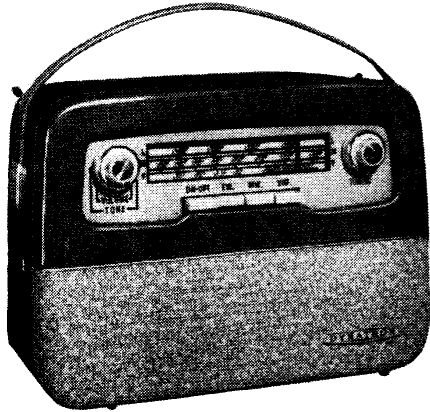


"TRADER" SERVICE SHEET
1559

DYNATRON TP15

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



Appearance of TP15 "Commodore"

are 183-555m (M.W.), 1,110-2,000m (L.W.) and 88-108Mc/s (F.M.).
Release date and original price: August, 1961, £25 8s 9d. Purchase tax extra.

Transistor Table

Transistor	Emitter (V)	Base (V)	Collector (V)
TR1 OC171}	Inaccessible for voltage measurements		
TR2 OC171}			
TR3 AF116	3.3	3.5	9.0
TR4 AF116	2.8	3.0	7.0
TR5 AF116	3.0	1.2	9.0
TR6 OC71	4.0	3.5	6.0
TR7 OC81D	1.75	2.0	9.2
TR8 OC81	—	0.25	9.5
TR9 OC81	—	0.25	9.5

TRANSISTOR ANALYSIS

Transistor voltage readings given in the table above were taken from information supplied by the manufacturers. They were measured on a model 8 Avometer switched to its 10V D.C. range. All readings are negative with respect to battery positive (not chassis) and care should be taken during measurement not to short-circuit transistor electrodes to chassis. Battery voltage was 9.5V. The receiver volume control was turned fully anti-clockwise.

CIRCUIT DESCRIPTION

Operation on A.M.—M.W. aerial coils L11, L12, and L.W. L9 and L10 together

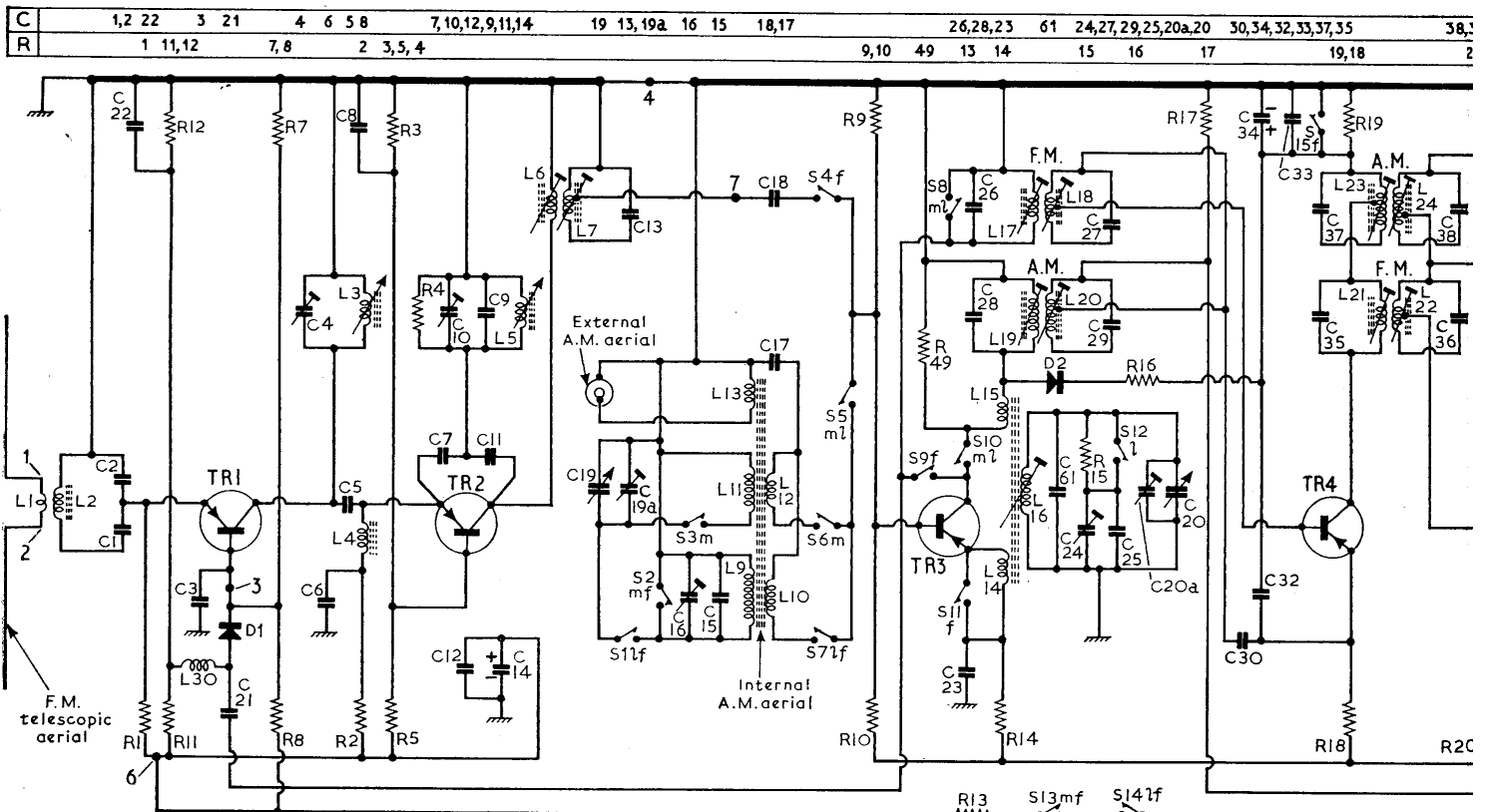
with external coupling coil L13 are mounted on a ferrite rod to form an internal aerial. On M.W., S3 is closed and L11 is tuned by C19 and C19a, the received signal being fed from L12 via S6 and S5 to the base of the mixer TR3.

On L.W. S1 is closed and L9 is tuned by C19, C19a with C15 and C16 in parallel, the received signal then being fed from L10 via S7 and S5 to the base of TR3.

Correct operating bias is provided by the potentiometer R9, R10. TR3 operates as a self-oscillating mixer, regeneration is obtained by feedback from collector to emitter provided by the coupling of L14 and L15.

The frequency of operation is determined by the tuned circuit comprising on M.W., L16, C20, C20a and C61. R15 in series with C25 and C24 provide frequency dependant damping and helps maintain constant oscillator amplitude over the medium wave band. On L.W. R15 is short circuited by S12, L16 being tuned by C20, C20a, C61, C24 and C25 in parallel.

D.C. stabilization of the emitter current of TR3 is provided by R14, degeneration at R.F. is prevented by the decoupling capacitor C23. The intermediate frequency signal generated by TR3 is fed via the double tuned coupling transformer L19, L20 to the base of the first I.F. amplifier TR4. Base bias is provided by R17, R30 and R48; emitter current stabilization by R18 decoupled by C30, C32. The amplified signal from TR4 is coupled by means of a second double tuned transformer L23, L24 to the base of the



Circuit diagram of Dynatron TP15. Diode D1 in TR1 base circuit is biased by R11, R12 and prevents the R.F. amplifier from being over-

second I.F. amplifier. **TR5**. Base bias is provided by **R20**, **R21** and emitter current stabilization by **R22** decoupled by **C40**, **C41**. The output of **TR5** is fed to the diode detector **D5** via the single tuned transformer **L28**, **L29**. The audio signal resulting from the rectification of the I.F. signal by **D5** is developed across **R48**. **C47** prevents the formation of R.F. voltage across **R48**.

The audio signal is fed via **R47** and **S19** or **S17**, **S18** to the volume control **R31**.

The D.C. component of the rectified signal is fed via **R30**, decoupled by **C31** to the base of **TR4**. This voltage is of positive polarity and thus reduces the bias on **TR4**, resulting in a decrease of emitter current and a reduction in gain, thus providing A.G.C. action.

A.G.C. action is further assisted on strong signals by the action of **D2** and **R16** as follows:—The cathode of **D2** is connected via **R16** to the junction of **R19**, **C33**, **C34** and the cold end of **L23** primary. Under no signal conditions the potential of the cathode of **D2** is about 2 volts less negative than the HT line by virtue of the voltage drop due to the collector current of **TR4** flowing through **R19** (2.2K ohms).

The anode of **D2** is connected to the "live" end of the primary of **L19**, and is maintained almost at HT potential.

Diode **D2** is thus reversed biased and presents a high impedance, having a negligible effect on the circuit. When a strong signal is received the collector current of **TR4** is reduced by the A.G.C. action described above, this decrease in current causes the voltage dropped across **R19** to decrease reducing the reverse bias on **D2** and lowering its impedance, thus damping **L19**, resulting in a further reduction in gain.

With the reception of a very strong signal, the bias on **D2** is reversed, causing **D2** to conduct strongly and heavily damp **L19**.

D2 also operates as a "catching diode" and prevents the collector voltage of **TR3**

from "bottoming," as might otherwise occur with strong impulsive interference, causing blocking and other troubles.

Operation on F.M.—The signal from the telescopic "V" dipole aerial is coupled by the broad-band input transformer, **L1**, **L2**, to the emitter of the RF amplifier **TR1**. The

amplified output of **TR1** is tuned by **L3**, **C4**, and is fed to the emitter of the mixer **TR2**. **L4**, **C6** is an I.F. rejection circuit. The frequency of oscillation is determined by the circuit consisting of **L5**, **C9**, **C10**, **R4**.

I.F. output of the mixer is coupled by the (Continued overleaf col. 1)

COMPONENT VALUES AND LOCATIONS

Resistors			Capacitors		
R1	560Ω	E3	C1	470pF	E3
R2	3.3kΩ	E3	C2	30pF	E3
R3	10kΩ	E3	C3	1,000pF	E3
R4	10kΩ	E3	C4	20pF	E3
R5	10kΩ	E3	C5	5.6pF	E3
R6	—	†	C6	470pF	E3
R7	22kΩ	B1	C7	3.3pF	E3
R8	3.9kΩ	B1	C8	1,000pF	E3
R9	27kΩ	B2	C9	30pF	E3
R10	6.8kΩ	B2	C10	8pF	E3
R11	1.5kΩ	A2	C11	68pF	E3
R12	5.6kΩ	A2	C12	1,000pF	E3
R13	150Ω	C1	C13	68pF	E3
R14	1kΩ	A1	C14	350μF	B1
R15	270kΩ	A2	C15	68pF	H5
R16	820Ω	B2	C16	30pF	H5
R17	56kΩ	B2	C17	0.02μF	F6
R18	680Ω	B2	C18	1,000pF	B1
R19	2.2kΩ	B2	C19, C19a	—	H6
R20	3.9kΩ	C2	C20, C20a	—	H6
R21	18kΩ	C2	C21	1,000pF	B2
R22	1kΩ	C2	C22	0.04μF	A2
R23	220Ω	C2	C23	0.02μF	A1
R24	470Ω	C2	C24	30pF	H5
R25	1.5kΩ	C2			
R26	18kΩ	D2			
R27	5.6kΩ	C2			
R28	4.7kΩ	C2			
R29	330Ω	C2			
R30	8.2kΩ	C2			
R31	5kΩ	C1			
R32	47kΩ	D1			
R33	120kΩ	C1			
R34	8.2kΩ	D1			
R35	12kΩ	C1			
R36	470Ω	D1			
R37	12kΩ	D1			
R38	100kΩ	D1			
R39	680Ω	D1			
R40	270kΩ	D2			
R41	68Ω	D2			
R42	8.2kΩ	D2			
R43	8.2kΩ	D2			
R44	5.6Ω	D2			
R45	5kΩ	D1			
R46	10kΩ	D1			
R47	15kΩ	§			
R48	5.6kΩ	§			
R49	82kΩ	§			
C25	330pF	H5			
C26	180pF	G5			
C27	180pF	G5			
C28	560pF	G5			
C29	560pF	G5			
C30	2,200pF	B2			
C31	8μF	B2			
C32	0.25μF	B2			
C33	1,000pF	B2			
C34	2μF	C2			
C35	180pF	G5			
C36	180pF	G5			
C37	300pF	G5			
C38	300pF	G5			
C39	2,200pF	C2			
C40	0.04μF	C2			
C41	0.1μF	B2			
C42	1,000pF	C2			
C43	300pF	G5			
C44	10pF	G5			
C45	250pF	G5			
C46	0.01μF	G5			
C47	0.01μF	C2			
C48	330pF	D2			
C49	8μF	D2			
C50	470pF	C2			
C51	3,000pF	D2			
C52	0.1μF	C2			
C53	0.25μF	C1			
C54	100μF	D1			
C55	1μF	D1			
C56	100μF	D1			
C57	100μF	C1			
C58	100μF	A2			
C59	0.25μF	F5			
C60	100μF	D1			
C61	15pF	H6			

Coils

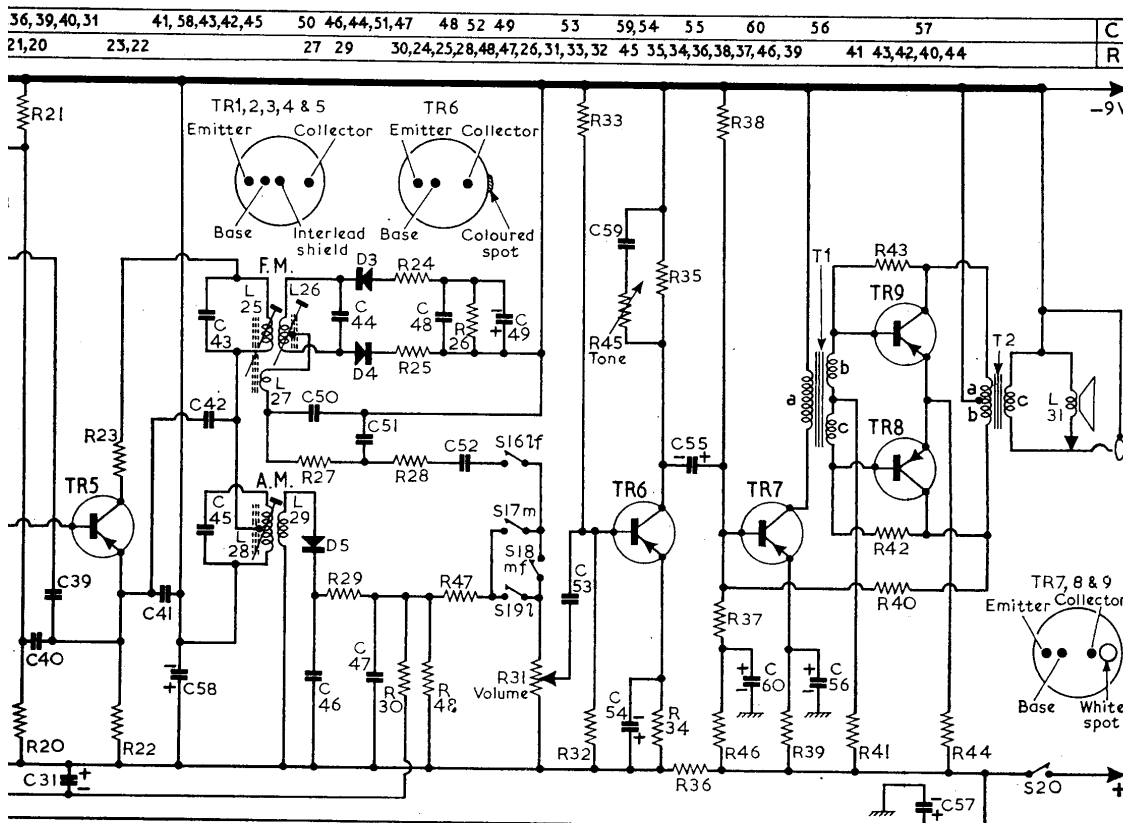
L1	—	E3
L2	—	E3
L3	—	E3
L4	—	E3
L5	—	E3
L6	—	E3
L7	—	E3
L8	—	†
L9	—	H6
L10	—	H6
L11	—	F6
L12	—	F6
L13	—	A2
L14	—	A2
L15	—	A2
L16	—	A2
L17	—	B2
L18	—	B2
L19	—	B2
L20	—	B2
L21	—	B2
L22	—	B2
L23	—	B2
L24	—	B2
L25	—	C2
L26	—	C2
L27	—	C2
L28	—	C2
L29	—	C2
L30	—	A2
L31	—	—

Transformers*

T1	{ a 100.0 b 25.0 c 25.0	D2
T2	{ a 1.25 b 1.25 c —	D2

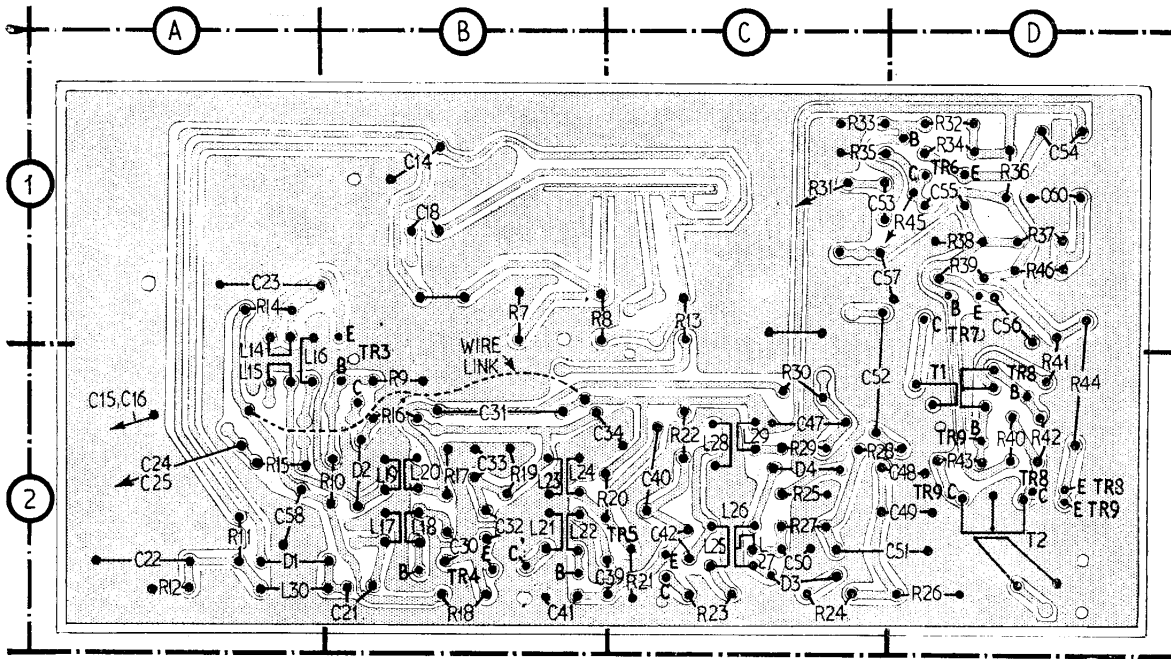
Miscellaneous

D1	OA79	A2
D2	OA79	B2
D3	OA79	C2
D4	OA79	C2
D5	OA70	G5
S1-S19	—	G5
S20	—	G5



loaded on strong signals. Wavechange switches are incorporated in a three-position press-button unit

*Approximate D.C. resistance in ohms.
†No Component.
§Wired on press button unit.



Foil-side view of the main receiver printed circuit panel as it appears when looking into the rear of the receiver. A metal screening cover (not shown) normally obscures the lower part of the panel and is punched with holes to allow access to the cores of the I.F. and A.M. oscillator coils. It should be in position during alignment

Circuit Description—continued

I.F. transformer L6, L7 via S4 to the base of TR3 which becomes the 1st FM I.F. amplifier. The output of TR3 is fed via S9 to the 2nd FM I.F.T. L17, L18. The signal also feeds the diode D1 via C21, to provide AGC on strong signals, by reducing the gain of TR1. A suitable delay voltage is provided by R11, R12.

The signal is further amplified by TR4, TR5, a composite AM/FM I.F. amplifier.

Audio modulation of the I.F. signal is recovered by the ratio detector circuit consisting of L25, L26, L27, C43, C44, D3, D4, R24, R25, R26, C48, C49. R.F. filtering and de-emphasis is carried out by R27, R28, C50, C51. The audio signal is then fed via C52 and S16 and S18 to the volume control R31, and hence as for AM through the audio amplifier to the loudspeaker.

CIRCUIT ALIGNMENT

Equipment Required.—A signal generator with the necessary frequency coverage, modulated 30% at 400c/s; an R.F. coupling loop which can be constructed by winding three turns of insulated wire to a diameter of 10ins; an output meter; a 20,000Ω/V meter (model 8 Avometer is suitable); a bladed type non-metallic trimming tool for the I.F. cores; two capacitors, 0.1μF and 0.04μF and two matched 100kΩ resistors.

A.M. I.F. Alignment

- 1.—Connect the output meter in place of the loudspeaker. Connect the signal generator via the 0.1μF capacitor between chassis and the base of TR3 i.e. across R9 (location reference B2).
- 2.—Switch receiver to M.W., set the volume control to maximum output and the tone

control fully anti-clockwise. Tune receiver to the low frequency end of the scale.

- 3.—Feed in a 470kc/s modulated signal and adjust L28 (C2), L24 (B2), L23 (B2), L20 (B2) and L19 (B2) in that order for maximum output, adjusting the input to maintain an output of about 50mW as the circuits come into line. Repeat until no further improvement can be obtained.

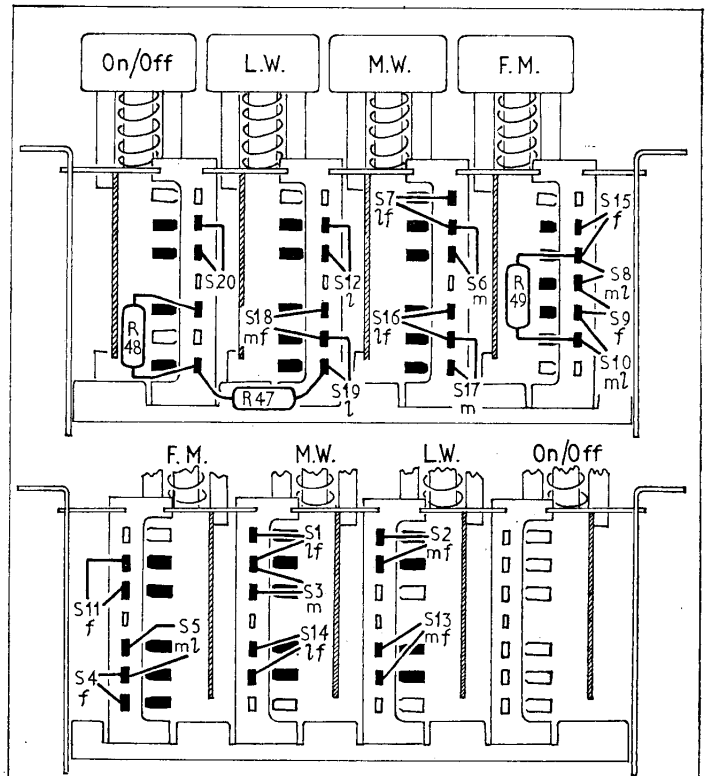
A.M. R.F. Alignment

- 1.—Check that the scale cursor travels symmetrically within the scale aperture between the limits of the tuning gang travel. Connect the output from the signal generator to the ends of the coupling loop. Place the loop 24 inches from the centre of the ferrite rod coaxial with the rod.
- 2.—Switch to M.W. and tune receiver to the

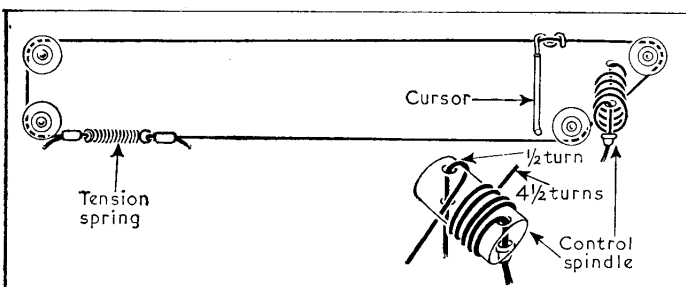
L.F. end of scale. Feed in a 540kc/s signal and adjust L16 (A2) for maximum output.

- 3.—Tune receiver to the H.F. end of scale, feed in a 1,640kc/s signal and adjust C20a (H6) for maximum output.
- 4.—Repeat operations 2 and 3 until no further improvement can be obtained.
- 5.—Switch to L.W. and tune receiver to a point midway between the 1,400m and 1,600m marks on scale. Feed in a 200kc/s signal (or use B.B.C. Light programme) and adjust C24 (H5) for maximum output.
- 6.—Switch to M.W. Feed in a 600kc/s signal and tune receiver to this signal. Adjust L11 (F6) for maximum output.
- 7.—Feed in a 1,300kc/s signal and tune receiver to this signal. Adjust C19a (H6) for maximum output.

Right: Two views of the switch unit, from above (top) and below the chassis with the chassis rear facing the observer



Below: Scale drive cord assembly with (inset) details of the method of threading round the tuning spindle



- 8.—Repeat operations 6 and 7 until no further improvement can be obtained.
- 9.—Switch to L.W. Feed in a 160kc/s signal and tune receiver to this signal. Adjust **L9** (H6) at the same time slightly rock the tuning control for maximum output.
- 10.—Feed in a 260kc/s signal and tune receiver to this signal. Adjust **C16** (H5) for maximum output.
- 11.—Repeat operations 9 and 10 until no further improvement can be obtained.

F.M. I.F. Alignment

- 1.—Connect the two matched 100kΩ resistors across **C49** (location reference D2). Connect the model 8 Avometer across **C49** for use as an output meter. Connect the signal generator via the 0.04μF capacitor to the base of **TR5**.
- 2.—Switch to F.M., feed in a 10.7Mc/s signal and adjust **L25** (C2) for maximum output on the D.C. meter.
- 3.—Transfer the voltmeter between the junction of the two 100kΩ resistors and the junction of **R27** and **R28**. Adjust **L26** (C2) for zero reading on meter (the meter reading should swing from one polarity to the other through zero).
- 4.—Repeat operations 2 and 3 until no further improvement can be obtained.
- 5.—Reconnect D.C. meter as in operation 1. Transfer signal generator to the base of **TR4**. Feed in a 10.7Mc/s signal and adjust **L21** (B2) and **L22** (B2) for maximum output on the meter.
- 6.—Transfer signal generator to the base of **TR3**. Feed in a 10.7Mc/s signal and adjust **L17** (B2) and **L18** (B2) for maximum output.
- 7.—Connect signal generator across **L1** (across tuner unit terminals 1 and 2). Feed in a 10.7Mc/s signal and adjust the tuning control to select the strongest signal, i.e. avoid receiving harmonics of 10.7Mc/s. Adjust **L6** and **L7** (G6) for maximum output.
- 8.—Check the adjustment of **L25**, **L22**, **L21**, **L18**, **L17**, **L7** and **L6**.

F.M. Tuner Unit

- 1.—Connect the signal generator across **L1**, feed in a 99Mc/s signal and tune receiver to this signal.
- 2.—Slacken the grub screw in the collar of the tuning gang spindle, holding the collar to retain the receiver tuning. Rotate the tuning knob to bring the cursor in line with the 99Mc/s calibration mark then tighten the grub screw. Correct small errors by adjustment to **C10** (G6).
- 3.—Feed in a 92Mc/s signal and tune receiver to this signal. Adjust **C4** (G6) for maximum output at the same time rock the tuning control slightly to prevent oscillator pulling.

GENERAL NOTES

Dismantling:—Open rear cover and unplug aerial leads from F.M. aerial terminals.

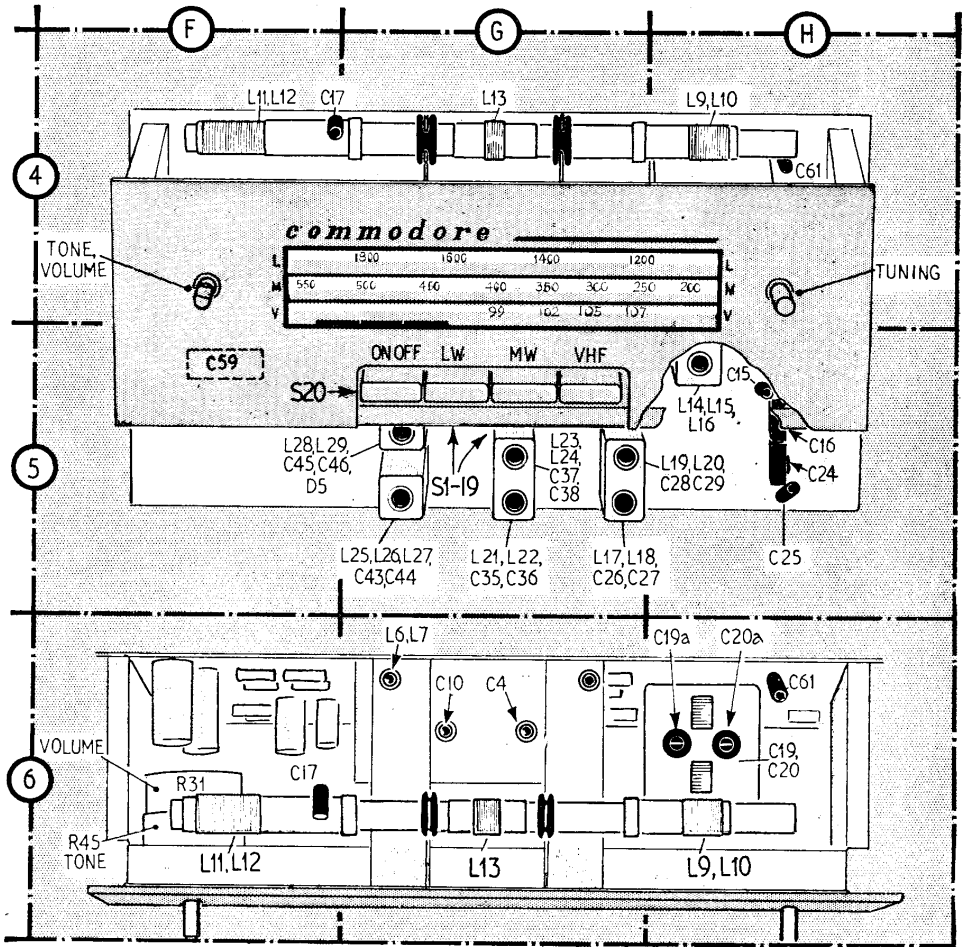
Disconnect batteries and unplug output socket leads from output transformer.

Unplug both leads from car aerial socket. Remove the four cheese-headed screws and shake proof washers from securing brackets.

Withdraw chassis from case ensuring that the ferrite rod is not damaged by being brought into contact with the cover retaining clip.

Drive Cord Replacement:—Remove the chassis from its case as previously described. Place chassis with the scale facing operator and remove the scale by undoing two securing screws. Make up new cord as shown in the illustration col. 1.

Turn tuning control fully clockwise (tuning gang fully open). Take shortened end of cord and pass it from the rear through bottom hole in tuning spindle. Crimp the eyelet on white mark on cord and pull eyelet tight against spindle.



Front and top views of the receiver illustrating all the adjustments required for alignment

Wind the cord half a turn round spindle clockwise, and lay it along the two bottom pulleys. Turn the tuning spindle anti-clockwise by four turns when the tuning gang should be fully closed.

Pass the cord round bottom left-hand pulley, lay it along the two top pulleys and make a half turn clockwise round the tuning spindle.

Pass cord from the rear through the top hole in spindle, slip eyelet on cord and tension cord until white spot marker appears. Crimp eyelet over white spot.

Fully close the tuning gang and attach cursor at the black left-hand line of scale aperture. Varnish cursor in position.

Switches. **S1-19** are the waveband

switches, **S20** is the battery on/off switch. They are housed in a press-button unit shown in location ref. G5. The individual switch contacts are given in a separate drawing of the unit in col. 3. In this drawing the switch numbers are given suffix letters, as are the switch numbers in the circuit diagram, indicating the positions in which they are closed, where *m* means closed on M.W., *l* means closed on L.W., and *f* means closed on F.M. For example, **S7lf** means **S7** is closed in both L.W. and F.M. positions of the press-button unit. **S20** is operated independently by the on/off press-button.

Batteries.—Two batteries are required, connected in parallel. Suitable types are Ever Ready PP9, Drydex DT9, Vidor T6009.

Foil-side view of the F.M. tuner unit printed circuit panel. The F.M. unit is assembled to the main receiver panel with the flange carrying connections 1-7 protruding at right-angles through a slot in the panel. At this point inter-connections are made by direct soldering between the two panels

