

The present invention relates to a device for mechanical protection of a printed circuit board, in particular of a colour-television chassis.

Most of the electronic components, other than the cathode ray tube, of a television are currently arranged on a single large printed circuit board. The standards for testing the mechanical strength of such boards, which are mounted in the cabinet of the television, require, in particular, drop tests consisting in letting the television fall from a height of approximately 60 cm. In order to enable these boards to withstand such shocks, they are surrounded in a rigid framework fixed firmly to the cabinet of the television. Such a framework conceals part of the printed circuit, which complicates maintenance thereof. Moreover, this framework does not always prevent breakage or cracking of the printed circuit board, and the drop may give rise to a movement of the rear cover relative to the cabinet and thus relative to the printed circuit board supporting, inter alia, the connectors of the television, such as the "Peritel" socket and the aerial socket.

The subject of the present invention is a device for mechanical protection of a printed circuit board, of general rectangular shape, arranged in a cabinet comprising a removable lateral partition, one of the sides of the board being close to and parallel with this removable partition, which protection device is easy to produce and to position, while guaranteeing that the board can withstand shocks, such as a very considerable deceleration, or vibrations very satisfactorily, and which prevents any relative movement of the board with respect to the said removable partition. Moreover, this device must conceal the components and the printed circuits of the board as little as possible.

The device for mechanical protection according to the invention comprises a "U"-shaped stirrup piece, composed of a central portion and of two branches, surrounding the board on the three sides away from the

removable partition, this stirrup piece comprising, at its front part, at least two "L"-shaped feet penetrating freely into corresponding holes made in the base of the cabinet, each end of the stirrup piece interacting with
5 a guiding and holding device with limited pivoting which is formed on the removable partition, advantageously a snap-fitted device. According to an advantageous aspect of the invention, a stiffener is fastened, preferably by means of snap-fitting, to the stirrup piece, onto the
10 fourth side of the board.

According to a further advantageous aspect of the invention, applying particularly to the chassis of televisions or of monitors, a circular cylindrical projection, which can be inserted into a corresponding
15 hole made in a wall of the cabinet to hold the chassis in position for repair, is formed on at least one of the branches of the stirrup piece.

The present invention will be better understood on reading the detailed description of an embodiment, taken as a non-limiting example and illustrated by the
20 attached drawing, in which:

- Figure 1 is a top view of a printed circuit board equipped with a protection device according to an advantageous embodiment of the invention, in the normal
25 position in a casing;

- Figure 2 is a section through II-II in Figure 1, and

- Figure 3 is a simplified perspective view of the board in Figure 1 in position for repair.

30 The invention is described below with reference to a printed circuit board comprising the basic essentials of the electronic circuits of a television or of a monitor but, obviously, the invention is not limited to such an application and may be implemented in virtually
35 any equipment item comprising a relatively thin board on which components are fitted, some of which must be accessible through openings in a removable partition fitted on the cabinet enclosing this equipment item, this

equipment item having to be capable of withstanding shocks or vibrations.

In the present case, the removable partition is the rear cover of the television, and the components which must be accessible through this partition are input and output connectors of the chassis. These components could also be components which are adjustable from the outside with the aid of a screwdriver or of a suitable tool, such as potentiometers. The thin board supporting the components is the "chassis" of the television, that is to say the printed circuit comprising virtually all the electronic circuits of the television (circuits such as the circuits for adjustment of tuning and station display may be arranged on an additional small printed circuit fitted separately on the casing of the television or on its front).

The chassis 1 of the television is a printed circuit board of rectangular shape, which has not been shown in detail on the drawing. The chassis 1 carries connectors permitting connection of the television to the external environment: mains, aerial, satellite-transmitted signal demodulator, etc. In Figure 1, four such connectors, referenced 2 to 5 are shown diagrammatically, which are, in the present case, fitted on the upper face of the chassis 1, distributed along its large rear side (that is to say, its large side which is closest to the rear cover 6).

In order both to fit the chassis 1 in the cabinet 7 of the television and to make it rigid, it is equipped with a "U"-shaped support device 8 which surrounds it on three sides (except for its large rear side). This support device 8 is composed of a central portion 9 and of two branches 10, 11 and it is advantageously made from plastic in the general shape of a profiled section with an "F"-shaped cross section. The two "F"-shaped small branches form a channel in which the edges of the chassis 1 are housed with slight friction, and the large (vertical) branch of the "F" is long enough for the board

1 to be sufficiently distant from the base 7 of the cabinet when the support 8 rests on this base 7, the board 1 being in position in the support 8. The support 8 may even be relatively flexible in terms of bending (forces directed parallel to the plane of the chassis 1), and may thus be relatively thin and lightweight, which makes it inexpensive.

The ends of the branches 10 and 11 of the support 8 engage in guides 12, 13 formed integrally with the rear cover 6 which retain them laterally (in the direction of the large sides of the chassis 1), but allow them a slight clearance (of approximately 10 to 20°) in the direction of a vertical pivoting about the ends of these branches.

In order to make the board 1 rigid on its side which is not protected by the support 8, a stiffener 14 is clipped onto this side. This stiffener may, for example, be a profiled section made from plastic with an "F"-shaped or "I"-shaped cross section whose ends 15, 16, provided with suitable snap-fitting devices, snap-fit onto the branches 10, 11, respectively, of the support 8. The width of the stiffener 14 and the length of the branches 10, 11 are such that a play of approximately 5 mm remains between this stiffener and the cover 6 when the branches 10, 11 are snap-fitted in the cover 6.

In order to facilitate handling of the board 1, handles 17, 18 are formed on the outer faces of the branches 10, 11.

Tabs 19, 20 in the shape of an "L", projecting downwards, are formed on the branches 10, 11 near to their junction with the portion 9 of the support 8. The large branches of these "L"s are perpendicular to the plane of the board 1 and their small branches are parallel thereto. Moreover, holes 21, 22 are made in the wall 7 for the passage of these tabs. The diameter of these holes is greater than the length of the small branches of the "L"s of the tabs 19, 20. The dimensions of the large branches of the "L"s, formed by the tabs 19,

20, and the arrangement of these tabs relative to the support 8 are such that, when the support 8 is in position, the short branches of the "L"s are applied against the lower face of the wall 7. In order to improve holding in position of the support 8, studs 23, 24, respectively, projecting downwards and housed in holes 25, 26 made in the wall 7 are formed on the branches 10, 11 to the rear of the feet 19 and 20. Advantageously, the holes 25, 26 have the same diameter and the same distance between centres as the holes 21, 22 in order to permit the insertion therein and holding of the tabs 19, 20 in order to be able to place the board 1 in a set-back position in the cabinet of the television and to have better access to its components, for example for an adjustment.

In order to place the board 1 in position with its support 8, it is presented so as to be slightly slanting in order to be able to insert the tabs 19, 20 easily into the holes 21, 22 and to be able to pass the studs 23, 24 through. When the long branches of the tabs 19, 20 abut against the front portion of the holes 21, 22, the board 1 is tilted in order to render it parallel to the wall 7, and the studs 23, 24 are housed in the holes 25, 26, abutting against their rear generatrix. The rear cover 6 is then placed in position and fitted, for example by means of snap-fitting, on the cabinet, and is simultaneously fitted on the snap-fitting devices 12, 13 of the support 8. If the stiffener 14 is used, it is, of course, mounted before the board 1 is placed in position in the cabinet.

On one of the branches 10 or 11 of the support 8, or even on both of them, it is possible, advantageously, to form a projection 27 with the shape of a short cylinder with circular cross section. In the example shown, this projection is formed on the branch 10, near to its junction with the portion 9. The external diameter of the projection 27 is substantially equal to the diameter of the holes 21, 22 or 25, 26. By virtue of this

projection 27 which can be introduced into one of these holes, or, optionally, into another hole with the same diameter made in a suitable location on the cabinet, it is possible to position the board 1 with its support 8 in position for repair, as, for example, shown in Figure 3. The circuits of the board are thus fully visible and easily accessible, and the board may remain connected to the other elements of the television (cathode ray tube, control keyboard, etc.).

Advantageously, an access passage 28 serving as a cable way for the cables (not shown) connecting the circuits of the board 1 to other element [sic] of the television may be formed on the portion 9 of the support 8, outside this support (relative to the board 1). In order to hold these cables in position satisfactorily, clips, such as the clips 29 to 31 shown on the drawing, are formed on the piece 9.

Thus, the protection device of the invention makes it possible to hold the chassis 1 in position in the cabinet of the television, while ensuring the correct positioning of the sockets 2 to 5 relative to the holes in the cover, this protection device establishing a link by means of articulation (by virtue of the "L"-shaped feet 19, 20) between the chassis 1 and the cabinet, with no stresses being exerted on the chassis in any of its use conditions. Moreover, the placing in position of the chassis in the cabinet and its removal therefrom are much simplified.

CLAIMS

1. Device for mechanical protection of a printed circuit board (1), in particular of a colour-television chassis, arranged in a cabinet (7) comprising a removable lateral partition (6), one of the sides of the board, of general rectangular shape, being close to and parallel with this removable partition, characterised in that this protection device comprises a "U"-shaped stirrup piece (8), composed of a central portion (9) and of two branches (10, 11), surrounding the board on the three sides away from the removable partition, this stirrup piece comprising, at its front part, at least two "L"-shaped feet (19, 20) penetrating freely into corresponding holes (21, 22) made in the base (7) of the cabinet, each end of the branches of the stirrup piece interacting with a guiding and holding device (12, 13) with limited pivoting which is formed on the removable partition.
2. Protection device according to Claim 1, characterised in that a stiffener (14) is clipped onto the fourth side of the board.
3. Protection device according to Claim 2, characterised in that the stiffener is snap-fitted to the stirrup piece (15, 16).
4. Protection device according to one of the preceding claims, characterised in that a circular cylindrical projection (27), which can be inserted into a corresponding hole made in a wall of the cabinet (7) to hold the board in position for repair (Figure 3) is formed on at least one of the branches (10, 11) of the stirrup piece.
5. Device according to one of the preceding claims, characterised in that studs (23, 24) projecting downwards and being housed in holes (25, 26) made in the base wall (7) of the cabinet in order to improve holding in position of the board in the cabinet are formed on the two branches of the stirrup piece.
6. Protection device according to one of the preceding claims, characterised in that a cable way (28) and



cable clips (29 to 31) are formed on the central portion
(9) of the stirrup piece.

