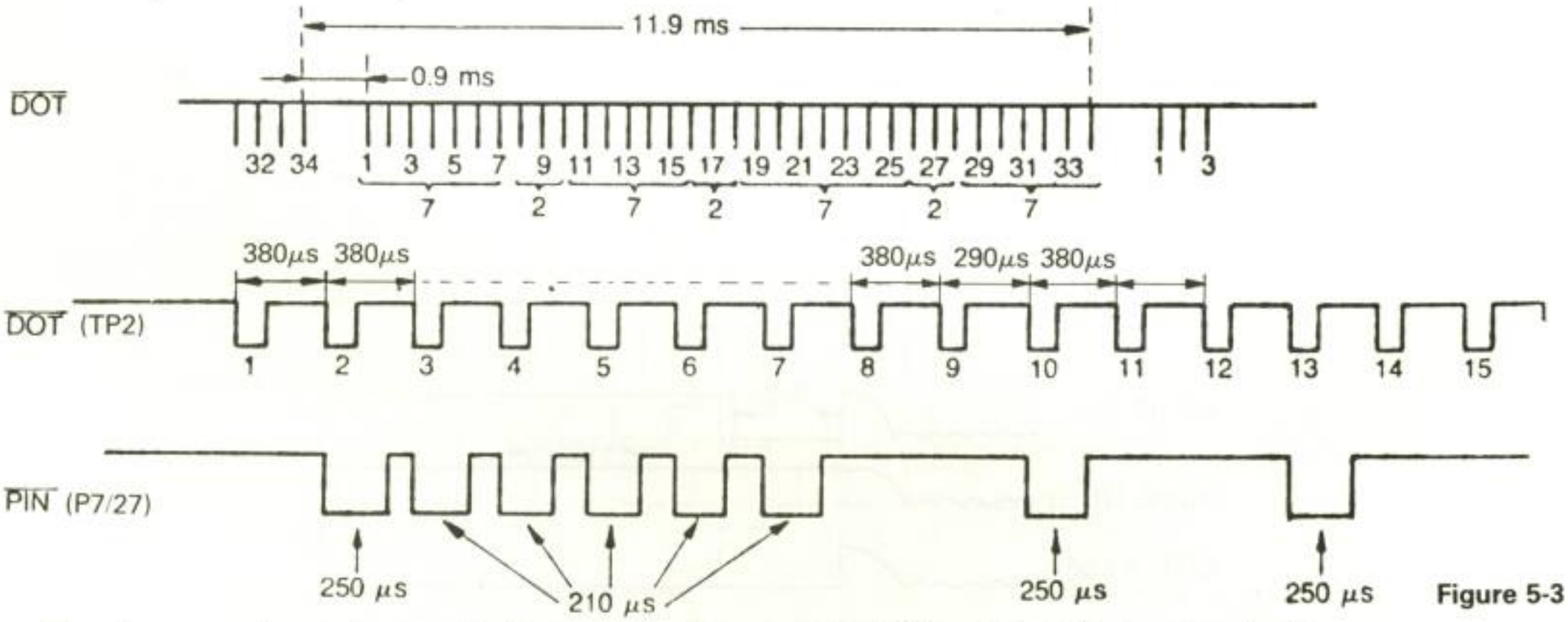


Figure 5-3

The diagram above shows what happend when caracter 'A' is printed. Dot pulses 1~7, 10~16, 19~25 and 28~34 are synchronized to activate the $\overline{\text{PIN}}$ signal.

4. Carrier return operation

After printing a line, the CPU sets the $\overline{\text{MOT}}$ signal (P7/30) HIGH and the $\overline{\text{HC}}$ signal (P7/29) LOW. The motor then stops and the print head carrier begins to return to the home position because it is pulled by the recovery spring. If a carrier return operation includes a line feed, the CPU sets the $\overline{\text{LFPW}}$ signal (P7/28) LOW and drives the stepping motor about 10ms later. Refer to the line feed flowchart. After performing a line feed, the CPU waits until the HOME signal goes HIGH, which means the print head has returned to the home position. When the HOME signal goes HIGH, the CPU sets the $\overline{\text{HC}}$ signal HIGH about 160ms later, ending the carrier return operation.

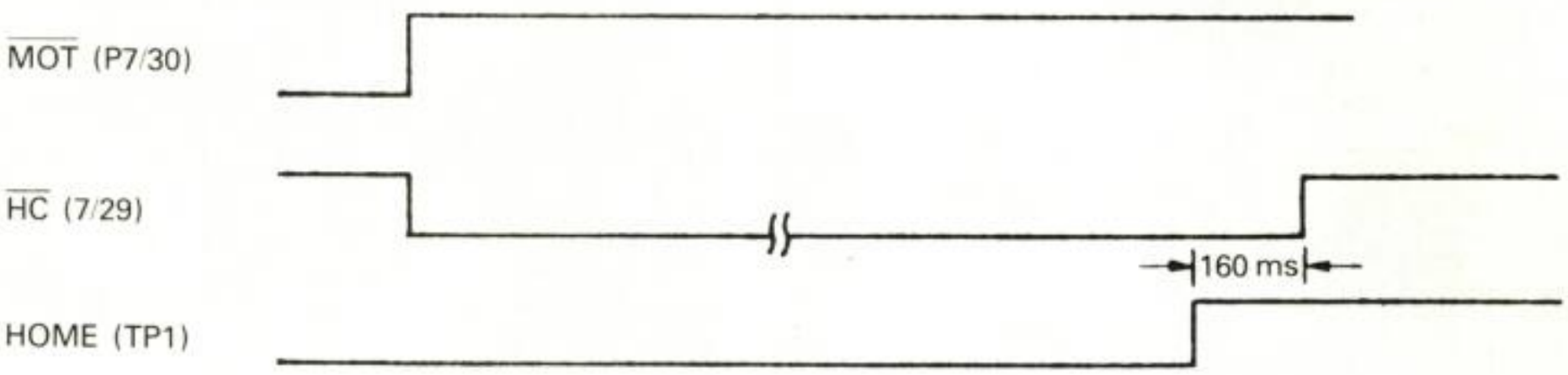


Figure 5-4

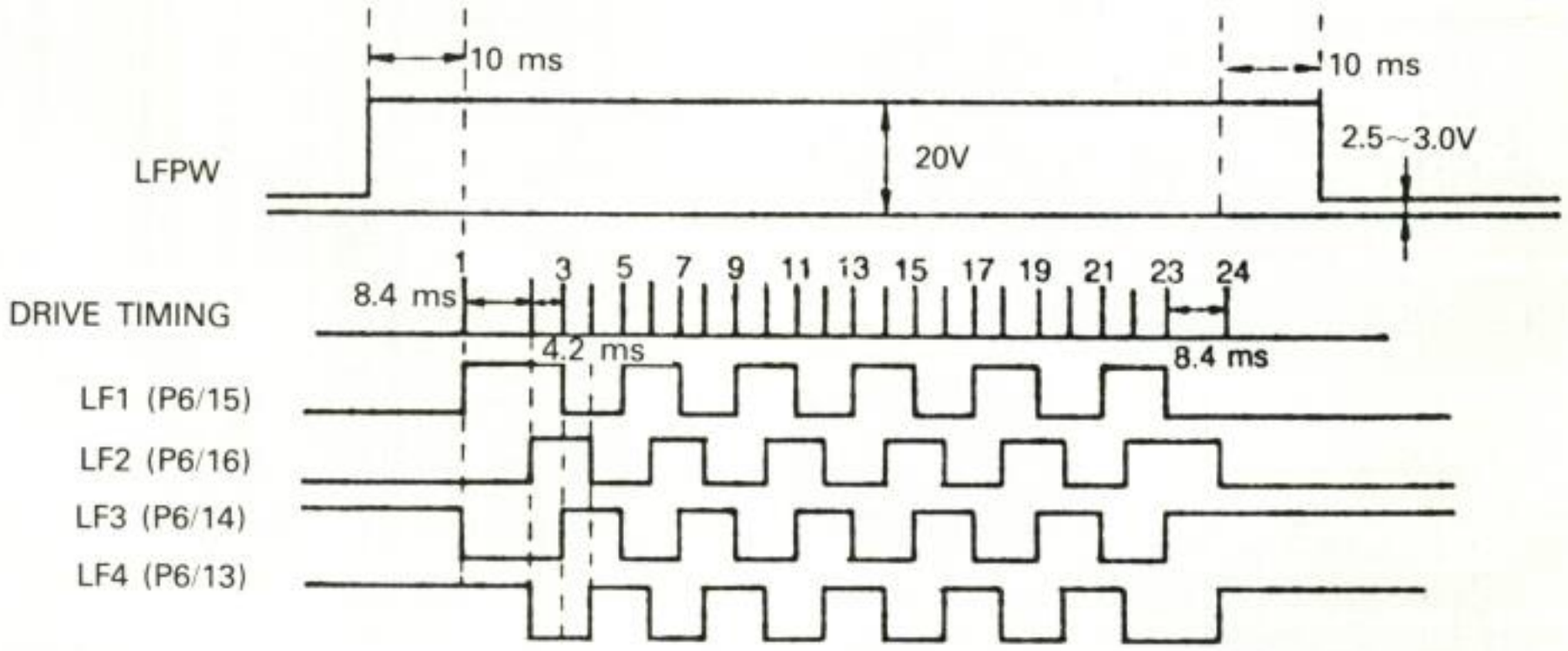
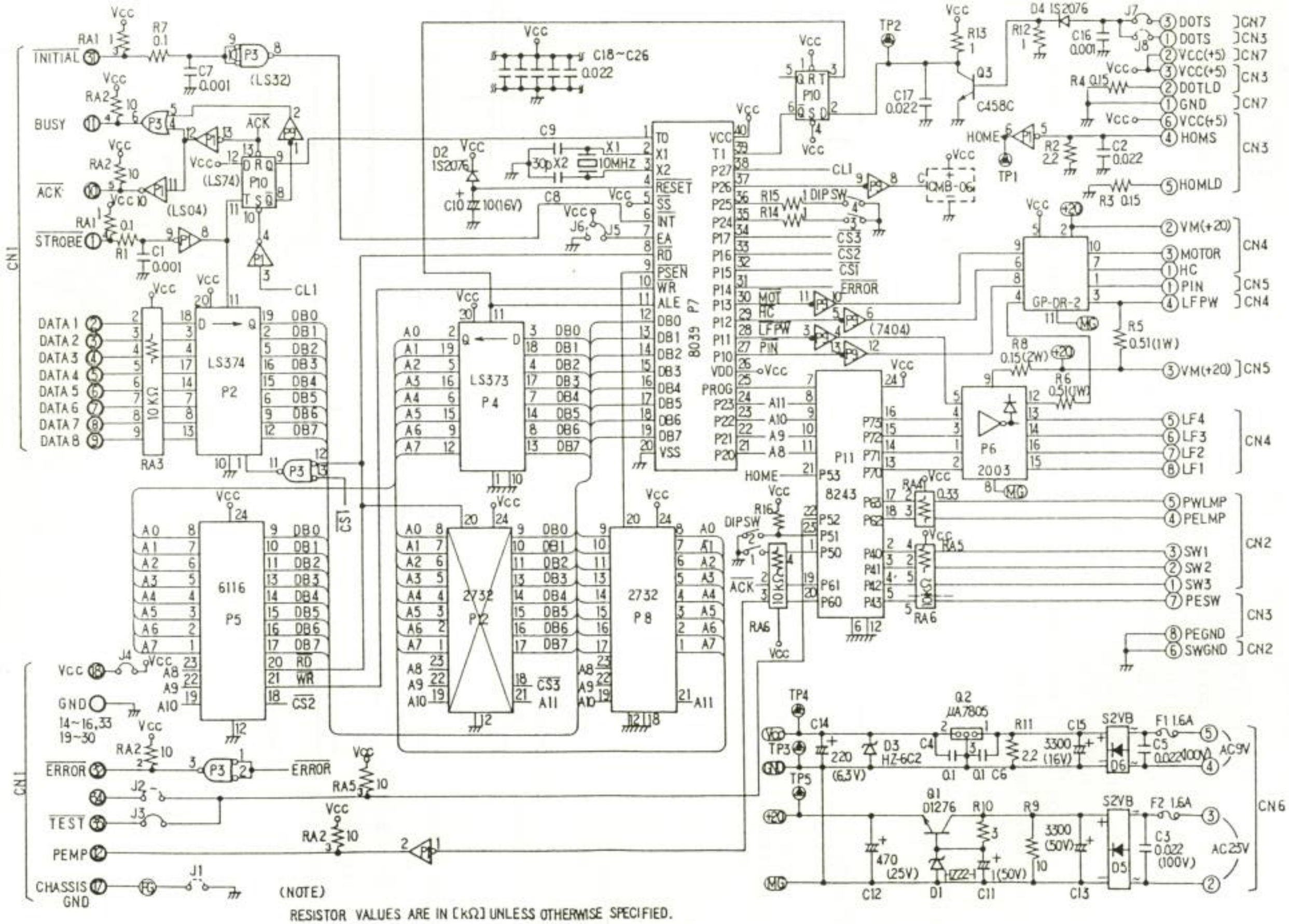


Figure 5-5

1/144 inch is the smallest movement and occurs when the LF stepping motor is driven one step. 24 pulses of the DRIVE TIMING perform a line feed of 24 × 1/144 = 1/6 inch.

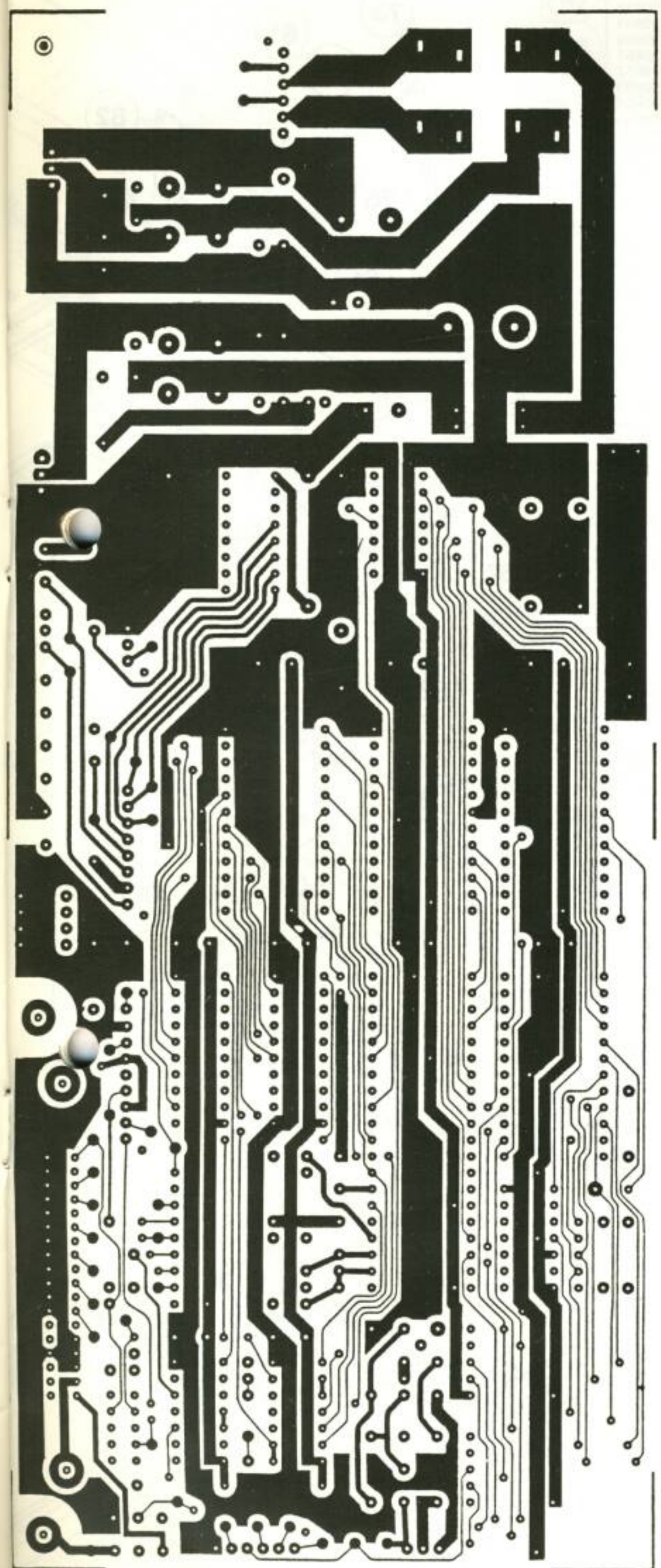
[6] CIRCUITRY



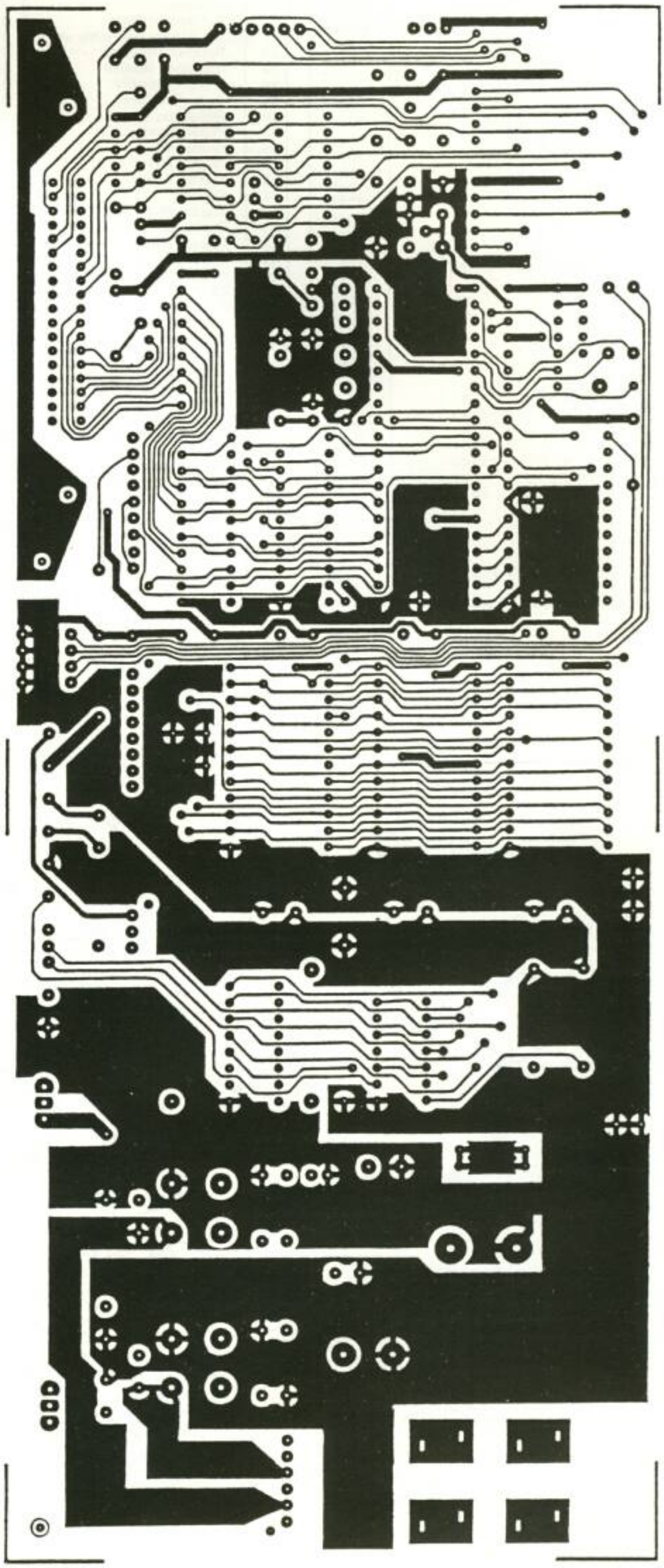
1. Circuit Diagram of Control PCB

2. Control PCB Pattern

2-1. Soldering Side



2-2. Component Side

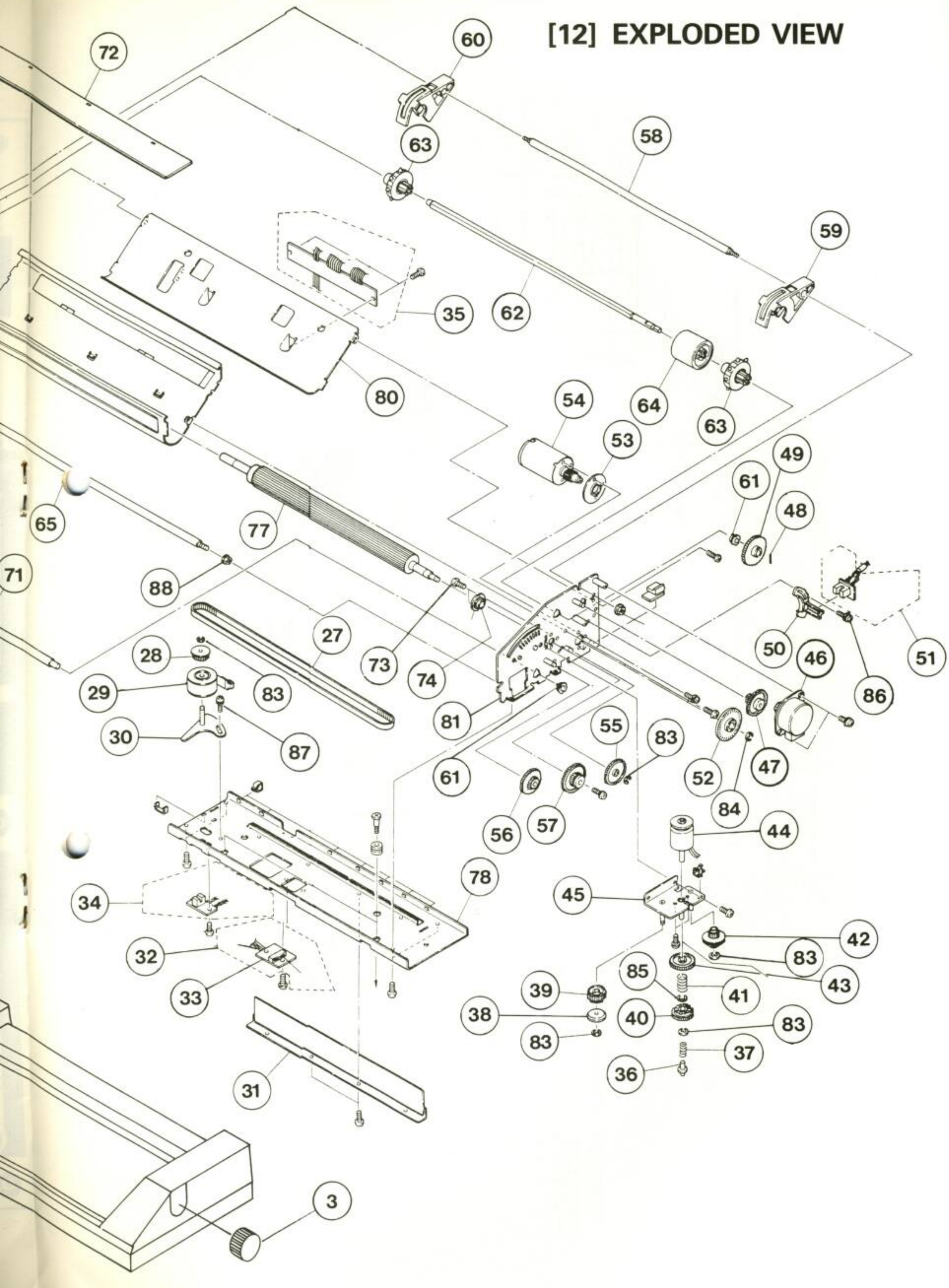


Parts List

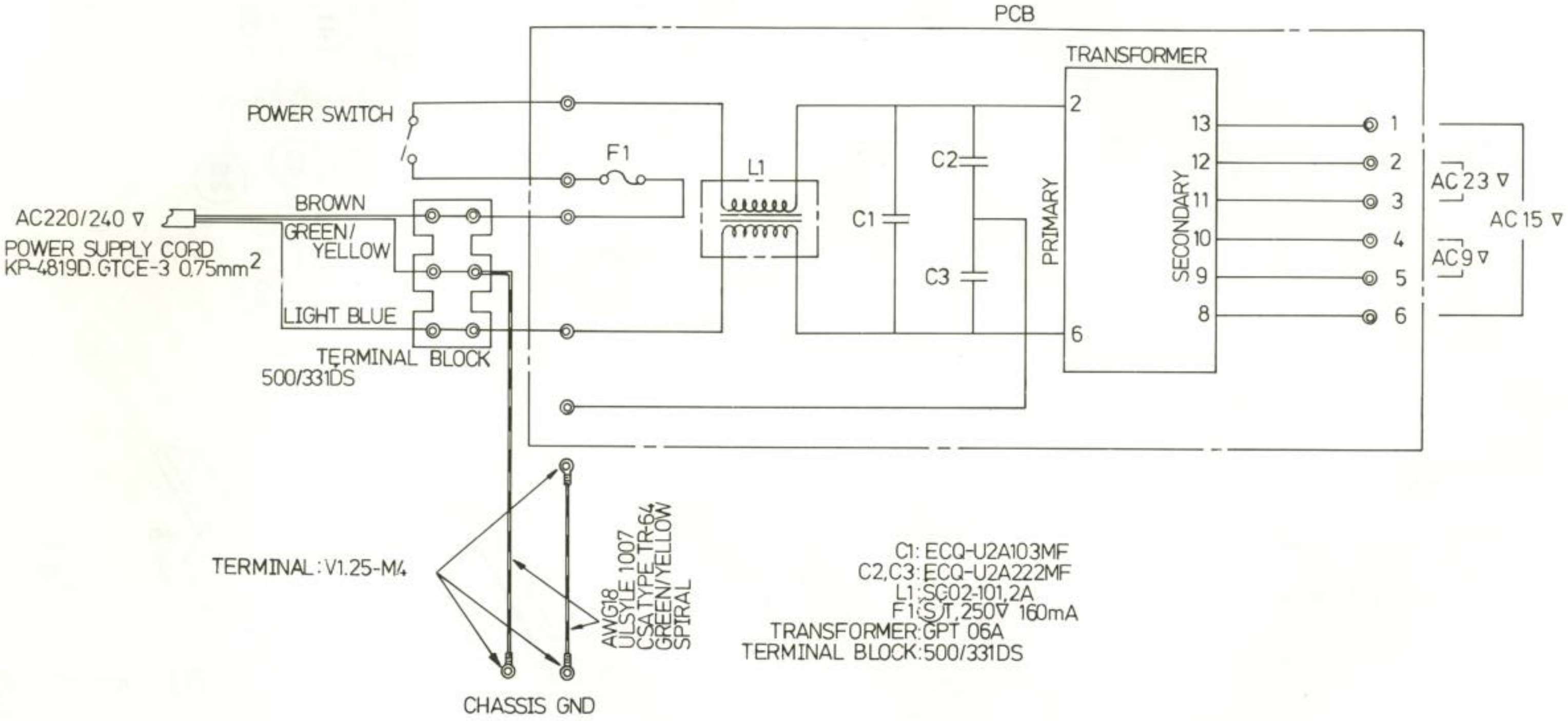
Sym	Description	Part No.
1	Printer Cover	170601
2	Paper Shelf	170602
3	Paper Feed Knob Unit	170603
4	Upper Case	170604
5	Warning Label	170605
6	Bottom Case	170606
7	L.E.D PCB Unit	170607
8	L.E.D.	946008
9	L.E.D. Harness	1706508
10	Power Plate	170609
11	L.E.D. Housing	170610
12	Transformer GPT06A	170611
13	Toroidal Coil	170612
14	Powqer Harness	170613
15	Relay Chord	170614
16	Switch &harness	170615
17	Power panel	170616
18	Cord Bush EA-5	170617
19	Control PCB	170618
20	Terminal Block	170619
21	Cable Guide	170620
22	Print Head Unit	170621
23	Head Adjustment Spring	170622
24	Ribbon Drive Pulley	170623
25	Ribbon Clutch Spring	170624
26	Ribbon Drive Shaft	170625
27	Timimg Belt	170626
28	Idler Pulley	170627
29	Recovery Spring Drum Unit	170628
30	Pulley Plate Block	170629
31	Paper Press Spring	170630
32	Head PCB Assembly	170631
33	Head Connector	170632
34	Sensor PCB Assembly	170633
35	Relay PCB Assembly	170634
36	Spring Step	170635
37	Clutch Moving Spring	170636
38	Pulley Step	170637
39	Drive Pulley	170638
40	Clutch B	170639
41	Clutch Spring	170640
42	Reduction Gear C	170641
43	Clutch	170642

sym	Description	Part No.
44	H-Solenoid	170643
45	Clutch Plate Block	170644
46	LF Motor Assembly	170645
47	LF Reduction Gear	170646
48	Pin B	170647
49	LF Gear	170648
50	Dot Sensor Plate	170649
51	Dot Sensor Assembly	170650
52	Rotation Detector	170651
53	Insulation Washer	179652
54	Motor Assembly	170653
55	Reduction Gear	170654
56	Reduction Gear B	170655
57	Platen Gear	170656
58	Guide Pillar	170657
59	Tractor R Unit	170658
60	Tractor L Unit	170659
61	Bearing	170660
62	Tractor Shaft	170661
63	Pin Feed Roller	170662
64	Tractor Ring	170663
65	Guide Pillar C	170664
66	Head Adjustment Lever	170665
67	Damper	170666
68	Damper B	170667
69	Carrier Spacer	170668
70	Carrier Unit	170669
71	Guide Pillar B	170670
72	Platen Upper Cover	170671
73	Bearing Stop Screw	170672
74	Platen Bearing	170673
75	Shaft Press Spring	170674
76	Shaft Lock Washer	170675
77	Platen	170676
78	Guide Plate B	170677
79	Paper Guide Unit	170678
80	Paper Guide B	170679
81	Ground Plate R Block	170680
82	Ground Plate L	170681
83	E-28 E-Ring	170682
84	BE-50S E-Ring	170683
85	CE-3 E-Ring	170684

[12] EXPLODED VIEW



PRIMARY CIRCUIT



2. POWER lamp PCB–Control PCB

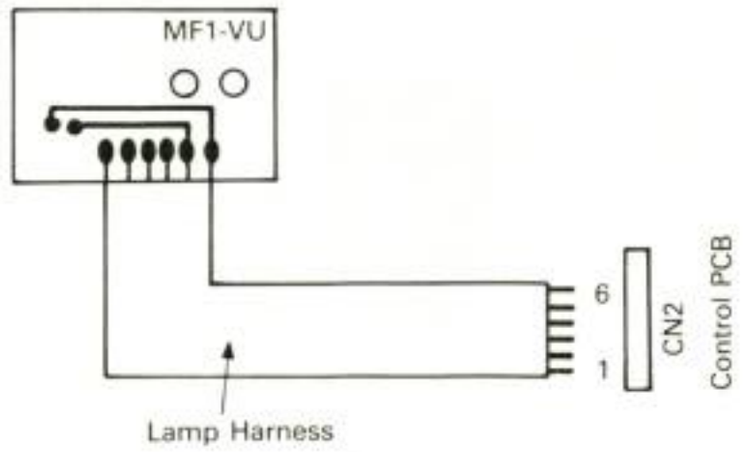


Figure 8-2

3. Transformer PCB–Control PCB

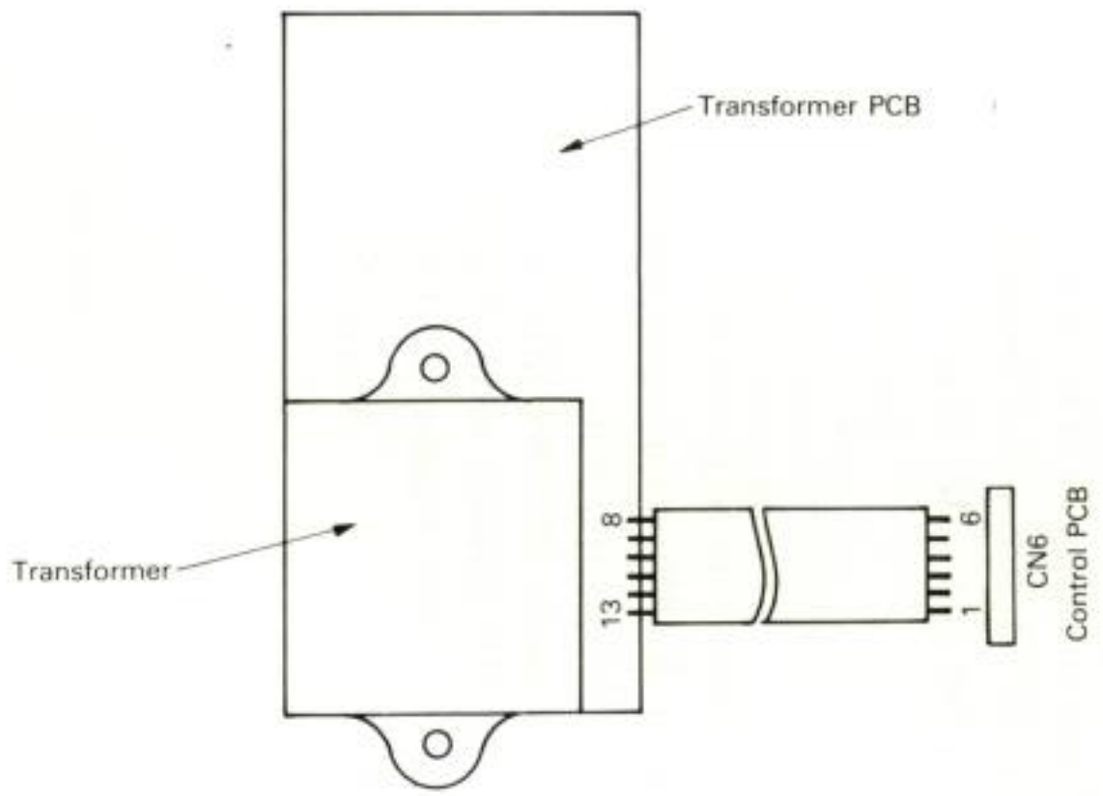
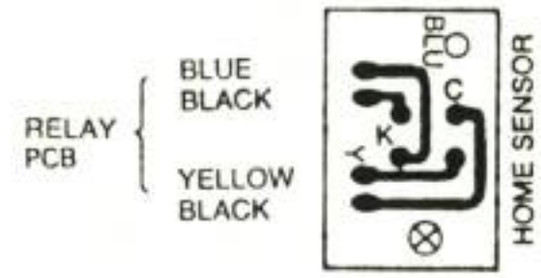


Figure 8-3

[7] WIRING DIAGRAMS

1. In Mechanism



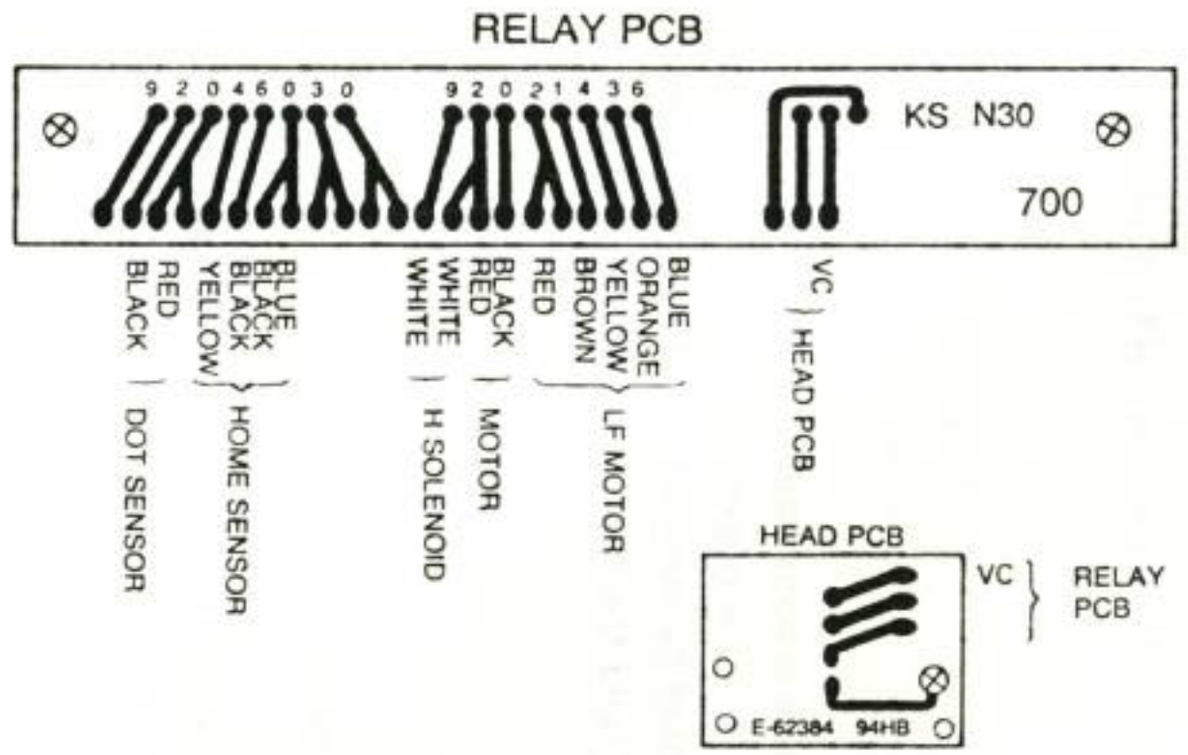
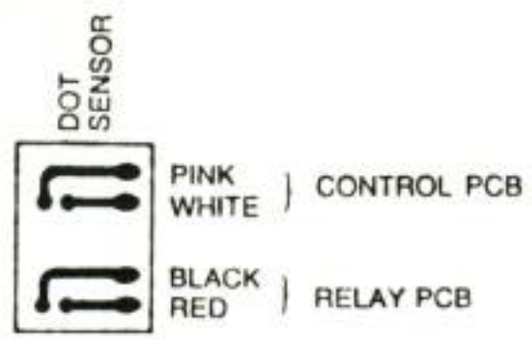
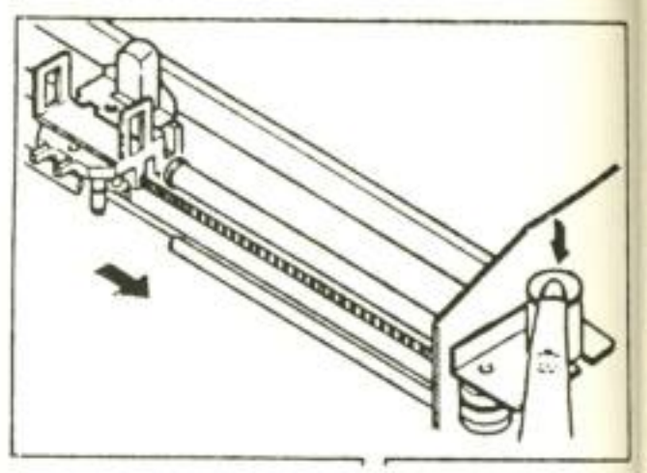


Figure 7–1

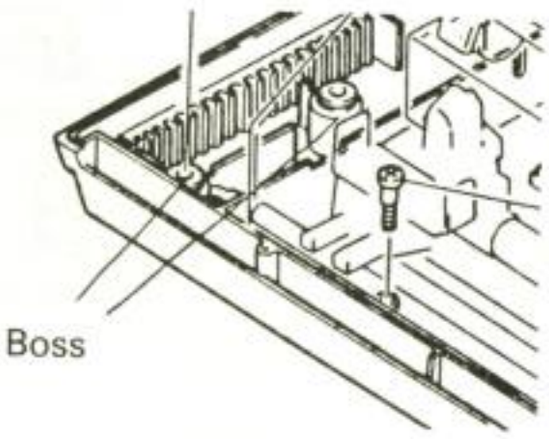


[9] CAUTIONS

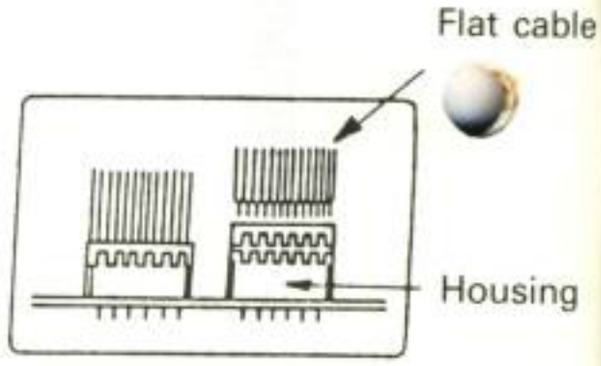
1. Be sure to unplug the power cord from the outlet before removing the upper case.
2. Do not try to move or apply undue force to the print head and carrier unit.
   They can be moved manually if the top of H solenoid (**44**) is pressed down to free clutch B (**40**) after removing the ribbon cassette.



3. Since the enclosure material is plastic, it is recommended that the 4 screws which hold the upper and lower cases together not be overtightened. Also replacing the transformer PCB unit too many times should be avoided because the 2 bosses of the bottom case may become too loose to hold the transformer PCB unit with two screws.



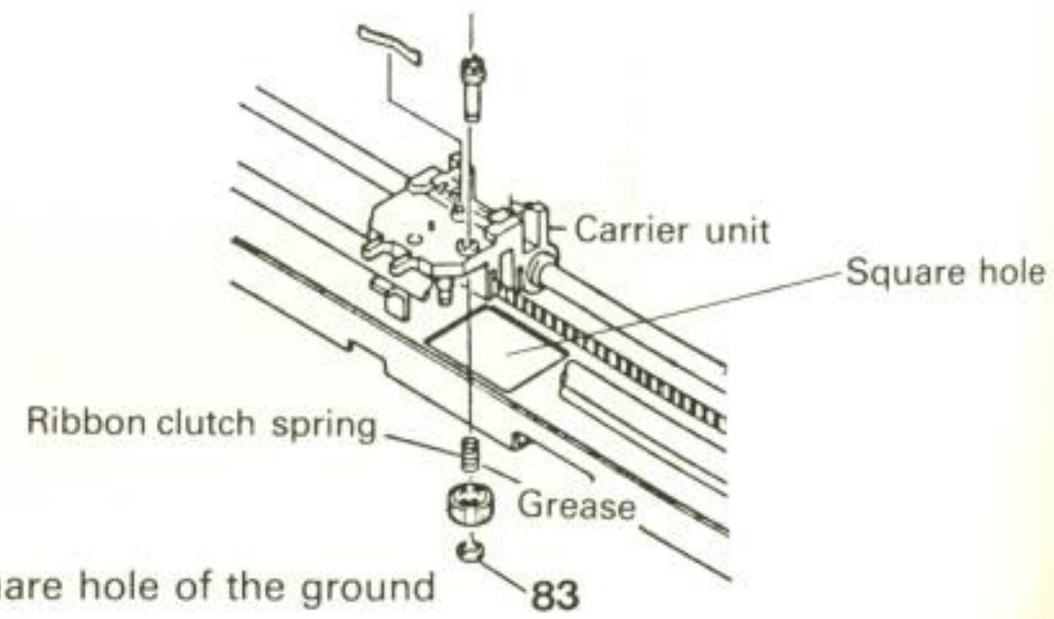
4. Do not use lubricants other than the designated ones. Wipe off dirt with a clean cloth before lubrication.
5. To detach the flat cable from the PCB, lift the connector housing and pull up on the cable. The cable is secured by lifting the connector housing, inserting the cable, and then pressing the housing down until it clicks into position. Make sure the connection is good by pulling up on the cable slightly.



6. When attaching the upper case to the bottom case, make sure the flat cable of the power lamp is positioned under the 3 flat cables which are lying between the RELAY PCB and the control PCB. Failure to do so may obstruct the paper passage.
7. Be careful not to cut your finger when detaching the spring of the idler pulley (**28**) from the carrier unit (**70**) since it is a very strong one.

8. The smooth side of E-ring should face a rotating gear.
9. Once Pin B (**48**) is removed, replace it with a new one because it is quite easy to deform it while removing.
10. The flat calbe and two ground wires running over the barrier between mechanism and the transformer room should go across the recessed parts of the barrier.
11. All the serrated washer used for ground wires are placed next to the metal plates to be shorted.

12. The ribbon clutch spring (**25**) can be replaced through a square hole of the ground plate B (**78**) without removing any guide pillars.



[10] TROUBLESHOOTING

Conerning the reference numbers, refere to the exploded view of the machanism for identification.

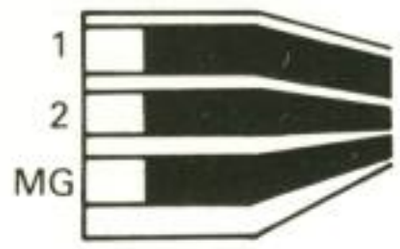
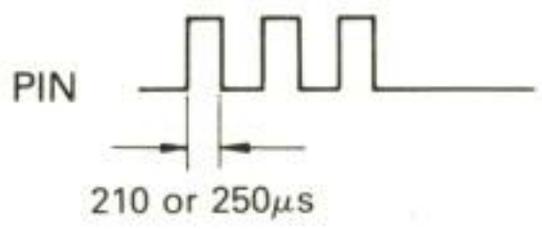
SYMPTOM 1. The POWER lamp does not light.

	POSSIBLE CAUSE	SOLUTIONS
1.	Fuse is blown	Replace only with a fuse of the same rating
2.	Power switch is broken	Replace it.
3.	Transformer is bad	Disconnect the control PCB from the transformer PCB and check the secondary output of the transformer.
4.	Insecured connection at CN6 of the control PCB	Reconnect it.

SYMPTOM 2. The carrier unit does not move or movement is too slow or too fast.

	POSSIBLE CAUSE	SOLUTIONS
1.	Recovery spring **29** is broken.	Replace it.
2.	Head solenoid **44** is defective.	Replace it.
3.	Timing belt **27** is broken.	Replace it.
4.	Motor **54** does not revol ve.	Replace it or repair the control PCB.
5.	Guide pillar B **71** is not oiled.	Lubricate with the designated oil.
6.	The position of the idler pulley **28** is not correct.	Loosen the screw **87** and adjust the position.
7.	The print head position is too near to the platen.	Readjust the position.

SYMPTOM 3. The carrier unit moves, but there is no printing.

	POSSIBLE CAUSE	SOLUTIONS
1.	The print head is defective.  	About 3.5 ohms of resistance should be measured between 1 and 2 if the print head is normal. Replace it if defective.
2.	Control PCB is defective.  	Check the output of PIN. Repair it.

SYMPTOM 4. Some part of a printed character is missing.

	POSSIBLE CAUSE	SOLUTIONS
1.	Part of the platen ridge is broken.	Replace the platen **77**
2.	Control PCB is defective.	Repair it.
3.	The position of the dot sensor **51** is not correct.	Adjust it.

SYMPTOM 5. Printing is too light.

	POSSIBLE CAUSE	SOLUTIONS
1.	Ribbon clutch spring is broken. (Ribbon shaft does not revolve to re-ink the ribbon.)	Replace it.
2.	Inker in the ribbon cassette is not correctly installed.	Reinstall or replace the inker.
3.	Print head is defective.	Replace it.

SYMPTOM 6. Improper paper feeding.

	POSSIBLE CAUSE	SOLUTIONS
1.	LF motor **46** is defective.	Replace it.
2.	Control PCB is defective.	Check signals LF1 ~ LF4 and repair.
3.	Pin B **48** is broken.	Replace it.

SYMPTOM 7. Self-test does not work.

	POSSIBLE CAUSE	SOLUTIONS
1.	Dot sensor **51** is bad.	Replace it or repair control PCB.
2.	Home sensor **32** is bad.	Repalce it or repair control PCB.
3.	Connections to PCB are defective or loose.	Replace or repair connections.
4.	Control PCB is defective	Repair it.
5.	Transformer PCB is broken	Repair it.

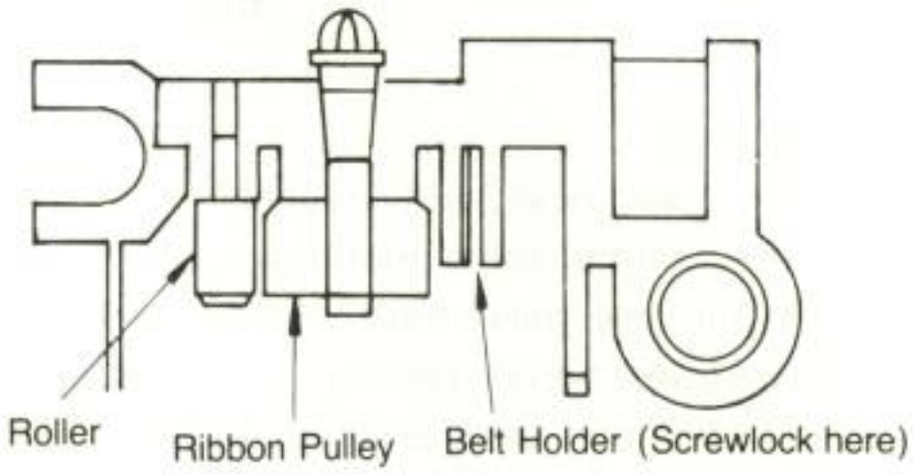
[12] ADJUSTMENTS

Regarding the reference numbers, refer to the exploded view for identification.

Timing belt installation

1. Place the timing belt around the lower gear of the drive pulley (**39**) and around the idler pulley (**28**). The timing belt should be inserted into the belt holder of the carrier and also inserted between the ribbon pulley and the roller, as shown in the figure below.
2. While pressing the spring drum unit (**29**) outward to put tension on the timing belt, tighten the screw **87** to hold the pulley plate block (**30**) in place on ground plate B (**78**).

   There is a tendency for the carrier to return to the home position more slowly when the tension of the timing belt is increased.

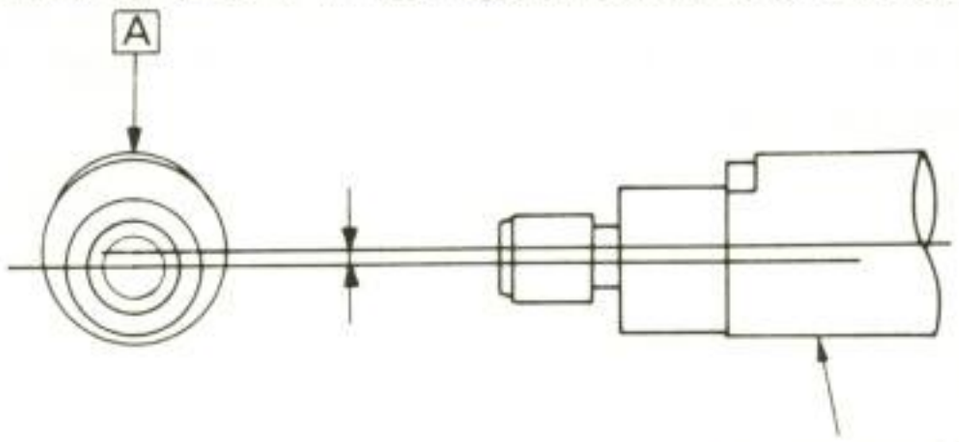


Side View of the Carrier

Figure 12-1

Guide pillar installation

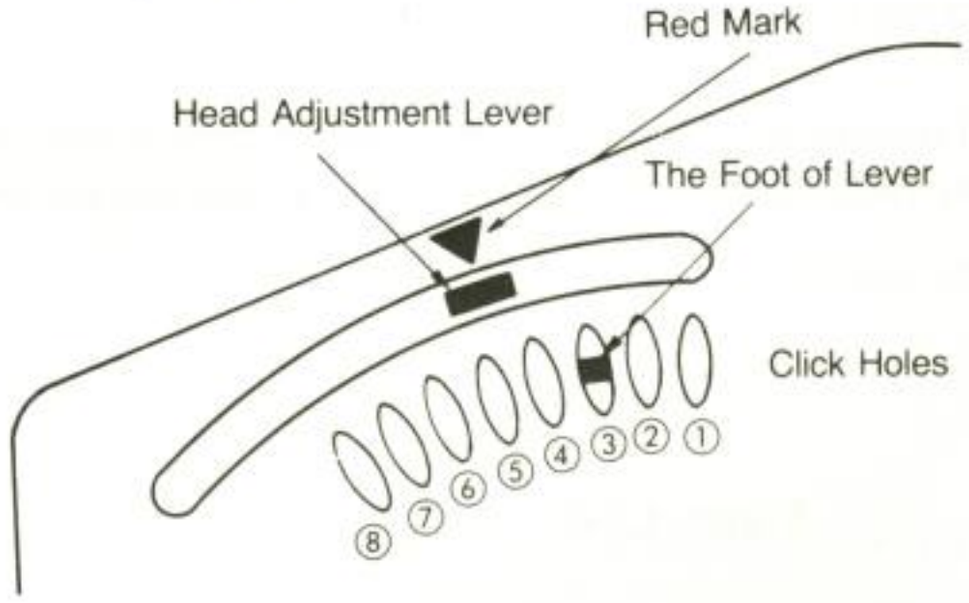
1. Insert the damper (**67**), the carrier spacer (**69**), and the carrier unit (**70**) into guide pillar (**71**). Insert guide pillar into the ground plate right and left assemblies along with the bearing (**61**) on both ends. Guide pillar should be placed so that part [A] , which protrudes the most as shown in the figure below, is at the top position.



Guide Pillar **71**

Figure 12-2

2. Insert the head adjustment lever (**66**) into the left end of guide pillar and tighten the flange nut **88** such the that the foot of the lever is set in click hole ③ , as shown in the figure below, when part [A] of guide pillar is facing up. When tightening the flange nut, it is O.K. to grasp the leftmost end of guide pillar (**71**) with pliers, since it is coverd with the damper (**67**).



Inside view of ground plate Left

Figure 12-3

Note: Be sure that after tightening the flange nut, part [A] of guide pillar (the part which protrudes the most), is at the top position when the foot of the lever is set in click hole③ .

Dot Sensor Unit Adjustment

Install the ribbon cassette and paper before printing.
Conduct printing and check to see if the upper part or the lower part of the printed characters is missing.
If one or the other is missing, adjust position of the dot sensor unit (**50**) to eliminate the missing part after loosening the screw **86** .

Figure 12–4

(a) Normal
(b) The uppermost part is missing.
The hammer starts printing too early when a platen ridge has not yet reached the correct position.
In this case, move the dot sensor unit counter clockwise.
(c) The lower part is missing.
The hammer starts printing too late.
Move the dot sensor unit clockwise.

When it is impossible to make a satisfactory adjustment with the above method, after removing the rotation detector (**52**), rotate it clockwise 4 holes in the case of (b) or counter clockwise 4 holes in the case of (c) and then replace it.
The rotation detector can be replaced after removing the dot sensor unit and the **84** ring. Be sure to insert the rotation detector such that the two bosses on the rotation detector are engaged with the gears of the motor (**54**).

Figure 12–5

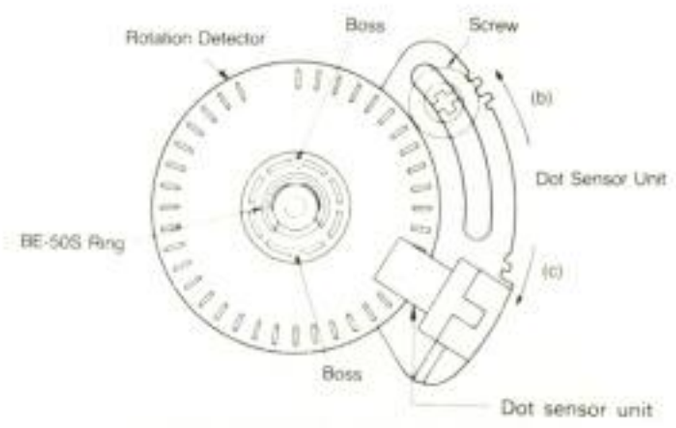


Figure 12-5

Rotate the platen gear (**57**) such that one of the holes of it matches hole [H] in ground plate right.
Set the rotation detector (**52**) so that part [S] , where there is no hole, is facing hole [G] of ground plate right.
Setting up by this method insures that it is possible to eliminate the missing upper or lower part of a character by only adjusting the position of the dot sensor unit.

Figure 12–6

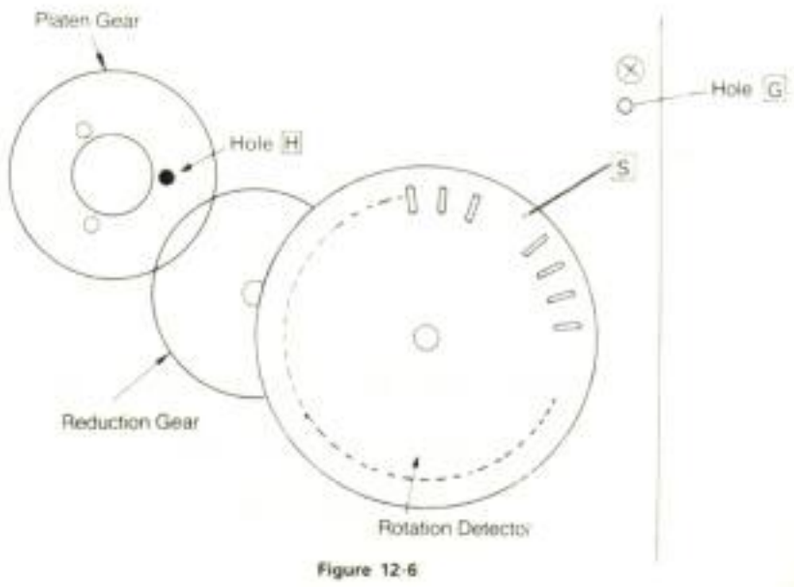


Figure 12-6

Print Head Position Adjustment

(1) Place the print head unit on top of the carrier so that both ends of spring Ⓒ appear.
(2) Loosely tighten the two screws Ⓐ. Insert an adjusting screw to hole Ⓑ.
(3) Adjust the printed character quality with screw Ⓑ when the foot of the head adjustment lever is at position ③, as shown in figure 12-3.
(4) Firmly tighten the two screws Ⓐ and make sure that smudging does not appear when the foot of the lever is at the position ①
(5) Remove the screw Ⓑ which is a tool for adjusting print head position.

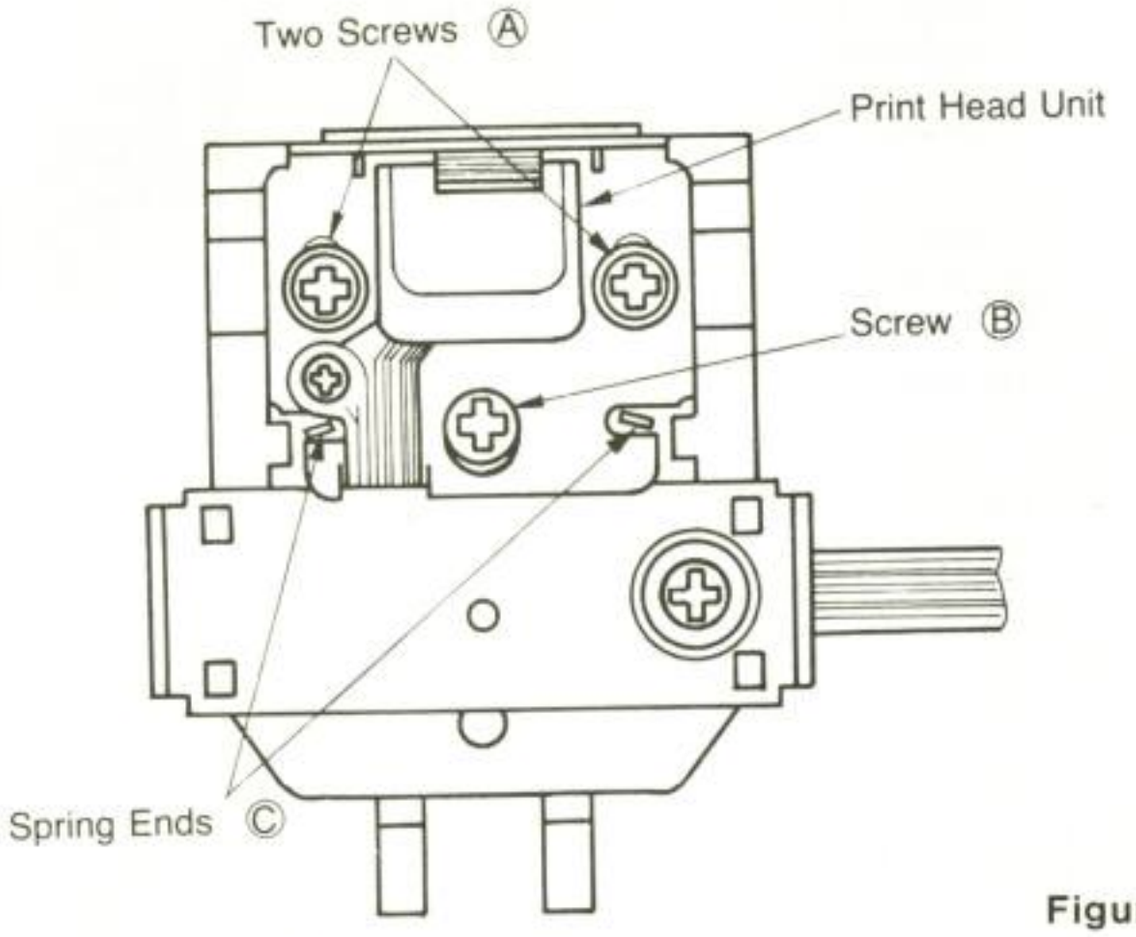
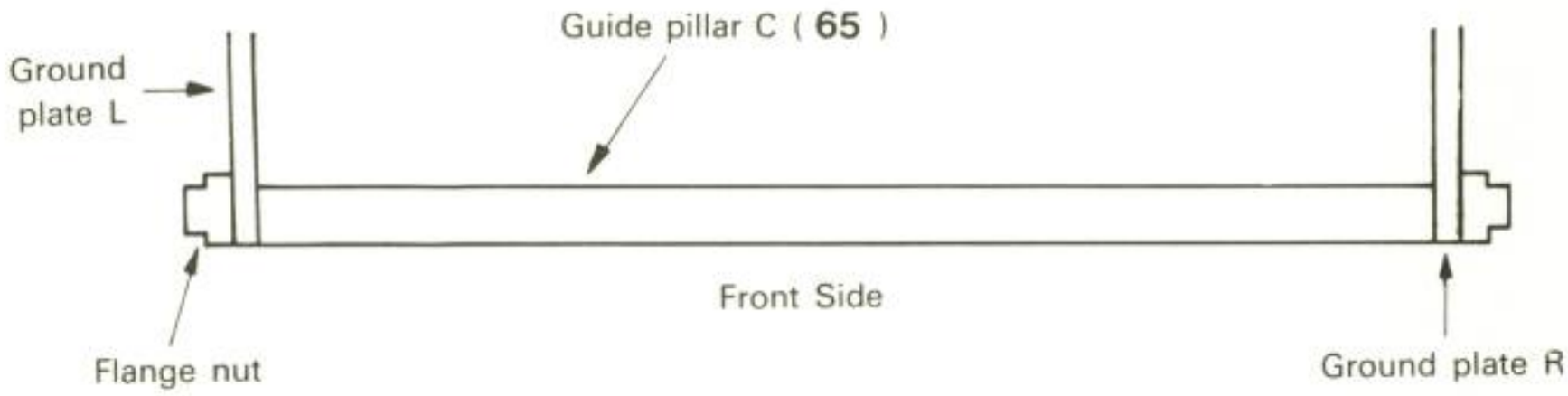


Figure 12-8

Top View of Print Head

Adjustment of Smudges on the Left or Right End



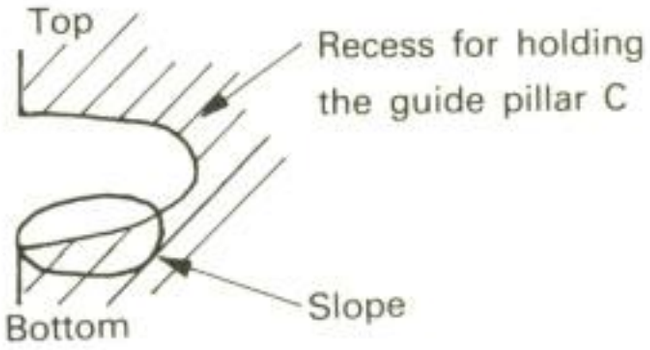


Figure 12-9

The recess on each ground plate for holding the guide pillar C has a slope at the bottom. When there is smudge on the left whereas no smudge on the right, slightly moving the left end of guide pillar C to the front can eliminate the smudge on the left.
If there is smudge on the right and no smudge on the left, moving the right end a little to the front eliminates the smudge appeared on the right.

ELECTRICAL PARTS LIST

IC's	
IC 74LS04	170685
IC 74LS374	170686
IC 74LS32	170687
IC 74LS373	170688
IC HM6116P-4	170689
IC ULN2003	170690
IC MBL8039 CPU	170691
IC MBM2732 ROM	170692
IC 7404	170693
IC 74LS74	170694
IC MBL8243 I/O	170695
IC GP-DR-2	170696
IC Socket DILB24P-8JC	170697
Transistors	
TR 2SD1276	170698
uA7805UC Voltage Regulator	170699
TR 2SC485	170700
Diodes	
HZ22-1 Zener Diode	170701
IS2076 Diode	170702
HZ6C2 Zener Diode	1422114
S2VB10 Bridge Rectifier	170703
Miscellaneous	
CSA10.00MT Ceramic Oscillator	170704
DYS-4 Dip Switch	170705
510 ohm / 1W Metal Oxide	170706
150 ohm / 2W Metal Oxide	170707
10k/5 Pin Array	170708
10k/5 Pin Array	170709
10k/9 Pin Array	170710
330 ohm/5 Pin Array	170711
3300uF/50V Capacitor	170712
3300uF/50V Capacitor	170713

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