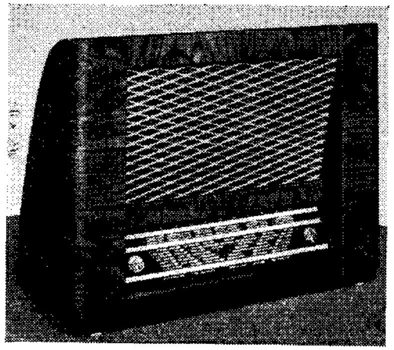
PILOT 75



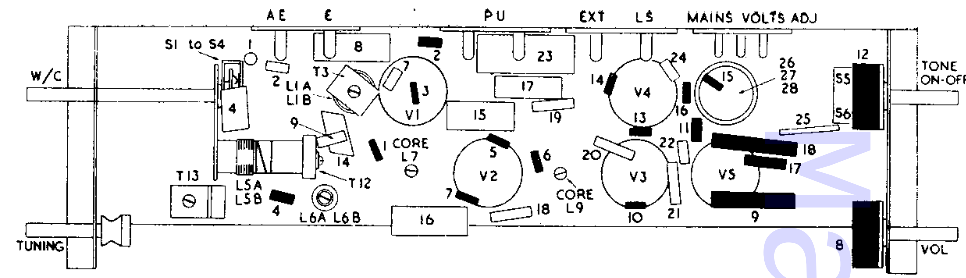
Price £22 10s. 0d. (£17 0s. 3d. plus £5 9s. 9d. tax). Date released, September, 1952. Five-valve three-waveband superhet receiver with waveband coverage of 16.5-50, 185-550, 1200-2000m. Housed in walnut table cabinet of modern styling. Internal loop aerial for MW and LW. Sockets for external aerial and earth, low-impedance extension speaker and high-resistance magnetic or crystal pickup. Suitable for 200-225, 230-250V, 40-100c/s AC. Manufactured by Pilot Radio Ltd., Park Royal Road, London, NW10.

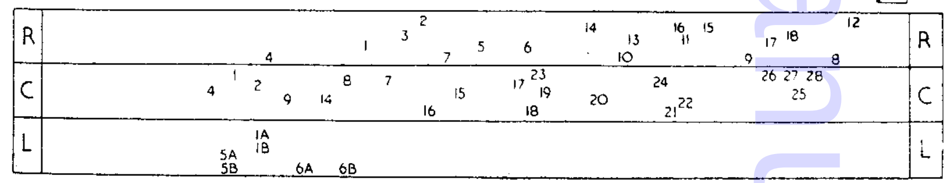
AERIAL. The receiver incorporates an internal frame aerial L2 for MW and LW, a frame compensating coil L3, and a LW loading coil L4. Sockets at rear of chassis enable an external aerial and earth system to be employed for SW reception. Use of an external aerial is not recommended on MW and LW, except where bad interference or weak signals prevail, since the tuned circuits will be overloaded and whistles produced.

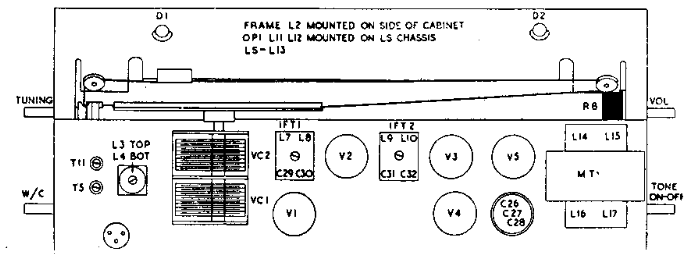
On SW band, signals from external aerial are coupled to grid circuit of V1 by L1A L1B T3. Bottom end injection at junction of L2 L3 is employed on MW and LW when an external aerial is used.

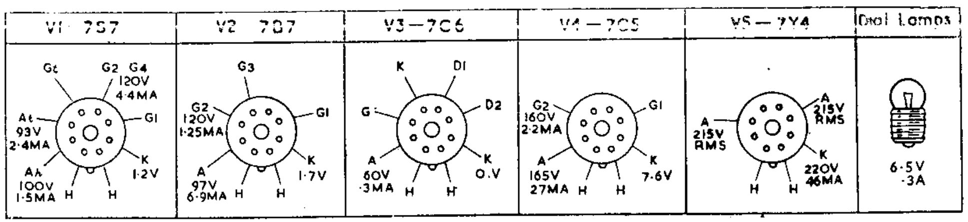
On SW switch S1 short-circuits L3 and connects earthy end of L1A, the SW aerial coil, to chassis via C2. On MW band L1A is returned to chassis via L3 C2, while in the LW position capacitor C1 is switched across L2 L3 to prevent MW breakthrough.

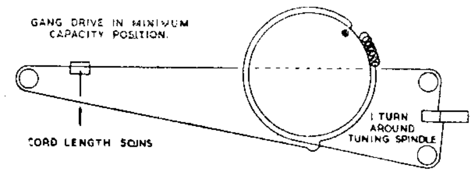
Continued opposite.

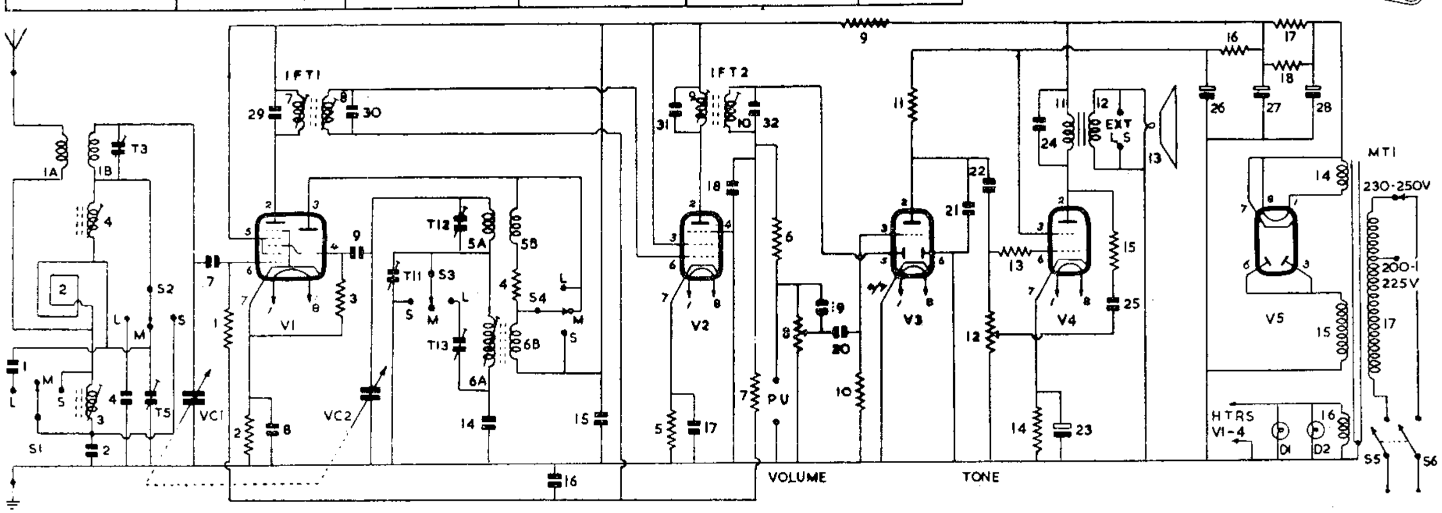












CAPACITORS

C		Capacity	Type
1	...	.001	Mlded Tub 350V
2	...	.01	Mlded Tub 150V
3	...	No Component	
4	...	180pF	Silver Mica
5		No Component	
6		No Component	
7	...	100pF	Ceramic
8	...	.1	Tubular 350V
9	...	100pF	Ceramic
10		No Component	
11		No Component	
12		No Component	
13		No Component	
14	...	500pF	Silver Mica
15	...	.1	Tubular 350V
16	...	.1	Tubular 350V
17	...	.1	Tubular 350V
18	...	100pF	Ceramic
19	...	100pF	Ceramic
20	...	.002	Tubular 500V
21	...	100pF	Ceramic
22	...	.04	Mlded Tub 150V
23	...	50	Electrolytic 12V
24	...	.100	Tub. 300 V-AC
25	...	500pF	Mica 750V
26	...	16	Electrolytic 275V
27	...	16	Electrolytic 275V
28	...	16	Electrolytic 275V
29	...	110pF	Silver Mica
30	...	110pF	Silver Mica
31	...	110pF	Silver Mica
32	...	110pF	Silver Mica

RESISTORS

R		Ohms		Watt
1	...	1M	...	1/8
2	...	220	...	1/4
3	...	47K	...	1/8
4	...	68	...	1/2
5	...	270	...	1/8
6	...	47K	...	1/8
7	...	1M	...	1/8
8	...	500KLog Potr.		
9	...	4.7K	...	1
10	...	10M	...	1/8
11	...	270K	...	1/4
12	...	500K Potr. with DP switch	...	
13	...	4.7K	...	1/8
14	...	270	...	1/8
15	...	470K	...	1/8
16	...	4.7K	...	1/8
17	...	3.3K	...	1/2
18	...	1.5K	...	1

INDUCTORS

L		Ohms
1A		Very Low
B		Very Low
2	...	1.5
3	...	1.5
4	...	9.5
5A	...	Very Low
B	...	.5
6A	...	2
B	...	1
7	...	7.5
8	...	7.5
9	...	7.5
10	...	7.5
11	...	450
12	...	.4
13	...	2.75
14	...	Very Low
15	...	225
16	...	Very Low
17	...	65

PILOT 75—*Continued*

Switch S2 is in V1 grid circuit. On SW band L1B and SW trimmer T3 are returned to chassis via C2, while on MW band L1B T3 are switched to junction of L2 L4, which shorts out LW loading coil L4 and puts frame aerial L2 and MW trimmer T5 into circuit. On LW band L1B goes to chassis via C4, and L4 L2 L3 are introduced. Aerial tuning capacitor is VC1.

Aerial signals are fed to control grid of triode-heptode frequency-changer V1 via C7. AVC voltage, decoupled by R7, C16, is applied through R1, the grid load.

Cathode bias is provided by R2, decoupled by C8. Primary L7 C29 of IFT1 is in the heptode anode circuit.

Oscillator is the triode section of V1 connected in a tuned grid series-fed circuit. Grid coils L5A(SW) L6A(MW and LW) are trimmed by T12 T11 and T13 respectively, and switched by S3 to oscillator tuning capacitor VC2. C9 provides grid coupling, with R3 as leak. On SW band trimmer T11 (MW) and L6A C14 (MW and LW) are short circuited and earthy end of L5A (SW) connected to chassis. On MW band T11 is in circuit across L6A C14. With S3 in the LW position, trimmer T13 is switched across L6A.

Anode reaction voltages are obtained inductively from L5B (SW) L6B (MW and LW). HT for oscillator anode is fed through series-connected coils L5B L6B and SW limiter R4. On SW band L6B is short-circuited by S4, while on MW and LW bands L5B R4 are shorted.

IF amplifier. The 470kc/s IF signals appearing at V1 heptode anode are transformer coupled to grid of IF amplifier V2 by L7 L8 of IFT1. AVC voltage, decoupled by R7 C16, is fed to control grid of V2 through L8. Cathode bias is developed across R5 with C17 as bypass. Screen and anode voltages come direct from main HT line. Suppressor grid is earthed to chassis. Primary L9 C31 of IFT2 is in the anode circuit.

Demodulator. Secondary L10 C32 of IFT2 feeds amplified IF signal to one diode of the double diode triode V3 for demodulation. R8, volume control, provides the diode load, while R6 C18 C19 constitute an IF filter circuit. The other diode is earthed to chassis.

AVC. The DC component of the demodulated signal built up across R6 and volume control R8, is decoupled by R7 C16, and fed to control grids of V1 V2 for AVC.

Pickup sockets are provided at rear of chassis for connection of a high resistance magnetic or crystal type pickup. Output voltage from pickup is applied across R8. To prevent radio breakthrough, the receiver should be tuned to silent part of waveband, for instance, lower end of LW. Pickup should always be disconnected when broadcast reception is required.

AF amplifier. Demodulated signal appearing across volume control R8 goes to grid of triode AF amplifier section of V3. Automatic grid bias is developed across C20, with R10 as leak. R11 is the anode load and C21 provides RF bypass. The cathode is earthed.

Output stage. Signal at V3 anode is fed to control grid of beam tetrode output amplifier V4 via C22, with R13 as grid stopper. Negative feedback from anode to grid is achieved by R15 C25, the amount of feedback being governed by R12, Tone control. Cathode bias is built up across R14, bypassed by C23.

Amplified signal at anode is transformer coupled by OP1 to an 8in. PM speaker with a speech coil impedance of 3ohms. Connection for the low impedance extension speaker is provided on secondary L12 of OP1.

HT is provided by indirectly-heated full-wave rectifier V5, connected in half-wave circuit; the anode voltage for which is derived from secondary L15 of MT1. Heater current comes from L14. Main HT line, supplying V1 V2 anodes and screens and anode of V4, is resistance-capacity smoothed by R17 R18 C27. HT for V3 anode and V4 screen is further resistance-capacity smoothed by R16 C26. C28, the reservoir capacitor, should have a ripple current rating of 120mA.

Heaters V1 to V4 and dial lamps D1 D2 are parallel connected and obtain their current from secondary L16 of MT1.

Mains input is to primary L17 of MT1, which is tapped for 200-225V, 230-250V, 40-100c/s AC. S5-S6, mains On-Off Switch, is ganged to Tone control R12.

TRIMMING INSTRUCTIONS

Apply signal as stated below	Tune receiver to	Trim in order stated for maximum output
(1) 470kc/s to g1 of V1 via .01 capacitor	—	Cores L10, L9, L8 and L7
(2) 18.2mc/s to AE Socket via dummy aerial	16.5 metres	T12, T3
(3) 1.5mc/s as above	200 metres	T11, T5
(4) 600kc/s as above	500 metres	Cores L6, L3 and repeat operations (3) and (4)
(5) 230kc/s as above	1300 metres	T13 Core L4

NOTE.—In operation (2) two peaks will be obtained when adjusting T12—use setting with higher capacity (the second peak whilst screwing in trimmer).

PYE FVI

UPON switching on this faulty receiver, after a few minutes the screen became illuminated, but the picture was unintelligible. Then with a sudden burst, the sound came on, emitting a terrific hum.

The sound fault was quickly traced to a faulty PL33. On the valve tester the emission was zero for some time, the next instant the needle was hard over.

The vision fault and hum was also quickly traced to C95 and C96 (ELECTRICAL AND RADIO TRADING service sheet) being completely open circuited. When these components were replaced the set was restored to normal.

I was interested to note that the receiver operated very well indeed on a double 32mF condenser in place of the 200+100mF specified, whilst I had to wait for the correct replacement.

I submit this contribution not because it was difficult to trace—it was too drastic to present any great difficulty—but because it was unusual. It may also preclude other engineers being caught on the wrong foot without a suitable capacitor. At the time I was staggered to find how many wholesalers had none in stock.—K. J. J., Bishop's Stortford.

FERRANTI—*Continued from p. 17*

Inject 19.25mc/s—tune L8 L11 for minimum video.

Inject 19.25mc/s modulated—tune L12 L13 L14 for maximum sound.

Finally recheck all the above operations and re-adjust where necessary.

RF Stages Place contrast R64 at approximately one-quarter of its travel. Place Channel Selector lever to appropriate channel setting.

Inject signals given in table below into aerial socket.

Tune oscillator coil for maximum sound output and aerial and RF coils for maximum video output

	Osc.	*Aerial*	*RF*
Channel 1	41.5 mc/s mod	44.25mc/s	42.25mc/s
,, 2	48.25 ,,	51 ,,	49 ,,
,, 3	53.25 ,,	56 ,,	54 ,,
,, 4	58.25 ,,	61 ,,	59 ,,
,, 5	63.25 ,,	66 ,,	64 ,,

Video Rejector. Unscrew core L16 to nearly full out position. If picture is free from an interfering " dot " pattern leave core set in this position. If not —adjust until interference is reduced to a minimum

Electrical Casebook

FAULTS CAUSED BY ABSENCE OF NEUTRAL CONNECTION

TWO three-phase 400V motors were used in a building, both being controlled by means of contactors operated by thermostatic switches. It was found that one motor would run only when the other motor was running, and vice versa.

Insulation resistance tests showed satisfactory results and neither of the contactor coils was o/c. The contactor coils were designed to operate on the phase-to-neutral voltage, but it was found that voltage between the phase and the neutral existed only when one or both of the thermostatic switches was closed.

Investigation revealed that there was no neutral connection from the supply to the three-phase and neutral distribution box to which the motors were connected. The contactor coils for the two starters were connected to different phases. The diagram (Fig. 1) shows that when only one thermostatic switch was closed there was no supply to the coil in circuit with this thermostat. However, when both thermostats closed the contactor coils in the two starters were connected in series across two of the supply phases, and thus were subject to 200V each (instead of the normal phase-to-neutral voltage of 230 volts) and 200V was sufficient to operate the contactors and start the motors.

A neutral conductor was brought into the distribution box to remedy matters.

Some large three-phase 400V motors were fed from a distribution box in one department, and a small 230V single-phase motor was later added. After stoppage for the summer holidays the single-phase motor refused to start, and tests showed that there was only a low voltage across the motor when the switch was closed. Further investigation revealed that no neutral connection had been brought into the distribution box ; the motor had been connected between one of the phase fuses and the neutral busbar in the distribution box, but the neutral busbar had merely been connected to the case of the distribution box. Furthermore, the case of the distribution box was not connected to earth (see Fig. 2).

Apparently the current for the single-phase

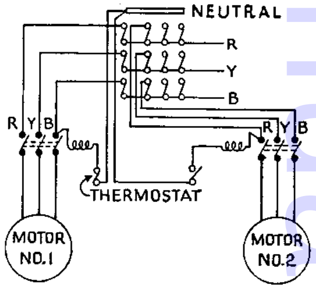
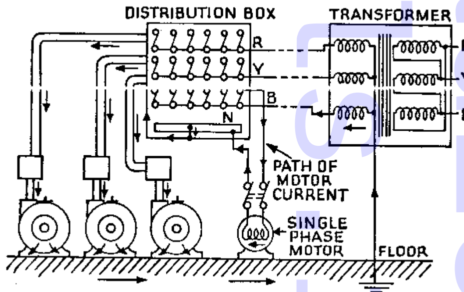


Fig. 1.—A neutral conductor was needed in the distribution box as shown. Fig. 2.—Damp floor replaced the neutral



motor had previously been returning to the earthed neutral point of the supply transformer through the rather damp floor on which the three-phase motors had stood, the framework of these motors being bonded to the case of the distribution box. During the summer stoppage the floor had dried out, thus interrupting the circuit of the single-phase motor.

This system, of course, was most dangerous In contravention of regulations the supply was earthed at more than one point (through the damp floor); the framework of the three-phase motors was not efficiently earthed; and when the single-phase motor was switched on with the floor dry, one phase of the supply was connected to the (unearthed) framework of the three-phase motors. A serious shock might have been received by any of the operators. A neutral connection was brought into the distribution box and the connection between the neutral busbar and the case removed, the framework being properly earthed.