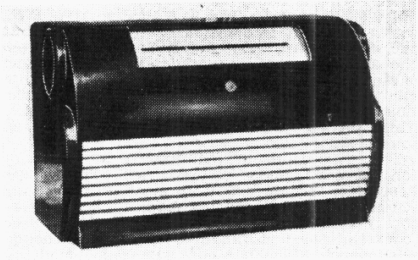
"TRADER" SERVICE SHEET

914

EKCO U76

"CONSORT" A.C./D.C. SUPERHET



FRAME aerials are provided in the Ekco U76 "Consort" receiver to permit it to operate on all wavebands in temporary locations without the need for an external aerial, but full provision is made for efficient operation from such an aerial when it is available.

The receiver is a 4-valve (plus rectifier) 3-band superhet designed to operate from A.C. or D.C. mains of 200-250 V, 40-100 c/s in the case of A.C. The waveband ranges are 16-49 m (S.W.), 200-550 m (M.W.) and 1,000-2,000 m (L.W.). Unusual features are the fitting of large-diameter control knobs at the sides of the cabinet with finger-tip recesses for high-speed rotation, and the provision of forward A.V.C. Alternative intermediate frequencies are employed for north and south areas of the country.

Release date and original price: October 1948; £14 13*s.* 5*d. plus purchase tax.*

CIRCUIT DESCRIPTION

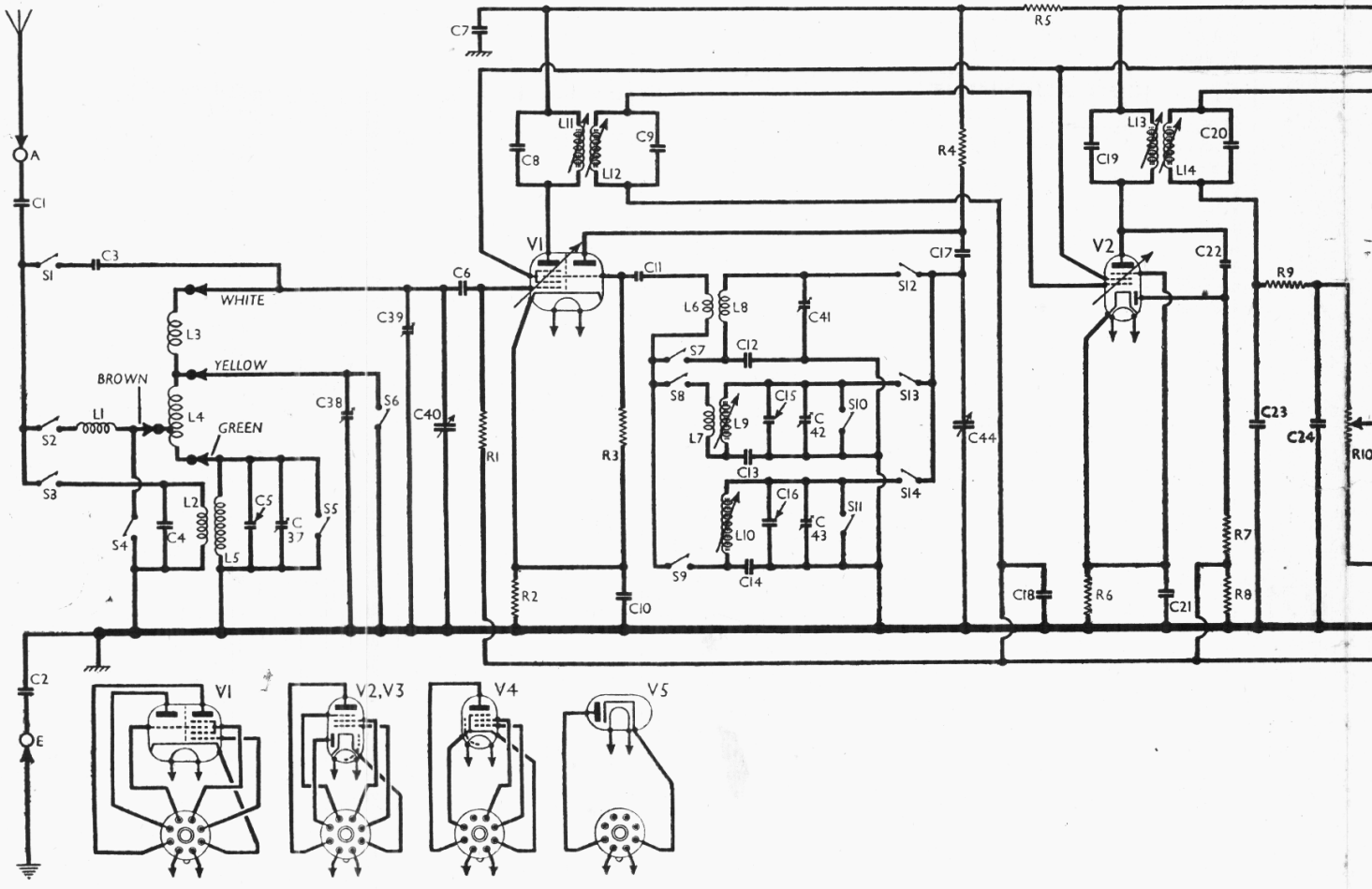
Tuned frame aerial input by **L3, C40** (S.W.), **L4, C40** (M.W.) and **L4, L5, C40** (L.W.) precedes a triode hexode valve **(V1, Mullard UCH42)** operating as frequency changer with internal coupling. Provision is made for the connection of an external aerial via series capacitor **C3** (S.W.), series choke **L1** (M.W.), or coupling coil **L2** (L.W.).

Triode oscillator anode coils **L8** (S.W.), **L9** (M.W.), **L10** (L.W.) are tuned by **C44** with parallel trimming by **C41** (S.W.), **C15, C42** (M.W.), **C16, C43** (L.W.) and series tracking by **C12** (S.W.), **C13** (M.W.), **C14** (L.W.). Capacitative reaction coupling, due to the common impedance of trackers in grid and anode circuits is employed on all bands, with additional inductive coupling by **L6** (S.W.) and **L7** (M.W.).

Second valve **(V2, Mullard UAF41 or UAF42)** is a single diode variable-mu R.F. pentode operating as intermediate frequency amplifier and A.G.C. rectifier. The pentode section of **V2** is tuned-transformer coupled by **C8, L11, L12, C9** and **C19, L13, L14, C20** and, as the tuning capacitors are fixed, alignment adjustments are effected by varying the positions of the iron-dust cores.

Intermediate frequency 455 kc/s or **460 kc/s** (see under "Circuit Alignment").

Diode second detector is part of a second single diode variable-mu pentode



valve **(V3, Mullard UAF41 or UAF42).** Audio frequency component in rectified output is developed across the volume control **R10,** which is also the diode load resistor, and is fed via A.F. coupling capacitor **C25** and C.G. resistor **R11** to control grid of **V3** pentode section, which operates as A.F. amplifier. I.F. filtering by **C23, R9, C24** in diode circuit, and **C28** in pentode anode circuit.

The diode section of **V2,** fed from its pentode anode via **C22,** provides D.C. potential which is developed across load resistors **R7, R8,** tapped off, and fed back through a decoupling circuit as G.B. to **V1, V2** and **V3,** giving automatic gain control.

Resistance-capacitance coupling by **R13, C29, R17** is employed between **V3** pentode and pentode output valve **(V4, Mullard UL41).** Fixed tone correction by **C31** in anode circuit. Negative voltage feed-back is provided by the frequency selective network **C33, R19, R20, C32** between anode and control grid.

H.T. current is supplied by I.H.C. half-wave rectifying valve **(V5, Mullard UY41)** which, with D.C. mains, behaves as a low resistance. Smoothing by iron-cored choke **L16** and electrolytic capacitors **C34, C35.** The valve heaters, together with indicator lamp and heater ballast resistor **R23,** are connected in series across mains input. Mains R.F. filtering by **C36** across mains input circuit.

COMPONENTS AND VALUES

	RESISTORS	Values (ohms)	Locations
R1	V1 hex. C.G. ...	750,000	G6
R2	V1 fixed G.B. ...	330	G7
R3	V1 osc. C.G. ...	22,000	G6
R4	Osc. anode load ...	15,000	F6
R5	H.T. decoupling ...	1,000	H5
R6	V2 fixed G.B. ...	330	E5
R7	A.G.C. diode load	680,000	F5
R8	resistors... ...	1,000,000	G5
R9	I.F. stopper ...	220,000	H4
R10	Volume control ...	500,000	D1
R11	V3 C.G. resistor ...	680,000	G5
R12	V3 S.G. feed ...	750,000	G5
R13	V3 pent. load ...	220,000	G5
R14	H.T. potential divider resistors ...	22,000	E8
R15		47,000	G5
R16		220	F5
R17	V4 C.G. resistor ...	560,000	F4
R18	V4 G.B. resistor ...	150	F4
R19	Negative feed-back	220,000	B1
R20	potential divider	68,000	E4
R21	Pilot lamp shunt ...	33	D1
R22	V5 surge limiter ...	160	C2
R23	Heater ballast ...	§ 1,230	D3

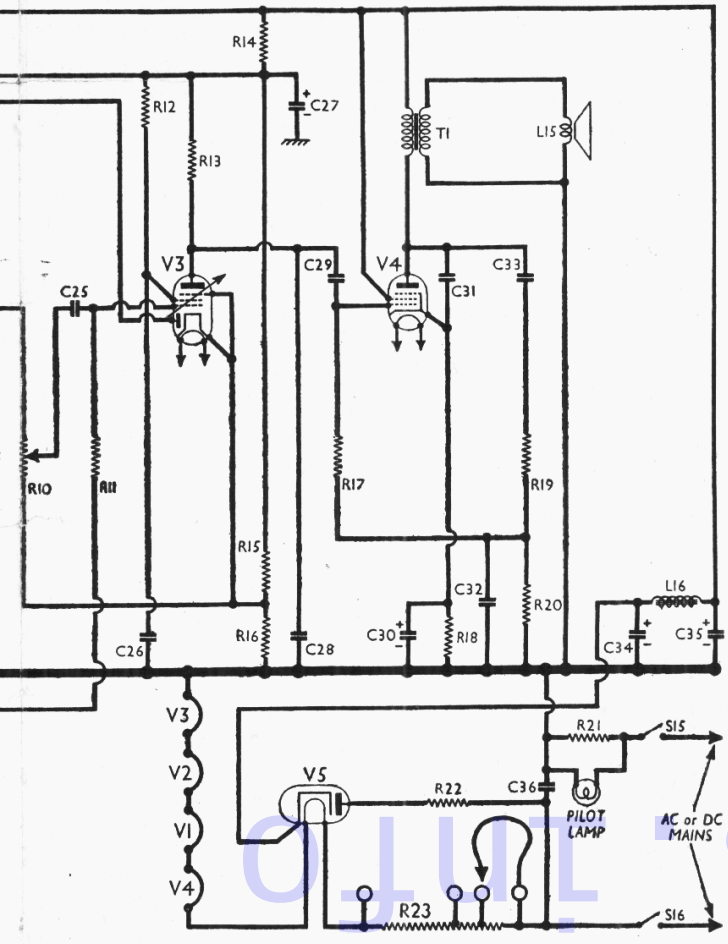
§ Tapped at 930 Ω + 150 Ω + 150 Ω from V5 heater.

	CAPACITORS	Values (μF)	Locations
C1	Aerial isolator ...	0·001	G8
C2	Earth isolator ...	0·1	E8
C3	Aerial S.W. series	0·000005	A3
C4	Aerial L.W. shunt	0·001	B2
C5	Aerial L.W. trim....	0·00005	A3
C6	V1 hex. C.G. ...	0·0001	G6
C7	V1 H.T. decoup. ...	0·1	G6
C8	1st I.F.transformer	0·0001	B2
C9	tuning	0·0001	B2
C10	V1 cath. by-pass ...	0·1	G7
C11	V1 osc. C.G. ...	0·00005	G7
C12	Osc. S.W. tracker...	0·006715	H7
C13	Osc. M.W. tracker	0·000643	H6
C14	Osc. L.W. tracker	0·00017	H6
C15	Osc. M.W. trim. ...	0·000022	H7
C16	Osc. L.W. trim. ...	0·00014	H6
C17	Osc. anode coup. ...	0·0005	G6
C18	A.G.C. decoupling	0·1	E6
C19	2nd I.F. transfor-	0·0001	A1
C20	mer tuning ...	0·0001	A1
C21	V2 cath. by-pass ...	0·1	F5
C22	A.G.C. coupling ...	0·000005	F5
C23	I.F. by-passes ...	0·0001	G4
C24		0·0001	H4
C25	A.F. coupling ...	0·01	G4
C26	V3 S.G. decoup. ...	0·1	G5
C27*	H.T. decoupling ...	2·0	F8
C28	I.F. by-pass ...	0·0002	H5
C29	A.F. coupling ...	0·01	F4
C30*	V4 cath. by-pass ...	50·0	F5
C31	Tone corrector ...	0·0025	F4
C32	Negative feed-back	0·002	B1
C33	coupling ...	0·002	B2
C34	H.T. smoothing ...	8·0	C2
C35		32·0	C2
C36	Mains R.F. by-pass	0·1	D1
C37‡	Aerial L.W. trim....	—	H8
C38‡	Aerial M.W. trim.	—	H8
C39‡	Aerial S.W. trim....	—	H8
C40†	Aerial tuning ...	—	A2
C41‡	Osc. S.W. trim. ...	—	G8
C42‡	Osc. M.W. trim. ...	—	G8
C43‡	Osc. L.W. trim. ...	—	G8
C44†	Oscillator tuning ...	—	A2

* Electrolytic. † Variable. ‡ Pre-set.

If the component numbers given in the accompanying tables are used when ordering replacement parts, dealers are advised to mention the fact on the order, as these numbers may differ from those used in the manufacturers' diagram.

	OTHER COMPONENTS	Approx. Values (ohms)	Locations
L1	Aerial choke ...	15·0	A2
L2	L.W. aerial coup....	26·0	A2
L3	S.W. frame aerial...	Very low	—
L4	M.W. frame aerial	1·0	—
L5	Aerial L.W. coil ...	25·0	A2
L6	S.W. react. coil ...	Very low	H8
L7	M.W. react. coil ...	0·6	H6
L8	Osc. tuning coils ...	Very low	H8
L9		2·0	H6
L10		5.5	H6
L11	1st I.F. trans. Pri.	15·0	B2
L12	Sec.	15·0	B2
L13	2nd I.F. trans. Pri.	15·0	A1
L14	Sec.	15·0	A1
L15	Speech coil ...	2·5	—
L16	Smoothing choke...	380·0	C3
T1	Output trans. Pri.	490·0	B1
	Sec.	0·8	
S1-S14	W/band switches ...	—	A3
S15, S16	Mains switches, ganged R9 ...	—	D1



Circuit diagram of the Ekco U76 "Consort" A.C./D.C. superhet. **L3** and **L4** are frame aerial windings, whose lead colours are indicated. The diode in **V2** is used to supply the A.G.C. potential, while the diode in **V3** is the signal detector. "Forward" A.G.C. is attained by applying the A.G.C. line to **V3** control grid. **V2** and **V3** holders are wired to accept either a UAF41 or a UAF42. In early models a 12Ω resistor is connected in parallel with the speech coil **L15.**

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating from 230 V

Valve	Anode (V)	Anode (mA)	Screen (V)	Screen (mA)	Cath. (V)
V1 UCH42	157	1·2			
	Oscillator		68	1·3	2·0
	96	4·0			
V2 UAF42	163	4·0	68	1·1	1·5
V3 UAF42	20	0·2	12	0·07	0·4
V4 UL41	140	45·0	163	9.1	8·0
V5 UY41	215†	—	—	—	193

† A.C.

A.C. mains, using the 220-230 V tapping on the heater ballast resistor. The receiver was tuned to the lowest wavelength on the M.W. band, and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Avometer, except cathode voltages, which were measured on the most convenient range. Chassis was the negative connection.

DISMANTLING THE SET

Removing Chassis.—Remove the three control knobs (recessed grub screws, inside cabinet) and the four self-tapping chassis retaining screws (with rubber washers);

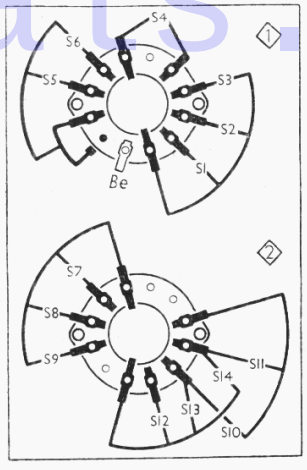
the chassis and speaker may now be slid from the cabinet as a single unit with the frame aerials still connected, but before access may be gained to the majority of the components the sub-baffle must be detached.

When replacing, note that a rubber washer must be fitted between the chassis and the cabinet when inserting each chassis retaining screw, and if the frame aerial leads have been disconnected they should be resoldered as follows, numbering the connecting tags on the back cover from top to bottom: 1, white; 2, yellow; 3, brown; 4, green.

Removing Sub-baffle.—Unsolder the two speaker leads at the speech coil connecting panel, remove the four 4BA cheese-head screws and nuts at the corners of the sub-baffle, and withdraw the single 4BA screw and nut securing the speaker frame to a supporting bracket on the receiver chassis.

When replacing, note that the yellow rubber-covered speaker lead should be soldered to the upper speech coil connecting tag, to which is joined an earthing lead from the speaker frame.

Waveband Switch Diagrams and Table



Diagrams of the waveband switch units, drawn as seen when viewed from the side of the chassis on which they are mounted, as indicated in our rear view of the chassis. The associated table is on the right.

Switch	L.W.	M.W.	S.W.
S1	—	—	C
S2	—	C	—
S3	C	—	—
S4	—	—	C
S5	—	C	C
S6	—	—	C
S7	—	—	C
S8	—	C	—
S9	C	—	—
S10	—	—	C
S11	—	C	C
S12	—	—	C
S13	—	C	—
S14	C	—	—

GENERAL NOTES

Switches.—**S1-S14** are the waveband switches ganged in two rotary units mounted at one end of the chassis deck. The units are indicated in our rear view of the chassis, where they are identified by the numbers **1** and **2** in diamonds, with arrows to show the directions in which they are viewed in the diagrams in col. 2, where they are shown in detail.

The table above gives the switch positions for the three control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and **C**, closed.

S15, S16 are the Q.M.B. mains switches, ganged with the volume control **R10.**

Pilot Lamp.—This is an Osram lamp, with a large clear spherical bulb and an M.E.S. base, rated at 6.2 V 0.3 A. It is shunted by a 33 Ω 1 W carbon resistor.

Alternative I.F. Value.—Two alternative intermediate frequencies are used, according to the geographical location of the receiver. Those supplied for use in the southern half of England are aligned at 455 kc/s, while those suplied for the northern half of the country are set to 460 kc/s.

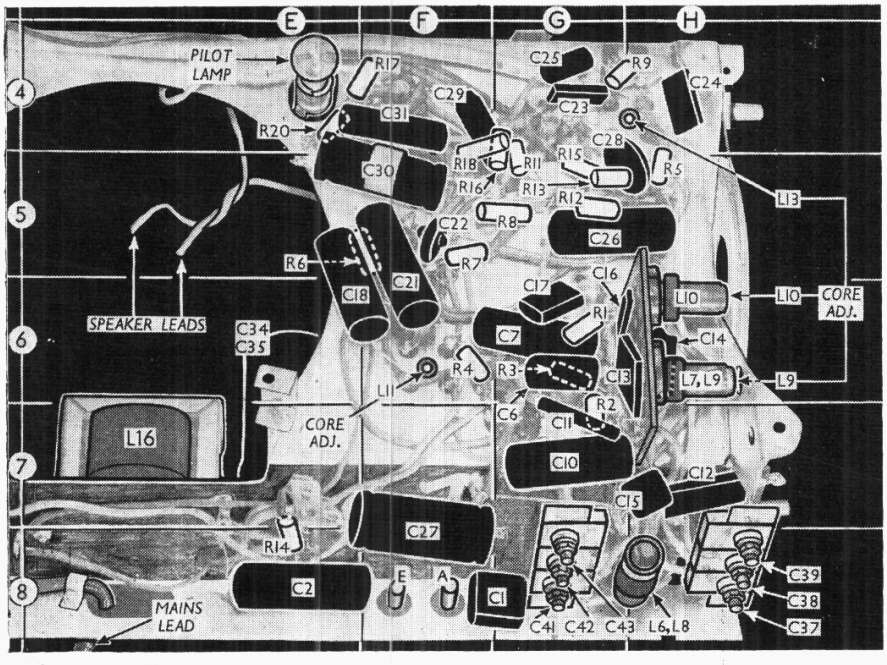
The frequency to which the I.F. channel is tuned is indicated by some kind of marking near the serial number, on the rear member of the chassis, as explained under "Circuit Alignment," but when alignment is being performed the frequency used should be chosen according to the location, irrespective of the original marking.

A receiver transferred from a southern district to a northern one, or vice versa, should be realigned, and the I.F. marking on it should be altered accordingly.

Speaker Impedance.—No provision is made for the connection of an external speaker, but the impedance of the internal speaker is given as 3Ω at 400 c/s.

Service Note.—In a few early chassis, an intermittent fault has been traced to the I.F. transformers, where poor contact was found to exist between the eyelets at the base and the fixed tuning capacitor leads. The solution is to disconnect the leads, clean both sides of the joint well, and resolder, running the solder well round each side of the eyelet to ensure a lasting remedy.

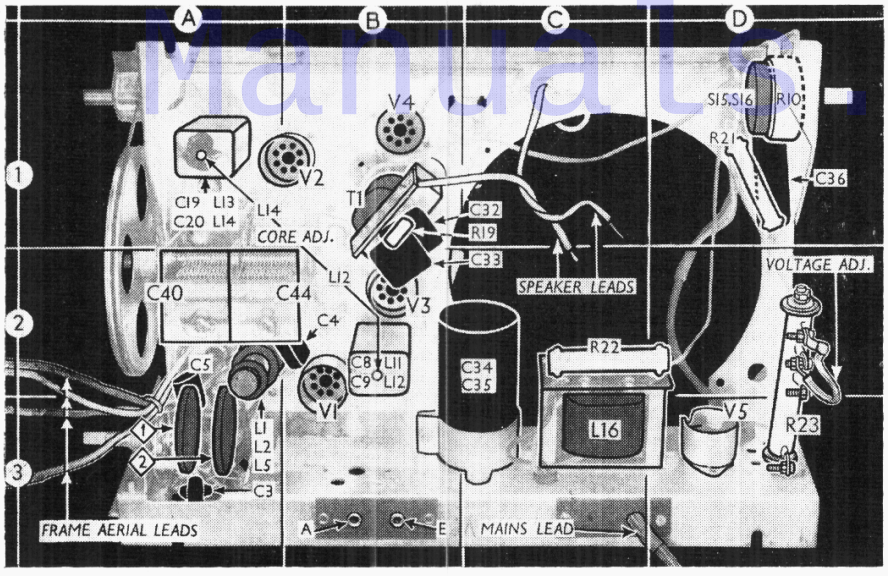
In early versions, also, there may be a 12Ω resistor connected in parallel with the speech coil. It would be mounted directly to the speech coil tags.



Three-quarter view of the front of the chassis, showing the components there and those under the platform. Holes in the base of the cabinet give access to the trimmers.

DRIVE CORD REPLACEMENT

Good quality flax fishing line should be used for a new drive cord, four feet being ample for the job and providing plenty of spare for tying off. The complete drive system is shown in the sketch (col. 4), where it is drawn as seen when viewed from the rear left-hand corner of the chassis when the gang is at maximum.

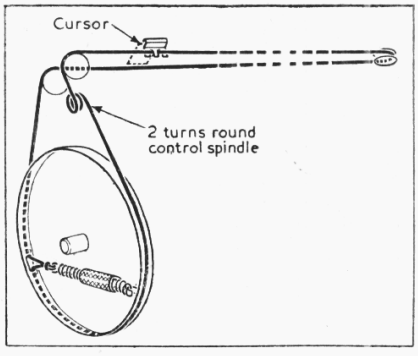


Rear view of the chassis. Arrows indicate the direction in which the waveband switch units (numbered 1 and 2 in diamonds at the bottom left-hand corner) are viewed in the diagrams in col. 2. The I.F. transformer secondary core adjustments are indicated here also.

Both ends of the cord are tied to the same loop at the free end of the tension spring, the tension being adjusted so as to extend the spring to about twice its relaxed length when its fixed end is hooked to the anchor provided for it on the face of the gang drum.

CIRCUIT ALIGNMENT

I.F. Stages.—Alternative intermediate frequencies of 455 kc/s (659.3 m) or 460 kc/s (652.1 m) are employed in this receiver, dependent upon its geographical location. Sets used in Southern England should have an I.F. of 455 kc/s, and this fact will be stamped or written above the serial number on the rear chassis member and indicated by the letter "S" printed on the back cover close to the model number. In Northern England the I.F. should be 460 kc/s, indicated by the letter "N" on the back cover.



Sketch showing the drive cord system, drawn as seen from the rear left-hand corner with the gang at maximum.

Switch set to M.W., turn gang and volume control to maximum, connect signal generator, via an 0.1 μF capacitor in the "live" lead, to control grid (pin 6) of **V1** and the **E** socket, feed in the appropriate I.F., and adjust the cores of **L14, L13, L12, L11** (location references A1, H4, B2, F6) for maximum output.

R.F. and Oscillator Stages.—Before carrying out the following operations the chassis must be inserted in the cabinet, but access may be gained to the trimmer capacitors involved, through holes in the underside of the cabinet. With the gang at maximum capacitance, the cursor should coincide with the long vertical lines at the high wavelength ends of the three scales. It may be adjusted by sliding its carriage along the drive cord in the appropriate direction. Transfer "live" signal generator lead to **A** socket, via an 0.0001 μF capacitor.

S.W.—Switch set to S.W., tune to 20 m on scale, feed in a 20 m (15 Mc/s) signal, and adjust **C41** (G8) and **C39** (H8) for maximum output.

M.W.—Switch set to M.W., tune to 250 m on scale, feed in a 250 m (1,200 kc/s) signal, and adjust **C42** (G8) and **C38** (H8) for maximum output.

L.W.—Switch set to L.W., tune to 1,000 m on scale, feed in a 1,000 m (300 kc/s) signal, and adjust **C43** (G8) and **C37** (H8) for maximum output.

The cores of **L9** and **L10** (H6) are sealed in position by the manufacturers, and should not be disturbed. If they have been tampered with, they should be adjusted at 550 m (545.4 kc/s) and 2,000 m (150 kc/s) respectively for correct calibration. This should be repeated after performing the foregoing M.W. and L.W. adjustments, the oscillator core and trimmer adjustments being repeated again in turn until no improvement can be obtained.

Service Instrument Review

ADVANCE SERVICE OSCILLATOR

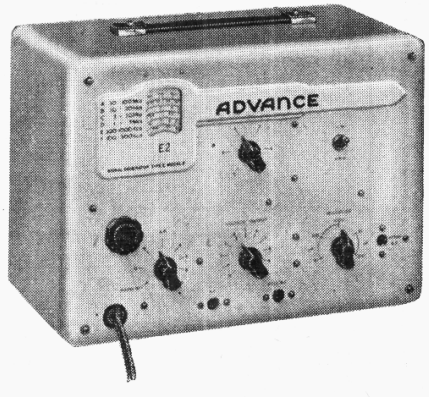
THE manufacturers of Advance signal generators have given us the opportunity to use one of their Type E (model 1) instruments for a protracted period in the normal course of our work in the laboratory, where it has fully justified their published claims for it.

It is essentially a workshop instrument designed to provide the radio service man with a general-purpose signal source at a modest price. All the usual outlet conditions are available, such as A.F., full R.F., attenuated R.F., with or without modulation (30% at 400 c/s) but the controls are very simple and obvious from the start, so that the process of familiarising oneself with operating procedure is reduced to a minimum. Nevertheless, very complete instructions are given in the accompanying booklet, which includes a simplified circuit diagram and some service data.

The scale is calibrated directly in frequency for the six ranges covered: 100-300 kc/s, 300-1,000 kc/s, 1-3 Mc/s, 3-10 Mc/s, 10-30 Mc/s and 25-60 Mc/s, selection being made by a 6-position rotary switch. The second harmonic can be used to extend the last range to 120 Mc/s, although in model 2, which has now superseded model 1, this range covers 30-100 Mc/s on a fundamental. Generally there is no overlap between ranges, although some uncalibrated space occurs at both ends of each scale.

A simple rotary attenuator is provided to control the A.F. output, but the R.F. attenuator consists of a continuously variable potentiometer calibrated 0-10 followed by a 5-position ladder attenuator calibrated as a multiplier of the input control x1, x10 and x100 μV; and x1 and x10 mV, so that the output is continuously variable from something approaching zero to 100 mV. The output impedance is 75Ω.

A few quantitive tests made after several months' use showed that the output voltage was within ±20 per cent of the calibrated markings on all except the two highest frequency bands, where the output progressively decreased and was nearer to half the calibrated figure.



Beat-frequency tests made against reliable sources, such as broadcast stations and standard crystals, revealed an accuracy at most settings as close as the thickness of the scale divisions permitted. This was maintained at 41.5 Mc/s, where a beat could be obtained from the television sound channel transmission. The frequency tolerance claimed is within ±1 per cent. Drift checked at 20 Mc/s over a period of two hours was still within the thickness of a scale dividing line.

The only improvement we would suggest is to earth the case via a 3-core mains lead, if that does not upset the mains filter. This includes a pair of 0.005 μF capacitors through which a harmless but unpleasant shock may be received when connecting up the instrument to the work.

The instrument is soundly constructed and well screened, and is supplied complete with an A.F. connecting lead, a screened R.F. cable and a terminating pad, at £23 10s, less a trade discount of 15 per cent. It is finished in the cream enamel that distinguishes the low-priced range of Advance service equipment. The makers are Advance Components, Ltd., Back Road, Shernhall Street, Walthamstow, London, E.17.

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