TITLE OF INVENTION: SOCKET GUIDER FOR TESTER FOR ELECTRONIC PARTS

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of Korean Patent Application No. 10-2021-0104498 filed on August 9, 2021, which is hereby incorporated by reference herein in its entirety.

BACKGROUND

1. Technical Field

The present invention relates to a socket guider for the testing of electronic parts that guides electronic parts through precise movement when the electronic parts are inserted into test slits.

2. Description of the Related Art

Manufactured electronic parts (e.g., solid-state drives (SSDs), circuit boards, semiconductor devices, etc.) are tested by testers and classified into good and defective products, and only good products are shipped.

Electronic parts can be tested only when they are electrically connected to testers. In this case, the equipment that provides support in such a manner as to allow

electronic parts to be tested by electrically connecting them to testers is a handler for the testing of electronic parts (hereinafter abbreviated as the “handler”).

Conventionally, in the case of relatively large electronic parts such as SSDs, testing has been supported in such a manner that operators directly connect and disconnect electronic parts to and from testers. Meanwhile, as the demand for SSDs has exploded, the present applicant has developed and proposed a handler for automatically handling SSDs and electrically connecting and disconnecting the SSDS to and from testers.

Electronic parts such as SSDs have terminals formed on first sides thereof, so that they can be electrically connected to testers by being inserted into slit-shaped test sockets (hereinafter referred to as “test slits”). In this case, a socket guider is employed to appropriately guide electronic parts through movement while the electronic parts are inserted into test slits. Furthermore, the socket guider also serves to support the electronic parts inserted into the test slits.

By the way, the specifications of electronic parts such as SSDs are continuously being upgraded. Accordingly, as more electronic elements are additionally installed to achieve high-level integration and high-level density, the weight of large electronic parts is gradually increasing more and more.

Meanwhile, the socket guider supports electronic parts, and also needs to guide the electronic parts through movement. This implies that the socket guider cannot employ a structure in which it comes into strong, close contact with both ends of electronic parts and stably supports the electronic parts. Accordingly, at present, the appropriate postures of electronic parts are maintained by clamping force in the state in which the electronic parts have been inserted into test slits.

In general, as shown in the reference view of FIG. 22, in the state in which an electronic part ED is inserted into a test slit S, a portion supported by a tester is only a partial region of the back end of the electronic part ED, and electronic elements EEs increasing the weight of the electronic part ED are installed in the remaining portion. As a result, as described above, the weight of the electronic parts ED is gradually increasing more and more. Accordingly, it is expected that in the near future, the time will come when electronic parts ED cannot maintain appropriate postures while being inserted into test slits S due to an operating shock or load. If the electronic parts ED fail to maintain appropriate postures, a short circuit or a test failure may occur due to poor electrical contact.

[Related Art Literature]

Korean Patent Application Publication No. 10-2019-0050483

Korean Patent Application Publication No. 10-2019-0061291

SUMMARY

The present invention has been conceived from the motivation to appropriately maintain the posture of a large electronic part that is electrically connected to a tester in the manner of being inserted into a test slit.

According to an aspect of the present invention, there is provided a socket guider for the testing of electronic parts, the socket guider including: a pair of guider bodies provided to support both ends of an electronic part to be inserted into an elongated test slit into which the contact terminal-side portion of the electronic part is inserted; and a pair of elastic supporters replaceably coupled to the guider bodies, respectively, and configured to maintain the posture of the electronic part by elastically supporting both ends of the electronic part while the contact terminal-side portion is inserted into the test slit or in the state in which the contact terminal-side portion has been inserted into the test slit; wherein the pair of guider bodies are disposed on both sides of the test slit, respectively, in a direction in which the test slit is elongated; and wherein the pair of elastic supports are allocated to the pair of guider bodies, respectively, and are detachably installed in the guider

bodies, respectively.

A guide groove may be elongated in each of the guider bodies in a direction, in which the electronic part is moved, in order to guide the electronic part through movement in the process in which the electronic part is inserted into the test slit, and a coupling depression may be formed at one point of the guide groove; each of the elastic supports may be a ball plunger provided in a structure in which the ball plunger is inserted into the coupling depressing; and the ball of the ball plunger may press the electronic part while being elastically supported by a spring.

Each of the elastic supports may include: a coupling portion coupled to a corresponding one of the guider bodies; a guide portion provided with a guide groove elongated in the direction, in which the electronic part is moved, in order to guide the electronic part through movement in the process in which the electronic part is inserted into the test slit; and at least one elastic portion formed to protrude from the coupling portion toward the guider body so that the coupling portion and the guide portion can be elastically supported on the guider body by means of the elastic portion; and a coupling groove may be formed in the guider body to which the coupling portion can be coupled, so that the coupling portion can be coupled to the guider body by being inserted into the coupling groove.

The coupling portion may have a stop protrusion configured to be caught on the back end of the guider body in the process in which the coupling portion is fitted into the coupling groove while moving in the back-front direction.

The coupling portion, the guide portion, and the elastic portion may be integrated with one another.

The elastic support may be made of a synthetic resin material that can be injection-molded and can also be elastically deformed and restored.

The coupling portion may be provided with a fitting depression configured such that the elastic portion is fitted thereinto; and the elastic portion may be coupled to the coupling portion by being fitted into the fitting depression.

The coupling portion and the guide portion may be integrated with each other; and the elastic portion may be elastically deformable and restorable, may be softer than the coupling portion and the guide portion, and may be injection-molded with a synthetic resin material.

The socket guider may further include at least one calibration pin coupled to each of the guider bodies to protrude forward, and configured to be mated with a calibration hole formed in a gripping mechanism to correct the position of the electronic part fed by the gripping mechanism so that the contact terminal-side portion of the electronic part can be precisely inserted into the test slit; the

calibration pin may be disposed off-centered from an imaginary straight line passing through the test slit in the direction in which the test slit is elongated; and the calibration hole may be disposed off-centered from a plane including one surface of the electronic part gripped by the gripping mechanism.

The socket guider may further include first and second calibration pins coupled to each of the guider bodies to protrude forward, and configured to be mated with calibration holes formed in a gripping mechanism to correct the position of the electronic part fed by the gripping mechanism so that the contact terminal-side portion of the electronic part can be precisely inserted into the test slit; the calibration pins may be disposed off-centered from an imaginary straight line passing through the test slit in the direction in which the test slit is elongated, and are spaced apart from each other; the first calibration pin may be used for correcting the position of the electronic part when the electronic part is inserted into the test slit after the electronic part in a laid position has been erected at 90 degrees, and the second calibration pin may be used for correcting the position of the electronic part when the electronic part is inserted into the test slit after the electronic part in a laid positon has been erected at -90 degrees; and the calibration holes may be disposed off-centered from a plane including one surface of

the electronic part gripped by the gripping mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features, and advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a reference view illustrating an electrical connection structure between an electronic part and a tester;

FIG. 2 is a reference view illustrating the location at which a socket guider according to the present invention is installed;

FIG. 3 is a schematic plan view of a handler paired with a tester;

FIG. 4 is a schematic perspective view of the handler of FIG. 3;

FIG. 5 is a conceptual plan view of a connection part in the handler of FIG. 3;

FIG. 6 is a schematic excerpt view of an important portion in the connection part of FIG. 5;

FIG. 7 is an excerpt view of a cradle in the connection part of FIG. 5;

FIG. 8 is an excerpt view of a test hand in the connection part of FIG. 5;

FIG. 9 is an excerpt view of a gripping element in the test hand of FIG. 8;

FIG. 10 is an excerpt view of an opening element in the test hand of FIG. 8;

FIG. 11 is an excerpt view of a connection element in the test hand of FIG. 8;

FIG. 12 is a perspective view of a socket guider according to a first embodiment of the present invention;

FIGS. 13 to 15 are reference views illustrating the socket guider of FIG. 12;

FIG. 16 is a perspective view of a socket guider according to a second embodiment of the present invention;

FIG. 17 is a partially exploded perspective view of the characteristic portion of the socket guider of FIG. 16;

FIGS. 18 and 19 are reference views illustrating the socket guider of FIG. 16;

FIGS. 20 and 21 are reference views illustrating a modification of the socket guider of FIG. 16; and

FIG. 22 is a reference view illustrating background art.

DETAILED DESCRIPTION

Embodiments of the present invention will be described in detail below with reference to the accompanying drawings. For brevity of description, descriptions of redundant or

substantially identical configurations will be omitted or abridged as much as possible.

<Description of the Electrical Connection between an Electronic Part and a Tester>

A socket guider 100 or 200 (see FIG. 11 or 14) according to the present invention is applied to a case where the contact terminal-side portion of an electronic part is inserted into a test slit of a tester.

For example, as shown in FIG. 1, a tester TESTER is provided with test slits S and the terminal T-side portion of an electronic part ED is inserted into a corresponding one of the test slits S, so that the electronic part ED and the tester TESTER are electrically connected to each other.

Furthermore, as shown in FIG. 2, the socket guider 100 or 200 according to the present invention is installed around test slits S. The socket guider 100 or 200 guides electronic parts ED through their movement in the process in which the electronic parts ED are inserted into the test slits S by a handler, and maintains the postures of inserted electronic parts ED while electronic parts ED are inserted into the test slits S. This will be described in detail below for each embodiment.

<Schematic Description of the Overall Configuration of a Handler>

FIG. 3 is a schematic plan view of a handler HR paired

with a tester TSETER, and FIG. 4 is a schematic perspective view of the handler HR of FIG. 3.

The handler HR according to the present embodiment includes a stacker part SP, a connection part CP, and a transfer part TP.

The stacker part SP accommodates customer trays CT on which electronic parts ED are seated. This stacker part SP is used to receive customer trays CT on which electronic parts ED to be tested are seated from the outside, or is used to transfer customer trays CT on which tested electronic parts ED are seated to the outside. Furthermore, the stacker part SP is also used to store customer trays CT that have been brought in from the outside or will be taken out to the outside.

The connection part CP draws electronic parts ED from customer trays CT transferred from the stacker part SP and electrically connects them to a tester TESTER placed in back thereof, or seats tested electronic parts on customer trays CT while classifying the electronic parts ED, tested by a tester TESTER, according to their test grade.

The transfer part TP transfers customer trays CT between the stacker part SP and the connection part CP. In other words, customer trays CT on which electronic parts ED to be tested are seated are fed from the stacker part SP to the connection part CP by the transfer part TP, and customer trays CT on which tested electronic parts ED are seated are

recovered from the connection part CP to the stacker part SP by the transfer part TP.

Next, the connection part CP related to the socket guider 100 or 200 according to the present invention will be described in more detail.

The connection part CP includes a cradle 510, a moving hand 520, an opener 530, a changer 540, a reciprocator 550, and a test hand 560, as shown in the conceptual plan view of FIG. 5 and the excerpt view of the important portion I of FIG. 6.

The cradle 510 is provided to hold an electronic part ED thereon. An electronic part ED may be held on the cradle 510 without intervention, or may be held on the cradle 510 through the intervention of an adapter AD capable of gripping an electronic part ED. This cradle 510 includes a pair of fixing members 511, a driving source 512, and a pair of transmission elements 513, as shown in the excerpt views of FIGS. 7(a) and 7(b).

The pair of fixing members 511 may selectively fix and release an electronic part ED by being widened or narrowed in the left and right directions. In other words, when the fixing members 511 are moved straight in the left and right directions while being guided by guide rails GR and thus the gap between the fixing members 511 is widened, the cradle 510 enters the state in which an electronic part ED or an adapter

AD, on which an electronic part ED is seated, can be held on the cradle 510 or separated from the cradle 510. In contrast, when the gap between the fixing members 511 is narrowed, the cradle 510 enters the state in which an electronic part ED is fixedly seated on the cradle 510.

The driving source 512 supplies a driving force adapted to adjust the gap between the pair of fixing members 511, and is provided as a cylinder in the present embodiment.

The transmission elements 513 transmit a driving force, applied by the driving source 512, to the pair of fixing members 511. Although the present embodiment employs a link structure in which as the transmission elements 513 are rotated, the forward and backward movement forces of the driving source 512, which is a cylinder, are converted into the left and right movement forces of the fixing members 511 and the left and right movement forces are transmitted, various modifications may be made depending on the implementation.

The moving hand 520 moves an electronic part ED to be tested from a customer tray CT transferred from the stacker part SP to a feed position FP by the transfer part TP and then mounts the electronic part ED on the cradle 510, or moves a tested electronic part ED, held on the cradle 510, to a customer tray CT located at a recovery position RP. This moving hand 520 grips an electronic part ED in a laid position

through vacuum suction. Multiple vacuum suction elements are provided and one or more vacuum suction elements selectively perform suction, so that all types of electronic parts EDs having various sizes can be sucked and held (see Korean Patent Application No. 10-2020-0019380).

The opener 530 is utilized in the case where an adapter AD is applied to mount an electronic part ED on the cradle 510. In this case, the adapter AD serves as not only a holding mechanism but also a carrier for handling a relatively small electronic part ED having a size that makes it difficult for the electronic part ED to be directly mounted on the cradle 510 (see Korean Patent Application No. 10-2021-0017446). In other words, the opener 530 opens the adapter AD by pushing the operation member of the adapter AD in a first operation area W1, so that the moving hand 520 can load or unload an electronic part ED onto or from the adapter AD. The opener 530 may include a pusher 531 configured to push the operation member that is operated to open the adapter AD, and a forward/backward movement source 532 configured to move the pusher 531 forward and backward selectively.

The changer 540 ultimately changes the posture of an electronic part ED mounted on the cradle 510 by rotating the cradle 510 by 90 degrees or -90 degrees. In other words, the posture of the electronic part ED may be changed from a laid position to an erected position by the changer 540, or may be

changed from an erected position to a laid position. The electronic part ED whose posture has been changed from a laid position to an erected position by the changer 540 is in the state in which the contact terminal T-side portion can be appropriately inserted into a test slit S. In contrast, the electronic part ED whose posture has been changed from an erected position to a laid position is in the state in which the electronic part ED can be appropriately sucked and gripped by the moving hand 520. It is obvious that in the case where an electronic part ED is electrically connected to a tester TESTER in a laid position (for example, as in the case where a test slit is elongated in the horizontal direction), the changer 540 may not perform its role, or the configuration of the changer 540 may be omitted. In this case, the reason why the changer 540 is configured to selectively rotate the cradle 510 by 90 degrees or -90 degrees is related to the position of a connection terminal in a test slit S. In other words, since the contact terminal T of an electronic part ED and a connection terminal in a test slit S need to face each other to make electrical contact with each other, the contact terminal T of the electronic part ED needs to be rotated to face the connection terminal depending on whether the connection terminal in the test slit S is located on the left or right side of the inserted electronic part ED.

The reciprocator 550 moves the cradle 510 between the

first operation area W1 in which the moving hand 520 operates and a second operation area W2 in which the test hand 560 operates. Since the cradle 510 is reciprocated between the first operation area W1 and the second operation area W2 by the reciprocator 550, the first operation area W1 and the second operation area W2 are separated from each other, and thus the interference between the moving hand 520 and the test hand 560 can be prevented.

The test hand 560 grips an electronic part ED, mounted on the cradle 510, in the second operation area W2, moves the electronic part ED, and inserts the contact terminal T-side portion of the electronic part ED into a test slot S. When a test on the electronic part ED is finished, the test hand 560 draws out the electronic part ED from the test slot S, seats the electronic part ED on the adapter 500, and then mounts the electronic part ED back on the cradle 510. It is obvious that in the case where the adapter AD is applied, the test hand 560 moves the adapter AD holding the electronic part ED. For this purpose, as shown in the excerpt view of FIG. 8, the test hand 560 includes a gripping element 561, horizontal movement elements 562a and 562b, a vertical movement element 563, an opening element 564, and a connection element 565.

The gripping element 561 is provided to selectively grip and release an electronic part ED or an adapter AD. For this purpose, as shown in the excerpt view of FIG. 9, the gripping

element 561 has a pair of gripping members 561a-1 and 561a-2 configured to selectively grip and release an electronic part ED or an adapter AD as the gap between them is widened or narrowed by the driving force of a first drive source 561b.

The horizontal movement elements 562a and 562b move the gripping element 561 in the left, right, forward and backward directions, i.e., the horizontal directions, so that an electronic part ED can be moved toward a currently empty one of the plurality of test slits S.

The vertical movement element 563 moves the gripping element 561 in the vertical direction, so that the gripping element 561 may grip an electronic part ED or an adapter AD at a gripping position or raise an electronic part ED or an adapter AD to a height required for testing. The reverse operation may also be performed.

When an adapter AD is applied, the opening element 564 slightly opens the adapter AD within the extent to which an electronic part ED can be held in the adapter AD. To this end, the opening element 564 has a first pusher 564a configured to be moved forward and backward selectively by a second driving source 564b, as shown in the excerpt view of FIG. 10. In this case, the first pusher 564a opens the adapter AD by slightly pushing the operating member of the adapter AD in a state in which the gripping element 561 grips the adapter AD, so that the electronic part ED can be moved

backward in the state of being maintained on the adapter AD. In other words, the opening element 564 provided in the test hand 560 opens the adapter AD only to the extent that the electronic part ED can be moved backward without being separated from the adapter AD. Accordingly, the electronic part ED may be moved backward in the state of still being mounted on the adapter AD.

As shown in the excerpt view of FIG. 11, the connection element 565 allows the contact terminal T-side portion of the electronic part ED to be inserted into a test slit S in such a manner that the second pusher 565a that is moved forward and backward selectively by the operation source 565b pushes the electronic part ED backward. Furthermore, the socket guider 100 or 200 according to the present invention functions in the process in which the contact terminal T-side portion of an electronic part is inserted into a test slit S by the operation of the connection element 565 and in the state in which the contact terminal T-side portion of an electronic part has been inserted into a test slit S.

For reference, although the test hand 560 is configured to grip an electronic part ED or an adapter AD whose posture has been changed from a laid position to an erected position by the changer 540 in this embodiment, an implementation where the test hand 560 can grip an electronic part ED or an adapter AD in a laid position may be made depending on the shape of a

test slit S.

<First Embodiment of the Socket Guider>

FIG. 12 is a perspective view of a socket guider 100 according to a first embodiment of the present invention. The socket guider 100 according to the present embodiment includes a pair of guider bodies 110, ball plungers 120, first calibration pins 131, second calibration pins 132, and coupling members 140.

The pair of guider bodies 110 are provided to face each other on both sides of test slits S in the vertical directions with the test slits S extending in the vertical directions interposed therebetween, and the configurations thereof are the same. The pair of guider bodies 110 are provided to guide electronic parts ED, to be inserted into the test slits S, through the movement thereof and ultimately support both ends of the electronic parts ED.

Elongated guide grooves 111 are formed in the guider bodies 110 in the front-back directions, which are the directions in which electronic parts ED are moved. The guide grooves 111 are each configured such that the front end portion of the guide groove 111 is enlarged forward such that an electronic part ED moving backward can be appropriately inserted into the guide groove 111.

In addition, in the guider bodies 110, a coupling depression 112 is formed at one point on each of the guide

grooves 111 in the vertical direction.

Each of the ball plungers 120 is composed of a pair of ball plunges 120, and serves as an elastic support that maintains the posture of an electronic part ED by elastically supporting both ends of the electronic part ED whose contact terminal T-side portion has been inserted into a test slit S. Furthermore, the pair of ball plungers 120 forming each ball plunger are arranged in a structure in which they are allocated to the pair of guider bodies 110, respectively, and are vertically inserted into coupling depressions 112.

Each of the first calibration pins 131 corrects the position of an electronic part ED gripped by a gripping mechanism (which may be an adapter or a test hand) by being mated with a calibration hole RH (see FIG. 8) formed in the gripping mechanism, so that the contact terminal T-side portion of the electronic part ED is guided through precise insertion into a test slit S on the side of the contact terminal T. The first calibration pin 131 is disposed at a position off-centered from an imaginary straight line L to the right when the imaginary straight line L passing through the center of the test slit S in the vertical direction is drawn, as shown in the reference diagram of FIG. 13.

A corresponding one of the second calibration pins 132 corrects the position of the electronic part ED gripped by the gripping mechanism by being mated with a calibration hole RH

formed in the gripping mechanism, so that the contact terminal T-side portion of the electronic part ED is guided through precise insertion into the test slit S. The second calibration pin 132 is symmetrically spaced apart from the first calibration pin 131 with an imaginary straight line L disposed therebetween, as shown in the reference diagram of FIG. 13. It is obvious that the second calibration pin 132 is also disposed at a position off-centered from the imaginary straight line L to the left.

In addition, in the process in which the electronic part ED is inserted into the test slit S, the first calibration pin 131 and the second calibration pin 132 are selectively used.

For example, the first calibration pin 131 is used for correcting the position of an electronic part ED when the electronic part ED is inserted into a test slit S after the electronic part ED in a laid position has been erected at 90 degrees. In contrast, the second calibration pin 132 is used for correcting the position of an electronic part ED when the electronic part ED is inserted into a test slit S after the electronic part ED in a laid position has been erected at -90 degrees.

For reference, although only a case where the calibration hole RH is formed in the test hand 560, as shown in FIG. 8, is employed as an example herein, the calibration hole RH may be formed in an adapter AD in an implementation. In this case,

regardless of the configuration that is employed as the gripping mechanism, the calibration holes RH are off-centered to one side (a lower side in FIG. 14) from a plane PS including one surface of an electronic part ED gripped by the gripping mechanism, as in the conceptual diagram of FIG. 14, and are thus mated with the first calibration pin 131 or the second calibration pin 132.

The coupling members 140 fixedly couple the ball plungers 120, inserted into the coupling depressions 112, to the guider bodies 110. Accordingly, after the coupling members 140 are separated later, the ball plungers 120 that have reached the ends of their lifespans may be replaced. In other words, the ball plungers 120 are coupled to the guider bodies 110 in a replaceable manner.

According to the first embodiment described above, the balls 121 press both ends TT and DT (see FIG. 22) of an electronic part ED while being elastically supported by springs 122 in the state in which the contact terminal T-side portion of the electronic part ED has been inserted into a test slit S, as shown in the exaggerated and conceptual cross-sectional view of FIG. 15. Accordingly, the electronic part ED is subject to the pressing force of the balls 121 as well as the clamping force applied by the test slit S, so that the state in which the electronic part ED has been inserted into the test slit S in a stable and appropriate posture can be

maintained.

<Second Embodiment of the Socket Guider>

FIG. 16 is a perspective view of a socket guider 200 according to a second embodiment of the present invention, and FIG. 17 is a partially exploded perspective view of the characteristic portion of the socket guider 200 of FIG. 16.

The socket guider 200 according to the present embodiment includes a pair of guider bodies 210, elastic supports 220, first calibration pins 231, and second calibration pins 232.

The pair of guider bodies 210 are provided to face each other on both sides of test slits S in the vertical directions with the test slits S extending in the vertical directions interposed therebetween, and have the same configuration. The pair of guider bodies 210 are provided to guide electronic parts ED, to be inserted into the test slits S, through the movement thereof and ultimately support both ends of the electronic parts ED. As in the first embodiment, coupling grooves 212 into which elastic supports 220 can be fitted may be formed in the guider bodies 210.

Each of the elastic supports 220 includes a coupling portion 221, guide portions 222, and an elastic portion 223, as shown in the excerpt perspective views of FIGS. 18(a) and 18(b).

The coupling portion 221 is coupled to the guider body 210 by being fitted into the coupling groove 212. In this

case, the coupling portion 221 is fitted into the coupling groove 212 while being moved in the back-front direction, and the back end of the coupling portion 221 protrudes downward and forms a stop protrusion J. As a result, the back surface of the elastic support 220 comes into contact with the front surface of a tester and the stop protrusion J is caught on the back end of the guider body 210, so that the elastic support 220 is fundamentally prevented from moving backward or forward from the coupling groove 212.

The guide portion 222 has a guide groove 222a elongated in the front-back direction, which is the direction in which an electronic part ED is moved, to guide the electronic part ED through the movement thereof in the process in which the electronic part ED is inserted into a test slit S.

The elastic portions 223 are formed to protrude from the coupling portion 221 toward the guider body 210 so that the coupling portion 221 and the guide portion 222 can be elastically supported on the guider body 210 by means of the elastic portions 223. It is preferable that the elastic portions 223 are plural in number in order to achieve the appropriate magnitude and balance of elastic force. It is obvious that although the elastic portions 223 may have a reversed ‘L’ shape, as shown in FIG. 18, they may have a short protrusion shape in an implementation, in which case the ends of the elastic portions 223 may be designed to have a round

shape, thereby solving the problem of friction.

In addition, the coupling portion 221, the guide portion 222, and the elastic portions 223 are integrated with one another. In other words, the elastic support 220 is preferably made of a synthetic material (e.g., Ultem®) that can be elastically deformed and restored and can be injection-molded.

Since the first calibration pins 231 and the second calibration pins 232 are the same as those of the first embodiment, descriptions thereof will be omitted.

According to the second embodiment described above, contact surfaces forming the guide grooves 222a of the elastic supports 220 press an electronic part ED in the state of being brought into close contact with both ends TT and DT (see FIG. 22) of the electronic part ED by the elastic force of the elastic portions 223 in the state in which the contact terminal T-side portion of the electronic part ED has been inserted into a test slit S, as shown in the exaggerated and conceptual cross-sectional view of FIG. 19. Accordingly, the electronic part ED is subject to the pressing force of the elastic supports 220 as well as the clamping force applied by the test slit S, so that the state in which the electronic part ED has been inserted into the test slit S in a stable and appropriate posture can be maintained.

<Modification of the Second Embodiment>

FIGS. 20 and 21 are perspective and exploded views of a modification of the second embodiment described above, respectively, and more specifically, perspective and exploded views of a modification of the elastic support 220, respectively.

In the elastic support 220 according to the present modification, only a coupling portion 221 and a guide portion 222 are integrated with each other. Instead, a fitting depression 221a into which an elastic portion 223 can be inserted is formed in the coupling portion 221.

The elastic portion 223 has a fitting protrusion 223a and four elastic legs 223b-1, 223b-2, 223b-3, and 223b-4, and is injection-molded in an integrated form.

The fitting protrusion 223a is inserted into the fitting depression 221a, so that the elastic portion 223 can ultimately be fitted into the coupling portion 221.

The four elastic legs 223b-1, 223b-2, 223b-3, and 223b-4 are divided into two groups of two legs, which extend forward and backward, respectively, from the fitting protrusion 223a. In other words, the elastic portion 223 has an ‘H’ shape when viewed from the bottom. Furthermore, the elastic legs 223b-1, 223b-2, 223b-3, and 223b-4 are inclined downward in the direction away from the fitting protrusion 223a, so that the ends thereof come into contact with a bottom surface forming the coupling groove 212.

Meanwhile, the coupling portion 221 and the guide portion 222 are molded in an integrated form. It is preferable that the coupling portion 221 and the guide portion 222 are made of a material harder than that of the elastic portion 223 and, thus, have hard physical properties relatively robust against damage attributable to use. It is obvious that although it is preferable that the coupling portion 221 and the guide portion 222 are also made of a synthetic resin material that can be molded through injection molding, they are not necessarily limited to the material.

In addition, the elastic portion 223 is made of a material that is softer than that of the coupling portion 221 and the guide portion 222 and can be elastically deformed and restored. For example, the elastic portion 223 may be made of a thermoplastic polyurethane resin to achieve appropriate elastic deformation and restoration.

The present modification is more preferable than the second embodiment in that the present modification allows only the elastic portion 223, which is easily damaged by continuous elastic deformation, to be separately replaced, thereby lowering the replacement cost and providing a more environmentally friendly structure through resource saving. It is obvious that when damage is caused to the coupling portion 221 and/or the guide portion 222 due to long-term use, the elastic support 220 itself may need to be replaced, but

the replacement cycle will be longer than that in the previous second embodiment.

Meanwhile, although the above-described embodiments have been described in conjunction with the structure in which an electronic part ED is inserted into a test slit S elongated in the vertical direction while moving in the front-back direction, the present invention is not limited to the structure. For example, the present invention may also be applied to a case where a test slit is elongated in the left-right direction, and may be appropriately applied to a structure in which an electronic part ED is inserted into a test slit while moving in the vertical direction.

According to the present invention, the following advantages may be achieved.

First, both ends of a heavy, large electronic part are pressed by the elastic supports in the state in which the electronic part is inserted into a test slit and thus the electronic part maintains a stable posture, so that the reliability of the electrical connection between the electronic part and a tester is improved.

Second, the elastic supports made of a material different from that of the guider bodies are provided to be replaceable, so that only the elastic supports can be replaced when a problem such as wear or loss of elasticity occurs, thereby reducing replacement cost and achieving stability.

Third, the calibration pins are allocated to both sides of imaginary center lines, so that it may be possible to deal with a case where test conditions need to be changed, a case where the sequence of contact between the terminals of a test socket and the terminals of an electronic part needs to be changed, a case where the direction in which an electronic part is inserted needs to be changed depending on a tester, etc.

As described above, the detailed description of the present invention has been given with reference to the embodiments taken in conjunction with the accompanying drawings, but the above-described embodiments are merely examples of the present invention. Therefore, it should not be understood that the present invention is limited only to the above-described embodiments, and the scope of the present invention should be understood based on the following claims and equivalents thereto.

WHAT IS CLAIMED IS:

1. A socket guider for testing of electronic parts, the socket guider comprising:

a pair of guider bodies provided to support both ends of an electronic part to be inserted into an elongated test slit into which a contact terminal-side portion of the electronic part is inserted;

a pair of elastic supporters replaceably coupled to the guider bodies, respectively, and configured to maintain a posture of the electronic part by elastically supporting both ends of the electronic part while the contact terminal-side portion is inserted into the test slit or in a state in which the contact terminal-side portion has been inserted into the test slit; and

at least one calibration pin coupled to each of the guider bodies to protrude forward, and configured to be mated with a calibration hole formed in a gripping mechanism to correct a position of the electronic part fed by the gripping mechanism so that the contact terminal-side portion of the electronic part can be precisely inserted into the test slit;

wherein the pair of guider bodies are disposed on both sides of the test slit, respectively, in a direction in which the test slit is elongated; and

wherein the pair of elastic supports are allocated to the pair of guider bodies, respectively, and are detachably installed in the guider bodies, respectively,

wherein the calibration pin is disposed off-centered from an imaginary straight line passing through the test slit in the direction in which the test slit is elongated; and

wherein the calibration hole is disposed off-centered from a plane including one surface of the electronic part gripped by the gripping mechanism.

2. A socket guider for testing of electronic parts, the

socket guider comprising:

a pair of guider bodies provided to support both ends of an electronic part to be inserted into an elongated test slit into which a contact terminal-side portion of the electronic part is inserted;

a pair of elastic supporters replaceably coupled to the guider bodies, respectively, and configured to maintain a posture of the electronic part by elastically supporting both ends of the electronic part while the contact terminal-side portion is inserted into the test slit or in a state in which the contact terminal-side portion has been inserted into the test slit; and

first and second calibration pins coupled to each of the guider bodies to protrude forward, and configured to be mated with calibration holes formed in a gripping mechanism to correct a position of the electronic part fed by the gripping mechanism so that the contact terminal-side portion of the electronic part can be precisely inserted into the test slit;

wherein the pair of guider bodies are disposed on both sides of the test slit, respectively, in a direction in which the test slit is elongated; and

wherein the pair of elastic supports are allocated to the pair of guider bodies, respectively, and are detachably installed in the guider bodies, respectively,

wherein the calibration pins are disposed off-centered from an imaginary straight line passing through the test slit in the direction in which the test slit is elongated, and are spaced apart from each other;

wherein the first calibration pin is used for correcting the position of the electronic part when the electronic part is inserted into the test slit after the electronic part in a laid position has been erected at 90 degrees, and the second calibration pin is used for correcting the position of the electronic part when the electronic part is inserted into the

test slit after the electronic part in a laid positon has been erected at -90 degrees; and

wherein the calibration holes are disposed off-centered from a plane including one surface of the electronic part gripped by the gripping mechanism.