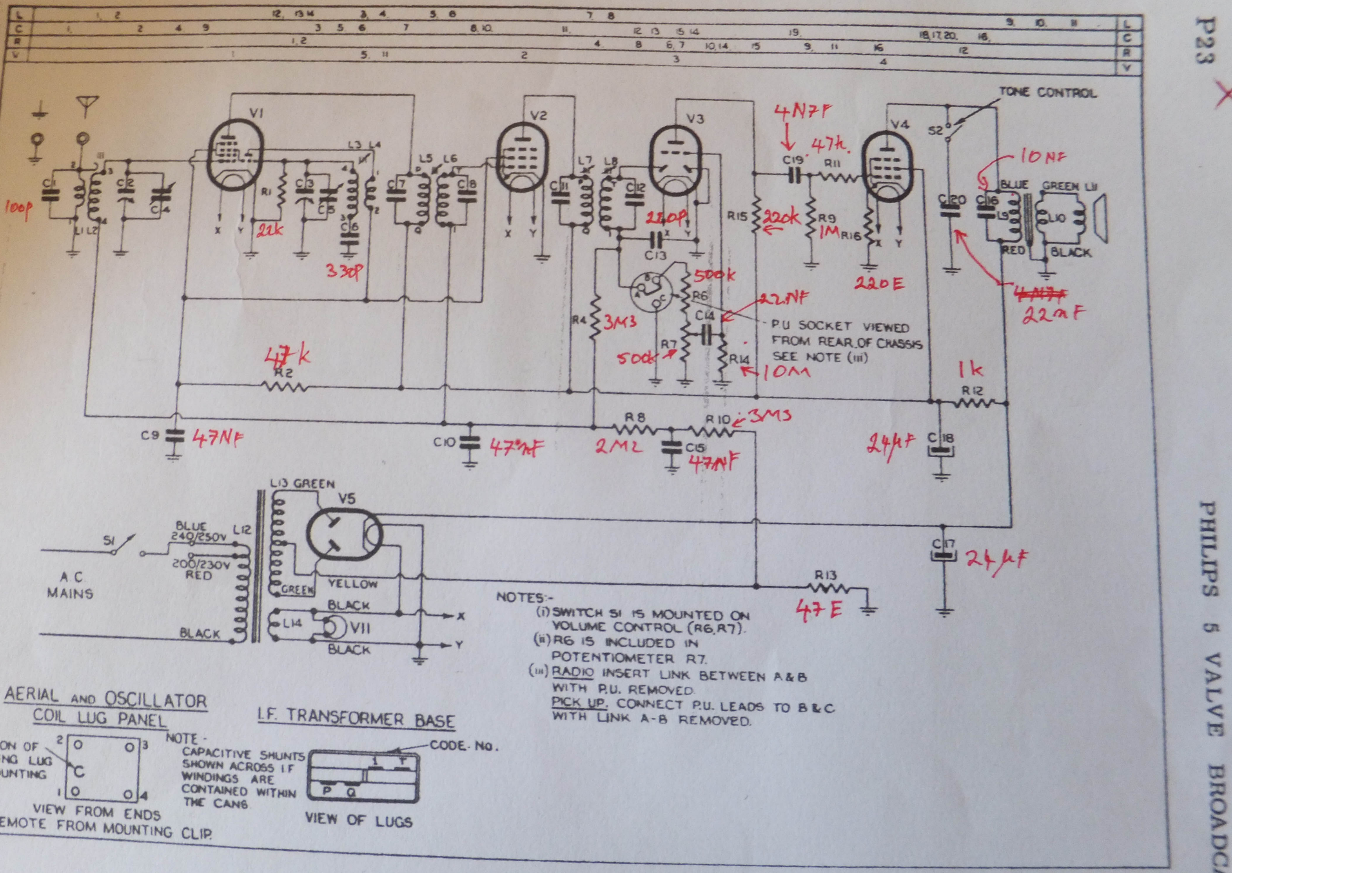
From The Workbench

By Chris Ratcliff

This is a Philips Model 167, which was brought to me by a collector, who had replaced the capacitors including the two electrolytics, but when it was powered up, R12 became so hot that it smoked!

This repair became “Perry Mason and the Case of the Smoking R12”.

From the circuit diagram below, you will see that R12 is a 1K x 1W resistor and is used as a filter device, in place of a filter choke. Using my Ohm-Meter between the chassis and the C18 side of R12 there appeared to be a dead-short. The two original electrolytic capacitors, C17 and C18 were chassis mounted and their tags were used as wiring and component terminations. Although disconnected, the replacements terminated above the old capacitors. The replacements had to be moved elsewhere on the chassis to gain access to the wires that terminated at C18. Dividing these 3 wires, and individually placing my Ohm-meter on each wire, would tell me where in the radio the short was located.


TONE CONTROL
V1
V2
V3
V4
V5
4N7F
47k
10NF
100p
22k
330P
220P
220k
1M
220E
500k
22NF
4N7F
22nF
3M3
50ok
10M
47k
1k
47NF
47NF
2M2
3M3
47NF
24μF
24μF
47E
P.U SOCKET VIEWED FROM REAR OF CHASSIS SEE NOTE (iii)
BLUE
GREEN L11
RED
BLACK
L13 GREEN
BLUE 240/250V
200/230V RED
A C MAINS
BLACK
GREEN
YELLOW
BLACK
BLACK
NOTES:-
(i) SWITCH S1 IS MOUNTED ON VOLUME CONTROL (R6, R7).
(ii) R6 IS INCLUDED IN POTENTIOMETER R7.
(iii) RADIO INSERT LINK BETWEEN A & B WITH P.U. REMOVED.
PICK UP. CONNECT P.U. LEADS TO B & C WITH LINK A-B REMOVED.
AERIAL AND OSCILLATOR COIL LUG PANEL
POSITION OF LOCATING LUG IN MOUNTING CLIP.
VIEW FROM ENDS REMOTE FROM MOUNTING CLIP.
NOTE - CAPACITIVE SHUNTS SHOWN ACROSS I.F. WINDINGS ARE CONTAINED WITHIN THE CANS.
I.F. TRANSFORMER BASE
CODE. No.
VIEW OF LUGS

PARTS LISTS

Using this method, the dead-short was easily located as being in the Intermediate frequency (IF) stage of the radio. So then I figured that I needed to check the valves. I pulled out the EBF80 (6N6) valve. It was NOT an EBF80 but ECH80(6AN7) which I was expecting to be in a different socket. On closer inspection it was obvious that these two valves had accidentally been swapped in position when the person had replaced the capacitors!
EBF80's Anode is pin 6. ECH80's pin 6 is an internal connection which shorted out the H.T. via L7 which is connected to the primary winding of the I.F. transformer - It was VERY lucky that no further damage had been caused!!

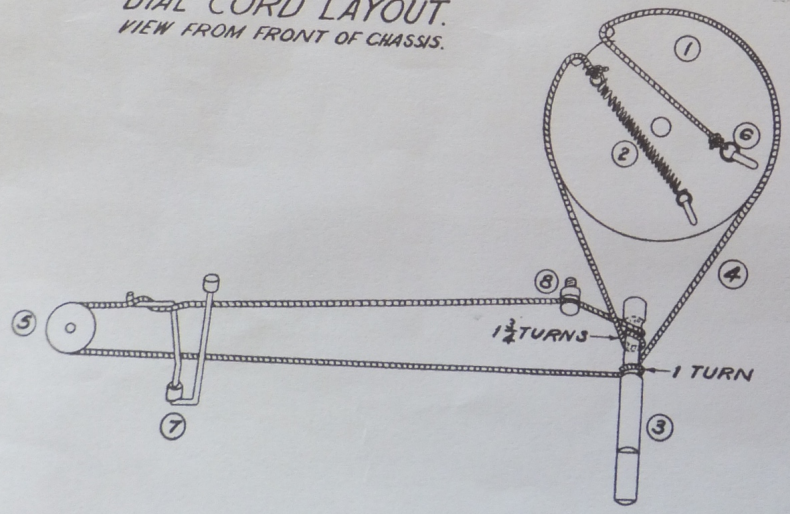
I returned the EBF80 to its original position and installed a replacement ECH80 and a new 1K x 1W resistor. Finally, I powered up the radio and it worked!

THE MORAL OF THIS STORY? – Remember where valves are positioned before you start work.
Photos of the chassis can be a big help, as can a quick labels made from masking tape on which you write the valve values and stick them next to each valve socket.

MISCELLANEOUS COMPONENTS

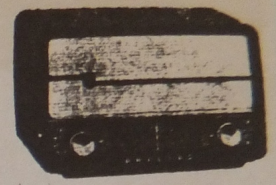
No. on Dial Cord Layout Drawing	Description	Code No.
7	Assembly, cursor	CR.480.662
—	Assembly, lampholder	CZ.367.920
—	Back, cabinet, coral	CS.462.669
—	Back, cabinet, grey	CS.462.671
—	Back, cabinet, ivory	CS.462.630
—	Back, cabinet, red	CS.462.672
—	Badge, Philips	CR.531.422
—	Bracket, cabinet back mtg., x3	CS.244.602
—	Bracket, chassis retaining, x2	CS.225.229
—	Bracket, speaker mounting, x3	CS.233.505
—	Cabinet, with grille, badge, dec. strip and Philips name—	
	Coral	CR.573.513
	Grey	CR.573.516
	Ivory	CR.573.515
	Red	CR.573.517
—	Clip, spring, I.F.T. mtg., x2	A3.652.58
4	Cord, dial drive 37" of cord required	
1	Drum, dial	CS.359.810
—	Grommet, gang mounting, x3	CS.422.468
—	Knob, control, x2	CR.523.731
—	Link, pick-up socket	CS.365.270
—	Lug strip, speaker transformer	C/F 245-2-6
—	Philips name	CS.436.446
8	Post	CS.237.019
—	Prism, dial scale	23.678.74
5	Pulley, dial	CS.359.618
—	Ring "C," tuning spindle, x2	CS.281.802
6	Ring, dial cord	CS.281.807
—	Scale, dial	CS.412.393
—	Screw, dial scale mtg., x2	CS.258.856
—	Socket, pick-up	CR.265.222
3	Spindle, tuning	CS.351.359
2	Spring, dial drum	CS.210.029
—	Spring, knob retaining, x2	CS.281.832
—	Strip, decorative	CS.430.920
—	Switch, tone control	CZ.222.007

DIAL CORD LAYOUT.
VIEW FROM FRONT OF CHASSIS.



PHILIPS RADIOPLAYER
MODEL 167
SPECIFICATIONS
(Subject to alteration without notice)

Power Supply ..... 200-250V, 40-50 c/s.
Tuning Range ..... 530-1620 kc/s.
Intermediate Frequency ..... 455 kc/s.
Cabinet ..... Bakelite mantel



VALVE EQUIPMENT AND VOLTAGE ANALYSIS

Valve Function	Valve No.	Valve Type	Plate Volts	Screen Volts	Osc. P. Volts	Bias Volts
Frequency Converter	V1	6AN7	223	40	40	—
I.F. Amplifier	V2	6BH5	223	40	—	—
Audio Amplifier, A.V.C. and Demodulator	V3	6BD7	55	—	—	—
Power Amplifier	V4	6M5	221	223	—	6.5
Rectifier	V5	6V4	Cathode — L13 C.T., 239V.			
Dial Lamp	V11	6.3V, 0.32A tubular screw				
Voltage across R13, —2.7V.						

NOTE: These voltages are measured with an "1,000 ohms per volt" meter and may vary ± 10% from the figures quoted. They are measured from the socket points indicated to chassis, or across the resistor listed. The receiver should be in a "no signal" condition.

TO REMOVE CHASSIS FROM CABINET.

Remove the power plug from the wall outlet socket. Pull the control knobs from their spindles. Remove the combined back and bottom cover. Unsolder the speaker voice coil connections from the lug strip alongside the output transformer. Unwind the dial cursor from the dial drive cord.

The chassis is held to the cabinet by two screws at the rear. Removal of these two screws and the associated mounting brackets and packing pieces allows the chassis to be withdrawn from the cabinet leaving the speaker and dial scale in the cabinet.

The chassis may be replaced by a reversal of the above procedure.

DIAL SCALE REMOVAL.

The dial scale is removed from the front of the cabinet. The control knobs must first be withdrawn. In removing the dial scale securing screws, care must be taken to ensure that damage is not caused to the scale by tools.

ALIGNMENT.

By making use of short length tools, alignment can be undertaken with the chassis in the cabinet.

I.F. transformer adjustments are:—
2nd I.F.T.—
Secondary — front screw
Primary — rear screw
1st I.F.T.—
Secondary — screw nearer 6N8
Primary — screw nearer 6AN7

Before commencing R.F. alignment, fully close the tuning capacitor and set the dial cursor to the stop mark which will be found at the bottom of the dial scale at the low frequency end. Use an 100 pF capacitor as dummy aerial for R.F. alignment. Trimming adjustments are: oscillator trimmer (1,420 kc/s, 3XY) front of tuning capacitor, aerial trimmer (1,420 kc/s) rear of tuning capacitor, padding (600 kc/s, 7ZL) iron core in oscillator coil.

In the event of replacement of the oscillator coil, it is advisable to make a preliminary peaking of the iron core at 600 kc/s before commencing alignment.

No attempt should be made to adjust the aerial coil iron core.

MAINS VOLTAGE ADJUSTMENT.

The power transformer is provided with two primary winding tappings—200/230 volts and 240/250 volts—for adjustment of the receiver to the supply voltage at the point of installation. The receiver is adjusted at the factory to the 240/250 volts tapping.

DIAL CALIBRATION ADJUSTMENT.

If dial calibrations are incorrect over the dial scale by an equal amount, the error can be corrected by sliding the cursor on the dial cord to the correct position.

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