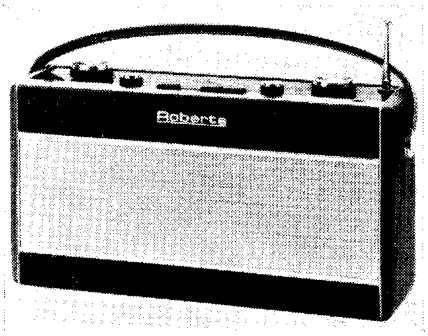
"TRADER" SERVICE SHEET

1759

ROBERTS R700

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

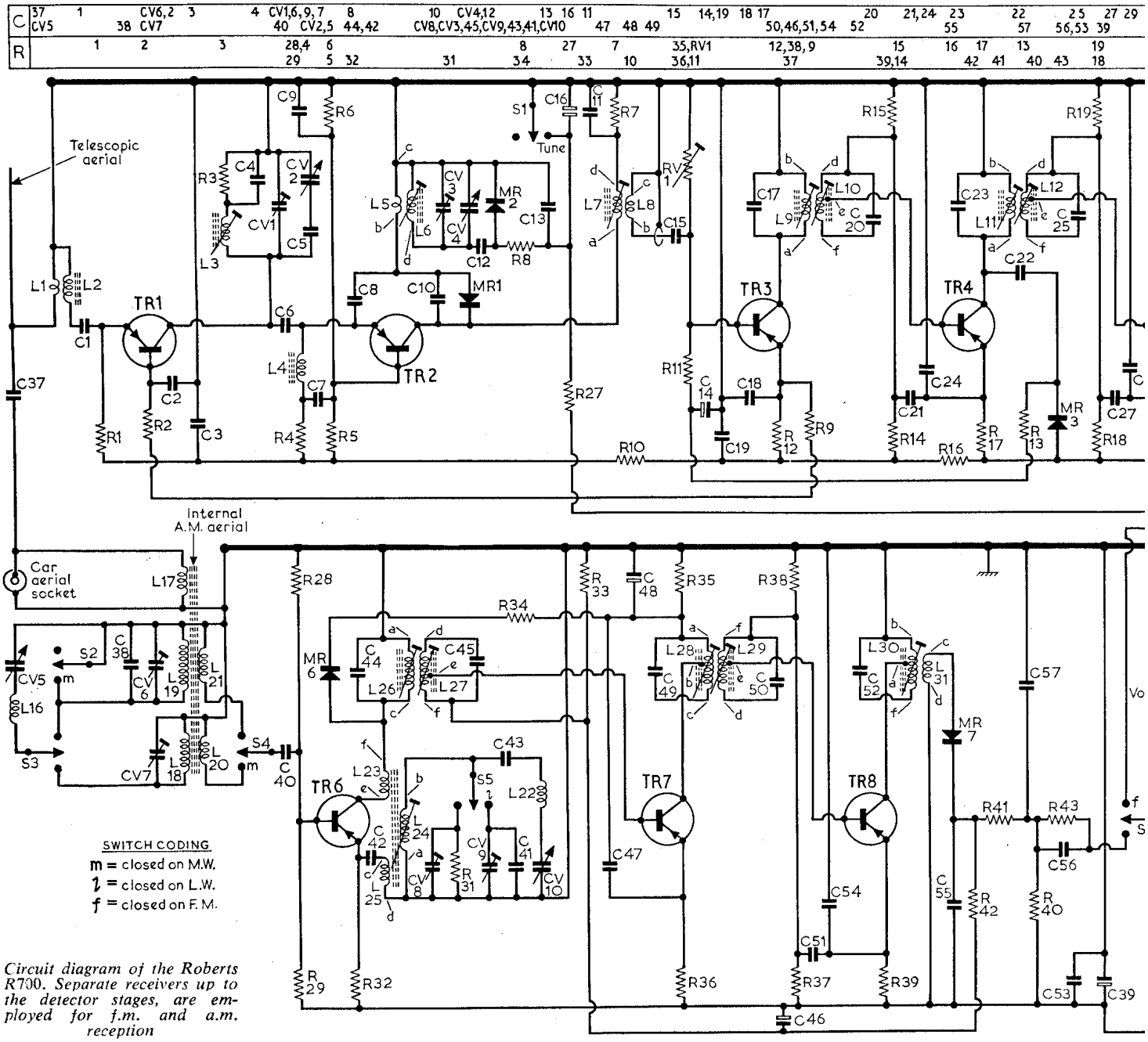


FEATURING automatic frequency control on f.m. and separate bass and treble tone controls, Roberts R700 is a three waveband a.m./f.m. portable radio receiver. It is powered by two 9V dry batteries and employs a total of 14 transistors and 8 diodes.

Waveband ranges are 183-577m. (m.w.), 1,120-2,000m. (l.w.) and 87-108Mc/s (f.m.) with reception via a ferrite rod a.m. aerial and a telescopic f.m. aerial.

Socket facilities provide for the connection of an earphone, which automatically mutes the loudspeaker when the plug is inserted, and a car type aerial.

(*Continued overleaf col.* 1)



Circuit diagram of the Roberts R700. Separate receivers up to the detector stages, are employed for f.m. and a.m. reception

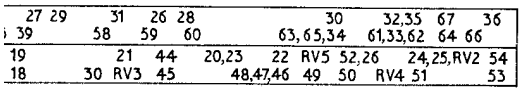
Resistors

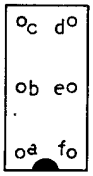
R1	1kΩ	A1
R2	1kΩ	A1
R3	220Ω	A1
R4	1kΩ	A1
R5	3·3kΩ	A2
R6	22kΩ	A2
R7	220Ω	A2
R8	82kΩ	A2
R9	3·3kΩ	A1
R10	22Ω	A1
R11	3·3kΩ	A1
R12	1kΩ	A1
R13	5·6kΩ	B1
R14	3·3kΩ	B1
R15	22kΩ	A2
R16	56Ω	B1
R17	1kΩ	B1
R18	5·6kΩ	B1
R19	6·8kΩ	B2
R20	220Ω	B1
R21	3·3kΩ	B1
R22	150Ω	B1
R23	330Ω	B1
R24	1kΩ	B2
R25	560Ω	B2
R26	1kΩ	B1
R27	68kΩ	B1
R28	33kΩ	B2
R29	6·8kΩ	B1
R30	3kΩ	B1
R31	180kΩ	B1
R32	1kΩ	B1
R33	68kΩ	B2
R34	1kΩ	C2
R35	1kΩ	B2
R36	560Ω	C2
R37	4·7kΩ	C1
R38	22kΩ	C1
R39	1kΩ	C1
R40	4·7kΩ	C1
R41	1kΩ	C1
R42	10kΩ	C1
R43	56kΩ	B1
R44	68kΩ	C1
R45	10kΩ	C1
R46	2·2kΩ	C1
R47	330Ω	C1
R48	15kΩ	C1
R49	3·3kΩ	C1
R50	3·3kΩ	C1
R51	1kΩ	C1
R52	3·3kΩ	C1
R53	10kΩ	C1
R54	82kΩ	C2
R55	1kΩ	C2
R56	5·6kΩ	C2
R57	2·7kΩ	C2
R58	12kΩ	C2
R59	6·8kΩ	C2
R60	10Ω	C2
R61	1·5kΩ	C2
R62	1·2kΩ	C2
R63	82Ω	C2
R64	1·5kΩ	C1
R65	2·2Ω	C1
R66	2·2Ω	C1
R67	330Ω	C2
RV1	100kΩ	A1
RV2	22kΩ	B2
RV3	20kΩ	D3
RV4	50kΩ	E3
RV5	50kΩ	D3
RV6	10kΩ	C2
RV7	220Ω	C1

Capacitors

C1	1,000pF	A1
C2	1,000pF	A1
C3	0·1µF	A1
C4	0·01µF	A1
C5	100pF	A1
C6	2·2pF	A2
C7	270pF	A1
C8	8·2pF	A2
C9	1,000pF	A2
C10	68pF	A2
C11	0·01µF	A2
C12	8·2pF	A2
C13	1,000pF	A2
C14	2µF	A1
C15	0·01µF	A1
C16	2µF	A2
C17	180pF	B2
C18	0·01µF	A1
C19	0·1µF	A1
C20	180pF	B2
C21	0·01µF	B1
C22	5pF	B1
C23	180pF	B2
C24	0·01µF	B1
C25	180pF	B2
C26	0·1µF	B1
C27	0·01µF	B1
C28	80pF	B1
C29	0·01µF	B1
C30	50pF	B1
C31	100µF	B1
C32	330pF	B2
C33	330pF	B2
C34	330pF	B1
C35	1,000pF	B1
C36	5µF	B2
C37	20pF	F3
C38	70pF	B2
C39	100µF	B1
C40	0·01µF	B2
C41	350pF	B1
C42	0·022µF	B1
C43	440pF	B1
C44	560pF	C2
C45	560pF	C2
C46	10µF	B2
C47	0·047µF	B2
C48	2µF	B1
C49	270pF	C2
C50	270pF	C2
C51	0·022µF	B1
C52	250pF	C1
C53	0·022µF	B2
C54	0·022µF	B1
C55	0·01µF	C1
C56	5,000pF	B1
C57	0·01µF	C1
C58	0·5µF	D3
C59	1µF	D3
C60	100µF	C1
C61	100µF	C1
C62	0·01µF	C1
C63	0·047µF	D3
C64	2µF	C2
C65	0·022µF	C1
C66	100µF	C2
C67	2µF	C2
C68	100µF	C2
C69	2µF	C2
C70	100µF	C2
C71	175µF	C2
C72	500pF	C2
C73	100µF	C2
C74	350µF	C2
C75	100µF	C2
C76	2,000pF	D3
CV1	20pF	A1
CV2	15pF	F3
CV3	10pF	D3
CV4	15pF	F3
CV5	392pF	F3
CV6	80pF	B2
CV7	40pF	B2
CV8	40pF	B1
CV9	80pF	B1
CV10	392pF	F3

The component numbers in these tables correspond with those used in the receiver manufacturer's service manual





Coils

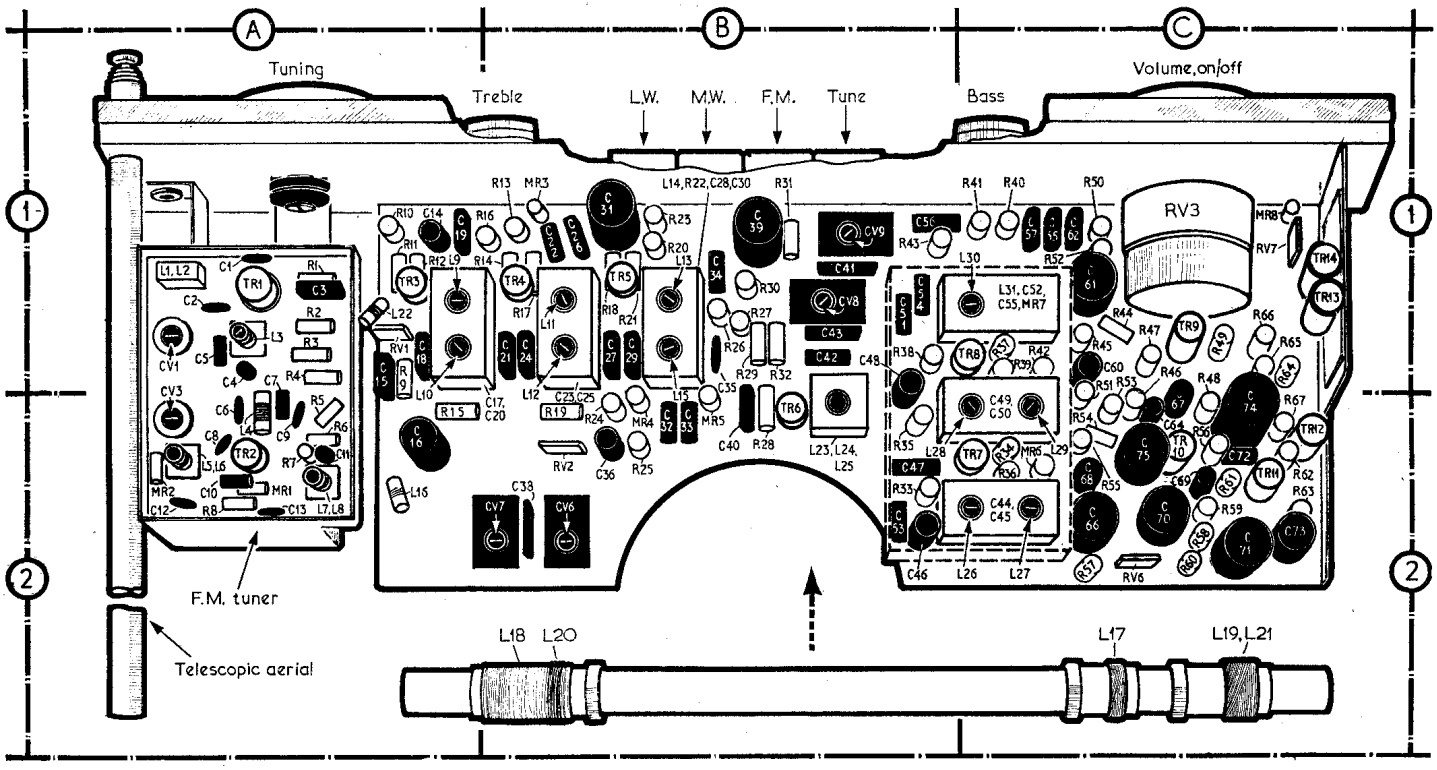
L1	—	A1
L2	—	A1
L3	—	A1
L4	—	A2
L5	—	A2
L6	—	A2
L7	—	A2
L8	—	A2
L9	—	A1
L10	—	A2
L11	—	B1
L12	—	B2
L13	—	B1
L14	—	B1
L15	—	B2
L16	—	A2
L17	—	C2
L18	—	B2
L19	—	C2
L20	—	B2
L21	—	C2
L22	—	A1
L23	—	B2
L24	—	B2
L25	—	B2
L26	—	C2
L27	—	C2
L28	—	B2
L29	—	C2
L30	—	C1
L31	—	C1
L32	25Ω	—

Transistors

TR1	AF180	A1
TR2	AF114	A2
TR3	AF114	A1
TR4	AF114	B1
TR5	AF114	B1
TR6	AF117	B2
TR7	AF117	C2
TR8	AF117	C1
TR9	OC71	C1
TR10	OC75	C2
TR11	AC127	C2
TR12	OC81D	C2
TR13	AC127	C1
TR14	OC81	C1

Diodes

MR1	AA119	A2
MR2	BA102	A2
MR3	AA119	B1
MR4	AA119	B2
MR5	AA119	B2
MR6	AA119	C2
MR7	OA90	C1
MR8	BA114	C1



The chassis as seen from the component side of the printed panel. For ease of servicing the receiver can be withdrawn from the case in one complete unit with only the speaker remaining

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CIRCUIT DESCRIPTION

The circuit comprises two independent receivers, one for the reception of f.m. signals and one for a.m. signals, up to and including the detector output, followed by a common audio channel featuring a complementary output stage. **TR1** to **TR5** operate on f.m. only, **TR6** to **TR8** operate on a.m. only and **TR9** to **TR14** are common to both modes of operation. Battery supply is switched to the appropriate receiver section by the action of **S7.**

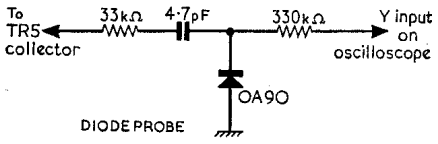
On f.m., **TR1** and **TR2** are connected as earthed base r.f. amplifier and self-oscillating mixer stages respectively. R.f. signals developed across the broad band aerial transformer **L1/L2** are coupled via **C1** to the emitter of **TR1.** An a.g.c. bias for **TR1** is derived from the potential across **TR3** emitter resistor **R12** which is fed to the base via **R9** and **R2.**

The tuned circuit **L3, CV1, CV2, C5, R3** and **C4** form **TR1** collector load impedance and signals developed across the load are fed via **C6,** and the 10·7Mc/s trap **L4,** to the emitter of **TR2.** Local oscillator signals are generated by the tuned circuit **CV3, CV4, C12** and **L6** shunted by the a.f.c. diode **MR2** with collector to emitter feedback via **C10** and **C8.** A reference signal for the a.f.c. circuit is derived from the ratio detector output via **R27** and this reference is short-circuited to chassis via **S1** while the receiver is being tuned to render the a.f.c. inoperative.

The 10·7Mc/s i.f. component in **TR2** collector is coupled via **L7/L8** to a conventional three-stage i.f. amplifier and applied to the ratio detector diodes **MR4** and **MR5** via the discriminator transformer **L13-L15.** I.f. signals at the collector of **TR4** are fed via **C22** to an a.g.c. diode **MR3.** Positive d.c. from **MR3** is filtered by **R13** and **C14** and applied via **R11,** to **TR3** base as a.g.c. bias. Initial level of **TR3** bias is achieved by the setting of potentiometer **RV1.** Audio output from the f.m. detector is coupled via **S6** and **C58** to the volume control **RV3.**

On a.m., signals induced in the ferrite rod aerial are tuned by **L18, CV7, L16** and **CV5** (m.w.), and **L19, CV6, C38, L16** and **CV5** (l.w.) and are inductively coupled via **L20** or **L21** to the base of **TR6** which operates as a self-oscillating mixer. Base bias for **TR6** is set by the potential divider **R28, R29** in conjunction with emitter resistor **R32.** The oscillator coil **L24** is tuned by **C43, L22** and **CV10** in parallel with **CV8** and **R31** (m.w.), and **CV9** and **C41** (l.w.).

I.f. signals in **TR6** collector at 470kc/s are passed via the double-tuned transformer **L26, L27** to a two-stage i.f. amplifier **TR7** and **TR8. TR7** is an a.g.c. controlled stage. Its base is connected in the potential dividing network **R33, R42, R41** and **R40** from which the initial forward bias is derived. On receipt of a signal, this bias is backed off by a positive d.c. developed across **R40** and **R41** due to rectified carrier current output from **MR7.**



On strong signals, the consequent fall in **TR7** collector current through **R35** due to normal a.g.c. action, lifts the reverse bias on diode **MR6** causing it to conduct, damping **L26** with a low resistance shunt to prevent overloading. Audio output from the detector **MR7** is filtered by **R41** and **C57** and fed via correction components **R43** and **C56** to the volume control.

Signals arriving at the volume control are applied via **C59** to the audio amplifier **TR9.** Connected in the coupling between **TR9** and a second amplifier **TR10** are the tone controls **RV5** (bass) and **RV4** (treble) and their associated frequency correction components. Transistors **TR11** to **TR14** are connected in d.c. stabilised amplifier and output-stages using a complementary pair (**TR13** and **TR14**) to achieve transformerless phase-splitting. Output balance is obtained by adjustment to **RV6** and output stage quiescent current conditions by adjustment to **RV7.** 18V operating supply is obtained from two 9V batteries connected in series.

CIRCUIT VOLTAGES

Circuit voltages quoted below and in the transistor table in col. 5 were taken from information supplied by the manufacturers.

They were measured on a model 8 Avometer with no signal input and the volume control set at minimum. All voltages are positive with respect to chassis.

Voltage measured:

Across **C75,** 18V.
Across **C66,** 12·25V.
Across **C61,** 11·5V.
Across **C39,** 6·72V.
Across **C31,** 14·7V.
Across **C19,** 14·25V.
Across **C3,** 14·2V.

The total receiver quiescent current was 15mA (a.m.) and 21mA (f.m.).

CIRCUIT ALIGNMENT

Check that with the tuning gang fully meshed the cursor coincides with three datum pips at the left-hand end of the tuning scale. Calibration marks are printed on the l.w. scale at 1,141m. and 1,911m.

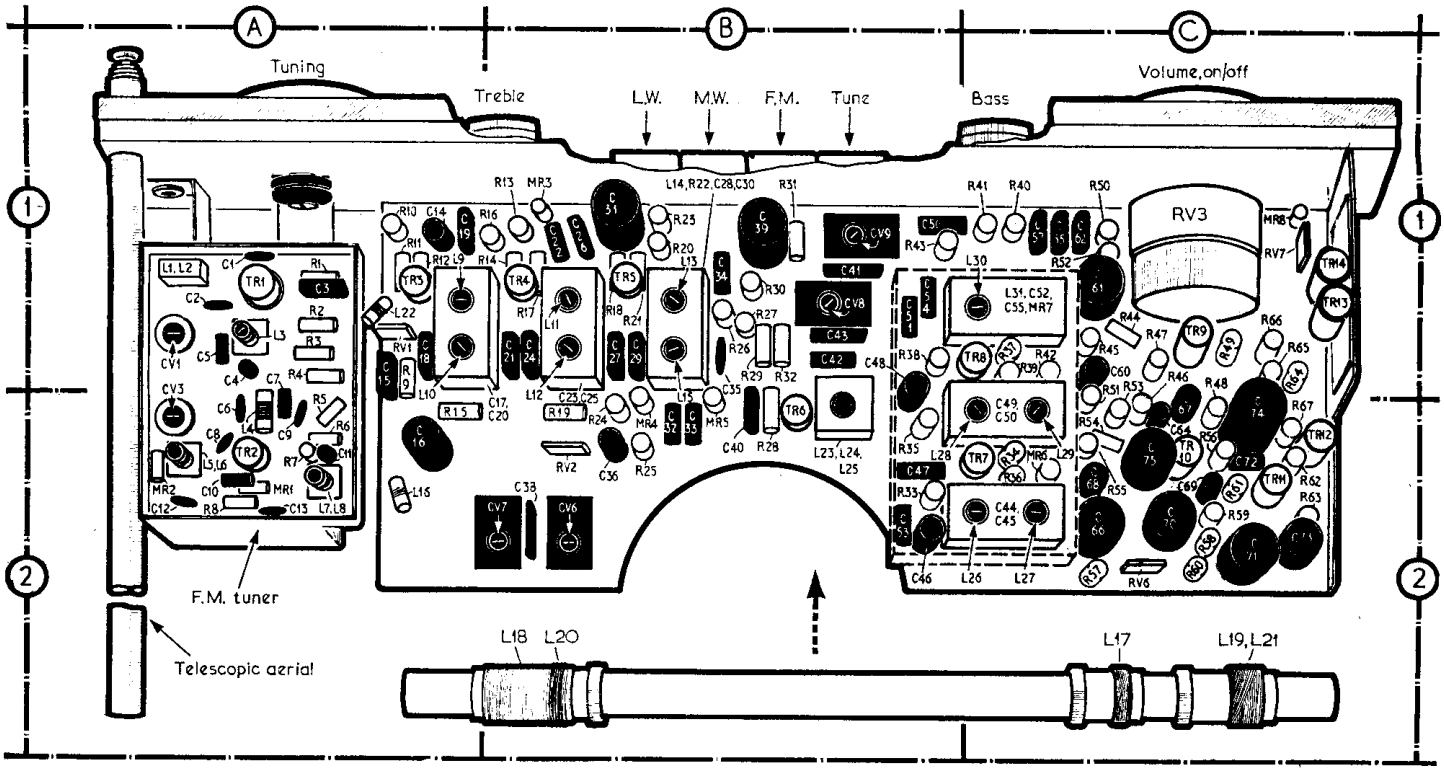
During alignment the input signal should be kept as low as possible to prevent a.g.c. action.

Equipment Required.—A wobbulator with a centre frequency of 470kc/s, and 10·7Mc/s with markers; an a.m. signal generator; an f.m. signal generator; an audio output meter with an impedance to match 25Ω or, alternatively, an a.c. voltmeter; an oscilloscope; a diode detector probe made up as shown in the diagram in col. 2; a 10kΩ resistor and an r.f. coupling coil.

A.M. Circuits

1.—Connect the wobbulator to the r.f. coil and couple the coil to the ferrite rod aerial. Connect the oscilloscope across **R40.**

2.—Switch receiver to m.w. and tune to the 1,911 m. mark. Feed in 470kc/s signal and adjust the cores of **L26** to **L30** for maximum gain and symmetry of the response curve.



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The tuned circuit **L3, CV1, CV2, C5, R3** and **C4** form **TR1** collector load impedance and signals developed across the load are fed via **C6**, and the 10·7Mc/s trap **L4**, to the emitter of **TR2**. Local oscillator signals are generated by the tuned circuit **CV3, CV4, C12** and **L6** shunted by the a.f.c. diode **MR2** with collector to emitter feedback via **C10** and **C8**. A reference signal for the a.f.c. circuit is derived from the ratio detector output via **R27** and this reference is short-circuited to chassis via **S1** while the receiver is being tuned to render the a.f.c. inoperative.

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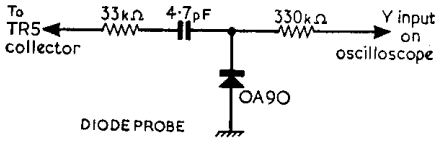
I.f. signals in **TR6** collector at 470kc/s are passed via the double-tuned transformer **L26, L27** to a two-stage i.f. amplifier **TR7** and **TR8**. **TR7** is an a.g.c. controlled stage. Its base is connected in the potential dividing network **R33, R42, R41** and **R40** from which the initial forward bias is derived. On receipt of a signal, this bias is backed off by a positive d.c. developed across **R40** and **R41** due to rectified carrier current output from **MR7**.



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Signals arriving at the volume control are applied via **C59** to the audio amplifier **TR9**. Connected in the coupling between **TR9** and a second amplifier **TR10** are the tone controls **RV5** (bass) and **RV4** (treble) and their associated frequency correction components. Transistors **TR11** to **TR14** are connected in d.c. stabilised amplifier and output-stages using a complementary pair (**TR13** and **TR14**) to achieve transformerless phase-splitting. Output balance is obtained by adjustment to **RV6** and output stage quiescent current conditions by adjustment to **RV7**. 18V operating supply is obtained from two 9V batteries connected in series.

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A.M. Circuits

1.—Connect the wobbulator to the r.f. coil and couple the coil to the ferrite rod aerial. Connect the oscilloscope across **R40**.

2.—Switch receiver to m.w. and tune to the 1,911 m. mark. Feed in 470kc/s signal and adjust the cores of **L26** to **L30** for maximum gain and symmetry of the response curve.