Durst EST 500

REPAIR INSTRUCTIONS

Durst®
PHOTOTECHNIK

1. INTRODUCTION

The EST 500 is an electronic voltage stabiliser functioning according to the phase angle control principle. Due to the low electrical loss, the adjustment resp. control is effected on the primary winding. The EST 500 supplies the voltage for operating the CLS 500 colour head and the VLS 500 light source.

2. TECHNICAL DATA

Input voltage range	:	180 – 240 V / (90 – 130 V) 50 – 60 cycles
Power consumption	:	300 VA
Output voltage	:	24 V
Output power	:	275 VA

3. GENERAL DESCRIPTION OF OPERATION

The load circuit consists of thyristors Th 1 and Th 2 as well as transformer Tr 1, which feeds the colour head's lamp. The actual voltage is measured at thyristor Th 1 and reaches differential amplifier Ic 1c/d. It functions as R.M.S. converter and supplies a direct voltage to be compared with the reference voltage – produced by D 10, D 11 and adjusted by P 1 – in comparator IC 1a/b.

The control voltage at the output of comparator IC 1a/b is directly proportional to the brightness of the colour head's lamp and is passed on to the pulse generator.

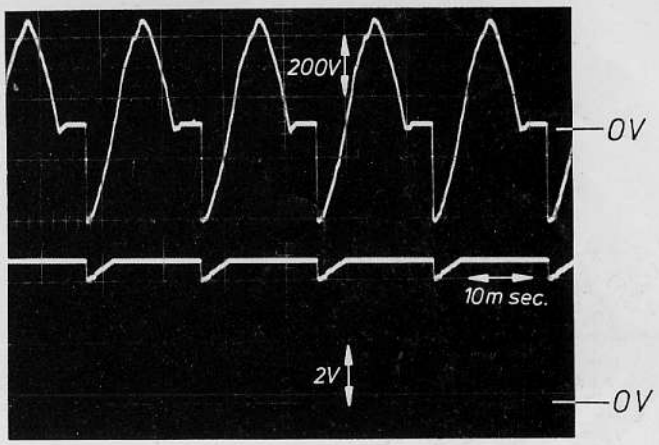
The pulse generator produces the ignition pulses in proportion to the magnitude of the IC 1a/b comparator's output voltage. These ignition pulses are required for switching the two thyristors Th 1 and Th 2. The pulse generator is synchronised with the line frequency by optical coupler OK 1. The circuit board features also a protective circuit, consisting of components T 5/C 5/IC 1e. It monitors the triggering of both thyristors and prevents, in cases of misfiring, the reaction of the fuse on account of the D.C. voltage share in the transformer.

4. DETAILED DESCRIPTION

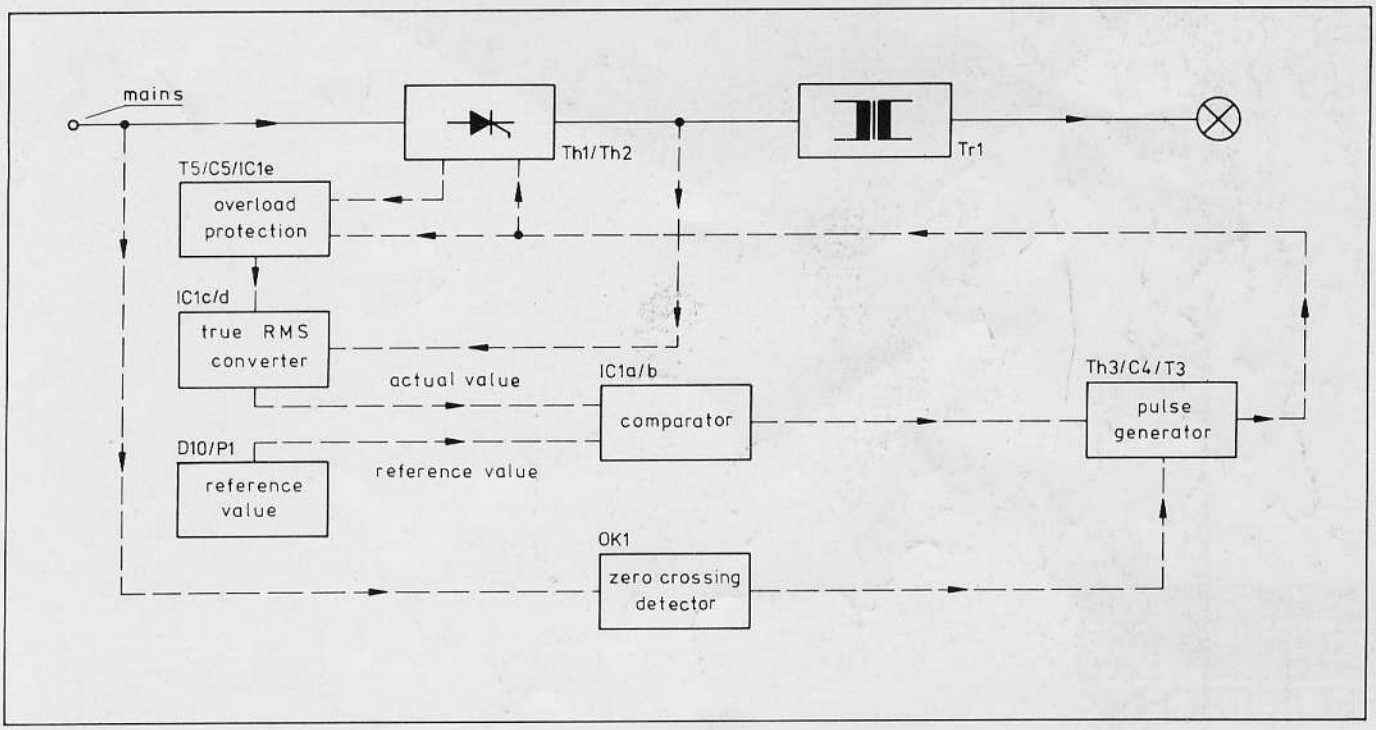
(see enclosed circuit diagram)

The phase angle controlled voltage is rectified by diode D 16, then evened out via condensator C 11 and stabilised by D 13. It amounts to 15 V and serves as supply voltage for the electronics. This voltage is also the actual voltage being picked off via D 15. (see oscillogram 1 a).

(D 15 and D 12 are located underneath IC 1 and are fitted with a heat conducting paste to compensate for temperature variations of IC 1).



a) actual value (D 15/D 16)
b) RMS value (IC 1d/11)



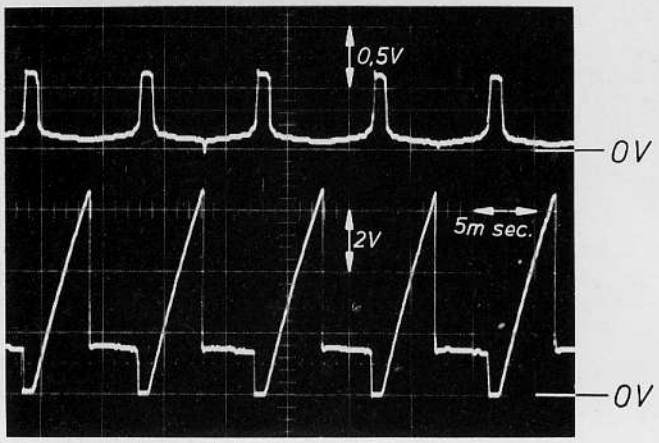
This voltage reaches the base of IC 1c and controls transistor IC 1d via emitter resistor R 28. The bias voltage for IC 1c/d is furthermore stabilised via D 14. The transistors IC 1c/d function as differential amplifiers and make up the R.M.S. value of the phase angle controlled voltage. This voltage appears at Pin 11 of IC 1d (see oscillogram 1b) and is screened via condensator C 10 and transferred to Pin 2 of IC 1a. Also IC 1a/b is a differential amplifier. At Pin 4 of IC 1/b there is the reference voltage, stabilised by D 10, D 11, evened out by C 12 and picked off at the brush of P 1. This voltage amounts to approximately 14 V. At Pin 1 of IC 1a there appears the differential voltage between actual and reference voltage which is then transferred via transistor T 3 to the pulse generation.

Condensator C 4 functions with PUT (Th 3) for the generation of the trigger pulses. The current supplied by transistor T 3 charges condensator C 4. As soon as the condensator voltage reaches the value of the gate voltage of PUT (Th 3) – approximately 6 V – the latter cuts through (see oscillogram 2b). The pulse generated by PUT (Th 3) is amplified via transistor T 4 and transferred to the gates of thyristors Th 1 and Th 2 (see oscillogram 3 a/b).

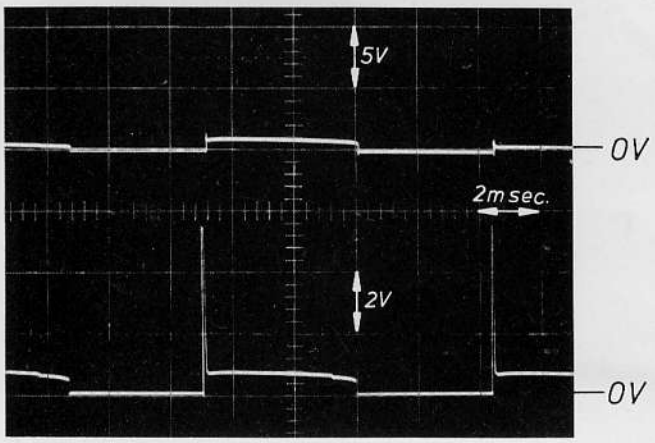
The optical coupler OK 1, which is directly connected to the mains voltage via diodes D 3 – D 6, has the task of completely discharging condensator C 4 during each zero phase passage of the sine wave. The phototransistor in the optical coupler locks briefly during the zero passage phase, transistor T1 becomes therefore conductive and discharges condensator C 4 (see oscillograms 2 a/b).

The circuit board features a protective circuit, too. It makes sure that fuse Si 1 doesn't burn through if either one of the two thyristors (Th 1 and Th 2) should misfire (this would be the case on account of a D.C. voltage share appearing suddenly in the primary winding of Tr 1).

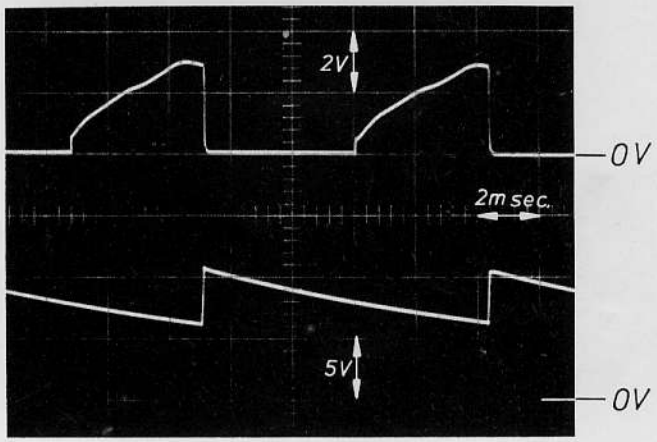
The phase angle controlled voltage is picked off via resistors R 34 and R 35 and transferred to the base of transistor T 5 (see oscillogram 4a). At the same time the output pulse of PUT (Th 3) is at the collector or transistor T 5. These two pulses bring about the charging of condensator C 5 (see oscillogram 4 b).



a) synchronisation (OK 1)
b) saw tooth (R71C4)



a) trigger pulse (R1/R2)
b) trigger pulse (R6/Th 3)



a) mains voltage (R 34/R 35)
b) protection circuit (C 5/R 10)

Condensator C 5 discharges continuosly via transistor T 2, but it is always charged again after each ignition. If either one of the two thyristors shouldn't ignite, condensator C 5 is completely discharged, transistor T 2 locks and transistor IC 1e becomes thus conductive, simulating too high an actual voltage at the base of IC 1a. The output voltage falls therefore off until it reaches an innocuos value.

5. ADJUSTMENT OF THE OUTPUT VOLTAGE

The 23,5 V output voltage of the EST 500 may be adjusted by turning potentiometer P 1.

Note:

- The measurement must be taken off the lamp socket.
- The stabiliser's output must be loaded.
- Since it is a phase angle controlled alternating-current voltage, a true R.M.S. meter must be used.

We furthermore suggest to use a 2,3 Ohm (250 W) wire resistance in place of the lamp when making the adjustment.