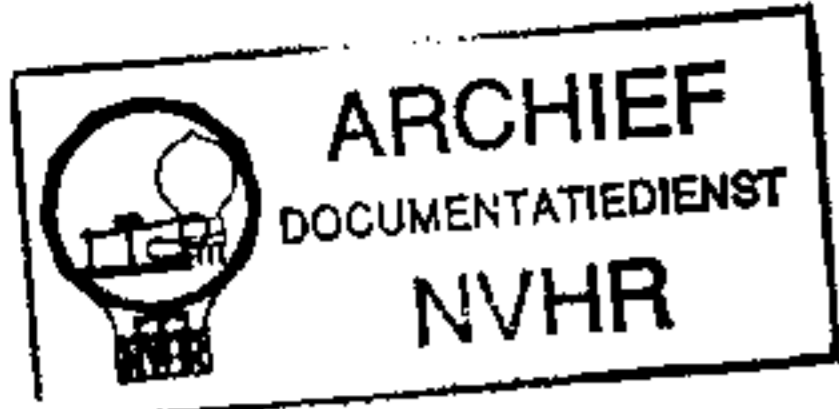


Ned. Ver. v. Historie v/d Radio



# KOLSTER BRANDES KR019 REGENTONE TR419

A.M./F.M. Transistor Portable Radio Receivers

**E**MPLOYING twelve transistors and five diodes, K.B. KR019 and Regentone TR419 are three-waveband a.m./f.m. radio receivers which are fitted with an identical chassis. They are powered by a 6V battery (four 1.5V cells) and, using a push-pull output stage, provide 300mW audio power to a 3½ in. loudspeaker.

Ferrite rod and telescopic aerials are incorporated in the receiver and a socket is provided for the connection of a car type aerial. A second socket provides an output which can be fed to an earphone, with automatic muting of the internal loudspeaker.

Waveband ranges are 184-586m (m.w.),

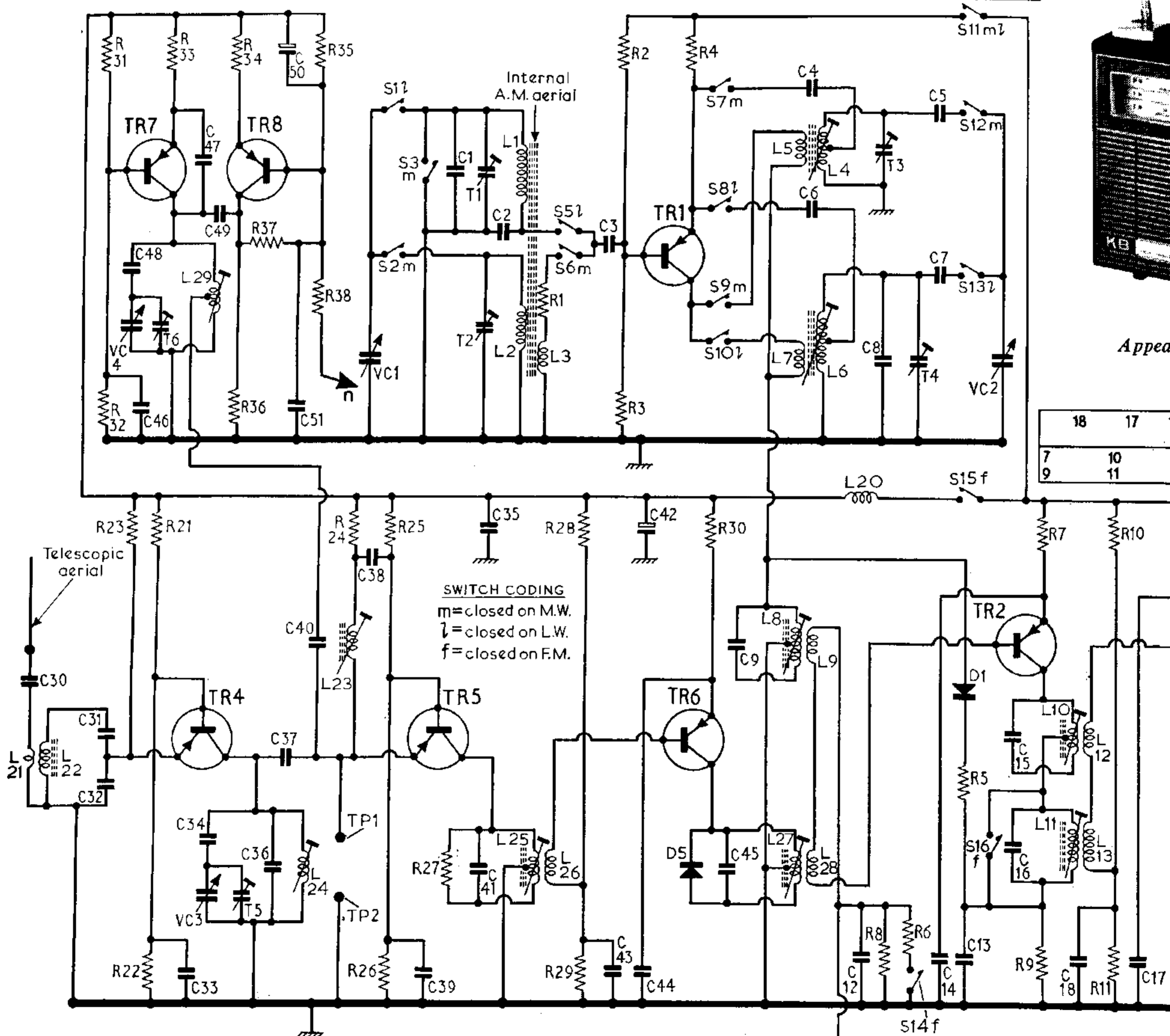
1,091-2,174m. (l.w.) and 86.5-105.1Mc/s (f.m.) Battery consumption is 9mA quiescent and 110mA for 300mW output.

### TRANSISTOR ANALYSIS

Transistor voltages quoted in the table in col. 6 were taken from information

(Continued overleaf col. 1)

C	30	31,48,46	47,34,49	50,51	VC1	1	T1,35,2	3	42	9	4	T3	T4,5	VC2,15		
R		32,VC4,T6	33,VC3	T5	36,37,40	38	39	T2,41	43	44	45	6	12	8	7,14,13	16
		31	21,33	34	37	35	25	1	28	2	4					
		32	23,22	36		38	24	26	27	29	3	30	8	6	5	



Appea

18	17
7	10
9	11

**Resistors**

R1	150Ω	A1
R2	4.7kΩ	A1
R3	15kΩ	A1
R4	2.2kΩ	A1
R5	3.3kΩ	A2
R6	18kΩ	A2
R7	1kΩ	B2
R8	75kΩ	A2
R9	2.2kΩ	A2
R10	4.7kΩ	A2
R11	10kΩ	A2
R12	1kΩ	B2
R13	220Ω	B3
R14	1kΩ	A2
R15	1kΩ	A2
R16	470Ω	A3
R17	2.2kΩ	B3
R18	4.7kΩ	A3
R19	10kΩ	A2
R20	10kΩ	A2
R21	3.3kΩ	C1
R22	6.8kΩ	C1
R23	1kΩ	C1
R24	470Ω	B1
R25	3.3kΩ	B1
R26	27kΩ	B1
R27	—	B1
R28	4.7kΩ	B2

R29	10kΩ	B2
R30	1kΩ	B2
R31	3.3kΩ	C2
R32	6.8kΩ	C1
R33	470Ω	B2
R34	100Ω	C2
R35	47kΩ	C2
R36	10kΩ	C1
R37	150kΩ	C2
R38	100kΩ	C2
R39	—	A3
R40	1kΩ	C3
R41	—	A3
R42	4.7kΩ	C3
R43	27kΩ	C3
R44	100Ω	C3
R45	1kΩ	C3
R46	100Ω	C3
R47	5.6kΩ	C3
R48	3.9kΩ	C3
R49	47kΩ	C3
R50	10Ω	C2
R51	100Ω	C2
R52	100Ω	C3
R53	240Ω	C3
R54	5.6kΩ	C2
R55	2.2Ω	C3
R56	560Ω	C2

C25	1,000pF	A2
C26	1,000pF	A2
C27	10μF	A2
C28	5,000pF	B3
C29	0.02μF	A3
C30	10pF	C1
C31	20pF	C1
C32	25pF	C1
C33	1,000pF	C1
C34	160pF	B1
C35	0.04μF	C1
C36	18pF	C1
C37	3pF	C1
C38	600pF	B1
C39	1,000pF	B1
C40	7pF	B1
C41	—	B1
C42	30μF	C1
C43	0.01μF	B1
C44	0.01μF	B2
C45	—	B2
C46	1,000pF	B1
C47	7pF	B2
C48	160pF	B2
C49	10pF	B2
C50	5μF	C2
C51	0.02μF	C2
C52	0.2μF	C3
C53	1μF	C3
C54	100μF	C3
C55	30μF	C3
C56	1μF	C3
C57	100μF	C3
C58	30μF	C2
C59	100μF	C3
C60	0.02μF	C2
C61	0.04μF	C2
VC1	—	B2
VC2	—	B2
VC3	—	B2
VC4	—	B2
T1	—	A1
T2	—	B2
T3	—	A1
T4	—	A1
T5	—	B1
T6	—	B1

L6	4.5	B1
L7	—	B1
L8	6.8	B1
L9	—	B1
L10	—	B2
L11	6.4	A2
L12	—	B2
L13	—	A2
L14	—	A2
L15	—	B2
L16	6.5	B3
L17	—	B2
L18	—	B2
L19	—	B3
L20	1.2	B1
L21	—	C1
L22	—	C1
L23	—	B1
L24	—	C1
L25	—	B1
L26	—	B1
L27	—	B2
L28	—	B2
L29	—	B2
L30	13.2	A2

L31	320.0	C2
L32	220.0	C2
L33	8.9	C2
L34	—	C2
L35	—	C3
L36	8.0	†

**Miscellaneous**

D1	OA90	A2
D2	OA90	A3
D3	OA90	A3
D4	OA90	A2
D5	OA90	B1
S1-S3	—	A1
S5-S20	—	A1
S21	—	A3
TH1	5D300	C3

\* Approximate d.c. resistance in ohms.  
† Speaker

**Capacitors**

C1	55pF	B1
C2	2,500pF	A1
C3	0.02μF	A1
C4	5,000pF	B1
C5	310pF	B1
C6	0.01μF	B1
C7	140pF	B1
C8	120pF	B1
C9	—	B1
C10	100μF	A1
C11	5μF	A2
C12	0.02μF	B2
C13	0.02μF	A2
C14	0.02μF	B2
C15	—	B2
C16	—	A2
C17	0.02μF	B2
C18	0.02μF	A2
C19	30pF	B2
C20	500pF	B3
C21	—	B3
C22	—	B2
C23	0.02μF	A3
C24	2,000pF	B3

**Coils\***

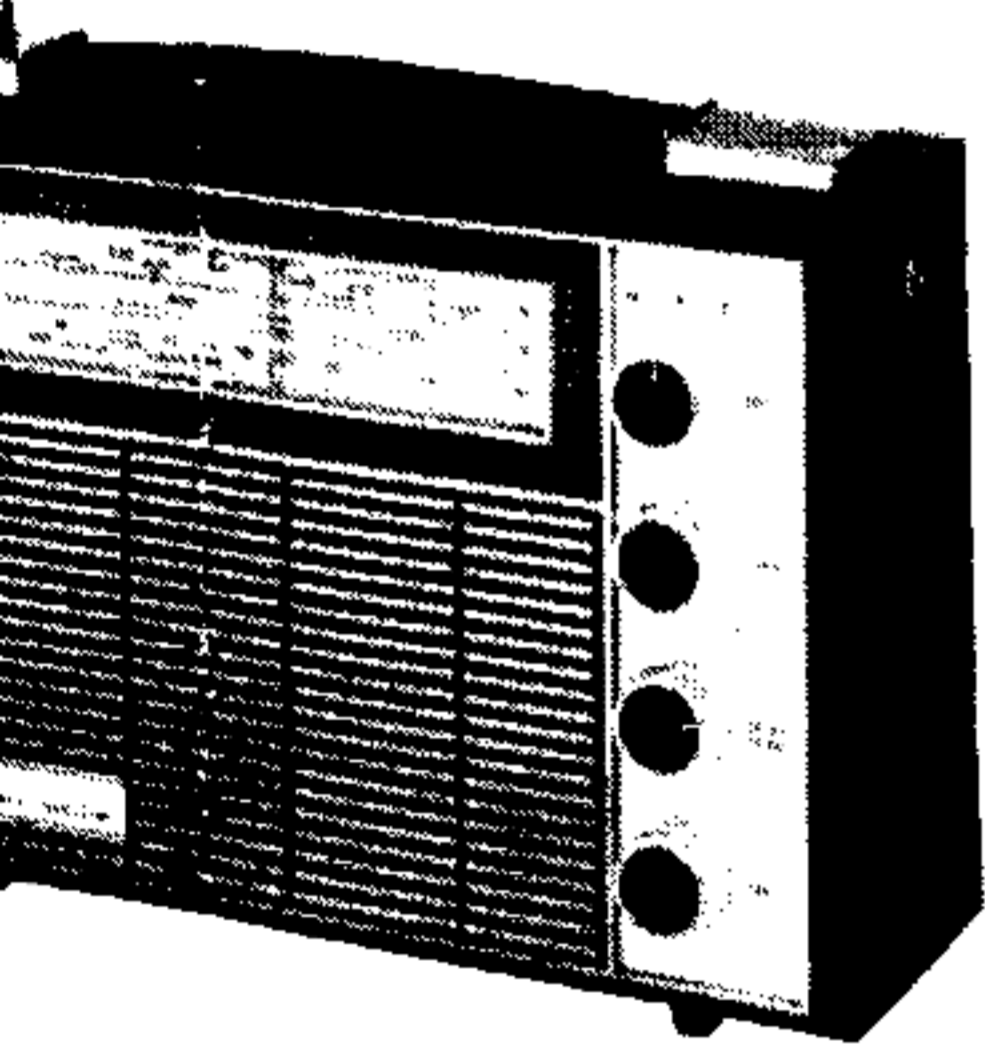
L1	10.0	A1
L2	1.6	C1
L3	—	C1
L4	2.7	B1
L5	—	B1

**Transistor Table**

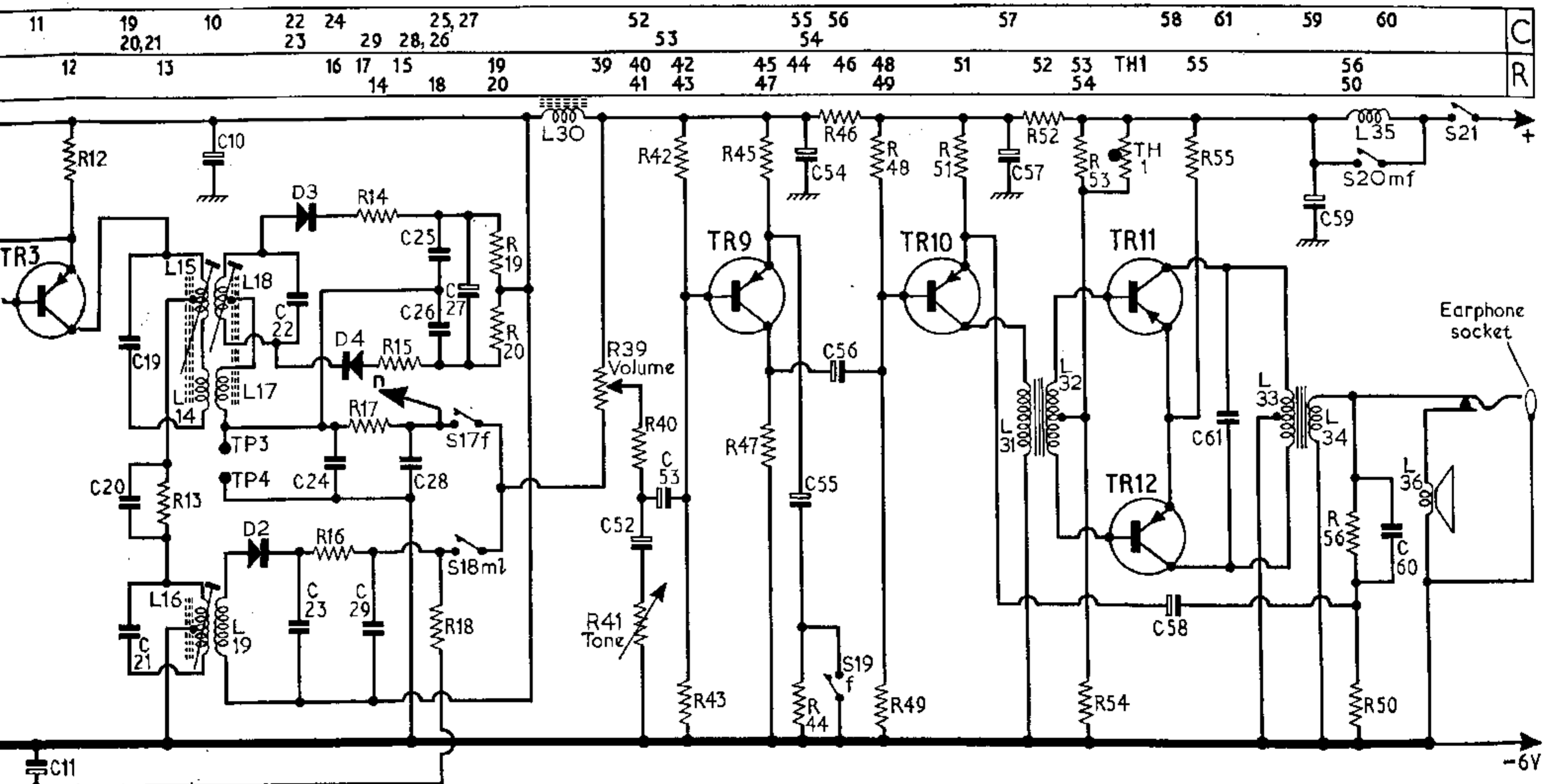
Transistor	Emitter (V)	Base (V)	Collector (V)
TR1 2SA103	4.0*	3.8*	—
TR2 2SA70	2.9	2.7	1.9
TR3 2SA70	2.9	2.6	0.2
TR4 2SA71	3.0	2.7	—
TR5 2SA71	2.6	3.3	—
TR6 2SA70	2.9	2.7	—
TR7 2SA71	2.9	2.7	—
TR8 2SA100	4.0	3.8	2.8
TR9 2SB32	3.6	3.4	2.2
TR10 2SB33	4.7	4.5	0.5
TR11, 12 2SB33	6.0	5.8	—

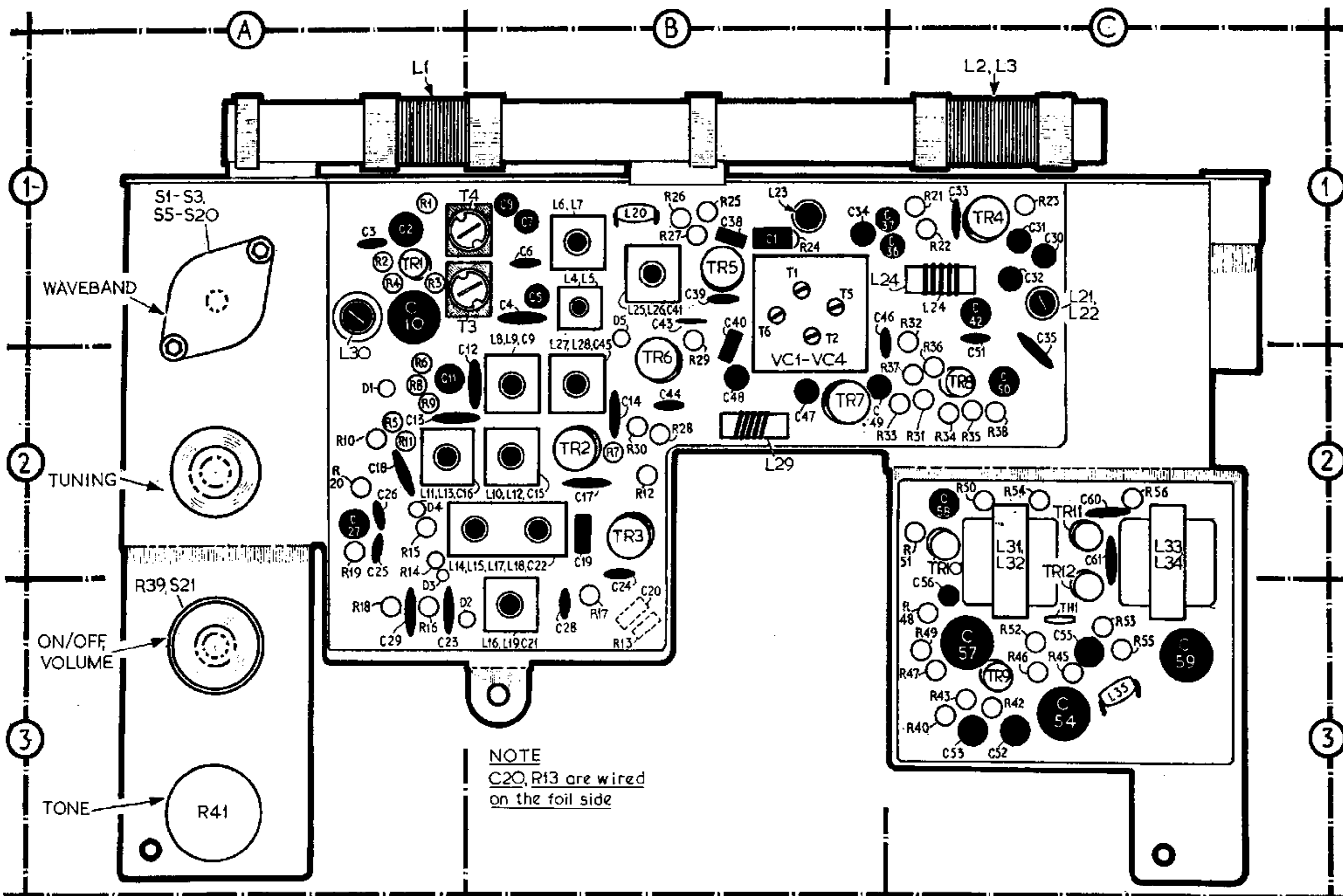
\* Switch to a.m. for these measurements only.

Circuit diagram of the chassis employed in K.B.KR019 and Regentone TR419 portable radio receivers. On f.m., separate oscillator and mixer stages are used (TR7 and TR5) with an additional transistor (TR8) providing automatic frequency control of the oscillator



Appearance of our sample receiver K.B.KR019





Component-side view of the chassis showing the location of components on the r.f. and a.f. printed panels. R13 and C20, shown in broken line in location reference B3, are wired on the foil side. The connections of these two components should be checked as described in col. 6

Continued from overleaf—  
supplied by the makers. They were measured, except where stated otherwise, with the receiver switched to f.m. and are positive with respect to chassis.

#### CIRCUIT DESCRIPTION

F.M. signals from the telescopic aerial are coupled via the wideband input transformer L21, L22 to the emitter of TR4 which operates as an earthed base r.f. amplifier. The collector circuit L24 is tuned together with the oscillator coil L29 by ganged capacitors VC3 and VC4. L23 shunts the input to TR5 with a low impedance at 10.7Mc/s. TR5 operates as an earthed base mixer stage with r.f. signals coupled to its emitter via C37 together with oscillator voltage from the oscillator stage TR7 via C40.

The resultant 10.7Mc/s i.f. signals present in TR5 collector circuit are selected by the tuned i.f. transformer primary L25 and coupled by the secondary L26 to a three-stage i.f. amplifier comprising TR6, TR2 and TR3. Limiter diode D5 prevents overloading of the i.f. channel on strong signals.

Amplified output from TR3 is fed to the f.m. ratio detector comprising discriminator transformer L14, L15, L17, L18 and diodes D3, D4. Audio output from the detector is de-emphasised by components R17, C28 and fed via S17 to the volume control R39.

The d.c. voltage developed at the ratio detector, due to the f.m. signal, is fed via R38 to the base of TR8. This voltage determines the degree of conduction of TR8 and thus the effect of C49 across the oscillator tuned circuit L29. By this means the oscillator is retuned, providing automatic frequency control.

On a.m., signals induced in the ferrite rod aerial are coupled to the base of TR1 which operates as a self-oscillating mixer with separate aerial and oscillator coils for either waveband. I.f. output from TR1 is passed via L8 and L9 to a two-stage i.f. amplifier TR2 and TR3 and then to the detector diode D2. The d.c. voltage which is developed across the diode load and volume control R39 is fed via R18 to the base of TR2 as a.g.c. bias.

The audio section comprises three stages, TR9, TR10 and the push-pull output pair TR11 and TR12. Negative feedback is applied to TR10 emitter via R56, C60 and C58 while the output stage bias is temperature stabilised by thermistor TH1.

#### CIRCUIT ALIGNMENT

**Equipment Required.**—An a.m./f.m. signal generator covering the range 140-1,630kc/s a.m., modulated 30 per cent at 1,000c/s, and 10.7-105Mc/s f.m., an audio output meter with an impedance to match 8Ω; a shielded r.f. coupling coil (85 turns of enamelled copper wire on a 2 in. diameter former);

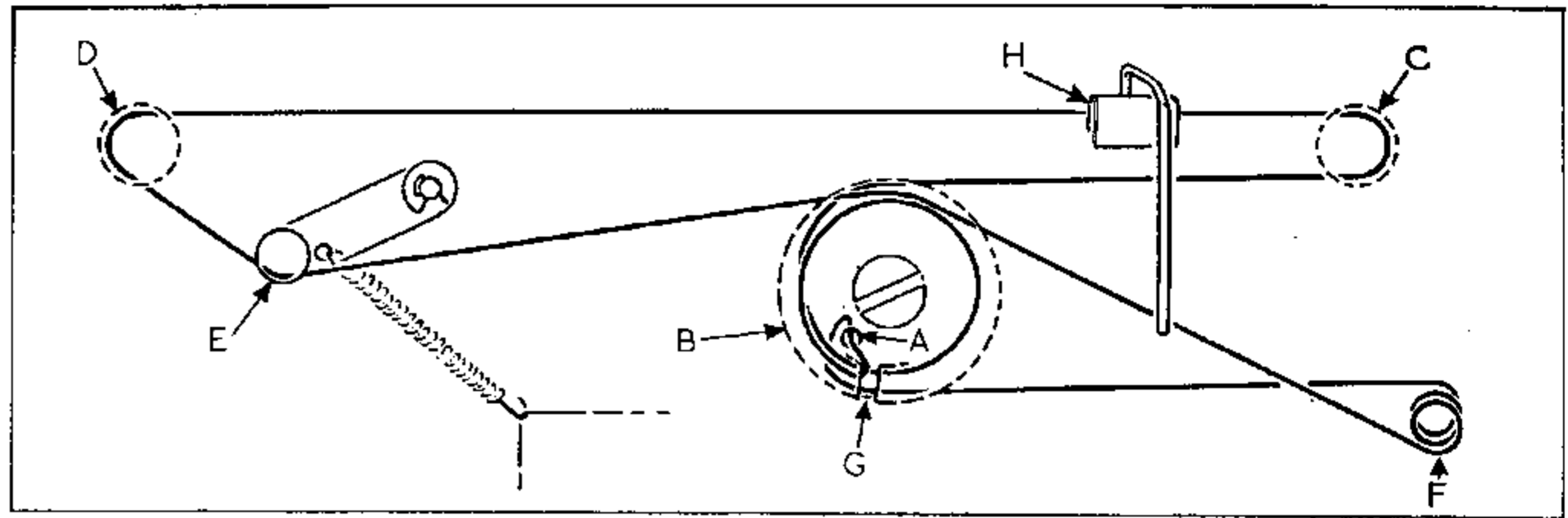
a 5,000pF capacitor and suitable trimming tools.

During alignment, the signal input level should be adjusted to maintain receiver output of approximately 50mW.

#### A.M. CIRCUITS

- 1.—Connect the audio output meter to the receiver via the earphone socket using the correct type of plug. Connect the signal generator to the coupling coil and place the coil co-axially with the ferrite rod, five inches from the m.w. winding.
- 2.—Set the volume control at maximum and the tone control at maximum high frequency response. Turn the tuning gang to the fully closed position and check that the cursor lines up with the "L" of "Light" on the f.m. scale.
- 3.—Switch receiver to m.w. and fully open the tuning gang. Feed in a 470kc/s a.m. modulated signal and adjust L16, L11 and L8 for maximum output. Repeat.
- 4.—Fully close the tuning gang. Feed in a 509kc/s signal and adjust L4 for maximum output.
- 5.—Fully open the tuning gang. Feed in a 1,630kc/s signal and adjust T3 for maximum output.
- 6.—Tune receiver to 500m. Feed in a 600kc/s signal and adjust L2 (slide

Drive cord assembly, drawn as seen when the tuning gang is fully open. Full directions for fitting a replacement cord are given under "General Notes"



- former along ferrite rod) for maximum output.
- 7.—Tune receiver to 214m. Feed in a 1,400kc/s signal and adjust T2 for maximum output.
- 8.—Repeat operations 4, 5, 6 and 7.
- 9.—Switch receiver to l.w. and fully close the tuning gang. Feed in a 140kc/s signal and adjust L6 for maximum output.
- 10.—Fully open the tuning gang. Feed in a 270kc/s signal and adjust T4 for maximum output.
- 11.—Tune receiver to 1,875m. Feed in a 160kc/s signal and adjust L1 (slide former along ferrite rod) for maximum output.
- 12.—Tune receiver to 1,200m. Feed in a 250kc/s signal and adjust T1 for maximum output.
- 13.—Repeat operations 9, 10, 11 and 12.

### F.M. CIRCUITS

- 1.—Connect the audio output meter to the receiver via the earphone socket using the correct type of plug. Connect the signal generator via a 5,000pF capacitor to the red wire test point.
- 2.—Switch receiver to f.m., turn the volume control to maximum and the tone control to maximum high frequency response.
- 3.—Feed in a 10.7Mc/s signal, f.m. deviation  $\pm 25$ kc/s at 1,000c/s, and adjust L15, L10, L27 and L25 for maximum output. Adjust L23 for minimum output.
- 4.—Switch the signal generator to a.m. modulation, 30 per cent at 1,000c/s and adjust L18 for minimum output.
- 5.—Repeat operations 3 and 4.
- 6.—Retract the telescopic aerial fully and connect the signal generator to the car aerial socket.
- 7.—Fully close the tuning gang. Feed in an 87Mc/s f.m. signal and manipulate L29 (expand or contract the turns) for maximum output.
- 8.—Fully open the tuning gang. Feed in 105Mc/s signal and adjust T6 for maximum output.
- 9.—Tune receiver to 90Mc/s. Feed in a 90Mc/s signal and manipulate L24 for maximum output.
- 10.—Tune receiver to 104Mc/s. Feed in a 104Mc/s signal and adjust T5 for maximum output.

11.—Repeat operations 7, 8, 9 and 10.

### GENERAL NOTES

**Dismantling.**—To remove the chassis from the case, open the rear flap and take out the batteries and battery container.

Pull off the front control knobs.

Take out five chassis fixing screws. These are located as follows: one at either end of the battery bracket, one below L16, L19 i.f. can, one in the top left-hand corner of the chassis and one on the right-hand side of the chassis immediately above the audio panel and behind the telescopic aerial.

Unsolder the leads from the car aerial socket.

The chassis and battery bracket can now be eased out from under the telescopic aerial rod to the extent of the speaker leads.

**Drive Cord Replacement.**—A diagram of the drive cord system appears at top of page.

To fit a replacement, fully open the tuning gang. Pass one end of the new cord through the hole A on the drive drum B, leaving approximately 1½ in. of cord protruding on the top side of the drive drum.

Wind the other end of the cord 2½ turns clockwise round the drive drum then route the cord over pulleys C and D and the tension arm E. Pass the cord over the drive drum and on to the control spindle F and wind 3 turns anti-clockwise round the control spindle.

Finally pass the cord through slot G on the drive drum and tie together the two

ends of the cord, making sure that the arm E is under tension. With the tuning gang fully closed, attach the cursor H and align it with the "L" of "Light" on the f.m. tuning scale.

**Switches.**—S1-S20 are waveband switches which are located in a rotary unit in the top left-hand corner of the chassis. On the circuit diagram each switch is given a code letter to show its closed position according to the switch key. S21 is the battery on/off switch which is ganged with the volume control.

**Batteries.**—Four 1.5V cells, U11 or V11.

**Drive Mechanism Sticking.**—If difficulty is experienced with the drive mechanism sticking, the drive drum spindle should be lubricated with light machine oil and the gear assembly should be lightly greased.

**Blocking on M.W. or L.W.**—Intermittent blocking on m.w. or l.w., which may also occur when the receiver is subject to impulsive interference (e.g. switching on lights), can be due to excessive gain in the final i.f. stage. To overcome this trouble, a 56kΩ resistor should be fitted across the primary of the i.f. transformer L16.

**C20 and R13.**—Instances have been found where C20 and R13, which are wired on the foil side of the printed panel, are short-circuited by the copper foil. In these instances a break should be made in the copper foil between the two points where C20 and R13 are connected.

Plan of the r.f. printed panel illustrating the alignment adjustments only. L24 and L29 are adjusted by expanding or contracting the turns as required

