The invention relates to a picture reproduction device with a cathode-ray tube and a circuit arrangement for measuring the beam current during a particular period of time, in particular during some lines outside the picture to be reproduced, for the automatic adjustment of the cut-off point of the electron beam system.

Picture reproduction devices possess a cathode-ray tube whose luminescent coating has an efficiency varying from tube to tube due to manufacturing tolerances. Said efficiency of one and the same cathode-ray tube may also vary during the latter's service life. Picture reproduction devices of this kind are therefore provided with an automatic feature which, if the luminance is small, holds the latter constant. Said holding constant is important in particular in the case of three-gun coloured picture tubes with electron beam systems for red, green and blue, in order that no colour distortions can occur, particularly in the case of small luminance values. To this end the cut-off points of the three beams have to be adjusted precisely to one another. If the luminance is small, the human eye reacts particularly sensitively to colour distortions, for which reason the adjustment and stability of the cut-off points is particularly important precisely in the case of coloured picture tubes. Because of the varying efficiencies of the luminescent phosphoruses, the optimum cut-off point is different for each beam system. There corresponds to each cut-off setting a quite specific beam current, which is measured and held constant by means of a control loop. Said beam current is of the order of magnitude of 30 $\mu$A. To enable the beam current to be measured, there are generated during the period of particular lines, in the case of three-gun tubes during one line per system respectively, the measurement beams corresponding to the cut-off point. With normal television receivers this takes place during the non-visible sweep of the electron beams, i.e. outside the screen content to be reproduced, e.g. during the 17th, 18th and 19th lines. This is possible because usually the picture reproduction screen is over-written, so that the measured lines remain invisible, but the measurement circuit evaluates beam currents occurring during said lines.
The situation is otherwise in the case of the so-called monitors, with which the screen is greater than the raster reproduced. As a result the measured lines can visibly obtrude, which is perceived as interference.

The aim of the invention is to eliminate said interfering effect of the measured lines. This aim is achieved by the measure given in the main claim. Other advantageous developments of the invention are described in the sub-claims.

The invention is described below with reference to the drawing.

Figure 1 shows a first exemplifying embodiment and
Figure 2 shows a second exemplifying embodiment of the invention.

In Figure 1 there is shown a coloured picture tube 1 with its three electron beam systems R, G and B, which are activated from a video output stage 2. The coloured picture tube 1 possesses in addition to some grid clips (not shown in detail) also the high-voltage connection $U_H$ and the connection for the focusing voltage $U_F$ on the capacitor 3 via the resistor 4. In the case of an optimally adjusted focusing voltage, which is derived from the line transformer (not shown), the spot focus of the electron beams impinging on the screen is at its greatest.

The invention provides an arrangement 5 which sharply reduces the focusing during the period of the generation of the measurement beams. This takes place by the usual focusing voltage of the order of 5 kV being clamped to a fixed lower value. To this end there is generated from the sync pulse Sy, by means of the amplitude filter 6, the vertical blanking pulse which activates via a driver stage 7 and a differentiating stage 8 a high-vacuum tube 9, whose cathode is connected to a 21 V bus provided in any case in the picture reproduction device. The focusing electrode of the cathode-ray tube 1 is thus connected to said 21 V pulse-wise via the transfer element 10. This results in a defocussing of such strength of the electron beams that they are no longer visible, particularly as the beam current is extremely small at this time.

Figure 2 shows the solution with a switching transistor 11, which is connected via a transformer 12 to the focus electrode of the cathode-ray tube 1. There is coupled into the secondary winding 13 of the transformer 12 during the vertical blanking time a negative pulse voltage. In order to suppress interfering decay of said pulse, the transformer 12 is damped.

## Claims

1. Picture reproduction device with a cathode-ray tube and a circuit arrangement for measuring the beam current during a particular period of time, in particular during some lines outside the picture to be reproduced, for the automatic adjustment of the cut-off point of the electron beam system, characterised in that an arrangement (5) is provided which defocuses the electron beam during said particular period of time.

2. Picture reproduction device according to claim 1, characterised in that the arrangement (5) reduces the focusing voltage of the cathode-ray tube (1) by means of an electronic switch.

3. Picture reproduction device according to claim 2, characterised in that the electronic switch is formed by a high-vacuum tube (9) which is connected to the focus electrode of the cathode-ray tube (1).

In Figure 1 there is shown a coloured picture tube 1 with its three electron beam systems R, G and B, which are activated from a video output stage 2. The coloured picture tube 1 possesses in addition to some grid clips (not shown in detail) also the high-voltage connection $U_H$ and the connection for the focusing voltage $U_F$ on the capacitor 3 via the resistor 4. In the case of an optimally adjusted focusing voltage, which is derived from the line transformer (not shown), the spot focus of the electron beams impinging on the screen is at its greatest.

The invention provides an arrangement 5 which sharply reduces the focusing during the period of the generation of the measurement beams. This takes place by the usual focusing voltage of the order of 5 kV being clamped to a fixed lower value. To this end there is generated from the sync pulse Sy, by means of the amplitude filter 6, the vertical blanking pulse which activates via a driver stage 7 and a differentiating stage 8 a high-vacuum tube 9, whose cathode is connected to a 21 V bus provided in any case in the picture reproduction device. The focusing electrode of the cathode-ray tube 1 is thus connected to said 21 V pulse-wise via the transfer element 10. This results in a defocussing of such strength of the electron beams that they are no longer visible, particularly as the beam current is extremely small at this time.

Figure 2 shows the solution with a switching transistor 11, which is connected via a transformer 12 to the focus electrode of the cathode-ray tube 1. There is coupled into the secondary winding 13 of the transformer 12 during the vertical blanking time a negative pulse voltage. In order to suppress interfering decay of said pulse, the transformer 12 is damped.

## Claims

1. Picture reproduction device with a cathode-ray tube and a circuit arrangement for measuring the beam current during a particular period of time, in particular during some lines outside the picture to be reproduced, for the automatic adjustment of the cut-off point of the electron beam system, characterised in that an arrangement (5) is provided which defocuses the electron beam during said particular period of time.

2. Picture reproduction device according to claim 1, characterised in that the arrangement (5) reduces the focusing voltage of the cathode-ray tube (1) by means of an electronic switch.

3. Picture reproduction device according to claim 2, characterised in that the electronic switch is formed by a high-vacuum tube (9) which is connected to the focus electrode of the cathode-ray tube (1).

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4. Picture reproduction device according to claim 2, characterised in that the electronic switch is formed by a transistor (11) which is connected via a transformer (12) to the focus electrode of the cathode-ray tube (1).

5. Picture reproduction device according to claim 4, characterised in that the transformer (12) is damped.

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