

A FRAME FOR A COLOUR SELECTION MECHANISM FOR A CATHODE RAY TUBE

5 The invention relates to a frame for a colour selection mechanism for use in a cathode ray tube.

A conventional colour selection mechanism 1 for a cathode ray tube (CRT) is shown in Figure 1. From Figure 1 it can be seen that the colour selection
10 mechanism 1 comprises an aperture grill 10 which includes a number of narrow belt-shaped grid elements 8, which are commonly known as tapes and which define slit shaped apertures 9 between adjacent tapes 8. The aperture grill 10 is supported on a metallic frame 6 which includes two support members 2, 3 which are coupled together by two frame members 4, 5. The aperture grill 10 is welded
15 to the support members 2, 3 at opposite edges so that the tapes 8 extend from the support member 2 to the support member 3.

The colour selection mechanism 1 also includes two damper wires 12 which are mounted by mounting members 14 to the frame members 4, 5 so that the damper
20 wires 12 are stretched across the tapes 8, as shown in Figure 1. The damper wires 12 are stretched across the tapes 8 such that the damper wires 12 are in contact with each of the tapes 8 (see Figure 2) to minimise vibration of the tapes 8 when the colour selection mechanism is installed in a CRT. This is especially important in situations where the colour selection mechanism is located near a
25 speaker. For example, in a television or a computer monitor with attached speakers, as the sound from the speakers tends to induce vibration of the tapes 8.

This vibration results in distortion of the image on the CRT if the damper wires 12 are not present.

In addition, the colour selection mechanism 1 includes four spring loaded clips 15 mounted to each of the support members 2, 3 and the frame members 4, 5 by spring holders 13. The spring clips 15 permit mounting of the colour selection mechanism within a CRT.

Each of the support members 2, 3 is formed with a radius of curvature R in the Z direction, as shown in Figure 3. In conventional colour selection mechanisms for conventional CRTs, the radius of curvature R was typically of the order of 1000 mm or less. Therefore, the radius of curvature was sufficiently small to ensure that the damper wires 12 were in contact with all of the tapes 8 even if there was an error in the alignment of one of the tapes. For example, if one of the tapes was twisted.

However, more recently, there has been a trend towards flat screen CRTs in which the radius of the curvature is at least 4000 mm and can be as high as 8000 mm, or greater. With a large radius of curvature such as this, small errors in alignment of the tapes 8 (for example, twisting of the tapes 8) can cause the damper wires not to touch tapes that are adjacent to the twisted tapes. This is a particular problem at the edges of the aperture grill where the edge tapes 8A are wider to provide additional support for the damper wires 12 at the edges of the aperture grill adjacent to the damper wire supports 14. Typically, the edge tape 8A at each side of the aperture grill is approximately ten times the width of the other tapes forming

the aperture grill. Hence, a small twisting of one of the edge tapes 8A can cause the damper wires 12 not to contact tapes 8B adjacent to the edge tapes 8A, as shown in Figure 4.

5 Therefore, this can result in vibration of the tapes 8B not contacted by the damper wires during use which can result in distortion of the image on the CRT.

In accordance with first aspect of the present invention, there is provided a colour selection mechanism for a colour CRT which includes

10 a frame to which a colour selection electrode thin plate is to be applied, and a colour selection electrode thin plate, characterised in that

a surface of said frame to which said colour selection electrode thin plate is to be applied is formed from a face represented by a first and a second function in
15 a longitudinal direction from the center of said frame, and said surface is leftwardly and rightwardly symmetrical with respect to a center axis thereof.

Preferably, the first function is a polynomial of degree three or more.

20 Preferably, the second function is a polynomial of degree two.

Typically, the transition from the first to the second function occurs at 10 to 15 colour selection electrode pitches inwardly from edge of the colour selection electrode thin plate.

In accordance with a second aspect of the present invention, there is provided a frame for a colour selection mechanism for a colour CRT, the frame being adapted to have a colour selection thin plate attached thereto, and the frame comprising two spaced apart support members, the support members each having a mounting
5 surface, each of the mounting surfaces having a central surface portion with a first radius of curvature and end surface portions with a second radius of curvature, the second radius of curvature being smaller than the first radius of curvature.

Typically, the end surface portions extend for less than approximately 30 mm from
10 the end of the mounting surfaces, preferably for less than 20 mm, and most preferably, extend for between 5 mm to 15 mm from the end of the mounting surfaces.

Typically, the first radius of curvature is greater than or equal to 4000 mm and the
15 second radius of curvature is less than 1000 mm. Preferably, the second radius of curvature is less than 500 mm.

In accordance with a third aspect of the present invention, there is provided a colour selection mechanism for a colour CRT comprising a frame in accordance
20 with the second aspect of the invention, a colour selection thin plate mounted on the mounting surfaces and a vibration reducing member extending across the colour selection thin plate.

In accordance with a fourth aspect of the present invention, there is provided a cathode ray tube comprising a colour selection mechanism in accordance with the first or the third aspect of the invention.

5 An example of a frame for a colour selection mechanism in accordance with the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a conventional colour selection
10 mechanism;

Figure 2 is a side view along the line AA of Figure 1;

Figure 3 is a side view of a conventional frame for a colour selection mechanism;

Figure 4 is a side view along the line AA of Figure 1 with a twisted edge
15 tape;

Figure 5 is a side view of a frame for a colour selection mechanism in accordance with the invention; and

Figure 6 is a detailed view of section B of Figure 5.

20 As described above, Figure 1 shows a conventional colour selection mechanism comprising an aperture grill 10 mounted on support members 2, 3 of a frame and having damper wires 12 extending across the aperture grill 10.

Figure 2 is a detailed end view along the line AA of Figure 1. From Figure 2 it can
25 be seen that the edge tape 8A is considerably wider than the other tapes 8B

forming the aperture grill 10. In this example, the support member 2 has a relatively large radius of curvature R_z (see Figure 3) and typically, greater than 4000 mm.

5 In Figure 2, it can be seen that all of the tapes 8A, 8B are aligned correctly and so the damper wire 12 contacts all of the tapes 8A, 8B to minimise vibration of the tapes 8A, 8B.

However, the edge tape 8A is particularly prone to misalignment for example, due
10 to twisting and such a situation is shown in Figure 4. Here it can be seen that the edge tape 8A is twisted and that this causes the damper wire 12 to not be in contact with the tape 8B immediately adjacent to the tape 8A. Hence, tape 8B will not be damped by the damper wire 12 and this is likely to lead to distortion of an image on the CRT in which the colour selection mechanism is mounted.

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However, the invention alleviates this problem by providing a frame 20 for a colour selection mechanism in which the mounting surfaces of the support members 2, 3 have a smaller radius of curvature at the edge of the mounting surfaces, as shown in Figure 5. The frame 20 comprises intermediate members 4, 5 with two support
20 members 21 (only one shown). The support members 21 have a mounting surface to which the aperture grill 10 is attached. As shown in Figure 5, the mounting surface comprises a central surface portion 22 and two end surface portions 23. The radius of curvature of the central surface portion 22 is the normal radius of curvature for a flat screen CRT. Typically, this is a radius of curvature of
25 at least 4000 mm.

However, the radius of curvatures of the end surface portions 23 are smaller and is typically less than 1000 mm and preferably, less than 500 mm.

5 Figure 6 shows an exploded end view of section B in Figure 4. Here it can be seen that the radius of curvature R_A of the end surface portion 23 extends from the edge tape 8A of the aperture grill 10 inwards for a number of tapes 8B until a transition zone 25 is reached. At the transition zone 25 the radius of curvature changes to R_Z . This is the radius of curvature of the central surface portion 22.

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Typically, the radius of curvature R_Z of the central surface portion 22 is given by the following equation:

$$R_Z = M_1X^2 + M_2X^4 + M_3X^6$$

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where M_1 , M_2 and M_3 are constants and X is the distance along the x-axis from central axis 26 of the point on the surface 22 to be determined.

Typically, the radius of curvature R_A of the end surface portions 23 is given by the
20 following equation:

$$R_A^2 = (X - r)^2 + (Z + s)^2$$

where $|X| > a$ (a is shown in Figure 5 and is the distance from the centre of the
25 support members 21 to the transition zone 25 in the X direction), X is as defined

above, Z is the distance along the z -axis of the point on the surface 23 to be determined, and r and s are the x and z co-ordinates respectively of the centre of the circle with radius R_A .

- 5 Typical examples of R_Z and R_A for a 21 inch CRT are $R_Z = 6800$ mm and $R_A = 263$ mm with the transition zone 25 being 183 mm from the central axis 26 of the support members 21.

It can be seen from Figure 5 that due to the smaller radius of curvature R_A at the
10 end surface portions 23, a minor misalignment of the edge tape 8A is less likely to cause the damper wire 12 not to contact adjacent tapes 8B. Therefore, a colour selection mechanism using the frame 20 in accordance with the invention has the advantage of having a greater margin for error in alignment of the edge tapes 8A and so is less likely to suffer distortion of the image on the CRT due to vibration of
15 the tapes 8B.

CLAIMS

1. A colour selection mechanism for a colour CRT which includes
a frame to which a colour selection electrode thin plate is to be applied, and
a colour selection electrode thin plate,
5 characterised in that
a surface of said frame to which said colour selection electrode thin plate is
to be applied is formed from a face represented by a first and a second function in
a longitudinal direction from the center of said frame, and said surface is leftwardly
and rightwardly substantially symmetrical with respect to a center axis thereof.
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2. A colour selection mechanism according to claim 1, wherein the first
function is a polynomial of degree three or more, and the second function is a
polynomial of degree two.
- 15 3. A colour selection mechanism according to claim 1 or claim 2, wherein the
transition from the first function to the second function occurs at 10 to 15 colour
selection electrode pitches inwardly from edge of the colour selection electrode
thin plate.
- 20 4. A frame for a colour selection mechanism for a colour CRT, the frame being
adapted to have a colour selection thin plate attached thereto, and the frame
comprising two spaced apart support members, the support members each having
a mounting surface, each of the mounting surfaces having a central surface
portion with a first radius of curvature and end surface portions with a second



radius of curvature, the second radius of curvature being smaller than the first radius of curvature.

5. A frame according to claim 4, wherein the end surface portions extend for less than approximately 30 mm from the end of the mounting surfaces.
6. A frame according to claim 5, wherein the end surface portions extend for less than approximately 20 mm from the end of the mounting surfaces.
- 10 7. A frame according to claim 6, wherein the end surface portions extend for between 5 mm to 15 mm from the end of the mounting surfaces.
8. A frame according to any of claims 4 to 7, wherein the first radius of curvature is greater than or equal to 4000 mm and the second radius of curvature is less than 1000 mm.
- 15 9. A frame according to claim 8, wherein the second radius of curvature is less than 500 mm.
- 20 10. A colour selection mechanism for a colour CRT comprising a frame in accordance with any of claims 4 to 9, a colour selection thin plate mounted on the mounting surfaces and a vibration reducing member extending across the colour selection thin plate.



11. A cathode ray tube comprising a colour selection mechanism in accordance with any of claims 1 to 3 or claim 10.

