

The invention refers to a colour television tube of the mask type.

A colour television tube consists of a glass bulb under vacuum including a front side or envelope on the inner side of which the luminophores, which form the screen, are placed and a cylindrical rear part, the so-called neck, which includes the electron gun(s) and which is connected to the envelope by a flare-shaped part.

The deflection of the electron beams is obtained with magnetic fields generated by a vertical deflection winding and a horizontal deflection winding. The horizontal deflection winding, or line deflector, allows to scan the electron gun along horizontal lines and the vertical deflection winding, or frame deflector, ensures the passing on from one line to another. These two windings are placed around the neck and the flare-shaped part.

In a tube with three electron guns, in order that a gun intended for a determined colour generates a beam which only reaches the luminophore of the corresponding colour, a perforated mask is generally provided which is placed inside the tube at a short distance from the screen, the arrangement of the guns and of the holes of the mask being such that it allows this colour separation.

At the present time, there do exist two types of colour television tubes which can be distinguished by the diameter of their neck. In the first type, this diameter is in the range of 22 millimeters and in the second type, the diameter is in the range of 29 millimeters. These diameters are independant of the dimension of the screen. Such a tube with a neck with a

diameter of 29 millimeters has been described for example in the article of Gross et al in "IEEE Transactions on Consumer Electronics", vol. CE-29, n° 4 (1983), pages 486 to 490.

The advantage of the tube with a neck with a small diameter is, on the one part, its small size and therefore its low material cost and, on the other part, that the energy supplied to the deflector is relatively low, this deflector being not too distant from the electron beams. The disadvantage of this type of tube is that the focussing of the beams is not always satisfactory and that the vacuum is more difficult to obtain.

On the other hand, in a tube with a neck with a bigger diameter in the range of 29 millimeters, it is easier to create a vacuum and the performances of the electron guns are also higher than those of guns of tubes with a smaller diameter. The deflector of the tube with a neck with a bigger diameter however needs more energy and is more expensive.

The different characteristics of the deflectors mean different characteristics of the circuits of the television receivers combined with these tubes. In other words, a determined type of associated circuit is required for a certain type of tube. Generally, the circuit associated with the tube with the neck with a smaller diameter is preferred because it needs less energy.

The invention combines the advantages of both types of tubes which are mentioned above.

The invention refers to a colour television tube of the mask type with a glass bulb and a horizontal deflection winding (15) having the form of a saddle with rear (19) and front (21)

leading-out wires placed in recesses (18, 20) which are part of a support (14) separating the vertical deflection winding from the horizontal deflection winding and the vertical deflection winding (16) having the shape of a torus wound on a magnetic core (17) which is between the recesses (18, 20) of the leading-out wires (19, 21) of the horizontal deflector, the vertical deflection winding (16) being directly in contact with the outer surface of the support (14) between the recesses (18, 20) for the leading-out wires of the horizontal deflection winding so that there is practically no clearance between the vertical deflection winding and the support.

The invention is characterized in that the glass bulb includes, at its rear part, a neck (11) with an outer diameter of approximately 29 millimeters and that the deflector is provided for a 90° deflection, the L/R ratio of the inductive resistor (L) to the resistor (R) of the horizontal deflection winding (15) of the deflector (12) being included between 630 and 670 microseconds.

Such a colour television tube has the advantage of a tube with a neck with a big diameter, i.e. the good quality of the image achieved and, on the other part, it is surprising to state that, in spite of more considerable distances between the deflector and the electron beams, the electric power consumption of this deflector is in the same range than that with a tube with a neck diameter of 22 millimeters.

The conical part of the glass bulb ("funnel") corresponding to the deflection area is, for example, that of the "coty - 29" tube, type 90°, sold by RCA.

In "Valvo-Datenbuch", 1986, page 8.86/6 and 8.86/7, a deflector is described in which the L/R ratio of the inductive resistor to the resistor of the winding is included between 727 and 740 microseconds.

In US-A-4 376 924, a deflector is described which includes a horizontal deflection winding and a vertical deflection winding which are both directly in contact with the surface of a common support. The L/R ratio of the inductive resistor to the resistor of the winding is however not mentioned.

Characteristics and advantages of the invention shall appear by reading the description of one of its embodiments, the description being made with reference to the annexed drawings.

Figure 1 is a partial axial cutaway view according to a plane passing through the horizontal axis (parallel to the bigger sides of the screen) of a tube according to the invention.

Figure 2 is a view similar to figure 1 but is a cutaway view according to a plane passing through the vertical axis (parallel to the smaller sides of the screen) of the tube.

Figure 3 is a side view of a deflector of a tube according to the invention.

Figure 4 is a rear view of the deflector of figure 3.

The tube according to the invention has a glass bulb 10 with associated guns with a conical part of the "coty-29" type of RCA with a neck 11 with an outer diameter of 29 millimeters.

On the other hand, the deflector 12 can be distinguished from the "coty-29" tube in that the L/R ratio of the line deflector is included between 630 and 730 microseconds, and is preferably in the range of 670 microseconds. The dimensions, the required space and the consumption of the deflector of the tube according to the invention are lower than the corresponding values for the "coty-29" tube.

This deflector 12 extends for one part around the neck 11 and for another part around the flare-shaped part 13.

It includes a support 14 made of a non-magnetic material, for example of a plastic material, which contains the horizontal deflection winding 15 (line deflector) having the form of a saddle. The vertical deflection winding 16 (frame deflector) has the shape of a torus and is wound around a magnetic core 17 made of ferrite. This frame deflector is carried by the support 14.

According to an important measure of the invention, the shapes and dimensions of the support 14, of the core 17 and of the winding 16 are such that, even before assembly, i.e. before fixing the frame deflector 16, 17 to the support 14, there is practically no clearance in the direction perpendicularly to the axis 11a of the tube for the vertical deflector. This characteristic constitutes indeed a disadvantage because it prevents from performing a convergence adjustment during the assembly of the deflector but it allows, by bringing the frame deflector nearer to the axis 11a, to minimize the power consumption of this frame deflector.

The loss of a convergence adjustment possibility by translating the vertical deflector perpendicularly to the axis 11a is compensated by an increase of the manufacturing accuracy of the various elements.

The support 14 has a rear collar 18 containing the rear leading-out wires 19 of the horizontal deflection winding 15. This support 14 also has a front collar receiving the front leading-out wires of the horizontal winding 15.

The vertical deflection winding 16 has two parts 16₁ and 16₂ with two wide spaces 17₁ and 17₂ of the core 17 which are not surrounded by a winding. Each part 17₁ or 17₂ which is not covered by the core 17 has dimensions in the same range than those of each part covered by a winding 16₁ or 16₂.

The rear part 22 of the support 14 is cylindrical with an inner diameter in the range of 30 millimeters.

In an embodiment, the smallest diameter of the inner surface of the core 17 is in the range of 40 millimeters whereas the biggest diameter of the inner surface of this core 17 is in the range of 70 millimeters. The length L1 (figure 1) of the core 17 along the axis 11a is 37 millimeters. The length L2 which separates the edges which are the nearest to the recesses 18 and 20 is 45 millimeters. The total length of the support 14, still along the axis 11a, is 66,5 millimeters. The biggest diameter of the deflector, i.e. that of the recess 20, is 96 millimeters.

In a classical way, the part 22, which is notched to be flexible and to be applied against the neck, is surrounded by a clamping collar 23 (figure 4) and the collar 18 of the support

14 has the connections 24 to the feed circuit as well as shoulders 25 for the snap-on-mounting in the box of a television receiver.

In the above mentioned embodiment for a tube of 90°, the energy consumption of the line winding is less than 1,6 millijoule approximately and the power of the frame winding is 2,5 Watt for a high voltage of 25 kW, i.e. for the same level of energy than that given by the electronic circuits of the frames which are associated with tubes with a neck with a diameter of 22 millimeters.



CLAIM

Colour television tube of the mask tube type with a glass bulb and a deflector, the horizontal deflection winding (15) having the form of a saddle with rear (19) and front (21) leading-out wires placed in recesses (18, 20) which are part of a support (14) separating the vertical deflection winding from the horizontal deflection winding and the vertical deflection winding (16) having the shape of a torus wound on a magnetic core (17) which is between the recesses (18, 20) of the leading-out wires (19, 21) of the horizontal deflector, the vertical deflection winding (16) being directly in contact with the outer surface of the support (14) between the recesses (18, 20) for the leading-out wires of the horizontal deflection winding so that there is practically no clearance between the vertical deflection winding and the support, characterized in that the glass bulb includes, at its rear part, a neck (11) with an outer diameter of approximately 29 millimeters and that the deflector is foreseen for a 90° deflection, the L/R ratio of the inductive resistor (L) to the resistor (R) of the horizontal deflection winding (15) of the deflector (12) being included between 630 and 670 microseconds.