TEST PROBE APPARATUS FOR DETECTING CIRCUIT BOARD

(1) Field of the invention

This invention relates to a test probe apparatus for detecting circuit board, especially a base plate of the test probe apparatus having glue in their lead wire holes, the peeled end of the lead wires can be inserted to fix firmly in the lead wire holes, further the top of the lead wire is grinded to form a flat face with the base plate, the bottom of the compression spring can touch the lead wire top exactly so as to improve the test accuracy and prevent the lead wire separating form the compression spring.

(2) Description of the Prior Art

The circuit board is detected by a test probe apparatus to check whether the circuit is normal or not. For the conventional test probe apparatus, the lead wires are always welded or hanged on the bottom of the compression spring to transmit test signal to the test reading equipment. It is very difficult for the operator to weld the small lead wire on the compression spring. Fig. 1 shows the conventional test probe apparatus for detecting circuit board, the test probe apparatus is composed of a base plate A, a test probe seat B, a plurality of lead wires C, compression springs D and test probes G, on the test probe seat B having a plurality of probe holes B1 arranged according to the position of circuit to be tested on the circuit board F, the peeled end of the lead wire being inserted through the lead wire holes A1 on the base plate A and welded on the bottom of the compression springs. The compression springs D are

installed respectively in the probe holes B1, the test probe G installed on the top of the compression spring D, the end of the test probe G extending out of the locating hole E1 on a locating plate E to touch the test point on the circuit board F. Once the circuit board F is put on the test probe apparatus, the top end of the test probes G touching the test points on the circuit board A to transmit a signal to the test reading equipment by the lead wires C to check whether the circuit is normal or not. The size of the test probe G is decided by the density of the test points on the circuit board, the test probe G have to be manufactured into very small size if the circuit board having very dense test points. Accordingly, it will be very difficult for the manufacturer to weld the lead wire on the compression spring. On the other hand, the size of welding point between the lead wire C and the compression spring D must be bigger than the diameter of lead wire hole A1 on the base plate A to prevent the lead wire falling off from the base plate A, such that, the diameter of the probe hole I1 is limited by the size of the welding point. Accordingly, the dense circuit on the circuit board can't be tested by the above conventional test probe apparatus.

Another conventional test probe apparatus is developed to improve the above defects. The test probe apparatus for detecting circuit board is composed of a test probe seat H, a base plate I, locating plates J, K and an elastic cloth L, such as shown in Fig.2. On the test probe seat H, the base plate I, the locating plates J, K and the elastic cloth L have respectively a plurality of probe holes H1, lead wire holes I1 and locating holes J1, K1, L1 arranged according to the position of test points on the

circuit board. The compression springs M and the test probes O are installed in sequence in the probe holes, the end of the test probe extending out of the locating hole on the fixing plate to contact the test points on the circuit board. The peeled end of the lead wire is pressed into T shape head and stopped in the wire hole to touch or hang on the bottom of the compression spring, the other end of the lead wire is connected to the test reading equipment.

There is no welding problem for such kind of conventional test probe apparatus for detecting circuit board, however, still having some defects. Such as the very small size of the lead wire may cause deviation when it is pressed into T-shape head, thus the hanged lead wire is very easy to fall from the compression spring. Further the size of the T-shape head must be bigger than the diameter of the lead wire to prevent the lead wire falling form the lead wire hole. The diameter of the probe hole I1 is still limited by the size of the pressed T-shape head and can't match the dense circuit on the circuit board.

SUMMARY OF THE INVENTION

It is therefore the main object of this invention to provide a test probe apparatus for detecting circuit board, especially a base plate of the test probe apparatus having glue in their lead wire holes, the peeled end of the lead wire cab be inserted to fix firmly and quickly in the lead wire hole to keep it contacting the compression spring, further the top of the lead wire is grinded to form a flat face with the base plate, the bottom of the compression spring can touch the lead wire top

exactly so as to improve the test accuracy.

It is another object of this invention to provide a test probe apparatus, wherein the compression springs can touch directly the lead wires without welding, the diameter of the probe holes, the compression springs and the test probes can be reduced to minimum size, so the test probe apparatus can test the circuit board having dense test points.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, which illustrate the preferred embodiments and modes of operation of the invention, and in which like reference characters designate the same or similar parts throughout the several views:

Fig.1 is a perspective view showing a conventional test probe apparatus for detecting circuit board of this invention;

Fig.2 is a partial sectional view showing another conventional test probe apparatus for detecting circuit board;

Fig.3 is an exploded view showing a test probe apparatus for detecting circuit board of this invention;

Fig.4A and Fig.4B are sectional views showing the lead wire inserted into the base plate; and

Fig.5 is a partial sectional view showing the assembly of the test probe apparatus for detecting circuit board.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Fig.3 to Fig.5, this invention, a test probe apparatus for detecting circuit board, is composed of a plurality of lead wires 1, test probes 2 and compression springs 3, a base plate 4, a test probe seat 5, an elastic cloth 6, an upper locating plate 7 and a lower locating plates 7'. The teat probe seat 5 is sandwiched between the lower locating plate 7' and the base plate 4. The elastic cloth 6 is covered on the test probe seat 5 and the upper locating plate is installed above the test probe seat 7. On the test probe seat 5, the base plate 4, the elastic cloth 6 and the locating plates 7, 7' have respectively a plurality of probe holes 51, lead wire holes 41 and locating holes 61, 71, 71' which are arranged according to the position of test points on the circuit board 9.

The lead wire hole 41 on the base plate 4 has a wire part 411 and a core part 412. One end of the lead wire 1 is connected to a test reading equipment and the end is peeled to expose a wire core 11, further the wire core 11 being cut to be longer slightly than the depth of the core part 412. The surface of the reverse base plate 4 is coated with a layer of glue 8. Once glue 8 flow into the lead wire holes 41, the lead wire 1 and its wire core 11 can be inserted to locate respectively in the wire part 411 and the core part 412 of the lead wire hole 41. After inserting all lead wires inserting in the lead wire holes 41, the glue in the base plate 4 can be blown with warm wind to solidify and fix the lead wire 1. Finally the top surface of the wire core 11 can be grinded by emery cloth or other proper tools to form a flat face with the base plate 4 and remove the glue 8 on it, such as shown in Fig.4A and Fig.4B.

The compression springs 3 are installed respectively into the probe holes 51, further the bottom of the compression spring 3 contacting the wire core end of the lead wire 1. The test probes 2 are located on the compression springs 3, the top end of the test probes 3 extending through the locating holes 6, 7, 7' on the elastic cloth 6, the upper locating plate 71 and the lower locating plate 71' to contact the test points on the circuit board 9, such as shown in Fig.5.

Once the circuit board 9 is put on the test probe apparatus, the compression springs 3 can absorb appropriately the downward force to make the test probes 2 can contact the test points on circuit board 9 but not damage these test points. The locating holes 61,71,71' on the elastic cloth 6, the upper locating plate 7 and the lower locating plate 7' can lead vertically the test probes 2 to contact the circuit board 9. The elastic cloth 6 also can provide proper friction force to prevent the test probes 2 moving out of the probe holes 51. The test probes 2 contacting the test points on the circuit board 9 can transmit signals to the test reading equipment through the compression spring 3 and the lead wire 1 to check whether the circuit is normal or not.

Accordingly, the invention has following advantages:

(1) The peeled end of the lead wires are inserted to fix firmly and quickly in the lead wire holes filled with glue to keep it contacting the compression spring, further the top of the lead wire is grinded to form a flat face with the base plate, the bottom of the compression spring can touch the lead wire top exactly so as to improve the test

accuracy. (2) The compression springs can touch directly the lead wires without any welding point, the diameter of the probe holes can be reduced to minimum size, so the test probe apparatus can test the circuit board having dense test points.

Claims

1. A test probe apparatus for detecting circuit board comprising:

a test probe seat, on the test probe seat having a plurality of probe holes which are arranged according to the position of test points on the circuit board;

an elastic cloth covered on the test probe seat, on the elastic cloth having a plurality of locating holes aiming said the probe holes;

at least one or more locating plate installed above the test probe seat and the elastic cloth, on the locating plate having a plurality of locating holes aiming to said probe holes

a base plate, said test probe seat being sandwiched with said elastic cloth and the base plate, on the base plate having a plurality of lead wire holes aiming to said probe holes, each lead wire hole having a wire part and a core part;

a plurality of compression springs installed respectively in the probe holes;

a plurality of test probes installed respectively on the compression springs, the top end of the test probe extending out of the locating hole on the elastic cloth and the locating plate to contact the test points on the circuit board;

a plurality of lead wires, one end of the lead wire being connected to a test reading equipment, the other end being peeled to expose a wire core;

the reverse base plate being coated with a layer of glue, once glue flow into said lead wire holes, the lead wire and its wire core can be inserted respectively to locate in the wire part and the core part of said lead wire hole, the top surface of the

wire core being grinded to form a flat face with the base plate for contacting said compression spring directly.