(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 785 566 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
23.07.1997 Bulletin 1997/30

(51) Int. Cl.[6]: **H01J 29/00**

(21) Application number: **96400129.1**

(22) Date of filing: **19.01.1996**

(84) Designated Contracting States:
DE GB SE

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(54) Low varying electric field and radiation CRT

(57) A CRT (10) whereby the periphery (13) of the screen (11) in contact with the remainder of the envelope is covered with metallic adhesive strips (12) or sprayed with metallic conductive paint so as to decrease the strength of the varying electric field and the energy of the non-ionising radiation.

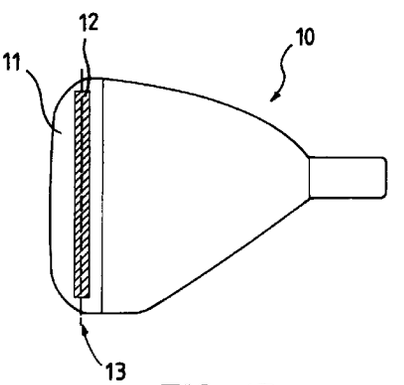

FIG. 1B

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Description

BACKGROUND OF THE INVENTION

FIELD OF INVENTION

The present invention relates to a CRT, and more specifically to a CRT whereby the peripheral of the screen in contact with the CRT envelope is covered with metallic conductive paint so as to decrease the strength of the varying electric filed and the energy of the non-ionising radiation.

DESCRIPTION OF PRIOR ART

Computers create powerful electric fields and radiation in the work environment. As a result, the Swedish Confederation of Professional Employees (TCO) has set certain standards related to monitors and keyboards. One of the requirements is that with the CRT at the first frequency band (5Hz - 2Hz), the electric field, measured 30 cm from the receiving instrument, cannot be higher than 10 V/m. At the second frequency band (2KHz - 400KHz), the electric field, measured at 30cm from the receiving instrument, cannot be higher than 1 V/m. Since the public's awareness of safety in the work place is increasing day by day, the standards set by the TCO have been widely accepted by computer manufacturers and soon will be accepted throughout the world.

The known technique utilized the addition of eye-protecting type screens to meet the TCO standards, but the costs related to this technique is too high.

SUMMARY OF THE INVENTION

One of the purposes of the subject invention is to create a simple and economical CRT, whilst conforming to the standards of the TCO through the technical characteristics recited in claim 1. Preferred embodiments of the invention are defined in the sub-claims. These and other objects, advantages and features of the present invention will be more fully understood and appreciated by reference to the written specification.

BRIEF DESCRIPTION OF THE DRAWINGS

Figures 1A and 1B show the subject invention having metallic adhesive strips on the CRT.

Figure 2 shows a test system for determining whether a given CRT conforms to the TCO standards.

Figures 3A and 3B show the test results from the system as shown in Figure 2, measured in the first and second frequency bands for a CRT without metallic adhesive strips.

Figures 4A and 4B show the test results, measured with the system as shown in Figure 2 and in the first and second frequency bands for a CRT with the metallic adhesive strips.

DETAILED DESCRIPTION OF THE INVENTION

Figures 1A and 1B show the front and side views of the subject CRT having metallic adhesive strips. The inventor has discovered that if metallic adhesive strips (12) are applied along substantial portions around the periphery of the screen (11) of the CRT (10), e.g. at the outer surface of the CRT, the strength of the electric field and energy of the non-ionising radiation can be decreased to conform to the standards of the TCO. This surprising result is shown from Figures 3 and 4. The metal used for the metallic strip is preferably copper or aluminium foil, and the material should cover at least a substantial portion of the contact surface (13) between the screen part (11) and the remainder of the CRT envelope (10). In addition, copper or aluminium foil may be replaced by applying metallic conducting paint e.g. on the outer surface of the CRT at the level of the aforementioned contact surface.

In Figure 2, a 17-inch CRT, such as the M41KVZ180 x 11(U) model by Hitachi, is positioned 30 cm from a receiving instrument (21), in accordance to the TCO standards, at the area (22) of receiving signals to test the strength of the electric field and the energy of non-ionising radiation emission from the CRT (20).

The tests, which used the system as shown in Figure 2, were conducted in the first and second frequency bands for CRTs both with and without the metallic adhesive strips. The following tables were obtained from the results : Table I (without metallic adhesive strips); Table II (with copper foil strips); and Table III (with aluminium foil strips). The frequencies 31, 48, 56 and 64 KHz, shown in the tables are the switching channels.

Table I (without metallic adhesive strips)

Specification / Frequency Band	Turn Table	Antenna Position	Results (V/m) 31 KHz	48 KHz	56 KHz	64 KHz
Band I	0^0	0^0(30cm)	18.67	19.85	14.67	20,40
Band II	0^0	0^0(30cm)	1.251	1.333	1.531	1.630

Table II (with copper foil strips)

Specification / Frequency Band	Turn Table	Antenna Position	Results (V/m) 31 KHz	48 KHz	56 KHz	64 KHz
Band I	0^0	0^0(30cm)	3.96	4.31	2.96	4.57
Band II	0^0	0^0(30cm)	0.547	0.510	0.627	0.668

Table III (with aluminum foil strips)

Specification / Frequency Band	Turn Table	Antenna Position	Results (V/m) 31 KHz	48 KHz	56 KHz	64 KHz
Band I	0^0	0^0(30cm)	3.97	4.43	3.06	4.68
Band II	0^0	0^0(30cm)	0.548	0.520	0.647	0.678

It can be seen from Table I that if a CRT is not covered with metallic adhesive strips, the electric field emitted in the first frequency band (5Hz - 2KHz) and second frequency band (2KHz - 400 KHz) in both cases exceeds the TCO standards of 10 V/m and 1 V/m respectively. As Tables II and III indicate, it is clear from the test results that the present invention completely conforms to the standards of the TCO. Therefore, the subject invention is able to lower the varying electric field to comply with the TCO's requirements.

Figures 3A and 3B show the test results of a CRT without metallic adhesive strips. The tests were conducted by using an oscilloscope probe in the first and second frequency bands. In Figure 3A, at 60Hz (first frequency band), the amplitude is 39 Vp-p (peak-to-peak voltage). In Figure 3B, at 64KHz (second frequency band), the amplitude is 22.3 Vp-p respectively.

Yet, compared to Figures 4A and 4B, the amplitudes ore only 29 and 9.4 Vp-p respectively. The present invention clearly decreases the strength of non-ionising radiation.

Claims

1. A cathode ray tube (10) defining an envelope comprised of a screen (11) having a peripheral portion (13) joining with the remainder of the envelope, characterized in that at least a substantial part of said peripheral portion is provided with an electrically conductive material (12) so as to decrease the strength of the varying electric field and the energy of the non-ionising radiation.

2. A cathode ray tube (10) as claimed in claim 1, wherein said electrically conductive material (12) is provided on the outer surface of at least a substantial portion of said peripheral portion (13).

3. A cathode ray tube (10) as claimed in claim 1 or 2, wherein said electrically conductive material (12) is provided substantially along the entire periphery of said peripheral portion (13) except at comers thereof.

4. A cathode ray tube (10) as claimed in any one of claims 1 to 3, wherein said conductive material is in the form of a metallic adhesive strip, e.g. made of copper or aluminium.

5. A cathode ray tube (10) as claimed in any one of claims 1 to 3, wherein said conductive material comprises a conductive paint.

6. A CRT apparatus as claimed in claim 5, wherein said metallic conductive paint is copper based.

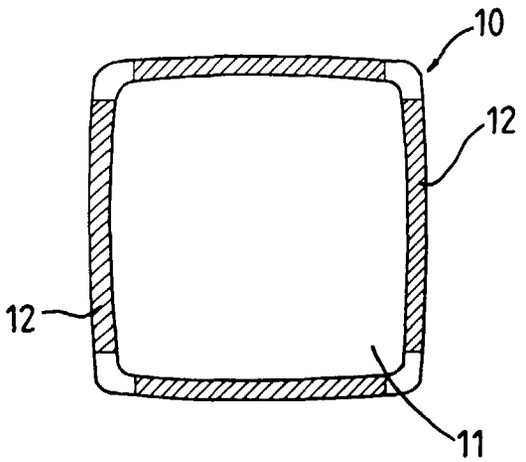

FIG. 1A

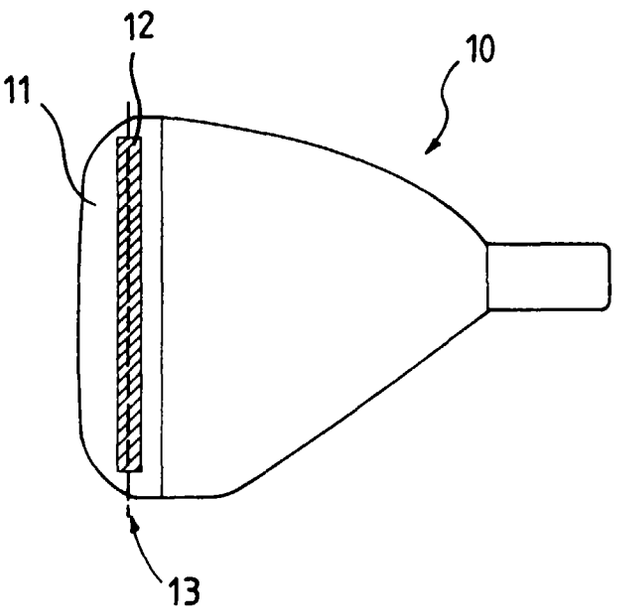

FIG. 1B

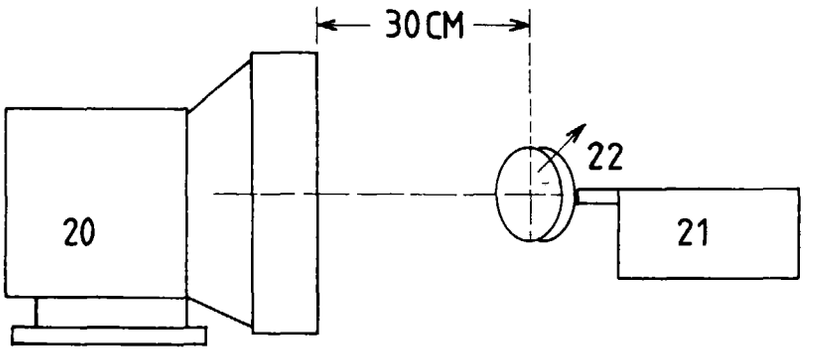

FIG. 2

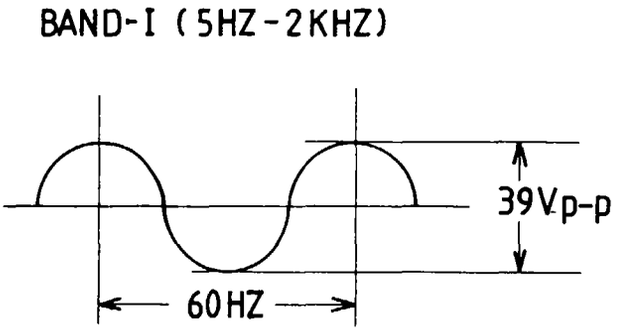

FIG. 3A

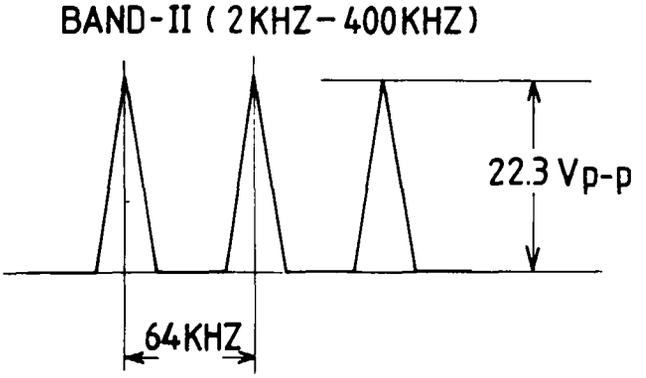

FIG. 3B

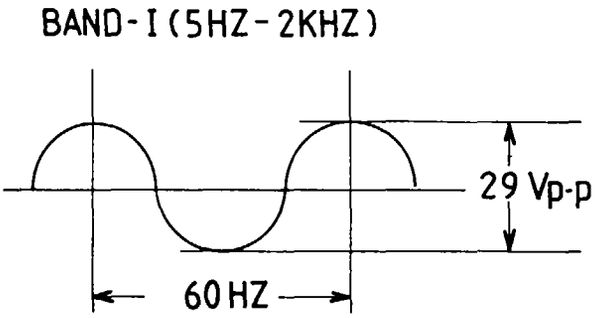

FIG. 4A

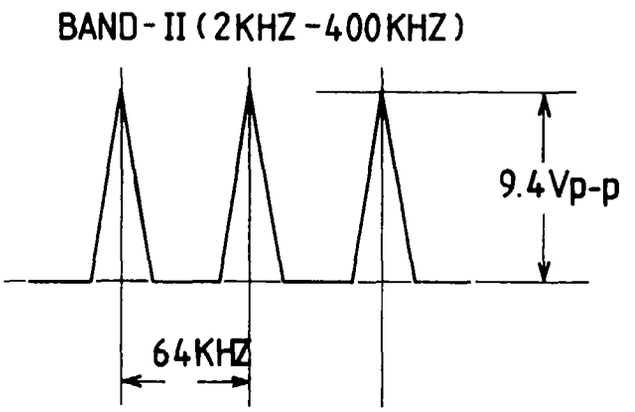

FIG. 4B

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 40 0129

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP-A-0 179 298 (BERTHELSEN VIGGO) 30 April 1986 * claims 6-10; figures 1-3 *	1,4	H01J29/00
A	DE-A-43 30 952 (MITSUBISHI ELECTRIC CORP) 10 March 1994 * claims 1-15 *	1	
A	DE-C-41 23 565 (TANDBERG DATA) 17 September 1992 * claims 2-10 *	1	
A	EP-A-0 547 856 (SONY CORP) 23 June 1993 * claims 1-10 *		
A	WO-A-91 15869 (FRIBAB AB) 17 October 1991 * claims 1-7 *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

H01J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17 June 1996	Van den Bulcke, E

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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