ULTRA 205 PUSH-BUTTON CONSOLE

The 205 is a four-valve plus rectifier, three band set with trimmer - type automatic tuning for seven stations.

CIRCUIT.—Single-tuned circuits with coupled aerial windings are used on the three wavebands, together with an I.F. trap in the aerial circuit. These circuits form the input to V1, a triode hexode, which has a grid stabiliser in the screen connection.

In the press-button position tuning is effected by two banks of trimmers selected by ganged, interlocked switches.

Tuned anode is used for the oscillator section of V1, but the anode load resistance is also used for audio-amplification in the pick-up position, the amplified voltages being transferred to the grid of the output pentode through a switching arrangement.

The anode of the hexode section feeds the primary winding of the first I.F. transformer, which is trimmer tuned and works into V2, an H.F. pentode. A.V.C. is applied through the secondary winding.

A perfectly standard circuit leads to the signal diode which forms one half of V3, a separate double diode. This valve is connected to a potentiometer consisting of two resistances across the H.T. line, by means of which a suitable bias is obtained on the A.V.C. diode. The demodulation and A.V.C. circuits call for no comment.

The signal diode load has the usual shunt condenser and is connected to the volume control. This operates on the grid of the output valve, V4, through a simple filter. The tone control is also across the signal diode load.

Orthodox connections are again used on V4, which has a shunt compensating condenser.

Power supply is by means of a full-wave rectifier, V5, and the speaker field as a smoothing choke in conjunction with two large condensers. The pilot lamps are run from a tapping on the heater supply, and work below the normal heater voltage.

Chassis Removal.—Withdraw the tone and volume knobs from the front of the cabinet. Remove the tuning knob from the side by releasing the grub-screw from inside the cabinet and withdrawing the knob and extension rod as a whole. The selector switch is of lever type and has a long hole up the main portion. A very thin screwdriver must be used to release a grub-screw at the end of this hole.

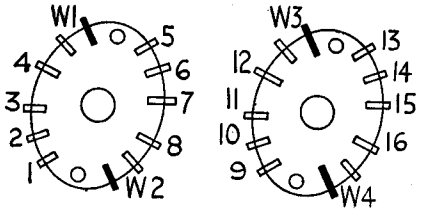
The chassis may now be withdrawn by releasing the anchorage bolts. If the

RESISTANCES

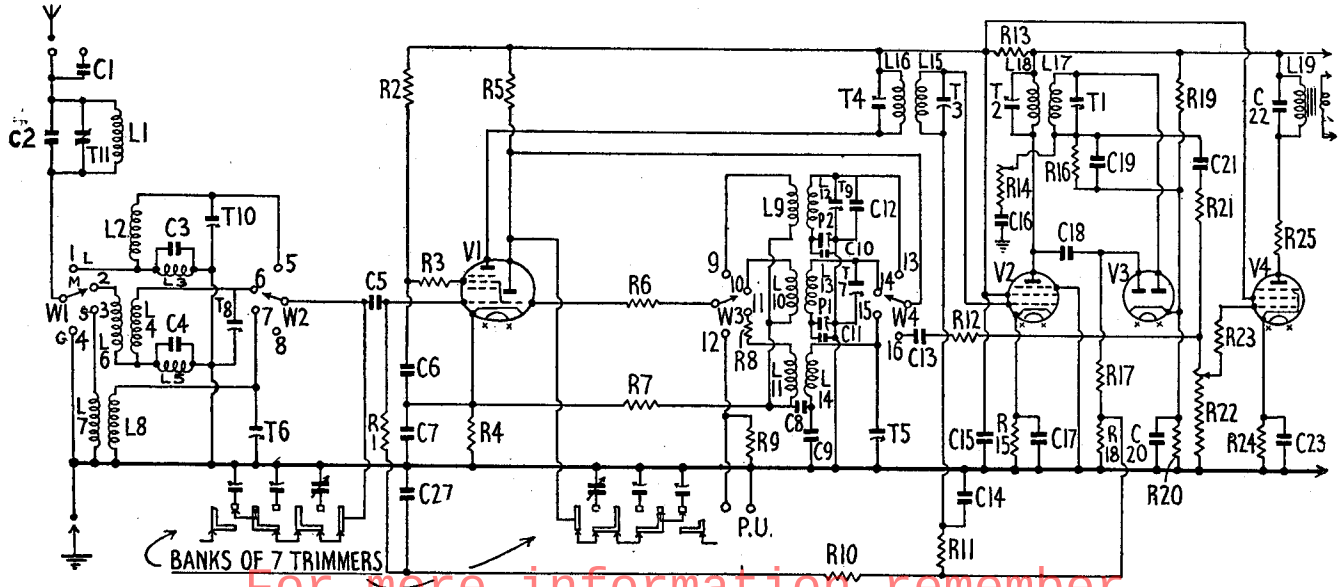
R.	Purpose.	Ohms.
1	V1 grid return	1 meg.
2	V1 screen decouple	10,000
3	V1 screen suppressor	60
4	V1 cathode bias	200
5	V1 osc. anode load	40,000
6	V1 osc. grid suppressor ..	60
7	V1 osc. grid leak	25,000
8	S.W. het. voltage control ..	30
9	Pick-up shunt	250,000
10	V1 A.V.C. decouple	1 meg.
11	V2 A.V.C. decouple	1 meg.
12	V4 grid stopper (pick-up) ..	100,000
13	V1 feed and V2 screen decouple	2,000
14	Tone control	2 meg.
15	V2 cathode bias	130
16	Signal diode load	500,000
17	A.V.C. diode load (part) ..	250,000
18	A.V.C. diode load (part) ..	750,000
19	V3 cathode pot. (part) ..	1 meg.
20	V3 cathode pot. (part) ..	50,000
21	V4 grid stopper	100,000
22	Volume control	1 meg.
23	V4 grid suppressor	1,000
24	V4 cathode bias	140

CONDENSERS

C.	Purpose.	Mfds.
1	Aerial series	.00005
2	Trap fixed tune	.002
3	L.W. aerial fixed shunt ..	.002
4	M.W. aerial fixed shunt ..	.004
5	V1 grid isolating	.00005
6	V1 screen decouple	.1
7	V1 cathode bias shunt ..	.1
8	V1 osc. grid coupling ..	.0002
9	S.W. fixed padder	.004
10	L.W. fixed padder	.000045
11	M.W. fixed padder	.00025
12	L.W. fixed trimmer. . ..	.00001
13	V1 to V4 coupling (pick-up position)	.004
14	V2 A.V.C. decouple. . ..	.05
15	V1 feed and V2 screen decouple	4
16	Tone control	.004
17	V2 cathode bias shunt ..	.1
18	A.V.C. coupling	.00001
19	Diode load shunt	.0002
20	V3 cathode bias shunt ..	.1
21	L.F. coupling	.01
22	Pentode load shunt	.004
23	V4 cathode bias shunt ..	50
24	H.T. smoothing	8
25	H.T. smoothing	16
26	Mains filter	.004
27	V1 A.V.C. decouple. . ..	.05



The wavechange wafers with the one nearer "click" plate on left. See also "Wavechange Switches" in text on opposite page.



security bolts are in place these must also be unscrewed. It should be noted that two of these are at the back of the tuning scale.

Long leads are used between the speaker and the chassis, allowing ample freedom for normal repairs. If complete removal is necessary the order of the leads, which all have the same colour with the exception of small bands of colour paint, are as follows :—

With the speaker in position there are six tags on the strip and the colours run—black, white, green, plain, green, red.

Special Notes.—No marked divergence from the standard specification was found in our chassis. It was noticed, however, that R8, which is in the short-wave oscillator grid circuit, was not fitted in our chassis.

Some variation of the tone control circuit may be found. In this case the sliders of both tone and volume controls may be strapped so that the effective tone control is also to a slight extent a function of the volume control position.

Wavechange Switches. — The complete set of switching operations is carried out by only two wafers, around which the coils are grouped with an interposed screen. Each wafer carries two wipes, the wafer nearest the click plate carrying W1 and W2, which control the aerial circuits.

The other wafer carries W3 and W4, which switch the oscillator coils and also change over the gramophone pick-up connections.

It will be noticed on inspection that there is a blank contact next to each wipe. This helps to identify them.

WINDINGS (D.C. Resistances)

L.	Ohms.	Range.	Where measured.
1	3.7	—	Across C2.
2	20	L.W.	W1 and W2.
3	30	—	Across C3.
4	1	M.W.	W2 and C4.
5	16	—	Across C4.
6	Very low	M.W.	W1 and C4.
7	Very low	S.W.	W1 and chassis.
8	Very low	S.W.	W2 and chassis.
9	1	L.W.	W3 and C8+R7.
10	Very low	M.W.	W3 and C8+R7.
11	Very low	S.W.	W3 and C8+R7.
12	17	L.W.	W4 and P2.
13	6	M.W.	W4 and P1.
14	Very low	S.W.	W4 and C8+C9.
15	13	—	V2 grid and C14+R11.
16	12	—	V1 anode and R13+R5.
17	12	—	Signal diode and C19+R16.
18	11	—	V2 anode and H.T. positive.
19	250	—	Black and red speaker tags.
20	940	—	Black and white speaker tags.
21	38	—	Mains plug.

Alignment Notes

I. F. Circuits.—Connect output meter to speaker sockets, switch receiver to M.W. band, turn gang to maximum and volume control to maximum.

Connect generator to grid of V1 and chassis and inject a signal of 470 kc.

Adjust T1, T2, T3 and T4 for maximum in that order. Reduce the input as the circuits come into line to keep the signal below the point at which the A.V.C. operates.

I.F. trap Circuit.—Tune the set to 950 metres, connect the generator to the aerial and earth sockets and inject a strong 470 kc. signal.

Adjust T11 for *minimum* signal.

Medium Waves.—Tune set and oscillator to 250 metres (1,200 kc.) and adjust T7 and T8 for maximum.

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

(*Continued on page* 46)

VALVE READINGS

V.	Type.	Electrode.	Volts.	Ma.
	(*All Mazda*)			
1	AC/TH1 ..	Anode ..	185	3.0
		Screen ..	120	6.5
		Osc.anode	45	3.5
2	AC/VP2 ..	Anode ..	230	10.5
		Screen ..	185	3.0
3	DD.41 (Octal)	Diodes only	—	—
4	AC5/Pen. ..	Anode ..	218	38
		Screen ..	185	60
5	UU4	Heater ..	300	—
—	Pilot lamps ..	Filaments	4.5	300

Ultra 205 on Test

MODEL 205.—For A.C. mains, 200-260 volts, 40-100 cycles. Price 13½ gns.

DESCRIPTION. — Four-valve, plus rectifier, three-waveband console superhet, with manual and trimmer controlled press-button tuning.

FEATURES. — Large full-vision, coloured scale calibrated in names and wavelengths. Front controls for tone, volume and range and a side tuning knob. Two long wave and five medium wave press-button stations. Sockets for extension speaker and pick-up, optional aerials and earth. Nine-inch speaker.

LOADING.—60 watts.

Sensitivity and Selectivity

SHORT WAVES (16.8-52 metres).—Very good gain and selectivity, easy handling and no drift.

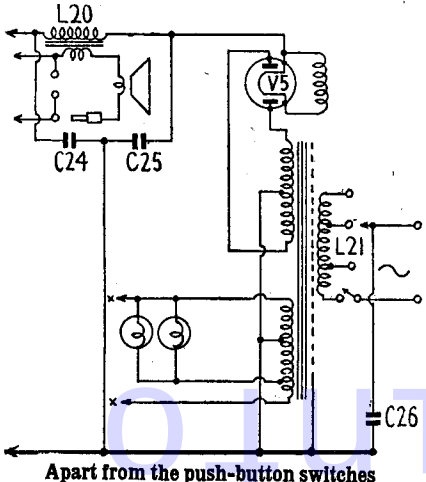
MEDIUM WAVES (200-500 metres).—Representative gain and selectivity, small local station spread and well maintained gain, with a clean background.

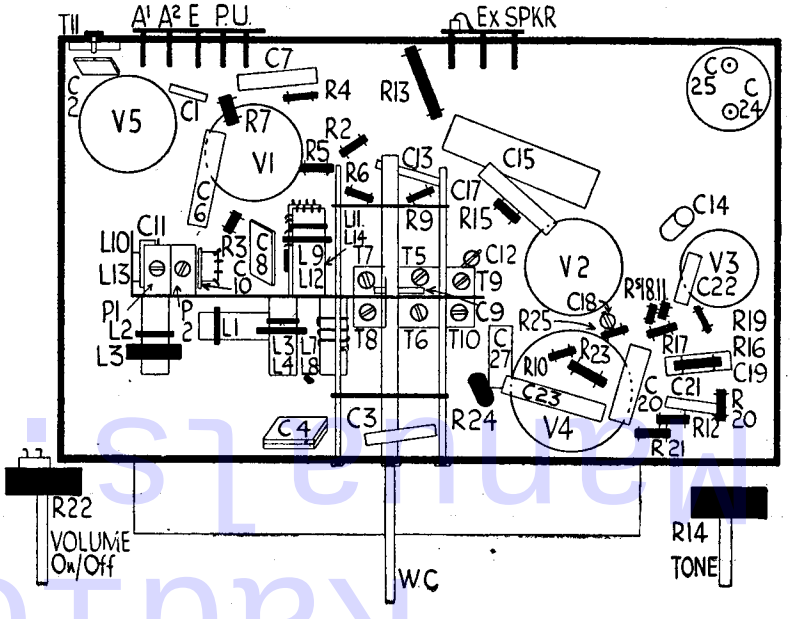
LONG WAVES (900-2,000 metres).—Very good gain and selectivity, with little interference on Deutschlandsender. All main stations clearly received.

Acoustic Output

Excellent volume for a large room, without overloading. The characteristic is good, with a crisp forward tone and the balance is very pleasing on all types of reproduction. Tone control is effective and not too vigorous in action.

EXACT replacement condensers available from A. H. Hunt, Ltd., Garratt Lane, Wandsworth, London, S.W.18, for the model 205 are : for C24 and C25, unit 2923, 9s. 6d. ; for C23, 2915, 1s. 9d., and for C15, 1946, 2s.





Apart from the push-button switches and the trimmers which are switched across aerial and oscillator coils, the circuit is entirely conventional. Right, the under-chassis layout.

Ultra T22: Adjustments

Format Adjustment.

The amplitude of the line and frame sweep is controlled by R6 and R16 located at the back of the scanning chassis. These controls are adjusted until the picture fully occupies the mask area.

Centring is automatic, provided that the tube neck lies correctly in the scan coils. As the clearance is small no adjustment is necessary.

Focus Control.

If the focus control will not focus accurately it may be due to the fact that the coil is not in the correct position on the tube neck. The whole coil can be moved on the supporting frame by slackening the bolts at the side.

This is correctly adjusted when the set leaves the factory and should only require attention when a new tube is fitted.

Brilliance.

Brilliance is controlled by the bias on the tube. There are two variable resistances for this purpose, R60 and R5, the latter being a pre-set.

If, under operating conditions, the white level is just too low with the set brilliance control advanced to maximum, the pre-set should be slightly adjusted.

Form Adjustment.

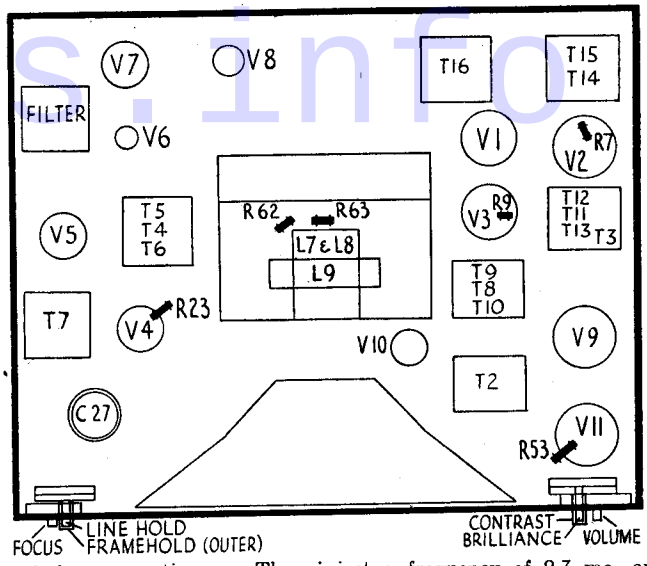
The line output waveform is controlled by a correction circuit on the line output transformer. This is adjusted by the manufacturers and should not normally require attention.

The resistance R12 is the variable element of the correction circuit. Should adjustment be necessary, this must be varied until the edge of the picture assumes a correct undistorted shape without tendency to fold or become extended.

Synchronising Adjustment.

As the set uses the "less negative" system, there is no pre-set datum line control, the natural line and frame speed controls being the adjustments of the set, that is R56 and R57.

Synchronising trouble is, then, only likely to be due to an obvious fault in the synchronising circuit or failure of the bonding on the screened lead to the gas relay grid.



This diagram of the top of the vision chassis shows the locations of the trimmers. Actually, the trimmers are vertical and on the sides of the cans. On the drawing they are given in correct top-to-bottom order on each can. T1 is under the chassis.

Alignment

As a safety precaution, before connecting the generator to the set, remove the EHT rectifier valve and carefully insulate and anchor the lead to the top cap. There is then no danger from EHT voltages.

When trimming the vision set two indicators may be used. An output meter can be connected between the anode of V7 and chassis through an isolating condenser. Alternatively, if the engineer is experienced and knows the trimming can be carried out with perfect safety with the EHT on and the CR tube operating, the tube itself can be used as an indicator. A modulated generator signal gives horizontal bands on the screen, the intensity of which is an indication of output.

Sound Channel.

As the frequencies are high, it is advisable to short the oscillator valve grid to chassis by a very short lead, or connect it to earth through a large condenser (0.1 mfd).

It is vitally important to use an accurately calibrated generator.

Tune the generator to 2.3 mc. and inject to the grid of V9. Adjust T1 and T2 for maximum.

Then inject a frequency of 2.3 mc. on the grid of V2 and adjust T1 for maximum.

Resonance should be determined with an output meter.

Vision Channel.

Inject at V5 grid a frequency of 4.6 mc. and adjust T4 and T5.

Change the frequency to 4 mc. and adjust the top coupling trimmer T6.

Inject at grid V4 a frequency of 4.81 mc. and adjust T7 for maximum.

Inject at grid V3 a frequency of 4.45 mc. and adjust T8 and T9.

Change the frequency to 3.88 and adjust the top coupling trimmer T10.

Inject at the grid of V2 a frequency of 4.28 mc. and adjust T11 and T12.

Change the frequency to 3.95 mc. and adjust top coupling trimmer T13.

Unshort the oscillator section and inject at V1 grid a frequency of 45 mc. and adjust T14 and T15.

It should be noted that no output will be obtained until the receiver oscillator tuning condenser is correctly adjusted for reception at 45 mc.

Connect the generator to the input terminals of the set and adjust T16.

Replacement Condensers.—Exact replacements available from A. H. Hunt, Ltd., are: for either C4, 6 or (vision chasis) 27, unit 3058, 9s. 6d.; for C2, 3055, 6s.; C1, 3053, 6s.; C15, 2915, 1s. 9d.; C16, 1955, 2s., and for C24 (vision unit), 2964, 1s. 10d.

(*Continued from page* 25)

Long Waves.—Tune set and oscillator to 1,300 metres (230 kc.) and adjust T9 and then T10 for maximum.

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

Repeat both operations until no further improvement results.

Short Waves.—Tune set and oscillator to 19 metres (15.7 mc.), screw T5 right up and then unscrew it until the second resonance point is obtained. Then adjust T6 for maximum.

The short wave padding is fixed and the trimming should be checked at 30 and 50 metres.

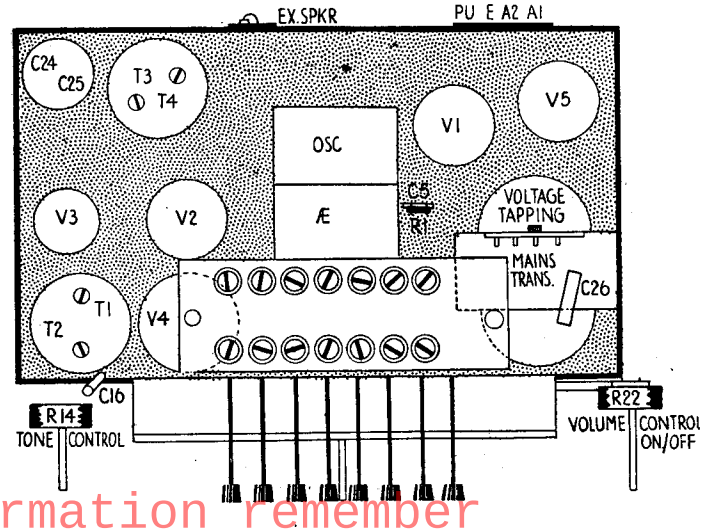
Push-button Adjustment

The push-button controls are located under a bakelite cover on the top of the cabinet.

The two rows of trimmers have an indicating plate showing the waveranges they cover. The medium band is divided into five groups, and there are two long-wave buttons. The row of trimmer adjustment screws nearer the front of the cabinet control the aerial circuit, and the back row the oscillator circuit.

To adjust a station on any particular button, the buttons are counted from the left and the appropriate number is found on the trimmer assembly. The back trimmer (oscillator) is then adjusted for resonance and the front trimmer adjusted for maximum output.

Ultra Push-Button 205



Top of chassis layout diagram of the 205 showing the positions of valves and other parts. The push-button trimmers are accessible through a panel on the cabinet top.