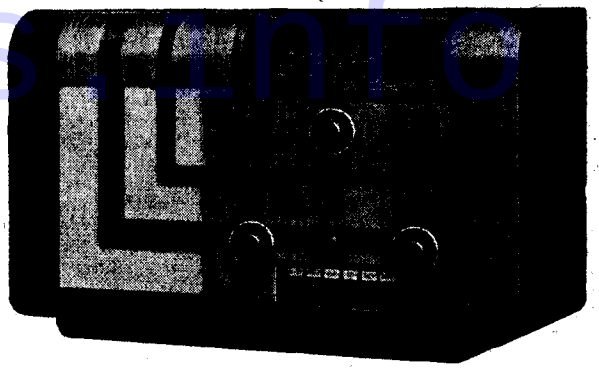
FERRANTI 515PB PUSH BUTTON



A four-valve plus rectifier receiver the Ferranti 515PB covers three wavebands and provides a choice of six stations by press buttons. A preset condenser system is utilised.

CIRCUIT.—The heptode frequency changer, V1, is fed by H.F. transformer coils on all wavebands, some of the transformers being iron cored. The press-tune coil has a further primary-secondary coupling in the form of C4.

A small neutralising capacity between the signal and oscillator grids is afforded by two insulated wires twisted together and connected between the aerial and oscillator sections of the gang. Wavetraps are included for the I.F. and also to prevent breakthrough of London National.

An I.F. transformer, tuned to 450 kcs., provides the coupling between V1 and the tetrode amplifier V2. The transformer has a wider band width characteristic when being used for the press-button range to compensate for slight variations in the oscillator trimmers. This is obtained by connecting a further small coupling coil and damping resistance in series with the transformer secondary winding.

A fixed band-width transformer effects the coupling to the demodulating diode load of V3, a double diode triode. The rectified potentials are fed to the grid of the triode section *via* a gram-radio switch, coupling condenser and a manual volume control.

The other diode provides a D.C. potential utilised to feed the automatic volume

QUICK TESTS

Quick tests are available on the leads to the speaker panel. Volts measured between these and the chassis should be:—

Blue lead, 350 volts, unsmoothed H.T.
Red lead, 280 volts, smoothed H.T.
Green leads, 270 volts, smoothed H.T.

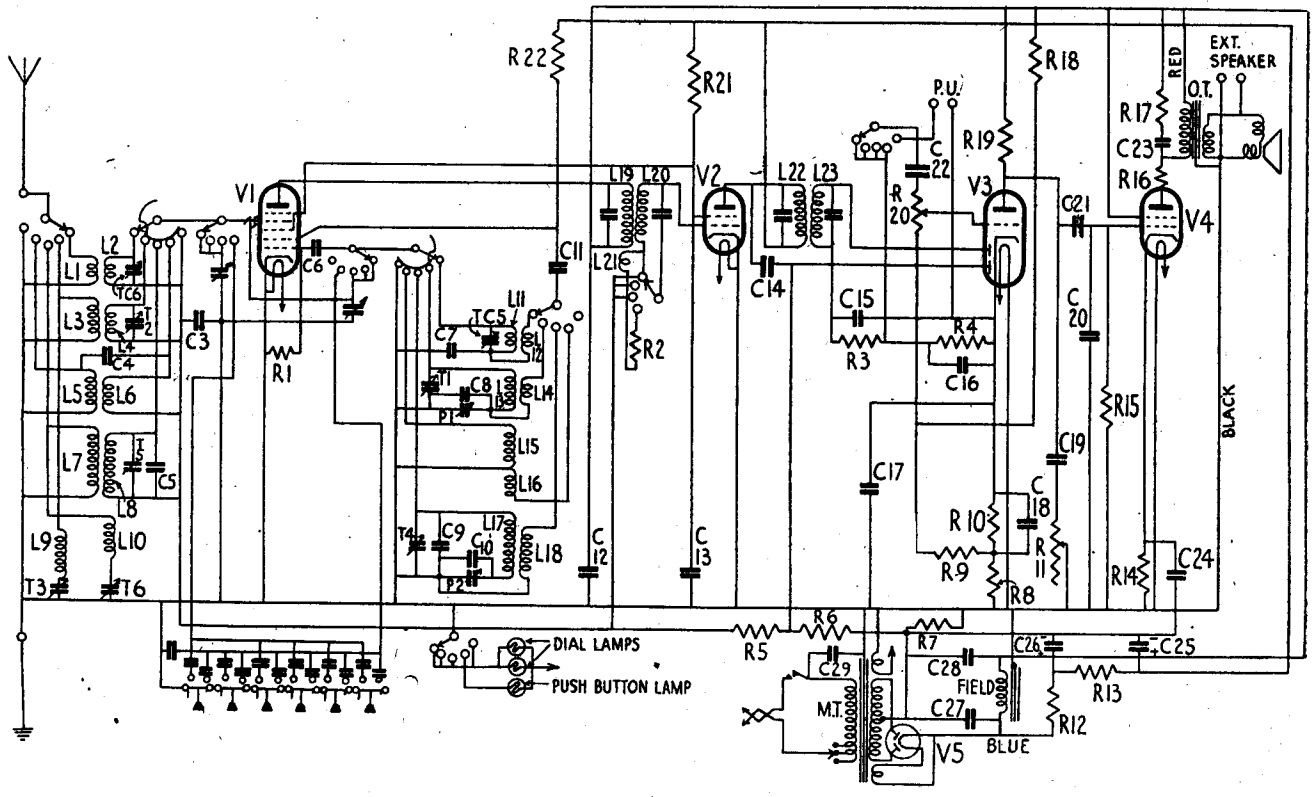
VALVE READINGS

No signal. Volume maximum. M.W. min. cap. 200 volt A.C. mains.

V.	Type.	Electrode.	Volts.	Ma.
1	6A86 or X63 ..	Anode ..	280	3
		Screen ..	65	3.6
		Osc. anode	150	4.2
2	6K7Gor KTW63	Anode ..	280	5
		Screen ..	65	1
3	6Q7G or DH63	Anode ..	70	1
4	6F6G or KT63	Anode ..	270	32
		Screen ..	280	5
5	U50 or 5Y3G	Heater ..	350	—

RESISTANCES

R.	Purpose.	Ohms.
1	Osc. grid leak.	50,000
2	I.F. correction resistance ..	50
3	H.F. stopper	100,000
4	Demodulating diode load ..	500,000
5	A.V.C. decoupling	2 meg.
6	A.V.C. diode load	2 meg.
7	A.V.C. delay	50
8	V3 cathode bias (part) ..	1,000
9	Hum balancing	250
10	V3 cathode bias (part) ..	10,000
11	Tone control	500,000
12	V1 and V2 H.T. decoupling. .	10,000
13	V1 and V2 H.T. decoupling. .	10,000
14	V4 cathode bias	450
15	V4 grid leak	500,000
16	V3 anode stabiliser	100
17	Tone modifier.	20,000
18	H.T. bleeder	20,000
19	V3 anode load	250,000
20	Volume control	1 meg.
21	V1 and V2 screens decoupling	40,000
22	Oscillator anode load ..	10,000



The circuit of the 515PB is entirely conventional, with the addition of the preset condensers and the push-button switch bank—shown in the lower left-hand corner.

control circuit to V1 and V2. Tone control is obtained from a condenser and variable resistance connected in series between the anode of the triode and chassis.

V3 is resistance capacity coupled to the output valve V4, a tetrode. Fixed tone modification is afforded by R17 and C23 connected across the primary of the speaker transformer.

Mains equipment consists of a mains transformer, a full-wave rectifying valve V5, electrolytic smoothing condensers and a smoothing choke (the speaker field). A mains suppressor condenser is connected between one side of the mains and earth.

Chassis Removal.—Remove the back and the four-spring fixed control knobs. Remove the four chassis-securing bolts from the base.

The chassis may then be withdrawn to the extent of the leads to the speaker panel and is fully accessible for service.

To obtain access to the portion of the chassis covered by the trimmer unit it is necessary to remove the two screws securing this to the front of the chassis. The unit can then be swung on its three connecting wires away from the chassis.

Special Notes.—A pair of sockets on the speaker panel are for operating a low-impedance extension speaker.

A pair of sockets at the rear of the chassis are for connecting a pick-up.

The two bulbs illuminating the wavelength scale and the bulb illuminating the push-button station names panel are rated at 6.5 volts, .3 amp., and are Osram bulbs type "S" with M.E.S. bases.

The mains adjustment device located on the mains transformer takes the form of three tags with indications of voltage values.

R2 is mounted inside I.F.T.1 and R3, R4, C15 and C16 are inside I.F.T.2.

Alignment Notes

I.F. Circuits.—Set volume to maximum, pointer to 200 metres, wavelength switch to L.W. band and tone to "high."

Connect an output meter across the primary of the speaker transformer and a service oscillator between the top grid cap of V1 (*via* a .05 mfd. condenser) and chassis.

Tune oscillator to 450 kcs. and

(*Continued on page* 19.)

CONDENSERS

C.	Purpose.	Mfds.
3	A.V.C. decoupling	.05
4	Top coupling P.B. coil	.00001
5	L.W. aerial fixed trimmer	.00005
6	Osc. grid	.0001
7	S.W. osc. padder	.004
8	M.W. osc. fixed padder	.0004
9	L.W. osc. fixed trimmer	.0001
10	L.W. osci. fixed padder	.00015
11	Osc. anode coupling	.001
12	H.T. line bypass	.1
13	V1 and V2 screen decoupling	.1
14	A.V.C. diode coupling	.00005
15	H.F. bypass	.00015
16	H.F. bypass	.00015
17	V3 cathode bias shunt (part)	.05
18	V3 cathode bias shunt (part)	6
19	Tone control	.005
20	V4 grid shunt	.0004
21	L.F. coupling	.02
22	L.F. coupling	.02
23	Tone modifier	.01
24	V4 cathode bias shunt	50
25	V1 and V2 H.T. line decoupling.	4
26	V1 and V2 H.T. line decoupling.	4
27	H.T. smoothing	12
28	H.T. smoothing	12
29	Mains suppressor	.002

WINDINGS

L.	Ohms.	Range.	Where measured.
1	.2	S.W.	Aerial socket and chassis.
2	2.5	S.W.	Top grid V1 and R5.
3	36	M.W.	Aerial socket and chassis.
4	7.4	M.W.	Top grid V1 and R5.
5	84	Auto	Aerial socket and chassis.
6	6	Auto	Top grid V1 and R5.
7	66	L.W.	Aerial socket and chassis.
8	30	L.W.	Top grid V1 and R5.
9	34	M.W.	Aerial socket and T3.
10	5	L.W.	Aerial socket and T6.
11	.2	S.W.	C6 and C7.
12	.7	S.W.	C11 and C7.
13	6.3	M.W.	C6 and P1.
14	1.3	M.W.	C11 and P1.
15	6.3	Auto	C6 and chassis.
16	7.7	Auto	C11 and chassis.
17	14.7	L.W.	C6 and P2.
18	3.7	L.W.	C11 and chassis.
19	10.7	—	Anode V1 and C12.
20	11	—	Top grid V2 and R5.
22	10.7	—	Anode V2 and C12.
O.T. prim.	250	—	Red and green leads speaker panel.
M.T. prim. (200v.)	33	—	Mains plug pins.
Field	1,000	—	C27 and C28.

Ferranti 515PB on Test

MODEL 515PB.—For A.C. mains, 200-270 volts, 40-100 cycles. Price, 15½ gns.

DESCRIPTION.—Four-valve, plus rectifier, three-waveband superhet with Prestune automatic push-button tuning.

FEATURES.—Full-vision scale, calibrated in metres and station names, coloured as to waveband and traversed by a vertical pointer. Controls for combined volume and master switch, concentric manual tuning, tone and combined wave-selection, gram. and Prestune switch. Choice of four medium wave and two long wave stations automatically "Prestuned." Speaker at side of chassis. Socket for pick-up and extension speaker.

LOADING.—68 watts.

Sensitivity and Selectivity

SHORT WAVES (16.7-51 metres).—Excellent gain and selectivity, with easy handling and well maintained performance.

MEDIUM WAVES (200-550 metres).—Very good gain and adequate selectivity, with local stations spreading on adjacent channels only. Good background.

LONG WAVES (1,000-2,000 metres).—Adequate sensitivity. All main stations easily received.

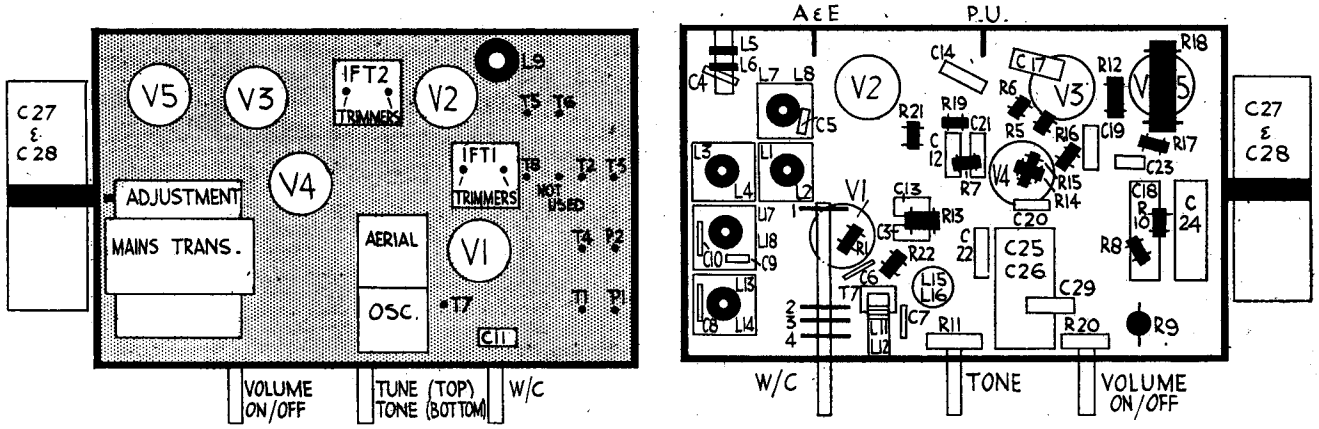
Acoustic Output

Ample volume for an ordinary room. Little colouration on speech and a well balanced output giving pleasing orchestral and general musical reproduction.

Push-button Notes

The push-button selector mechanism works satisfactorily and all stations selected are accurately tuned and did not show any appreciable drift during our test.

REPLACEMENT units available from A. H. Hunt, Ltd., are: for C27 and C28, 4,244, 8s. 6d.; C25 and C26, 3,633, 4s. 6d.; C24, 1,918, 1s. 9d.; and C18, 3,722, 1s. 6d.



These diagrams permit identification of all the components on the 515PB chassis. The trimmers are accessible from above—see top-of-chassis diagram on left.

Marconiphone 858 Four-band Six

(*Continued from page* 15.)

Signal Circuits.—With the gang at maximum the pointer should register exactly on the small mark just below the L.W. calibration on the right-hand end of the scale.

Connect the service oscillator to the A. and E. sockets. Only feed sufficient input to obtain reliable peaks in the output meter and progressively reduce the input as the circuits come into line. Remove short circuit from oscillator section gang.

Long Waves.—Turn gang to maximum, tune service oscillator to 725 metres (13.8 kcs.) and adjust T5 for maximum response.

Set service oscillator to 850 metres (352.9 kcs.), tune in on receiver and adjust T6 and T7 for maximum response.

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

Return to 725 metres and check setting of T5.

Medium Waves.—With gang at maximum and service oscillator tuned to 195 metres (1,538.5 kcs.) adjust T8 for maximum response.

Set service oscillator to 210 metres (1,428.6 kcs.), tune in on receiver and adjust T9 then T10 for maximum response.

Set oscillator to 530 metres (566 kcs.), tune in on receiver and adjust P2 for maximum, simultaneously rocking the gang.

Return to 195 metres and check setting of T8.

Short Wave 1 (30-90 metres).—With gang at maximum and service oscillator tuned to 30 metres (10 mcs.), adjust T11 for maximum.

Set oscillator to 32 metres (9.38 mcs.), tune in on receiver and adjust T12 and then T13 for maximum.

If L9 has been replaced, tune service oscillator to 86 metres (3.88 mcs.), tune in on receiver and adjust loop of wire joining C7 to coil tag for maximum output at the same time rocking the gang.

Return to 30 metres and check setting of T11.

Short Wave 2 (13-30 metres).—The trimmers of this band are adjusted from the top of the chassis by slackening the hexagonal lock-nut sufficiently for the rod to be moved up or down with a piece of bent wire. After adjustment the hexagonal nuts should be tightened.

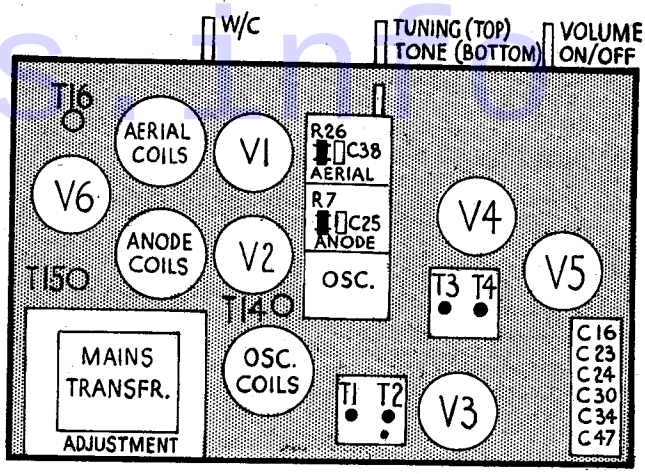
With gang at maximum and service oscillator tuned to 13 metres (23.08 mcs.), adjust T14 for maximum.

Set oscillator to 14 metres (21.43 mcs.), tune in on receiver, and adjust T15 and then T16 for maximum, simultaneously rocking the gang.

If L22 has been replaced, set oscillator to 30 metres (10 mcs.), tune in on receiver and adjust loop of L22 for maximum, simultaneously rocking the gang.

WINDINGS (D.C. Resistances)

L.	Ohms.	Range.	Where measured.
1	0.1	S.W.1	Aerial gang and chassis.
2	5.5	M.W.	Aerial gang and chassis.
3	16	L.W.	Aerial gang and chassis.
20	Very low	S.W.2	Aerial gang and chassis.
5	0.1	S.W.1	Fixed vane gang and H.F. V.T. target.
6	5.5	M.W.	Fixed vane gang and H.F. V.T. target.
7	16	L.W.	Fixed vane gang and H.F. V.T. target.
21+R27 ..	1,000	S.W.2	Fixed vane gang and H.F. V.T. target.
9	Very low.	—	Across ends.
10	5.2	—	Across ends.
11	5.5	—	Across ends.
22	Very low.	—	Across ends.
12	1.4	S.W.1	Across ends.
13	1.8	M.W.	Across ends.
14	4.5	L.W.	Across ends.
23	0.2	S.W.2	Across ends.
16	4	—	Anode V2 and V.T. target.
17+R7 ..	4	—	Across ends.
18	4	—	Across ends.
O.T. prim.	450	—	Across ends.
Field ..	1,600	—	Across ends.



The top-of-chassis layout diagram for the Model 858 identifying valves and other components. Some trimmers have to be adjusted from above and some from below.

(*Continued from page* 13.)

Ferranti Push-button Alignment

adjust the trimmers of the second I.F. transformer and then the first I.F. transformer for maximum response, reducing the input from the service oscillator as the circuits come into line.

Signal Circuits.—Connect the service oscillator to the aerial and earth sockets *via* a dummy aerial. Only feed sufficient input to obtain reliable peaks in the output meter and progressively reduce the input as the circuits come into line.

Medium Waves.—With gang at minimum, tune service oscillator to 200 metres (1,500 kcs.) and adjust T1 for maximum.

Tune set and oscillator to 228 metres (1,315 kcs.) and adjust T2 for maximum.

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

With gang at maximum, tune service oscillator to 450 kcs. and adjust T3 for *minimum* response.

Now repeat the complete M.W. alignment at 200, 228 and 500 metres and then finish at 200 metres.

Long Waves.—Tune set and oscillator to 1,128 metres (266 kcs.) and adjust T4 and T5 for maximum.

Tune set and oscillator to 1,807 metres (166 kcs.) and adjust P2 for maximum simultaneously rocking the gang for maximum output.

Tune set and oscillator to 1,200 metres, inject a 261-metre (1,149 kcs.) signal and adjust T6 for *minimum* response.

Then repeat 1,128 and 1,807 metres alignment

Short Waves.—With gang at maximum, tune service oscillator to 18 mcs. (approx. 16.6 metres), screw T7 right up and then unscrew until the second peak (lowest capacity) is heard.

Tune set and oscillator to 20 metres (15 mcs.) and adjust T8 for maximum.

The short-wave padding is fixed, but check calibration throughout the range covered.

Push-button Alignment

TO re-align the push buttons, connect an aerial and earth system to the receiver, turn the wave-selection switch to press-button tuning. The press-button panel will then be illuminated.

Press a button and adjust the oscillator trimmer to tune in the station spot on. Then adjust the corresponding aerial trimmer for maximum sensitivity and volume. The chassis must be removed from the cabinet for adjustment of the aerial trimmers.

The chassis may then be replaced in the cabinet and, if necessary, the oscillator trimmers, which, accessible underneath the chassis from the rear of the cabinet, may be readjusted in case they have moved whilst replacing the chassis.

It will not always be found necessary to adjust the aerial trimmers as the oscillator trimmers are the most likely to drift.

To change the stations of the push-buttons it will be necessary sometimes to change the fixed condensers connected across the oscillator and aerial trimmers. If a press-button will not tune in the new station required, replace the condensers according to the wavelength required (see table).