"TRADER" SERVICE SHEET
1068

SOBELL 512 Series

Covering Models 512P, 512W, 512TAG, 512ACG and Twin-speaker ARG 612AG

AN unusual feature of the circuit of the Sobell 512 series is the provision of standing grid bias for the first two valves from the grid-current potential of the oscillator. Another feature is the use of a tuned-anode I.F. output coupling to the diode.

The 512W, on which our work was performed, is a 4-valve (plus rectifier) 3-band superhet designed to operate from A.C. mains of 200-250V, using a double-wound mains transformer. It is housed in a walnut cabinet. The 512P is identical in every respect except the cabinet, which is made of plastic.

The 512TAG is a table autoradiogram employing a considerably modified 512W chassis, but the differences are fully explained overleaf and the circuit is shown in section diagrams beside our main circuit diagram below. The 512TAG/3 is a 512TAG with a 3-speed motor.

Models 512ACG and 512ACG/3 are console versions of the 512TAG, while the 612AG and 612AG/3 are better grade consoles, with larger cabinets and twin speakers. The differences between all these models are explained overleaf under "Associated Models."

Release date, all models, September 1951. Original prices: 512W, £21 6s 7d; 512P, £16 8s 4d; 512TAG, £38 4s 10d; 512TAG/3, £41 18s 5d; 512ACG, £50 0s 2d; 512ACG/3, £53 13s 9d; 612AG, £72 1s 5d; 612AG/3, £75 14s 11d. Purchase tax extra.

CIRCUIT DESCRIPTION

Aerial input via coupling coil **L1** (S.W.) and bottom capacitative coupler **C2** (M.W. and L.W.) to single tuned circuits **L2, C33** (S.W.), **L3, C33** (M.W.) and **L4, C33** (L.W.) which precede triode hexode valve **(V1, Mullard ECH42)** operating as frequency changer with internal coupling.

Oscillator anode coils **L8** (S.W.), **L9** (M.W.) and **L10** (L.W.) are tuned by **C35.** Parallel trimming by **C13** (S.W.), **C34** (M.W.) and **C14** (L.W.); series tracking by **C10** (S.W.), **C11** (M.W.) and **C12** (L.W.). Inductive reaction coupling from grid by **L5** (S.W.), **L6** (M.W.) and **L7** (L.W.).

Second valve **(V2, Mullard EF41)** is a variable-mu R.F. pentode operating as intermediate frequency amplifier with tuned transformer coupling **C6, L11, L12, C7** and tuned anode coupling **L13, C18.**

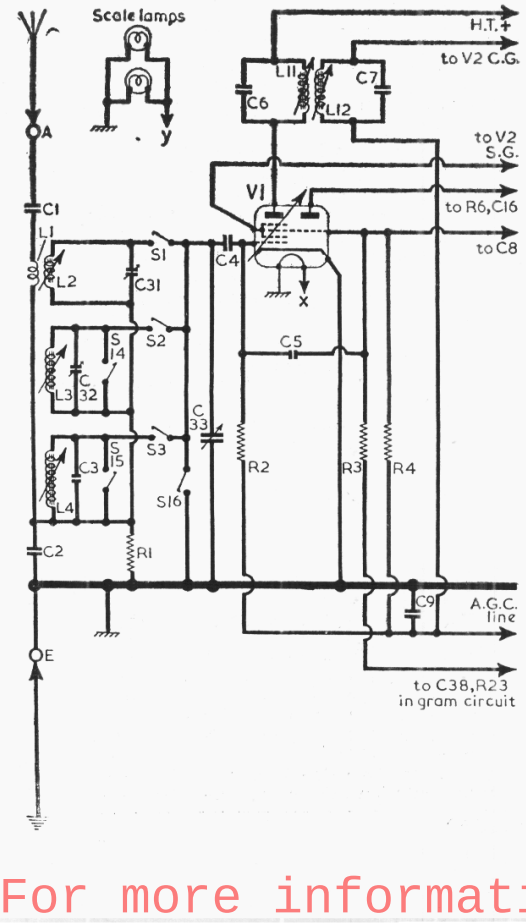
Intermediate frequency 470 kc/s.

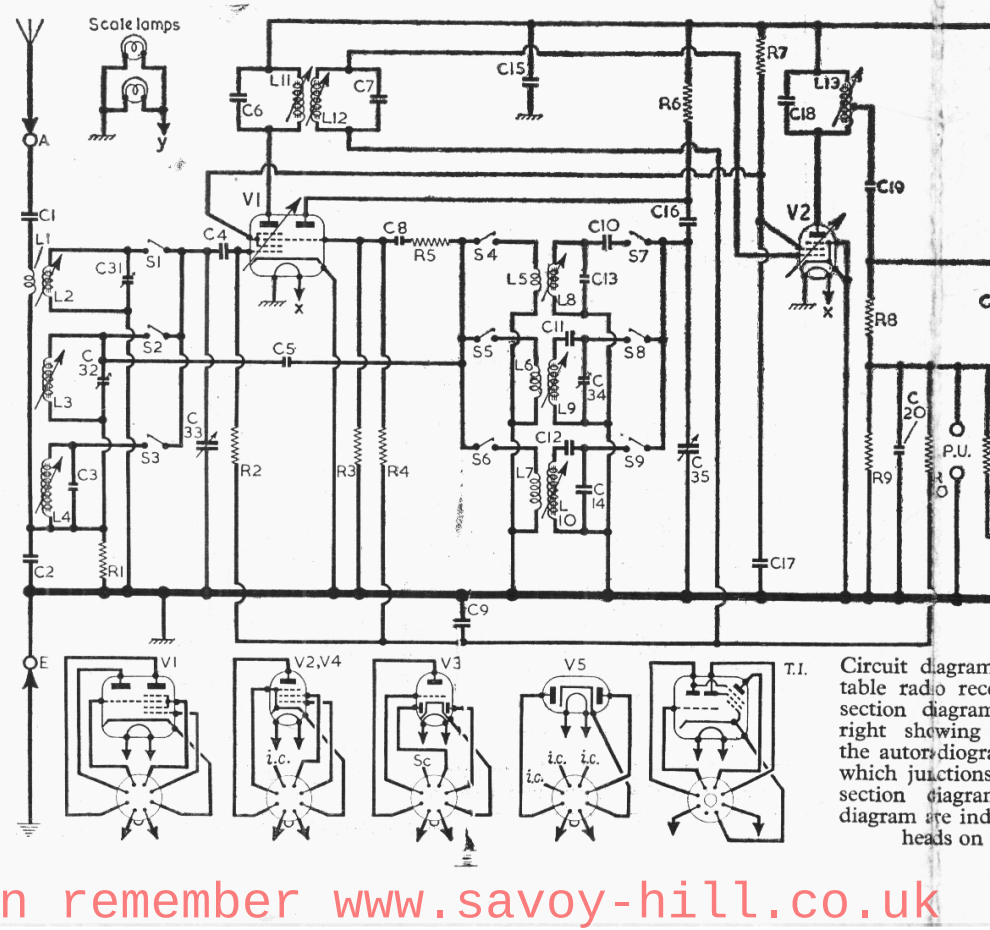
Diode signal detector, part of double diode triode valve **(V3, Mullard EBC41),** is fed via **C19** from a tapping on **L13,** and the audio frequency component in the rectified output is developed across diode load resistors **R8, R9,** which ensure that a large I.F. signal is applied to the diode to operate it in the linear portion of its curve. That portion of the A.F. output which is developed across **R9** is passed via the manual volume control **R11** and **C21** to control grid of triode section, which operates as A.F. amplifier.

I.F. filtering by **C20.** Provision is made for the connection of a gramophone pick-up across **R9.** In the radiogram models the pick-up is connected via **S17,** which closes only in the gram position of the waveband control. At the same time **S16** closes to prevent radio break-through, while **S18** in the bias circuit opens for the same reason, applying negative bias to the A.G.C. line and thus to **V1** and **V2** control grids. **R8** serves on gram to isolate the signal diode from the pick-up input circuit.

In the radio version, D.C. potential

(*Continued col. 1 overleaf*)





Circuit diagram
table radio rec
section diagram
right showing
the autoradiogr
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COMPONENTS, VALUES AND LOCATIONS

	CAPACITORS	Values	Locations
C1	Aerial series ...	200pF	G4
C2	Aerial coupling ...	0·003μF	G4
C3	L.W. aerial trim.	75pF	A1
C4	V1 C.G.	100pF	A2
C5	Osc. neutralizing	1pF	G3
C6	I.F. trans. tuning	200pF	A2
C7		200pF	A2
C8	V1 osc. C.G. ...	50pF	G4
C9	A.G.C. decoupling	0·05μF	F4
C10	S.W. osc. tracker	0·0039μF	F3
C11	M.W. osc. tracker	410pF	G3
C12	L.W. osc. tracker	190pF	F3
C13	S.W. osc. trim. ...	10pF	F4
C14	L.W. osc. trim....	140pF	G3
C15	H.T. decoupling...	0·1μF	F4
C16	Osc. anode coup.	200pF	A2
C17	S.G. decoup. ...	0·1μF	F4
C18	I.F. auto-trans. tune	200pF	F4
C19	Detector diode coup.	50pF	E4
C20	I.F. by-pass ...	50pF	E3
C21	A.F. coupling ...	0·01μF	E3
C22	V3 anode decoup.	0·25μF	D3
C23	Part tone control	0·01μF	E3
C24		100pF	E3
C25		0·005μF	D3
C26	A.F. coupling ...	0·01μF	E4
C27*	H.T. smoothing...	32μF	B2
C28	Tone corrector ...	0·005μF	E4
C29	Neg. feed-back ...	0·25μF	E3
C30*	H.T. smoothing...	32μF	B2
C31‡	S.W. aerial trim.	40pF	A1
C32‡	M.W. aerial trim.	40pF	A1
C33†	Aerial tuning ...	528pF	A2
C34‡	M.W. osc. trim. ...	40pF	G3
C35†	Oscillator tuning	528pF	A2
C36	A.G.C. diode coup.	50pF	—
C37	Tone corrector ...	30pF	—
C38*	Bias decoupling...	50μF	—

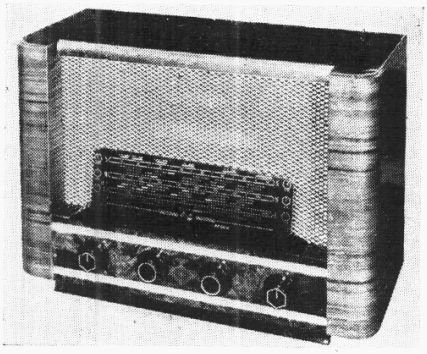
*Electrolytic. †Variable. ‡Pre-set.

	RESISTORS	Values	Locations
R1	Aerial shunt ...	33 kΩ	G4
R2	V1 C.G.	1MΩ	G4
R3	V1 osc. C.G. ...	47kΩ	G4
R4		10MΩ	G4
R5	Osc. stabilizer ...	150Ω	G3
R6	Osc. anode feed ...	27kΩ	G4
R7	S.G. feed ...	22kΩ	G4
R8	I.F. stopper ...	330kΩ	E3
R9	Signal diode load	470kΩ	E4
R10	A.G.C. decoupling	2·2MΩ	E3
R11	Volume control ...	2MΩ	E3
R12	V3 C.G.	10MΩ	E4
R13	V3 anode decoup.	68kΩ	F4
R14	V3 anode load ...	150kΩ	E4
R15	V4 C.G.	680kΩ	E4
R16	V4 C.G. stopper ...	220kΩ	E4
R17	H.T. smoothing...	2·4kΩ*	F4
R18	V4 G.B. ...	150Ω	F4
R19	Neg. feed-back	3·3kΩ	E3
R20		270Ω	D3
R21	A.G.C. decoupling	1·5MΩ	—
R22	A.G.C. diode load	1MΩ	—
R23	Muting bias ...	220Ω	—
R24	T.I. decoupling ...	3·3MΩ	—
R25	T.I. anode loads	1MΩ	—
R26		1MΩ	—

*Made up of two 1·2kΩ resistors in series.

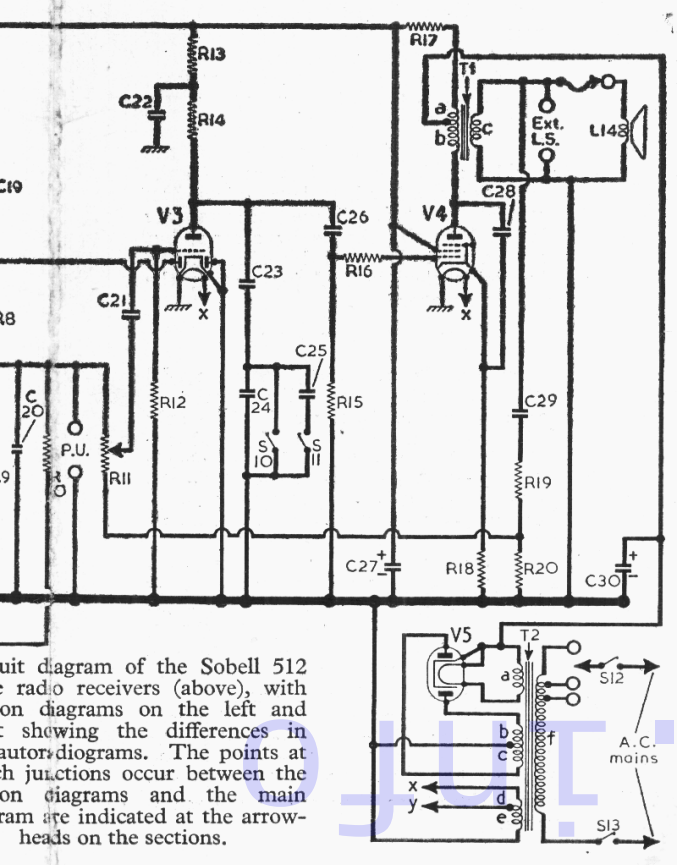
	OTHER COMPONENTS	Approx. Values (ohms)	Locations
L1	Aerial coupling ...	—	A1
L2		—	A1
L3	Aerial tuning coil	3·0	A1
L4		20·0	A1
L5		—	F4
L6	Oscillator reaction coils	·0	G3
L7		3	F3
L8		—	F4
L9	Oscillator tuning	·6	G3
L10		7·0	F3

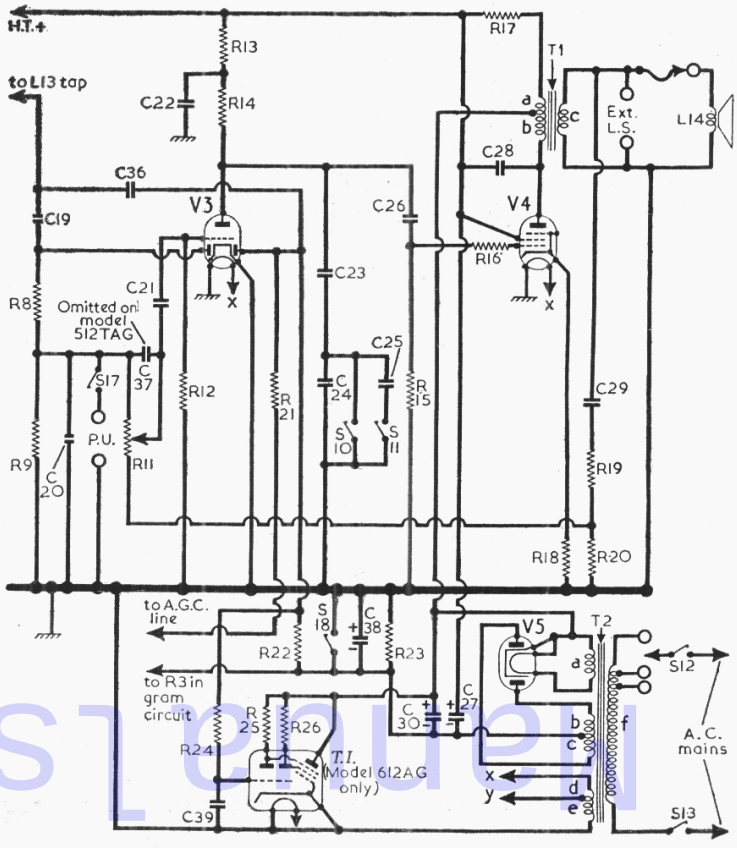
(Continued next col.).



The appearance of the Sobell 512W.

	OTHER COMPONENTS	Approx. Values (ohms)	Locations
L11	I.F. trans. Pri....	6·5	A2
L12	Sec....	6·5	A2
L13	I.F. auto-trans. ...	6·5	F4
L14	Speech coil ...	2·3	—
T1	O.P. trans a ...	11·0	
	b ...	350·0	F3
	c ...	—	
T2	Mains trans a ...	—	
	b ...	135·0	
	c ...	135·0	
	d ...	—	C2
	e ...	—	
	f, (total)	32·0	
S1-S9	Waveband switches ...	—	G3
S10, S11	Tone switches ...	—	D3
S12, S13	Mains sw., g'd R11	—	E3
S14-S18	Additional switches on radiograms	—	—





...uit diagram of the Sobell 512 ...e radio receivers (above), with ...on diagrams on the left and ...t showing the differences in ...autor diagrams. The points at ...h junctions occur between the ...on diagrams and the main ...ram are indicated at the arrow-heads on the sections.

Circuit Description—*continued*

developed across **R9** is tapped off and fed back as bias to F.C. and I.F. stages, giving automatic gain control, while the second diode is strapped to its cathhode, and is unused. In the radiogram versions, this diode is fed from **L13** and provides D.C. potential which is developed across load resistor **R22** and applied to the A.G.C. line as before, but of course **R10** is omitted in these chassis.

Negative bias is applied from the same source as before on gram to the A.G.C. diode and the A.G.C. line. The cathodes of **V1** and **V2** are returned directly to chassis, but a standing fixed negative bias is applied to their control grids via the A.G.C. line from the D.C. potential developed across the oscillator grid resistor **R3,** via the decoupling resistor **R4.**

Resistance-capacitance coupling by **R14, C26** and **R15** between **V3** triode anode and pentode output valve **(V4, Mullard EL41).** Three-position tone control by **S10, S11** and **C23, C24, C25.** Tone correction by **C28,** and by the negative feed-back between **T1** secondary and **V3** grid circuit, applied via potential divider **C29, R19** and **R20.** Provision is made for the connection of a low impedance external speaker across **T1** secondary. The internal speaker may be muted by withdrawing its plug from the middle socket on the extension speaker panel.

A cathode ray tuning indicator **(T.I., Mullard EM34)** is fitted to radiogram model 612AG, its control grid being connected to the A.G.C. line and its anodes being fed from the unsmoothed H.T. positive line.

H.T. current is supplied by I.H.C. full-wave rectifying valve **(V5, Mullard EZ40).** Smoothing by **R17** and electrolytic capacitors **C27, C30.** Residual hum is neutralized by passing the total H.T. current through section **a** of **T1** primary winding. In the gram models the negative bias required to mute the control grids on the A.G.C. line is obtained from the drop along **R23** in the negative H.T. lead to chassis. During radio reception **R23** is short-circuited by **S18.**

Switch	L.W.	M.W.	S.W.
S1	—	—	C
S2	—	C	—
S3	C	—	—
S4	—	—	C
S5	—	C	—
S6	C	—	—
S7	—	—	C
S8	—	C	—
S9	C	—	—

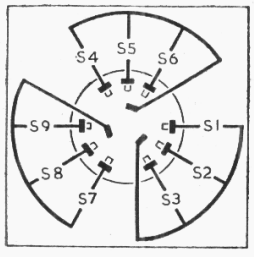


Diagram of the waveband switch unit in the table receiver, as seen from the rear of an inverted chassis. Above the diagram is the associated switch table.

VALVE ANALYSIS

Valve voltages and currents given in the following table are those measured in our receiver when it was operating from 230 V A.C. mains, using the 220-230 V tapping on the mains transformer. The receiver was tuned to the highest wavelength end of M.W. and the volume control was at maximum, but there was no signal input.

Voltage readings were measured with an Avo Electronic TestMeter, which has a high internal resistance, and allowance should be made for the current drawn when using other types of meter. Chassis was the negative connection in each case.

Valve	Anode		Screen		Cath.
	V	mA	V	mA	V
V1 ECH42	205	3·5	90	3·4	—
	Oscillator				
	95	4·2			
V2 EF41	205	6·3	90	2·0	—
V3 EBC41	98	0·6	—	—	—
V4 EL41	250	34·0	205	4·8	5·8
V5 EZ40	235†	—	—	—	270·0*

† Each anode, A.C. * Total cathode current, 59 mA.

General power supply conditions quoted by the makers for the 512 are as follows : H.T. line voltage, 200 V, at 22 mA; H.T. at rectifier cathode, 245 V at 55 mA; voltage drop along **R23** (in radiograms only) 10 V; total mains consumption, on full load (table models only), 40 W. The scale lamp voltage should be about 5 V at tapping **y** on **T2** (winding **e**).

GENERAL NOTES

Switches.—**S1-S9** are the waveband switches, ganged in a single 3-position rotary unit beneath the chassis. The unit is indicated in our underside view of the chassis, and shown in detail in the diagram in col. 2, where it is drawn as seen when viewed from the rear of an inverted chassis. Switches **S14-S18** are also on the main switch control, but they occur only in the radiograms.

The table below it 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.

S10, S11 are the tone control switches, ganged in a 3-position rotary unit mounted on a bracket bolted to one end of the front member of the chassis. In the fully anti-clockwise position of the control knob, both switches are open for maximum treble response; in the central position **S11** closes, shunting **C25** across **C24;** in the fully clockwise position **S10** closes short-circuiting **C24** for maximum treble attenuation.

S12, S13 are the Q.M.B. mains switches, ganged with the volume control **R11.**

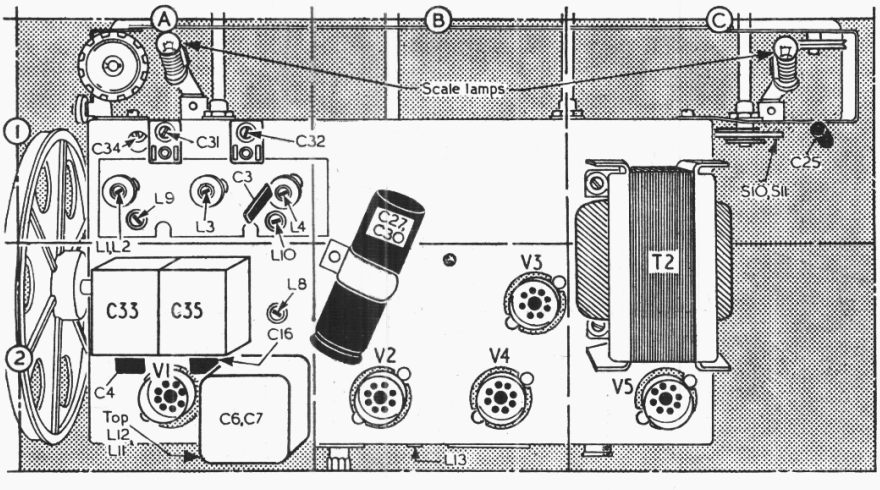
Scale Lamps.—These are two M.E.S.-type lamps, with clear spherical bulbs, rated at 6.3 V, 0.3 A.

External Speaker.—Two sockets are provided at the rear of the chassis for the connection of a low impedance (about 3 Ω) external speaker. These sockets are identified on the chassis by arrows, but between them is a third socket with a plug on a flexible lead for muting the internal speaker.

Associated Models

Our sample receiver was a model 512 W, the suffix letter indicating that it has a cabinet made of wood. The only difference between this model and the 512P is that the latter has a plastic cabinet, which again is indicated by the suffix letter. Our main circuit diagram, and all our data, is based on the model 512 W.

The **512 TAG** is a table autoradiogram employing a modified 512 W type of chassis, in which there are numerous differences as compared with the 512 W. These differences are shown in the two circuit sections disposed at either end of the main circuit diagram overleaf. On the left is a diagram of the aerial circuit up to the frequency changer, and on the right is the A.F. and power supply diagram from the pick-up input to the output circuit, as they are in the radiograms.



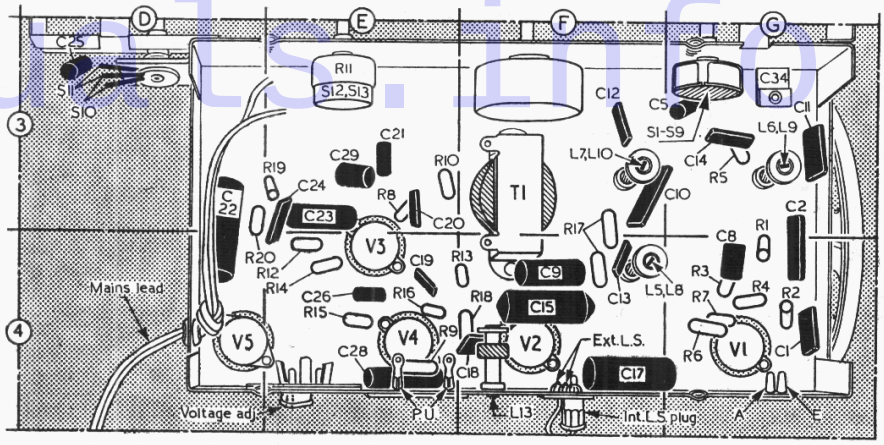
Plan view of the chassis. All the alignment adjustments are indicated here, and all are accessible for adjustment while the chassis is in the cabinet.

The principal features to be observed are the introduction of gramophone pick-up switching, effected by a fourth position on the waveband control, and the introduction of the second diode of **V3** into service as the A.G.C. rectifier. **S16** and **S17** close for pick-up operation, while **S18** opens, applying a muting bias to the A.G.C. line and thus to **V1** and **V2.** The tuning indicator is not used in the 512 models.

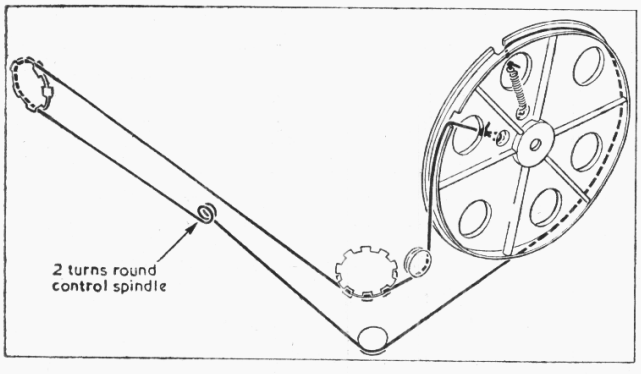
All the added switches **S14-S18** are included in the waveband switching assembly, which has four positions and is of different construction from that in the radio receiver. The gramophone motor is a single-speed Collaro with auto-changer for unmixed records.

The **512 TAG/3** is virtually a 512 TAG with a Collaro 3-speed auto-changer with the dual (reversible) head. Models **512 ACG** and **512 ACG/3** are console versions of the 512 TAG, and again the suffix "3" indicates 3-speed auto-changer. Models **612 AG** and **612 AG/3** might be described as de luxe versions of the 512 ACG embodying refinements to improve the tone and convenience.

The 612 AG has a larger cabinet than the 512 ACG, with door-covered record storage compartments at the front, between corner-sited speaker grilles. There are two 8in speakers, well spaced in the cabinet, and a tuning indicator is fitted. The circuit of the tuning indicator **(T.I., Mullard EM34)** is shown at the foot of the right-hand section diagram. The record-changer is usually a Plessey 3-speed model, handling mixed 10in and 12in records. When a Plessey record-changer is used, a 330 kΩ resistor is inserted in series with the pick-up lead.



Underside view of the 512 table chassis. In the autoradiograms a different type of waveband switch unit is employed.



Sketch showing the tuning drive cord system, drawn as seen when viewed from the front right-hand corner of the chassis when the gang is at minimum capacitance.

DRIVE CORD REPLACEMENT

About five feet of high-grade flax fishing line is required for a new tuning drive cord, this length permitting an ample margin for tying off. The cord should be run as shown in the accompanying sketch, where the system is drawn as seen when viewed from the front right-hand corner of the chassis.

The cursor drive carriage can be slipped on when replacing chassis in cabinet, and should be adjusted as explained under "Circuit Alignment."

CIRCUIT ALIGNMENT

All the I.F. and R.F. adjustments are accessible with the chassis in its cabinet.

I.F. Stages.—Connect output of signal generator, via an 0.1μF 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 the core of **L13** (location reference B2) for maximum output. Transfer "live" signal generator lead to control grid (pin 6) of **V1.** Shunt **L11** with a damping unit consisting of a 5kΩ resistor in series with an 0.1μF capacitor, and then, feeding in a 470 kc/s signal, adjust the core of **L12** (A2) for maximum output. Transfer damping unit from **L11** to **L12** and adjust **L11** (A2) for maximum output.

R.F. and Oscillator Stages.—As the tuning scale is fixed to the cabinet, and no substitute tuning scale is provided on the chassis, the following alignment adjustments should be carried out with the chassis in its cabinet. Check that with the gang at maximum capacitance, the cursor coincides with the ends of the tuning scales. Connect the signal generator leads, via a standard dummy aerial to **A** and **E** sockets.

S.W.—Switch receiver to S.W., tune to calibration mark at 46.16 m, feed in a 46.16 m (6.5 Mc/s) signal and adjust the core of **L8** (A2) for maximum output. Tune receiver to 20 m, feed in a 20 m (15 Mc/s) signal and adjust **C31** (A1) for maximum output, while rocking the gang for optimum results. Retune receiver to 46.16 m calibration mark, feed in a 46.16 m (6.5 Mc/s) signal and adjust the core of **L2** (A1) for maximum output. Repeat the adjustments to **C31** and **L2** until no further improvement results.

M.W.—Switch receiver to M.W., tune to 214.3 m calibration mark, feed in a 214.3 m (1,400 kc/s) signal and adjust **C34** (A1) and **C32** (A1) for maximum output. Tune receiver to 500 m, feed in a 500 m (600 kc/s) signal and adjust the cores of **L9** (A1) and **L3** (A1) for maximum output. Repeat these operations until no further improvement results.

L.W.—Switch receiver to L.W., tune to 176.5 m calibration mark, feed in a 176.5 m (170 kc/s) signal and adjust the cores of **L10** (A1) and **L4** (A1) for maximum output.

DISMANTLING

The majority of the components that are located beneath the chassis can be made accessible by removing the cabinet base cover.

Removing Chassis.—Remove back cover (five wood screws with washers) and stand receiver on one end;

remove base cover (three wood screws), and, tuning the cursor into the middle of the scale, release the drive cord from the clamps on the cursor carriage, now accessible through cabinet base aperture;

remove four control knobs (pull-off) with felt spindle washers;

unsolder leads from speech coil tags on speaker;

remove four hexagon-head self-tapping chassis bolts (with washers and grommets) and withdraw chassis.

Service Sheet Correction

It has been brought to our notice that in Service Sheet 1031/T22, which covered the Invicta T112 television receiver, the value of the sound diode detector load resistor R60 was mis-quoted as 33 Ω. This should, of course, be 33 kΩ, and readers are requested to correct the value in their copies to prevent confusion arising at some later date.

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