

CHAPTER 4 REPAIRS

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4.1 Repairs

Before starting repairs

(1) Static electricity

- Human bodies carry the static generated by friction of the clothes, etc. If a man with a static charge touches circuit elements with his fingers, for example, the static can break down the elements. Before starting repairs, touch the case cover with both hands to discharge the static that you may have in the body.
- When using an oscilloscope or other instrument whose ground terminal must be grounded, contact the conductive part of the ground terminal with the casing of the QX-10 or your fingers, and then connect it to the GND terminal on the circuit board.

(2) Circuits

- Even if the power switch is pushed off, the RAMs and some of the ICs are backed up by the batteries. When conducting a continuity test on circuits, disconnect the battery connector and wait for about 30 seconds before starting the test.
- Follow the same procedure when replacing circuit elements on the control circuit board.

(3) Soldering

Refer to the section on soldering before making repairs on the circuit boards.

4.2 Repair Tools and Instruments

4.2.1 Tools and Instruments

NO.	Tool/Instruments	Spec.	Use	Commercial available
1	Oscilloscope	50 MHz 2-channel	Control circuit board repair	Yes
2	Digital voltmeter	5V range, 3 digits	Battery voltage measurement	Yes
3	Multi-tester	Resistance	Continuity test, element check	Yes
4	Electric soldering iron	100V 15W, 80W	Coontrol circuit board repair	Yes
5	Solder wick (or pump)		Removing (unsoldering) elements from circuit board	Yes
6	Nippers	Midishure 1178 made by EPE	Removing (unsoldering) elements from circuit board	Yes
7	Philips screwdriver No.2	100 mm		Yes
8	Tweezers	MM 125 mm		Yes
9	ET holder No. 1.2	ETH 1.2	FDD SD-321 repair	Yes
10	ET holder No.1.5	ETH1.5	FDD SD-321 repair	Yes
11	ET holder No.2	ETH 2	FDD SD-321 repair	Yes
12	Philips precision screwdriver set		FDD SD-321 repair	Yes
13	Regular precision screw-driver set		FDD SD-321 repair	Yes
14	Pliers	No.0	FDD SD-321 repair	Yes
15	Brush (medium)		FDD SD-321 repair	Yes
16	Brush (fine)		FDD SD-321 repair	Yes
17	Tension gauge	200g	FDD SD-321 repair	Yes
18	Solder		Control circuit board repair	Yes
19	Safety goggles		Protection during soldering and use of oil, grease, chemicals	Yes Yes
20	Gloves		Soldering	Yes

Table 4-1

4.2.2 Test Items

NO.	Item	Part Code	Use	Commercial available
1	Test program	-	Diagnostic Program	No
2	Extension Cable # 905	B765100001	CN9, CN10 (Q10SYM ⇔ Q10GMS)	No
3	# 948	Y130312000	CN6 (Q10SYM) ⇔ Cable # 518	No
4	# 949	Y130313000	CN8 (Q10SYM) ⇔ Cable # 521	No
5	# 950	Y130325000	CN7 (Q10SYM) ⇔ Cable # 516	No
6	Extension Card	Y135211000	Q10SYM ⇔ Option Card	No

Table 4-2

4.3 Soldering

4.3.1 Parts Removal and Installation

- (1) When removing an IC or transistor from a circuit board, it is necessary, as a rule, to cut off its leads with nippers and unsolder the part. (Reason: To prevent lengthening of solder melting time due to heat absorption by the part.)
- (2) Solder parts as quickly as possible. In some cases, a cooling agent may have to be used to prevent the parts from overheating. (Reason: To protect the parts and circuit board)
- (3) When removing parts, remove the solder adhering to the through-holes and lands, and remove the leads without using undue force. (Reason: If the leads are forcibly pulled out, the lands or printed pattern can be stripped.)
- (4) When installing parts, be careful of the lead bending direction and lead length so that the leads will not contact other lands on the back of the circuit board. (Reason: To prevent short circuit on the back)
- (5) When install a register on a circuit board, make sure that the parts are not in direct contact with the circuit board surface. (Reason: To protect the circuit board from damage due to the heating of the parts)
- (6) When using a wire for repair, make it as short as possible. If the leads of other parts stand in the shortest route, select other route.
 - If a long wire must be used, bond it to the circuit board surface with an epoxy adhesive.
 - Do not lay a wire parallel to a printed pattern over a long distance. (Reason: To prevent noise)
 - Wind the wire around the part lead.

4.3.2 Soldering

- (1) Through-hole soldering
 - a) Solder part leads as shown in the center of the below sketch. (Solder builds up about 30° to 45° to the land.)

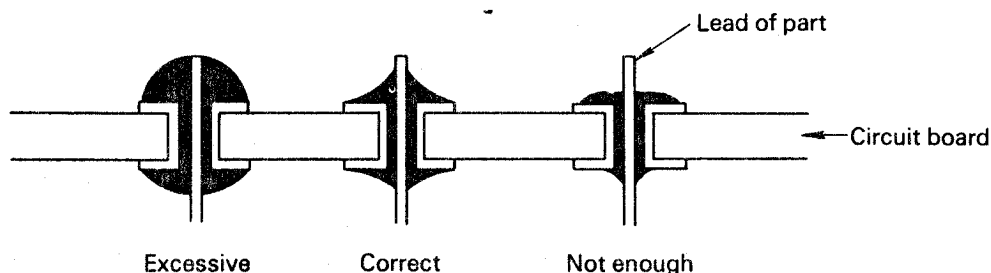


Fig. 4-1

b) Through-holes must be fully filled with solder.

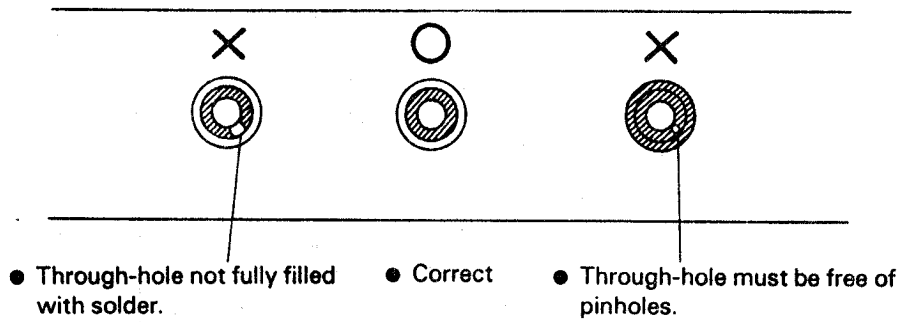


Fig. 4-2

c) Leads must be of proper length, and clear of other land.

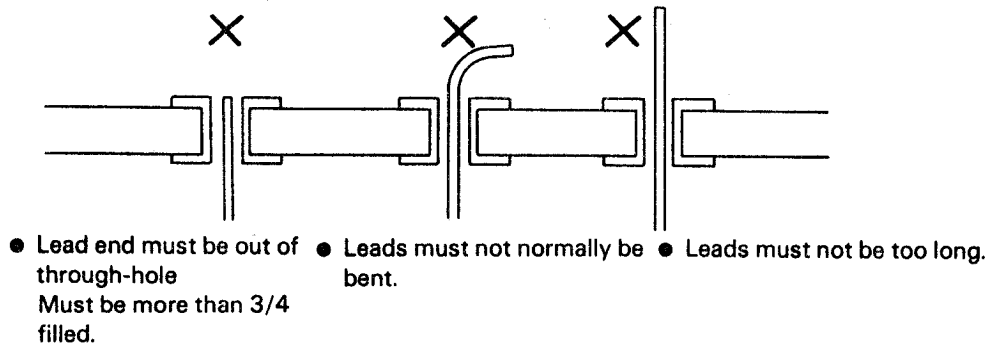


Fig. 4-3

(2) Parts Installation

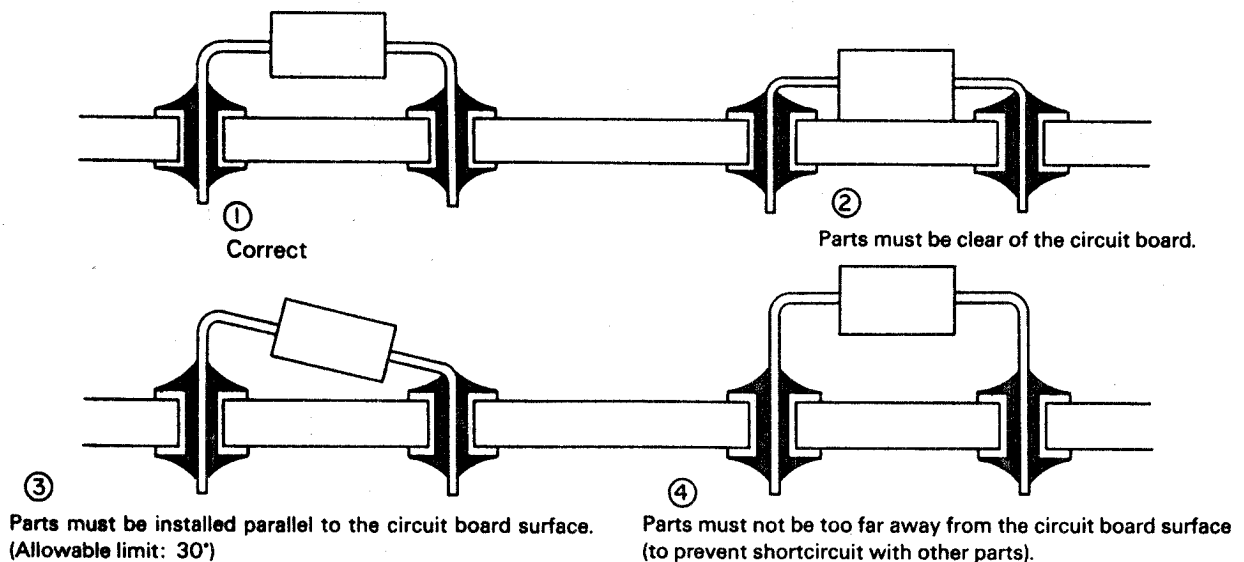


Fig. 4-4

(3) Wire connection

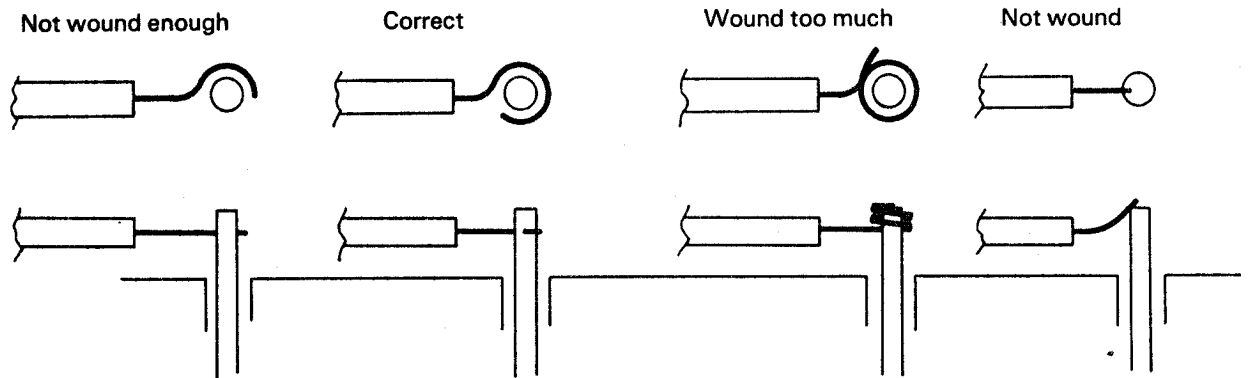


Fig. 4-5

- Wind wire more than 3/4 of a turn or about a turn around leads (IC pins).
- Wire ends must be covered to a point near the land. Exposed wire ends must be less than one half the land length.

4.3.3 Unreparable

Dispose of the following without repairing because quality and durability problems remain even if repairs are attempted.

- Through-hole with peeled copper lining
- Peeled land
- Peeled printed pattern
- Burnt circuit board
- Cracked circuit board
- * Replace the circuit board itself if it has any of the above defects.

4.3.4 After Repairs

Take the following steps after repairing (soldering).

- Completely wipe off the flux from soldered points with a brush or the like.
- If patterns are touched by hand, wipe them clean.
- Wipe the connectors clean, and apply a contact lubricant where necessary.
- Dry.
- * If the above steps are not taken, the patterns can corrode due to oxidation, which causes troubles.

4.3.5 Terms

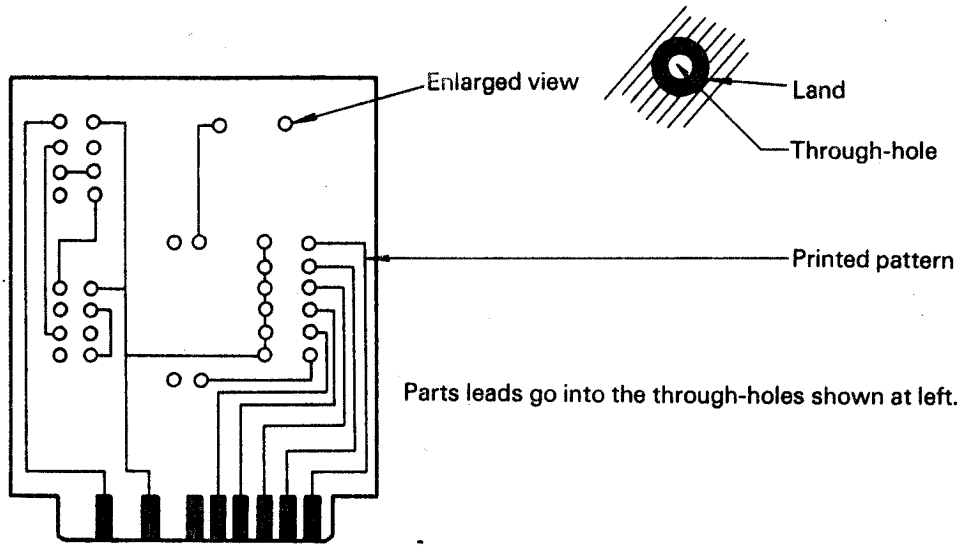


Fig. 4.6 Front of Circuit Board

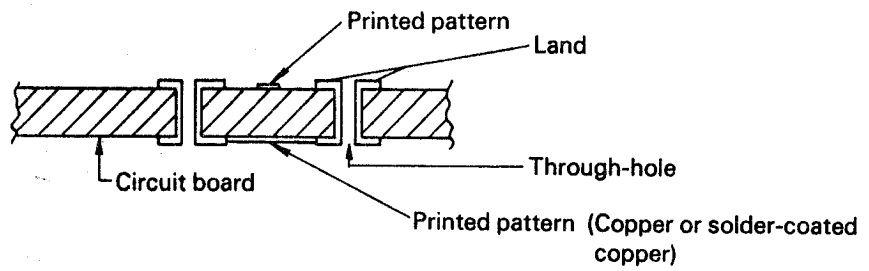


Fig. 4.7 Cross Section of Circuit Board