

The invention relates to a method and a device for regulating the static convergence and/or the purity of colour television tubes, particularly those of the perforated mask type.

5 It is known that a colour television tube comprises a screen on which luminescent substances (or phosphors) are deposited, such substances being arranged in triads in which each dot (termed a luminophore) on being excited emits a primary colour, e.g. red, green or blue. The
10 excitation is produced by an electron beam created by an electron gun allocated to a specific colour. The three electron beams have different directions in order that the three pencils of these beams which pass through a single aperture of the mask shall strike different points
15 on the screen, each point of impact being one part of a luminophore called a chromatom. The regulation which involves adjusting the direction of each beam so that it excites only the colour for which it is intended is called purity regulation.

20 However, even when the purity regulation is correct, the reproduction of colours is not necessarily perfect: it is also essential that the chromatoms in each triad are not too far from each other. For if the eye is to have the impression that it is seeing a white or uniform
25 spot when there are in fact three luminous dots of the three primary colours, these luminous dots must be sufficiently close to each other. To achieve this, the points of impact of the three beams are arranged so that they are superimposed on the screen in the absence of the
30 mask. The regulation that enables this to be achieved is called convergence regulation.

Both purity and convergence regulation are obtained on the one hand by means of steady magnetic fields produced by one or more magnets and on the other hand by
35 correctly positioning the deflecting system (used for deflecting the electron beams to produce the scanning) with respect to the rest of the tube.

The regulation of purity and static convergence (i.e. convergence at the centre of the screen without scanning) is carried out by means of permanent magnets. The invention relates to this type of regulation.

5 It concerns more particularly the regulation of purity and static convergence in tubes incorporating a magnetized ring arranged around the neck of the tube. This ring is made, for example, of a flexible material known as "plastoferrite", which consists of the ferrite
10 embedded in a plastic material.

To carry out the regulation of purity and static convergence, a certain number of poles, e.g. eight, are created in the magnetizable ring and distributed regularly about the axis of the ring, the intensity of magnetization (i.e. the induced magnetism) of each pole being
15 dependent on the set of corrections to be made.

The magnetization of these various poles has until now been achieved by means of coils in a specified position held in a fixed support (FR-A-2,399,120) or in a
20 support in the form of a clamp (FR-A-2,502,386). However, because the magnetizable rings are not all the same size and also because the necks of the tubes do not all have identical dimensions, the current to be supplied to each coil to magnetize the ring (in order to produce the corrections for purity and static convergence) varies from
25 one tube to another. As a result, the regulation differs from one tube to another, which is a nuisance for mass production. In addition, the scatter of values makes it difficult to automate the regulation.

30 The invention does not have this disadvantage.

It is characterized in that each coil is integral with a support, or jaw, capable of motion perpendicular to the axis of the tube in such a manner that, at the time of magnetization, this coil - and/or the core around
35 which it is wound - may be applied to the periphery of the magnetizable ring.[sic] around which it is wound, against the said ring. In this way, a current of a given

intensity in a coil creates a magnetic pole having a well-defined induction. Such reproducibility facilitates the regulation and enables it to be automated. In fact, a prior calibration makes it possible to draw up, for each type of tube, a chart giving the intensity of the current to be supplied to each coil in order to correct an error in the static convergence or the purity as a function of the value of this error, whereas with previously known methods such a calibration cannot be carried out or is not accurate enough.

Each coil is preferably at the end of a jaw.

For automatic magnetization of the ring in order to regulate the purity and static convergence, a device for measuring the errors in the purity and static convergence is used and, because the relationship between each error and the current to be supplied to each coil is known from the said prior calibration, a means of computation is used so that each coil receives the amount of energy it needs to achieve the correction.

For the measurement of errors in the static convergence, the device described in EP-A-0,037,766 (FR-A-2,480,032) may be used; and for the measurement of errors in the purity, the device described in US patent US-A-4,001,877 may be used.

Other characteristics and advantages of the invention will appear with the description of certain methods of implementing it, such a description being given with reference to the appended diagrams, amongst which:

- Figure 1 is a drawing of a device for the regulation of purity and static convergence according to the invention, and

- Figure 2 is a drawing of an arrangement in which the device of Figure 1 is used.

A ring 10, flexible and magnetizable, made of plastroferrite for example, is mounted around the neck 11 of a colour television tube. In one type of construction, this tube is a perforated mask tube with

three in-line guns, i.e. such as to produce three electron beams in the same plane.

The ring 10 is intended to be magnetized in order to create magnetic fields to deflect the electron beams with the aim of obtaining colour purity, i.e. so that the beam from the gun intended for the blue phosphors reaches phosphors exclusively of that colour and, similarly, so that the guns intended to excite the red and green phosphors respectively produce beams reaching only these phosphors. The magnetic fields created by the magnets formed in the ring 10 are also to be used for the purpose of regulating the static convergence, i.e. they ensure that the three beams, in the absence of scanning, produce the same trace at the centre of the screen, assuming that the mask containing the perforations is removed.

In the example, eight poles are created in order to carry out these regulations.

To this effect, the device 12 (Figure 1) according to the invention comprises eight jaws 13, each of which is guided radially, i.e. perpendicular to the axis 14 of the tube, and has a narrow end 15 around which is wound a magnetizing coil 16.

The jaws 13 thus have a dual function: firstly, they enable the flexible ring 10 to be pressed against the periphery of the neck 11 (this ring nevertheless being previously stuck to the neck 11) and secondly, they apply the coils 16 directly to the external surface of the ring 10. Moreover, the end 15 forms a magnetic core. It should be noted that it is not essential that the coils should be applied to the ring 10: it is sufficient if the cores 15 are in contact with this ring. However, it is preferable, in order to achieve the maximum efficiency, as is the case in the example, for the end of the coil 16 to be in contact at the same time as the end face of the core 15 is against the ring 10. In other words, in the example, the turn at the end of the coil 16 is in the same plane as

the end face of the core 15.

To carry out the initial regulation of purity and static convergence, the following procedure is adopted. A device 20 (Figure 2) for measuring errors on the screen produces electrical signals which are sent to a computer 21, programmed to provide the values of the currents to be supplied to the coils 16 in order to obtain a resultant action which corrects the measured errors. The program is easy to construct for anybody skilled in the art: a prior calibration makes it possible to determine the relationship existing between the errors in the purity and static convergence measured on the screen and the currents to be supplied to each coil in order to obtain a correction of the errors, the said calibration being made possible by eliminating the gap between the coils 16 and the plastoferrite 10, whereas with methods used previously the magnetizing coils were fixed which, in view of the scatter in the dimensions both of the diameters of the necks of the tubes and dimensions of the rings 10, did not allow an accurate calibration to be carried out.

When the regulation has been completed, the jaws are withdrawn from the ring 10.

The regulation can be carried out entirely automatically, a motor then being provided to move the jaws 13 towards and away from the rings 10, with corresponding means for controlling it.

CLAIMS

1. Device for regulating the purity and/or static convergence of colour television tubes making possible the formation, by the use of coils (16), of poles in a magnetizable ring (10) surrounding the neck (11) of the tube, characterized in that each coil (16) is integral with a support (13), or jaw, capable of motion perpendicular to the axis (14) of the tube in such a manner that, at the time of magnetization, this coil -and/or the core (15) around which it is wound - may be applied to the periphery of the ring (10).
2. Device according to Claim 1, characterized in that each coil is at the end (15) of the support (13), the end constituting the said core.
3. Device according to Claim 1 or Claim 2, characterized in that the magnetizable ring (10) is made of a flexible material.
4. Device according to any one of Claims 1 to 3, characterized in that it comprises means (20) for measuring purity and static convergence errors on the screen, the said means supplying a signal representing such errors, a means such as a programmed computer (21) supplying a signal representing the intensity of the different currents to be supplied to the coils (16) in order to obtain a resultant action which corrects the measured errors and a means of supplying the coils using such signals.
5. Device according to any one of the preceding claims, characterized in that the number of poles, and thus the number of coils (16), is equal to eight.
6. Method for regulating the purity and the static convergence of a colour television tube as for instance one of the perforated mask type and with three in-line guns, in which a magnetizable ring (10) is magnetized with the aid of current-carrying coils, characterized in that the displacement of each coil (16) and/or of each core (15) around which it is wound is controlled individually in



such a manner as to apply each of these coils (16) or each of these cores (15) to the ring (10) to effect magnetization, the intensity of the current supplied to each coil (16) being determined by a computer (21) associated with a means (20) of measuring faults on the screen.

