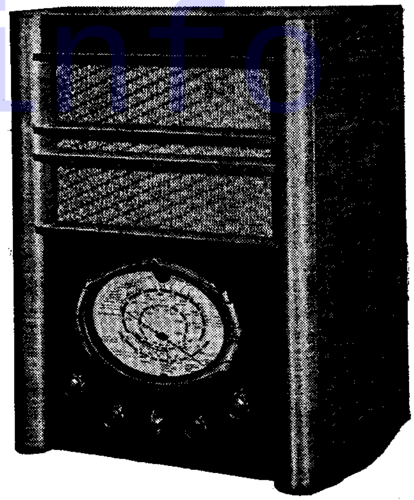
BURNDEPT 290 FOUR-BAND EIGHT



The Burndept 290 is a seven-valve, plus rectifier and tuning indicator, receiver with push-pull output.

CIRCUIT.—V1 is an injection H.F. pentode, the injection grid of which is fed from a separate oscillator valve, V2. Coupled aerial circuits are selected by a double ganged switch, controlling separate aerial and tuned windings on the four wave bands.

V2, the oscillator, is a triode and the anode circuit is coupled to the injection grid of V1 by a condenser and a load resistance.

The arrangement of V3, the I.F. valve, is orthodox, coupling being by trimmer tuned transformers. The secondary of I.F.T.2 works into V4, a double diode triode, there being a tapping for the diode connection.

A.V.C. is obtained by a separate diode with a conventional network and the control voltage is applied to the grid returns of V1 and V3. A resistance capacity filter precedes the signal diode load, and the low frequency voltages are passed through a coupling condenser and grid leak, in the

RESISTANCES

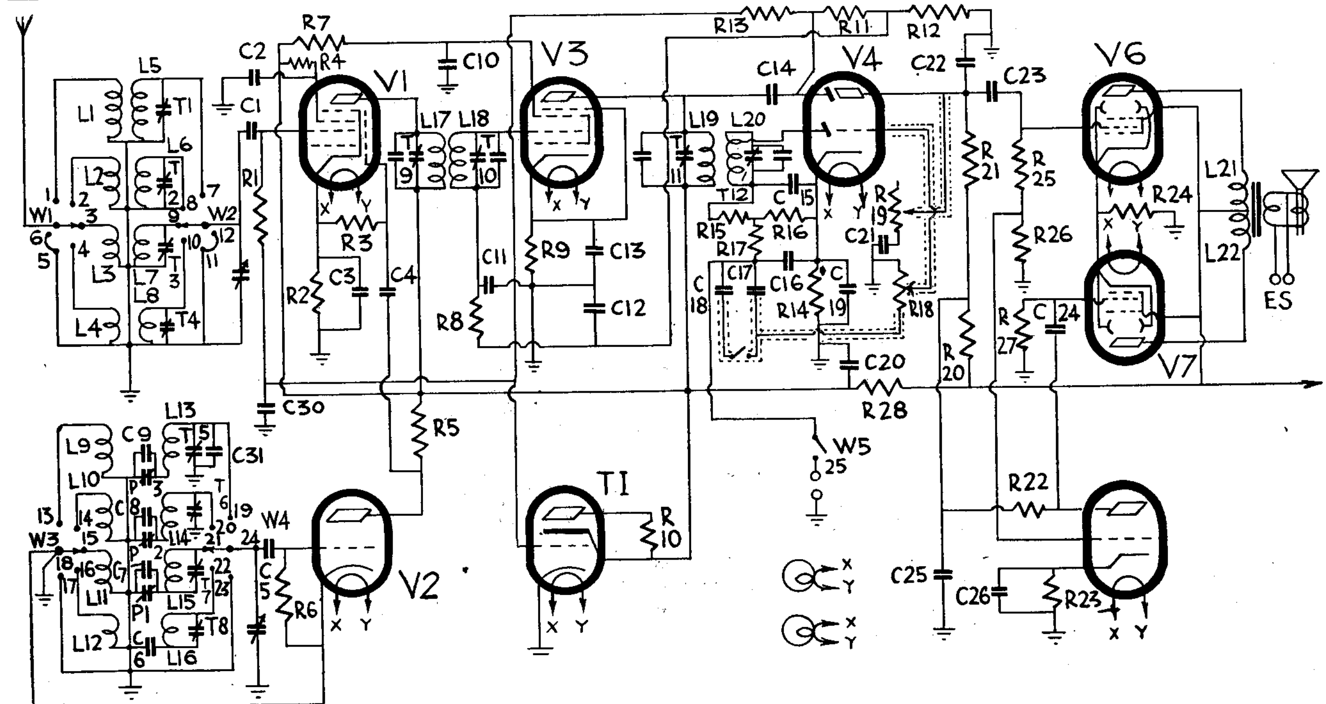
R.	Purpose.	Ohms.
1	V1 grid feed	500,000
2	V1 cathode bias	300
3	V1 injector grid return	50,000
4	V1 screen decoupling	30,000
5	V2 anode load	5,000
6	V2 grid leak	50,000
7	V3 screen decoupling	50,000
8	V3 A.V.C. decoupling	100,000
9	V3 cathode bias	250
10	Tuning indicator feed	1 meg.
11	A.V.C. diode load (part)	1 meg.
12	A.V.C. diode load (part)	500,000
13	V1 A.V.C. decoupling	1 meg.
14	V4 cathode bias	2,000
15	Demodulator diode (part)	250,000
16	Demodulator diode (part)	250,000
17	H.F. filter	50,000
18	Volume control	500,000
19	Tone control	250,000
20	V4, V5 anode decoupling	20,000
21	V4 anode load	100,000
22	V5 anode load	50,000
23	V5 cathode bias	2,500
24	V6 and V7 cathode bias	200
25	V6 grid potr. (part)	250,000
26	V6 grid potr. (part)	250,000
27	V7 grid leak	250,000
28	H.T. line decoupling	1,500

CONDENSERS

C.	Purpose.	Mfds.
1	V1 grid isolating	.0001
2	V1 screen decoupling	.1
3	V1 cathode bias shunt	.1
4	V1 injection grid	.0001
5	V2 grid	.0001
6	S.W.1 fixed padder	.009
7	S.W.2 fixed padder	.001
8	M.W. fixed padder	.0005
9	L.W. fixed padder	.0001
10	V3 screen decoupling	.1
11	V3 A.V.C. decoupling	.05
12	A.V.C. decoupling	.05
13	V3 cathode bias shunt	.1
14	A.V.C. decoupling	.0001
15	H.F. bypass	.0001
16	H.F. bypass	.0001
17	V4 L.F. coupling (treble)	.0005
18	V4 L.F. coupling (bass)	.02
19	V4 cathode bias shunt	25
20	H.T. line decoupling	.25
21	Tone control	.01
22	V4 anode shunt	.0005
23	V6 grid coupling	.1
24	V7 grid coupling	.1
25	V4 and V5 anode decoupling	4
26	V5 cathode bias shunt	25
27	Mains filter	.01
28	H.T. smoothing	8
29	H.T. smoothing	16
30	V1 A.V.C. decoupling	.05
31	L.W. osc. fixed trimmer	.00004

VALVE READINGS

V.	Type.	Electrode.	Volts.
1	6L7G	Anode	248
		Screen	120
2	6C5G	Anode	130
3	6K7G	Anode	248
		Screen	120
4	6Q7G	Anode	140
5	6C5G	Anode	125
6	6L6G	Anode	268
		Screen	280
7	6L6G	Anode	268
	(All above are Mullard).	Screen	280
8	5V4G (Brimar)	Heater	305
	Tuning indicator 6G5 (Mullard)		
	Pilot lamp, Vita B M.E.S.		6.5 volts 500 m.a.



form of a volume control, to the triode portion of V4. A switch provides alternative coupling condensers so that the bass response can be controlled.

Two valves are used in the output stage, V6 and V7 working in push-pull. These are beam power tetrodes. The anode circuit of V4 is resistance coupled to V6. V7 is fed by resistance coupling through V5, a paraphase valve designed to give unity gain.

V8, a full-wave rectifier, derives the high-tension current through the usual mains transformer, the primary circuit of which has a mains filter. Finally, mention must be made of the cathode-ray tuning indicator which is fed from the A.V.C. line through part of the decoupling network.

Chassis Removal.—For small adjustments there is a removable panel at the base of the cabinet. For major service work, complete removal of the chassis is easily effected by unscrewing the five knobs on the front and releasing the four retaining bolts.

When it is necessary to remove the speaker this can be done by unscrewing the four retaining nuts. Six leads connect the chassis with the speaker, these being colour coded. With the speaker mounted in its correct position with the transformer on the right, when viewed from the back of the cabinet, the correct order of leads is: green, yellow, red, blue, brown and black.

Special Notes.—The circuit shows for the second short wave band a fixed and variable padder condenser connected in shunt. The fixed condenser, C7, actually takes the form of half a double trimmer on a ceramic base. For adjustment either half of the trimmer can be used, but it is no doubt preferable to leave one section fully screwed up and simply carry out the padding operation with the other.

A practice which is now very general is that of incorporating the anode feed re-

(*Continued on page* 9)

Burndept 290 on Test

Model 290.—For A.C. operation, 200-260 volts, 50-100 cycles. Price, 13 gns.

Description.—Seven-valve, plus rectifier and tuning indicator, four-band superhet with manual control.

Features.—Controls for tuning, wave selection, tone, volume combined with master switching, and bass. Aeroplane type pointer working on colour-marked full-vision scale calibrated in wavelengths and names. Two pilot lights and inset magic eye C.-R. tuning indicator. Push-pull output with beam valves. Sockets for speaker, pick-up, aerial and earth.

Loading.—100 watts.

Sensitivity and Selectivity

Short Waves (13.5-51 and 50-180 metres).—Excellent gain on both bands, with a quiet background and well maintained sensitivity. Easy handling, with no drift.

Medium Waves (175-580 metres).—Very satisfactory gain and selectivity. Local stations spread on adjacent channels only. Very clean background.

Long Waves (750-2,000 metres).—Excellent gain and selectivity, with practically no interference on Deutschlandsender.

Acoustic Output

Ample volume for a very large room without overloading. Tone is crisp and clean, with good attack, and the medium and low registers radiate very well without any marked resonances. The tone control is not too vigorous in action and the "base-treble" switch is a very useful adjunct of particular value on the long waves.

QUICK TESTS

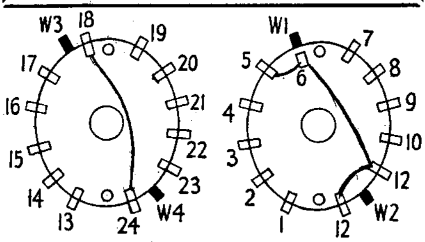
Quick tests are available on this receiver between the chassis and the following leads on the speaker strip:—

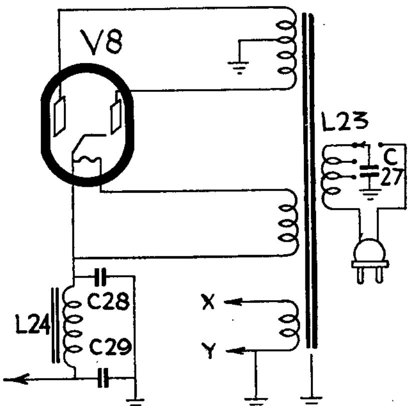
Chassis and red, 280 V., smoothed H.T.

Chassis and yellow or blue, 268 V., V6 or V7 anode.

WINDINGS (D.C. Resistances)

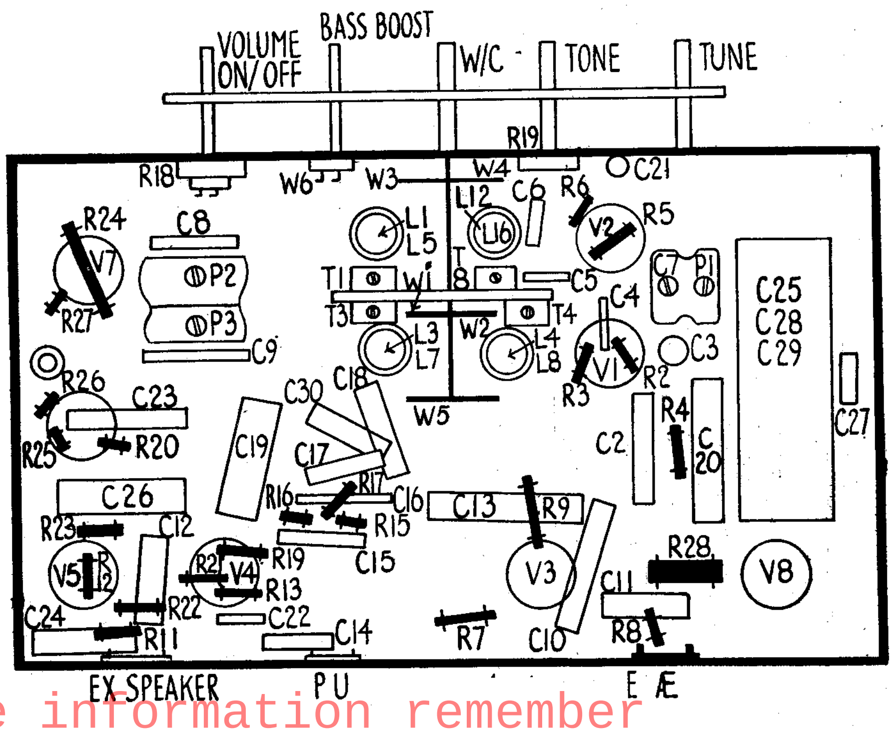
L.	Ohms.	Range.	Where measured.
1	101	L.W.	Aerial and E.
2	1.2	M.W.	Aerial and E.
3	.3	S.W.2	Aerial and E.
4	.6	S.W.1	Aerial and E.
5	9	L.W.	Input gang and E.
6	2.2	M.W.	Input gang and E.
7	.3	S.W.2	Input gang and E.
8	Very low	S.W.1	Input gang and E.
9	1.5	L.W.	W 3. and E.
10	63	M.W.	W.3 and E.
11	41	S.W.2	W.3 and E.
12	.5	S.W.1	W.3 and E.
13	4.8	L.W.	Osc. gang and P3.
14	5.7	M.W.	Osc. gang and P2.
15	.3	S.W.2	Osc. gang and P1.
16	Very low	S.W.1	Osc. gang and C6.
17	5	—	V1 anode and (R28+C20).
18	5	—	V3 grid and (R8+C11).
19	4.6	—	V3 anode and (R28+C20).
20	2.9	—	V4 demod. diode and (R15 + C15).
21	121	—	V6 anode and positive H.T.
22	105	—	V7 anode and positive H.T.
23	14	—	Mains plug.
24	207	—	V8 heater and R28.





The circuit, which is divided only for presentation reasons, contains a separate oscillator (V2) and L.F. arrangements include a paraphase valve. Above are the switch banks excluding the simple W5 wafer.

Components below the chassis are identified by the diagram on the right. The top "deck" layout is on page 9.



Burndept 290 Four-band Eight

(Continued from page 3.)

sistor of the tuning indicator inside the cover of the socket. This is actually adopted in this set with R10.

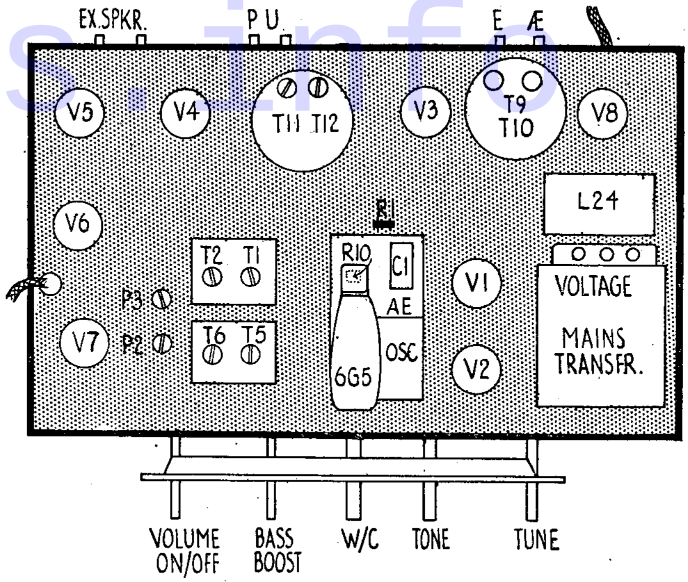
Attention is drawn to the fact that V5 is a paraphase amplifier and should, therefore, have no gain, simply giving a unity transference of voltage. The amplification is controlled by the grid potentiometer, R25 and R26, in the grid circuit of V6.

It should be noticed that the common cathode resistor of V6 and V7 has no by-pass condenser. Such an arrangement produces a certain amount of negative feed-back effect.

As the demodulator diode is tapped down on the winding of I.F.T.2, it is not possible to measure the full resistance of the winding without opening the can. This accounts for the marked difference in the resistance of the primary and secondary windings shown in the table.

Wave-change Switches.—The switching arrangements are very simple. One wafer provides for the oscillator circuits and this will be found nearest to the side of the chassis. The next wafer carries the contacts for the tuned and untuned aerial circuit windings.

The radiogram switch is fitted on a separate wafer which carries the two contacts and will readily be distinguished. The switch providing for bass boost has a separate control shaft and is bolted against the side of the chassis.



The top-of-chassis layout diagram for the model 290. Most, but not all, trimmers are accessible from above.

Circuit Alignment Notes

I.F. Circuits.—The signal generator should be set to 473 kc., and its output connected between the control grid of VI and the earth line, with a .25 megohm resistance connected between control grid and chassis. Short circuit the oscillator section of the gang condenser. Connect an output meter to the receiver.

Trim the secondary circuit of I.F.T. 2 (T12), following up with the primary circuit (T11). Then trim I.F.T. 1 secondary (T10) and primary (T9) for maximum response. As the circuits come into line reduce the oscillator output to keep below the point at which the A.V.C. functions.

Signal Frequency Alignment.—Connect the signal generator to the A. and E. sockets. Each band should be aligned in turn, commencing with the long waves and working progressively to the first short-wave band.

Long Waves.—Tune the receiver and oscillator to 750 metres and adjust T5 for maximum response, and then T1.

Tune signal generator and receiver to 2,000 metres. Adjust P3 while rocking the gang.

Re-trim the set at 750 metres, and check the padding operation at 2,000 metres, repeating the process until the trimming has little effect on the padding and *vice versa.*

Medium Waves.—The procedure on this band is identical with that on the long. The set is trimmed at 200 metres with T6 and T2, and the padding is carried out with P2 at 550 metres.

Short Waves.—The S.W.2 band is trimmed and padded as in the previous cases. Trimming is carried out at 50 metres with the oscillator trimmer, T7, and the input trimmer, T3. Padding is adjusted at 170 metres with P1.

On the S.W.1 band there is no padding. Trimming is by T8 on the oscillator and T4 on the input at 13.5 metres.

On this band, trimming is exceedingly critical, and great care should be taken to see that the pressure of the trimming tool is not affecting the process. Care should be taken to get the right channel or calibration and performance will not be good. The first tuning point on the trimmer is the correct one. On this band a 30 to 40 mmfd. condenser is preferable to the normal dummy aerial.

Replacement Condensers

EXACT replacement condensers are available for the 290 from A. H. Hunt, Ltd., Garratt Lane, Wandsworth, London, S.W.18. These are: For the block containing C29, C28 and C25, unit 4147, price 9s. 6d., and for either C19 or C26, unit 2915, 1s. 9d.

Engineer's Tips

AN F.C.4 valve was put into a Philips set and worked perfectly for some days. Then the set was brought back with a complaint of intermittent working on the lower end of the M.W. scale.

Testing the valve with an analyser gave results as O.K., and trying it in another type of set for a short period was successful.

Putting it back in its own set gave bad results as before, and thinking the set was at fault, the engineer checked the alignment and other factors—which were all correct.

Trying, as a matter of interest, 10 other F.C.4 valves in the set, all gave perfect results, and a long soak test with one of these was successful.—F. DAY-LEWIS, Dublin.

HERE is a hint which will save time when confronted with a receiver exhibiting intermittent reproduction. If it is fitted with a shadowgraph or cathode-ray tuning indicator, this device will enable you to determine whether the cause of the trouble is in the H.F. or L.F. circuits of the receiver.

If the fault is in the H.F. portion, the tuning indicator will vary in sympathy with the fading; while if the fault lies in the L.F. part of the set, the tuning indicator will not be affected and will remain constant during the periods of "fading" or intermittent reception.

A signal to work with may be provided by an oscillator, varying the strength of the output to see whether that will provoke the trouble if it is not present immediately the receiver has warmed up.—L. W. S., Southall.

FOR cases of instability, probably caused by open decoupling condensers, it is useful to have one or two condensers of suitable average values ready wired to test leads.

Substitution Method

All you have to do with a faulty set is to methodically locate each decoupling condenser, starting from the aerial end, and apply a flying lead of the test condenser to the side of the decoupling condenser which is connected to its associated decoupling resistance. The other condenser lead is "permanently" tapped to chassis.

When an application of the test lead stops the trouble the decoupling condenser at that point may be strongly suspected and taken out for a thorough examination or another substituted.