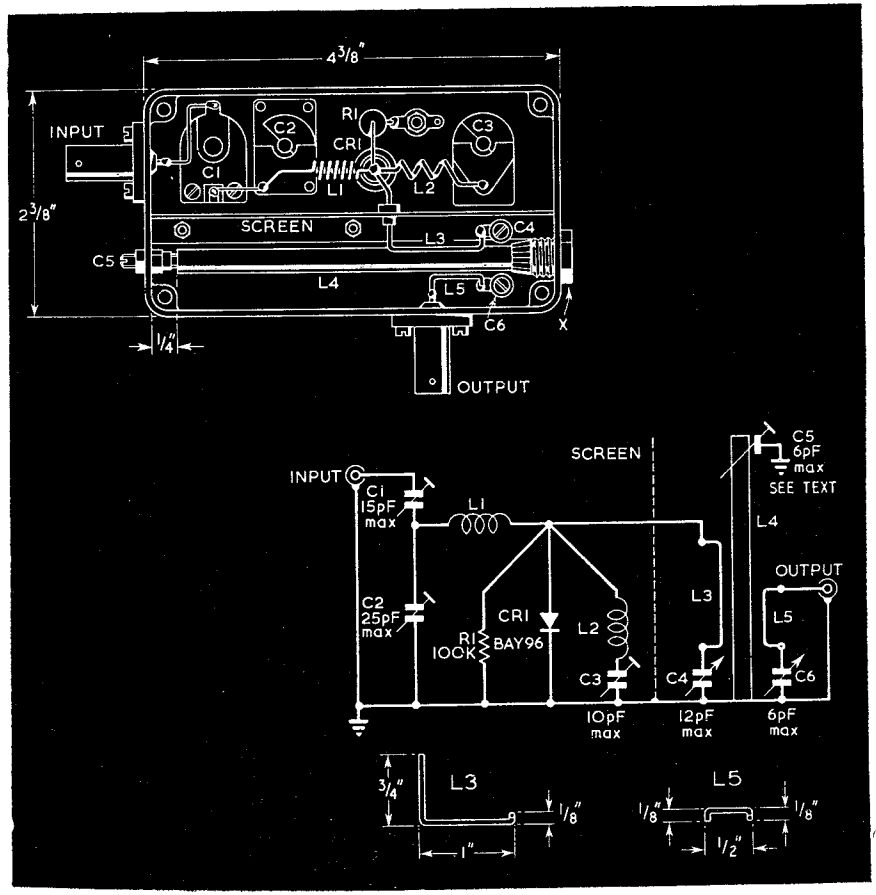
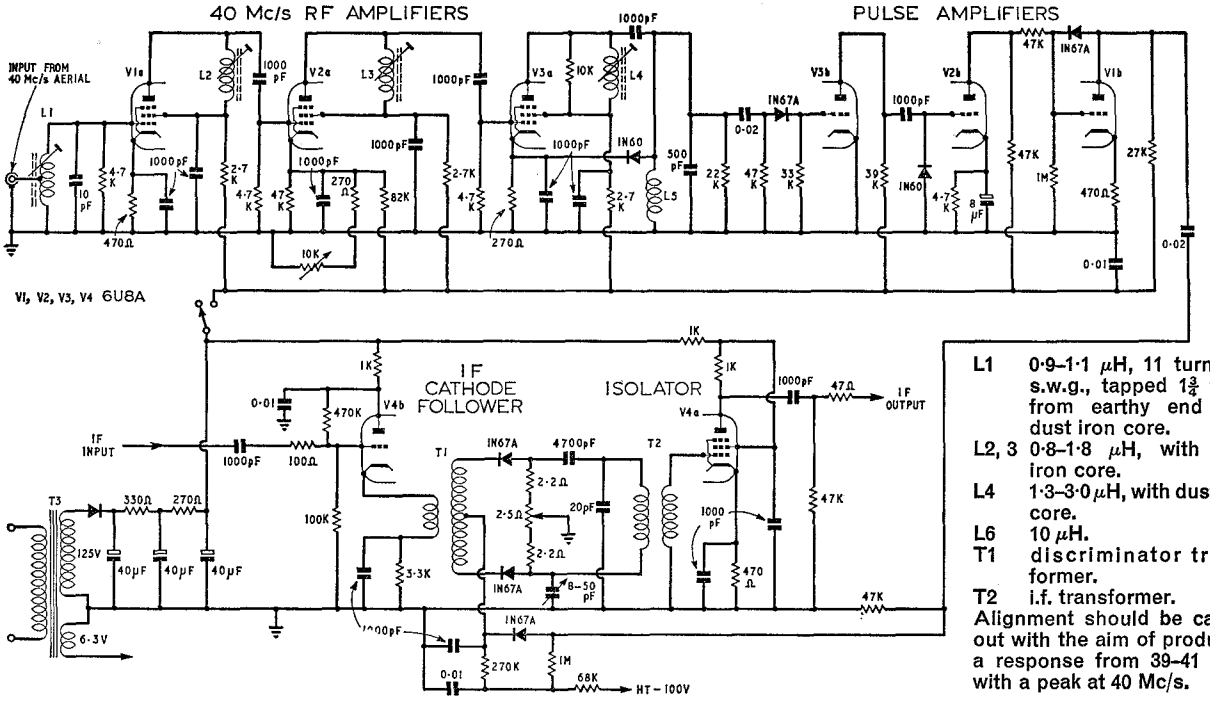
Twelve Shillings 60np

$5

amateur radio circuits book

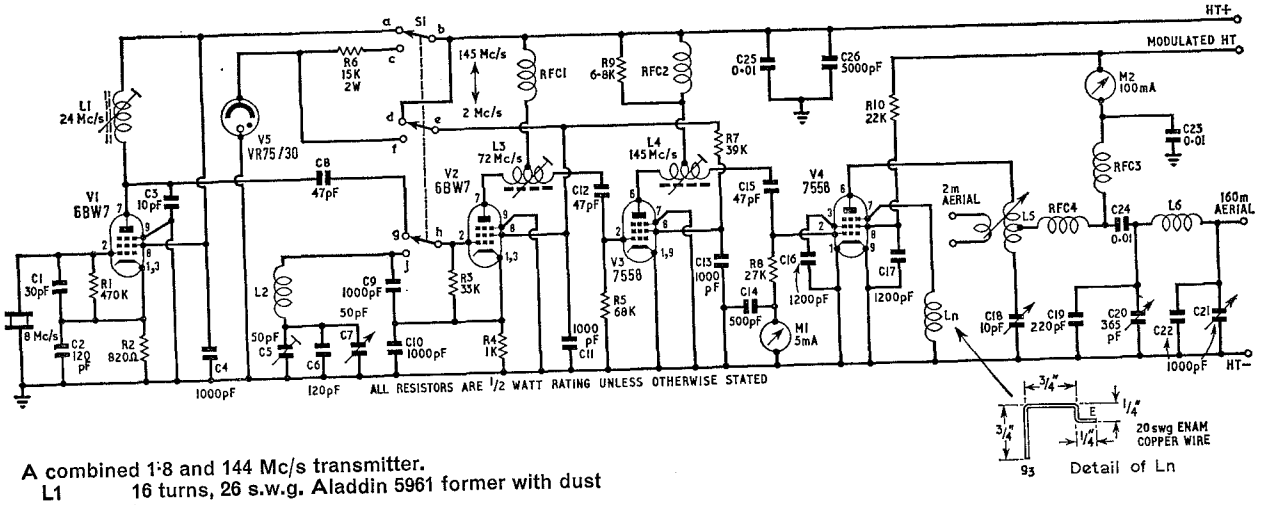
PUBLISHED BY THE RADIO SOCIETY OF GREAT BRITAIN





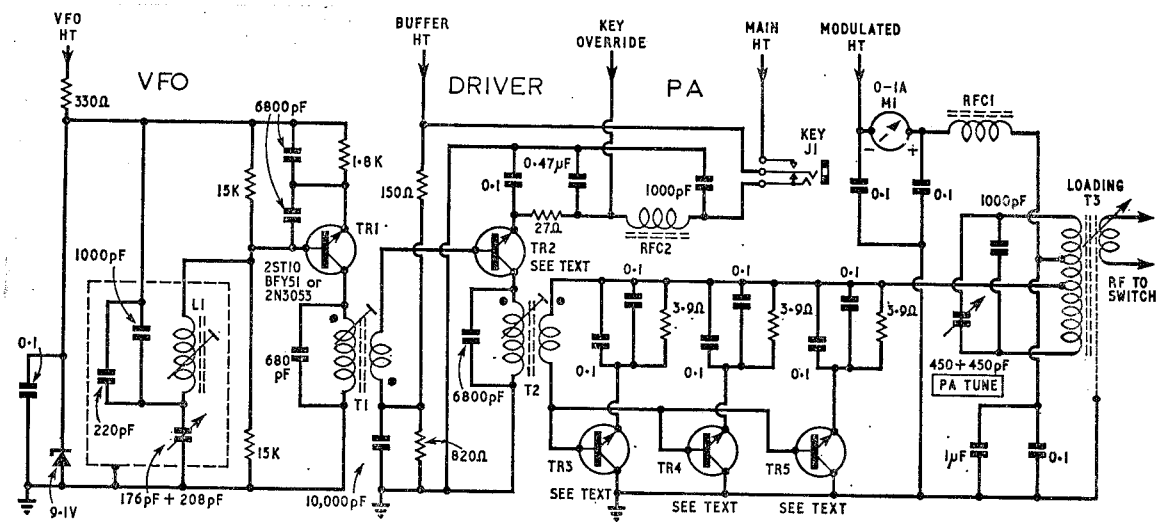
L1 0·9–1·1 μH, 11 turns, 30 s.w.g., tapped $1\frac{3}{4}$ turns from earthy end with dust iron core.
L2, 3 0·8–1·8 μH, with dust iron core.
L4 1·3–3·0 μH, with dust iron core.
L6 10 μH.
T1 discriminator transformer.
T2 i.f. transformer.
Alignment should be carried out with the aim of producing a response from 39–41 Mc/s with a peak at 40 Mc/s.

In the r.f. type of noise blanker a noise pulse is picked up by a completely separate aerial and wideband receiver, in this case tuned to 40 Mc/s a good general purpose vertical aerial is recommended. The receiver consists of three broadly tuned r.f. amplifiers followed, after rectification, by three pulse amplifiers. The output is fed into a gating circuit normally positioned in the first i.f. stage of a double conversion receiver, ahead of the selective filter and second i.f. amplifier. This type of noise blanker is particularly effective for short pulse-type of noise, such as that produced by ignition systems.



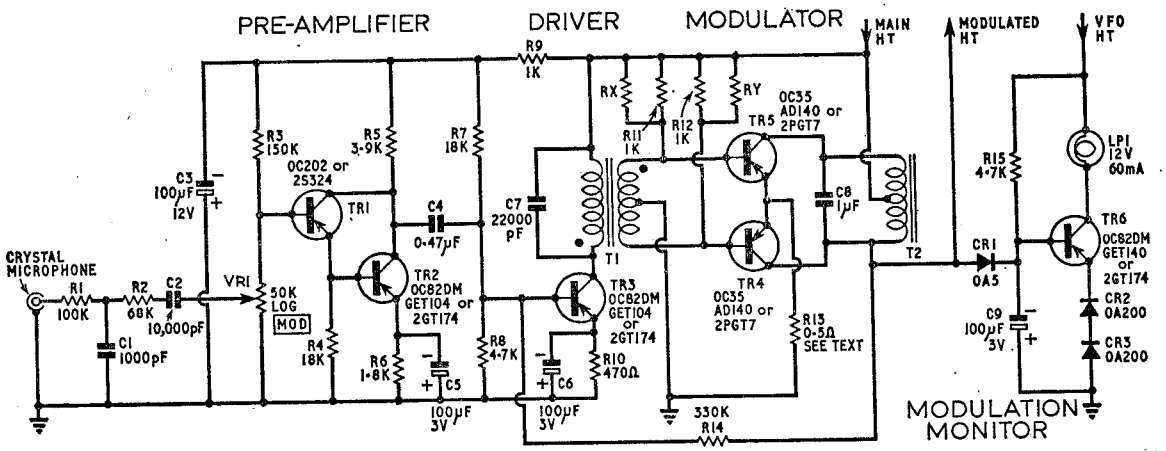
A combined 1·8 and 144 Mc/s transmitter.
L1 16 turns, 26 s.w.g. Aladdin 5961 former with dust iron core.
L2 95 turns, 38 s.w.g., close wound on $\frac{1}{2}$ in. diam. former.
L3 21 turns, 26 s.w.g., tapped at 10 turns from anode end, Aladdin 5961 former with brass core.
L4 $6\frac{1}{2}$ turns, 20 s.w.g., tapped at $3\frac{3}{4}$ turns from anode end, Aladdin 5961 former with brass core.
L5 5 turns, 20 s.w.g., tapped at $2\frac{1}{2}$ turns from anode end, $\frac{1}{2}$ in. diam., self supporting, $\frac{5}{8}$ in. long.
L6 36 turns, 18 s.w.g., $1\frac{1}{2}$ in. diam., 2 in. long.
RFC1, 2 220 mH.
RFC3 2·5 mH.
RFC4 40 turns, 30 s.w.g. e.s.s., on Aladdin 5961 former.

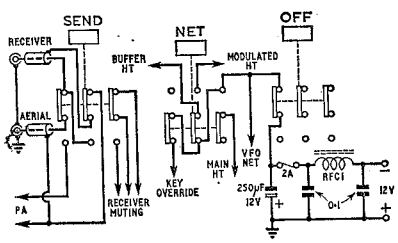
For 144 Mc/s operation the output of V1, the crystal oscillator, is fed into V2 which operates as a tripler. This drives V3 which doubles to the final frequency to drive V4, the p.a. When switched to 1·8 Mc/s V2 is operated as the v.f.o. and V3 becomes an untuned buffer. An unusual feature of the p.a. circuit is the use of suppressor neutralising by the inductance Ln. This method is claimed to enable stable operation over a wider frequency range than would be possible by the conventional capacitance method.



A 10 watt Top Band (1·8–2 Mc/s) transmitter. A suitable modulator can be found on page 49. The h.t. is 12 volts.

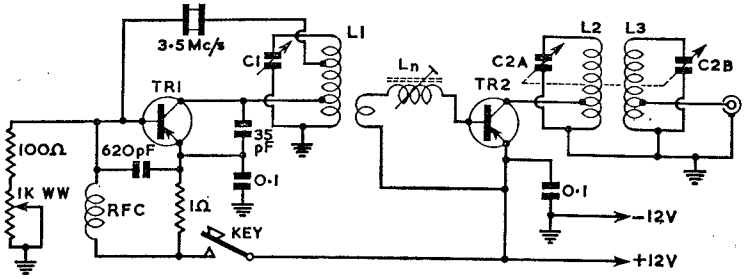
- L1 Osmor QO4, with windings in series, fitted into a $\frac{3}{4}$ in. square screening can.
- RFC1 40 turns, 28 s.w.g., $\frac{1}{4}$ in. diam. ferrite tube, $1\frac{1}{2}$ in. long (5 μH).
- RFC2 1·5 mH.
- T1 *Primary* 30 turns, 20 s.w.g.; *Secondary* 10 turns, 24 s.w.g., on 11mm ferrite pot core, adjustable.
- T2 *Primary* 6 turns, 30 s.w.g.; *Secondary* 3 turns, 24 s.w.g., on 11mm ferrite pot core, adjustable.
- T3 *Primary* 9 turns, 19 s.w.g., starting $\frac{5}{16}$ in. from one end of $\frac{1}{2}$ in. diam. ferrite rod ($1\frac{1}{2}$ in. long), tapped at $3\frac{1}{2}$ and $4\frac{1}{2}$ turns; *Secondary* 4 turns, 22 s.w.g., on former to slide along rod.
- TR2–5 2N3053 or BFY51. If the latter type is used, TR5 may be omitted.





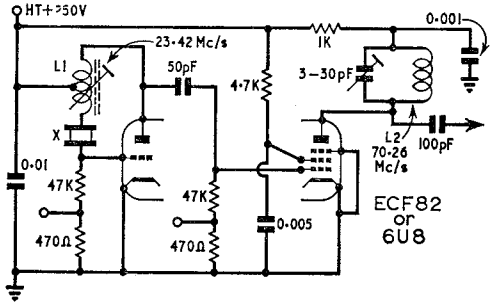
A 6-watt modulator for a 10 watt transistor transmitter such as the Top Band transmitter on page 48. H.t. is 12 volts. Details of the switching required when used with the transmitter on page 48 are also shown.

- R13 this can be a short length of resistance wire.
- Rx, Ry values to be adjusted for 30 mA in each collector.
- T1 Ardente D3052, or:
  Primary 1120 turns, 43 s.w.g.; *Secondary* 200 + 200 turns, 38 s.w.g., bifilar wound; $\frac{1}{4}$ in. stack of No. 450, 0·015 in. Radiometal laminations butted, coded grey. 1 in. × $\frac{3}{4}$ in. overall with $\frac{1}{4}$ in. centre limb.
- T2 180 + 180 turns, 23 s.w.g., bifilar wound; $\frac{7}{8}$ in. stack of No. 187, 0·018 in. Silicon iron laminations, butted. $2\frac{1}{4}$ in. × $2\frac{3}{4}$ in. overall with 1 in. centre limb.

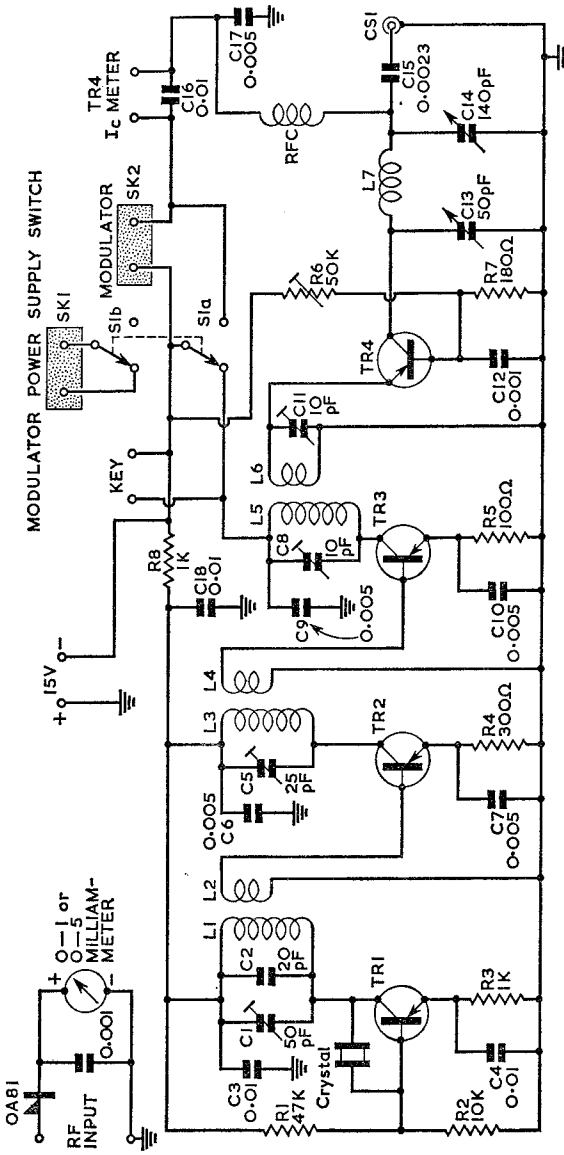


A 3·5 Mc/s 15 watt transistor transmitter.
- L1, 46 turns, 22 s.w.g., collector tap 2½ turns from earthy end, crystal tap 28 turns from earthy end, link winding 2 turns at earthy end, 1 in. diam., 3 in. long former.
- L2, 29 turns, 22 s.w.g., collector tap 2½ turns from earthy end, 1 in. diam.
- L3, as L2, but with tap 4 turns from earthy end for 50 ohm load, or 10 turns for 300 ohm load.
- Ln, 10 turns, 28 s.w.g., close wound, $\frac{5}{16}$ diam., with dust core.
- C1, 230 pF.
- C2, 385 pF twin gang.
- RFC, 300 μH, 7–10 ohms d.c. resistance.
- TR1, PADT50 (Amperex).
- TR2, 2N1907 (Texas).

The second output tuned circuit is included to improve the waveform.

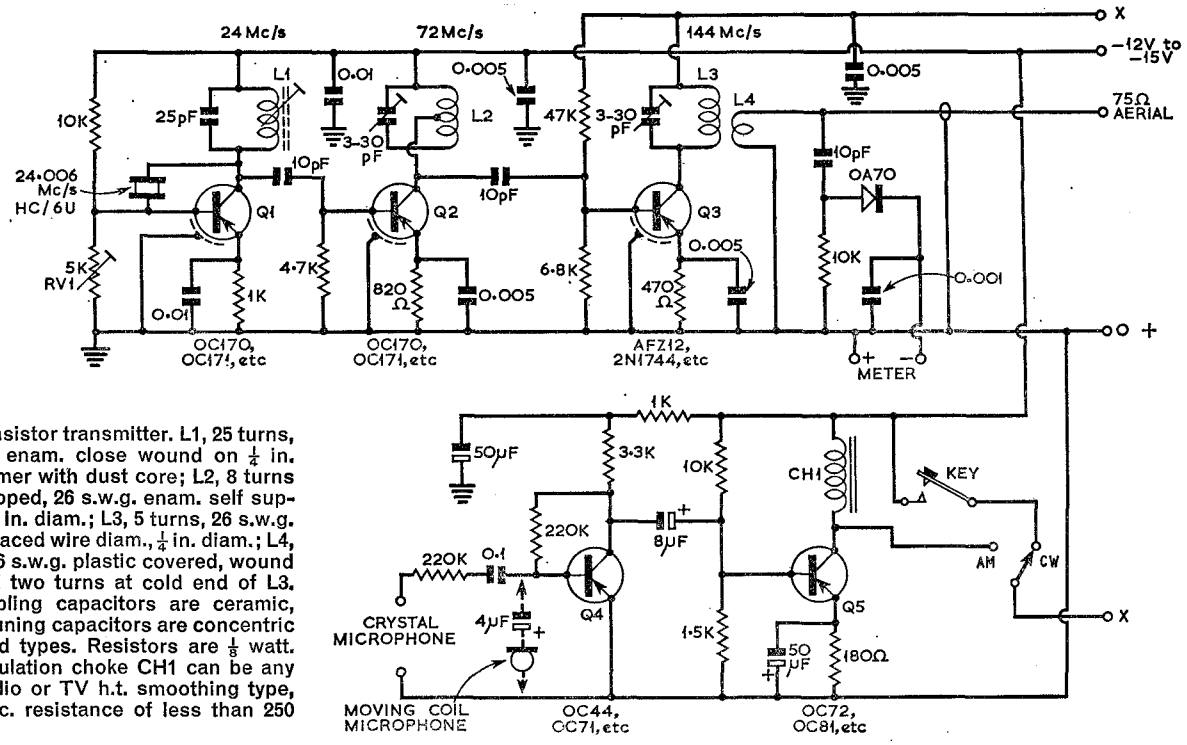


Single valve 70 Mc/s exciter.
- L1 31 turns, 28 s.w.g., tapped at 8 turns from crystal end, ¼ in. diam.
- L2 7 turns, 18 s.w.g., turns spaced one wire diam., ¼ in. diam.
- X 11·71 Mc/s crystal, series resonant.

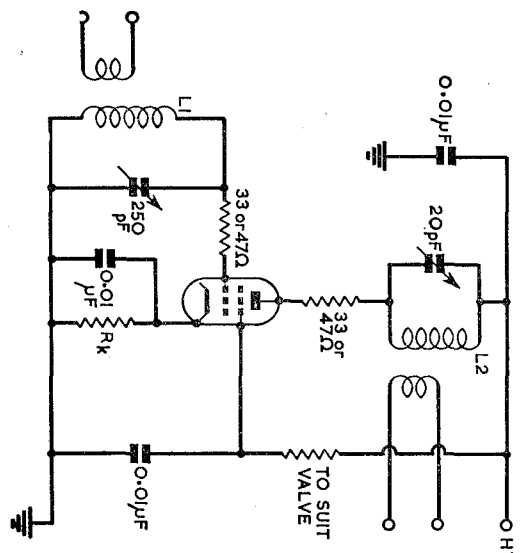


Circuit of a transistor transmitter for 70 Mc/s. Connect the transistors one at a time, beginning with TR1, and tune each collector circuit for maximum output. An absorption wavemeter must be used simultaneously to ensure that the transistors are not amplifying on a spurious frequency.

L1, 42 turns 28 s.w.g. enam. $\frac{3}{8}$ in. dia.; L2 8 turns 28 s.w.g. enam. overwound at low-potential end of L1; L3, 18 turns 28 s.w.g. enam. $\frac{3}{8}$ in. dia.; L4, 5 turns 28 s.w.g. enam. overwound at low-potential end of L3; L5, 12½ turns 22 s.w.g. enam. 0·3 in. dia.; L6, 5 turns 26 s.w.g. silk-covered interwound at low-potential end of L5; L7, 8 turns 16 s.w.g. silver-plated $\frac{1}{16}$ in. dia., $\frac{7}{8}$ in. long (0·3μH); RFC, 42 in. 28 s.w.g. enam. wound on $\frac{3}{8}$ in. dia. former; TR1, Texas 2G401, Mullard OC170; TR2, TR3, Texas 2G402. Mullard OC171; TR4, Texas 2G110. Crystal 7·788—7.855 Mc/s. L1-L2 fund., L3-L4 × 3, L5-L6 × 3.



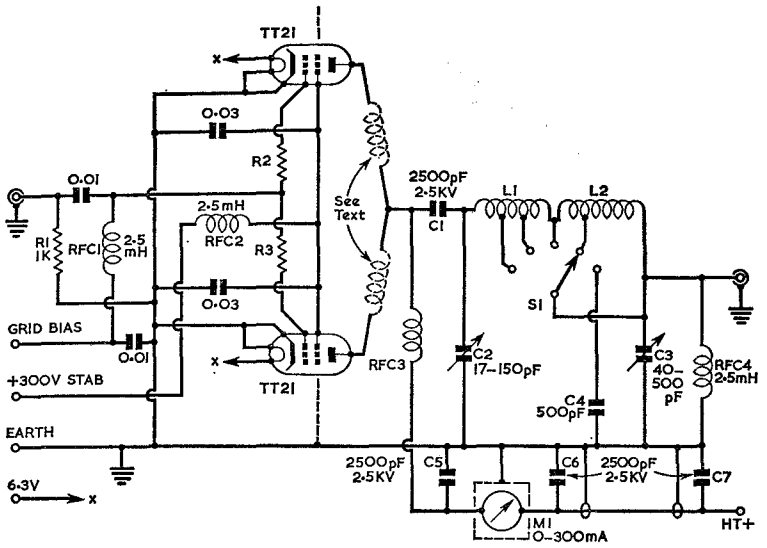
A 2m transistor transmitter. L1, 25 turns, 30 s.w.g. enam. close wound on $\frac{1}{4}$ in. diam. former with dust core; L2, 8 turns centre-tapped, 26 s.w.g. enam. self supporting, $\frac{1}{4}$ in. diam.; L3, 5 turns, 26 s.w.g. enam., spaced wire diam., $\frac{1}{4}$ in. diam.; L4, 2 turns, 26 s.w.g. plastic covered, wound over final two turns at cold end of L3. The coupling capacitors are ceramic, and the tuning capacitors are concentric air-spaced types. Resistors are $\frac{1}{8}$ watt. The modulation choke CH1 can be any small audio or TV h.t. smoothing type, with a d.c. resistance of less than 250 ohms.



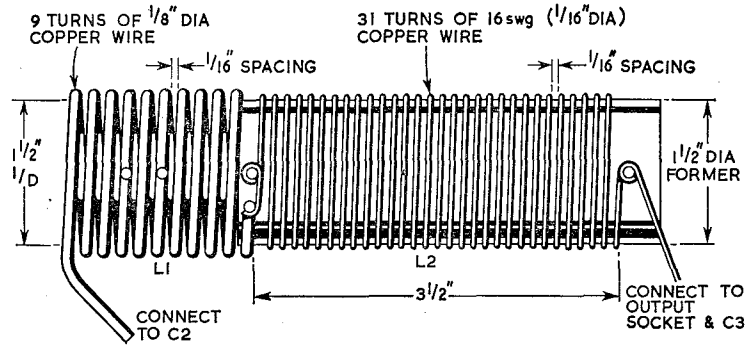
TYPICAL OPERATING CONDITIONS

P.A. Valves		Driver Valves									
Type		Type	Anode		Screen		Bias	ohms			
			Voltage	Current	Voltage	Current	Voltage				
6146	500	6AU6	250	10	150	4·5	−1	68	2800		
807	500	EF89	250	9	100	3	−2	180	3600		
5B/254M		6CH6	250	40	250	6	−4·5	100	4500		
		6CL6	300	30	150	7	−3	82	6500		
6146B	600	EL84	250	48	250	5·5	−7·5	135	6500		
	750	5763	300	40	225	2·4	−7·5	175	6500		
TT21/22	800										
	1000										
	1250										
4CX250B	1000										
	1500										
			Anode		Screen		Bias				
			Voltage	Current	Voltage	Current	Voltage				
	500		300	40	200	5–7·4	−22	470	2800		
	600		250	24–125	200	3·9–6·3	−47				
	750		300	24–125	200	0·5–11	−48				
	800		300	40–122	300	0·3–10	−38				
	1000		300	35–116	300	0·1–8	−40				
	1250		300	28–136	300	6–30	−45				
	1000		350	83–250	350	9·5–30	−55				
	1500		350	83–250	350		−55	280	4500		
			R.f. Load Impedance		Resistor Rk (ohms)						

Where the valve has a separate grid 3 or suppressor plate this is connected to earth.



A linear amplifier using two TT21 valves, giving a power output of 220 watts at 3·5 and 7 Mc/s, and 130 watts at 29 Mc/s. RFC1, 2 and 4 are standard Eddystone 2·5 mH r.f. chokes. RFC3, 100 turns, 24 s.w.g. enam., wound on ½ in. diam., 2½ in. long ceramic former. Parasitic chokes may be inserted in the anode leads if necessary. R1 provides the correct operating load for the exciter. The supply requirements are +1200 volts h.t., +300 volts stabilized, and −50 volts max., adjustable, bias. The 0·03 μF screen bypass capacitors consist of three 0·01 μF 500 V ceramic, in parallel. R2 and R3 are 100 ohms.



Winding details for L1 and L2.

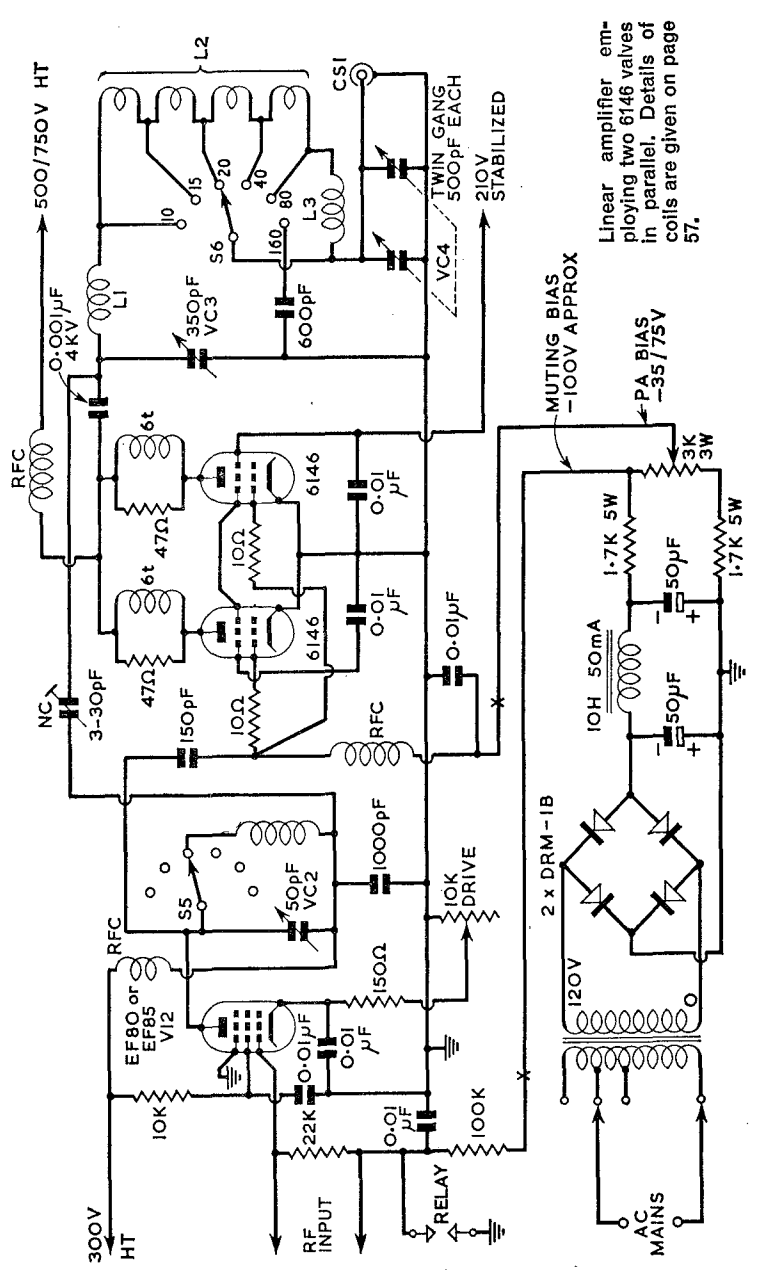
L1 (14, 21, 28 Mc/s), 9 turns, ⅛ in. diam. copper wire, spaced $\frac{1}{16}$ in. between turns, 1½ in. i.d.

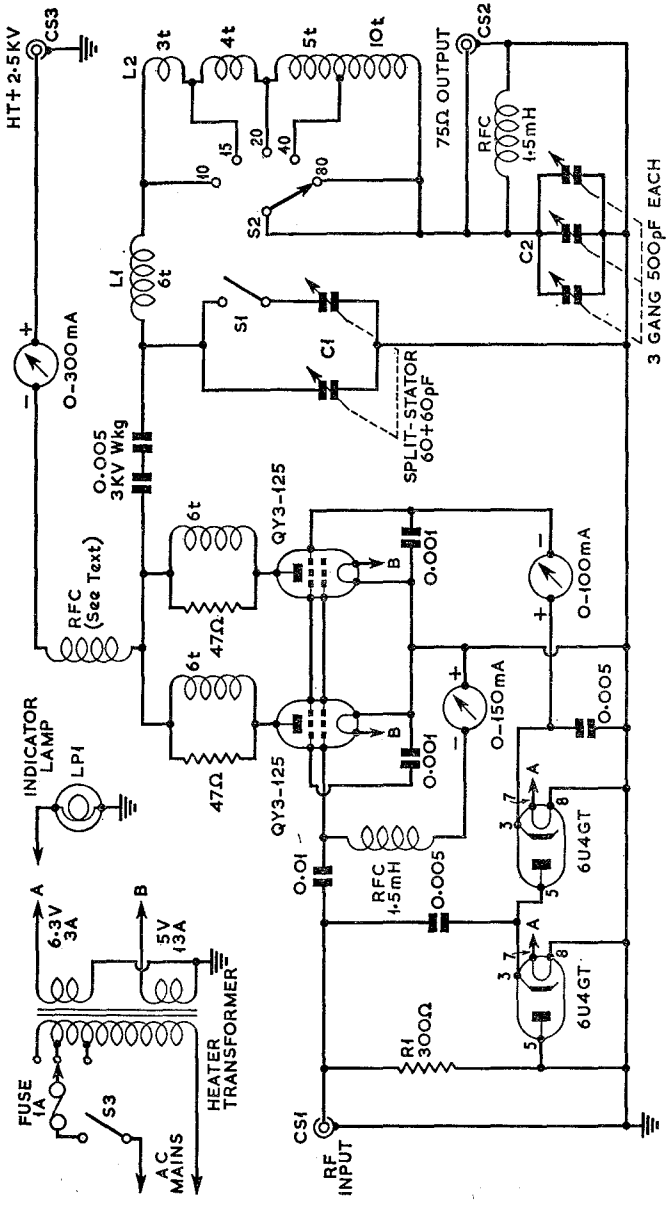
Tapping points, from anode end. 28 Mc/s, 3 turns; 21 Mc/s, 5 turns; 14 Mc/s, junction of L1 and L2.

L2 (3·5, 7 Mc/s), 31 turns, 16 s.w.g. copper wire, spaced to length of 3½ in., 1½ in. i.d.

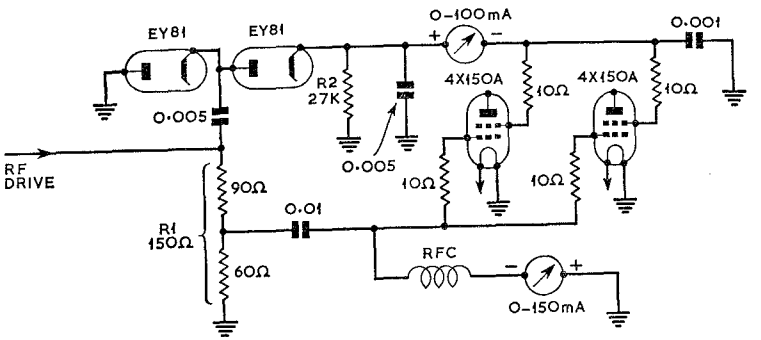
Tapping point, from anode end: 7 Mc/s, 12 turns.

Both coils are wound on 1½ in. diam. epoxy resin former, and secured with nuts and bolts.





G2DAF linear amplifier using two QY3-125 valves. Component details are given on page 57.



Circuit modifications of the screen supply for 4X150A or 4CX250B valves for the G2DAF linear.

COIL AND COMPONENT DETAILS FOR THE LINEAR AMPLIFIER ON PAGE 55

L1 4 turns, 16 s.w.g. t.c., spaced to $\frac{1}{2}$ in., 1 in. diam., self supporting.

L2 10 + 8 + 3 + 2 turns, 18 s.w.g. t.c., 16 t.p.i., with $\frac{3}{16}$ in. gap between sections, $1\frac{1}{2}$ in. diam., 2 in. long approx.

L3 32 turns, 22 s.w.g., close wound, $\frac{7}{8}$ in. diam.

VC3 350 pF variable capacitor, originally a surplus type with 0·025 in. air gap.

COMPONENT DETAILS FOR THE LINEAR AMPLIFIER ON PAGE 56

C1 60 pF split-stator tuning capacitor, 0·01 in. air gap.

C2 500 pF triple gang tuning capacitor, broadcast type.

CS3 Belling Lee coaxial socket, coloured red.

L1 6 turns 12 s.w.g., 1 in. diam., spaced to 2 in., self supporting at right angles to L2.

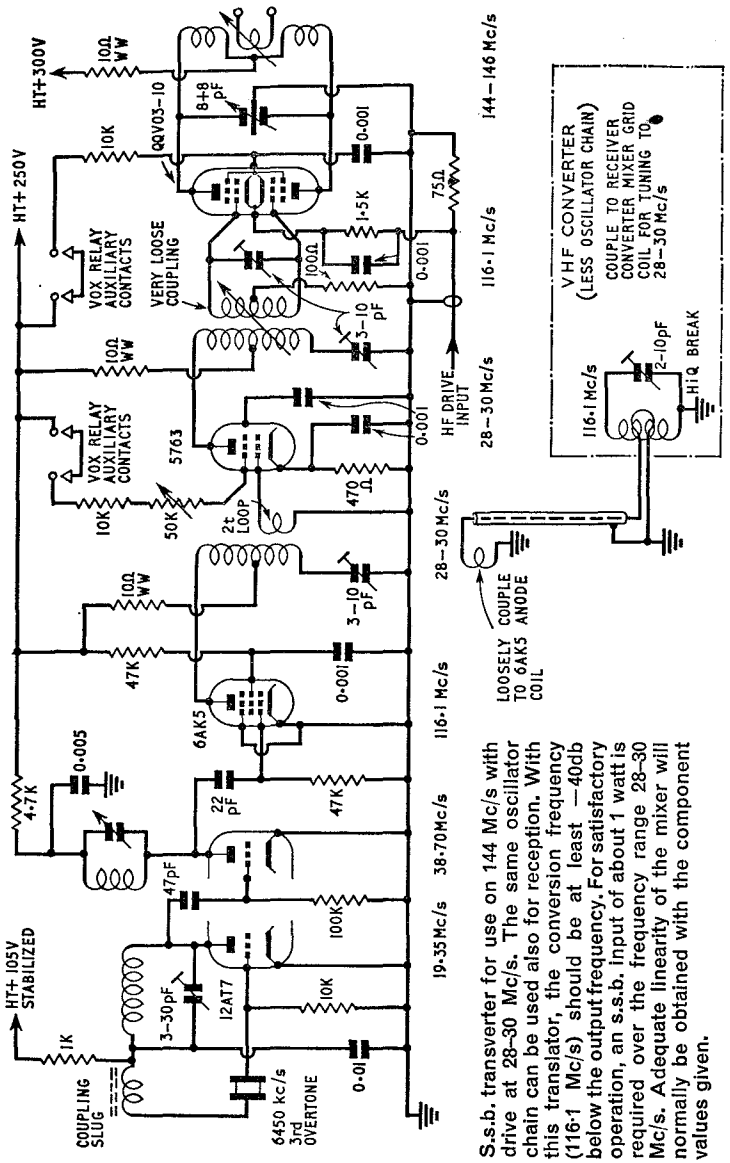
L2 22 turns 16 s.w.g. tinned copper, tapped at 3, 7 and 12 turns, leaving one spare groove of an Eddystone $2\frac{1}{2}$ in. diam. ceramic former, 8 t.p.i., between each section.

RFC 300 turns 32 s.w.g. enam., wound in sections of 165, 65, 35, 20 and 15 turns, spaced $\frac{1}{8}$ in. between each section, on a 1 in. diam., $5\frac{1}{2}$ in. long ceramic former. Alternatively a single winding choke as shown on page 54 may be used.

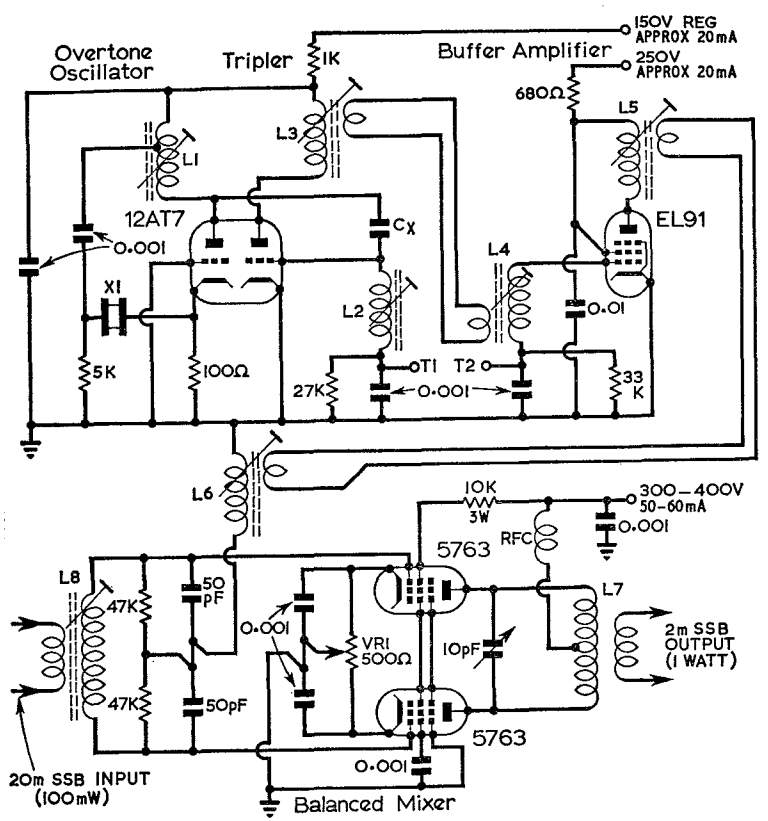
S1 1 pole, on/off ceramic wafer switch (ON—80 and 40m; OFF—20, 15 and 10m).

S2 1 pole, 5 way heavy duty ceramic wafer switch.

All fixed capacitors are mica except for 0·005 μF 3 kV anode blocking which are disc ceramic.

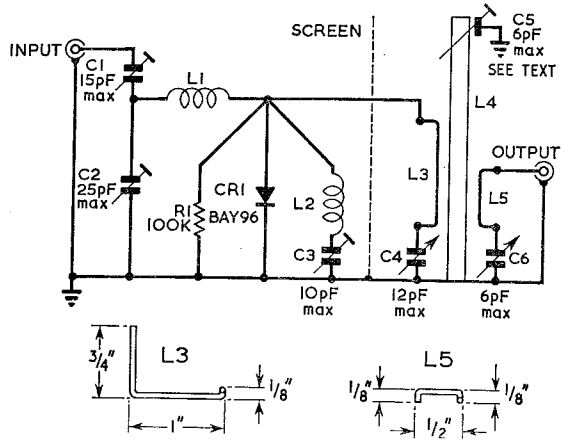


S.s.b. transverter for use on 144 Mc/s with drive at 28–30 Mc/s. The same oscillator chain can be used also for reception. With this translator, the conversion frequency (116·1 Mc/s) should be at least —40db below the output frequency. For satisfactory operation, an s.s.b. input of about 1 watt is required over the frequency range 28–30 Mc/s. Adequate linearity of the mixer will normally be obtained with the component values given.



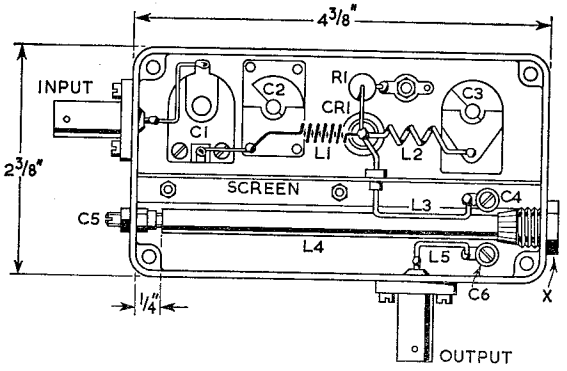
A frequency converter (transverter) for translating a 14 Mc/s s.s.b. signal into 144 Mc/s output. The tuned circuits L3, L4 and L5 are adjusted to 130 Mc/s (three times the overtone frequency) and this frequency is mixed with the 14 Mc/s signal to produce output in the 2m band (144–145 Mc/s).
L1 15 turns, 36 s.w.g. enam., tapped at 1·5 turns from h.t. end, $\frac{1}{4}$ in. diam.
L2 15 turns, 36 s.w.g. enam., $\frac{1}{4}$ in. diam.
L3 4 turns, 26 s.w.g., spaced one wire diam., $\frac{1}{4}$ in. diam.
L4 4 turns, 26 s.w.g., spaced one wire diam., $\frac{1}{4}$ in. diam.
L5 4 turns, 26 s.w.g., spaced one wire diam., $\frac{1}{4}$ in. diam.
L6 3 turns, 20 s.w.g., spaced one wire diam., $\frac{1}{4}$ in. diam.
L7 3 turns, 16 s.w.g., 1 in. diam. with 1 turn link.
L8 20 turns, 24 s.w.g., $\frac{3}{8}$ in. diam., with 4 turn link.
L1–L4, and L8 use dust iron cores, while L5 and L6 require brass cores.
Link coupling coils for L3, L4, L5 and L6 are 2 turns, wound at the cold end of the coil.

Suggested alignment procedure appears on page 60.



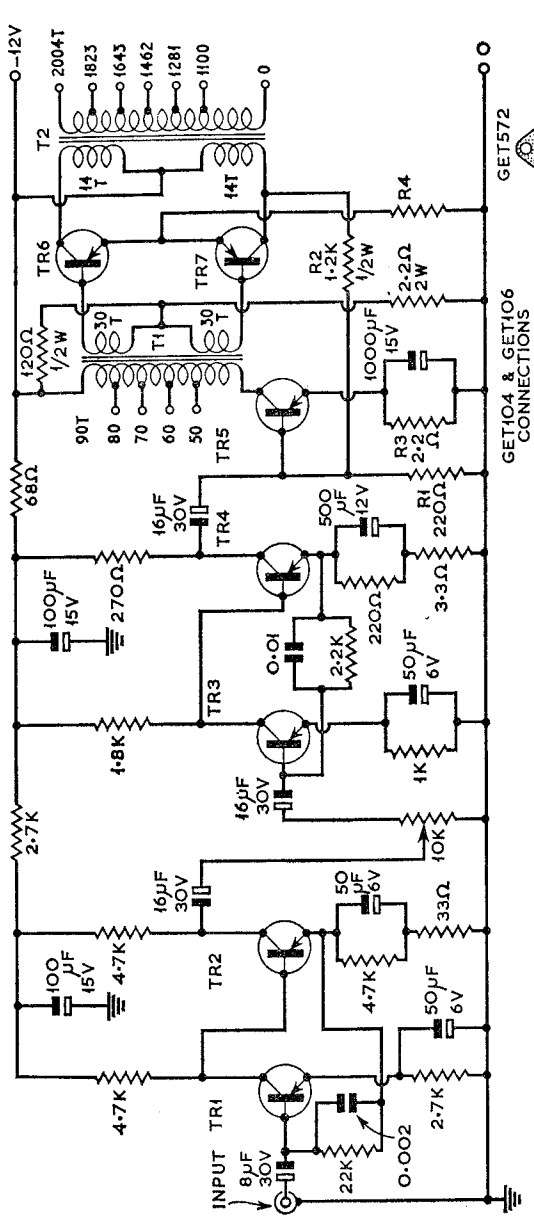
A 432 Mc/s varactor tripler. When the tripler is properly adjusted an output of 17 watts at 432 Mc/s can be obtained from an input of 25 watts at 144 Mc/s.

L1 6 turns, 18 s.w.g., $\frac{3}{16}$ in. diam., $\frac{1}{2}$ in. long.
L2 3 turns, 14 s.w.g., $\frac{3}{16}$ in. diam., $\frac{3}{4}$ in. long.
L3 18 s.w.g., shaped as shown, and spaced $\frac{3}{32}$ in. from L4.
L4 $\frac{1}{4}$ in. o.d., $\frac{3}{16}$ in. i.d., copper tube, $4\frac{1}{8}$ in. long.
L5 18 s.w.g., as drawing, spaced $\frac{3}{16}$ in. from L4.



Suggested alignment procedure for Transverter on page 59.

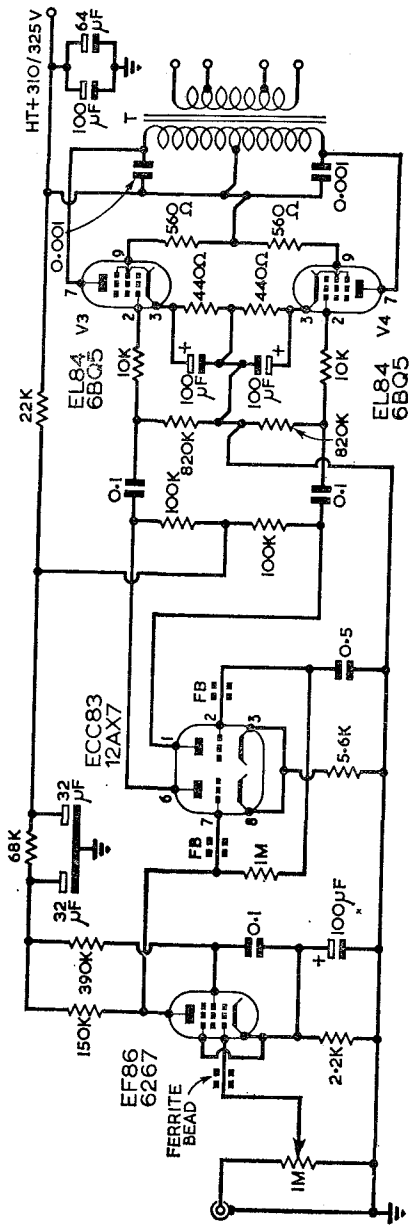
(i) Adjust dust cores of L1 and L2 for maximum voltage at T1.
(ii) Adjust Cx to give about —40 volts at T1. Capacitance should be about 1 pF.
(iii) Adjust core of L3 and L4 for maximum voltage at T2.
(iv) Adjust core of L5 for minimum voltage across 680 ohms resistor in anode lead to the EL91 130 Mc/s amplifier.
(v) Adjust L8, L6 and the 10 pF capacitor across L7 for maximum s.s.b. output at 144 Mc/s.
(vi) Set VR1 (balance control) for minimum 130 Mc/s output with no 14 Mc/s input.
Adjustments (i) and (ii) are performed without 14 Mc/s drive



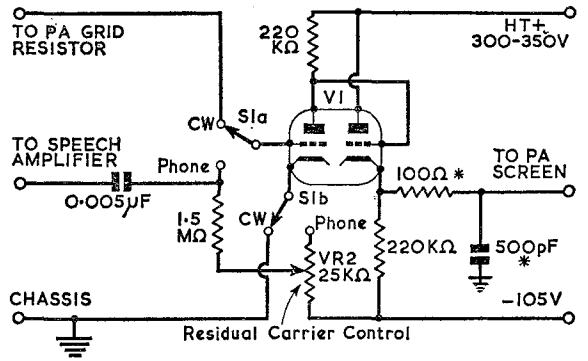
A 30 watt transistor modulator for operation from a 12 volt d.c. supply, with current requirements of 0·8 A quiescent to 5·5 A at full output. TR1, TR3, GET106, TR2, TR4, GET104, TR5, TR6, TR7, GET572. R4, 67 turns 22 s.w.g. enam. copper close wound on 3-watt carbon resistor;

T1, Driver Transformer.
Core 1 in. stack of 3 in. × $2\frac{1}{2}$ in. 0·01 in. thick Stalloy, 95 each E and I assembled with $\frac{1}{32}$ in. air gap.
Primary 90 turns, 20 s.w.g. wound in three layers tapped at 50, 60, 70 and 80 turns.
Secondary 60 turns, 20 s.w.g. wound in two layers centre tapped.

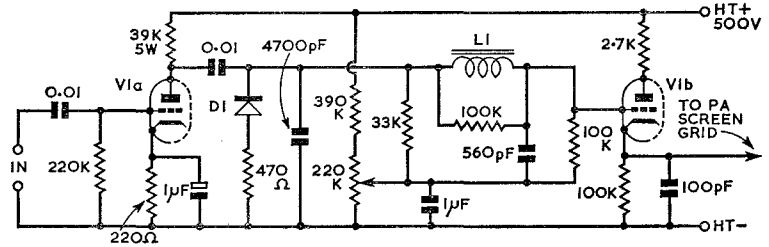
T2, Modulation Transformer, to match 3 ohm primary to impedance of modulated stage.
Core 1 in. stack of type 101 Laminic stampings, 70 each E and I, 0·015 in. thick.
Secondary wound on core: 2004 turns, 34 s.w.g. in 22 layers, tapped at 1100, 1201, 1462, 1643, 1823 and 2004 turns. These give impedances of approximately 4600, 6250, 8150, 10,300, 12,700 and 15,400 ohms.
Primary wound over secondary: two layers of 14 turns, 17 s.w.g. centre tapped.



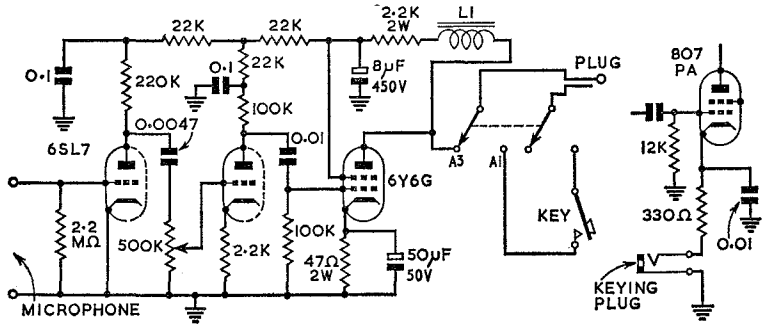
A modulator suitable for use with a 40 watt input power amplifier. If a higher gain is required for a particular microphone, V1 should be replaced by a double triode cascade amplifier. Suitable component values can be obtained from the data given on page 69 and 70. To avoid instability or hum, the earth bus bar should be earthed only at the microphone (or input) socket; ideally this also applies to the earth connections of the decoupling capacitors, but this can only be done if they are insulated from their fixing clips. Note that V1 is d.c. coupled to the driver/phase splitter V2.
T, Modulation transformer, Gardners, 25 watts, with primaries of 6·5, 8 and 9 K ohms. (a) Secondary tapped at 3, 5, 7 and 10 K ohms. (b) Secondary voice coil, 3 and 15 ohms.



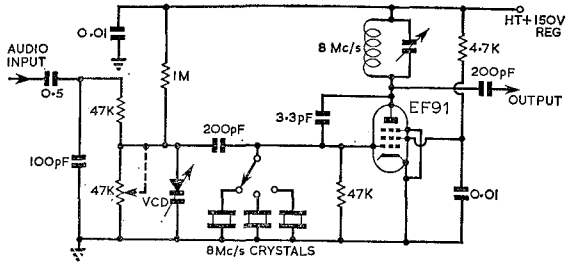
A series gate modulator suitable for p.a. inputs of up to 75 watts, using 6SN7 or 12AU7 valves. Alternatively two 6J5s or triode connected 6V6s are suggested. For higher inputs, a 12BH7 is recommended. The 100 ohm resistor and 500 pF capacitor marked with asterisks are the normal screen decoupling components mounted close to the p.a. valveholder. As the heater cathode potential will be high it is advisable to use a separate heater winding.



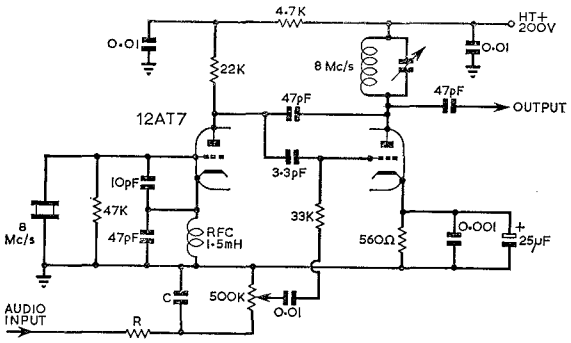
A screen modulator with a built-in clipper/filter. D1, OA210; L1, 5H smoothing choke; V1, ECC81. The inputs to V1a should be about 0·6 volts peak, and a pre-amplifier to provide this is therefore necessary.



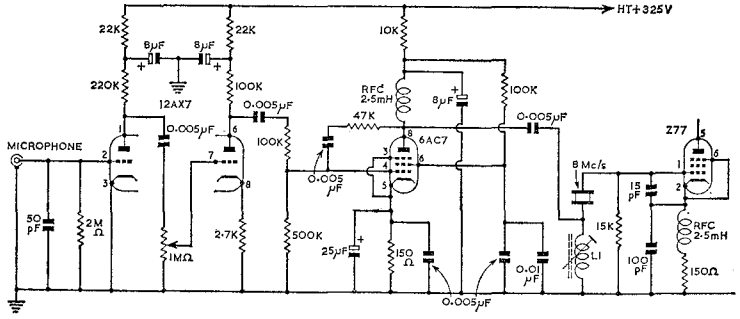
A cathode modulator. L1, 15H choke. Miniature valves can be used if desired such as a 12AT7 or 6AQ5.



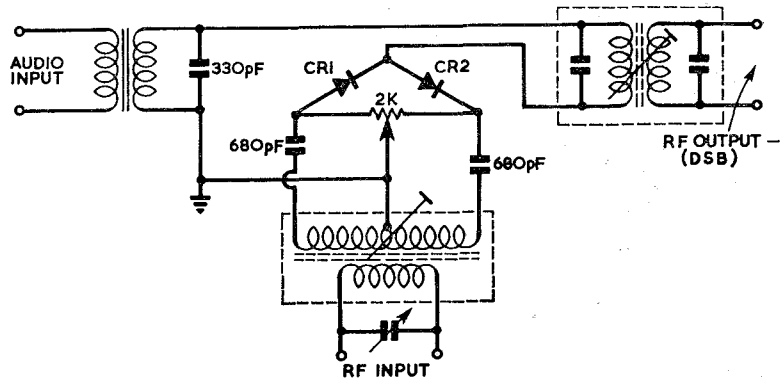
A Varacter diode frequency modulator.



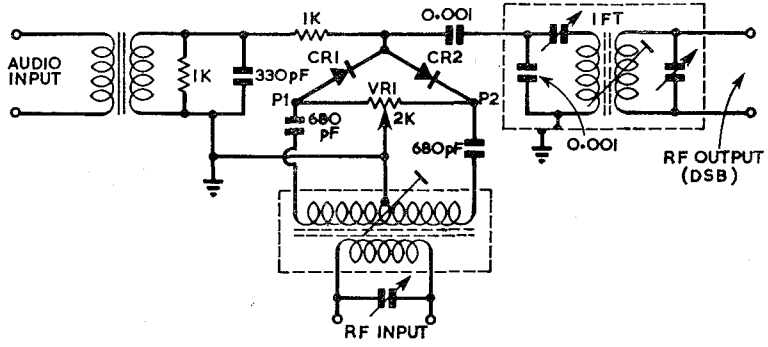
A twin-triode phase modulator.



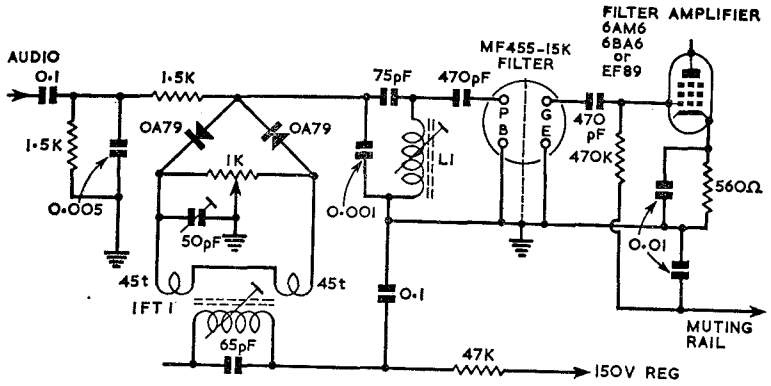
A speech amplifier and frequency modulator for v.h.f. and u.h.f. transmitters. The inductance L1 in series with the crystal consists of 35 turns of 36 s.w.g. enamelled wire close wound on a $\frac{1}{4}$ in. former with dust iron core. This inductance should be adjusted so that the operating frequency is about 30 kc/s lower than without the inductance in circuit.



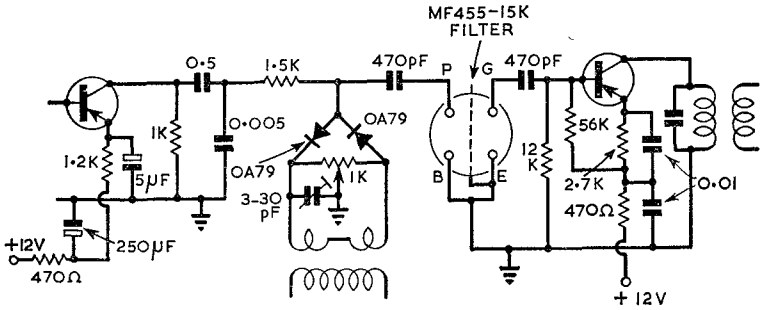
Series-type diode balanced modulator. The r.f. input-transformer should be modified by removing the original secondary and substituting a 50–100 turn bifilar winding. CR1, CR2, OA79.



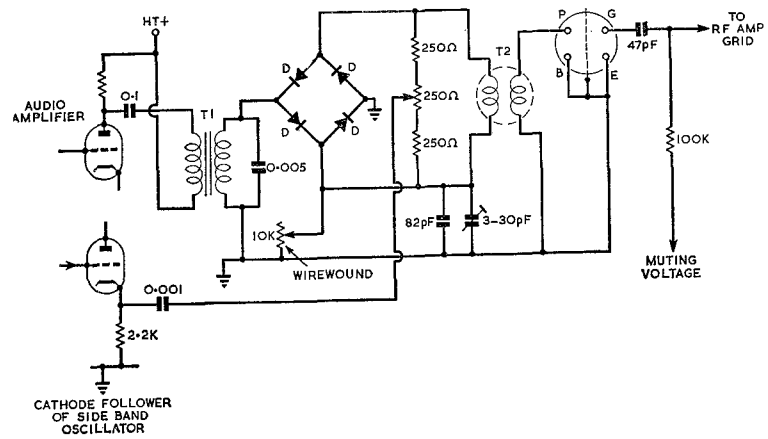
Shunt-type diode balanced modulator. The r.f. input transformer (a modified i.f. transformer) is constructed by removing the original secondary and substituting a 50–100 turn bifilar winding. The output i.f.t. is modified by adding a 0·001 μF capacitor in series with the original trimmer as shown in the diagram. CR1, CR2, OA79.



Circuit details showing the method of using the Kokusai mechanical filter in an s.s.b. exciter. L1 is one pie of a Maxi-Q IFT II/465 transformer with the internal 65 pF resonating capacitor removed. IFT1 is a Maxi-Q IFT II/465 transformer with the secondary removed and replaced with a scramble winding of 90 turns of the original wire, tightly coupled each side of the primary as shown. To align: with the r.f. applied, feed a 1–1·5 kc/s tone into the audio input, and resonate L1 for maximum output of the filter amplifier valve.



A shunt connected balanced modulator feeding a filter, with transistor audio input and output amplifiers.

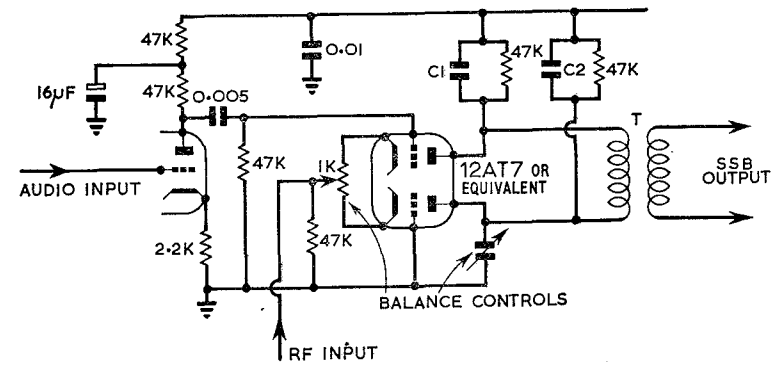


A balanced ring modulator for feeding into a series connected input to a Kokusai mechanical filter.

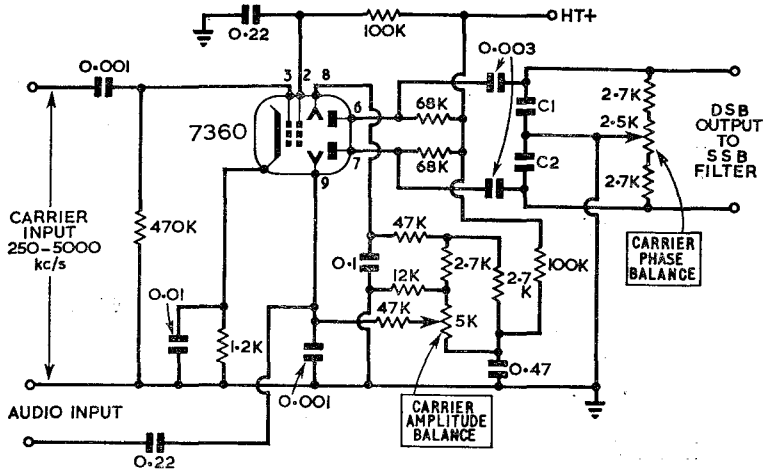
T1 midget audio transformer with 10 K ohm primary and 600 ohm secondary.

T2 ferrite ring transformer. Primary and secondary each consist of 11 turns of 38 s.w.g. wire to give 50 μH. Core type FX-1594 (Mullard).

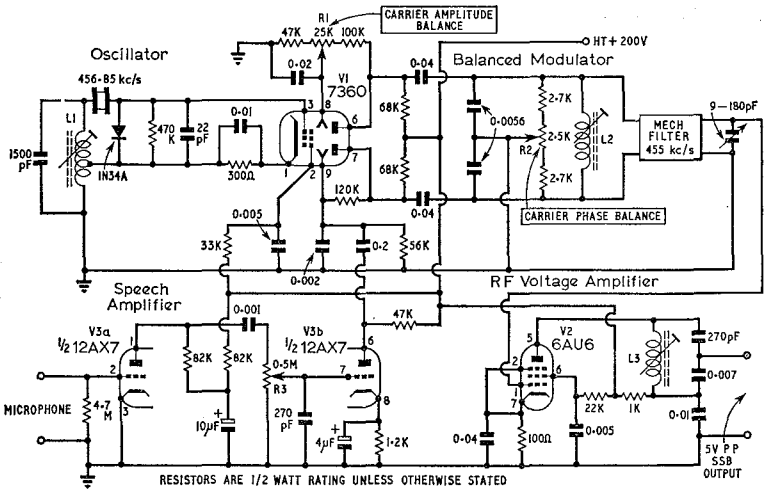
D set of four matched diodes such as GEX34/4 or 1N34A.



Balanced modulator using a double triode. The output transformer may have a centre tapped primary, in which case capacitors C1 and C2 would be connected directly across the winding. The value of these components will depend on the transformer.

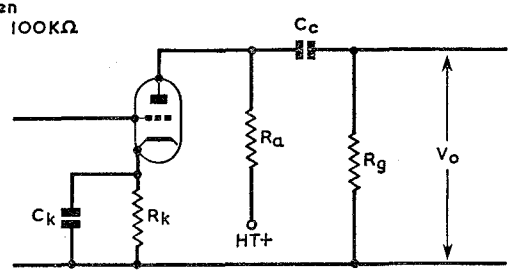


A typical 7360 balanced modulator suitable for carrier frequencies between 250 and 5000 kc/s. C1 and C2 are 0·0056 μF.



Filter-type s.s.b. generator using the 7360 as a combined crystal controlled oscillator and balanced modulator.
L1 88 μH approx., adjustable.
L2 50 μH approx., adjustable.
L3 450 μH approx., adjustable.
R1, 2, carbon or moulded track, linear.
R3 carbon or moulded track, log.

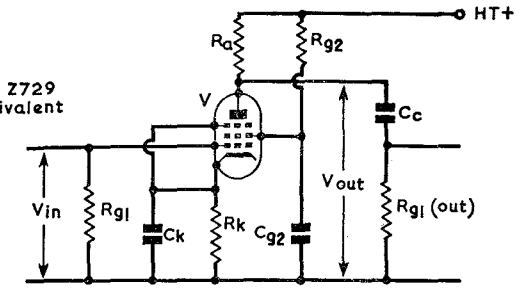
Data given for Ra = 100KΩ



VALVE	HT V	Rg MΩ	Rk KΩ	Ck µF	Cc µF	Vo V	Gain
12AU7 ECC82	90	0·1	3·0	1·6	·032	10	11
	90	0·22	3·8	1·1	·015	15	11
	90	0·47	4·5	1·0	·007	18	11
	180	0·1	2·0	1·9	·032	24	12
	180	0·22	2·8	1·4	·016	33	12
	180	0·47	3·6	1·1	·007	40	12
	300	0·1	1·9	1·9	·032	44	12
	300	0·22	3·0	1·3	·016	68	12
	300	0·47	4·0	1·1	·007	80	12
12AT7 ECC81	90	0·22	7·4	1·0	·012	12	21
	90	0·47	7·5	0·85	·008	13	24
	90	1·00	7·8	0·81	·006	15	25
	180	0·22	2·6	1·63	·014	18	29
	180	0·47	2·63	1·4	·0085	19	31
	180	1·00	2·7	1·3	·006	20	28
	300	0·22	1·2	2·4	·0155	22	34
	300	0·47	1·23	1·8	·0086	23	36
	300	1·00	1·25	1·6	·006	24	38
12AX7 ECC83	90	0·22	7·0	1·6	·013	6	39
	90	0·47	7·4	1·4	·006	9	45
	90	1·00	7·6	1·3	·003	11	48
	180	0·22	3·0	2·4	·012	24	53
	180	0·47	3·5	2·1	·006	34	59
	180	1·00	3·9	1·8	·003	39	63
	300	0·22	2·2	3·0	·013	54	59
	300	0·47	2·8	2·3	·006	60	65
	300	1·0	3·1	2·1	·003	79	68

PENTODE

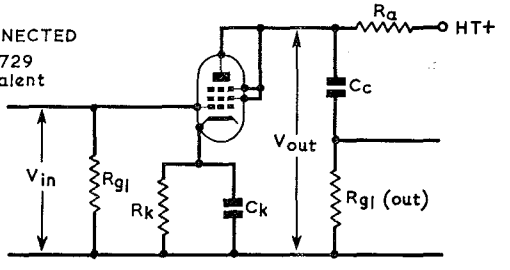
V= EF86, Z729 or equivalent



HT V	Ra KΩ	Ik mA	Rg2 MΩ	Rk KΩ	Rgl MΩ (max)	Gain	V out V	Dist %	Rgl(out) KΩ
400	100	3·3	0·39	1·0	2·2	124	87	5	330
300	100	2·45	0·39	1·0	3·6	116	64	5	330
200	100	1·65	0·39	1·0	8·0	106	40	5	330
400	220	1·55	1·0	2·2	4·4	200	73	5	680
300	220	1·1	1·0	2·2	8·0	188	54	5	680
200	220	0·75	1·0	2·2	10·0	176	36	5	680

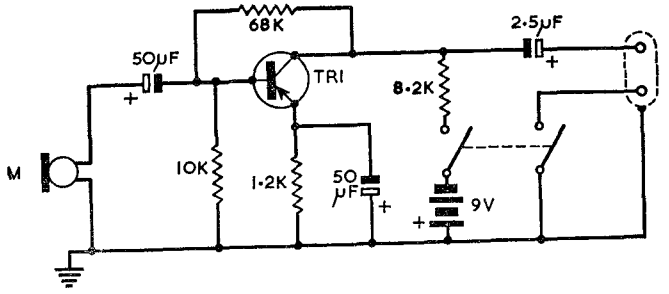
TRIODE CONNECTED

V= EF86, Z729 or equivalent

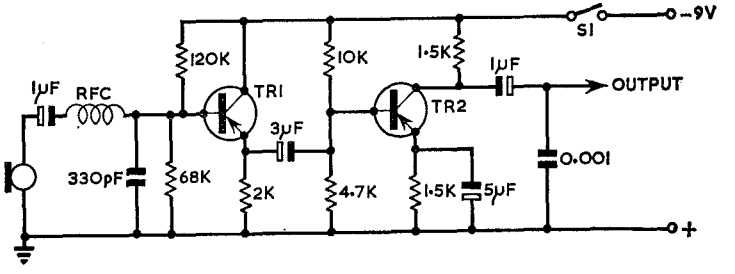


HT V	Ra KΩ	Ia mA	Rk KΩ	Rgl MΩ (max)	Gain	Vout V	Dist %	Rgl (out) KΩ
400	47	3·7	1·2	3·9	24·5	64	4·5	150
300	47	2·7	1·2	9	24	43	3·8	150
200	47	1·85	1·2	33	23·5	22	3·1	150
400	100	2	2·2	9	28·5	73	4·0	330
300	100	1·5	2·2	21	28·5	50	3·8	330
200	100	1·0	2·2	72	27·5	27·5	3·3	330
400	220	1·05	3·9	24	32	74	3·8	680
300	220	0·8	3·9	60	31	51	3·7	680
200	220	0·5	3·9	100	30·5	28	3·1	680

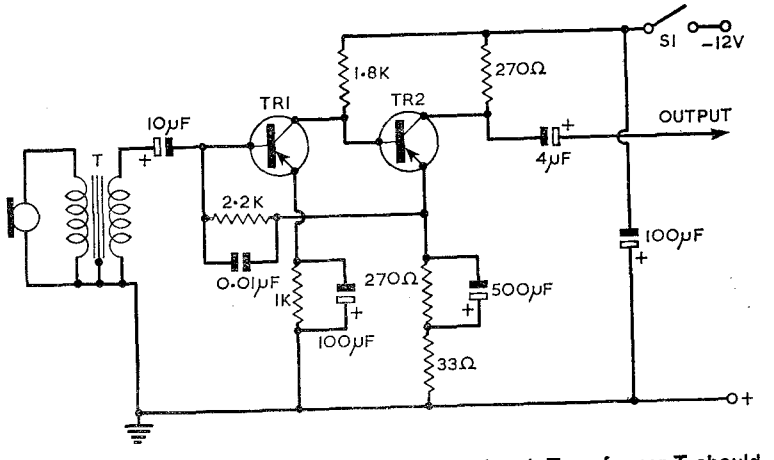
Capacitor values: The reactance of C_k should normally be less than one tenth of R_k at the lowest frequency; the reactance of C_{g2} should normally be less than one tenth of R_{g2} and that of C_c should normally be less than one tenth of R_{gl}



A single transistor microphone amplifier. M, moving coil microphone or small loudspeaker. TR1, OC72, GET106, 2N109, etc.



A preamplifier suitable for use with a high impedance dynamic microphone. Transistors TR1 and TR2 should be low noise a.f. types such as the GET106 or equivalent.



A microphone preamplifier with a low impedance input. Transformer T should match the desired input impedance to 10 or 20 K ohms. TR1, TR2, OC71.