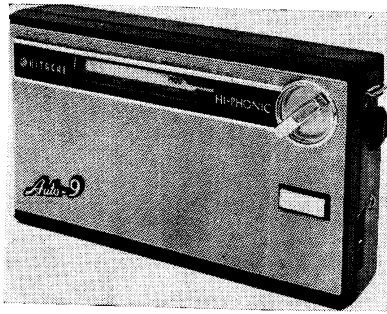


ERT

SERVICE CHART 1536 New Series



HITACHI TH900 AUTO-9

Additional copies of this chart price 1s. 6d. post free. Payment with order to the Cashier, ERT, 40 Bowling Green Lane, London EC1.

AUTO-TUNING portable battery-operated radio covering the medium-wave band by a spring-driven system started by push-button and stopped by any programme-level transmission. Manual control is also provided. Nine transistors are used, including those in the automatic tuning control circuit.

Batteries. Four Ever Ready U7, Vidor VT14 or equivalent.

Waveband. MW 187-567m (530-1605kc/s).

Transistors. 2SA354, two 2SA12, 2SA353, 2SB75, four 2SB77.

Diodes. Four IN34A.

Thermistor. D2B.

IF. 455kc/s.

Aerial. Ferrite.

Speaker. 3½ × 2½in.

Output. 250mW max., 180mW undistorted.

Outlet. Earphone jack; EL216 magnetic earphone provided.

Dimensions. 7 × 4 × 1½in.

Weight. 1.54lb.

Manufacturer. Hitachi Ltd., Tokyo, Japan.

Distributor. Lee Products (GB) Ltd., 10/18 Clifton Street, London EC2. Bis. 6711.

Service Department. As above.

AUTOMATIC TUNING

Conventional aerial and oscillator circuits are tuned by a continuously-rotatable two-gang capacitor which is at one end of the cylindrical dial. At the other end is an assembly of gears and clutches by which the dial and capacitor can be turned by a manual tuning knob or by a spring motor.

The motor spring is wound by winder knob on the front of the receiver. With spring fully wound and volume control about mid-position, pressing and releasing a push-button energises the motor and dial and gang capacitor rotate. On arriving at any sufficiently-strong transmission the mechanism stops. The user adjusts the volume level if necessary or, if the programme is not wanted, pushes the button again.

When many stations are receivable (usually at night) and button pushing becomes time consuming, a DX-Local

switch can be operated to reduce sensitivity.

Automatic stopping at correct tune point is obtained by means of a beat-frequency signal and a relay. A local oscillation at IF (455kc/s) is mixed with the IF signal in a diode stage. The beat signal, after a low-pass (2kc/s) filter, is amplified in the AF section of the receiver, rectified and passed to a control transistor connected to the relay.

The beat-frequency signal cuts off the control transistor, the relay arm is released and a pawl stops the motor (actually, the governor coupled to the

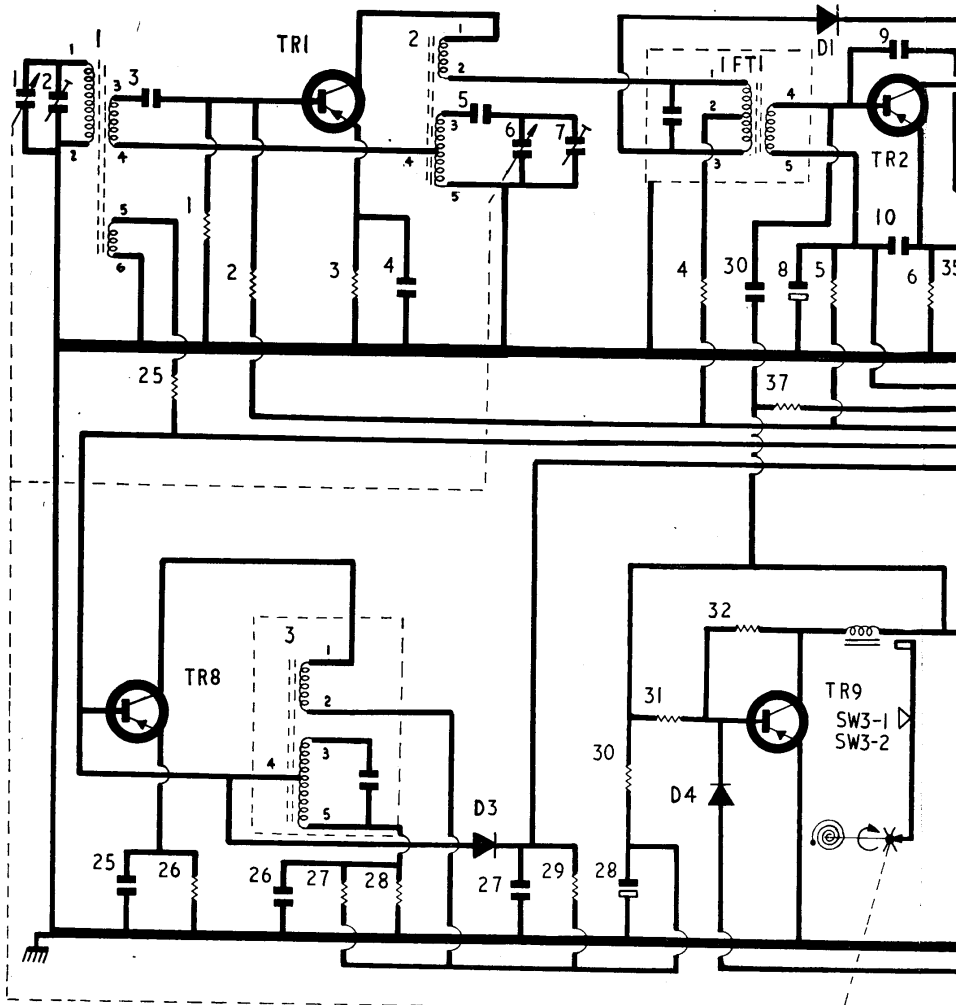
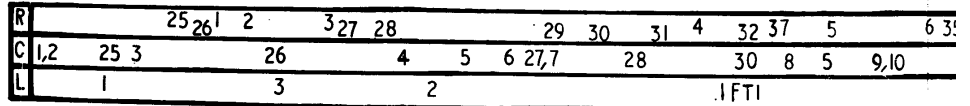
motor). At the same time, contacts on the relay switch the audio amplifier from the beat circuit to the detector diode, and connect the speaker to the audio amplifier, so that the programme is heard.

When the Tune button is pressed, the pawl is withdrawn from the governor and the contacts transfer the audio amplifier from the detector to the beat-frequency circuit and disconnect the speaker.

As the beat signal is bandwidth limited, the tuning cannot halt until within 2kc/s of carrier frequency. As the relay takes a brief time to function, the accuracy is better than 2kc/s.

TRANSISTOR

No.	Type
TR1	2SA3
TR2	2SA1
TR3	2SA3
TR4	2SB7
TR5	2SB7
TR6/7	2SB7
TR8	2SA1
TR9	2SB7



CIRCUIT DESCRIPTION

Ferrite aerial, tuned by one section of the gang capacitor, passes the signal to TR1(2SA354) frequency-changer. The IF signal is amplified by TR2(2SA12) and TR3(2SA353) stages before rectification by D2(1N34A) diode.

Via signal/beat-signal change-over switch SW3-1 the signal reaches AF amplifier TR4(2SB75) and driver TR5(2SB77). Class B push-pull output stage TR6/7 uses two 2SB77 transistors with TH1(D2B) thermistor in the bias circuit for temperature compensation. Connections from the output transformer secondary to the speaker coil are interrupted by relay switch SW3 during auto tuning and by the earphone jack when plugged in. SW3 also controls 6V supply to relay transistor TR9.

AGC from the DC component at signal

rectifier diode is applied to bases of both FC and first-IF stages. Damping diode D1(1N34A) operates when the signal across primary of IFT1 exceeds a certain level. In the local position, DX-Local switch SW1 opens and removes C13 from across R11. Feedback across R11 reduces gain of TR3.

Oscillator for auto tuning circuit is TR8(2SA12). This generates 455kc/s signal which passes D3(1N34A) mixer diode together with IF signal obtained via C15. When beat frequency falls to

2kc/s it is no longer shunted by C27/R29 but passes by C31 to change-over switch SW3-1.

Amplified beat signal, from one side of the push-pull transformer T4, is rectified by D4(1N34A) and applied to control transistor TR9(2SB77) which it cuts off.

NOTES ON USE

Owners should be advised not to touch the auto tuning mechanism,

Continued overleaf

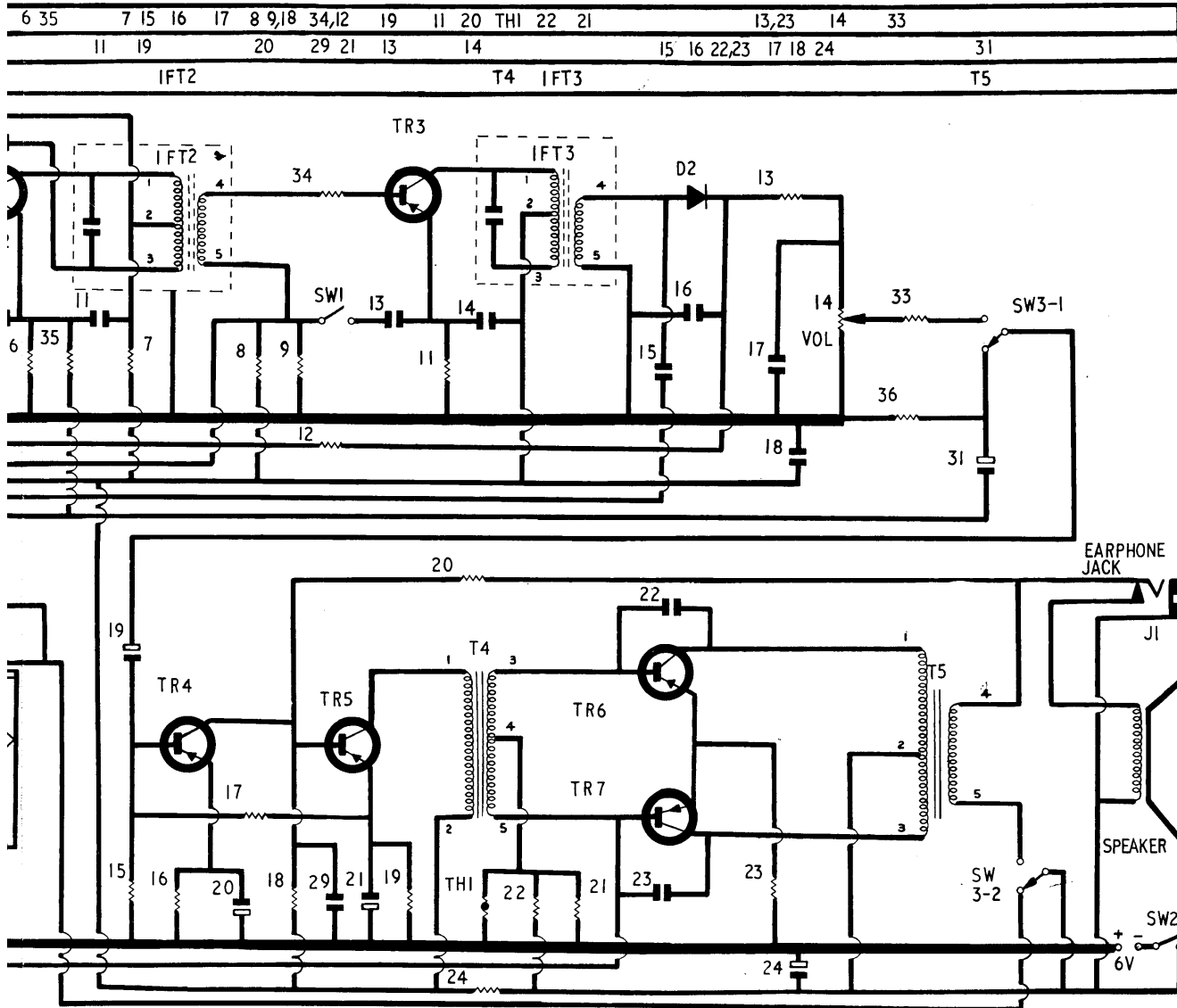
SISTOR VOLTAGES

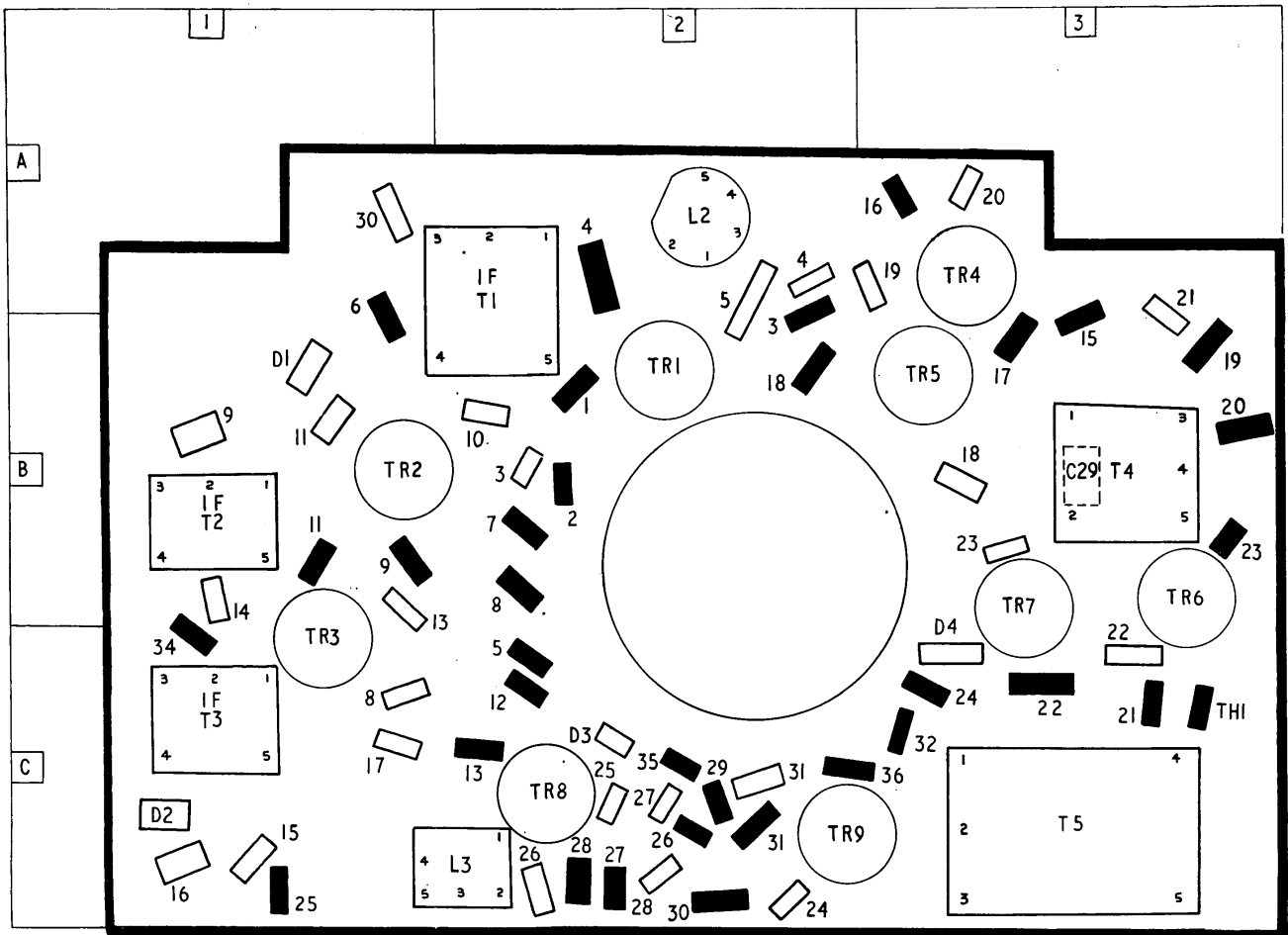
Type	Function	Base	Emitter	Col-lector
		V	V	MA
2SA354(A)	Mix-osc	0.69	0.61	0.37
2SA12(C)	First IF	0.52	0.39	0.45
2SA353(C)	Sec. IF	0.67	0.47	0.69
2SB75(B)	AF amp	0.43	0.32	0.57
2SB77(C)	AF amp	1.4	1.3	1.1
2SB77(A/P)	Output	0.14	0.08	3.6
2SA12(A)	Beat osc	0.53	0.43	3.6
2SB77(C)	Control	0.24	—	0.16

RESISTORS

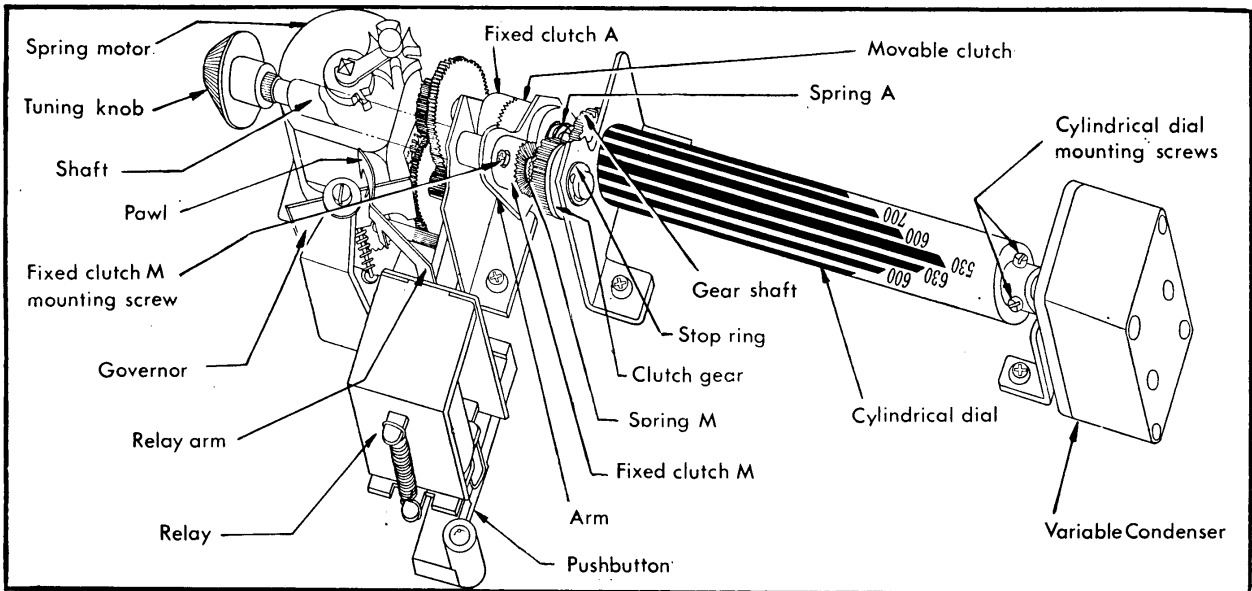
R1	5K6	B2	R25	22K
R2	39K	B2	R26	820
R3	1K8	B2	R27	1K8
R4	330	A2	R28	220
R5	100K	C2	R29	150K
R6	820	A1	R30	390
R7	3K9	B2	R31	See note
R8	33K	B2	R32	56K
R9	6K8	B1	R33	1K attached R14
R10	680	B1	R34	See note
R11	See note	C2	R35	47K
R12	1K	C2	R36	10K
R13	5K	Vol	R37	150K
R14	4K7	B3	NOTE :	R12 6K8-12K,
R15	560	A3	R31	16K-27K, R34 180-
R16	6K8	B3		1K5.
R17	10K	B2	CAPACITORS	
R18	1K2	B3	C1	
R19	82K	B3	C2	Gang
R20	330	C3	C3	Gang
R21	4K7	C3	C4	6K8pF
R22	2.2	B3	C5	6K8pF
R23	100	C3	C6	140pF

C7	3mF	Gang
C8	7pF	B1
C9	22KpF	B1
C10	22KpF	B1
C11	22KpF	A1
C12	22KpF	B1
C13	22KpF	A1
C14	22KpF	B1
C15	80pF	C1
C16	47KpF	C1
C17	22KpF	C1
C18	50mF	B3
C19	3mF	A3
C20	10mF	A3
C21	5mF	A3
C22	2K2pF	C3
C23	2K2pF	B3
C24	10mF	C2
C25	22KpF	C2
C26	10KpF	C2
C27	47KpF	C2
C28	10mF	C2
C29	20KpF	B3
C30	3K3pF	A1
C31	3mF	C2





Above, printed board component layout. Resistors are in solid black, capacitors in outline only. Below, details of auto-tune mechanism



especially governor and gears. Back of set should be kept on to exclude dust from gears. Spring should not be left completely wound for long periods.

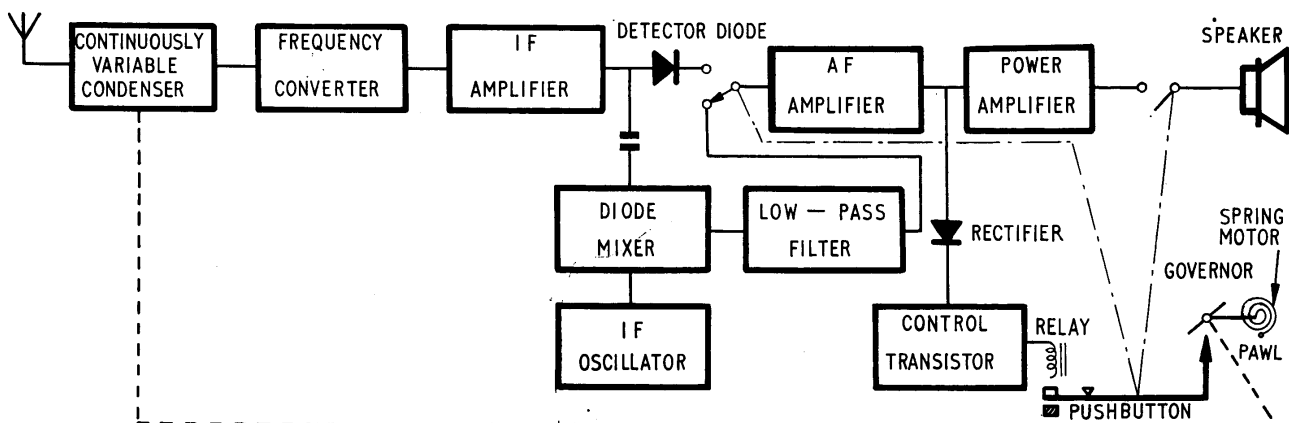
If auto tuning does not function, battery voltage has probably dropped below two-thirds nominal voltage and relay is not operating. Replace batteries.

Button should be released immediately dial starts to move. If next station does not come in although "present" station fades, cause is probably widening of selectivity due to increased signal strength. Button should be pressed again after short pause. Unnecessary use of button shortens

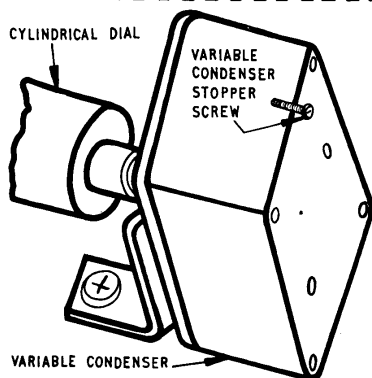
battery life. Required stations can be dialled manually, with final tuning by button.

DISMANTLING

To remove printed board, pull off tuning knob, remove two screws holding back, turn winder knob to left and



Above, Auto-9 block diagram showing switching arrangement between signal and motor control channels. Left, location of variable capacitor stopper screw used in alignment adjustments



remove, take out two screws holding board (lower edge of board), also four chassis screws.

ALIGNMENT

Battery voltage (no signal) must be not less than 5.5V. Turn volume to maximum, connect output of signal generator to two/three turn coil of 4in. diameter and couple this to ferrite aerial. Connect valve voltmeter, with scale 3V AC or less, to speaker speech coil.

With the generator signal modulated 400c/s or 1kc/s, inject the frequencies given below, keeping the meter reading below 0.5V while making adjustments.

IF circuits. Set dial to max. frequency. Inject 455kc/s and adjust cores IFT3, IFT2 and IFT1 in that order for maximum output.

MW band. Turn dial from high frequency side toward low frequency and set near 1000kc/s. Turn stopper screw of variable capacitor clockwise. Make sure condenser does not turn more than half-a-turn, then turn fully counter-clockwise.

At minimum frequency on dial, inject 515kc/s and adjust osc. coil L3. At max. frequency on dial, adjust osc. trimmer C7. Repeat these two adjustments two or three times.

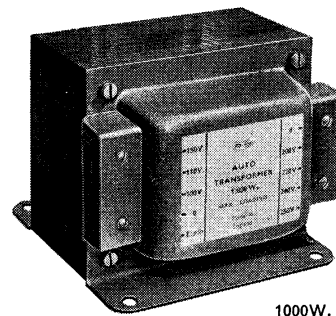
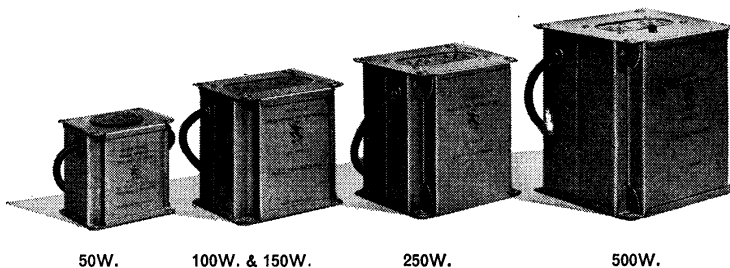
Tune and inject 600kc/s and slide aerial coil L1 for max. Tune and inject 1600kc/s and adjust C2. Repeat these two adjustments two or three times.

Beat circuit. Tune 1400kc/s and inject this (unmodulated). Connect oscilloscope to output transformer T5.

Prevent governor from turning but hold auto button in to obtain beat signal. Turn core of IF coil L3 to obtain beat signal. Set core at position of zero beat i.e. where adjustment either way produces beat.

Finally turn capacitor stopper screw counter-clockwise so that 360 degree rotation is possible again.

AUTO TRANSFORMERS



A range of safe, efficient and robust transformers for the Service Engineer. Six types cover ratings from 50W. to 1000W. All provide a choice of input or output voltages of 100V., 110V., 150V., 200V., 220V., 240V. and 250V. (Except 50W. which has 205V., 225V. and 245V. inputs and 115V. output only.)

1000W.

Radiospares Ltd.

BOX 268, 4-8 MAPLE STREET, LONDON, W.1.
PHONE: EUSTON 0151 (ORDERS) OR EUSTON 7232 (OTHER DEPTS.).
TELEGRAMS & CABLES: RADOSPARES, LONDON, W.1.



RS 30A/1