As we were unable to obtain from the makers of the Ekco 74A.C. the schematic wiring diagram in time for publication, this service review is to that extent incomplete.

(*Continued from page 14.*)

Quick Tests.—Terminals on L.S. transformer :—

Top.	1 and 2 joined H.T.+ (smoothed)	275v.
	3 V4 anode	255v.
	4 H.T.+ (unsmoothed)	365v.
Valves.	(V1) SP4 anode, 225v.	
	(V2) ,, ,, 225v.	

Removing Chassis.—Remove knobs, grub screw (two on tuning). Pull out speaker plug and remove four screws at sides of bottom of cabinet (not the buffer supports).

Lift chassis out.

For tests, the speaker leads are sufficiently long to allow the plug to be inserted with the chassis outside the cabinet.

General Notes.—The set functions equally well with the alternative valves. If the condenser drive appears to slip, this is most probably caused by the load thrown on the drive.

(*a*) Apply a little vaseline to the brass rod on which the indicator travels and/or to the pulleys.

(*b*) The drum is set too far back on the condenser spindle. Undo the grub screw and ease it forward a little, taking care that the L.T. terminals and leads are not fouled.

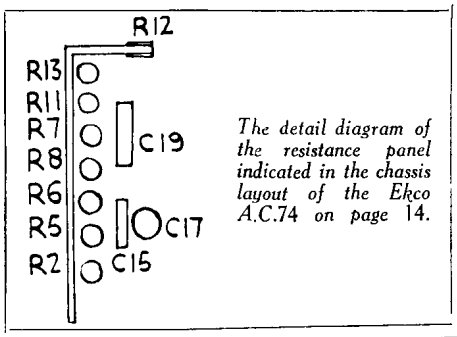
(*c*) If the calibration is wrong through the drum moving on the condenser spindle, tune in a fairly distant station (identified), and, after undoing grub screw, set drive to correct position and tighten grub screw.

Note that the L.T. wires to the pilot lamps pass over the pulleys at the sides. These latter are insulated from the chassis and care should be taken to ensure that they are not short-circuited.

When the A.V.C. system is inoperative, test for short circuit between A.V.C., anode and earth. Diode side of C14 may be making contact with the screen. Try a new double-diode-triode.

Condenser Bank.—The three condensers in the container, Cs 23, 24 and 25, are similar.

Replacing Chassis.—Make sure the drive is correct. Replace chassis in cabinet and replace the four holding screws. Replace knobs and replace speaker plug.



The detail diagram of the resistance panel indicated in the chassis layout of the Ekco A.C.74 on page 14.

CONDENSERS

C.	Purpose.	Mfd.
4	Aerial series condenser	.001
6	Cathode osc. circuit V1	.002
8	Series with anode osc. coil V1	.00055
13	Anode feed condenser to osc. coil V1	.0001
14	Coupling to AVC anode V2	.0001
15	H.F. by-pass	.001
16	Screens V1 and V2	.1
17	L.F. coupling diode to grid V3	.01
18	Across grid of triode V3	.0005
19	Anode by-pass V3	.002
20	Coupling condenser V3 to V4	.1
21	Cathode V4	25
22	Compensator anode V4	.0025
23	Smoothing	4
24	Smoothing	4
25	Smoothing	4
26	Cathode V2	.1
27	Across lower half of AVC ptr.	.1

RESISTANCES

R.	Purpose.	Ohms.
1	Bias resistor V1	4,000
2	Bias resistor V2	300
3	Across aerial input (L.D. switch)	20 (wire)
4	Part of AVC ptr.	1 meg.
5	Part of AVC ptr.	.25 meg.
6	Across rectifying diode	.25 meg.
7	Anode coupling V3 to V4	80,000
8	Bias resistor triode V3	300
9	Grid leak V4	.25 meg.
10	Bias resistor V4	450 (wire)
11	Part of screen ptr. V1, V2	50,000
12	Voltage dropping to aux. grid V4 and H.F. of set	4,000 (wire)
13	Part of screen ptr. V1, V2	50,000
—	L.S. field	2,000
—	Output transformer primary	750 to 825

Mains Hum and Radio Interference

The subject of hum in loudspeaker output and interference are somewhat closely associated. Interference can be classified under three headings—pure inductive hum, ripples and surges transferred to a set through the mains supply, and radio frequency interference.

Pure inductive hum can originate in a receiver itself and also outside the set. Hum which has its origin in a receiver is due entirely to incorrect design. The most prolific cause is inadequate smoothing, and the cure is just a matter of increasing the smoothing by using more efficient chokes of high inductance and increasing the capacity.

Hum which still persists is then invariably due to induction caused by relatively strong fields adjacent to grid wires, or even interaction amongst the low-frequency components and the mains transformer or smoothing chokes. This is easily detected by moving any components or leads which are suspected of causing trouble, and seeing if this has the effect of increasing or diminishing the hum.

Care must be taken particularly with regard to long leads connected to the input of the amplifying portion, as, for example, the pick-up connection. An earthed screened lead will usually cure the trouble. It sometimes happens on a set with which an external pick-up is used that the mains lead is brought too near to the pick-up or even to the aerial or earth lead of the set. In this manner hum is sometimes introduced, and the remedy, of course, is obvious.

The first rule is always to disconnect the aerial from the receiver, and then the earth, to determine if the interference is being picked up on the radio-frequency side of the set. Interference which comes in strongly with the aerial connected, and is almost absent without the aerial must be eliminated at its source.

These remarks are taken from the large service section of the 1934 "Broadcaster Annual" (post free 2s. 6d. to subscribers of The Broadcaster). They are followed by practical tips on curing man-made static.

PHILCO 260-261 FIVE-STAR CHASSIS

Circuit.—A band-pass aerial coupling precedes the *combined first detector oscillator V1, a heptode* (6A7). Oscillation takes place between the osc. grid and osc. anode with osc. transformer. The valve anode is coupled *to the I.F. valve V2* (78) by the *first I.F. transformer* (125 kc.), and V2 is coupled in the same manner to the strapped anodes of *V3, a double diode triode* (75). Full compensating A.V.C. is applied by biasing the grids of both V1 and V2.

Resistance coupling is used between the triode anode of V3 and *V4, a pentode* (42), and tone compensation and control are employed with a multi-point switch. The speaker is of the energised type with a humbucking coil, and the *field is used for smoothing in the positive H.T. lead.*

The *full-wave rectifier is an* (80), and the bias for the grid of the triode section of V3 is taken from a potentiometer in the H.T.—lead of the whole set. An H.F. by-pass condenser is connected between one side of the mains and chassis, and the voltage adjustment is by a two-way switch.

Special Notes.—Nearly all the screws in the assembly are self-threading.

American valves with 6.3 volt filaments are used, and the table of connections can be obtained from the makers.

Sets of replacement resistors can also be obtained.

Removing the Chassis.—Pull off knobs, stand set on chassis end and remove four screws from underneath. Lift chassis out (speaker leads are long).

Stand chassis on mains transformer end.

General Notes.—The heptode (6A7) connections, looking from underneath and counting clockwise, are : anode, screen, osc. anode, osc. grid, cathode. The det. grid is at the top and the two thick pins are filament.

Double diode triode (75) connections, as above, are : filaments (thick), triode anode, diode anode, diode anode, cathode.

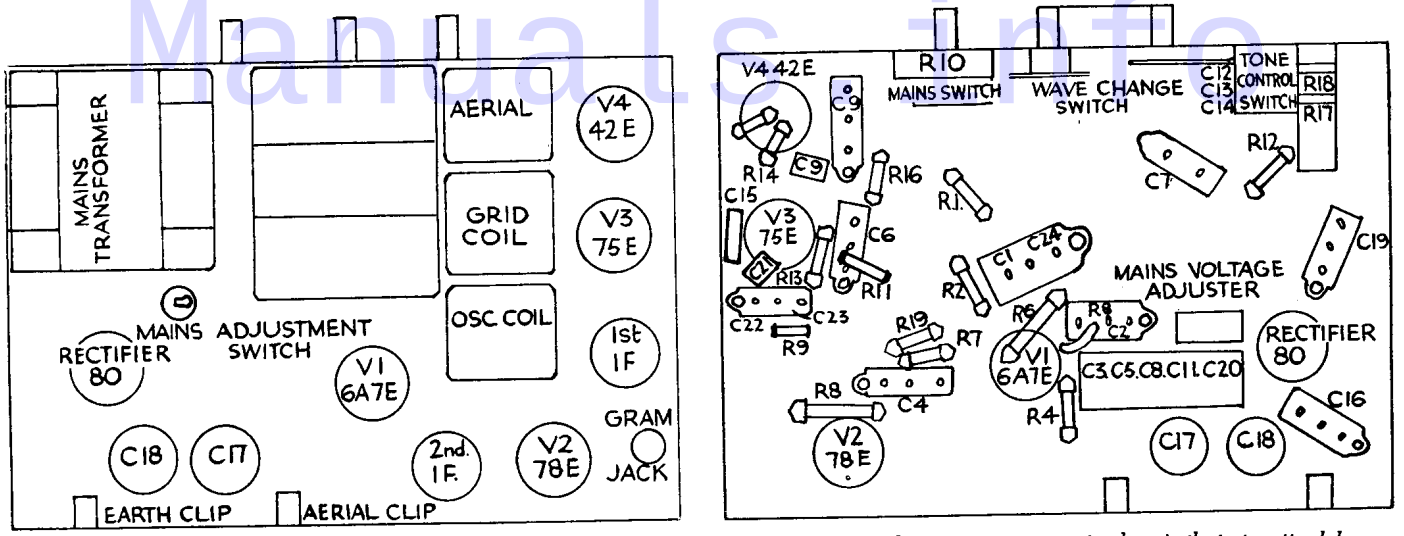
Remember that V1 and V3 have grid terminals on top of the bulbs.

(*Continued in col. 1, page 16.*)

VALVE READINGS

(VC max., no signal.)

Valve.	Connections.	Volts.	M.A.
V1 6A7E	anode	240	Owing to the absence of suitable split adaptors the makers recommend trying new valves when voltages on electrodes are high (i.e., when current is presumably low).
	bsc anode	247	
	screen grid	51	
V2 78E	anode	240	
	screen	88	
V3 75E	anode	153	
V4 42E	anode	230	
	aux. grid	245	



How the chassis are planned in both the Philco 260 and 261 receivers. The few differences between the two receivers are pointed out in the text matter below.

(*Continued from previous page.*)

Connections to Mains Transformer.

1,	White with 20 per cent. black tracer	(mains outer tap)
1A,	Green	(mains tap)
2,	White	(mains 0)
3,	Black	(set filaments)
4,	Black with yellow tracer	(C.T. of set fil.)
5,	Black	(set filaments)
6,	Blue	(Rectifier filament)
7,	Blue	(Rectifier filament)
8,	Yellow	(Rectifier anode)
9,	Yellow with green tracer	(H.T.–)
10,	Yellow	(Rectifier anode)

Special Features.—Types 260 and 261 have slight variations.

When the condenser C16 is omitted in the 261 the K19 and H14 speakers are used. In these the black and yellow leads are reversed to the output transformer.

A 4-point tone control is used in 261.

A 2-point tone control is used in 260.

Shadow tuning meter is used only in 261. The condenser bank is the same in both models.

Replacing Chassis.—Screw in four holding screws and push knobs on to control spindles.

RESISTANCES

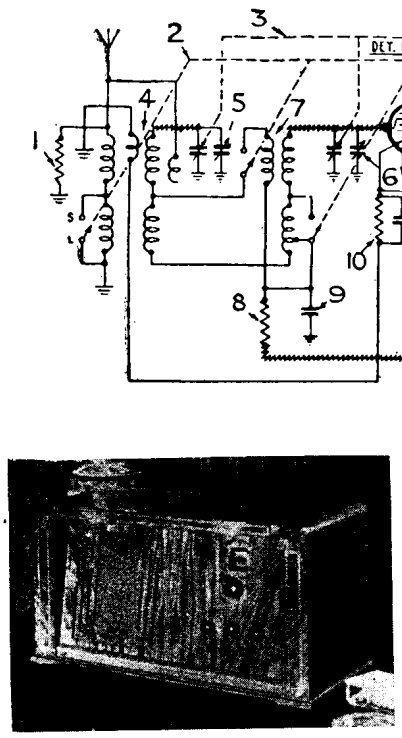
R.	Purpose.	Ohms.
1	Across aerial tuning coil ...	10,000
2	Bias decoupler V 1	70,000
3	Bias resister V 1...	500
4	Series osc. grid of V 1	50,000
5	Bias resistor V 2...	250
6	Lower part of S.G. pot. ...	13,000
7	Part of S.G. pot.	10,000
8	Part of S.G. pot.	25,000
9	Part of AVC system	50,000
10	Part of AVC system and V.C.	350,000
11	Grid leak triode of V 3 ...	1 meg.
12	Decoupling grid of V 3... ...	100,000
13	H.F. stopper grid of V 3 ...	25,000
14	Triode V 3 anode coupling ...	70,000
15	Anode decoupling V 3	70,000
16	Grid leak V 4	.5 meg.
17	Part of bias pot. to grid V 3 ...	235...Trapped ... 32
18	Part of bias pot. to grid V 3 ...	
19	Part of ACV system	2 meg.

CONDENSERS

C.	Purpose.	Mfd.
1	Band pass coupling	.05
2	Cathode V 1	.09
3	Tuning meter by-pass	.25
4	Cathode V 2	.09
0	S.G. V 2	.09
6	Coupling to grid of triode of V 3	.01
7	Grid decoupling V 3	.09
8	Screening grid V 1	.09
9	Anode by-pass V 3	.00025
10	L.F. coupling V 3 and V 4 ...	.01
11	Anode decoupling V 3	.25
12	Tone control switch	.01
13	Tone control switch	.015
14	Tone control switch	.01
15*	Pentode compensating	.003
16**	Across L.S. field	.09
17	Electrolytic smoothing	8
18	Electrolytic smoothing	8
19	Mains H.F. by-pass	.015
20	Across bias pot	.05
21	Triode grid of V 3	—
22 & 23	By pass of AVC system ...	.00025 each
24	Decoupling AVC to V 1 ...	.05

* Tuning indicator and pentode compensator are not included in model 260.

** In some cases this is omitted in model 261



The circuit of the Philco 260 and 261 models. The compensating or trimmer capacities are here shown as variable condensers. The thicker, zig-zag lines indicate screened leads.

BATTERY "AUSTIN" BY C.A.C. (Cont.)

so that the voltage will drop in proportion to the H.T. battery as it runs down.

Special Notes.—The battery connections are :—

Drydex H1073 combined H.T. and G.B.

H.T. : H.T.+1, 123 volts; H.T.+2, 75 volts.

G.B. : G.B.—1, 1.5 volts; G.B.—2, 3 volts; G.B.—3, 4.5 volts; G.B.—4, 9 volts.

Note that H.T.— and G.B.+ have separate sockets on the battery. For greater economy in battery use, with a slightly lower output G.B.—3 may be plugged into the —6-volt tapping.

Quick Tests.—Set current, with no signal, taken in negative H.T. lead should be approximately 10 m.a. with voltages as above. Take individual valve readings.

Removing Chassis.—It is more convenient to unsolder the L.S. leads than to leave them attached.

Remove knobs (grub screw) and undo the two wood screws at the back of the flanges at the side of the chassis.

Remove the battery shelf and lift the chassis out.

General Notes.—The driver transformer is situated between V4 and V5 sockets. The two primary tappings are on one side, and of the five secondary tappings on the V5 side only the three middle ones are used. The centre tapping is connected to the I.S. (G.B.) tag on the L.F. transformer.

In the L2DD the grid terminal is at the top of the bulb, and the pin that is ordinarily connected to the grid is one diode anode, while the centre pin is the other diode anode.

For convenience, the condenser C8 is mounted in front of the switch instead of across the volume control, across which it is connected through the L.T.+ wiring.

Switch contacts are of the wiping type, and can be cleaned by turning them alternately towards the chassis base plate and cleaning them with a clean duster.

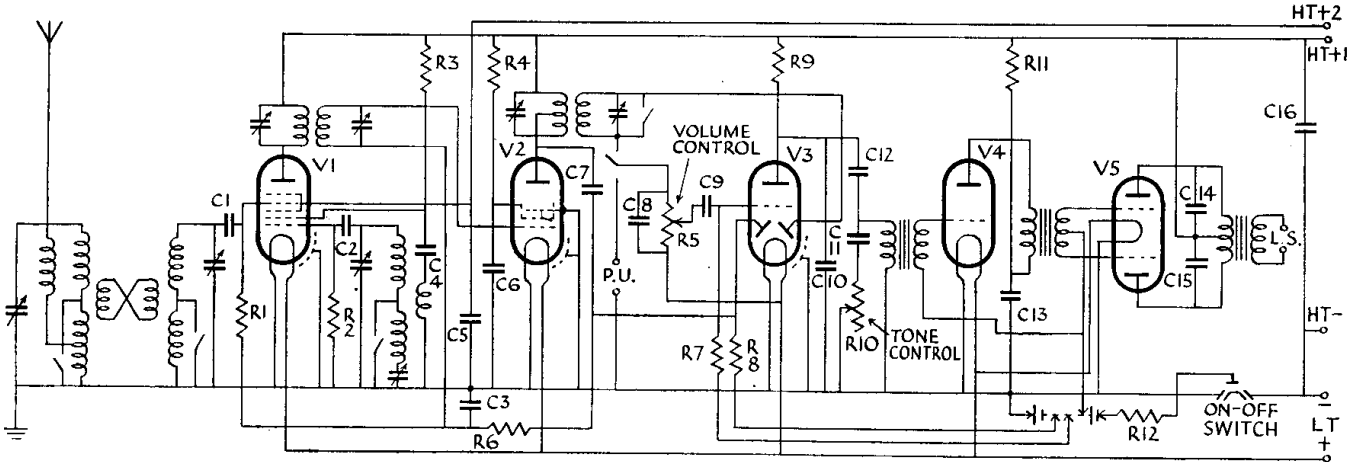
Replacing Chassis.—Lay chassis inside cabinet, and replace two holding screws.

Resolder the L.S. transformer leads with the green lead in the middle, and replace the knobs.

Replace the battery shelf and push the battery leads through the hole next the accumulator holder.

November "Service Engineer"

Receivers dealt with in the next issue of Service Engineer will include the Aerodyne "Swan," Burgoyne Five-valve Battery Superhet, McMichael Duplex Transportable, and Ultra "44."



A Ferranti heptode frequency-changer forms the first valve in the C.A.C. battery "Austin" and the other types are respectively an H.F. pentode I.F. amplifier, a double-diode triode for detection and A.V.C., a driver and a class B output valve.

ADDITIONAL NOTES ON PHILCO

MODELS 260, 261, 263, 264 AND 1263

Models 260-261, 5-valve A.C. superhet.—This chassis was described in the January issue of the Service Engineer. Two important modifications have been incorporated in the latest models, and dealers are recommended to alter the sets so as to include the second item if and when they are returned for service.

First Modification.—It has been found that the suppressor coil allowed break-through of the local station when left in circuit for the long waves. In some models an extra contact will be found on the switch to connect the cathode return direct to earth instead of to the suppressor coil when the switch is turned to L.W.

As the revised circuit involves a larger switch, dealers should charge the customer for the improvement, as they themselves will have to pay for the switch.

Second Modification.—In some cases the 6A7 (V1) refuses to oscillate at one end of the tuning range. This can be cured in most cases by connecting the oscillator grid return lead to earth instead of to cathode.

Whenever it is necessary to remove the chassis for any other purpose the engineer should change this lead.

Model 264.—Dealers who recognise that the chassis used in the 264 is the same as in the 260 and 261 may be surprised to find

(*Continued on next page.*)

VALVE READINGS

[No signal.]

Valve.	Type.	Electrode.	Volts.	Ma.
1	6A7	anode	240	
		screen	51	
		osc. anode	247	
2	78E	anode	240	
		screen	88	
3	75	anode	153	
4	42E	anode	230	
		aux. grid	245	

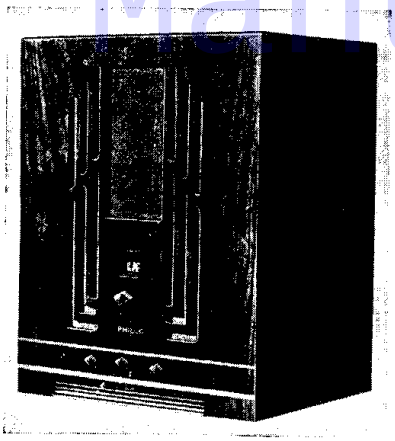
RESISTANCES

R.	Purpose.	Ohms.
1	Across aerial coil	10,000
2	Decoupling V1 grid	70,000
3	V1 cathode bias	500
4	Decoupling V1 osc. grid	51,000
5	V2 cathode bias	300
6	Lower part of screen ptr.	13,000
7	Part of screen ptr.	10,000
8	Part of screen ptr.	25,000
9	H.F. stopper from diode	51,000
10	Diode load (variable V.C.)	350,000
11	V3 grid leak	1 meg.
12	V3 grid decoupling	99,000
13	V3 grid H.F. stopper	25,000
14	V3 anode, L.F. coupling	70,000
15	V3 anode, decoupling	70,000
16	V4 grid leak	490,000
17	Part of V3 bias ptr.	235
18	Part of V3 bias ptr.	32

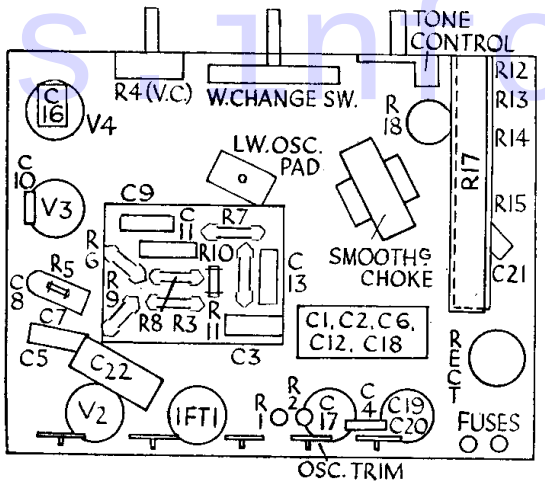
CONDENSERS

C.	Purpose.	Mfd.
1	Band-pass coupling	.05
2	V1 cathode	.09
3	V1 anode decoupling	.25
4	V2 cathode	.09
5	V2 screen	.09
6	L.F. coupling to V3 triode grid	.01
7	V3 grid decoupling	.09
8	V1 screen decoupling	.09
9	V3 anode by-pass	.00025
10	L.F. coupling V3 to V4	.01
11	V3 anode decoupling	.25
12	V4 anode, tone compensating	.01
13	V4 anode, tone compensating (switched on).	.01
17	H.T. smoothing	8 el.
18	H.T. smoothing	8 el.
19	Mains H.F. by-pass	0.15
20	Across V3 bias ftr.	.05
22	H.F. filter from diode	.00025
23	H.F. filter from diode	.00025
24	Decoupling AVC to V1	.05
25	H.F. by-pass from V3 grid	.0001

NOTES ON PHILCO RECEIVERS (Cont.)



The 263 receiver by the Philco Radio and Television Corpn. of G.B., Ltd., utilises the same chassis as the 260, 261, 264 and 1263 receivers.



The under-chassis Philco layout. The condenser referred to in the text regarding the 263 is on the right of the diagram projecting from underneath the switch.

that the performance has been improved. This has been achieved by increasing the efficiency of the band-pass intermediate transformers by widening the band width of one (increasing the coupling) and narrowing that of the other. This also results in an avoidance of a good part of the background noise.

The alteration in the coils has not been considered great enough to warrant the use of a new spare part number.

Models 263 and 1263, 5-valve universal superhet.—The identical chassis are used in these models.

In some of the original receivers the condenser C21 of .05 mfd. connected between the anodes and cathode of the rectifier has been found to break down. This causes A.C. to be applied across the smoothing condensers C19 and C20, and as these are electrolytic the current passed is sufficient to blow the fuse.

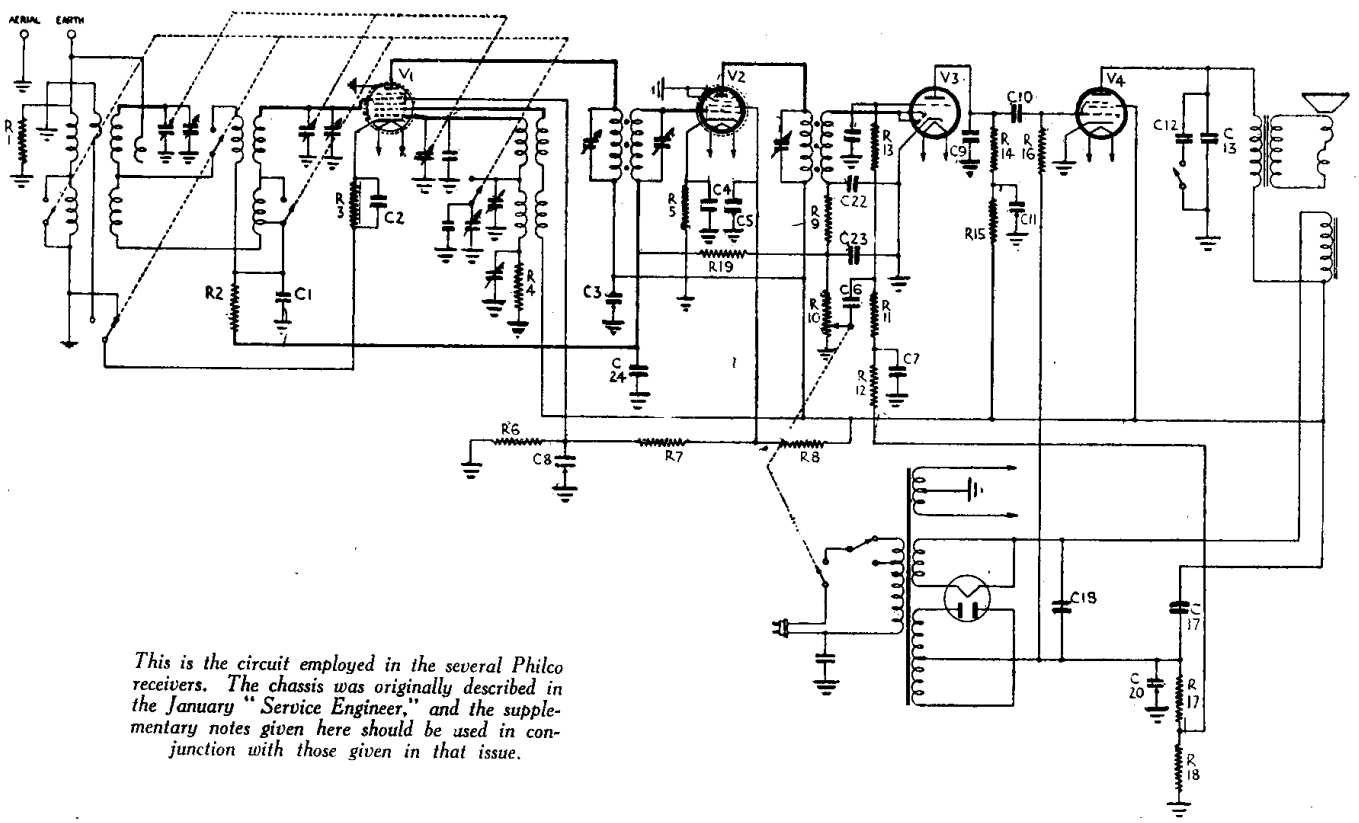
In all cases it has been found that the fuse prevents damage to the condensers.

Dealers who find that the fuses (inside the chassis) have been burnt out should immediately suspect the condenser C21.

The part number of the original condenser is 30-4123, and the case is a tubular one of greenish colour. It is mounted underneath the switch.

Whenever a set is returned to the dealer for any purpose whatever, this condenser should be removed and a new one of 275 volts R.M.S. working inserted in its place. These latter will be supplied free by the makers on receipt of the chassis number of the instrument.

The high-voltage working type is contained in a brown tubular case.



This is the circuit employed in the several Philco receivers. The chassis was originally described in the January "Service Engineer," and the supplementary notes given here should be used in conjunction with those given in that issue.