

In a television receiver, it is known to build in a loudspeaker for the reproduction of sound on both the left and the right side of the picture tube within the housing. A loudspeaker enclosure of this type produces stray magnetic fields especially static stray fields due to the magnets of the loudspeaker and dynamic stray fields due to inductances of frequency filters which are located in the signal path for the distribution of the frequency band over a plurality of loudspeakers. Stray magnetic fields of this type can cause disturbances in the picture tube and in its circuitry in the form of colour purity errors or variable shadow effects. These disturbances consist for example of visible structures which move over the picture screen in time with the sound reproduced by the loudspeakers. In addition, various metal parts of the loudspeaker enclosure such as e.g. fastening means, metal loudspeaker baskets, diaphragms consisting of aluminium and the like can influence the magnetic field effective in the picture tube and thereby lead to picture distortions during the reproduction. This interference with the reproduction of the picture by stray magnetic fields is particularly aggravating in the new kinds of picture tubes having a picture screen diagonal of 33 inches.

It is known to render the interfering magnet fields ineffective by means of screens in the form of a soft iron housing or Mu metal. However, this solution is relatively expensive and cannot be made use of, especially in a television receiver, on the grounds of cost and weight.

The effect of the stray magnet field on the picture tube can also be reduced by virtue of a greater separation between the loudspeaker enclosure and the picture tube. However, this solution is also not practical because the enclosure is arranged within the housing and the dimensions of the housing are limited.

The object of the invention is to reduce on the one hand the effect of stray magnet fields due to the magnets and the inductances on the magnetic field of the picture tube and on the other hand the effects upon the picture tube field caused by metal parts of the loudspeaker enclosure, the fixing means, basket and diaphragm.

This object is achieved by the invention defined in claim 1. Advantageous developments of the invention are specified in the appendant claims.

The invention is based on the following perceptions and considerations: For most of the components of an enclosure which

contain metal and cause the said interference in the picture tube, there are equivalent alternative solutions which are magnetically ineffective and do not cause any detrimental effects on the reproduction of the picture. When all of these possible alternative solutions have been exhausted and substantially only the loudspeaker magnet remains as a metal part within the enclosure and this too is provided with a magnetic screen, the interfering magnet fields in the picture tube can be overcome in such a manner that the disturbances mentioned no longer occur during the reproduction of the picture. Thus, the said object can be achieved without any appreciable increase in costs and without detriment to the functioning of the loudspeaker enclosure by a deliberate utilisation and combination of measures which are of themselves individually known.

The housing of the enclosure, which is preferably matched to the shape of the picture tube, can be put together from the individual housing sections without the use of metal parts e.g. by means of an adhesive joint or an interlocking latching coupling, a so-called snap-in. Such a solution is described in the earlier patent application DE-A-37 06 158.5 published on the 29. 9 1988 and also in the application GB-A-2 119 20?.

The disturbing effect of the unavoidable permanent magnet of the loudspeaker can be overcome by means of a screen consisting of a soft iron housing or Mu metal that surrounds the magnet in the manner of a pot. A loudspeaker of this type having a screen for the magnet is described in the DE-GM 17 16 352 for example.

All the remaining parts of the loudspeaker can be constructed without the use of ferromagnetic metal parts. In particular, the loudspeaker basket and the diaphragm consist of synthetic material. The fixing of the loudspeaker to a housing wall of the enclosure likewise preferably follows without use of metal parts by means of an interlocking latching coupling in accordance with the DE-GM 84 02 128 or the DE-OS 35 12 896. The stray magnetic field emerging from the air gap of the loudspeaker can be considerably reduced by the utilisation of a magnetic fluid within the air gap. This solution is described more fully in the DE-OS 30 28 065.

In a multi-way enclosure, frequency selective filters are required in order to distribute the whole LF frequency band over the different loudspeakers e.g. a base loudspeaker, a mid range loudspeaker and a tweeter. Electrical filters of this type which include capacitors and inductances can be replaced by constructional measures on the loudspeaker. It is possible to

achieve a low pass filter effect for the loudspeaker by means of a special construction of the diaphragm and the centring diaphragm or by means of a special coupling and connection between these parts. A specific frequency response for the loudspeaker can also be achieved by means of other measures such as for example a special suspension of the diaphragm or additional damping means in the path of the sound field in front of the loudspeaker. Constructional solutions of the loudspeaker of this type, for the achievement of a specific frequency response, are described more fully in the DE-OS 33 34 442, 34 47 745, 36 41 760.

It has been shown moreover, that the transient response of the loudspeaker is improved by the absence of inductances in the path of the LF signal which inevitably have a low pass filter effect for the current. Moreover, the efficiency of such loudspeakers is increased.

With the conventional low pass filters of loudspeakers, which consist of inductances in series with the moving coil, a frequency decay is obtained at higher frequencies. By the use of 4 layer moving coils (usually, there are 2 layers), the low pass choke is transferred in practice to the inner part of the moving coil.

The invention will be explained by means of an embodiment with the help of the drawing. Therein

Fig. 1 shows in sectional view the loudspeaker, the housing and the rear housing section and

Fig. 2 a view of the open side of the rear housing section.

In Fig. 1, the loudspeaker enclosure contains a housing 1. The loudspeaker 3 is inserted in the front wall 2 of the housing 1 from the front i.e. from the left and is held, interlocked, on the front wall 2 by a latching coupling 4. The latching coupling 4 is formed in that resilient noses 5 on the front wall 2 slot in behind rigid edges on the loudspeaker basket. The loudspeaker 3 contains the permanent magnet 17 which represents the only metal part of the enclosure and is surrounded by a pot shaped magnetic screen 18. The air tight closure between the front flange 6 of the loudspeaker 3 and the front wall 2 is formed by an inlaid seal 7 consisting of rubber for example. The housing section 8 is placed on the rear end of the housing 1 in the direction 9 and is held, interlocked, on the housing 1 by a plurality of interlocking latching couplings 10 distributed around the periphery. The air tight closure is thereby formed by

the inlaid seal 11 between the housing 1 and the rear housing section 8. The rear housing section 8 is provided with a plurality of ribs 12 which serve for bracing and, in addition, for the production of a diffuse sound field and hence for the avoidance of standing waves due to the plurality of reflections. The housing 1 is fastened at its front end through the intermediary of a grating 13 to the side wall 14 of a television receiver housing.

The outer shape of the rear housing section 8 is matched to the shape of the picture tube 15 provided in the television receiver. Thereby, there is an optimum utilisation of the relatively narrow space available in a television receiver between the side wall 14 and the picture tube 15.

Fig. 2 shows a view of the open side of the housing section 8 alone. The housing section 8 is provided on its inner side with a plurality of ribs 12 which form a mosaic like field having surfaces bounded by ribs. The ribs 12 serve on the one hand for bracing the housing section 8 and on the other hand, in the manner described, for promoting a diffuse sound field in the inner part of the enclosure and for the avoidance of standing waves. The housing section 8 contains, on its peripheral edge, a peripheral groove 16 into which the seal 11 e.g. in the form of a round rubber welt, is manually inserted. On cost grounds, the seal 11 is not formed as a closed ring but rather as a cut length having two ends. In order to prevent the air tight closure being interrupted at the location of the two ends, the peripheral groove 16 contains two short regions 16a and 16b which lie directly adjacent to one another. Thereby, the two ends of the inlaid seal 11 are located directly adjacent to one another in the segments 16a and 16b and produce the effect, after the sections 1, 8 have been brought together, of a continuous air tight closure similar to a ring-like endless seal. Journals 17 are provided at the peripheral edge of the groove 16. These serve to guide the seal 11 which is to be inserted into the groove 16 during manual insertion and for simplifying the insertion of the seal 11.

No metal parts are used for any of the individual parts described and for the air tight assembly of the sections to form the enclosure.



Claims

1. Passive multi-way loudspeaker enclosure for a television receiver, characterised by the combination of the following features:
 - a) As regards metal parts, the enclosure contains substantially only the loudspeaker magnets (17) provided with a screen (18) for the stray magnetic field while the loudspeaker basket and the diaphragm consist of synthetic material.
 - b) The housing sections (1, 8) consist of synthetic material and are held together, without the use of metal parts, by an interlocking latching coupling (10, 11) or an adhesive joint.
 - c) The filters for the distribution of the frequency band over a plurality of loudspeakers are realised by mechanical measures on the loudspeakers.
2. Enclosure in accordance with Claim 1, characterised in that, the filter effect is achieved by means of a special construction or coupling of diaphragm and centring diaphragm.
3. Enclosure in accordance with Claim 1, characterised in that, a magnet fluid is arranged in the air gap for reducing the stray field of the air gap.
4. Enclosure in accordance with Claim 1, characterised in that, the loudspeaker (3) is secured on a housing wall of the enclosure (1) by means of an interlocking latching coupling (4).
5. Enclosure in accordance with Claim 1, characterised in that, an airtight closure of the enclosure is formed on the one hand by one or more loudspeakers (3) and on the other hand by a rear housing section (8) which are each mounted on the housing (1) by means of an interlocking latching coupling (4, 10) using a sealing means (7, 11).
6. Enclosure in accordance with Claim 1, characterised in that, opposite walls of the housing (1) or of a housing section (8) are not parallel to one another and are stabilised by inner located ribs (12).
7. Enclosure in accordance with Claim 1, characterised in that, the shape of the housing (1) and/or of the housing section is matched to the shape of the conical part of the picture tube (15) in a television receiver.