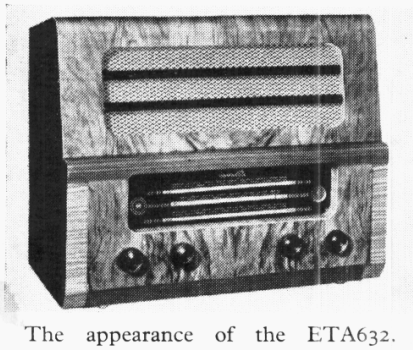
"TRADER" SERVICE SHEET
949

ETRONIC ETA632 & ETA539

4-valve, 3-band Superhets



The appearance of the ETA632.

A CATHODE RAY tuning indicator is employed in the Etronic ETA632, a 4-valve, 3-band superhet designed for operation from A.C. mains of 200-250 V, 40-100 c/s. Provision is made for the use of an internal plate aerial, a gramophone pick-up, and an external speaker.

The ETA539 is similar in most respects, but it is housed in a different cabinet, has no tuning indicator, and has a different tuning drive system. We had a specimen of each model in the laboratory for the preparation of this information, and both are covered fully.

Release date, both models, September, 1949; original prices: ETA632, £19 15s; ETA539, £15 12s 8d. Purchase tax extra.

CIRCUIT DESCRIPTION

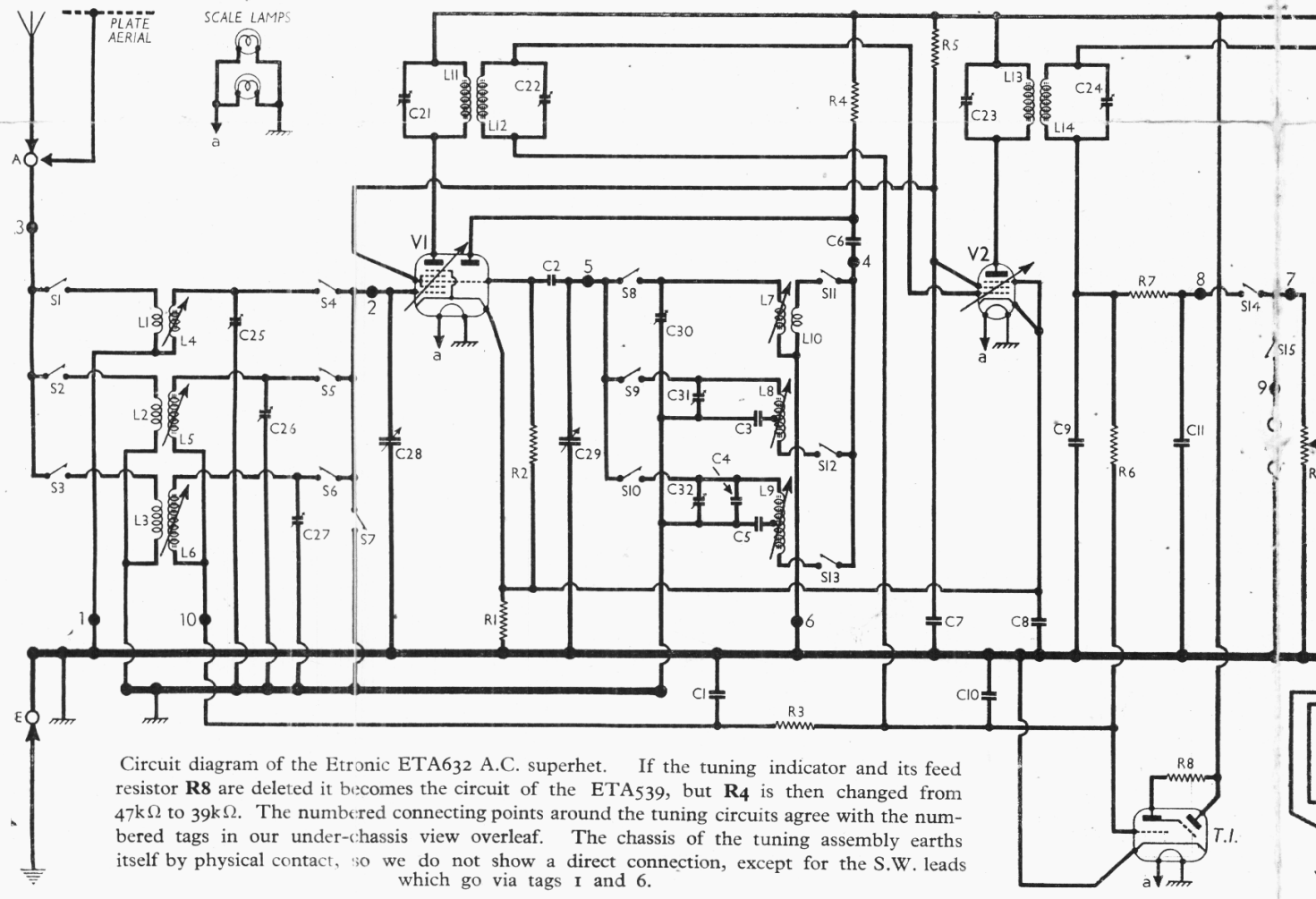
Plate or external aerial input is inductively coupled by **L1** (S.W.), **L2** (M.W.) and **L3** (L.W.) to single tuned circuits **L4, C28** (S.W.), **L5, C28** (M.W.) and **L6, C28** (L.W.), which precede a triode-heptode valve **(V1, Cossor 7S7)** operating as frequency changer with internal coupling.

Triode oscillator grid coils **L7** (S.W.), **L8** (M.W.) and **L9** (L.W.) are tuned by **C29.** Parallel trimming by **C30** (S.W.), **C31** (M.W.) and **C4, C32** (L.W.); series tracking by **C3** (M.W.) and **C5** (L.W.). Reaction coupling by **L10** (S.W.) and the anode ends of the single-wound tuning coils **L8** (M.W.) and **L9** (L.W.), with the additional coupling derived from the common impedance of the trackers in grid and anode circuits.

Second valve **(V2, Cossor 7B7)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer couplings **C21, L11, L12, C22** and **C23, L13, L14, C24.**

Intermediate frequency 470 kc/s (or 465 kc/s).

Diode second detector is part of double diode triode valve **(V3, Cossor 7C6),** in which the diode sections are wired in parallel. Audio frequency component in



Circuit diagram of the Etronic ETA632 A.C. superhet. If the tuning indicator and its feed resistor **R8** are deleted it becomes the circuit of the ETA539, but **R4** is then changed from 47kΩ to 39kΩ. The numbered connecting points around the tuning circuits agree with the numbered tags in our under-chassis view overleaf. The chassis of the tuning assembly earths itself by physical contact, so we do not show a direct connection, except for the S.W. leads which go via tags 1 and 6.

rectified output is developed across the load resistor **R9,** which is also the manual volume control, and passed via **C12** and **R10** to grid of triode section, which operates as A.F. amplifier. I.F. filtering by **C9, R7** and **C11** in diode circuit, and by **C13** in triode anode circuit.

Provision is made for a gramophone pick-up to be connected across **R9** via **S15,** which closes for "gram" operation and opens for all waveband ranges, when **S14** closes. The D.C. potential developed across **R7, R9** is used as the control voltage for the tuning indicator **(T.I., Osram Y63)** and is also fed back via decoupling circuits as G.B. to F.C. and I.F. valves, giving automatic gain control.

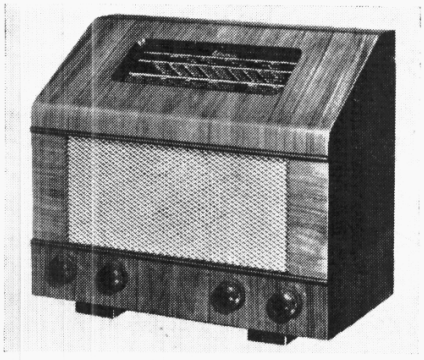
Resistance-capacitance coupling by **R11, C16, R13,** via grid stopper **R14,** between **V3** triode anode and tetrode output valve **(V4, Cossor 7C5).** Fixed tone correction in **V4** anode circuit by **C17,** and variable tone control in **V3** anode circuit by **C14** and **R12.** Provision for connection of a low impedance external speaker.

H.T. current is supplied by I.H.C. full-wave rectifying valve **(V5, Cossor 7Y4).** Smoothing by resistor **R17** and electrolytic capacitors **C19** and **C20** to the anode circuit of **V4,** with further resistance-capacitance smoothing by **R15** and **C15** to the remainder of the circuit.

COMPONENTS AND VALUES

	CAPACITORS	Values	Locations
C1	A.G.C. decoupling	0·01μF	F3
C2	V1 osc. C.G. ...	50pF	E4
C3	Osc. M.W. fixed track	572pF	F4
C4	Osc. L.W. fixed trim	33pF	E3
C5	Osc. L.W. fixed track	150pF	F3
C6	Osc. anode coupling	0·0022μF	E4
C7	V1, V2 S.G. decoup.	0·1μF	D4
C8	Cathodes by-pass ...	0·1μF	E3
C9	I.F. by-pass ...	100pF	D4
C10	A.G.C. decoupling	0·05μF	E4
C11	I.F. by-pass ...	100pF	E4
C12	A.F. coupling ...	0·01μF	D3
C13	I.F. by-pass ...	400pF	D3
C14	Part tone control ...	0·01μF	C3
C15*	H.T. decoupling ...	16μF	A2
C16	A.F. coupling ...	0·01μF	D3
C17	Tone corrector ...	0·002μF	D3
C18*	V4 cath. by-pass...	25μF	C3
C19*	H.T. smoothing ...	16μF	C3
C20*		16μF	A2
C21‡	1st I.F. trans. tuning ...	—	A2
C22‡		—	A2
C23‡	2nd I.F. trans. tuning ...	—	B2
C24‡		—	B2
C25‡	Aerial S.W. trim....	—	E3
C26‡	Aerial M.W. trim....	—	E3
C27‡	Aerial L.W. trim....	—	F3
C28†	Aerial tuning ...	—	A2
C29†	Oscillator tuning ...	—	A1
C30‡	Osc. S.W. trim. ...	—	E4
C31‡	Osc. M.W. trim. ...	—	F4
C32‡	Osc. L.W. trim. ...	—	F3

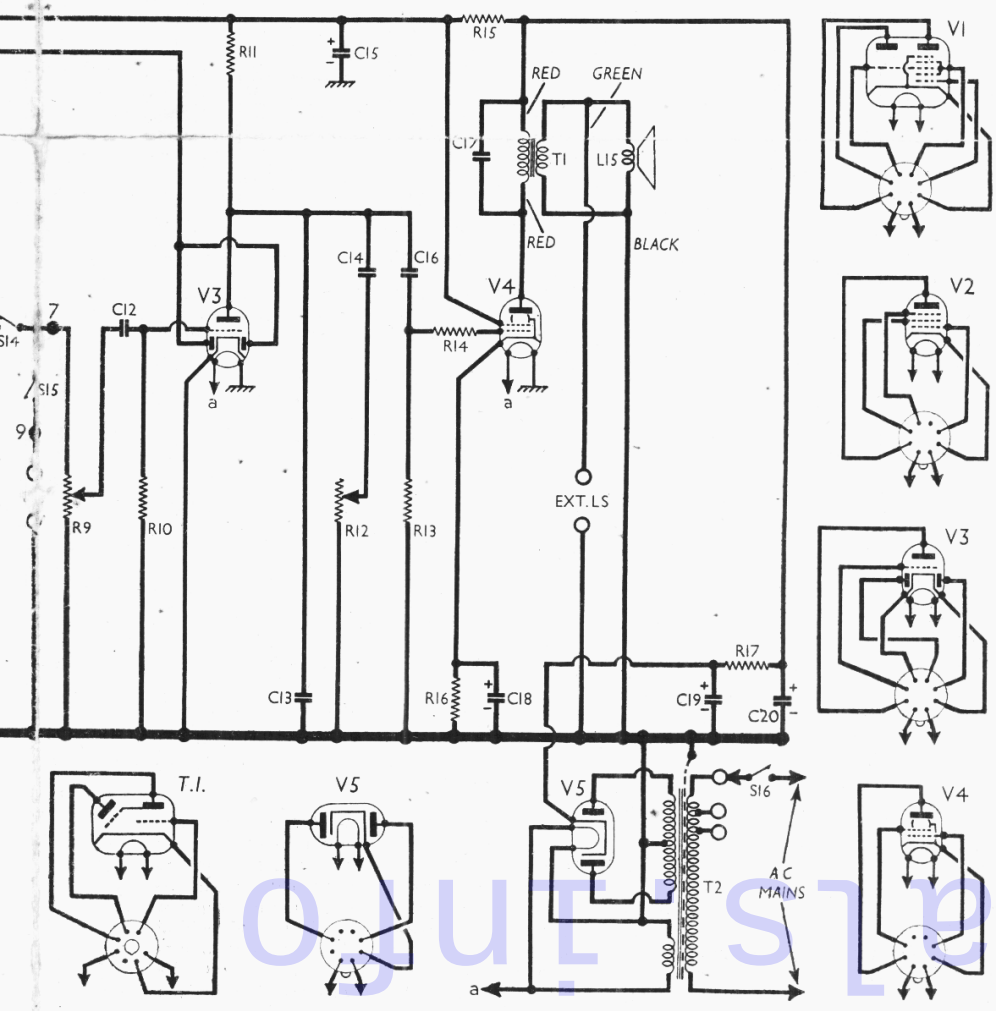
* Electrolytic. † Variable. ‡ Pre-set.



The appearance of the Etronic Model ETA539, which has no tuning indicator.

	RESISTORS	Values	Locations
R1	V1, V2 fixed G.B....	150Ω	D4
R2	V1 osc. C.G. ...	82kΩ	E4
R3	A.G.C. decoupling	150kΩ	E4
R4	Osc. anode load ...	47kΩ	D4
R5	H.T. feed	22kΩ	D4
R6	A.G.C. decoupling	2·2MΩ	D4
R7	I.F. stopper ...	56kΩ	D4
R8	T.I. H.T. feed ...	1MΩ	B1
R9	Volume control ...	0·5MΩ	D3
R10	V3 triode C.G. ...	10MΩ	D3
R11	Triode anode load...	220kΩ	D3
R12	Tone control ...	0·5MΩ	C3
R13	V4 C.G. resistor ...	0·47MΩ	D3
R14	Grid stopper ...	56kΩ	D3
R15	H.T. decoupling ...	4·7kΩ	E4
R16	V4 G.B.	330Ω	D3
R17	H.T. smoothing ...	1kΩ	C3

	OTHER COMPONENTS	Approx. Values (ohms)	Locations
L1	Aerial coupling coils	—	E3
L2		24·0	E3
L3		96·0	F3
L4	Aerial tuning coils	—	E3
L5		2·0	E3
L6		18·0	F3
L7	Osc. tuning coils ...	—	E4
L8		3·5	F4
L9		9·5	F3
L10	S.W. react. coil ...	1·0	E4
L11	1st I.F. trans. Pri.	5·0	A2
L12	1st I.F. trans. Sec.	5·0	A2
L13	2nd I.F. trans. Pri.	5·0	B2
L14	2nd I.F. trans. Sec.	5·0	B2
L15	Speech coil ...	3·0	—
T1	Output trans. Pri.	390·0	—
	Output trans. Sec.	0·5	—
T2	Mains trans. Pri. (total)	38·0	
	Mains trans. H.T. sec. (total)	400·0	C4
	Mains trans. Heater sec.	0·2	
S1-S13	W/band switches	—	F3
S14, S15	Gram switches ...	—	F4
S16	Mains sw. g'd R12	—	C3



DISMANTLING THE SET

Removing Chassis.—Remove the four control knobs (recessed grub screws); remove the four self-tapping chassis fixing bolts and withdraw chassis to extent of speaker leads.

To free chassis entirely, unsolder speaker leads.

When replacing (model 632 only), ensure that the tuning indicator is not protruding by more than $\frac{5}{8}$ of an inch through the scale backing plate.

Removing Speaker.—Remove four 4BA nuts and clamping plates (with 3

washers and one soldering tag) and lift speaker out.

When replacing, the speaker transformer should be above the magnet.

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our model ETA632 chassis when it was operating from A.C. mains of 230 V, using the 216-235 V tapping on the mains transformer, but they apply equally to the ETA539.

Except for cathode readings all voltages were measured on the 400 V scale of a model 7 Avometer, chassis being the negative connection.

Valve	Anode		Screen		Cath
	V	mA	V	mA	V
V1 7S7	175	2·8	98	3·9	2·0
	Oscillator				
	78	2·2			
V2 7B7	175	6·6	98	1·6	2·0
V3 7C6	73	0·28	—	—	—
V4 7C5	250	30·0	175	2·9	9·0
V5 7Y4	278†	—	—	—	315·0
T.I. Y63	12	0·1	—	—	—
	Target				
	175	0·8			

† Each anode, A.C.

GENERAL NOTES

Tuning Assembly.—All the aerial and oscillator circuit components, with the exception of the tuning gang, are housed in a special tuning assembly beneath the chassis. This is indicated on the right in our under-chassis illustration, where all the components it contains are identified, although three capacitors **C3**, **C4** and **C5** are shown in broken line as they are not visible.

To obtain access to the inside of the assembly, the whole unit must be removed and the upper side (facing the chassis deck) taken off. Instructions for doing this can be derived from the numbered connections, numbered **1** to **10**, which are shown in the photograph and in our circuit diagram overleaf.

Switch Table and Diagrams

Switch	Gram	Long	Med.	Short
S1	—	—	—	C
S2	—	—	C	—
S3	—	C	—	—
S4	—	—	—	C
S5	—	—	C	—
S6	—	C	—	—
S7	C	—	—	—
S8	—	—	—	C
S9	—	—	C	—
S10	—	C	—	—
S11	—	—	—	C
S12	—	—	C	—
S13	—	C	—	—
S14	—	C	C	C
S15	C	—	—	—

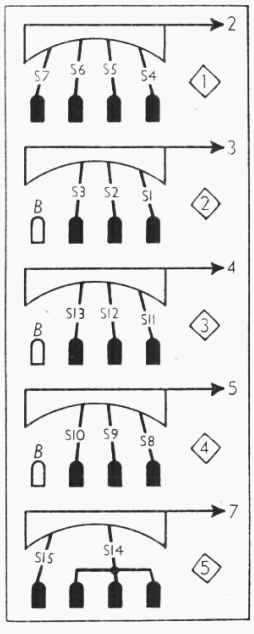
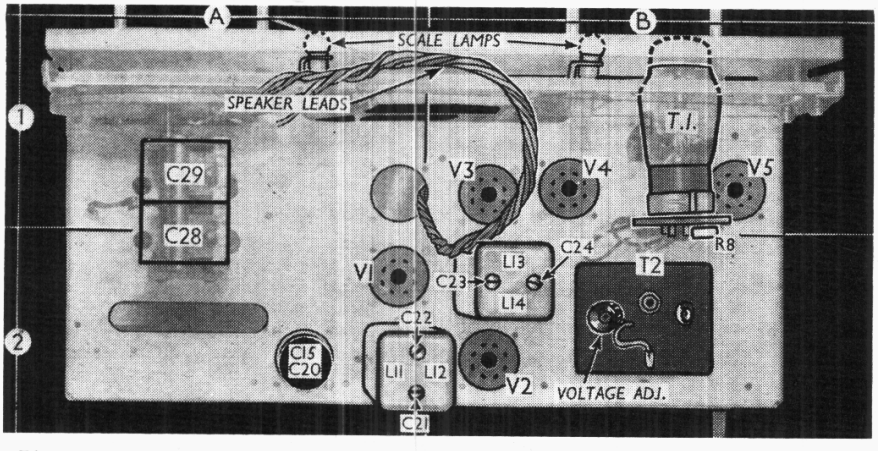


Diagram of the waveband switch assembly, drawn as seen from the rear of the upper side of the tuning assembly after removing it from chassis, turning it over and lifting the lid. The upper quadrants in these diagrams actually come away with the lid.



Plan view of the chassis of the model ETA632, with the I.F. transformer trimmers indicated. In the ETA539, the tuning indicator is omitted and **V3** and **V4** move up towards **V5**.

Switches.—**S1-S13** are the waveband and radio muting switches, and **S14, S15** are the radio/gram change-over switches, ganged together as part of the tuning assembly. The outer tags, which are indicated in our under-chassis view, are on one side of the tuning assembly, and the common contacts are on the opposite side. The central spindle drives the five sprung wipers which sweep the contacts.

The positions of the five sets of switches are indicated in our photograph by the numbers **1** to **5** in diamonds, and the five sets of switches, similarly numbered, are shown in detail in the diagrams in col. 2, where they are drawn as seen from the rear of the unit after it has been removed from the chassis and turned over, with the upper cover off, revealing the inside of the assembly as seen "through" the chassis deck.

The table (col. 2) gives the switch positions for the four control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open and **C** closed.

Coils.—The aerial and oscillator circuit coils are in six units inside the tuning assembly. Their positions are indicated by reference to their ends, which are visible in our under-chassis view, but the coils themselves are visible only when the assembly is removed from the chassis, and they are then seen from the opposite side of the unit. Their adjustments are accessible from the underside, as indicated in our illustration.

Scale Lamps.—These are two Osram lamps, rated at 6.5 V, 0.3 A, with small clear spherical bulbs and M.E.S. bases. In both models their spring-fitted holders can be extracted from the rear of the receiver without removing the chassis.

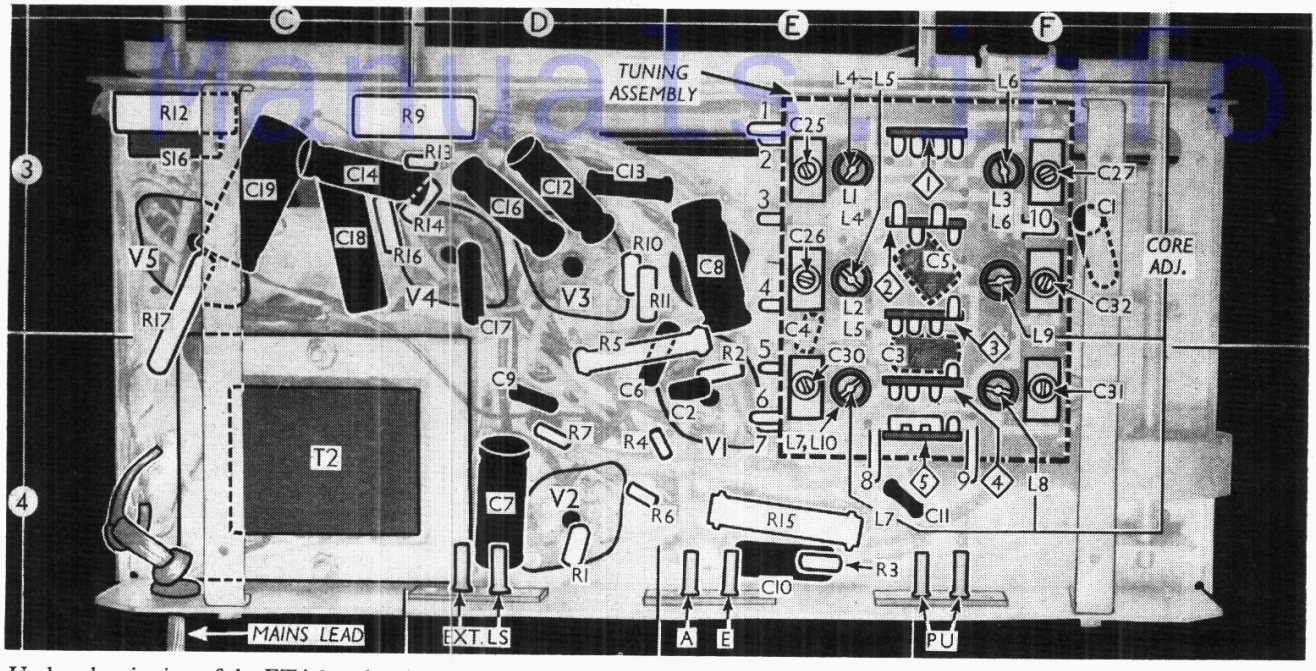
External Speaker.—Two sockets are provided at the rear of the chassis for the connection of a low impedance (about 2-5 Ω) external speaker.

CIRCUIT ALIGNMENT

For these operations the chassis must be removed from its cabinet as described under "Dismantling the Set." The intermediate frequency is now 470 kc/s, but prior to the operation of the Copenhagen wavelength allocations it was 465 kc/s. The following procedure applies to ETA539 and 632 models throughout.

I.F. Stages.—Switch set to M.W., turn volume and gang controls to maximum and tone control to "high." Connect signal generator (via 0.1 μF capacitor in the "live" lead) to control grid (pin 6) of **V2** and chassis. Feed in a 470 kc/s (638.3 m) signal, and adjust **C24** (B2) and **C23** (B2) for maximum output. Transfer signal generator "live" lead to control grid (pin 6) of **V1**, feed in a 470 kc/s signal, and adjust **C21** (A2) and **C22** (A2) for maximum output. Repeat all four adjustments with signal generator connected to pin 6 of **V1** until no further improvement results.

R.F. and Oscillator Stages.—In order to perform the alignment procedures with the chassis out of its cabinet, the makers recommend that a substitute scale be made up from a strip of transparent or translucent paper. This is placed behind the tuning scale, and the alignment points are marked on the paper against the tuning scale. An alternative method of



Under-chassis view of the ETA632 chassis. That of the ETA539 is not very different, but owing to the different positions taken by **V3** and **V4** some of the components move a little to the left. The tuning assembly is shown in position and its contents are clearly indicated. Its external connections are numbered **1-10** to agree with the numbers in the circuit diagram overleaf.

marking, however, is described below.

With the chassis in the cabinet, turn the gang to maximum, when the pointer should coincide with the high wavelength ends of the tuning scales, it may be adjusted in position by loosening the two drum drive boss screws.

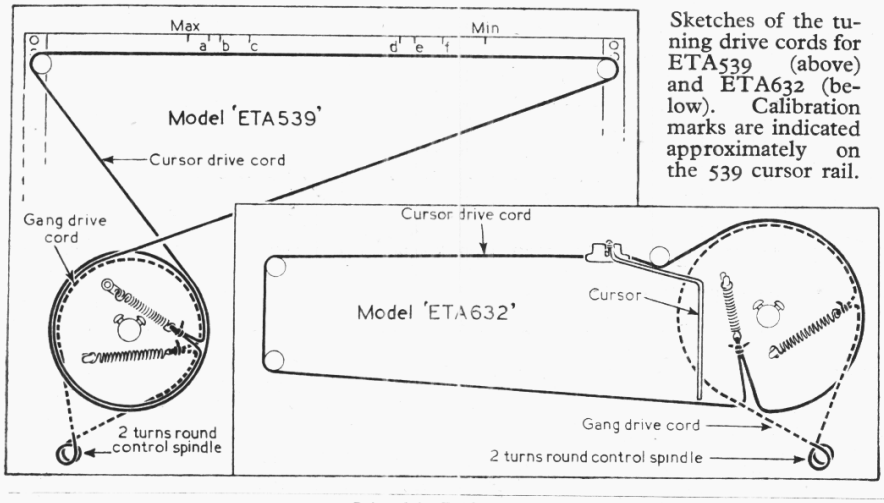
Make a pencil mark on the scale backing plate against the left-hand edge (when viewed from the rear) of the cursor carriage. Now tune to the following trimming points on the scale and likewise mark the edge of the backing plate. The sequence and approximate positions are shown in the ETA539 tuning drive sketch below, where they are letter coded for reference in the following instructions.

Transfer signal generator "live" lead to **A** socket via a suitable dummy aerial.

S.W.—Switch set to S.W., tune to 50 m (b) on scale, feed in a 50 m (6 Mc/s) signal, and adjust the cores of **L7** (E4) and (whilst slightly rocking the gang) **L4** (E3). Tune to 20 m (e) on scale, feed in a 20 m 15 Mc/s signal and adjust **C30** (E4) and (while rocking the gang) **C25** (E3). Repeat these operations until no improvement results.

M.W.—Switch set to M.W., tune to 500 m (c) on scale, feed in a 500 m (600 kc/s) signal and adjust the cores of **L8** (F4) and **L5** (E3) for maximum output. Tune to 200 m (f) on scale, feed in a 200 m (1,500 kc/s) signal and adjust **C31** (F4) and **C26** (E3) for maximum output. Repeat these operations until no improvement results.

L.W.—Switch set to L.W., tune to 2,000 m (a) on scale, feed in a 2,000 m (150 kc/s) signal, and adjust the cores of **L9** (F3) and **L6** (F3) for maximum output. Tune to 1,000 m (d) on scale, feed in a 1,000 m (300 kc/s) signal, and adjust **C32** (F3) and **C27** (F3) for maximum output. Repeat these operations until no improvement results.



Sketches of the tuning drive cords for ETA539 (above) and ETA632 (below). Calibration marks are indicated approximately on the 539 cursor rail.

DRIVE CORD REPLACEMENT

The tuning drive systems are different in the two models, but the same kind of cord may be used in each case. This may be Nylon braided glass yarn or good quality plaited and waxed flax fishing line. The two systems are shown in the sketches in cols. 4 and 5, where the gang is turned to maximum capacitance in each case, but whereas the ETA539 drive is viewed from the rear, that of the ETA632 is viewed from the front.

In each case two separate cords are involved, the gang drive cord and the cursor drive cord. To distinguish them in our sketches, the gang drive cord is shown in broken line, and the cursor drive cord in solid line.

Model ETA632.—Take two feet of cord for the gang drive, and four feet for the cursor drive. These lengths will leave ample to spare for tying off. The courses followed by the two cords are obvious from the lower sketch of the two, which is drawn as seen from the front of the chassis after removing the scale backing plate (two self-tapping screws, with a spacing sleeve on the left-hand screw).

Model ETA539.—Take two feet of cord for the gang drive, and five feet for the cursor drive, which leaves ample in each case for tying off. The courses followed by the cords are clearly shown in the upper sketch of the two, which is drawn as seen from the rear of the chassis with the gang at maximum.

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