

In EP-A-0 097 884, published on 11.1.84, a switching network section for (a device with stand-by mode, more particularly for a television receiver) is described which forms the prior art according to article 54 (3) EPC. This switching network section has a first rectifier for producing a first, high operating voltage and a second rectifier for producing a second, low operating voltage which is active even in the stand-by mode. It operates without problem in the stand-by mode without using a relay even at low mains voltages and consumes only a low power in the stand-by mode.

Furthermore, this switching network section is characterised by the following features:

- a) With stand-by mode a voltage arising on the secondary side is coupled into the primary side circuit via an electrical isolating element isolated from the isolating transformer, such that the first voltage falls to a reduced value, at which subsequently connected stages no longer operate.
- b) The first operating voltage is utilised as the second operating voltage at its reduced value.

In order to implement the feature b) the first operating voltage is switched during stand-by mode by a switch comprising transistors to the path of the second operating voltage, so that the first operating voltage is active, at its reduced value, as the second operating voltage for the stages which are active in the stand-by mode. The electronic switch requires a certain power for through connection, so that heat has to be dissipated and cooling plates may be necessary for the transistors forming the switch. The power emission is therefore particularly disadvantageous, because the stand-by mode is present predominantly, i.e. approximately 80 to 90 per cent of the total time.

According to an article by Egon F. Nepf in the periodical "Electronics" 5/1981 from the publishers Franzis, Munich, on pages 113 to 116 it is known to use thyristor regulation for through connecting fairly high outputs in laboratory network sections which can be regulated.

The problem underlying the invention is to reduce the power consumption and the cost outlay for the required electronic switch.

This problem is solved by the invention described in claim 1. Advantageous modifications of the invention are described in the dependent claims.

As compared to a switch with transistors the thyristor has the advantage that it only has two conditions. Either it is completely blocked or completely through connected and it therefore consumes effectively no power in both conditions. A thyristor is also cheaper than a corresponding transistor. The thyristor acts advantageously as a controlled rectifier, which is blocked during normal operation and rectifies the a.c. voltage at the input of the first rectifier during stand-by mode and at the same time switches to the path of the second operating voltage. 16

An example of embodiment of the invention is explained by way of the drawings:

The switching network section according to the drawings includes, on the primary side of the isolating transformer 1, the mains rectifier 2, the charge capacitor 3, the measuring resistor 4, the primary winding 5, the switching transistor 6, the feedback winding 7 which serves to produce oscillation and the thyristor 8 which serves to control the switching transistor 6. The secondary winding 14 delivers a first operating voltage U1 via the rectifier 15 to the terminal f. A second secondary winding 19 delivers an operating voltage U2 for the remote control receiver 18 via the rectifier 20 and the diode 35 to the terminal g. Moreover a further operating voltage U3 is produced via the voltage stabiliser 36 at the terminal i. The dot-dash line 34 indicates the electrical isolating point between the mains and receiver circuit. The voltages U1, U2 have the stated low value during stand-by mode and the stated high value during normal operation. In the following the mode of action is described in succession for stand-by mode and normal operation.

Stand-by Mode

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The remote control receiver 18 delivers the setting signal 22 with the value + 5V. The transistor 37 is open, the transistor 38 is blocked, the optical coupler 23 has no voltage. As a result, the voltage at the RC element 39 on the primary side becomes so small and at such a low value that the current i1 is switched off, so that the switching network section only transmits the power required for stand-by mode. The voltage U1 has a value of 15 V, at which the subsequent stages no longer operate. The voltage U2 at the terminal g would also drop so far that the remote control receiver 18 no longer operates. However, the latter has to continue to be supplied with operating voltage during stand-by mode. To this end the a.c. voltage input k of the rectifier 15 is connected via the series circuit of the thyristor 40 and diode 41 to the terminal g. The transistor 42 is blocked by the conducting transistor 37. The a.c. voltage at the input k reaches the control electrode of the thyristor 40 via the capacitor 43 and conductively controls this periodically with positive half waves. The diode 44 prevents negative voltage pulses from occurring at the control electrode. The thyristor 40 acts as a rectifier and produces an operating voltage of $U2 = 12$ V at the terminal g from the a.c. voltage at the point k, said operating voltage being sufficient for the remote control

receiver 18.

(7)

Normal Operation =====

The remote control receiver 18 delivers a setting signal 22 with the value 0. The transistor 37 is blocked. The voltage U2 reaches the transistor 38 as an operating voltage, so that the optical coupler 23 is supplied with current. As a result, the voltage at the RC element 39 and thus the final value of the periodic current i1 are increased so that the switching network section transmits the power necessary for normal operation and the voltages shown assume the stated high values. A regulating voltage reaches the transistor 38 from the potentiometer 45. The said regulating voltage controls the voltage at the RC element 39 too in the sense of stabilising the output voltages U1, U2, U3. The voltage U2 also reaches the base of the transistor 42, so that it is conductive and the control electrode of the thyristor 40 goes to earth. The thyristor 40 can no longer now be conductively controlled by the pulses via the capacitor 43 and remains blocked. The points k and g are decoupled from one another as a result. A voltage of U1 = 150 V is now applied to the terminal f and a voltage of U2 = 15 V is applied to the terminal g. The diode 41 serves for decoupling in order to keep the voltage U2 away from the thyristor 40.



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PATENT CLAIMS

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1. A switching network section for a device with stand-by mode, more particularly for a television receiver, with a first rectifier (15) for producing a first, high operating voltage (U1) and a second rectifier (20) for producing a second, low operating voltage (U2) which serves to maintain the stand-by mode, in which the first operating voltage (U1) is switched over during stand-by mode to a low value (15V) and is applied via an electronic switch to the path (g) of the second operating voltage (U2) and the electronic switch is formed by a thyristor (40) lying between the a.c. voltage input (k) of the first rectifier (15) and the path (g) of the second operating voltage (U2), and operating as a controlled rectifier.
2. A network section according to claim 1, characterised in that a setting signal (22) causing switchover and the a.c. voltage from the input (k) of the first rectifier (15) are applied to the control electrode of the thyristor (40).
3. A network section according to claim 2, characterised in that the control electrode is connected via a capacitor (43) to the input (k) of the first rectifier (15) and via a diode (44) to earth.

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LEGEND
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Fernb.- Empf.

rem. contr. receiv.