"TRADER" SERVICE SHEET
1746

BAIRD 298

HOUSED in a polished wood cabinet, Baird 298 is an a.m./f.m. transportable table radio receiver employing ten transistors and four crystal diodes.

It is fitted with a ferrite rod aerial for a.m. reception and a telescopic aerial for f.m. A socket provides for the connection of an external f.m. aerial if required, and a second socket allows the output to be fed to an external speaker, earphone or tape recorder, the internal loudspeaker being automatically disconnected as the plug is inserted.

Waveband ranges are 1,200-2,000m (l.w.) 183-550m (m.w.) and 88-100Mc/s (f.m.) with band selection by press-buttons.

The circuit features a manual tone control and complementary Class B output stage. Operating power is obtained from a 9V dry battery or alternatively from the mains supply via a special mains unit which replaces the battery in the cabinet.

Release date: March 1965.

TRANSISTOR ANALYSIS

Transistor voltages given in the table in col. 3 were taken from information supplied by the manufacturers. All readings are negative with respect to chassis.

CIRCUIT DESCRIPTION

Operation on A.M.—On m.w. the signal is picked up by **L15, L17** being short-circuited by the action of **S2.** The tuning gang aerial section **C29** is connected across **L15** and **L16** couples the aerial coil to the base of **TR3** via **C31.** The d.c. base bias conditions for **TR3,** which operates as a self-oscillating mixer, are obtained by **R12** and **R13** in conjunction with **R14.**

On l.w. **L15** is short-circuited and **L17** is connected across **C29** and coupled via **L18** to **TR3** base. **C23** and **C30** are fixed trimmers for m.w. and l.w. respectively, **C28** is a variable trimmer.

Regenerative feedback from collector to emitter of **TR3** is obtained by coupling **L19** and **L20** together through the tuned oscillator winding **L21.** On m.w. **L21** is tuned by **C34** and **C35** and on l.w. **C36** and **C37** are added in parallel.

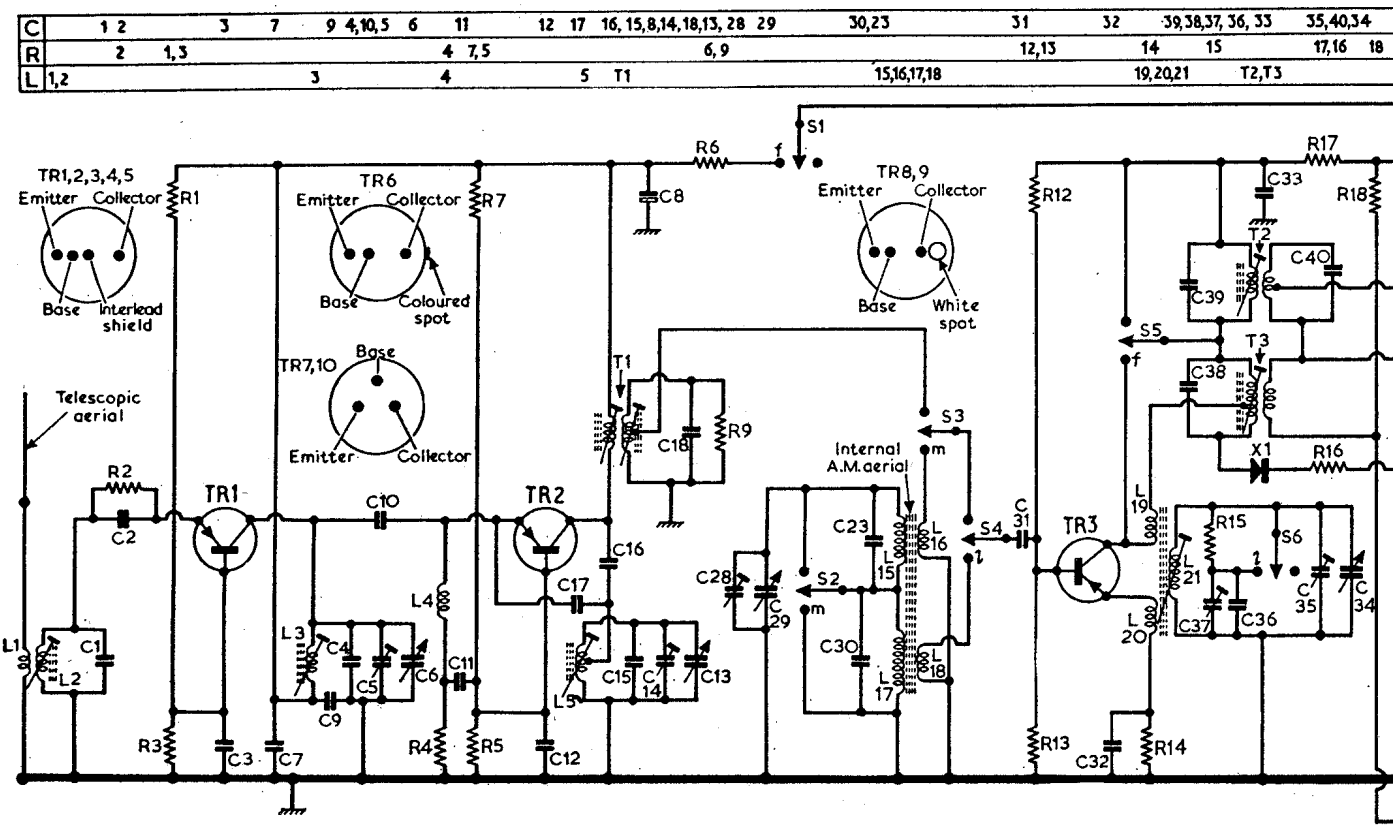
The 470kc/s i.f. component output in **TR3** collector circuit is tapped into a single tuned i.f. transformer **T3** and is fed via a coupling winding to the base of **TR4.** The f.m. i.f. transformer **T2** is short-circuited by the action of **S5. C42** is switched across **TR4** base on m.w. to prevent oscillator harmonics from being fed into the f.m. i.f. circuits.

TR4 collector is fed to a double tuned i.f. transformer **T4** which couples the signal through **T5,** which is a low impedance at 470kc/s, to the base of **TR5.** Base bias is provided by **R22, R23** and base decoupling by **C51. T6** feeds the a.m./i.f. output from **TR5** into the detector **X2** and the rectified audio output is filtered by **C58, R30** and **C59** and developed across the diode load resistor **R31.** It is then coupled via **C65** and an attenuator circuit **R32, R35** through **S8** and **C69** to the volume control **R40.**

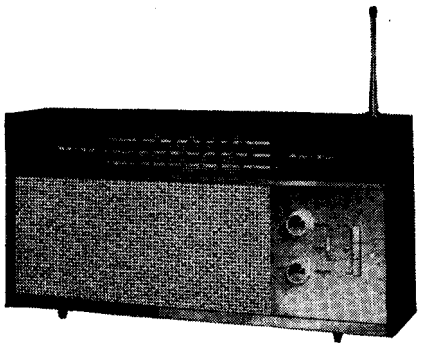
Transistor Table

Transistor	Emitter (V)	Base (V)	Collector (V)
TR1 AF114	0·7	1.0	7·0
TR2 AF115	0·9	1·2	7·0
TR3 AF116	0·7	0·9	7·0
TR4 AF116	0·8	1·0	5·6
TR5 AF116	1·0	1·1	6·9
TR6 OC71	2·0	1·8	3·7
TR7 AC127	4·2	4·0	0·15
TR8 OC81	—	0·15	4·5
TR9 OC81	4·6	4·8	9·0
TR10 AC127	4·6	4·5	—

Circuit diagram of the Baird 298. **TR1** *and* **TR2** *are operative on f.m. only and are connected as earthed base r.f. amplifier and oscillator/mixer respectively.* **TR3** *operates as the a.m. self-oscillating mixer and is switched to become an i.f. amplifier on f.m.*



A.M./F.M. Transportable Table Radio Receiver



The d.c. voltage present across **R31** is used to control the gain of the i.f. stages. An increase in signal at the aerial of the receiver produces an increase in the positive voltage developed at the cathode of **X2.** This appears across **R31** and is fed via a filter network comprising **R24** and **C44** to the base of **TR4** thus causing a reduction in current and therefore gain.

On strong signals, the fall in collector current through **R19** has the effect of reducing the positive voltage on **X1** cathode thereby reducing its reverse bias. As it is bought into conduction, **X1** represents a low resistance shunting the tuned winding of **T3** thus causing a further reduction in gain. Series resistor **R16** prevents **X1**

(*Continued overleaf, col.* 1)

Resistors

R1	27kΩ	B3
R2	560Ω	B3
R3	4·7kΩ	B3
R4	560Ω	B2
R5	1·5kΩ	B2
R6	560Ω	B2
R7	6·8kΩ	B2
R9	1kΩ	B2
R12	47kΩ	B2
R13	6·8kΩ	B2
R14	1kΩ	B2
R15	270kΩ	B2
R16	1·8kΩ	B2
R17	100Ω	B2
R18	150kΩ	A1
R19	1kΩ	B2
R20	220Ω	B1
R21	680Ω	B2
R22	22kΩ	B2
R23	4·7kΩ	B1
R24	39kΩ	A1
R25	1kΩ	B1
R26	470Ω	B1
R27	47Ω	B2
R28	560Ω	B1
R29	1kΩ	C1
R30	470Ω	B1
R31	22kΩ	B2
R32	6·8kΩ	B2
R33	18kΩ	C1
R34	1kΩ	B2
R35	12kΩ	B2
R40	50kΩ	B3
R41	3·3kΩ	B2
R42	5kΩ	A2
R43	47kΩ	C2
R44	100kΩ	C2
R45	10kΩ	C2
R46	22kΩ	C1
R47	3·3kΩ	C2
R48	33kΩ	C2
R49	6·8kΩ	C2
R50	10Ω	C2
R51	330Ω	C2
R52	560Ω	C2
R53	68Ω	C1
R54	680Ω	C1
R55	560Ω	C1
R56	1Ω	C1
R57	1Ω	C2
R58	VA1040	C1

Capacitors

C1	27pF	B2
C2	1,000pF	B3
C3	1,000pF	B3
C4	12pF	B3
C5	—	B3
C6	—	B3
C7	0·1μF	B2
C8	160μF	B2
C9	1,000pF	B2
C10	3·3pF	B2
C11	680pF	B2
C12	1,000pF	B2
C13	—	B2
C14	—	B2
C15	12pF	B2
C16	68pF	B2
C17	4·7pF	B2
C18	180pF	B2
C23	3·3pF	A3
C28	—	B3
C29	—	B3
C30	37pF	C3
C31	0·01μF	A1
C32	0·022μF	B2
C33	0·1μF	B2
C34	—	B2
C35	—	B2
C36	120pF	B2
C37	80pF	B2
C38	350pF	B1
C39	180pF	B1
C40	470pF	B1
C41	1,000pF	B1
C42	3,900pF	B1
C43	4μF	B2
C44	2·5μF	A1
C45	0·1μF	B1
C46	180pF	B1
C47	470pF	B1
C48	270pF	B2
C49	270pF	B2
C50	0·1μF	B2
C51	0·02μF	B1
C52	2,000pF	B1
C53	1,000pF	B1
C54	0·5μF	B1
C55	250pF	B1
C56	68pF	B1
C57	270pF	B1
C58	0·01μF	B1
C59	0·01μF	B1
C60	1,000pF	B1

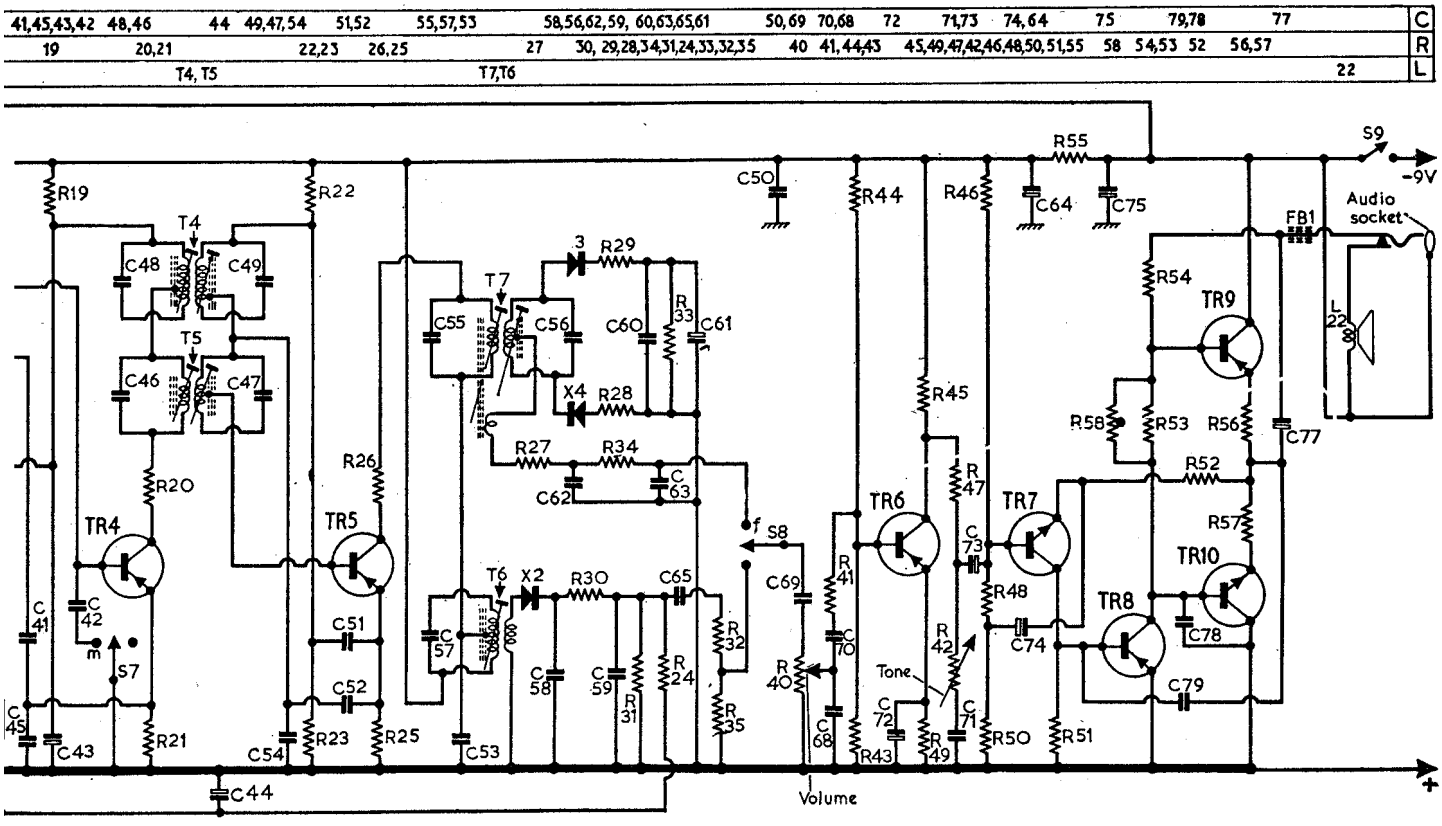
C61	10μF	C1
C62	330pF	B1
C63	0·01μF	B2
C64	400μF	C1
C65	0·047μF	B2
C68	3,000pF	B3
C69	0·047μF	A3
C70	0·047μF	B2
C71	0·1μF	A2
C72	10μF	C2
C73	1·6μF	C1
C74	200μF	C2
C75	160μF	C1
C77	200μF	C2
C78	2,000pF	C2
C79	4,700pF	C2

Coils & Transformers

L1	—	B2
L2	—	B2
L3	—	B2
L4	—	B2
L5	—	B2
L15	—	A3
L16	—	A3
L17	—	C3
L18	—	C3
L19	—	A1
L20	—	A1
L21	—	A2
L22	9Ω	C2
T1	—	B2
T2	—	B1
T3	—	B1
T4	—	B1
T5	—	B1
T6	—	B1
T7	—	B1

Miscellaneous

FB1	FX1242	C2
S1-S8	—	A2
S9	—	B3
X1	OA79	B1
X2	OA90	B1
X3	OA79	B1
X4	OA79	B1



Circuit Description—*continued*

from conducting too heavily on very strong signals, and **C43** decouples any audio component developed across **R19** due to the diode action.

Operation on F.M.—Signals from the telescopic aerial are coupled to the emitter of the earthed base r.f. amplifier **TR1** via the wide band aerial transformer **L1, L2** and **C1**. **L2** is tuned approximately to the band centre frequency. Base bias is provided by **R1** and **R3** in conjunction with **R2** while the base is earthed to r.f. by **C3.**

Output developed across **TR1** collector load impedance **L3** is coupled via **C10** to **TR2** which operates as an earthed base self-oscillating mixer stage. I.f. rejection is provided by **L4** and **C11** which shunt the emitter input circuit with a low impedance at 10.7Mc/s.

Components **L5, C13, C14** and **C15** comprise the local oscillator tuned circuit, **C16** is the coupling capacitor and **C17** the feedback capacitor. **C17** provides correction to obtain a zero degrees phase change in the feedback from collector to emitter at operating frequency. **L5** is tapped for greater stability.

I.f. output developed across **T1** is coupled through switches **S3** and **S4** to the base of **TR3** which operates on f.m. as the first i.f. amplifier. The primary of **T3** and the oscillator feedback winding **L19** are short-circuited by the action of **S5.** Amplified i.f. output developed across **T2** primary is coupled to the base of **TR4** and from **TR4** via **T5** to **TR5.** Capacitors **C41, C52** and **C53** provide earth return paths for the a.m. transformers. **R20** is included in **TR4** collector to prevent "bottoming oscillation" on f.m.

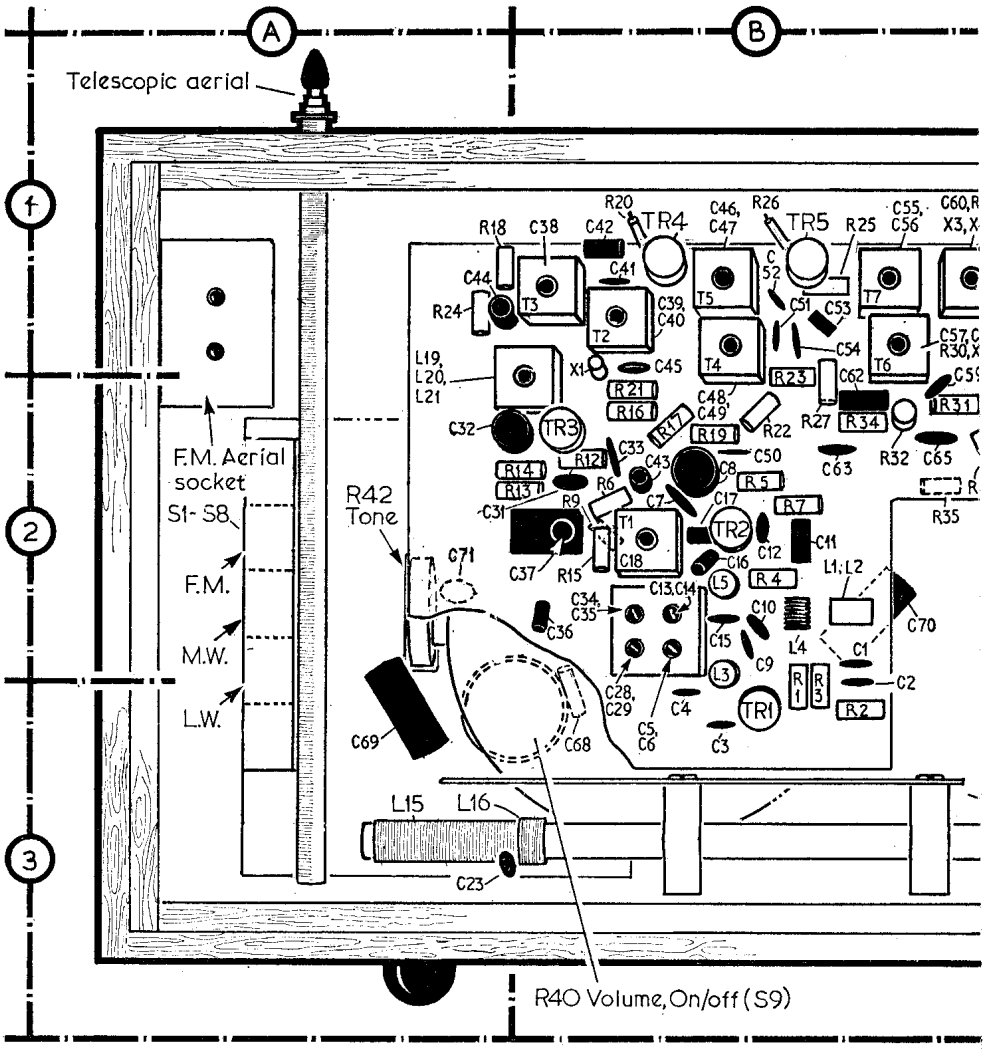
The primary of the discriminator transformer **T7** is connected in the collector circuit of **TR5** and the secondary feeds detector diodes **X3** and **X4. R28** and **R29** are balancing resistors and **C60** the i.f. filter. Audio signal voltages developed across the load resistor **R33** appear at the junction **R27, C62** which form part of the limiting circuit. Audio is then de-emphasized by the filter **R34, C63** and fed via **S8** to the volume control **R40.**

The audio component is fed from the slider of the volume control via **C70** and **R41** to the base of the preamplifier **TR6** and the amplified signal which appears across the collector load **R45** is coupled via **R47** and **C73** to the base of **TR7. R42** and **C71** form a variable tone control. Output from **TR7** is d.c. coupled to the base of the driver **TR8,** base bias being derived from the potential developed across **TR7** collector load **R51.** Drive for the complementary output transistors is taken from the collector load resistor of **TR8, R54.**

TR9 conducts on negative half-cycles and is cut-off on positive half-cycles while **TR10** conducts on positive half-cycles and is cut-off on negative half-cycles. The resultant waveform present at the junction **R56, R57** is passed via **C77** to the loudspeaker **L22.**

CIRCUIT ALIGNMENT

Equipment Required.—An a.m. signal generator with 30 per cent modulation; an f.m. signal generator with 15-75 kc/s deviation; an audio output meter with an impedance to match 9Ω; an oscilloscope and suitable trimming tools.



View of the receiver from the rear showing component locations and (inset) details of the press-button is also the audio socket bracket. Components **R20** *and* **R26** *(B1) are soldered directly t*

A.M. CIRCUITS

During alignment the signal input level should be progressively reduced as the circuits come into line until it is just sufficient to provide approximately 50mW output with the volume control at maximum.

1.—Connect the oscilloscope or output meter across the loudspeaker. Turn the tuning gang to the fully meshed position and the volume control fully clockwise. Connect the a.m. signal generator to an r.f. coupling coil and loosely couple the coil to the receiver.

2.—Switch receiver to m.w. Feed in a 470kc/s 30 per cent modulated signal and adjust **T6** for maximum output. Note: the correct tuning peak is the one which occurs with the core nearest the top of the former.

3.—Adjust the cores of **T4,** bottom core first, for maximum output, setting each core to the tuning peak which occurs nearest its own end of the former. Adjust **T3** core for maximum output.

4.—Repeat operations 2 and 3 for optimum results.

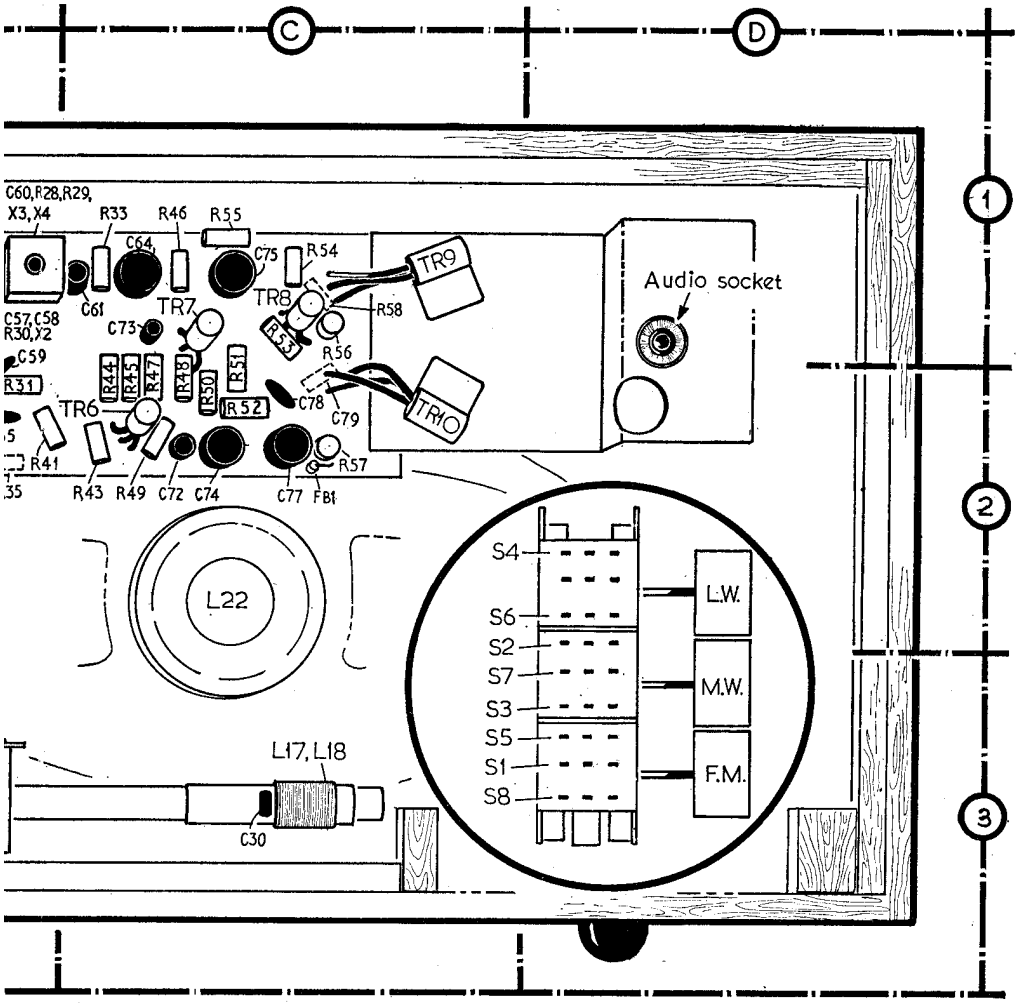
5.—Set all four trimming capacitors located on the rear of the tuning gang assembly to their mid-position. With the tuning gang fully meshed, adjust the cursor so that it is in line with the calibration marks at the low frequency end of the scale.

6.—Tune receiver to 500m on the scale. Feed in a 600kc/s signal and adjust the core of **L21** to tune in this signal. Adjust **L15,** by sliding the former along the ferrite rod, for maximum output.

7.—Tune receiver to 200m on the scale. Feed in a 1,500kc/s signal and adjust **C35** to tune in this signal. Then adjust **C28** for maximum output.

8.—Repeat operations 6 and 7 for best calibration and output.

9.—Switch receiver to l.w. and tune to 1,800m on the scale. Feed in a 166.6 kc/s signal and adjust **C37** to tune in this signal. Then adjust **L17,** by sliding the former along the ferrite rod for maximum output. Repeat until calibration is correct.



itton switch assembly. The cases of output transistors **TR9** *and* **TR10** *are bolted to a metal heat sink which ly to* **TR4** *and* **TR5** *collector lead wires and are concealed inside short lengths of rubber sleeving*

F.M. CIRCUITS

1.—Connect the f.m. signal generator across the aerial transformer primary **L1**. Connect the oscilloscope or output meter across the loudspeaker. Switch receiver to f.m. and tune to 88 Mc/s on the scale.

2.—Set the upper and lower cores of **T1, T2, T5** and **T7** flush with the ends of the formers. Feed in a 10.7 Mc/s 15kc/s deviation f.m. signal and increase the input level until an output is observed on the oscilloscope. If sufficient input is not available the signal may be applied to the base of **TR3** or **TR4** via a suitable blocking capacitor. In this event the signal generator connections should be transferred progressively back to the aerial transformer as the i.f. circuits are aligned.

3.—Adjust the cores of **T7**, upper core first, for maximum output. Two tuning peaks occur on the lower core, the second one is the correct tuning point.

4.—Adjust the cores of **T5, T2** and **T1** in that order, adjusting the lower core first in each case, for maximum output.

5.—Switch to 70 kc/s deviation and readjust the i.f. cores in the same order for a symmetrical sine wave output.

6.—Set the core of **L3** approximately 4 turns in from the top of the former and the core of **L5** flush with the top of the former. Adjust **C5** and **C14** to the mid-position.

7.—Feed in an 88Mc/s f.m. signal, 75kc/s deviation and with the receiver tuned to 88Mc/s, adjust **L5** for maximum output, then adjust **L3** for maximum output.

8.—Tune receiver to 100Mc/s. Feed in a 100Mc/s signal and adjust **C14** to tune in this signal. Then adjust **C5** for maximum output.

9.—Repeat operations 7 and 8 for correct scale calibration.

GENERAL NOTES

Dismantling.—To remove the chassis from the cabinet first remove the back cover, the battery and the two small control knobs.

Pull off from the printed panel the two connections which carry the leads from the telescopic aerial after noting which way round they are connected.

To remove the chassis completely, leaving the speaker in the cabinet, unsolder the speaker leads and remove the speaker fixing nut securing the solder tag.

The speaker leads are sufficiently long to give reasonable access without unsoldering or, alternatively, the speaker may be removed with the chassis.

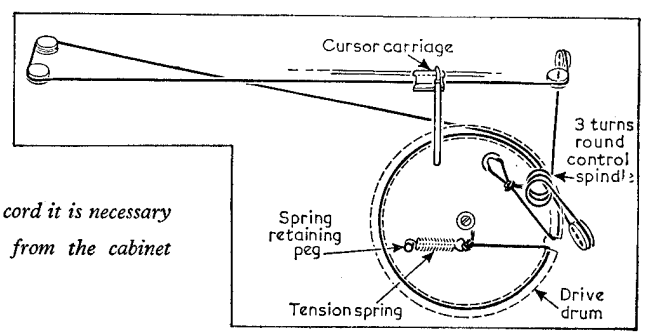
Using a box key, remove two chassis securing nuts and washers near the top and bottom edges of the press-button unit and one accessible through a large clearance hole in the audio socket bracket.

When replacing the chassis it should be centred so that the press-buttons and tone control knob do not foul the control escutcheon before finally tightening the nuts.

Switches.—S1-S8 are the waveband switches which are housed in a press-button unit shown in location reference A2. (Details of the unit are shown inset.) On the circuit diagram, each switch is coded in one of its two positions with *l*, *m* or *f* to indicate its closed position when either the l.w., m.w. or f.m. button is depressed. The switch is in the alternative position when the button is released. On/off switch **S9** is ganged with the volume control.

Battery.—9V Ever Ready PP9 or equivalent.

Mains Unit.—Baird type PP1.



Details of the scale drive assembly drawn with the tuning gang at minimum. To fit a replacement drive cord it is necessary to remove the chassis from the cabinet

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