

# CHAPTER 8

## TROUBLESHOOTING

<b>8.1</b>	<b>Entry for Troubleshooting</b> .....	8- 1
<b>8.2</b>	<b>Check-out Procedure</b> .....	8- 2
<b>8.3</b>	<b>Unit Troubleshooting</b> .....	8-11
8.3.1	MOSU Circuit Board.....	8-11
8.3.2	Keyboard.....	8-46
8.3.3	LCD.....	8-50
8.3.4	Micro Printer (Model-160) .....	8-54
<b>8.4</b>	<b>Troubleshooting Table</b> .....	8-60
8.4.1	Power Source.....	8-60
8.4.2	Initialization.....	8-65
8.4.3	Keyboard.....	8-67
8.4.4	LCD.....	8-69
8.4.5	Micro Printer (Model-160) .....	8-71
8.4.6	RS-232C.....	8-76
8.4.7	Serial .....	8-79
8.4.8	ROM Cartridge.....	8-80
8.4.9	Microcassette.....	8-81
8.4.10	RAM .....	8-83
8.4.11	External Cassette .....	8-85

## 8.1 Entry for Troubleshooting

Troubleshooting is not an easy process since troubles can happen in various sections in varied forms. The following three items, however, will provide handy guidelines for you to overcome your troubles.

### 1. Check-out procedure

**Objective:** Provide guidelines to overcome troubles which can not be specifically described.

**Level:** Fix up the system through replacement of units. (A basic knowledge of the system is the only requirement.)

### 2. Unit repair flow chart.

**Objective:** Fix up faulty units at parts level.

**Level:** A full knowledge and an advanced technique for the system are required.

### 3. Troubleshooting table

A handy tool to pinpoint the cause of trouble from visible defects or malfunctions.

## Step for troubleshooting

**Step 1:** Try to fix the system by using the check-out procedure as described above. Be sure to check the replaced units to find out if they are faulty after the replacement. (So that you can discern the troubles due to faulty units from those due to bad connection of connectors and other parts.)

2: Replace the elements within the replaced units which are responsible for the trouble consulting the unit flow charts and/or the troubleshooting table.

**Note 1:** If you come across confirmation items on the flow charts, be sure that you follow the required confirmation procedure. Unless you do as you are required, you can damage the new units which have been set in the system.

2: If you are lost on the way of troubleshooting, be sure to come back to the beginning of the procedure to do it all over again.

3: If you lost the exit, repeating a same routine on the flow chart, consult the troubleshooting table to perform the repair correctly.

#### Step 1

Check-out  
procedure

Fix up the system  
through replacement of  
units.

#### Step 2

Unit repair  
flow chart

Fix up faulty units at  
parts level.

Trouble-  
shooting table

Pinpoint the cause of  
trouble from visible  
defects or malfunc-  
tions.

## 8.2 Check-out Procedure

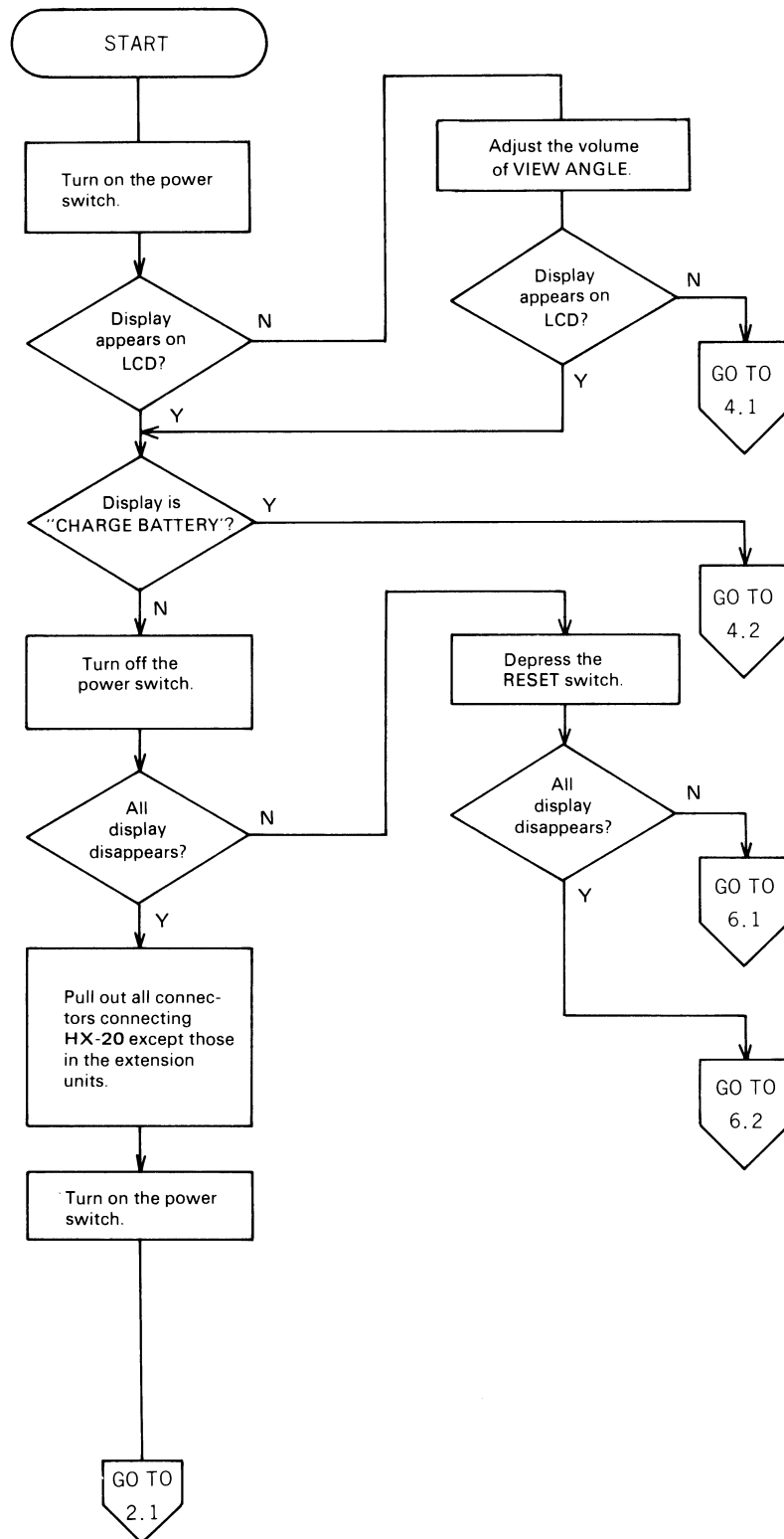


Table 1.

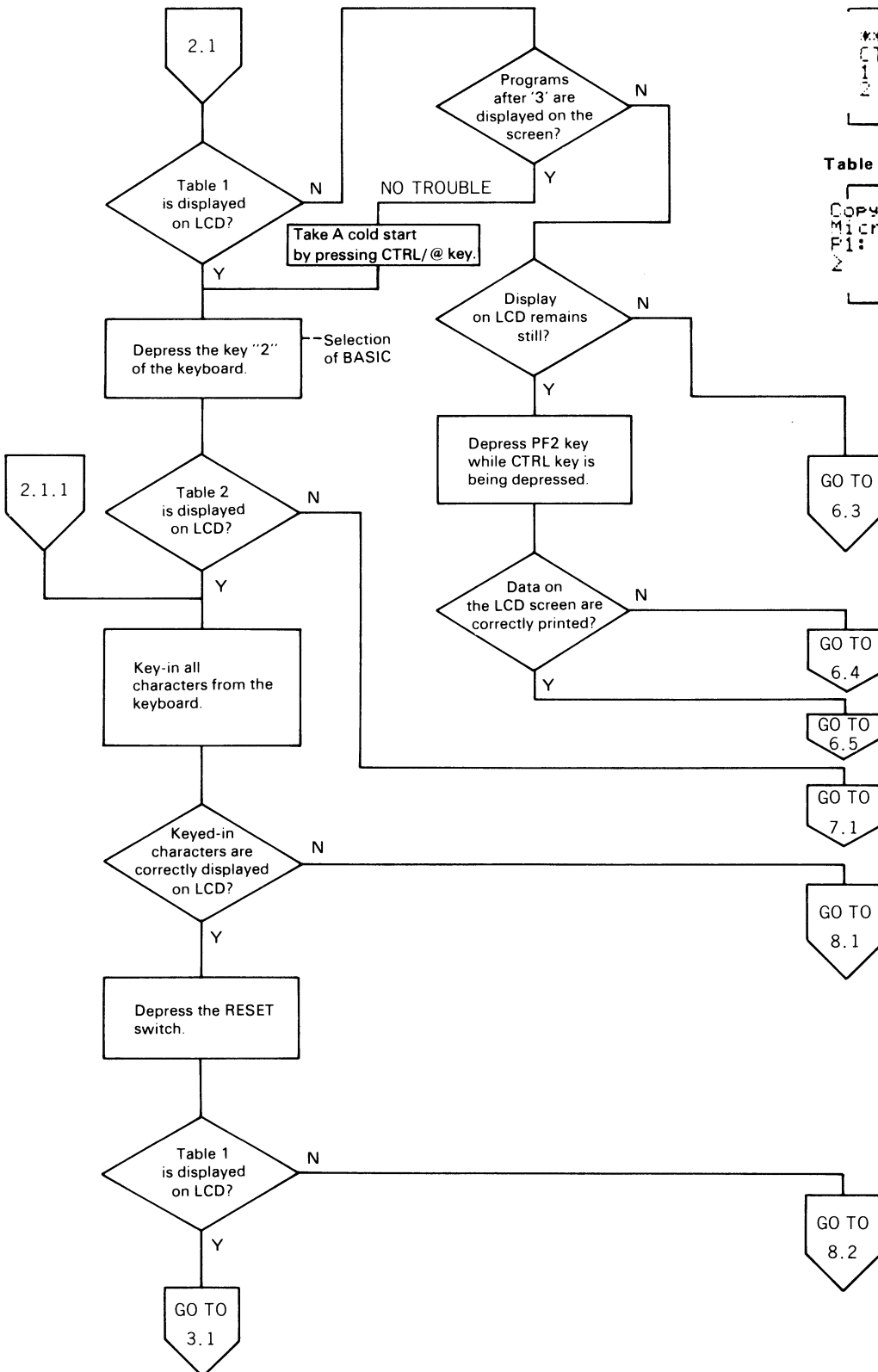
```

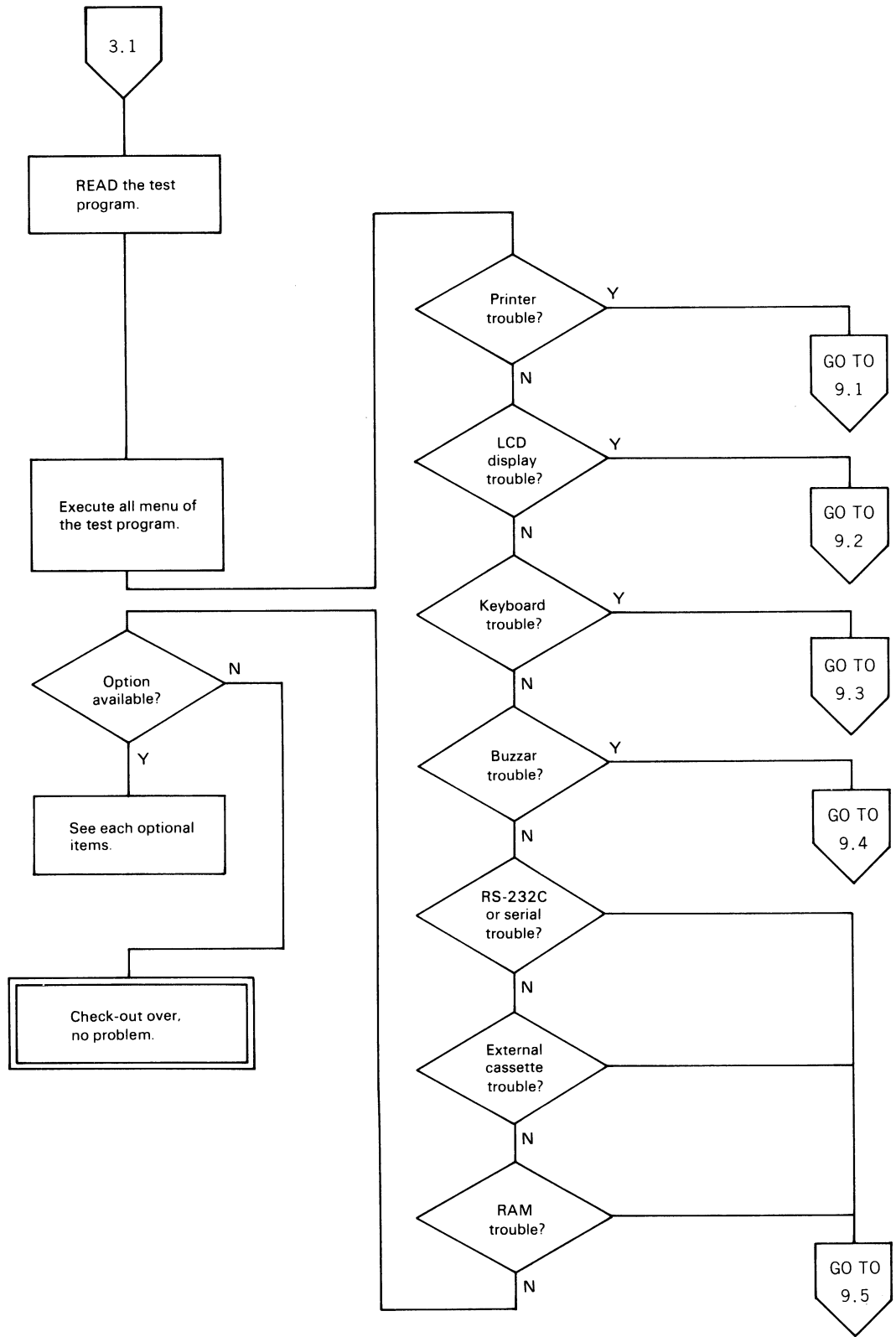
*** MENU ***
CTRL/@ Initialize
1 MONITOR
2 BASIC
    
```

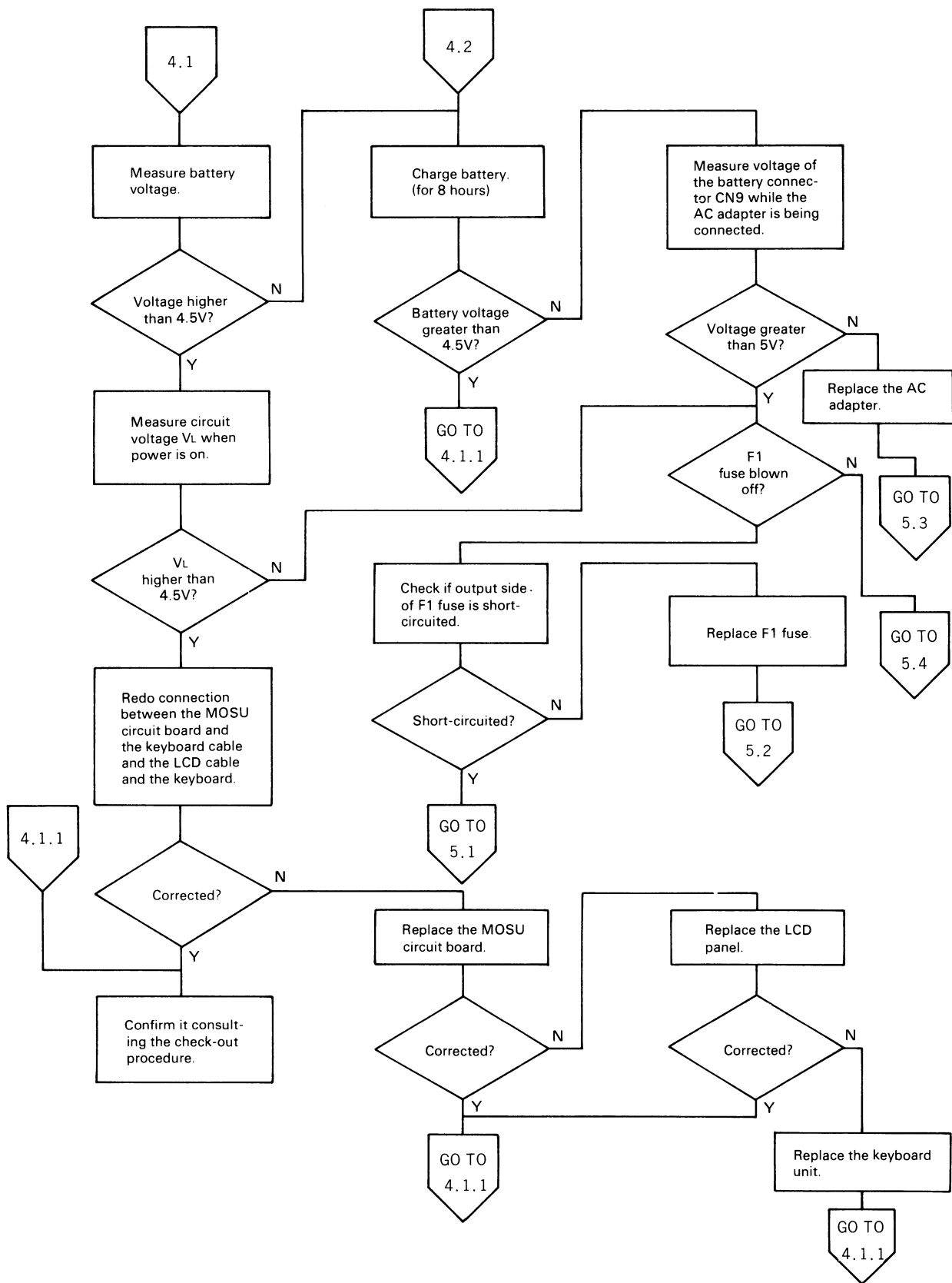
Table 2.

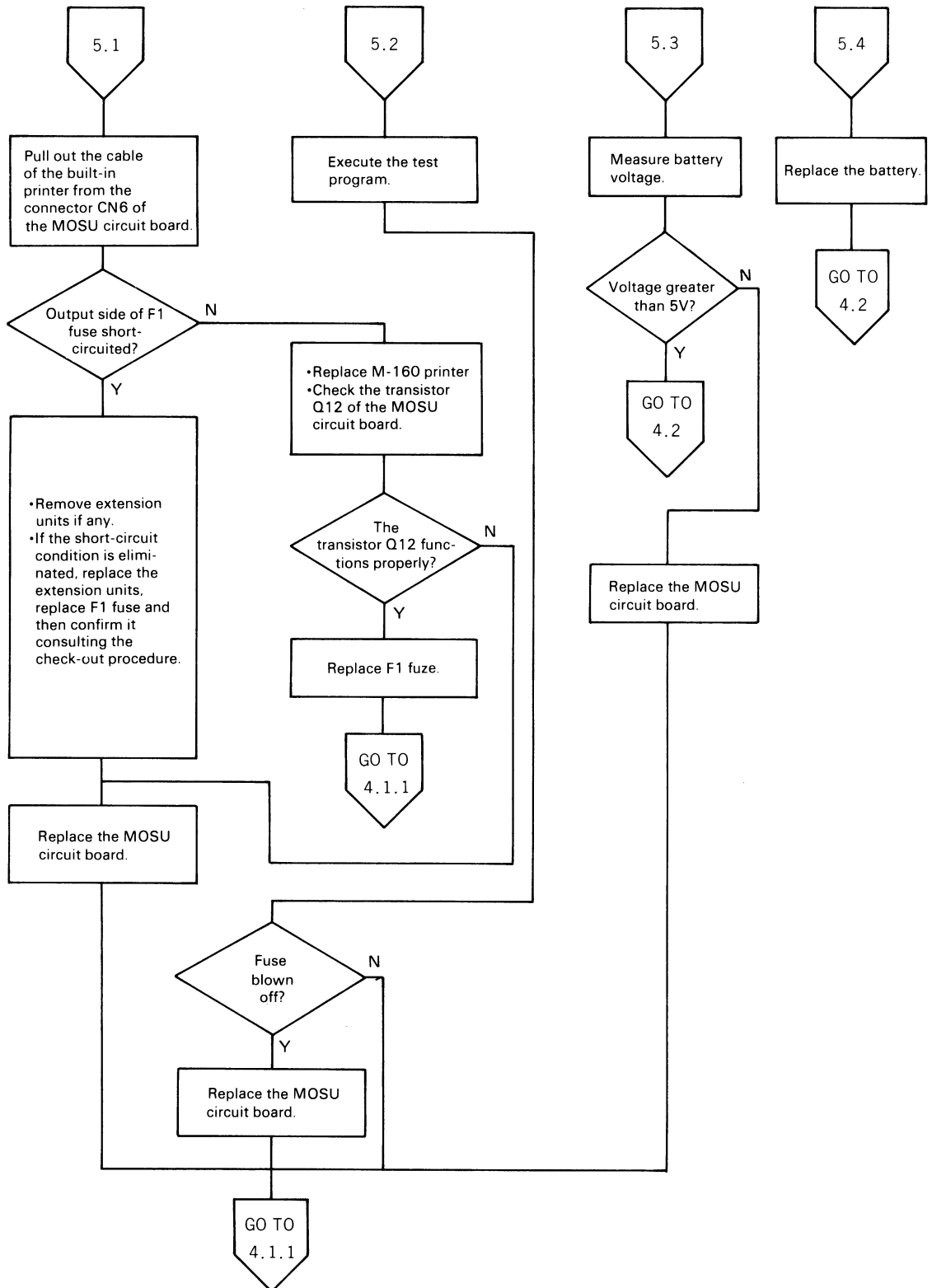
```

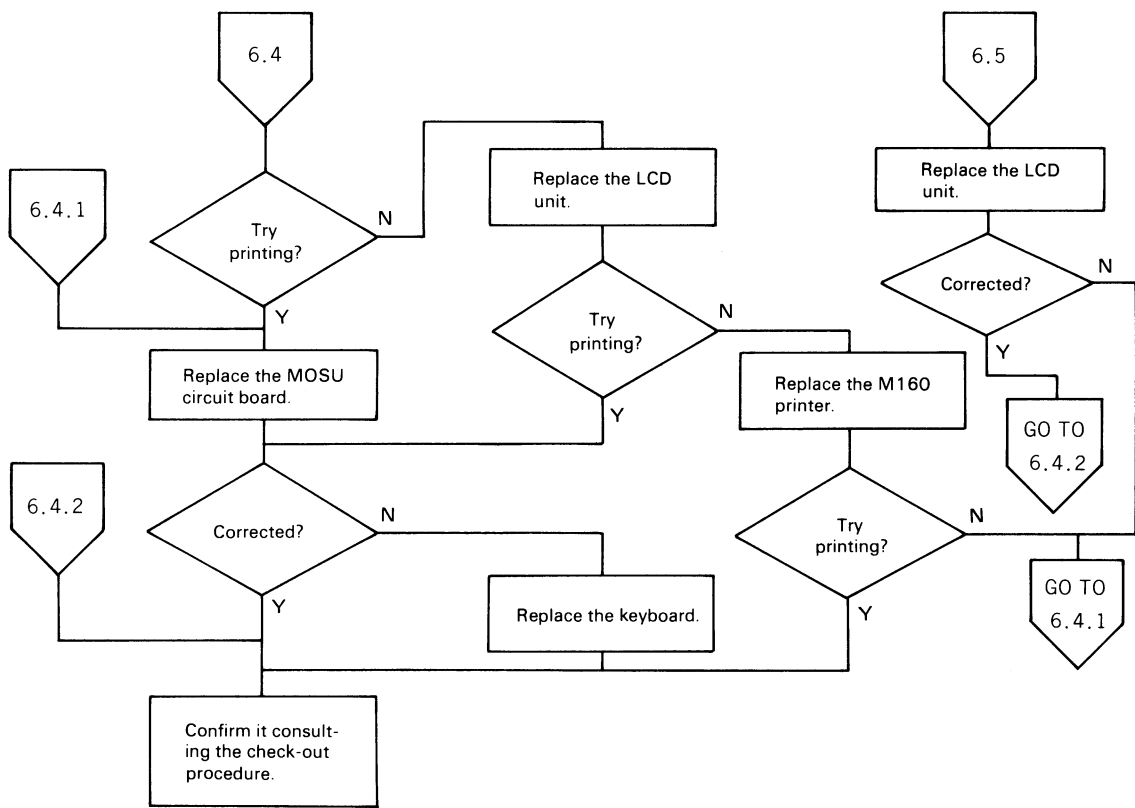
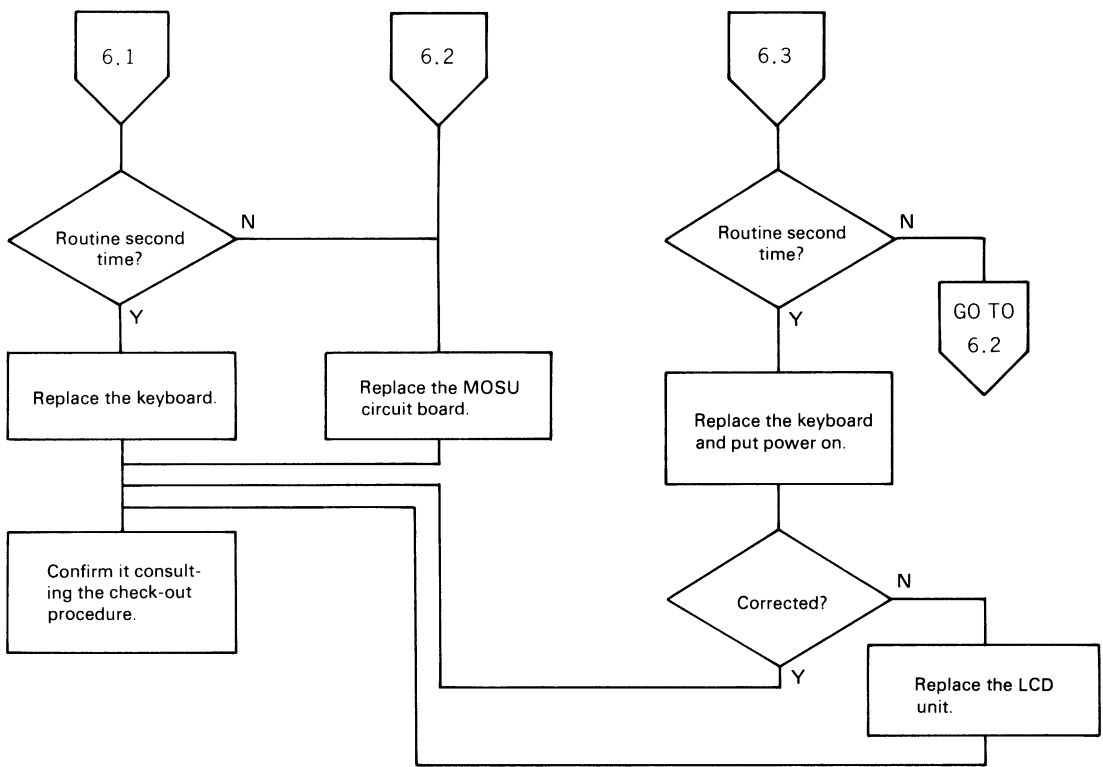
Copyright 1982 by
Microsoft & EPSON
P1: 0B9tL
2
    
```



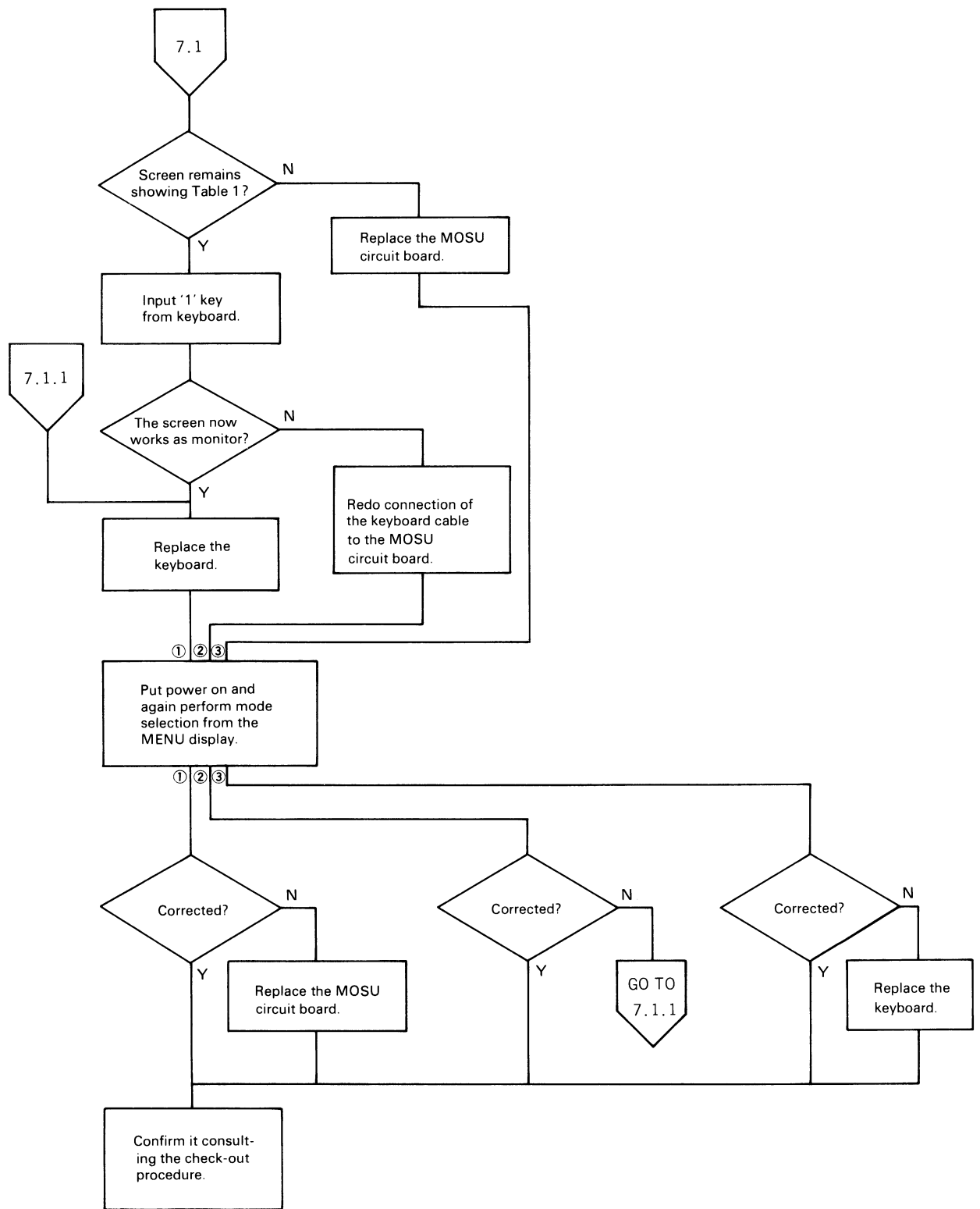


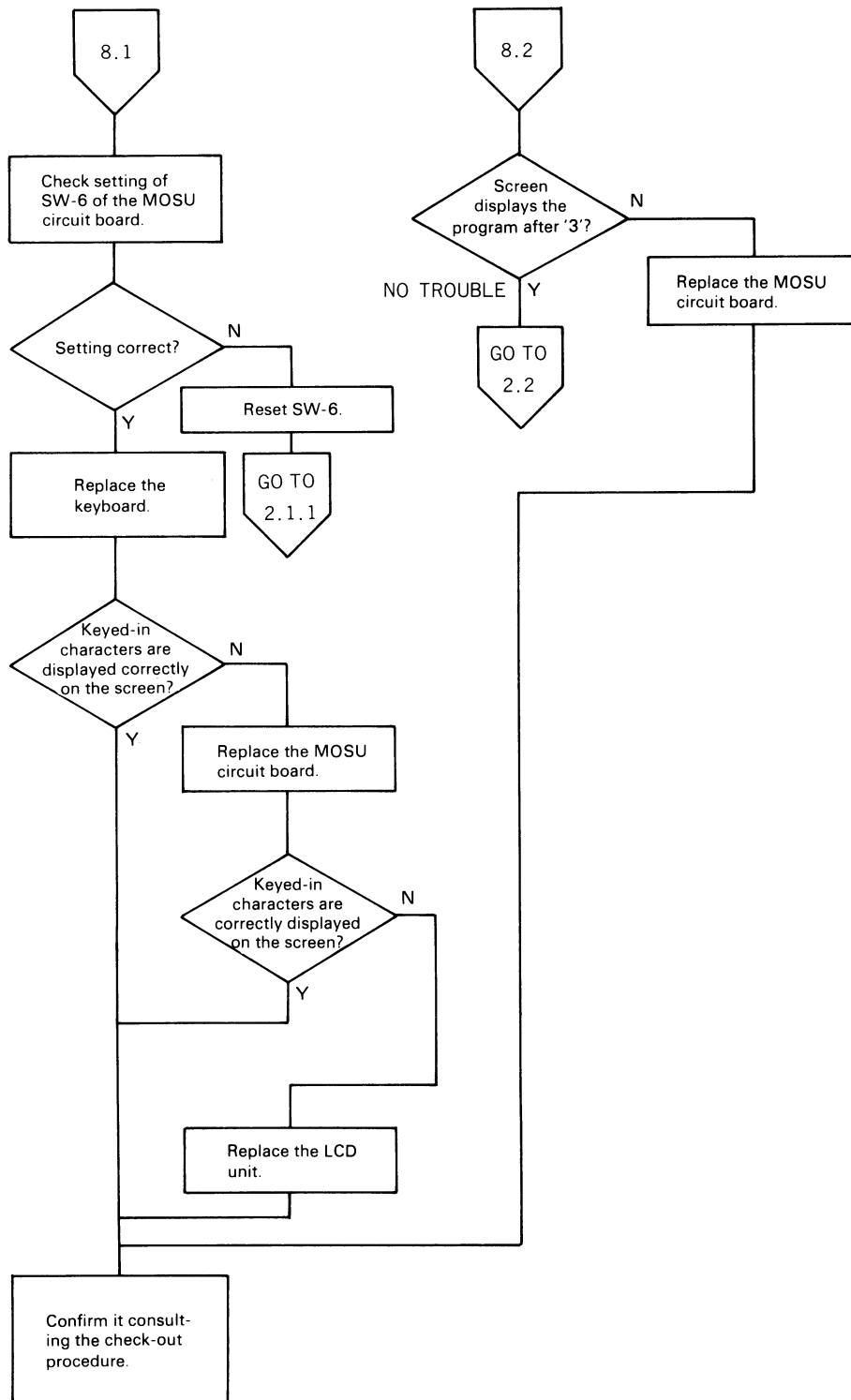


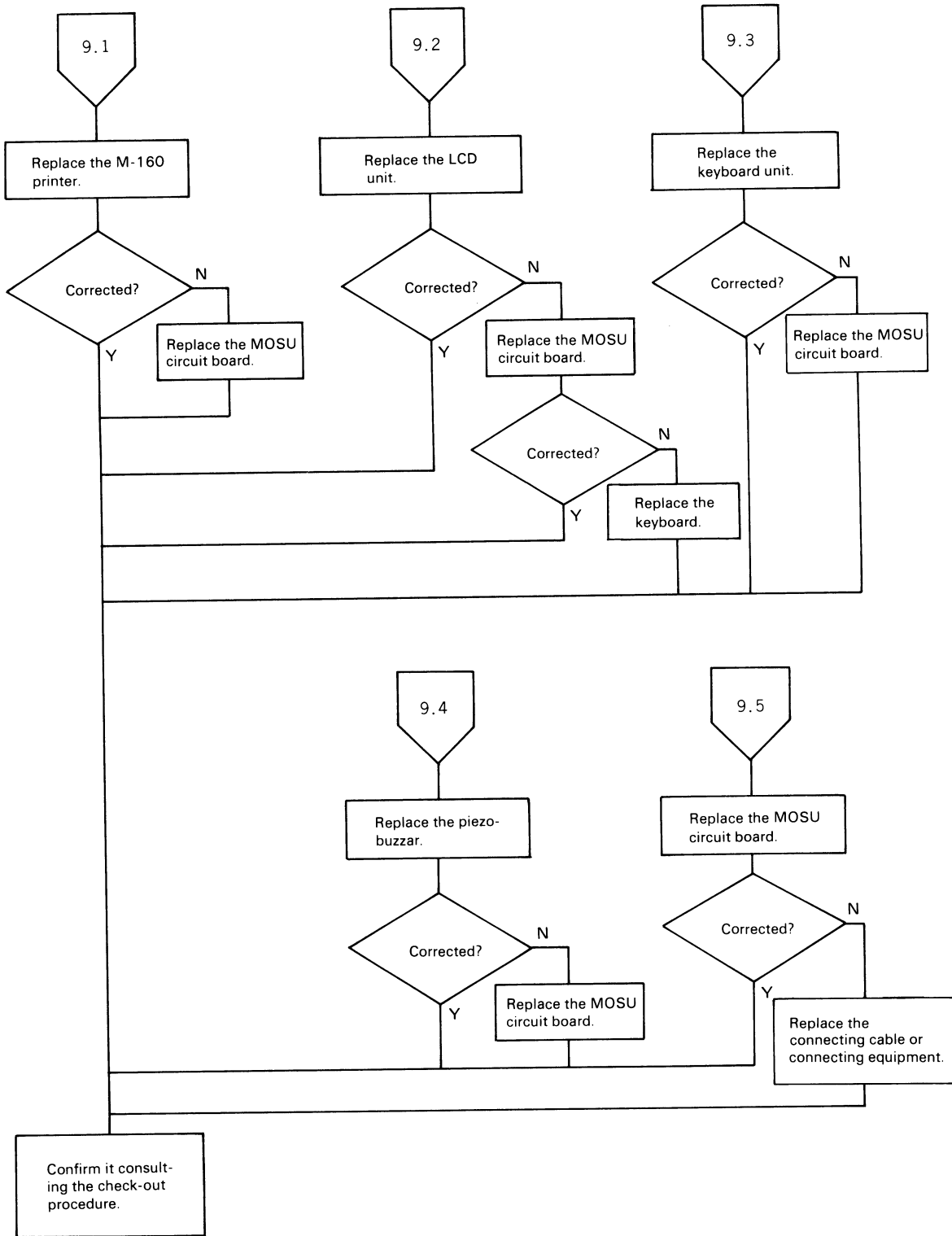












## 8.3 Unit Troubleshooting

### 8.3.1 MOSU Circuit Board

In troubleshooting the MOSU circuit board, search the entry routine for each type of trouble by using the entry table. If there are two or more troubles which are subject to change half way, enter as a rule the trouble which occurred first.

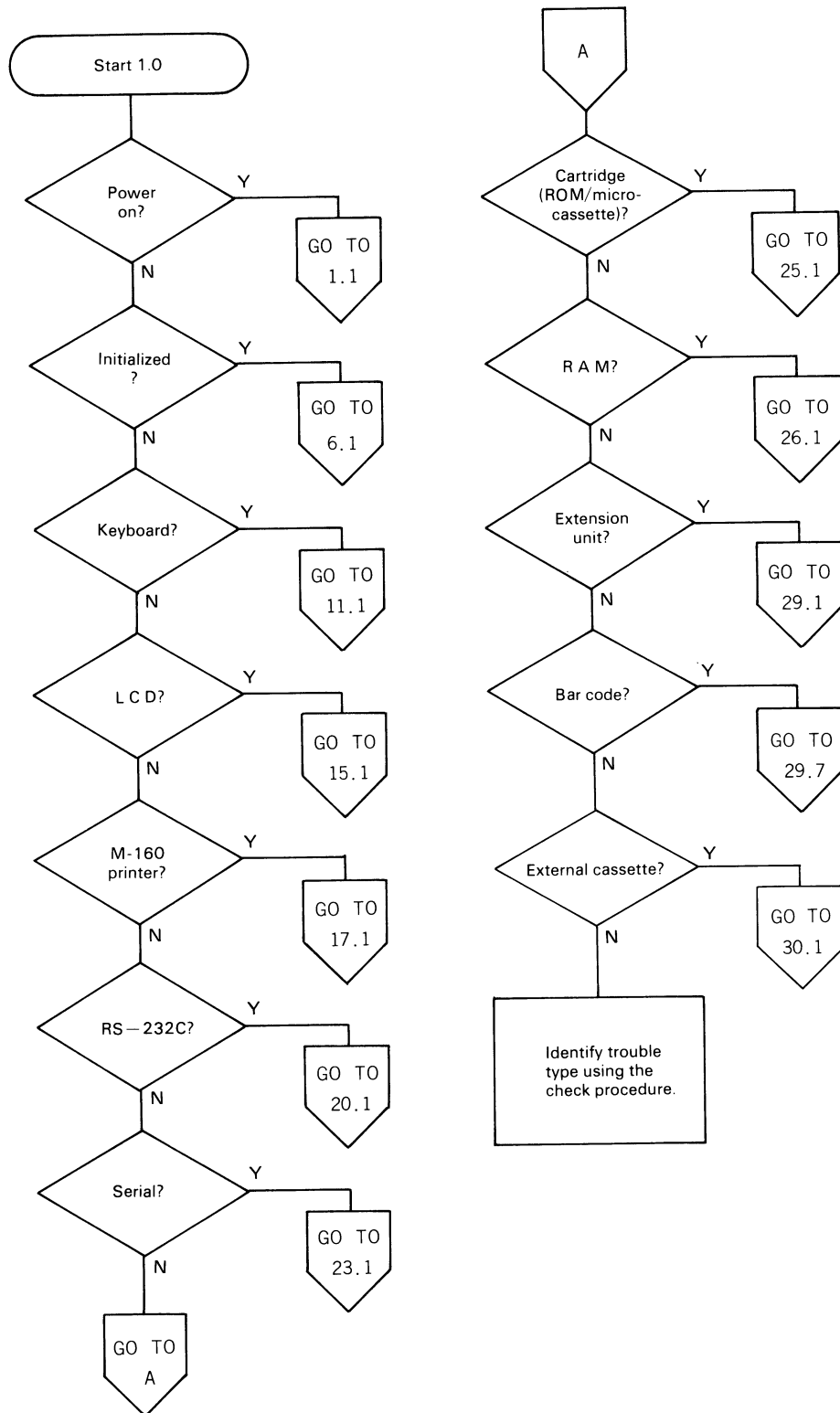
#### Precautions

- 1) If a continuity check on the circuit elements is indicated in the flow chart, be sure to disconnect the AC adaptor and battery connector from the MOSU circuit board, and wait for more than 30 seconds before starting the continuity check.
- 2) The flow chart may not indicate a mode in which to conduct a check. Examine the steps before and after the desired check item in the flow chart, or the trouble phenomenon involved before attempting the check.
- 3) If the same routine must be repeated in the troubleshooting flow chart, or if repairs are impossible, refer to the circuit diagram and operation description, and try to repair, or make a repair entry as mentioned below.

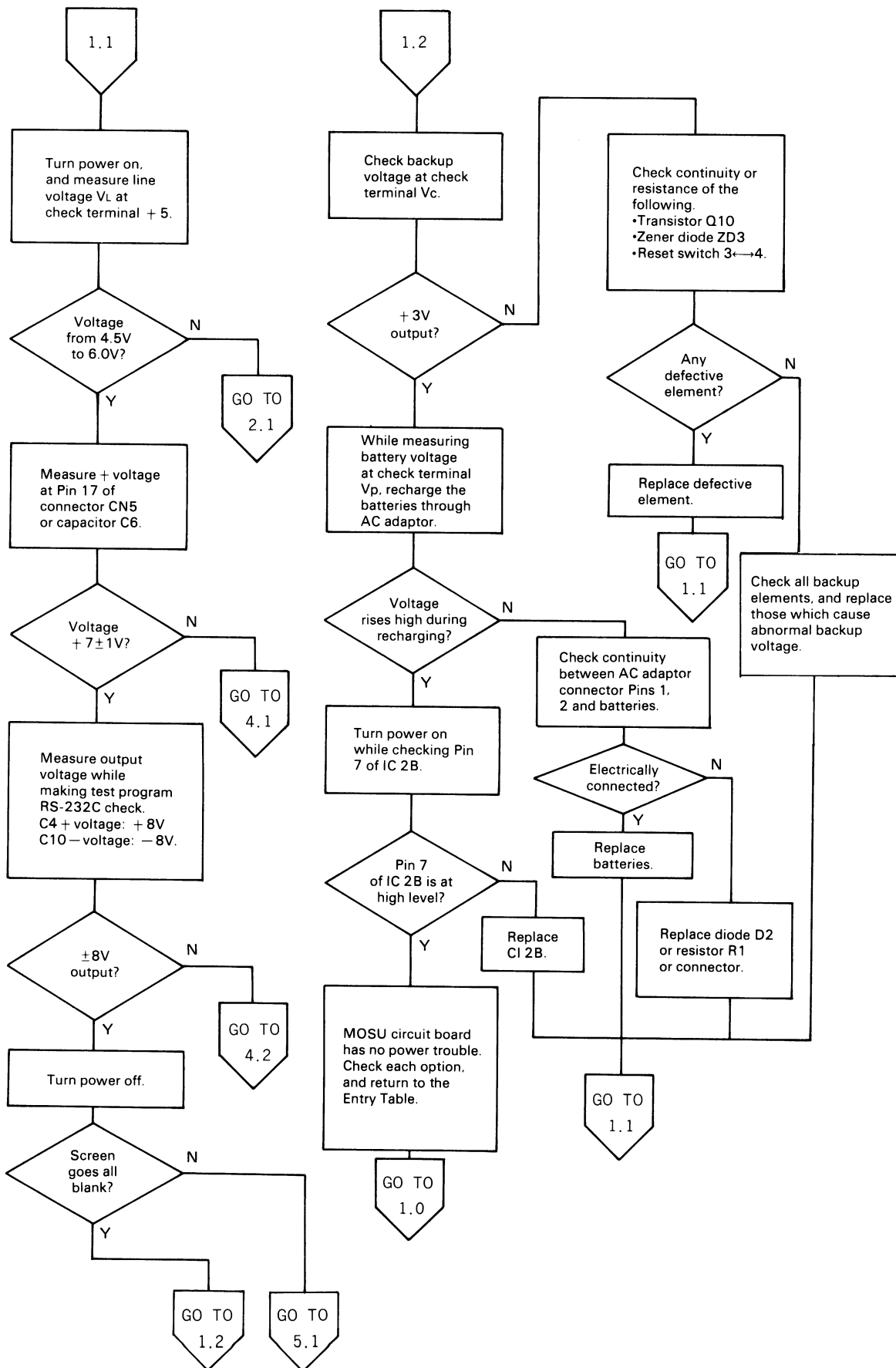
#### Steps

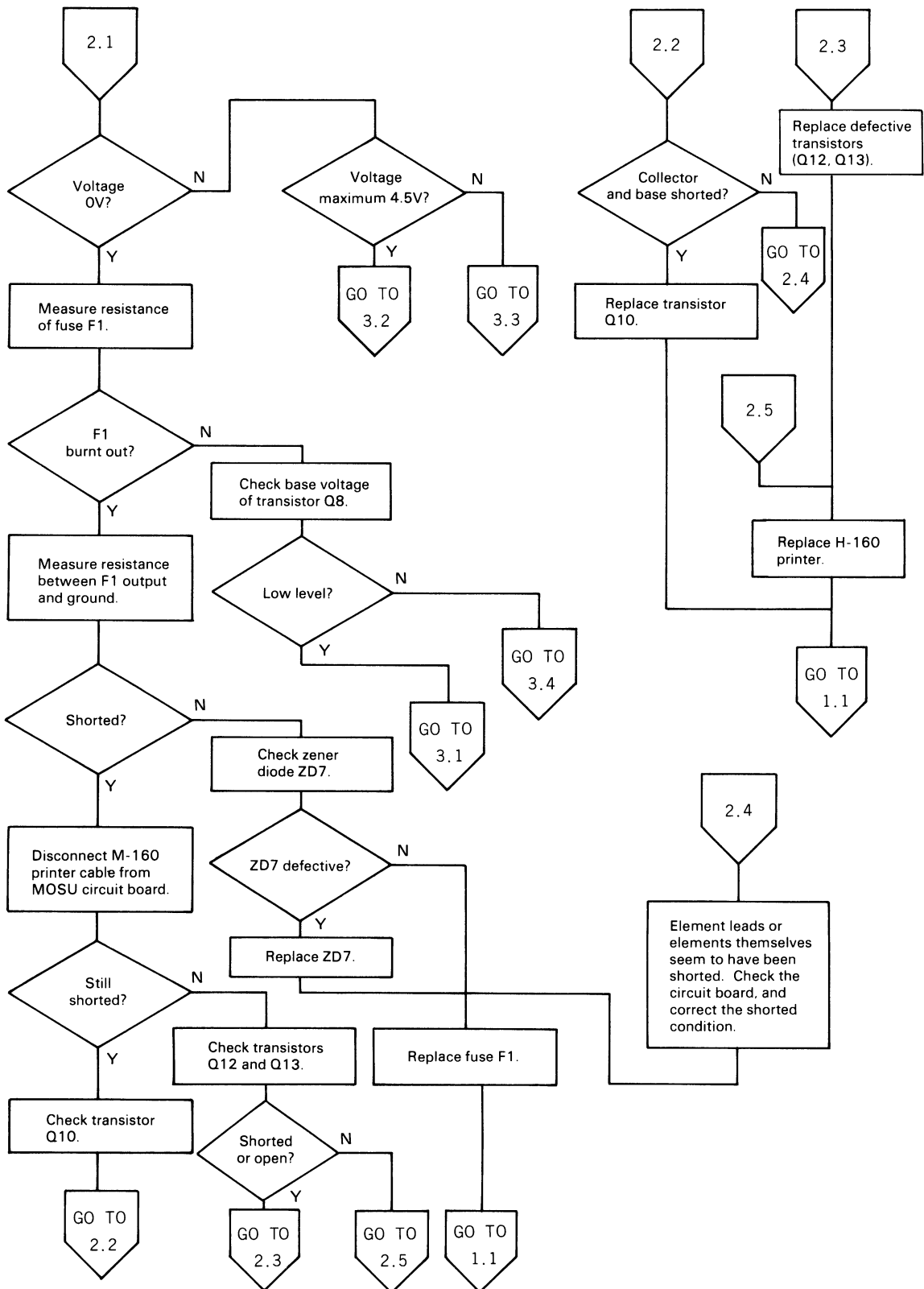
1. Replace the MOSU circuit board with another, and check again if it is defective.
  2. If the trouble is identified, assume its cause by referring to the Table of Troubles, check various parts, and replace or adjust parts.
  3. If the trouble is unlikely to recur, or if it seldom occurs and is difficult to identify, regulate the drive voltage in the following way.
    - a) Disconnect the batteries from the battery connector (CN9).
    - b) Set up a DC regulator that can vary voltages from about 0 to 10V.
    - c) Set the regulator voltage to +5V, and turn off the regulator output voltage.
    - d) Connect the regulator output terminal to connector CN9 or the check terminal on the circuit board (Vp: +5V, GND (P): GND).
    - e) Turn the regulator on to output the +5V voltage.
- \* After taking the above steps, vary the voltage from 4.5V to 6.0V, and check operation at each voltage level. If the trouble recurs due to the voltage variation, fix the voltage, and attempt repairs by referring again to the check procedure and troubleshooting flow chart.

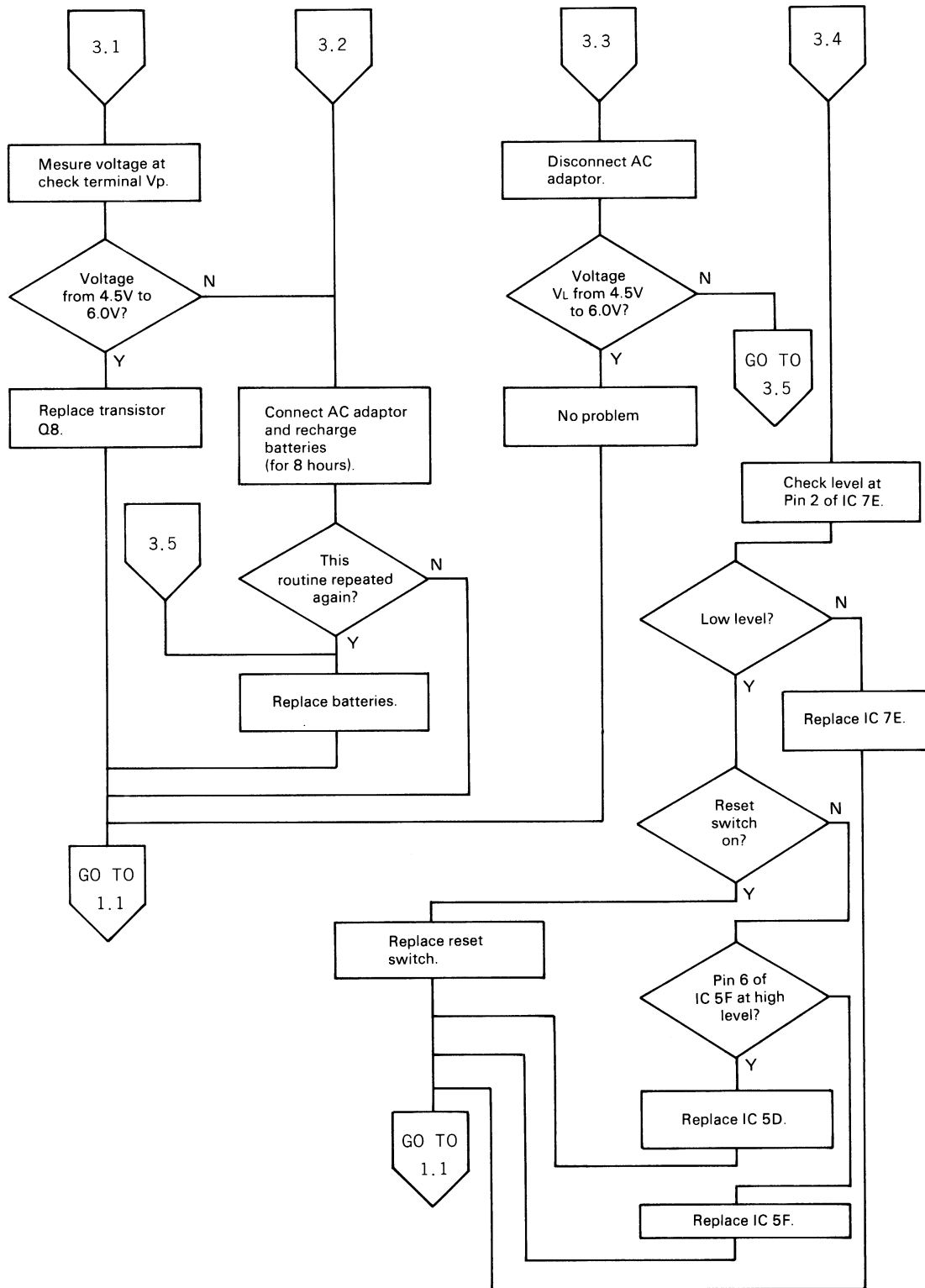
ENTRY TABLE



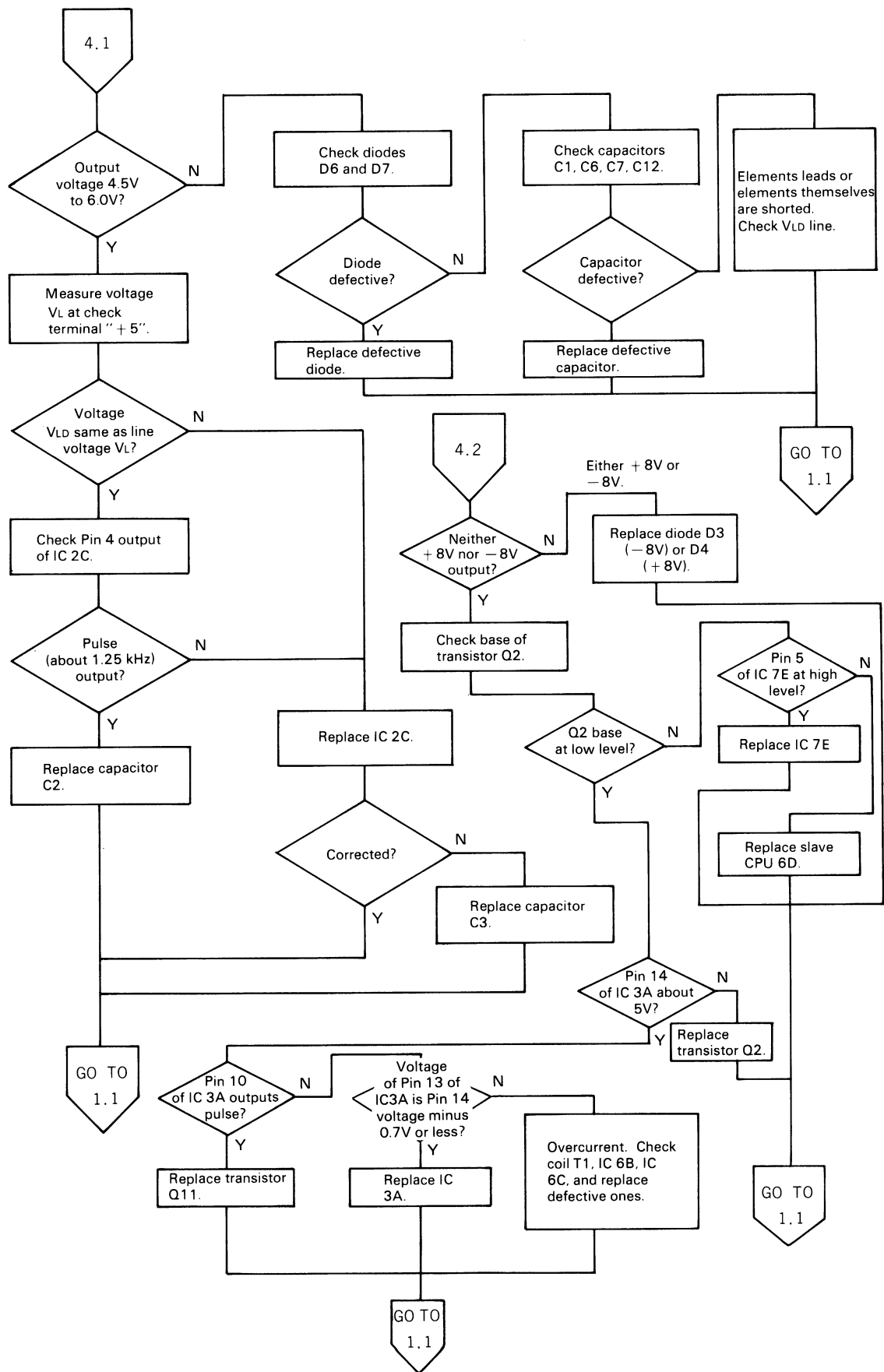
**POWER TROUBLE**

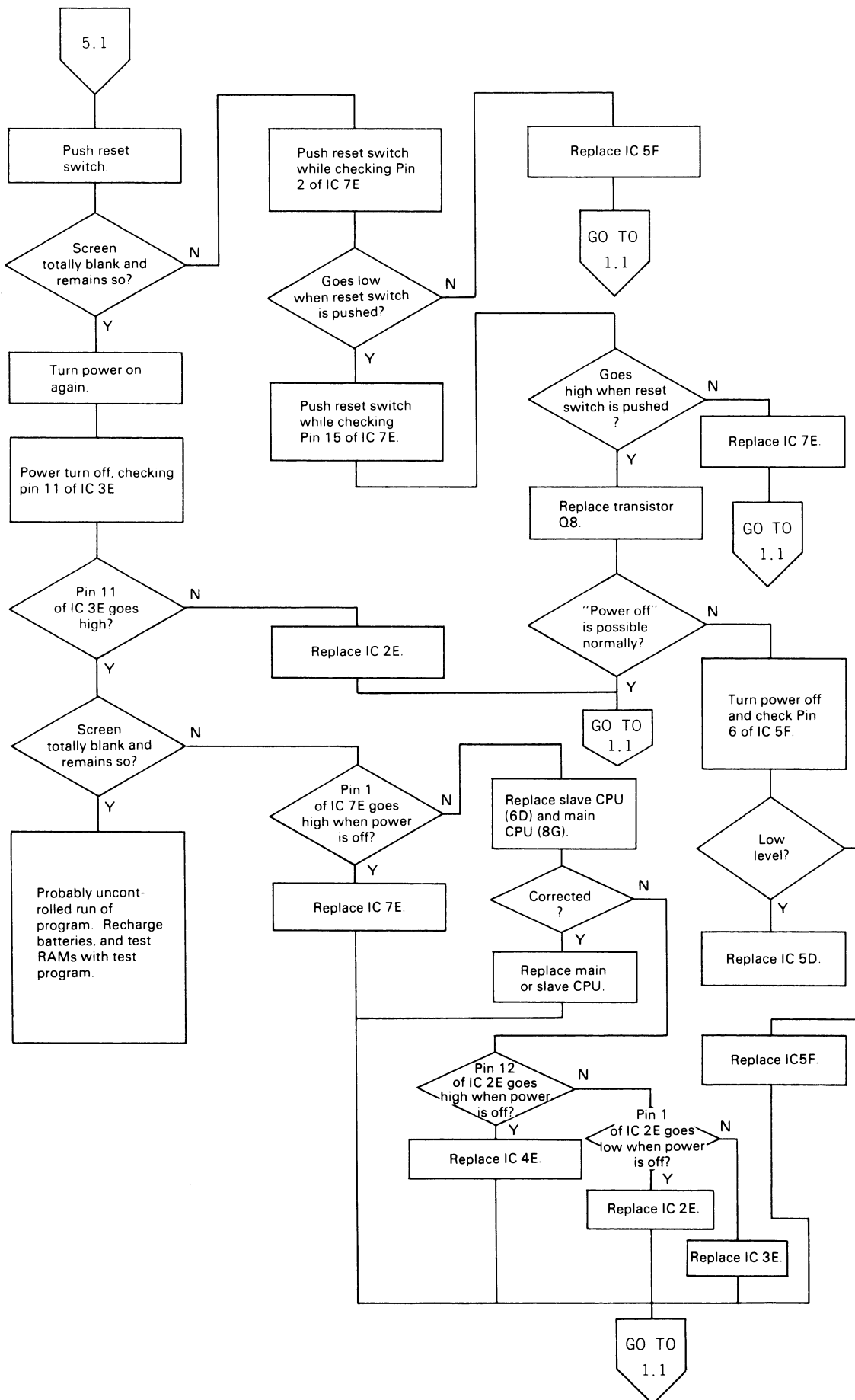


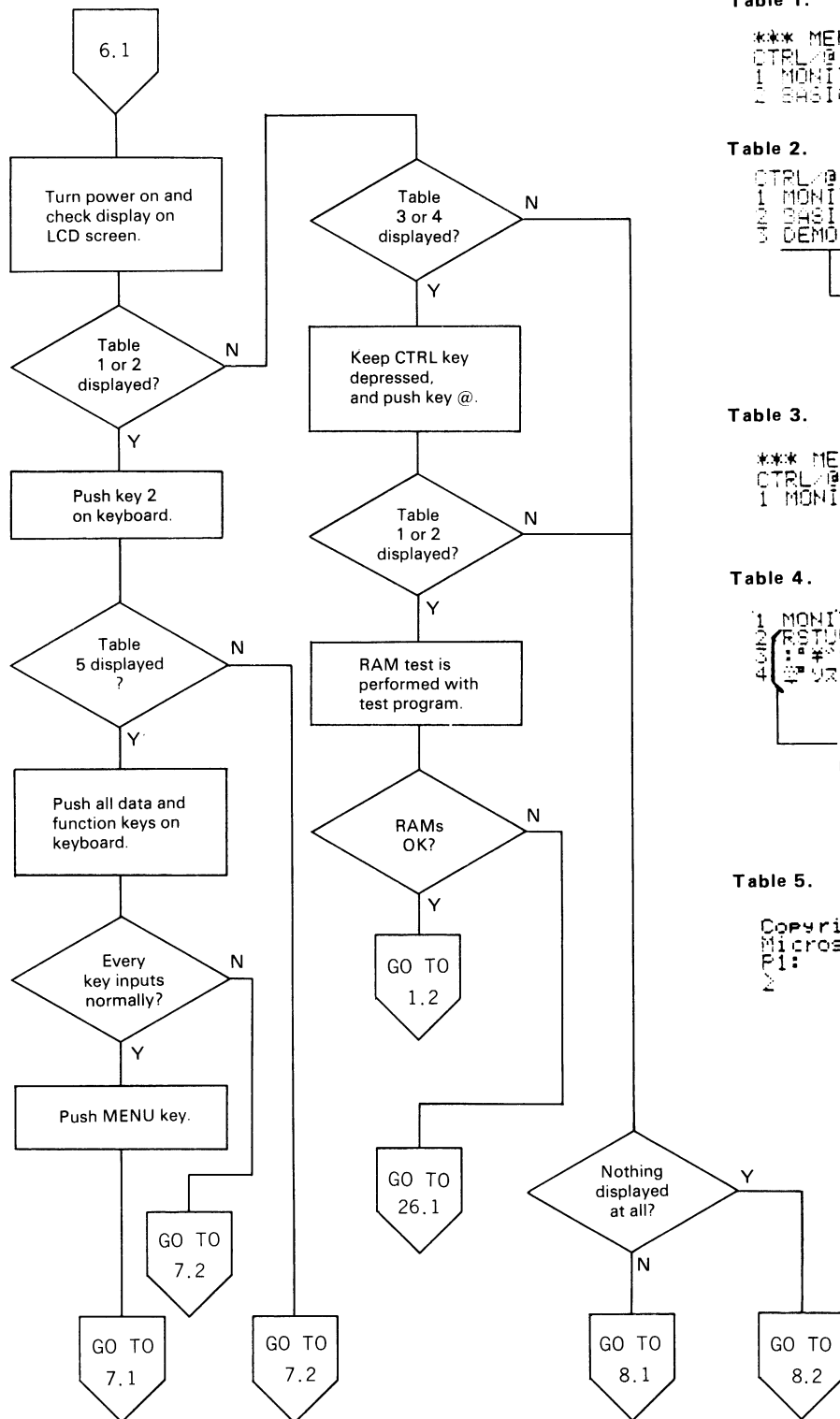












**Table 1.**

```

*** MENU ***
CTRL/@ Initialize
1 MONITOR
2 BASIC

```

**Table 2.**

```

CTRL/@ Initialize
1 MONITOR
2 BASIC
3 DEMO PGM BAS

```

Arbitrary program name

**Table 3.**

```

*** MENU ***
CTRL/@ Initialize
1 MONITOR

```

**Table 4.**

```

1 MONITOR
2 STUNNY BAS
3 *P1: BAS
4 *P1: BAS

```

Unintelligible program name

**Table 5.**

```

Copyright 1982 by
Microsoft & EPSON
P1:
  Bytes

```

Number of bytes of program P1 (0~XXXX Bytes)

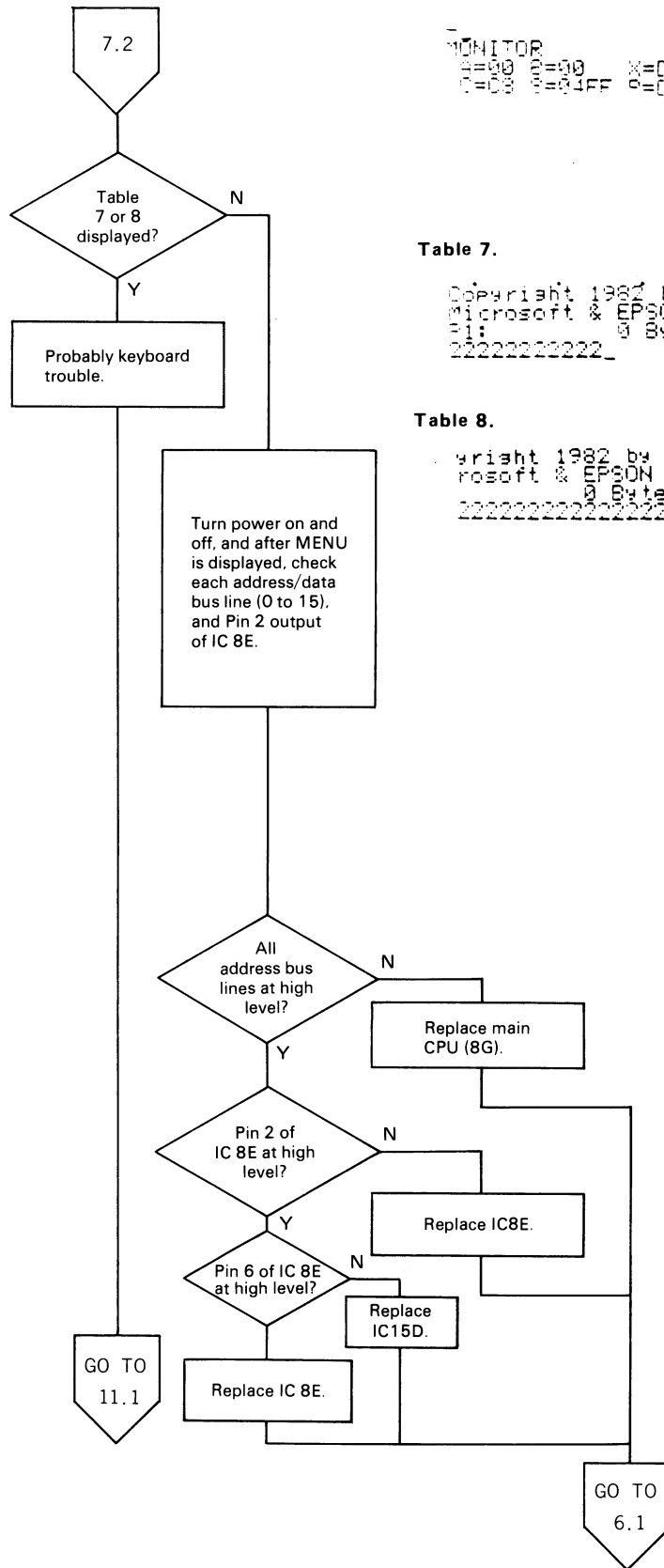
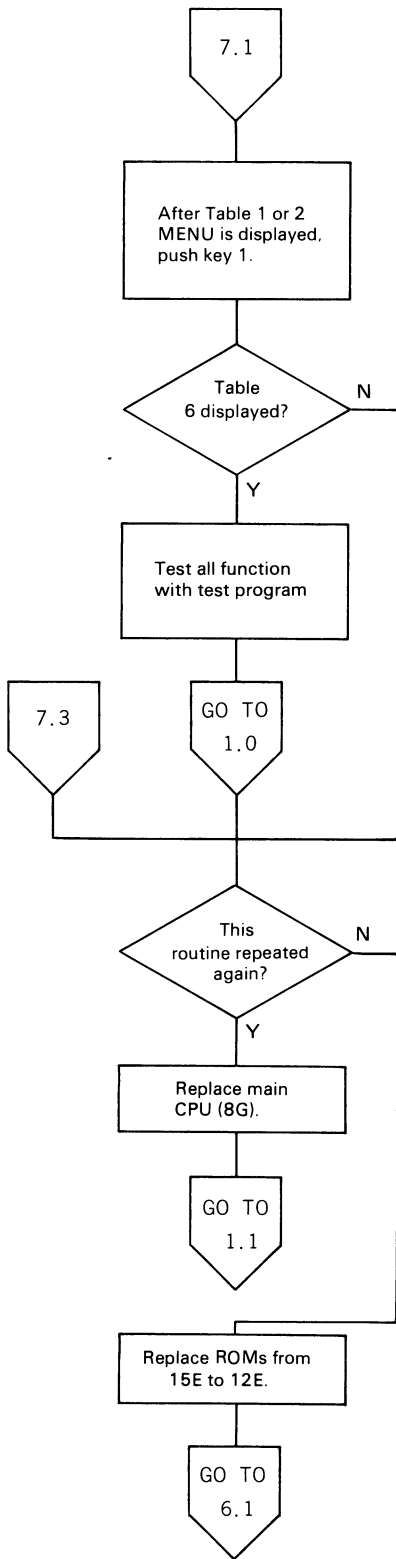


Table 6.

```

MONITOR
A=00 B=90 X=0840
C=08 D=4FF Y=0E40
  
```

Table 7.

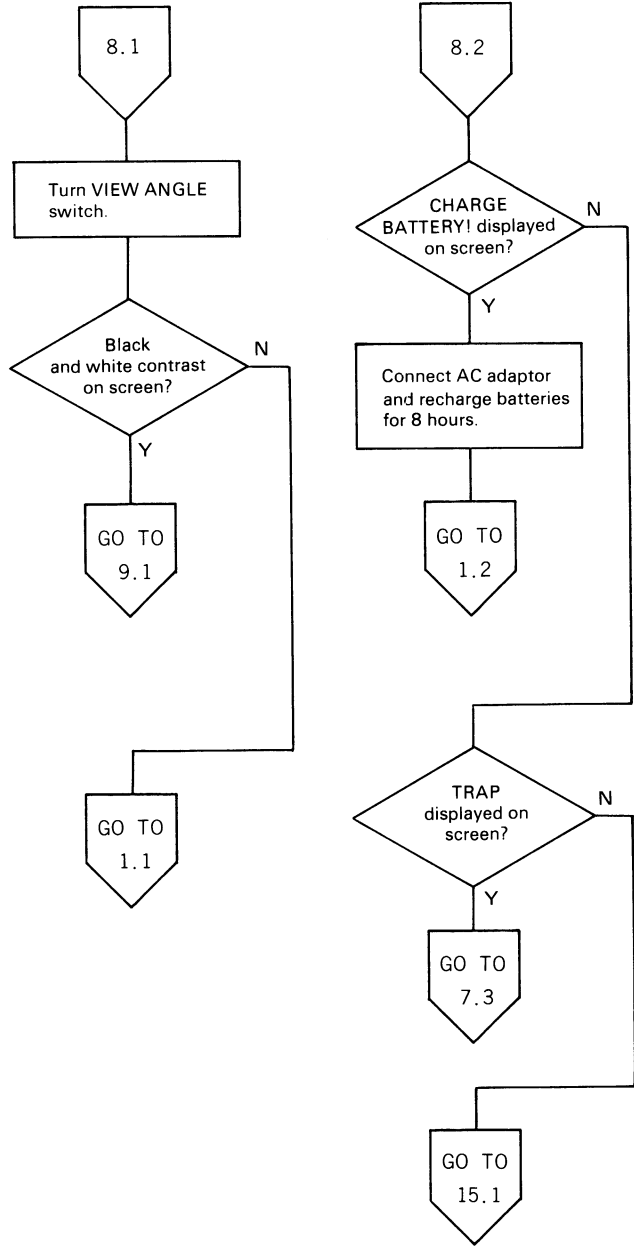
```

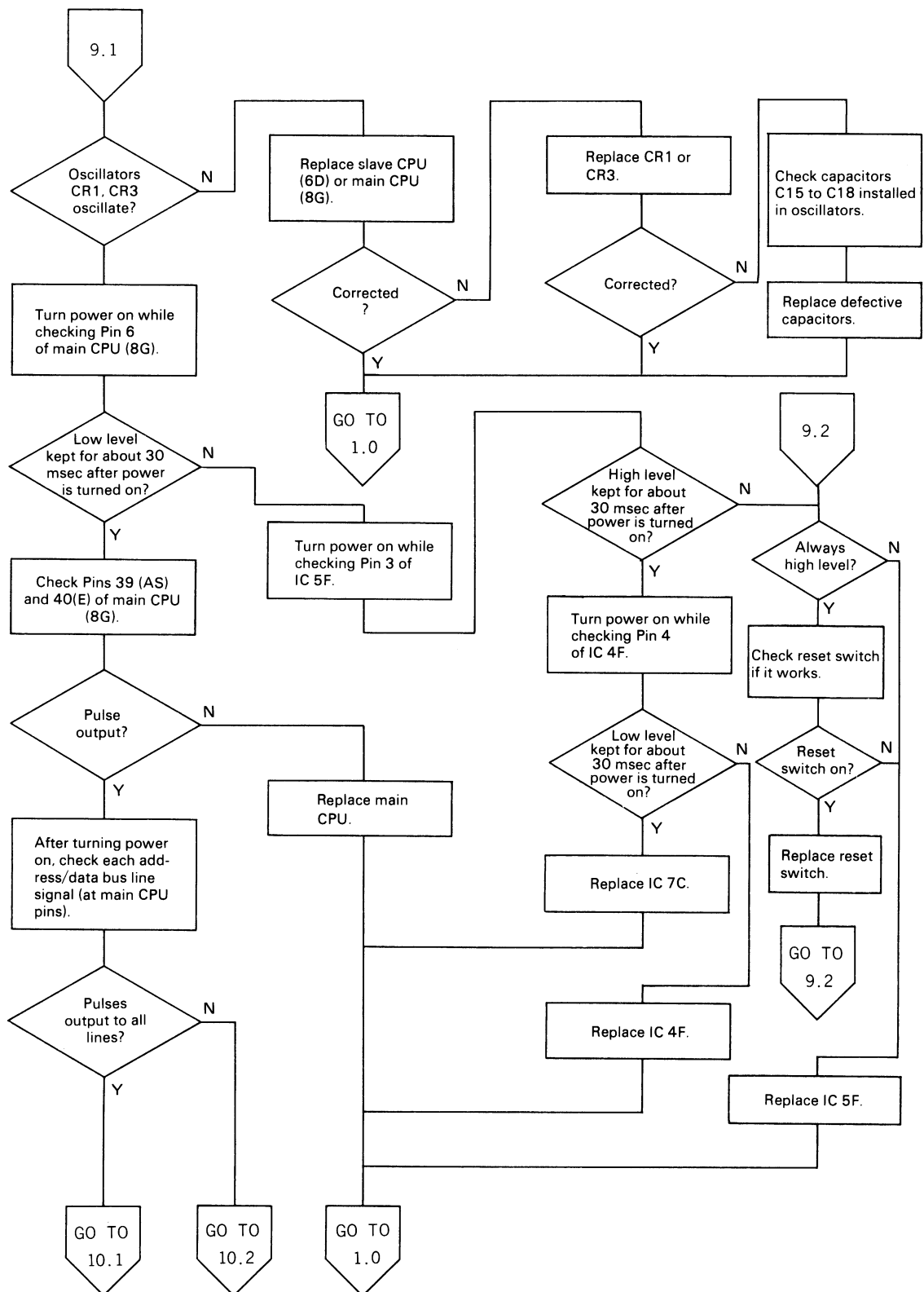
Copyright 1982 by
Microsoft & EPSON
01: 0 Bytes
22222222222222222222
  
```

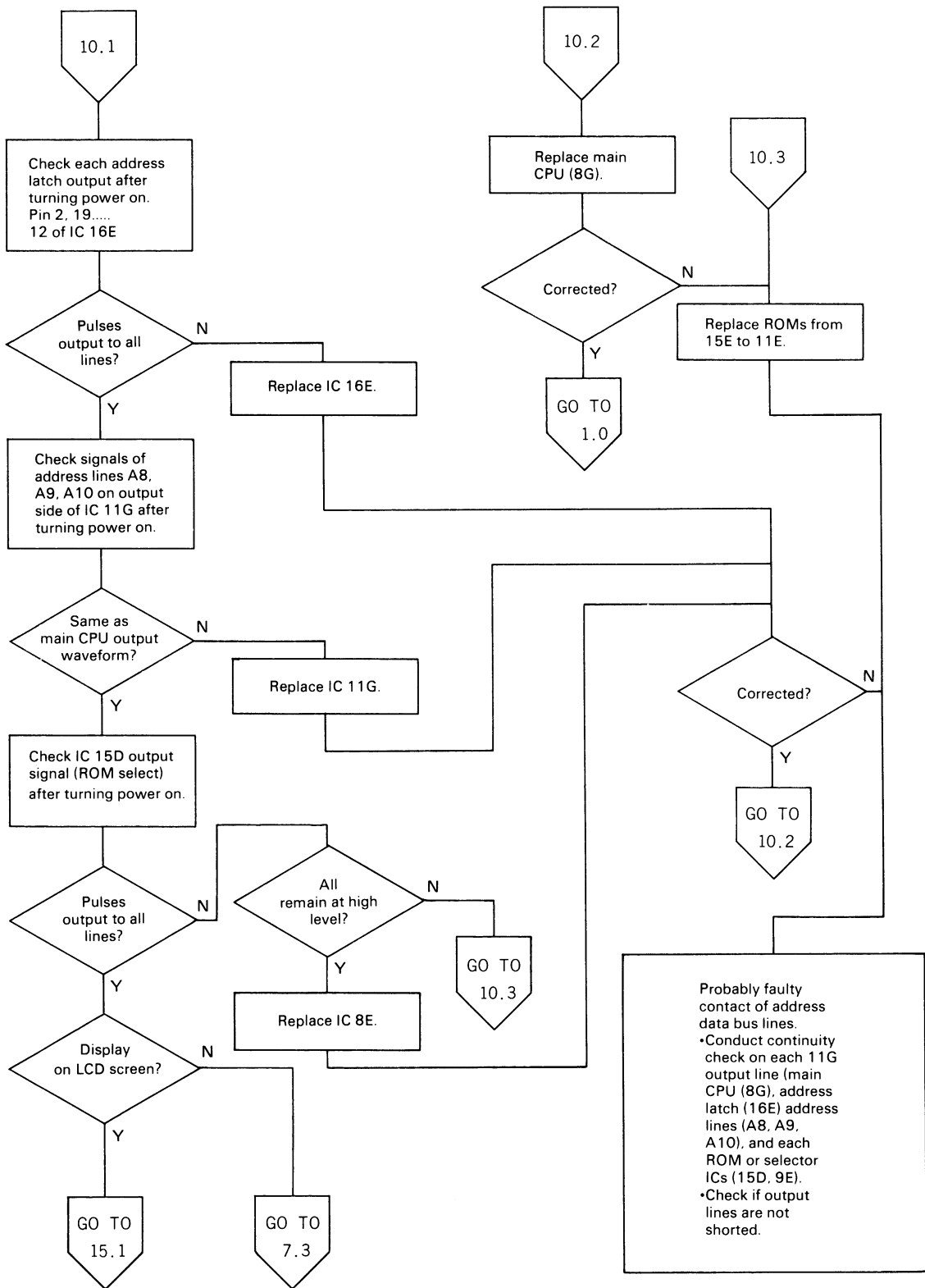
Table 8.

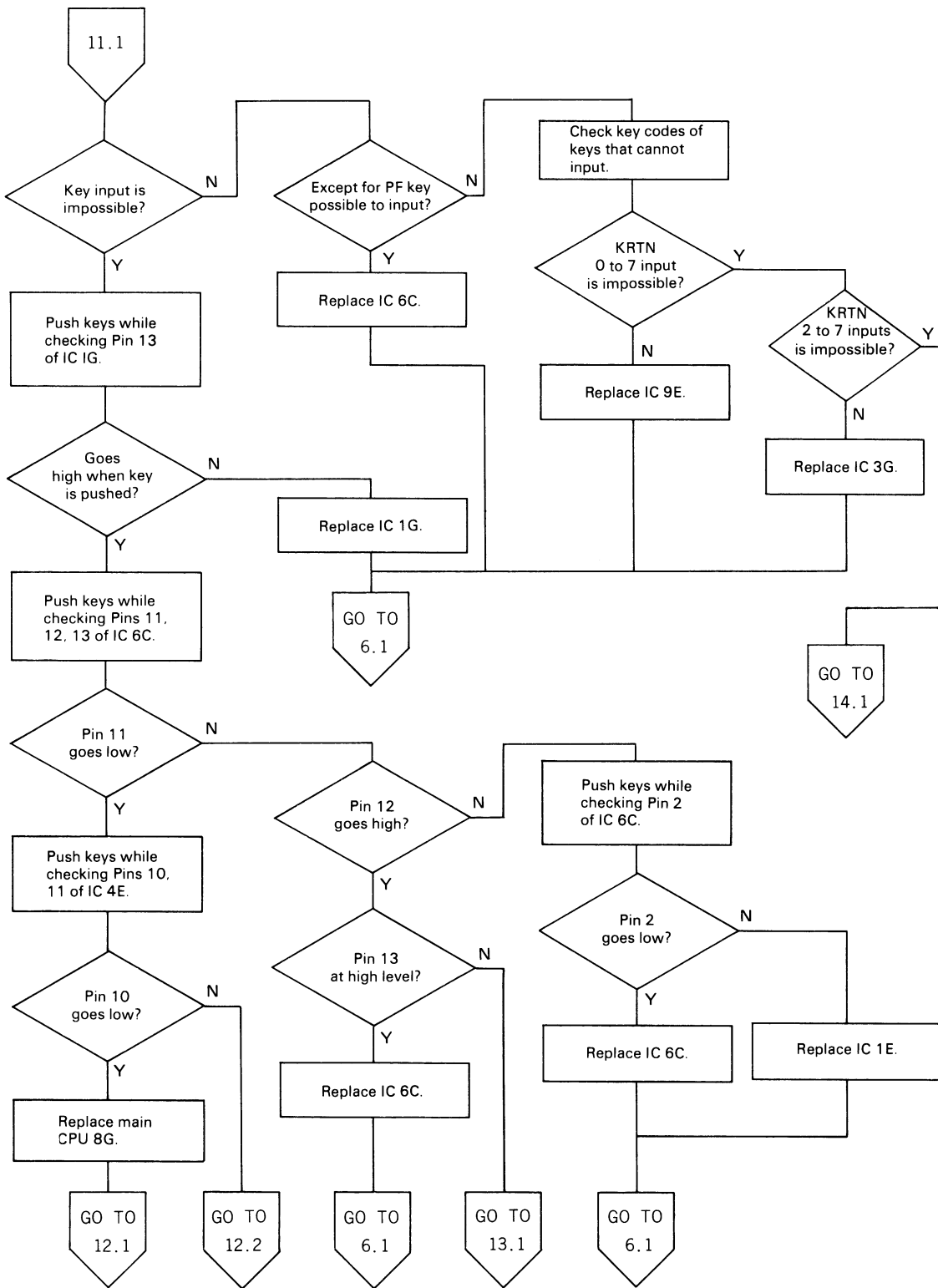
```

Copyright 1982 by
Microsoft & EPSON
0 Bytes
22222222222222222222
  
```

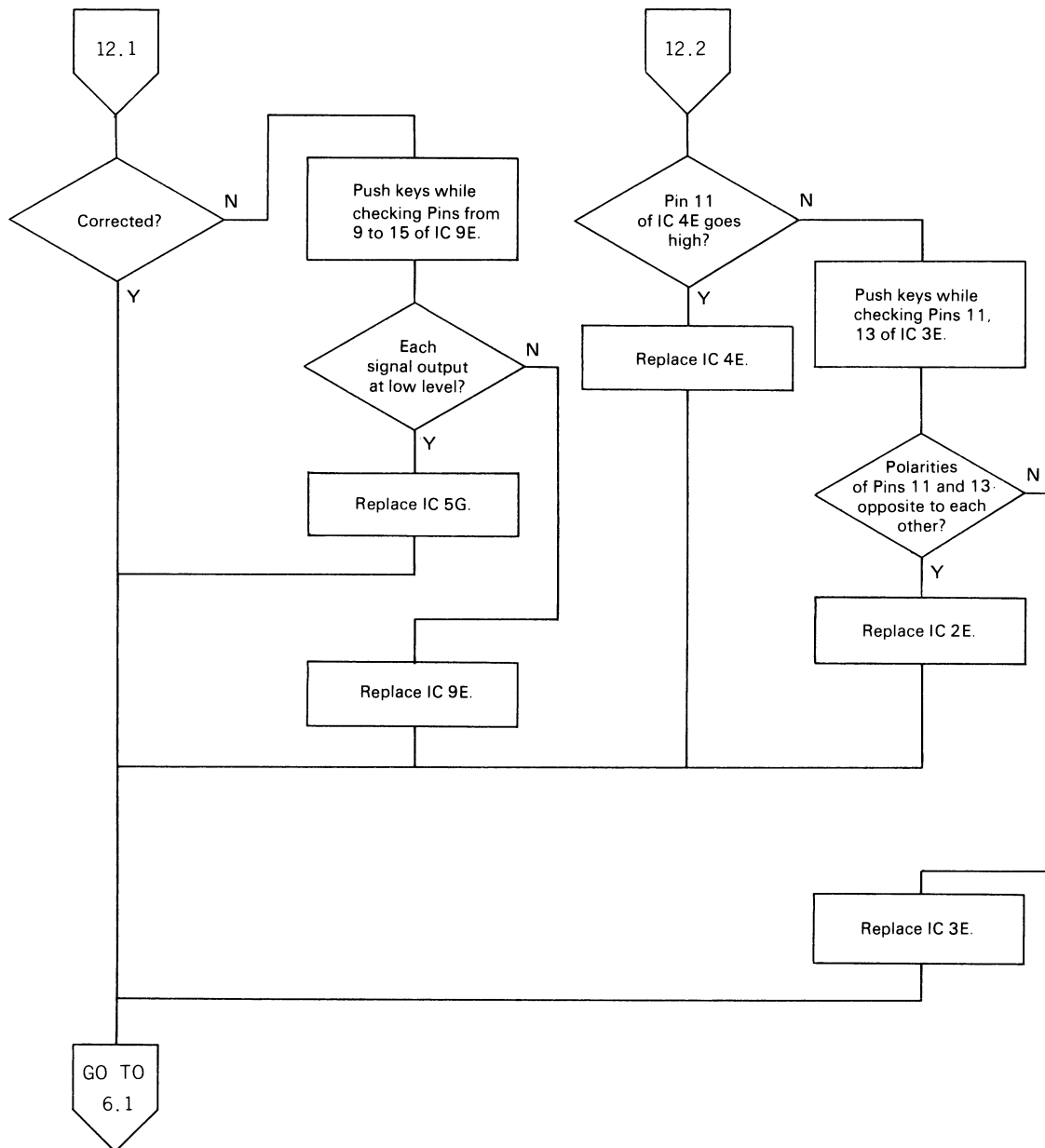


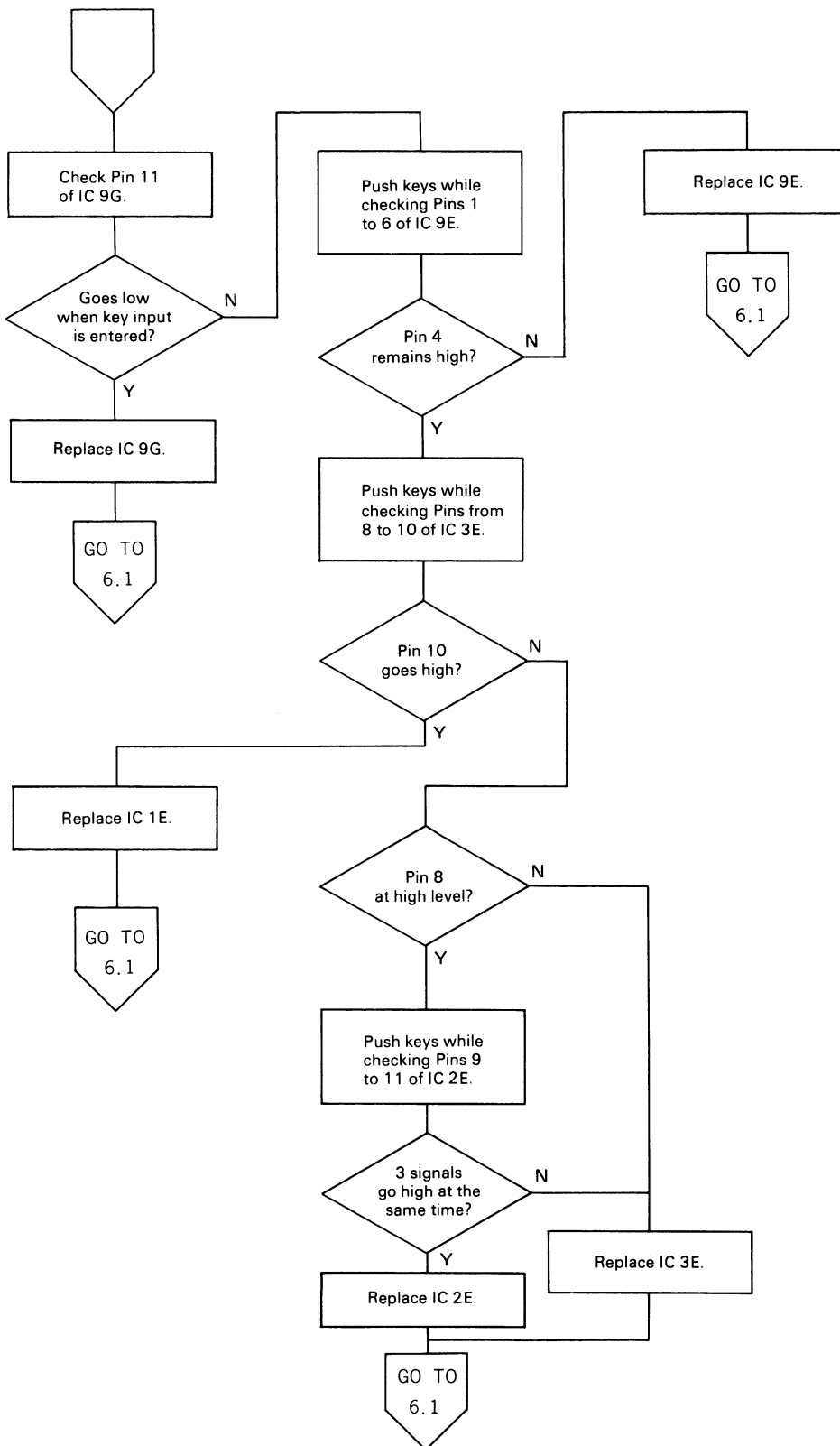












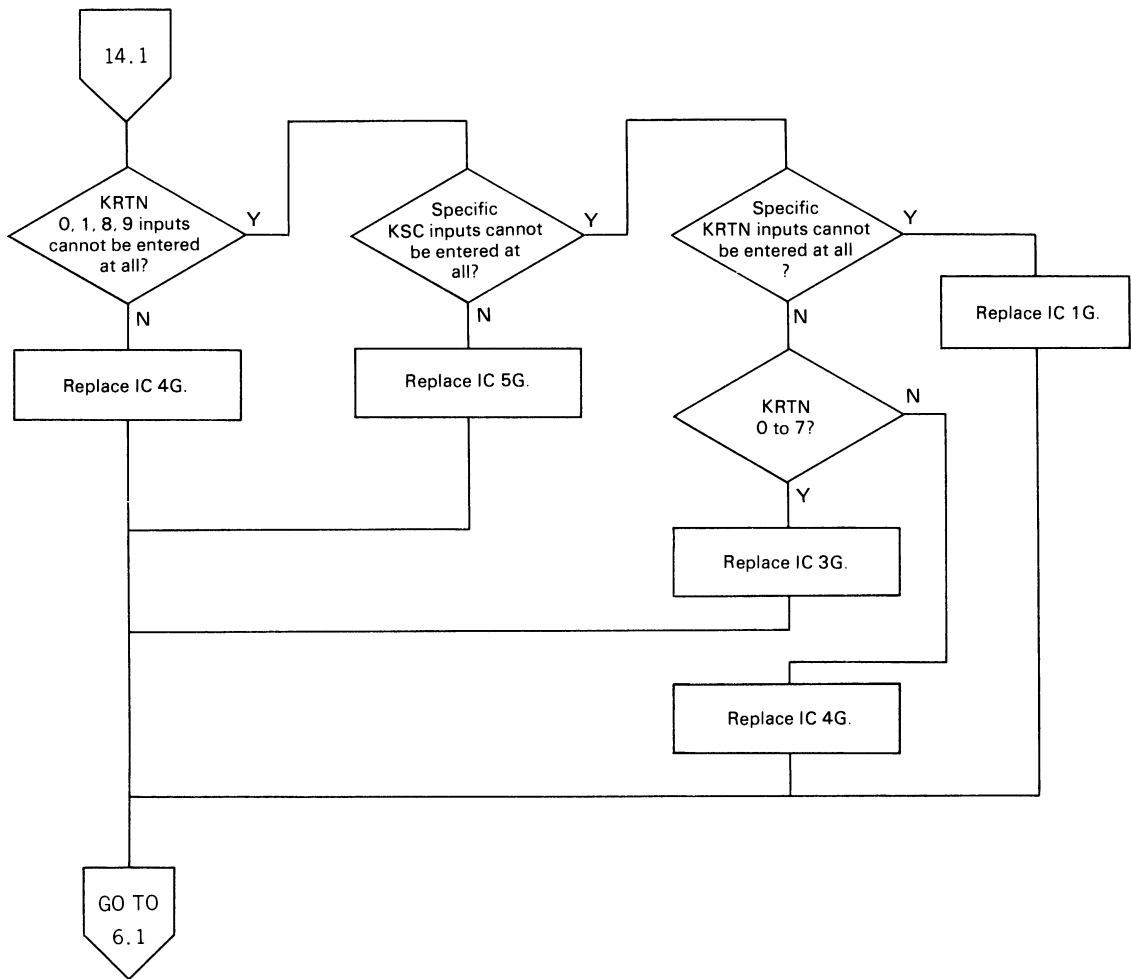


Table 9.

```

*** MENU ***
CTRL+M Initialize
1 MONITOR
2 BASIC

```

Table 10.

```

CTRL+M Initialize
1 MONITOR
2 BASIC
3 DEMO PGM BAS
└ Arbitrary program name

```

Table 11.

```

Copyright 1982 by
Microsoft & EPSON
P1:
  2 Bytes

```

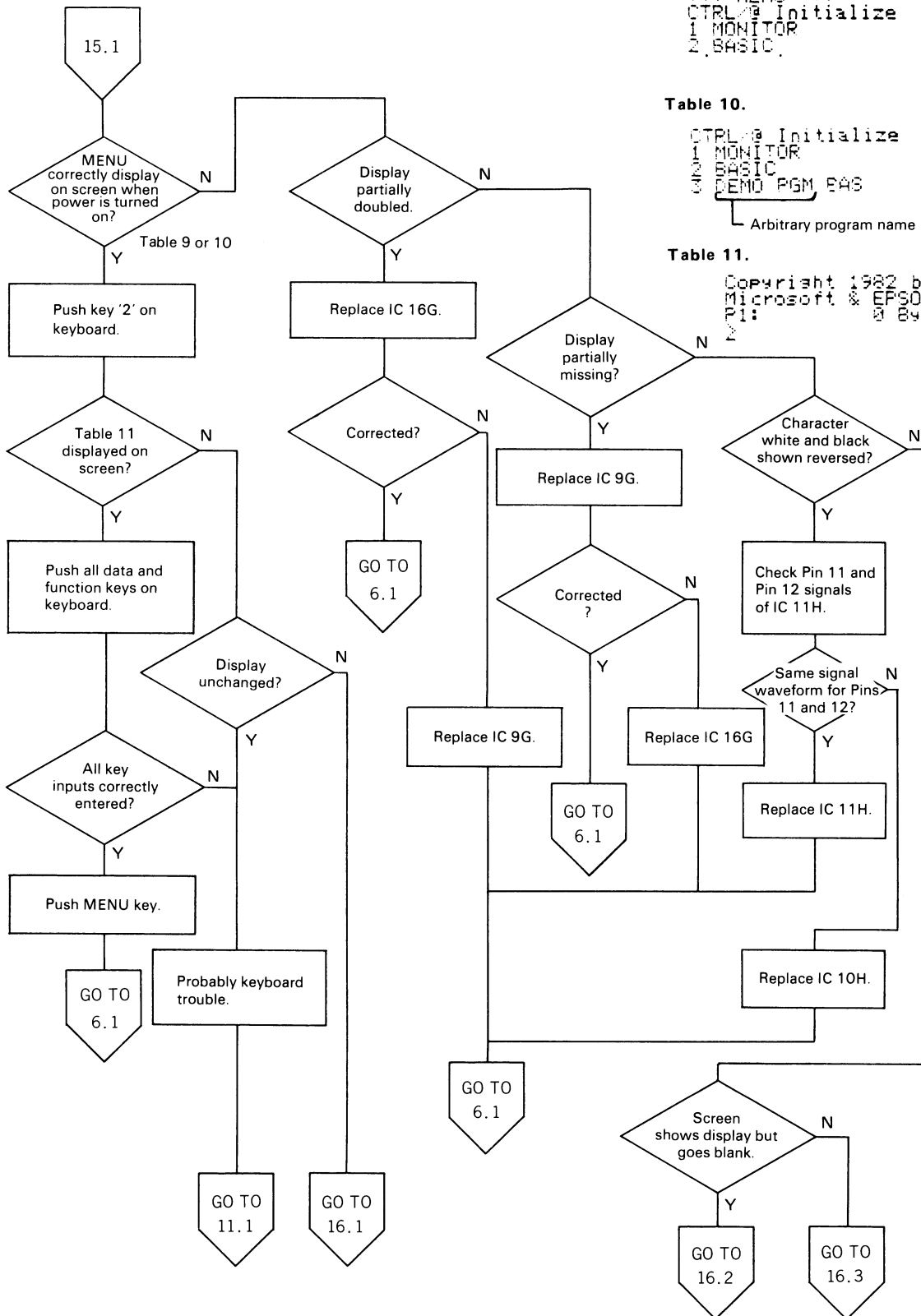
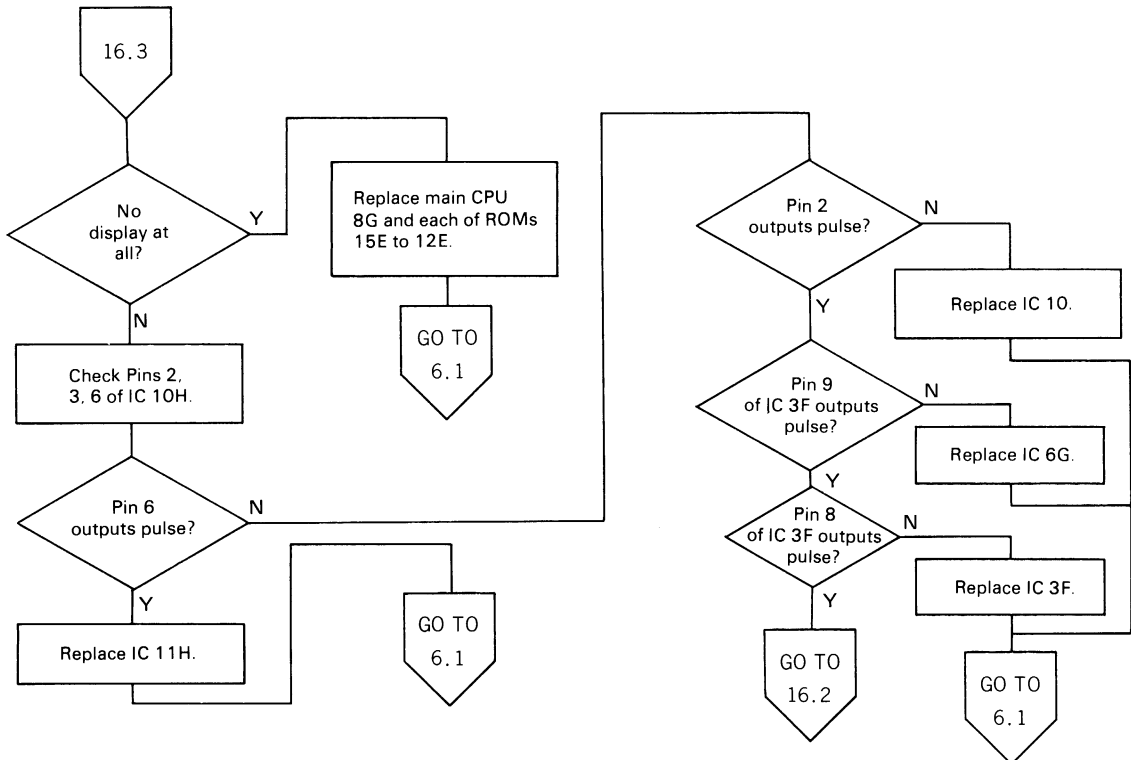
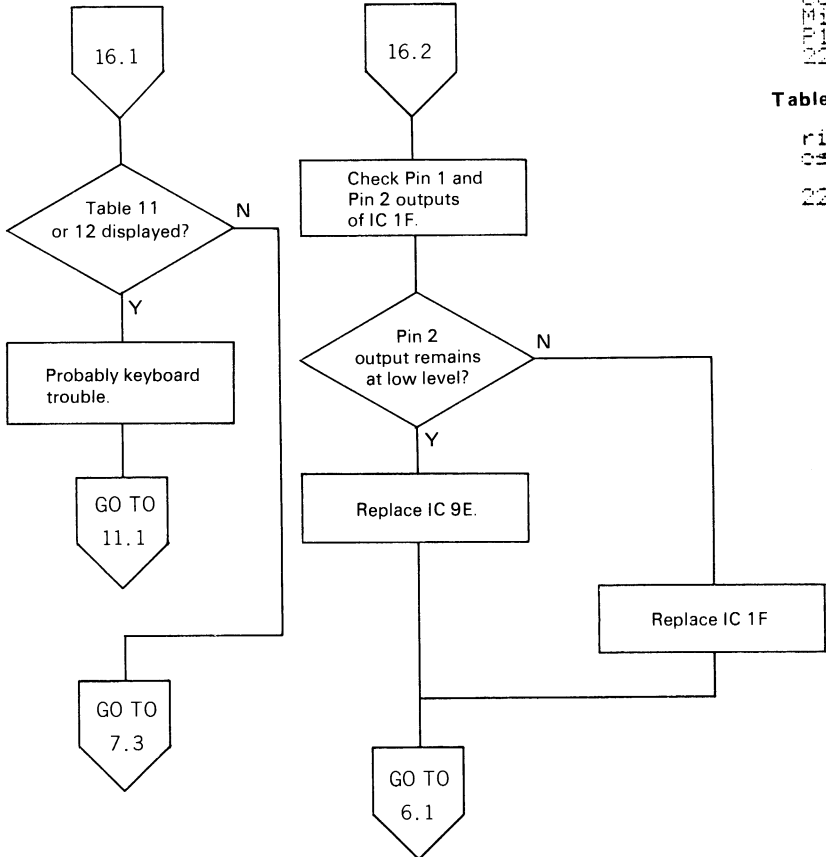


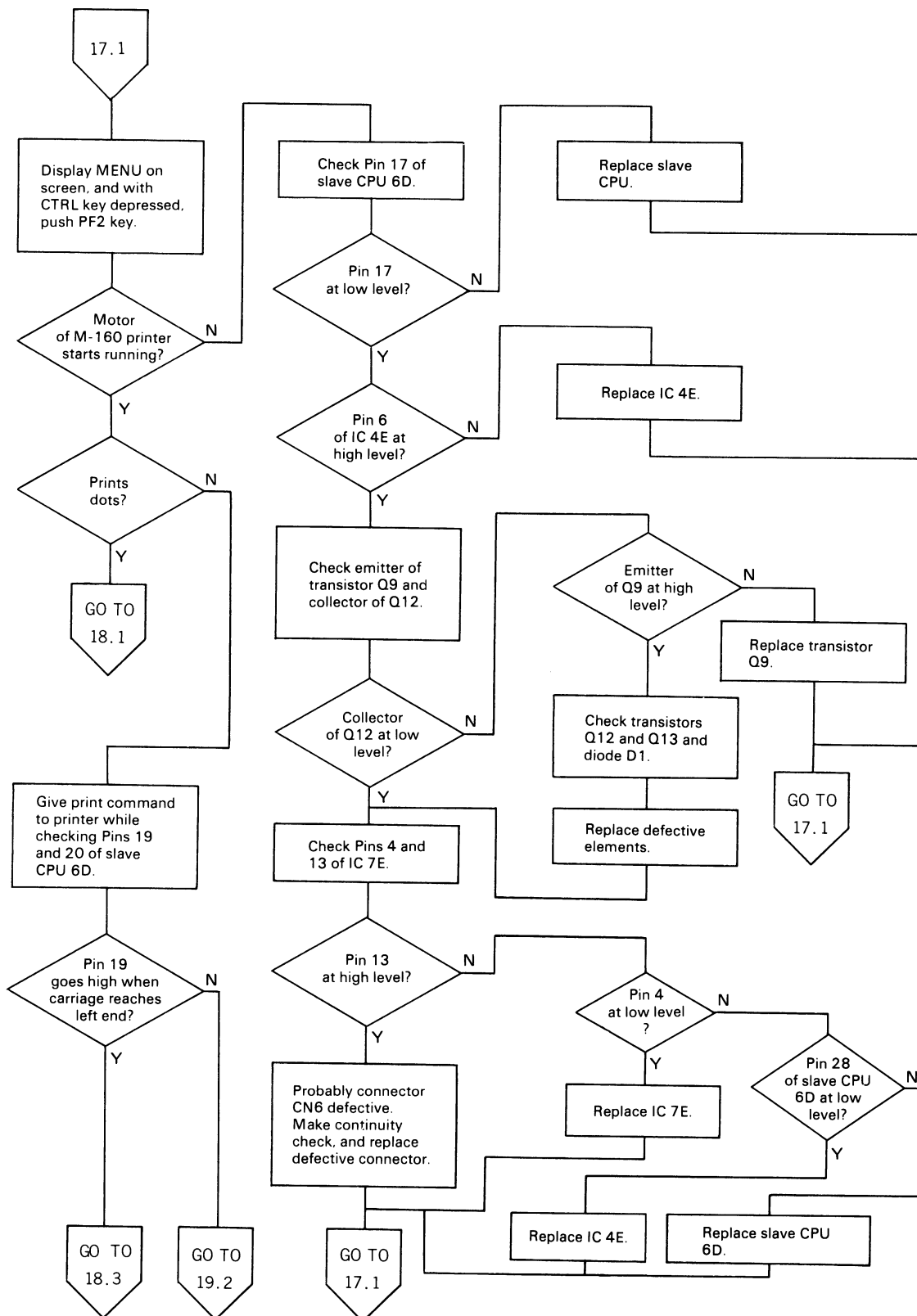
Table 12.

Copyright 1982 by  
Microsoft & EPSON  
File: 0 Bytes  
22222222222222222222

Table 13.

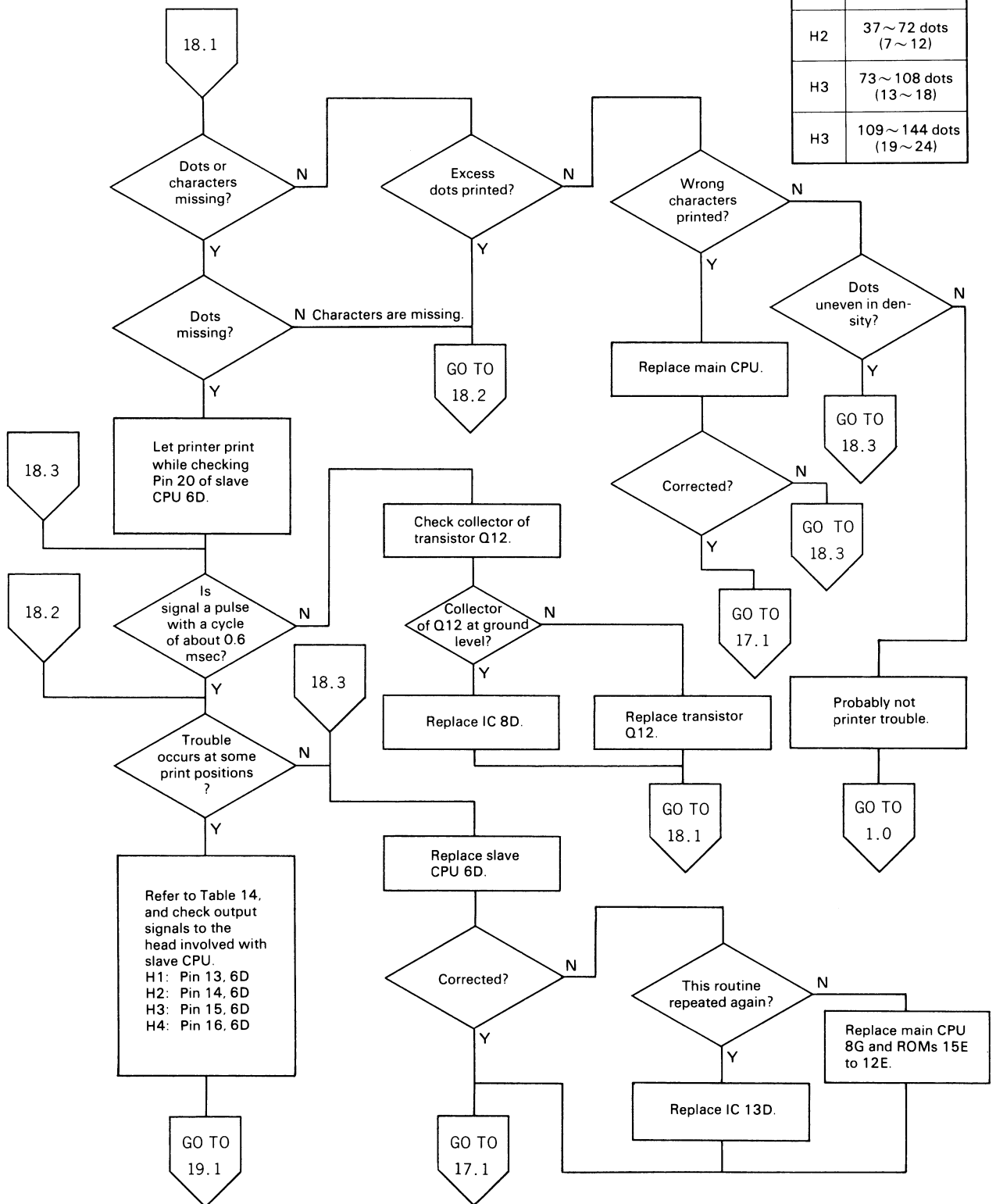
Copyright 1982 by  
Microsoft & EPSON  
File: 0 Bytes  
22222222222222222222

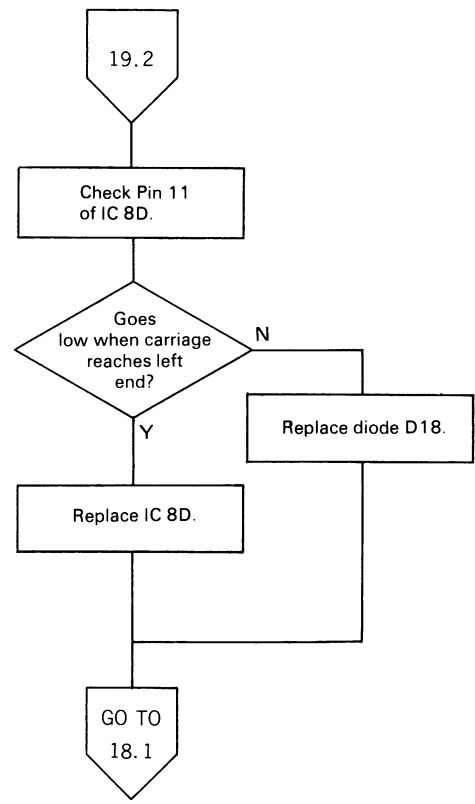
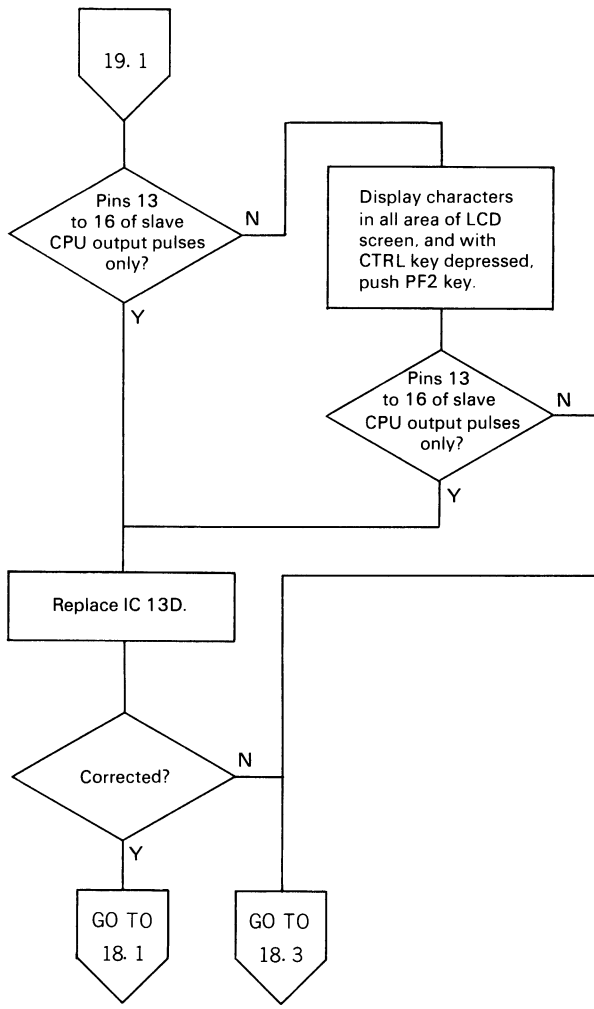




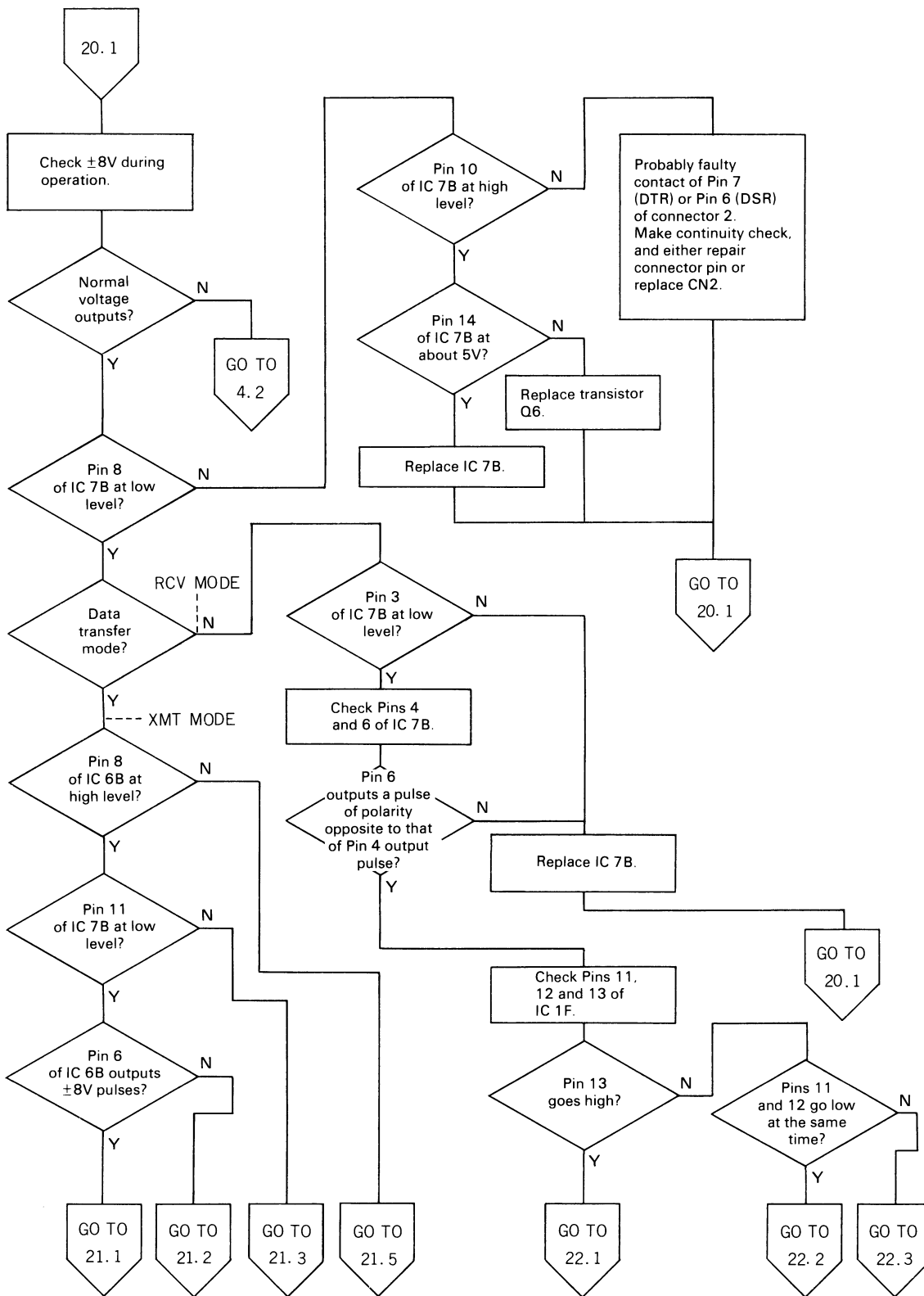
**Table 14.**

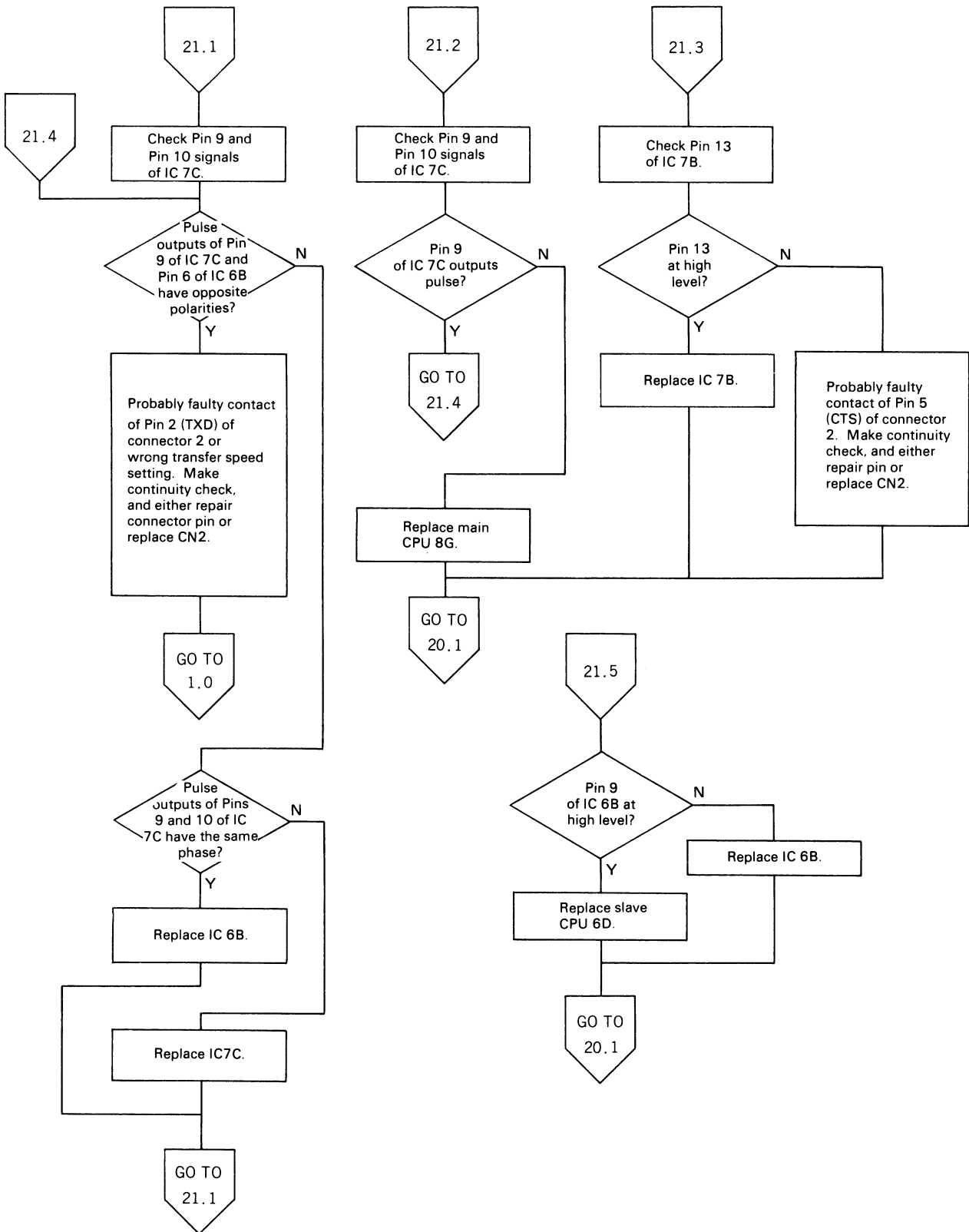
Head	Printing position
H1	1 ~ 36 dots (1 ~ 6)
H2	37 ~ 72 dots (7 ~ 12)
H3	73 ~ 108 dots (13 ~ 18)
H3	109 ~ 144 dots (19 ~ 24)

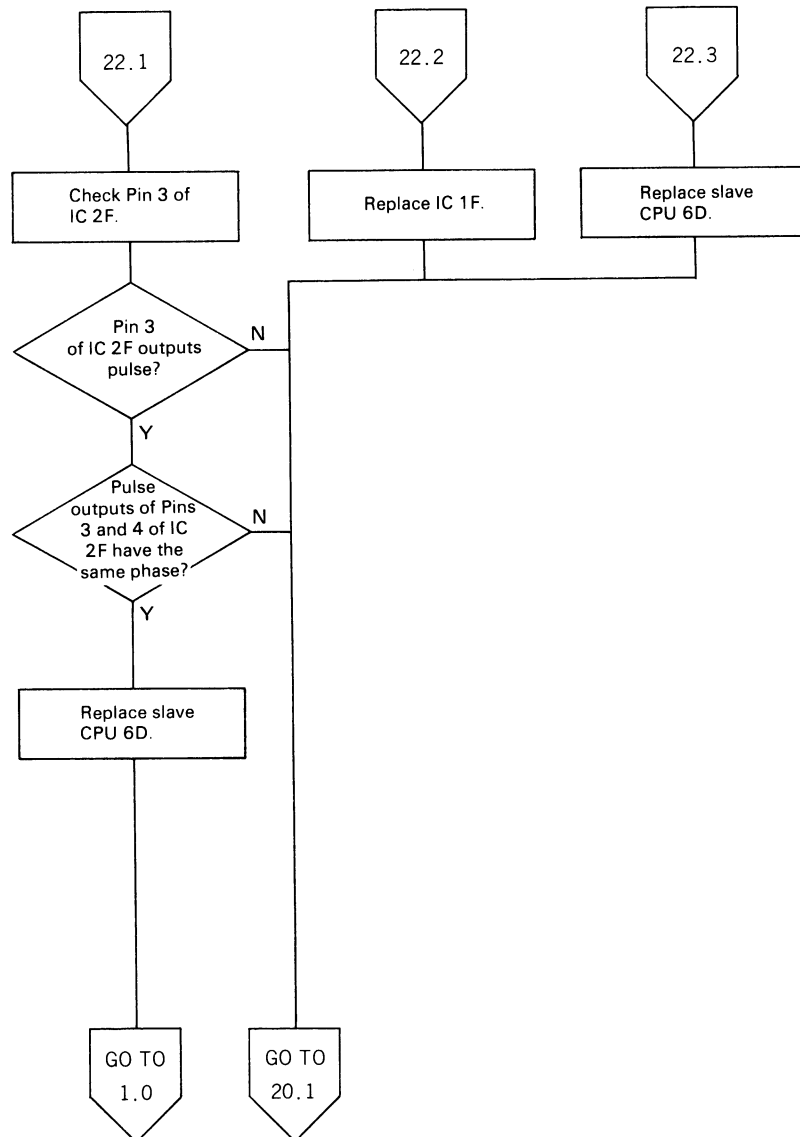


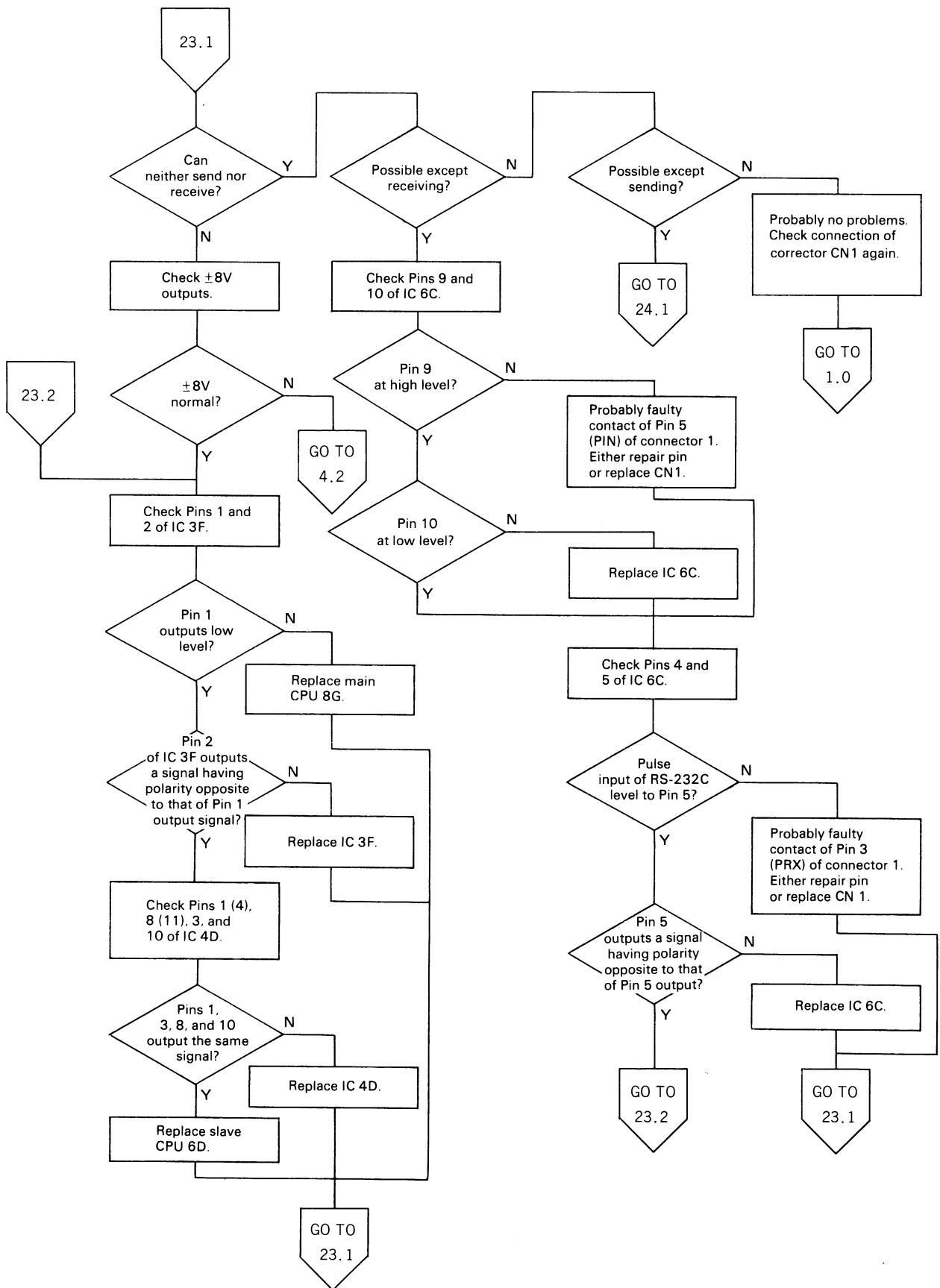


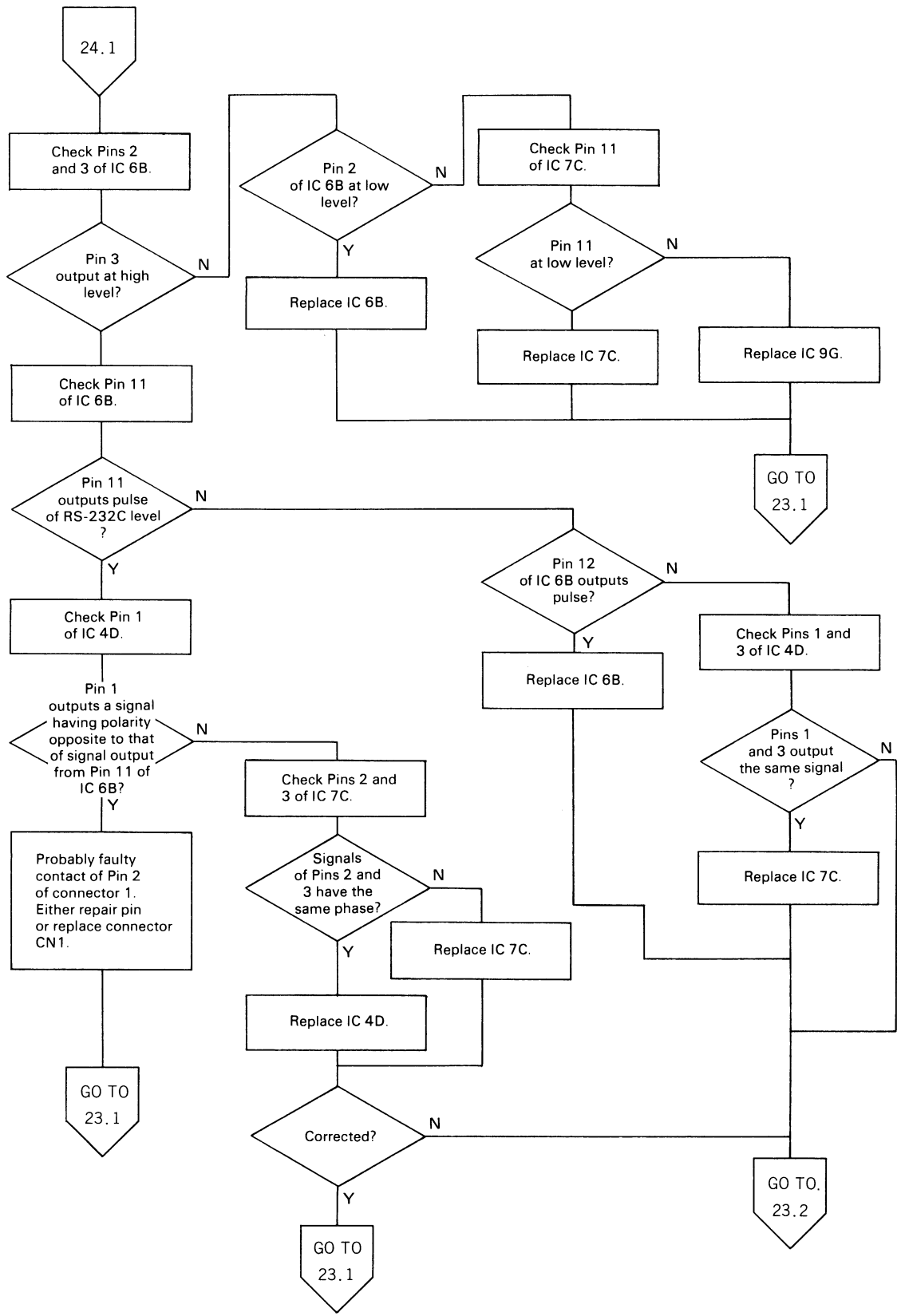


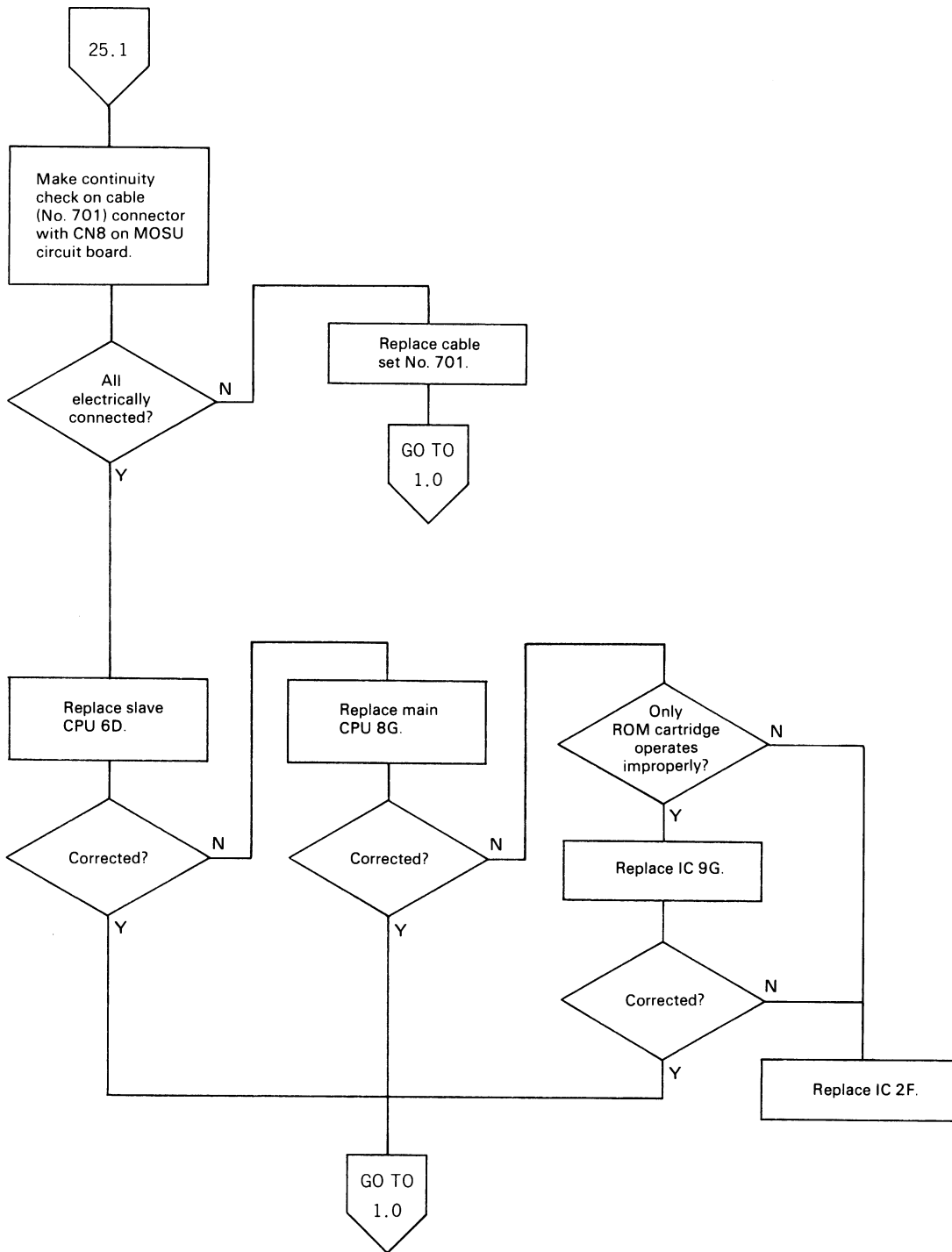








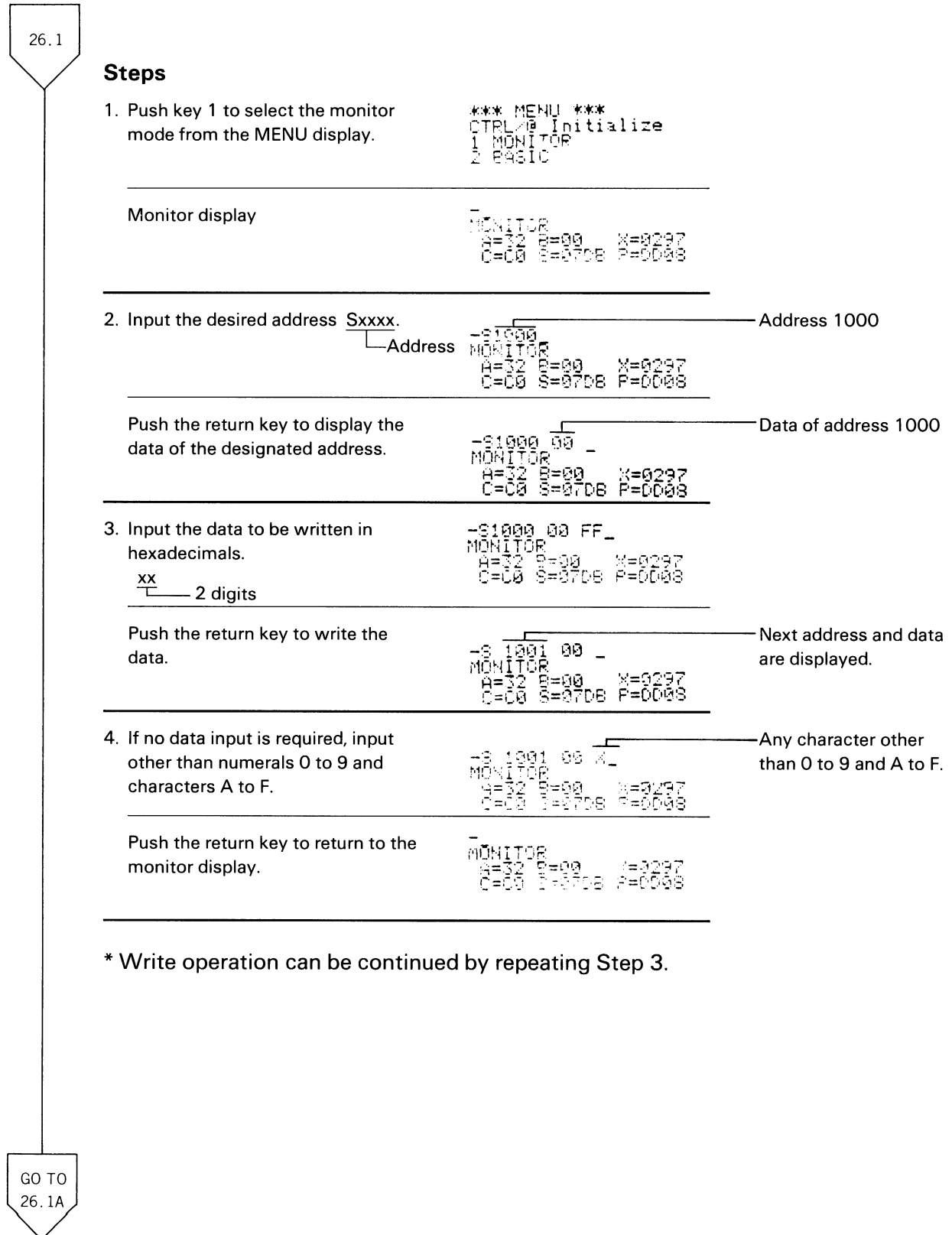




## Read/Write to (and from) RAM

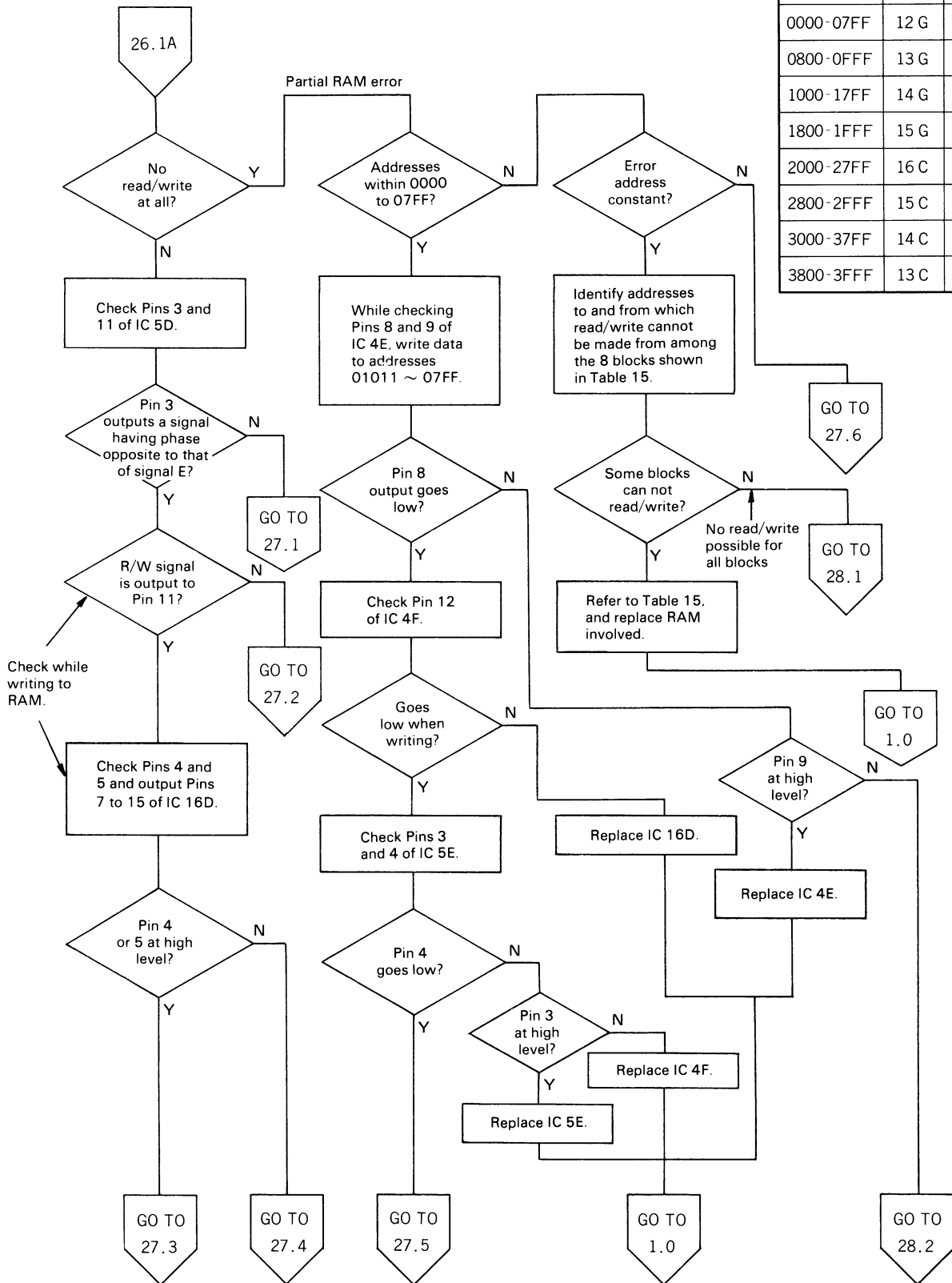
- Read/write to (and from) RAM can be tested by selecting the monitor mode from the MENU display on the screen.

This flow chart requires a write operation to the designated address for a signal check. Read the following description, and enter the troubleshooting flow chart.

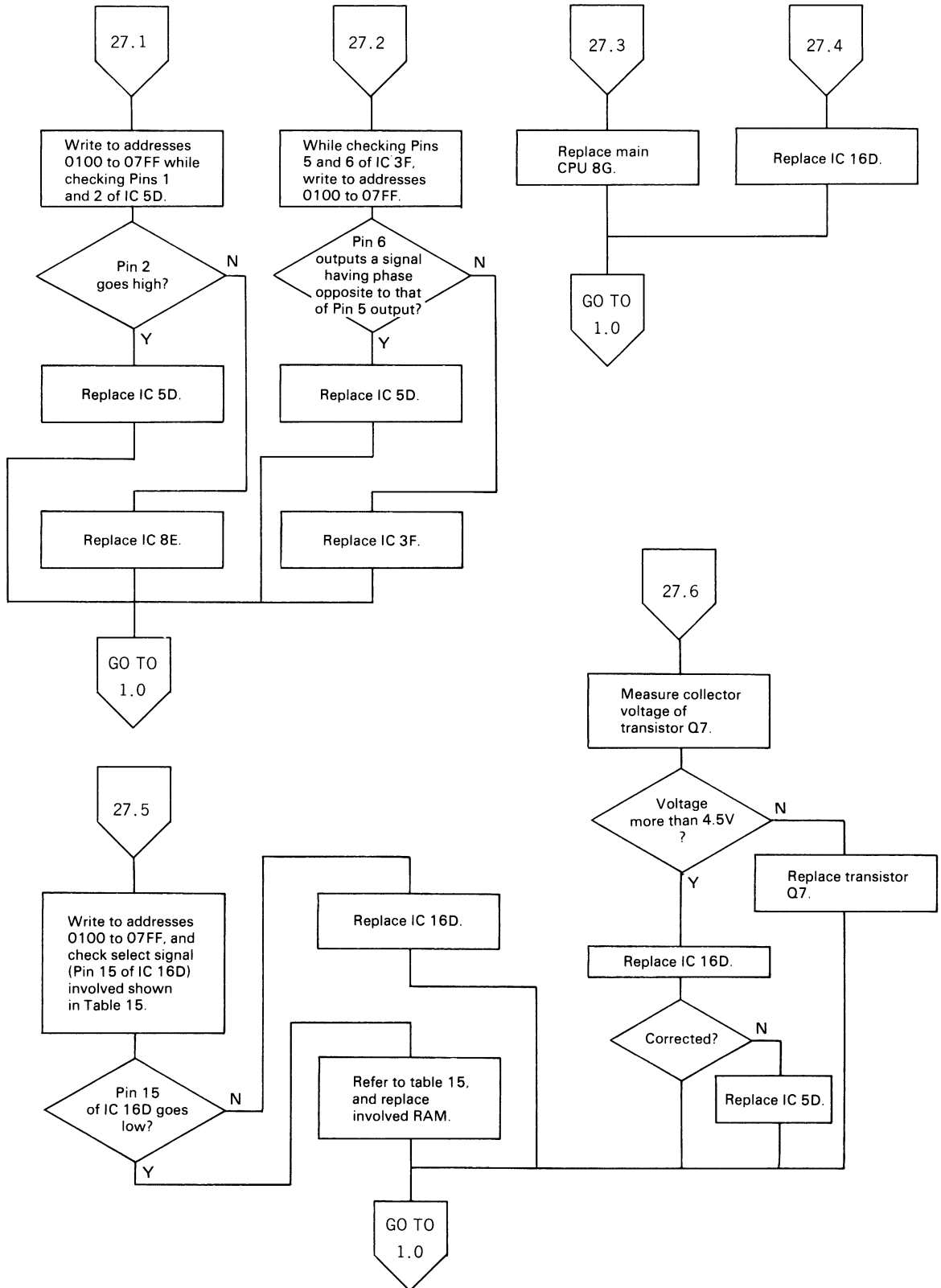


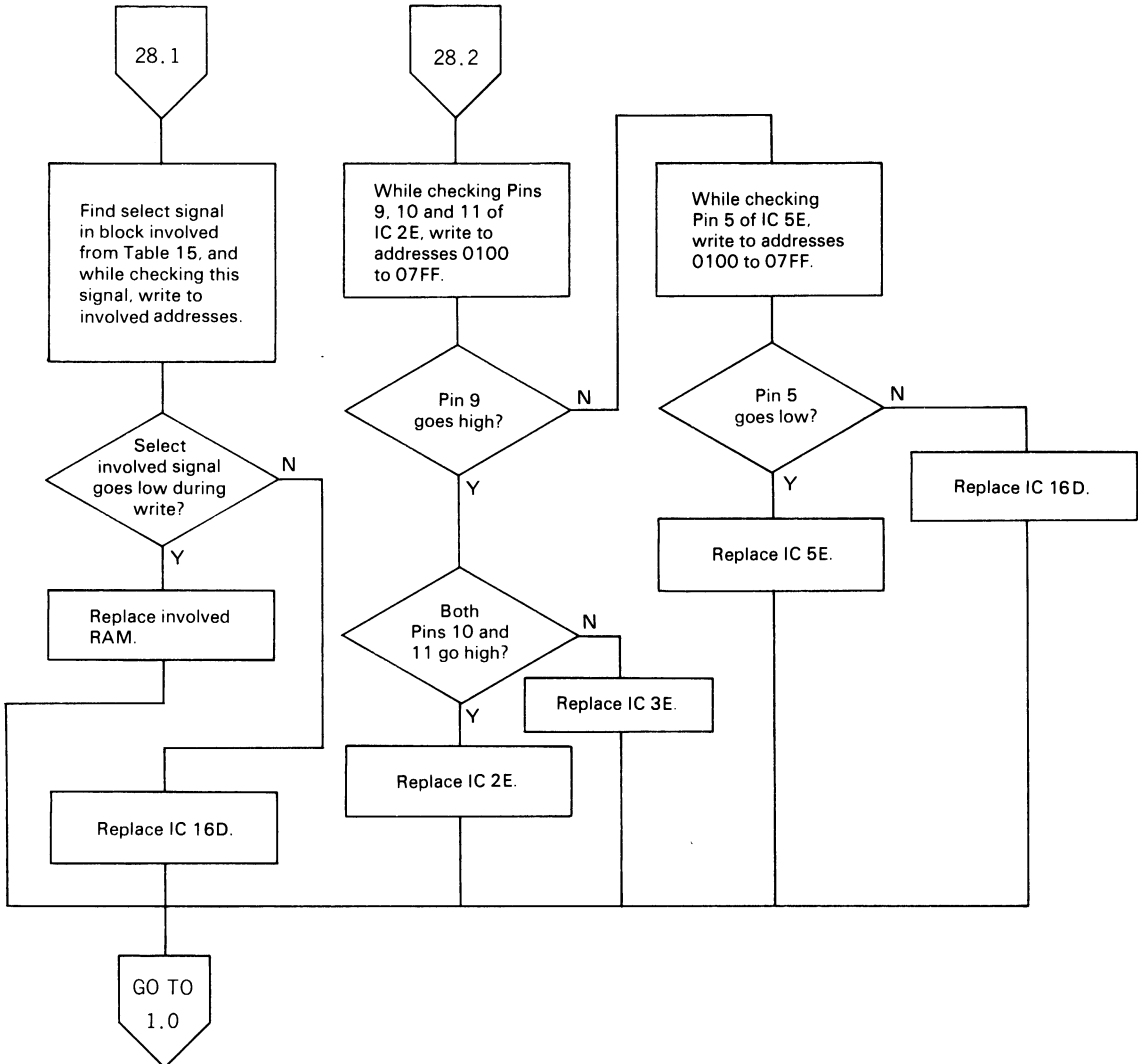
**Table 15.**

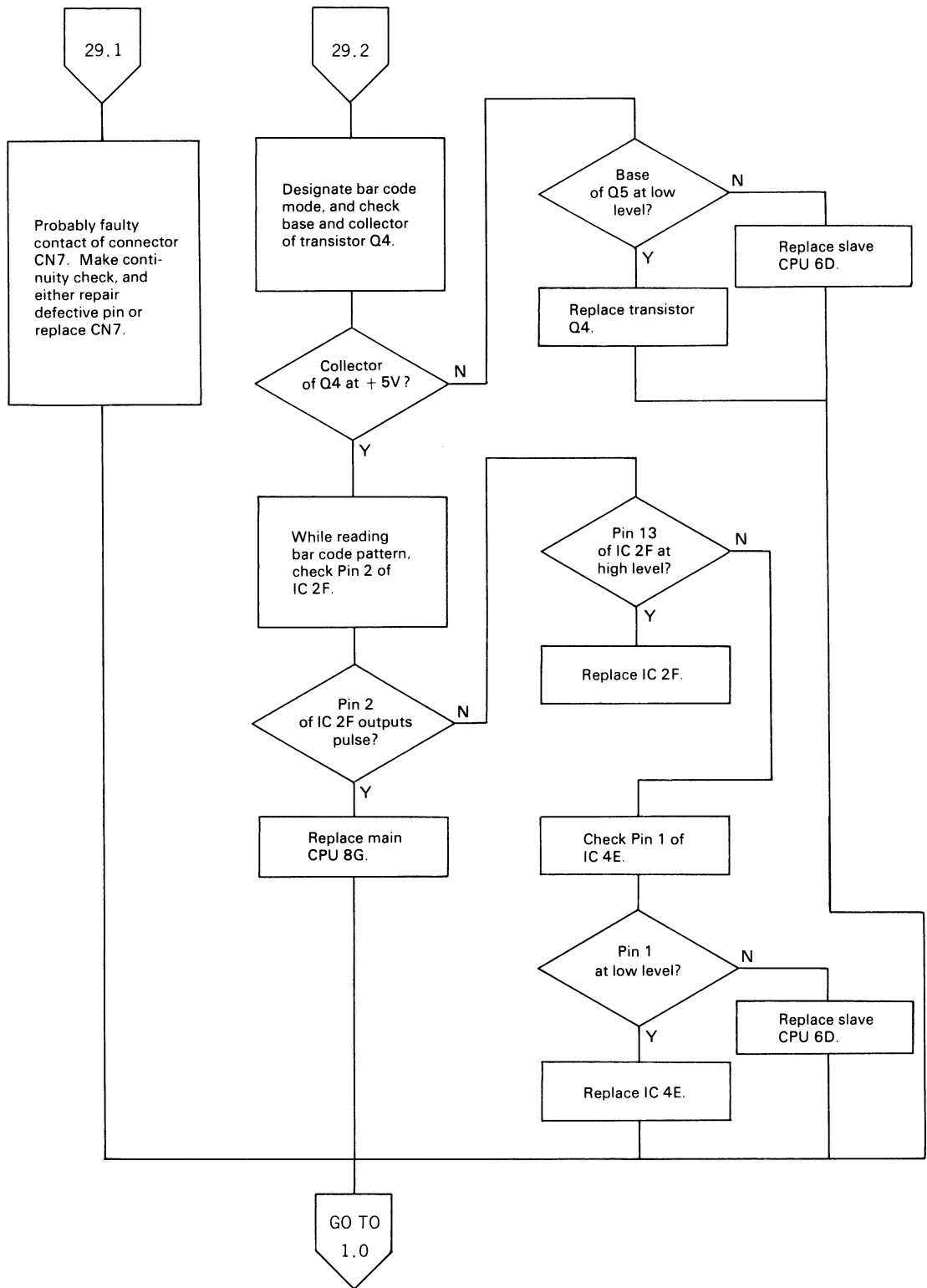
Address	IC location	Select signal
0000-07FF	12 G	16D-7
0800-0FFF	13 G	16D-9
1000-17FF	14 G	16D-10
1800-1FFF	15 G	16D-11
2000-27FF	16 C	16D-12
2800-2FFF	15 C	16D-13
3000-37FF	14 C	16D-14
3800-3FFF	13 C	5 E-4 (16D-15)

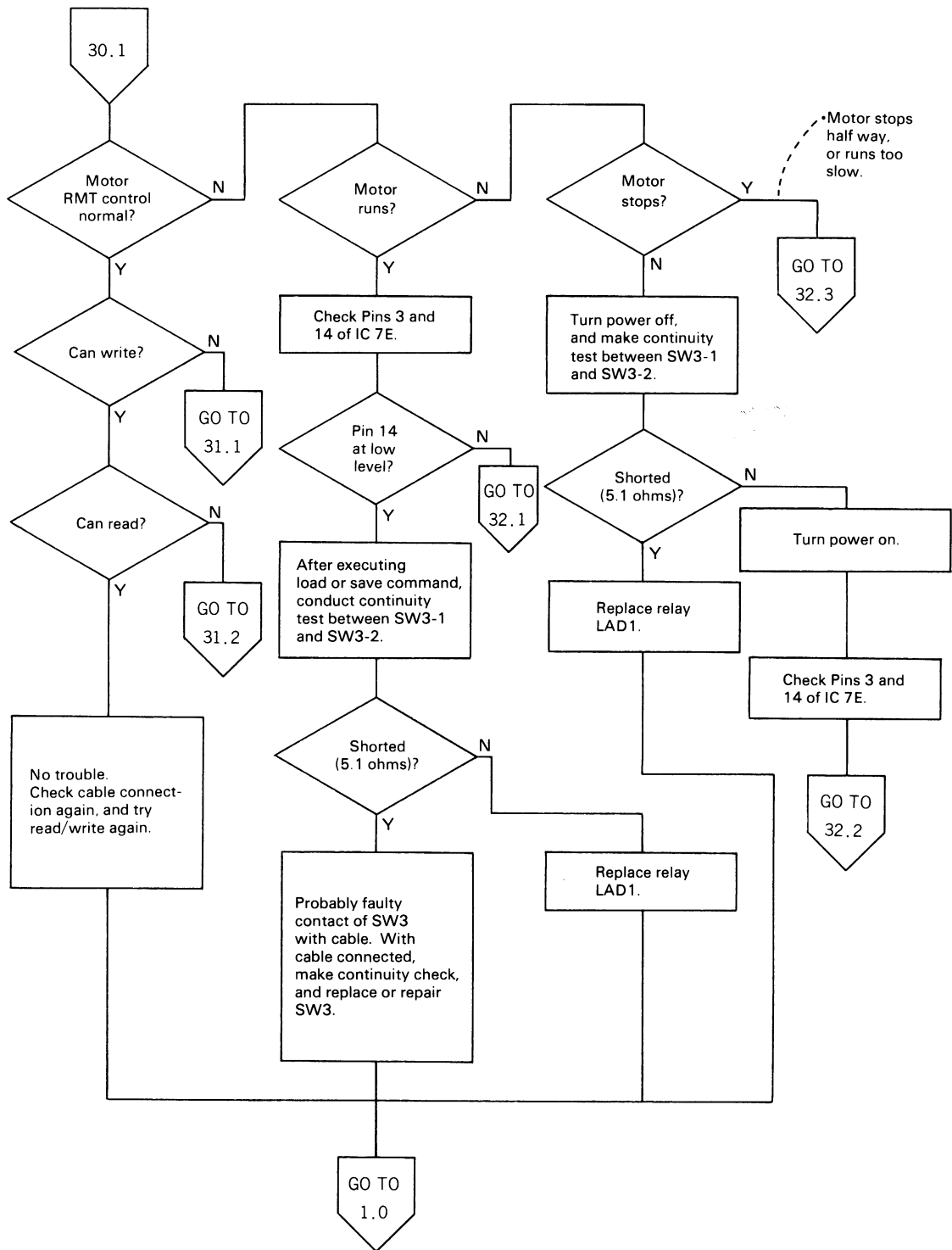


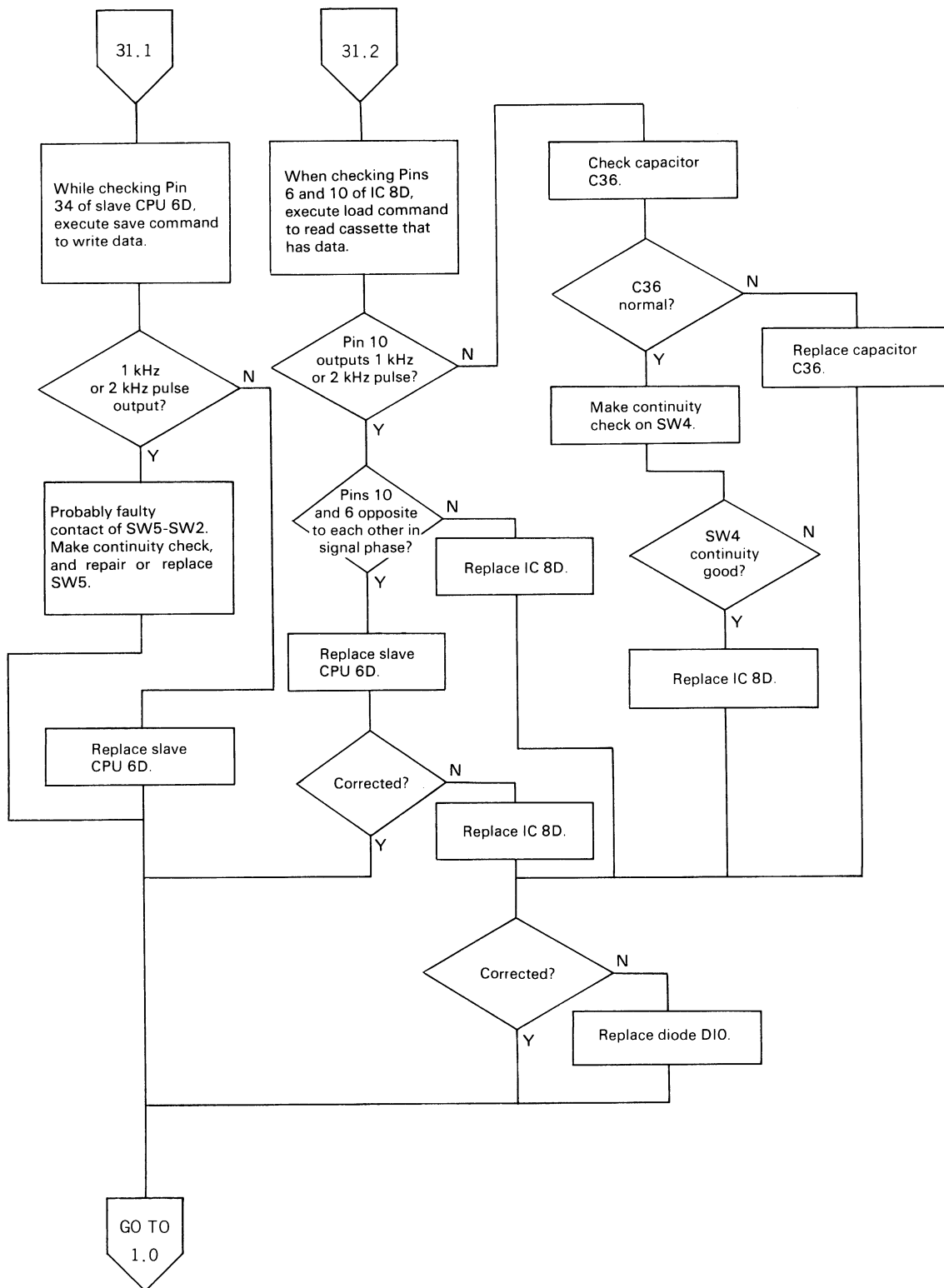


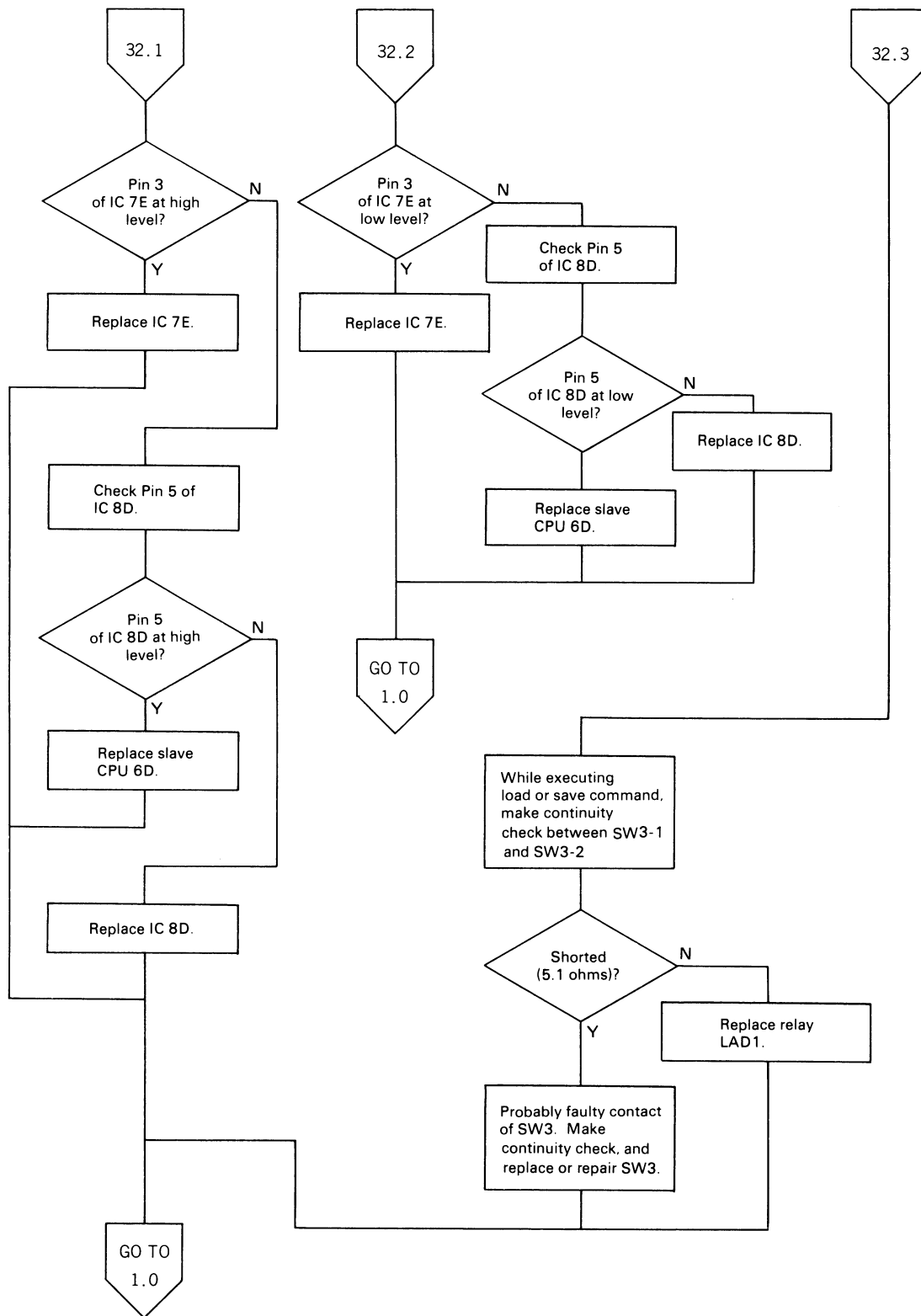












### 8.3.2 Keyboard

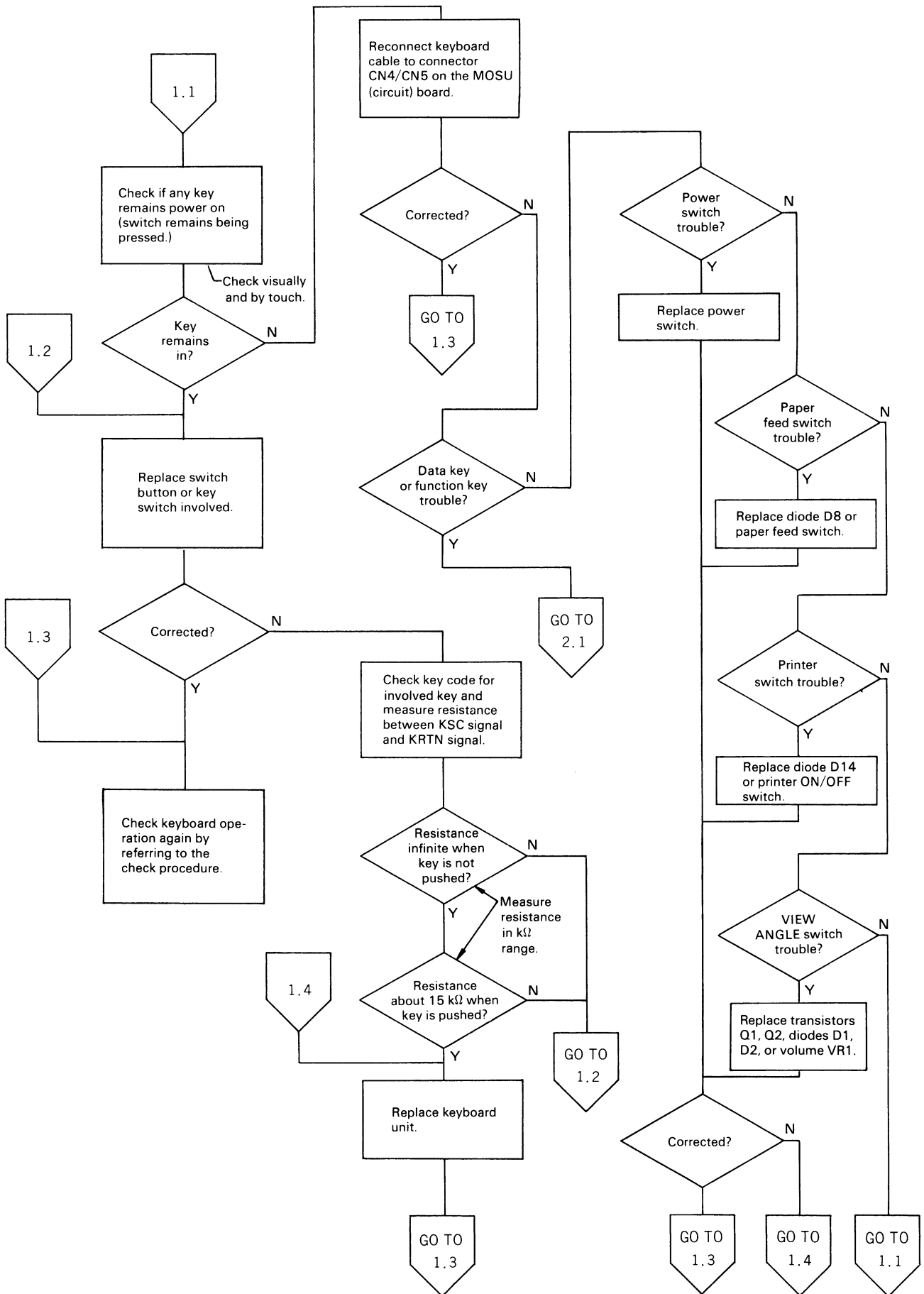
Confirm the following before repairing the keyboard.

- (1) Keyboard free of deformation and circuit board cracking
- (2) Keyboard cable connections free of damage
- (3) Keyboard free of waterdrops inside (circuit board, FPC, patterns, switches, etc.)
- (4) FPC pattern not peeled from the circuit board

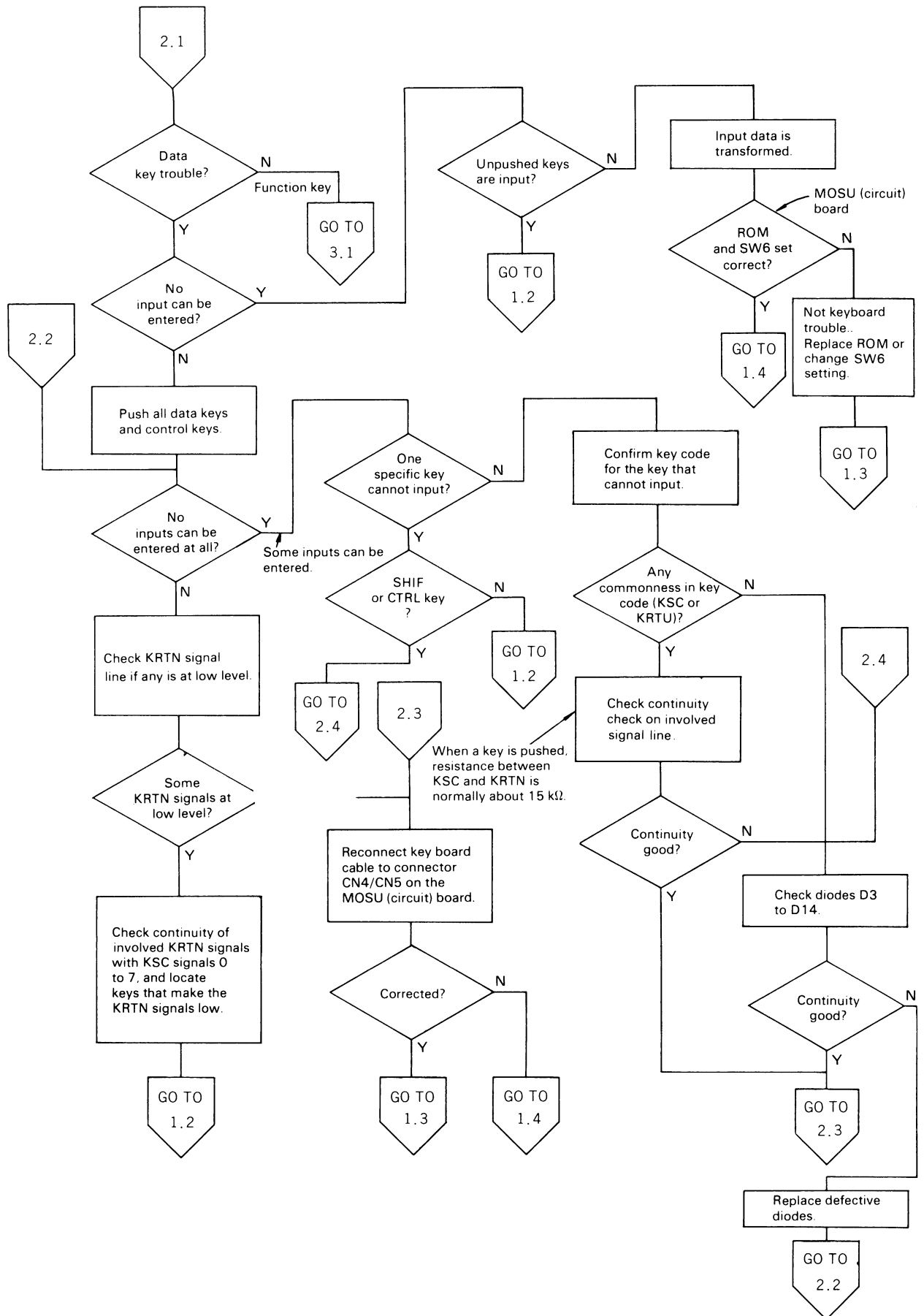
If the keyboard is found defective concerning Item (1) or (2) above, replace the keyboard unit with a new one because it cannot be repaired.

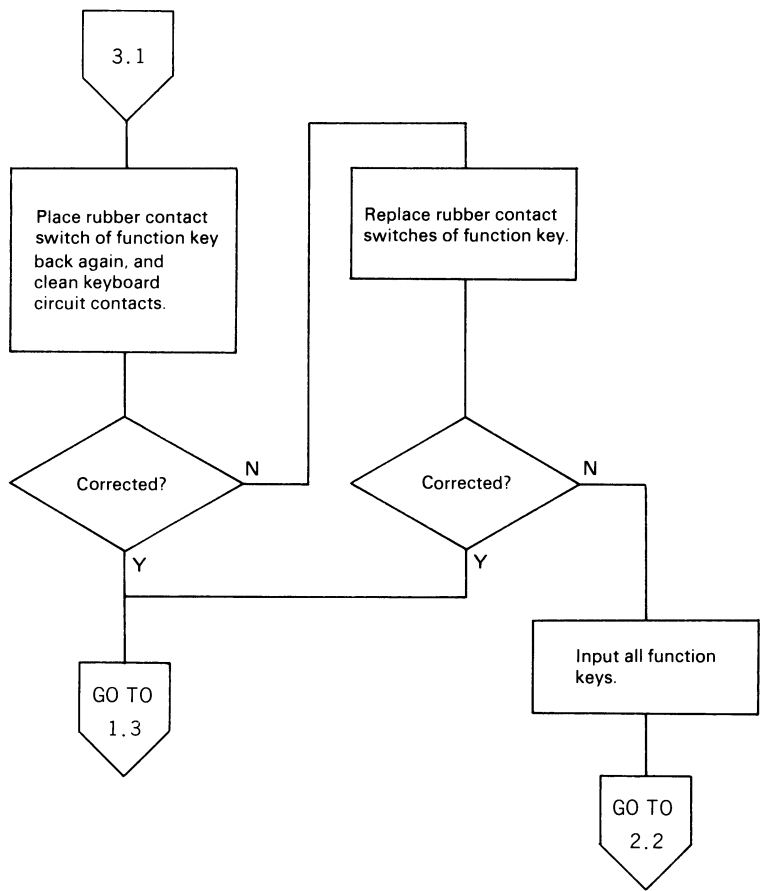
If waterdrops are found as mentioned in Item (3), wipe them off, and let the keyboard dry naturally at normal temperature. Recheck the keyboard function after it is dry, and if the trouble persists, replace the keyboard unit. (It is recommended that the unit be replaced with a new one because the trouble can recur due to oxidation of the patterns even if it is remedied once.)

If the trouble mentioned in Item (4) developed, fastened the peeled part with a tape or adhesive on the outside. If it cannot be repaired by this method, replace the keyboard unit with a new one.









### 8.3.3 LCD

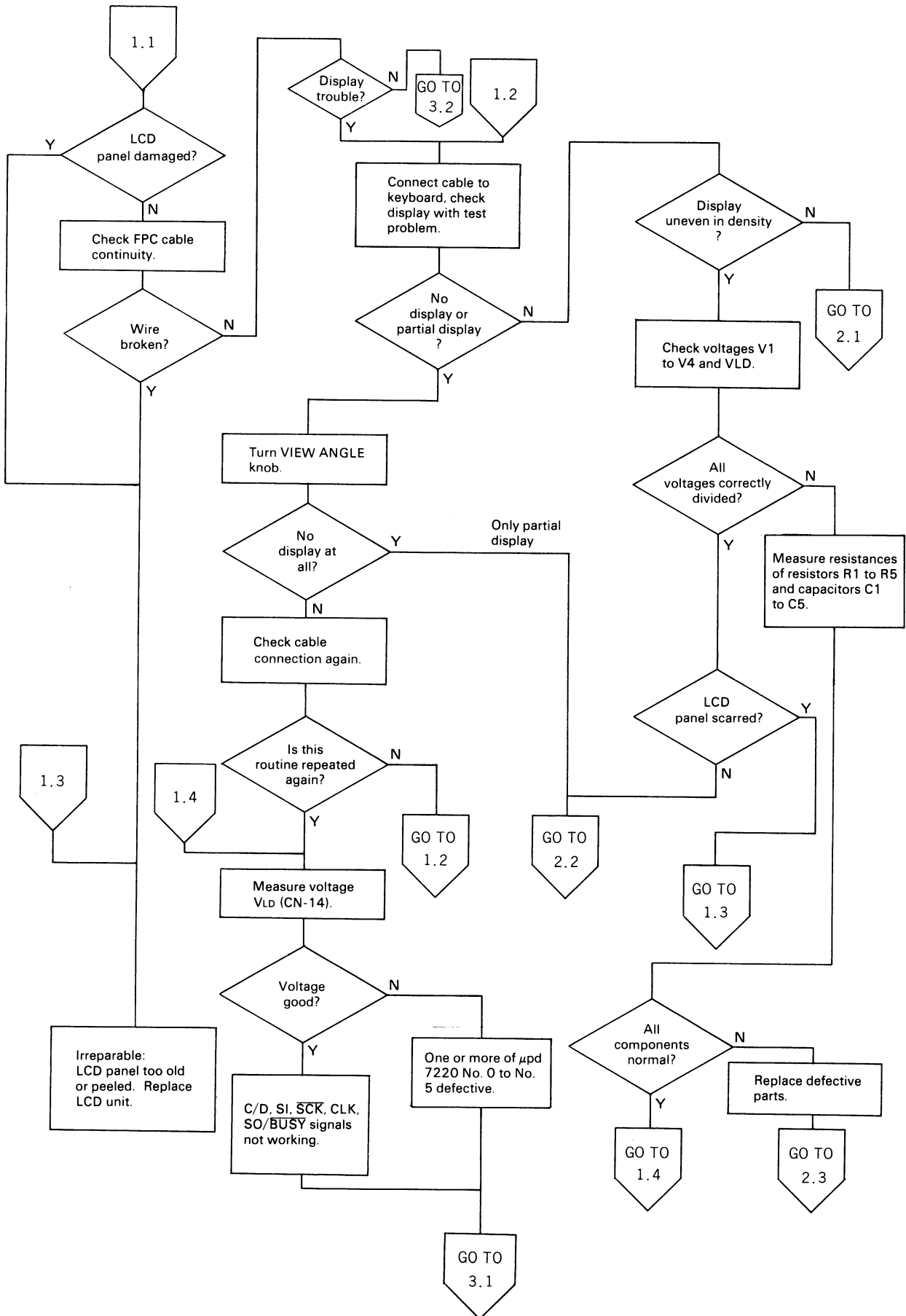
Confirm the following when repairing the LCD.

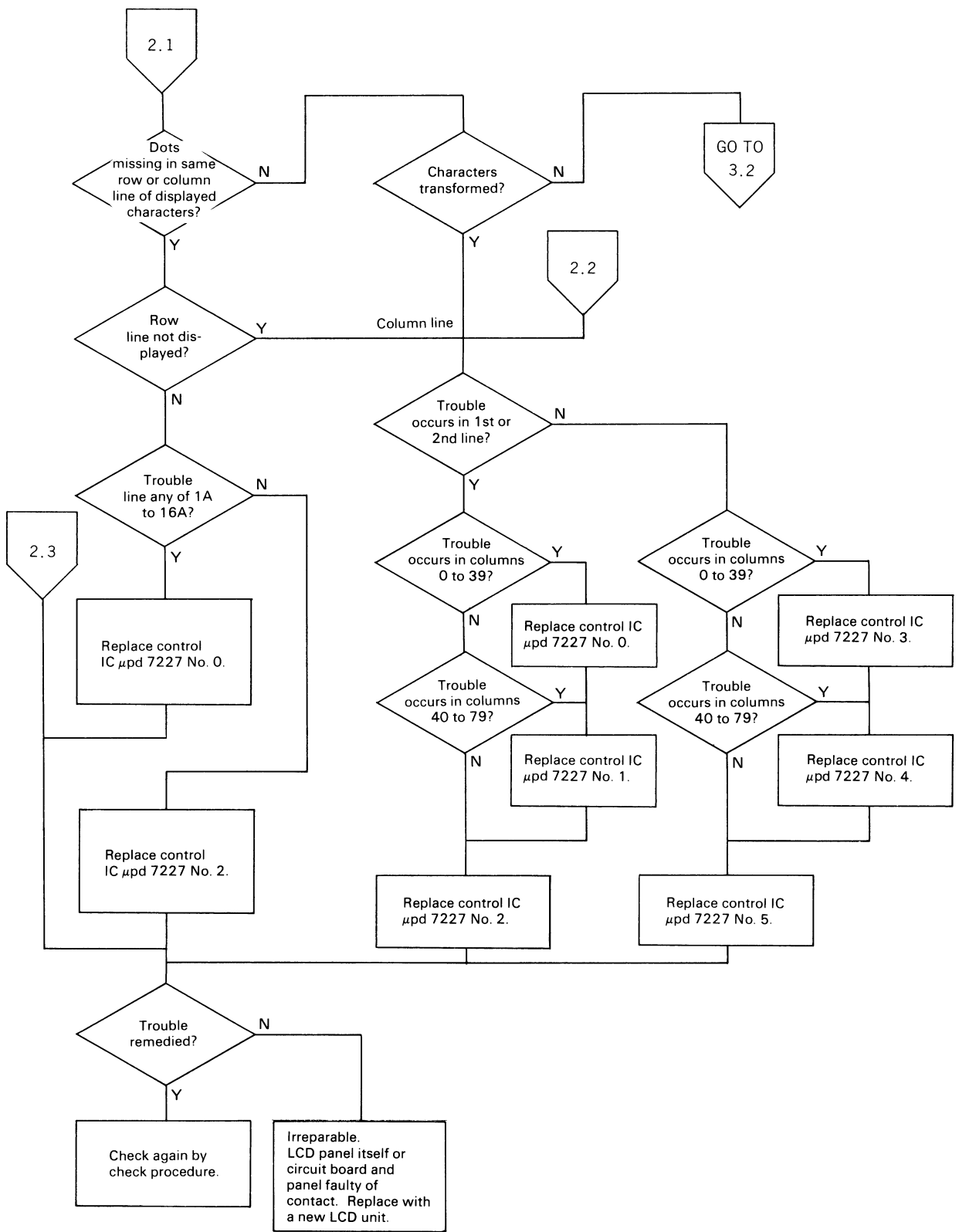
- (1) LCD panel surface free of damage
- (2) No partial shade on the panel when power is off
- (3) LCD (circuit) board free of damage

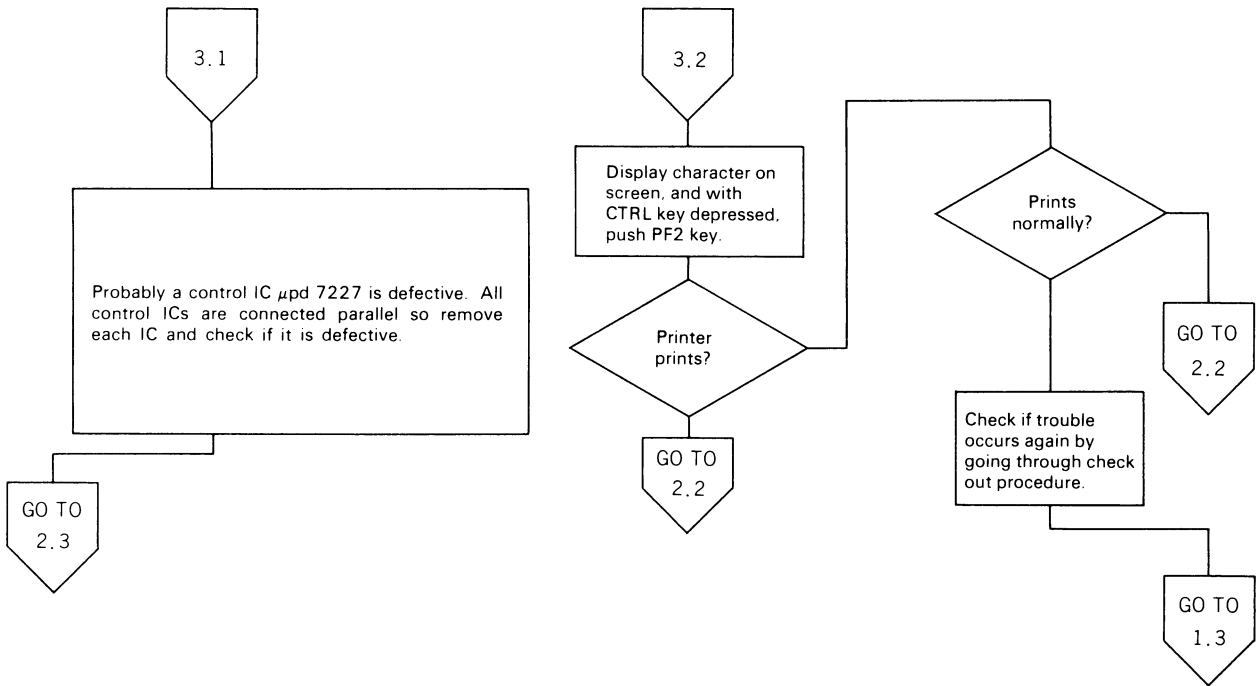
If any trouble is detected concerning Item (1), (2) and (3) above, replace the LCD unit with a new one because it cannot be repaired.

\* When replacing an IC ( $\mu$ Pd 7227) in the LCD unit, follow the procedure below.

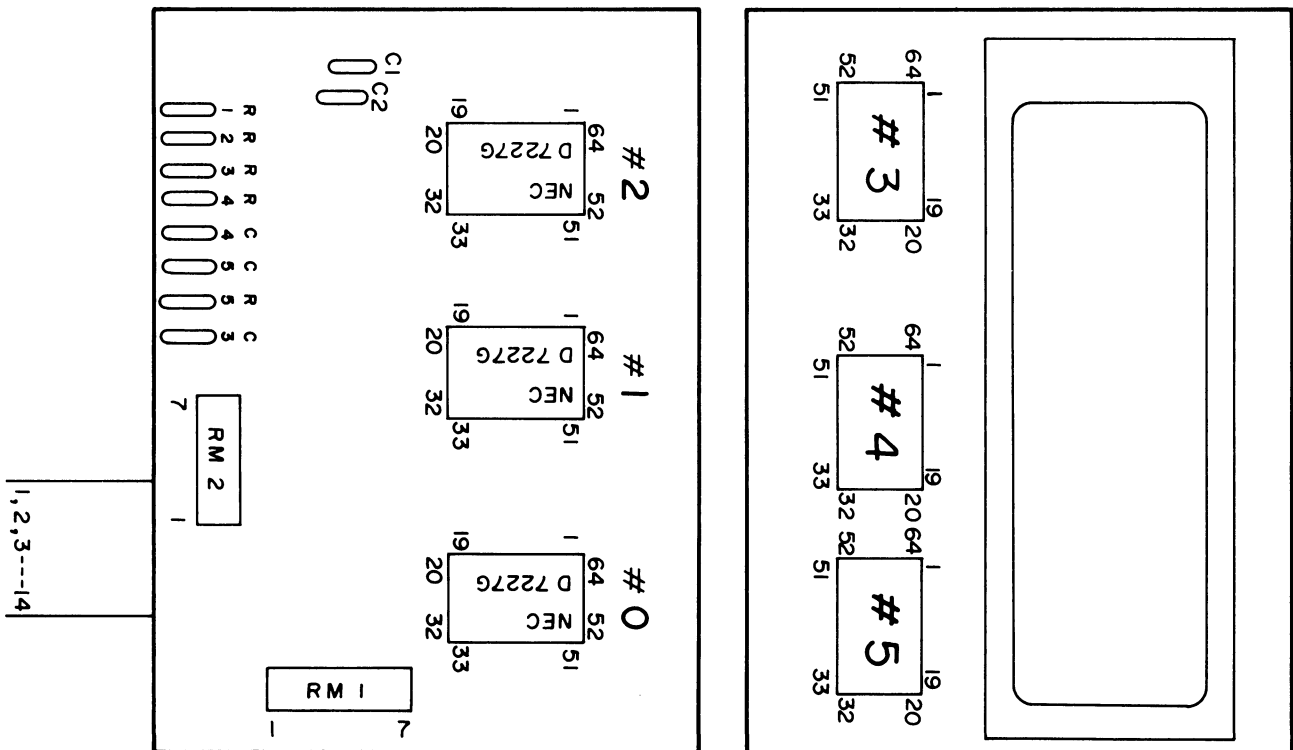
- (1) Remove the solder from each IC lead with a solder wick.
- (2) Slightly push the IC up with a precision screwdriver or the like. (Do not forcibly raise the IC. Otherwise, the pattern peels, making the LCD unit irreparable.)
- (3) Remove the IC, and completely remove the solder from the pattern with a solder wick.
- (4) Reform the leads of a new IC. (Remember that the ICs on the front and back of the circuit board have their leads bent in the opposite direction. Parts number also different.)
- (5) Solder the new IC.
- (6) Remove the flux from the soldered part.







	COL 0	COL 39, 40	COL 79, 80	COL 119
1st line	# 0 BANK 0	# 1 BANK 0	# 2 BANK 0	ROW IA S 16A
2nd line	# 0 BANK 1	# 1 BANK 1	# 2 BANK 1	
3rd line	# 3 BANK 0	# 4 BANK 0	# 5 BANK 0	ROW IB S 16B
4th line	# 3 BANK 1	# 4 BANK 1	# 5 BANK 1	

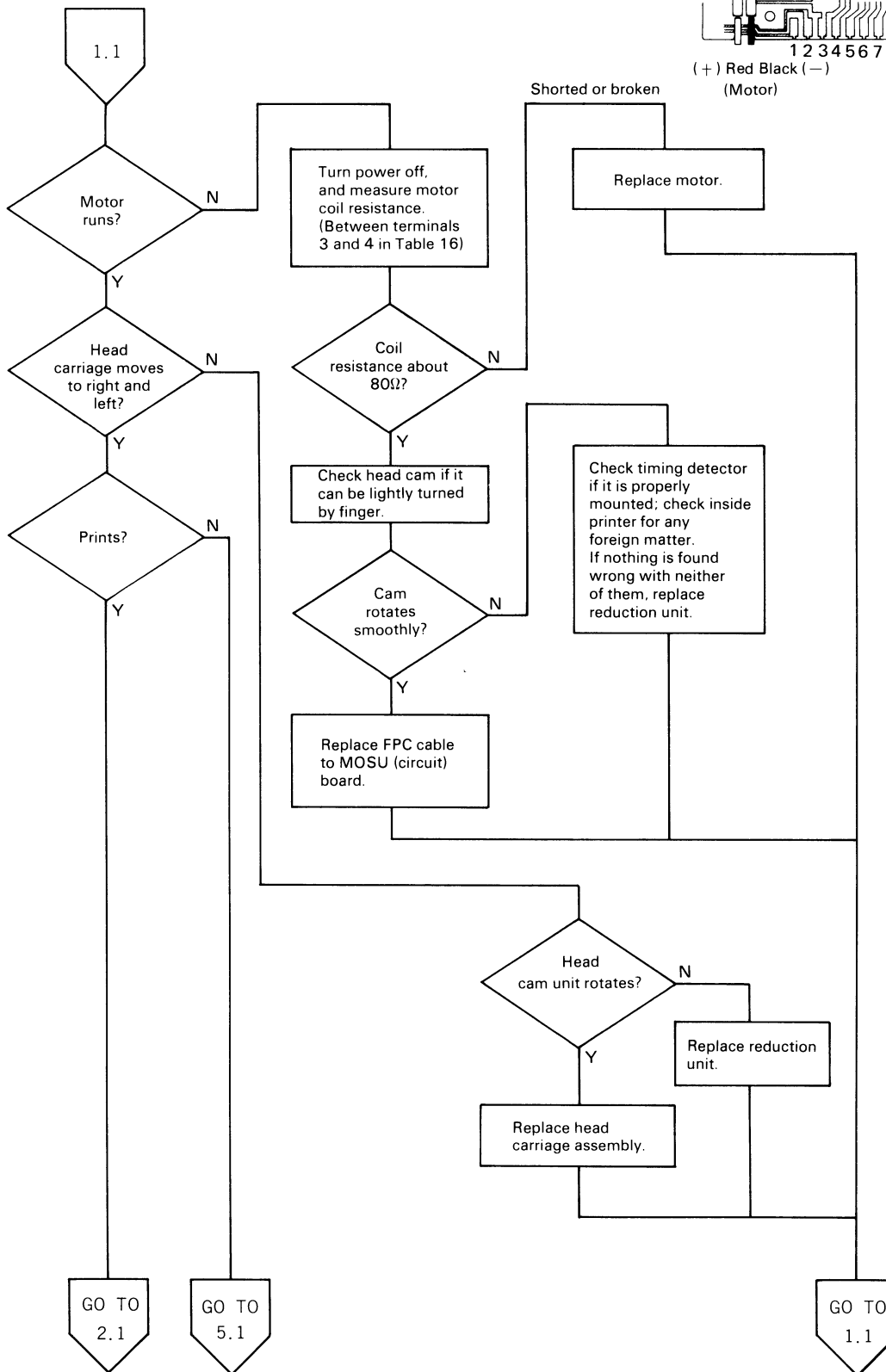
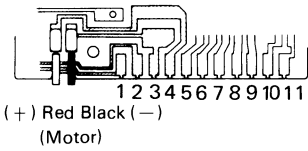


#### **8.3.4 Micro Printer (Model-160)**

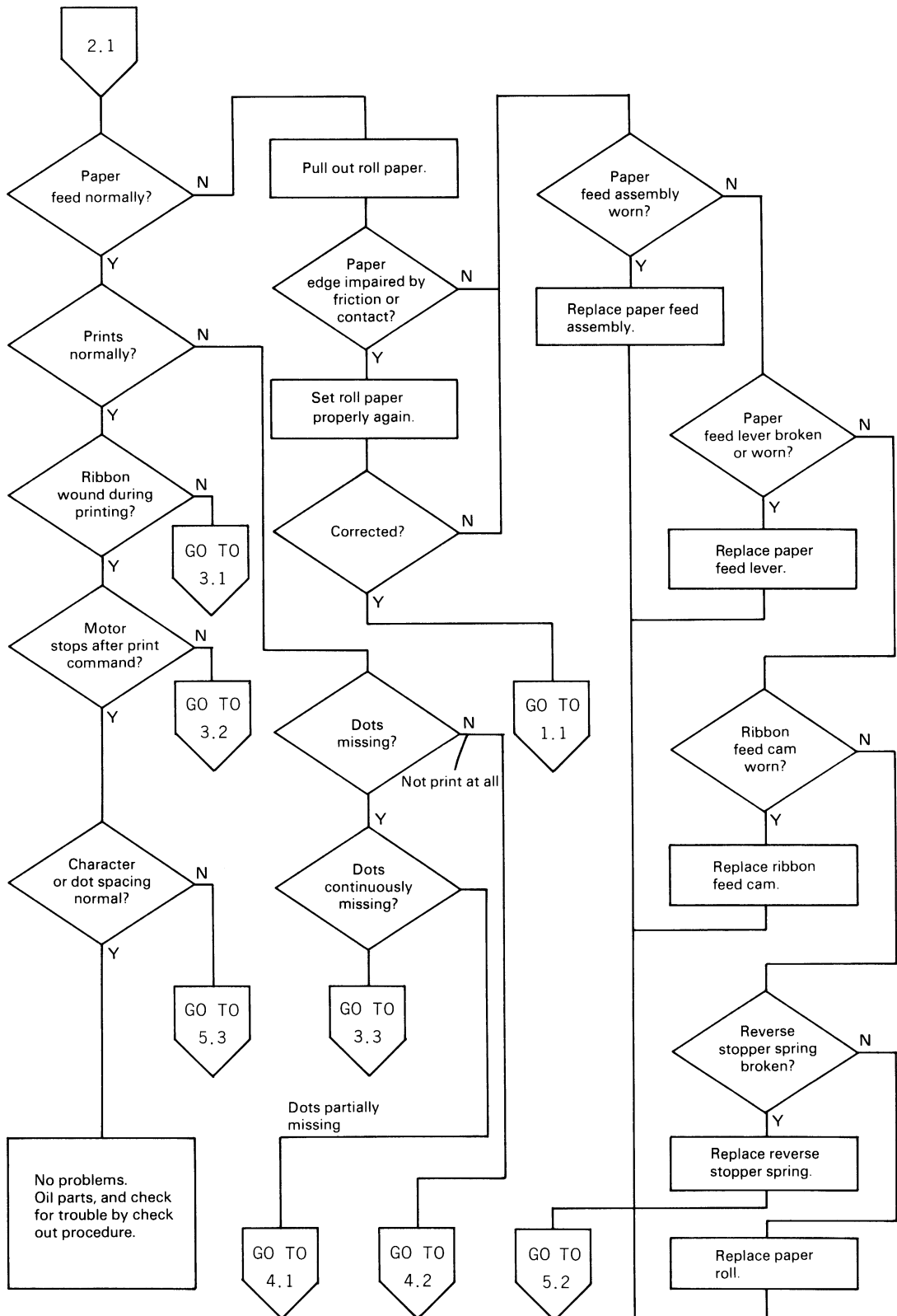
Observe the following precautions when repairing the printer.

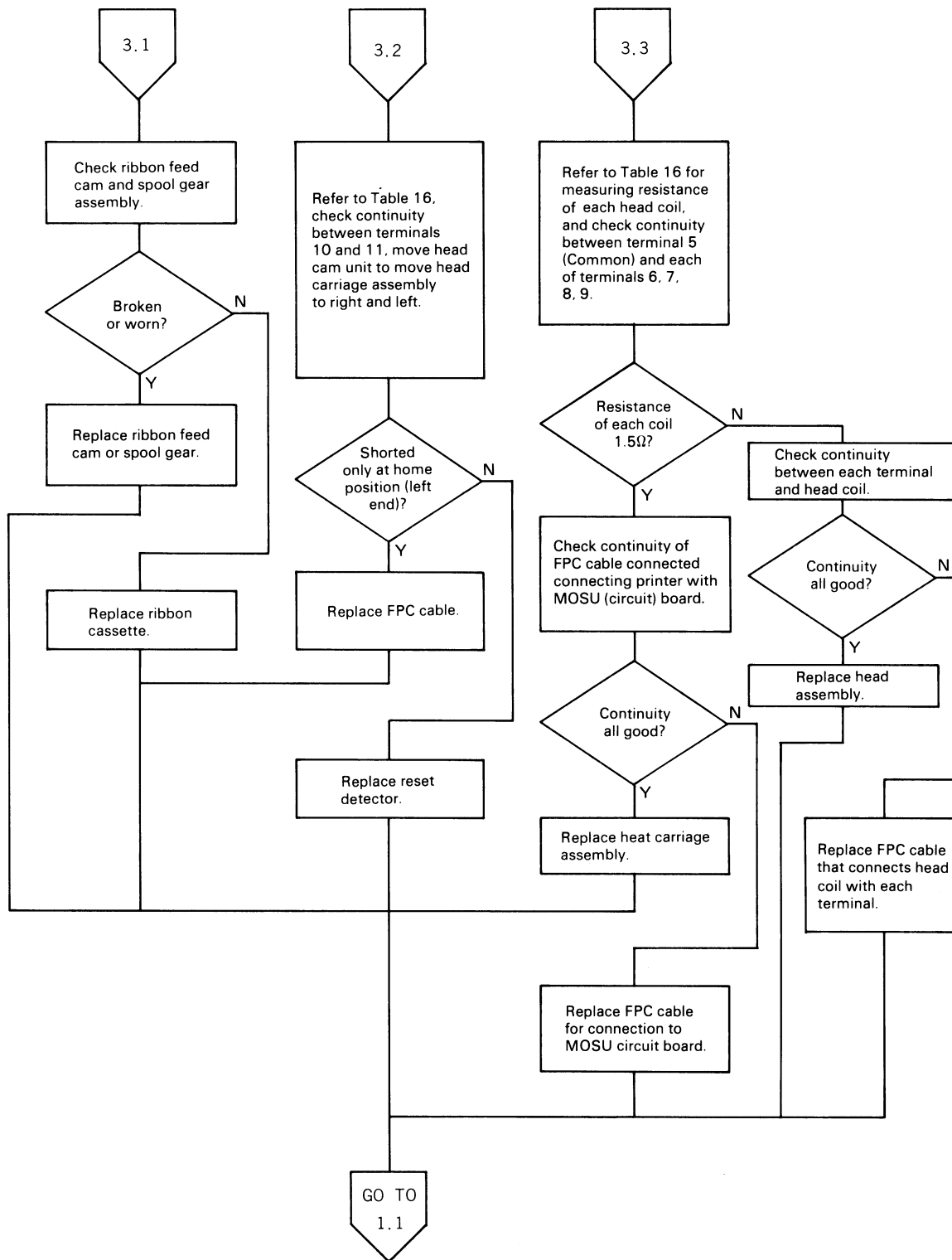
- (1) Carefully read the description of the principles and construction of the printer before attempting repairs. Be especially attentive to the mounting positions and installing procedure.
- (2) Be careful not to lose the retaining rings TYPE-E. Use the ET holder when installing the printer.
- (3) If any part is touched by fingers, wipe off the fingerprints with alcohol or the like after repairs. Oil if necessary.
- (4) Do not strain the parts when removing or installing them.
- (5) When connecting the FPC cable, do not keep the soldering too long on it.

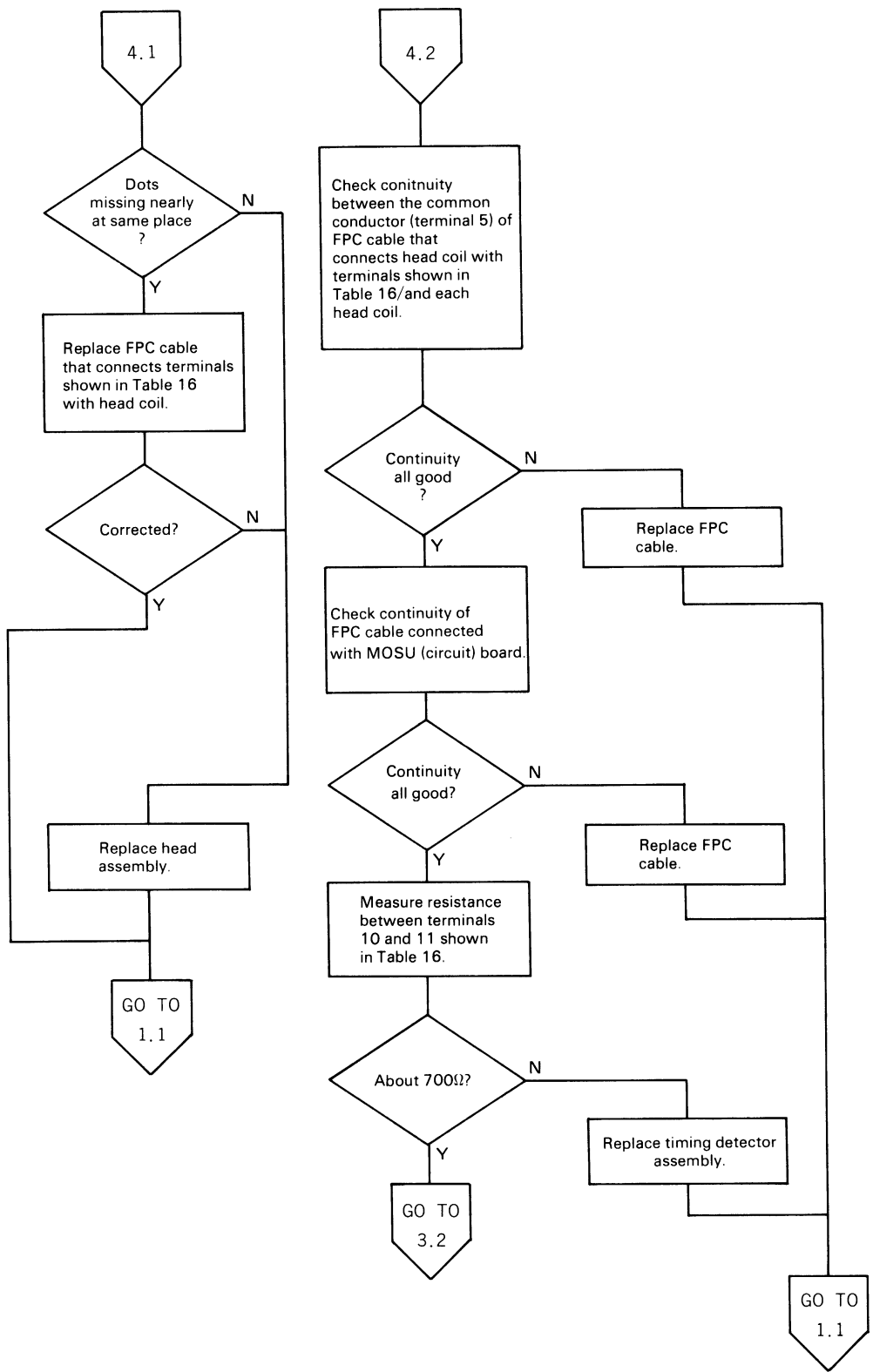
Table 16.

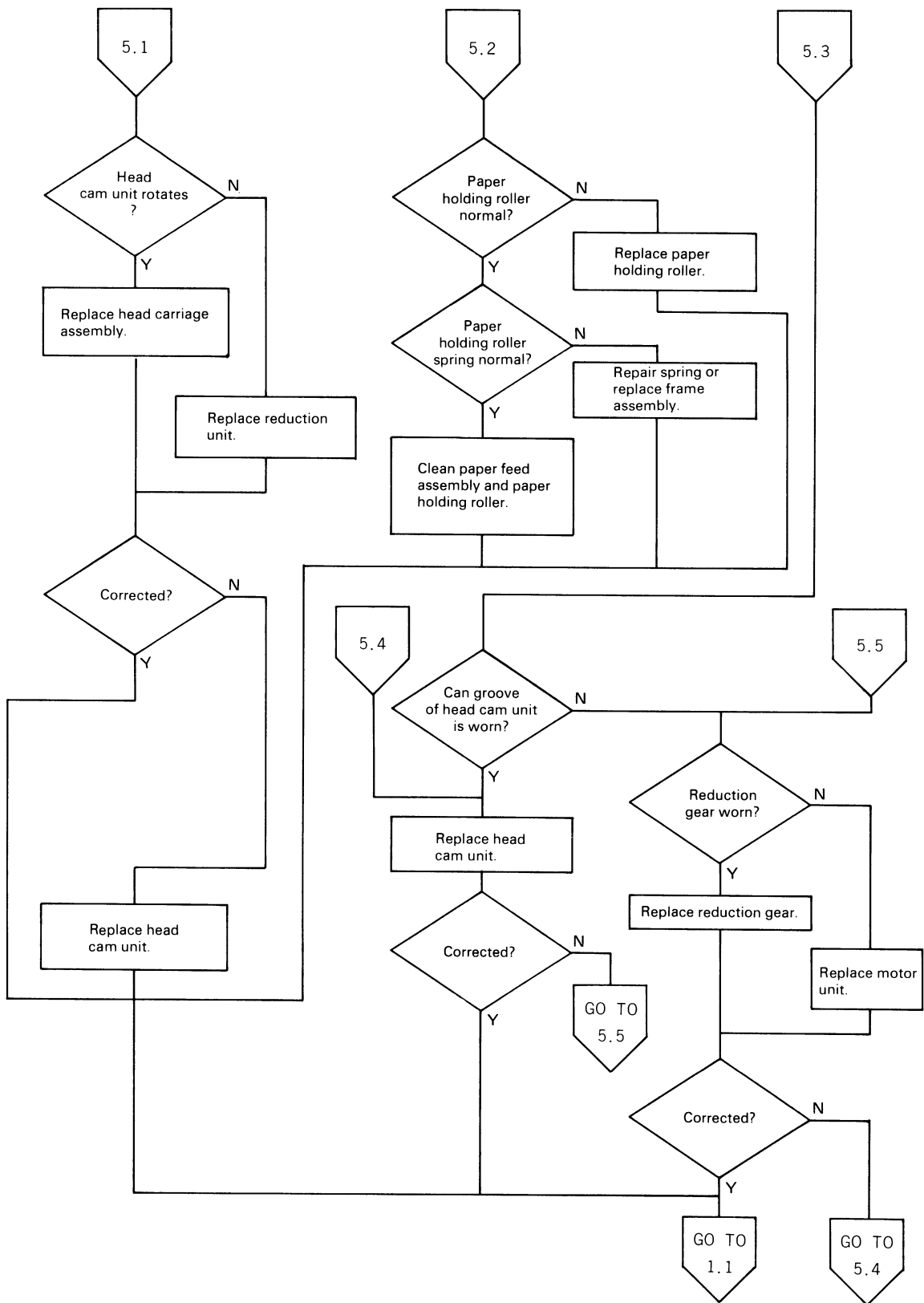












## 8.4 Troubleshooting Table

### 8.4.1 Power source

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
Unable to set power on	The line voltage $V_L$ and other control voltage are not present. (No LCD display)	(1) The power fuse is blown off.	<ul style="list-style-type: none"> <li>● Check conductivity of the F1 fuse.</li> <li>● Measure resistance between the check terminals "GND(P)" and "Vp" of the MOSU circuit board.</li> <li>● Check if the zener diode ZD7 is short-circuited.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the fuse if it is blown off and the connection between the check terminals "GND(P)" and "Vp" is not short-circuited.</li> <li>● If the connection between the check terminals "GND(P)" and "Vp" is short-circuited, dismount the M-160 printer and other installed optional units to find out the cause of the short-circuit. If the MOSU circuit board is suspected to be responsible for the short-circuit, check the power source circuit.</li> </ul>
		(2) A reduced battery voltage.	<ul style="list-style-type: none"> <li>● Check the check terminals "GND(P)" and collector of the transistor Q8 on MOSU board.</li> </ul>	<ul style="list-style-type: none"> <li>● When the voltage is lower than 4.5V, recharge the battery by using an AC adapter.</li> </ul>
		(3) The power-on switch is dead.	<ul style="list-style-type: none"> <li>● Check and see if CN4-19 and CN5-18 of the MOSU substrate do not go low when the power-on switch is turned to the "on" position.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the connection of the connectors CN4/CN5.</li> <li>● Replace the keyboard unit.</li> </ul>
		(4) The power-on switch circuit does not function properly.	<ul style="list-style-type: none"> <li>● Check signals form IC "5E" pin 11, "5D" pin 8 and "7E" pin 2.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the detected malfunctioning IC (s).</li> </ul>
		(5) No circuit voltage $V_L$ is present.	<ul style="list-style-type: none"> <li>● Measure the resistance of the transistor Q8 of the MOSU circuit board.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the transistor Q8.</li> </ul>
		(6) The reset circuit remains working	<ul style="list-style-type: none"> <li>● Check the reset switch.</li> <li>● When the power-on switch is turned to the "on" position, IC "5F" pin 3 turns (H → L) and pin 11 turns (L → H).</li> <li>● IC "4F" pin 4 and IC "7D" pin 4 turn (L → H).</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the detected malfunctioning IC (s).</li> </ul>
		(7) The main CPU is dead.	<ul style="list-style-type: none"> <li>● Check the pins 40/39 of the main CPU 8G and read their pulse outputs at the interval of approximately 1.6 <math>\mu</math>sec.</li> <li>● Check the output of the oscillator CR3.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the main CPU 6301.</li> <li>● If it has no effect, replace the oscillator CR3.</li> </ul>

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
		<p>(8) The VIEW ANGLE adjustment circuit of the keyboard does not function properly.</p> <p>(9) No VLD voltage is provided from the power source.</p> <p>(10) No signals for LCD are present.</p>	<ul style="list-style-type: none"> <li>● Check if the V<sub>CL</sub> voltage is being provided to CN5 pins 1 and 2 of the MOSU circuit board.</li> <li>● Check if CN5 pin 7 of the MOSU circuit board has a potential of approximately 7V.</li> <li>● Check the output of IC "2C" pin 4.</li> <li>● Check and see if all of CN5 pin 4 (C/D), pin 6 (SD), pin 7 (SCK) and pin 5 (CLK) provide a pulse output when the power line is connected or power is supplied by way of key-in at the keyboard.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace either the transistor Q1 or Q2, whichever appropriate, of the keyboard.</li> <li>● The diode D7, the capacitor C2 or IC "2C" is suspected to be responsible for the malfunction.</li> <li>● Replace all detected malfunctioning ICs, which can be IC "1H", "1F" or some other ICs.</li> </ul>

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
Unable to set power off.	Power keeps on coming after the power-off switch has been turned to the "off" position.	<p>(1) The program is running out of control.</p> <p>(2) The power switch does not function properly.</p> <p>(3) The slave CPU does not work properly.</p> <p>(4) Either the power switch circuit or the interrupt circuit contains defective elements.</p> <p>(5) The power-on circuit contains defective elements.</p>	<ul style="list-style-type: none"> <li>● Depress the reset switch to see if power supply can be cut off.</li> <li>● Check and see if both CN5 pin 18 and CN4 pin 19 of the MOSU substrate go high with power off.</li> <li>● Check and see if IC "7E" pin 1 goes high when power supply is turned off.</li> <li>● Check the PW and SW signal lines of IC "5E" pin 10, "2E" pins 6 and 12 and other similar pins by turning the power switch on and off alternatively.</li> <li>● Make sure that power is cut off when the reset switch is depressed.</li> </ul>	<ul style="list-style-type: none"> <li>● If power supply can be cut off by depressing the reset switch, most likely the program is responsible for the trouble. .... Examine the program and its operations. If the trouble can not be eliminated by checking the program, replace the main CPU "8G". .... Carry out a RAM check with the test program.</li> <li>● If they do not go high, replace the keyboard. .... Either the power switch of the keyboard or the keyboard connector is considered to be responsible for the trouble.</li> <li>● If it does not go high, replace the slave CPU "6D".</li> <li>● Replace the malfunctioning IC (ss).</li> </ul>
Fuse goes blown off.		<p>(1) The zener diode ZD7 for overvoltage prevention does not work properly.</p> <p>(2) The charging voltage is too high.</p>	<ul style="list-style-type: none"> <li>● Check and see if breakdown of the zener diode ZD7 occurs when it is not short-circuited or put under less than 7V.</li> <li>● Check if the battery is correctly connected with the connector and the output voltage of the AC adapter is not too high.</li> </ul>	<ul style="list-style-type: none"> <li>● If power is cut off by depressing the reset switch, IC "7E" is suspected to be responsible for the trouble. .... Check the outputs of IC "7E" pins 1 and 1b. If power can not be cut off depressing the reset switch, the transistor Q8 is likely to be responsible for the trouble. ... Check the resistance of the transistor.</li> <li>● Replace the diode ZD7.</li> <li>● Replace the battery of the AC adapter whichever is appropriate.</li> </ul>

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
		(3) The circuit which is connected with the output of the fuse is short-circuited.	<ul style="list-style-type: none"> <li>● Dismount the printer to detect to the short-circuited unit. Then check each element involved.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace either the whole unit or the unit which is found to be short-circuited.</li> </ul>
No back up power is available	Programs stored in the RAM are destroyed. (sometimes it is unable to make power on.)	(1) See items (1) through for "Unable to make power on". (2) The back up circuit contains defective elements.	<ul style="list-style-type: none"> <li>● Check to see if the transistor Q10 of the MOSU circuit board has the emitter voltage of approximately 3V. Also check the collector and the base voltage (less than 4V).</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the Q10 transistor if the emitter voltage is not present.</li> <li>● Replace the zener diode ZD3 if the base voltage is as low as the GND level.</li> </ul>
Unable to detect low voltage.	Programs go out of control or non-operational without "Charge battery" indication.	(3) Some of the backed up elements do not work properly. (1) No bias is provided to the voltage detection circuit.	<ul style="list-style-type: none"> <li>● If power on can be set, make it on and see whether any other troubles are involved.</li> <li>● If power on can not be set, check to find out whether there are short-circuited back up elements.</li> <li>● Check if the base of the transistor Q1 of the MOSU circuit board goes low when the power switch is set to the "ON" position.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the elements which are responsible for the trouble.</li> <li>● If no low level is attained, check the PW SW signal (CN5 pin 18 of the MOSU circuit board). If the latter is not low, check again the connection of the keyboard connector. Replace the keyboard if it can not be made operational.</li> </ul>
		(2) Some of the elements of the voltage detection circuit do not function properly.	<ul style="list-style-type: none"> <li>● Check if voltage is provided to the collector of the transistor Q1.</li> <li>● Pull out the battery connector temporarily with power on and see if the pin 7 of IC "2B" goes low.</li> <li>● Check the <u>POWER ABNORMAL</u> signal line. Also check the output of IC "5E", "4E" and "2E".</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the transistor of no voltage is present.</li> <li>● If it does not go low, replace IC "2B" of the MOSU circuit board.</li> <li>● Replace the detected defective element (s).</li> </ul>



Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
"CHARGE BATTERY" is indicated	Indication occurs during operation or while the power on condition is maintained.	<p>(1) The battery voltage is too low.</p> <p>(2) Some of the elements of the voltage detection circuit do not function properly.</p>	<p>● Measure the battery voltage V<sub>B</sub>.</p> <p>● Check if IC "2B", pin 1 has the voltage greater than 1.2V and if the output of the pin 7 is at the HIGH level. If the output of the pin 7 is found high, check the <u>POWER ABNORMAL</u> line of IC "5E", "4E" and "2E".</p>	<p>● Recharge the battery. If duration of operation of the battery is remarkably reduced after recharge, the battery should be re-placed.</p> <p>● If the pin 1 has the voltage greater than 1.2V and the output of the pin 7 is at the LOW level, replace IC "2B".</p> <p>● Replace defective IC (s).</p>
Unable to recharge the battery	"CHARGE BATTERY" indication does not go off after recharge of the battery with an AC adapter, or the battery does not come to be abled.	<p>(1) The output voltage of the AC adapter is too low.</p> <p>(2) Some of the elements of the recharge circuit do not function properly.</p> <p>(3) The battery does not function properly.</p> <p>(4) The battery voltage circuit (V<sub>B</sub> line) is almost short-circuited.</p>	<p>● Check and see of the output voltage of the AC adapter is as high as 6V.</p> <p>● Check the conductivity of the diode D2 and the resistor R1.</p> <p>● Check the connection of the battery connector and then pull out the connector to measure the battery voltage. .... Restore the connector, put power on and then check the battery voltage. (Check the non-loaded condition and the non-loaded voltage.)</p> <p>● Check the resistance of line and the ground line. If the resistance is to low (almost as low as 1 ohm), dismount the built-in printer and the extension unit to pinpoint the cause of the trouble.</p>	<p>● Replace the AC adapter.</p> <p>● Replace defective IC (s).</p> <p>● If a voltage greater than 4.5V is not attained after recharge or a significant fall of voltage occurs when the power switch is set on, re-place the battery.</p> <p>● Replace the defective unit or element (s).</p>

## 8.4.2 Initialization

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
<p>Power can be set on but no displays become operational. (The logic voltage VL is present.)</p>	<p>The main CPU is completely out of work.</p>	<p>(1) The reset signal can not be released.</p>	<ul style="list-style-type: none"> <li>● Check if IC "5F" pin 3 goes low approximately 30 msec after power is set on.</li> <li>● Check if IC "4F" pins 4 and "7C" pin 5 go high approximately 30 msec after power is set on.</li> <li>● Check if the main CPU "8G" pins 40 and 39 have a pulse output.</li> <li>● Check if IC "5F" pin 11 goes high approximately 30 msec after power is set on.</li> <li>● Check if the reset signal of each of IC 9G, 10G and 16D and the slave CPU "6D" is normal.</li> </ul>	<ul style="list-style-type: none"> <li>● If it remains high, replace IC "5F"</li> <li>● If they remain low, replace either IC "4F" or "7C".</li> <li>● Replace the main CPU "8G"</li> <li>● If it remains low, replace IC "5F".</li> </ul>
	<p>Programs can not be executed.</p>	<p>(2) The oscillator are not operational.</p>	<ul style="list-style-type: none"> <li>● Check if the respective oscillators CR3 and CR1 of the main and slave CPU are operational.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the non-operational oscillator (s). If it does not (or they do not) become operational, replace the main and/or the slave CPU.</li> </ul>
		<p>(1) No pulse output is present on the address data bus line.</p>	<ul style="list-style-type: none"> <li>● Just after power on, check if all outputs of the main CPU "8G" pin 22 to 37 are pulsing.</li> <li>● Check all inputs and outputs of the address latch IC "16E" pin 11 as well as of "16E" and see if a pulse output is present.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the main CPU "8G".</li> <li>● If a low level signal is always present, replace by turn each of the elements which are connected to the address data bus line.</li> <li>● Replace the main CPU when IC "16E" pin 11 (address strobe) is not providing a pulse output.</li> <li>● If a pulse output is not present on the output side, replace IC "16E".</li> </ul>
	<p>(2) No ROM select signal is provided or some of the ROMs are not functional.</p>	<ul style="list-style-type: none"> <li>● Check the address lines 8 to 10 at IC "11G" to see if an output signal which is identical with the input signal is present.</li> <li>● Check if IC "15D" pins 7, 9, 10 and 11 have a pulse output.</li> <li>● Replace one by one the ROMs until the system becomes operational.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace IC "11G".</li> <li>● Replace IC "15D" or "8E".</li> </ul>	

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
	Interrupt is proceeding.	(1) Either the BRAEAK or MENU key is kept on.	<ul style="list-style-type: none"> <li>● Check if any of the keys is left depressed.</li> <li>● Dismount the keyboard and check passage of the KRTN signal and the KSC signal.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace either the rubber contact switch or the key top, whichever is appropriate.</li> <li>● Replace the keyboard if the resistance does not go infinitely high when the keyboard is dismounted.</li> </ul>
	The system is operational whereas the indicators are dead. (Programs are executed without any display.)	<p>(1) The I/O select (address select) signal does not work properly.</p> <p>(2) No serial data are provided to LCD.</p>	<ul style="list-style-type: none"> <li>● Check if both IC 9E pins 12 and 10 go low. If either of them does not go low, check the input signal for it.</li> <li>● Check outputs of IC "10G" pin 13, "10H" pin 6 and "11H" pin 12 to see if a pulse output is contained in each signal.</li> </ul>	<ul style="list-style-type: none"> <li>● Any of IC "9G", "1E", "2E" or "3E" is suspected to be responsible for the trouble. So check the signal of each of them and replace the defective IC.</li> <li>● If IC "2E" pin 9 is low, check IC "5E" or "16".</li> </ul>
	Operation stops unexpectedly or goes out of control.	(1) There is an insufficient connection or disconnections in any of the IC sockets for ROMs and CPUs or in any of the circuit patterns.	<ul style="list-style-type: none"> <li>● Check all signals (address signals, data bus signals, line signals etc.) from the main CPU and the connections among the elements.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace any defective IC socket (s) and repair the broken patterns.</li> </ul>
The MENU screen shows some display but the system is dead.	Selection of operation mode (BASIC/MONITOR or/ Application) can not be achieved through the keyboard.	(1) The keyboard is in a keyed-in condition or an interrupt operation from the keyboard is under way in the circuit.	<ul style="list-style-type: none"> <li>● Check the function keys PF1-PF5, the MENU key and other data keys to see if any key switches are left in a depressed condition.</li> <li>● Check the <u>KB REQUEST</u> signal line at IC "2E", "6C", "1E" and "1G".</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the defective key switches or the keyboard.</li> <li>● Replace the detected defective ICs.</li> </ul>

### 8.4.3 Keyboard

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
Unable to key-in	All the keys are functionless for input.	(1) Bad contact of the keyboard connector.	<ul style="list-style-type: none"> <li>● Check connection of the connectors CN4 and CN5 on the MOSU circuit board.</li> </ul>	<ul style="list-style-type: none"> <li>● Redo the connection or replace the connectors.</li> <li>● If the connector cable is damaged, replace the keyboard unit.</li> </ul>
		(2) No KRTN signal is provided.	<ul style="list-style-type: none"> <li>● Depressing the corresponding keys, check the signals of IC "1G" pin 13, of the main CPU "8G" pins 18 and 5.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the faulty ICs.</li> </ul>
		(3) The RESET signal is faulty.	<ul style="list-style-type: none"> <li>● Check IC "5G" pin 1 of the MOSU circuit board to see that it goes low after "power-in".</li> </ul>	<ul style="list-style-type: none"> <li>● Check the reset circuits including IC "7C" and "4F".</li> </ul>
		(4) The KSC signal line is faulty.	<ul style="list-style-type: none"> <li>● Check the KSC output signals of IC "5C" to see if they go low after "power-on".</li> </ul>	<ul style="list-style-type: none"> <li>● Replace IC "5C" if all of them do not go low.</li> </ul>
Some of the key switches are not functional for input.		(1) Bad contact of the keyboard connector.	<ul style="list-style-type: none"> <li>● Measure resistance between the KRTN signal and the KSC signal of the corresponding switches at CN4 and CN5 of the MOSU circuit board, depressing the switches.</li> </ul>	<ul style="list-style-type: none"> <li>● If the line is dead (Resistance of approximately 15k<math>\Omega</math> can not be detected when the switches are depressed), replace the whole keyboard.</li> </ul>
		(2) No interrupt (KB RE-QUEST) occurs by specific KRTN signals.	<ul style="list-style-type: none"> <li>● Signal out the key code (KRTN or KSC) which can not be keyed in by consulting the key code table.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the keyboard. If the trouble is a keyboard trouble, check the diodes D3 to D14. If the KRTN signal can not be keyed in on all the keys, then replace IC "1G" of the MOSU circuit board.</li> <li>● If the KSC signal can not be keyed in, then replace IC "5G".</li> </ul>
One of the switches is not functional for input.		(1) The contact of the switch itself is faulty.	<ul style="list-style-type: none"> <li>● Single out the key code which can not be keyed in by consulting the key code table and measure resistance between the KRTN signal and the KSC signal, depressing the switches.</li> </ul>	<ul style="list-style-type: none"> <li>● If the resistance comes to 15 k<math>\Omega</math> from infinite when the switch is depressed, replace the switch.</li> <li>● If the function key is responsible for the trouble, replace the rubber contact switch.</li> <li>● If neither of the above remedies is effectless, replace the keyboard unit.</li> </ul>

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
	Other keys are functional for input.	(1) Key switches are faulty.	<ul style="list-style-type: none"> <li>● Check if any key is kept depressed. Check all KRTN codes to confirm if any code is on low level.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the key switches or keyboard unit.</li> </ul>
Key-in occurs at some non-touched keys.	Some of the keys input in data without the corresponding switches being depressed.	(1) Binding of key switches.  (2) The keyboard has been deformed.  (3) Either the input circuit of the KRTN signal is faulty or some of the keyboard switches are defective.	<ul style="list-style-type: none"> <li>● Check if the key switches are in touch with the case cover. Also check if the switches can be fully lifted by means of the return coil.</li> <li>● Check if the keyboard has been deformed due to bending or torsion.</li> <li>● Check the key codes of the faulty keys as well as the KRTN signal line of the MOSU circuit board.</li> <li>● If the line is low when the keys are not depressed, dismount the keyboard to determine whether the cause for the low level is in the keyboard side or the MOSU circuit board side.</li> </ul>	<ul style="list-style-type: none"> <li>● Adjust mounting of the keyboard.</li> <li>● Replace the return coil or the switches.</li> <li>● Redo mounting of the keyboard. If it has no effect, replace the keyboard unit.</li> <li>● If the keyboard is responsible for the trouble, replace the switches. If the replacement of switches has no effect, replace the keyboard unit.</li> <li>● If the trouble is attributable to the MOSU circuit board, replace the faulty element in IC "1G" "2G" "3G".</li> </ul>
Stored input data can be altered unexpectedly.	Stored letters are different from the keyed in letters. (e.g. A keyed in character is altered to a mere "space".)	(1) The gate signal for the keyed in data (select line) is faulty.  (2) Improper output timing of the KSC signal.  (3) The main CPU is defective.	<ul style="list-style-type: none"> <li>● Check IC 3G and 4G of the MOSU circuit board to see if they produce the gate signal for the keyed in data at the time of key input.</li> <li>● Check IC "5G" pin 11 as well as the wave form of each of the KSC output signals.</li> <li>● Confirm that the respective KRTN signal is sent to the data bus line by way of IC "3G" or "4G".</li> </ul>	<ul style="list-style-type: none"> <li>● Replace faulty elements in IC "3G", "4G" and "9E".</li> <li>● Replace the detected faulty elements in IC "5G" and "9E".</li> <li>● Replace the main CPU "8G".</li> </ul>

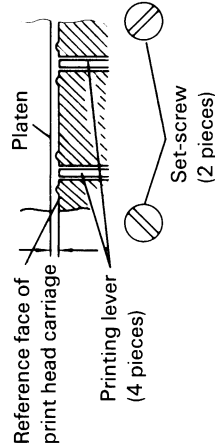
## 8.4.4 LCD

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
<p>The display system is dead.</p>	<p>The display feature does not totally function.</p>	<p>(1) Maladjustment of the volume control of the view angle.</p>	<ul style="list-style-type: none"> <li>● Turn back and forth the volume control of the view angle on the keyboard.</li> </ul>	<ul style="list-style-type: none"> <li>● If no display appears, some other causes should be suspected</li> </ul>
		<p>(2) Bad contact of the connector section.</p>	<ul style="list-style-type: none"> <li>● Check the connection between LCD and the keyboard and between the latter and the MOSU circuit board CN5.</li> </ul>	<ul style="list-style-type: none"> <li>● Redo connection of the connector.</li> </ul>
		<p>(3) The voltage V<sub>LD</sub> for LCD is not available.</p>	<ul style="list-style-type: none"> <li>● Check the MOSU circuit board CN5 pin 17 to see if it has the voltage of approximately 7V.</li> </ul>	<ul style="list-style-type: none"> <li>● Check the diodes, D7 and D5 and IC "2C". Replace all defective elements.</li> </ul>
		<p>(4) The view angle regulating circuit of the keyboard is not functioning properly.</p>	<ul style="list-style-type: none"> <li>● Check if V<sub>CL</sub> voltage is provided to CN5 pin 17 of the MOSU circuit board.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the transistor Q1 or Q2 of the keyboard.</li> </ul>
		<p>(5) There is no output of signals for LCD.</p>	<ul style="list-style-type: none"> <li>● Check the following signals at CN5 of the MOSU substrate after power has been keyed-in through the keyboard to see if they are pulse outputs.            *pin 4 (C/D) : Carry/Data            *pin 6 (SD) : Serial data            *pin 7 (SCK) : Shift clock            *pin 5 (CLK) : Clock for the ROW line.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the detected defective IC(s), which can be IC "12H", "1F" and so on.</li> </ul>
		<p>(6) The LCD unit itself is defective.</p>	<ul style="list-style-type: none"> <li>● Dismount IC <math>\mu</math>Pd 7227 one by one from the LCD unit to find defective ICs.</li> </ul>	<ul style="list-style-type: none"> <li>● If the system does not work properly after replacement of defective ICs, then replace the whole LCD unit.</li> </ul>
<p>The display feature does not function partially. (Partial alteration of stored data occurs.)</p>	<p>(1) The chip select signal of LCD is faulty.</p>	<ul style="list-style-type: none"> <li>● Check IC "16G" pin 9 to 14 as well as pins 1 to 3 after power is put on or while the screen is being scrolled.</li> </ul>	<ul style="list-style-type: none"> <li>● If the output (pins 9 to 14) of IC "16G" is faulty, replace the IC.</li> <li>● If the trouble is found on the input side, then replace IC "9G".</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the faulty IC(s).</li> </ul>
	<p>(2) Some of the ICs of the LCD unit are faulty.</p>	<ul style="list-style-type: none"> <li>● Check and see which block is not displayed. (Detect the responsible IC(s) out of ICs No. 0 to 5.)</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the faulty IC(s).</li> </ul>	<ul style="list-style-type: none"> <li>● Redo the connection of the connector.</li> <li>● If the line is disconnected somewhere in the keyboard, replace it with a new one.</li> </ul>
	<p>(3) Contact of the connector is faulty.</p>	<ul style="list-style-type: none"> <li>● Check conductivity between LCD and the keyboard and between the latter and MOSU. (CS1 ~ 6 signal lines).</li> </ul>	<ul style="list-style-type: none"> <li>● Redo the connection of the connector.</li> <li>● If the line is disconnected somewhere in the keyboard, replace it with a new one.</li> </ul>	<ul style="list-style-type: none"> <li>● Redo the connection of the connector.</li> <li>● If the line is disconnected somewhere in the keyboard, replace it with a new one.</li> </ul>

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
The display contrast becomes reverse.	Black and white is displayed reversely.	(1) Serial data line signal is reversed.	<ul style="list-style-type: none"> <li>● Check IC 11H pins 11 and 12 of the MOSU circuit board.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace IC 11H if the signal has the same phase for Pins 11 and 12, and replace IC 10H if it has an opposite phase.</li> </ul>
The view angle can not be adjusted.	The view angle does not change if the volume control of the unit is turned.	<p>(1) The volume control switch is faulty.</p> <p>(2) One of the transistors is faulty.</p>	<ul style="list-style-type: none"> <li>● Check if resistance of VR1 on the keyboard varies when the volume control switch is turned.</li> <li>● Check if the base voltage of the transistor Q2 on the keyboard varies when the volume control of VR1 is turned.</li> </ul>	<ul style="list-style-type: none"> <li>● If the resistance does not vary, replace VR1.</li> <li>● If the voltage does not vary, replace the transistor Q1.</li> <li>● If the voltage varies, replace the transistor Q2.</li> </ul>
The uppermost two lines of LCD can not be displayed properly.	They can not be displayed totally or correctly.	(1) Some of ICs on LCD are faulty. (The ROW line can not be controlled properly.)		<ul style="list-style-type: none"> <li>● Replace IC <math>\mu</math>Pd 7227 No. 0.</li> </ul>
The lower most two lines of LCD can not be displayed properly.	Same as above	(1) Same as above.		<ul style="list-style-type: none"> <li>● Replace IC <math>\mu</math>Pd 7227 No. 2.</li> </ul>
Totally meaningless lines are displayed after power is put on.	While some letters or illustrations are displayed, they are totally meaningless.	(1) Setting is not done properly.	<ul style="list-style-type: none"> <li>● Check if IC "11H" pin 15 is high approximately 30 msec after power is put on. If it is not high, check IC "1F" and "3F".</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the detected faulty IC.</li> </ul>
	Displayed, but the picture is cleared off.	(1) SCK signal is always generated.	<ul style="list-style-type: none"> <li>● Check IC 1F pin 2 of the MOSU circuit board.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace IC 9E if Pin 2 remains on low level, and replace IC 1F if it is on high level.</li> </ul>

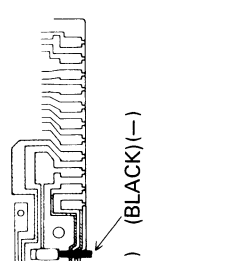
### 8.4.5 Micro Printer (Model-160)

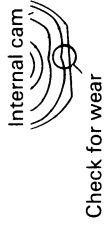
Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
1. No dot can be printed.	Motor rotates normally, but no dot can be printed.	<p>(1) The timing signal TS is not detected.</p> <p>(2) The slave CPU or the driver circuit is not functioning properly.</p> <p>(3) The reset signal is not detected.</p> <p>(4) Rupture of FPC (flexible printed cable) common wire.</p> <p>(5) Bad contact between FPC common wire and circuit board terminal.</p> <p>(6) Faulty relative position of platen and print head.</p>	<ul style="list-style-type: none"> <li>● Check the connector CN6 pin 19 and IC "8D" pins 14 and 15 of the MOSU circuit board.</li> <li>● Check the slave CPU "6D" pins 13 to 16 and IC 13D pins 3, 5, 9 and 7.</li> <li>● Check IC "8D" pins 11 and 12.</li> <li>● Check FPC common wire for electrical continuity.</li> <li>● Check solder connecting circuit board terminal and FPC common wire for electrical continuity.</li> <li>● Check distance between platen and printing lever's impact face.</li> <li>● Proper distance: 0.6 mm</li> </ul>	<ul style="list-style-type: none"> <li>● If the TS signal is not present at CN6 pin 19, replace the FPC cable or the T detector.</li> <li>● Replace the slave CPU "6D" or the driver IC "13D" whichever is appropriate.</li> <li>● Replace IC "8D" or the diode D18, whichever is appropriate. .... If the signal is not detectable at the diode, PFC or the R detector should be replaced.</li> <li>● Discontinuity being confirmed, replace FPC (5-2).</li> <li>● Discontinuity being confirmed, resolder the parts.</li> <li>● Distance being improper, correct as follows:               <ol style="list-style-type: none"> <li>1) Loosen the two set-screws.</li> <li>2) Displace print head so that reference face of print head carriage and impact face of printing lever become flush, as illustrated below.</li> </ol> </li> <li>3) Proper distance between platen and printing lever's impact face is approx. 0.6 mm.</li> <li>4) Retighten the screws.</li> </ul>






Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy		
<p>2. Constant omission of dots at particular dot positions.</p>	<p>A particular print solenoid does not operate. (Printing is not done for the four columns to be covered by a particular solenoid.)</p>	<p>(1) The driver circuit or the slave CPU is not functioning properly.</p> <p>(2) Rupture of FPC.</p> <p>(3) Bad contact of FPC.</p> <p>(4) Bad contact of print solenoid wire.</p> <p>(5) Rupture of print solenoid.</p> <p>(6) Faulty operation of print head.</p> <p>(7) Faulty operation of printing lever.</p>	<ul style="list-style-type: none"> <li>● Check CPU "6D" pins 13 to 16 and the driver IC "13D" pins 3, 5, 7 and 9.</li> <li>● Check FPC for electrical continuity.</li> <li>● Check corresponding FPC terminal and circuit board terminal for electrical continuity.</li> <li>● Check for electrical continuity the solder connecting the corresponding print solenoid terminal wire and FPC terminal.</li> <li>● Check resistance of corresponding solenoid. (For the value of resistance, refer to Par. 1.2-11, Chap. 1.)</li> <li>● Check corresponding push rod for smooth operation.</li> <li>● Check corresponding printing lever for smooth operation.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace either the slave CPU "6D" or the driver IC "13D", whichever is appropriate.</li> <li>● If the driver IC is not functioning properly, check if the head coil is short-circuited or disconnected.</li> <li>● Discontinuity being confirmed, replace FPC (5-2).</li> <li>● Discontinuity being confirmed, resolder terminals.</li> <li>● Discontinuity being confirmed, resolder.</li> <li>● The measured value being lower than specified, replace print head assy (5-1).</li> <li>● Faulty operation being confirmed, replace print head assy (5-1).</li> <li>● Faulty operation being confirmed, replace print head carriage assy (5-3).</li> </ul>		
	<p>3. Inconstant omission of dots at particular position.</p>	<p>Inconstant omission of dots occurs at dot position to be covered by a particular print solenoid.</p>	<p>(1) Bad contact or rupture of FPC.</p> <p>(2) Bad contact of print head solenoid wire.</p> <p>(3) Faulty operation of print head.</p> <p>(4) Faulty operation of printing lever.</p>	<ul style="list-style-type: none"> <li>● Same as with POSSIBLE CAUSE 2), NATURE OF TROUBLE 2.</li> <li>● Same as with POSSIBLE CAUSE 3), NATURE OF TROUBLE 2.</li> <li>● Same as with POSSIBLE CAUSE 5), NATURE OF TROUBLE 2.</li> <li>● Same as with POSSIBLE CAUSE 6), NATURE OF TROUBLE 2.</li> </ul>	<ul style="list-style-type: none"> <li>● Discontinuity being confirmed, resolder.</li> <li>● Discontinuity being confirmed, resolder.</li> <li>● Faulty operation being confirmed, replace print head assy (5-1).</li> <li>● Faulty operation being confirmed, replace print head carriage assy (5-3).</li> </ul>	
		<p>Inconstant omission of dots occurs at unparticular dot positions.</p>	<p>(1) Bad contact of FPC.</p>	<ul style="list-style-type: none"> <li>● Check electrical continuity between FPC common wire terminal and circuit board terminal.</li> </ul>	<ul style="list-style-type: none"> <li>● Discontinuity being confirmed, resolder.</li> </ul>	<ul style="list-style-type: none"> <li>● Discontinuity being confirmed, resolder.</li> </ul>

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
4. Character width changes.	Character width changes at a particular column.	(1) Wear or damage of gears.  (2) Wear of lead cam groove.	<ul style="list-style-type: none"> <li>● Check motor gear, reduction gear and lead cam internal gear for wear or damage.</li> <li>● Check lead cam groove for wear.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace worn or damaged part, if any: motor assy (2-1), reduction unit (3-7), lead cam assy (3-1).</li> <li>● Cam groove being found worn, replace lead cam assy (3-1).</li> </ul>
5. Motor does not rotate.	Motor does not rotate in spite of application of Print Command.	(1) Improper power supply to motor.	<ul style="list-style-type: none"> <li>● Check motor terminal voltage using tester or oscilloscope.</li> </ul> <p>Rated voltage: 4.5<sup>+0.5</sup><sub>-0.7</sub> V DC</p>	<ul style="list-style-type: none"> <li>● Check power supply circuit and repair it, if necessary.</li> </ul>
			 <p>(RED)(+) (BLACK)(-)</p>	
		(2) Bad contact of motor lead wire.	<ul style="list-style-type: none"> <li>● Check electrical continuity between motor lead wire and circuit board terminal of motor terminal.</li> </ul>	<ul style="list-style-type: none"> <li>● Discontinuity being confirmed, resolder the parts concerned.</li> </ul>
		(3) Defective motor.	<ul style="list-style-type: none"> <li>● Apply 3.8V across motor and check if it rotates.</li> </ul>	<ul style="list-style-type: none"> <li>● If motor does not rotate, replace motor assy (2-1).</li> </ul>
		(4) The slave CPU is not functioning properly.	<ul style="list-style-type: none"> <li>● Check and see if the slave CPU "6D" pins 17 and 28 are at the lower level.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the slave CPU "6D".</li> </ul>
		(5) Some of the elements of the motor-on circuit are not functioning properly.	<ul style="list-style-type: none"> <li>● Check and see if <ul style="list-style-type: none"> <li>*IC "4E" pin 2 output is low,</li> <li>*IC "4E" pin 4 output is high,</li> <li>*"7E" pin 13 output is high and</li> <li>*the transistor Q13 emitter has the voltage of +5V.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● Replace defective elements.</li> <li>● If the transistor Q13 is not functioning properly, make sure that the motor coil of the printer is neither short-circuited nor disconnected and check the transistor Q12 before replacing defective elements.</li> </ul>
			<ul style="list-style-type: none"> <li>● Check and see if <ul style="list-style-type: none"> <li>*IF "4E" pin 6 is high,</li> <li>*the emitter of the transistor Q9 is high and</li> <li>*the collector of the transistor Q12 is low.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● Replace defective elements.</li> <li>● If either the transistor Q9 or Q12 is not functioning properly, check the transistor Q13 and the diode D1. Also check the motor coil of the printer to see if it is not short-circuited.</li> </ul>

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
6. Motor won't stop. (The motor would not stop turning.)	Turning of the motor is not terminated after the print cycle is over.	<p>(1) Faulty resetting detector.</p> <p>(2) Some of the elements of the RS signal circuit are not functioning properly.</p> <p>(3) Some of the elements of the drive circuit are not functioning properly.</p>	<ul style="list-style-type: none"> <li>● Rotate lead cam and check if signal appears at resetting detector output terminal by means of oscilloscope.</li> <li>● Check IC "8D" pins 11 and 12 to see if the RS signal is provided when the printer head is returned to the left side.</li> <li>● Check IC "4E" pin 5 and 6.</li> <li>● Check the emitter of the transistor Q9 and the collector of Q12.</li> </ul>	<ul style="list-style-type: none"> <li>● If reset signal does not appear, replace circuit board assy (4-2) including reed switch.</li> <li>● Check the diode D18 if IC "8D" pin 12 has no output. Replace either IC "8D" or the diode D18, whichever is appropriate.</li> <li>● Replace the slave CPU "6D" if IC "8D" pin 12 has the RS signal.</li> <li>● Replace the slave CPU "6D" if the pin 5 is low.</li> <li>● Replace IC "4E" if the pins 5 and 6 are high.</li> <li>● If the emitter of Q9 is high, check Q12, Q13 and the motor coil and replace all defective elements.</li> <li>● If Q12 is not functioning properly, check Q13 and the motor coil and replace all defective elements.</li> </ul>
7. Paper feeding cannot be performed.	Paper cannot be fed and consequently printing is repeated at the same spot on the paper.	<p>(1) Faulty feeding of paper.</p> <p>(2) Wear of internal cam of ribbon feeding cam.</p> <p>(3) Paper feeding lever being broken or worn.</p> <p>(4) Damage or wear of paper feeding assy.</p> <p>(5) Rupture or damage of one-way spring.</p>	<ul style="list-style-type: none"> <li>● Check paper for width, thickness and roll diameter.</li> <li>● For specifications of paper, refer to Par. 1.2-5, Chap. 1.</li> <li>● Check paper feeding course for clogging.</li> <li>● Check for wear the internal cam of ribbon feeding cam.</li> </ul> <div style="text-align: center;">  <p>Internal cam Check for wear</p> </div>	<ul style="list-style-type: none"> <li>● Paper not being as specified, replace.</li> <li>● Internal cam being worn, replace ribbon feeding cam (3-4).</li> <li>● Break or wear being found, replace frame assy (1-11).</li> <li>● Damage or wear being found, replace paper feeding assy (6-1).</li> <li>● Rupture or damage being confirmed, replace one-way spring (6-2).</li> </ul>

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
		(6) Damage of paper holding roller. (7) Permanent deformation of paper holding spring.	<ul style="list-style-type: none"> <li>● Check paper holding roller for damage.</li> <li>● Check paper holding spring for permanent deformation.</li> </ul> 	<ul style="list-style-type: none"> <li>● Damage being found, replace paper holding roller (6-3).</li> <li>● Permanent deformation being confirmed, replace frame assy (1-1).</li> </ul>
8. Irregular pitch of paper feeding.	Characters are not printed at regular line spacing or lines overlap.	(1) Faulty feeding of paper. (2) Wear of internal cam of ribbon feeding cam. (3) Wear or damage of paper feeding lever. (4) Wear of damage of paper feeding assy. (5) Fatigue of one-way spring. (6) Faulty operation (unsmooth rotation) of paper holding roller. (7) Permanent deformation of fatigue of paper holding spring.	<ul style="list-style-type: none"> <li>● Same as with POSSIBLE CAUSE 1, NATURE OF TROUBLE 7.</li> <li>● Same as with POSSIBLE CAUSE 2, NATURE OF TROUBLE 7.</li> <li>● Same as with POSSIBLE CAUSE 3, NATURE OF TROUBLE 7.</li> <li>● Same as with POSSIBLE CAUSE 3, NATURE OF TROUBLE 7.</li> <li>● Check one-way spring for fatigue.</li> <li>● Check paper holding roller for wear, damage or quantity of lubricant.</li> <li>● Same as with POSSIBLE CAUSE 7, NATURE OF TROUBLE 7.</li> </ul>	<ul style="list-style-type: none"> <li>● If paper not being as specified, replace.</li> <li>● The spring being found fatigued, replace it (6-1).</li> <li>● Wear or damage being found, replace paper holding roller (6-3). Quantity of lubricant being insufficient, supply specified lubricant (refer to Par. 2.2.2 "Lubrication Requirements").</li> </ul>
9. Inking mechanism does not operate at all.	Printing mechanism operates normally, but inking mechanism does not operate at all.	(1) Damage of spool gear assy. (2) Damage of ribbon feeding cam. (3) Damage of ribbon feeding gear. (4) Defective ribbon cassette.	<ul style="list-style-type: none"> <li>● Check spool gear assy for damage.</li> <li>● Check external toothed part of ribbon feeding cam for damage.</li> <li>● Check ribbon feeding gear for damage.</li> <li>● Check ribbon cassette for smooth rotation.</li> </ul>	<ul style="list-style-type: none"> <li>● Spool gear assy being found damaged, replace it (7-1).</li> <li>● Damage being found, replace ribbon feeding cam (3-4).</li> <li>● Replace ribbon feeding gear (3-6), if damaged.</li> <li>● Replace ribbon cassette (7-2), if it does not rotate.</li> </ul>

## 8.4.6 RS-232C

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
No data can be sent from RS-232C.	Both $\pm 8V$ are not provided. (No DTF signal is provided.)	(1) The slave CPU does not function properly.	<ul style="list-style-type: none"> <li>● Check if +8V is provided to IC "6B" pin 14 of the MOSU circuit board.</li> <li>● Check the slave CPU "6F" pin 31</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the slave CPU if the slave CPU "6D" pin 31 is high.</li> </ul>
		(2) The $\overline{SWL}$ signal line does not function properly.	<ul style="list-style-type: none"> <li>● Check IC "7E" pins 5 and 12. (If the slave CPU is OK, the pin 5 should be high.)</li> </ul>	<ul style="list-style-type: none"> <li>● Replace IC "7E" if the pin 5 input is inversely sent to the pin 12.</li> </ul>
		(3) The regulator circuit contains some faulty elements.	<ul style="list-style-type: none"> <li>● Check the collector side of the transistor Q2 as well as IC "3A" pin 14.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the transistor Q2 if the Q2 collector (IC "3A" pin 14) is high.</li> </ul>
		(4) The overcurrent protection circuit is at work.	<ul style="list-style-type: none"> <li>● Check if IC "3A" pin 10 has a pulse output.</li> </ul>	<ul style="list-style-type: none"> <li>● If it has no pulse output, replace IC "3A" after confirming that the capacitor C24 functions properly.</li> </ul>
		(5) Malfunction of the T1 coil.	<ul style="list-style-type: none"> <li>● Check IC "3A" pin 13. (See if it has a potential higher than the <math>V_B</math> voltage by more than 0.7V.)</li> </ul>	<ul style="list-style-type: none"> <li>● If a potential difference greater than 0.7V exists, the overcurrent protection circuit starts functioning to make the pin 10 high and stop the +8V output. So, replace the elements which are responsible for the existing overcurrent. (They can be the T1 coil and IC "6B".)</li> </ul>
Either of $\pm 8V$ is not provided.  Unable to detect a CTS signal.		(1) Malfunction of the rectifying diode.	<ul style="list-style-type: none"> <li>● Check resistance of the T1 coil to see if the coil is broken.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the T1 coil if it is broken.</li> </ul>
		(1) The system is not in the condition where data can be sent to the connected units.	<ul style="list-style-type: none"> <li>● Check conductivity of the diodes D3 and D4.</li> </ul>	
			<ul style="list-style-type: none"> <li>● Check if the sending mode is half duplex for receiving data.</li> </ul>	<ul style="list-style-type: none"> <li>● If the sending mode is half duplex and the system is taking in data, it normally stops sending data. .... No problem.</li> </ul>
			<ul style="list-style-type: none"> <li>● Check conductivity of the RTS/CTS line, while the interface cable is perfectly connected.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the interface cable or the connector.</li> </ul>
			<ul style="list-style-type: none"> <li>● Check if CTS signals are sent out from the connected units.</li> </ul>	

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy	
Unable to receive data.	No TXD signal is provided.	(2) Malfunction of some of the elements in the CTS signal line.	<ul style="list-style-type: none"> <li>● Check if the signal levels of IC "7B" pins 13 and 11 are inverted. *(The pin 13 has level of RS-232.)</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the main CPU "8G".</li> </ul>	
		(3) Malfunction of the main CPU	<ul style="list-style-type: none"> <li>● Make sure that the main CPU "8G" pin 14 is low.</li> </ul>		
		(1) Malfunction of some of the elements of the driver ICs.	<ul style="list-style-type: none"> <li>● Check IC "7C" pins 9 and 10 as well as IC "6B" pins 4 (5) and 6. .... Make sure that the output of IC "6B" pin 6 is of the same level (<math>\pm 8V</math>) as that of RS-232C.</li> </ul>		
	CD signals are not detected.	(2) Malfunction of the main CPU.	<ul style="list-style-type: none"> <li>● Check if the main CPU "8G" pin 9 has pulse output.</li> </ul>	<ul style="list-style-type: none"> <li>● If it has not pulse output, replace the main CPU.</li> </ul>	
		(1) Some of the connected units or interfaces are not functioning properly.	<ul style="list-style-type: none"> <li>● Check if CD signals are sent out of the connected units.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the units which are involved in the trouble.</li> </ul>	
			<ul style="list-style-type: none"> <li>● Check conductivity of the interface cables to see if they are properly connected.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the faulty interface cables or the connectors.</li> </ul>	
		(2) Some of the elements for the CD signal line are faulty.	<ul style="list-style-type: none"> <li>● Check IC "7B" pins 1 and 3 to see if the signal levels are inverted.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace IC "7B".</li> </ul>	
			Either smoothing capacitors or IC "3A" are not working properly.	<ul style="list-style-type: none"> <li>● Check the capacitors C3, C9, C4 and C10.</li> </ul>	<ul style="list-style-type: none"> <li>● If the capacitors are not faulty, replace IC "3A".</li> <li>● If any short-circuited/open capacitors are found, replace them and check the diodes D3/D4 at the same time.</li> </ul>
		DSR signals are not detected.	(1) Some of the connected units or interfaces are not functioning properly.	1. Check if the power source for the connected units is on.	<ul style="list-style-type: none"> <li>● Make sure that the connected units have proper power supply by turning the power switch on and off repeatedly.</li> </ul>
				2. Check the connected units to see if DSR signals are sent from them.	<ul style="list-style-type: none"> <li>● Replace the faulty interface cables or the connectors.</li> </ul>
3. Check conductivity of the interface cables to see if they are properly connected. (DTR/DSR line).	<ul style="list-style-type: none"> <li>● Replace the connected units if no DSR output is detected.</li> </ul>				
	(2) Some of the elements for the DSR signal line are faulty.	<ul style="list-style-type: none"> <li>● Check IC "7B" pins 14, 10 and 8. *(The pin 10 should be at the RS-232 level.)</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the transistor Q6 if the pin 14 is low.</li> <li>● Replace IC "7B" if output of the pins 10 and 8 is not inverted.</li> </ul>		

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
		(3) The main CPU is faulty.	<ul style="list-style-type: none"> <li>● Check the main CPU "8G" to see its level is low.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the main CPU "8G".</li> </ul>
	No RTS signals are sent out.	(1) Either the slave CPU or the ICs for the driver are not functioning properly.	<ul style="list-style-type: none"> <li>● Check IC "6B" pins 9 (10) and 8. *(The pin 8 should be at the RS-232 level.)</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the slave CPU if IC "6B" pin 9 (10) is low.</li> <li>● Replace IC "6B" if the output of IC "6B" pin 8 is not high (+8V).</li> </ul>
Unable to receive data.	CD signals are not detected.	(1) The slave CPU is faulty.	<ul style="list-style-type: none"> <li>● Check the slave CPU "6D" pin 22 to see if it is low.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the slave CPU "6D" if the pin is not low.</li> </ul>
	RXD signals are not detected.	(1) Some of the connected units or interfaces are not functioning properly.	<ul style="list-style-type: none"> <li>● Check the connected unit to see if RXD signals are sent from them.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the faulty units.</li> </ul>
		(2) Some of the elements for the RXD signal line or the slave CPU are not functioning properly.	<ul style="list-style-type: none"> <li>● Check conductivity of the interface cables to see if they are properly connected.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the faulty interface cables or the connectors.</li> </ul>
			<ul style="list-style-type: none"> <li>● Check IC "7B" pins 10 and 8 to see if the signal levels are inverted. *(The pin 4 should be at the RS-232C level.)</li> </ul>	<ul style="list-style-type: none"> <li>● Replace IC "7B".</li> </ul>
The interfaces and the signals are normal but entail no action.	A WRAP test based on the test program can be conducted without any trouble.	(1) Either the signal ground or the frame ground (CG) is not connected properly.	<ul style="list-style-type: none"> <li>● Check IC "2F" pin 5. If it is high, check the pin 3.</li> </ul>	<ul style="list-style-type: none"> <li>● If IC "2F" pin 5 is low, check IC "1F" pins 11 and 12. If they are both low, replace IC "1F". .... If they are both high, replace the slave CPU "6D".</li> <li>● If IC "2F" pin 3 has no output, replace IC "2F". .... If the pin 3 has output, replace the slave CPU "6D".</li> </ul>
	(2) The mode setting is different from that of the companion equipment (in beat, speed, etc.)		<ul style="list-style-type: none"> <li>● Check conductivity of the signal ground and the case ground.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the faulty interface cables or the connectors.</li> </ul>
			<ul style="list-style-type: none"> <li>● Confirm the mode setting for the companion equipment (in program, switch, etc.)</li> </ul>	

## 8.4.7 Serial

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
Data can not be transferred serially.	No $\pm 8V$ is provided.	(1) See the description for RS-232C.	See the description for RS-232C.	See the description for RS-232C.
	There is no output of POUT signals.	(1) Some of the elements for POUT signals are faulty.	<ul style="list-style-type: none"> <li>● Check IC "7C" pins 11 and 12 and "6B" pin 2 to see if they are low. Also check IC "6B" pin 3 to see if it has <math>\pm 8V</math>.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the faulty elements. If ICs "7C" and "6B" are normal, replace IC "9G" after checking output of its pin 9.</li> </ul>
	No output of PTX signals is detected.	(1) Either some of the elements for the PTX signal line or the slave CPU are faulty.	<ul style="list-style-type: none"> <li>● Check IC "4D" pins 5 and 3.</li> <li>● Check output of IC "7C" pin 2 and "6B" pin 11 (RS-232C level).</li> </ul>	<ul style="list-style-type: none"> <li>● If IC "4D" pin 5 is not high, check output of IC "3F" pins 1 and 2 as well as of the main CPU "8G" pin 10 to replace faulty elements.</li> <li>● Replace the faulty elements.</li> </ul>
	Signals are sent normally but cause no proper action.	(1) The connecting unit or interface is faulty.	<ul style="list-style-type: none"> <li>● Check the conductivity after confirming that the interface cables are connected properly.</li> <li>● Replace the connecting unit and confirm if it operates properly.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the interface cables or connectors.</li> <li>● Replace the unit.</li> </ul>
Data cannot be received.	Pin signal is not detected.	(1) Some of the elements for the PIN signal line are faulty.	<ul style="list-style-type: none"> <li>● Check IC "6C" pins 8(9) and 10. If output of the pin 8 is always low, also check conductivity of the zener diode ZD4.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the faulty elements.</li> </ul>
		(2) The main CPU is faulty.	<ul style="list-style-type: none"> <li>● Check the main CPU "8G" pin 19 to see if it is low.</li> </ul>	<ul style="list-style-type: none"> <li>● If the pin is low, replace the main CPU.</li> </ul>
		(3) The connecting unit or interface is faulty.	<ul style="list-style-type: none"> <li>● Check the conductivity after confirming that the interface cables are connected properly.</li> <li>● Replace the connecting unit, or check if the pin signal is generated on the connecting unit side.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the interface cable or connectors.</li> <li>● Replace the connecting unit.</li> </ul>
PRX signal is not detected.	(1) The connecting unit or interface is faulty.	(1) See above.	<ul style="list-style-type: none"> <li>● See above.</li> </ul>	



Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
		(2) The element of PRX signal line or the main CPU is faulty.	<ul style="list-style-type: none"> <li>● Check IC "6C" pin 5(6) ..... RS-232C level and pin 4 to confirm that the signal is reversed.</li> <li>● If IC "6C" pin 5 (6) is always kept on low level (grand), check the conductivity of Zener diode ZD5.</li> <li>● Check IC 4D pin 5, 8 (1 1).</li> </ul>	<ul style="list-style-type: none"> <li>● Replace IC "6C" pin.</li> <li>● Replace Zener diode.</li> <li>● If IC "4C" pin 5 is always kept on low level, replace the main CPU "8G". If pin 8 output is not obtained, replace IC "4D".</li> </ul>

### 8.4.8 ROM Cartridge

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
No data can be read out from the ROM cartridge.	No READ operation can be performed (including the header section).	<p>(1) The ROM cartridge is faulty.</p> <p>(2) Either the connecting cable or the connectors are faulty.</p> <p>(3) The ROM cartridge judgement signals do not function properly.</p> <p>(4) No power is supplied to the ROM cartridge.</p> <p>(5) The control signals (for clock, data, lines etc.) do not work properly.</p>	<ul style="list-style-type: none"> <li>● Replace the ROM cartridge and see if normal operation is available.</li> <li>● Check conductivity of the cable set No. 701 which is led into the cartridge connector and the connector CN8 of the MOSU circuit board.</li> <li>● Check the slave CPU "6D" pin 23 and IC "2F" pin 11 to see if they are low. Also check that the slave CPU "6D" pin 2 is low.</li> <li>● Check the slave CPU "6D" pin 26 to see if it is high.</li> <li>● Check the slave CPU "6D" pins 25 and 27 to see if they are turned for once. .... Clear signal.</li> <li>● Check if the main CPU "8G" pin 20 and IC "9G" pins 6 and 15 are provided with pulses.</li> </ul>	<ul style="list-style-type: none"> <li>● Redo connection of the cable set No. 701 or replace it.</li> <li>● Replace IC "2F" or the slave CPU "6D", whichever is appropriate.</li> <li>● Replace the slave CPU "6D".</li> <li>● Replace the faulty slave and/or main CPUs.</li> </ul>

## 8.4.9 Microcassette

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
The system does not work at all or works abnormally.	The system does not function at all. (The reel motor, the R/W head and other sections do not work at all.)	(1) The micro-cassette is faulty.	<ul style="list-style-type: none"> <li>● Replace the micro-cassette and see if normal function can be obtained.</li> </ul>	
		(2) The connection cables or the connectors are faulty.	<ul style="list-style-type: none"> <li>● Check conductivity of the cable set No. 701 which is led into the cartridge connector and the connector CN8 of the MOSU substrate. Also check connection of CN8.</li> </ul>	<ul style="list-style-type: none"> <li>● Redo connection of the cable set No. 701 or replace it.</li> </ul>
		(3) No power is supplied to the micro-cassette.	<ul style="list-style-type: none"> <li>● Check the main CPU "8G" pin 20 to see that it is high and then check the slave CPU "6D" pin 27 to see that it is also high.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the slave or main CPU, whichever is appropriate.</li> </ul>
The reel motor and the R/W head do abnormal movements.	The reel motor and the R/W head do abnormal movements.	(1) The command signals are faulty.	<ul style="list-style-type: none"> <li>● Check the slave CPU "6D" pins 25 and 26.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the slave CPU.</li> </ul>
		(2) Power would not turned off.	<ul style="list-style-type: none"> <li>● Check the slave CPU "6D" pin 27 to see if it remains low until the transmission of the commands is over.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the slave CPU.</li> </ul>
The tape counter does not function properly.	The tape counter does not function properly.	(1) The main CPU is faulty.	<ul style="list-style-type: none"> <li>● Check if the main CPU "8G" pin 29 has pulse output when the tape is being wound up.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the main CPU.</li> </ul>
		(1) The slave CPU is faulty.	<ul style="list-style-type: none"> <li>● Check output of the slave CPU "6A" pin 9. (WRITE data).</li> </ul>	<ul style="list-style-type: none"> <li>● If the pin remains low all the time, replace the slave CPU.</li> </ul>
		(2) The R/W head shows abnormal movement.	<ul style="list-style-type: none"> <li>● Check the slave CPU "6D" pin 23 to see if it is high at the time of READ or WRITE operation.</li> </ul>	<ul style="list-style-type: none"> <li>● If the pin is low, adjust or replace the head switch (HSW) of the micro-cassette.</li> <li>● If the pin is high, replace the slave CPU.</li> </ul>
No READ and WRITE operation can be performed.	The tape can not be moved.	(3) The R/W head is faulty.	<ul style="list-style-type: none"> <li>● Check the R/W head for any dirt or scars.</li> </ul>	<ul style="list-style-type: none"> <li>● Clean the R/W head or replace the P lever set.</li> </ul>
		(1) The cassette is improperly set.	<ul style="list-style-type: none"> <li>● Check the cassette tape to see if it is damaged.</li> <li>● Turn the tape upside down and set it once again.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the cassette.</li> </ul>

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
		<p>(2) The C axle (the capstan axle) is not turning.</p> <p>(3) The pinch roller is not in proper contact with the C axle.</p> <p>(4) The C axle or the belt is faulty.</p>	<ul style="list-style-type: none"> <li>● Check the belt drive motor to see if it is turning.</li> <li>● Check the drive belt to see if it is cut or displaced.</li> <li>● Check if the PR spring of the pinch roller is not broken. Also check if the tension of the pinch roller is found somewhere within the range of 150 ± 20g.</li> <li>● Check if the R/W head scrape head can be turned to move the pinch roller.</li> <li>● Check the axle to see if it turns heavily.</li> <li>● Measure the winding torque of the axle using a torque cassette. (Standard value is 7 ± 2g.)</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the motor.</li> <li>● Replace the belt or set it properly.</li> <li>● Replace the pinch roller or the PR spring, whichever is appropriate.</li> <li>● Replace the cum gear set (the head drive motor).</li> <li>● Replace the C axle.</li> <li>● Replace the C axle or the belt, whichever is appropriate.</li> </ul>
	<p>The head is not outstanding.</p> <p>The tape runs correctly and is properly in touch with the R/W head.</p>	<p>(1) Maladjustment of the HP switches.</p> <p>(2) Some foreign objects are found between the P lever set and the frame.</p> <p>(1) The READ/WRITE head is faulty or the head AZIMUTH is not properly adjusted.</p>	<ul style="list-style-type: none"> <li>● Check if the HP switches are located at a interval of 0.35 mm.</li> <li>● Check around the R/W head and the return coil of the P lever set.</li> <li>● Check the soldering or the wires connected with the head.</li> <li>● Check the replay wave forms using a 3 kHz test tape (AZIMUTH).</li> <li>● Also check frequency (speed) of 3 kHz. (If variance of frequency is too large, replace the belt, the C axle, the idler and the motor in this order.)</li> </ul>	<ul style="list-style-type: none"> <li>● Readjust the HP switches or replace them.</li> <li>● Remove the foreign objects.</li> <li>● Redo the soldering or replace the P lever set (with the R/W head).</li> <li>● Replace the P lever set unless the test shows no replay wave forms or sine curve wave forms.</li> <li>● When sine curve wave forms are reproduced, turn the AZIMUTH to attain a peak gain.</li> </ul>
No WRITE operation can be performed.	No WRITE operation can be performed while the tape is running.	(1) The PE switch is faulty.	<ul style="list-style-type: none"> <li>● Check the PE switch to see if it is not short-circuited. (Also check the connection between the frames.)</li> </ul>	<ul style="list-style-type: none"> <li>● Readjust the PE switch, and clean or replace it.</li> </ul>

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy	
			<ul style="list-style-type: none"> <li>● Check the PE switch to see if it is properly adjusted.</li> </ul>		
		(2) The P lever set (R/W head) is faulty.	<ul style="list-style-type: none"> <li>● Check the R/W head to see if it has dirt on it or it is damaged.</li> </ul>		<ul style="list-style-type: none"> <li>● Clean or replace the P lever set.</li> </ul>
		(3) The cassette is faulty.	<ul style="list-style-type: none"> <li>● Check if an anti-miss erasure notch is properly provided.</li> </ul>		<ul style="list-style-type: none"> <li>● If the notch is broken, replace the cassette.</li> </ul>
The tape stops running on during operation or runs very slowly.	R/W errors occur frequently.	(1) The cassette is defective.	<ul style="list-style-type: none"> <li>● The tape has scars or dirt on it.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the cassette.</li> </ul>	
		(2) The torque is too small.	<ul style="list-style-type: none"> <li>● Measure the torque using a torque check tape. (Specified value 7g ± 2g)</li> </ul>	<ul style="list-style-type: none"> <li>● Replace 1. the belt, 2. the C axle, 3. idler and 4. the motor in the said order.</li> </ul>	
		(3) The speed control circuit does not function properly.	<ul style="list-style-type: none"> <li>● Check VR1 of the motor control circuit to see if 400 Hz pulses are properly adjusted.</li> <li>● Check output of IC1 pin9 (S.T.B.).</li> </ul>	<ul style="list-style-type: none"> <li>● Adjust VR1 or replace IC1.</li> <li>● Replace the transistor Q19 or Q9, whichever is appropriate.</li> </ul>	

## 8.4.10 RAM

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy																											
RAM errors. Sometimes data are altered and READ/WRITE can not be performed.		(1) Abnormal voltage is provided to the circuit elements.	<ul style="list-style-type: none"> <li>● Examine the voltage by using the collector of the transistor Q7. (The voltage is normally +V5 in a power-on condition.)</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the transistor Q7 if the voltage is too low.</li> </ul>																											
		(2) Some of the RAM elements do not function properly.	<ul style="list-style-type: none"> <li>● Check error addresses. (Error addresses can be output by using an error program.)</li> </ul>	<ul style="list-style-type: none"> <li>● Pinpoint the defective IC by using the following table.</li> </ul> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Address</th> <th>Corresponding IC</th> <th>Select signal</th> </tr> </thead> <tbody> <tr> <td>0000 ~ 07FF</td> <td>12G</td> <td>16D-7</td> </tr> <tr> <td>0800 ~ 0FFF</td> <td>13G</td> <td>16D-9</td> </tr> <tr> <td>1000 ~ 17FF</td> <td>14G</td> <td>16D-10</td> </tr> <tr> <td>1800 ~ 1FFF</td> <td>15G</td> <td>16D-11</td> </tr> <tr> <td>2000 ~ 27FF</td> <td>16C</td> <td>16D-12</td> </tr> <tr> <td>2800 ~ 2FFF</td> <td>15C</td> <td>16D-13</td> </tr> <tr> <td>3000 ~ 37FF</td> <td>14C</td> <td>16D-14</td> </tr> <tr> <td>3800 ~ 3FFF</td> <td>13C</td> <td>16D-15</td> </tr> </tbody> </table>	Address	Corresponding IC	Select signal	0000 ~ 07FF	12G	16D-7	0800 ~ 0FFF	13G	16D-9	1000 ~ 17FF	14G	16D-10	1800 ~ 1FFF	15G	16D-11	2000 ~ 27FF	16C	16D-12	2800 ~ 2FFF	15C	16D-13	3000 ~ 37FF	14C	16D-14	3800 ~ 3FFF	13C	16D-15
		Address	Corresponding IC	Select signal																											
0000 ~ 07FF	12G	16D-7																													
0800 ~ 0FFF	13G	16D-9																													
1000 ~ 17FF	14G	16D-10																													
1800 ~ 1FFF	15G	16D-11																													
2000 ~ 27FF	16C	16D-12																													
2800 ~ 2FFF	15C	16D-13																													
3000 ~ 37FF	14C	16D-14																													
3800 ~ 3FFF	13C	16D-15																													
(3) Some of the RAM select signals do not function properly.	<ul style="list-style-type: none"> <li>● Check IC "16A" pins 7 to 15 to see if low level outputs are present.</li> </ul>																														

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
	The READ/WRITE function is completely out of order.	(1) No. R/W signal is available.  (2) No CE1 signal is provided.	<ul style="list-style-type: none"> <li>● Check IC "5D" pin 11 for a pulse output. If no pulse output is detected, check "5D" pins 12 and 13.</li> </ul>	<ul style="list-style-type: none"> <li>● If no pulse output is detected at IC "5D" pin 12, check IC "3F" pin 5 and the main CPU "8G" pin 38. If no pulse output is detected at "8G" pin 38, replace the main CPU.</li> <li>● If IC "5D" pin 13 does not go high, check IC "8E" pins 1, 2 and 3 to find out what prevents the pin 3 from going high. (Malfunction of the chip circuit of IC "8E" or "9E" can be suspected.)</li> <li>● If IC "5D" pin 2 is high, fix it following the above procedures. If no ENABLE signal (pulse) is present at the pin 1, replace the main CPU.</li> </ul>
No back-up function is available for data in RAM.	When power is set off, all data stored in RAM are erased. (Power can not be turned on in some cases.)	(1) No normal voltage is provided to the back-up circuit.	<ul style="list-style-type: none"> <li>● Check and see that the reset switch is not functioning. (Also make sure that base of the transistor Q10 and IC "7E" pin 16 are not low.)</li> <li>● Check the emitter voltage of the transistor Q10 while power is off. (The normal voltage is approximately 3V)</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the reset switch.</li> <li>● Replace either the transistor Q10 or the zener diode ZD3, whichever is appropriate.</li> </ul>

### 8.4.11 External Cassette

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
<p>READ/WRITE operations can not be performed.</p>	<p>The motor for the cassette tape recorder does not function.</p>	<p>(1) The REMOTE control relay is faulty.</p>	<ul style="list-style-type: none"> <li>● Check connections and conditions of the cable for the tape recorder.</li> <li>● Pull out the RMT plug on the cassette tape recorder and check conductivity of its pins 1 and 2.</li> <li>● Check IC "7E" pin 14 to see if it is low. If it is high, check IC "8A" pin 5 to see if it is low.</li> </ul>	<ul style="list-style-type: none"> <li>● Redo the connections.</li> <li>● If the cable (No. 702) is faulty, replace it. (Normally the resistance should be around 5Ω.)</li> <li>● If IC "7E" pin 14 is low, replace the relay LAD1.</li> <li>● If IC "8D" pin 5 is low, replace "8D" or "7E".</li> <li>● If IC "8D" Pin 5 is high, replace the slave CPU "6D".</li> </ul>
	<p>The motor torque is reduced or the motor unduly stops its motion.</p>	<p>(2) Too much current flows to the RMT relay circuit.</p>	<ul style="list-style-type: none"> <li>● Pull out the RMT plug and see if the motor moves correctly.</li> </ul>	<ul style="list-style-type: none"> <li>● Keep the RMT plug in a pulled out condition if the tape recorder provides voltage for the motor by way of the RMT terminal.</li> </ul>
	<p>No READ operation can be performed.</p>	<p>(3) An entangled magnetic tape adheres to the capstan axle.</p>	<ul style="list-style-type: none"> <li>● Check the tape drive section of the tape recorder to see if it has an entangled tape adhering to it.</li> </ul>	<ul style="list-style-type: none"> <li>● If a magnetic tape is adhering to the axle, replace the magnetic tape. Clean the axle before setting a new tape in position.</li> </ul>
		<p>(1) No passage of signals at the cables and the connectors.</p>	<ul style="list-style-type: none"> <li>● Pull out the cables alternatively from the cassette tape recorder and HX-20 to check their conductivity.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the faulty cables or the cable connectors for the MOSU circuit board.</li> </ul>
		<p>(2) The tape recorder has a too low load level.</p>	<ul style="list-style-type: none"> <li>● Enhance the load level (as high as the level for recording) and reload.</li> </ul>	
		<p>(3) The tape recorder and the cassette tape are not matching in terms of tape speed and/or head inclination.</p>	<ul style="list-style-type: none"> <li>● Try to load under the same conditions as the machine was used for recording.</li> </ul>	
		<p>(4) Some of the elements for the READ circuit are faulty</p>	<ul style="list-style-type: none"> <li>● Check if 1kHz or 2 kHz pulses are provided to IC "8D" pin 10 (during loading a tape).</li> <li>● Check the zener diode ZD6 to see if it is short-circuited.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace IC "8D" if the zener diode is not short-circuited and no pulse signals are provided.</li> </ul>

Nature of Trouble	Condition of Trouble	Possible Cause	Check Point	Remedy
	No READ operation can be performed.	<p>(5) The slave CPU is faulty.</p> <p>(6) The capacitor for filtering or the diode D10 is faulty.</p>	<ul style="list-style-type: none"> <li>● Check the slave CPU "6D" pin 35 to see if pulses are provided.</li> <li>● Check IC "8D" pin 7 to see if signals are provided.</li> <li>● Check the diode D10 to see if it is short-circuited or open.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the slave CPU if pulses are provided.</li> <li>● Replace the capacitor C36 if the diode is functional.</li> </ul>
	No READ operation can be performed.	<p>(1) The anti-miss erasure notch is broken.</p> <p>(2) No signals are provided via the cables or the connectors.</p> <p>(3) The magnetic tape is faulty.</p> <p>(4) The load level of the tape recorder is too low.</p> <p>(5) The slave CPU is faulty.</p> <p>(6) Some of the elements of the WRITE circuit are faulty.</p>	<ul style="list-style-type: none"> <li>● Check the notch of the cassette.</li> <li>● Pull out the cables alternatively from the tape recorder and HX-20 to check their conductivity.</li> <li>● Check the tape to see if it has no dirt or scars on it.</li> <li>● Raise the load level and try another WRITE operation.</li> <li>● Check the slave CPU "6D" pin 34 to see if 1 kHz or 2 kHz pulses are provided.</li> <li>● Check the zener diode ZD2 to see if it is not short-circuited.</li> <li>● Check the value (RK) of resistance of the resistor R9.</li> </ul>	<ul style="list-style-type: none"> <li>● Replace the magnetic tape cassette.</li> <li>● Replace the faulty cables or the cable connectors for the MOSU circuit board.</li> <li>● Verify the WRITE operation to see that a correct WRITE operation has been performed.</li> <li>● Replace the slave CPU if no pulses are present.</li> <li>● Replace the faulty elements.</li> </ul>

