

(COPY)
Orig on 1/7/53/7
Section Head,
Microelectronics.
Mr. D. E. ~~Shankman~~

Mr Gray
Comments as requested on Touchtone 12
sufficed.
AE 3/4/8

Re : Non-destructive examination of Touchtone 12 -
PWB and component mounting

Examination of PWB for Touchtone 12 reveals the following shortcomings:

1. The quality of soldering on the board is poor (Photo Nos. 3 & 4), for example :
 - 1.1 Presence of solder spikes, indicating incorrect soldering temperature used (Photo No.3, Items 1-8).
 - 1.2 Some of the spikes are very long and nearly bridge the spaces between the conductors (Photo No. 4, Items 1 & 2).
 - 1.3 It is suspected that some of the conductors were broken or defective and are covered with solder (Photo No.3, Items 3 & 8). It may be desirable ^{to} unsolder some areas of the conductor to confirm the suspicion after all other examinations and tests are carried out.
 - 1.4 Solder flux on the board has not been cleaned (Photo No.3, Items 9 - 11, Photo No.7, Items 1 & 2 and other areas too numerous to mark).
2. Attempt to mount components on the board properly has been carried out but not effectively. In a well designed and well assembled board the components are stood off the board to prevent moisture being trapped under the body of the component. Components with axial leads usually have the leads formed as shown in Figure 1, to stand the body off the board and also to prevent accidental pressure on the component from pushing the lands off the board.

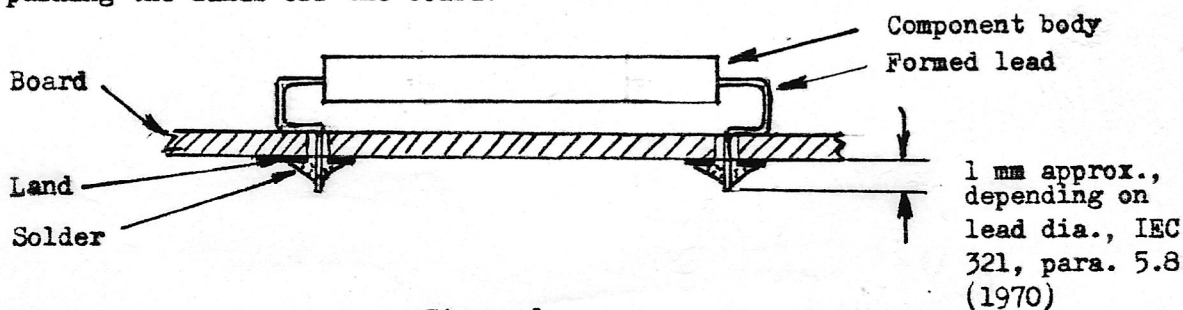


Figure 1

- 2.1 Photo No. 8, Items 1, 2 & 3 show that the holes are too big for leads and that the formed leads fall inside the holes and become ineffective.

- 2.2 On the solder side of the board, the component leads and connecting wires protrude too far above the surface (Photo No. 5, Items 1, 2, 3 and Fig. 1).
- 2.3 Glass encapsulated diode should have at least one of the leads formed into a loop (See Fig. 2) to prevent breaking of the seals between the glass and the leads during thermal expansion and contraction. None of the glass encapsulated diodes have their leads properly formed. (Photo No. 9, Item 1).



Glass encapsulated diode

Figure 2

- 2.4 The board itself is mounted through two slots on a pair of stand-offs attached to the base of the telephone (Photo No. 2, Items 1 & 2). The board has two lugs which slip into the slots. No screws retain the board to the base. The cross section of the lug is 9 mm X 1.6 mm at its weakest point (Photo No. 4, Item 3). Forceful pressing of the dial buttons, particularly digits 1, 2 & 3 (Photo No. 1, Items 1, 2 & 3) flexes the board and with a possible combination of harsh environment may lead to failure of solder joints causing intermittent contacts.

Enclosed are nine photographs used in explaining the above defects. Other papers related to the Touchfone 12 are also returned herewith.

The Touchfone 12 itself has been delivered to Mr. P. Meggs for further examination.

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