

MICROLINE 182/183 PRINTER
MAINTENANCE MANUAL

PREFACE

This maintenance manual describes field maintenance of the Microline 182/183 for maintenance engineers.

For performance specifications and operating procedures, refer to the "User's Manual".

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SPECIFICATIONS (STANDARD MODEL)

SPECIFICATIONS (IBM COMPATIBLE MODEL)

DIP SWITCH SETTING TABLE, (STANDARD MODEL)

DIP SWITCH SETTING TABLE (IBM COMPATIBLE MODEL)

RECORDS OF CHANGES

Part No.	ECO No.	Printer/PCB Serial No.	Page affected	Description of changes
OKI-J Part No. M-52033; ISSUE 1			3i-24, 3-25, 3-28, 3-29, 8i-9, 8-10, AM-5, AA-10,	Correction (Replacement) (Addition)
			Front-cover, Preface, I-1, 1i-2, 3-34 8i-2 to 8-8 AB-1, AB-2 AC-1, AC-2	Descriptions of ML183 are added. (Replacement)
			7-27 to 7-33	Circuit, diagram (Rev. 7) of SLMC-2 circuit board is added. (Addition)
NML-007		ML182 220 v 501 A00001 61 240 V 501A0000041 ML183 220 v 501 A0000001 240 V 501 A0000001	r-35 to 7-41	Circuit diagram (Rev. 8) of SLMC-2 circuit board is added. (Addition)
NML-035		ML182 220 v 504A0009311 240 V 504A0004441 ML183 220 v — 240 V —	7-43 to 7-49	Circuit diagram (Rev. 9) of SLMC-2 circuit board is added. (Addition)
NML-053		ML182 220 v 506A0012961 240 V 506A0007001 ML183 220 v 506A0000009 240 V 506A0000003	7-51 to 7-57	Circuit diagram (Rev. 10) of SLMC-2 circuit board is added. (Addition)
NML-063		ML1 82 220 v 508A0016961 240 V 508A0008501 ML183 220 v 506A0000009 240 V 506A0000003	7-59 to 7-69	Circuit diagram (Rev. 11) of SLMC-2 circuit board is added. (Addition)

(con.)

Part No.	ECO No.	Printer/PCB Serial No.	Page affected	Description of changes
	NML-037	220 V 504A0009311 240 V 504A0004441	AD1, AD2	Change of DIP switch functions (Replacement)
	NML-038	220 V 503A0007411 240 V 503A0003091	AE-1	
			AB-3	(Deletion)
			Back cover	Renewal of issue (Replacement)

1. CONFIGURATION

1. CONFIGURATION

1.1 Standard Printer Configuration

The standard configuration of the ML 182/183 is as follows:

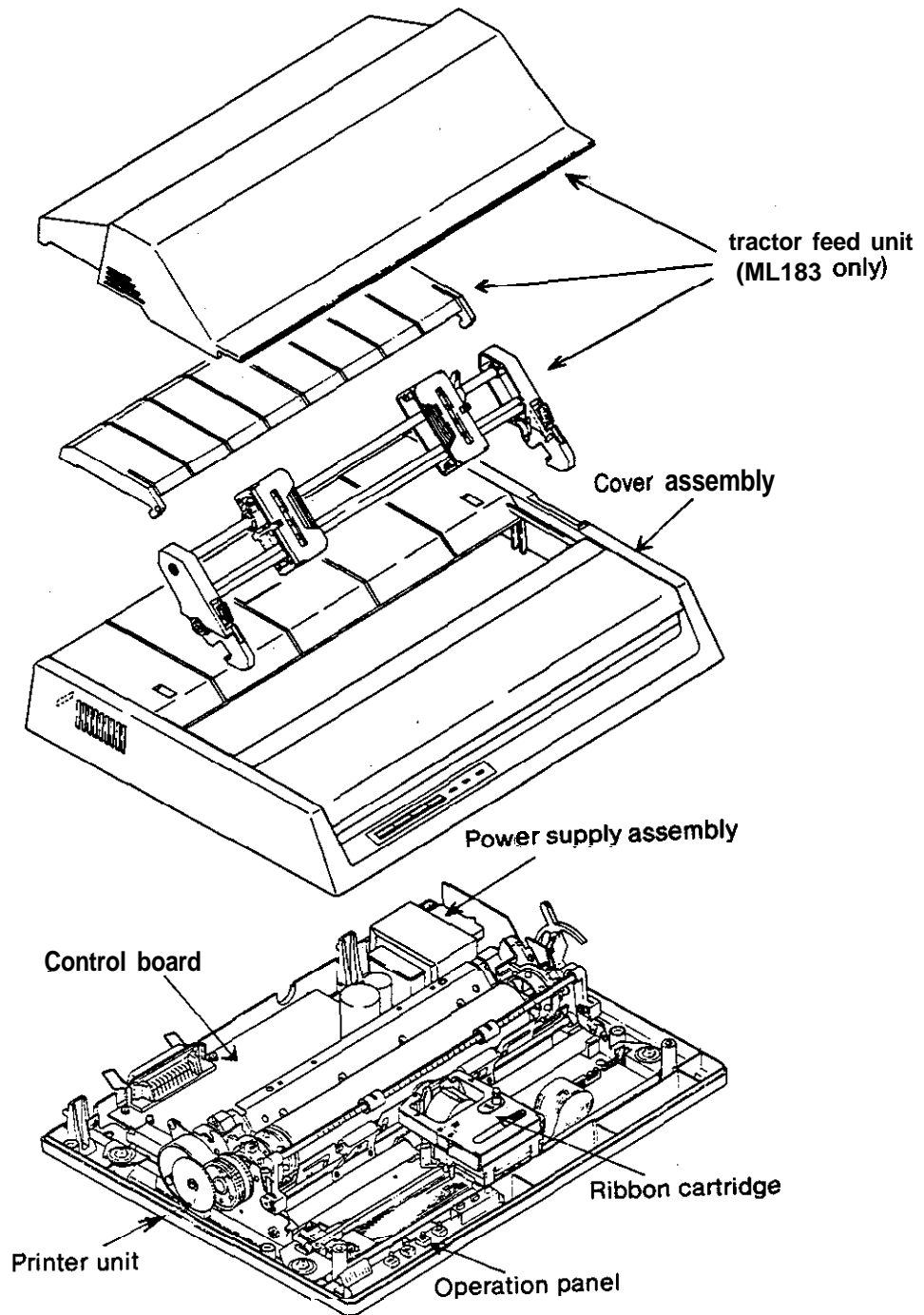
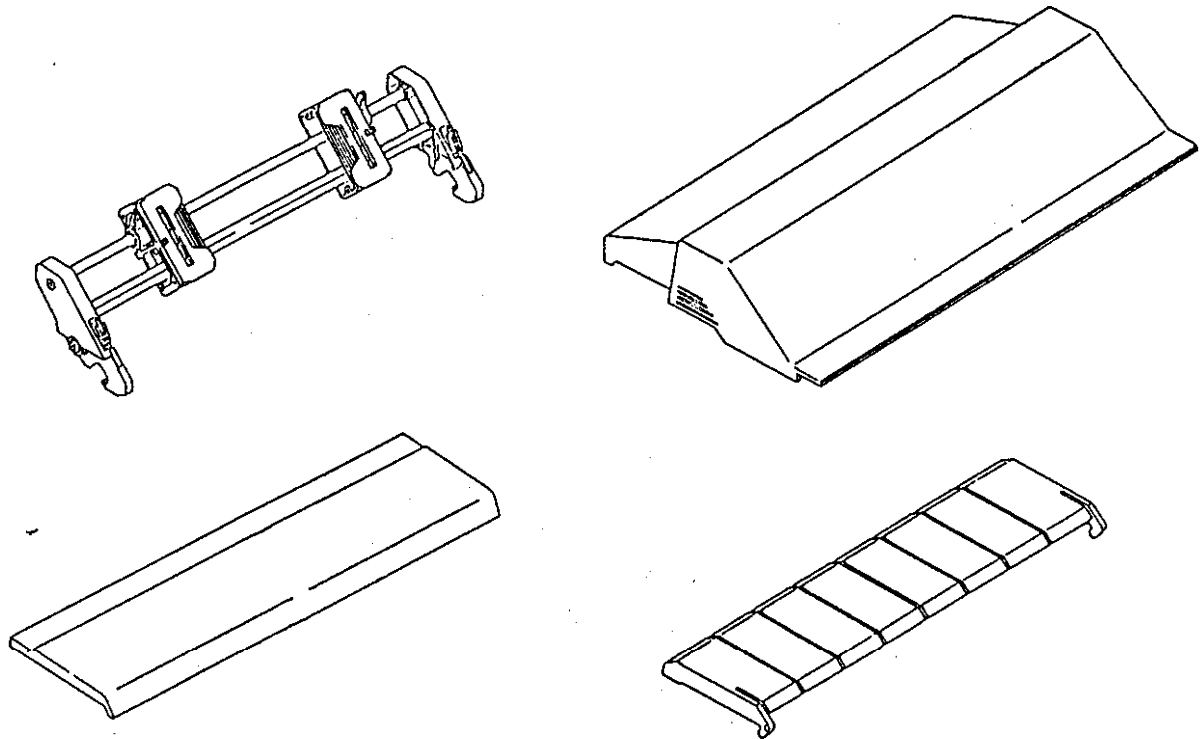


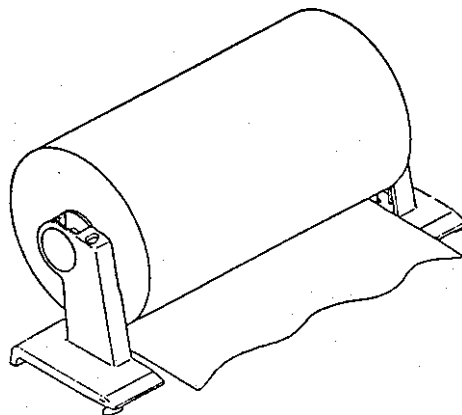
Figure I-1 Printer Configuration

1.2 Options

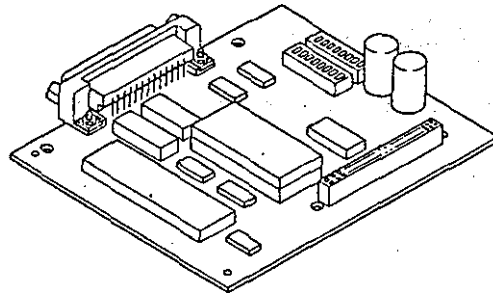
- (1) Tractor feed unit with acoustic cover, access cover and paper separator
(only ML1 82)



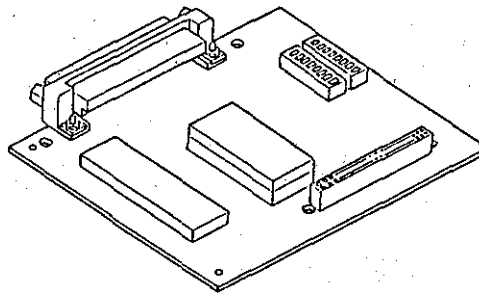
- (2) Roll paper stand (only ML182)



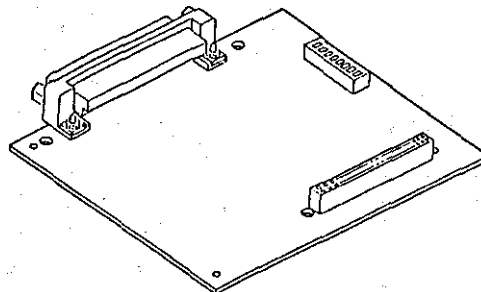
- (3) Super-speed RS232-C serial interface board,



- (4) Super-speed RS422-A serial interface board



- (5) High-speed RS422-A serial interface board



1. CONFIGURATION

1.1 Standard Printer Configuration

The standard configuration of the ML 182/183 is as follows:

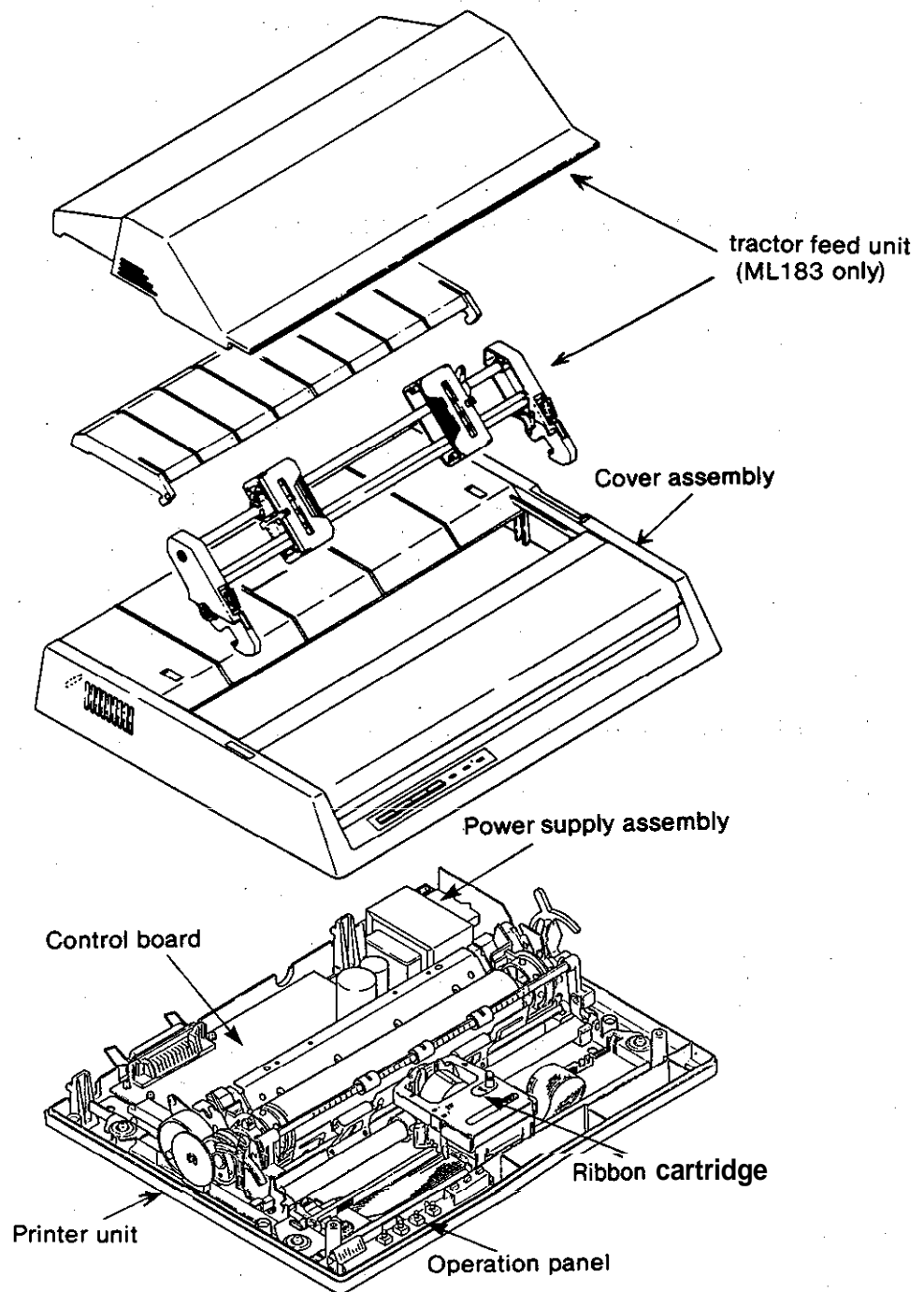
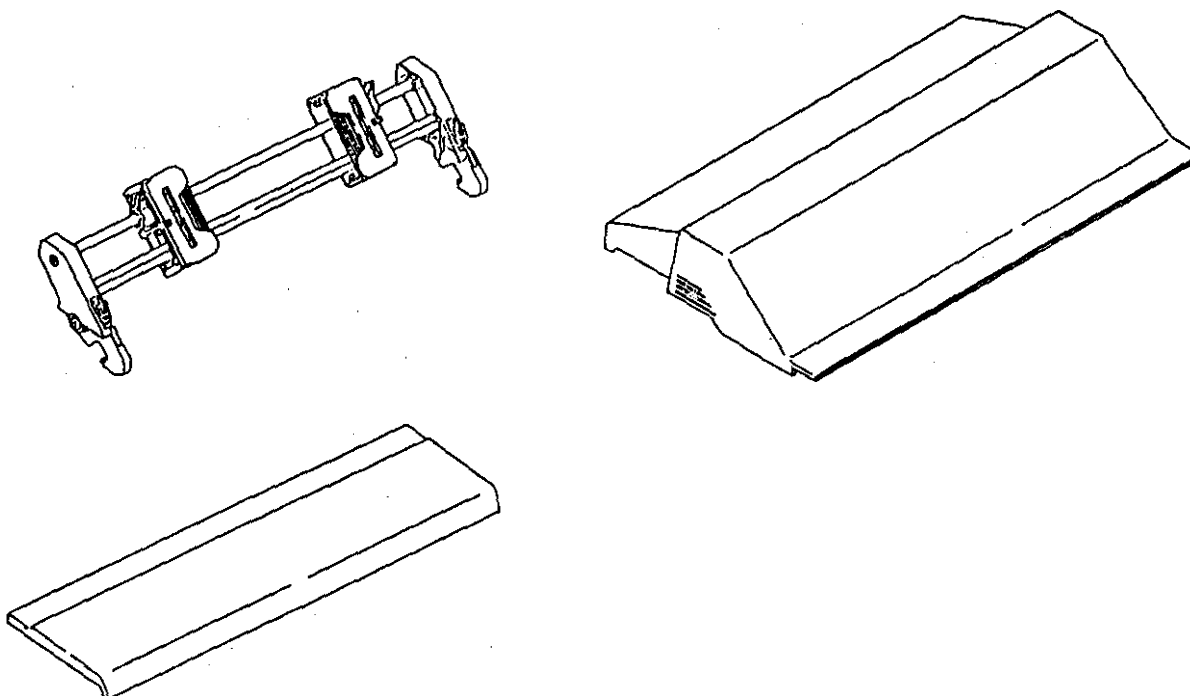


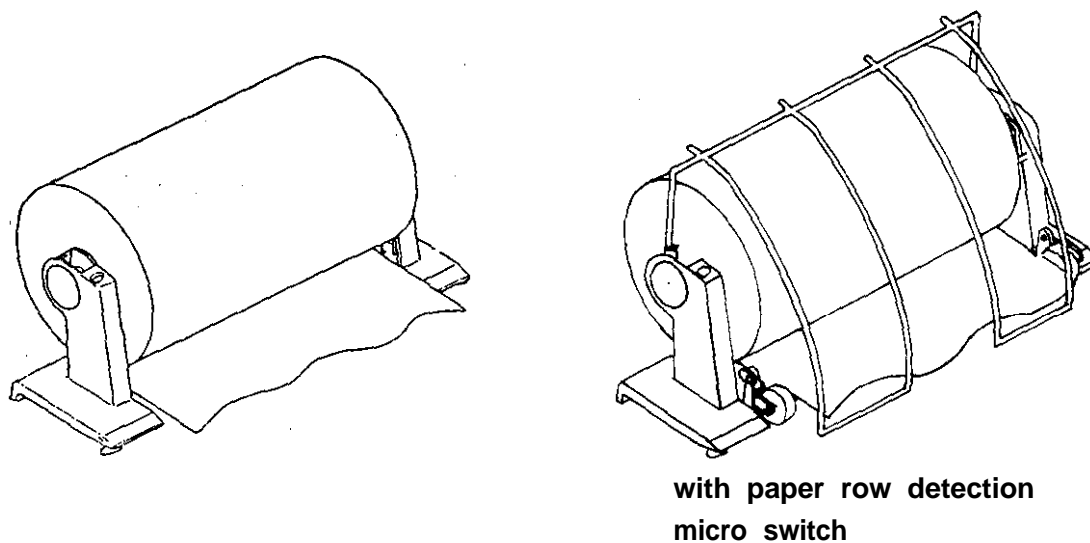
Figure I-1 Printer Configuration

1.2 Options

- (1) Tractor feed unit with acoustic cover and, access cover.
(only ML182)



- (2) Roll paper stand (only ML182)



2. MAINTENANCE

2. MAINTENANCE TOOLS

The tools in table 2-1 are necessary for replacing printed-circuit boards and unit parts. For other maintenance procedures, different tools may be necessary.

Table 2-1 Maintenance Tools

No.	Tool	Quantity	Purpose	Remarks
1	Phillips screwdriver No. 1-100	1	2- to 2.6-mm screws	
2	Phillips screwdriver No. 2-200	1	3- to 5-mm screws	
3	Screwdriver No. 3-100	1		
4	Cutters No. 5H	1		
5	Round pliers No. 1	1		
6	Thickness gauge set	1	for head gap adjustment	
7	Metal rod	1	for head gap. adjustment	
a	Volt-ohm-milliammeter	1		

3. PARTS REPLACEMENT

3. PARTS REPLACEMENT

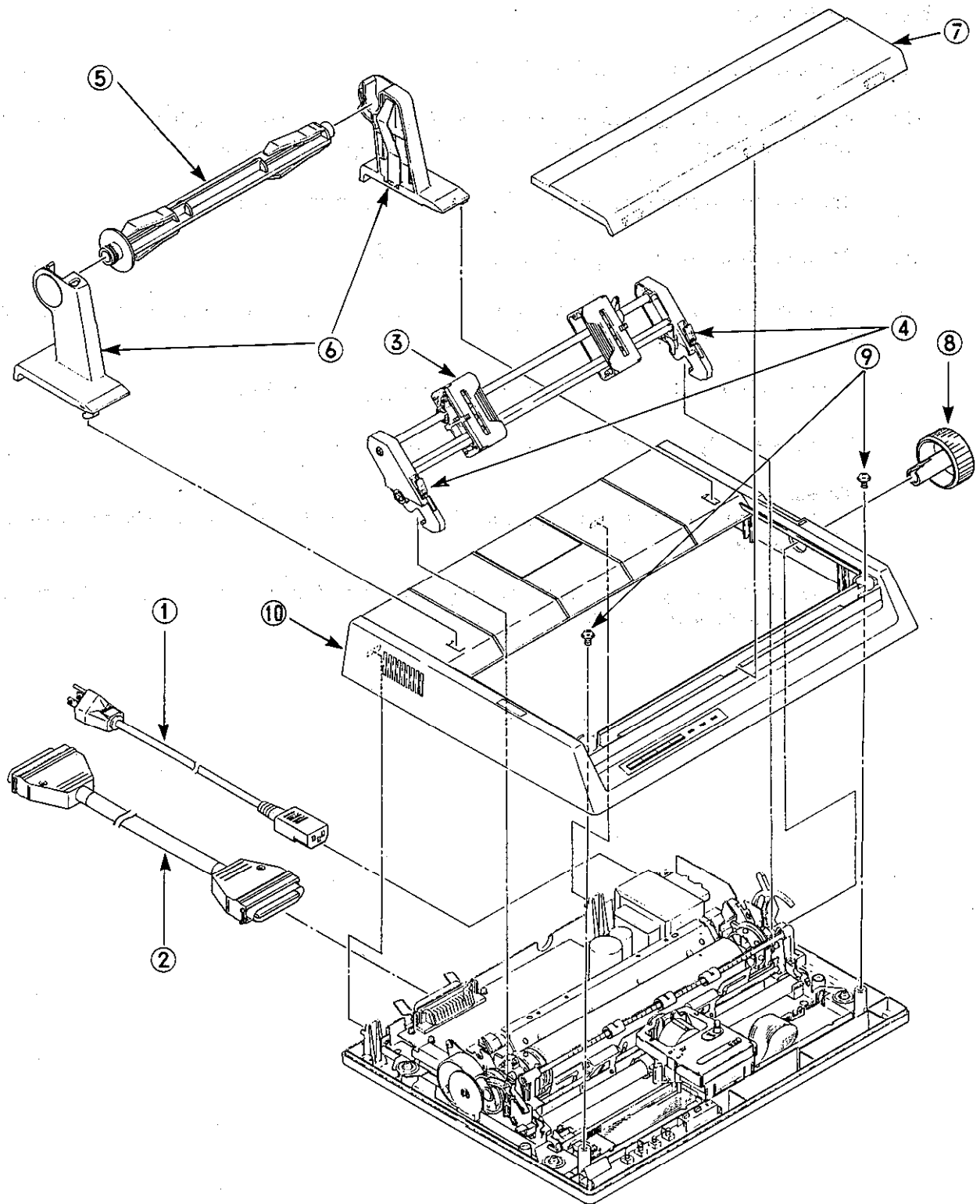
3.1 Precautions for Parts Replacement

- (1) Be sure to turn OFF the AC POWER switch and remove the **AC input** plug from the AC receptacle before disassembly or **reassembly**.
- (2) **Do not** disassemble the printer as long as it is in good **operating condition**.
- (3) Be careful not to remove parts unless, necessary. Disassembly should be the minimum necessary.
- (4) Use only the specified maintenance **tools**.
- (5) Disassemble the printer in the specified order of disassembly procedures; otherwise, parts may be damaged.
- (6) In the course of disassembly, it may be **a good idea to** keep the removed small parts such as screws and washers by attaching them temporarily to their original places so as not to lose them.
- (7) **ICs** such as the microprocessor, ROM, and RAM can easily be damaged by static electricity. Do not wear gloves that are apt to produce static electricity when handling printed-circuit boards.
- (8) Do not place the printed-circuit boards directly on the printer or the floor.

3.2 Disassembly and Reassembly Procedures

3.2.1 Upper cover

- (1) Turn OFF the AC POWER switch, and remove AC cable ① from the outlet, and then remove interface cable ②, remove paper.
- (2) Remove acoustic cover and paper separator (if installed).
- (3) Remove tractor feed unit ③ by depressing lock lever ④ and tilting backward (if it is installed).
- (4) Remove roll paper with paper shaft ⑤ by lifting upward. Remove side frame ⑥ by tilting forward (if it is installed).
- (5) Remove access cover ⑦ by lifting rear, edge.
- (6) Pull platen knob ⑧ out
- (7) Remove two screws'@.
- (8) Remove upper cover ⑩ by lifting up front and pushing it backward.
- (9) For reassembly, reverse the disassembly procedure.

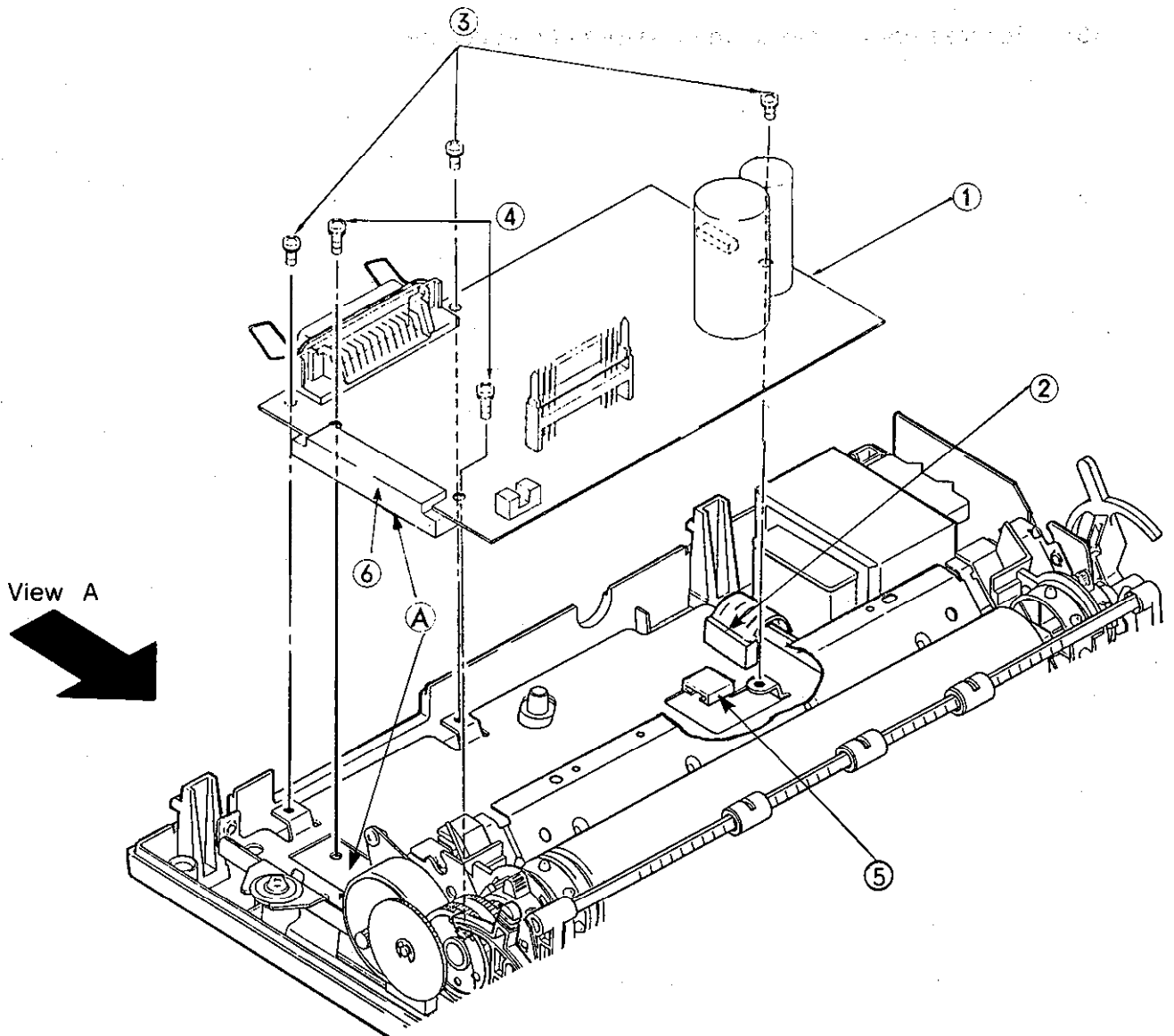
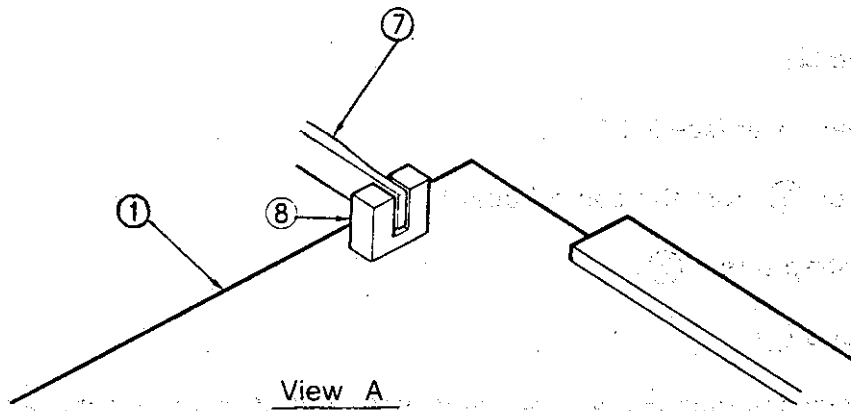


3.2.2 Control board

- (1) Remove the upper cover (**see** 3.2.1).
- (2) Remove serial interface board by removing two screws locating on both sides of interface connector. Remove interface board upward (**if** installed).
- (3) Remove transformer connector ② from **the** control board ①.
- (4) Remove three screws ③ and two screws ④.
- (5) Remove control board ① by **lifting** upward (see Notes below). **Observe paper near-end lever** when removing the PCB.
- (6) Before reassembly, secure rubber insulator ⑤ **is** installed.
- (7) For reassembly, reverse the disassembly procedure..

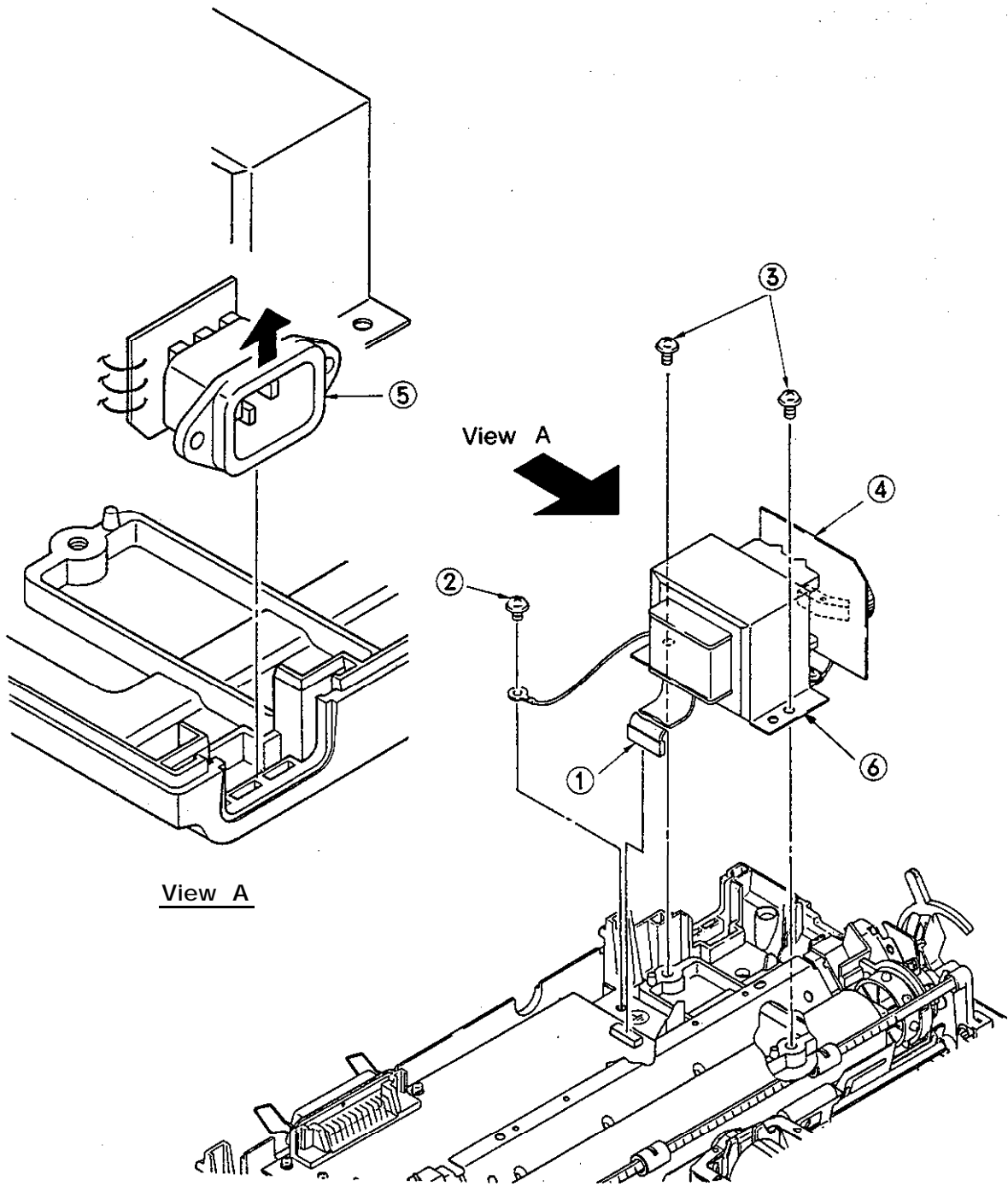
Notes:

1. Do **not touch** the terminal (contact) @for **connector ⑥ directly** with hand and make sure that it **is** clean.
2. When **affaching**, make sure that **paper near-end lever ⑦** is c/ear in the groove of phofosensor ⑧ on control board ①.



3.2.3 Transformer assembly

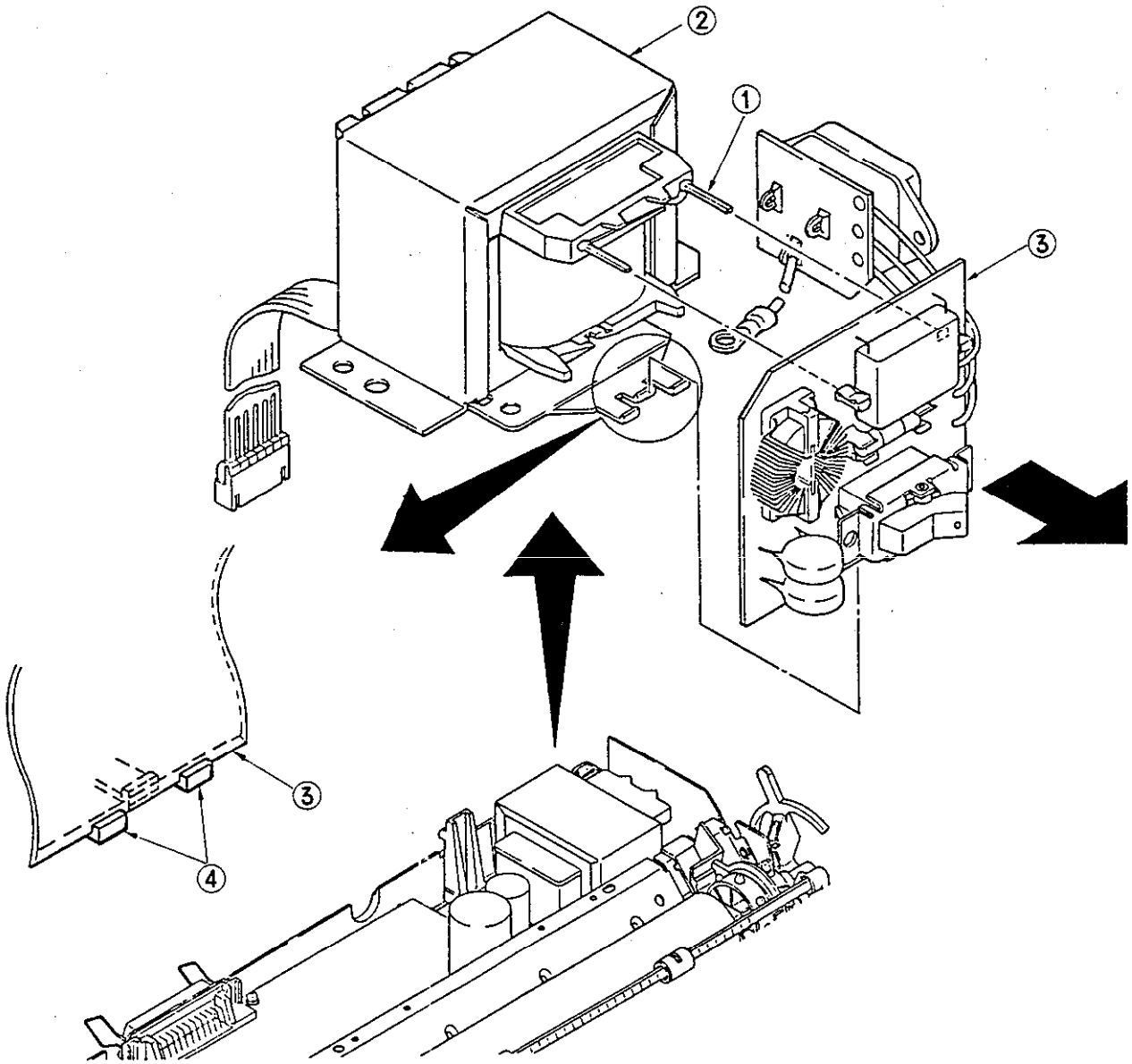
- (1) Remove the upper cover (see 3.2.1).
- (2) Remove connector ① from the control board.
- (3) Remove ground strap screw ②
- (4) Remove two screws ③.
- (5) Remove transformer assembly@ with power PCB ④ and AC cord receptacle ⑤ by lifting upward.
- (6) For reassembly, reverse the disassembly procedure.



3.2.4 Power supply board

- (1) Remove the upper cover (see 3.2.1).
- (2) Remove the transformer assembly (see 3.2.3).
- (3) Remove power supply board ③ from transformer ② by pulling off connection pins ①.
- (4) For reassembly, reverse the disassembly procedure.

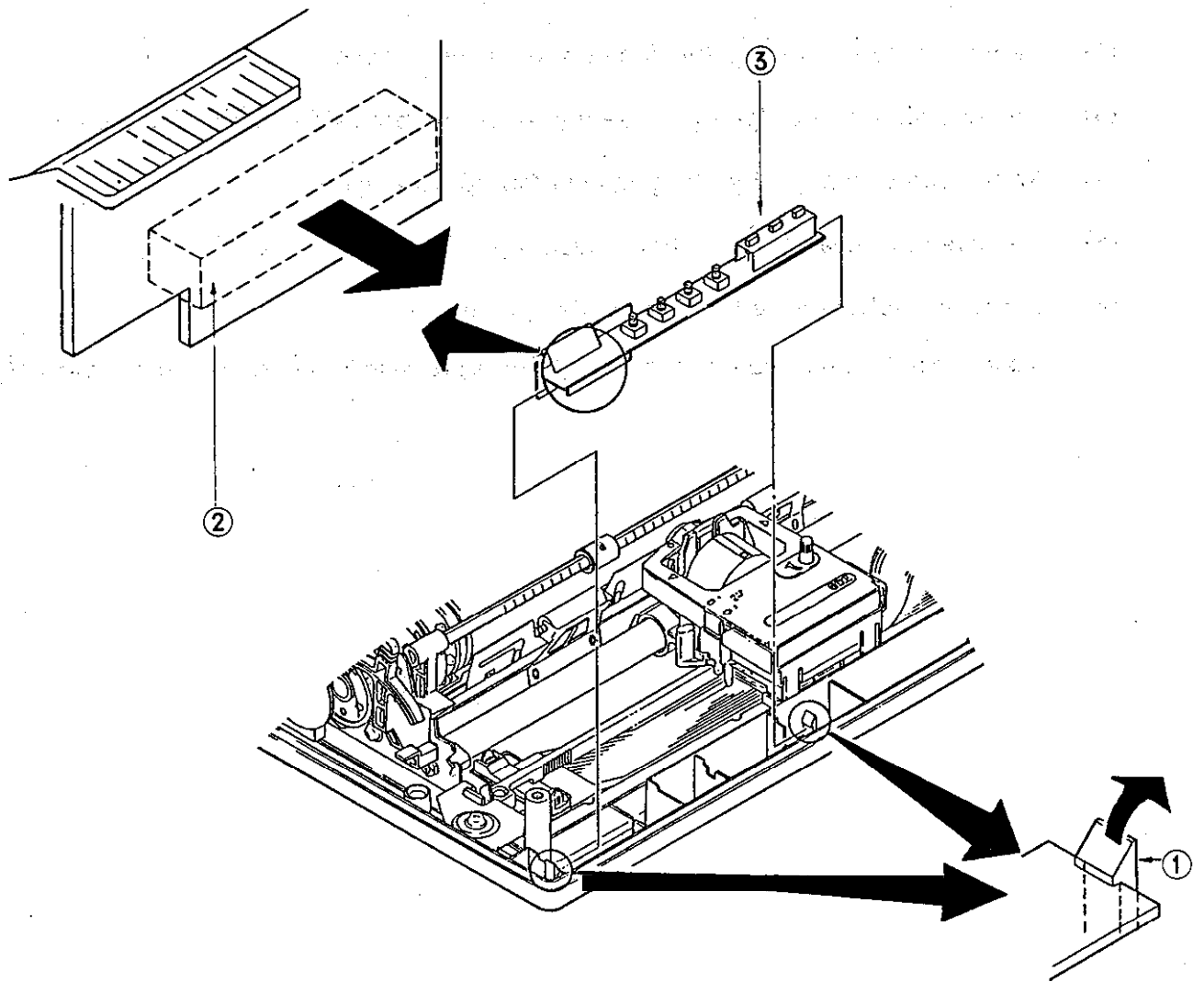
Note: *When attaching, set the powersupplyboard ③ along guide ④ before assembling.*



3.2.5 Operation board

- (1) Remove the upper cover (see 3.2.1).
- (2) Disengage two tabs ①.
- (3) Remove connector ② connecting the connection board and operation board.
- (4) Remove operation board ③.
- (5)** For reassembly, reverse the disassembly procedure.

Note: Be *careful not to damage the cab/e connecting the switch and the connector.*



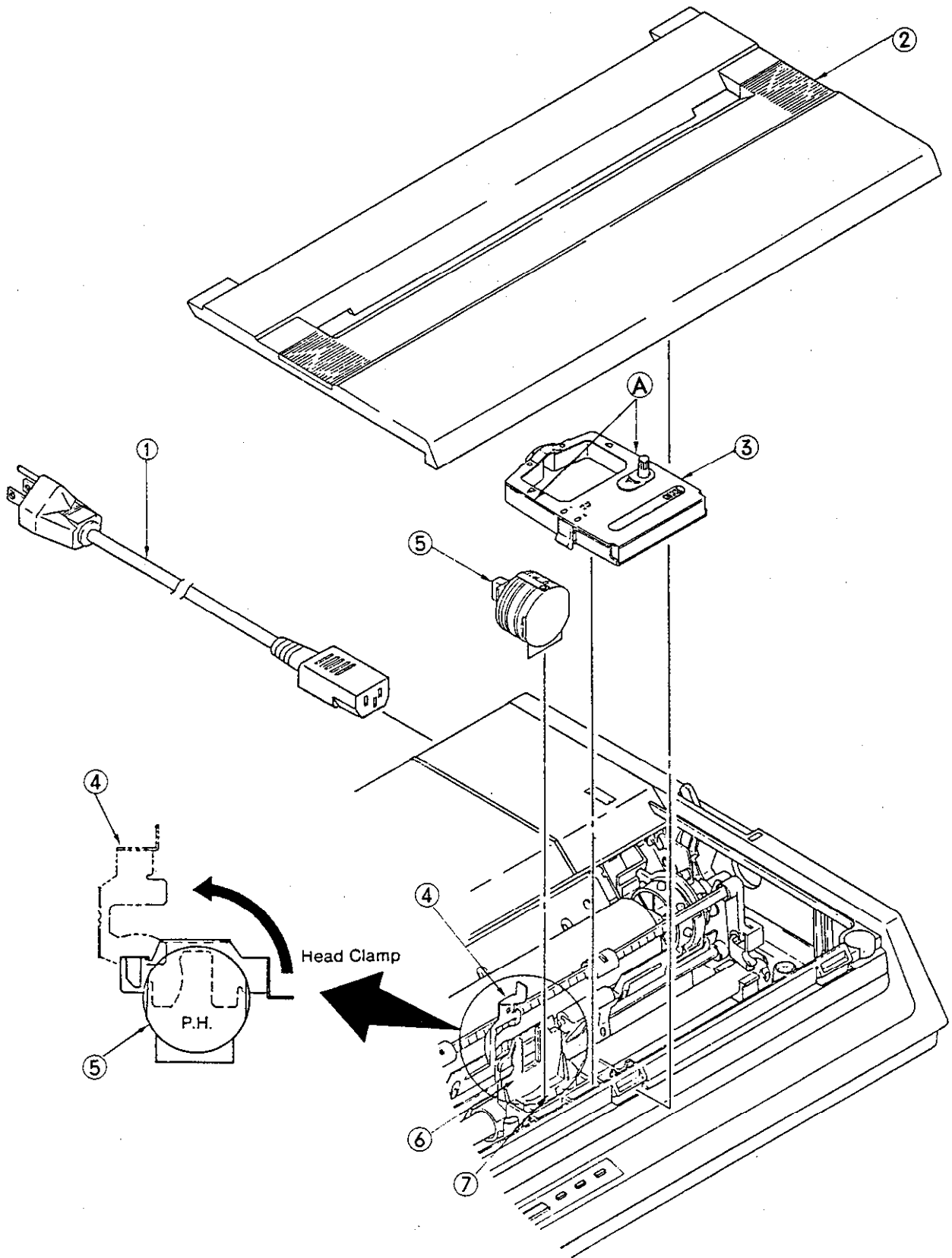
3.2.6 Print head

- (1) Turn OFF the AC POWER switch, and remove AC cable ① from the outlet.

Caution: *Print head may be hot after printing.*

- (2) Remove access cover ② by lifting up rear edge of cover.
- (3) Remove ribbon cartridge ③ by gently squeezing both sides ④ and lifting up.
- (4) Raise head clamp ④ by swinging right tab up (see figure).
- (5) Remove print head ⑤ by lifting straight up.
- (6) For reassembly, reverse the disassembly procedure.

Note: *Insert the print head in connector ⑦ while pressing it against the carriage frame@.*

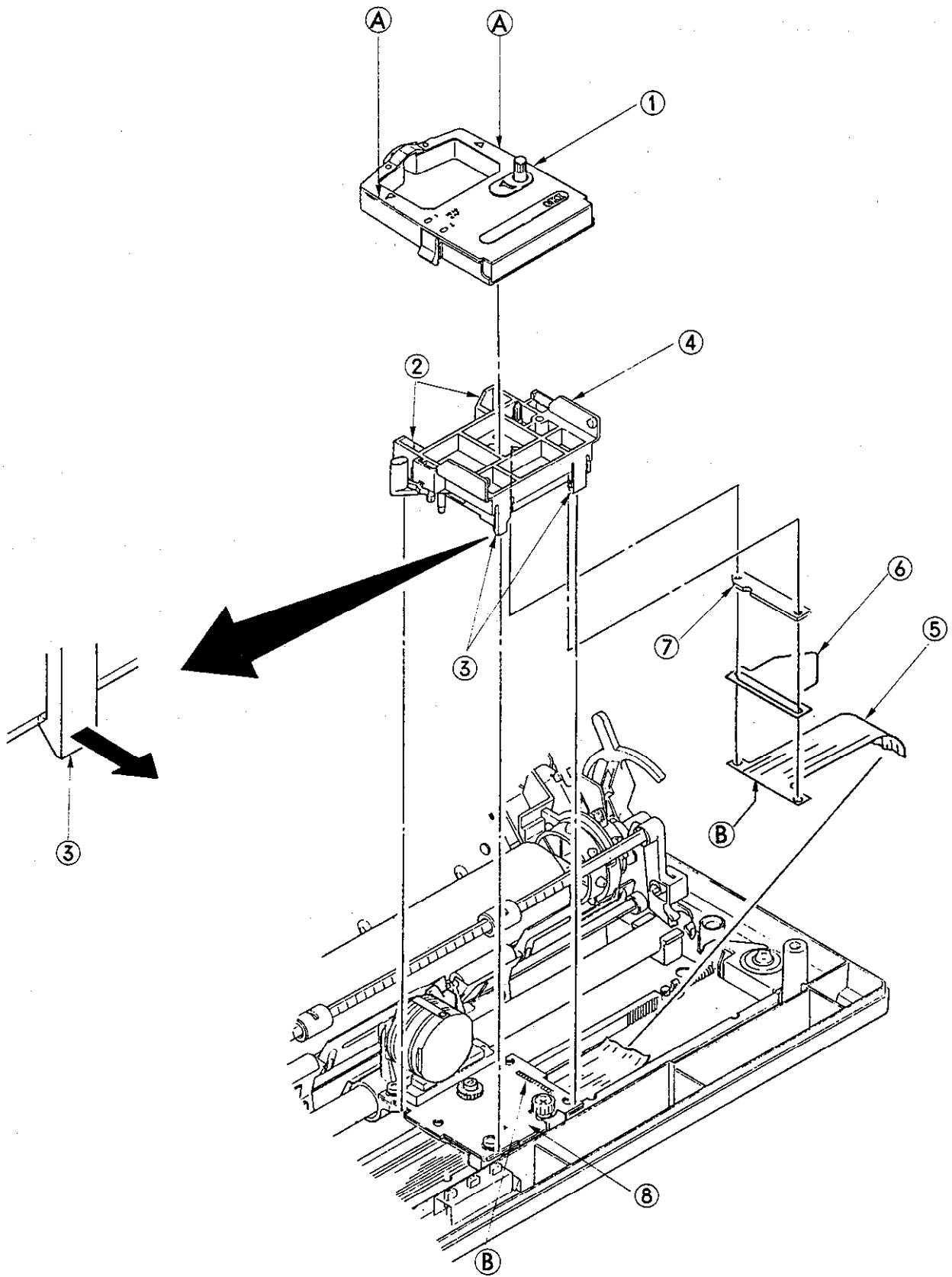


3.2.7 Ribbon feed gear assembly

- (1) Remove the upper cover (see 3.2.1).
- (2) Remove ribbon cartridge ① by lifting both sides ①A.
- (3) Disengage the two front tabs ③ and two rear tabs ③ (total of four tabs). Then lift upward by inserting small flat screwdriver to slots.
- (4) Remove ribbon feed gear assembly ④.
- (5) Remove carriage cable ⑤, cable holder ⑥, and contact pressure rubber ⑦ from ribbon feed gear assembly ④.
- (6) For reassembly, reverse the disassembly procedure.

Notes:

1. ***Do not touch the carriage cable ⑤ and space motor assembly ⑧ terminal (contact) directly with hand and make sure that it is clean.***
2. ***Make sure the carriage cable ⑤ is not folded.***
3. ***After installing ribbon feed gear assembly ④, check and adjust the gap between the platen and print head (see section 5).***

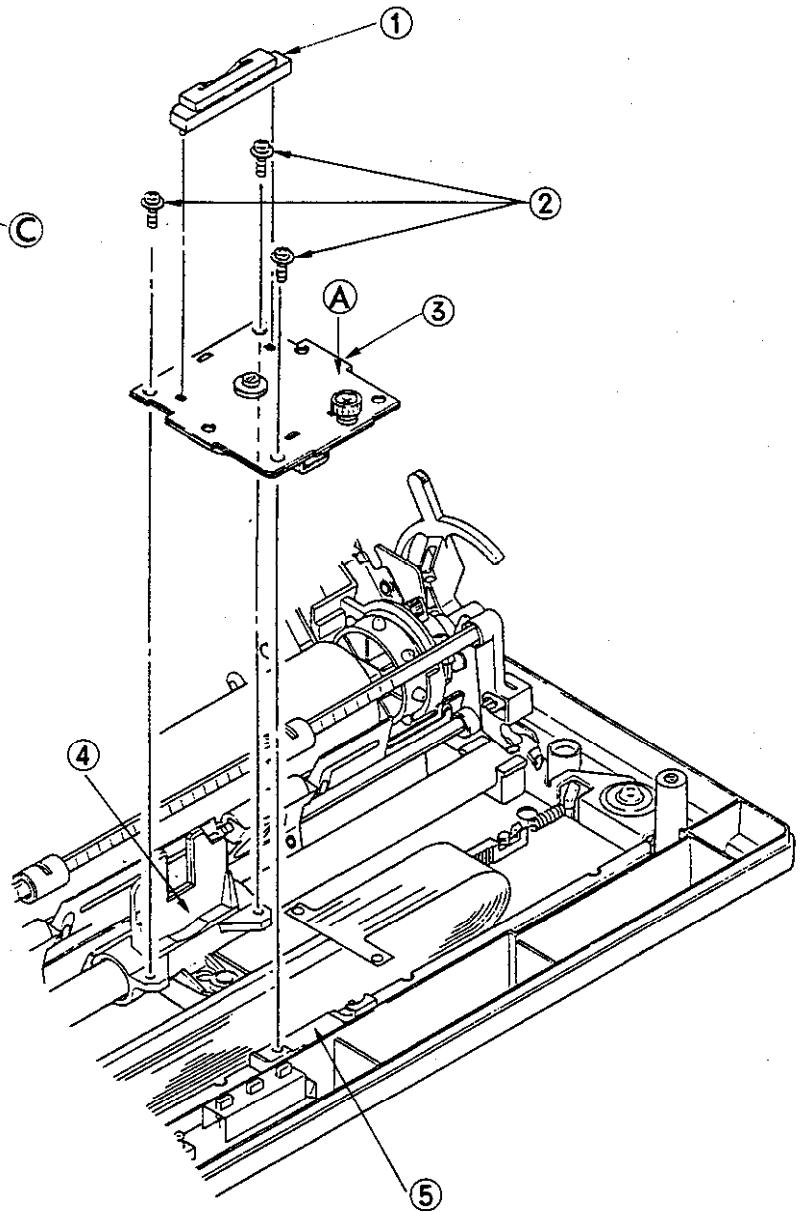
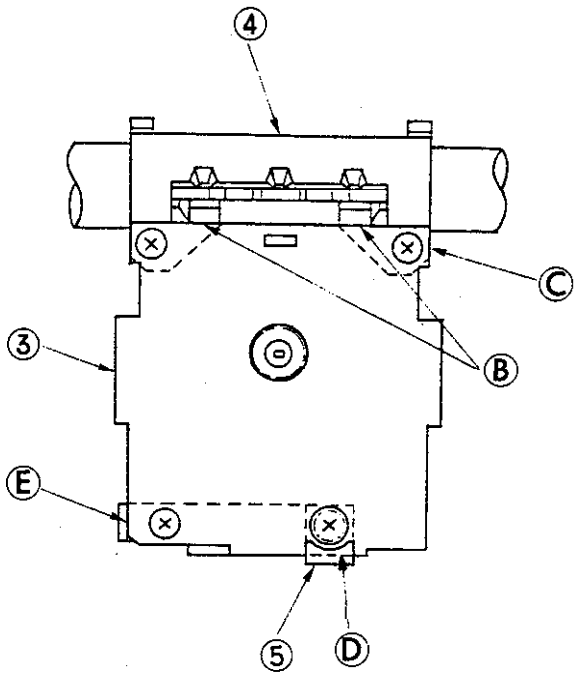


3.2.8 Space motor assembly

- (1) Remove the upper cover (see 3.2.1).
- (2) Remove the print head (see 3.2.6).
- (3) Remove the ribbon feed gear assembly (see 3.2.7).
- (4) Remove connector ①, and observe concave surface.
- (5) Remove three screws ②.
- (6) Remove space motor assembly ③.
- (7) For reassembly, reverse the disassembly procedure.

Notes:

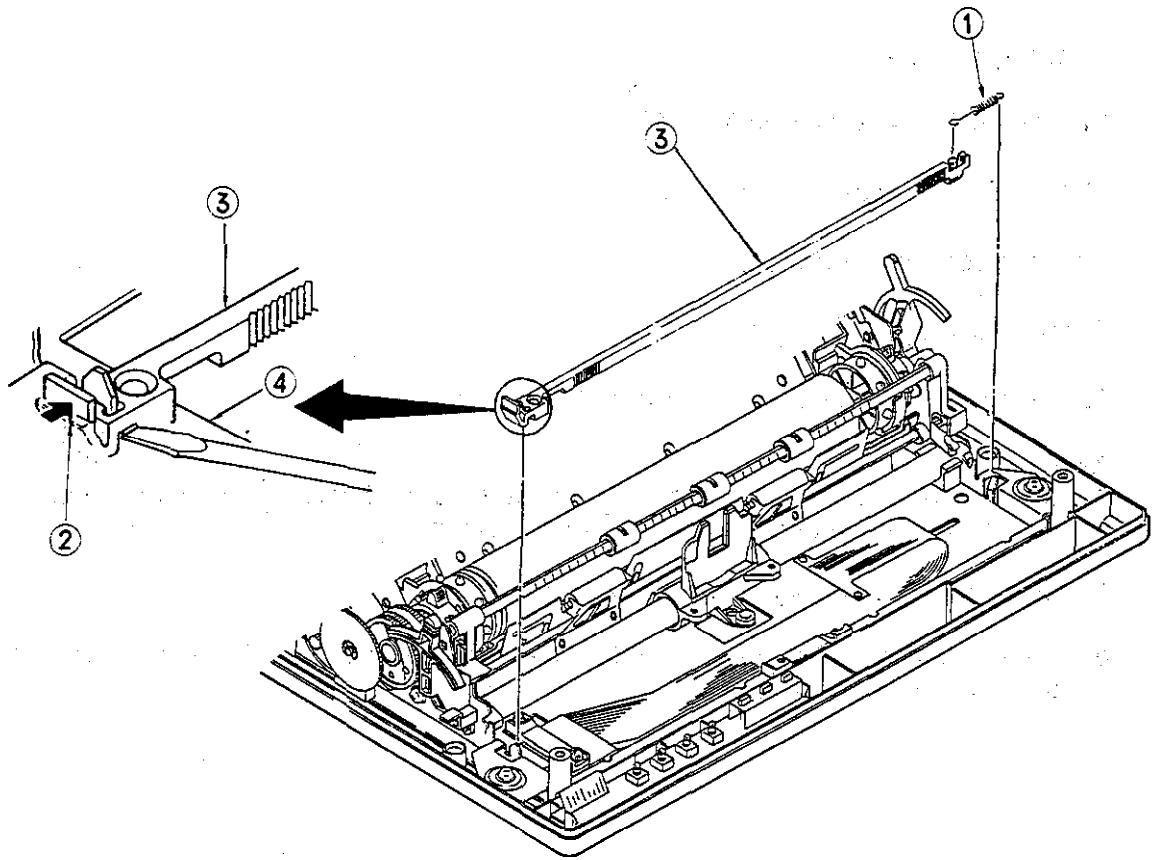
1. *Do not touch the space motor assembly ③ terminal (contact) ④ directly with hand and make sure that it is clean.*
2. *When installing space motor assembly ③, put the ⑤ side of the assembly close to carriage frame ⑥, and align the ⑦ side of the assembly with the corresponding side of the carriage frame.*
3. *When installing slider ⑧, put the ⑨ and ⑩ parts of the slider close to space motor assembly ③.*
4. *After installing space motor assembly ③, check and adjust the gap between the platen and print head (see section 5).*



3.2.9 Space rack

- (1) Remove the upper, cover (see 3.2.1).
- (2) Remove the print head (see 3.2.6).
- (3) Remove the ribbon feed gear assembly (see 3.2.7).
- (4) Remove the space motor assembly (see 3.2.8).
- (5) Remove spring ①.
- (6) Disengage tab ②.
- (7) Remove by inserting a minus screwdriver between space rack and base frame ④ and gently pushing the space rack ③ up.
- (8) For reassembly, reverse the disassembly procedure.

Note: *After installing space motor assembly, check and adjust the gap between the platen and print head (see section 5).*

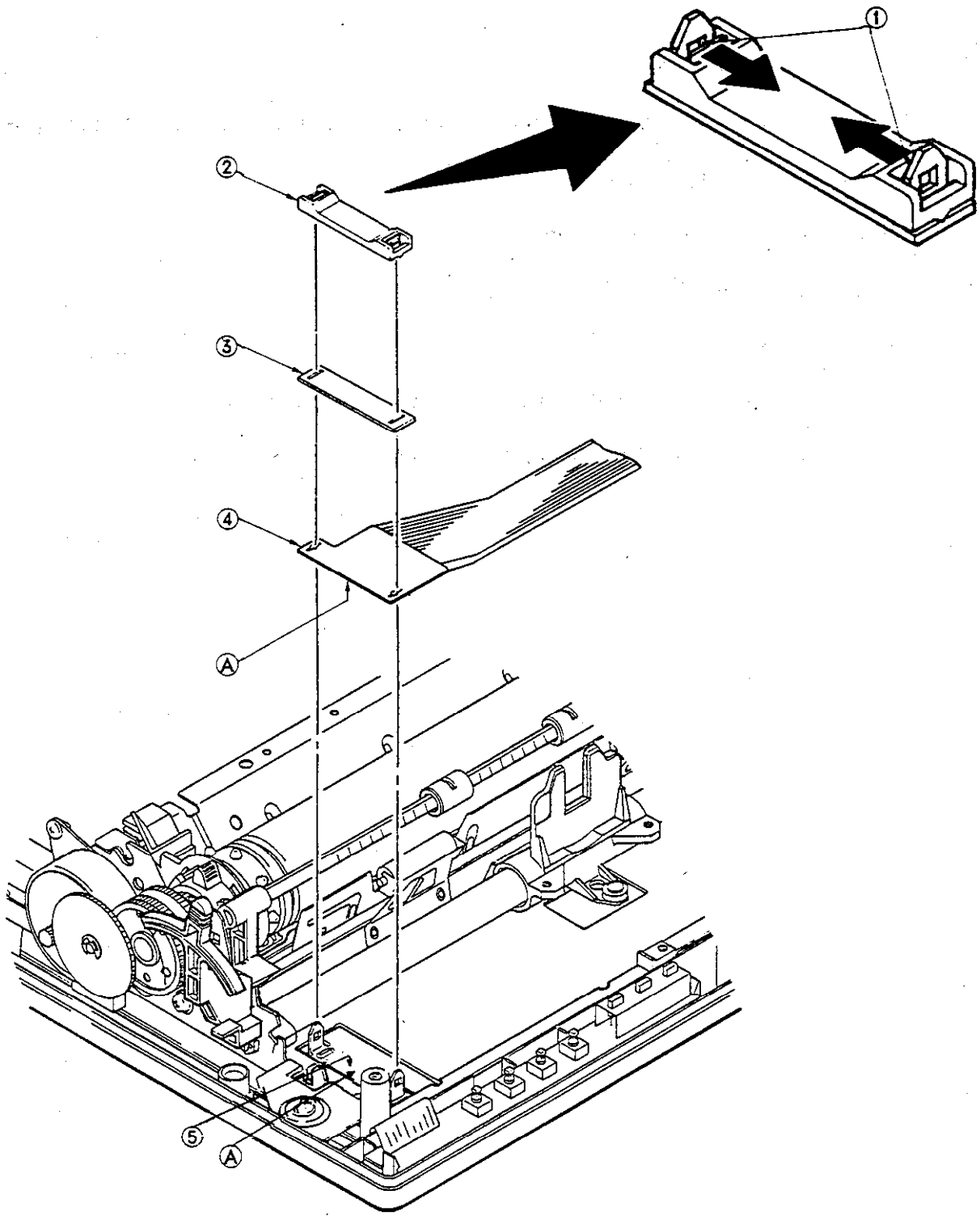


32.10 Carriage cable

- (1) Remove the upper cover (see 3.2.1).
- (2) Remove the print head (see 3.2.6).
- (3) Remove the ribbon feed gear assembly (see 3.2.7).
- (4) Remove the space motor assembly (see 3.2.8).
- (5) Remove the space rack (see 3.2.9).
- (6) Unlock the two tabs ① and remove cord clamp ②.
- (7) Remove contact rubber ③.
- (8) Remove carriage cable ④.
- (9) For reassembly, reverse the disassembly procedure.

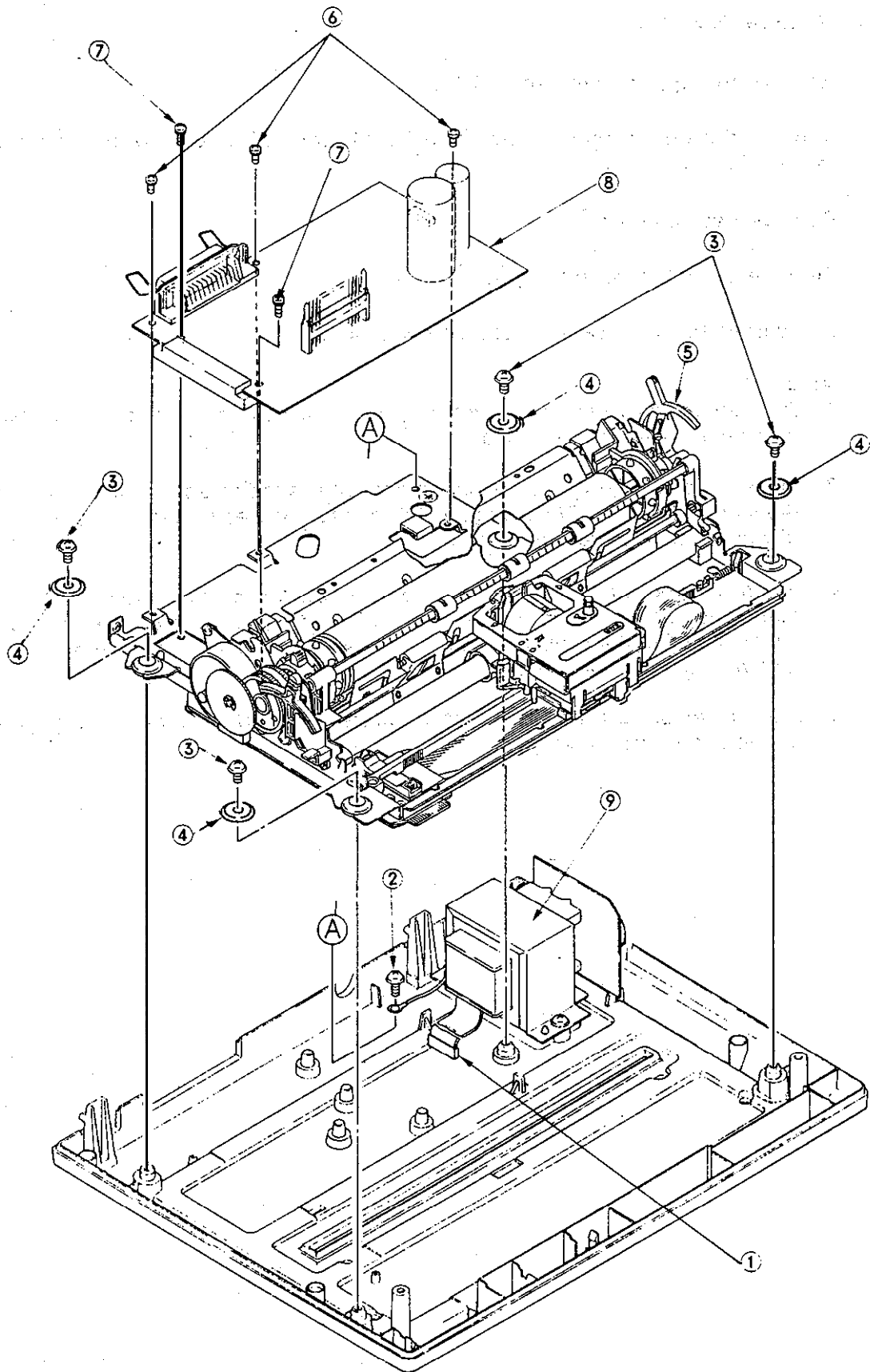
Notes:

1. Do not **touch** the carriage cable ④ and connection board ⑤ terminal (contact) ① directly with hand and make **sure that it is clean**.
2. Make sure **the** carriage cable ④ is not folded.
3. **After installing space motor assembly, check and adjust the gap** between the platen and print head (see section 5).



3.2.11 Printer mechanism

- (1) Remove the upper cover (see 3.2.1).
- (2) Remove connector ① connecting the control board ⑧ and transformer assembly@.
- (3) Remove ground 'strap screw ②.
- (4) Remove the operation board (see 3.2.5).
- (5) Remove four screws ③ and washers ④.
- (6) **Remove** printer mechanism ⑤.
- (7) Remove three screws@, two screws ⑦, and control board ⑧.
- (8) **For** reassembly, reverse the disassembly procedure.

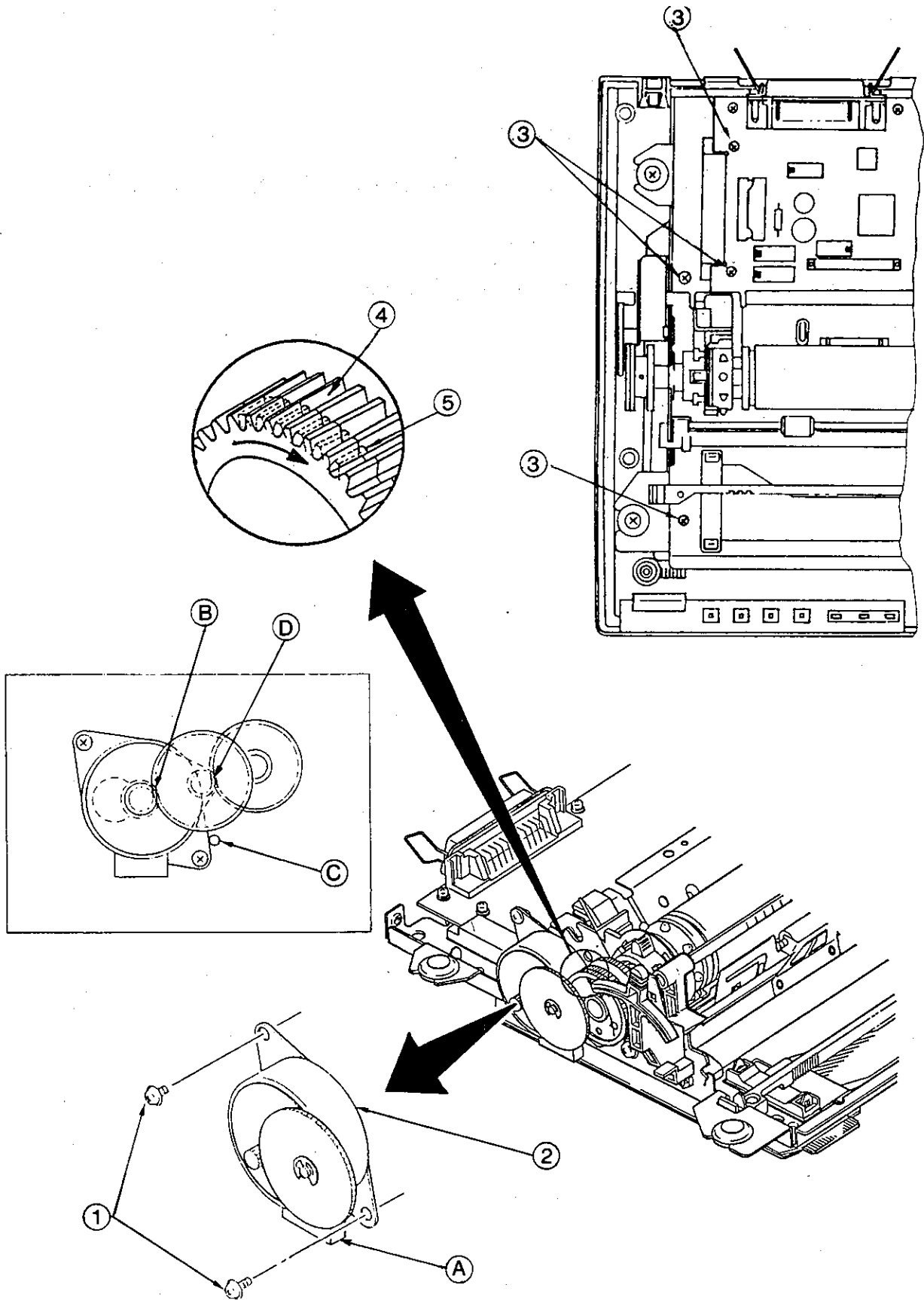


3.2.12 LF motor assembly

- (1) Remove the upper cover (see 3.2.1).
- (2) Remove the printer mechanism. (See 3.2.11 step 7. The control board **need not be removed.**)
- (3) Remove two screws ①.
- (4) Remove LF motor assembly ②.
- (5) For reassembly, reverse the disassembly procedure.

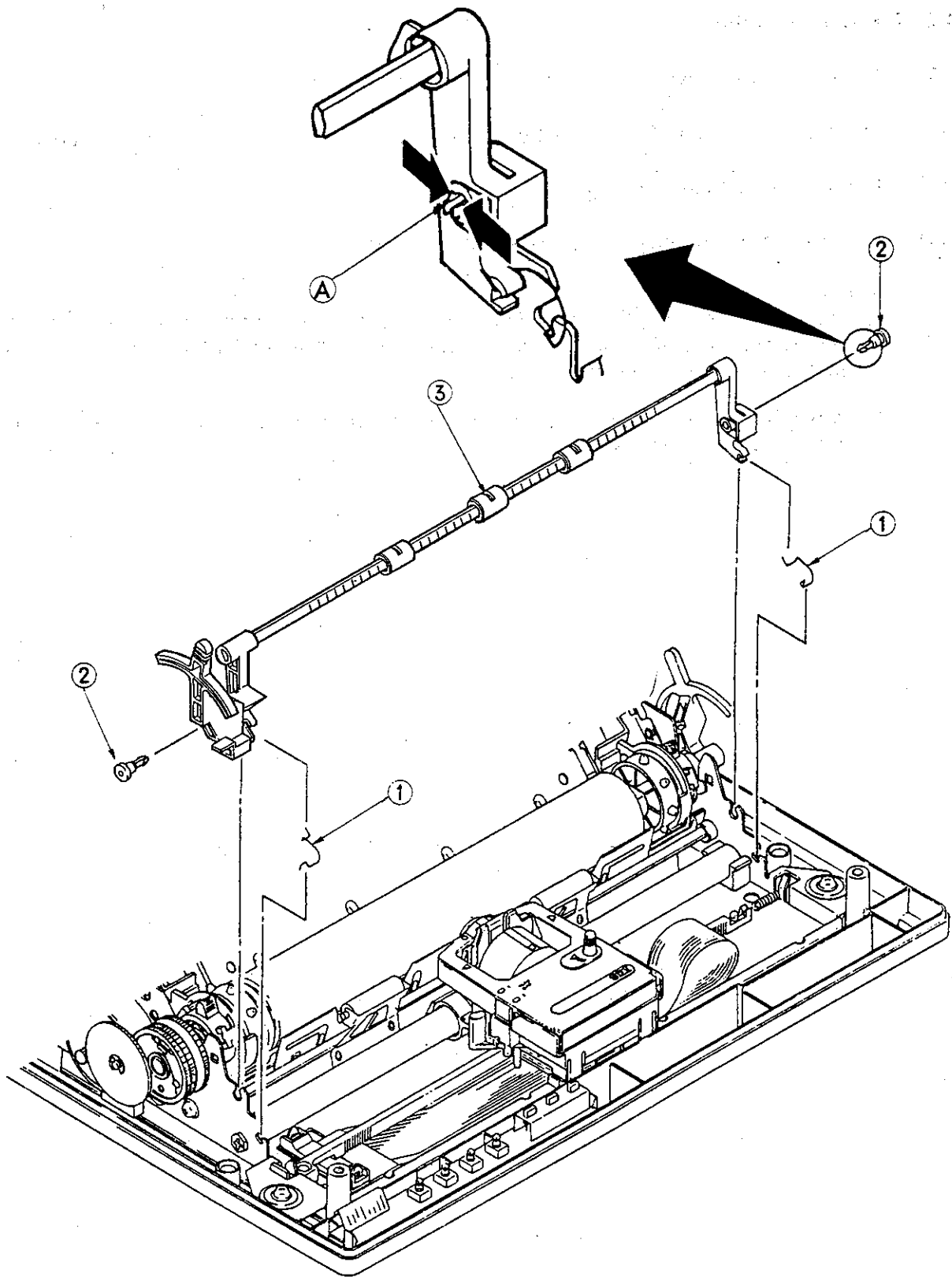
Notes:

1. Do not touch the LF motor assembly ② terminal (contact) @directly with hand or fold it and make sure that it is clean.
2. Move the bias gear ⑤ to the platen gear ④ as indicated by the arrow then engage them at portion ①. (The bias gear ⑤ is differentiated by half of a tooth with respect to the tooth of platen gear ④.)
3. When assembling the LF motor assembly ②, loosen the screw ③ fastening the connection board and make a space between the base and connection board. Then install the LF motor while pressing it against. ② and ③. Then tighten the screw ③ fastening the connection board.
4. After assembling, make sure that the platen gear ① is correctly engaged and the platen turns smoothly.



3.2.13 Column indicator bar

- (1) Remove the upper cover (see 3.2.1).
- (2) Remove two springs ① (see figure).
- (3) Remove two shafts ② by squeezing exposed shaft pin ④ and pushing out.
- (4) Remove column indicator bar ③.
- (5) For reassembly, reverse the disassembly procedure.

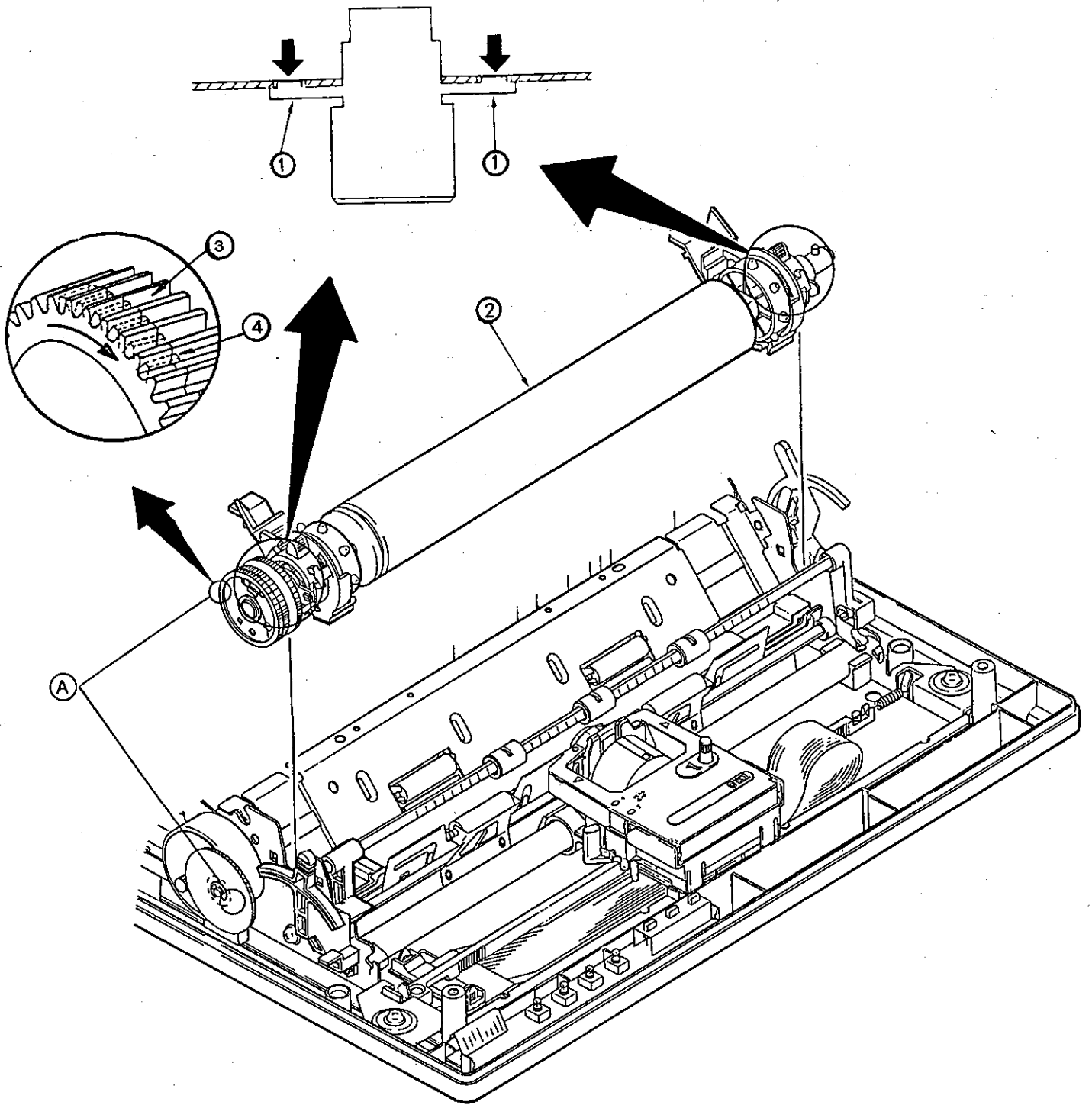


3.2.14 Platen assembly

- (1) Remove upper cover (see 3.2.1).
- (2) Disengage four tabs ① by gently pushing tabs from side plate (two on each side).
- (3) Remove platen assembly ②
- (4) For reassembly, reverse the disassembly procedure.

Notes:

1. Move the bias gear ④ to the platen gear ③ as indicated by the arrow then engage them at portion A. (The bias gear ④ is differentiated by half of a tooth with respect to the tooth of platen gear ③.)
2. After assembling, make sure that the platen gear A is correctly engaged and the platen turns smoothly.

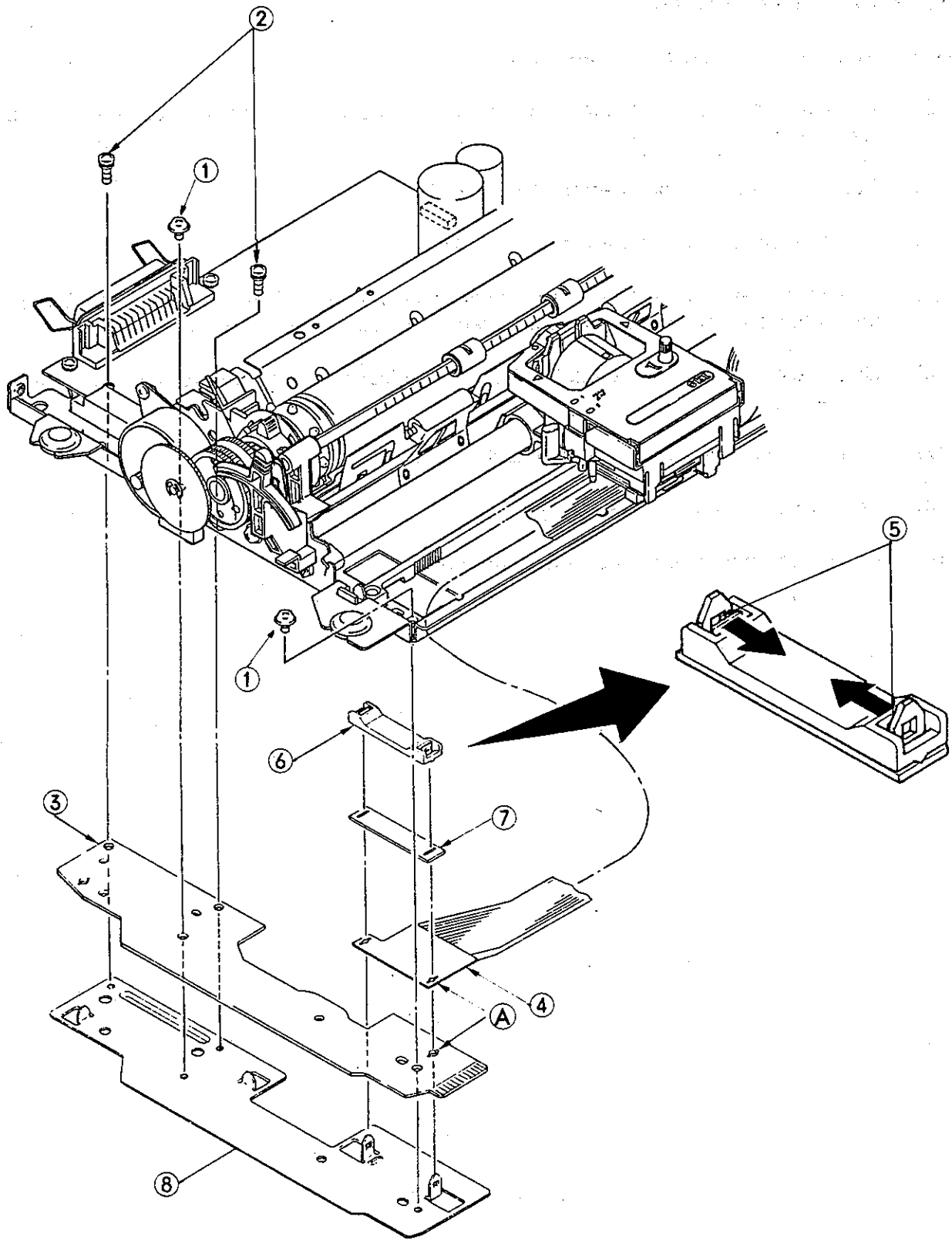


3.2.15 Connection board

- (1) Remove the upper cover (see 3.2.1).
- (2) Remove the printer mechanism. (See 3.2.11 step 7. The control board need not be removed.)
- (3) Remove four screws ① and ②.
- (4) Move the carriage to left end.
- (5) Remove the connection board ③ while feeding the carriage cable ④ through the hole on baseframe.
- (6) Disengage two claws ⑤, and remove cord clamp ⑥, contact rubber ⑦, and carriage cable ④.
- (7) Remove connection board ③ from circuit support ⑧.
- (8) For reassembly, reverse the disassembly procedure.

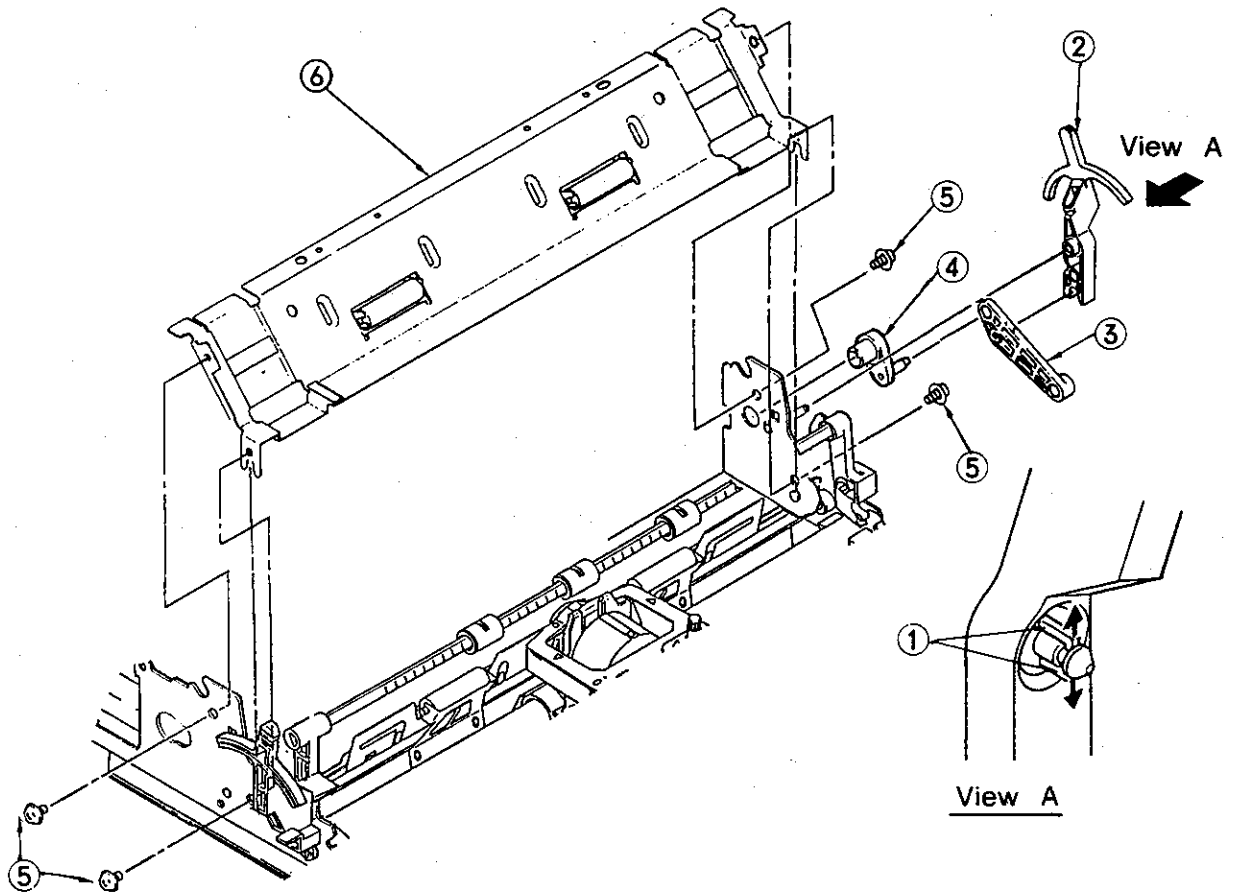
Notes:

1. Do not fold carriage cable ④.
2. Do not touch any of the terminals (contacts) ⑧ directly by hand or fold them. Also make sure they are kept clean.



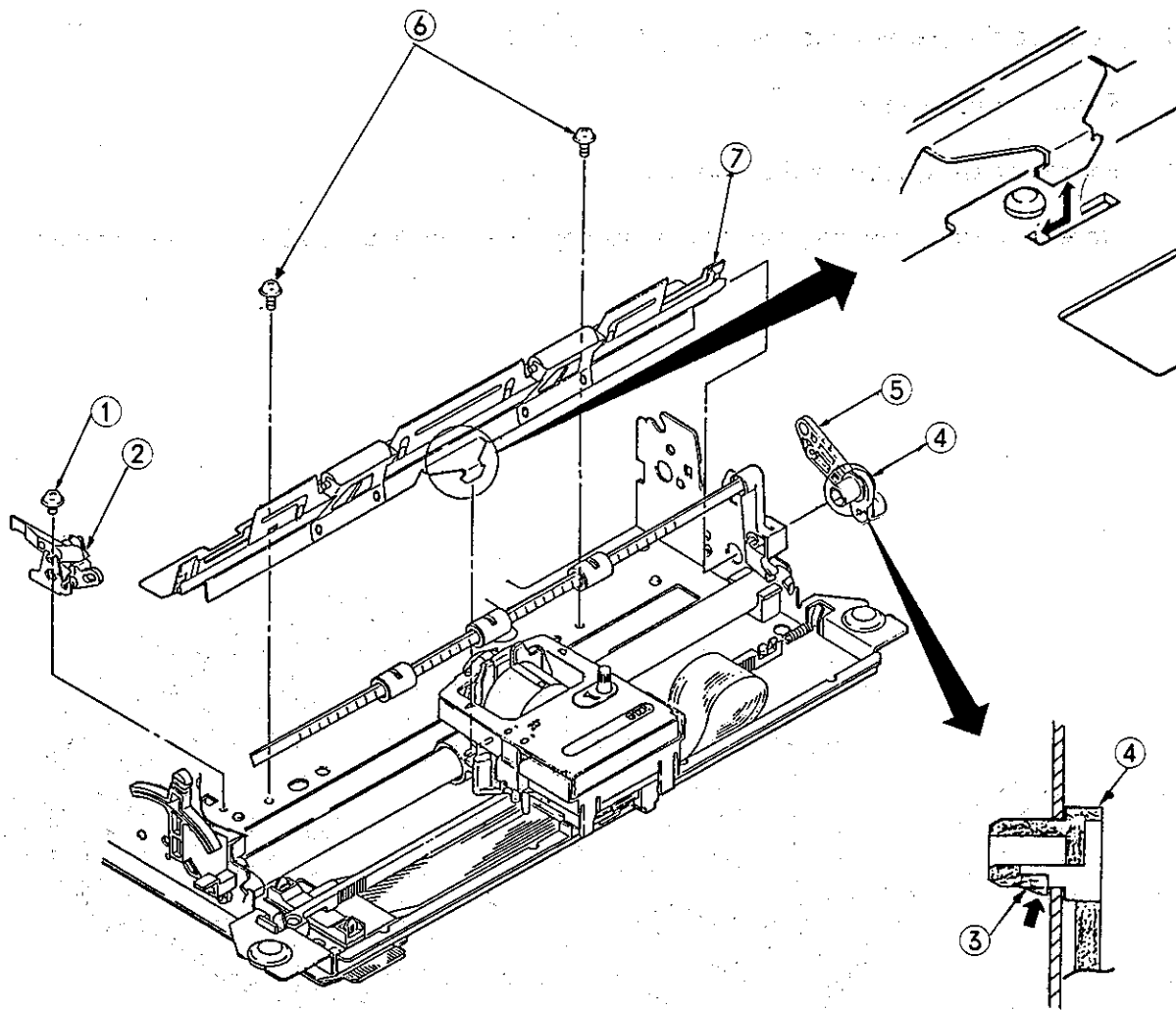
3.2.16 Paper chute assembly

- (1) Remove the upper cover (see 3.2.1).
- (2) Remove the printer mechanism (See 3.2.11 step 7. The control board need not be removed.)
- (3) Remove the LF motor assembly (see 3.2.12).
- (4) Remove the platen assembly (see 3.2.14).
- (5) Open two claws ①, with a minus screwdriver. With the claws opened, remove paper lock release lever ②. (Be careful because the claws are very small.)
- (6) Disengage middle release link ③ from rear release link ④, and remove rear release link ④.
- (7) Remove four screws ⑤ (two on each side).
- (8) Remove paper chute assembly ⑥.
- (9) For reassembly, reverse the disassembly procedure.



3.2.17 Bottom paper guide assembly

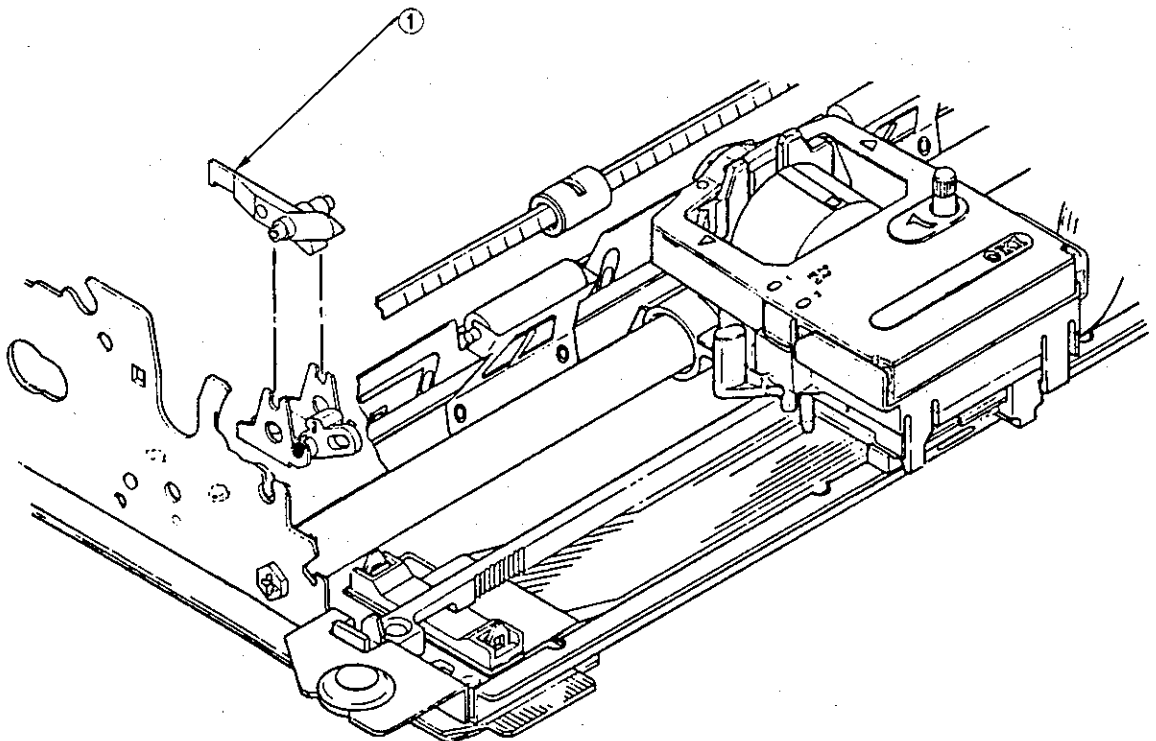
- (1) Remove the upper cover (see 3.2.1).
- (2) Remove the printer mechanism. (See 3.2.11 step 7. The control board need not be removed.)
- (3) Remove the LF motor assembly (see 3.2.12).
- (4) Remove the platen assembly (see 3.2.14).
- (5) Remove the paper chute assembly (see 3.2.16).
- (6) Remove screw ① and remove the near-end lever assembly ②.
- (7) Close the claws ③ and remove the front release link ④ together with middle release link ⑤.
- (8) Remove two (three in ML183) screws ⑥.
- (9) Remove bottom paper guide assembly ⑦.
- (10) For reassembly, reverse the disassembly procedure.



3.2.18 Near-end lever and bracket

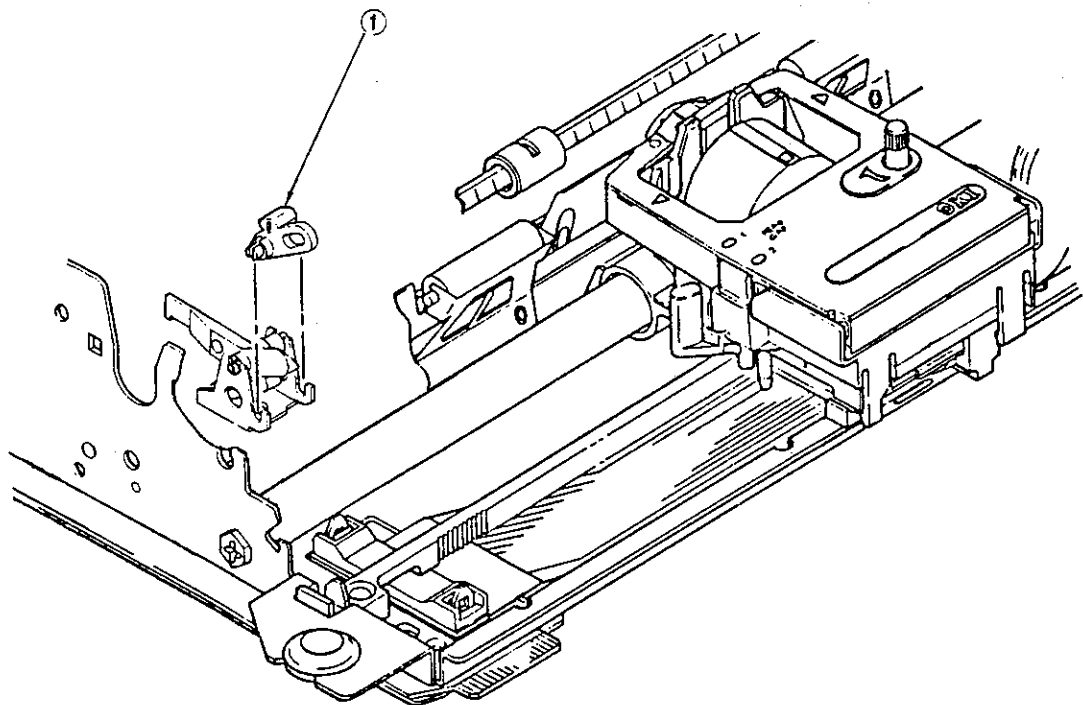
- (1) Remove the upper cover (see 3.2.1).
- (2) Remove the printer mechanism. (See 3.2.11 step 7. The control board need not be removed.)
- (3) Remove the LF motor assembly (see 3.2.12).
- (4) Remove the platen assembly (see 3.2.14).
- (5) Remove the paper chute assembly (see 3.2.16).
- (6) Remove near-end lever ①.
- (7) For reassembly, reverse the disassembly procedure.

Note: Near-end lever only can be removed by removing PCB (see 3.2.2) by pulling upward.



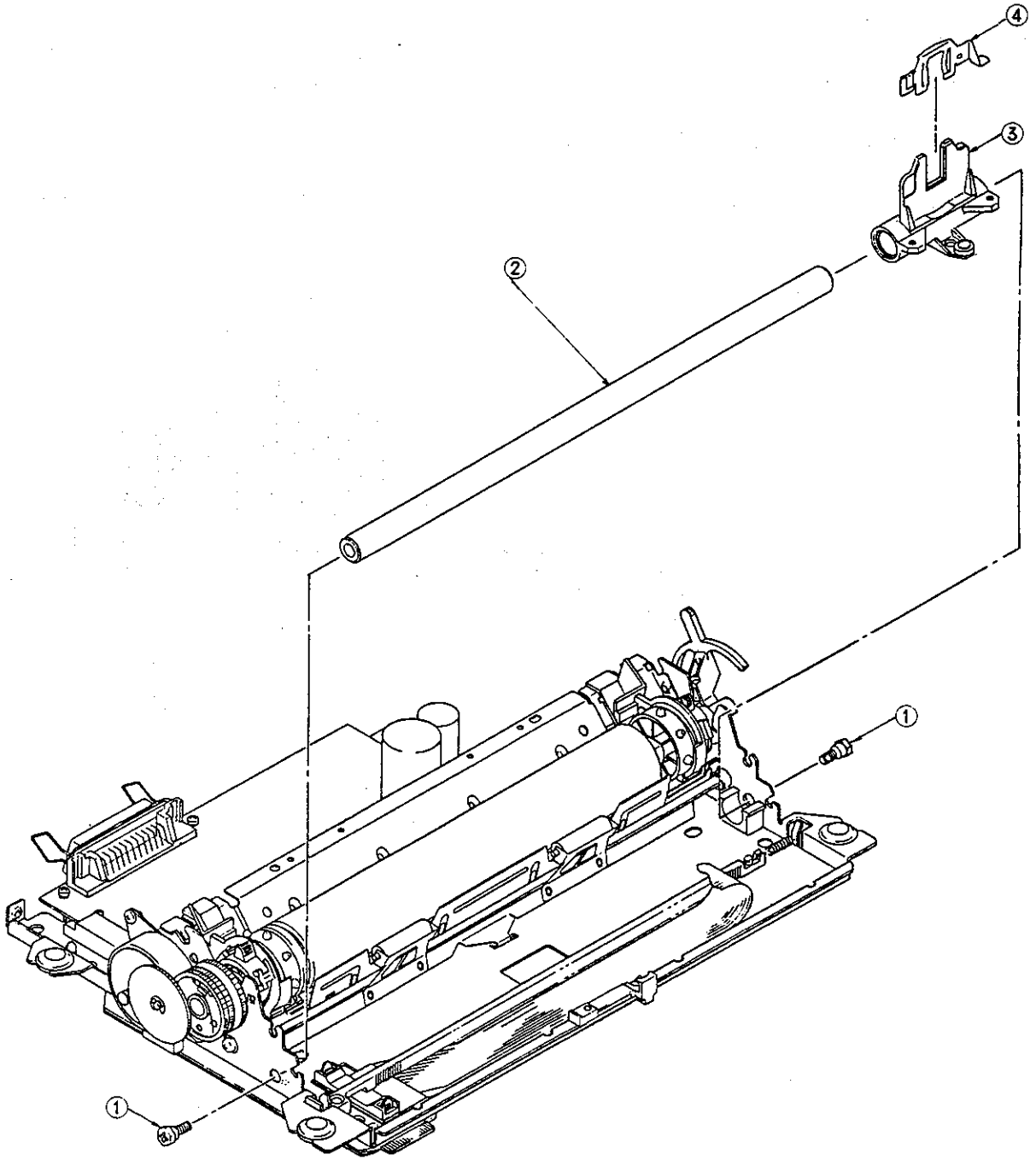
3.2.19 Bottom near-end lever

- (1) Remove the upper cover (see 3.2.1).
- (2) Remove the printer mechanism (See 3.2.11 step 7. The control board need not be removed.)
- (3) Remove the LF motor assembly (see 3.2.12).
- (4) Remove the platen assembly (see 3.2.14).
- (5) Remove the paper chute assembly (see 3.2.16).
- (6) Remove bottom near-end lever ①.
- (7) For reassembly, reverse the disassembly procedure.



3.2.20 Carriage frame

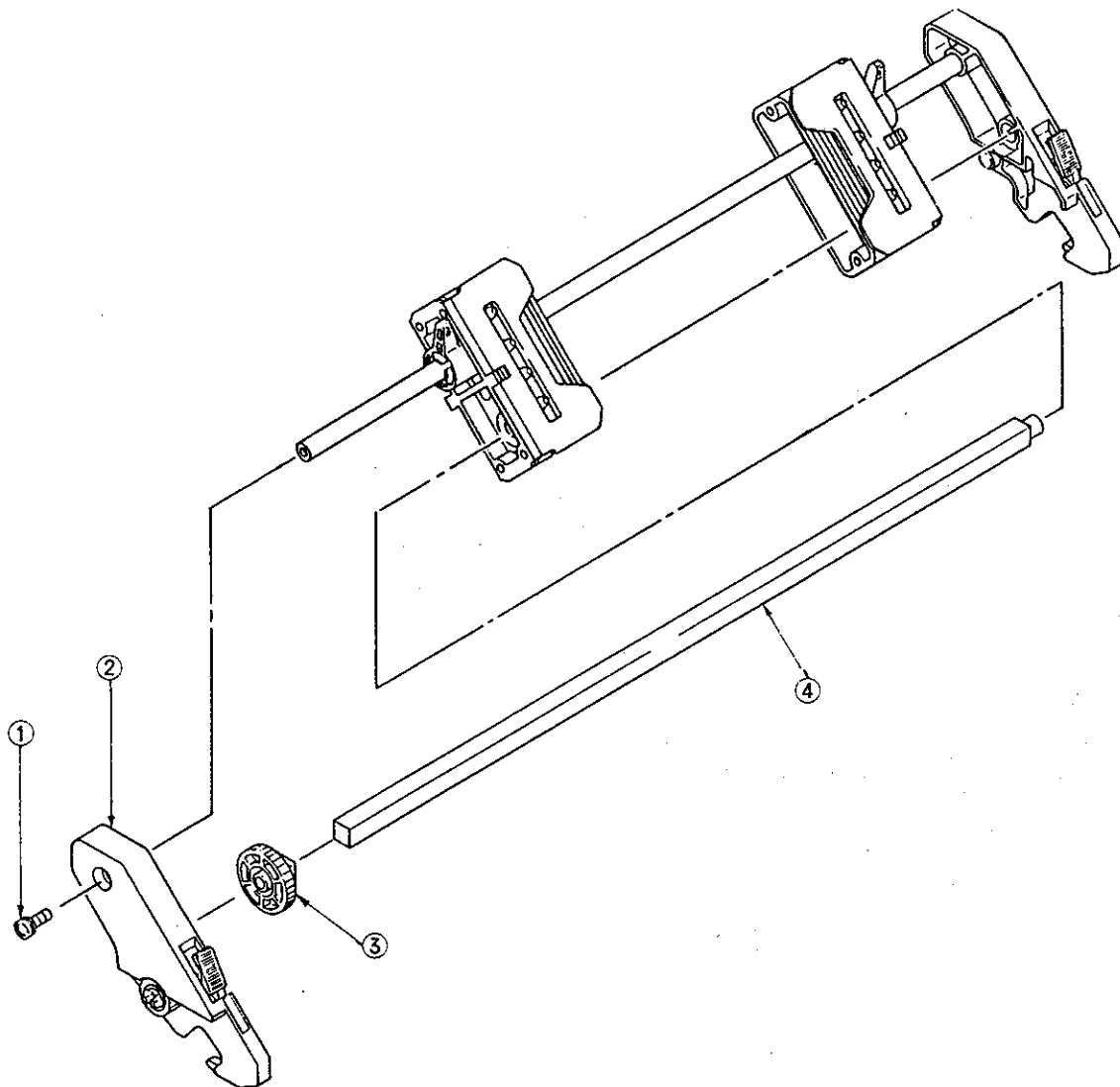
- (1) Remove the upper cover (see 3.2.1).
- (2) Remove the printer mechanism. (See 3.2.11 step 7. The control board need not be removed.)
- (3) Remove the column indicator bar (see 3.2.13).
- (4) Remove the print head (see 3.2.6).
- (5) Remove the ribbon feed gear assembly (see 3.2.7).
- (6) Remove the space motor assembly (see 3.2.8).
- (7) Remove two screws ① (one on each side).
- (8) Remove carriage shaft ② together with carriage frame ③.
- (9) Remove carriage frame ③ from carriage shaft ②.
- (10) Remove head clamp④.
- (11) For reassembly, reverse the disassembly procedure.



3.2.21 Drive shaft (Optional tractor feed unit)

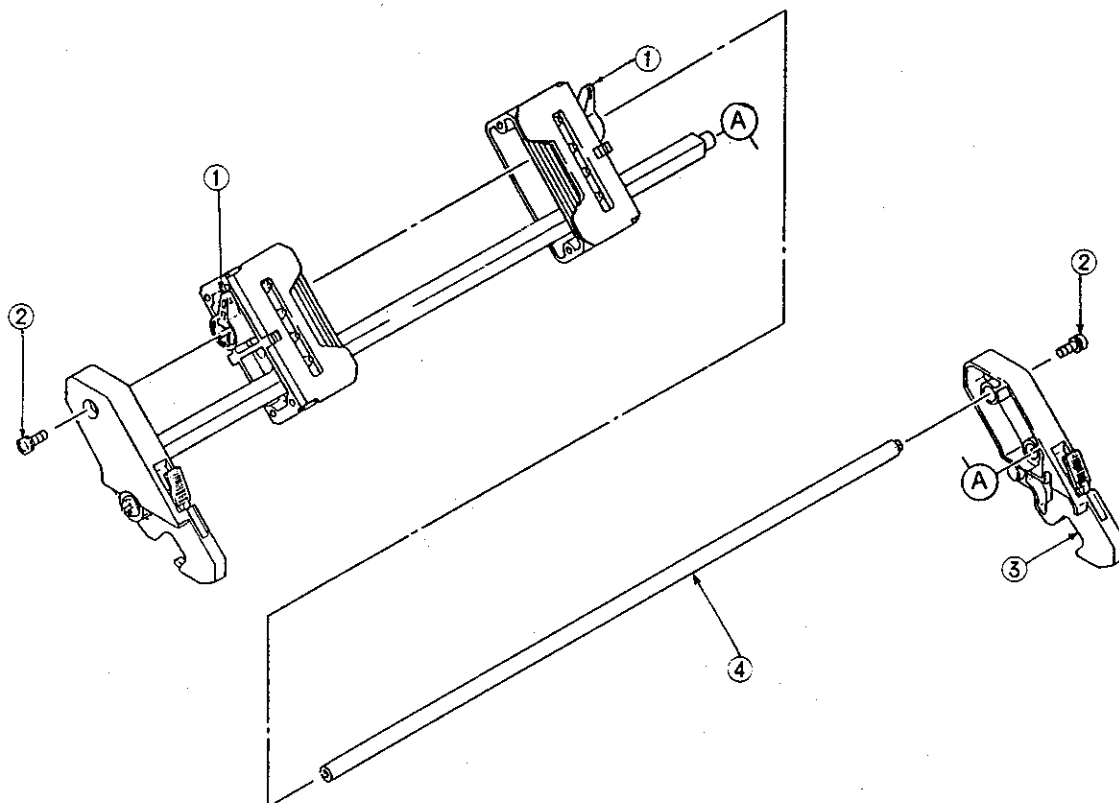
- (1) Remove screw ①.
- (2) Remove side frame assembly ②.
- (3) Remove drive gear ③.
- (4) Draw out drive shaft ④.
- (5) For reassembly, reverse the disassembly procedure.

Note: When inserting the drive shaft, be careful to keep the sprocket pins in phase.



3.2.22 Lock shaft (Optional tractor feed unit)

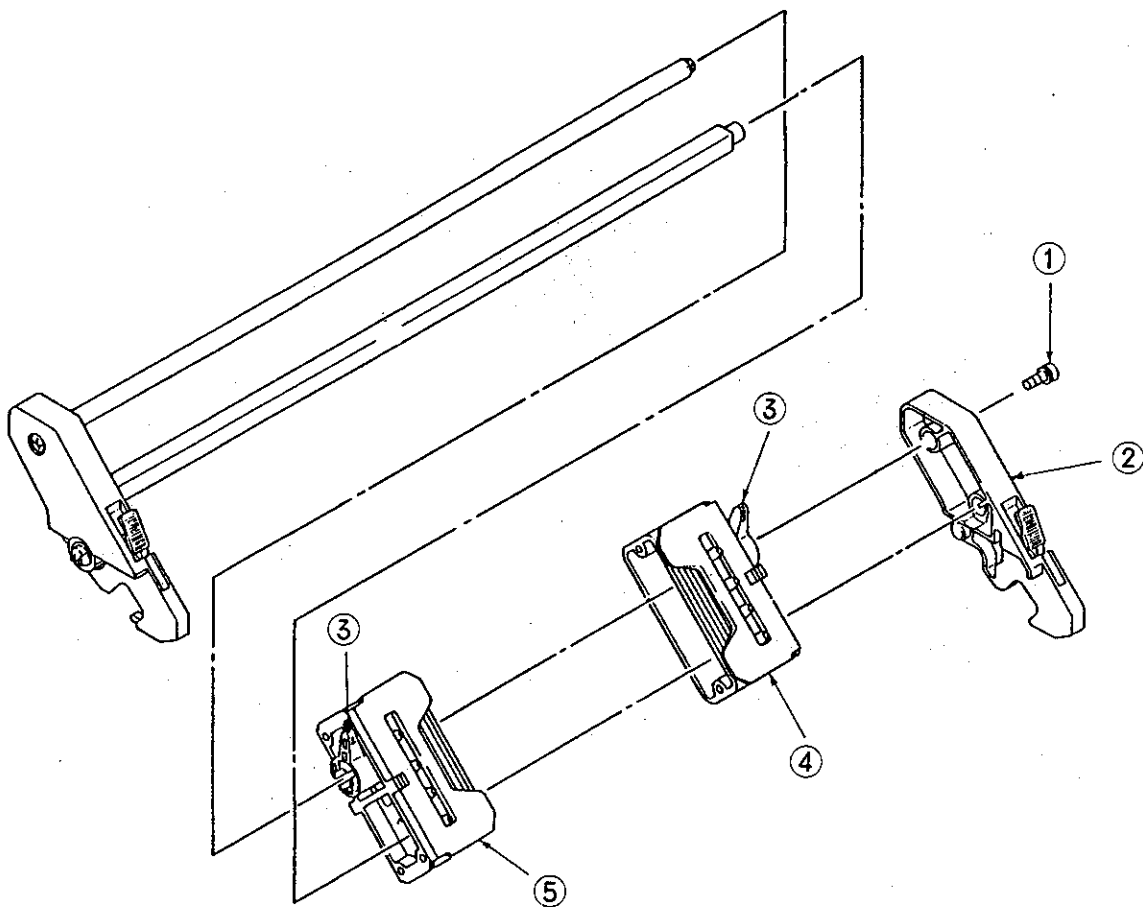
- (1) Release lock lever ①.
- (2) Remove two screws ② (one on each side).
- (3) Remove side frame ③.
- (4) Draw out lock shaft ④.
- (5) For reassembly, reverse the disassembly procedure.



3.2.23 Pin tractor (R) assembly and pin tractor (L) assembly (Optional tractor feed unit)

- (1) Remove screw ①.
- (2) Remove side frame ②.
- (3) Release lock levers ③, then remove pin tractor (R) assembly ④ and pin tractor (L) assembly ⑤.
- (4) For reassembly, reverse the disassembly procedure.

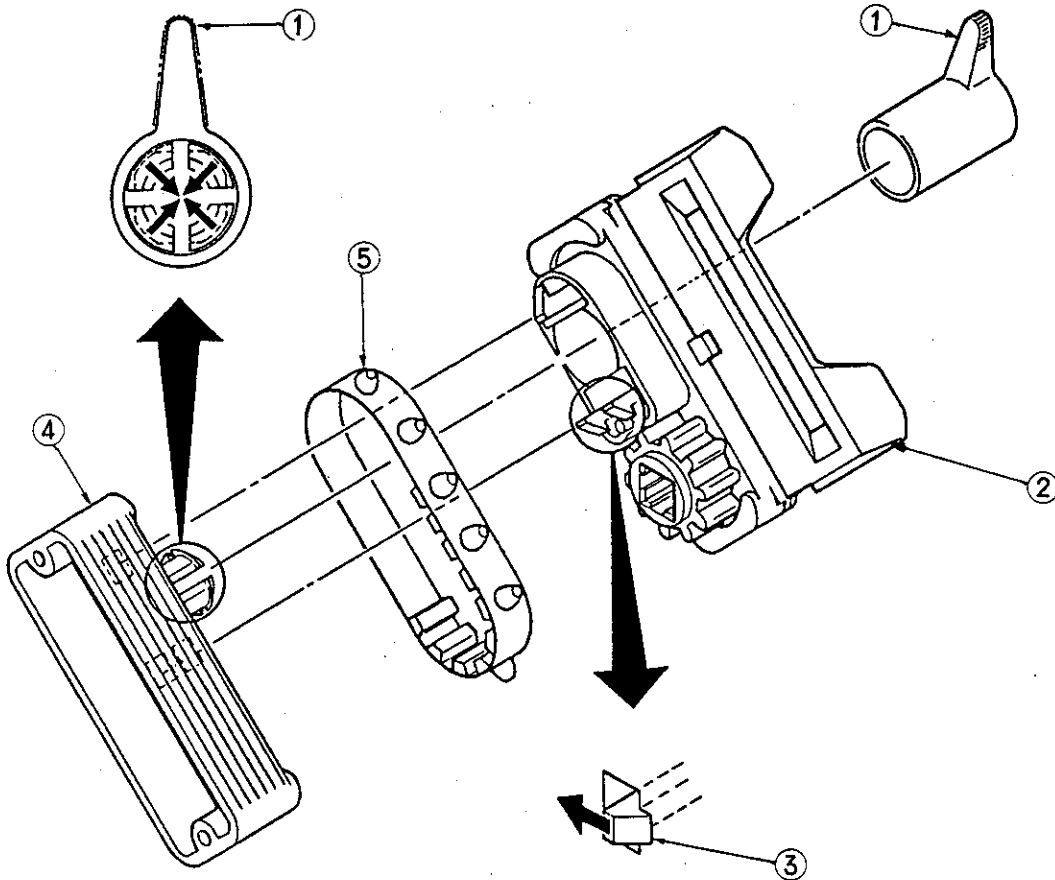
Note: When inserting the pin tractor assemblies, be careful to keep the sprocket pins in phase.



3.2.24 Belt (Optional tractor feed unit)

- (1) Remove the pin tractor assembly (see 3.2.23).
- (2) Remove lock lever ①.
- (3) Open tractor cover ②.
- (4) Disengage three claws ③.
- (5) Remove tractor frame ④.
- (6) Remove belt ⑤.
- (7) For reassembly, reverse the disassembly procedure.

Note: When inserting the belt, be careful to keep the sprocket pins of the both tractor assemblies in phase.



4. CLEANING

4. CLEANING

Caution:

1. Be sure to turn OFF the AC POWER switch before cleaning.
2. Be careful not to let paper lint, etc. get inside the mechanism.

The printer interior should be cleaned periodically as follows:

Period:	Either 6 months or 300 operating hours, whichever comes first
Time required for cleaning:	About 10 minutes
Tool:	Dry, soft cloth (such as gauze) (and vacuum cleaner if available)
Parts to be cleaned:	See table 4-1.

Table 4-1 Parts To Be Cleaned

Parts	Description
Carriage and its surroundings Paper path	Remove paper lint, dust, dirt, and ribbon lint.
Paper-end sensor	Remove paper lint and dust attached to the sensor. (Refer to figure 9 on page AA-26.)

5. ADJUSTMENT

5. ADJUSTMENT

Head-gap adjustment

- Tools:
- Thickness gauge set
 - Phillips screwdriver No. 2-200
 - Metal rod of about 0.04 inch (1 mm) diameter and 3 inches (76 mm) long
(An extended paper clip can be applicable.)

Adjusting procedure: (see figure 5-1)

- (1) Turn OFF the AC POWER switch and remove the AC input plug from the AC receptacle.
- (2) Remove the access cover.
- (3) Remove the ribbon cartridge.
- (4) Set the adjusting lever to range 1.
- (5) Insert the 0.019-inch (0.48-mm) thickness gauge between the platen and print head. Make sure that the thickness gauge can be smoothly inserted if rubbed a little. Carry out this check at the right end, and left end of the platen.
- (6) If gap adjustment is required, press down the adjusting gear with the metal rod to disengage the gear from the adjusting lever, and adjust the gap by turning the adjusting screw with the screwdriver.
- (7) After the adjustment, check the gap between the platen and print head again. The adjustment range is 0.016 to 0.02 inch (0.4 to 0.5 mm).

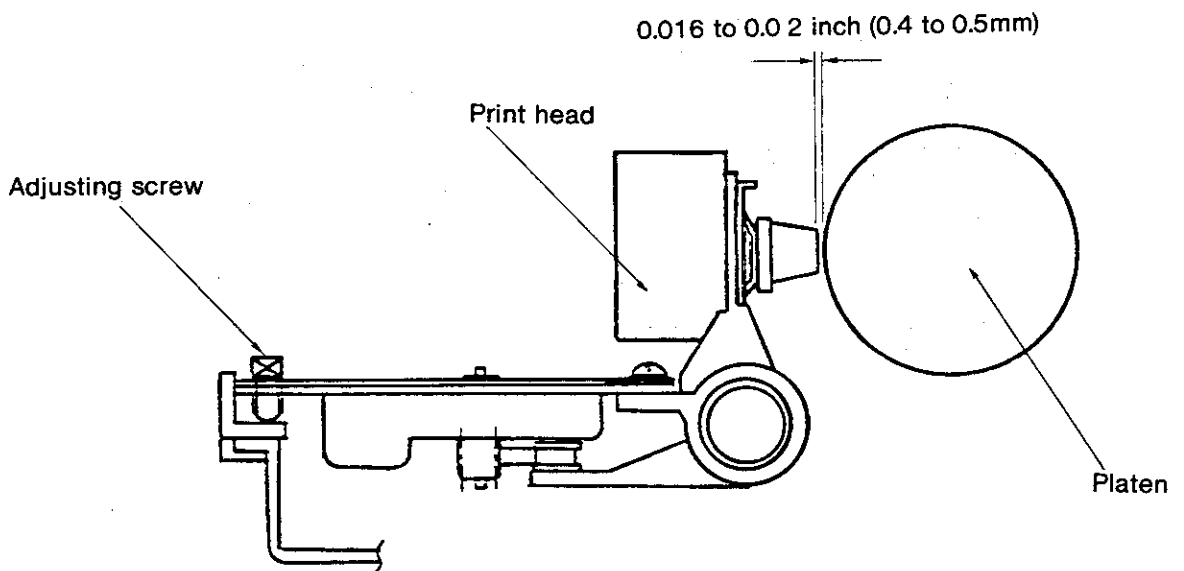
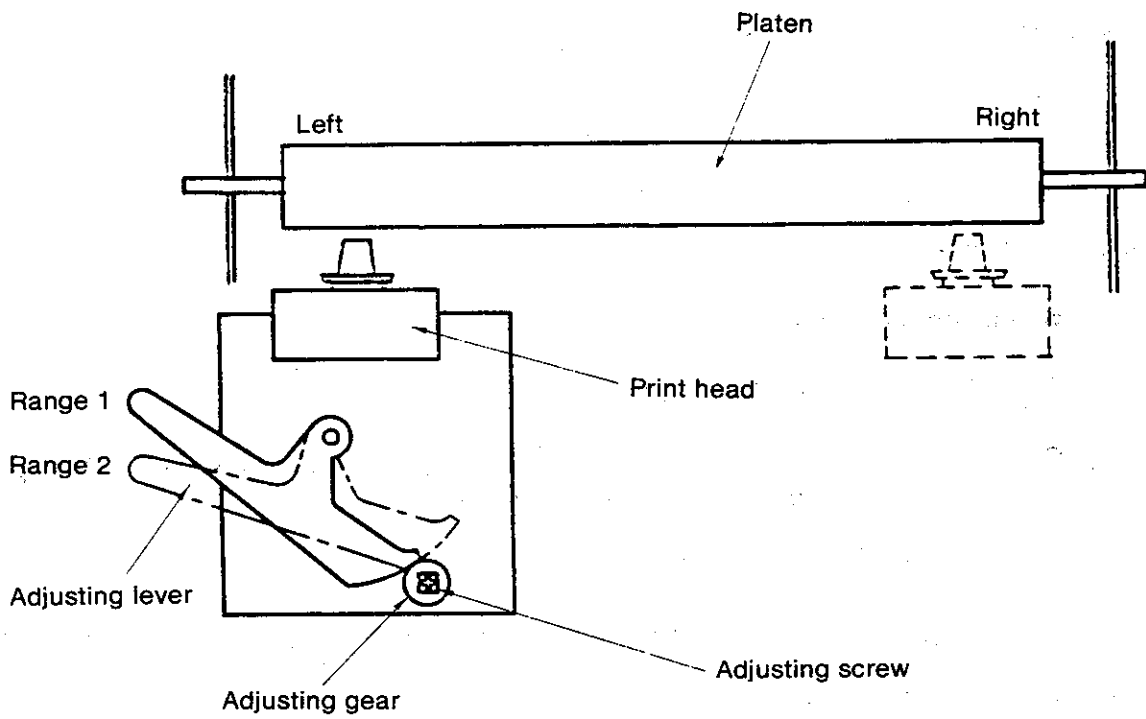


Figure 5-1

6. TROUBLESHOOTING AND REPAIR

6. TROUBLESHOOTING AND REPAIR

6.1 Items to be Checked Before Repair

If repair is requested by a user, check whether the printer can be fixed by the troubleshooting procedure described in the User's Manual.

If possible, ask the user under what conditions the trouble occurred, and record the answer.

Before troubleshooting, let the printer operate under the same conditions as at the time of trouble occurrence and check whether the trouble is reproducible. If the trouble is not reproducible, let the printer perform test printing, and then proceed to troubleshooting.

6.2 Method of Troubleshooting

First verify the trouble condition, then locate the trouble in accordance with the detailed procedure given for each item in table 6-1.

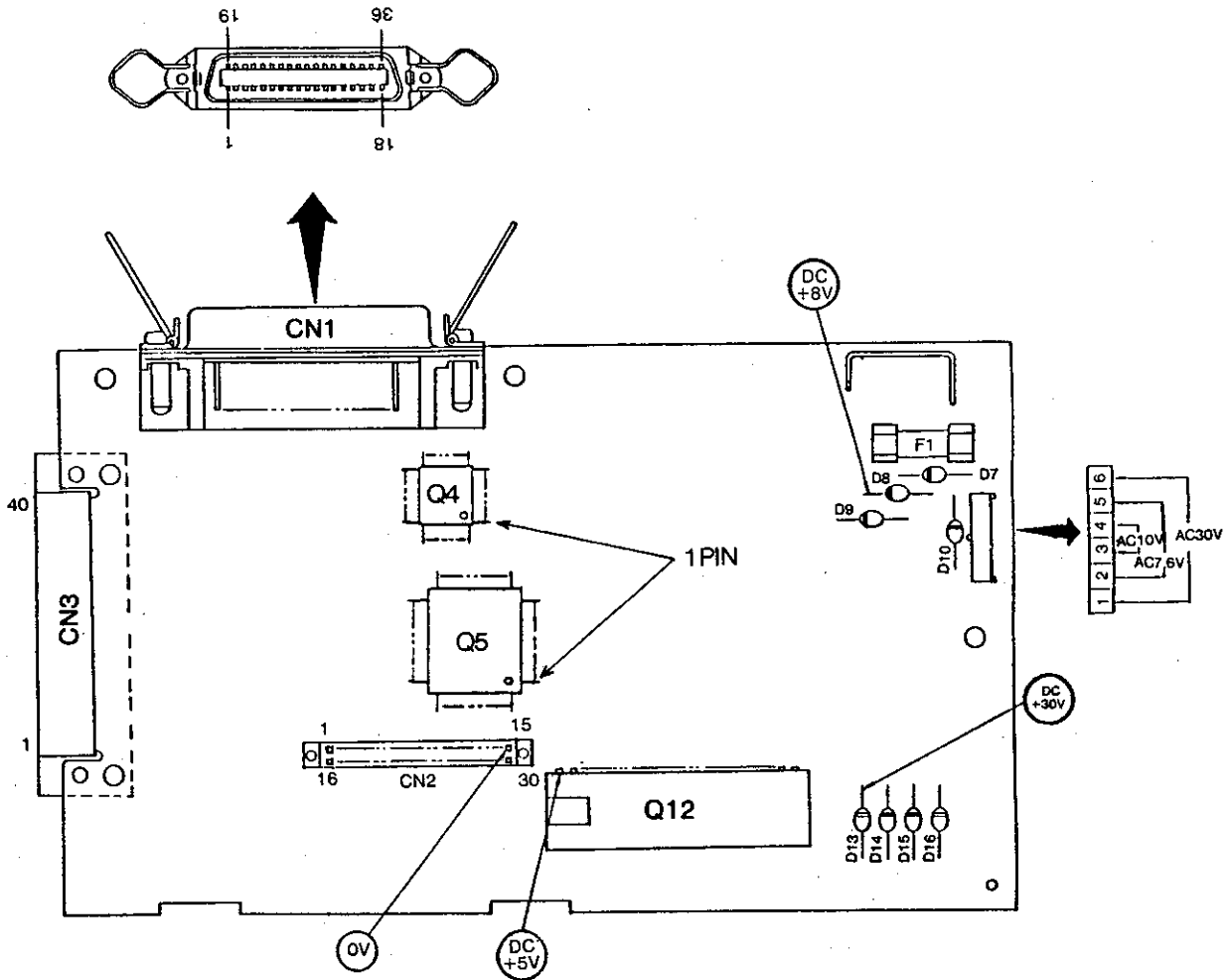
Before remedying the trouble, thoroughly read the precautions in Section 3.1.

The checkpoints for SLMC board and SLSQ board are shown in figure 6-1 and the connector locations and pin numbers are shown in figure 6-2.

Table 6-1

Division	Trouble description	Item
Trouble at power-on	The carriage does not move at all.	1
	The carriage does not move at all, and the POWER LED is lighted	2
	The carriage operation is abnormal (runway, vibration, incomplete homing).	3
	The homing operation is normal, but indicator display is abnormal.	4
	The fuse (F1) on the power supply board (SLPB) blows.	5
	The fuse (F1) on the control board (SLMC) blows.	6
Trouble during data reception/printing	Neither spacing nor printing operation occurs.	7
	The spacing operation is normal, but the printing operation is not performed.	8
	The printing operation stops.	9
	Wrong characters are printed or some characters are not printed.	10
	Some dots are not printed.	11
	Print is not dark enough.	12
	The line feed operation is not performed.	13
	The fuse (F1) on the power supply board blows.	14
A switch on the operation panel does not function. (The carriage returns to the home position at the power-on time.)	15	

SLMC Board



SLSQ Board

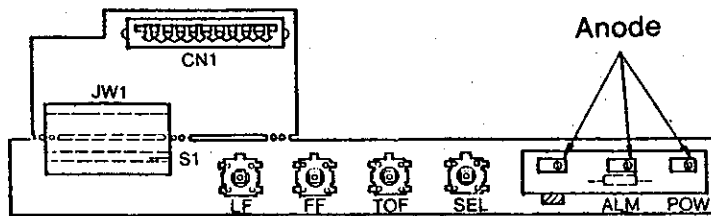


Figure 6-1 Checkpoints of Printed Circuit Board

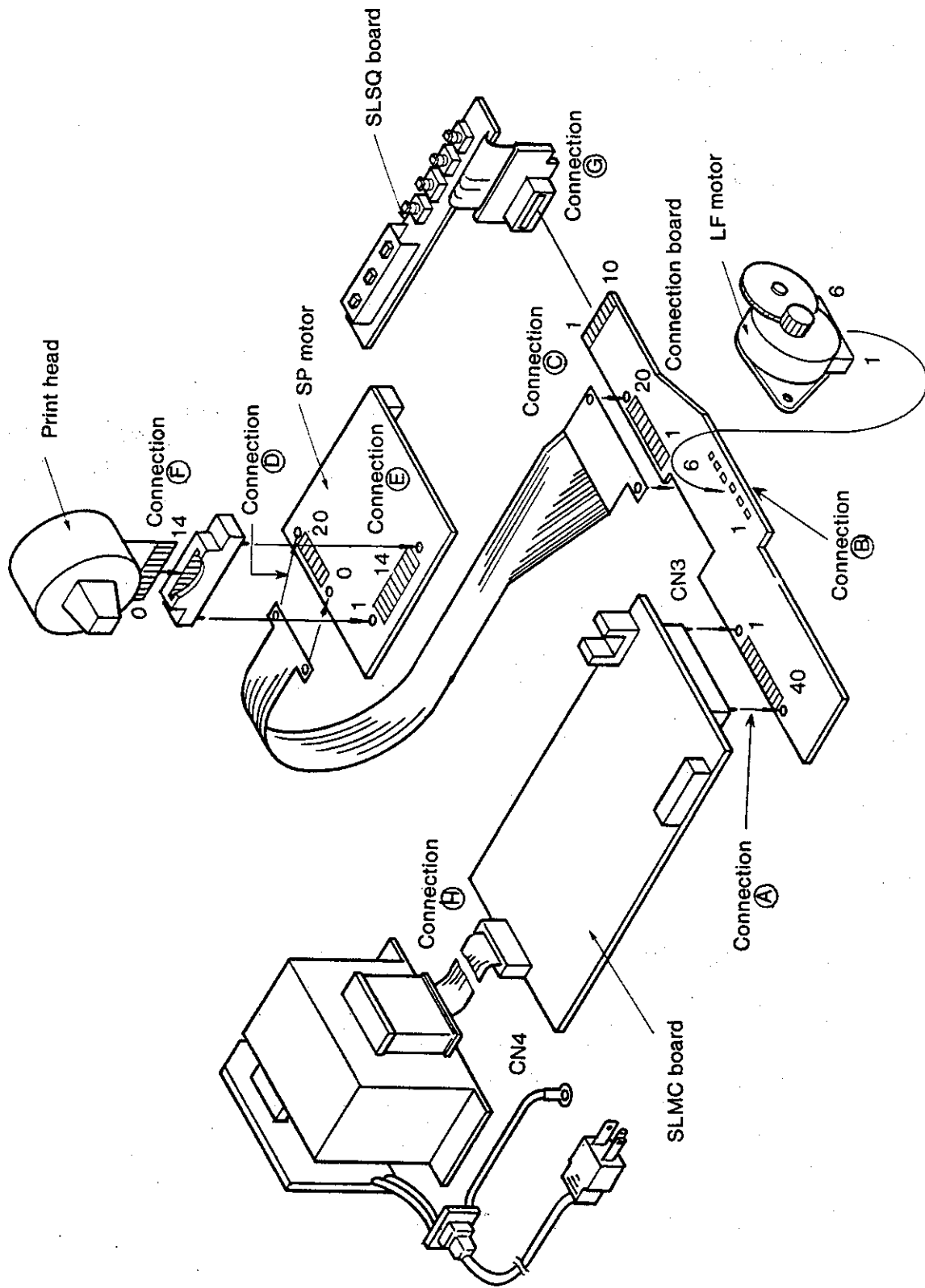
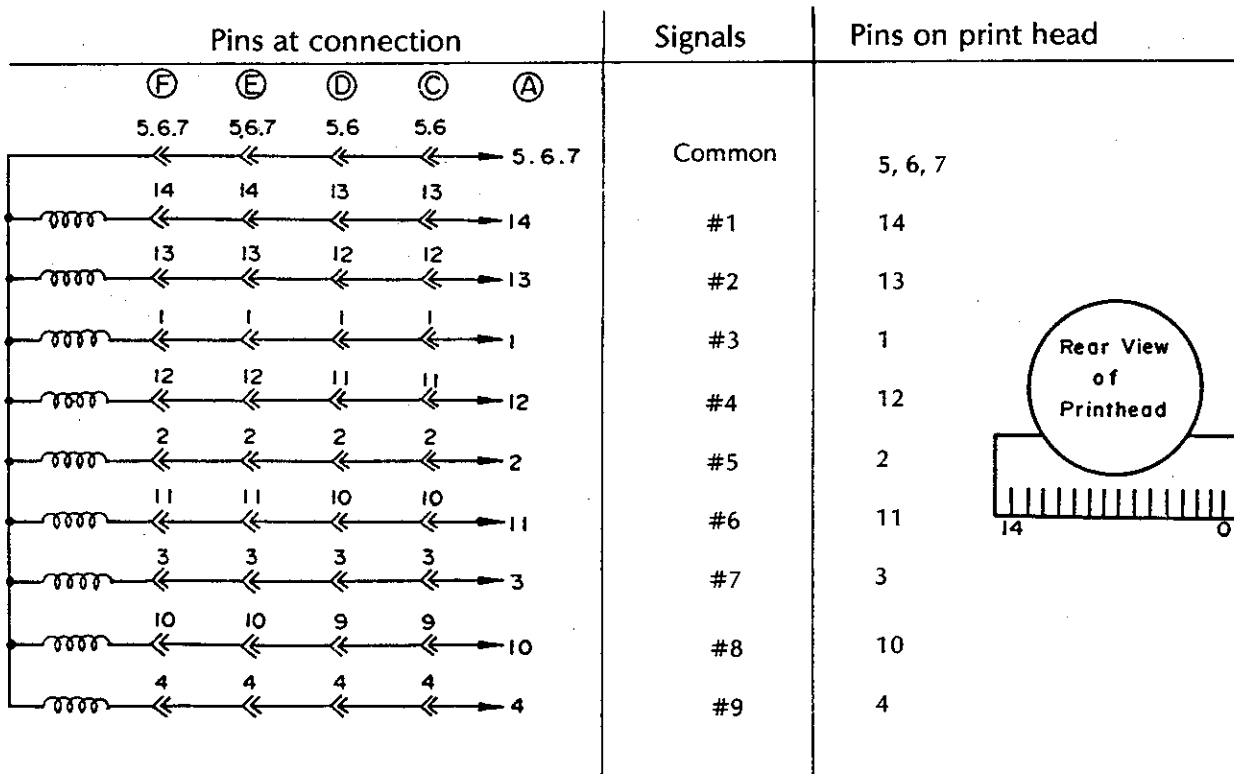


Figure 6-2 Connector Locations and Pin Numbers

6.3 Connection Circuit and Resistance Check for Print Head and LF/SP Motor

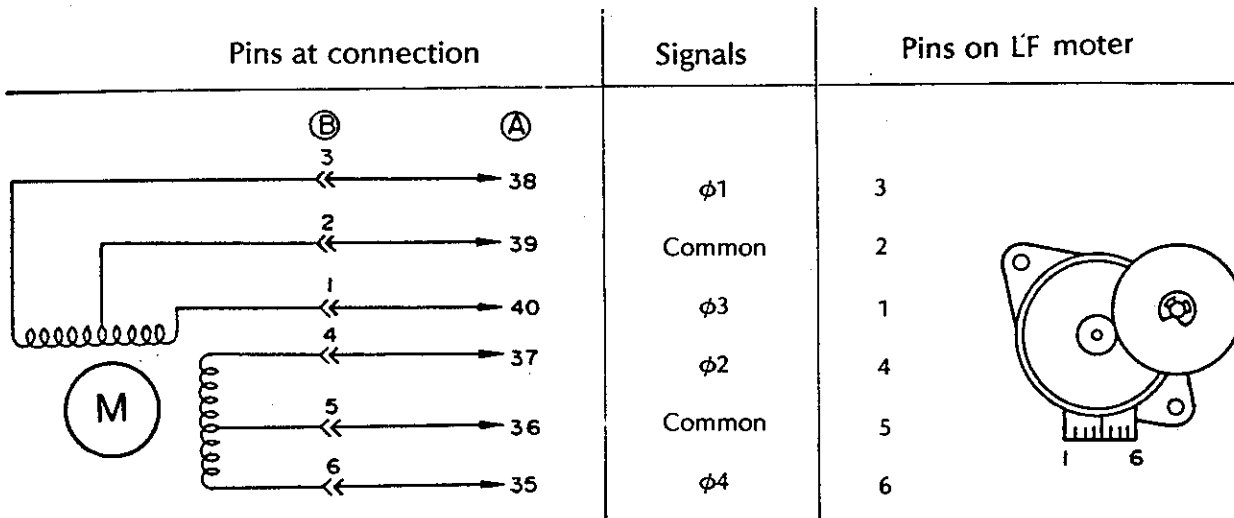
(1) Print head.

Resistance of each coil should be about 20 Ω .



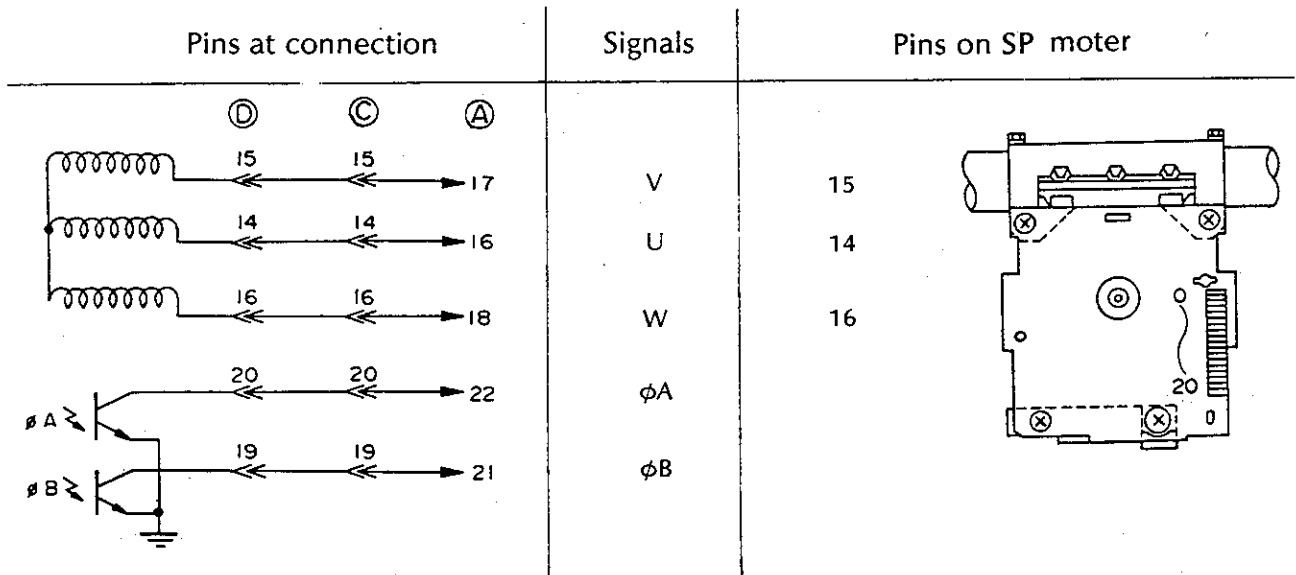
(2) Line feed motor

Resistances of each coil should be about 70 Ω .



(3) Space motor

Resistances of each phase should be about 21 Ω .



1

The carriage does not move when power is turned on.

Is power LED lit?

Yes

Proceed to ②.

No

Is AC power supplied to transformer?

Yes

Is +8 VDC output?

No

1-1

Yes

Is AC power supplied to SLPB board?

No

Replace the AC cable assembly.

Is +5 VDC output?

No

Proceed to ④-a.

Yes

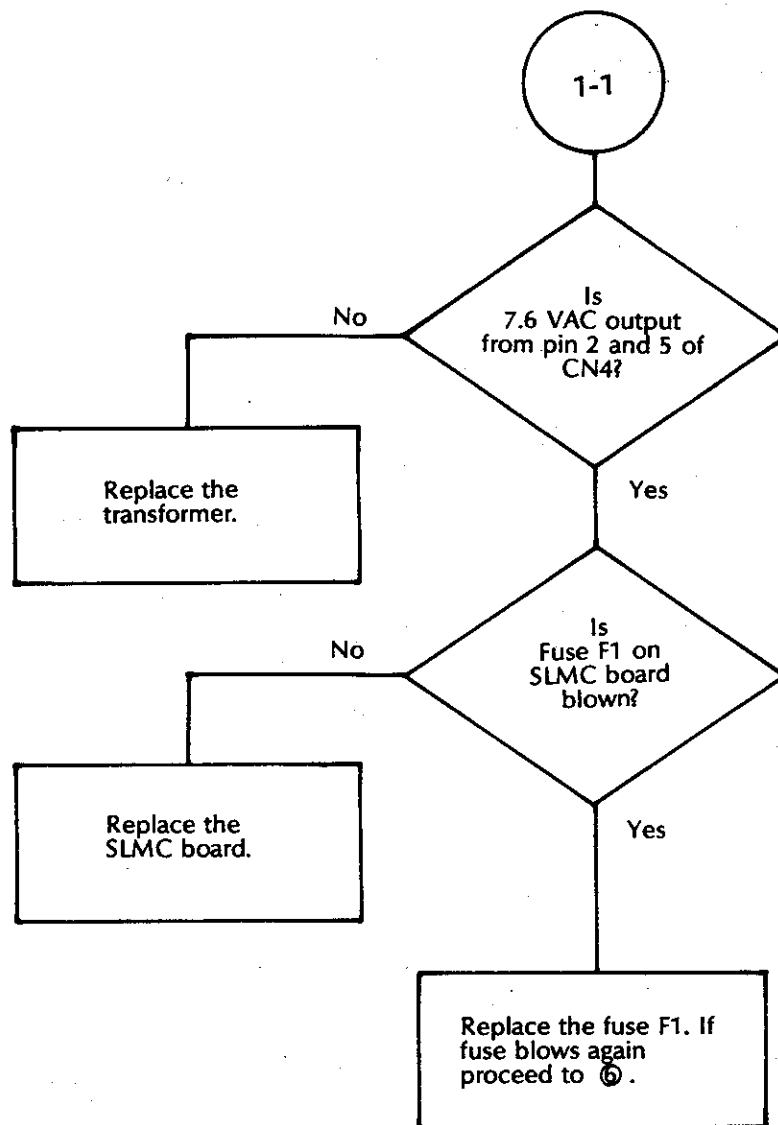
Is fuse F1 blown?

No

Replace the SLPB board.

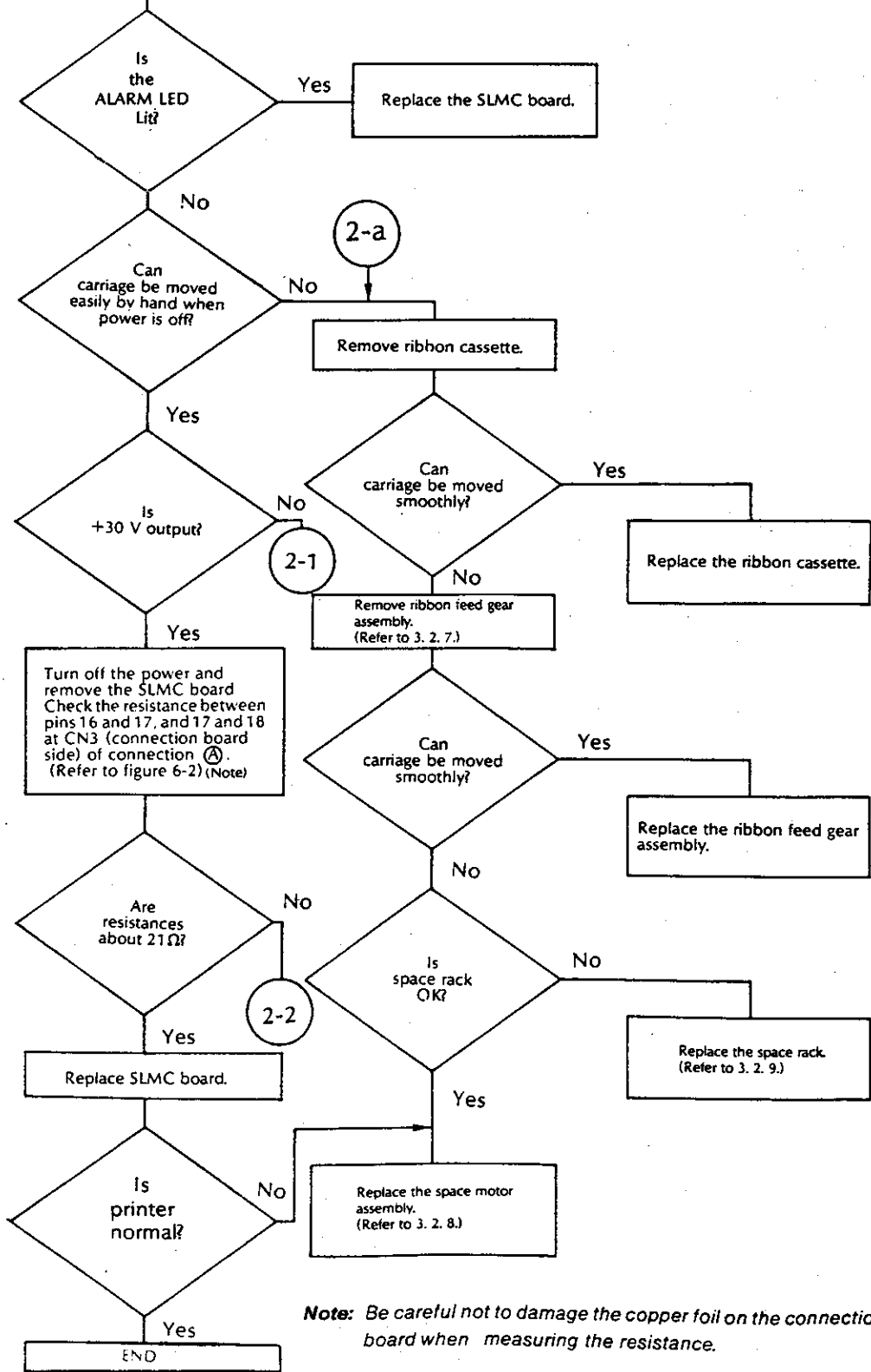
Replace the fuse F1. If fuse blows again proceed to ⑤.

Replace the SLMC board.

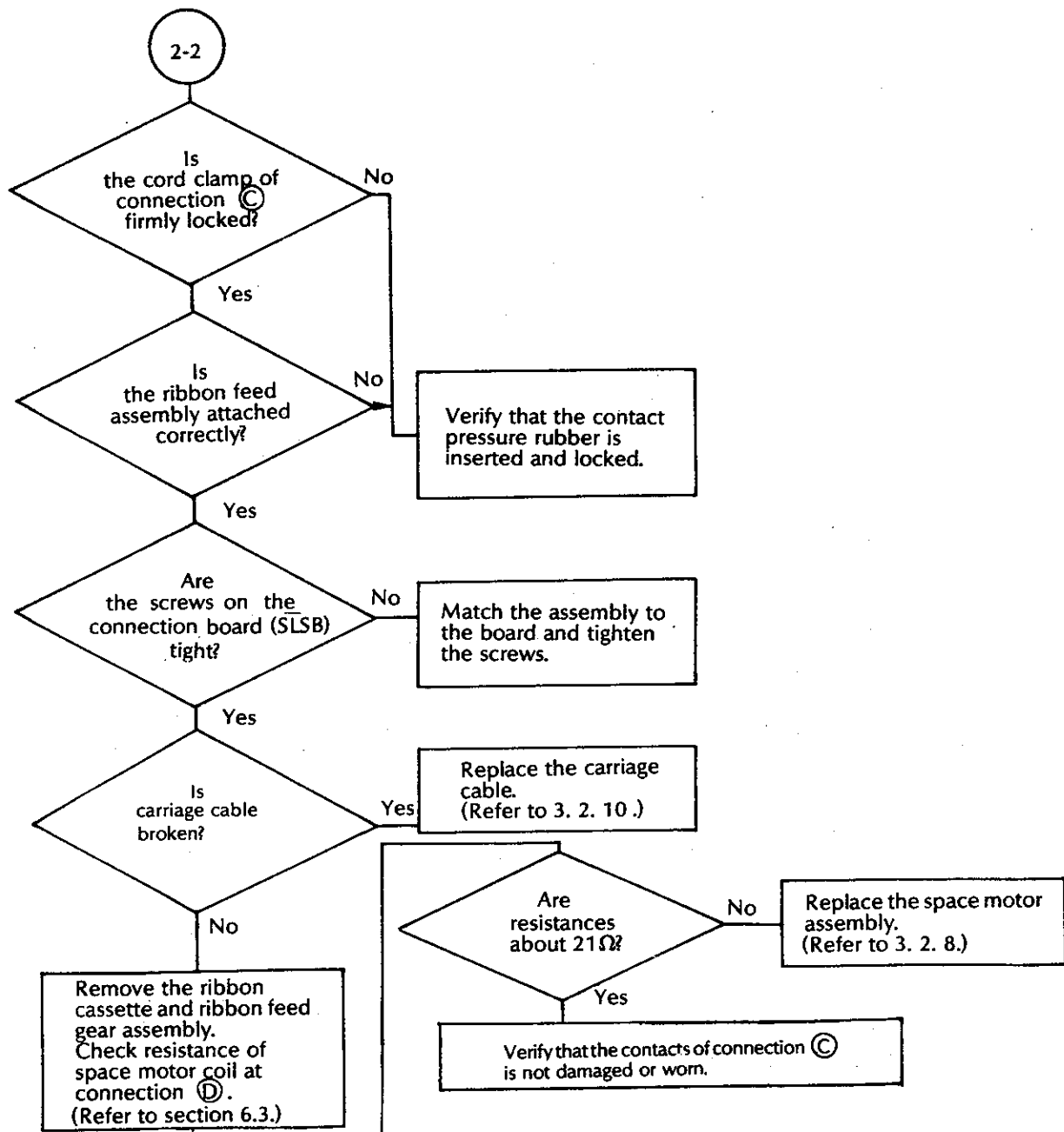
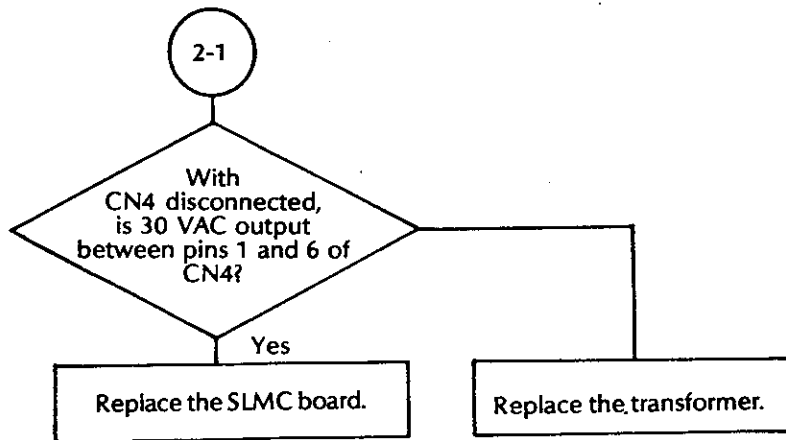


2

When power is turned on, the Power LED lights but the carriage does not move.

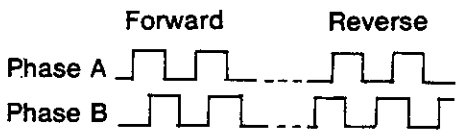
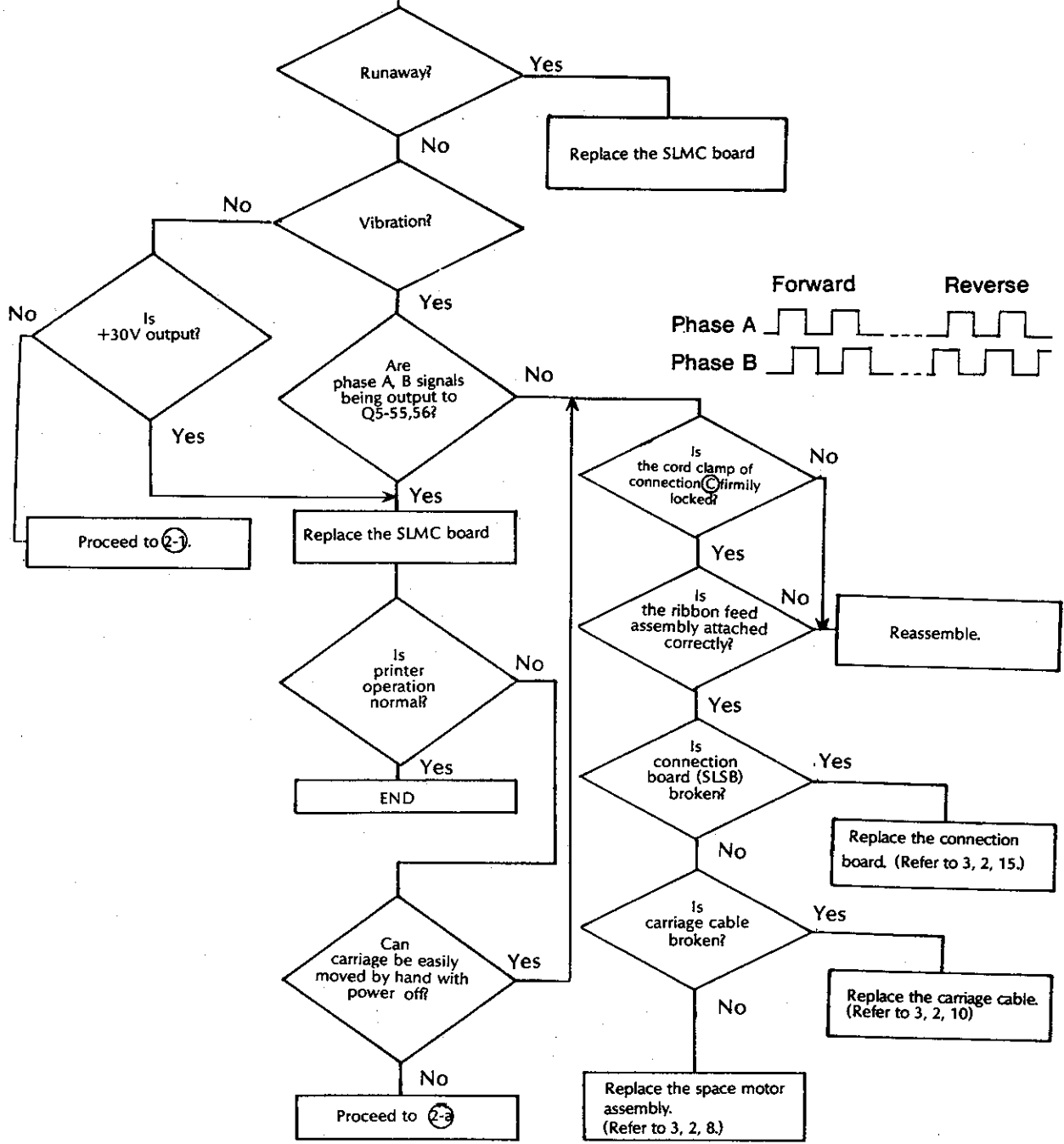


Note: Be careful not to damage the copper foil on the connection board when measuring the resistance.



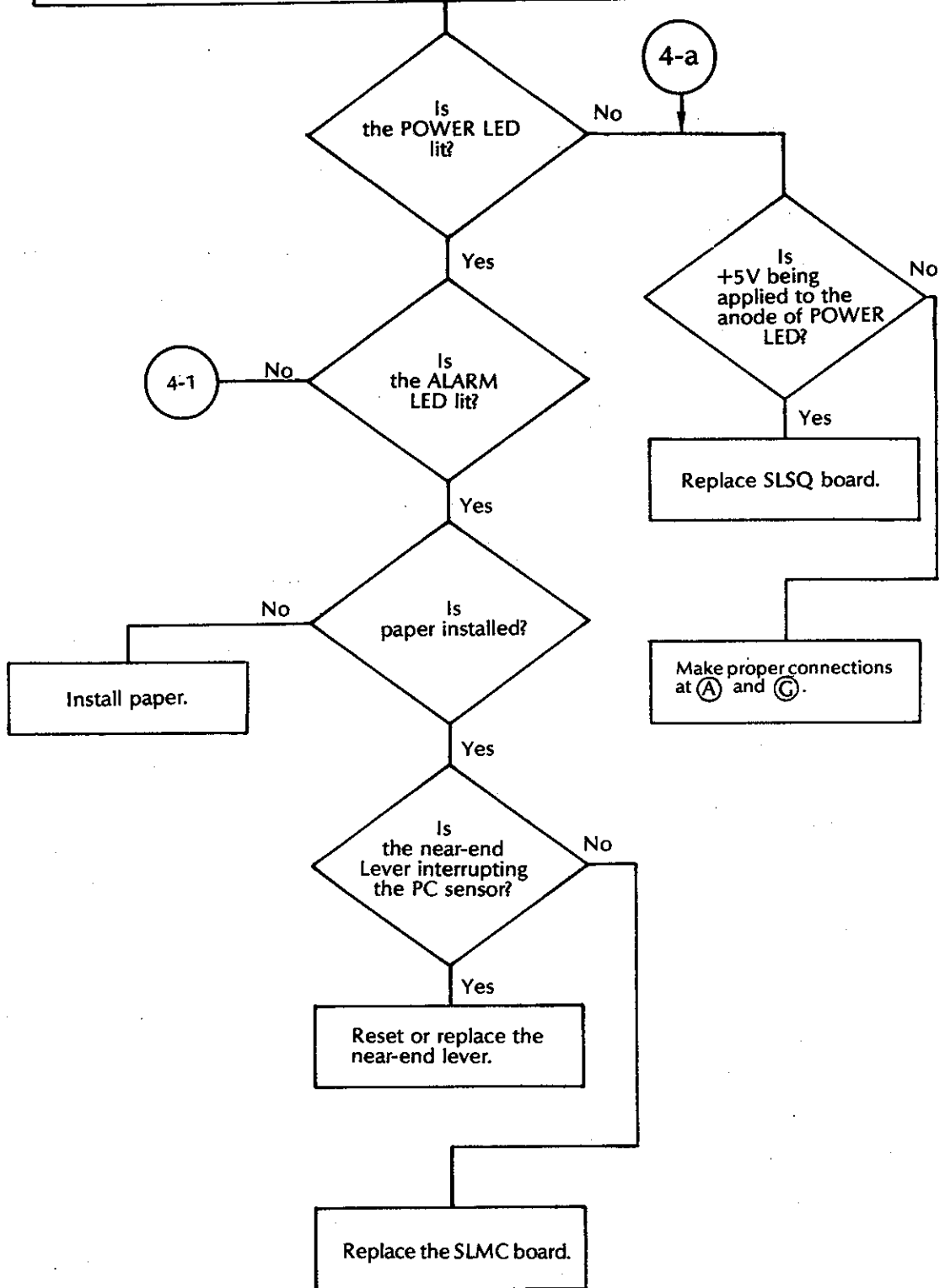
3

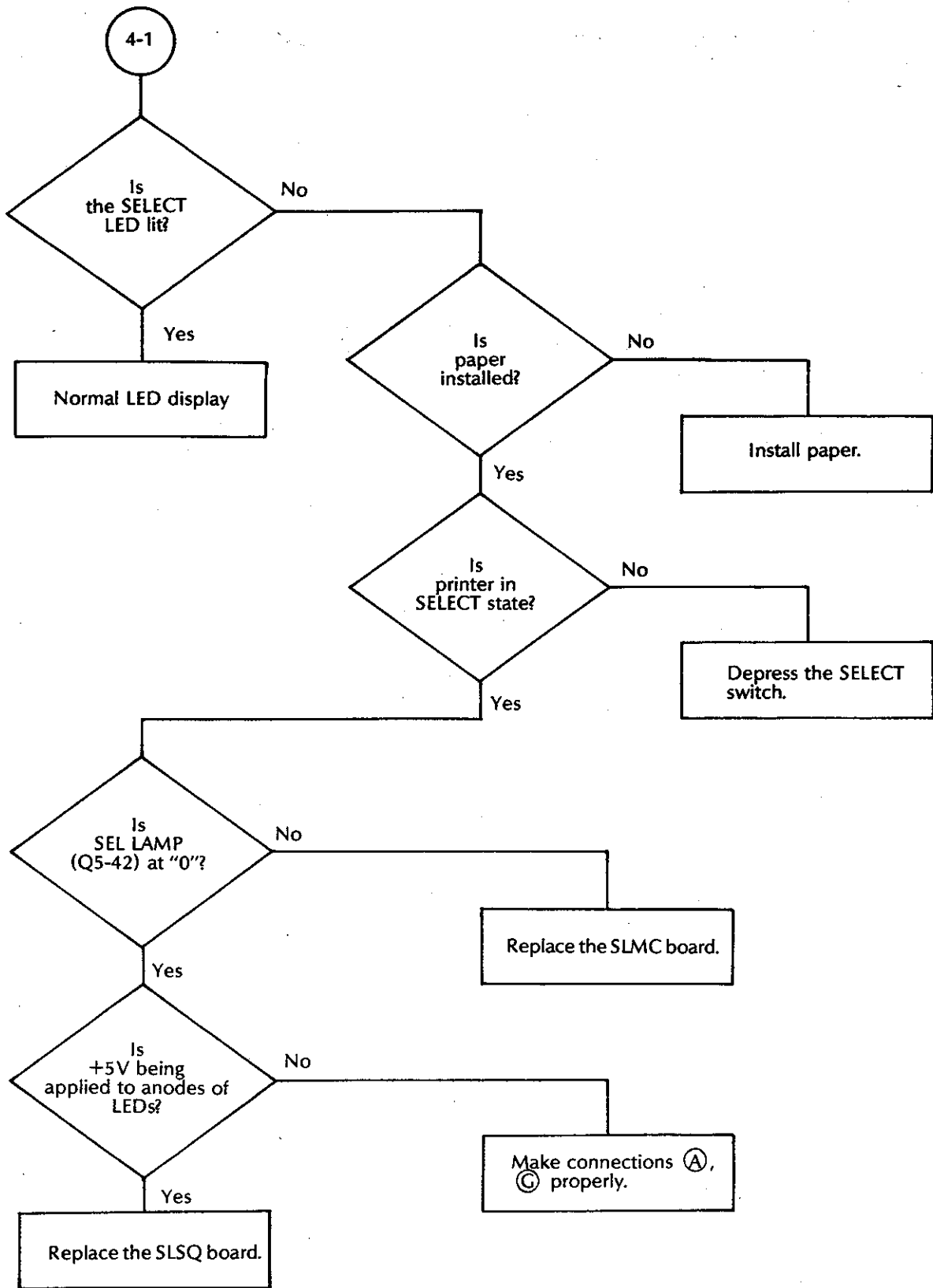
When power is turned on, carriage operation is abnormal (runaway, vibration, incomplete homing)



4

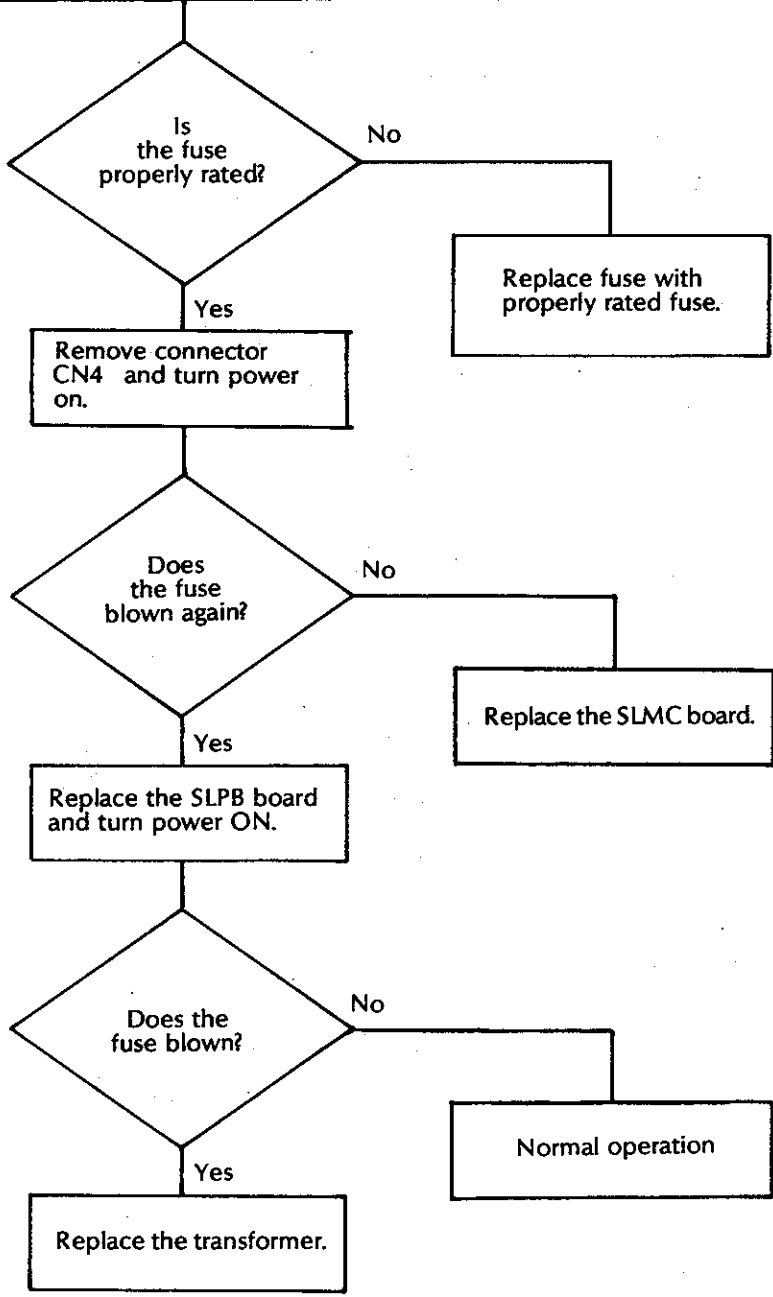
When power is turned on, the homing operation is normal, but the indicator display is abnormal.





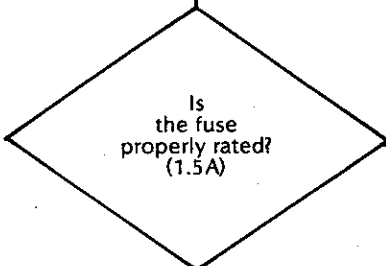
5

When power is turned on, fuse F1 on power supply board (SLPB) blows.



6

When power is turned on, fuse F1 on the control board (SLMC) blows.



No

Replace with properly rated fuse.

Yes

Replace the SLMC board.

7

During data reception, neither spacing nor printing occurs.

Verify data is being transmitted to printer.

Is SELECT LED lit?

Proceed to 4-1.

With interface cable removed are signal levels at CN1 as shown in table below?

Signal Levels	
Pin 10	H
Pin 11	L
Pin 12	L
Pin 13	H
Pin 32	H

With cable connected are parallel data (pins 2 to 9), STB (pin 1), on CN1 being received?

Is interface cable connected correctly?

Replace interface cable.

Can self test be performed?

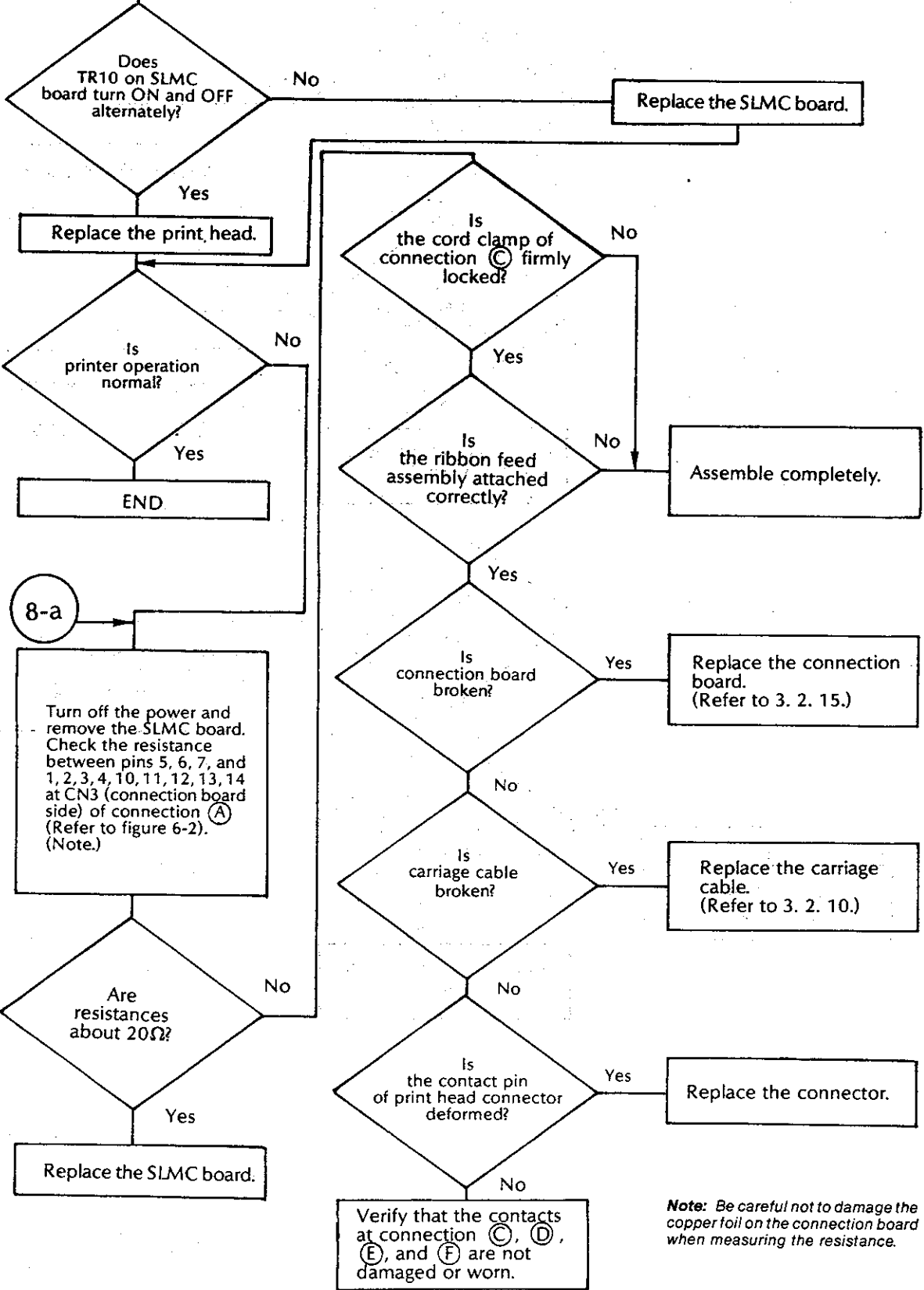
Connect interface cable correctly.

Replace SLMC board.

Proceed to 15-a.

8

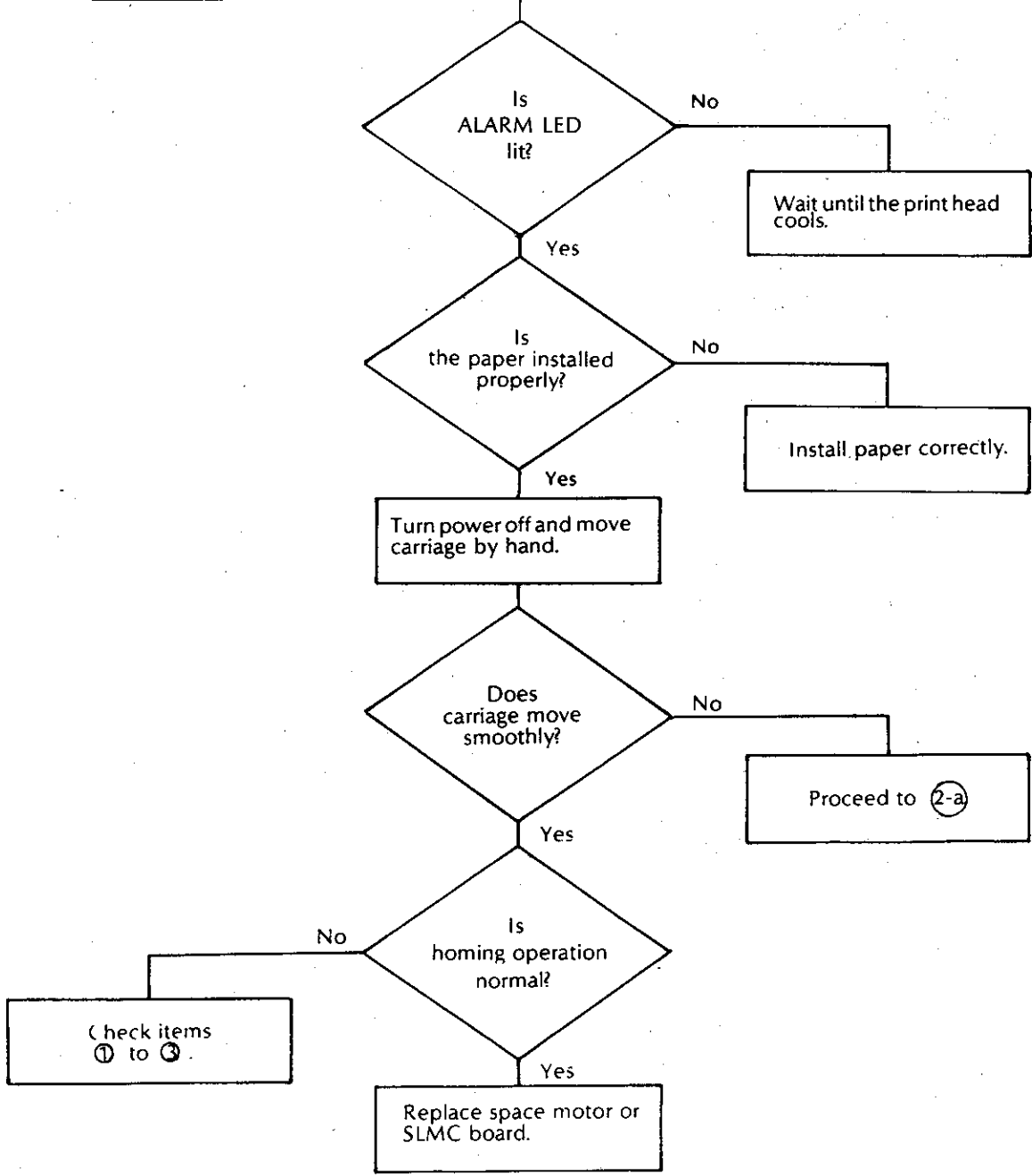
During data reception and printing, spacing is normal, but nothing is printed.



Note: Be careful not to damage the copper foil on the connection board when measuring the resistance.

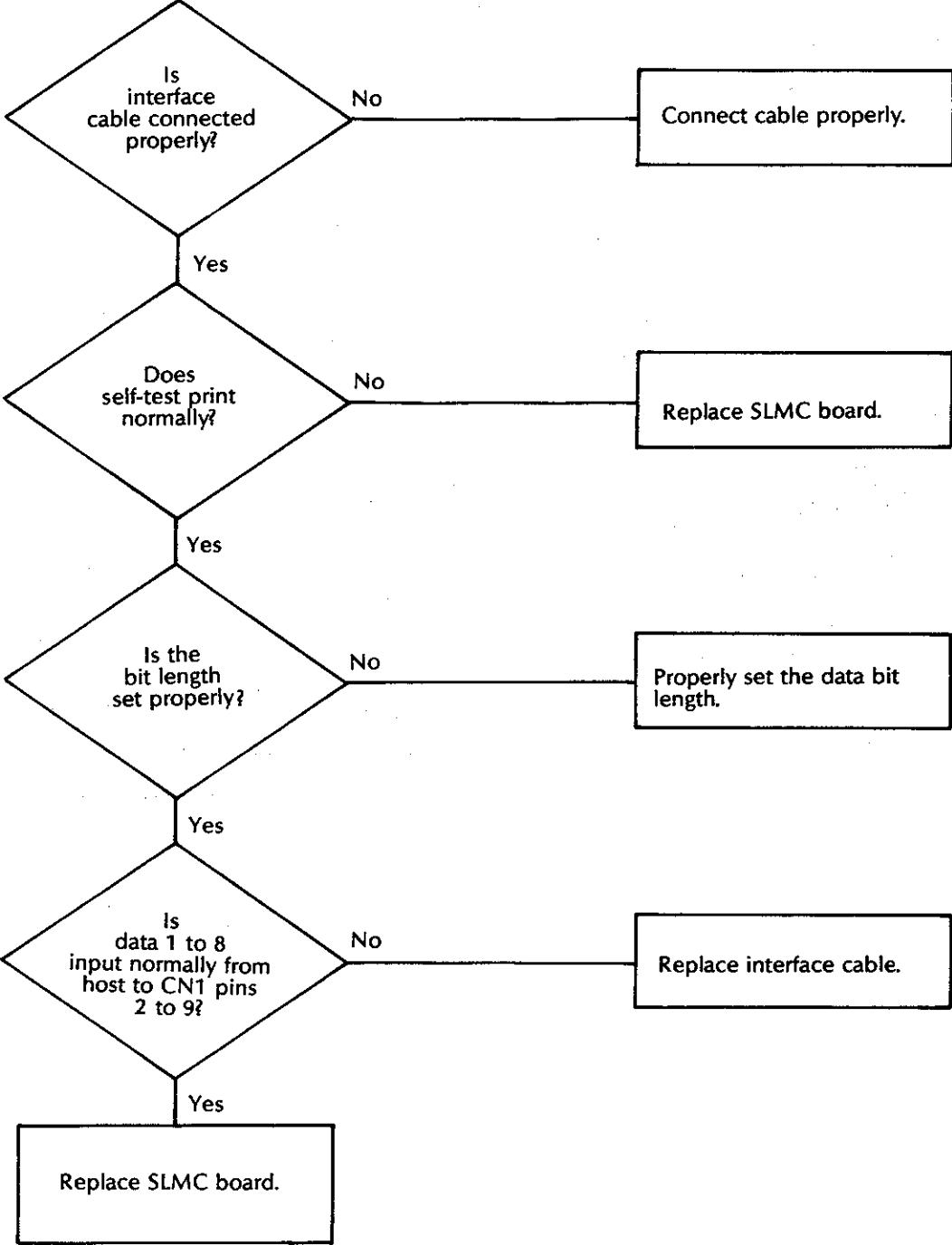
9

During data reception and printing, printing stops due to an ALARM.



10

Wrong characters are printed or some characters are not printed.



11

Some dots are not printed.

Remove the print head.

Is any dot pin broken?

Yes

No

Check resistance of print head coil at connection Ⓣ (Refer to section 6.3.)

Is resistance about 20Ω ?

No

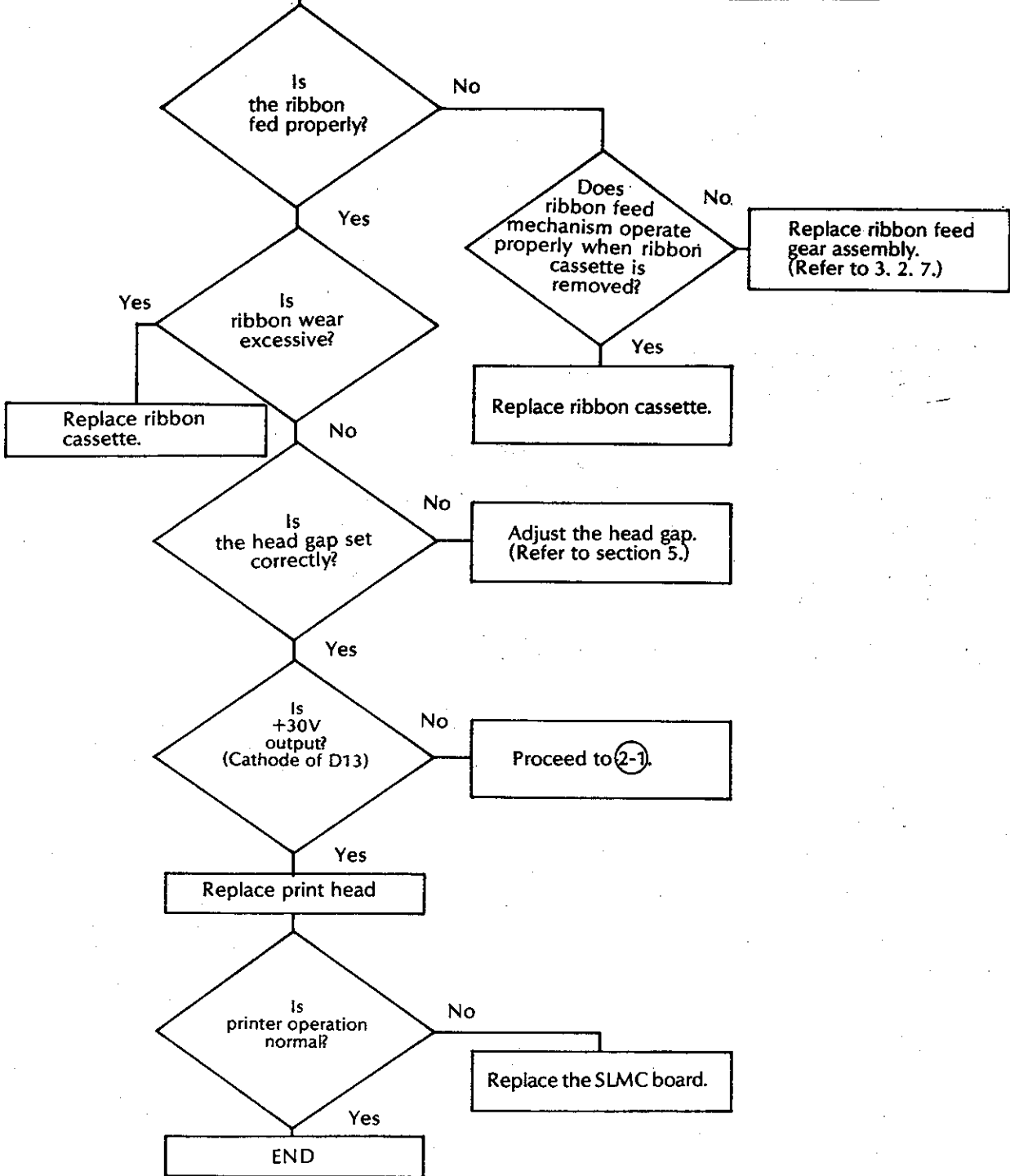
Yes

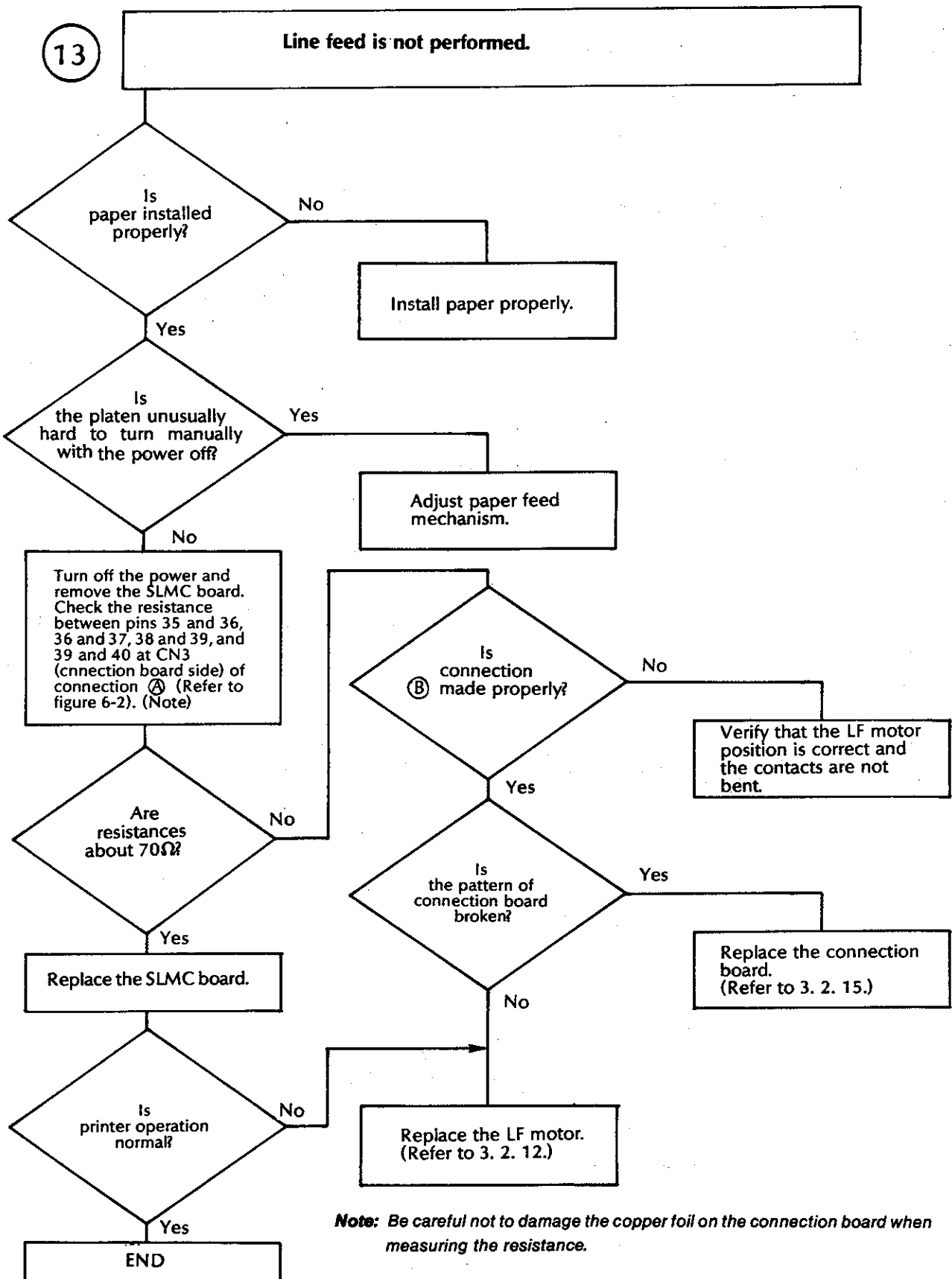
Proceed to 8-a

Replace the print head.

12

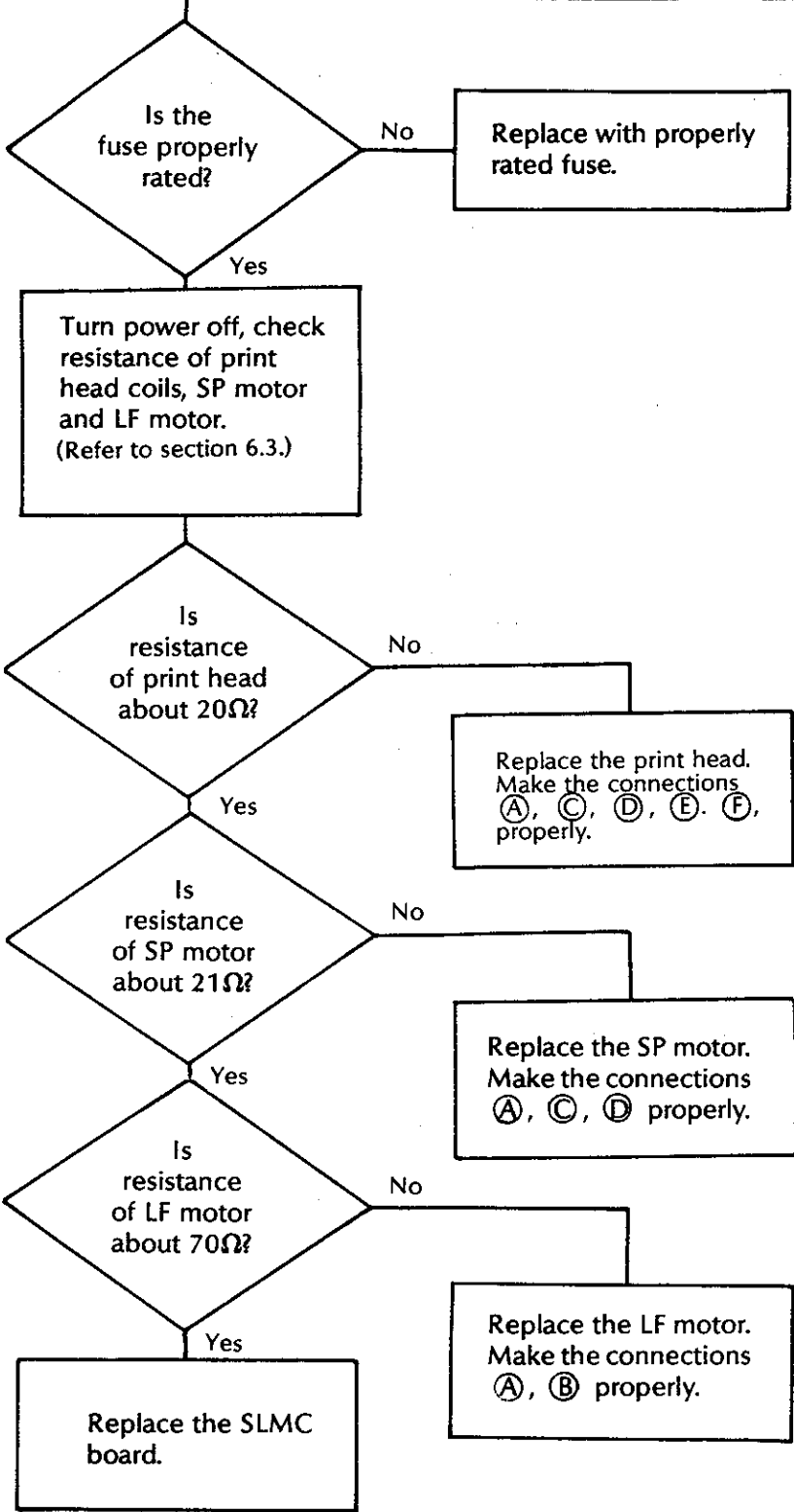
Print is not dark enough.

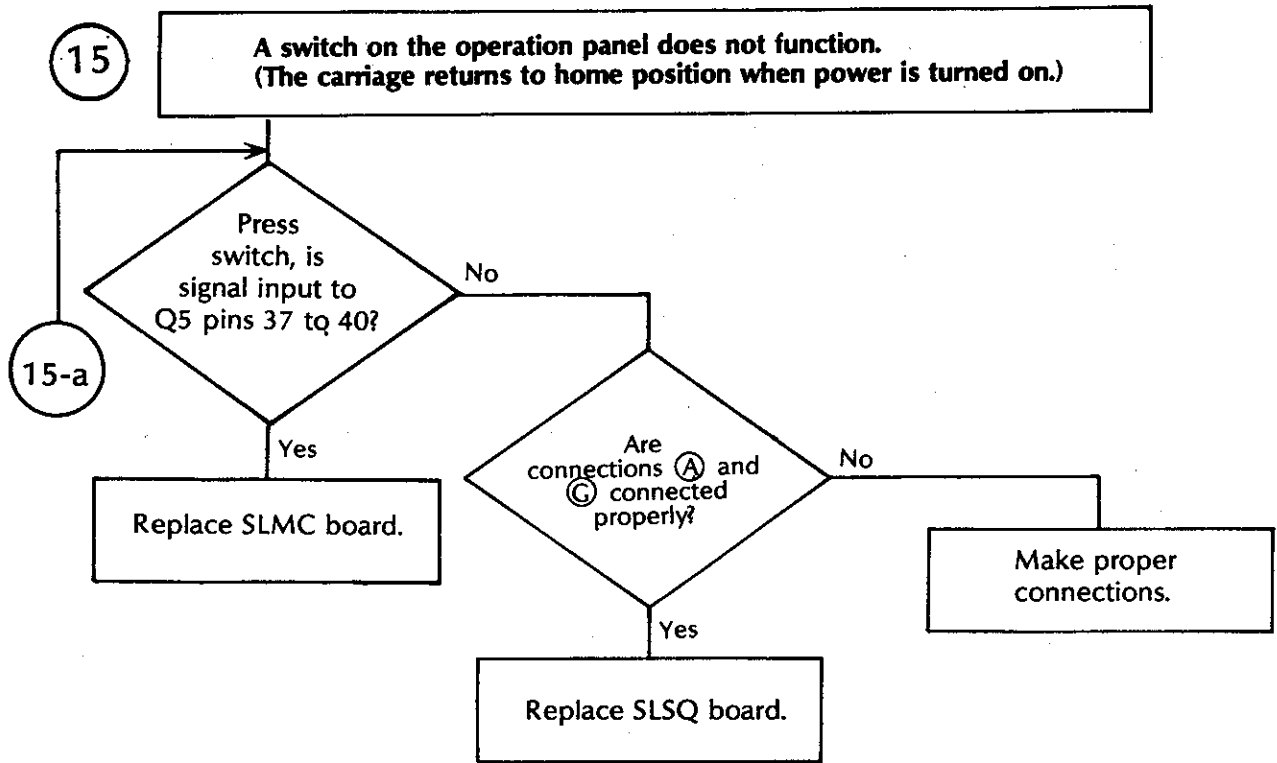




14

During data reception and printing, fuse F1 on power supply board blows.





7. CIRCUIT DIAGRAM

7. CIRCUIT DIAGAM

Table 7-1 shows the meanings of symbols used in the circuit diagrams and figure 7-1 shows the circuit diagrams.

Table 7-1 Table of Symbols

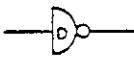

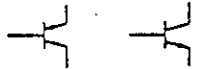





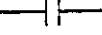
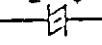

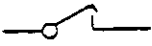
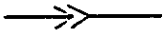
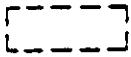

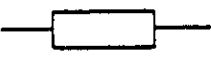







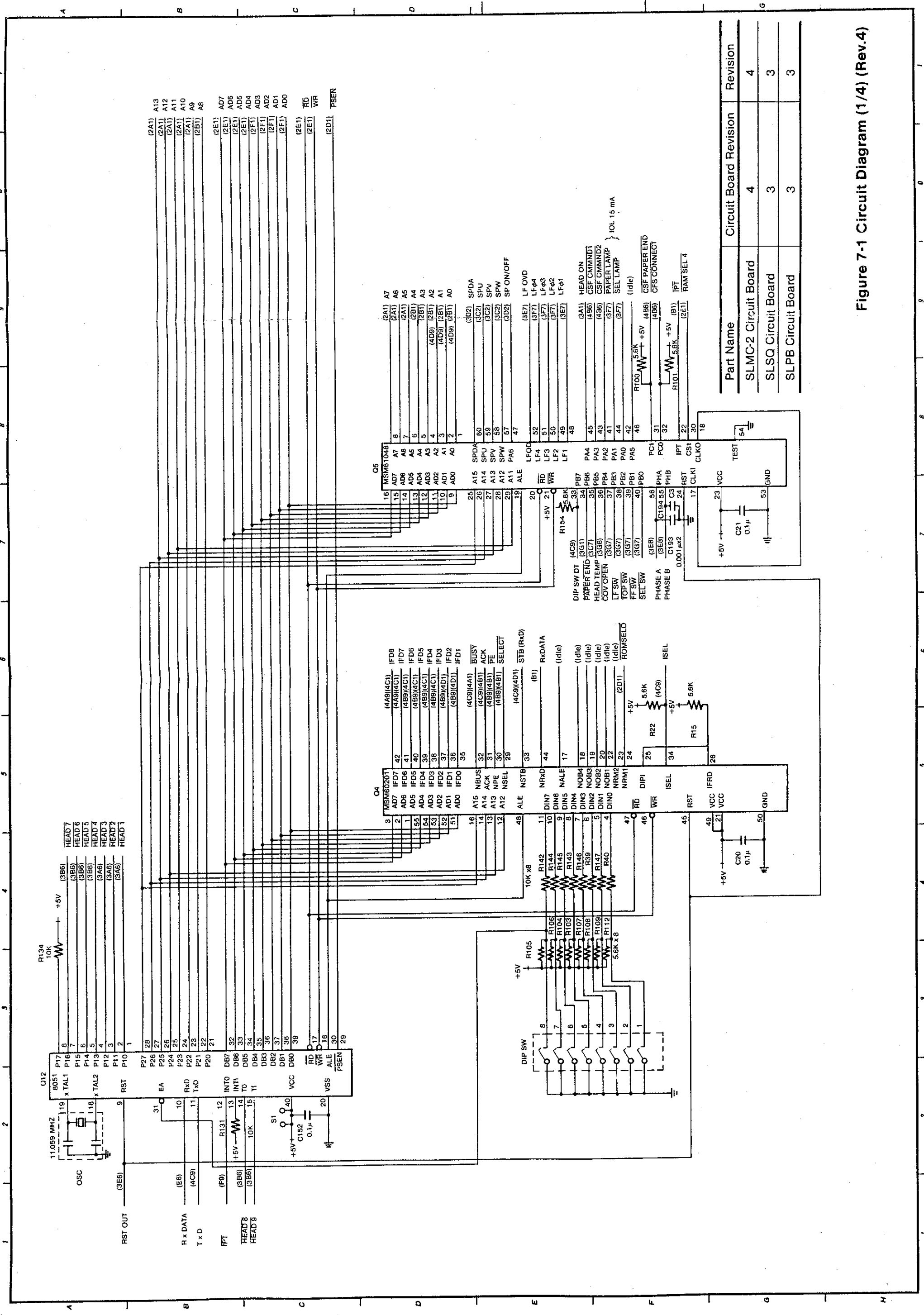
Symbol	Mark	Description
	Q	Inverter (open collector)
	OSC	Ceramic oscillator
	TR	Transistor
	SCR	Thyristor
	D	Diode
	D	Zener diode
	D	Light-emitting diode
	REG	Regulator
	C	Capacitor
	C	Electrolytic capacitor
	R	Resistor

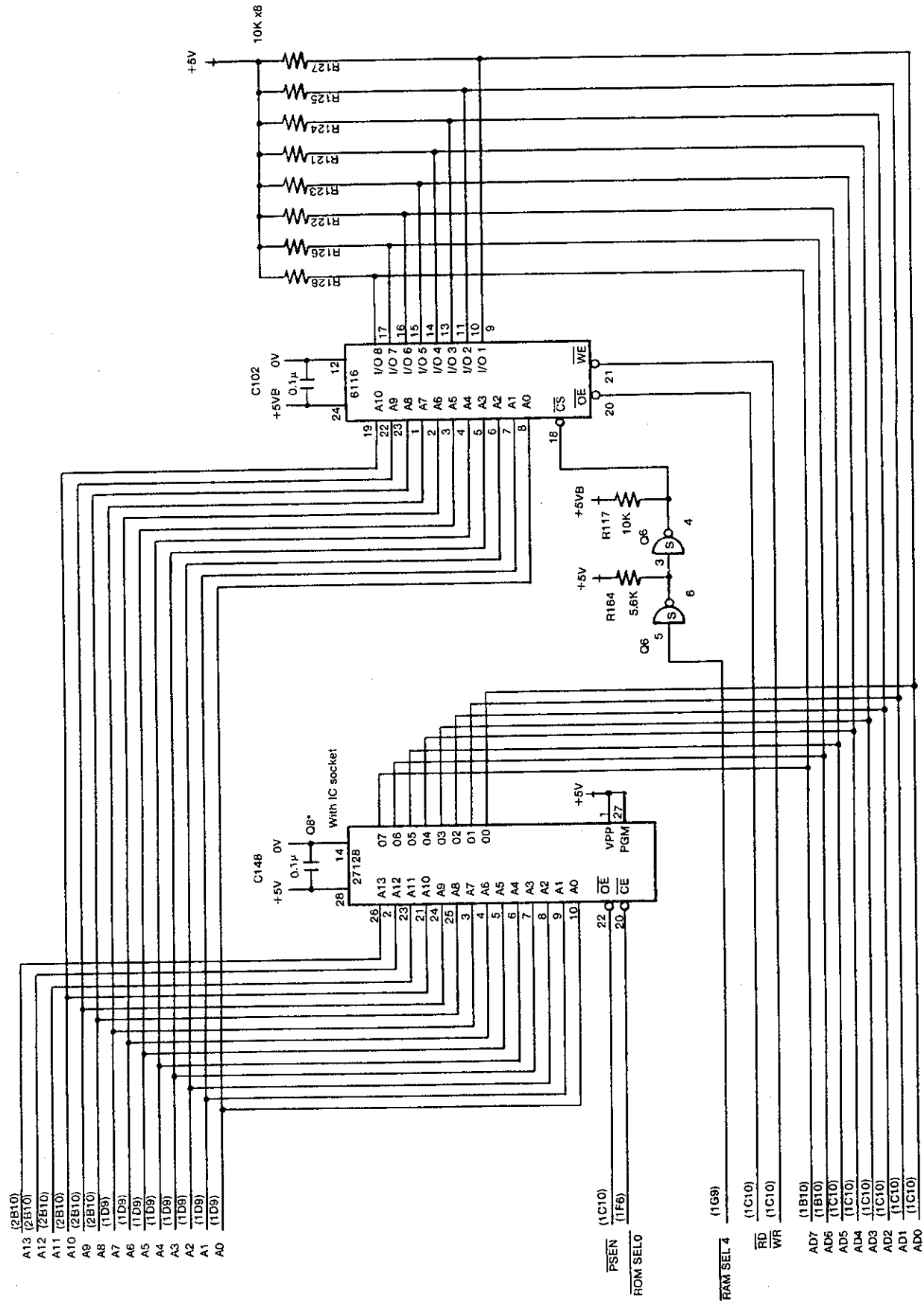
Table 7-1 (con.)

Symbol	Mark	Description
	SW	Switch
	CN	Connector (terminal)
(Reference) 		Means a single part.
	FG	Frame ground
		Dot head (element)
	L	Coil
	Q	339 Comparator
	THERMISTOR	Thermistor
	SG	Signal ground
	TF	Transformer
		Photo sensor
	F	Fuse



Part Name	Circuit Board Revision	Revision
SLMC-2 Circuit Board	4	4
SLSQ Circuit Board	3	3
SLPB Circuit Board	3	3

Figure 7-1 Circuit Diagram (1/4) (Rev.4)



* Q8 (ROM) is used when 27128 is mounted.

Figure 7-1 Circuit Diagram (2/4) (Rev.4)

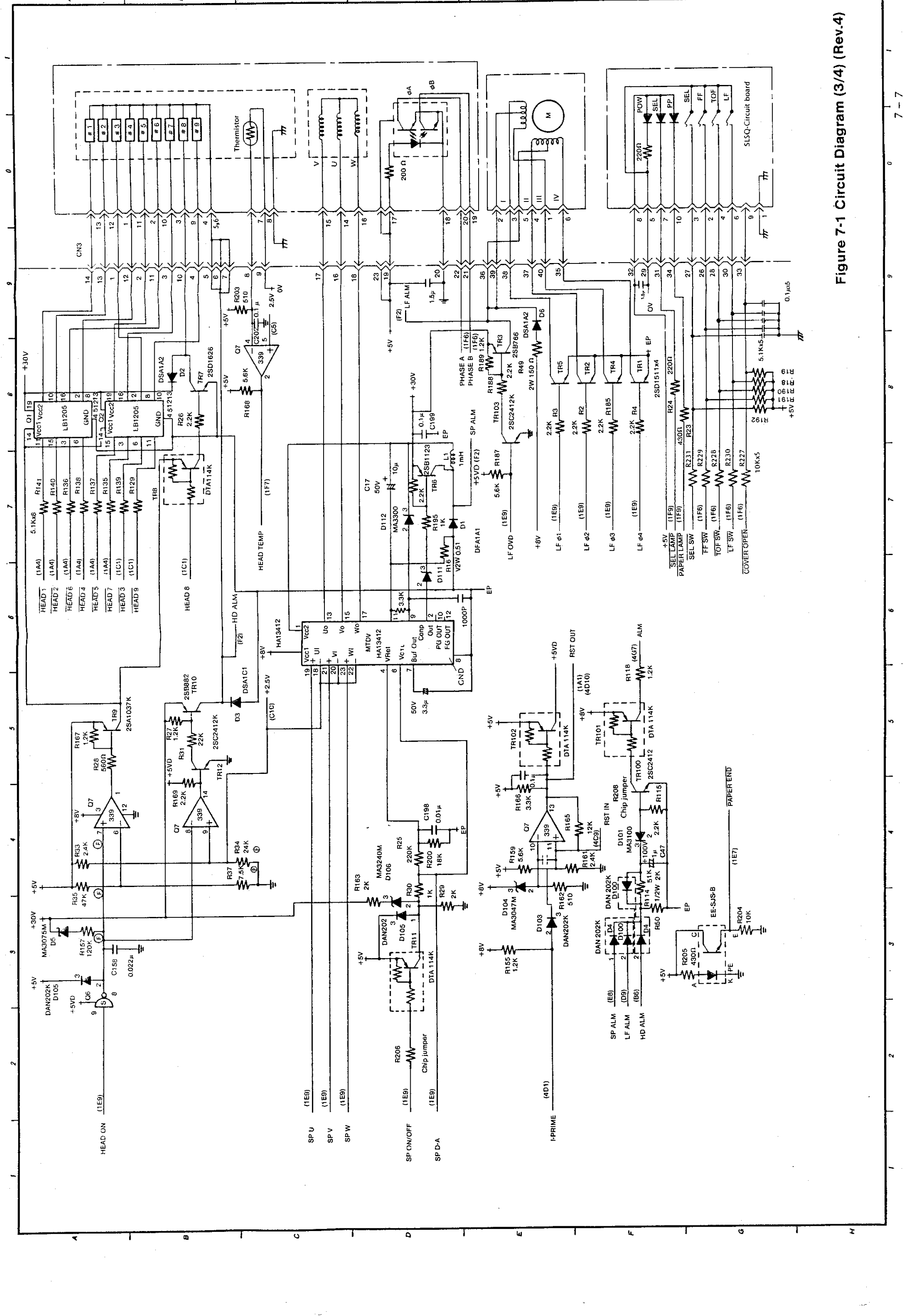


Figure 7-1 Circuit Diagram (3/4) (Rev.4)

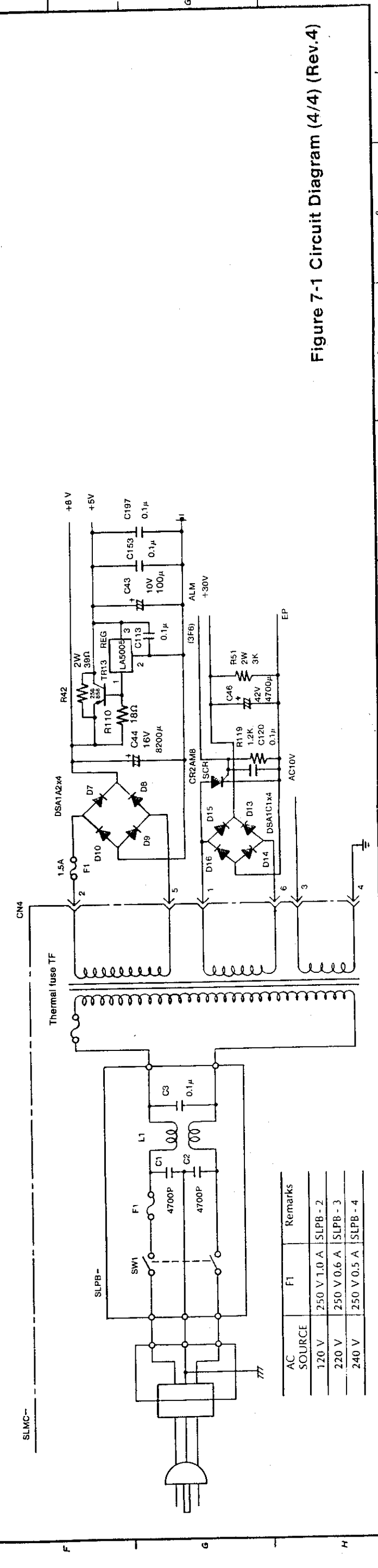
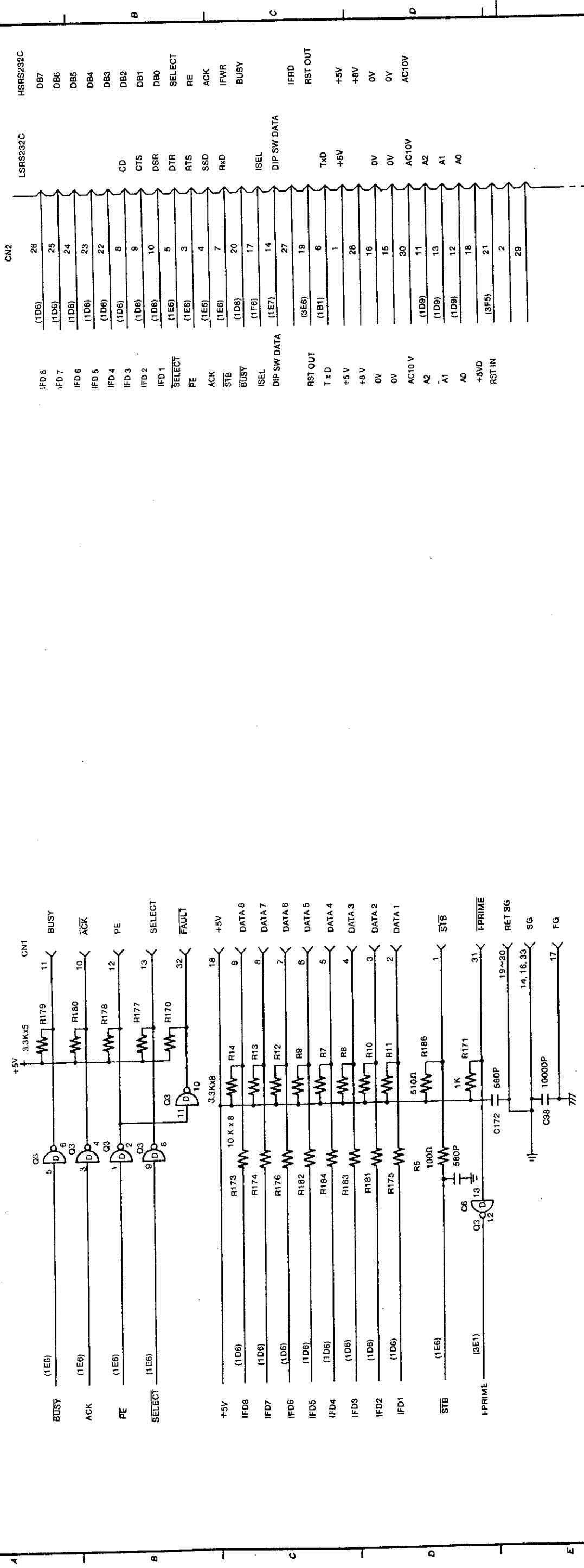
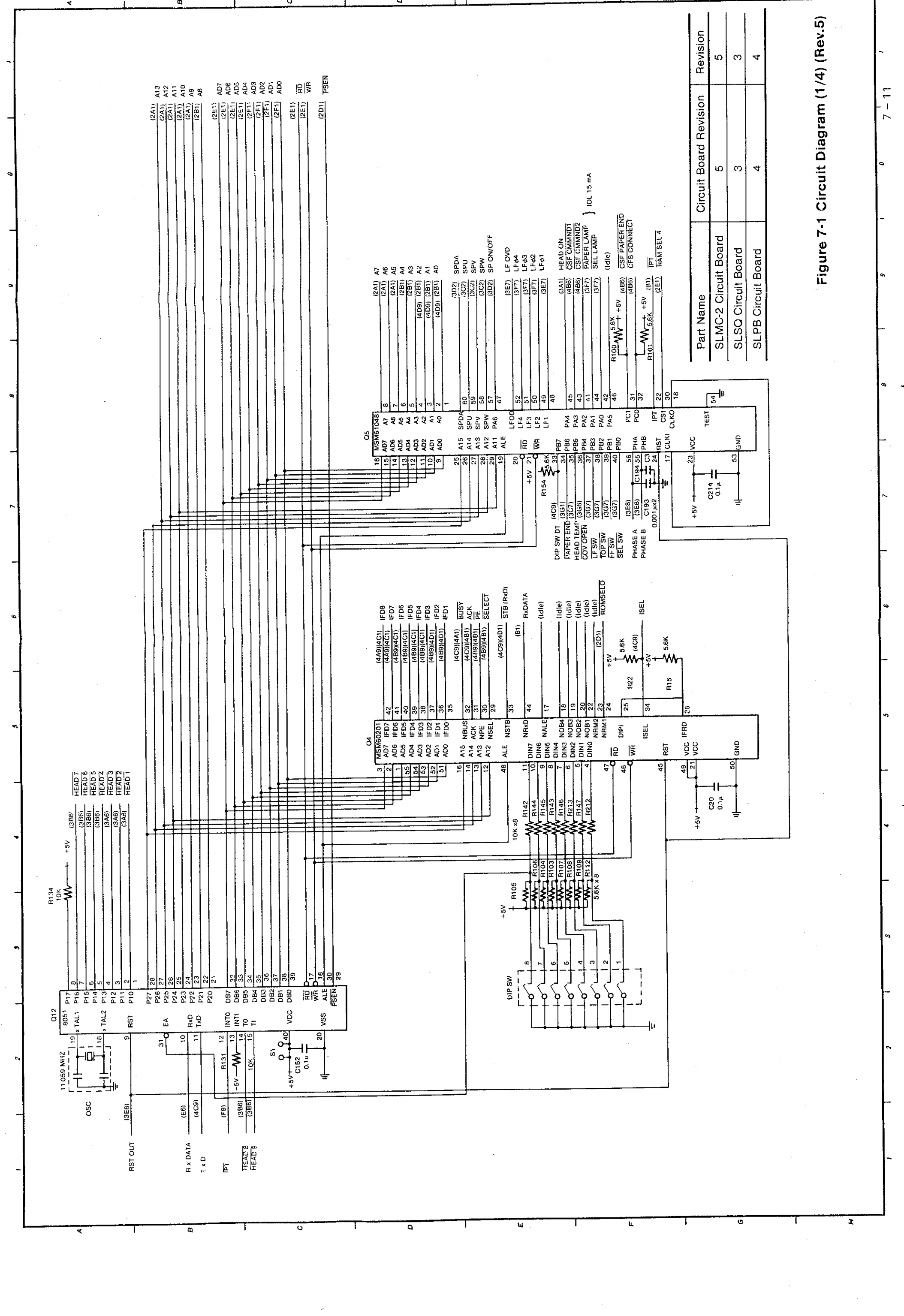
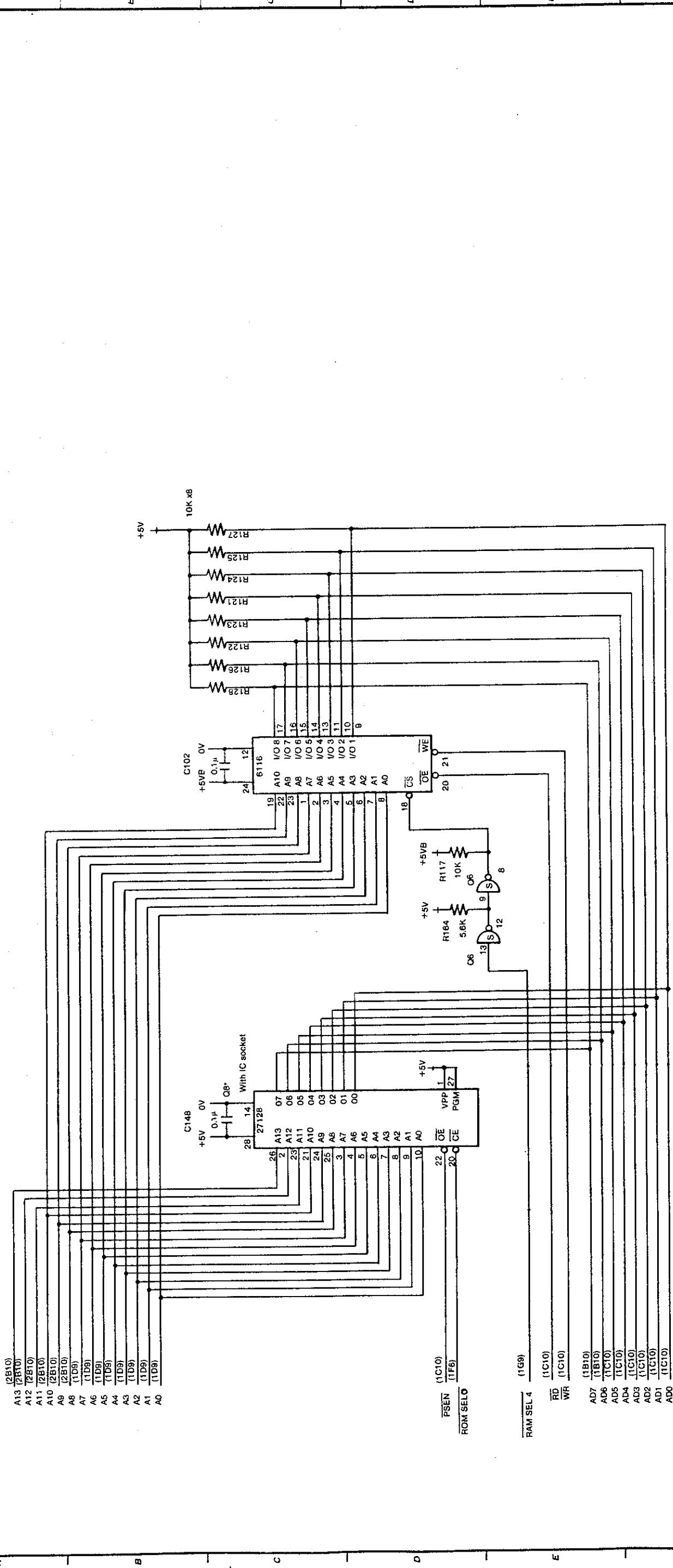


Figure 7-1 Circuit Diagram (4/4) (Rev.4)



Part Name	Circuit Board Revision	Revision
SLMC-2 Circuit Board	5	5
SLSQ Circuit Board	3	3
SLPB Circuit Board	4	4

Figure 7-1 Circuit Diagram (1/4) (Rev.5)



R116
Chip Jumper
+5V + +5VB

* Q8 (ROM) is used when 27128 is mounted.

Figure 7-1 Circuit Diagram (2/4) (Rev.5)

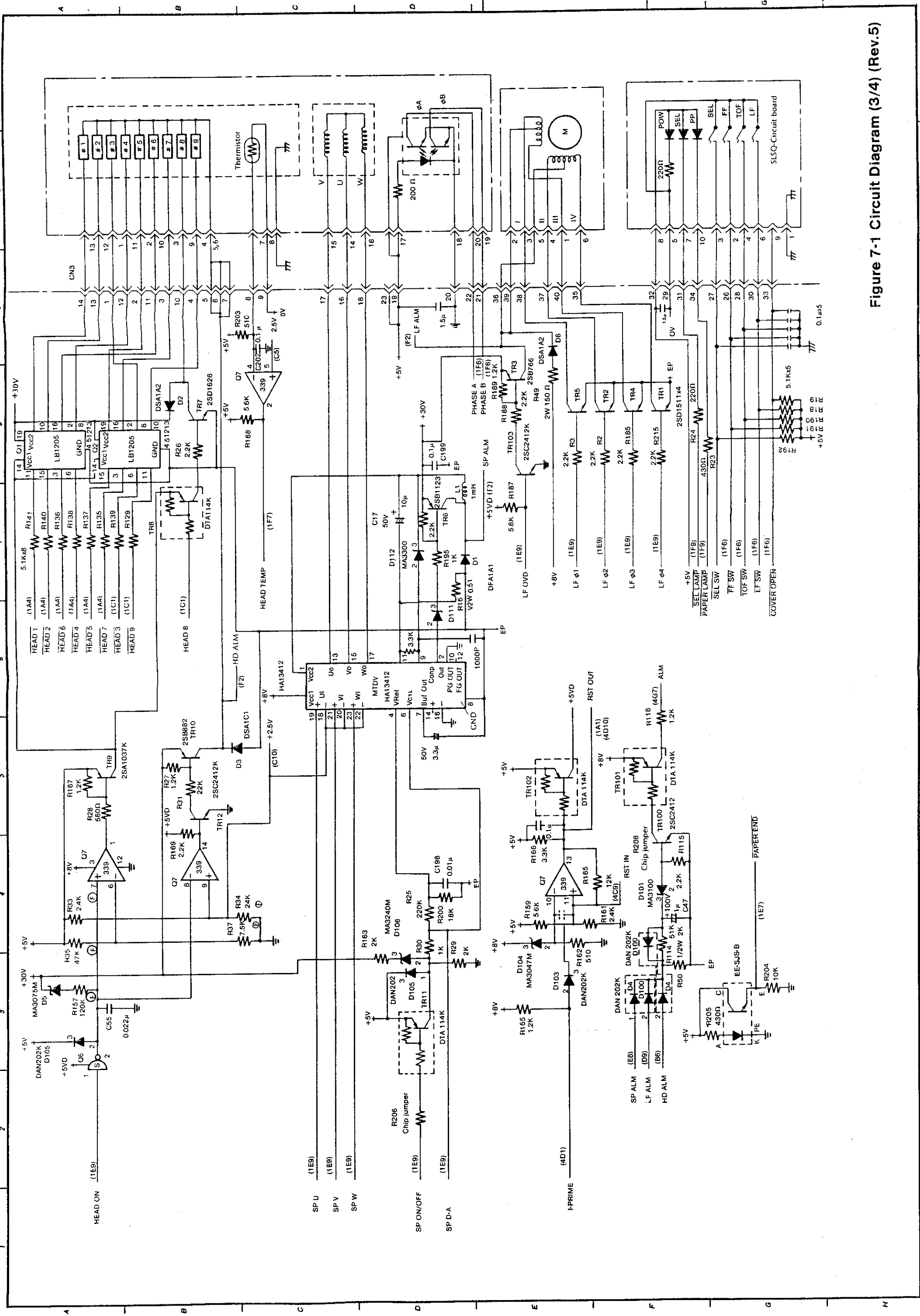
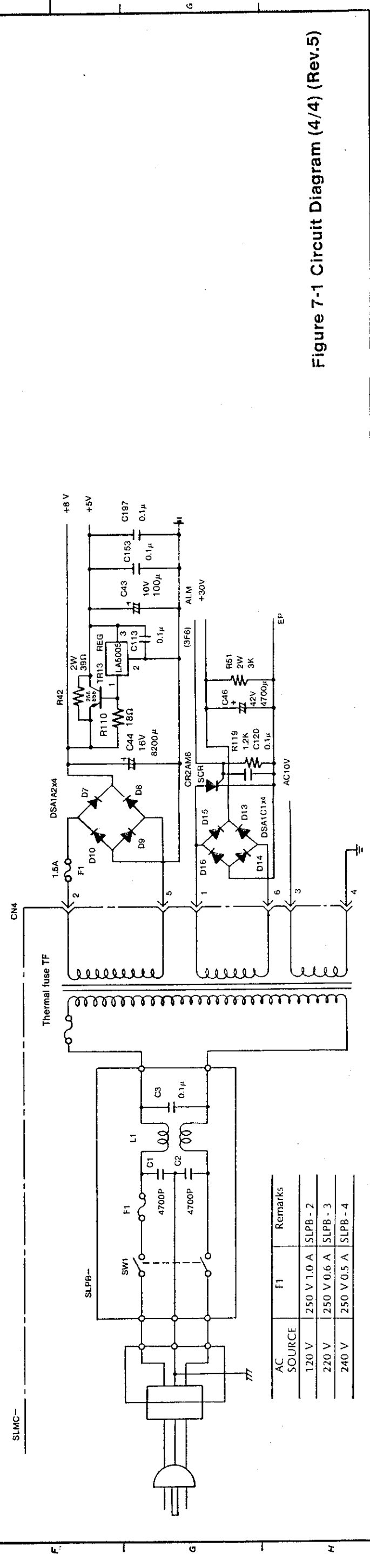
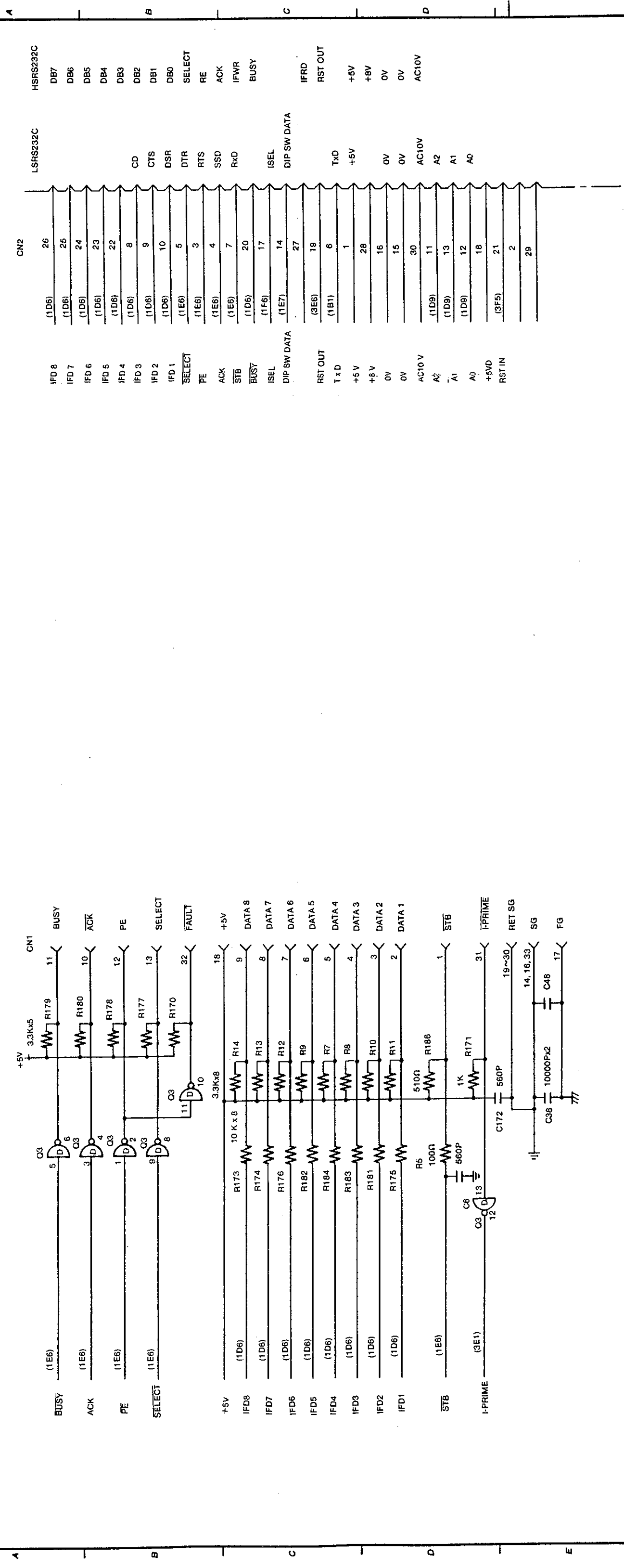
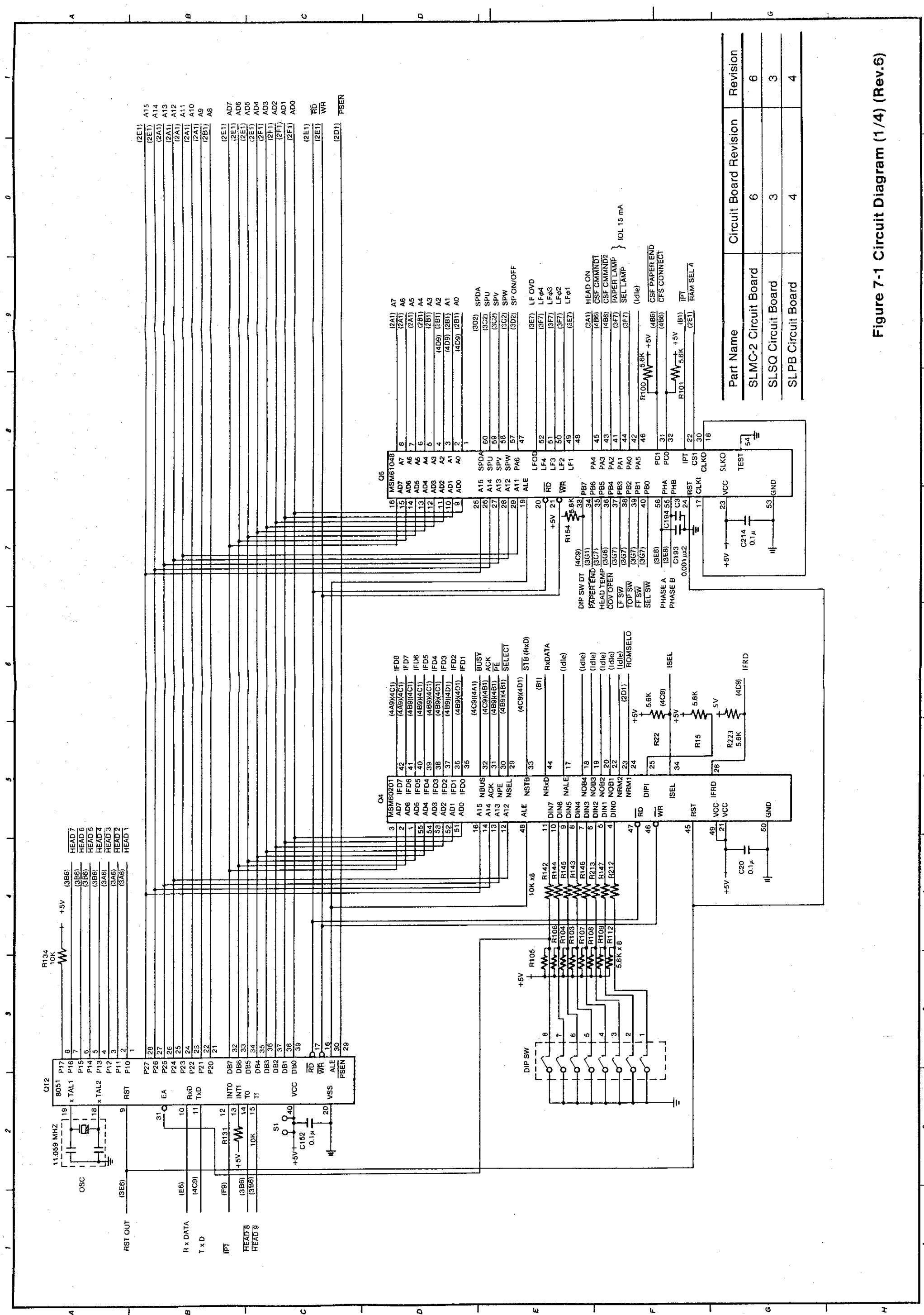


Figure 7-1 Circuit Diagram (3/4) (Rev.5)



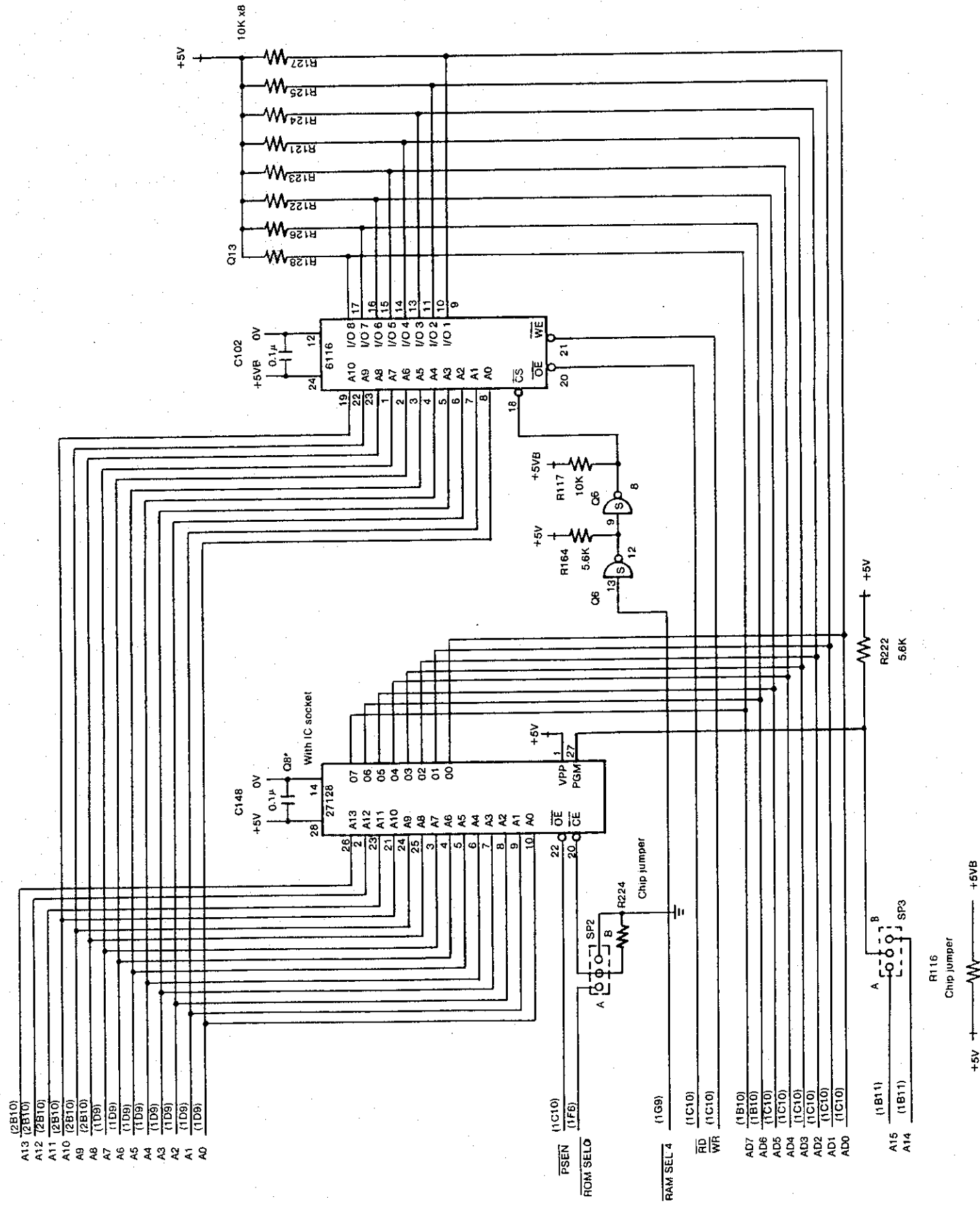
AC SOURCE	F1	Remarks
120 V	250 V 1.0 A	SLPB - 2
220 V	250 V 0.6 A	SLPB - 3
240 V	250 V 0.5 A	SLPB - 4

Figure 7-1 Circuit Diagram (4/4) (Rev.5)



Part Name	Circuit Board Revision	Revision
SLMC-2 Circuit Board	6	6
SLSQ Circuit Board	3	3
SLPB Circuit Board	4	4

Figure 7-1 Circuit Diagram (1/4) (Rev.6)



* Q8 (ROM) is used when 27128 is mounted.

Figure 7-1 Circuit Diagram (2/4) (Rev.6)

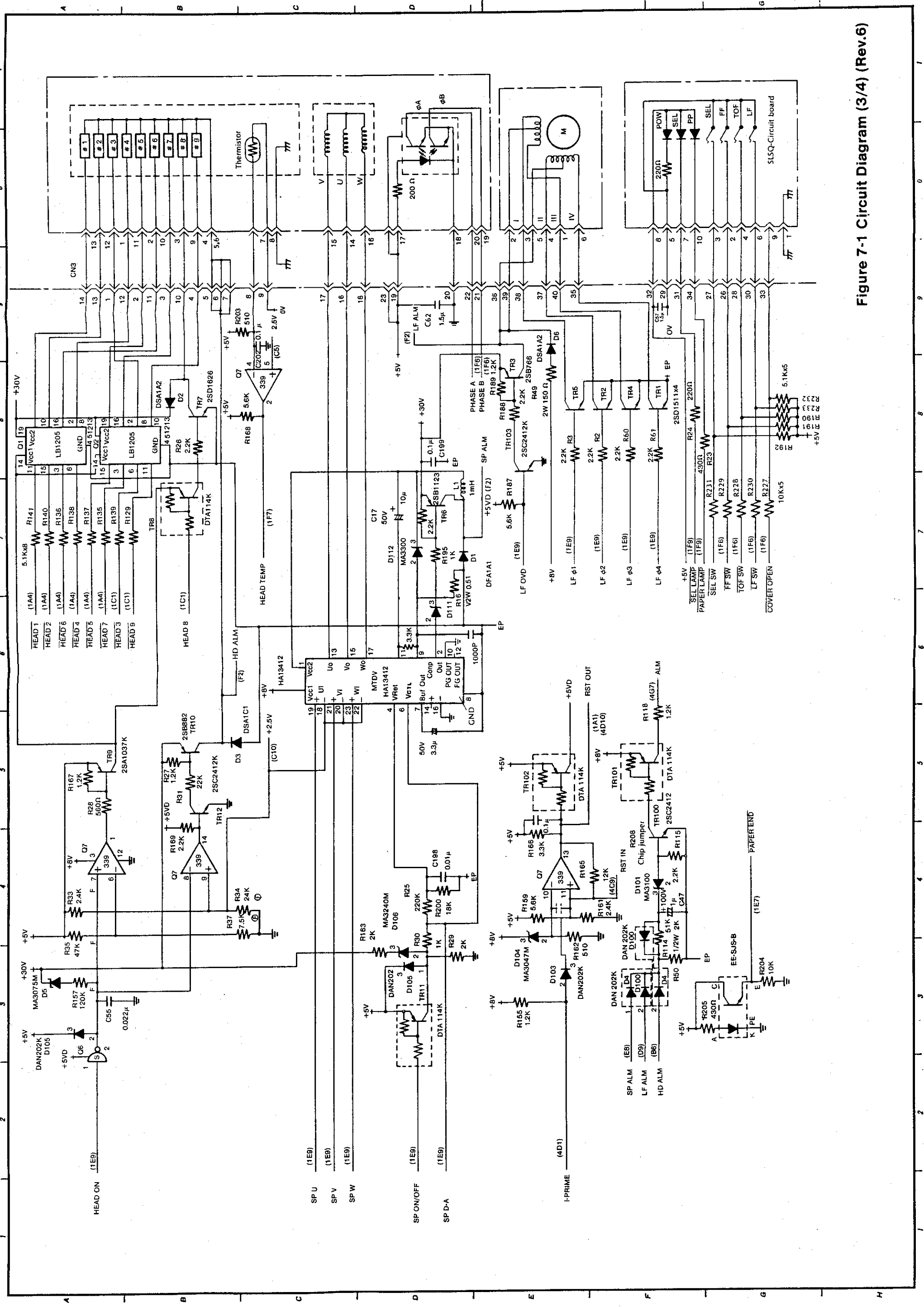
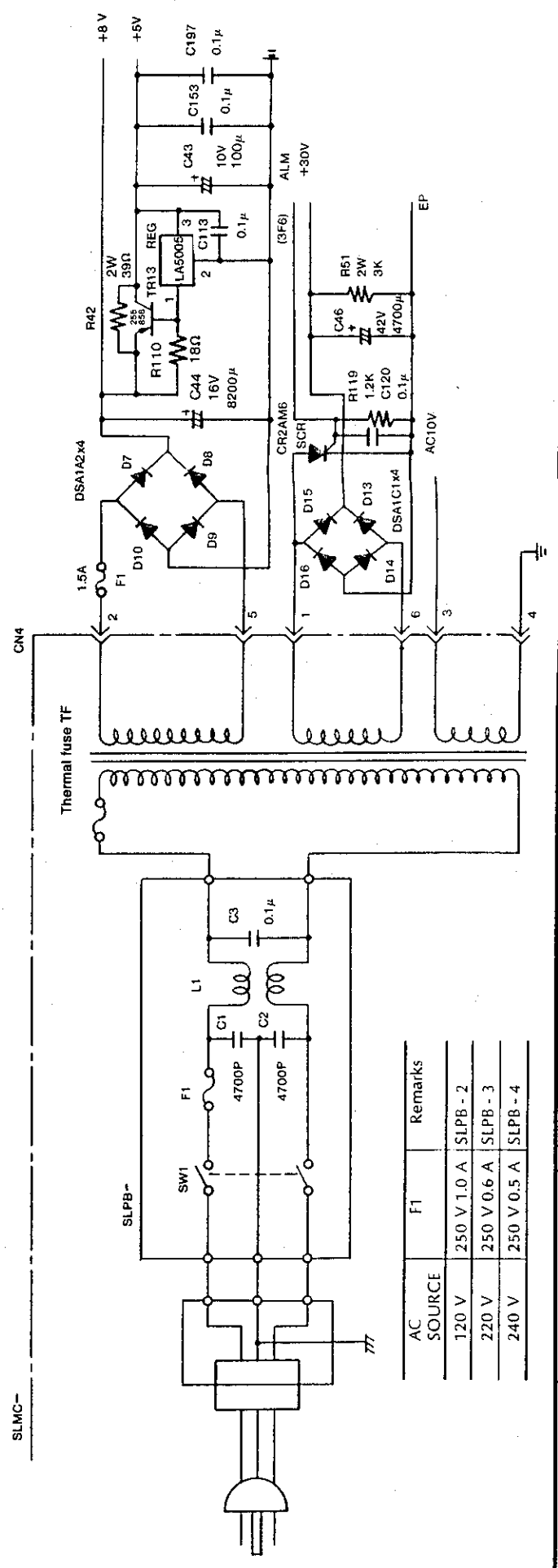
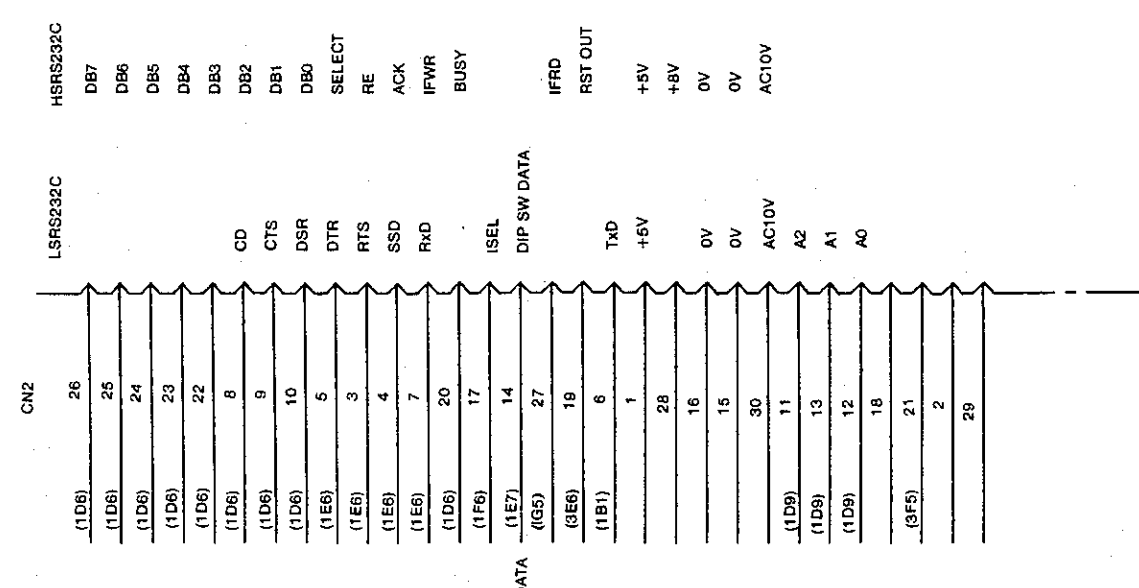
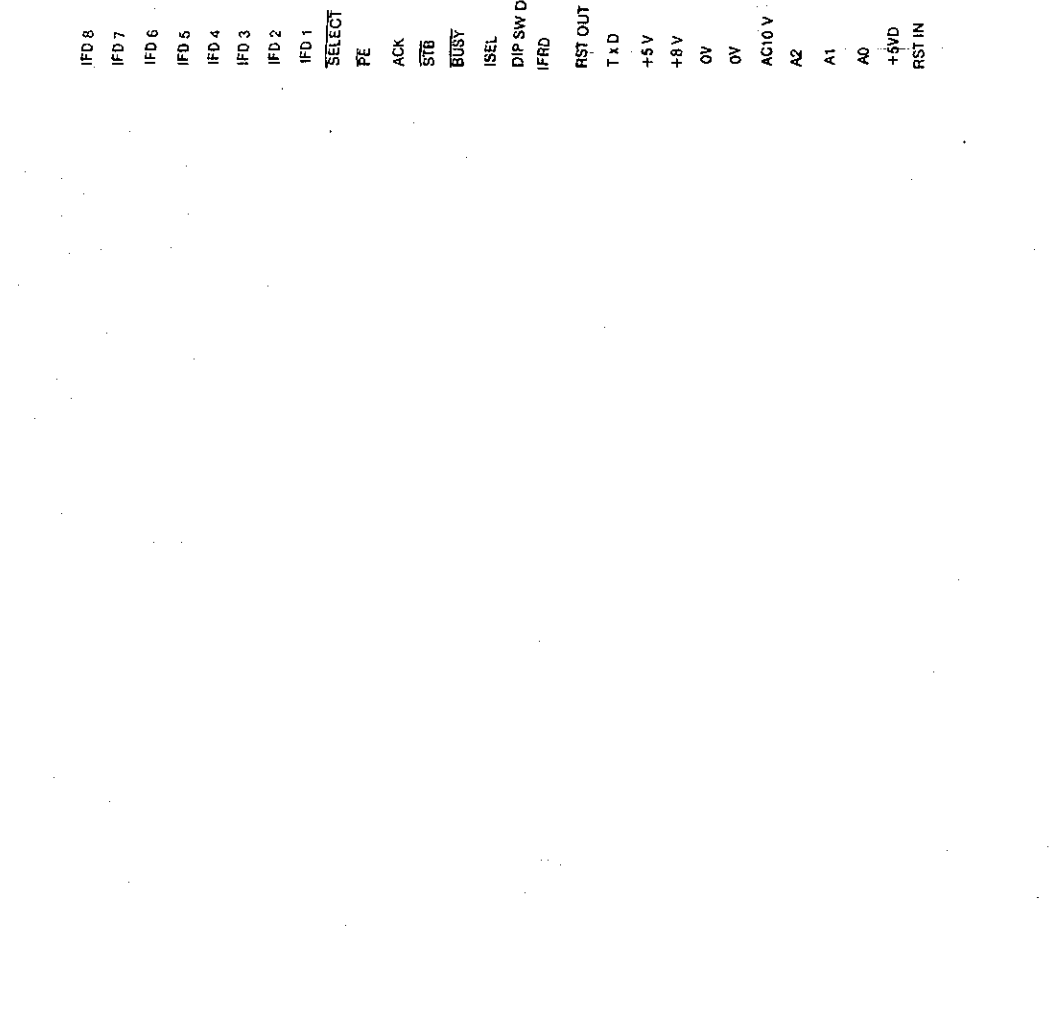
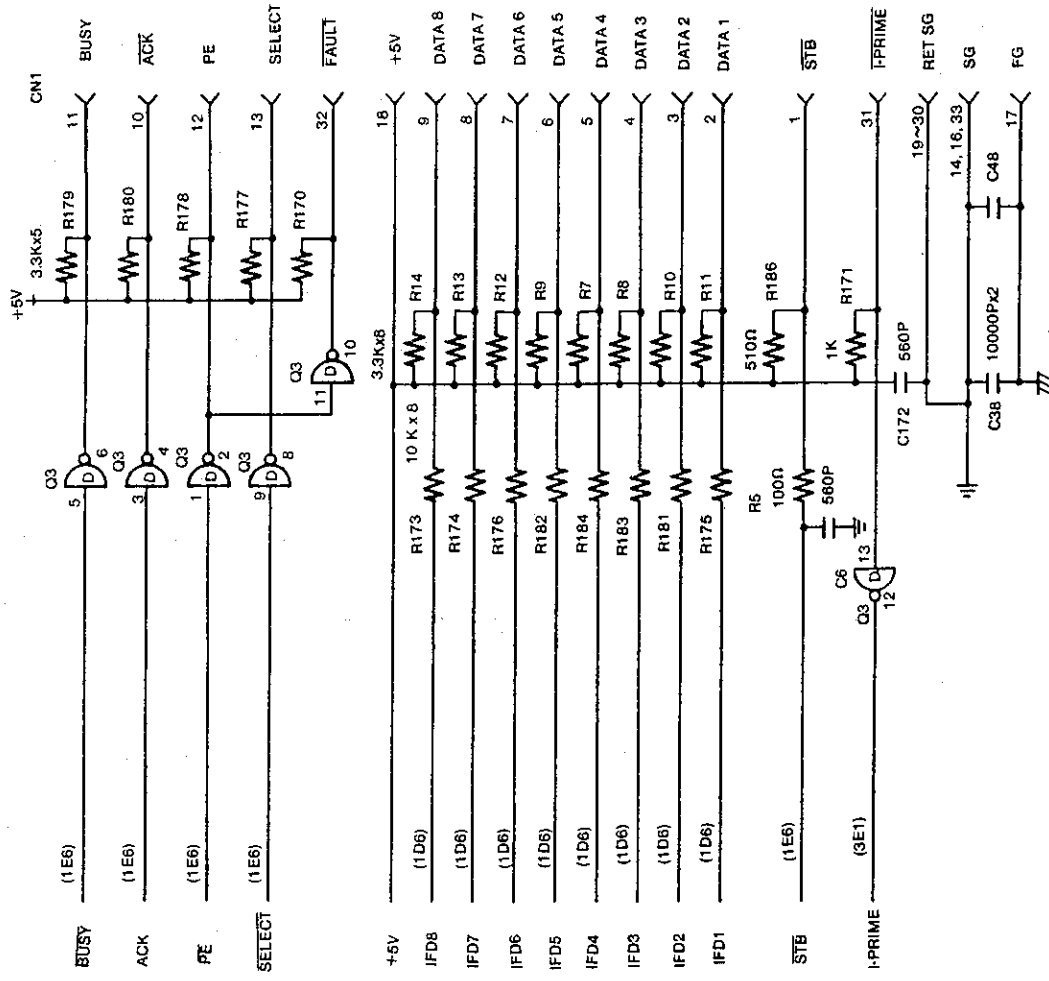
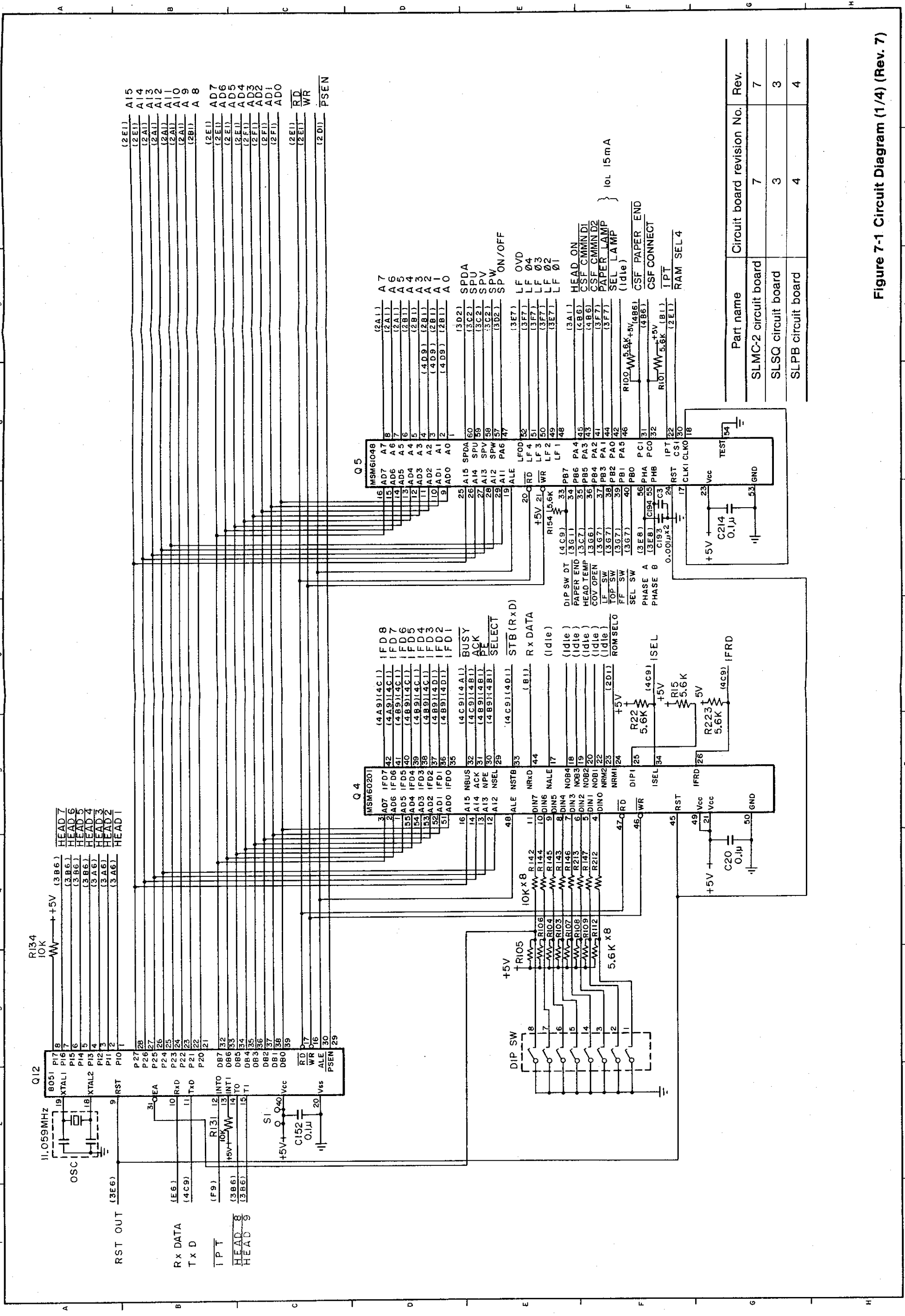


Figure 7-1 Circuit Diagram (3/4) (Rev.6)



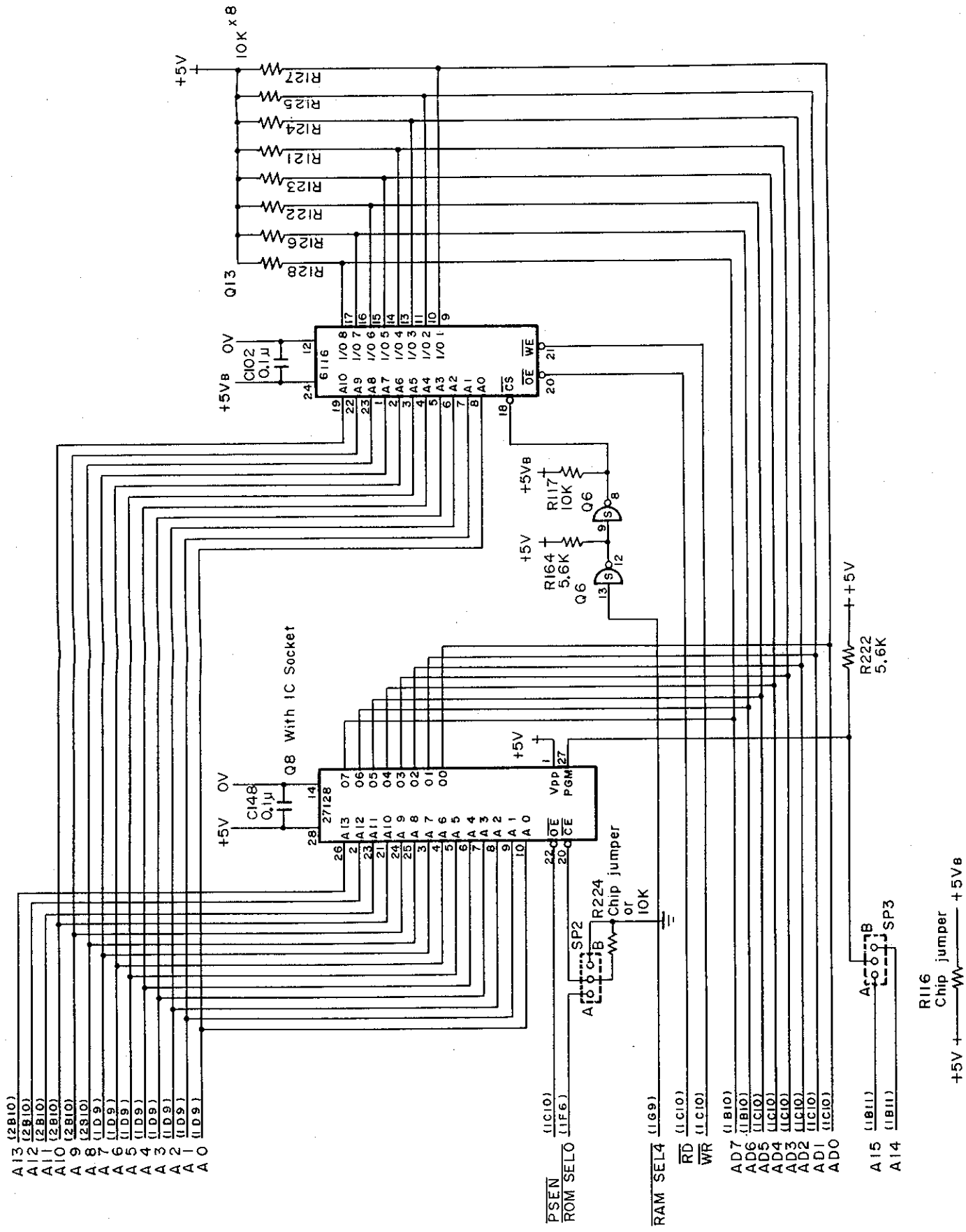
AC SOURCE	F1	Remarks
120 V	250 V 1.0 A	SLPB - 2
220 V	250 V 0.6 A	SLPB - 3
240 V	250 V 0.5 A	SLPB - 4

Figure 7-1 Circuit Diagram (4/4) (Rev.6)



Part name	Circuit board revision No.	Rev.
SLMC-2 circuit board	7	7
SLSQ circuit board	3	3
SLPB circuit board	4	4

Figure 7-1 Circuit Diagram (1/4) (Rev. 7)



Q8 (ROM) shows when 27128 is installed.

Figure 7-1 Circuit Diagram (2/4) (Rev. 7)

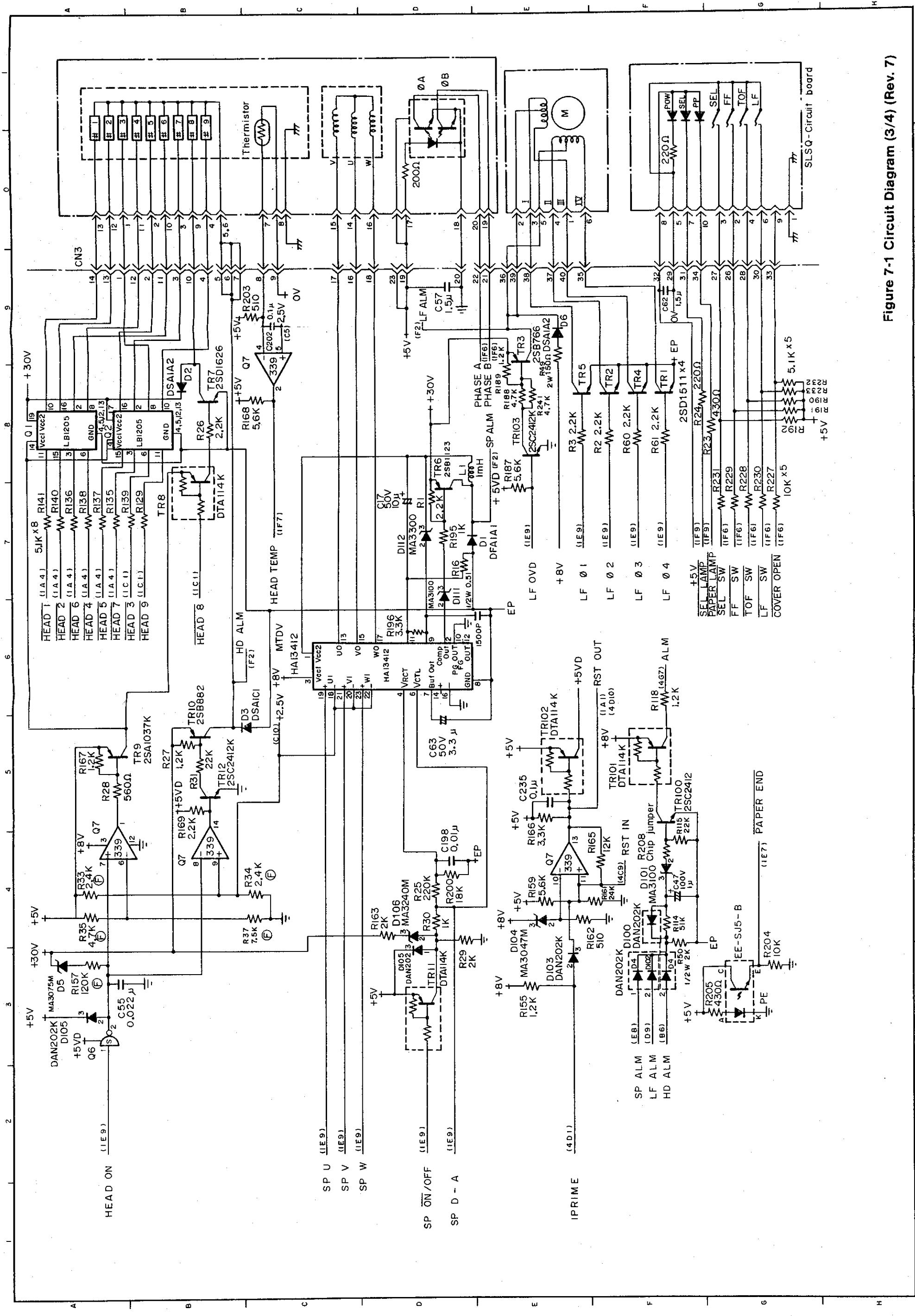


Figure 7-1 Circuit Diagram (3/4) (Rev. 7)

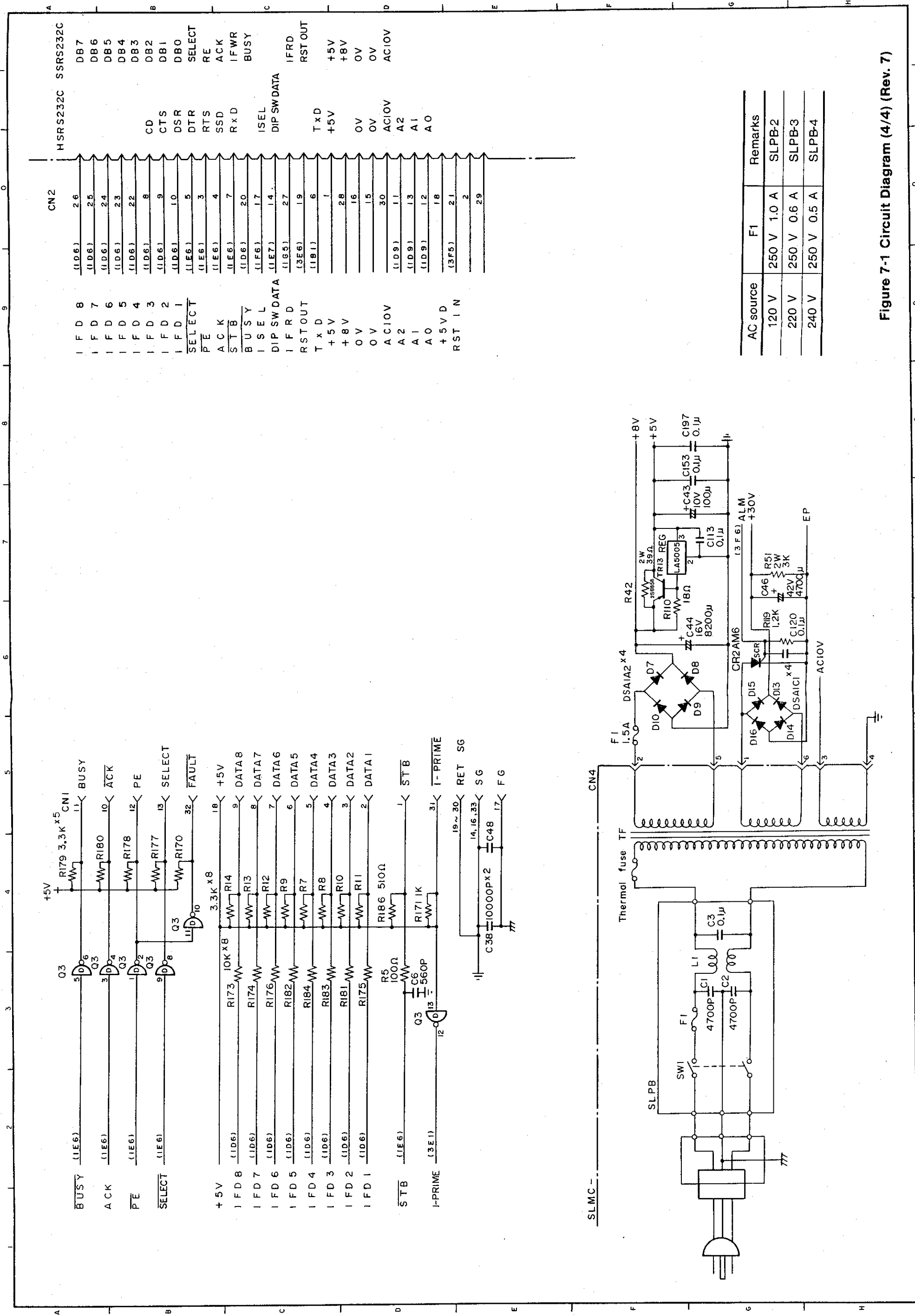
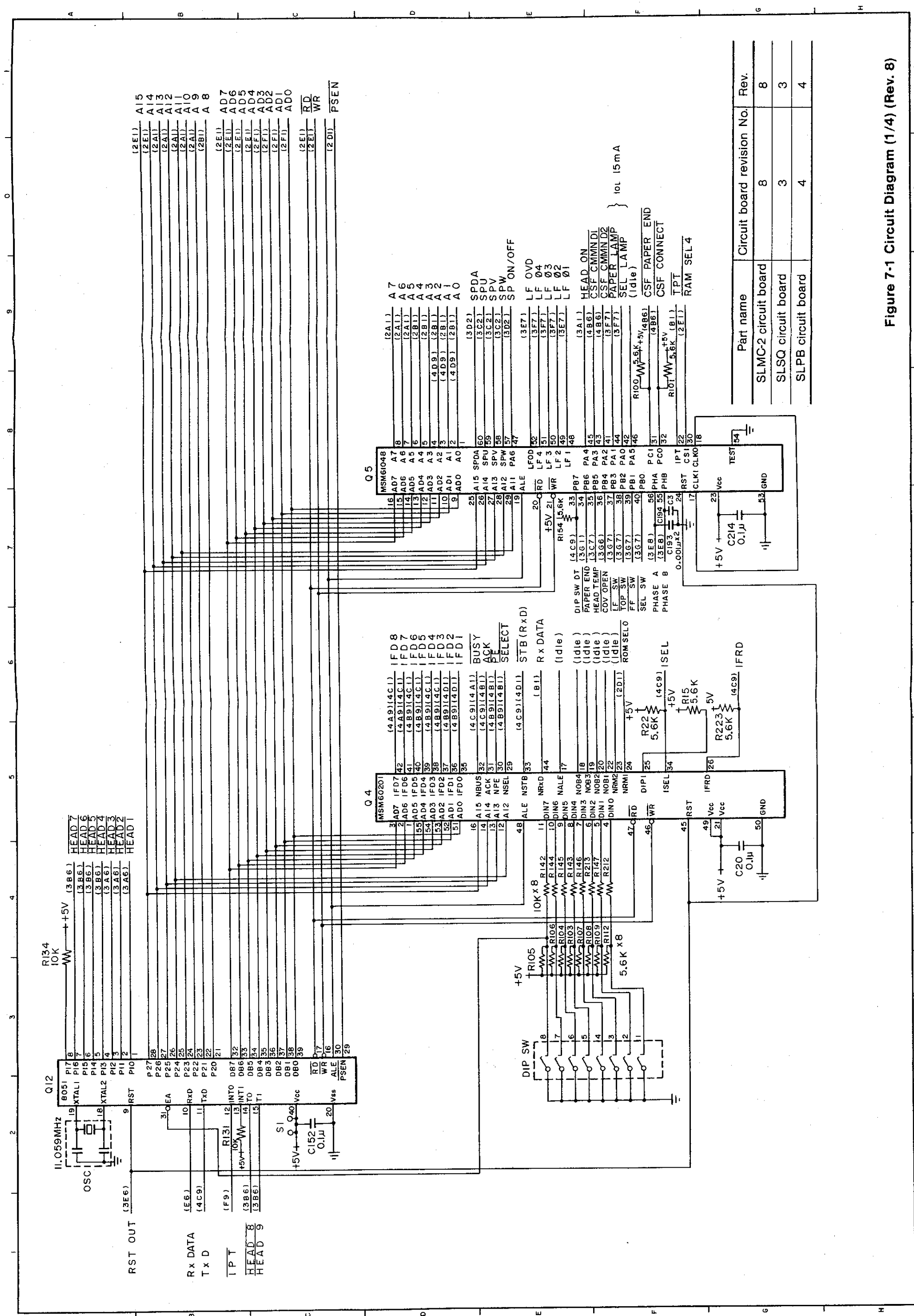
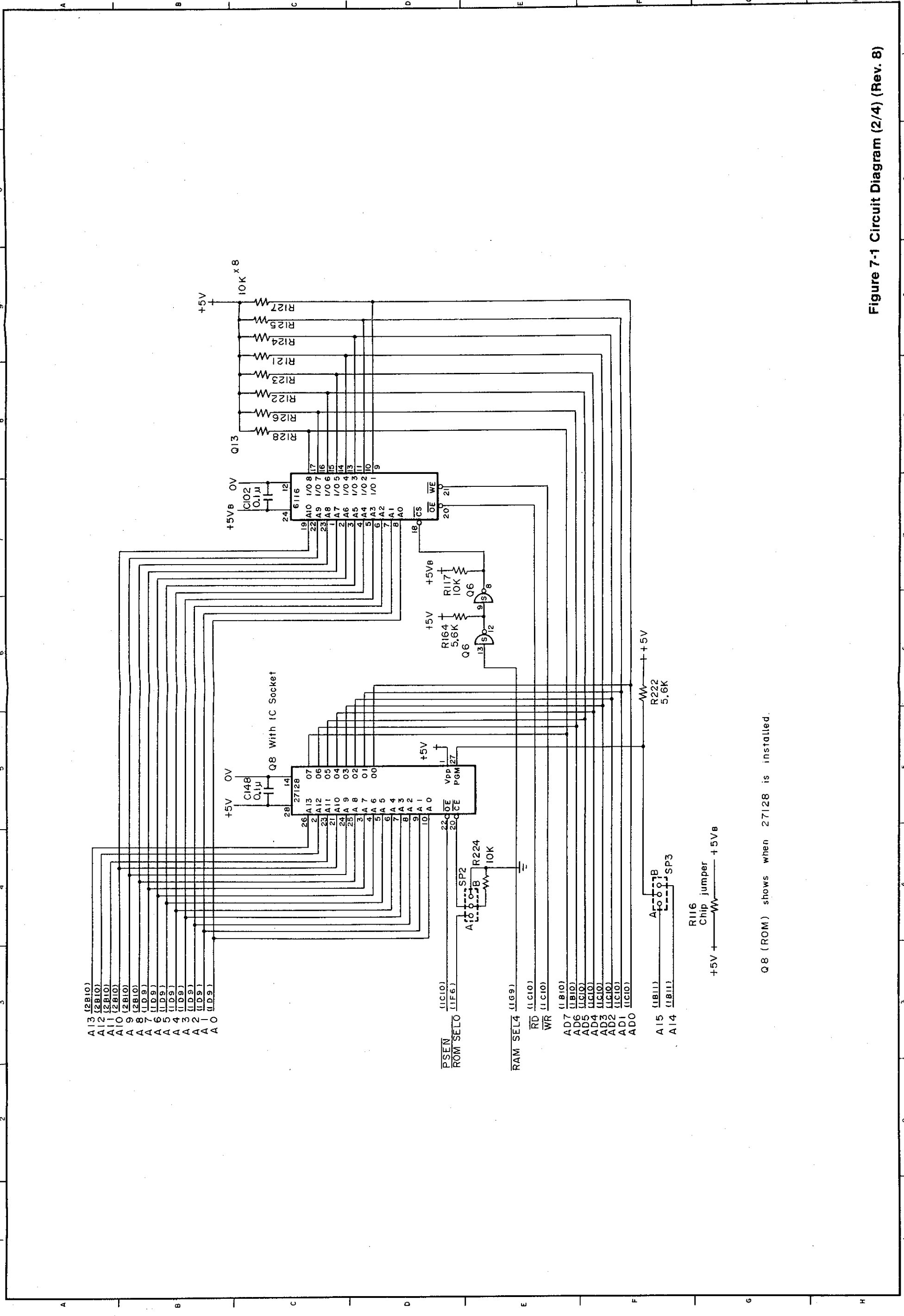


Figure 7-1 Circuit Diagram (4/4) (Rev. 7)



Part name	Circuit board revision No.	Rev.
SLMC-2 circuit board	8	8
SLSQ circuit board	3	3
SLPB circuit board	4	4

Figure 7-1 Circuit Diagram (1/4) (Rev. 8)



Q8 (ROM) shows when 27128 is installed.

Figure 7-1 Circuit Diagram (2/4) (Rev. 8)

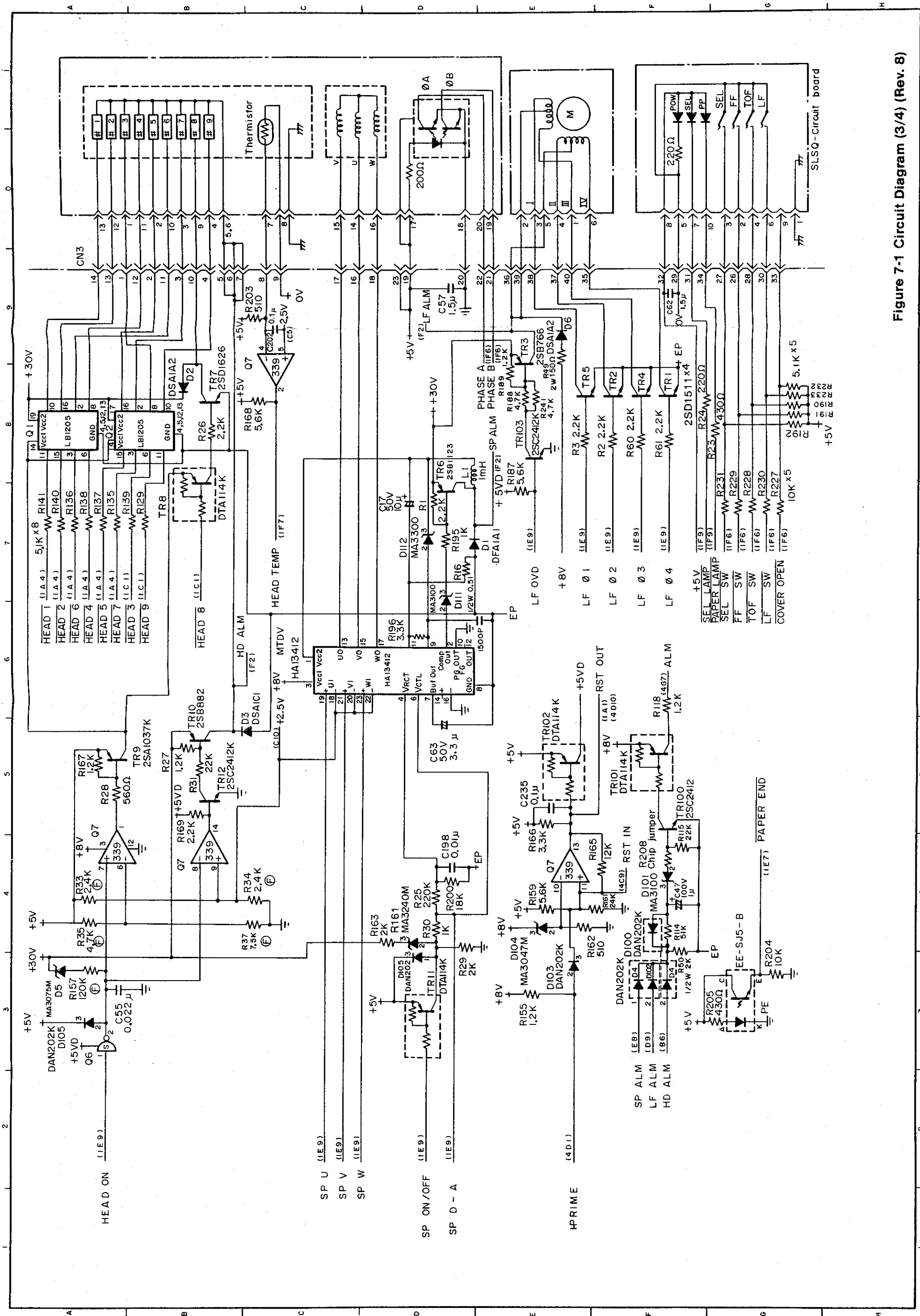


Figure 7-1 Circuit Diagram (3/4) (Rev. 8)

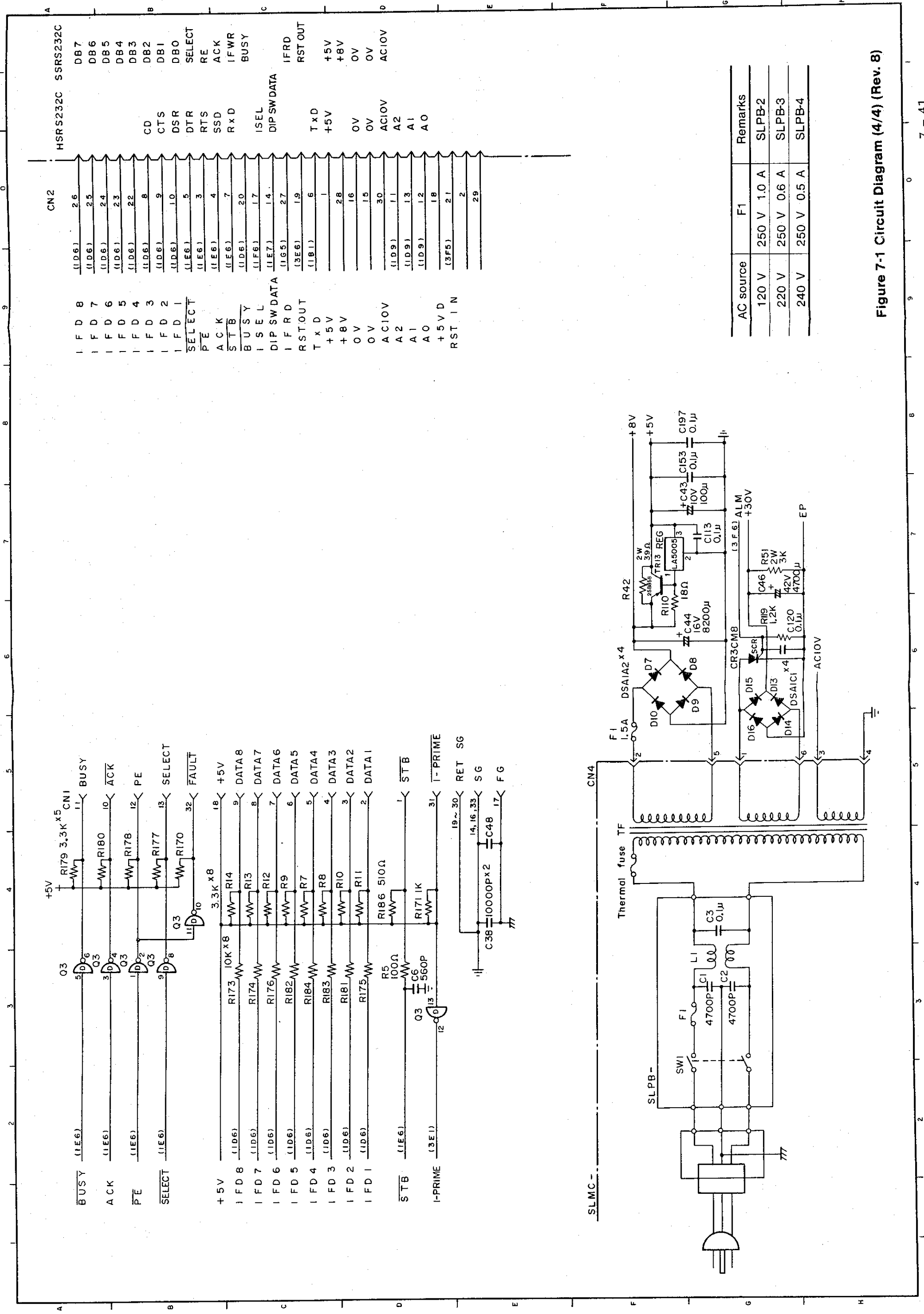
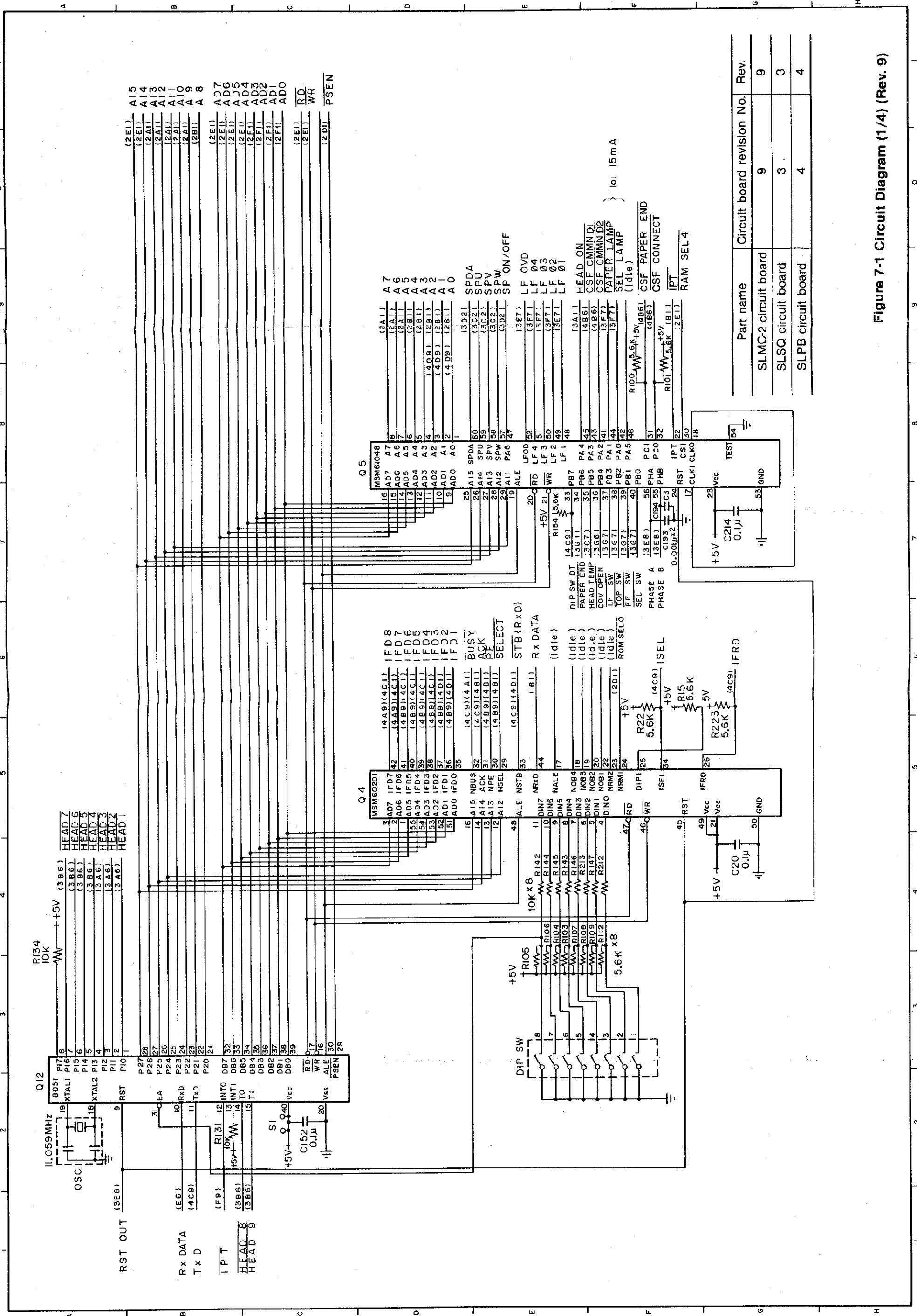
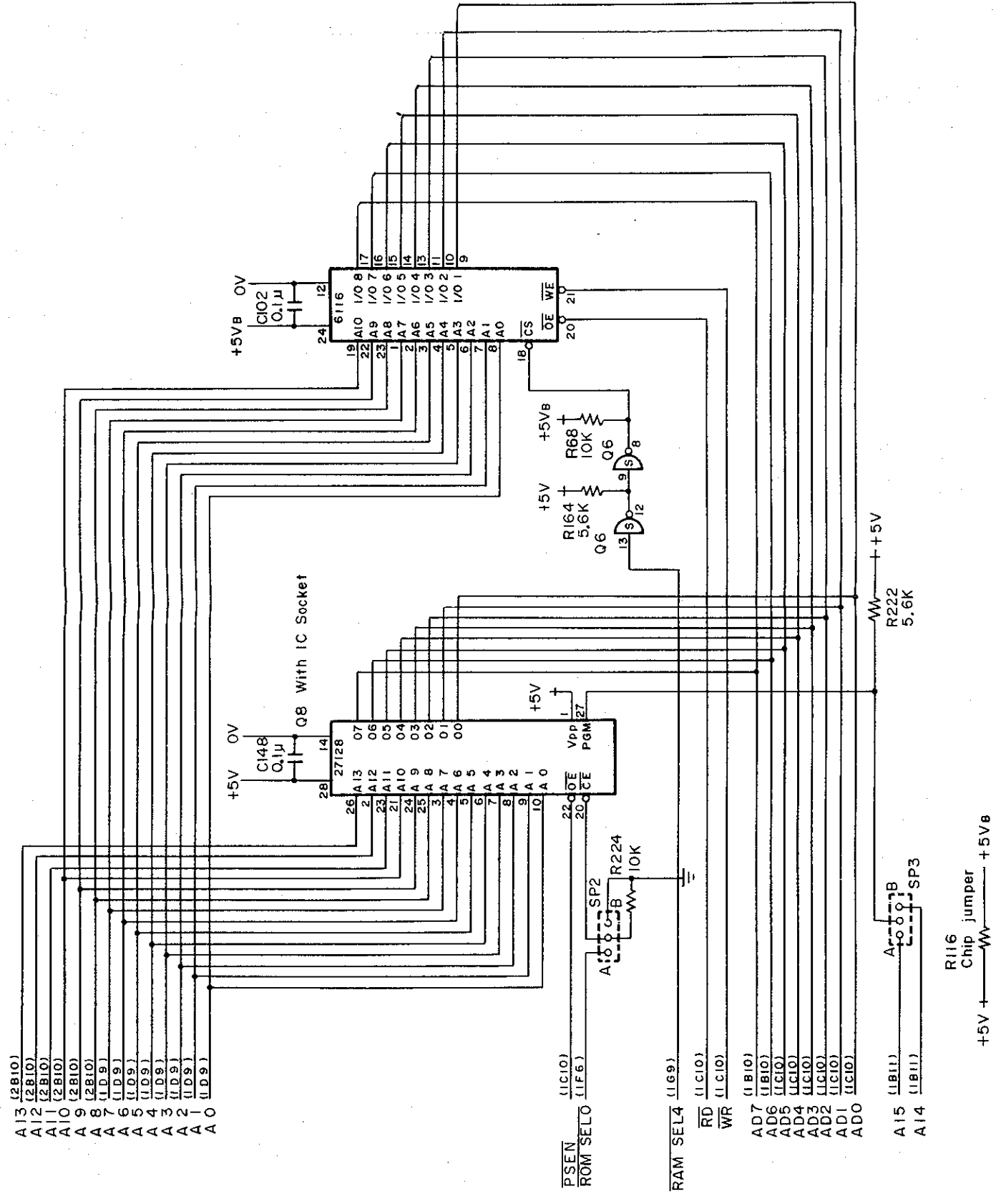


Figure 7-1 Circuit Diagram (4/4) (Rev. 8)



Part name	Circuit board revision No.	Rev.
SLMC-2 circuit board	9	9
SLSQ circuit board	3	3
SLPB circuit board	4	4

Figure 7-1 Circuit Diagram (1/4) (Rev. 9)



Q8 (ROM) shows when 27128 is installed.

Figure 7-1 Circuit Diagram (2/4) (Rev. 9)

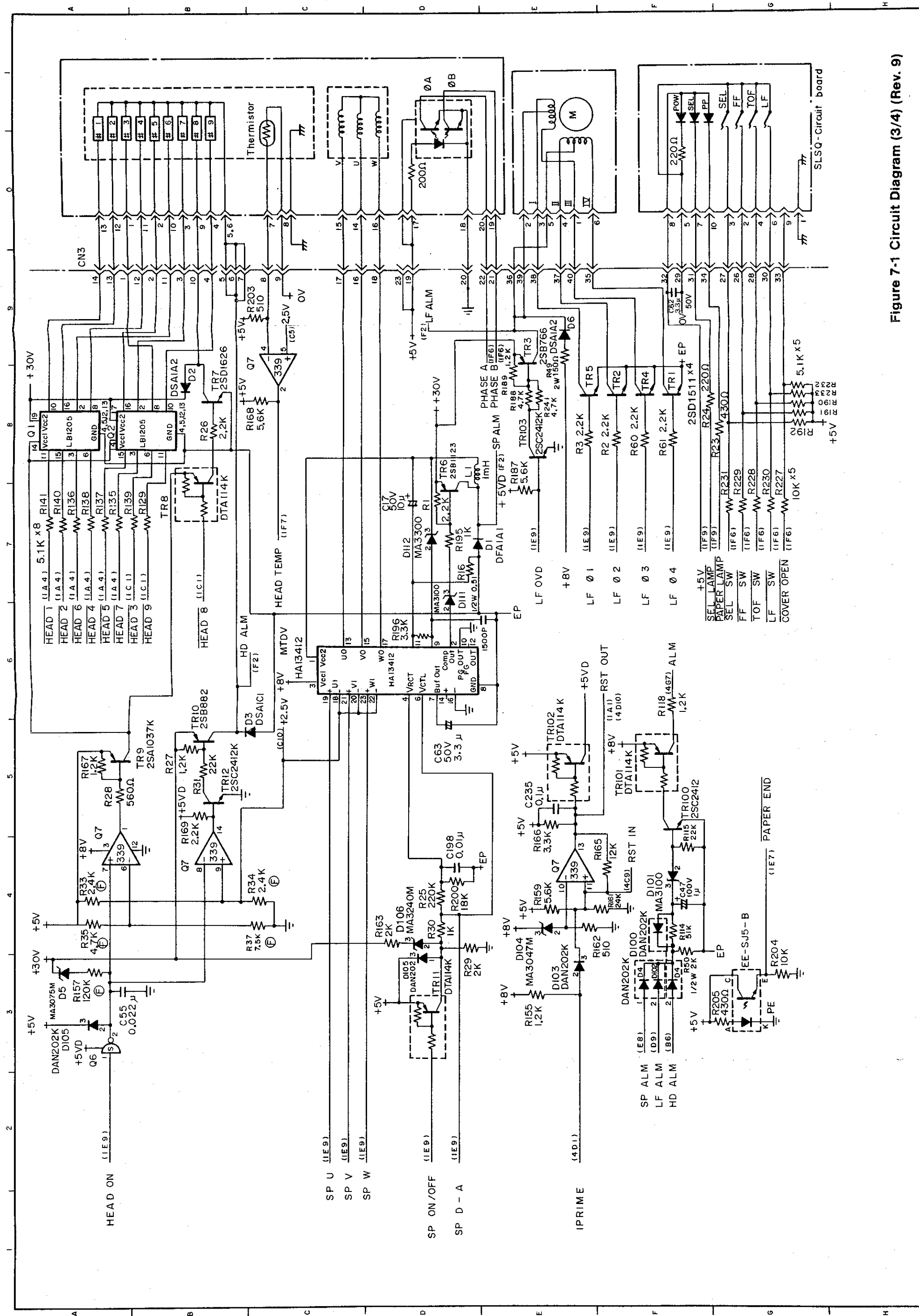
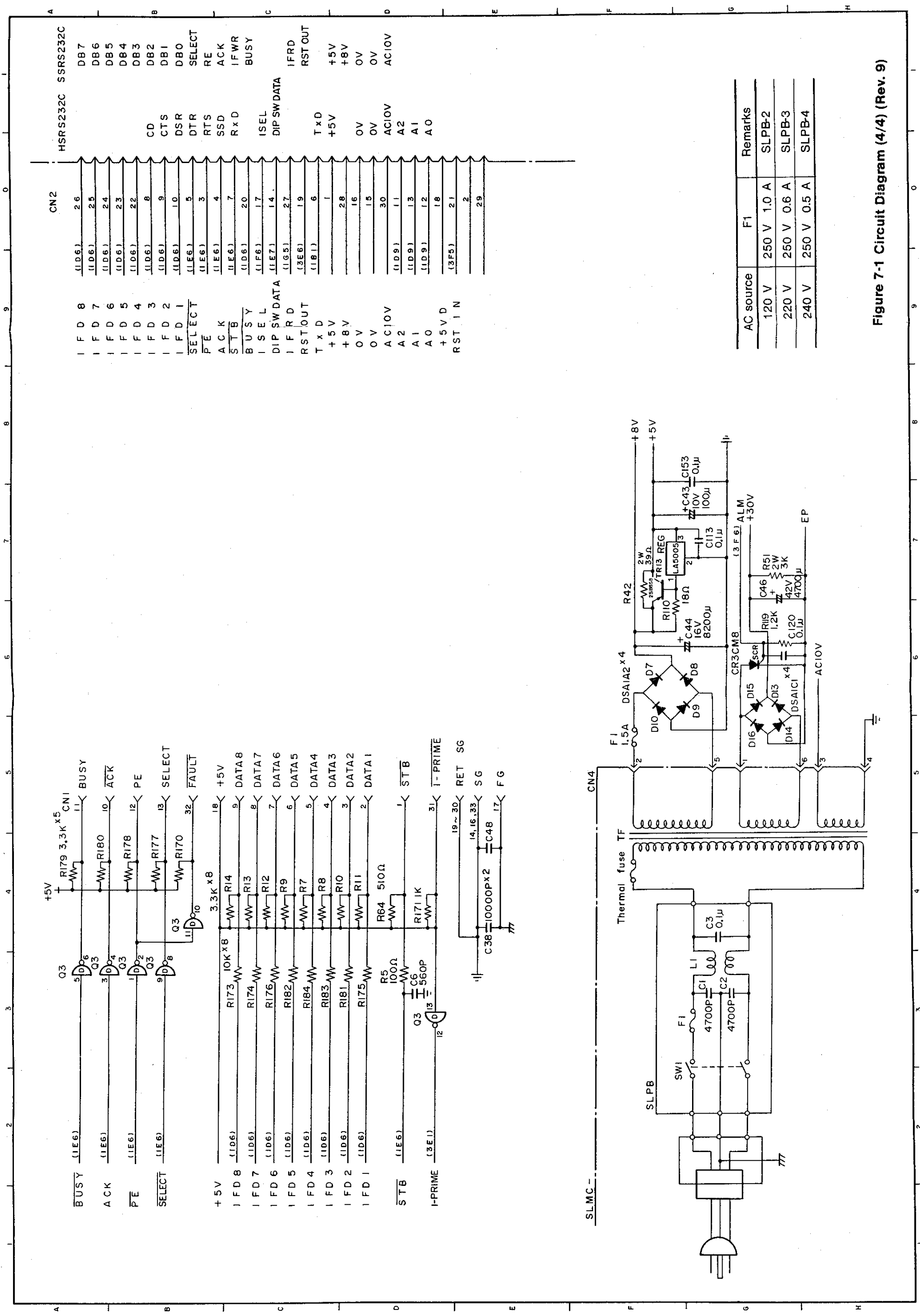


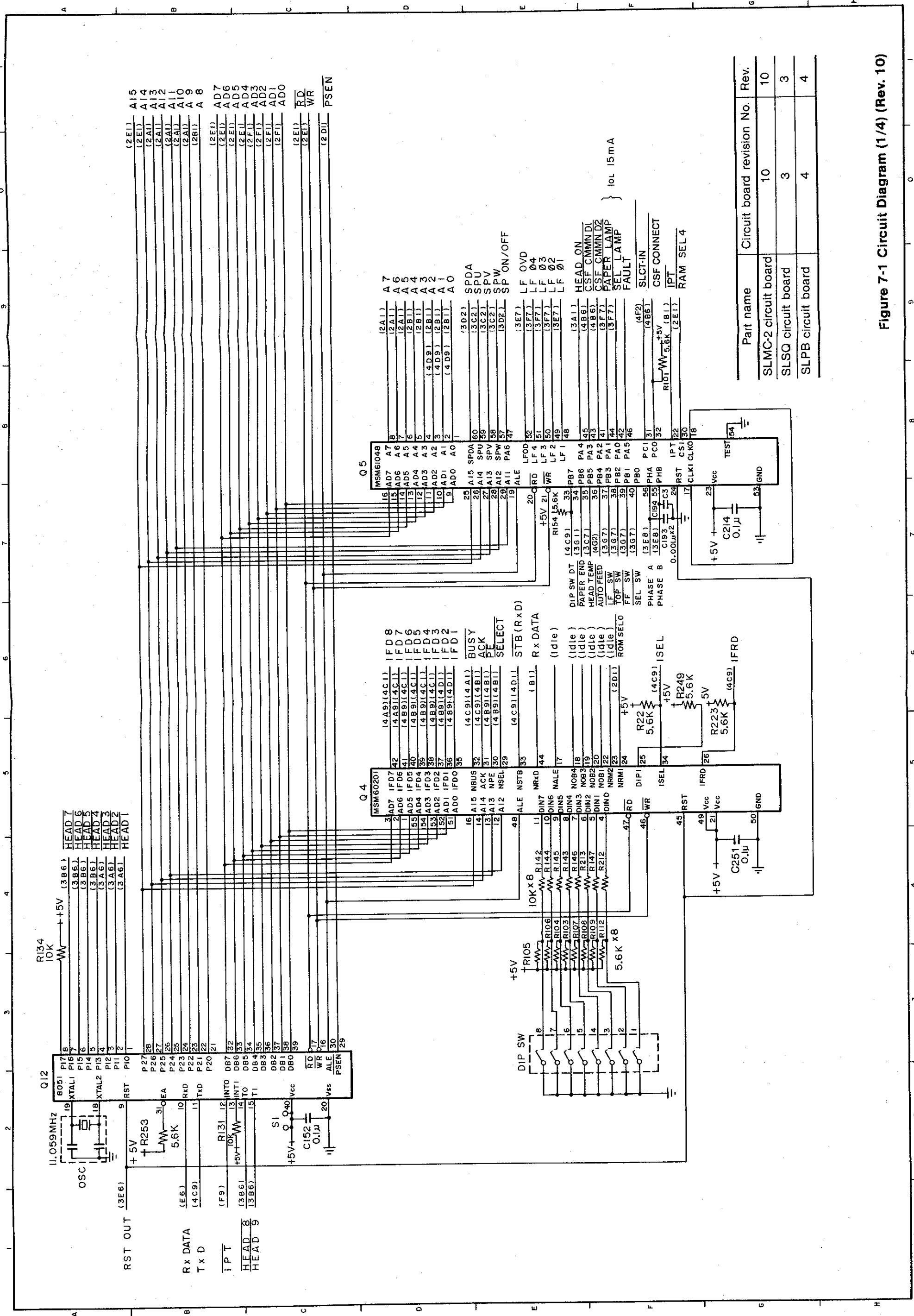
Figure 7-1 Circuit Diagram (3/4) (Rev. 9)



Pin	Signal	Component
1	IFD 8	(1D6)
2	IFD 7	(1D6)
3	IFD 6	(1D6)
4	IFD 5	(1D6)
5	IFD 4	(1D6)
6	IFD 3	(1D6)
7	IFD 2	(1D6)
8	IFD 1	(1D6)
9	SELECT	(1E6)
10	PE	(1E6)
11	ACK	(1E6)
12	BUSY	(1E6)
13	STB	(1E6)
14	BUSY	(1E6)
15	I SEL	(1E7)
16	DIP SW DATA	(1G5)
17	IFRD	(3E6)
18	RSTOUT	(1B1)
19	TxD	(1E6)
20	+5V	(1E6)
21	+8V	(1E6)
22	OV	(1E6)
23	OV	(1E6)
24	ACIOV	(1D9)
25	A2	(1D9)
26	A1	(1D9)
27	A0	(1D9)
28	+5V D	(3F5)
29	RST IN	(1E6)

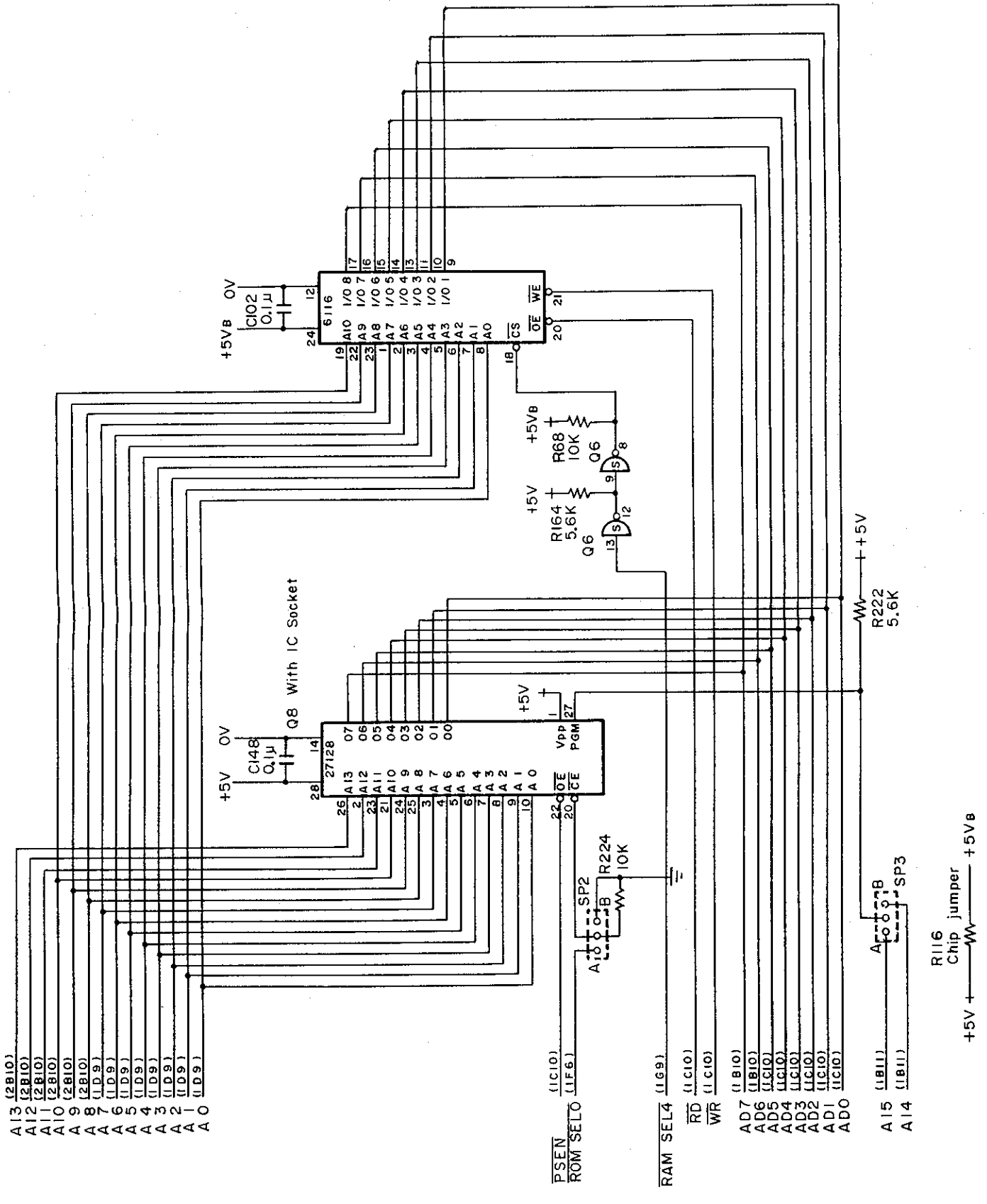
AC source	F1	Remarks
120 V	250 V 1.0 A	SLPB-2
220 V	250 V 0.6 A	SLPB-3
240 V	250 V 0.5 A	SLPB-4

Figure 7-1 Circuit Diagram (4/4) (Rev. 9)



Part name	Circuit board revision No.	Rev.
SLMC-2 circuit board	10	10
SLSQ circuit board	3	3
SLPB circuit board	4	4

Figure 7-1 Circuit Diagram (1/4) (Rev. 10)



Q8 (ROM) shows when 27128 is installed.

Figure 7-1 Circuit Diagram (2/4) (Rev. 10)

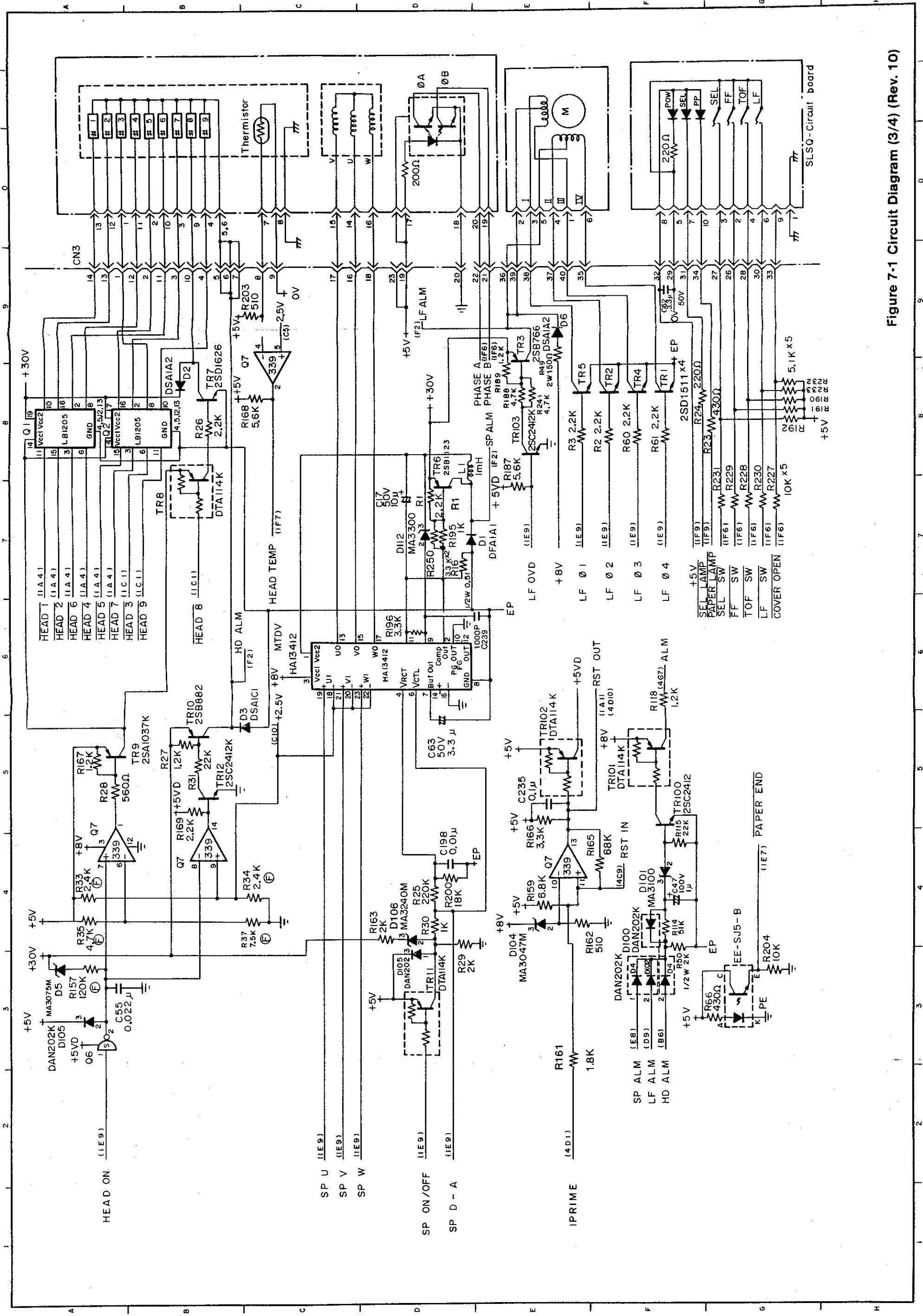
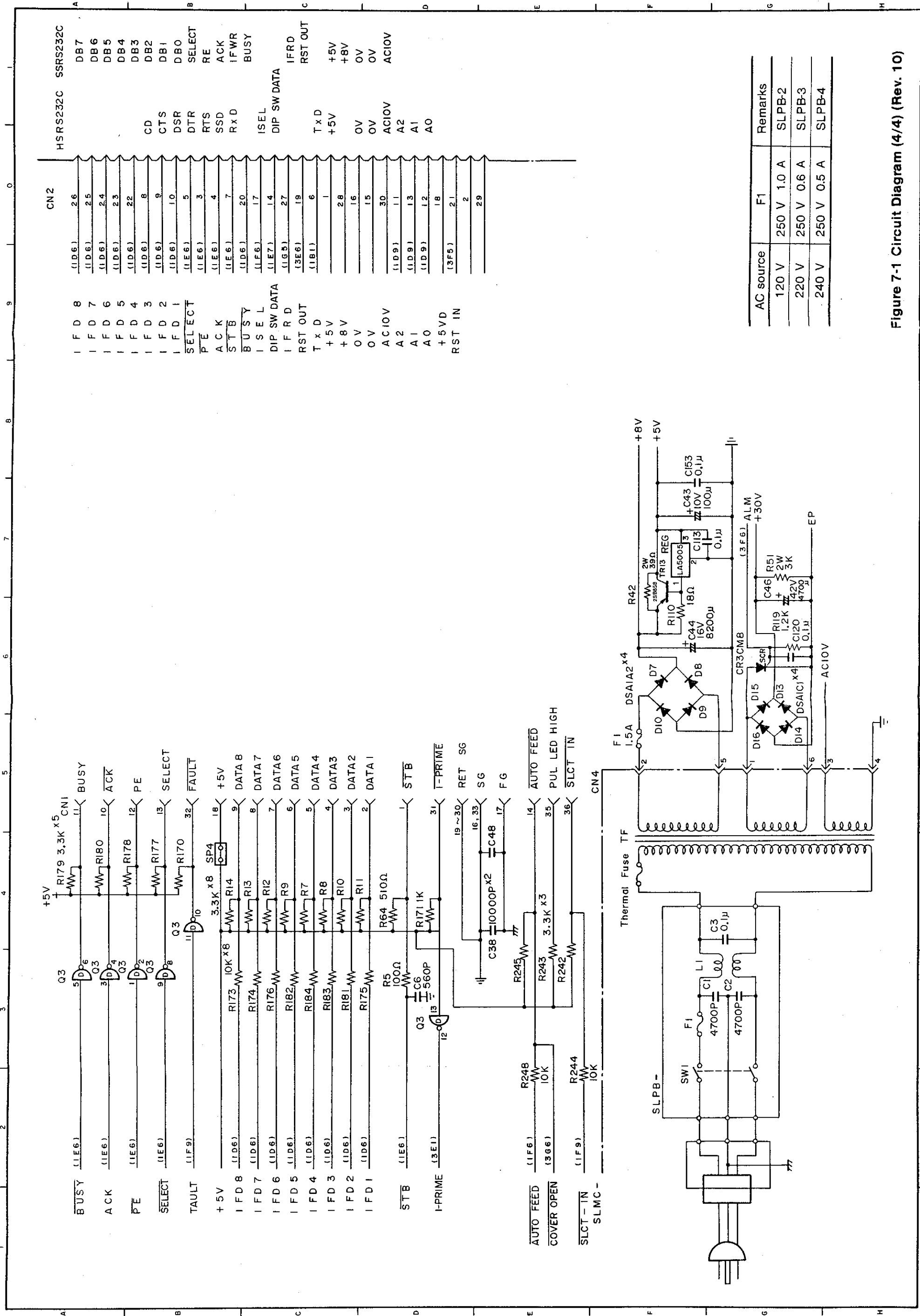


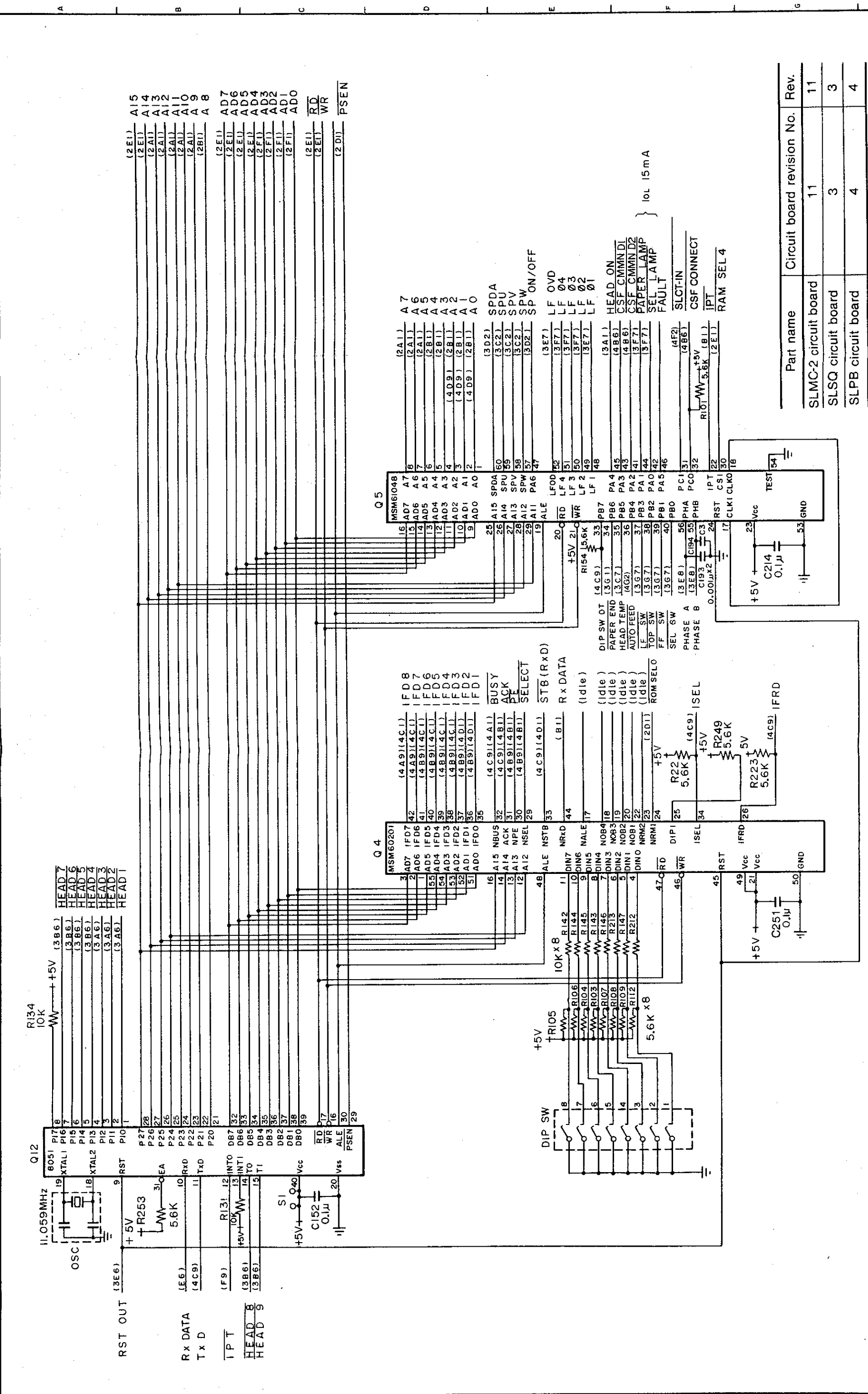
Figure 7-1 Circuit Diagram (3/4) (Rev. 10)



Pin	Signal	Notes
1	IFD 8	
2	IFD 7	
3	IFD 6	
4	IFD 5	
5	IFD 4	
6	IFD 3	
7	IFD 2	
8	IFD 1	
9	SELECT	
10	PE	
11	ACK	
12	STB	
13	BUSY	
14	I SEL	
15	DIP SW DATA	
16	IFRD	
17	RST OUT	
18	TxD	
19	+5V	
20	+8V	
21	OV	
22	OV	
23	OV	
24	AC10V	
25	A2	
26	A1	
27	A0	
28	+5VD	
29	RST IN	

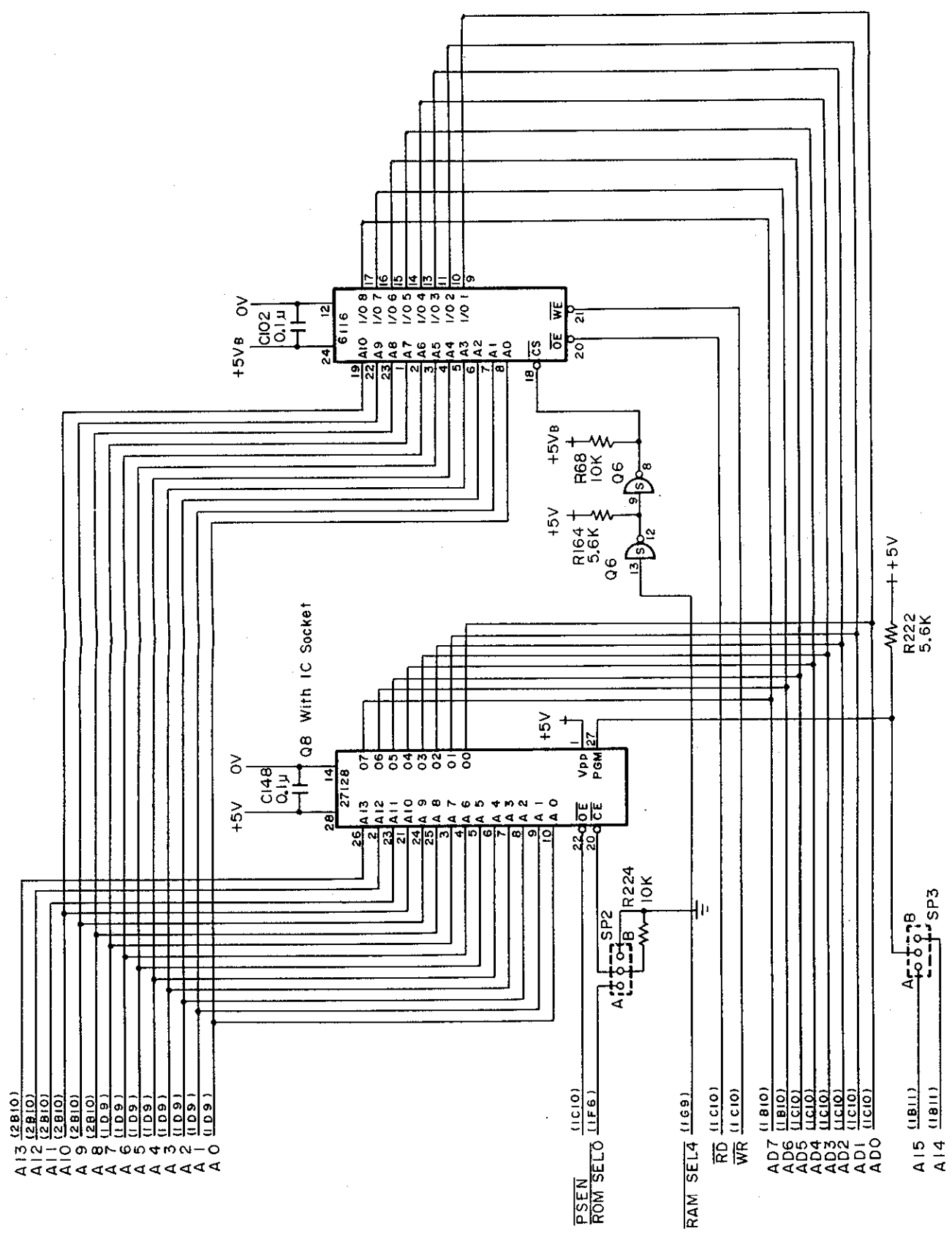
AC source	F1	Remarks
120 V	250 V 1.0 A	SLPB-2
220 V	250 V 0.6 A	SLPB-3
240 V	250 V 0.5 A	SLPB-4

Figure 7-1 Circuit Diagram (4/4) (Rev. 10)



Part name	Circuit board revision No.	Rev.
SLMC-2 circuit board	11	11
SLSQ circuit board	3	3
SLPB circuit board	4	4

Figure 7-1 Circuit Diagram (1/4) (Rev. 11)



Q8 (ROM) shows when 27128 is installed

Figure 7-1 Circuit Diagram (2/4) (Rev. 11)

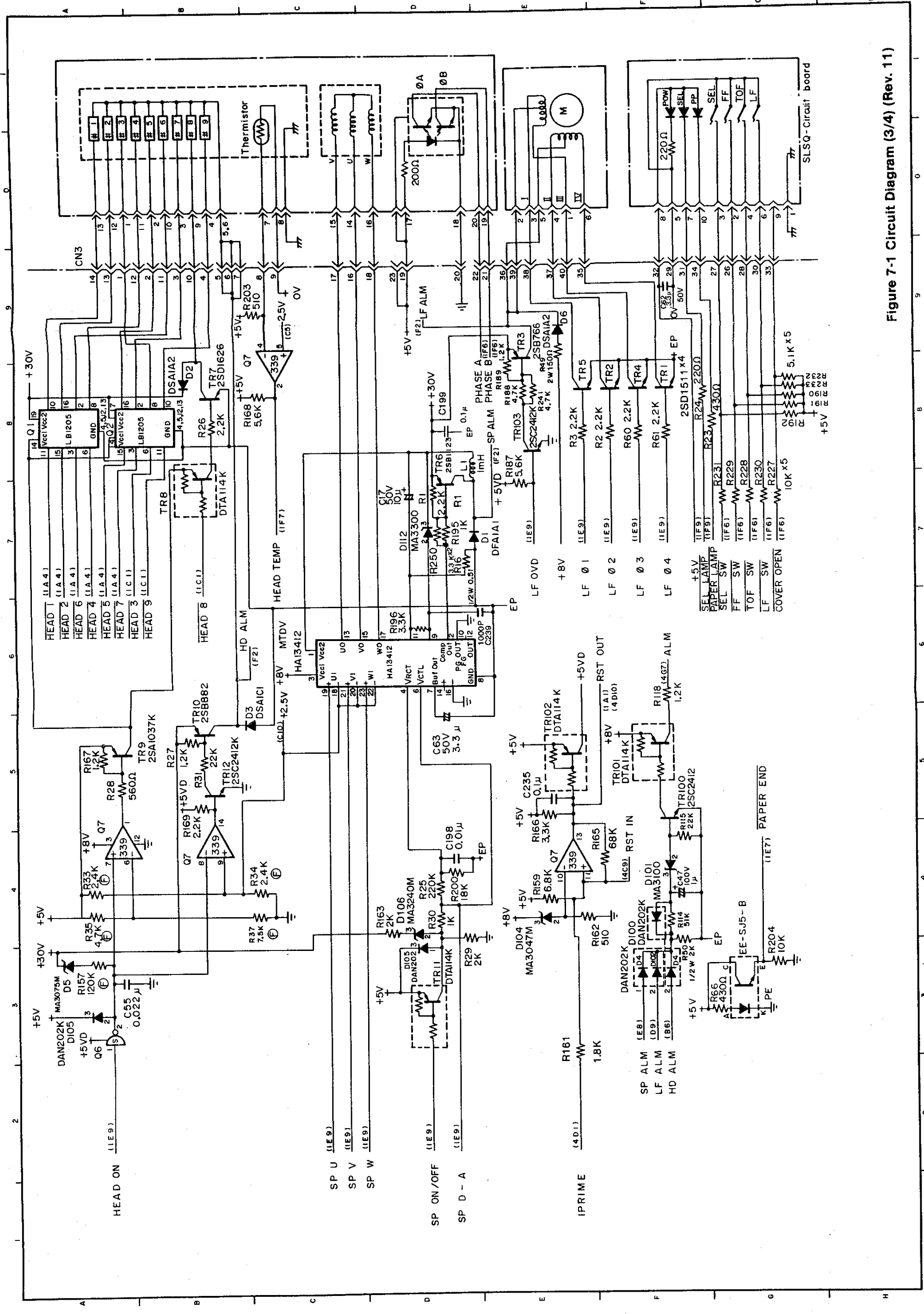
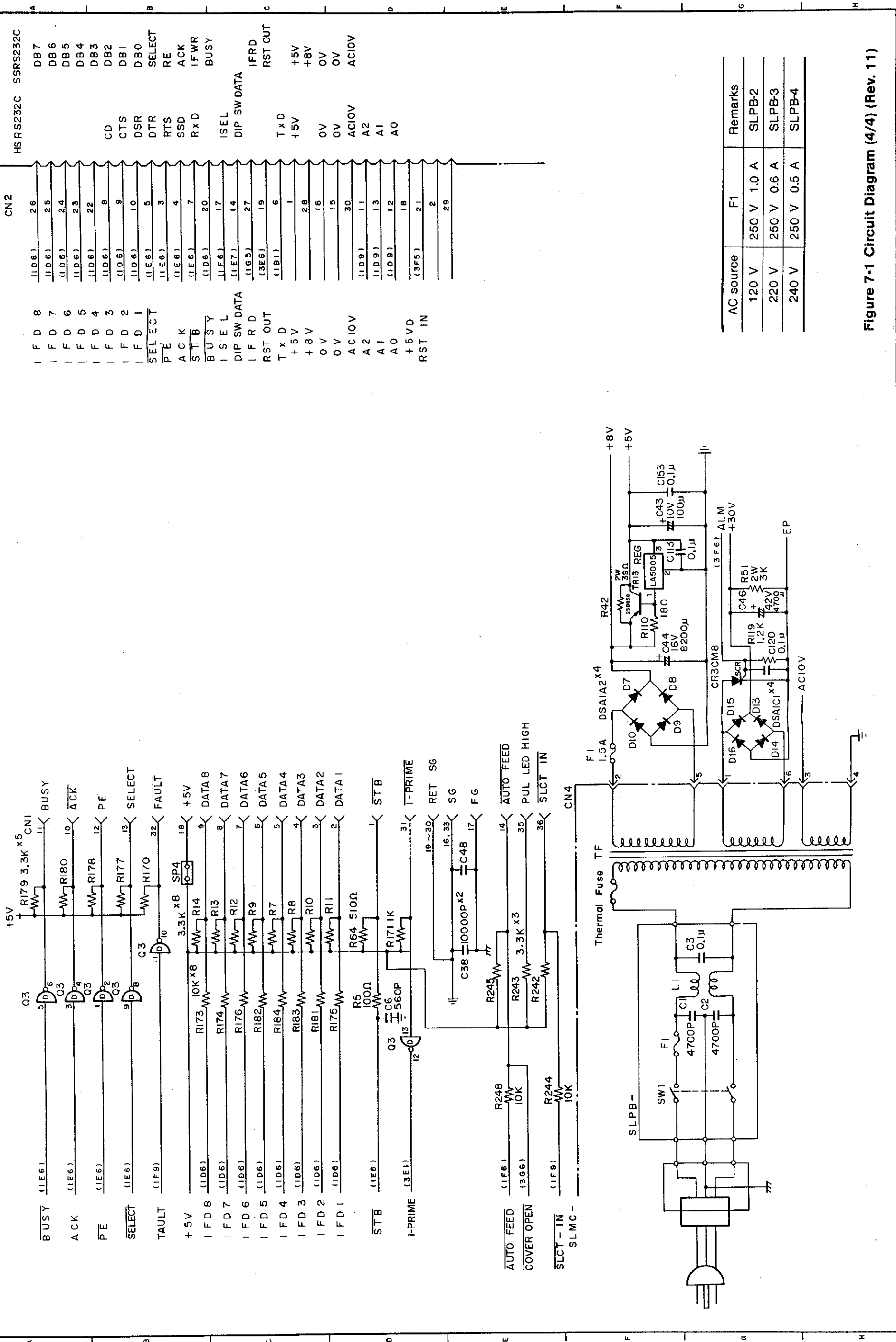


Figure 7-1 Circuit Diagram (3/4) (Rev. 11)



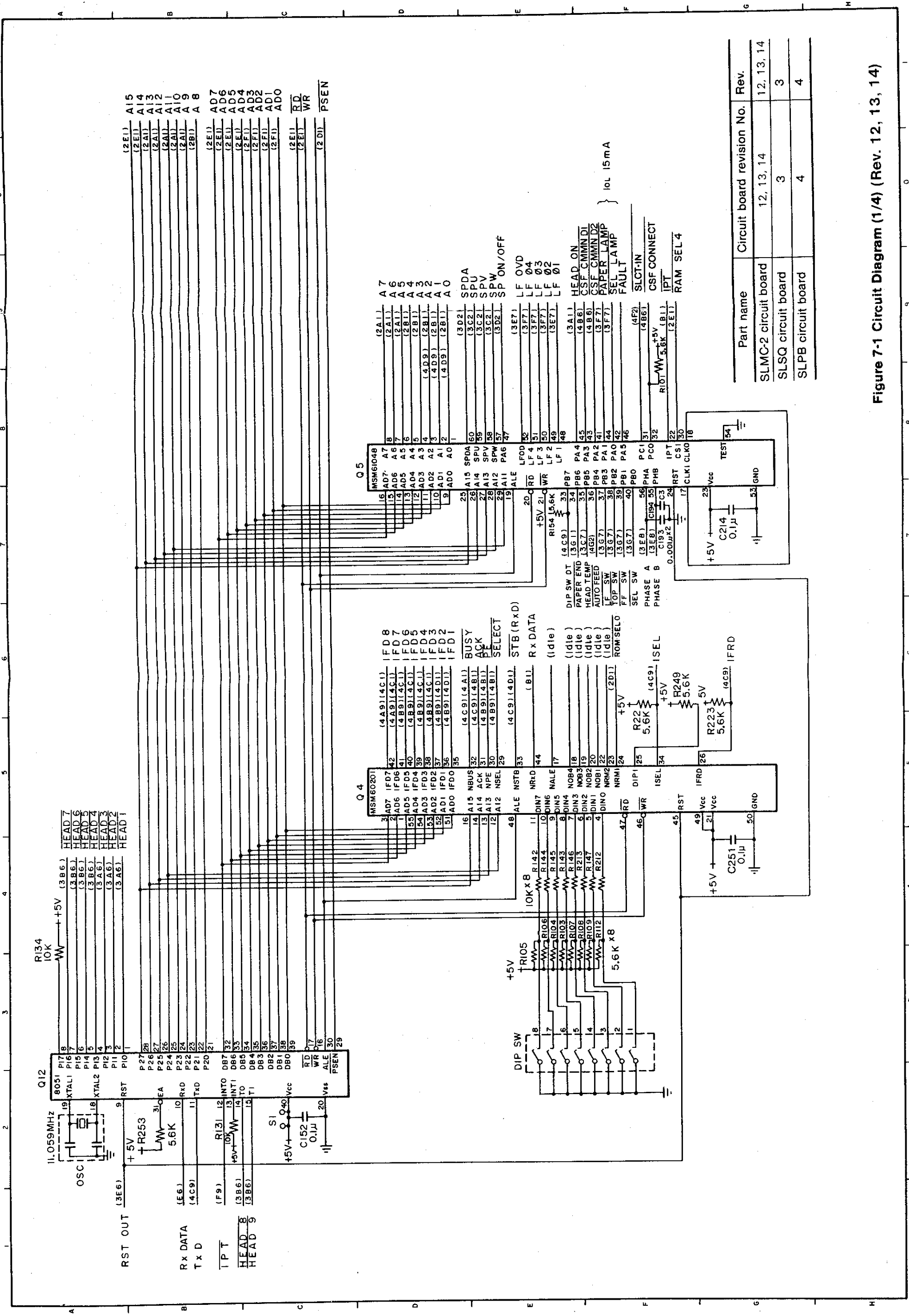
HSR232C SRS232C

Signal	Pin	Notes
IFD 8	26	(1D6)
IFD 7	25	(1D6)
IFD 6	24	(1D6)
IFD 5	23	(1D6)
IFD 4	22	(1D6)
IFD 3	8	(1D6)
IFD 2	9	(1D6)
IFD 1	10	(1D6)
SELECT	5	(1E6)
PE	3	(1E6)
ACK	4	(1E6)
STB	7	(1E6)
BUSY	20	(1D6)
I SEL	17	(1F5)
DIP SW DATA	14	(1E7)
IFRD	27	(1G5)
RST OUT	19	(3E6)
TxD	6	(1B1)
+5V	1	
+8V	28	
OV	16	
OV	15	
OV	30	
ACIOV	11	(1D9)
A2	13	(1D9)
A1	12	(1D9)
A0	18	(1D9)
+5VD	21	(3F5)
RST IN	2	

Signal	Pin	Notes
IFD 8	26	(1D6)
IFD 7	25	(1D6)
IFD 6	24	(1D6)
IFD 5	23	(1D6)
IFD 4	22	(1D6)
IFD 3	8	(1D6)
IFD 2	9	(1D6)
IFD 1	10	(1D6)
SELECT	5	(1E6)
PE	3	(1E6)
ACK	4	(1E6)
STB	7	(1E6)
BUSY	20	(1D6)
I SEL	17	(1F5)
DIP SW DATA	14	(1E7)
IFRD	27	(1G5)
RST OUT	19	(3E6)
TxD	6	(1B1)
+5V	1	
+8V	28	
OV	16	
OV	15	
OV	30	
ACIOV	11	(1D9)
A2	13	(1D9)
A1	12	(1D9)
A0	18	(1D9)
+5VD	21	(3F5)
RST IN	2	

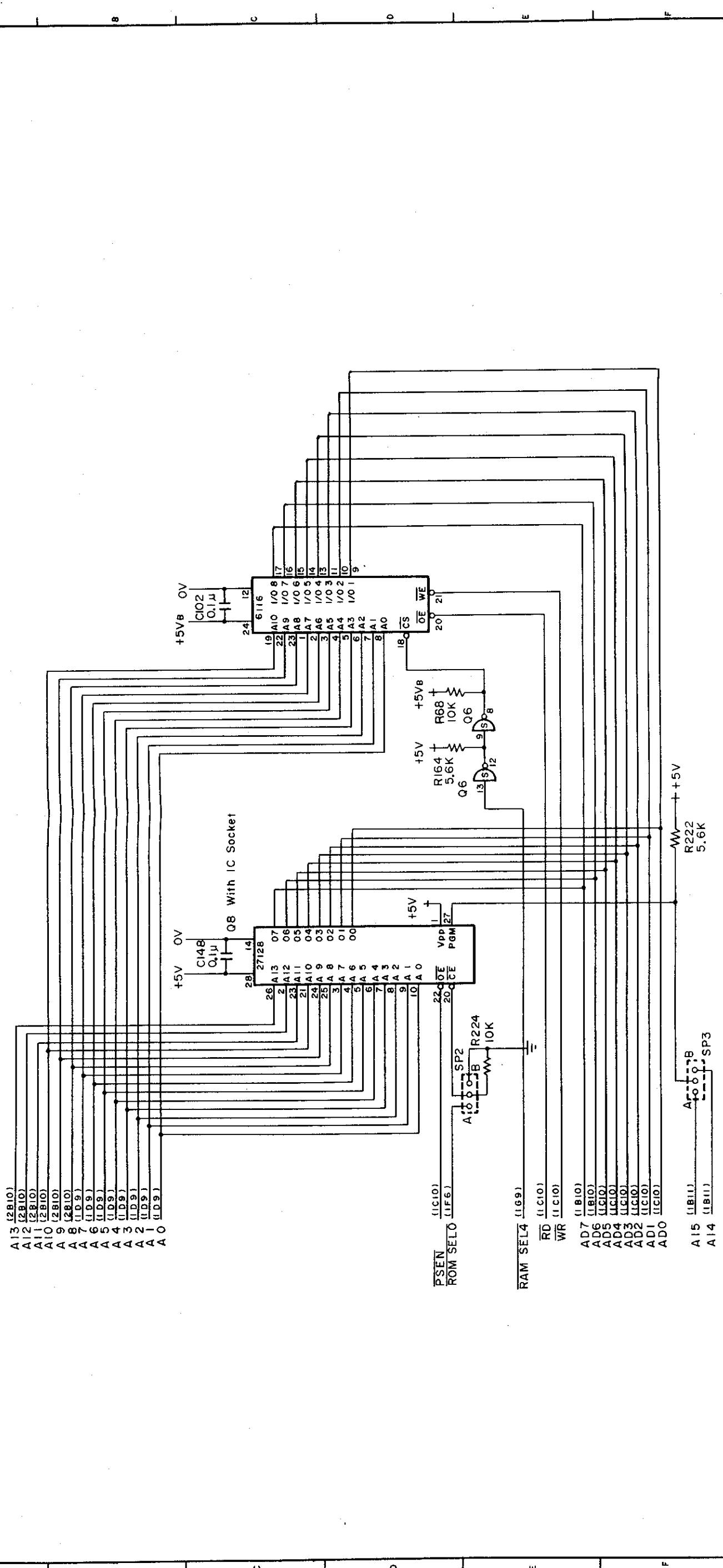
AC source	F1	Remarks
120 V	250 V 1.0 A	SLPB-2
220 V	250 V 0.6 A	SLPB-3
240 V	250 V 0.5 A	SLPB-4

Figure 7-1 Circuit Diagram (4/4) (Rev. 11)



Part name	Circuit board revision No.	Rev.
SLMC-2 circuit board	12, 13, 14	12, 13, 14
SLSQ circuit board	3	3
SLPB circuit board	4	4

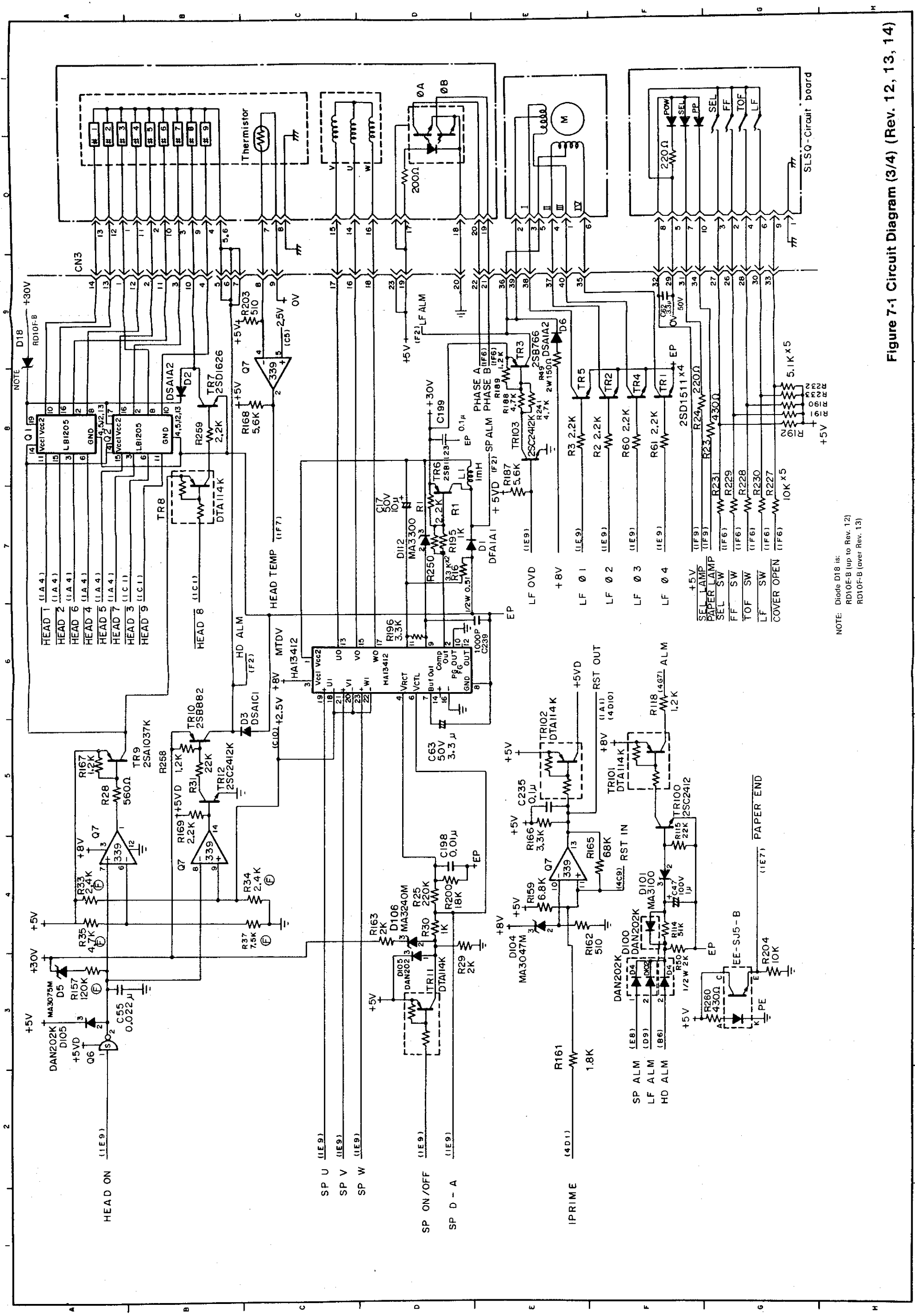
Figure 7-1 Circuit Diagram (1/4) (Rev. 12, 13, 14)



R116
Chip jumper
+5V + +5Vb

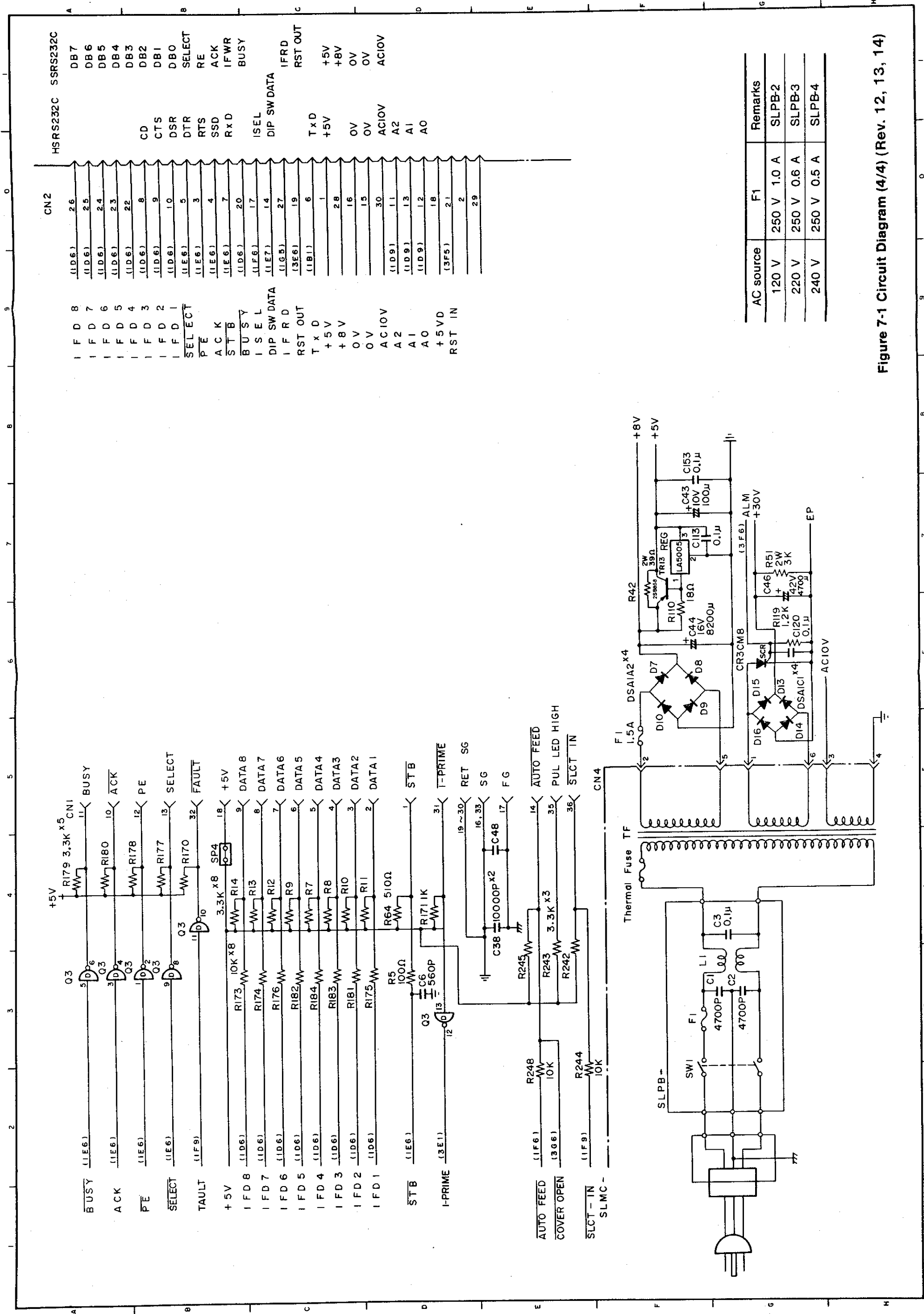
Q8 (ROM) shows when 27128 is installed

Figure 7-1 Circuit Diagram (2/4) (Rev. 12, 13, 14)



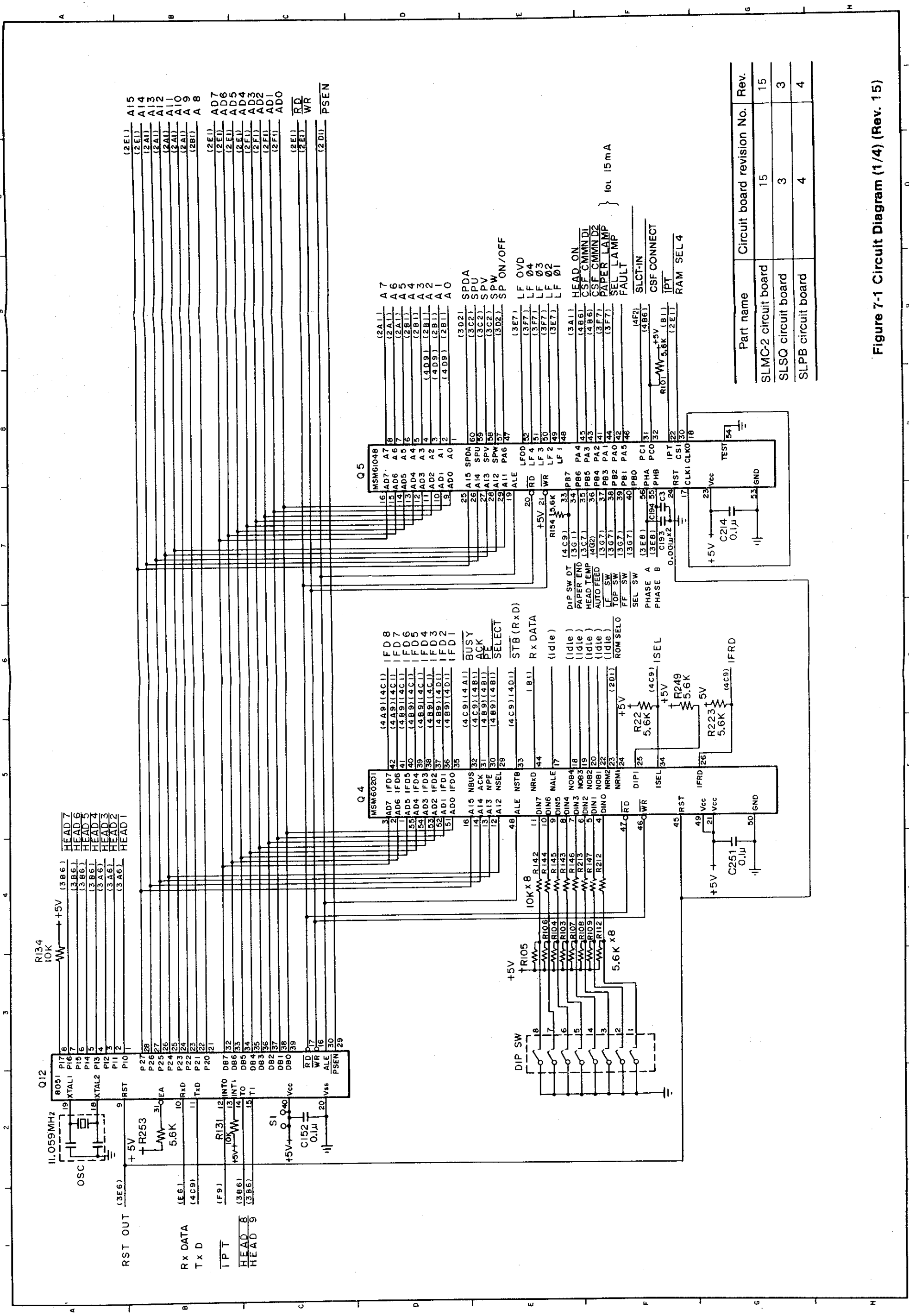
NOTE: Diode D18 is:
 RD10E-B (up to Rev. 12)
 RD10F-B (over Rev. 13)

Figure 7-1 Circuit Diagram (3/4) (Rev. 12, 13, 14)



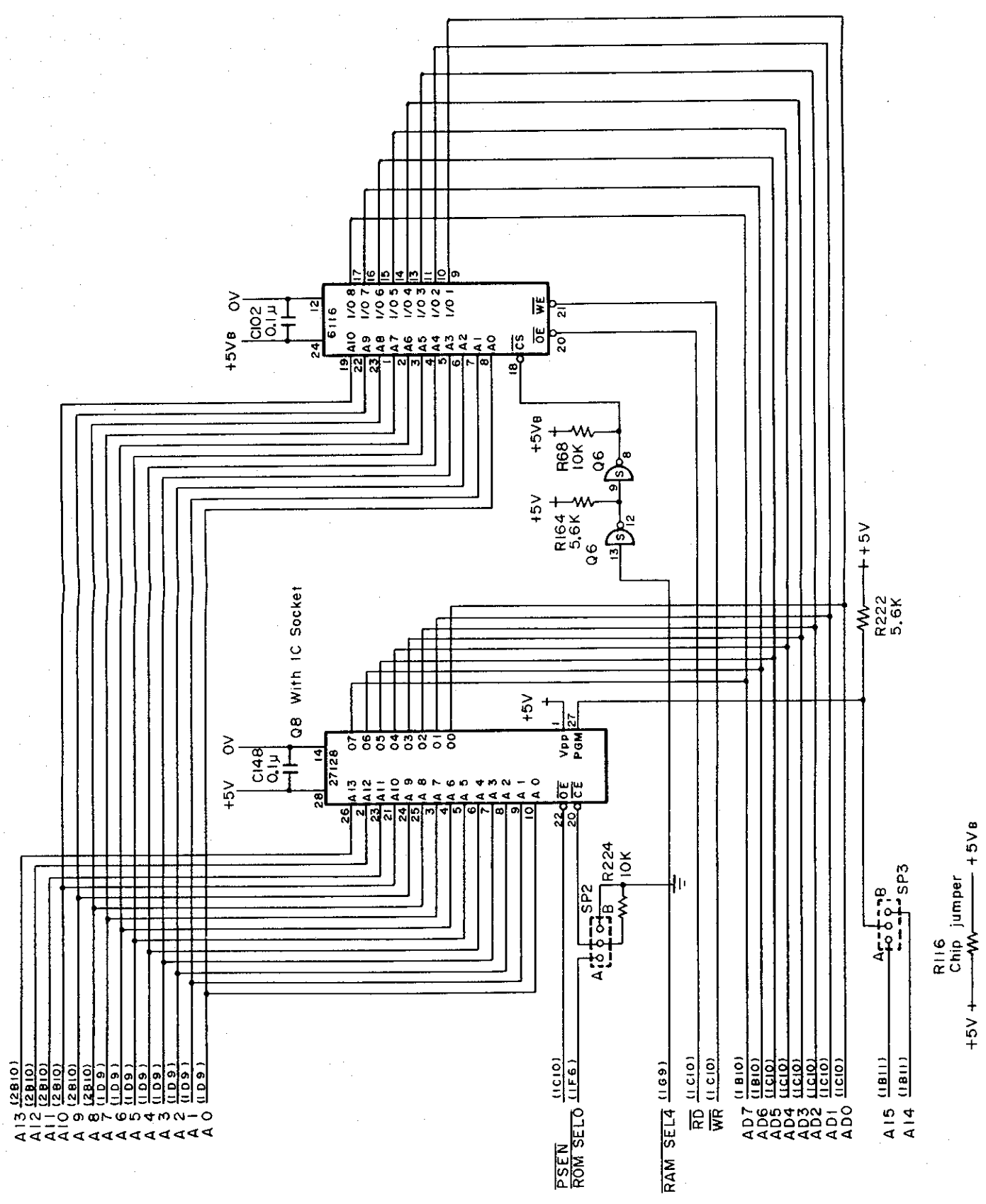
AC source	F1	Remarks
120 V	250 V 1.0 A	SLPB-2
220 V	250 V 0.6 A	SLPB-3
240 V	250 V 0.5 A	SLPB-4

Figure 7-1 Circuit Diagram (4/4) (Rev. 12, 13, 14)



Part name	Circuit board revision No.	Rev.
SLMC-2 circuit board	15	15
SLSQ circuit board	3	3
SLPB circuit board	4	4

Figure 7-1 Circuit Diagram (1/4) (Rev. 15)



Q8 (ROM) shows when 27128 is installed

Figure 7-1 Circuit Diagram (2/4) (Rev. 15)

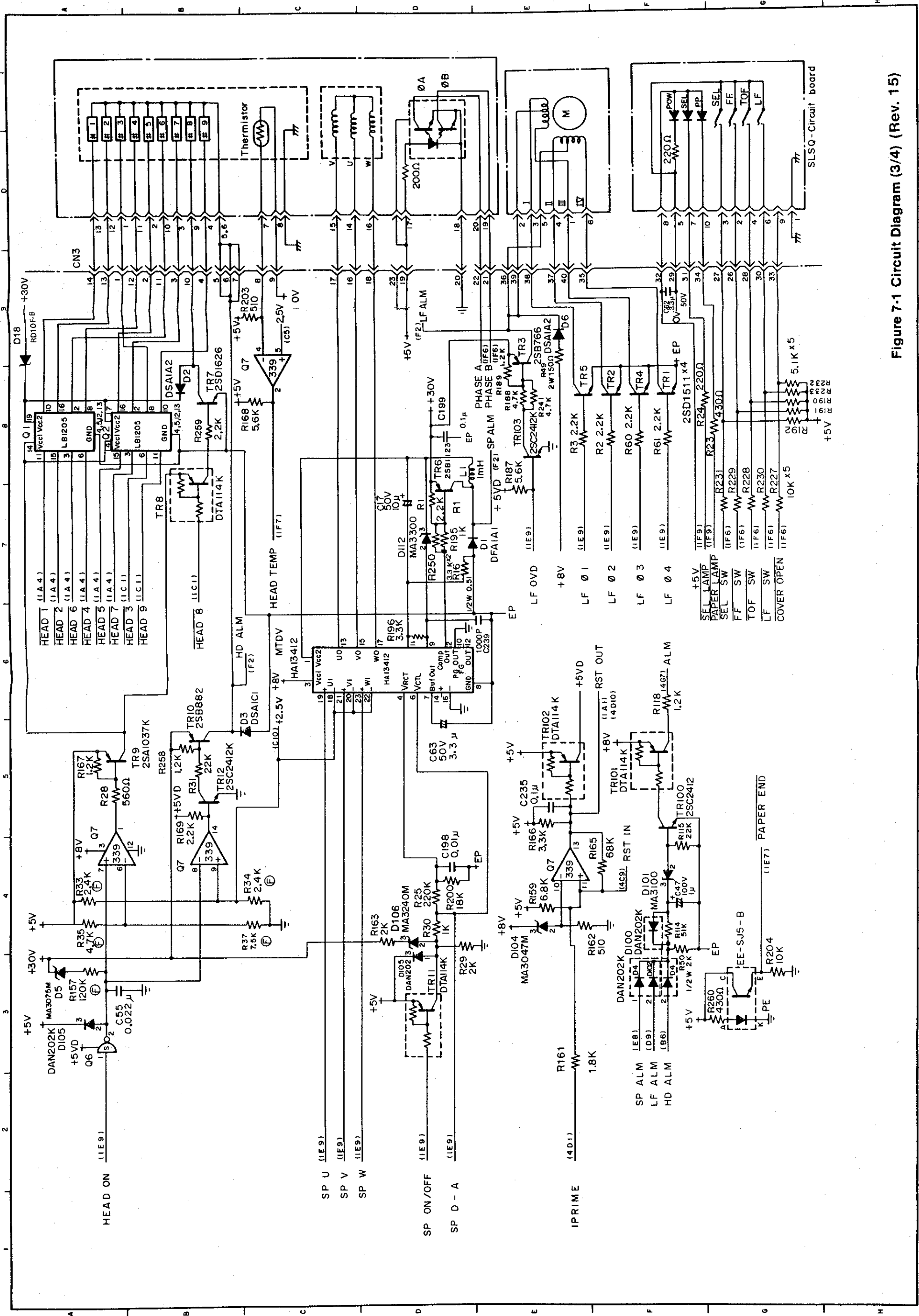
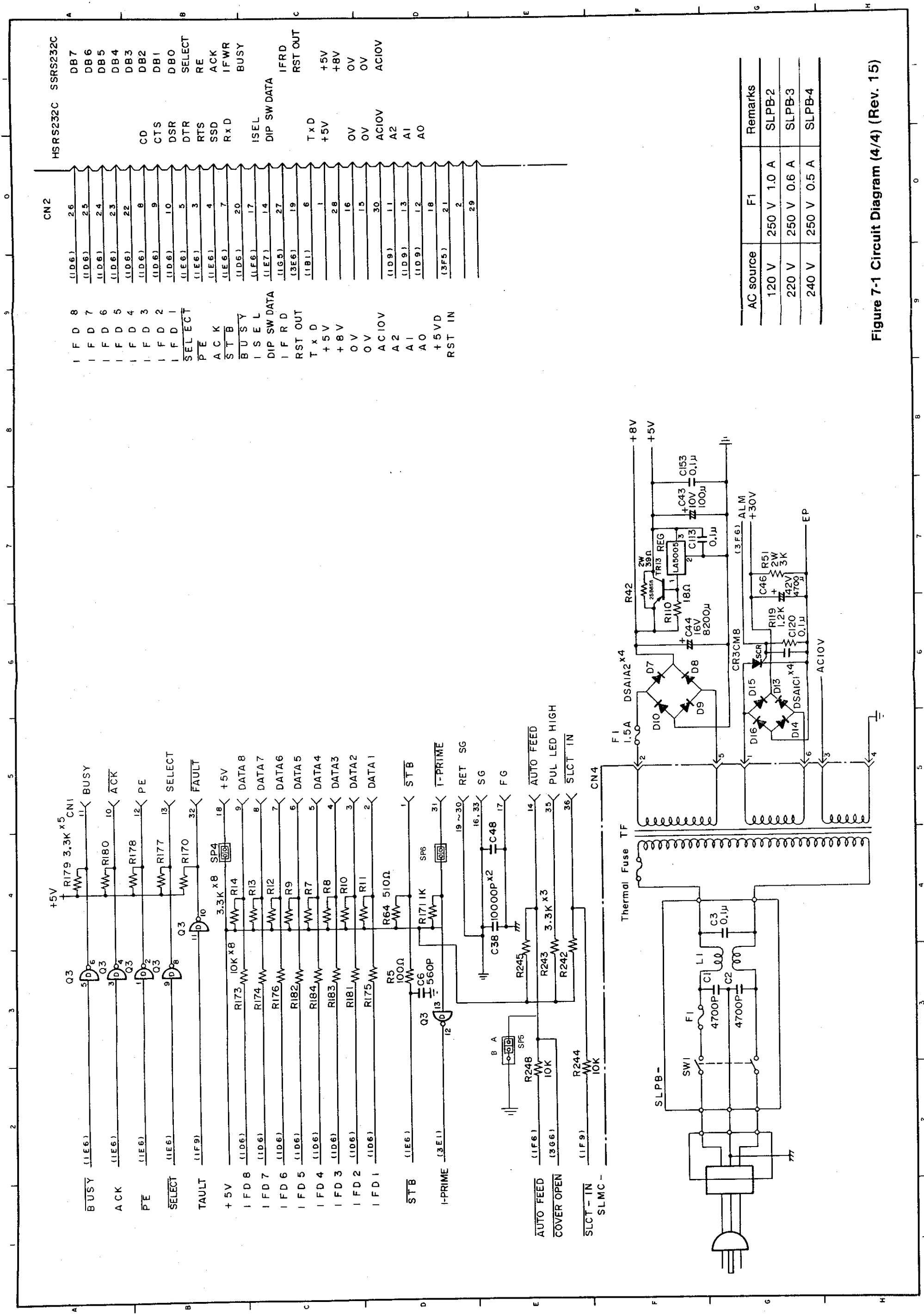


Figure 7-1 Circuit Diagram (3/4) (Rev. 15)



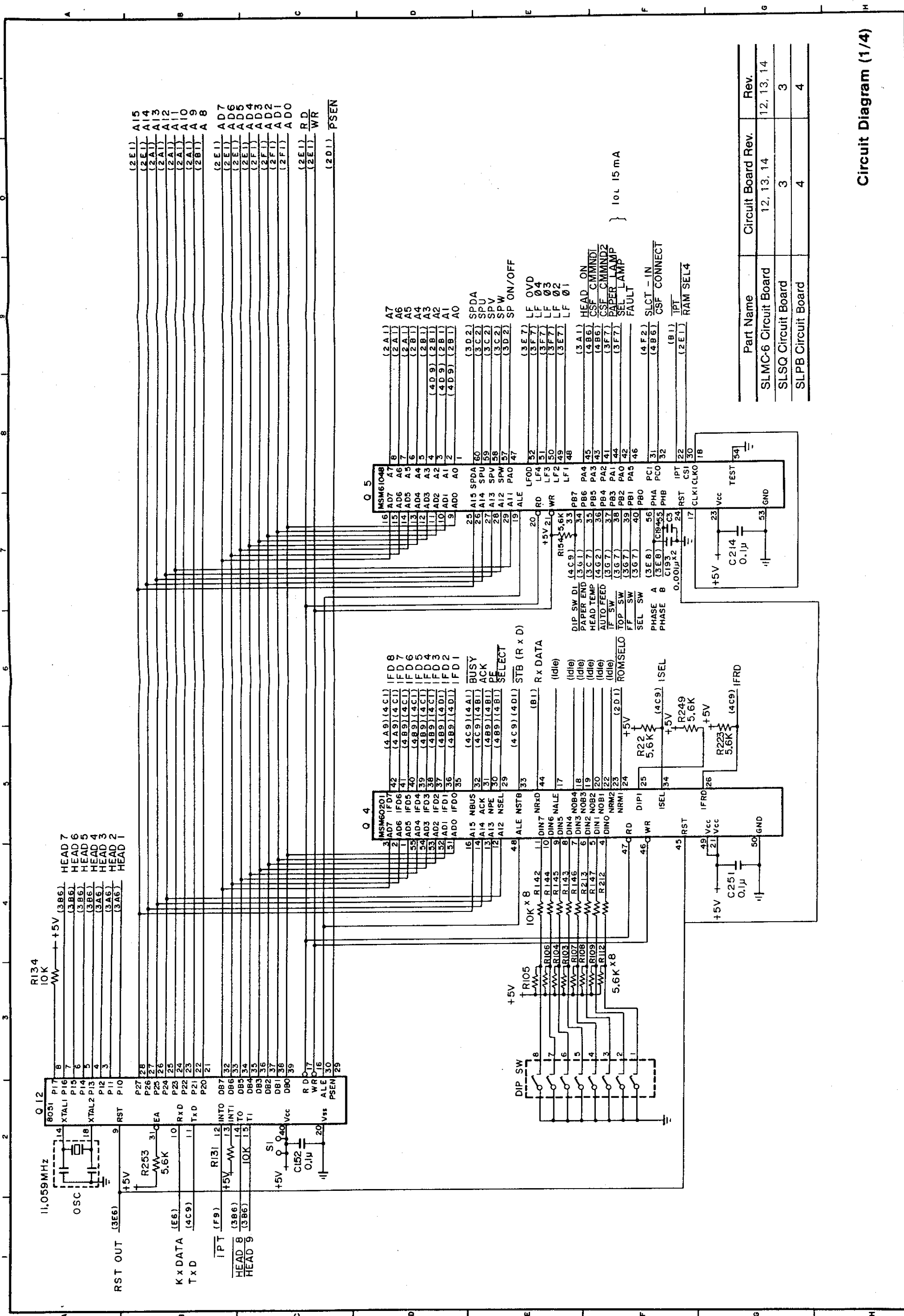
HSRS232C SSRS232C

CN2

1	IFD 8	(1D6)	26	DB7
2	IFD 7	(1D6)	25	DB6
3	IFD 6	(1D6)	24	DB5
4	IFD 5	(1D6)	23	DB4
5	IFD 4	(1D6)	22	DB3
6	IFD 3	(1D6)	8	DB2
7	IFD 2	(1D6)	9	DB1
8	IFD 1	(1D6)	10	DB0
9	SELECT	(1E6)	5	RE
10	PE	(1E6)	3	SELECT
11	ACK	(1E6)	4	ACK
12	STB	(1E6)	7	IFWR
13	BUSY	(1D6)	20	BUSY
14	ISEL	(1E6)	17	ISEL
15	DIP SW DATA	(1E7)	14	DIP SW DATA
16	IFRD	(1G5)	27	IFRD
17	RST OUT	(3E6)	19	RST OUT
18	TxD	(1B1)	6	TxD
19	+5V		1	+5V
20	+8V		28	+8V
21	OV		16	OV
22	OV		15	OV
23	ACIOV		30	ACIOV
24	A2	(1D9)	11	A2
25	A1	(1D9)	13	A1
26	A0	(1D9)	12	A0
27	+5V D	(3F5)	18	+5V D
28	RST IN		21	RST IN
29			2	

AC source	F1	Remarks
120 V	250 V 1.0 A	SLPB-2
220 V	250 V 0.6 A	SLPB-3
240 V	250 V 0.5 A	SLPB-4

Figure 7-1 Circuit Diagram (4/4) (Rev. 15)

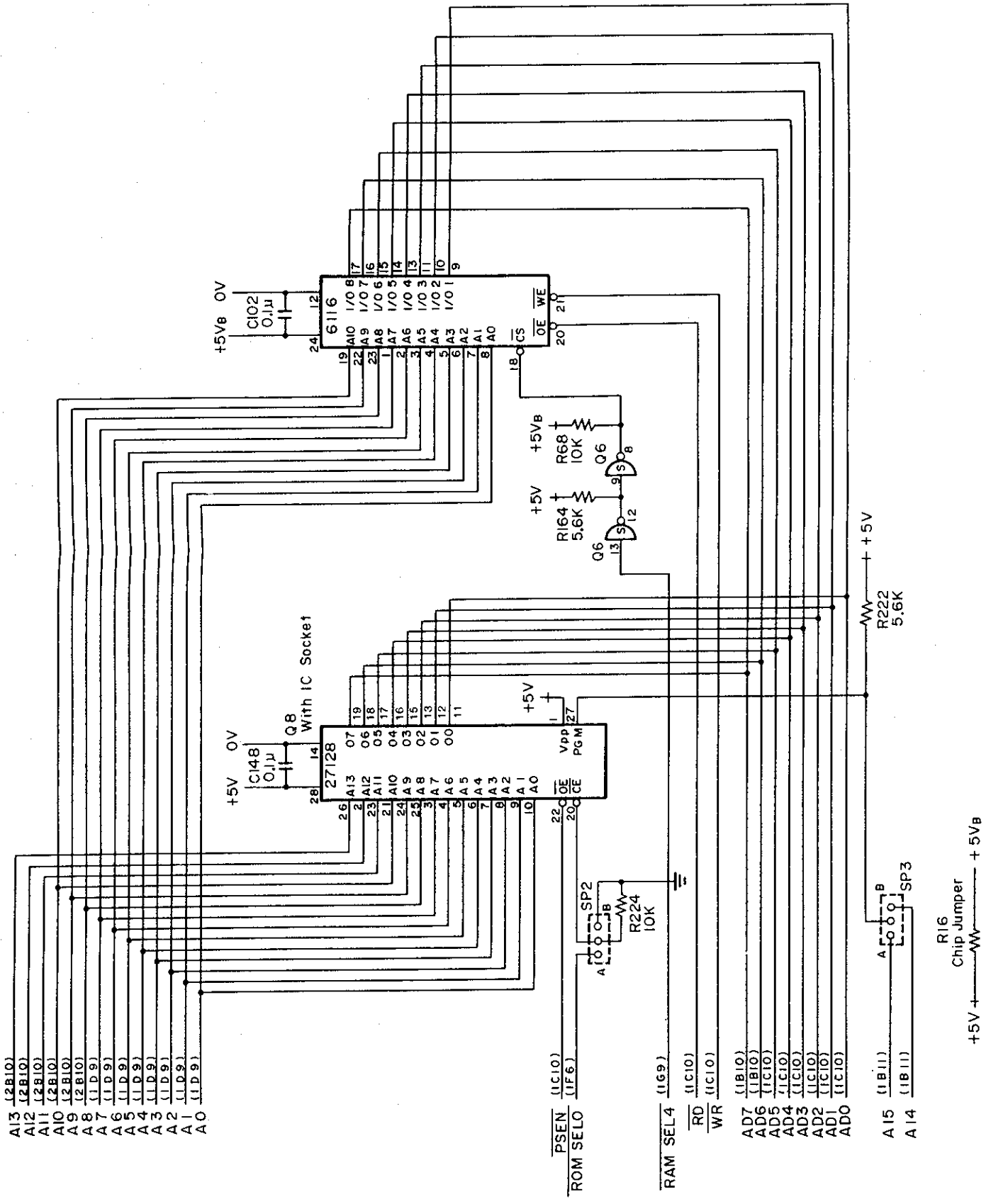


- (2E1) A15
- (2E1) A14
- (2A1) A13
- (2A1) A12
- (2A1) A11
- (2A1) A10
- (2A1) A9
- (2B1) A8
- (2E1) AD7
- (2E1) AD6
- (2E1) AD5
- (2E1) AD4
- (2E1) AD3
- (2E1) AD2
- (2E1) AD1
- (2E1) ADO
- (2E1) RD
- (2E1) WR
- (2D1) PSEN

- (2A1) A7
- (2A1) A6
- (2A1) A5
- (2A1) A4
- (2A1) A3
- (2A1) A2
- (2A1) A1
- (2A1) A0
- (3D2) SPDA
- (3C2) SPU
- (3C2) SPV
- (3C2) SPW
- (3D2) SP ON/OFF
- (3E7) LF OVD
- (3F7) LF 04
- (3F7) LF 03
- (3E7) LF 02
- (3E7) LF 01
- (3A1) HEAD ON
- (4B6) CSF_CMMND1
- (4B6) CSF_CMMND2
- (3F7) PAPER LAMP
- (3F7) SEL LAMP
- (4F2) SLC1-IN
- (4B6) CSF CONNECT
- (B1) IPT
- (2E1) RAM SEL4

Part Name	Circuit Board Rev.	Rev.
SLMC-6 Circuit Board	12, 13, 14	12, 13, 14
SLSQ Circuit Board	3	3
SLPB Circuit Board	4	4

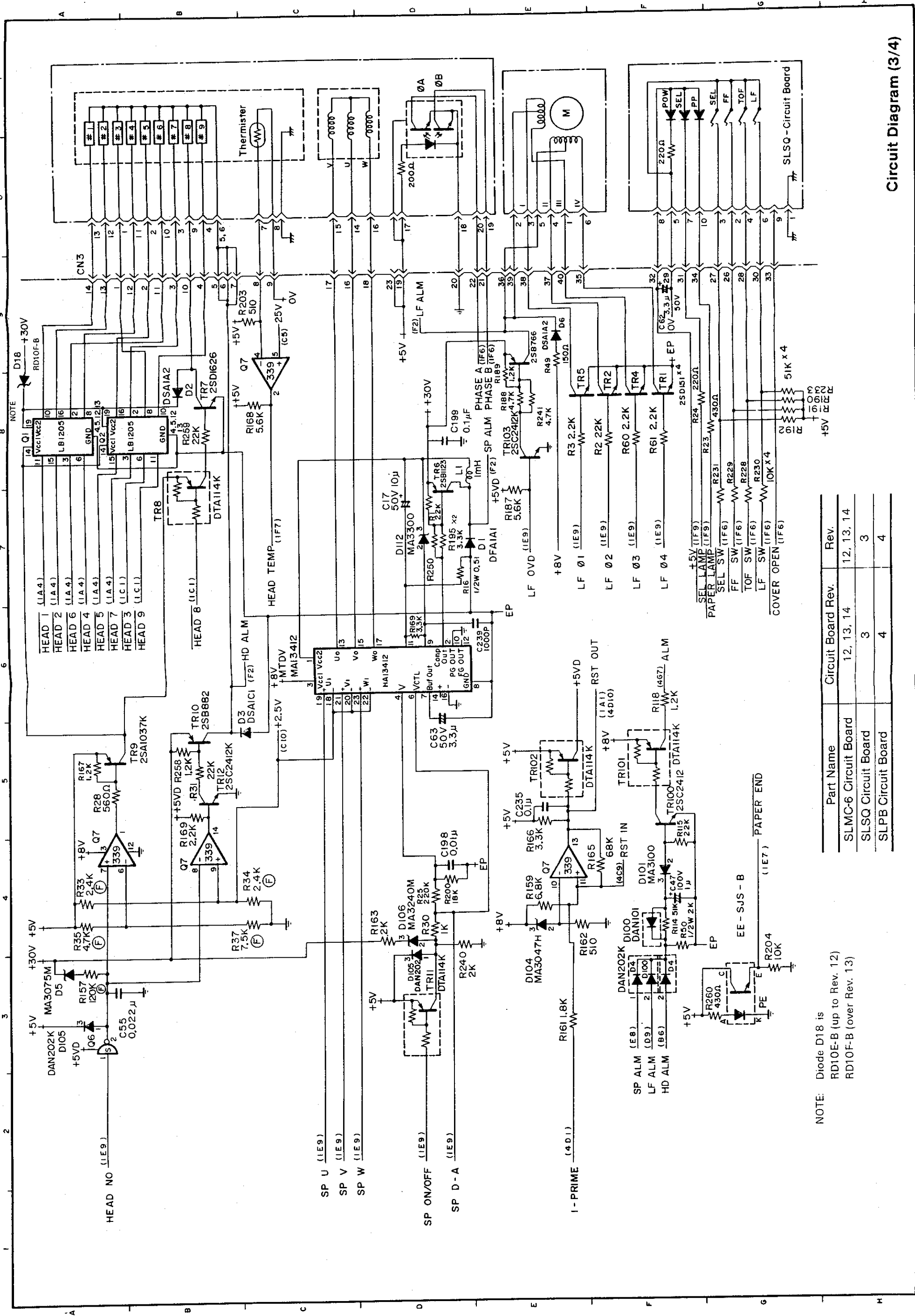
Circuit Diagram (1/4)



Q8 (ROM) shows when 27128 is mounted.

Part Name	Circuit Board Rev.	Rev.
SLMC-6 Circuit Board	12, 13, 14	12, 13, 14
SLSQ Circuit Board	3	3
SLPB Circuit Board	4	4

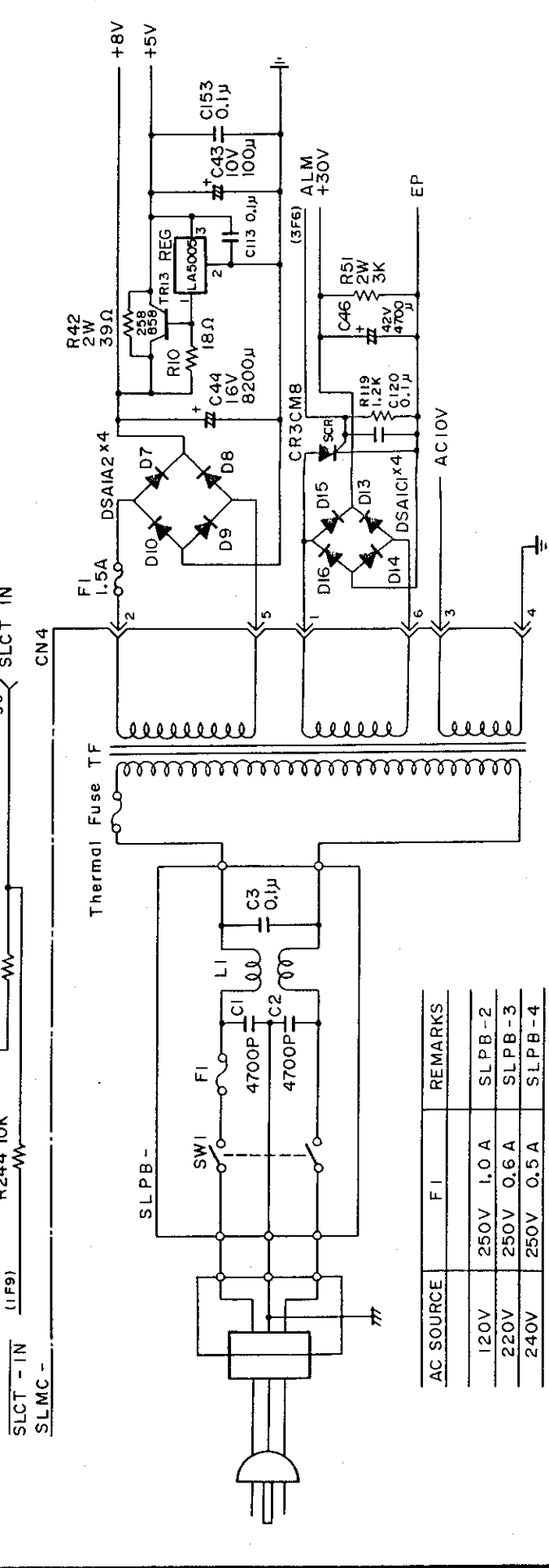
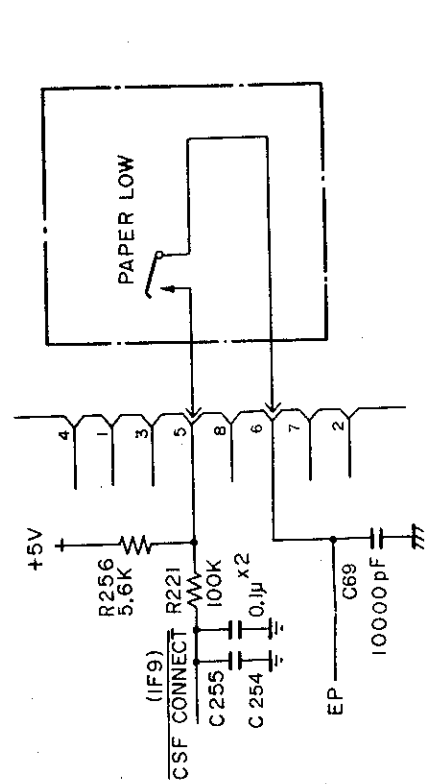
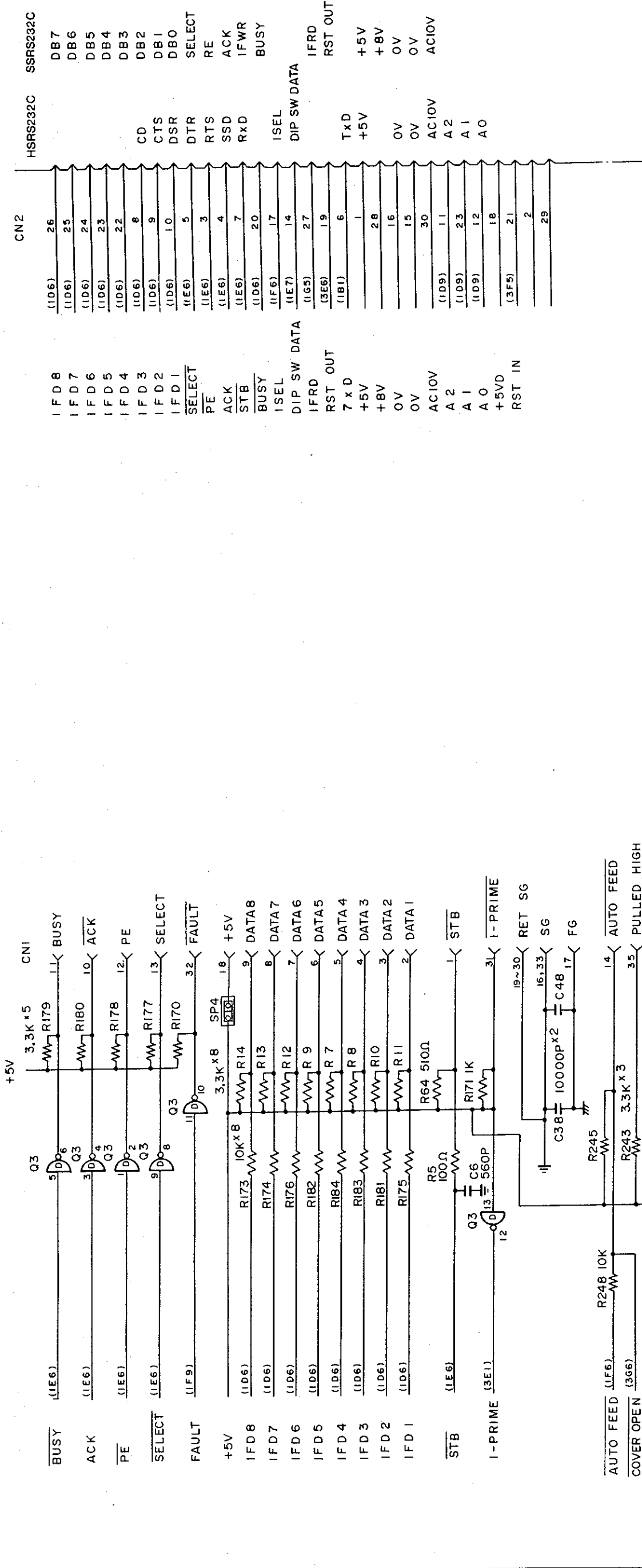
Circuit Diagram (2/4)



Circuit Diagram (3/4)

NOTE: Diode D18 is RD10E-B (up to Rev. 12) RD10F-B (over Rev. 13)

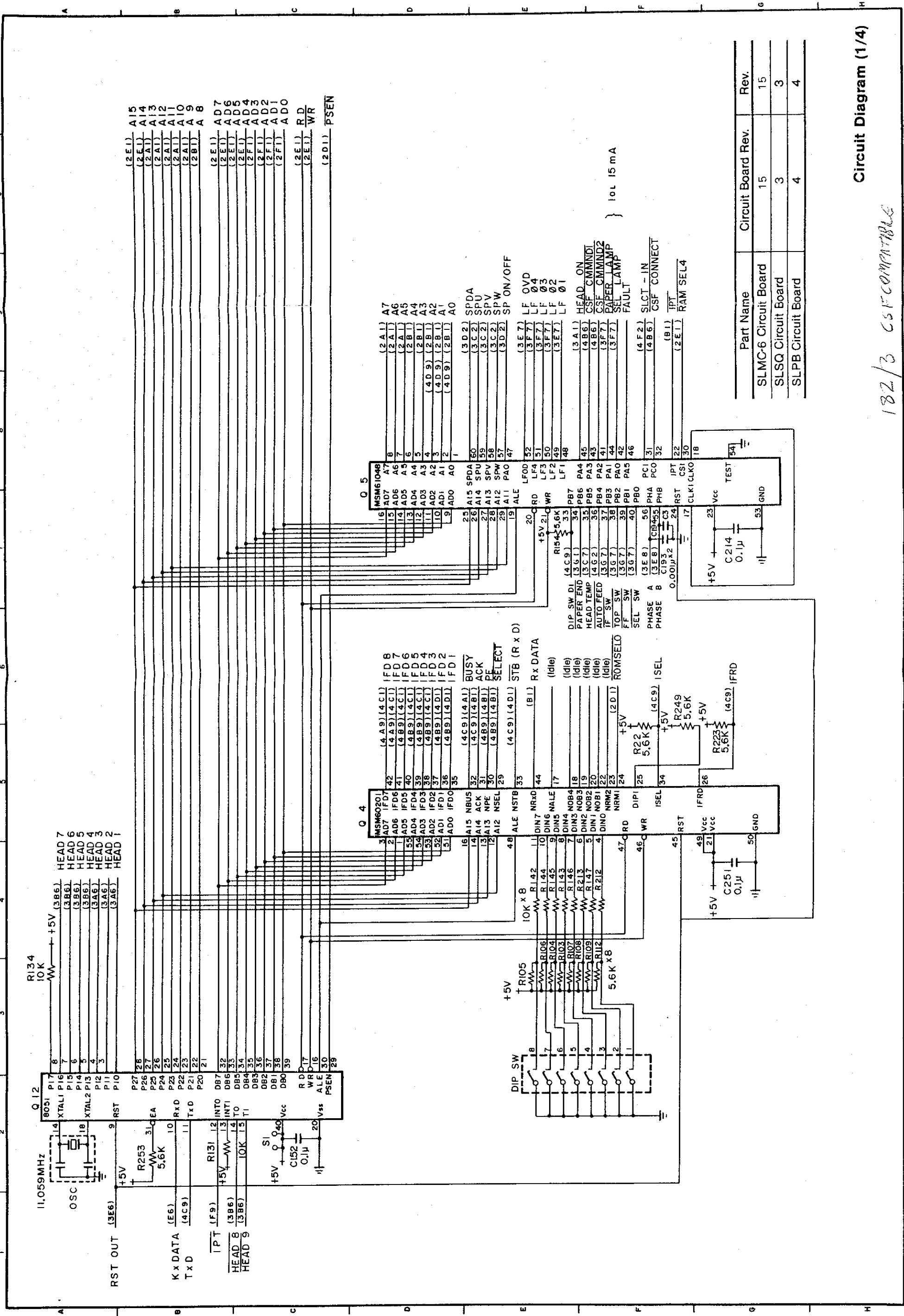
Part Name	Circuit Board Rev.	Rev.
SLMC-6 Circuit Board	12, 13, 14	12, 13, 14
SLSQ Circuit Board	3	3
SLPB Circuit Board	4	4



AC SOURCE	F1	REMARKS
120V	250V 1.0A	SLPB-2
220V	250V 0.6A	SLPB-3
240V	250V 0.5A	SLPB-4

Part Name	Circuit Board Rev.	Rev.
SLMC-6 Circuit Board	12, 13, 14	12, 13, 14
SLSQ Circuit Board	3	3
SLPB Circuit Board	4	4

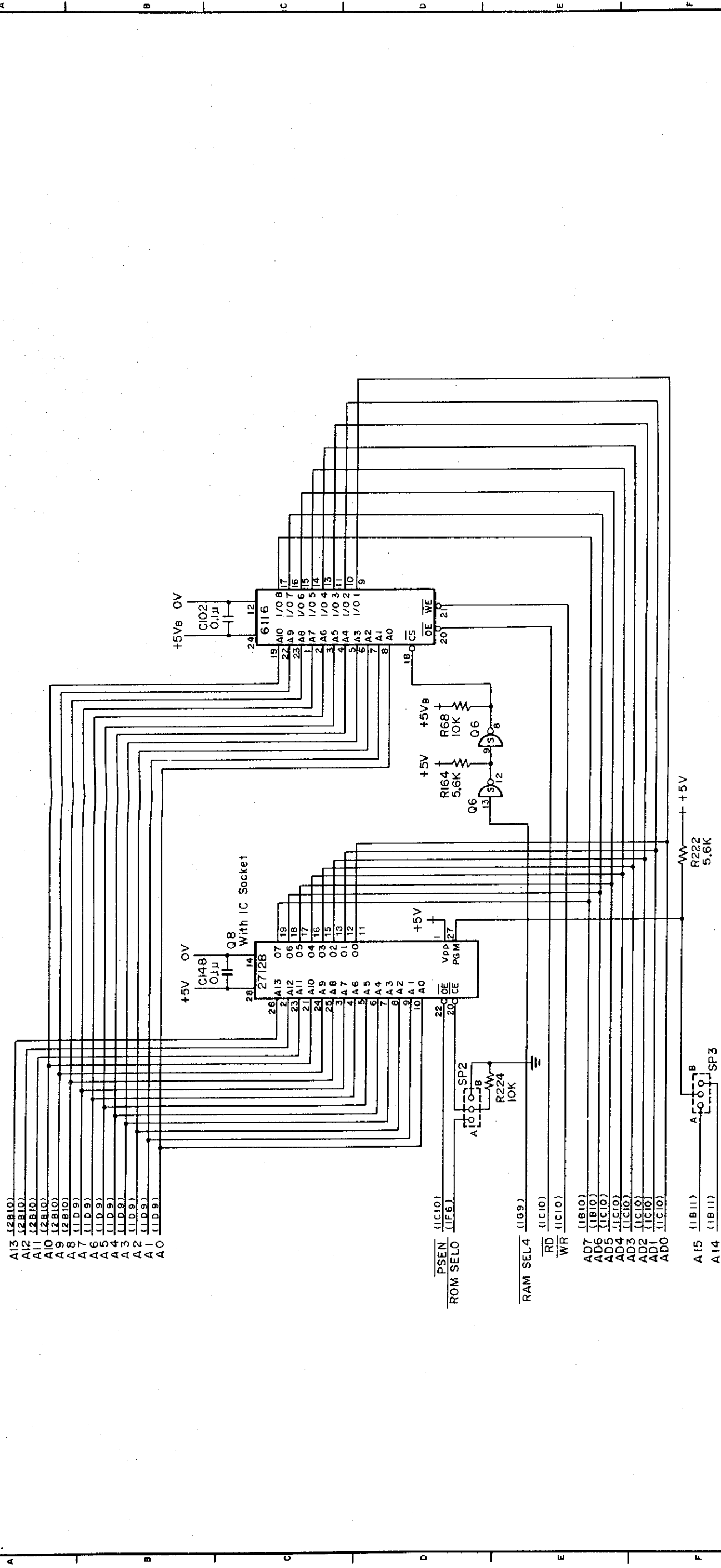
Circuit Diagram (4/4)



Part Name	Circuit Board Rev.	Rev.
SLMC-6 Circuit Board	15	15
SLSQ Circuit Board	3	3
SLPB Circuit Board	4	4

Circuit Diagram (1/4)

182/3 CSF COMPATIBLE

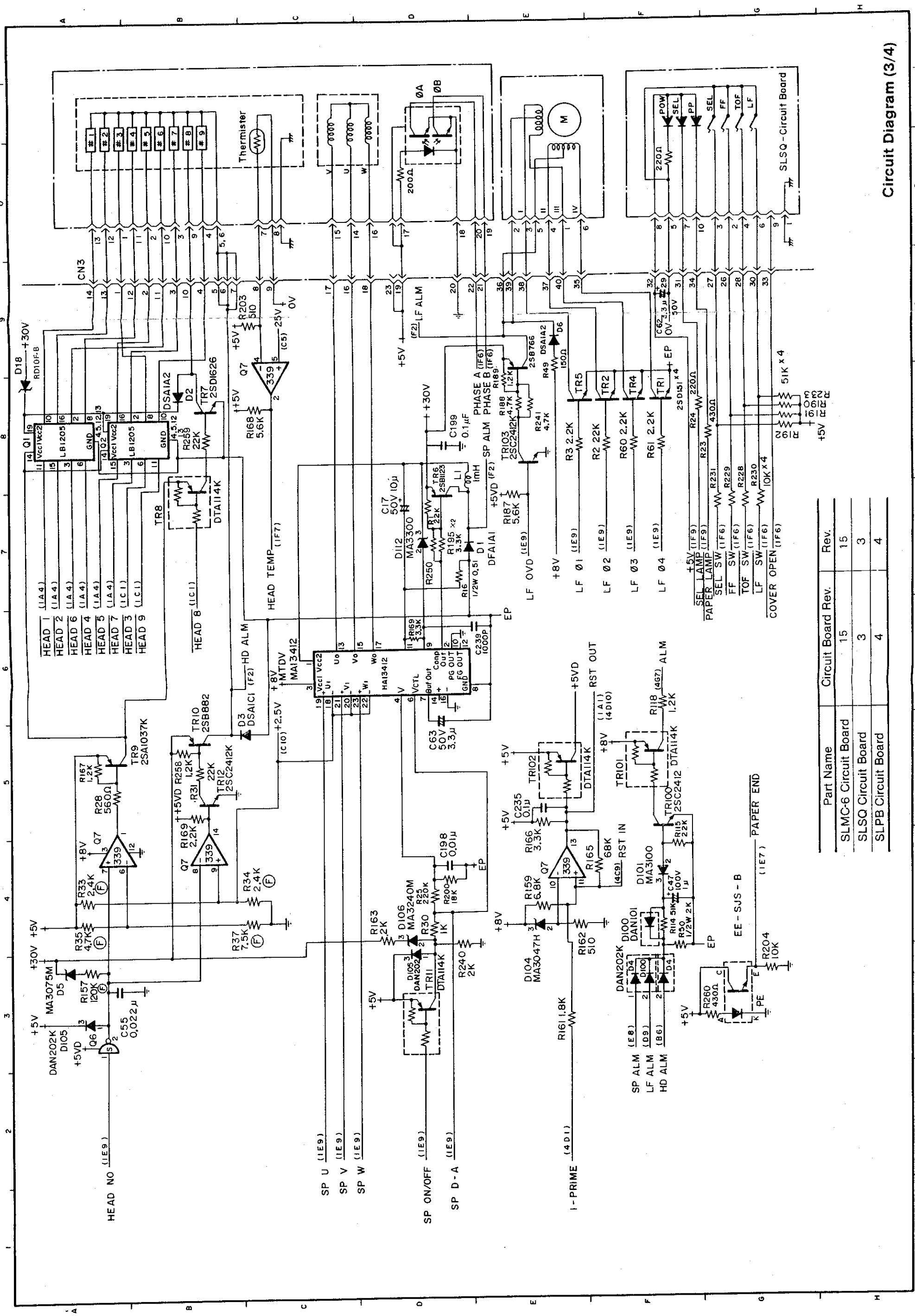


Q8 (ROM) shows when 27128 is mounted.

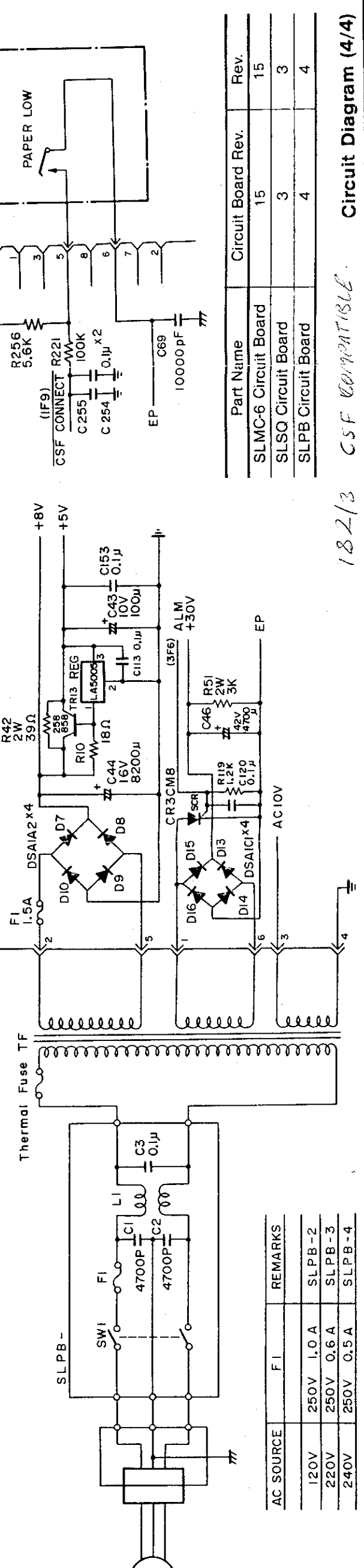
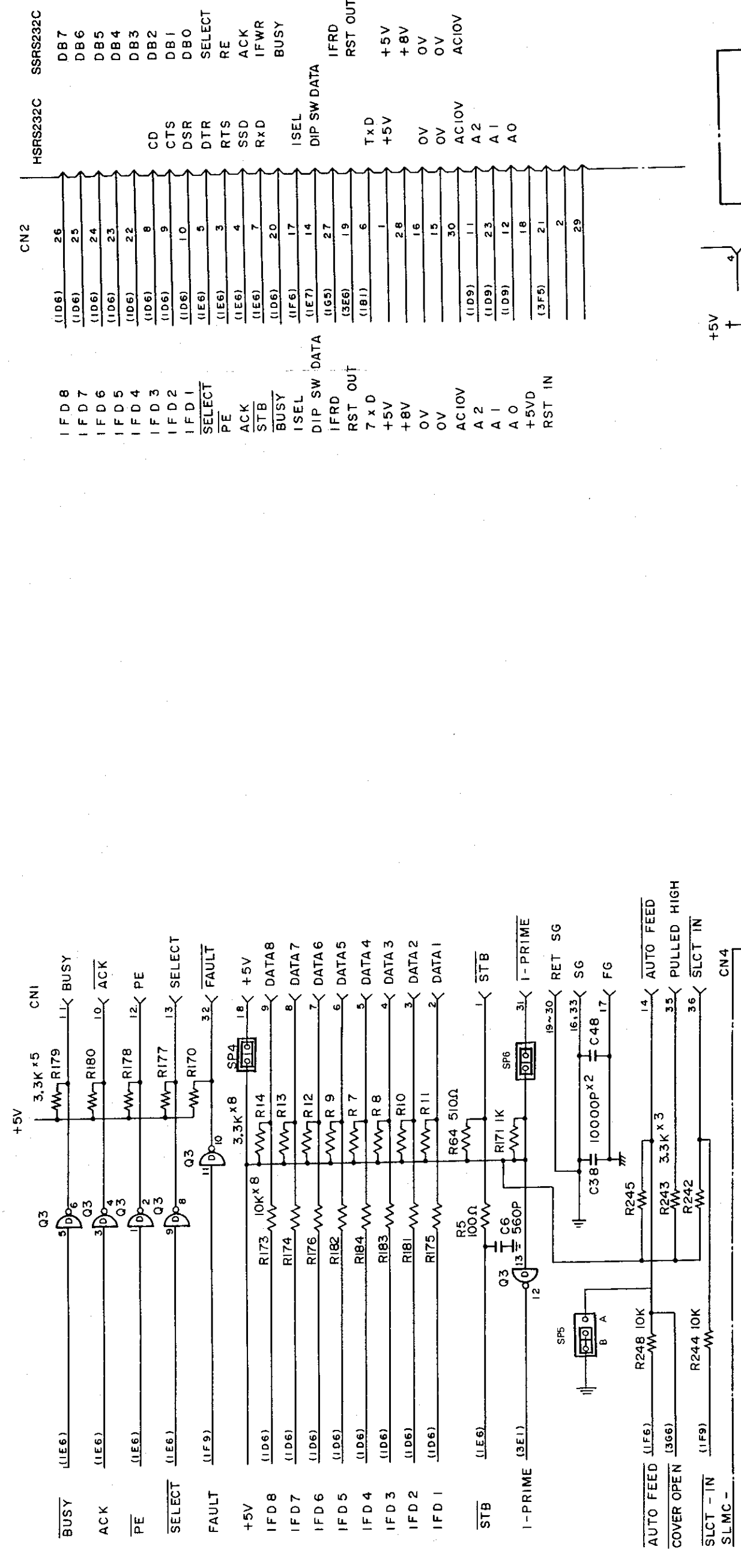
R16
Chip Jumper
+5V + --- +5V

Part Name	Circuit Board Rev.	Rev.
SLMC-6 Circuit Board	15	15
SLSQ Circuit Board	3	3
SLPB Circuit Board	4	4

Circuit Diagram (2/4)



Part Name	Circuit Board Rev.	Rev.
SLMC-6 Circuit Board	15	15
SLSQ Circuit Board	3	3
SLPB Circuit Board	4	4

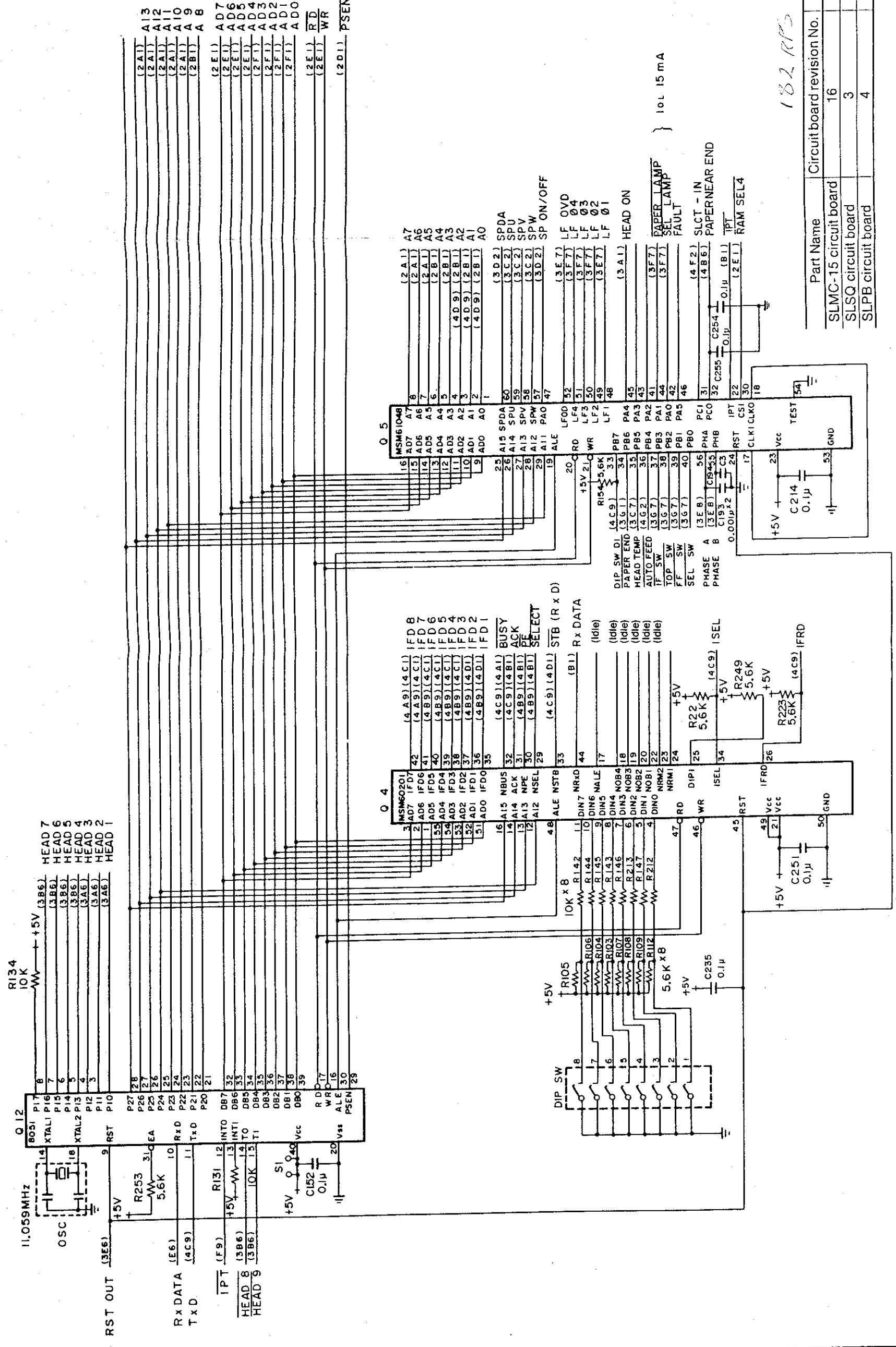


AC SOURCE	FI	REMARKS
120V	250V 1.0 A	SLPB-2
220V	250V 0.6 A	SLPB-3
240V	250V 0.5 A	SLPB-4

Part Name	Circuit Board	Rev.
SLMC-6	Circuit Board	15
SLSO	Circuit Board	3
SLPB	Circuit Board	4

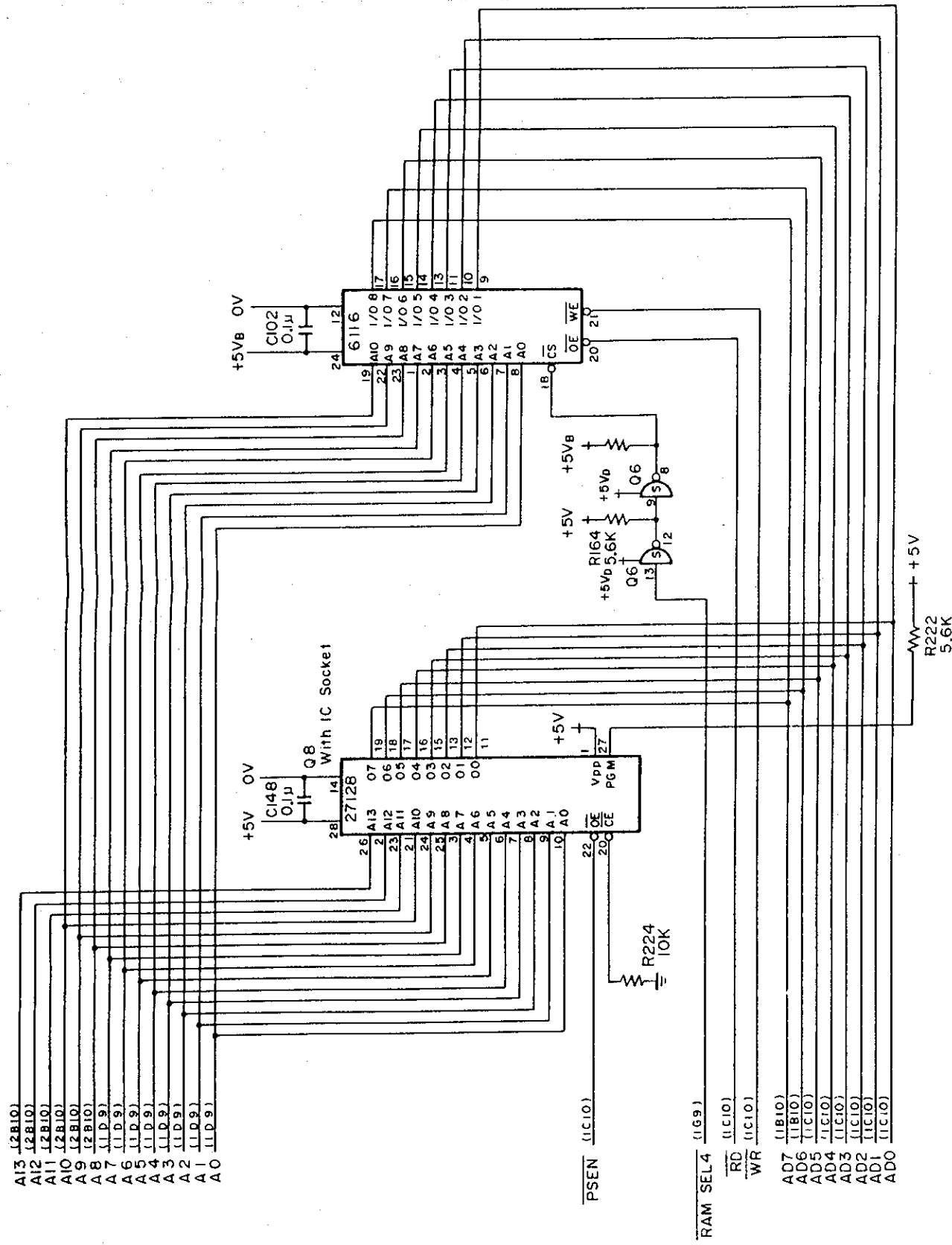
182/3 CSF COMPATIBLE

Circuit Diagram (4/4)



182 RPS

Part Name	Circuit board revision No.	Rev.
SLMC-15 circuit board	16	16
SLSQ circuit board	3	3
SLPB circuit board	4	4

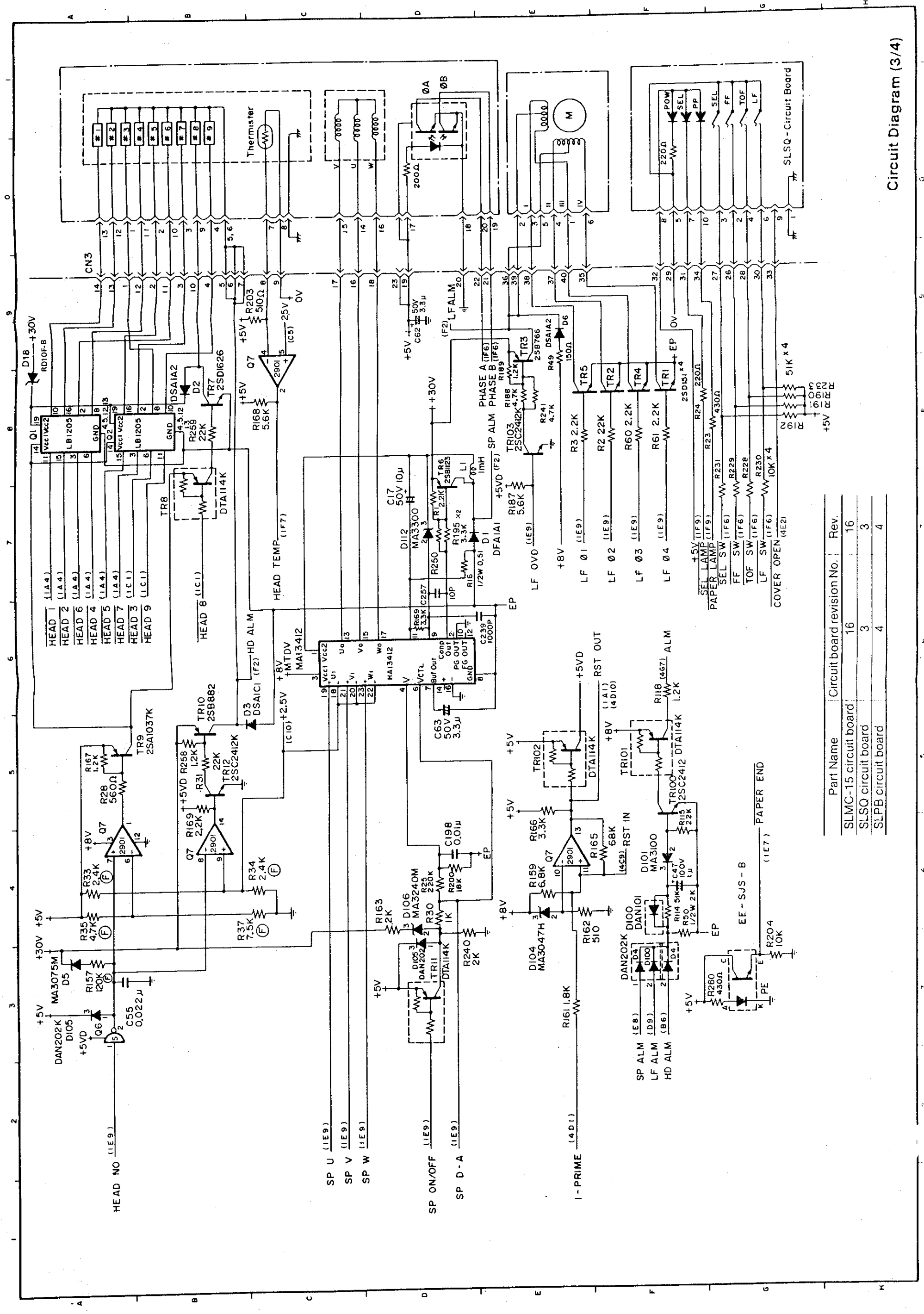


Q8 (ROM) shows when 27128 is mounted.

R16
Chip Jumper
+5V +-----+ +5Vb

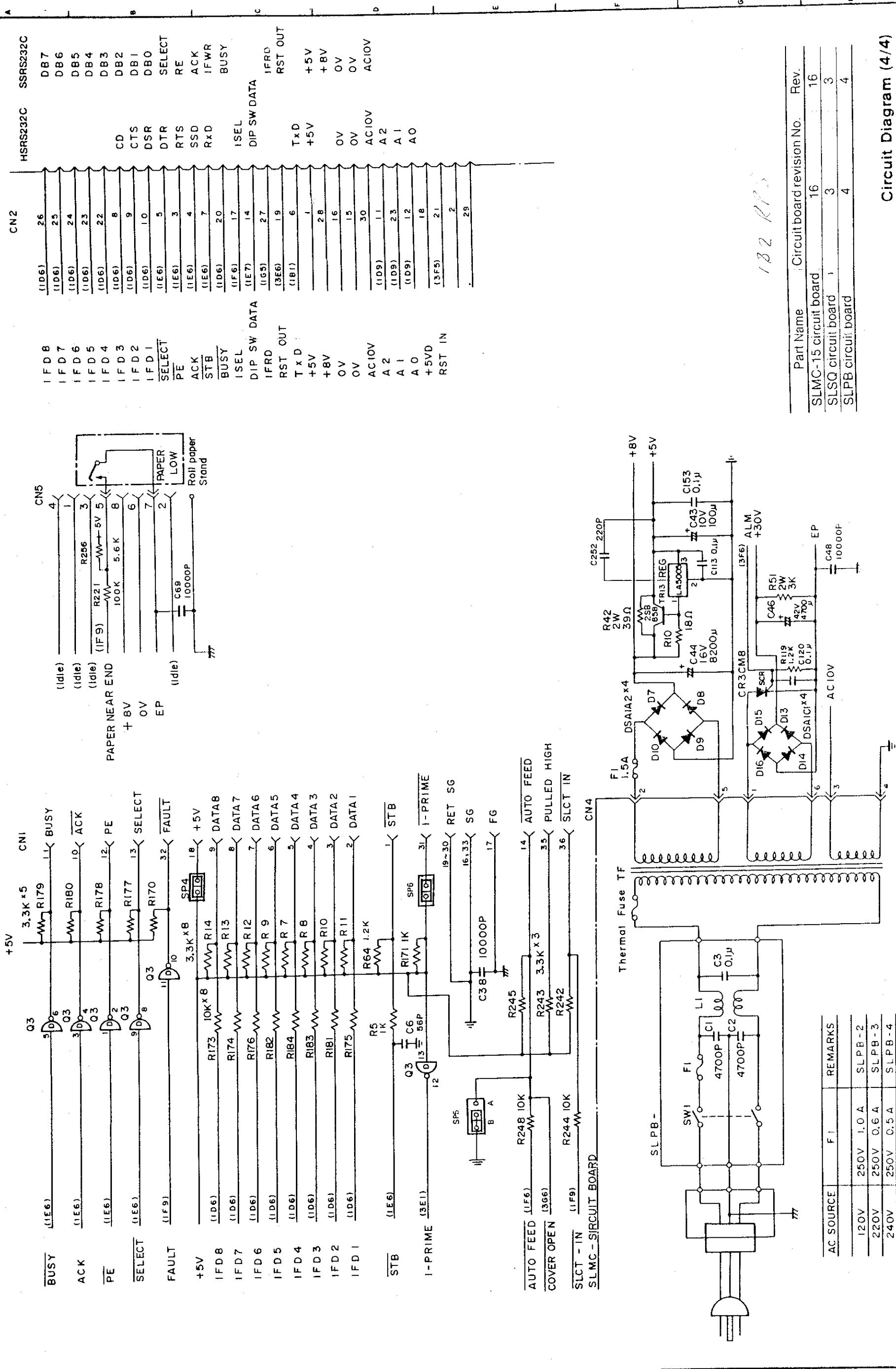
Part Name	Circuit board revision No.	Rev.
SLMC-15 circuit board	16	16
SLSQ circuit board	3	3
SLPB circuit board	4	4

Circuit Diagram (2/4)

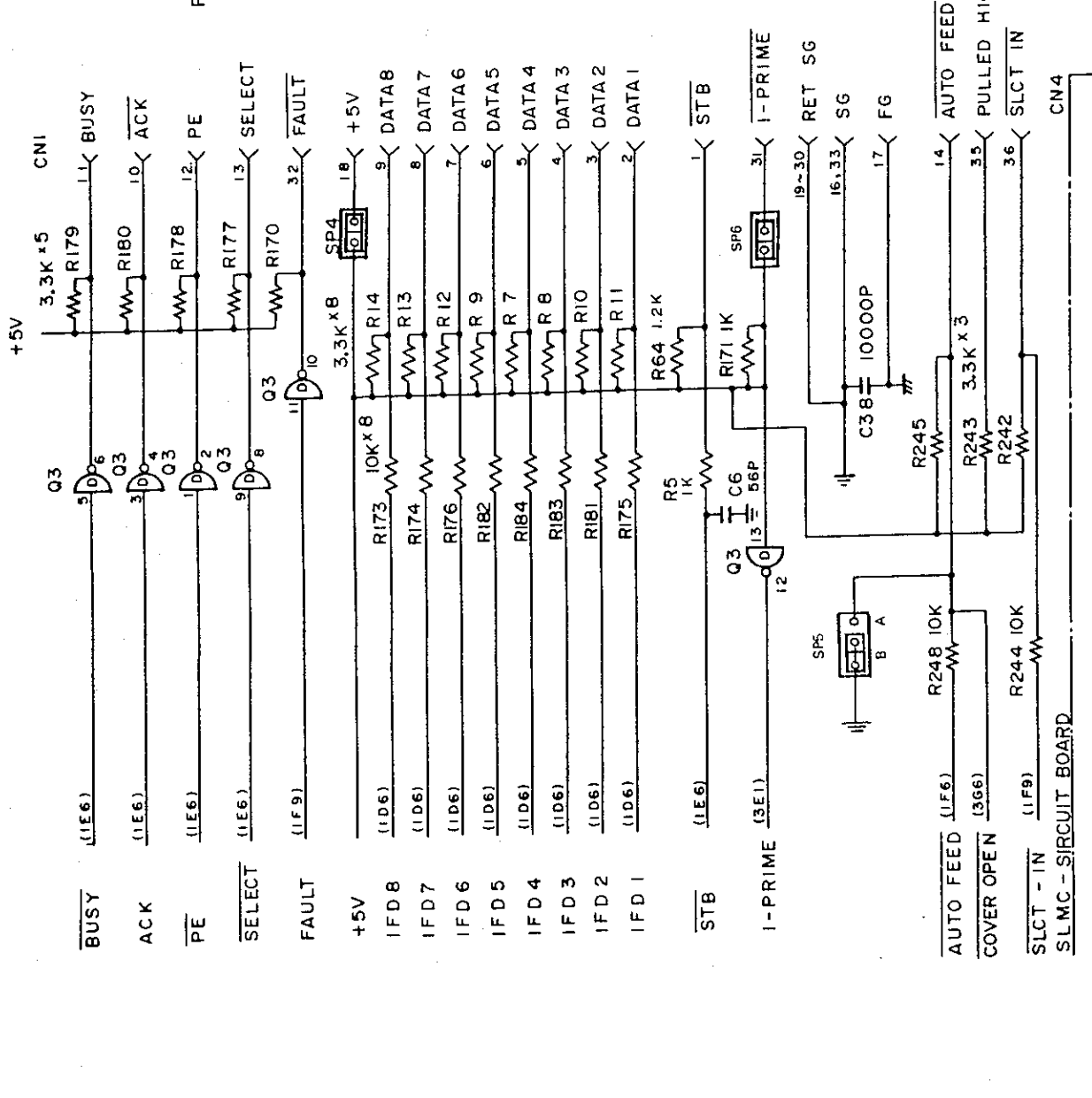
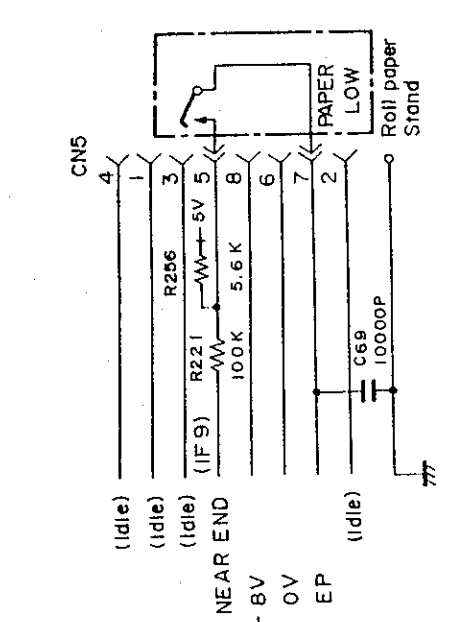


Part Name	Circuit board revision No.	Rev.
SLMC-15 circuit board	16	16
SLSQ circuit board	3	3
SLPB circuit board	4	4

Circuit Diagram (3/4)

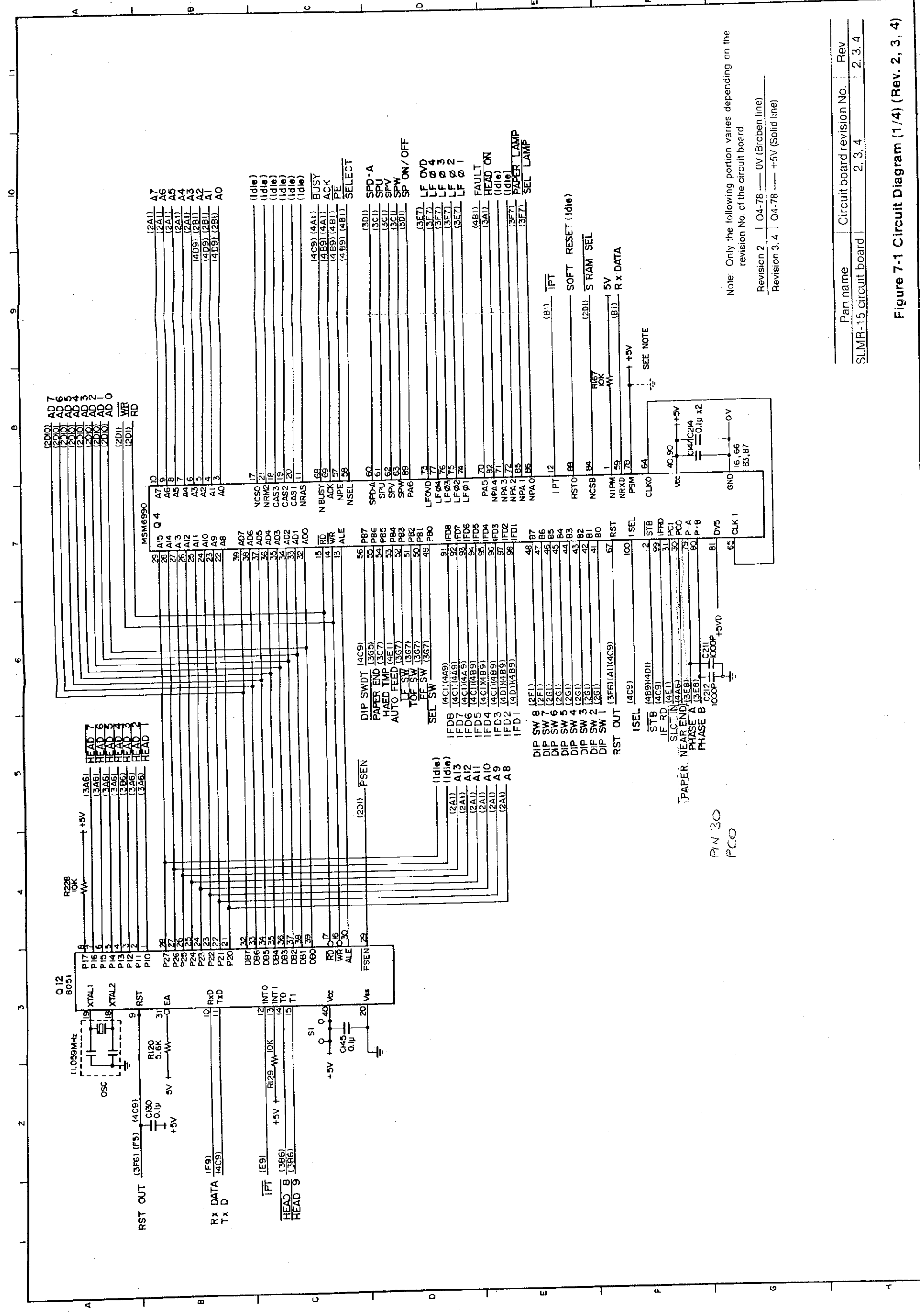


Signal	Pin	Signal	Pin
IFD 8	(1D6) 26	IFRD	(1E7) 14
IFD 7	(1D6) 25	RST OUT	(1G5) 27
IFD 6	(1D6) 24	TxD	(1B1) 6
IFD 5	(1D6) 23	+5V	1
IFD 4	(1D6) 22	+8V	28
IFD 3	(1D6) 8	OV	16
IFD 2	(1D6) 9	OV	15
IFD 1	(1D6) 10	OV	30
SELECT	(1E6) 3	AC10V	(1D9) 11
PE	(1E6) 4	A 2	(1D9) 23
ACK	(1E6) 7	A 1	(1D9) 12
STB	(1E6) 20	A 0	(3F5) 21
BUSY	(1F6) 17	+5VD	2
ISEL	(1E7) 14	RST IN	29
DIP SW DATA	(1E7) 27		
IFRD	(1G5) 27		
RST OUT	(3E6) 19		
TxD	(1B1) 6		
+5V	1		
+8V	28		
OV	16		
OV	15		
OV	30		
AC10V	(1D9) 11		
A 2	(1D9) 23		
A 1	(1D9) 12		
A 0	(3F5) 21		
+5VD	2		
RST IN	29		



Part Name	Circuit board revision No.	Rev.
SLMC-15 circuit board	16	16
SLSQ circuit board	3	3
SLPB circuit board	4	4

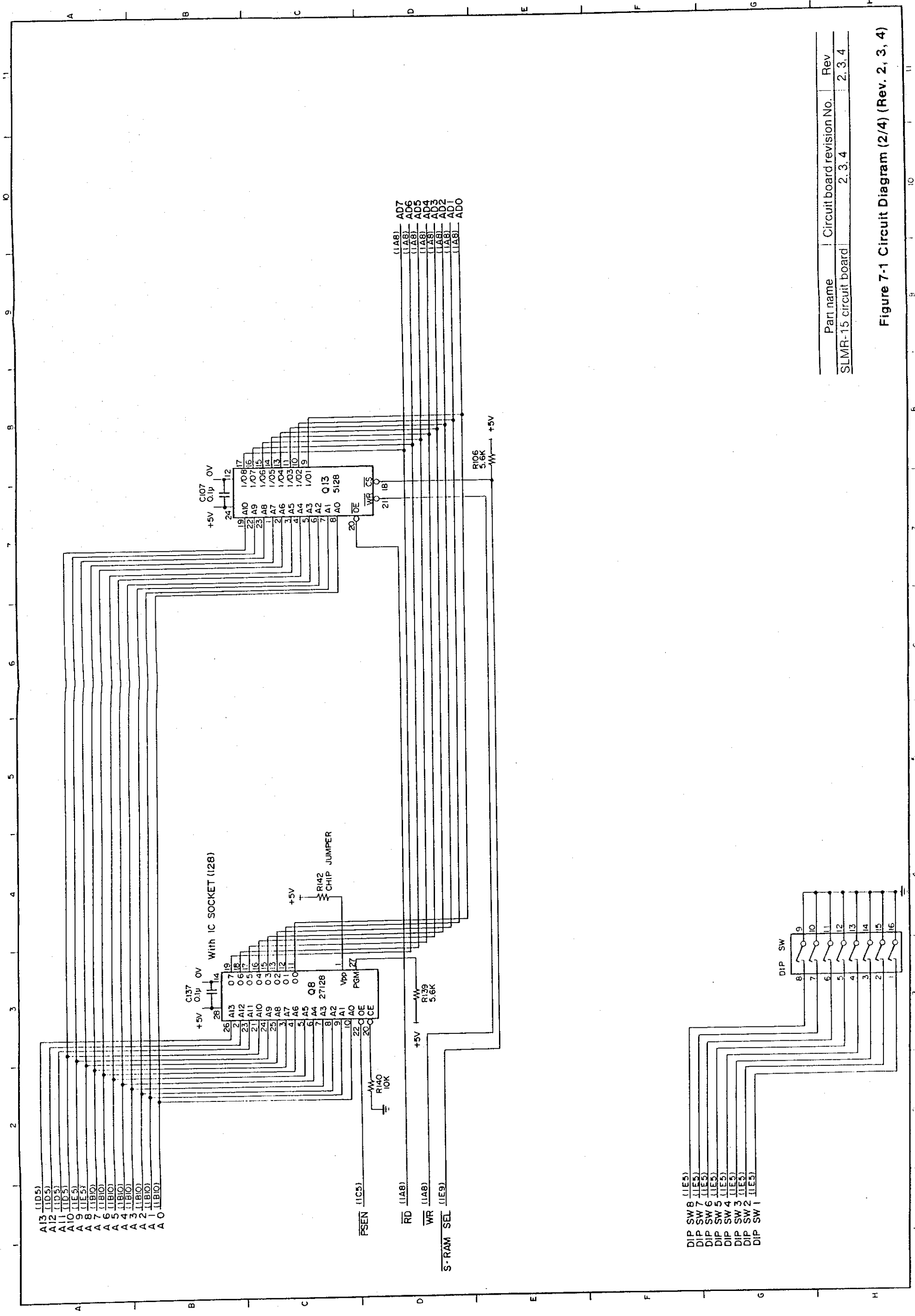
Circuit Diagram (4/4)



Note: Only the following portion varies depending on the revision No. of the circuit board.
 Revision 2 | 04-78 --- 0V (Broken line)
 Revision 3, 4 | 04-78 --- +5V (Solid line)

Part name | Circuit board revision No. | Rev
 SLMR-15 circuit board | 2, 3, 4 | 2, 3, 4

Figure 7-1 Circuit Diagram (1/4) (Rev. 2, 3, 4)



Part name	Circuit board revision No.	Rev
SLMR-15 circuit board	2, 3, 4	2, 3, 4

Figure 7-1 Circuit Diagram (2/4) (Rev. 2, 3, 4)

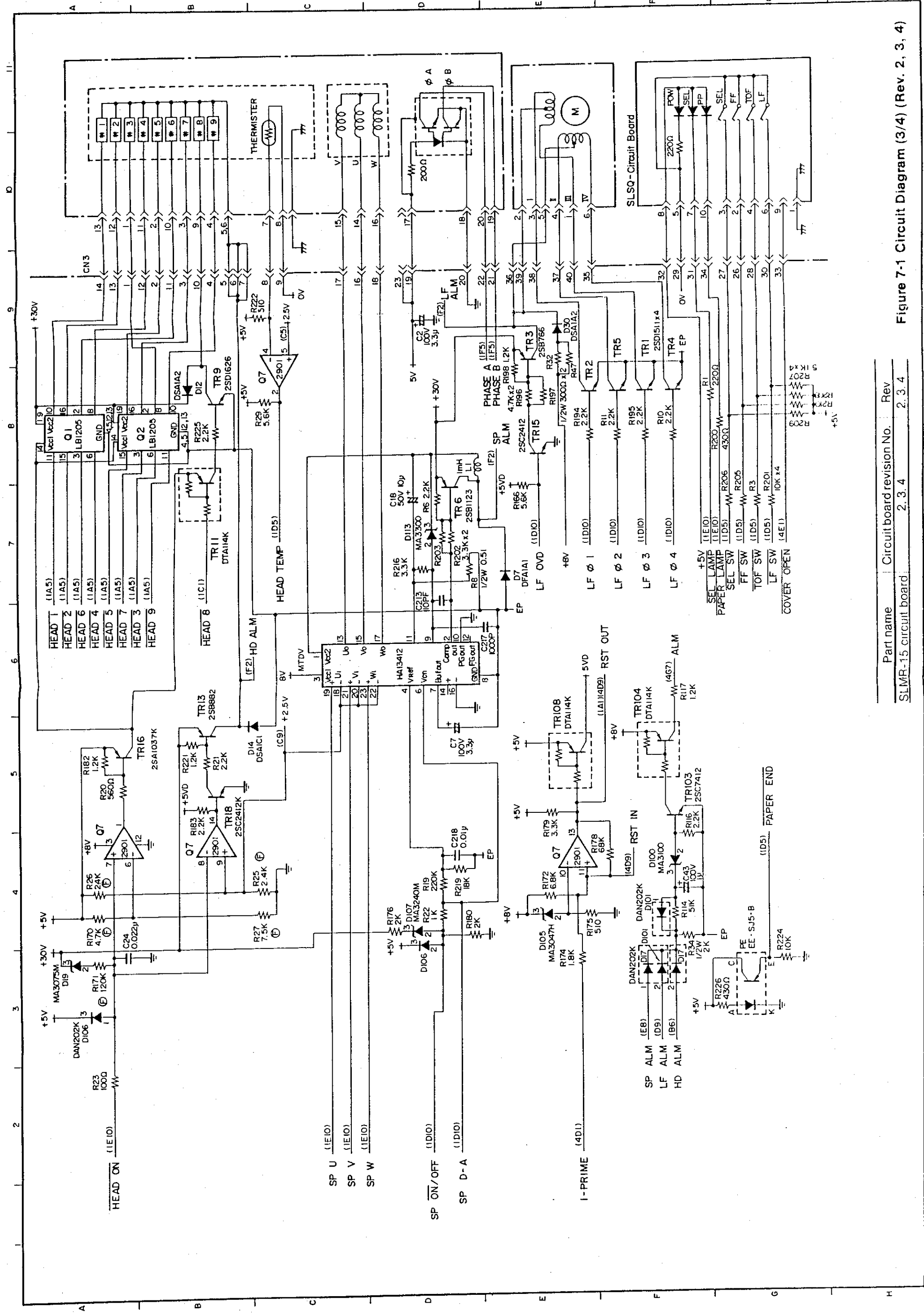
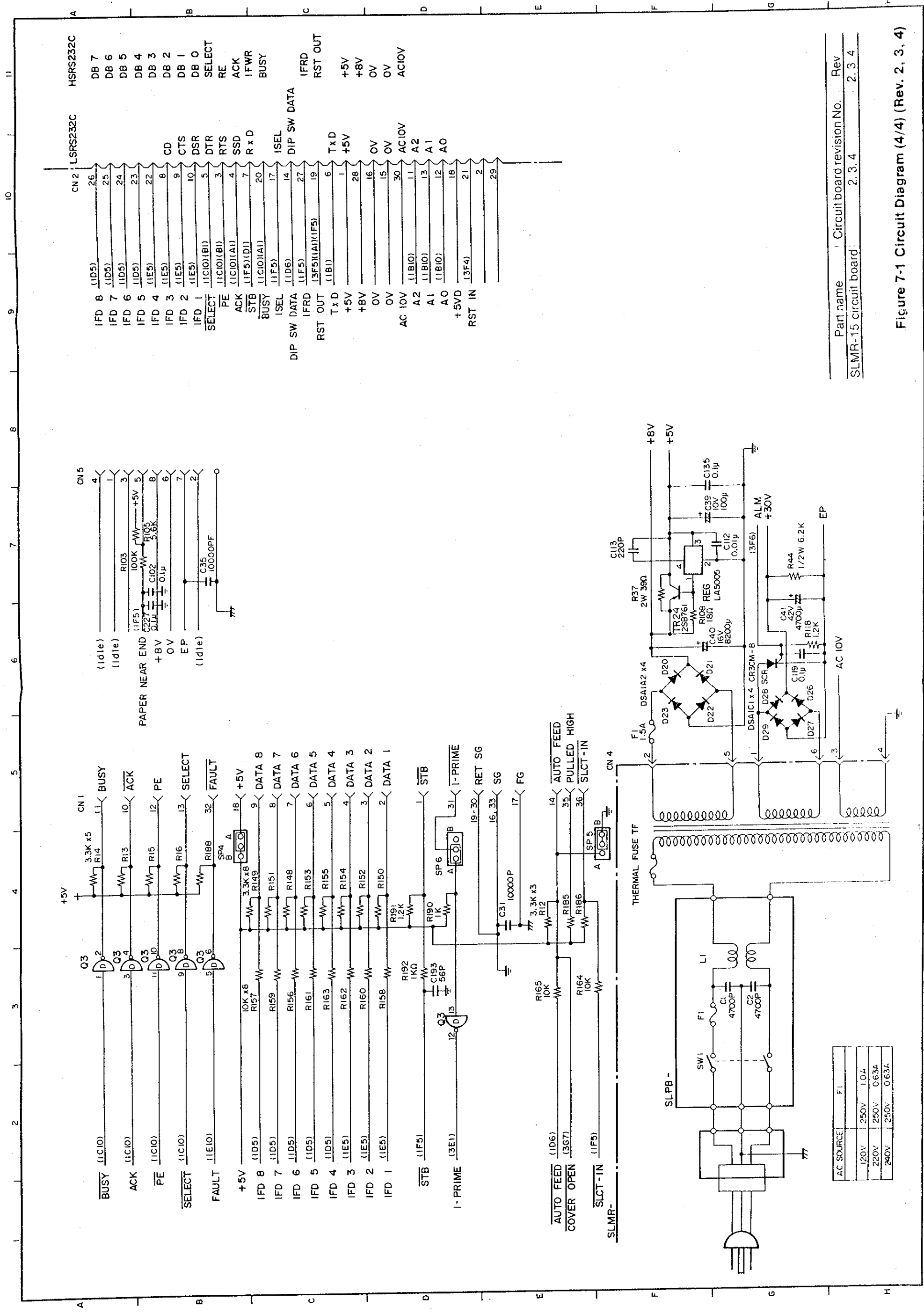


Figure 7-1 Circuit Diagram (3/4) (Rev. 2, 3, 4)

Part name	Circuit board revision No.	Rev
SLMR-15 circuit board	2.3.4	2.3.4

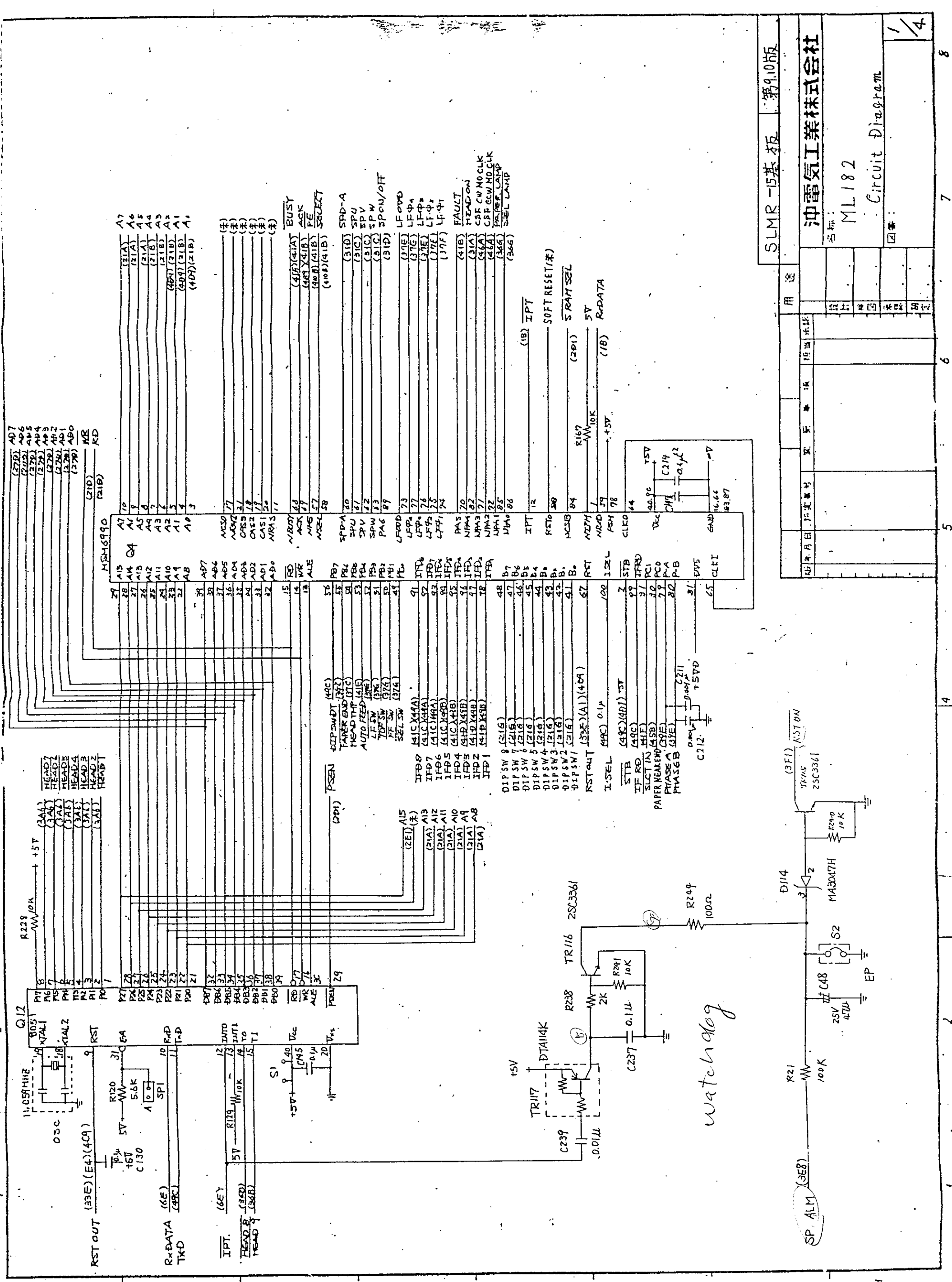


HSRS232C	LSRS232C
DB 7	26
DB 6	25
DB 5	24
DB 4	23
DB 3	22
DB 2	8
DB 1	9
DB 0	10
SELECT	5
RE	3
ACK	4
IFWR	7
BUSY	20
ISEL	17
DIP SW DATA	14
IFRD	19
RST OUT	6
+5V	1
+8V	28
OV	16
OV	15
ACIOV	30
ACIOV	11
A2	13
A1	12
AO	18
+5VD	21
RST IN	2
	29

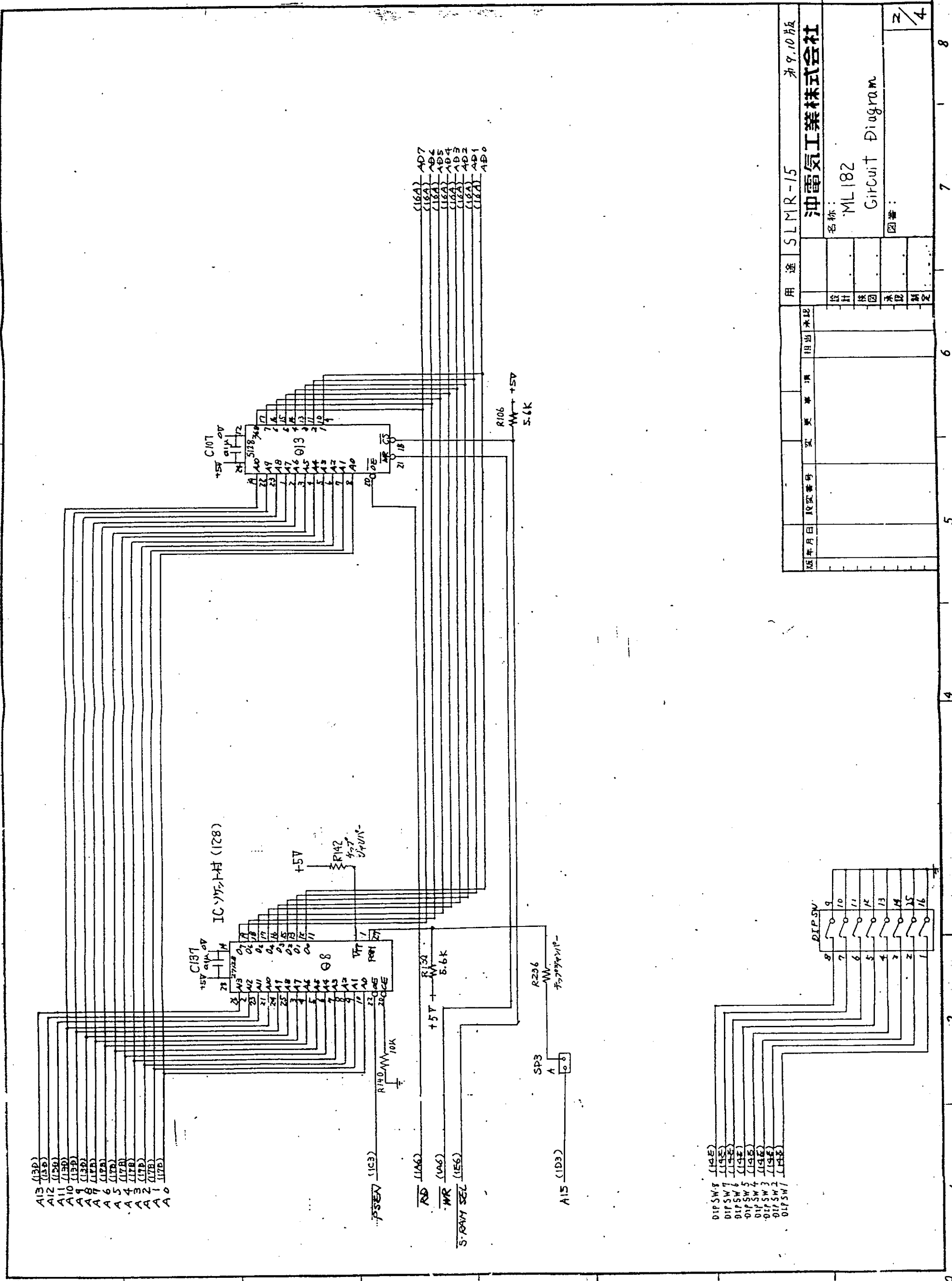
IFD 8	(ID5)
IFD 7	(ID5)
IFD 6	(ID5)
IFD 5	(ID5)
IFD 4	(IE5)
IFD 3	(IE5)
IFD 2	(IE5)
IFD 1	(IE5)
SELECT	(ICIO)(BI)
PE	(ICIO)(BI)
ACK	(ICIO)(AI)
STB	(IF5)(DI)
BUSY	(ICIO)(AI)
ISEL	(IF5)
DIP SW DATA	(ID6)
IFRD	(IF5)
TxD	(IBI)
+5V	
+8V	
OV	
OV	
ACIOV	
A1	(IBIO)
A2	(IBIO)
A0	(IBIO)
+5VD	(3F4)
RST IN	

Part name	Circuit board revision No.	Rev
SLMR-15 circuit board	2.3.4	2.3.4

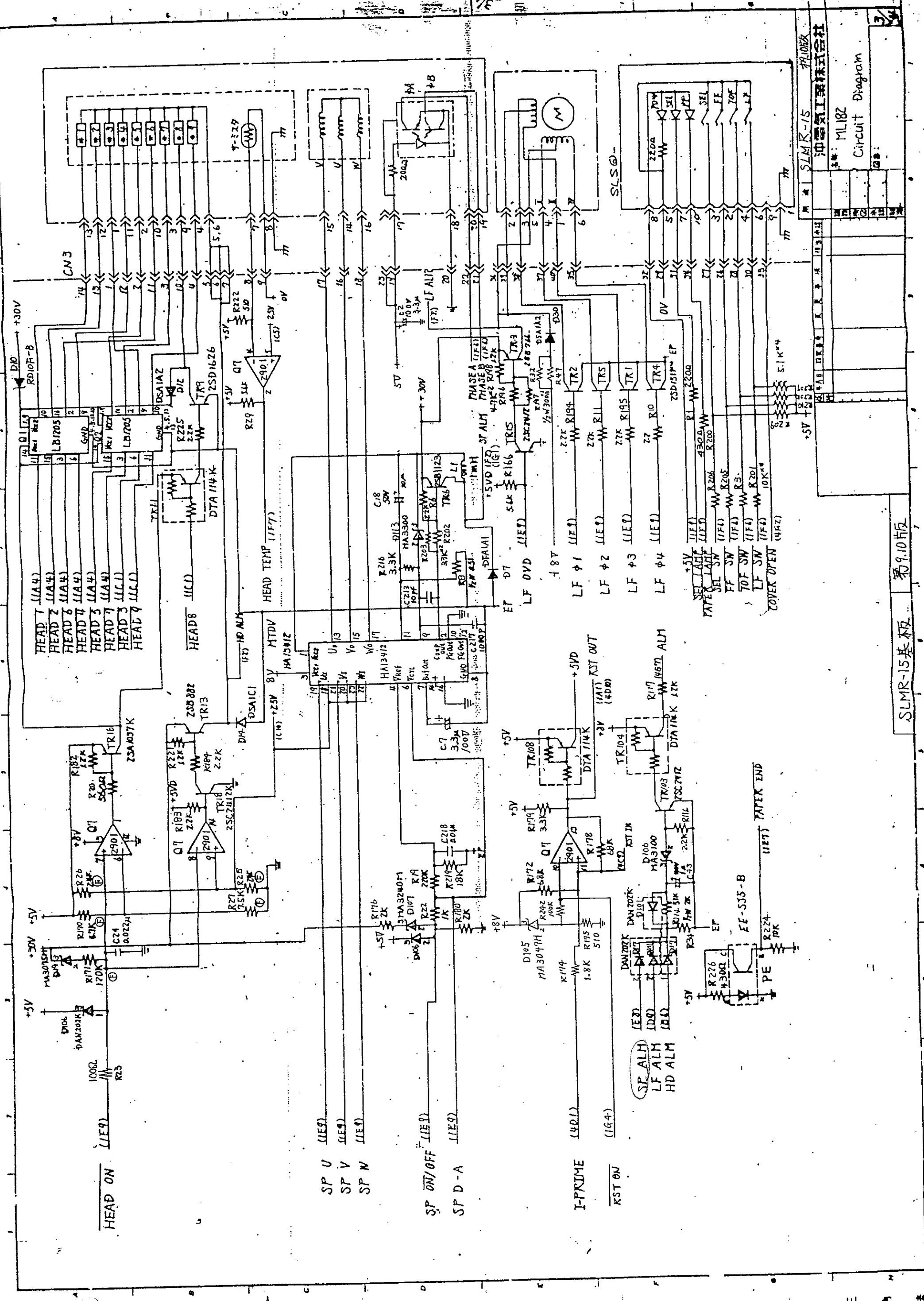
Figure 7-1 Circuit Diagram (4/4) (Rev. 2, 3, 4)



SLMR-15基板 第9.10版	
社名	沖電気工業株式会社
品名	ML182
図番	Circuit Diagram
図名	
製作者	
検査者	
承認者	
年月日	
部品番号	
実装	
検査	
部品	
検査	
部品	
検査	
部品	
検査	
部品	
検査	

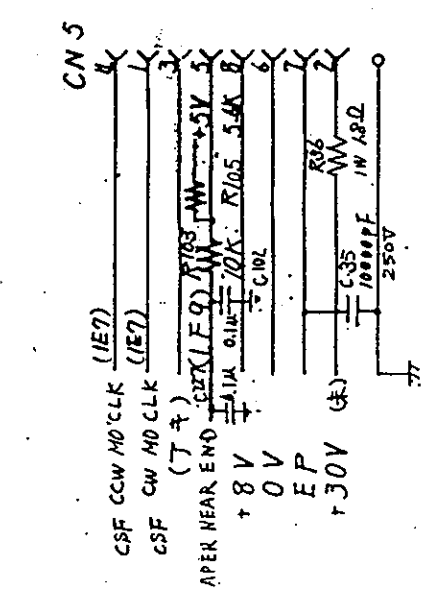
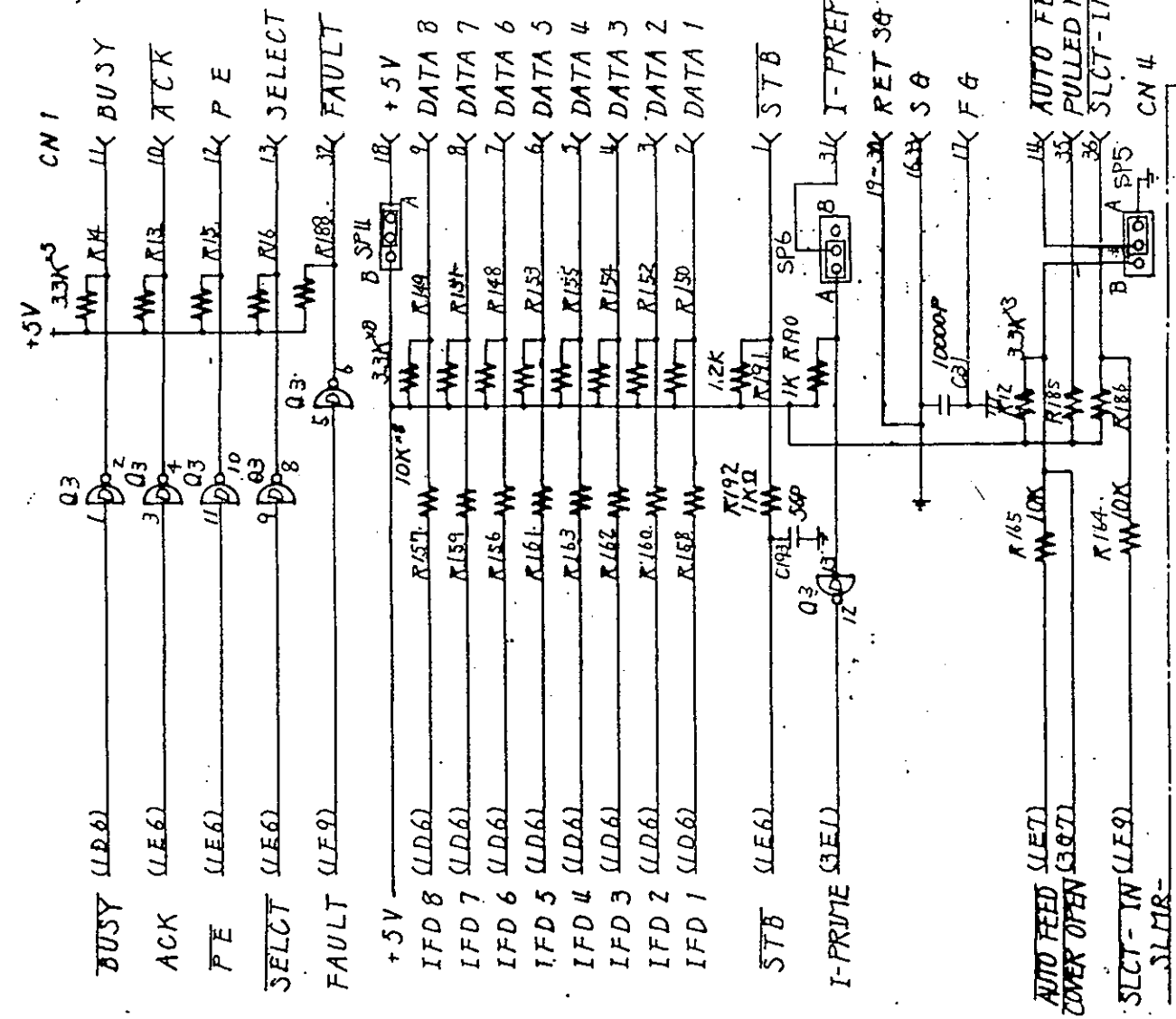


用途	SLMR-15	为9.10版
名称	ML182	冲雷气工業株式会社
图番	Circuit Diagram	
设计		
校图		
承認		
修改		
版年月日		
版回数		
変更事項		
出出未出		
1		
2		
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5		
6		
7		
8		



SLMR-15
 沖電気工業株式会社
 社名: ML18C
 Circuit Diagram

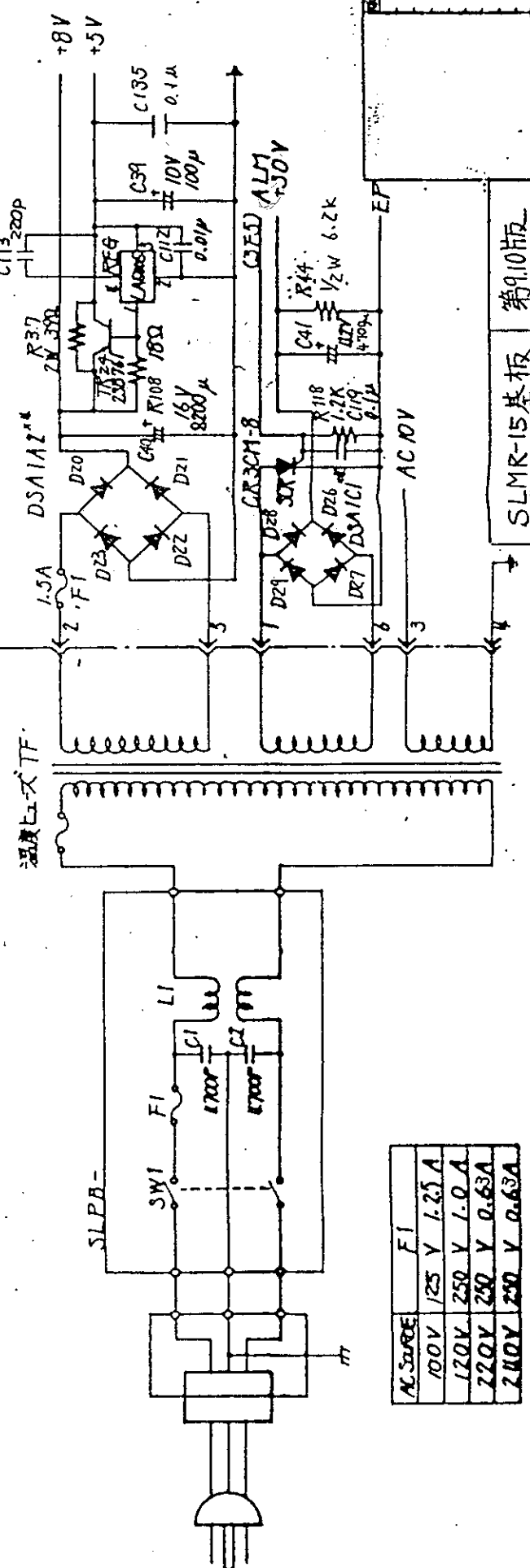
SLMR-15基本板 第9.10版



Signal	Pin	Connector	Signal	Pin	Connector
IFD 8	8	IFD 8	IFRD	27	(IF3)
IFD 7	7	IFD 7	RST OUT	19	(18)
IFD 6	6	IFD 6	TxD	1	(18)
IFD 5	5	IFD 5	+5V	28	(18)
IFD 4	4	IFD 4	+8V	16	(18)
IFD 3	3	IFD 3	0V	15	(18)
IFD 2	2	IFD 2	0V	30	(18)
IFD 1	1	IFD 1	AC10V	11	(18)
SELECT	1	SELECT	A2	11	(18)
PE	2	PE	A1	13	(18)
ACK	3	ACK	A0	12	(18)
CTB	4	CTB	+5VD	21	(18)
BUSY	5	BUSY	RST IN	29	(18)
ISEL	6	ISEL			
DIP SW DATA	7	DIP SW DATA			
IFRD	27	IFRD			
RST OUT	19	RST OUT			
TxD	1	TxD			
+5V	28	+5V			
+8V	16	+8V			
0V	15	0V			
0V	30	0V			
AC10V	11	AC10V			
A2	11	A2			
A1	13	A1			
A0	12	A0			
+5VD	21	+5VD			
RST IN	29	RST IN			

LSRS 232C HSRS 232C

DB 7	26
DB 6	25
DB 5	24
DB 4	23
DB 3	22
DB 2	8
DB 1	9
DB 0	10
RE	(107)(B1) 5
SELECT	(107)(B1) 3
PE	(107)(B1) 4
ACK	(107)(B1) 7
CTB	(107)(A1) 20
BUSY	(107) 17
ISEL	(107) 18
DIP SW DATA	(107) 27
IFRD	(107)(A5)(105) 19
RST OUT	(107) 6
TxD	1
+5V	28
+8V	16
0V	15
0V	30
AC10V	11
A2	11
A1	13
A0	12
+5VD	21
RST IN	29



AC Source	F1
100V	1.25A
120V	1.0A
220V	0.63A
240V	0.63A

SLMR-15 第9.10版

ML182
Circuit Diagram

8. MAINTENANCE PARTS LIST

8. MAINTENANCE PARTS LIST

Printer unit	Figure 8-1
Printer mechanism	Figure 8-2
Pin tractor assembly	Figure 8-3
SLMC-2 Printed circuit board	Figure 8-4
SLPB-Printed circuit board	Figure 8-5

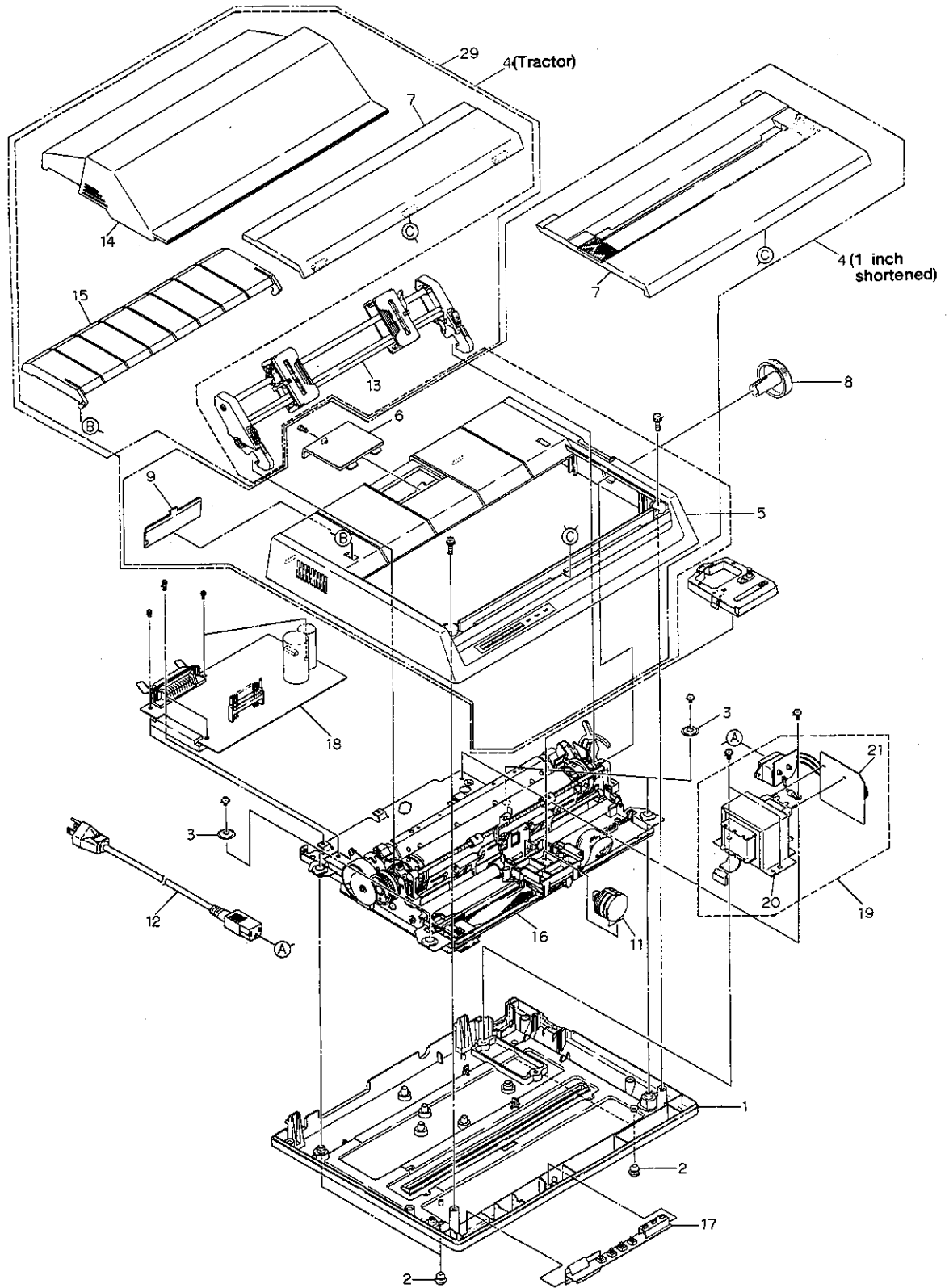


Figure 8-1 Printer Unit

Figure 8-1 Printer Unit

Item No.	Part No.	Description	Qty	Remarks
1	1PB4025-1121P1	Lower cover	1	ML182
1	1PB4025-1221P1	Lower cover	1	ML183
2	4PB4025-1137P1	Rubber foot	4	* (NOTE)
3	4PP4025-1152P1	Washer	4	*
4	3PA4025-1141G1	Upper cover assembly ^(1 inch shortened)	1	ML182
4	3PA4025-1226G1	Upper cover assembly (tractor)	1	ML183
5	3PP4025-1143G1	Upper cover	1	ML182
5	3PP4025-1227G1	Upper cover	1	ML183
6	4PB4025-1123P1	DIP switch access cover	1	*
7	3PA4025-1126G1	Access cover	1	ML182
7	2PB4025-1186P1	Access cover (tractor)	1	ML182 option
7	2PB4025-1187P1	Access cover (tractor)	1	ML183
8	4PB4025-1134P1	Platen knob	1	*
9	4PB4025-1124P1	Connector cover	1	*
11	4YA4025-1401G1	Print head	1	*
12	3YS4011-1051P1	AC cord	1	240 V
12	3YS4011-1052P1	AC cord	1	220 V
13	3PA4025-1311G1	Pin tractor assembly	1	ML182 option
13	3PA4025-1311G2	Pin tractor assembly	1	ML183
14	2PB4025-1130P1	Tractor cover	1	ML182 option
14	2PB4025-1130P2	Tractor cover	1	ML183
15	2PB4025-1188P1	Paper separator	1	ML182 option
15	2PB4025-1189P1	Paper separator	1	ML183
16	3YX4025-1010G1	Printer mechanism	1	ML182
16	3YX4025-1201G1	Printer mechanism	1	ML183
17	4YA4021-1007G1	SLSQ printed-circuit board	1	*
18	4YA4042-1001G012	SLMC-2 printed circuit board STD-I/F with EP ROM	1	ML182
18	4YA4042-1001G013	SLMC-2 printed circuit board IBM-I/F with EP ROM	1	ML182
18	4YA4042-1001G017	SLMC-2 printed circuit board for maintenance without ROM	1	*
18	4YA4042-1001G101	SLMC-2 printed circuit board STD-I/F with masked ROM	1	ML182
18	4YA4042-1001G102	SLMC-2 printed circuit board IBM-I/F with masked ROM	1	ML182
18	4YA4042-1001G103	SLMC-5 printed circuit board COMMODORE-I/F with EP ROM	1	ML182
18	4YA4042-1001G104	SLMC-6 printed circuit board TTY-I/F with EP ROM	1	ML182

Note: Parts indicated by * are common to both ML182 and ML183

Figure 8-1 (con.)

Item No.	Part No.	Description	Qty	Remarks
18	4YA4042-1001G042	SLMC-2 printed circuit board STD-I/F with EP ROM	1	ML183
18	4YA4042-1001G043	SLMC-2 printed circuit board IBM-I/F with EP ROM	1	ML183
19	3YX4021-1012G1	AC transformer assembly	1	ML182 (120 V)
19	3YX4021-1013G1	AC transformer assembly	1	ML182 (220 V)
19	3YX4021-1014G1	AC transformer assembly	1	ML182 (240 V)
19	3YX4021-1012G2	AC transformer assembly	1	ML183 (120 V)
19	3YX4021-1013G2	AC transformer assembly	1	ML183 (220 V)
19	3YX4021-1014G2	AC transformer assembly	1	ML183 (240 V)
20	3LP-45474-1	Transformer	1	ML182 (120 V)
20	3LP-45475-1	Transformer	1	ML182 (220 V)
20	3LP-45483-1	Transformer	1	ML182 (240 V)
20	3LP-45474-2	Transformer	1	ML183 (120 V)
20	3LP-45475-2	Transformer	1	ML183 (220 V)
20	3LP-45483-2	Transformer	1	ML183 (240 V)
21	3YU5003-5611G2	SLPB-2 printed-circuit board	1	120 V
21	3YU5003-5611G3	SLPB-3 printed-circuit board	1	220 V
21	3YU5003-5611G4	SLPB-4 printed-circuit board	1	240 V
29	4YA4025-1709G1	Pin tractor OPTION KIT	1	Option

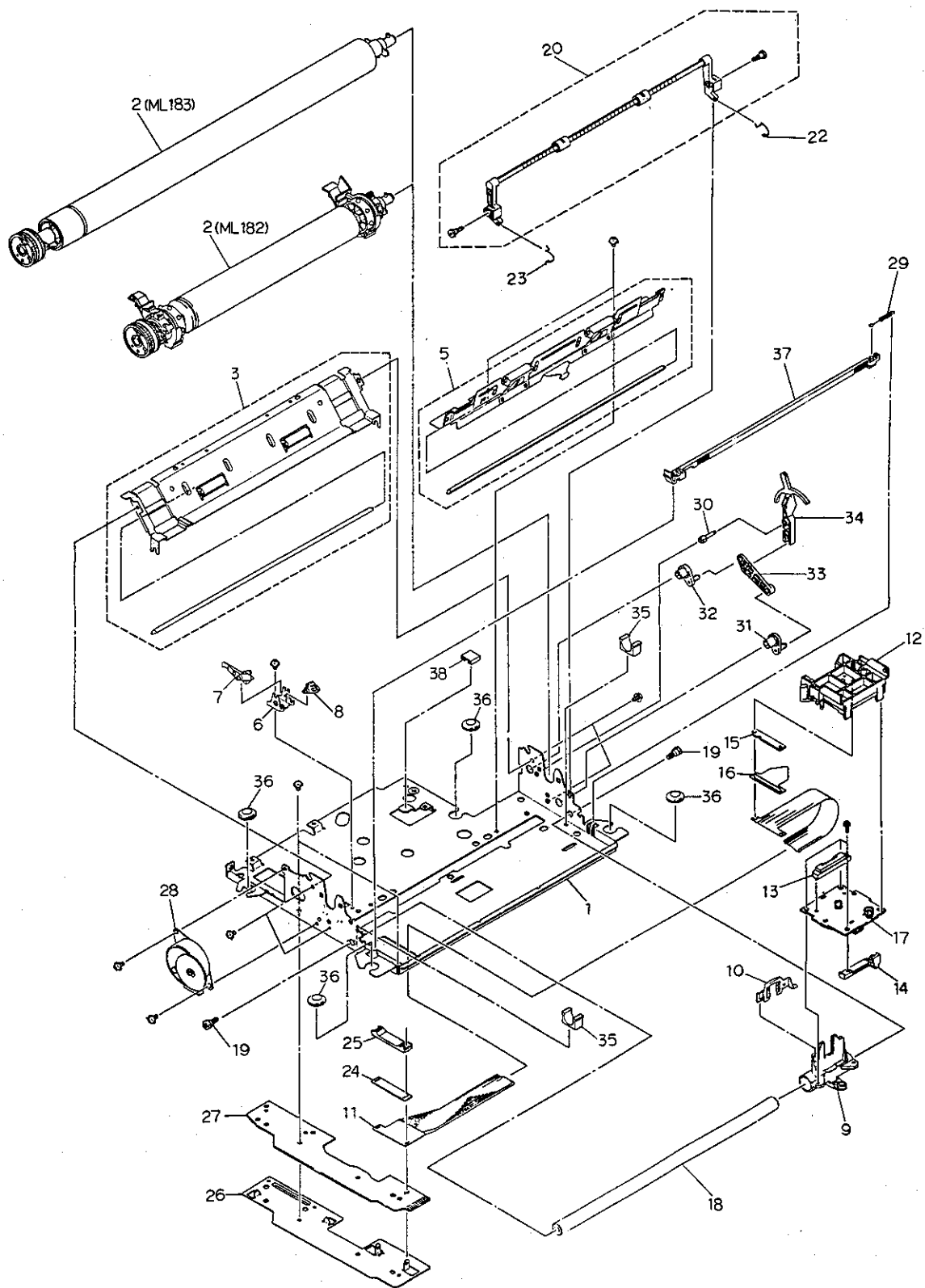


Figure 8-2 Printer Mechanism

Figure 8-2 Printer Mechanism

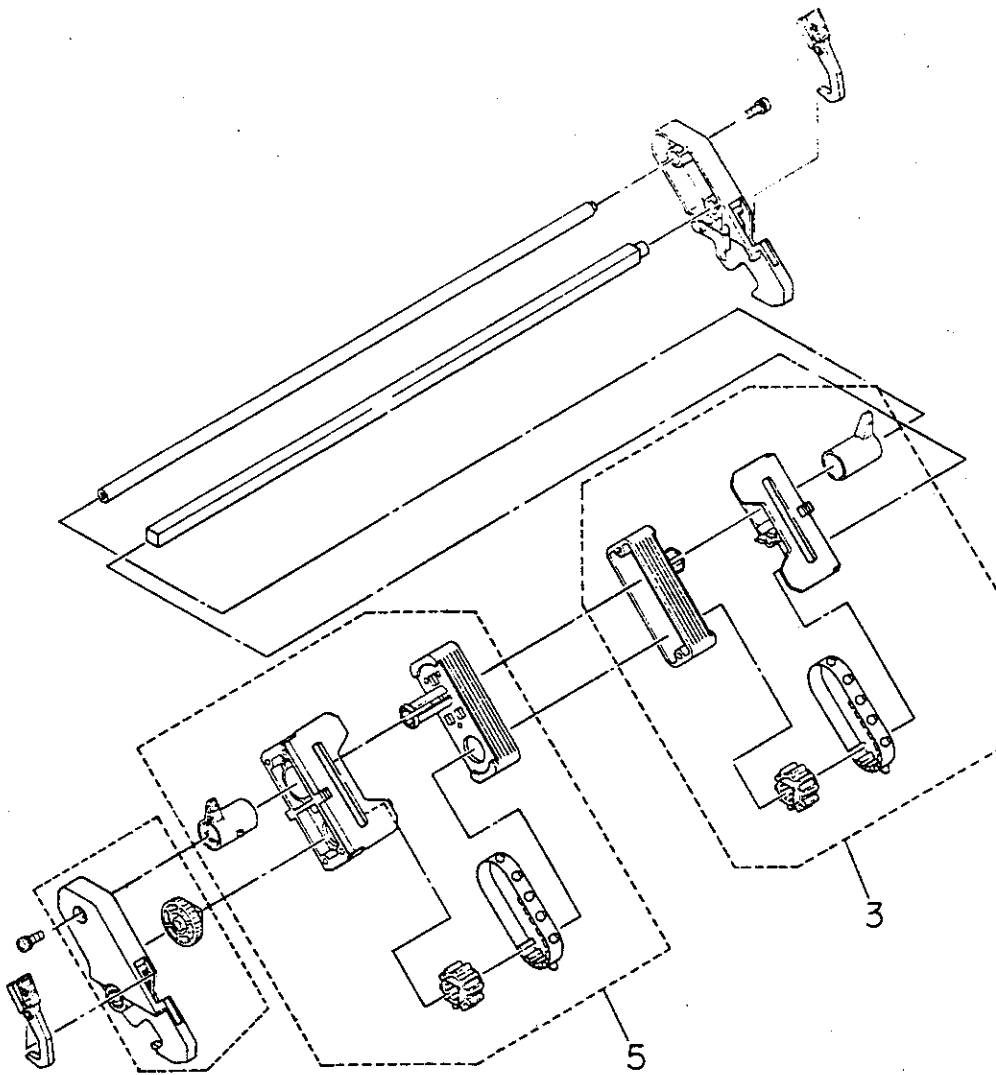
Item No.	Part No.	Description	Qty	Remarks
1	1PP4025-1011P1	Base frame	1	ML182
1	1PP4025-1202P1	Base frame	1	ML183
2	4PA4025-1012G1	Platen assembly	1	ML182
2	4PA4025-1203G1	Platen assembly	1	ML183
3	3PA4025-1027G1	Paper chute assembly	1	ML182
3	3PA4025-1205G1	Paper chute assembly	1	ML183
5	3PA4025-1032G1	Bottom paper guide assembly	1	ML182
5	3PA4025-1207G1	Bottom paper guide assembly	1	ML183
6	4PP4025-1038P1	Near-end bracket	1	* (NOTE)
7	4PB4025-1039P1	Near-end lever	1	ML182
7	4PB4025-1211P1	Near-end lever	1	ML183
8	4PB4025-1040P1	Bottom near-end lever	1	*
9	4PP4025-1118G1	Carriage roller	1	*
10	4PP4025-1048P1	Head clamp	1	*
11	2PU4007-1004P1	Carriage cable	1	ML182
11	2PU4007-1004P2	Carriage cable	1	ML183
12	4PA4025-1075G1	Ribbon feed gear assembly	1	*
13	3PB4025-1116P1	Connector	1	*
14	4PB4025-1088P1	Slider	1	*
15	4PP4025-1114P1	Contact pressure rubber	1	*
16	4PP4025-1182P1	Cable clamp	1	*
17	4YX4025-1800G1	Space motor assembly	1	*
18	4PB4025-1089P1	Carriage shaft	1	ML182
18	4PB4025-1089P2	Carriage shaft	1	ML183
19	4PB4025-1090P1	Main shaft screw	2	*
20	4PA4025-1091G1	Indicator assembly	1	ML182
20	4PA4025-1091G2	Indicator assembly	1	ML183
22	4PB4025-1097P1	Pressure roller spring (R)	1	*
23	4PB4025-1098P1	Pressure roller spring (L)	1	*
24	4PP4025-1099P1	Contact rubber	1	*
25	4PB4025-1100P1	Cord clamp	1	*
26	3PP4025-1103P1	Circuit support	1	*
27	2PU4003-5624P1	SLBS printed-circuit board	1	*
28	4PB4025-1105P1	LF motor	1	*
29	4PB4025-1106P1	Tension spring	1	*

Note: Parts indicated by * are common to both ML182 and ML183

Figure 8-2 (con.)

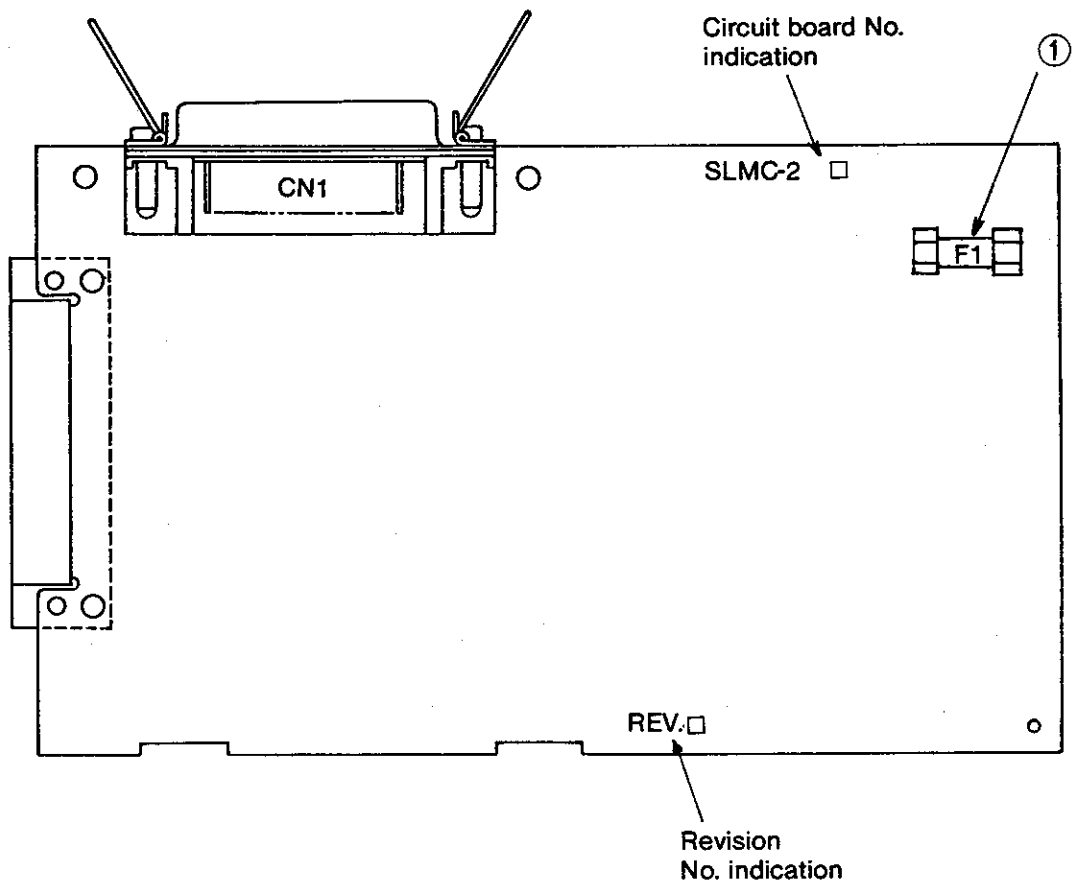
Item No.	Part No.	Description	Qty	Remarks
30	4PB4025-1107P1	Release post	1	* (NOTE)
31	4PB4025-1108P1	Release link (front)	1	*
32	4PB4025-1109P1	Release link (rear)	1	*
33	4PB4025-1110P1	Release link	1	*
34	4PB4025-1113P1	Paper lock release lever	1	*
35	4PB4025-1115P1	Stopper rubber	2	*
36	4PB4025-1159P1	Grommet	4	*
37	3PB4025-1049P1	Space rack	1	ML182
37	3PB4025-1049P2	Space rack	1	ML183
38	4PP4025-1158P1	Radiating rubber	1	*

Note: Parts indicated by * are common to both ML182 and ML 183



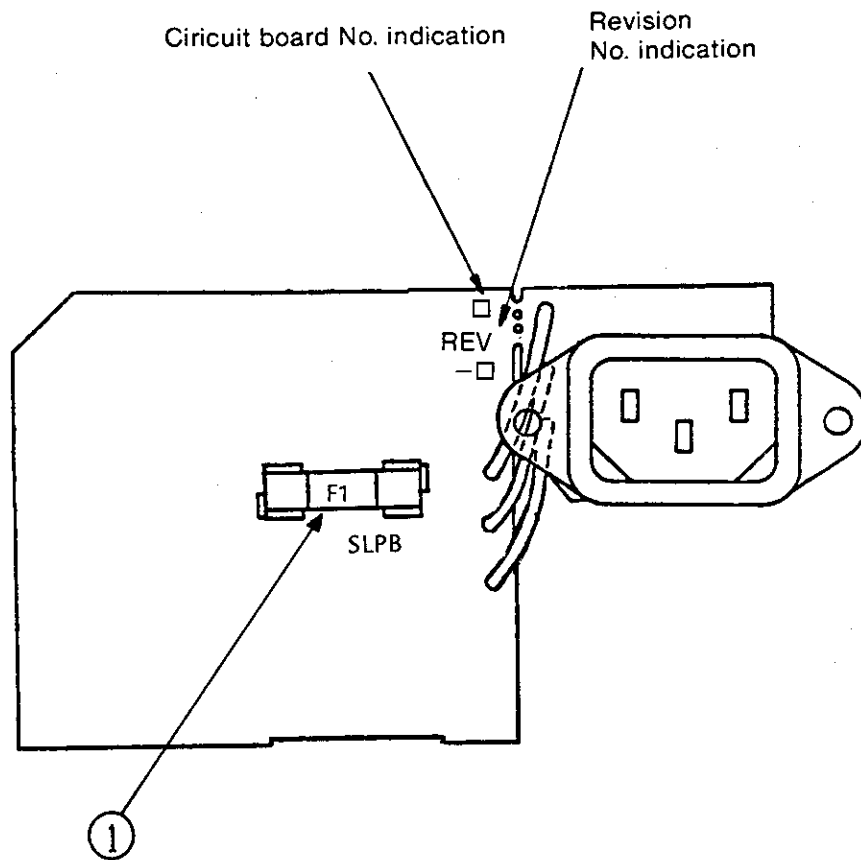
Item No.	Part No.	Description	Qty	Remarks
3	4PA4025-1315G1	Pin tractor assembly (R)	1	(ML182 option)
5	4PA4025-1328G1	Pin tractor assembly (L)	1	(ML182 option)

Figure 8-3 Pin Tractor Assembly (Option)



Item No.	Part No.	Description	Qty	Remarks
1	540A2036M1152	Fuse 1.5A	1	

Figure 8-4 SLMC-2 Printed-Circuit Board



Item No.	Part No.	Description	Qty	Remarks
1	540A2036M2102	Fuse 1.0A	1	G2 120V
1	540A2044S2631	Fuse 0.63A	1	G3 220V
1	540A2044S2501	Fuse 0.5A	1	G4 240V

Figure 8-5 SLPB Printed-Circuit Board

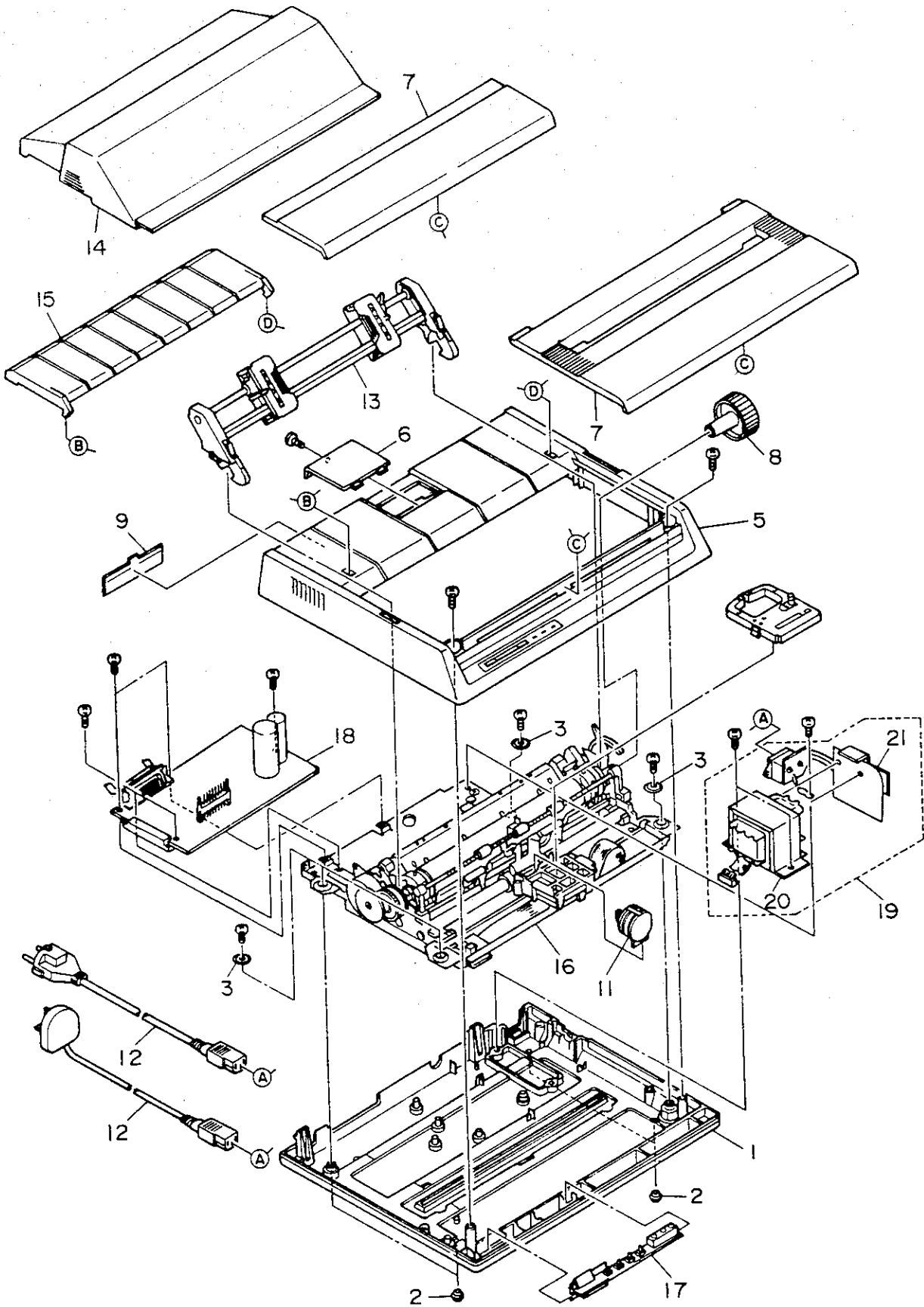


Figure 8-1 Printer Unit

Figure 8-1 Printer Unit

Item No.	Part No.	Description	Qty	Remarks
1	1PB4025-1121P1	Lower cover	1	ML182
1	1PB4025-1221P1	Lower cover	1	ML183
2	4PB4025-1137P1	Rubber foot	4	*(Note)
3	4PP4025-1152P1	Washer	4	*
5	3PP4025-1143G1	Upper cover	1	ML182
5	3PP4025-1227G1	Upper cover	1	ML183
6	4PB4025-1123P1	DIP switch access cover	1	*
△7	3PA4017-3044G1	Access cover	1	ML182
△7	2PB4017-3048P1	Access cover (tractor)	1	ML182 option
△7	2PB4017-3056P1	Access cover (tractor)	1	ML183
8	3PB4025-2156P3	Platen knob	1	*
9	4PB4017-3046P1	Connector cover	1	*
11	4YA4025-1401G1	Print head	1	*
12	3YS4011-1051P1	AC cord	1	240 V
12	3YS4011-1052P1	AC cord	1	220 V
13	3PA4025-2633G1	Pin tractor assembly	1	ML182 option
13	3PA4025-2633G2	Pin tractor assembly	1	ML183
14	2PB4025-1130P1	Tractor cover	1	ML182 option
14	2PB4025-1130P2	Tractor cover	1	ML183
△15	3PA4025-1268G1	Paper separator	1	ML182
△15	3PA4025-1269G1	Paper separator	1	ML183
△16	3YX4025-1010G2	Printer mechanism	1	ML182
△16	3YX4025-1201G2	Printer mechanism	1	ML183
17	4YA4021-1007G1	SLSQ printed circuit board	1	*
△18	4YA4042-1001G012	SLMR-15 printed circuit board STD-I/F with EP ROM	1	ML182
△18	4YA4042-1001G013	SLMR-15 printed circuit board IBM-1/F with EP ROM	1	ML182
△18	4YA4042-1001G112	SLMR-15 printed circuit board for maintenance without ROM	1	*
△18	4YA4042-1001G103	SLMR-5 printed circuit board COMMODORE—I/F with EP ROM	1	ML182
△18	4YA4042-1001G104	SLMR-6 printed circuit board TTY-I/F with EP ROM	1	ML182

Note: Parts indicated by * are common to both ML182 and ML183

△ : Correction
 △ : Changed

Figure 8-1 (con.)

Item No.	Part No.	Description	Qty	Remarks
△18	4YA4042-1001G042	SLMR-15 printed circuit board STD-I/F with EP ROM	1	ML183
△18	4YA4042-1001G043	SLMR-15 printed circuit board IBM-I/F with EP ROM	1	ML183
19	3YX4021-1012G1	AC transformer assembly	1	ML182 (120 V)
19	3YX4021-1032G1	AC transformer assembly	1	ML182 (220 V/240 V)
19	3YX4021-1012G2	AC transformer assembly	1	ML183 (120 V)
△19	3YX4021-1032G2	AC transformer assembly	1	ML183 (220 V/240 V)
20	3LP-45474-1	Transformer	1	ML182 (120 V)
20	4YB4021-1031P1	Universal Transformer	1	ML182 (220 V/240 V)
20	3LP-45474-2	Transformer	1	ML183 (120 V)
20	4YB4021-1031P2	Universal Transformer	1	ML183 (220 V/240 V)
21	3YU5003-5611G2	SLPB-2 printed-circuit board	1	120 V
21	3YU5003-5611G3	SLPB-3 printed-circuit board	1	220 V/240 V

△: Correction

△: Changed

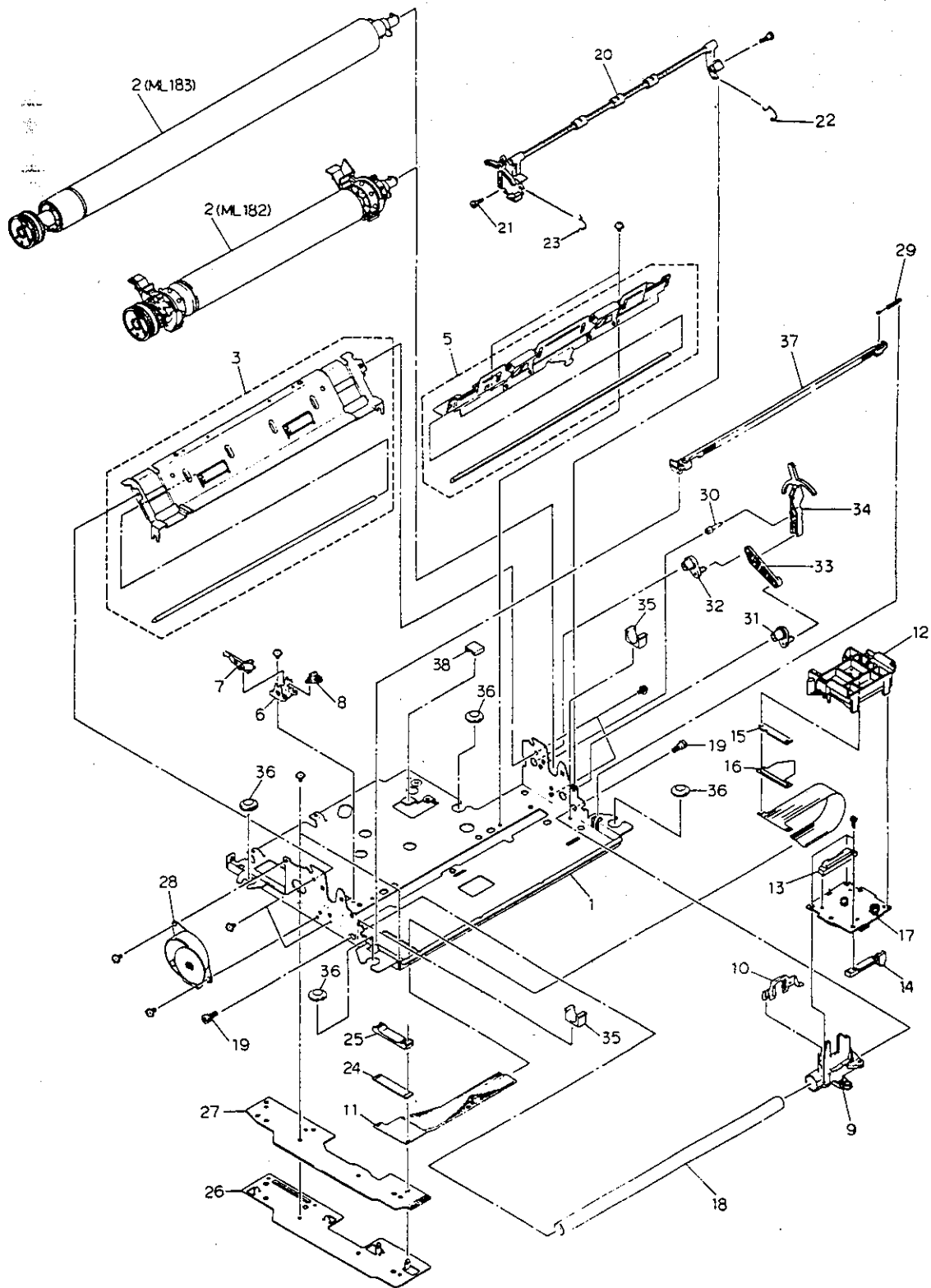


Figure 8-2 Printer Mechanism

Figure 8-2 Printer Mechanism

Item No.	Part No.	Description	Qty	Remarks
1	1PP4025-1011P1	Base frame	1	ML182
1	1PP4025-1202P1	Base frame	1	ML183
2	4PA4025-1012G1	Platen assembly	1	ML182
2	4PA4025-1203G1	Platen assembly	1	ML183
3	3PA4025-1027G1	Paper chute assembly	1	ML182
3	3PA4025-1205G1	Paper chute assembly	1	ML183
5	3PA4025-1032G1	Bottom paper guide assembly	1	ML182
5	3PA4025-1207G1	Bottom paper guide assembly	1	ML183
6	4PP4025-1038P1	Near-end bracket	1	* (NOTE)
7	4PB4025-1039P1	Near-end lever	1	ML182
7	4PB4025-1211P1	Near-end lever	1	ML183
8	4PB4025-1040P1	Bottom near-end lever	1	*
9	4PP4025-1118G1	Carriage roller	1	*
10	4PP4025-1048P1	Head clamp	1	*
△11	2PU4007-1065P1	Carriage cable	1	ML182
△11	2PU4007-1065P2	Carriage cable	1	ML183
12	4PA4025-1075G1	Ribbon feed gear assembly	1	*
13	3PB4025-1116P1	Connector	1	*
14	4PB4025-1088P1	Slider	1	*
15	4PP4025-1114P1	Contact pressure rubber	1	*
16	4PP4025-1182P1	Cable clamp	1	*
17	4YX4025-1800G1	Space motor assembly	1	*
18	4PB4025-1089P1	Carriage shaft	1	ML182
18	4PB4025-1089P2	Carriage shaft	1	ML183
19	4PB4025-1090P1	Main shaft screw	2	*
△20	3PA4025-2102G1	Indicator assembly	1	ML182
△20	3PA4025-2410G2	Indicator assembly	1	ML183
22	4PB4025-1097P1	Pressure roller spring (R)	1	ML182
22	4PB4025-2413P1	Pressure roller spring (R)	1	ML183
23	4PB4025-1139P1	Pressure roller spring (L)	1	ML182
24	4PB4025-2412P1	Pressure roller spring (L)	1	ML183
24	4PP4025-1099P1	Contact rubber	1	*
25	4PB4025-1100P1	Cord clamp	1	*
26	3PP4025-1103P1	Circuit support	1	*
27	2PU4003-5624P1	SLBS printed-circuit board	1	*

Note: Parts indicated by * are common to both ML182 and ML183

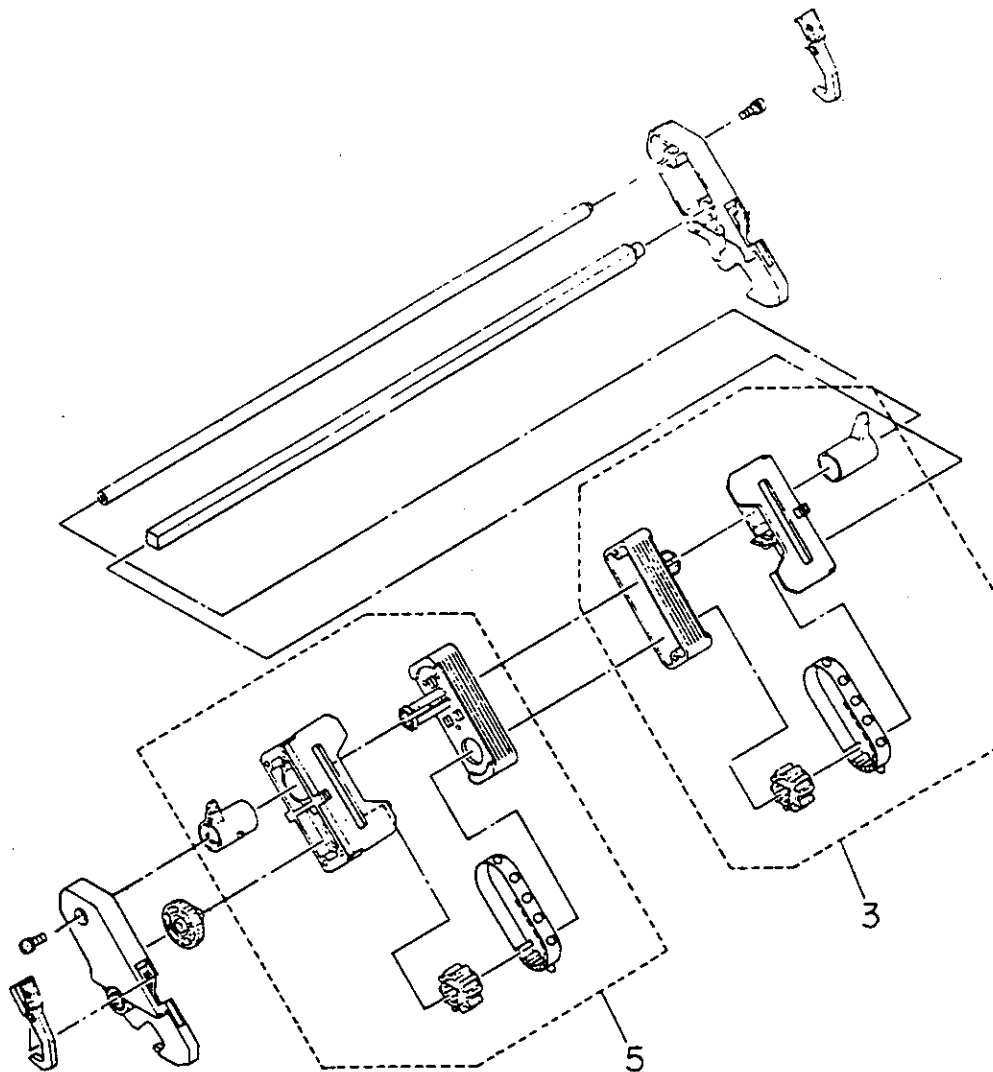
△ : Correction
 △ : Changed

Figure 8-2 (con.)

Item No.	Part No.	Description	Qty	Remarks
28	4PB4025-1105P1	LF motor	1	*
29	4PB4025-1106P1	Tension spring	1	*
30	4PB4025-1107P1	Release post	1	* (NOTE)
31	4PB4025-1108P1	Release link (front)	1	*
32	4PB4025-1109P1	Release link (rear)	1	*
33	4PB4025-1110P1	Release link	1	*
34	4PB4025-1113P1	Paper lock release lever	1	*
35	4PB4025-1115P1	Stopper rubber	2	*
36	4PB4025-1159P1	Grommet	4	*
37	3PB4025-1049P1	Space rack	1	ML182
37	3PB4025-1049P2	Space rack	1	ML183
38	4PP4025-1158P1	Radiating rubber	1	*

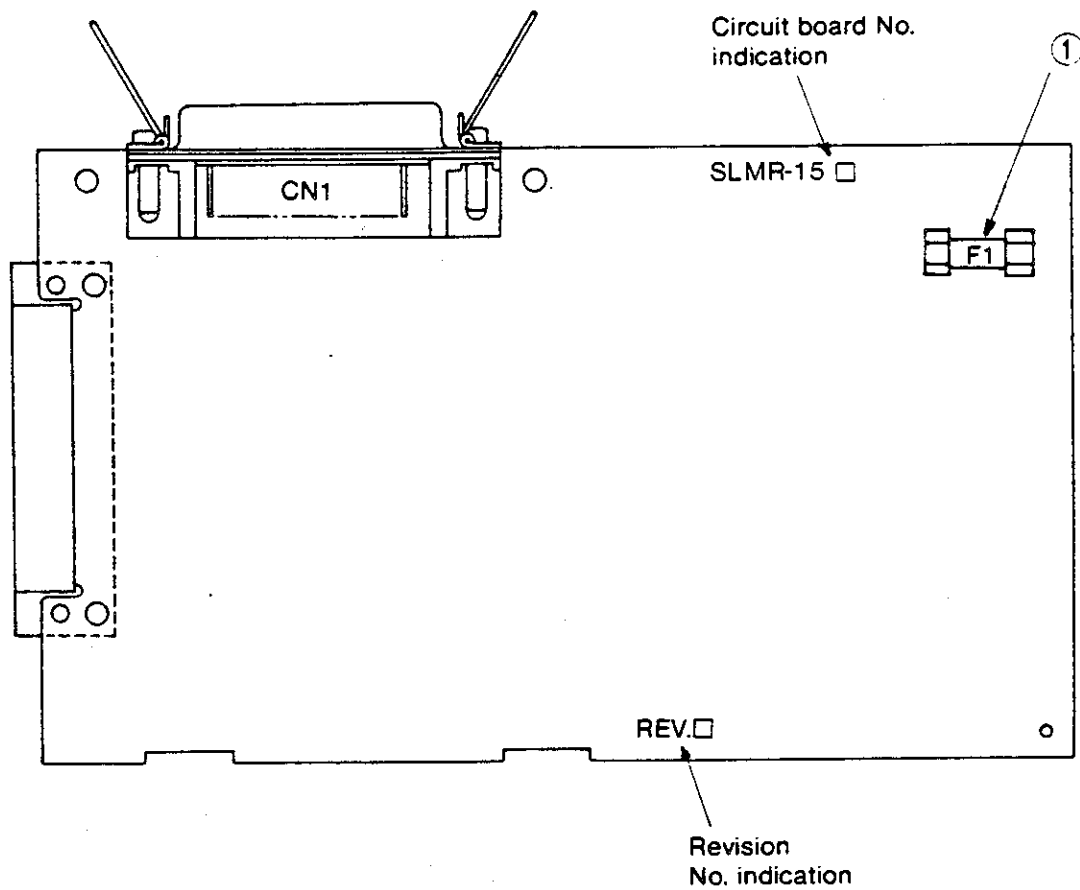
Note: Parts indicated by * are common to both ML182 and ML183

When replacing the indicator assembly from an old model (4PA4025-1091G1, 4PA4025-1091G2), to a new model (4PA4025-2102G1, 4BA4025-2410G2), the pressure roller spring and upper cover must also be replaced at the same time.



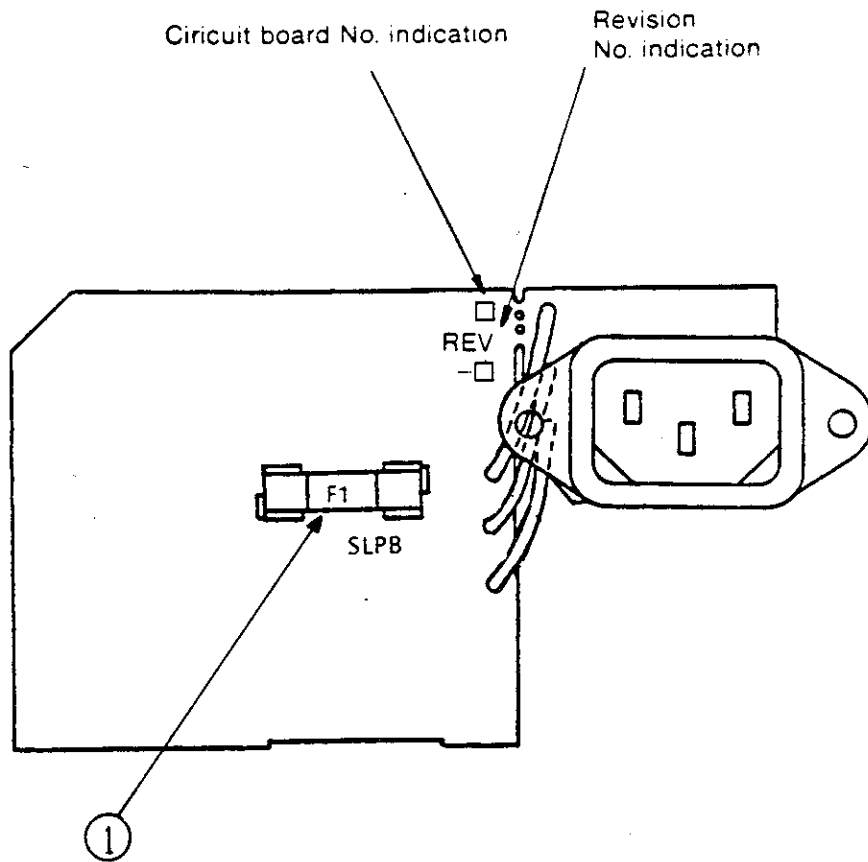
Item No.	Part No.	Description	Qty	Remarks
3	4PA4025-1315G1	Pin tractor assembly (R)	1	(ML182 option)
5	4PA4025-1328G1	Pin tractor assembly (L)	1	(ML182 option)

Figure 8-3 Pin Tractor Assembly (Option)



Item No.	Part No.	Description	Qty	Remarks
1	540A2045M1152	Fuse 1.5A	1	

Figure 8-4 SLMR-15 Printed-Circuit Board



Item No.	Part No.	Description	Qty	Remarks
1	540A2036M2102	Fuse 1.0A	1	G2 120V
1	540A2044S2631	Fuse 0.63A	1	G3 220V/240V

Figure 8-5 SLPB Printed-Curciut Board

APPENDIX A.

Theory of Operation

APPENDIX A THEORY OF OPERATION

1. CIRCUIT OPERATION

This section describes the operation of the printer circuits.

1.1 General

The electrical section of the printer consists of the components shown in figure 1.

On the control board are mounted not only the microprocessor and its peripheral circuits but also the DC power circuit, drive circuits, paper end sensor, and interface connector.

The power supply is connected with the control circuit via a cable, and other electrical parts are connected via the connection board.

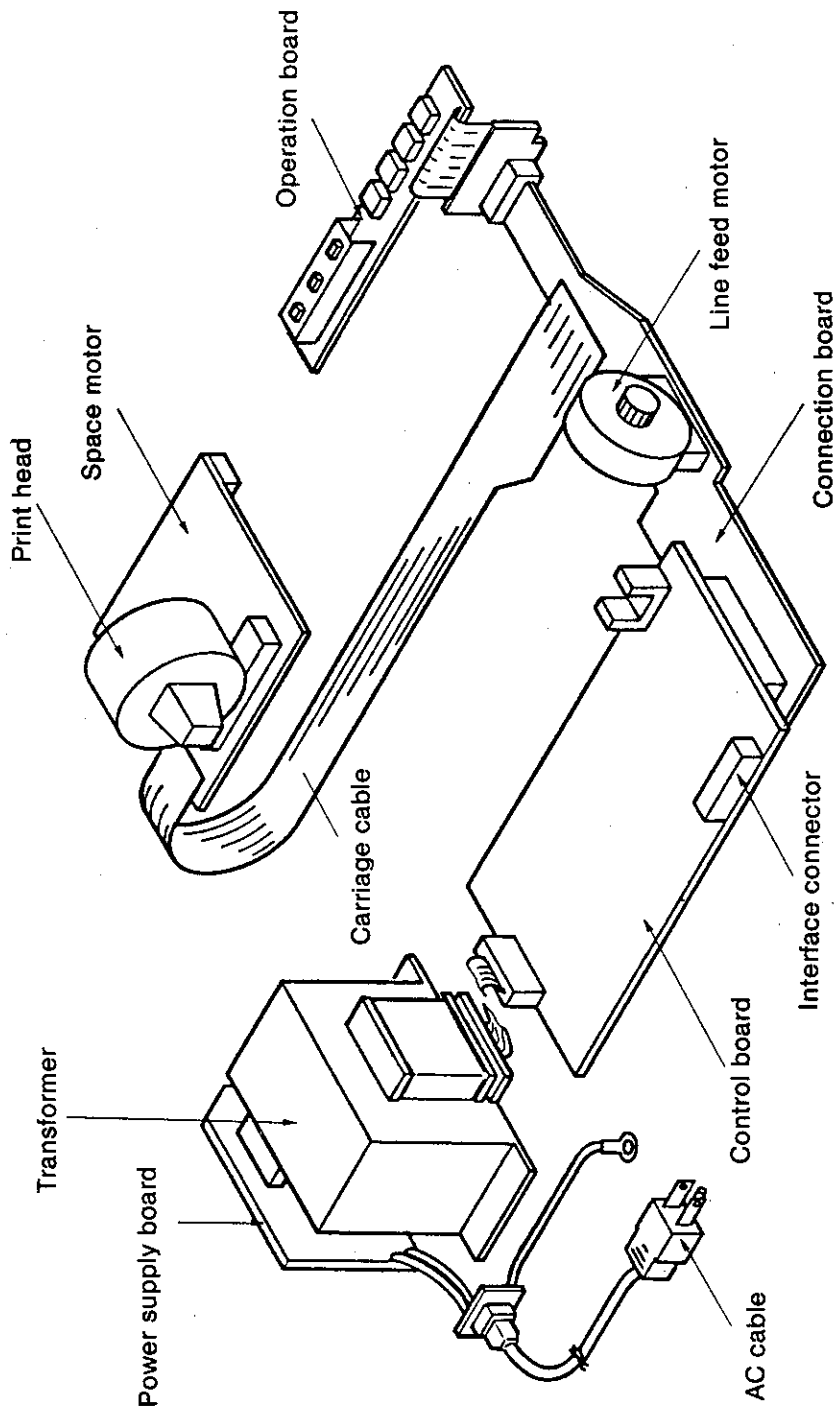


Figure 1 Configuration of Electrical Section

1.2 Microprocessor and Its Peripheral Circuits

(1) Microprocessor (Q12: 8051)

The microprocessor is the nucleus of the control circuit, and its peripheral circuits operate under control of this microprocessor.

The I/O ports of the microprocessor are connected with the address bus, data bus, and control lines.

(2) Program ROM (Q8)

The program ROM stores the control program for the printer. The microprocessor operates under control of this program.

(3) RAM (Q13)

The RAM stores data such as received print data.

(4) LSI (MSM60201)

The MSM60201 is an external interface LSI, and has the following functions:

(a) Parallel interface function

The parallel interface function mode is selected when the level of the mode selection signal (ISEL) is high. In this mode, IFD1 to 8 are used as an input port, and the parallel data received through the interface connector is latched in accordance with the strobe signal (\overline{STB}) and is sent to the CPU in accordance with the \overline{RD} signal. In this mode, the MSM60201 also sends \overline{BUSY} , \overline{ACK} , \overline{PE} , and \overline{SELECT} signals to the interface connector in accordance with the \overline{WR} signal.

(b) Serial interface function

The ISEL signal goes low and the serial interface function mode is selected only when the high-speed serial interface board (9600 BPS) is installed.

In this mode, the MSM60201 sends \overline{SSD} , \overline{RTS} , and DTR signals to the interface connector in accordance with the \overline{WR} signal.

(c) Address decoder

The address decoder decodes the address signal (A12 to A15), and sends the $\overline{ROM SEL 0}$ signal.

(d) Parallel port function

This function is used to load the DIP switch data.

(5) LSI (MSM61048)

The MSM61048 motor control LSI has the following functions:

(a) Space motor speed control function

This accelerates and decelerates the space motor in accordance with commands from the microprocessor and controls the space motor speed in each printing mode.

(b) Dot timing generation function

This generates the dot-on timing signal (\overline{IPT}), synchronized with the printing speed in accordance with output signals (PHASE A, B) of the encoder on the space motor, and sends this timing information to the microprocessor.

(c) I/O ports

The MSM61048 has a 12-bit output port and a 10-bit input port, and outputs control signals in accordance with the commands input from the microprocessor.

The input port is also used to read information from the operation panel switches, etc.

If a high-speed serial interface board (9600 BPS) is installed, the input port is also used to read the DIP switch data from the interface board.

(d) Address latch

The address latch latches the low-order 8 bits of the address (A0 to A7). These bits are used as an address for read/write operations with peripheral devices.

(e) Address decoder

The address decoder decodes the address signal (A11 to A15) and sends the $\overline{RAM\ SEL\ 4}$ signal.

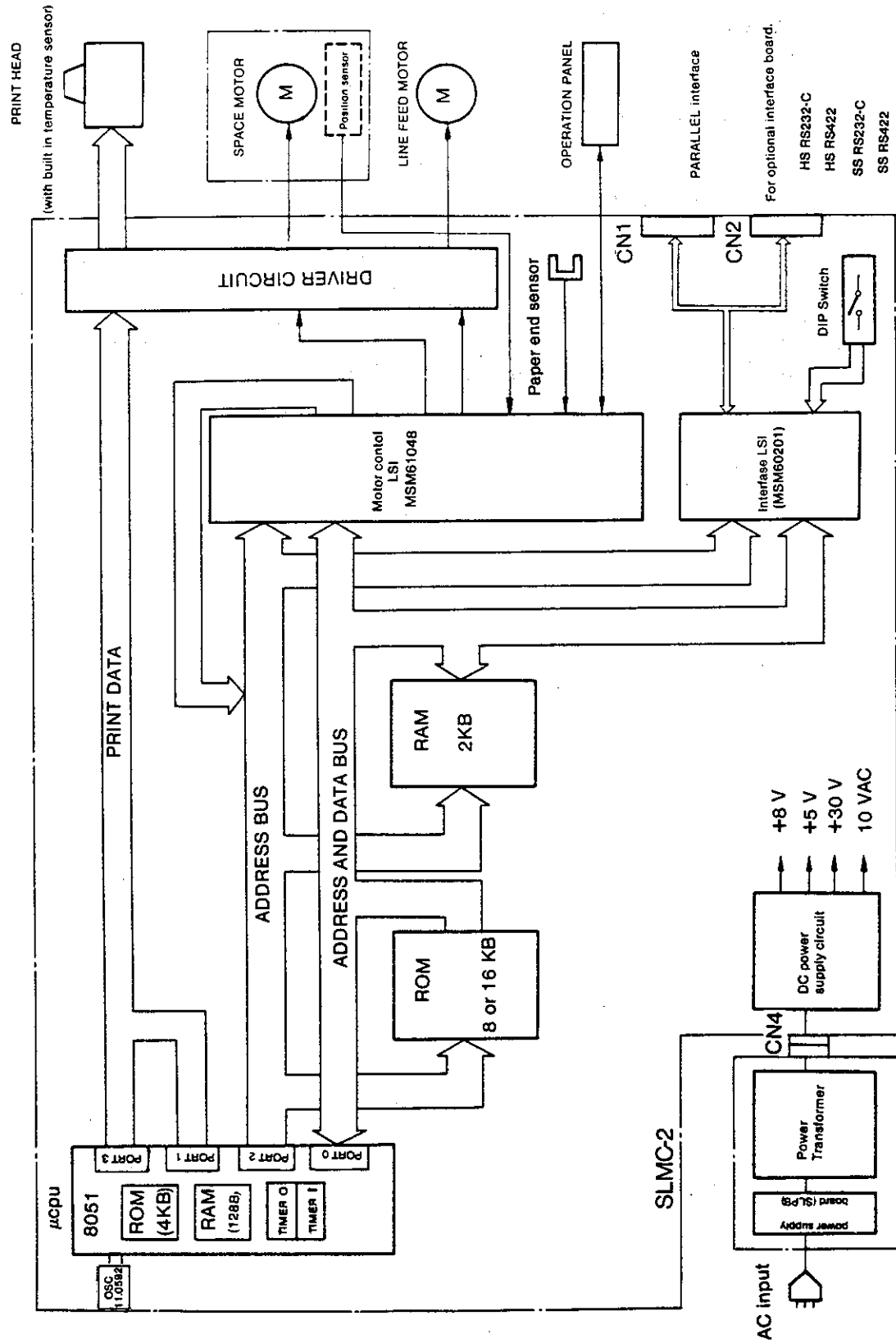


Figure 2 Block Diagram

1.3 Initialization

The printer is initialized when the power is turned on or when the parallel interface signal, I-PRIME, is received from the host computer.

Initialization is started with the RST OUT signal output from the reset circuit (Q7 pin 13) to reset Q12 (microprocessor), Q4 (interface LSI), and Q5 (motor control LSI).

When resetting is completed, the program starts with mode setting of Q12, Q4, and Q5, memory (ROM and RAM) check, RAM initialization, and then carriage homing. The program finally establishes the interface signals (output of ACK signal, BUSY signal, etc.), lights the SELECT indicator, and informs the host computer that the printer is ready for data reception (in the data reception wait state), thus completing the initialization.

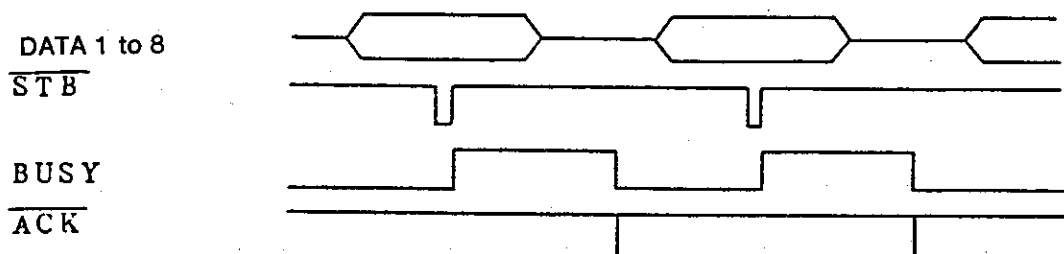
1.4 Interface Control

(1) Parallel interface

The data from the interface is input through the connector (CN1), and the interface LSI (Q4: MSM60201) latches this input data in sync with the \overline{STB} signal.

The BUSY signal is on during processing of this data. When the processing is completed, the BUSY signal is turned off, and an \overline{ACK} signal is sent to request the next data.

The BUSY signal is also sent to stop data sending when data cannot be received due to receiving buffer full state, etc.



(2) Serial interface

If the high-speed (9600 BPS) serial interface board is installed, the ISEL signal becomes low, and the interface LSI changes the I/O port to that for serial interface.

In reception, serial data from serial interface board is input through pin 33 (NSTB) of the LSI(Q4). This data is output from pin 44 (NRXD) via the internal latch, and is sent to serial port pin 10 (RXD) of the microprocessor (Q12).

In sending, the serial data is sent out directly from pin 11 (TXD) of the microprocessor.

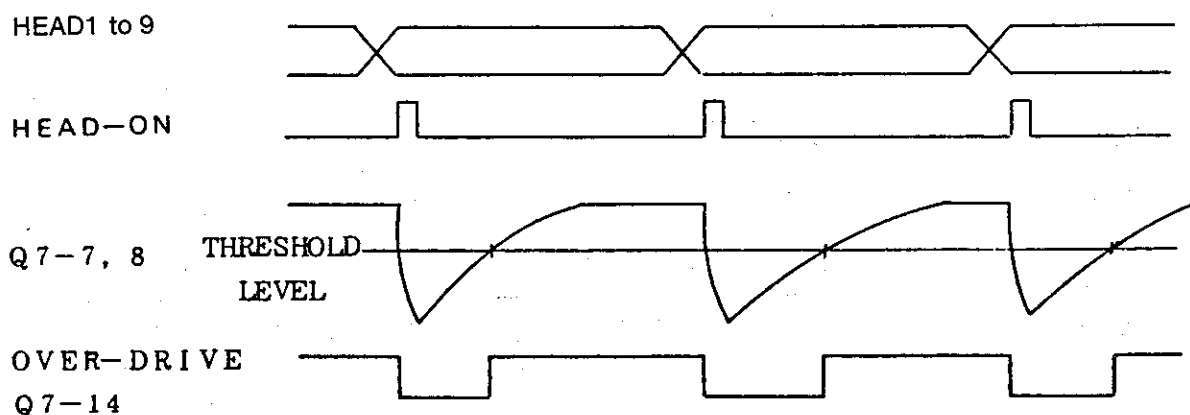
Refer to the High-Speed (9600 BPS) Serial Interface Manual for details.

1.5 Print Head Drive Circuit

This circuit drives the head magnets corresponding to the HEAD DATA1 to 9 signals in accordance with the HEAD-ON signal, thus making the print head print characters.

When the HEAD-ON signal goes high, the RC integrator (R157, and C158 or C55) determines the head drive time. This integrator automatically compensates the printing pressure in accordance with the drive voltage (+30 V).

That is, the integrator elongates the drive time if the drive voltage lowers, and shortens the drive time if the drive voltage rises.



1.6 Spacing

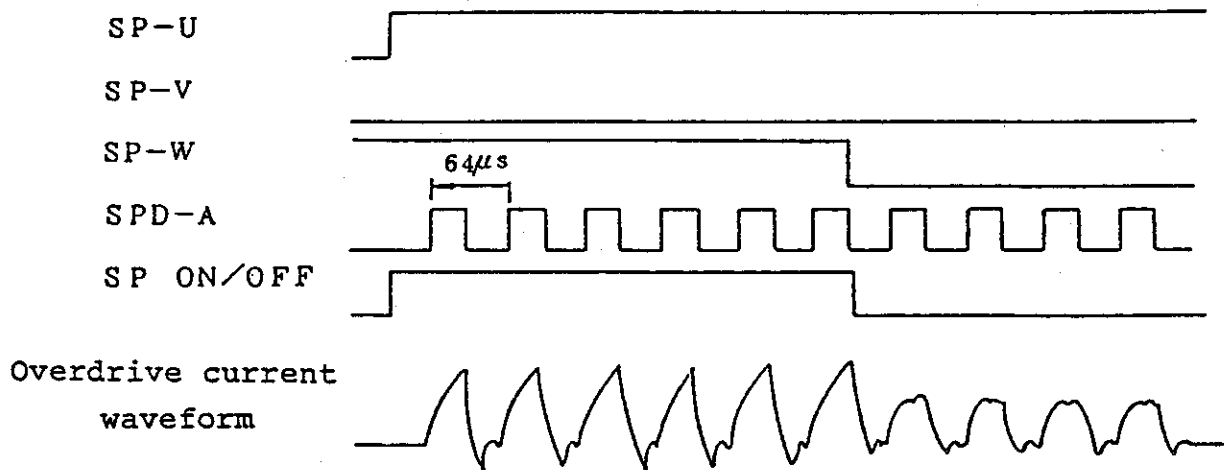
(1) Space motor control

The motor control LSI (Q5: MSM61048) outputs the space motor phase signals (SP-U, SP-V, and SP-W) in accordance with the spacing command from the microprocessor, and at the same time outputs the overdrive signal (SPD-A).

The SPD-A signal is a fixed-period pulse signal whose pulse width is controllable by the program, and is used to control the motor drive time.

The SP ON/OFF signal is output for acceleration and deceleration requiring a larger torque.

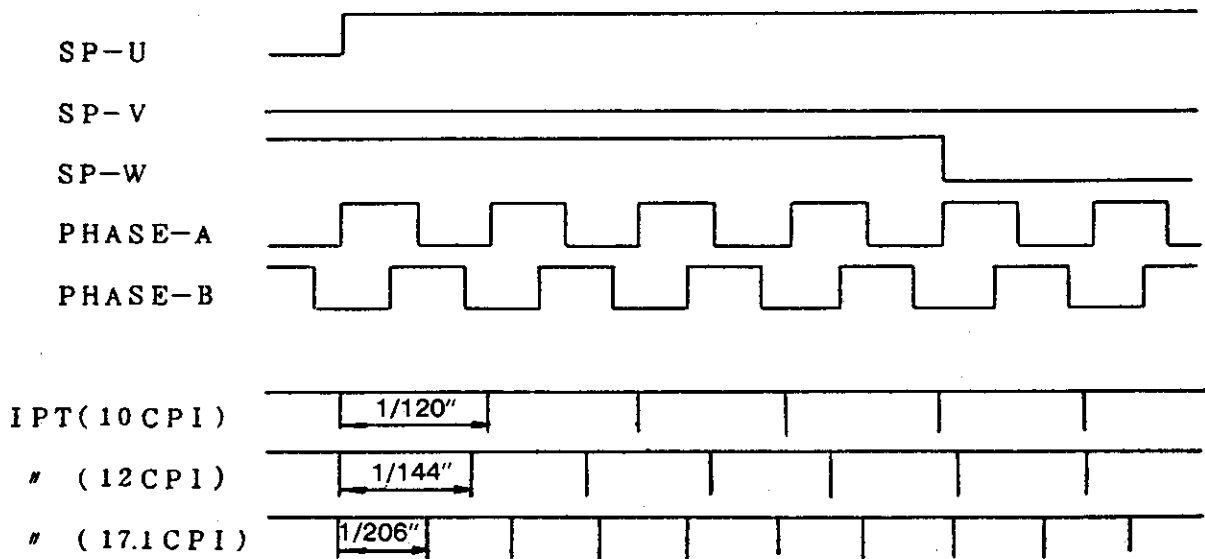
The motor driver (MTDV) drives the space motor in accordance with these signals. Pins 9 and 11 of the MTDV are for the protective circuits against overvoltage and overcurrent, respectively.



(2) Slit encoder

With operation of the space motor, the PHASE-A and PHASE-B signals are generated by the photosensor and disk slit.

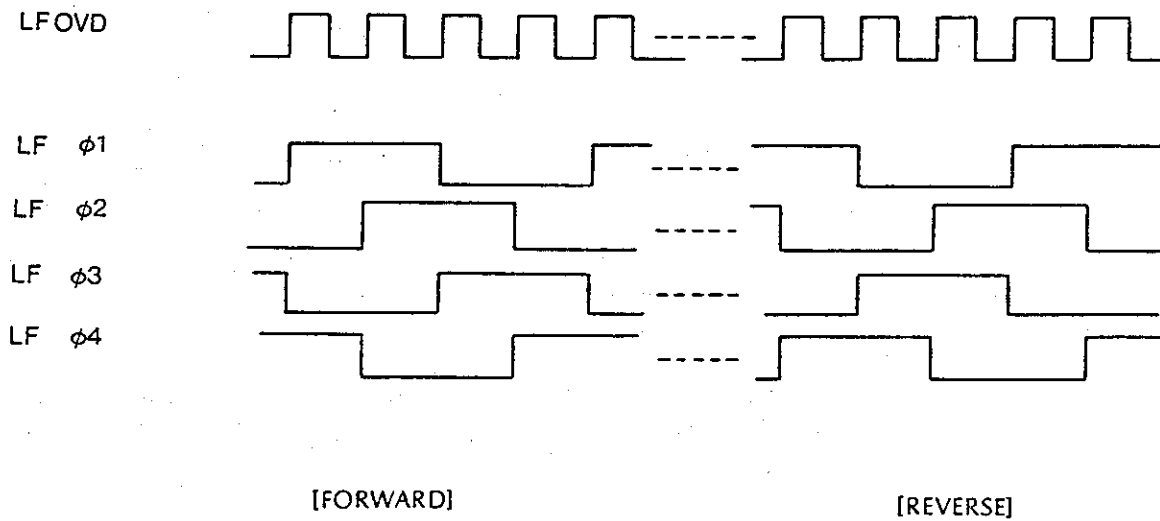
The motor control LSI (Q5: MSM61048) frequency divides these edge pulse signals in accordance with the print pitch, and outputs the IPT signal to provide dot-on timing and carriage position detection timing.



1.7 Line Feed

The line feed motor is locked with the +8 voltage while it is at a stop.

During line feed operation, the line feed motor is driven by the +30 voltage applied in accordance with the LF OVD signal.



1.8 Alarm Circuits

(1) Drive circuit fault alarm circuit

This is a protective circuit which makes the AC fuse blow when a fault occurs in the print head drive circuit, space motor drive circuit, line feed motor drive circuit, or their peripheral circuits, thus preventing trouble.

For this purpose, this circuit monitors the drive time using the HDALM, SPALM, and LFALM signals interlocked with the overdrive signal of each drive circuit. If the drive time of any drive circuit exceeds the specified time, the drive circuit fault alarm circuit outputs an ALM signal (high) to turn on the SCR.

This causes the secondary coil (30 V) of the transformer to be short-circuited, causing an overcurrent to flow through the primary coil and making the AC fuse blow.

(2) Head overheat alarm circuit

In order to protect the head coils, this circuit monitors the head temperature using the built-in thermistor of the print head.

If heavy-duty printing is performed continuously for a long time, the print head temperature rises. When the head temperature reaches a certain value (about 100°C), a head overheat alarm is detected.

When the alarm is detected, the printing operation is halted to wait for the head temperature to lower. When the head temperature returns below the alarm detection temperature, the printing operation is restarted.

The alarm detection is performed as follows:

When the temperature in the print head rises, the resistance of the thermistor lowers, and the potential of the comparator (Q7) negative input lowers to invert the comparator output, causing the HEAD TEMP signal to be output to the motor control LSI.

1.9 Paper End Detection Circuit

When the paper runs out, the photosensor (PE) on the control board is turned off, and as a result, the PAPER END signal becomes 0. This signal is fed to pin 34 of the motor control LSI (Q5), causing the printing operation to be stopped and the ALARM indicator to light.

1.10 Power Supply

The power supply consists of a power transformer, power supply board, a DC power supply circuit.

The input AC voltage is transformed into 7.6 VAC, 24 VAC, and 10 VAC by the power transformer, and these AC voltages are further converted into +8 VDC, +5 VDC, and +30 VDC levels by the DC power supply circuit for supply to each circuit.

(1) Power supply board

The power supply board mounts the power switch, AC fuse and AC noise filter.

(2) Power transformer

If the power transformer temperature rises abnormally, the built-in temperature fuse of the transformer blows to prevent any adverse effects on other components.

2. MECHANICAL OPERATION

2.1 Mechanism and Operation of Print Head (see figure 3)

The print head is spring-loaded, utilizing a permanent magnet, and can be easily removed or installed. The print head is mounted on a carriage that runs parallel to the platen, and is connected with the control circuit via the head board.

The print head consists of:

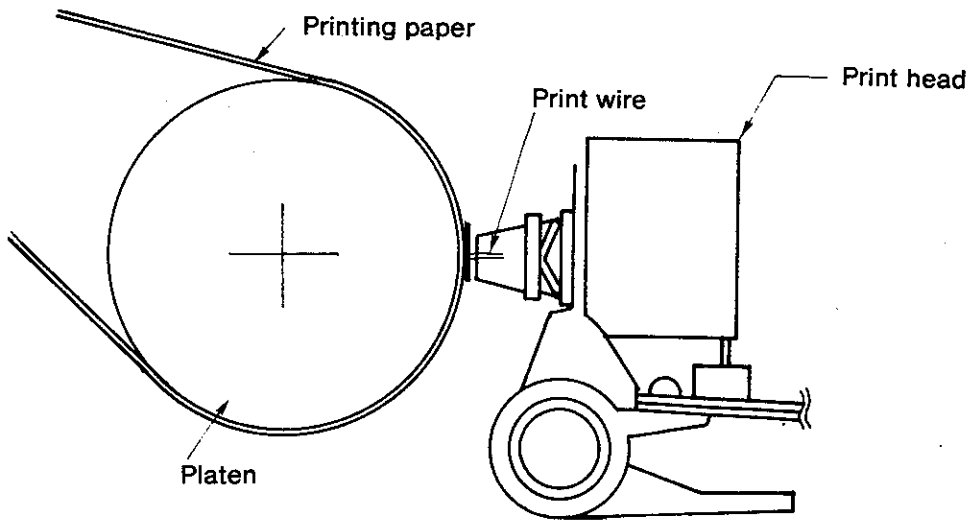
- (a) Wire guide
 - (b) Wires
 - (c) Armature assembly
 - (d) Yoke
 - (e) Springs
 - (f) Spacer
 - (g) Magnet assembly
 - (h) Thermistor
 - (i) PC board
- (1) Print head operation

When the print head is in the non-printing state, each armature is attracted by the permanent magnet, and the springs holding the armatures are compressed by the thickness of the spacer. Therefore, the print wires, which are fastened to the individual armatures, are held retracted within the wire guide.

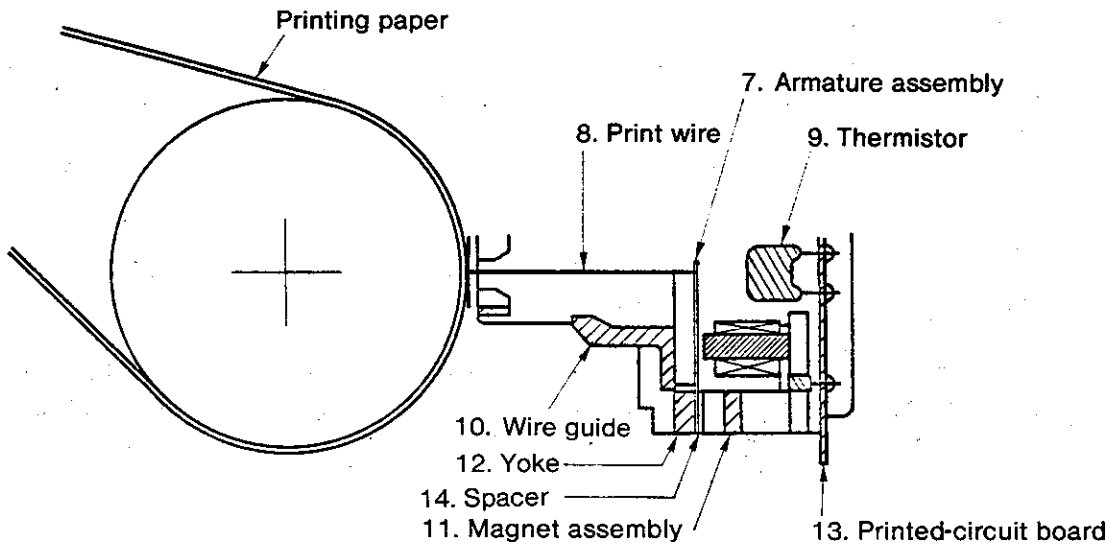
When signals corresponding to a character to be printed are detected by the control circuit, currents flow through the corresponding coils to nullify the magnetic flux generated by the permanent magnet between the armatures corresponding to those coils and the permanent magnet pole. As a result, those armatures are driven toward the platen by the force of the armature springs, and the print wires fastened to those armatures eject from the tip of the wire guide and strike the paper through the ribbon to print dots on the paper.

After the character is printed, the magnetic flux of the permanent magnet attracts the armatures again so that the print wires retract into the wire guide.

The print head has a built-in thermistor to prevent the coils from overheating and burning due to continuous bi-directional printing over a long period. If the coil temperature exceeds the limit (about 100°C), the control circuit detects the thermistor signal, and stops the printing operation until the coil temperature returns below the limit.



(1) Printing



(2) Not printing

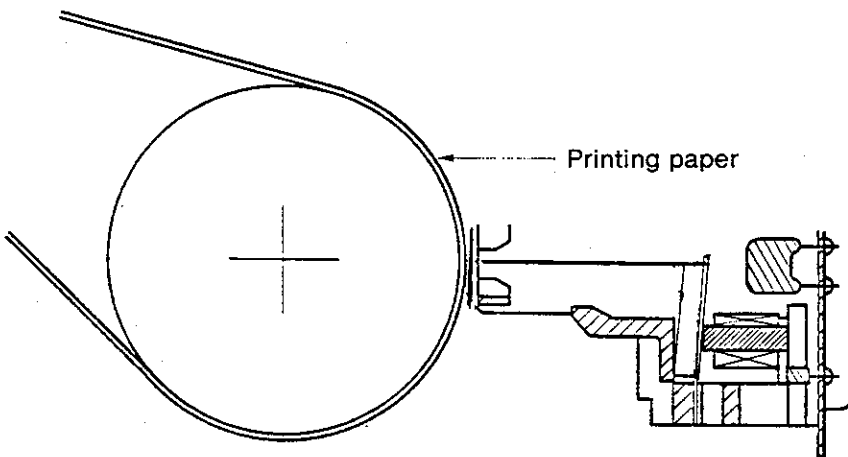


Figure 3

2.2 Space Mechanism and Operation (see figure 4)

The spacing operation is performed by driving the carriage frame, which is guided by the carriage shaft mounted parallel to the platen, by the DC motor mounted on the bottom of the carriage frame.

The space mechanism consists of:

- (a) DC motor with motor gear
- (b) Carriage frame (including stator yoke and motor board)
- (c) Carriage shaft
- (d) Space rack
- (e) Slit sensor
- (f) Slit disk

(1) Spacing operation

The carriage, with the print head and space motor mounted on it, moves parallel to the platen along the carriage shaft. As the space motor rotates counterclockwise, the motor gear is driven rightward along the space rack, and as a result, the carriage is driven also rightward.

The spacing mechanism is so designed that when the space motor rotates one turn, the carriage frame moves 0.8 inch (20.32 mm).

Motor rotation also rotates the slit disk, and the slits pass through the slit sensor. The position of the carriage frame can be obtained by counting the number of slits detected by the slit sensor.

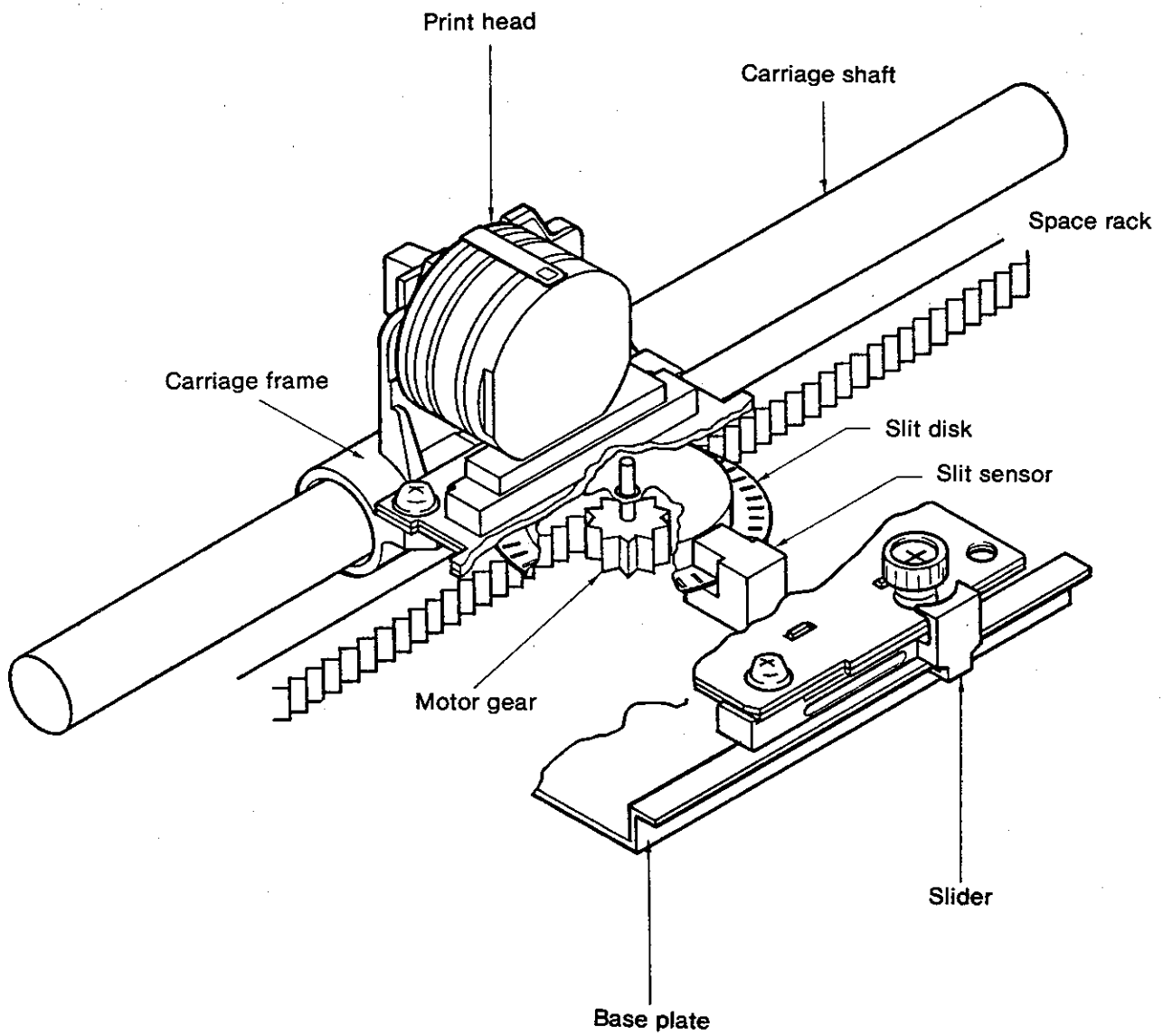


Figure 4

2.3 Head-Gap Adjusting Mechanism (see figure 5)

The head-gap adjusting mechanism adjusts the gap between the platen and print head by changing the tilt angle of the carriage frame with the adjusting lever.

When the adjusting lever is operated, the adjusting screw, which is interlocked with the lever via a gear, rotates to change the tilt angle of the carriage frame around the carriage shaft.

The print head, mounted vertically on the opposite side of the adjusting screw on the carriage frame, moves closer to or away from the platen with change in the carriage frame tilt angle.

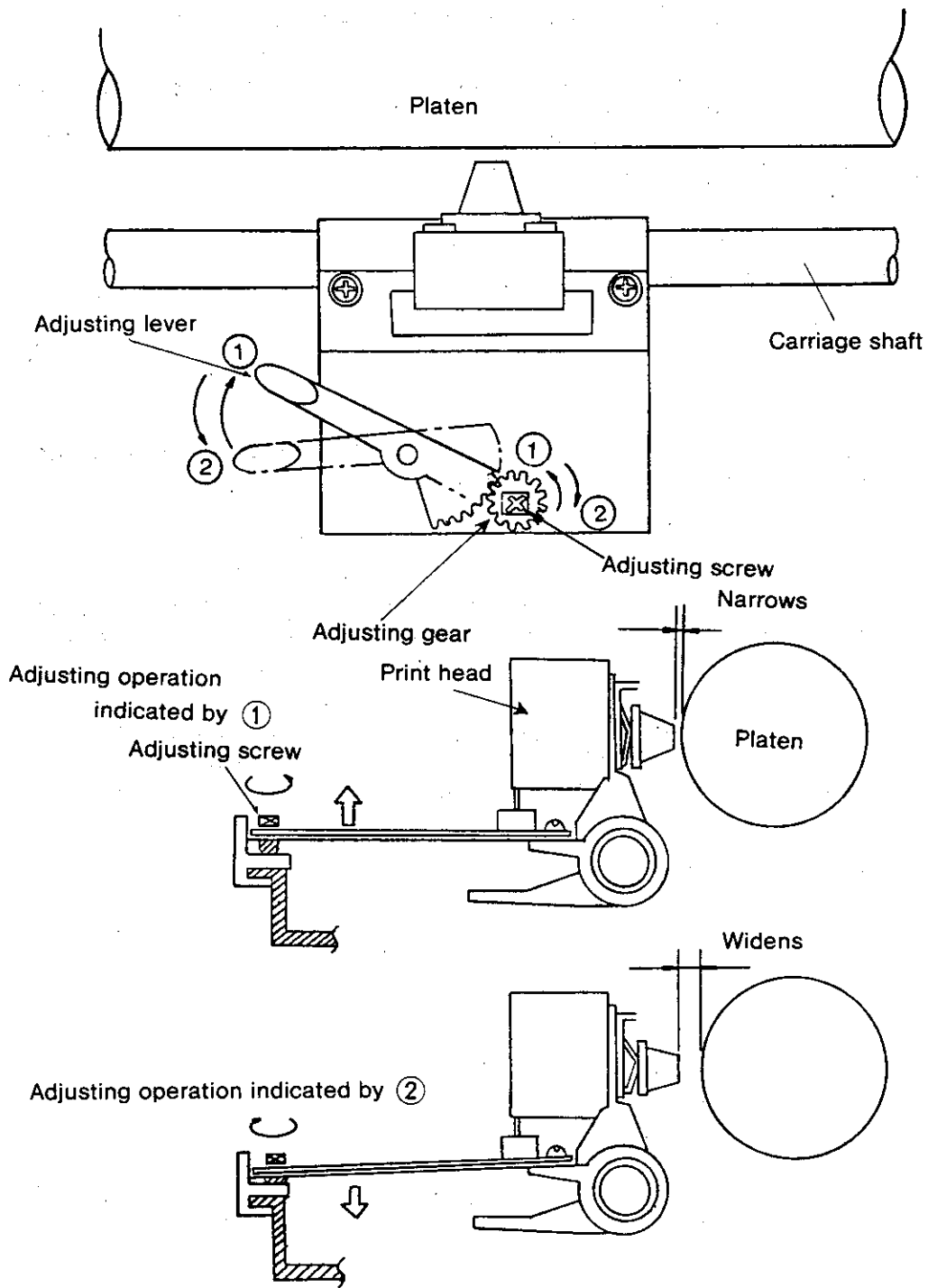


Figure 5

2.4 Ribbon Feed Mechanism and Operation (see figure 6)

The ribbon feed mechanism feeds the ribbon synchronously with the spacing operation. The mechanism is driven by the space motor.

The ribbon feed mechanism consists of:

- (a) Ribbon feed gear assembly
- (b) Ribbon gear (space motor)
- (c) Ribbon cartridge

(1) Ribbon cartridge

A one-way-feed endless ribbon is used. Ink is replenished by the built-in ink tank in the ribbon cartridge so that clear printing is always assured.

(2) Ribbon feed operation

As the space motor rotates, the ribbon gear on the space motor shaft rotates to drive the drive gear in the ribbon cartridge via the ribbon feed gear assembly, and as a result, the ribbon is fed.

In bi-directional printing, the ribbon gear rotational direction reverses every time the direction of carriage movement reverses. In this case, the gears in the ribbon feed gear assembly switch the rotational direction so as to feed the ribbon in a fixed direction.

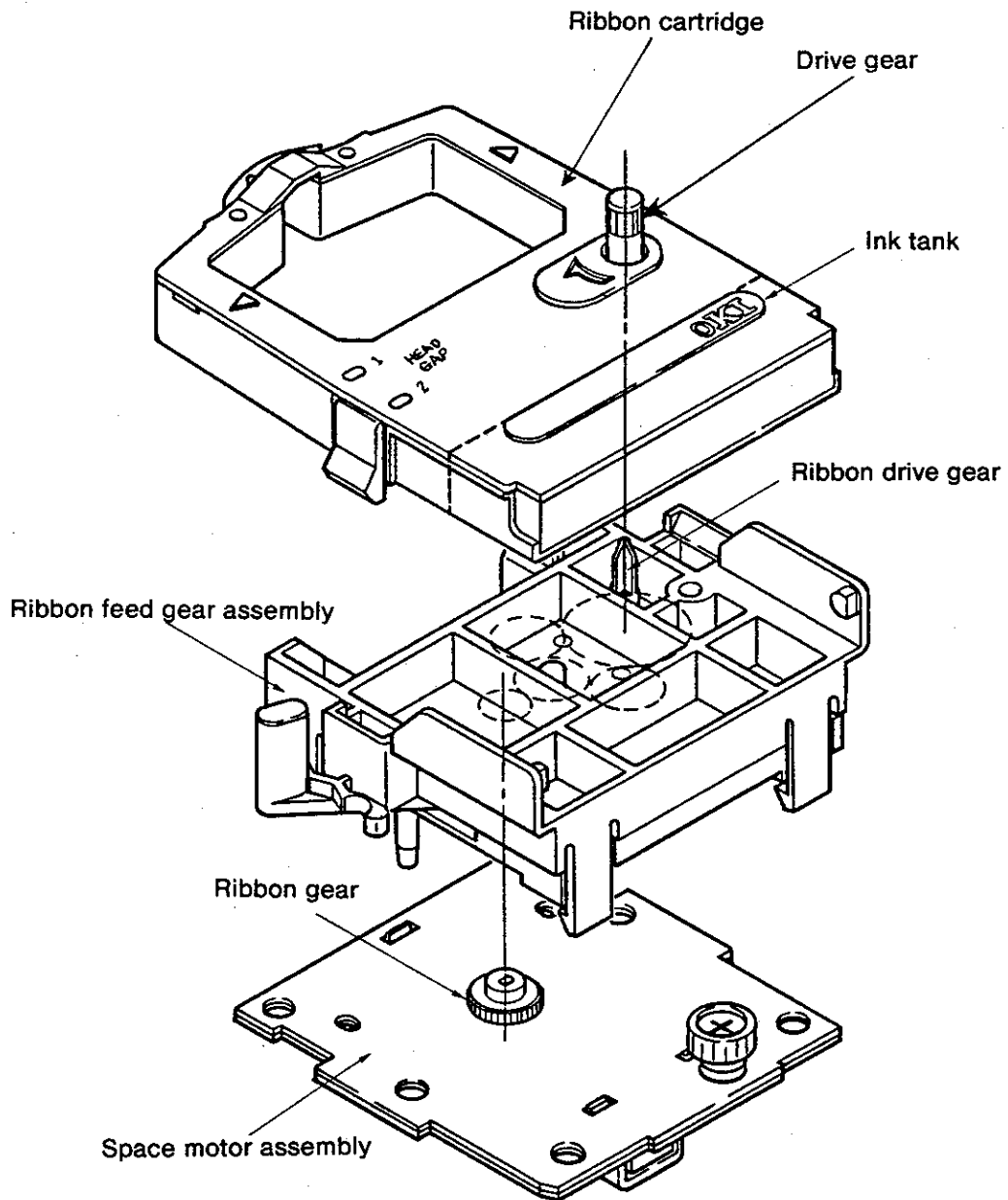


Figure 6

2.5 Paper Feed Mechanism and Operation

Paper feed is performed by rotating the platen and pin tractors, which are driven by the LF pulse motor.

The paper feed mechanism consists of:

- (a) Pulse motor with gear
- (b) Reduction gear
- (c) Platen
- (d) Tractor feed unit
- (e) Pressure rollers

(1) Paper feed operation (see figure 7)

The paper feed pulse motor is mounted on the left side frame, and its rotation is transmitted to the platen through the reduction gear. Platen rotation is also transmitted through the idle gear to the tractor feed unit.

The paper feed mechanism is so designed that when the pulse motor rotates 48 steps (360°), paper is fed 0.167 inch (4.32 mm).

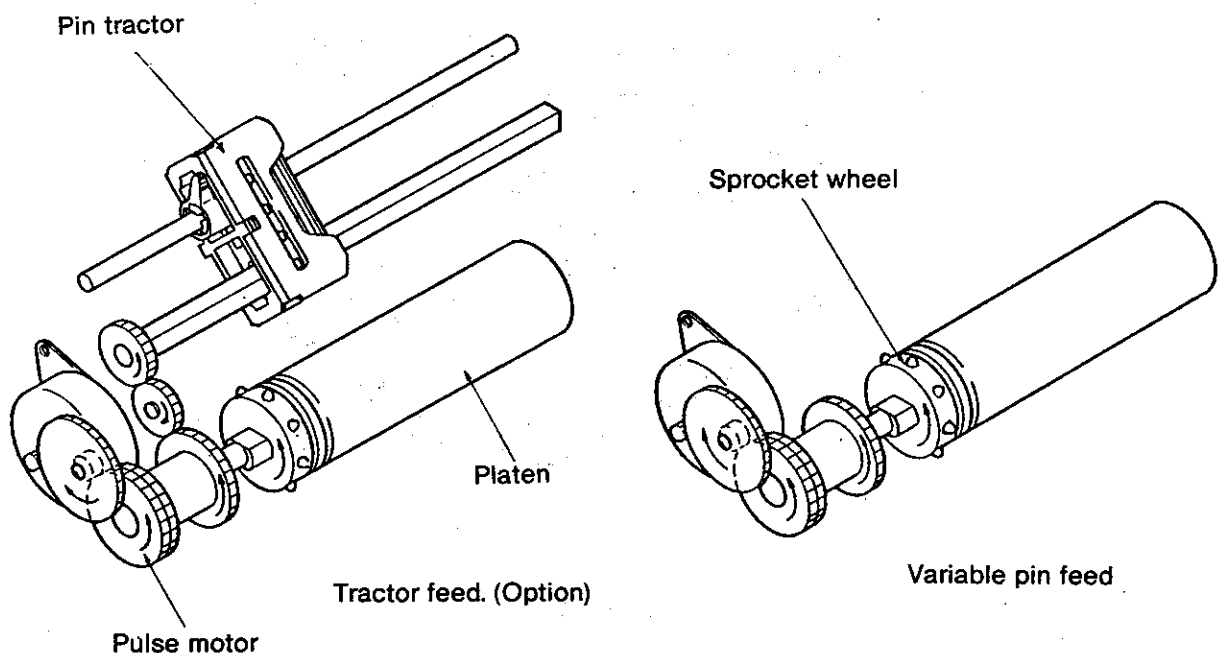


Figure 7

(2) Paper clamp mechanism (see figure 8)

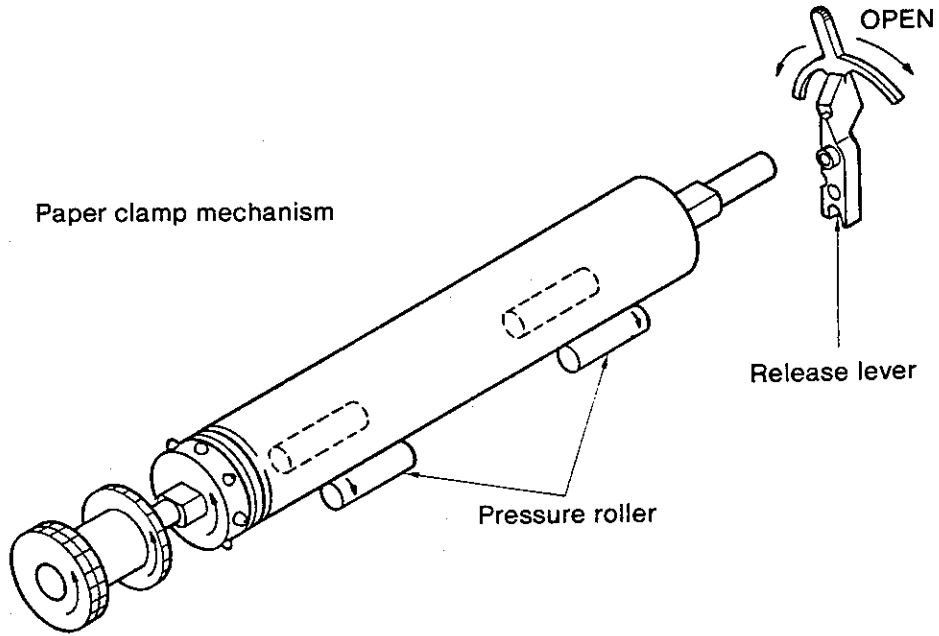


Figure 8(a)

When the release lever is set to the open position, the release link moves backward, and the front and rear release links rotate counterclockwise. At the same time, the release shaft interlocked with them also rotates counterclockwise so that a gap is made between the pressure rollers and platen, allowing insertion of paper.

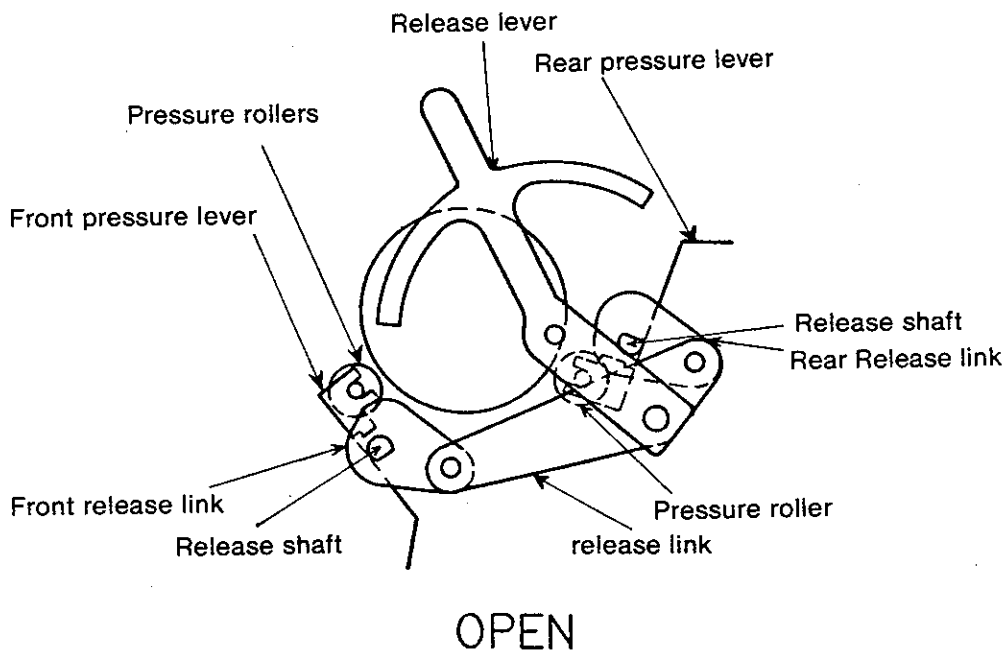
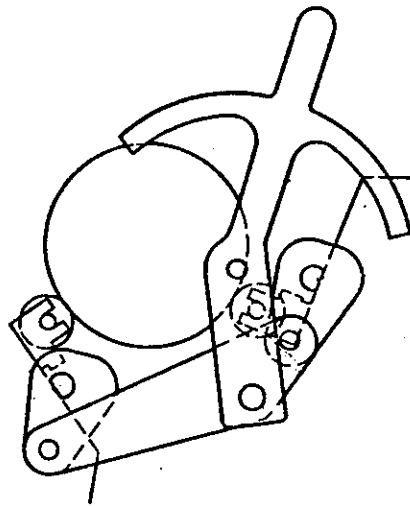


Figure 8(b)

When the release lever is set to the closed position, the release link moves forward, and the front and rear release links rotate clockwise. At the same time, the release shaft interlocked with them also rotates clockwise so that the pressure rollers are pushed against the platen by the front and rear pressure levers, allowing paper to be fed.



CLOSE

Figure 8(c)

2.6 Paper-End Detection Mechanism (see figure 9)

(1) Rear paper feed

When paper is present in the printer, the paper prevents the near-end lever from falling into the groove of the paper chute, and the paper-end sensor is on.

When the printer runs out of paper, the near-end lever falls into the groove of the paper chute so that the rear part of the near-end lever turns off the paper-end sensor, and thus paper-end is detected. Paper-end is detected when the end of the remaining paper is about 1 inch (25.4mm) from the printing position.

(2) Bottom paper feed

When paper is present in the printer, the paper prevents the bottom near-end lever from falling into the hole in the bottom paper guide. That is, the wedge on the bottom near-end lever pushes down the projection of the near-end lever, and the paper-end sensor is on.

When the printer runs out of paper, the tip of the bottom near-end lever falls into the hole in the bottom paper guide so that the rear part of the near-end lever turns off the paper-end sensor, and thus paper-end is detected. Also in this case, paper-end is detected when the end of the remaining paper is about 1 inch (25.4 mm) from the printing position.

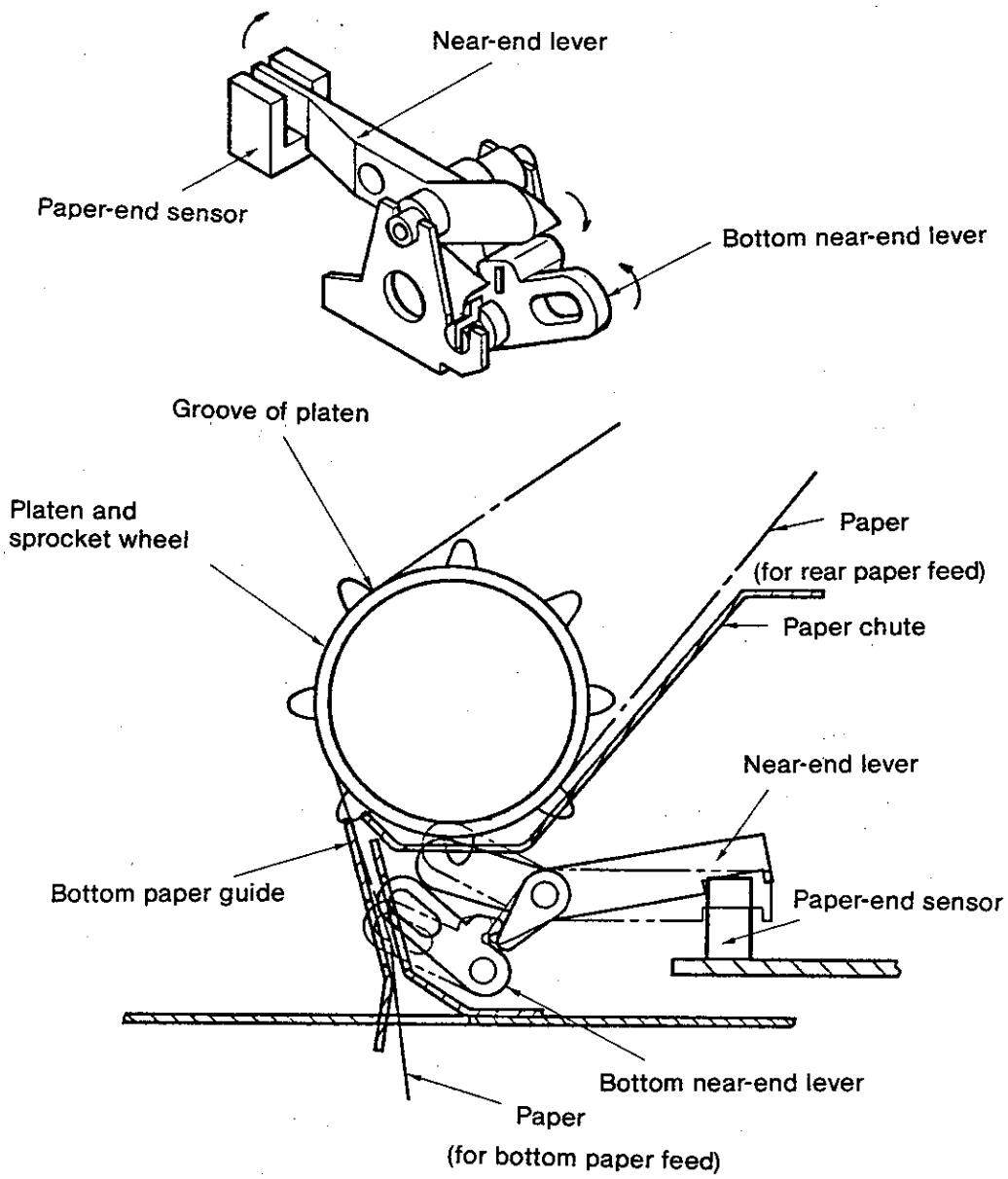


Figure 9

APPENDIX B.

**Specifications
(Standard Model)**

APPENDIX B SPECIFICATIONS (STANDARD MODEL)

- (1) Print method: Impact dot matrix
- (2) Print speed:
 Utility mode: 120 characters/second (at 10/12/17.1 CPI)
 60 characters/second (at 5/6/8.5 CPI)
 NLQ: 30 characters/second (at 10/12/17.1 CPI)
 15 characters/second (at 5/6/8.5 CPI)
- (3) Character pitches: Selectable with control codes
 5 CPI 0.2 inch (5.08 mm)
 6 CPI 0.167 inch (4.23 mm)
 8.5 CPI 0.117 inch (2.96 mm)
 10 CPI 0.1 inch (2.54 mm)
 12 CPI 0.083 inch (2.12 mm)
 17.1 CPI 0.058 inch (1.48 mm)
- (4) Maximum number of characters per line: Selectable with control codes

Character pitch		5	6	8.5	10	12	17.1
Maximum number of characters per line	ML182	40	48	68	80	96	137
	ML183	68	81	116	136	163	233
Control code		US			RS	FS	CS

- (5) Line feed pitches: 6 LPI 0.167 inch (4.23 mm)
 8 LPI 0.125 inch (3.175 mm)
 Variable line feed pitch $n/144$ ($n: 0 \leq n \leq 127$) is specifiable. Also 10 LPI (14/144 inch), 6 LPI (24/144 inch), and 8 LPI (18/144 inch) are available in APA graphics.
- (6) Paper-end detection: Paper-end is detected when the end of the remaining paper is about 1 inch (25.4 mm) from the printing position (in rear feed and bottom feed).

(7) Dimensions

	ML182	ML183
Width	14.17 inch (360 mm)	20.16 inch (512 mm)
Height	3.15 inch (80 mm)	3.15 inch (80 mm)
Depth	10.83 inch (275 mm)	10.83 inch (275 mm)

Note: These dimensions do not include the platen knob and tractor feed unit.

- (8) Weight: ML182 9.92 lb (4.5 kg)
ML183 13 lb (6 kg)
- (9) Input power: One of the following as specified:
120 VAC \pm 10% 50/60 Hz \pm 2%
220 VAC \pm 10% 50/60 Hz \pm 2%
240 VAC \pm 10% 50/60 Hz \pm 2%
- (10) AC power cable: Length 5.9 ft (1.8 m)
- (11) Power consumption: During operation About 33 VA
During idling About 8 VA
Wattage: 6W during idling
22W during test printing
- When Super-speed RS232-C interface board (option)
is mounted.
- (12) Ribbon: Cartridge ribbon for exclusive use (Re-inking
cartridge)
Ink color Black
Ribbon life About 3 million characters
- (13) Interface: The standard model has a Centronics parallel
interface.
Optional interface:
(a) Super-speed RS232-C serial interface
(b) Super-speed RS422-A serial interface
- (14) Options: Tractor feed unit (only ML182)
(with acoustic cover, and access cover)
Roll paper stand (only ML182)

(13) Interface:

The standard model has a Centronics parallel interface or RS232-C serial interface (9600 BPS)

Optional interfaces:

(a) Super-speed RS232-C serial interface

(b) Super-speed RS422-A serial interface

(14) Options:

(a) Tractor feed unit with acoustic cover, access cover, and paper separator

(b) Roll paper stand

APPENDIX C.

**Specifications
(IBM-Compatible Model)**

APPENDIX C SPECIFICATIONS (IBM-COMPATIBLE MODEL)

- (1) Print method: Impact dot matrix
- (2) Print speed:
 Utility mode: 120 characters/second (at 10/12/17.1 CPI)
 60 characters/second (at 5/6/8.5 CPI)
 NLQ: 30 characters/second (at 10/12/17/1 CPI)
 15 characters/second (at 5/6/8.5 CPI)
- (3) Character pitches: Selectable with control codes
 5 CPI 0.2 inch (5.08 mm)
 6 CPI 0.167 inch (4.23 mm)
 8.5 CPI 0.117 inch (2.96 mm)
 10 CPI 0.1 inch (2.54 mm)
 12 CPI 0.083 inch (2.12 mm)
 17.1 CPI 0.058 inch (1.48 mm)
- (4) Maximum number of characters per line: Selectable with control codes
- | Character pitch | | 5 | 6 | 8.5 | 10 | 12 | 17.1 |
|---------------------------------------|-------|---------------|----|-----|-----|------|------|
| Maximum number of characters per line | ML182 | 40 | 48 | 68 | 80 | 96 | 137 |
| | ML183 | 68 | 81 | 116 | 136 | 163 | 233 |
| Control code | | SO or ESC W 1 | | | DC2 | ESC: | SI |
- (5) Line feed pitches: 6 LPI 0.167 inch (4.23 mm)
 8 LPI 0.125 inch (3.175 mm)
- (6) Paper-end detection: Paper-end is detected when the end of the remaining paper is about 1 inch (25.4 mm) from the printing position (in rear feed and bottom feed).

(7) Dimensions

	ML182	ML183
Width	14.17 inch (360 mm)	20.16 inch (512 mm)
Height	3.15 inch (80 mm)	3.15 inch (80 mm)
Depth	10.83 inch (275 mm)	10.83 inch (275 mm)

Note: These dimensions do not include the platen knob and tractor feed unit.

- (8) Weight: ML182 9.92 lb (4.5 kg)
ML183 13 lb (6 kg)
- (9) Input power: One of the following as specified:
120 VAC \pm 10% 50/60 Hz \pm 2%
220 VAC \pm 10% 50/60 Hz \pm 2%
240 VAC \pm 10% 50/60 Hz \pm 2%
- (10) AC power cable: Length 5.9 ft (1.8 m)
- (11) Power consumption: During operation About 33 VA
During idling About 8 VA
Wattage: 6 W during idling
22 W during test printing
- When Super-speed RS232-C interface board (option) is mounted.
- (12) Ribbon: Cartridge ribbon for exclusive use (Re-inking cartridge)
Ink color Black
Ribbon life About 3 million characters
- (13) Interface: The standard model has a Centronics parallel interface.
Optional interface:
(a) Super-speed RS232-C serial interface
(b) Super-speed RS422-A serial interface
- (14) Options: Tractor feed unit (only ML182)
(with acoustic cover, and access cover)
Roll paper stand (only ML182)

APPENDIX D.

DIP Switch Setting Table (Standard Model)

APPENDIX D DIP SWITCH SETTING TABLE (STANDARD MODEL)

The DIP switches, provided on the control board, are used to select the following functions:

SW No.	Description	Function		Factory setting
		ON	OFF	
SW1	Selection of language/Page length setting	Note 1		ON
SW2				OFF
SW3				OFF
SW4				OFF
SW5				ON
SW6	AUTO LF	When CR is received, automatic carriage return and one-line feed are carried out after data printing.	When CR is received, automatic carriage return is carried out after data printing.	OFF
SW7	Selection of 7-bit/8-bit codes	Input data is all processed as 8-bit codes.	Input data is all processed as 7-bit codes.	ON
SW8	Internal/external ROM	-----	-----	OFF

Note 1: Selection of language and Page length

SW1	SW2	SW3	SW4	SW5	Page length (inches)	Language
OFF	OFF	OFF	OFF	OFF	11.0	ASC II (∅)
ON	OFF	OFF	OFF	↑	↑	ASC II (0)
OFF	ON	OFF	OFF	↑	↑	BRITISH
ON	ON	OFF	OFF	↑	↑	GERMAN
OFF	OFF	ON	OFF	↑	↑	FRENCH
ON	OFF	ON	OFF	↑	↑	SWEDISH
OFF	ON	ON	OFF	↑	↑	DANISH
ON	ON	ON	OFF	↑	↑	NORWEGIAN
OFF	OFF	OFF	ON	↓	↓	DUTCH
ON	OFF	OFF	ON	↓	↓	ITALIAN
OFF	ON	OFF	ON	↓	8.5	BRITISH
ON	ON	OFF	ON	↓	↑	GERMAN
OFF	OFF	ON	ON	↓	↓	FRENCH
ON	OFF	ON	ON	↓	↓	SWEDISH
OFF	ON	ON	ON	OFF	↓	DANISH
ON	ON	ON	ON	OFF	8.5	NORWEGIAN
OFF	OFF	OFF	OFF	ON	12.0	ASC II (∅)
ON	OFF	OFF	OFF	↑	↑	ASC II (0)
OFF	ON	OFF	OFF	↑	↑	BRITISH
ON	ON	OFF	OFF	↑	↑	GERMAN
OFF	OFF	ON	OFF	↑	↑	FRENCH
ON	OFF	ON	OFF	↑	↑	SWEDISH
OFF	ON	ON	OFF	↑	↑	DANISH
ON	ON	ON	OFF	↑	↑	NORWEGIAN
OFF	OFF	OFF	ON	↓	↓	DUTCH
ON	OFF	OFF	ON	↓	↓	ITALIAN
OFF	ON	OFF	ON	↓	11- ² / ₃	BRITISH
ON	ON	OFF	ON	↓	↑	GERMAN
OFF	OFF	ON	ON	↓	↓	FRENCH
ON	OFF	ON	ON	↓	↓	SWEDISH
OFF	ON	ON	ON	ON	↓	DANISH
ON	ON	ON	ON	ON	11- ² / ₃	NORWEGIAN

APPENDIX E.

DIP Switch Setting Table (IBM-Compatible Model)

APPENDIX E DIP SWITCH SETTING TABLE (IBM COMPATIBLE MODEL)

The DIP switches, provided on the control board, are used to select the following functions:

SW No.	Description	Function		Factory setting
		ON	OFF	
SW1	Char. for (9B)H/(9D)H	ø/ø	¢/¥	OFF
SW2	10 CPI/17.1 CPI	17.1CPI	10 CPI	OFF
SW3	AUTO LF	Automatic carriage return and one-line feed are carried out after data printing.	Automatic carriage return is carried out after data printing.	OFF
SW4	Page length setting	Note		ON
SW5				ON
SW6	SKIP OVER PERFORATION	1 inch	OFF	OFF
SW7	Selection of character set	II (including European characters)	I	ON
SW8	Not used	To be fixed "OFF"		OFF

Note: Page length setting

SW4	SW5	Page length (inches)	Number of lines for 6 LPI
OFF	OFF	11-2/3	70
OFF	ON	8.5	51
ON	OFF	11.0	66
ON	ON	12.0	72

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