ULTRA 150 THREE-BAND RADIOGRAM

of V1, a triode hexode frequency changer, is via a set of band-pass coils on the medium and long wave bands. On short waves the coupling is effected

by a transformer coil.

An iron-cored I.F. transformer, tuned to 456 kc., couples V1 to V2. the I.F. amplifier. It will be noticed that on gramophone the pick-up potentials are fed to the control grid of V2, the screen grid being used as an anode. R22 acts as the anode load and the L.F. coupling condenser, C28, leads to a switch arrangement and thence via a further coupling condenser, C23, and H.F. stopper resistance to the volume control. On radio this arrangement is rendered inoperative, and V2 operates as a conventional I.F. amplifier.

Another iron-core transformer couples V2 to the demodulating diode of V3, a double diode pentode valve. The other diode, fed by a coupling condenser, C20, provides a D.C. potential that is fed back to the grids of V1 and V2 for automatic

volume control.

VALVE READINGS

No signal. Volume maximum. MW min. cap. 230 rolt A.C. mains.

v.	Type.	Electrode.	Volts	Ma.
1	All Mazda. ACTH1 (7)	anode screen osc. anode	260 105 70	4.5 8.2 4.6
2	ACVP2 (7)	anode	260 185	$\frac{12}{3.2}$
3	AC2/PenDD(7)	anode	$\frac{165}{245}$	33 8.4
4	UU4 (4)	heater	380	

A manual volume control is included in the coupling arrangements to the control grid of the pentode section of V3. A pentode compensator condenser, C24, effects a fixed modification of the tone.

Mains equipment consists of a mains transformer, a full-wave rectifying valve, V4, electrolytic smoothing condensers and a smoothing choke (the speaker field).

a smoothing choke (the speaker field).

Chassis Removal.—Remove the two grub-screw fixed control knobs and the wave-change knob (spring fixing). Remove the back of the cabinet, detach the flex leads to the motor and the two leads to the pick-up, the green lead to the aerial socket and the black to the soldering tag on the chassis.

(Continued on opposite page.)

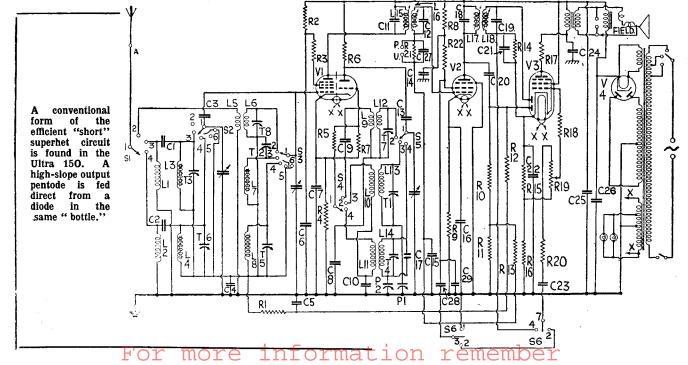
RESISTANCES

R.	Purpose.	Ohms.
1	V1 A.V.C. decoupling (part)	25,000
2 3 4 5 6 7	V1 screen decoupling	20,000
3	V1 screen stabiliser	60
1	V1 cathode bias	165
5	Regeneration modifier	60
6	Osc. anode load	40,000
7	Osc. grid leak	25,000
3	V2 screen decoupling	15,000
9	V2 cathode bias	60
)	A.V.C. diode load (part)	250,000
1	A.V.C. diode load (part)	750,000
2	V1 A.V.C. decoupling (part)	1 neg.
3	V2 A.V.C. decoupling	1 meg.
i	Demodulating diode load	500,000
5	V3 cathode bias (part)	138
3	V3 cathode bias (part)	276
7	V3 anode stabiliser	60
3	V3 grid stopper	1,000
)	Volume control	1 meg.
ĺ	UF atonnor	10,000
ĺ	Diele un chunt	10,000
2	V2 screen load	7,000

A Garrard motor and pick-up unit are added to a three-valve plus rectifier chassis in the 150.



CONDENSERS					
C.	Purpose.	Mfds.			
1	MW aerial coupling	.000005			
1 2 3 4 5 6 7 8 9	LW aerial coupling	.00001			
3	Top band pass coupling				
4	Bottom band pass coupling	.025			
5	V1 A.V.C. decoupling	.05			
6	V1 screen decoupling	.1			
7	V1 cathode bias shunt	.5			
8	SW osc. fixed padder	.004			
	SW osc. grid coupling	.0001			
10	MW and LW osc, grid	.001			
11	IFT1 primary fixed trimmer	.00015			
12	IFT1 sec. fixed trimmer	.00015			
13	Osc. anode coupling	.0001			
14	V2 screen decoupling	2			
15	T2 A.V.C. decoupling	.05			
16	V2 cathode bias shunt	.1			
17	LW osc, fixed trimmer	.00006			
18	IFT2 prim, fixed trimmer	.00015			
19	IF I 2 sec. fixed trimmer	.00015			
20	A.V.C. diode coupling	.0002			
21	HF bypass	.0002			
22	V3 cathode bias shunt	50			
23	LF coupling	.01			
24	Pentode compensator	.004			
25	HT smoothing	16			
26	HT smoothing	8			
27	Pick up shunt	.0002			
28	V2 screen LF coupling	.1			
29	V2 screen shunt	.001			



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Unsolder the three leads to the speaker and remove the four chassis securing bolts and washers from the underside of the shelf.

The speaker may be removed by unscrewing the three nuts securing three clamps and unsoldering the remaining three leads.

When replacing, the pick-up leads (coming from a hole in the chassis deck) are connected with the green lead going to the bolt on the left of the cabinet, to which a red lead is already secured, and the black lead goes to an adjacent earthing bolt, to which a black lead is already connected. The green wire from the rear of the chassis deck is connected to the aerial socket.

With the speaker transformer at the bottom, and counting from left to right, the speaker connections are: First tag blank with regard to external leads; second tag, connect the black lead; third the blue lead from the extension L.S. sockets: fourth, the black with white spot; fifth, the green with black spot that is connected to the two upper sockets of the extension L.S. panel; sixth, the red lead; and, to the seventh, connect the vellow, to which is connected the speaker control wander plug.

It should particularly be noted that if the chassis and speaker are operated out of the cabinet, the fifth tag should be connected to the seventh tag on the speaker transformer, otherwise speaker will remain inoperative.

Special Notes.—A pair of sockets on an insulating panel on the side of the cabinet enable a low impedance permanent magnet extension speaker to be operated.

Two pilot lamps are fitted in screw-in holders clipped to brackets at the side of the scale. These are Osram bulbs rated at 4.5 volt 0.3 amp. and fitted with M.E.S. bases.

The mains input is adjusted by inserting the metal link between the socket C and the appropriate socket.

It will be found that some of the coils are inaccessible for purposes of resistance (Continued on page 52.)

WINDINGS (D.C. Resistances)					
Induct- ance.		Ohms.	Range	Measured between	
L1	٠.	15	MW	S1 contact 3 to	
L2		70	LW	S1 contact 4 to	
L3 L4	• •	1.5 19	MW LW	Across T3. Across T6.	
L5	٠.,	.5	sw	S1 contact 2 to chassis.	
L6 L7	::	.25 1.6	SW MW	Across T8. Across T2.	
L8 L9		18 7	LW Any	Across 15. Coilside C9 to black lead 17.	
L10		1	MW	S4 contact 3 and C10.	
L11	٠.	1.2	LW	S4 contact 4 and C10.	
L12 L13		below 1 5.5	W MW	Across I7. Across T1.	
L13 L14	• •	9.5	ĹW	Across T4.	
L15		4		Anode V1 and HT	
L16		4		Control grid V2 to	
L17	٠.	4		Anode V2 and HT line.	
L18		4	-	S6 contact 4 (blue lead) to signal diode V3.	
Output trans.		462	-	Black and black and white spot	
prim. Mains trans.		21	-	lead spkr panel. "C" socket to pink of mains lead.	
prim. Total HT sec.		565	-]	Anode pins V4,	

The switch banks numbered corresponding to the circuit and under-chassis diagrams.

Ultra 150 on **Test**

MODEL 150.—For A.C. operation, 200-250 volts, 40-60 cycles. Price, £21.

DESCRIPTION. - Three-valve, plus rectifier superhet rac covering three waveranges. radiogram,

Features.—Full-vision scale calibrated in metres and station names. Scale coloured as to waveband. Controls for wavechanging, tuning and combined volume control and master switch. Garrard trol and master switch. Garrard motor with speed control and automatic stop switch. Sockets for extension L.S. with control plug.

Loadings.—88 watts with motor; 74 watts without motor.

Sensitivity and Selectivity
SHORT WAVES (16.8-50 metres).—
Very good gain and selectivity.
Easy handling, no drift and good all-round performance.
MEDIUM WAVES (200-550 metres).
Wall projection of the project of the

-Well maintained gain with good selectivity and sufficient sensitivity for normal requirements. Local stations spread on adjacent channels, quiet background, free from whistles.

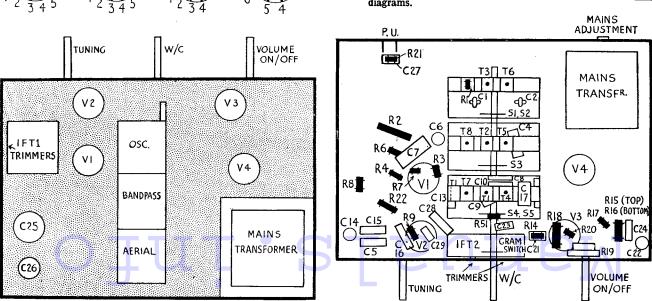
Long Waves (900-2,000 metres).— Representative gain and selectivity. All main stations easily received.

Gramophone Section

Motor speed substantially correct, little trace of speed variation. Sensitivity of pick-up ample for any ordinary record, with good reserve power. Characteristic good with no over-emphasised top, slight low-note compensation and good freedom from needle scratch.

Acoustic Output

Ample volume for an ordinary room, with a rather deep tone, but appreciable crispness.



GRAM

S6

SWITCH

All components on and under the Ultra chassis can be identified by means of these two diagrams. To facilitate reference, all resistors are in solid black and condensers in outline.

Marconiphone Model 538

For reconnection, the red lead is connected to tag 7, red lead with black dot to tag 6, black to tag 3, yellow to 1, yellow with black to 5, and the black rubber lead to the earthing tag on the electrolytic condenser support.

Special Notes.—The receiver has, in addition to ordinary aerial and earth sockets, a specially designed input circuit to match the line impedance of the Marconiphone Static-free aerial, type 72. This aerial equipment is provided with a non-reversible plug attached to the transmission line. This fits into two special sockets on the receiver, and a link plug is inserted between the aerial and earth sockets.

Sockets are provided for a high-

resistance pick-up.

The receiver will operate up to four extension speakers without greatly reducing the volume from the internal speaker. The total speech coil impedance of extra speakers should be approximately 5 ohms. The extension speaker sockets are on the side of the cabinet at the back.

Electrolytic smoothing condensers C39, C40 and C41 are mounted on a bracket near the speaker. C52 and C57 are located enside the aerial coils can, C58 in the anode coils can, R34, R35, R39, C9 and C59 in the oscillator coils can, and R13, R14, R40, C23 and C49 inside IFT2. R18 is mounted on the visual tuning indicator holder.

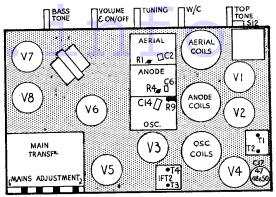
The single dial light is connected across the mains supply. It is rated at 230 volts 15 watts and mounted in a bayonet holder.

Circuit Alignment Notes

neter across the primary of the speaker transformer and a service oscillator to the top grid cap of V2 yia a 0.1 mfd. condenser and chassis. Set receiver to SW2 band, gang condenser to maximum, volume control to maximum, bass tone control fully anti-clockwise and top tone control as far anti-clockwise as possible without switching to high fidelity.

Tune service oscillator exactly to 465 kc. and adjust T1, T2 and T3 and T4 in that order for maximum response, using a non-metallic trimming tool and reducing the input from the service oscillator as the

The "top deck" arrangement of components on the Marconiphone model 538 is shown by this drawing. It will be seen some resistors and condensers are near the tuning condensers. Others are in coil cans (see Special Notes).



circuits come into line to render the A.V.C inoperative.

Signal Circuits.—Connect service oscillator to A. and E. sockets via a dummy aerial, only feeding sufficient input to obtain reliable peaks in the output meters of as to prevent operation of the A.V.C.

To check the wavelength scale, turn gang to minimum capacity and then turn the gang 10 degrees (on the vernier scale) in. The pointer should now register accurately on 725 metres. If it does not do so slacken the pointer fixing screws and adjust.

Long Waves.—Set receiver and escillator to 725 metres (413.8 kc.) and adjust

T5 for maximum.

Set oscillator to 850 metres (353 kc.), tune in on receiver and adjust T6 and T7 for maximum.

Set oscillator to 1,900 metres (157.9 kc.), tune in on receiver and adjust P1 for maximum simultaneously rocking the gang.

Repeat operations until no further improvement results.

Medium Waves.—Set receiver and oscillator to 194 metres (1,538 kc.) and adjust T8 for maximum.

Set oscillator to 210 metres (1,430 kc.) tune in on receiver and adjust T9 and T10 for maximum.

Set oscillator to 530 metres, tune in on receiver and adjust P2 for maximum simultaneously rocking the gang.

Repeat operations until no further improvement results.

Short Waves (35 to 100 metres).—Set pointer to read 725 metres on the L.W. scale, set oscillator to 35.2 metres, and adjust T11 for maximum.

Set oscillator to 37.5 metres (8 mc.).

tune in on receiver and adjust T12 and T13 for maximum simultaneously rocking the gang.

Repeat until no improvement results. Short Waves (11 to 35 metres).—Fully unscrew T15, set oscillator to 11.3 metres (26.6 mc.) tune in on receiver and adjust T14 for maximum at the same time rock-

ing the gang. Adjust T15 for maximum.

If the tuning coils have been seriously disturbed, and not otherwise, set oscillator to 30 metres (10 mc.) and tune in

signal on receiver.

Insert the Ferrocart end of a tuning wand into can containing L12. If output reading rises then L16 must be decreased by unsoldering the junction between C13 and its connecting wire and sliding the condenser tag down towards the coil base until the section of either end of the tuning wand into 12 produces a fall in output.

If reading falls when the Ferrocart end is inserted then increase inductance of L16 by sliding C13 upwards until the insertion of either end of the tuning wand

produces a fall in output.

Then repeat the operation outlined for 11.3 metres calibration.

If two condensers are used for C13 it is important that when resoldering the tags to the wire a good connection is made between the tags of the two condensers as far up the moulded cases as possible.

Replacement Condensers

EXACT service replacements for the 538 are available from A. H. Hunt, Ltd. These are: For C39, unit 3,058, price 9s. 6d; for C41, 3,056 7s. 6d.; for either C34 or C36, 1,807, 2s. 3d.; C50 is unit 3,914, at 9s. 6d., and for C17, C33, or C48 there is 2,780, 3s.

ULTRA 150 RADIOGRAM

(Continued from page 47.) tests. We have appended our usual list in order that in cases of partial dismantling the resistances can be checked.

C11 and C12 are inside IFT1, and C18, C19, C20, R10, R11, R12, and R13 inside IFT2.

Alignment Notes

I.F. Circuits.—Connect an output meter across the primary of the speaker transformer. Switch set to M.W., turn gang to maximum capacity and volume control to maximum. Connect a service oscillator between the top grid cap of VI and chassis.

Tune service oscillator to 456 kc, and

adjust the variable iron cores of IFT2 and then IFT1, reducing the input from service oscillator as the circuits come into line, so as to render the A.V.C. inoperative.

Signal Circuits.—Adjust the tuning pointer to coincide with the lower left black dial line when the gang is fully closed.

Connect the service oscillator to the Λ . and E, sockets, preferably via a dummy aerial or fixed condenser, only feeding sufficient input to obtain definite peaks in the output meter.

Medium Waves.—Tune set and service oscillator to 200 metres (1,500 kc.) and

adjust T1, T2 and T3 in that order for maximum response.

Tune set and oscillator to 500 metres (600 kc.) and adjust P1 for maximum, simultaneously rocking the gang.

Repeat both operations.

Long Waves.—Tune set and service oscillator to 1,500 metres (200 kc.) and adjust T4, T5 and T6 in that order for maximum response.

Tune set and service oscillator to 1,700 metres (176.5 kc.) and adjust P2 for maximum, simultaneously rocking the gang.

Repeat both operations.

Short Waves.—Tune set and oscillator to 17 metres (17,647 kc.) and adjust T7 and then T8 for maximum response.

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