POWER SUPPLY BOARD 12.9 V
LDK 4811/00

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A. TECHNICAL DATA

Input voltages	: approx. -15 V and +300 V
Output voltages	: -12.9 V; -6,45 V and +52 V; short-circuit proof.
Output current	: -12.9 V max. 700 mA. -6.45 V max. 325 mA +52 V, 20 mA
Noise and ripple voltage	: For -12.9 V and -6.45 V units <5 mV For +52 V < 25 mV_{pp}
Stability	: <10 mV for 1 V input variation on the 12.9 and 6.45 V unit
Power consumption	: approx. 26 W

B. CHECKING AND ADJUSTING

With R14 the output voltage is adjusted to -12.9 V

C. CIRCUIT DESCRIPTION

Series transistor TS9 is controlled by differential amplifier TS2-3-4-5 via TS1. The differential amplifier is controlled as follows: The voltage on the output of the power supply is applied to long-tail pair TS2 and TS5. The setting of this long-tail pair is such that TS2 is more conductive than TS5, which is achieved with zener diode SP1 and precision resistors R4-R5. At increasing load current the output voltage will decrease. The full change is transferred to the base of TS5 and via the emitter of TS5 to the emitter of TS2. Part of the voltage variation reaches the base of TS2. TS2 and TS3 become more conductive and via TS1 the series transistor receives more current to compensate for the higher load.

As TS2 is more conductive, the emitters of TS2 and TS5 will become less negative so that TS5 and , consequently, TS4 become less conductive. Therefore, TS2 and TS3 will be more conductive at increasing load current, while TS4 and TS5 will become less conductive. The circuit has been proportioned so that when a certain load current is exceeded the output voltage and the output current decrease in such a manner that a certain dissipation is not exceeded.

The charachteristic is shown in the figure.

The shape of the characteristic is obtained as follows:

At increasing load TS4 and TS5 become continually less conductive. TS2 has a low emitter impedance because it is parallel-connected to the emitter circuit of TS5.

When TS5 is cut off at a certain load the emitter impedance of TS2 is no longer low. TS2 is then strongly fed back by R7. TS3 is strongly fed back by R8 because TS5 is also cut off.

On account of the feedback the current control for TS1 and TS9 is greatly reduced (cross-over point in the curve). In this condition the Ic of TS3 is proportionale to V_{R8}, which in turn is proportional to the Ic of TS2 and consequently to V_{R4} The current applied to TS9 varies linearly with the Ic of TS3, which in turn is a linear function of V_{R4}. Consequently, V_{R4} will be a linear function of the output voltage.

In the situation described, the current of TS9 follows a resistance line. The cross-over point is not abrupt on account of the curvature of the Vb and Vce curves of TS5 and TS4.

In the case of a short-circuited output, TS3 should be conductive. If this is not the case, TS9 would remain cut off after removal of the short-circuit, because TS3 only supplies current when there is an output voltage. However, this output voltage can only arise when TS9 supplies current. Via R2 transmitter TS3 yet becomes conductive ot some extent at short-circuited output so that the above-mentioned effect is avoided.

The value of the output voltage is determined by selection of R14. R13 serves for temperature stabilisation of SP1.

For the heater supply of the plumbicons a voltage of 6.45 V is required (= 6.3 V + 2.5 %). The voltage is derived from the voltage on R4-R5. Via current amplifier TS6-7-8 the required current is supplied to the 6.45 V output. R20 is the common emitter resistor. GR2 protects the plumbicons in case of a short-circuit between

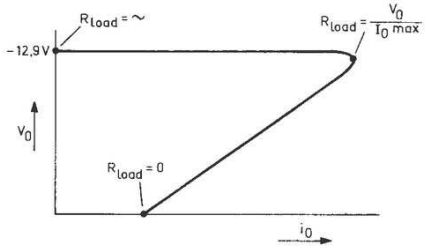
the -6.45 V line and earth. Otherwise 12.9 V would arise across the two plumbicons between the -12.9 and -6.45 V. On account of the short-circuit, amplifier TS6-7-8 is cut off. Via diode GR2 the base voltage of TS5 becomes practically 0 V, TS4 and TS5 are cut off, TS9 receives a small drive signal and the output voltage of the power supply becomes very low.

If there is a short-circuit in one of the plumbicon heater circuits between the -12.9 V and the -6.45 V, TS8 will become highly conductive on account of its low emitter resistance. This current is limited by GR1. The collector of TS8 becomes strongly negative and so does the base of TS4 via GR1.

The emitter voltage of TS3 rises, TS3 supplies less current and via TS1-TS9, the -12.9 V decreases so that the current of TS8 is reduced.

If on account of a defect in the power supply the output voltage tends to increase, the output voltage will be limited to max. 40 V with SP2-SP3.

The 300 V input voltage is reduced to a voltage of +54 V by SP4-5. This voltage is used as supply voltage for the blanking and parabola generator.



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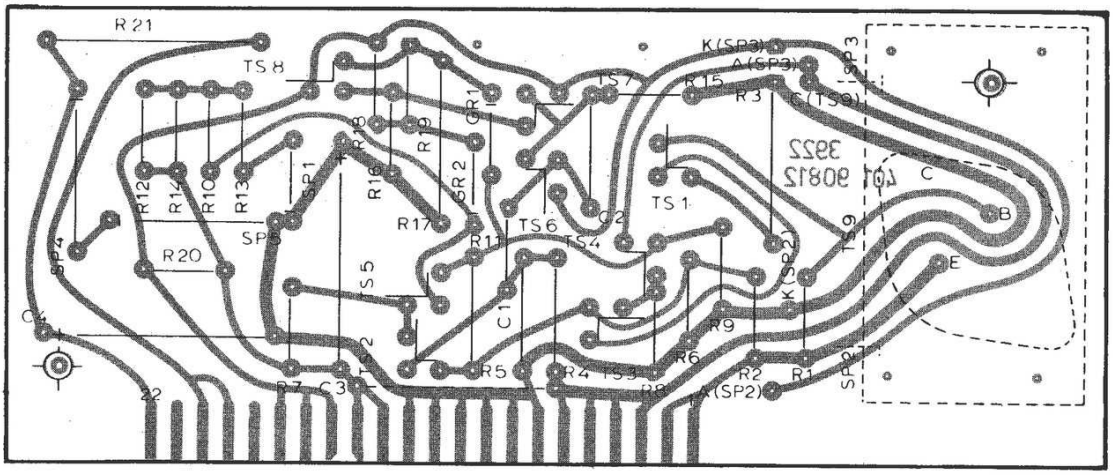
D. SERVICE PARTS

1. Mechanical

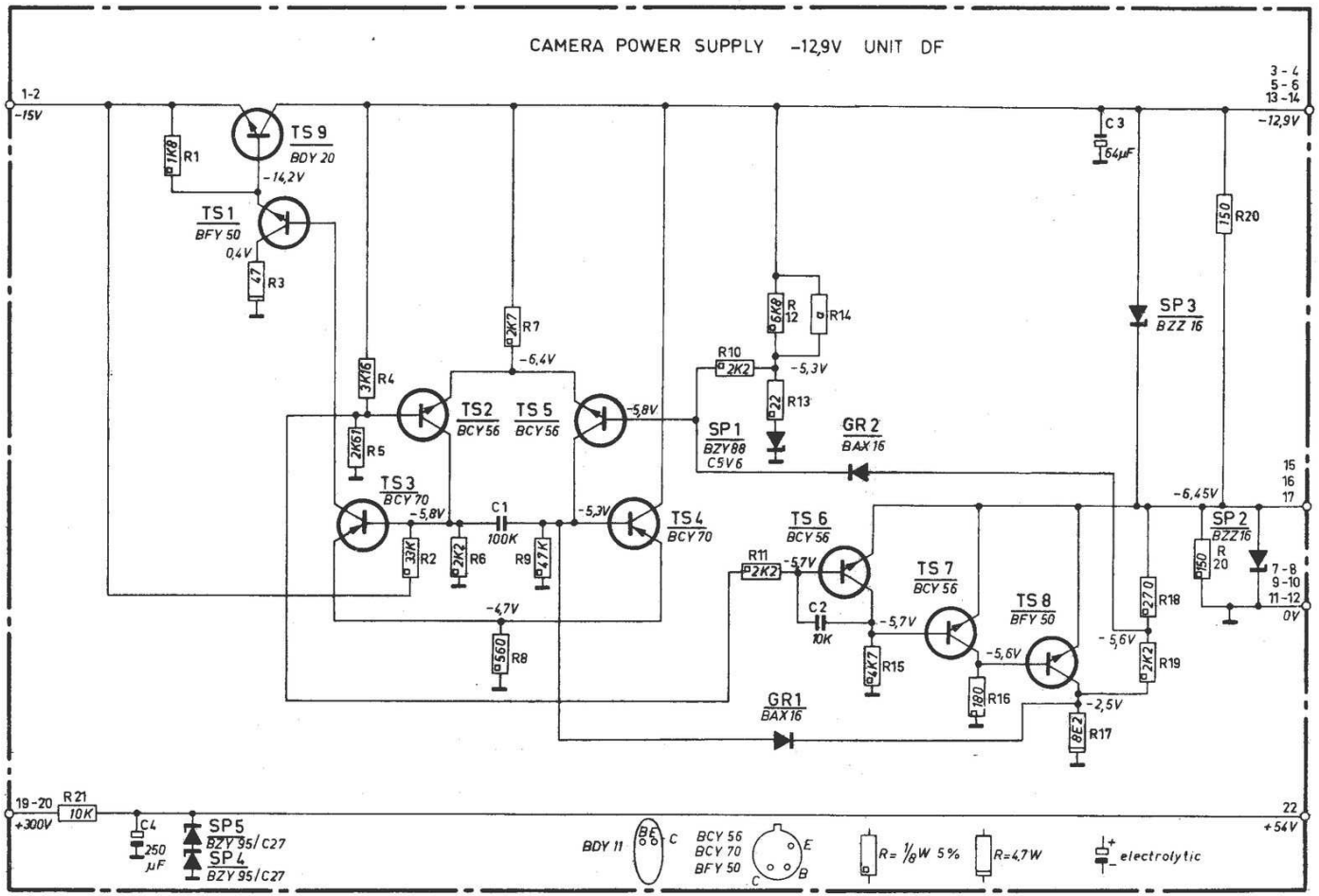
	Nylon spacer for transistors	4822 255 40006

2. Electrical

Item Pos	Description	Code number
C1	0,1 µF - 100 V Capacitor	4822 121 40036
C2	10 KpF - 100 V Capacitor	4822 121 40088
C3	64 µF - 16 V Electrolytic capacitor	4822 124 20377
C4	250 µF - 64 V Electrolytic capacitor	4822 124 20396
R4	3160 Ω - 0.25% Precision resistor	4822 113 10111
R5	2610 Ω - 0.25% Precision resistor	4822 113 10339
Ts1 - Ts8	BFY 50 Transistor	4822 130 40294
Ts2 - Ts5 Ts6 - Ts7	BCY 56 Transistor	4822 130 40325
Ts3 - Ts4	BCY 70 Transistor	4822 130 40324
Ts9	BDY 20 Transistor	4822 130 40449
GR1 - GR2	BAX 16 Diode	4822 130 30273
SP1	BZY 57 Zener diode	4822 130 30131
SP2 - SP3	BZZ 16 Zener diode	4822 130 30136
SP4 - SP5	BZY 95/C27 Zener diode	4822 130 30348


R21
TS8
TS7
K(SP3)
A(SP3)
R15
R3
E(TS9)
SP3
SP1
3822
30812
C
B
E
R12
R14
R10
R13
R1
R16
R17
TS6
C2
TS1
R11
TS4
SP4
R20
SP5
TS5
C1
TS9
K(SP2)
R9
R6
R5
R4
TS3
R8
R2
R1
A(SP2)
SP2
C3
R7
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