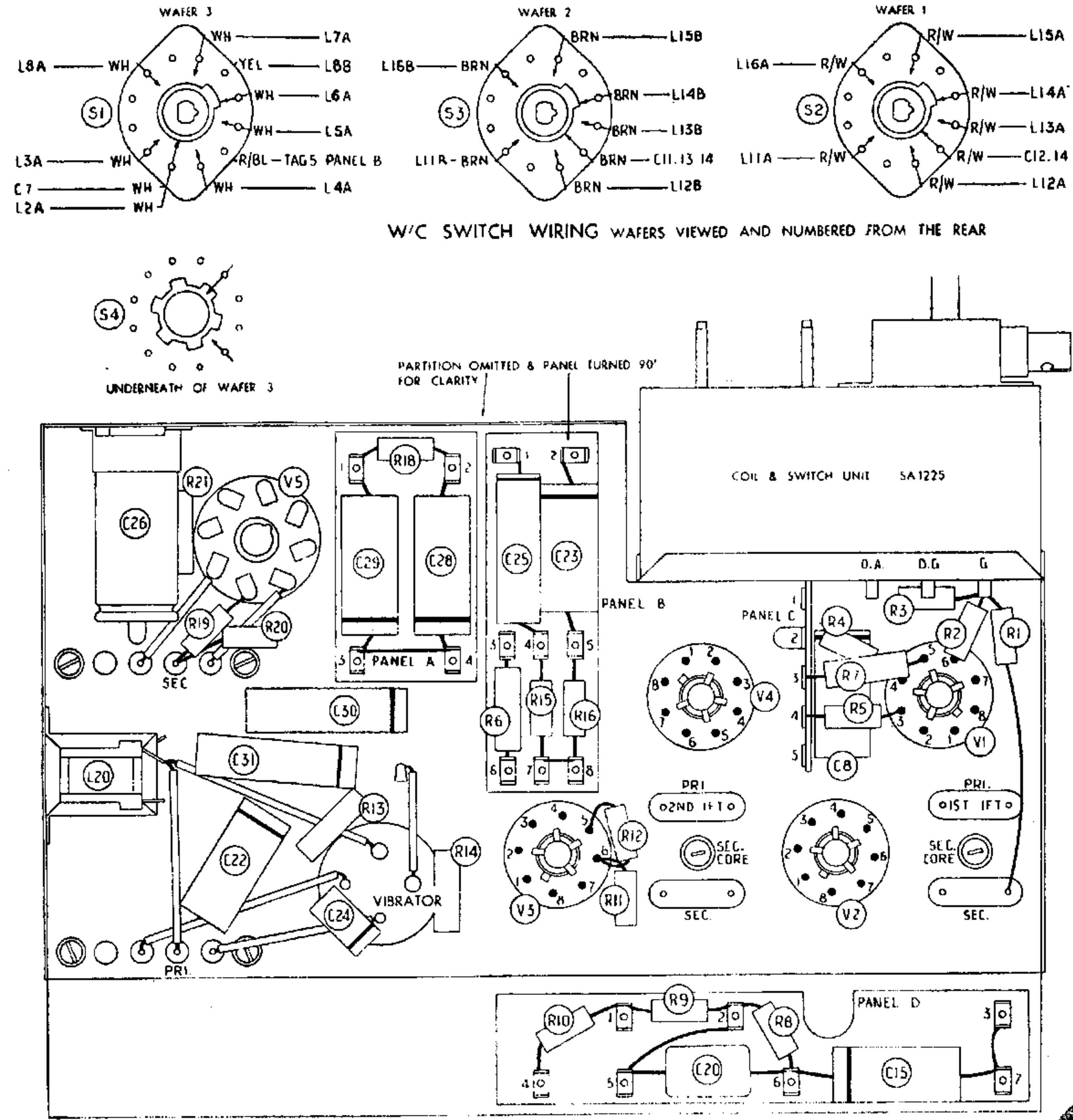
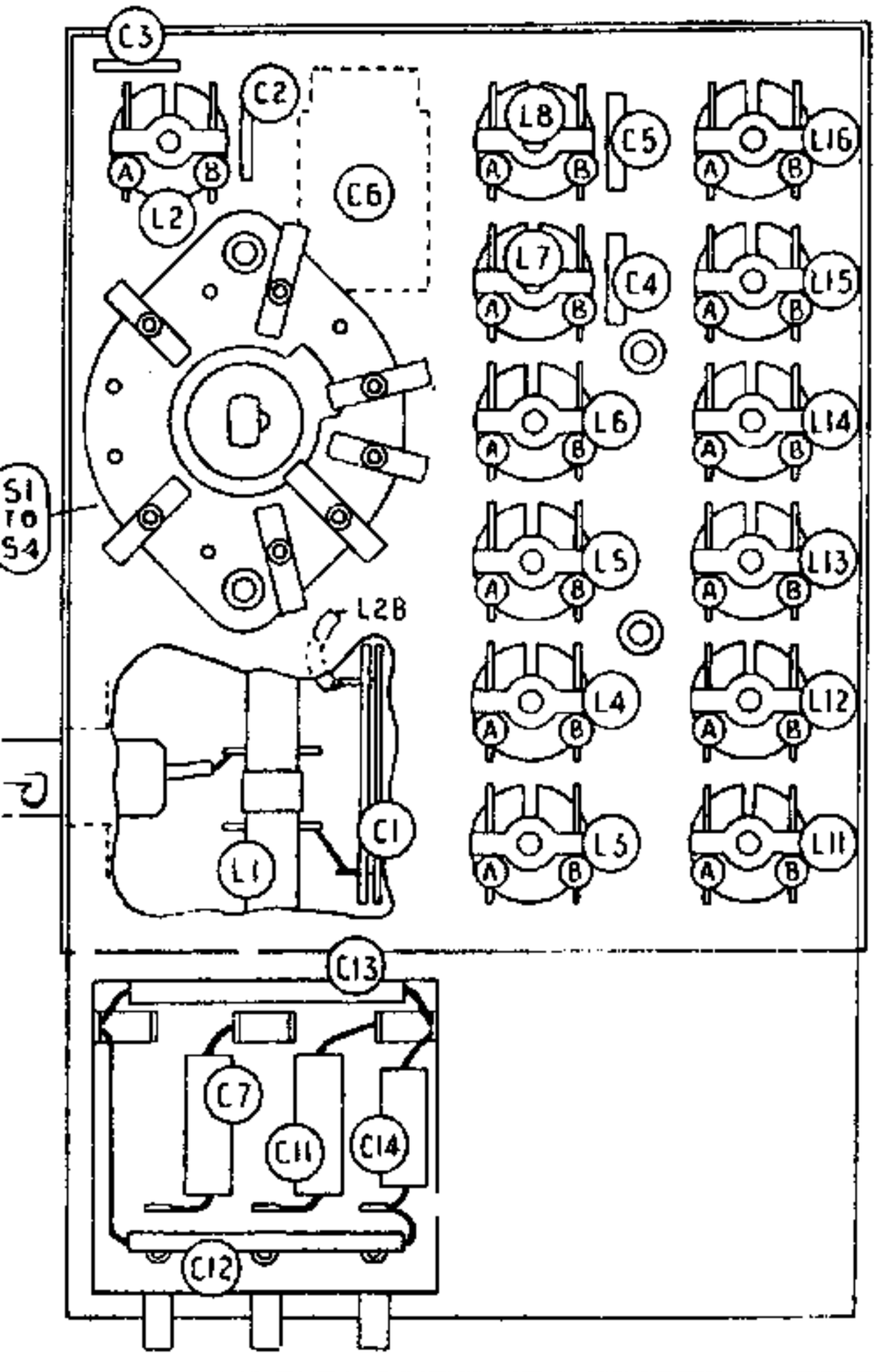
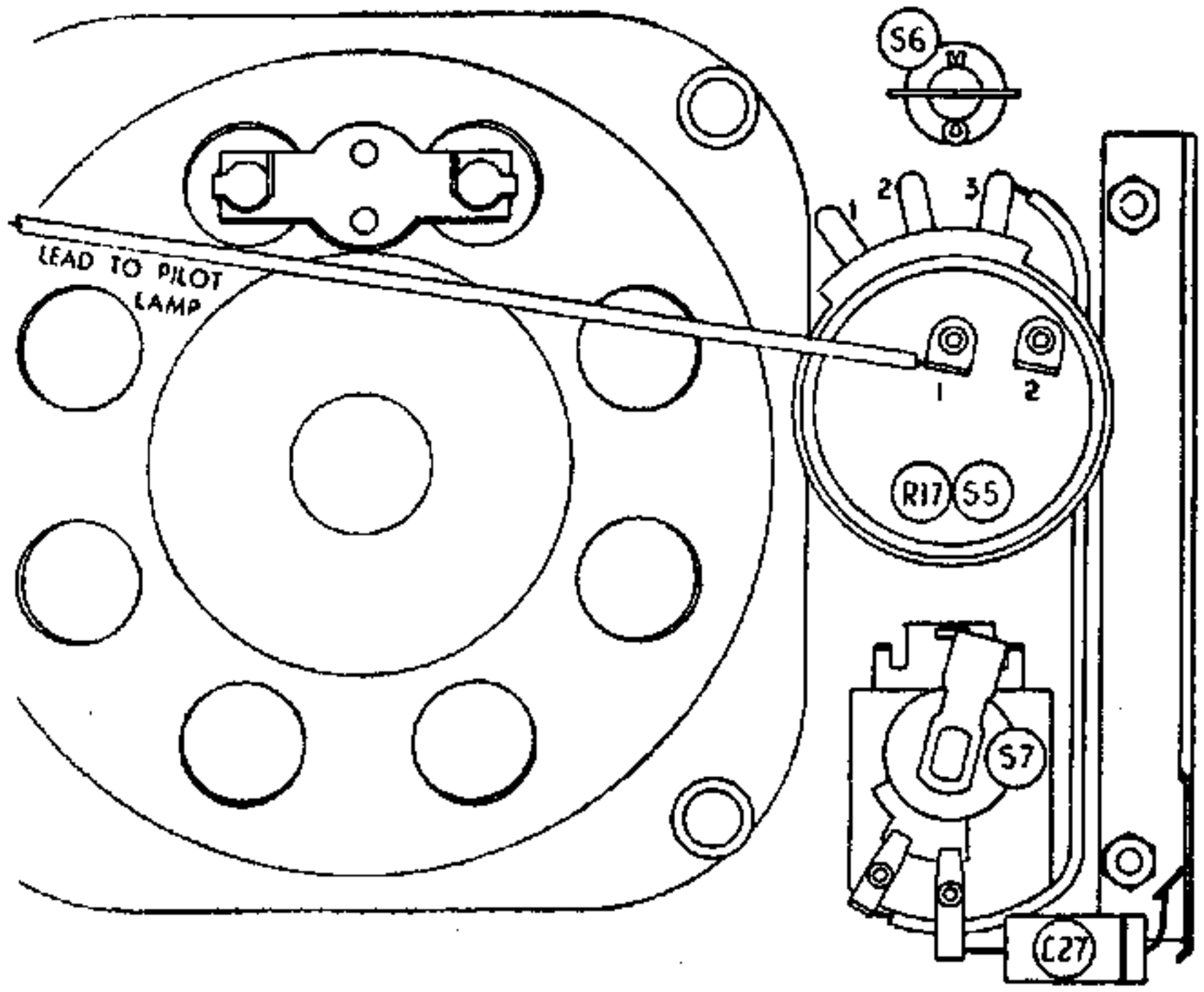
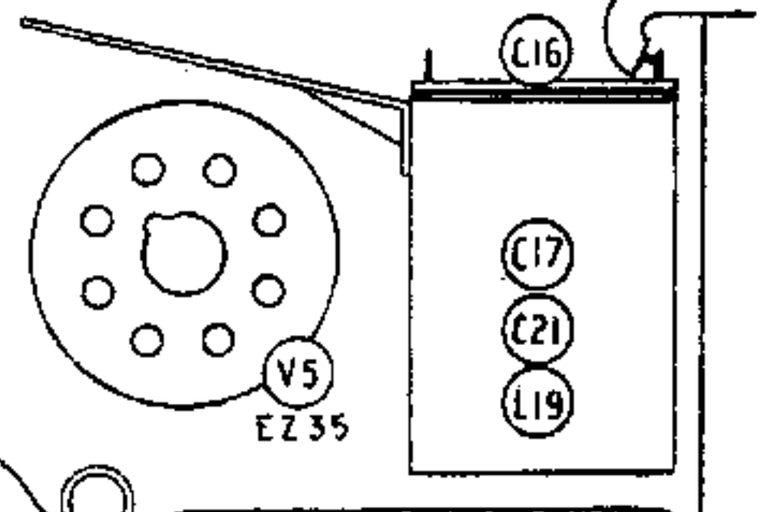
W/C SWITCH WIRING WAFERS VIEWED AND NUMBERED FROM THE REAR

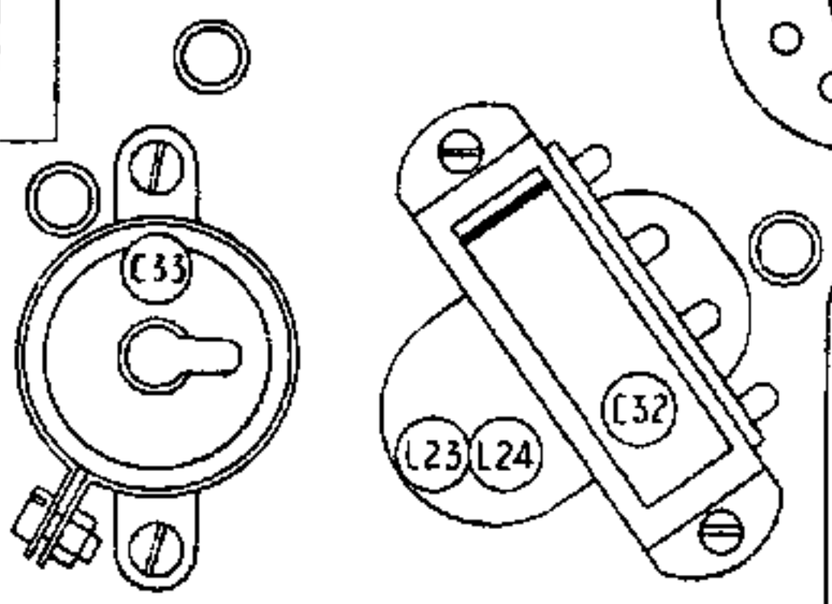


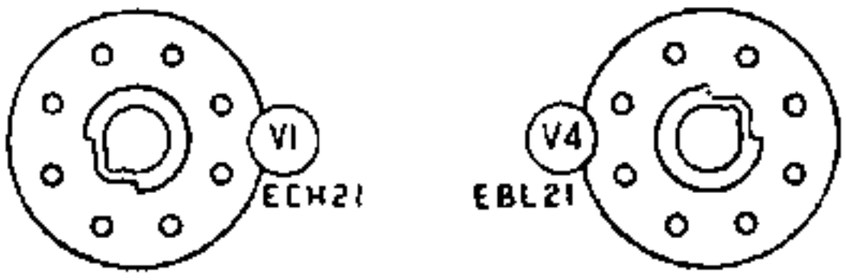
Positions of C.28, C.29 now reversed.

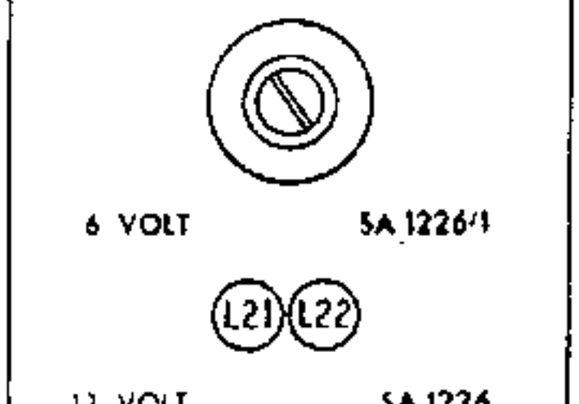


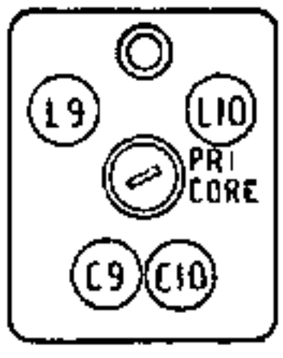




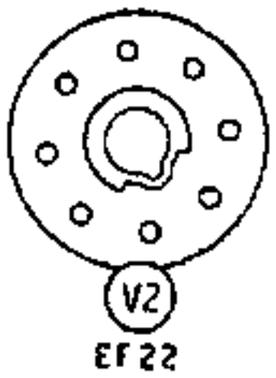




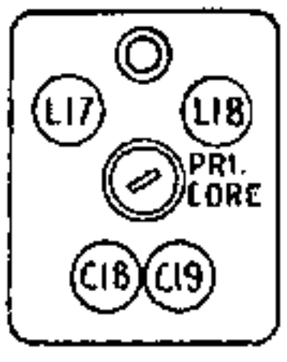




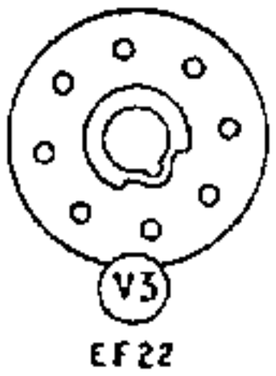
1ST. I.F.T.



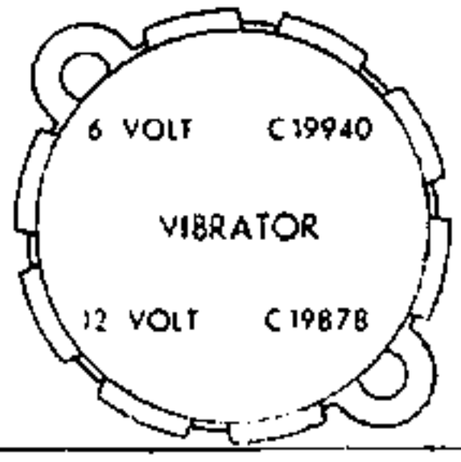
EF22



2ND. I.F.T.



EF22



MODEL CR32 is a five-valve, including rectifier, superheterodyne receiver, with pre-set tuning offering two L.W. and four M.W. stations. Later models 5 M.W. and 1 L.W. with consequent alteration to the circuit diagram at L.7. 15 (Page 3). It is designed for use in motor vehicles and draws its supply from the vehicle's accumulator. Requiring only the connection of the accumulator and aerial, the CR32 is otherwise completely self-contained. The concentric controls on the left are, centre knob—Volume ON/OFF and surround—a two-position tone control. The control on the right is the station selector.

BATTERY SUPPLY AND CONSUMPTION : 6 volts—4.2 amps, 12 volts—2.4 amps. In cases where the car chassis is positive earth, the battery connections of the CR32 will connect to the negative pole of the accumulator, and vice versa.

FUSES : 6v—10 amps. 12v—5 amps. Although these fuse ratings seem high compared with the current drawn, the initial surge of current when switching on has to be allowed for.

The fuse is inserted in the spring-loaded fuse socket on the receiver end of the battery lead. This socket should be examined to ensure that it contains an insulating sleeve as its absence will cause the fuse to be short-circuited.

VALVES : V1. ECH21 Frequency Changer. V2. EF22 I.F. Amplifier. V3. EF22 L.F. Amplifier. V4. EBL21 2nd det. L.F. Power Amplifier. V5. EZ35 I.H. Full-wave Rectifier.

V1 to V4 have Loctal bases. V5 has an international octal base. All valves are Mullard.

WARNING. On the 12v model the valve heaters are wired in series parallel. Do not remove any valve while the set is switched on to the supply, as overloading of the remainder will result in either deterioration or damage.

NON-SYNCHRONOUS VIBRATOR : 6 volt Vibrator—Part No. C.19940. 12 volt—C.19878.

PILOT LAMP : 6v model—6v .06 amp. 12v model—12v 1 watt. Both types are centre contact, screw type.

INTERMEDIATE FREQUENCY : 465 Kcs. I.F. Transformer primaries and secondaries are tuned by iron dust cores.

CIRCUIT DETAILS : Signals from the aerial pass through a U.H.F. filter L.1, C1., an I.F. filter L.2, C.2, and a series aerial condenser C.5 to V.1 grid circuit. The U.H.F. filter is effective over the accepted band width of spark interference. The I.F. filter is

---

SERVICE DEPT. E. K. COLE Ltd.
Somerton Works, Arterial Road
Southend-on-Sea
Phone: Southend 2296
Head Office: Ekco Works, Southend-on-Sea

permeability tuned to 465 Kcs to suppress any break-through of signals at or about the intermediate frequency. C.6, the aerial trimming condenser, when set in conjunction with the aerial capacitance, forms a suitable shunt capacity to allow the grid coils to be resonated over their allotted ranges.

Signal voltages developed in the tuned grid circuit are coupled by C.7 via the grid stopper R.2 to G.1 of V1.

The oscillator circuit formed by the coils and C.12, C.13, C.14 is a Colpitt's type and operates on the high frequency side of the aerial signal. C.11 is a D.C. blocking condenser and R.4 the oscillator grid leak.

The beat or intermediate frequency appearing in V1 anode circuit is coupled by I.F.T.1 to V2, amplified and coupled by I.F.T.2 to V4 diode circuit for demodulation. C.20 is an H.F. by-pass condenser. The rectified L.F. component developed across the diode load, R.8, is passed via the potentiometer formed by R.9, R.10, partly to V3 control grid (through the decoupling resistor R.11) and partly through R.10 as A.V.C. voltage. The function of R.12, S.6 is described under switching details.

From V3 anode, the amplified output is R.C. coupled by C.25, R.17 to the pentode section of V4 for final amplification before being fed by the output transformer to the loudspeaker.

A.V.C. voltage is filtered by R.10, C.15, R.1 and applied to the grid circuits of V1 and V2.

Bias is developed in the H.T. return lead across R.20 and filtered by the network R.19, C.29, R.18, C.28 before being fed via R.17 to V4 pentode grid and R.3 to V1 grid.

Prior to the ON/OFF switch S.5, in the input lead is included a U.H.F. filter L.19, C.16, and an additional 0.1 mfd condenser C.17 to prevent any interference carried by the car's battery circuit from reaching the receiver by way of the H.T. system and heater wiring. Between the vibrator and the valve heaters connection is a filter to keep vibrator hash and ripple from the heaters and car wiring.

The interrupted D.C. caused by the operation of the vibrator contacts induces an A.C. voltage across L.21, the vibrator transformer primary. This, in turn, induces a higher A.C. voltage across the secondary (L.22) which is rectified by V5 to provide the H.T. supply. The transformer secondary (L.22) is tuned by C.30, C.31 to minimise sparking at the vibrator contacts. R.13, R.14, C.24 further reduce sparking and thus eliminate R.F. interference. D.C. output of V5 is smoothed by C.33, R.21, C.26.

SWITCHING DETAILS : Switches S.1, 2, 3, and 5 are obvious and need no explanation. S.4 reproduced under wafer 3 in the diagrams, is a muting switch. Ganged along with S.1, 2, 3, it short circuits G.2 of V3 to chassis during the interval of time between the break and remake of these switches.

S.6 is the spring-loaded switch in the top left of the front plate and constructed to close when the fascia is removed. When the switch is normal (open), the A.V.C. circuits function resulting in an apparent flattening of the tuning. This condition makes it difficult to adjust the pre-selector controls aurally, as the ' peak ' is hardly noticeable, especially to the ear.

With S.6 closed, as it will be when the pre-selectors are exposed, R.12 is connected to chassis to complete an additional potentiometer in V3 grid circuit. The main effect resulting, is the removal of sufficient A.V.C. voltage to make the aerial tuning peaks more pronounced.

S.7 is a two-position tone control switch.

CHASSIS REMOVAL : Assuming that the complete receiver has been removed from the car, remove the two P.K. self-tapping screws from the top rim of the front plate, the two on the lower rim, then the two 4BA screws at the back. The metal body can now be slipped off. Remove the fascia by unscrewing the four captive screws above and below the loud-speaker grille.

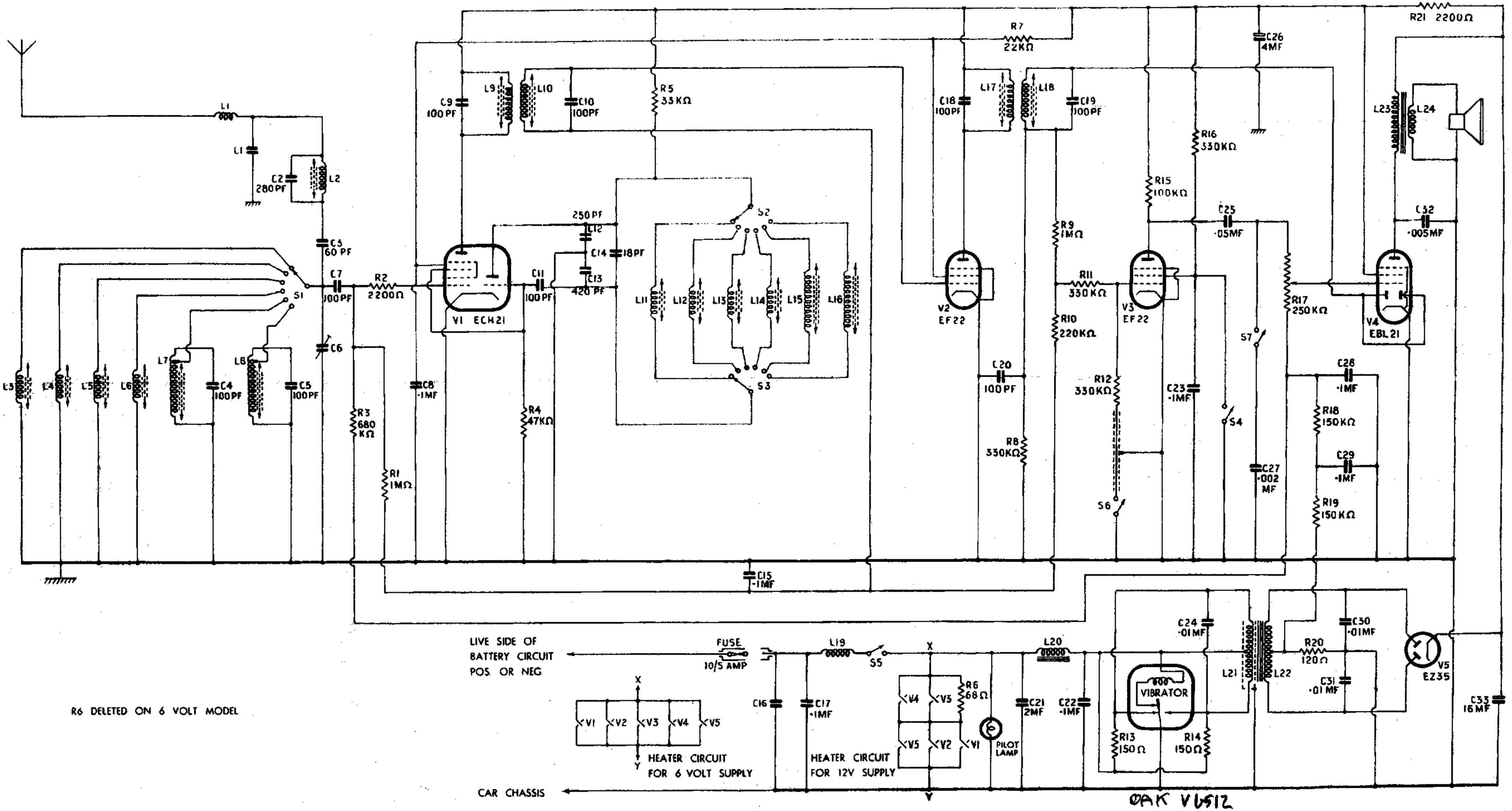
COMPONENT REMOVAL : As some of the components appear difficult to replace the following information is given to save unnecessary dismantling.

Front Plate Assembly : Remove the fascia and control knobs if desired. Unsolder the two loud-speaker leads, then the three leads and the three resistors from the lower rear of the coil and switch unit.

Remove the five 4BA screws securing the side wings to the main chassis, then ease the front plate forward slightly. Unsolder the battery input lead from C.16 and the two leads from the battery filter unit to S.5.

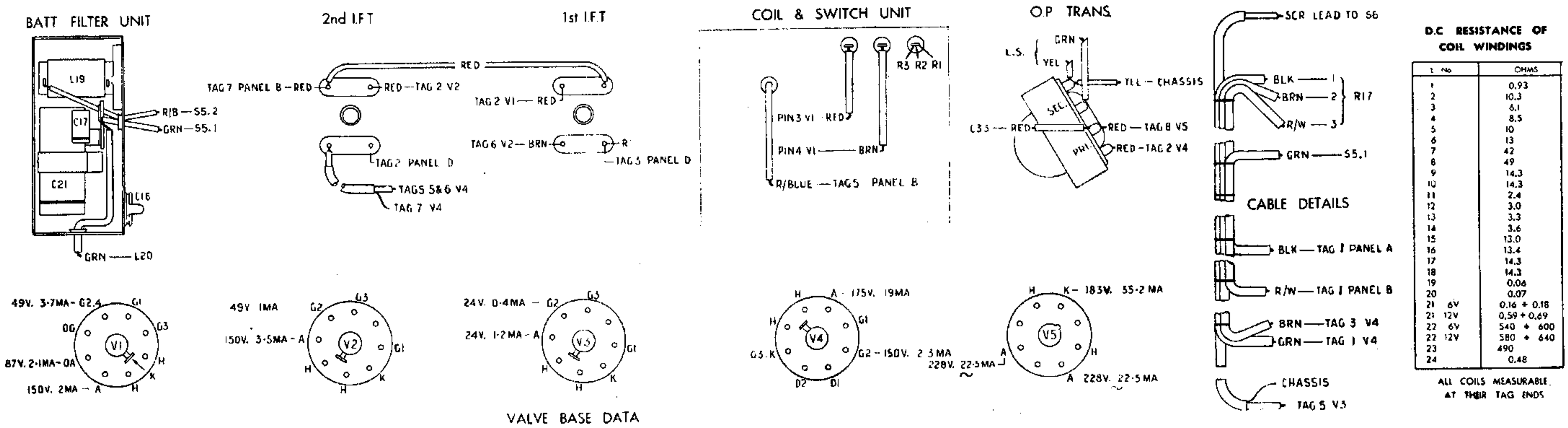
The complete front plate assembly can now be drawn clear to the extent of the cable form. Unsolder these connections as and if necessary. A replacement guide for all these removed connections is included in the diagrams.

(Continued page 4)



CIRCUIT DIAGRAM

Values of R.1, R.3 now reversed.



D.C RESISTANCE OF COIL WINDINGS

Tag No	OHMS
1	0.93
2	10.3
3	6.1
4	8.5
5	10
6	13
7	42
8	49
9	14.3
10	14.3
11	2.4
12	3.0
13	3.3
14	3.6
15	13.0
16	13.4
17	14.3
18	14.3
19	0.06
20	0.07
21 6V	0.16 + 0.18
21 12V	0.59 + 0.69
22 6V	540 + 600
22 12V	580 + 640
23	490
24	0.48

ALL COILS MEASURABLE AT THEIR TAG ENDS

Coil and Switch Unit : Remove the front plate assembly (see page 2) then remove the two 4BA screws between the two rows of adjustors and the 4BA Rd. Hd. screw below the selector spindle. The unit can now be lifted clear.

Before trying to remove the lid covering this unit, first clean the three outlet tags of surplus solder, etc., to enable them to pass through the insulating strip without breakage.

Pilot Lamp : Remove the fascia and selector knob. Unscrew the three self-tapping screws on the small plate now exposed. *Do not pull this plate clear*, but just turn it sufficiently to enable the pilot lamp to be handled.

Battery Filter Unit : Remove the front plate assembly as above, then unsolder the lead from the unit to L.20. Remove the base mounting screws on the 4 mfd condenser, C.26. Moving this condenser to one side will expose two P.K. screws. Remove these and the unit can be lifted off.

Output Transformer : Unsolder the six leads from the tag panel. One securing nut is accessible between C.30 and C.31 underneath the chassis, the other being covered by panel A alongside V5. Snip the wire from tag 3 to chassis and unsolder the lead from tag 1. Remove the two 6BA panel securing screws and lift the panel over V5 socket to expose the nut concerned.

I.F. ALIGNMENT. *Note.*—When adjusting each I.F.T. core, two peaks will be noticed, one each side of the coil centre. Tune to the first peak encountered when screwing in. Connect the receiver to the battery and switch on. Turn the station selector to position 3 (low frequency end of medium waveband) and connect output meter to the loud-speaker tags. 1st I.F.T. is marked with a red spot, 2nd I.F.T. is marked with a blue spot—in each case between Pri. winding tags.

Inject a modulated 465 Kcs signal via a 0.1 mfd Condenser to the grid G.1 of V1. Adjust all I.F.T. cores for maximum output in the following order ; 2nd I.F.T. lower and upper, 1st I.F.T. lower and upper, reducing the signal input as necessary when peaking.

I.F. FILTER ADJUSTMENT : Remain on position 3 and inject a 550 Kcs signal into aerial socket then adjust the cores of L.14 and L.6 for maximum output. Inject a 465 Kcs signal then adjust the core of L.2 for minimum output.

COIL UNIT ALIGNMENT. *Note.*—In order to ensure that the adjustors will cover their allotted ranges in accordance with the station setting details in the Instruction Booklet, the coil unit should be re-aligned as follows :

Switch to position 6 (HF end of M W. band) and inject a 200 metres (1,500 Kcs) signal to the aerial socket via a capacity of approx. 100 pf.

Fully unscrew the core of L.3 (see footnote) then adjust L.11 core and C.6 trimmer for maximum output. C.6 is now correctly set to match the circuits to the dummy aerial in use and all adjustors (including No. 6) may now be reset to the required wavelengths, the calibration being in accordance with the printed instructions.

Note.—Do not use unnecessary force when fully unscrewing the adjustors as this may cause the iron dust cores to be broken from the brass stems.

AERIAL MATCHING : When the set is finally installed in the car, the only adjustment necessary will be as for the initial installation, i.e. switch to the weakest station of positions 3, 4, 5 or 6 and re-adjust C.6 for maximum output.