

MURPHY A28

Eight-valve, plus rectifier, two waveband superhet. Manually tuned, but with automatic tuning correction, using two valves. Inter-station noise suppression. The A28RG radiogram is basically similar. Made by Murphy Radio, Ltd., Welwyn Garden City, Herts.

Circuit.—A band-pass tuning circuit including LO and CO for an rejection couples the aerial to V1, an

R.F. amplifier. A tuned-grid H.F. transformer leads to V2, the frequency-changer. The oscillator section of V2 is tuned anode with coupling coils into the cathode, not grid, circuit.

Trimmer-tuned I.F. transformers link up V4, the I.F. amplifier, and V5, the double-diode. The A.V.C. diode is fed via C34, the load being R23 and R24. The signal diode load is R17 and feeds L.F. to V7 through C37, the grid leak being R25.

V7 is an inter-station noise suppressor and L.F. amplifier. The unit F in the anode is a heterodyne whistle filter. L.F. is passed on to V8, the output valve, via C47 and the volume control R19.

H.T. is derived from V9, a full-wave rectifier, in a straightforward circuit, with a smoothing choke and two electrolytics in the positive line.

V3 and V6 are used for automatic tuning correction and operate so that the frequency of the V2 oscillator is automatically altered to maintain the correct I.F. regardless of fairly wide variations

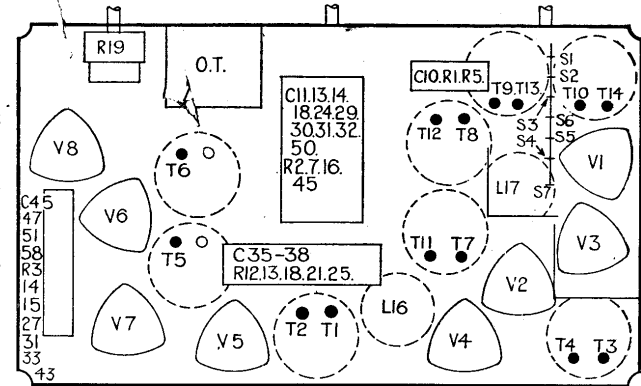
in either the receiver tuning or the received signal.

V6 is the "discriminator," and is a double diode energised by the I.F. signal, V4 anode. One diode circuit is tuned above the I.F. and the other below; when the I.F. strays either R34 or R35 develops a predominant voltage, which alters the bias between cathode and outer grid of V3.

V3 is the "control" valve connected across the oscillator so as to act as a reactance. The changing bias alters its effect on the oscillator circuit and thereby changes the oscillator frequency in such a direction that the signal at V4 anode is brought nearer the correct I.F.

V7, which silences the set between stations, is controlled by the signal voltage developed across R35 (V6). When there is no signal, the outer grid of V7 is biased so heavily that the valve is "silenced." The bias is provided by returning the grid via R30 and R35 to a tapping on the cathode bias network R27, R28, R29.

The under-chassis layout diagram showing the main features and positions of the trimmers, which include discriminator adjustments.



When a station is tuned in, the voltage across R35 counteracts this suppression bias and permits V7 to work.

GANGING

I.F. and A.T.C. adjustments should not be attempted unless the signal

generator is known to be accurate
I.F. Circuits.—Connect a 0-10 ma meter between V1 anode cap and anode lead. Connect .1 mfd. from anode to

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VALVE READINGS

V	Type	Electrode	Volts	Ma.
1	AC/VP1	Anode	215	10
		Screen	215	—
		Cathode	3.5	—
2	AC/TP	Anode	185	—
		Screen	175	—
		Ocs. anode	50	—
3	AC/SP1	Anode	230	.5
		Screen	230	—
		Cathode	12	—
4	AC/VP1	Anode	230	10
		Screen	230	—
		Cathode	2	—
5	V914	Cathode	20	—
		Cathode	7	—
		Anode (R)	215	—
7	AC/SP1	Anode (G)	140	3.5
		Screen	230	—
		Cathode	20	—
8	AC2 Pen	Anode	230	27
		Screen	230	6.5
		Cathode	4.5	—
9	UU3	Filament	375	—

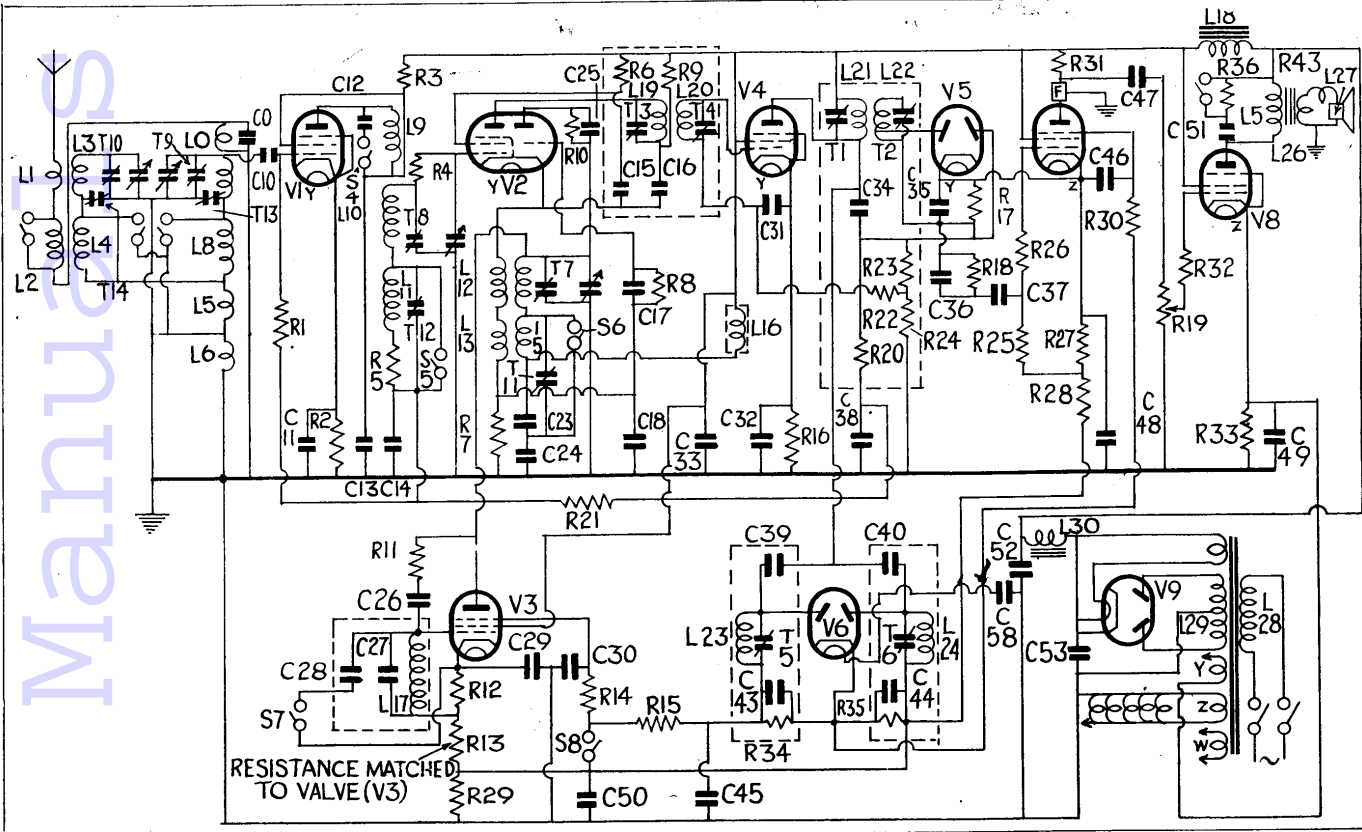
Left : The A28C circuit. V6 is the A.F.C. discriminator and V3 the control valve. V7 is an inter-station noise suppressor and L.F. amplifier.

RESISTANCES

R	Ohms.
1	.49 meg.
2	150
3	990
4	10
5	35
6	20,000
7	500
8	49,000
9	7,400
10	.16 meg.
11	.1 meg.
12	300
13	170
14	5,100
15	490,000
16	200
17	.1 meg.
18	1.3 meg.
19	100,000
20	1 meg.
21	99,000
22	1 meg.
23	1 meg.
24	5 meg.
25	1 meg.
26	690
27	375
28	1,500
29	450
30	1.9 meg.
31	20,000
32	690
33	140
34	1 meg.
35	1 meg.
36	6,500

CONDENSERS

C	Mfds.	C	Mfds.
CO	.01	33	.8
10	.01	34	.0001
11	.1	35	.001
12	.001	36	.000075
13	.1	37	.05
14	.1	38	.01
15	.0014	39	4.5 mmfds.
16	.002	40	4.5 mmfds.
17	.0005	43	.002
18	.1	44	.05
23	.001	45	.05
24	.1	46	.05
25	.002	47	.05
26	.002	48	.25
27	.000045	49	.75
28	.00031	50	.5
29	.1	51	.025
30	.4	52	.16
31	.1	53	.8
32	.1	58	.01



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SUPREME ALL-DRY AP 4

Four-valve, two-waveband superhet in small portable case, with self-contained aerial, and for operation from all-dry batteries. This receiver was made in America and may be taken as largely typical of imported all-dry sets.

Circuit.—The aerial is coupled to V1, the frequency-changer, via a series capacity, the grid tuning circuit consisting of a frame aerial winding with a section which is shorted out on M.W. The bottom of the loop is returned to the A.V.C. line.

The oscillator section of V1 is straight-forward, there being a single anode reaction winding. The tuned circuits are in the grid circuit with R2 and C4 as the grid leak and condenser.

Each of the two oscillator circuits has separate trimmers and padders, and

it will be noted that the long wave capacities remain in circuit on the medium band.

Trimmer-tuned I.F. transformers link up the I.F. amplifier V2 and the single-diode-triode, V3.

The volume control, R6, is the diode load. R5, C5 and C6 are an H.F. filter. The demodulated L.F. is passed on to the grid of the triode section via C7.

R3 and R4 form a potentiometer across R6 and tap off a part of the steady demodulation voltages for application to V1 and V2 for automatic volume control.

R8, C9 and R9 form the coupling to V4, the output pentode. R9 is returned to H.T. negative, but the filament of the valve is at L.T. negative potential by the voltage drop across R10, which the H.T. current must pass through to return to H.T. negative. V4 is, therefore, biased by the drop across R10.

C8 and C10 are H.F. and L.F. filters, and C11 is an electrolytic which decouples the H.T. battery. L.T. is obtained from a 1.5 v. dry cell and H.T. from a 90 v. unit. The receiver should operate until the voltages fall to 1.05 and 63 respectively.

Valves: detail valve readings are not necessary. The types used are: V1 1A7GT; V2, 1N5GT; V3, 1H5GT; and V4, 1Q5GT.

GANGING

I.F. Circuits.—Inject modulated 456 kc signal to V1 grid via .01 mfd. Adjust four I.F. trimmers for maximum on an output meter. Keep input signal low to prevent A.V.C. operating.

Long Waves.—This band must be adjusted first and the trimmers then left alone during M.W. adjustments.

Inject by connecting generator to small loop of wire placed some inches from the set.

Inject 1,800 m., and adjust T1 for maximum while "rocking" receiver tuning knob slightly. Inject 1,200 m., tune to 1,200 m., and adjust T2 for maximum.

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CONDENSERS

C	Mfds.	C	Mfds.
1	.0005	7	.01
2	.05	8	.0001
3	.05	9	.01
4	.0001	10	.001
5	.0001	11	8
6	.0001		

RESISTANCES

R	Ohms.	R	Ohms.
1	50,000	6	.5 meg.
2	200,000	7	2 meg.
3	2 meg.	8	1 meg.
4	2 meg.	9	2 meg.
5	50,000	10	500

MURPHY A28 — Continued

chassis. Stop V2 oscillating by shorting cathode to top of R7—C18.

Inject 119 kc. modulated to V4 via .1 mfd. Adjust T1 for minimum reading and T2 for peak between two minimum points. Repeat adjustments, which, with T1, are critical.

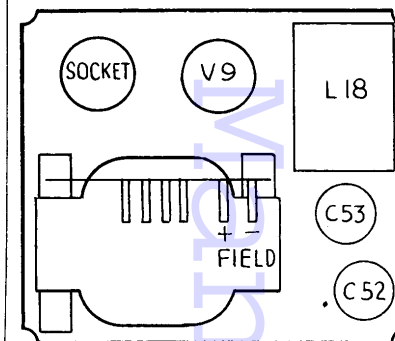
Inject to V2 grid. Switch set to L.W. and connect damping 100,000 ohms ($\frac{1}{2}$ -watt) and .1 mfd. in series between V4 grid and chassis. Adjust T3 for minimum. Transfer damping to V2 anode and adjust T4 for minimum.

A.T.C. Circuits.—See that switch S8 (front of tuning gang) is open. Remove milliammeter from V1 anode and insert in V3 anode circuit, connecting .1 mfd. from anode to chassis. Remove leads from fifth tag from rear of main condenser bank and connect the ends together (leads to R14 and V3 outer grid). Connect V2 cathode to chassis.

Inject 120.5 kc. to V4 grid. Adjust T5 for minimum reading. Inject 117.5 kc. and adjust T6 for maximum. Check that adjustments are correct by seeing that no change occurs when 119 kc. is injected.

Recheck I.F. circuits.

M.W. Band. Connect cathodes of V6 and V7. Short S8, inject 230 m. to aerial, tune to 230 m. and adjust T7, T8, T9, T10 for maximum on output meter.



The rectifier valve of the A28C is located on a separate power chassis.

L.W. Band. Inject and tune 1,200 m. and adjust T11, T12, T13, T14.

When chassis is back in cabinet re-adjust T7 and T11 for accurate calibration on the two bands.

Image Rejection. Join V6, V7 cathodes. Inject strong 333 m. signal to aerial, tune set to 480 m. Short S8. With erinoid tool, adjust screw at top of band-pass secondary grid coil for minimum on output meter.

Ballast Tube Substitute

OWING to the shortage of ballast tubes for American midget receivers (types C9266, etc.), I have found the following method of substitution very satisfactory.

I remove the burnt-out ballast tube and connect the end of the line cord to the dial light tap pin. An extra length of line cord is then added to the existing one, the additional value being calculated by adding the heater voltages of all the valves and the dial light, subtracting this from 110 and multiplying the result $3\frac{1}{2}$.

It will be seen that by using this method the dial light is in series with the heater chain and so acts as a fuse.—VANNI SCARFI, Newport, Mon.

The length of line cord required for a job can be ascertained before cutting off if one lead from the ohmmeter is fitted with a sharp probe to penetrate the insulation. With strange cords it is not safe to assume a certain resistance per length.—J. C., Lewes.

WINDINGS

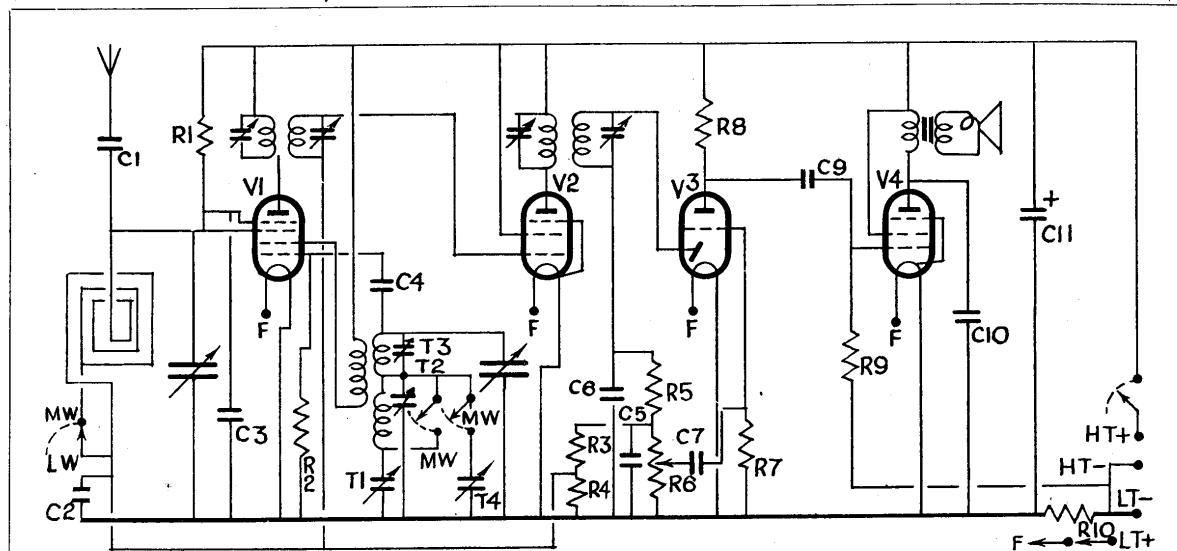
L	Ohms.	L	Ohms.
0	.1	16	48
1	1.2	17	7
2	8.5	18	200
3	4.2	19	40
4	10.5	20	40
5	2.5	21	31
6	.2	22	31
7	4.2	23	17.5
8	10.5	24	17.5
9	13.5	25	300
10	4.2	26	.2
11	.11	27	.2
12+13	2.5	28	12/15
14	3.5	29	240
15	7.5	30	1,400

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Repeat these adjustments until no further improvement results and calibration is as accurate as possible.

Medium Waves.—Tune to 200 m., inject 200 m. and adjust T3 for maximum.

Tune to 500 m., inject 500 m. and adjust T4 while rocking gang slightly. Repeat these two adjustments.



The circuit is representative of American "all-dry" two-waveband portables produced for this country. The arrangement is superhet with loop aerial and automatic volume control.