A 100W FIXED BIAS ULTRA-LINEAR AMPLIFIER

The circuit of this amplifier is given in Fig. 8 and it provides 100W output at 5% distortion with an h.t. potential of 560V. The performance is shown graphically in Fig. 9 and Table III gives the operating conditions for the output stage.

With fixed bias, the large change in anode current necessitates a low impedance power supply and, with normal rectifier circuits, an inductance-input-smoothing filter is essential. The smoothing capacitor should be of high value to prevent an instantaneous fall in h.t. potential upon the occurrence of a transient signal. Satisfactory performance will be obtained with a single inductor and a capacitance of 50—150µF. The circuit diagram shows two 160µF 450V electrolytic capacitors in series as an economical method of obtaining the required capacitance.

Reducing the h.t. potential to 460V, the load impedance to 4kΩ and the grid bias to —65V results in an amplifier giving 65W output. The performance of this version is shown in Fig. 10 and the appropriate operating data are included in Table III.

Protection Against Bias Failure

Should the bias supply fail, the KT88 anode currents would increase excessively and it is recommended that some device be incorporated for protecting the output tubes in the event of bias failure. The arrangement illustrated in Fig. 11 inserts a suitable resistor into the output stage cathode circuit which will enable the amplifier to function temporarily at half maximum output.

A triode, which could be one half of a double triode used also in the first stage of the amplifier, is connected in series with a relay across the main h.t. supply. The relay contacts are normally closed and short-circuit the emergency cathode resistor R1. The triode is held at cut-off by the connection of its grid to the bias supply at a point about 50V negative to earth. Should the bias fail, the grid of the triode will rise to earth potential and current will flow through the triode. This energises the relay, the contacts of which will open and bring into circuit the cathode bias resistor.
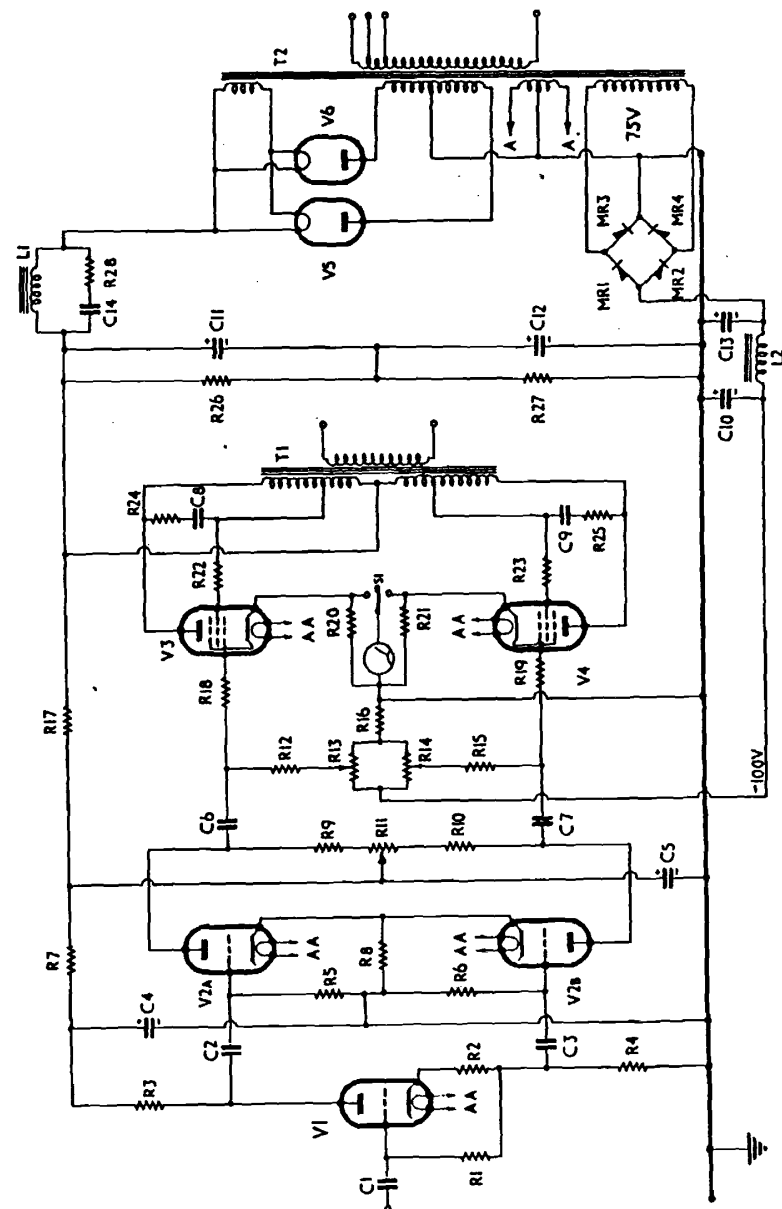
Fig. 8. Circuit diagram of the KT88 100W fixed bias ultra-linear amplifier. R26 and R27 equalise the voltages across C11 and C12, the series-connected smoothing capacitors. C14 and R28 prevent the build-up of high voltage transients across L1.

COMPONENT VALUES FOR FIG. 8

100W FIXED BIAS AMPLIFIER

GEC TUBES

V1	L63/6J5
V2	B65/6SN7
V3	KT88
V4	KT88
V5)	U19 (or GXU50 using separate HT
V6)	transformer with delay)

RESISTORS

(20%, 0.25W unless otherwise shown)

R1	1MΩ
R2	1.5kΩ
R3	33kΩ 1W)
R4	33kΩ 1W) matched to 5%
R5	470kΩ 10%
R6	470kΩ 10%
R7	33kΩ 1W
R8	1kΩ
R9	33kΩ 10% 1W
R10	33kΩ 10% 1W
R11	10kΩ (Pot)
R12	68kΩ 10% 0.5W
R13	20kΩ w.w. preset
R14	20kΩ w.w. preset
R15	68kΩ 10% 0.5W
R16	10kΩ 10% 1W
R17	4.7kΩ 1W
R18	5.6kΩ
R19	5.6kΩ
R20)	Meter shunts
R21)	
R22	270Ω 0.5W
R23	270Ω 0.5W
R24	470–1500Ω 0.5W
R25	470–1500Ω 0.5W
R26	100kΩ 10% 1W
R27	100kΩ 10% 1W
R28	10kΩ 0.5W

CAPACITORS

C1	0.01μF
C2	0.05μF
C3	0.05μF
C4	8μF 350V
C5	8μF 450V
C6	0.1μF
C7	0.1μF
C8	1000pF
C9	1000pF
C10	8μF 250V
C11	160μF 450V).each 100+60
C12	160μF 450V) dual
C13	8μF 250V
C14	0.01μF 750V

MISCELLANEOUS

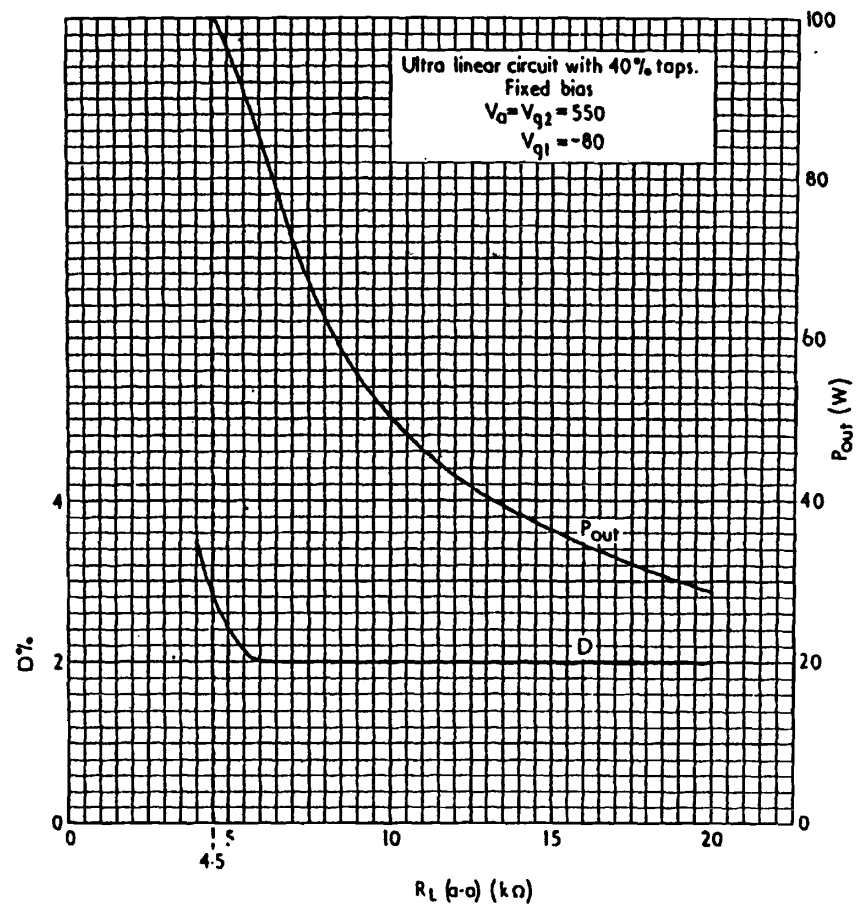|	
L1	5H 325mA
L2	20H 10mA
T1	100W Ultra-linear transformer
	4.5kΩ anode-anode (100W)
	4kΩ anode-anode (65W)
	Primary inductance: ≮40H
	Leakage inductances:
	Prim.–sec.: ≯6mH
	½ prim.–UL tap: ≯6mH
T2	Mains transformer
	Secondaries:
	*650–0–650V to give
	325mA d.c.
	6.3V 5A CT
	4V 7A
	75V 10mA (bias)
S1	1-pole 3-way
MR1)	
MR2)	75V 10mA
MR3)	
MR4)	

*If using GXU50, a separate H.T. trans-
former is required.

Fig. 9. Performance of the KT88 100W amplifier of Fig. 8.