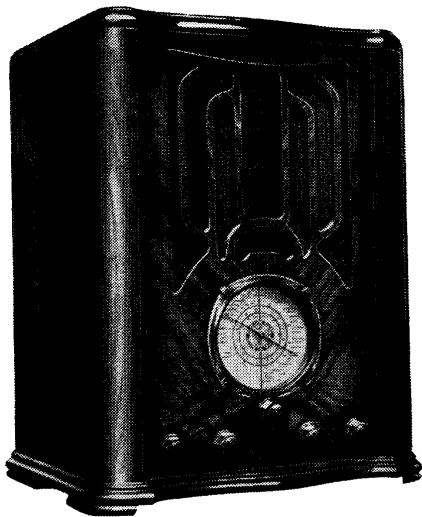


SERVICE ENGINEER

FERGUSON MODEL 378 UNIVERSAL



CIRCUIT.—A seven-valve superhet for operation on either A.C. or D.C. mains and working on long, medium and two short wavebands.

An inductively coupled band-pass filter couples the aerial to the grid of V1, an H.F. pentode, on medium and long waves. On the short wave ranges a single tuned circuit comes into operation.

A further set of inductively coupled coils is used to pass the signal to V2, the frequency changer, a tuned circuit being used on short waves as before.

Coupling to V3, an H.F. pentode, is through an I.F. transformer, tuned to 465 kc. A second I.F. transformer is used

to couple this valve to V4, a double diode triode.

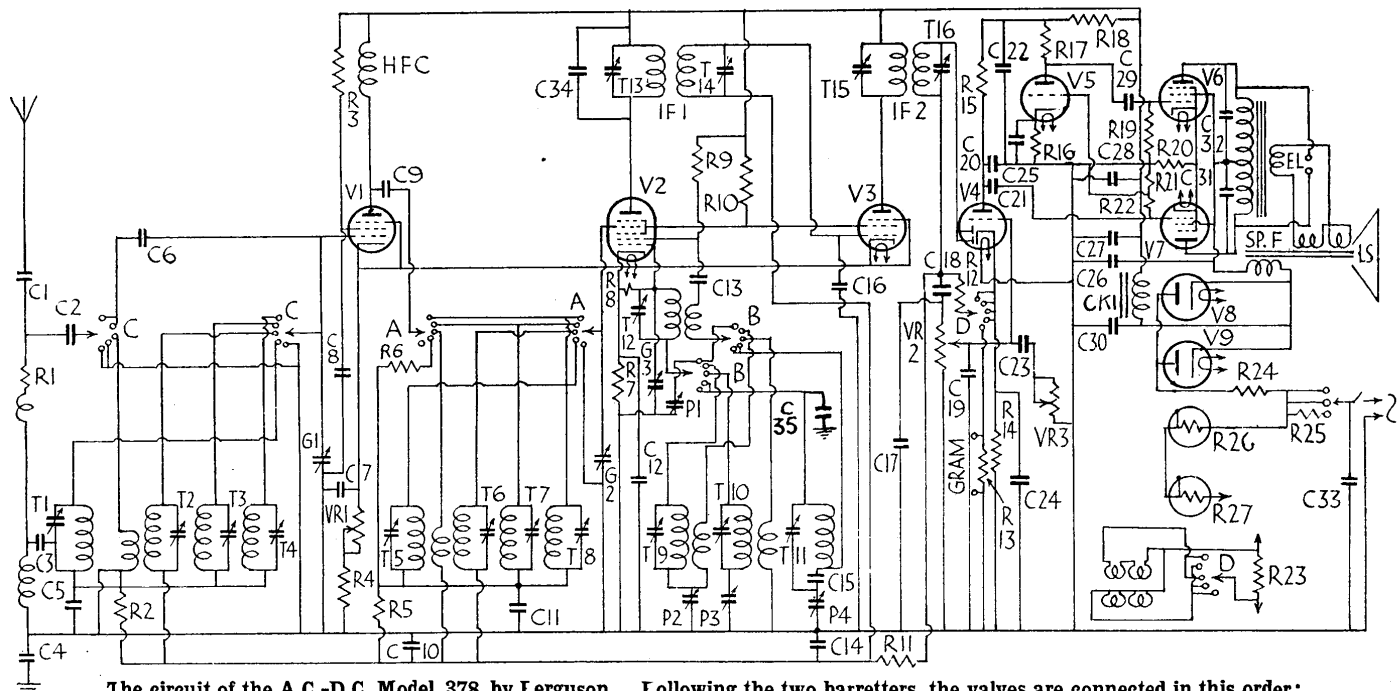
The diodes of V4 are strapped and used for both demodulation and A.V.C., the bias generated being fed to the preceding valves in the orthodox manner.

The volume control, VR2, operates by varying the input to the grid of V4. Tone

Description and alignment notes continued on next page.

RESISTANCES		
R.	Purpose.	Ohms.
1	Aerial series	2,500
2	V1 A.V.C. decoupling	500,000
3	V1 screen decoupling	100,000
4	V1 and V3 cathode bias	200
5	V2 A.V.C. decoupling	500,000
6	Long-wave anode shunt	50,000
7	V2 cathode bias	500
8	V2 osc. grid leak	50,000
9	V2 osc. anode load	25,000
10	V2 and V3 screen decoupling	50,000
11	V3 A.V.C. decoupling	250,000
12	Diode load	250,000
13	Pick-up shunt	25,000
14	V4 cathode bias	10,000
15	V4 anode load	250,000
16	V5 cathode bias	100,000
17	V5 anode load	250,000
18	V5 anode decoupling	10,000
19	V6 grid leak	500,000
20	V6 and V7 cathode bias	300
21	V7 grid leak ptr.	50,000
22	V7 grid leak ptr.	500,000
23	Dial light shunt	50
24	Voltage dropper	50
25	Voltage dropper	1,000
26	Voltage dropper	185
27	Voltage dropper	185

CONDENSERS		
C.	Purpose.	Mfds.
1	Aerial isolating	.01
2	Aerial feed	.00025
3	Long-wave aerial feed	.01
4	Chassis isolating	.01
5	V1 A.V.C. decoupling	.002
6	V1 grid (s. waves)	.00005
7	V1 cathode bias shunt	.1
8	V1 screen decoupling	.1
9	H.F. coupling	.00025
10	V2 A.V.C. decoupling	.1
11	V2 A.V.C. decoupling	.002
12	V2 cathode bias shunt	.1
13	V2 osc. anode feed	.00025
14	V3 A.V.C. decoupling	.1
15	Long-wave osc. padding	.00025
16	V2 and V3 screen decoupling	.1
17	H.F. by-pass	.00025
18	L.F. coupling	.01
19	H.F. by-pass	.00025
20	V4 anode decoupling	.001
21	L.F. coupling	.01
22	V4 and V5 anode decoupling	.1
23	Tone control	.01
24	V4 cathode bias shunt	.25
25	V5 cathode bias shunt	.5
26	H.T. smoothing	.20
27	H.T. smoothing	.20
28	H.T. shunt	.1
29	L.F. coupling	.01
30	H.T. smoothing	.20
31	Pentode compensating	.002
32	Pentode compensating	.002
33	Mains suppressor	.01
34	I.F. shunt	.00005
35	L.W. osc. trim.	.000025



The circuit of the A.C.-D.C Model 378 by Ferguson. Following the two barretters, the valves are connected in this order: V9, V8, V7, V6, V1, V2, V3, V5, V4, and so to earth. Pilot lamps are connected between V6 and V1.

FERGUSON 378 UNIVERSAL

(Continued from previous page.)

is also controlled in the grid circuit by VR3.

The L.F. output of V4 is fed to V5 and V7, through a resistance and capacity stage. V7 is an output pentode, and V5 a phase changer, which feeds V6, another output pentode, via a further resistance and capacity stage. The two output pentodes, V6 and V7, are in resistance coupled paraphrase push-pull and feed the moving coil speaker through a push-pull output transformer.

VR1 is the sensitivity control, and works by varying the bias applied to the cathodes of V1 and V3.

Mains equipment consists of two half-wave rectifiers, two barretters, in the form of valves, electrolytic condensers, and the speaker field.

Special Notes.—There are four dial lamps fixed to the dial assembly by spring clips. They are rated at 6 volts .3 amp.

The extension speaker connections are taken from the primary of the output transformer. An extra speaker should have its own matching transformer.

Removing Chassis.—Remove the knobs from the front of the cabinet (grab screws) and four bolts from underneath. The chassis may then be removed to the extent of the speaker leads which are plugged into a socket on the back of the chassis and may be removed if desired. The plug must, however, be in place during a test under working conditions as the

speaker field forms part of the smoothing equipment.

ALIGNMENT NOTES

Connect a modulated oscillator, tuned to 465 kc., to the grid of V3, and an output meter with large series condenser to the external speaker terminals. Adjust T16 and T15 for maximum reading on the output meter.

Transfer the oscillator lead to the grid cap of V2 and accurately adjust T13, T14, T15 and T16, for maximum reading.

Padding (All Waves).—The padding condensers should be adjusted after completing the I.F. adjustments. These condensers are P1, P2, P3 and P4.

A high-frequency buzzer should be connected in the aerial circuit and the padders adjusted for maximum output on each band with the gang condensers fully meshed.

Long Waves.—Inject a signal of 1,200 metres from a modulated oscillator to the aerial and earth terminals. Tune it in and adjust T11 for maximum output. Then adjust T5 and T1 for maximum output. With the buzzer, and the tuning condenser at maximum, adjust P4.

Return to 1,200 metres and repeat ad-

Below are chassis layouts of the Ferguson 378 Universal. The tinted one is the top view.

VALVE READINGS				
No signal. Volume maximum. 200 volt A.C. mains.				
V.	Type.	Electrode.	Volts.	Ma.
1	All National Union. 6D6 (6)	Anode	215	4.6
		Screen	60	1.3
2	6A7 (7)	Anode	210	1.6
		Screen	70	2.2
3	6D6 (6)	Osc. anode	135	2.25
		Anode	210	4.5
4	75 (6)	Screen	70	1.2
		Anode	50	.15
5	76 (5)	Anode	50	.55
		Screen	125	20
6	42 (6)	Anode	130	6.25
		Screen	125	20
7	42 (6)	Anode	125	20
		Screen	130	6.25
8 and 9	12Z3 (4)	Cathode	220	—

justments of T11, T5 and T1, finishing off by again repadding.

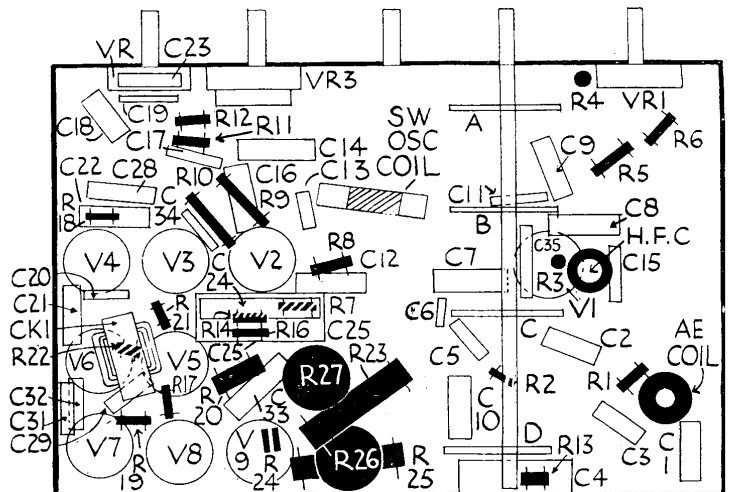
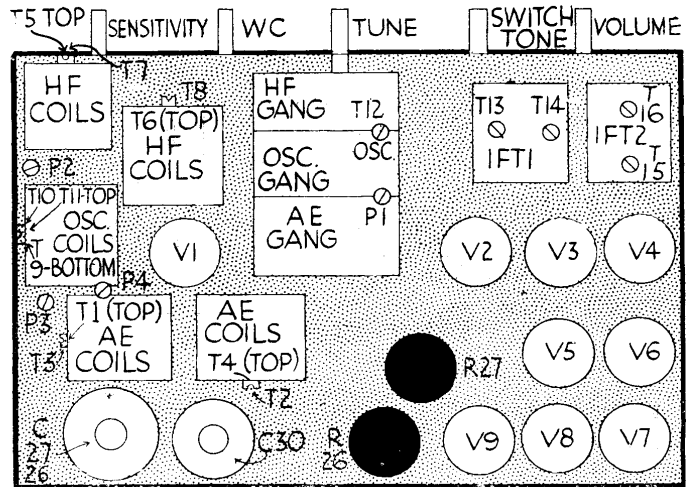
Medium and Short Waves.—The above procedure should be followed on medium waves and on the two short wavebands, the tune points and the trimmers being as follows:—

Medium Waves. 250 metres. T10, T6, T2 and P3.

Short Wave 2. 34 metres. T9, T7, T3 and P2.

Short Wave 1. 15.5 metres. T12, T8, T4 and P1.

While adjusting T12, two peaks will be found. The one nearer minimum capacity is the correct.



WESTON SUPER OSCILLATOR

H.F. range 100 kilocycles to 25 modulated or unmodulated. All ranges attenuate to below 1 Mic.V. Stray fields reduced to 1 Mic.V. Plug-in range coils eliminate switch contacts and prevent intercoil interference. Long dial and hairline anti-parallax cursor permit accurate adjustment. Instrument scale charts eliminate the use of curves, and still permit individual calibration of each range of each coil.

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