

A NOISE ABSORBER

BACKGROUND OF THE INVENTION

5 This invention relates to a noise absorber and is concerned with a noise absorber for enclosing wires of electronic equipment so as to absorb electrical (and electronic) noises generated within the equipment and to prevent noises generated outside the equipment from passing through the wires and into the equipment.

10 A conventional noise absorber surrounds an outer periphery of wires with ferrite or other magnetic material, thereby absorbing electric noises running through the wires. Such a noise absorber comprises coupling devices moulded of magnetic material. The coupling devices are in the shape of a cylinder cut in half along an abutment face
15 including the axis thereof. The coupling devices are housed in cases provided in a container made of synthetic resin. When the container is closed, the coupling devices enclose the wires therein in order to absorb noise. Such a noise absorber is secured to a chassis or a printed board by engaging an engaging portion disposed at its bottom
20 with an engaging member on a top of a stand which is screwed onto the chassis or the substrate.

Although such a noise absorber can be fixed to a printed board and a housing, the stand of the noise absorber occupies a lot of space,
25 thereby hampering placement of the noise absorber. Moreover, in repairing or other occasions where the noise absorber needs to be removed, the engaging portions between the stand and the noise absorber are difficult to reach since the stand is positioned at the bottom of the noise absorber. Thus, the mechanism for fixing the
30 noise absorber needs to be further improved.

SUMMARY OF THE INVENTION

Wherefore, an object of the invention is to provide a noise absorber which be easily installed at a desired location and has improved
35 operability.

A noise absorber according to the invention comprises:

a coupling member of magnetic material and having the shape of a hollow cylinder divided in half along a plane containing the longitudinal axis of the cylinder so as to form a pair of substantially identical mating coupling members which, when combined with one another, enclose the wire;

a container comprising first and second cases, each case containing one of said pair of coupling members therein, said first and second cases being hinged to one another so as to facilitate pivotable opening and closing of said container, said second case having a first engaging portion; and

a support member, for securing said container to a desired support surface, the support member having a bottom surface for engaging the support surface, means for securing said support member to the desired surface, a second engaging portion positioned remote from said bottom surface and located to engage said first engaging portion and secure said container to the support member, and flank support means for supporting an exterior flank portion of said container, wherein said first and second engaging portions and said support member are positioned such that at least a portion of said container substantially lies in or on a plane defined by said bottom surface of said support member when said first and second engaging portions engage one another.

In a noise absorber according to the invention, the container and the support member are integrally combined by engaging a first engaging portion of the container and a second engaging portion of the support member. When the container and the support member are so combined, a bottom surface of the container and the bottom face of the support member are substantially at the same level. The support member supports the container so that the container can be fixed on a chassis or a printed board while it is supported by the support member. Since the support member is provided on the same level as the container, the height of the noise absorber is advantageous for use in a location with limited space. Moreover, since the support member is provided at the flank of the container, it is easily accessible for removable from

the chassis or the printed board, thus facilitating disassembly of the container.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view showing the structure of a noise absorber of a first embodiment according to the present invention;

Figure 2 is a plan view of a container of the noise absorber;

Figure 3 is a bottom plan view of the container;

Figure 4 is a side view of the container;

5 Figure 5 is a side sectional view of the container;

Figure 6 is a front view of the upper case of the container;

Figure 7 is a rear view of the lower case of the container;

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Figure 8 is a sectional view of the container taken along the line 8-8 of Figure 2;

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Figure 9 is a sectional view of the container taken along the line 9-9 of Figure 2;

Figure 10 is a plan view of a stand of the noise absorber;

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Figure 11 is a bottom plan view of the stand;

Figure 12 is a side view of the stand;

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Figure 13 is a sectional view of the stand taken along the line 13-13 of Figure 10;

Figure 14 is a front view of the stand;

Figure 15 is a rear view of the stand;

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Figure 16 is a sectional view of the stand taken along the line 16-16 of Figure 10; and

Figure 17 is a sectional view of the noise absorber in a mounted condition.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of a noise absorber according to the present invention will now be explained hereinafter with reference to the drawings listed above.

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As shown in Figure 1, a noise absorber comprises co-operating coupling members in the form of ferrite pieces 1 and 3, a container 5 and a support member or stand 7. Each of the mating ferrite pieces 1 and 3 is in the shape of an annular or hollow cylinder divided in half along abutment faces which lie in a plane containing the central longitudinal axis of the cylinder, so as to enclose wires when combined with one another. The semi-cylindrical ferrite pieces 1 and 3 have indentations (not shown) in their outer surfaces for receiving a projection 15 (Figure 2) and other protrusions of the container 5 as described later. The container 5 comprises a first or upper case 11 and a second or lower case 13, interconnected by a hinge 9 for housing the ferrite pieces 1 and 3, respectively. As shown in Figures 2 through 9, the container 5 has an inwardly extending projection 15 and protrusions 17, 19 and 21 on an inner peripheral surface of the upper case 11. The projection 15 engages the co-operating indentation formed in the ferrite piece 1, thereby supporting the ferrite piece 1 inside the upper case 11. The protrusions 17, 19 and 21 offset the allowance of the outer dimension of the ferrite piece 1. The upper case 11 is provided with a disposing space, recess or opening 23 within which spring means comprising a leaf spring 25 is disposed as shown in Figure 17. The leaf spring 24 presses or biases the ferrite piece 1 against the oppositely-disposed ferrite piece 3 such that the opposite faces of the ferrite pieces 1 and 3 intimately abut one another. The upper case 11 is also provided with an engaging hook 29 on a first latch end for closing the container 5 and a first protective frame 27 on the same end for protecting the engaging hook 29. The protective frame 27 has an opening 25 for releasing a hook receiver 45 carried by the lower case 13 from the engaging hook 29 of the upper case 11. Handles 31 extend from opposite sides of the latch end of the upper case 11.

In the same manner as the upper case 11, as shown in Figure 2, the lower case 13 is provided with a projection 33 and protrusions 35, 37 and 39. The projection 33 engages a co-operating indentation formed in a side of the ferrite piece 3, thereby supporting the ferrite piece 3 inside the lower case 13. The protrusions 35, 37 and 39 offset the allowance of the outer dimension of the ferrite piece 3. The lower case 13 is also provided, on a first latch end, with a hook receiver 45 for receiving and engaging the engaging hook 29 of the upper case 11 and further, with a second protective frame 43 for protecting the hook receiver 45 and an engaging hook 51 of the stand 7. The protective frame 43 has an engaging aperture 41 for engaging the engaging hook 51 of the stand. Handles 47 extend from opposite sides of the first latch end of the lower case 13.

As shown in Figures 10 through 16, the support stand 7 comprises an engaging hook 51 located at the centre facing toward the front of a base 50 of the stand 7. Side walls 55 and 57 are provided on opposite sides of the engaging hook 51. The side walls 55 and 57 have a common support surface 53 which has a curvature substantially corresponding to the curvature of the outer peripheral surface of the upper and lower cases 11 and 13. The side walls 55 and 57 are interconnected and reinforced by an interconnecting member or board 59 extending laterally therebetween. As shown in Figure 12, the lower parts of the side walls 55 and 57 are partly hollowed out to form scoops 61. A securing aperture 63 (Figure 13) is formed in a rear portion of the base 50 so as to receive a fixing or securing member M, (Figure 1), such as a rivet, for fixing the support stand 7 to a chassis or a printed board. As shown in Figure 17, a bottom surface 65 of the base 50 is substantially at the same height as a portion of a bottom surface 13a of the container 5 when the stand 7 is integrally connected to the container 5. Thus, the container 5 and the stand 7 secured on the same support plane while maintaining their relative positions thereon.

In operation, as shown in Figure 17, by engaging the engaging hook 29 of the upper case 11 with the hook receiver 45 of the lower case 13,

the container 5 is kept closed, and the ferrite pieces 1 and 3 within the container are in intimate contact on their abutment faces so as to form a complete hollow cylinder. Electrical wires are located at a predetermined position such that the wires are disposed in a hollow central section 70 defined by the interior of the co-operating ferrite pieces 1 and 3. Once the stand 7 has been fixed on a chassis or a printed board by the fixing member M, the container 5 is connected to the stand 7 by engaging the engaging aperture 41 of the second protective frame 43 with the engaging hook 51 of the stand 7. The container 5 can be closed either before or after connection to the stand 7. The container 5 may be connected to the stand 7, by engaging the engaging aperture 41 with the engaging hook 51, prior to fixing the stand 7 on the chassis or the printed board by inserting fixing member M in the aperture 63.

When the noise absorber, with the container 5 and the stand 7 integrally connected, is mounted on the chassis or a substratum, the bottom surface 65 of the stand 7 and the bottom surface 13a of the container 5 are at the same level. The bottom surface 13a then lies on a plane defined by the bottom surface 65 of the stand 7.

The support surface 53 of the stand 7 covers a flank support portion of the container 5. Since the stand 7 is contiguous to the flank support portion of the container 5, the support surface 53 and the bottom surface 13a of the container 5 co-operate such that container 5 is secured to the chassis or the printed board. Moreover, since the stand 7 is provided at the flank support portion of the container 5 without elevating the container 5, the height of the noise absorber as a whole is reduced. Therefore, the noise absorber can be mounted in a location with limited space. Further, since the stand 7 is provided at the flank support portion of the container 5, the noise absorber can be easily disassembled for repairing or other occasions by removing the stand 7 from the chassis or the printed board.

The invention has been described above with reference to a preferred embodiment shown in the drawings. Modifications and alterations may

become apparent to one skilled in the art upon reading and understanding the specification. Despite the use of the one embodiment for illustration purposes, it is intended to include all such modifications and alterations within the scope and the spirit of the appended claims.

In this spirit, it should also be noted that in the embodiments as shown and described, the bottom surface 65 of the stand 7 and the bottom surface 13a of the container 5 are substantially at the same level. However, the noise absorber is also advantageous even when the container 5 is slightly larger making the level between the bottom surface 65 and the bottom surface 13a a little different. In this case, when the stand 7 is fixed to a chassis by the fixing member M, the stand 7 deflects, thus forcing the stand 7 and the container 5 to be firmly secured to the chassis and preventing backlash.



CLAIMS

1. A noise absorber for absorbing electrical noise in a wire, said noise absorber comprising:

a coupling member of magnetic material and having the shape of a hollow cylinder divided in half along a plane containing the longitudinal axis of the cylinder so as to form a pair of substantially identical mating coupling members which, when combined with one another, enclose the wire;

a container comprising first and second cases, each case containing one of said pair of coupling members therein, said first and second cases being hinged to one another so as to facilitate pivotable opening and closing of said container, said second case having a first engaging portion; and

a support member, for securing said container to a desired support surface, the support member having a bottom surface for engaging the support surface, means for securing said support member to the desired surface, a second engaging portion positioned remote from said bottom surface and located to engage said first engaging portion and secure said container to the support member, and flank support means for supporting an exterior flank portion of said container, wherein said first and second engaging portions and said support member are positioned such that at least a portion of said container substantially lies in or on a plane defined by said bottom surface of said support member when said first and second engaging portions engage one another.

2. A noise absorber according to Claim 1, wherein said first and second cases have means adjacent first ends thereof for releasably securing said container in the closed position.

3. A noise absorber according to Claim 1, wherein an inner peripheral surface of each of said first and second cases is provided with at least one inwardly extending projection, and the exterior surface of each of said pair of coupling means is provided with at



least one indentation for receiving said projection, and secure said coupling members within their respective first and second cases.

5 4. A noise absorber according to Claim 3, wherein said first case is provided with a recess locating spring means operable to bias said coupling member supported in said first case toward the other coupling member when said container is in the closed position.

10 5. A noise absorber according to Claim 3, wherein each of said inner peripheral surfaces of said first and second cases is provided with protrusions for engaging the exterior surfaces of said coupling members.

15 6. A noise absorber according to Claim 2, wherein said means for releasably securing said container in the closed position, comprise an engaging hook disposed adjacent said first case and a hook receiver adjacent said second case, said engaging hook and said hook receiver being operable to engage releasably with one another in order to maintain said container in the closed position.

20 7. A noise absorber according to Claim 6, wherein a first protective frame is provided to shield said engaging hook, the first protective frame having an opening to facilitate disengagement of said engaging hook from said hook receiver.

25 8. A noise absorber according to Claim 7, wherein each of said first and second cases have a pair of opposed handles.

30 9. A noise absorber according to Claim 7 or 8, wherein a second protective frame is provided to shield said hook receiver, and said first engaging portion, operable to engage said second engaging portion of said support member, forms part of said second protective frame.



10. A noise absorber according to Claim 9, wherein said first engaging portion comprises an aperture, and said second engaging portion comprises an engaging hook shaped to engage with said engaging aperture.

11. A noise absorber according to Claim 10, wherein said support member has a top surface carrying said engaging hook, said engaging hook facing toward a first edge of said support member and away from said container.

12. A noise absorber according to Claim 11, wherein said flank support means comprises first and second side walls which have a common support surface with curvature substantially corresponding to a curvature of the exterior of said container.

13. A noise absorber according to Claim 12, provided with a connecting member which interconnects and reinforces said first and second side walls.

14. A noise absorber according to Claim 13, wherein said side walls have portions, adjacent said bottom surface, which are hollowed out to form oppositely-disposed scoops.

15. A noise absorber according to Claim 14, wherein said means for securing said support member comprises a securing aperture, located adjacent a second edge of said support member, for receiving a securing member.

16. A noise absorber according to Claim 15, wherein said securing member is a rivet.

17. A noise absorber according to Claim 13, wherein said second protective frame is shaped so as to be closely received by said first and second side walls and said connecting member.



18. A noise absorber according to Claim 1, wherein said first case is pivotable to the open position even when said first and second engaging portions are engaged with one another.

19. A method of absorbing electric noises running through a wire with a noise absorber, the noise absorber comprising:

a coupling member of magnetic material and having the shape of a hollow cylinder divided in half along a plane containing the longitudinal axis of the cylinder so as to form a pair of substantially identical mating coupling members which, when combined with one another, enclose the wire;

a container comprising first and second cases, each case containing one of said pair of coupling members therein, said first and second cases being hinged to one another so as to facilitate pivotable opening and closing of said container, said second case having a first engaging portion; and

a support member, for securing said container to a desired support surface, the support member having a bottom surface for engaging the support surface, means for securing said support member to the desired surface, a second engaging portion positioned remote from said bottom surface and located to engage said first engaging portion and secure said container to the support member, and flank support means for supporting an exterior flank portion of said container, wherein said first and second engaging portions and said support member are positioned such that at least a portion of said container substantially lies in or on a plane defined by said bottom surface of said support member when said first and second engaging portions engage one another,

said method comprising the steps of:

disposing the wire adjacent one of said pair of coupling members;

closing said container to enclose the wire;

fixing said support member to the desired support surface; and

engaging said second engaging portion with said first engaging portion to secure said container to said support member.



20. A noise absorber substantially as hereinbefore described, with reference to the accompanying drawings.