PHILIPS RADIOGRAM

MODEL FZ956A

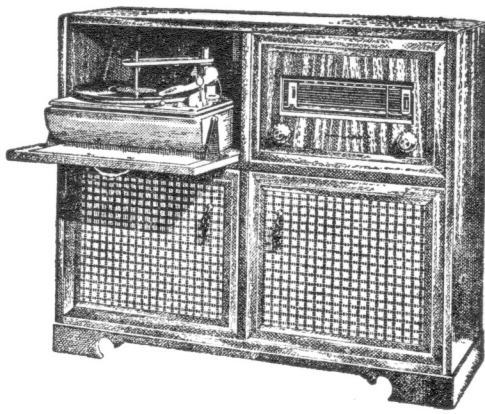
SUPERHETERODYNE RECEIVER

Mains supply: 210-250 volts 50 c/s 43 watts

Intermediate frequency: 455 kc/s

Wave Ranges: Broadcast 535—1740 kc/s
Shortwave 5.5—19 mc/s
Bandspread 25 and 31 metre bands

Record-changer: Philips Model AG 1000 3-speed automatic, 230 volts, 10 watts.



REMOVAL FROM THE CABINET

Remove the mains plug from the supply. Remove the back board. Disconnect the speaker lead and pickup lead from the screw terminals on the back of the chassis. Loosen off the screws in the bakelite-clad connector and remove the gram. motor supply cable, and tape up the base leads with a piece of insulating tape. Remove the four push-on type knobs. Two cabinet executions of this model have been manufactured, one with the speaker compartment under the chassis; the other with the record storage compartment under the chassis. In the first case, the chassis mounting screws are accessible from within the speaker compartment, but in the second case it will be necessary to remove the chassis mounting board by the removal of the two wood screws. To replace the chassis, reverse the above procedure. Care should be taken when replacing the two large feed-through control knobs, to see that the felt bearing washers glued to the cabinet are not pushed out of place.

ALIGNMENT OF THE RECEIVER:

The chassis should be fitted in the cabinet before alignment adjustments are commenced. Switch on the receiver and allow it to warm up for a few minutes. Turn the tuning condenser to minimum capacity. See that the wave-band switch is in the "Broadcast" position. Turn the volume control to the maximum position, and the tone control to the "treble lift, bass lift" position. Unscrew the adjusting cores on the I.F. transformers nearly right out.

Apply a signal of 455 kc/s modulated 400 c/s 30% to the control grid of the converter valve ECH81, through a 0.01 mfd condenser and adjust for maximum output in the following sequence:

1. Diode coil;
2. EBF80 plate coil;
3. ECH81 plate coil;
4. EBF80 grid coil.

If the above adjustments are carefully carried out no further adjustments should be made. Seal the I.F. adjusting slugs. The sensitivity should be less than 40 microvolts for 50 milliwatts output. Remove the 0.01 mfd condenser from the control grid of the ECH81 valve, and connect the signal generator by means of a standard dummy aerial to the aerial and earth connections of the receiver. Turn the tuning condenser to the maximum capacity position and adjust the pointer at the low-frequency end of the dial scale. Turn the broadcast aerial and oscillator trimmers to their mid-capacity positions.

Apply a signal of 600 kc/s to the aerial and turn the pointer to the 600 kc/s position on the scale. Adjust the broadcast oscillator padder until the signal is tuned in. Adjust the coil on the Ferroxcube rod aerial by sliding the coil along the rod with an insulated stick. Use a small piece of cellulose tape to hold the coil in place until final adjustments are made. Turn the pointer to the 1500 kc/s position on the dial scale and apply a signal of 1500 kc/s to the aerial. Adjust the broadcast oscillator trimmer until the signal is tuned in and adjust the broadcast aerial trimmer for maximum output. Check at 600 kc/s and again at 1500 kc/s, and adjust if necessary.

Check the sensitivity and calibration at 950 kc/s. If the calibration is not correct, the sensitivity will be low, and if 950 kc/s tunes in at a lower frequency on the scale, the oscillator inductance adjusting slug should be screwed in, slightly over-correcting, and the oscillator padder adjusted to correct 600 kc/s, and the oscillator trimmer to correct 1500 kc/s.

If 950 kc/s tunes in at a higher frequency on the scale, then the oscillator inductance adjusting slug should be screwed out, again slightly over-correcting and the oscillator padder adjusted to correct 600 kc/s and the oscillator trimmer to correct 1500 kc/s.

The connection of a signal generator to the aerial terminal damps the rather high "Q" value of the Ferroxcube rod aerial. For optimum results from the rod aerial the signal from the generator may be induced into the rod by connecting the signal generator to a loop of approximately six turns, 6 inches in diameter and the rod aerial coil and aerial trimmer finally adjusted at 600 kc/s and 1500 kc/s respectively. This means that when no external aerial is used the rod aerial will give maximum performance, and when a good external aerial is used the effect of the damping is offset by the increased signal. When all broadcast adjustments are completed, seal the trimmers, the oscillator coil inductance slug and the aerial coil to the rod with wax. The sensitivity on broadcast should be less than 15 microvolts input for 50 milliwatts output.

SHORTWAVE

Turn the wave band switch to the shortwave band position. Screw the oscillator trimmer to maximum capacity, and the oscillator padder to the mid position. Set the pointer to the 17 mc/s position on the scale and apply a signal of 17 mc/s to the aerial. Turn the oscillator trimmer out until the second signal is tuned in, and adjust the shortwave aerial trimmer for maximum output, rocking the tuning either side of the signal, as the aerial adjustment is made. Turn the pointer to the 6 mc/s position on the scale and apply a signal of 6 mc/s to the aerial terminals of the receiver. Adjust the shortwave oscillator inductance until the signal is tuned in and adjust the shortwave aerial inductance for maximum output. Turn the pointer to the 17 mc/s position on the scale, apply a signal of 17 mc/s to the aerial and readjust as before for calibration and sensitivity. Apply a signal of 10 mc/s to the aerial and check the calibration at 10 mc/s. If the calibration is

not correct, the oscillator inductance should be adjusted, slightly over-correcting as in broadcast, and adjust the 17 mc/s position with the shortwave oscillator trimmer and the 6 mc/s position with the shortwave oscillator padder. The oscillator padder must be adjusted with an insulated trimmer tool, as the outside plates are at the oscillator grid potential (see circuit diagram C10). After the shortwave band has been correctly aligned and satisfactory calibration and sensitivity obtained, seal the trimmers and adjusting slugs. The sensitivity should be less than 20 microvolts input for 50 milliwatts output.

BANDSPREAD, 25 and 31 metres

Turn the wave band switch to the "Bandspread" position. Before alignment of bandspread is attempted it is advisable to have available an accurate 1000 kc/s and 100 kc/s harmonic generator, capable of giving reasonable output up to 12 mc/s, so that the calibration and setting of the signal generator may be checked as alignment proceeds.

Turn the 25 metre bandspread oscillator trimmer to minimum capacity. If the receiver has been previously aligned it will be necessary to replace the two wire trimmers C4 and C8, allowing adequate time for them to cool down after soldering. Apply a signal of 9.6 mc/s to the aerial and turn the pointer to the 9.6 mc/s position on the scale, adjust the 31-metre band oscillator wire trimmer until the second peak is tuned in. Turn the pointer to the 11.8 mc/s position on the dial scale and apply a signal of 11.8 mc/s to the aerial. Adjust the 25 metre band oscillator trimmer by increasing its capacity until 11.8 mc/s is tuned in. Check the calibration at 9.6 mc/s and it will be found necessary to slightly reduce the capacity of the 31 metre band oscillator wire trimmer. Check and, if necessary, adjust the calibration at 11.8 mc/s, repeating the above until the calibrations at 11.8 mc/s and 9.6 mc/s are accurately placed on the dial scale.

Turn the pointer to the 11.8 mc/s position on the scale and apply a signal of 11.8 mc/s to the aerial. Adjust the aerial bandspread wire trimmer for maximum sensitivity, removing the wire until the second peak is reached.

Check the sensitivity at 9.6 mc/s and see that the image is on the correct side of the signal. Since the oscillator is at a frequency higher than the signal frequency on the 31 metre band it should be possible to tune in an applied signal of 10.51 mc/s as well as 9.6 mc/s at the 9.6 mc/s position on the scale. On the 25 metre band, the oscillator is at a lower frequency than the signal frequency, so that at the 11.8 mc/s position on the scale it should be possible to tune in an applied signal of 10.89 mc/s. If the aerial circuit is correctly adjusted then the two image frequencies should require a greater input from the signal generator than the fundamental to obtain standard output.

When all adjustments are completed, seal all trimmers and adjusting slugs.

The sensitivity at the check points 11.8 mc/s and 9.5 mc/s should be less than 30 microvolts input for 50 milliwatts output, into a 7 ohm load.

VOLTAGE TABLE

All readings taken with a primary input of 230 volts 50 cycles. Full load primary current should not exceed 220 mA.

Valve	Function	Filament	Plate	Screen	Cathode
ECH81	Frequency converter and oscillator	6.2	Conv. 225 / Osc. 95	60	—
EBF80	I.F. Amplifier, demodulator and delayed A.V.C.	6.2	225	60	—
EBC41	Audio voltage amplifier	6.2	100	—	—
EL84	Power output pentode	6.2	240	225	6.7
AZ41	Full-wave directly heated rectifier	4.0	290/290	—	285
DM70	Tuning indicator	1.0	80	—	—
8045D	Panel lamps	6.2	—	—	—

The above voltages are measured between the points indicated and chassis with a meter having a resistance of 20,000 ohms per volt on D.C. ranges and 1,000 ohms per volt on A.C. ranges. Variations up to ± 5% are permissible. Band switch in position "Broadcast", tuning condenser at maximum capacity.

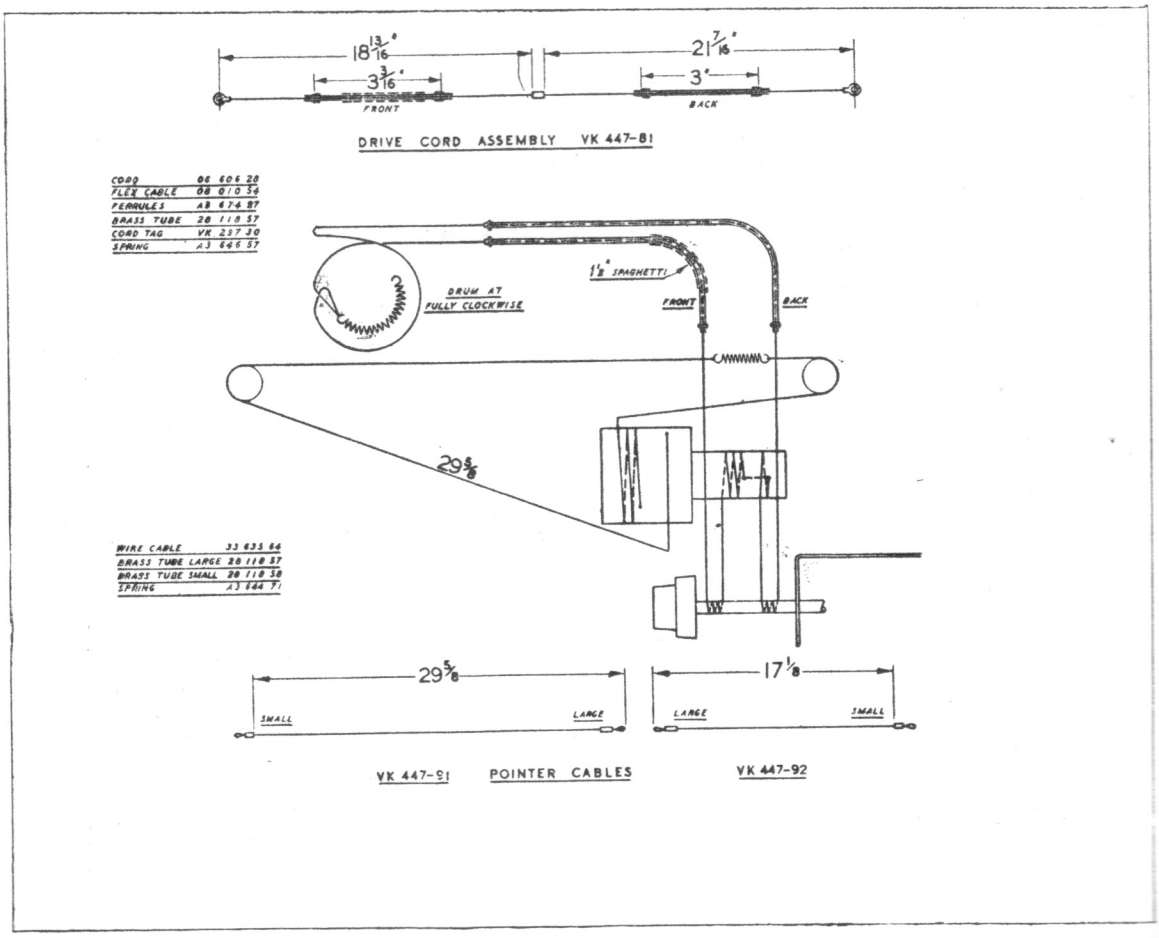
COIL AND TRANSFORMER RESISTANCES

VK 469 70	Ferroxcube rod aerial coil	Tuned	0.95 ohms
VK 469 55	Aerial coil, shortwave	Primary	1.5 ohms
		Tuned	0.16 ohms
VK 471 50	Oscillator coil, broadcast	Tuned	6.4 ohms
		Feedback	2.85 ohms
VK 471 37	Oscillator coil, shortwave	Tuned	0.17 ohms
		Feedback	0.345 ohms
		Padder	1.5 ohms
A3 126 84	1st and 2nd I.F. transformers	Primary	8.4 ohms
		Secondary	4.7 ohms
VK 671 03	Output transformer	Primary	460 ohms
		Secondary	0.925 ohms
		Feedback	28 ohms
VK 631 02/01	Power transformer	Primary	38 ohms
		6.3v. Filament	0.15 ohms
		Secondary	325 ohms
			380 ohms
		4v. Filament	0.21 ohms

REPLACING THE GANG DRIVE CORD AND POINTER DRIVE CABLE:

Unscrew the pilot lampholders from the dial mounting board. Lift the spring clip and release the DM71 tuning indicator from its escutcheon. Remove the pointer drive cable from the large bakelite drum and remove the dial mounting board assembly. Remove the bakelite pointer driving drum by loosening off the three screws. Turn the tuning condenser to the maximum capacity position and attach the spring A-364-657 securely to the drum by bending the lug of the drum over one end of the spring. The small bakelite drum has a slot across the rim, and two small grooves to position the drive cord. Under the slot is a round hole into which the brass tube on the cord is fitted, with the long end of the cord ($21\frac{7}{16}$") towards the back of the drum. When the slot is in the 2 o'clock position, a hole in the shaft mounting bracket above the chassis will line up with a hole in the rear of the drum. A short pin placed in these two holes will hold the drum in position during the threading-up operations. The longer end of the cord makes one complete turn round the drum in a clockwise direction, then passes over the tuning spindle, making $2\frac{1}{2}$ turns in a clockwise direction, progressing towards the chassis. The brass ferrule on the end of the 3" flex cable fits into the left-hand slotted hole in the drum mounting bracket, and the ferrule on the other end of the 3" flex cable fits into the rear slot on the tuning condenser pulley mounting bracket. The front part of the cord ($18\frac{13}{16}$") makes $2\frac{1}{2}$ turns round the drum in an anticlockwise direction, then passes under the tuning spindle, making $2\frac{1}{2}$ turns in an anticlockwise direction, progressing away from the chassis. The brass ferrule on the end of the $3\frac{3}{16}$" flex cable fits into the right-hand slotted hole in the drum mounting bracket, and the ferrule on the other end of the flex cable fits into the front slotted hole in the pulley mounting bracket on top of the tuning condenser. This end of the cord then passes round the tuning condenser drum in an anticlockwise direction, through the hole in the side of the drum, over the capstan, and the tag on the end of the cord attaches to the end of the spring. Remove the pin holding the bakelite drum in position and pass the back cord round the tuning condenser drum in a clockwise direction. Do not pass the cord round the pulley, as shown in the diagram, but thread the cord through the hole in the side of the drum, round the capstan, and hook the cord tag over the spring. By turning the tuning spindle in a clockwise direction, tension will be put on the cord, so that slack will appear in the back cord, which can then be placed easily round the pulley. Turn the drive shafts a few times to equalise the tension over the cord, and, if necessary, place the turns on the drum and shaft so that they do not bind. Replace the larger diameter bakelite drum with the three screws so that when the tuning condenser is in the maximum capacity position the longest slot in the rim of the drum is in approximately the 12 o'clock position.

Replace the dial mounting board assembly, making sure that the driving pin for the wave-band indicator fits into the slot on the indicator plate. Check that the dial mounting board is vertical with respect to the chassis, and securely tighten the four mounting screws. Replace the pilot lampholder assemblies. With the tuning condenser in the maximum capacity position, place the small brass clamp (28-118-58) of the $29\frac{5}{8}$" piece of cable (VK-447-91) in the longest slot in the drum and pass the cable round under the drum in a clockwise direction for half a turn. Place the cable over the left-hand pulley, then, keeping a little tension on the cable with the tuning spindle, turn the tuning condenser to minimum capacity. An elastic band should be used now to keep some tension on this cable while the second cable is fitted. When the tuning condenser is in the minimum capacity position the short slot in the rim of the drum should be in approximately the 11 o'clock position. Place the small brass clamp of the $17\frac{1}{8}$" piece of cable (VK-447-92) in the short slot of the drum and pass the cable round the drum, making two turns in an anticlockwise direction, then over the right-hand pulley. Join the two cables together with the spring A3-644-71 as shown in the diagram. The cables should now be adjusted on the drum so that they do not cross. Turn the tuning condenser to the maximum capacity position and attach the pointer to the cable, and adjust the pointer at the low-frequency end of the scale.



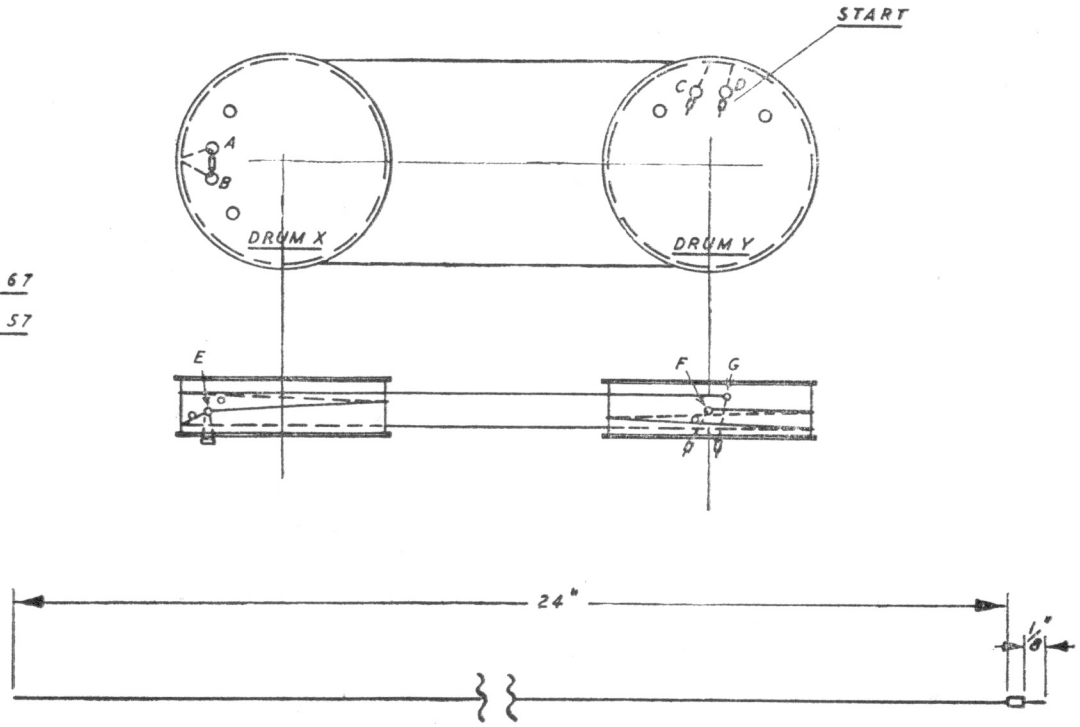
REPLACING THE TONE CONTROL DRIVE CABLE

Turn the drums to the position shown in the diagram (tone control in the low position). With the cable shown in the diagram, push the free end through the hole "D" in the drum "Y", then up through hole "G" making a quarter turn in an anticlockwise direction round drum "Y" and 1¼ turns round drum "X" in an anticlockwise direction. Feed the cable through holes "E" and "A", and slide a cable clamp (28-118-57) over the cable.

Pull the cable tight and pinch the clamp securely. Push the cable through hole "B", then through hole "E" again, and pass the cable round drum "X", a quarter turn in an anticlockwise direction. Pass the cable under drum "Y" for 1½ turns in an anticlockwise direction then through holes "F" and "C". Slide a cable clamp over the cable, pull tight, and clamp securely. Cut off superfluous end of cable.

CABLE 33 635 67

3 TAGS 28 118 57



TONE CONTROL CABLE ASSEMBLY VK 447-82

REMOVAL OF THE RECORD-CHANGER AG1000 FROM THE CABINET:

Remove the mains plug from the supply. Loosen off the pickup terminal screws on the back of the chassis and release the pickup cable. Remove the mains supply cable from the bakelite-clad connector. Open the door of the changer compartment and release the two counterbalance springs from the screw eyes in the top of the cabinet. Remove the four screws holding the mounting plate to the mounting spring. Check that the two cables are free, then lift the unit clear of the motor board. For service and adjustment see the separate document for the three-speed automatic record-changer type AG1000.

When replacing the unit, place the 12″-10″-7″ selector on the right-hand front corner in the 7″ position, so that the mounting spring fits on to the mounting plate.

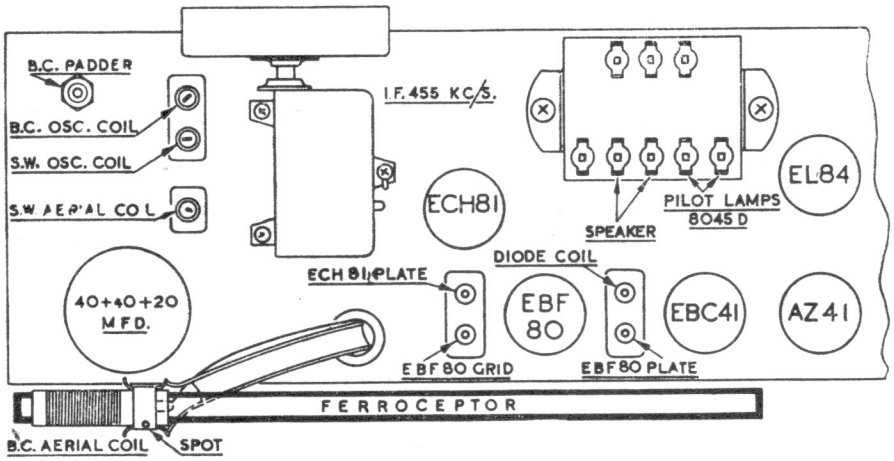
LIST OF SPARE PARTS

Knob, wave band	A3 736 07
Knob, tuning and volume	A3 735 15
Knob, tone	A3 736 07.1
Knob, spring	A3 526 08
Dial scale	VK 852 15
Pilot lamp holder	VK 286 04
Wave band indicator plate	VK 770 00
Wave band switch	VK 421 45
Volume control	48 900 00/DL
	M4 + 1M6
Tone control	B1 639 40
Tuning condenser assembly	49 001 42
Friction spring for controls	A3 652 97
Volume control drum	VK 691 38
Tone control drum	VK 691 39
Volume control spacer	SP4 0187
Volume control friction washer	A3 564 12
"C" ring for volume control shaft	07 891 86
Volume control shaft	VK 005 24
Wave band switch link assembly	VK 929 11
Wave band indicator lever	VK 065 04
Tuning spindle	A3 433 23
"C" ring for tuning spindle	07 891 85
Ferroxcube rod	56 681 23/4B

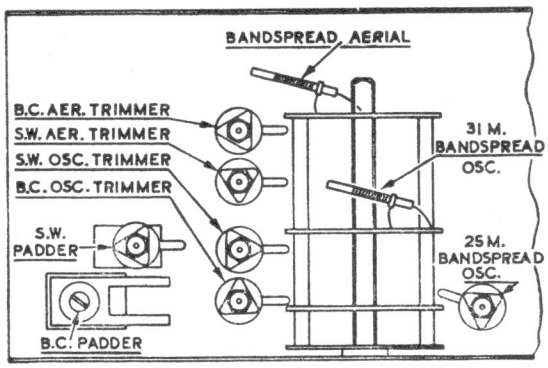
For all drive cord and cable spares, see diagrams.

For all coils and transformer part numbers, see circuit diagram.

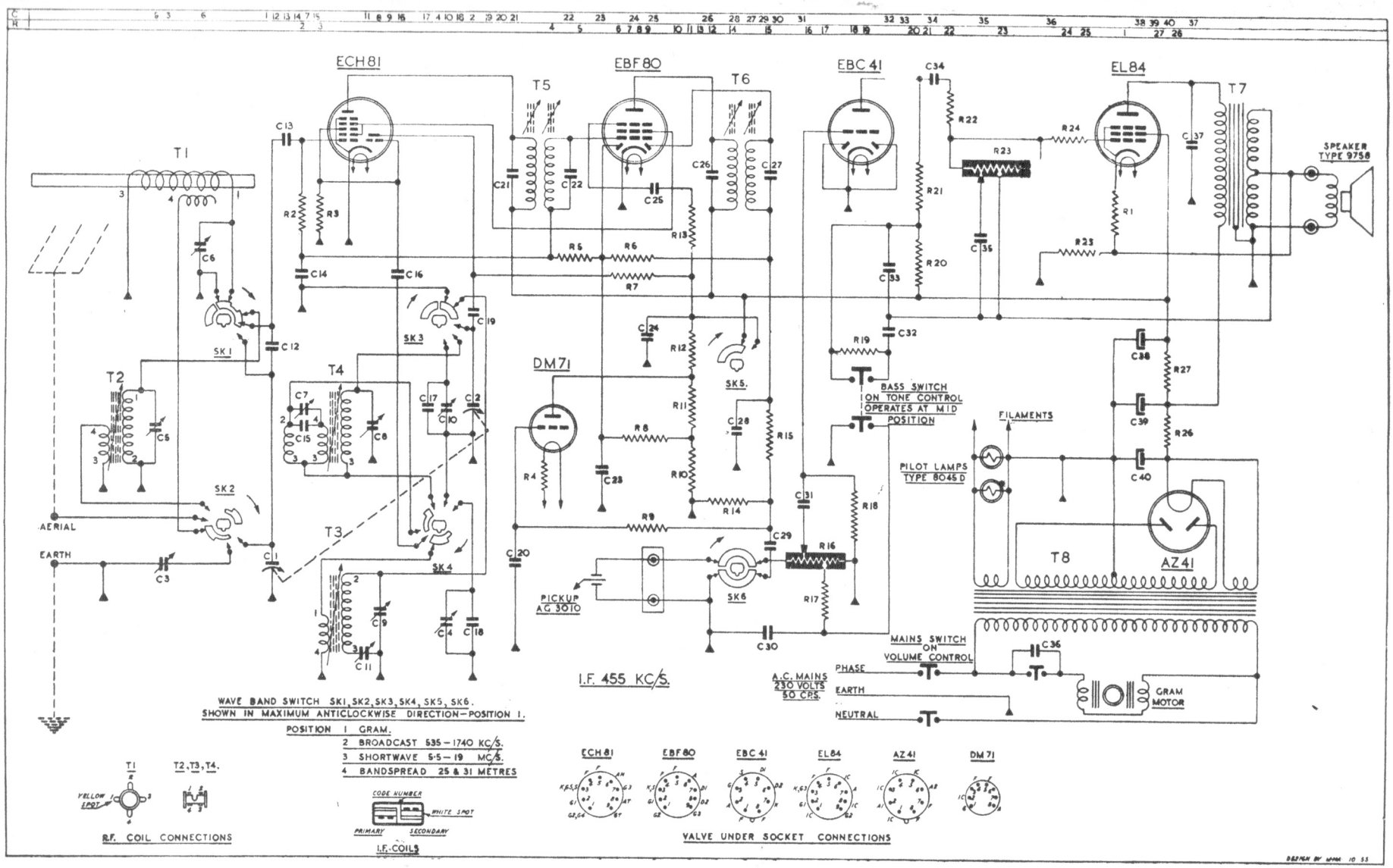
TRIMMER LOCATION DIAGRAMS



TOP VIEW



BOTTOM VIEW



CONDENSERS

C1 12—500 mmfd } ganged
C2 12—500 mmfd }
C3 175 mmfd wire trimmer
C4 175 mmfd wire trimmer
C5 3—30 mmfd air trimmer
C6 3—30 mmfd air trimmer
C7 4—60 mmfd air trimmer
C8 3—30 mmfd air trimmer
C9 3—30 mmfd air trimmer
C10 3—30 mmfd air trimmer
C11 150—750 mmfd padder
C12 233 mmfd 1% ceramic
C13 150 mmfd ceramic
C14 0.05 mfd 350v paper
C15 100 mmfd ceramic
C16 47 mmfd ceramic
C17 190 mmfd ceramic
C18 120 mmfd ceramic
C19 200 mmfd ceramic
C20 0.01 mfd 500v paper
C21 110 mmfd ceramic
C22 195 mmfd ceramic
C23 500 mmfd mica
C24 0.05 mfd 500v paper
C25 0.02 mfd 500v paper
C26 110 mmfd ceramic
C27 195 mmfd ceramic
C28 47 mmfd ceramic
C29 0.01 mfd 500v paper
C30 0.01 mfd 500v paper
C31 0.01 mfd 500v paper
C32 0.1 mfd 350v paper
C33 0.01 mfd 500v paper
C34 0.02 mfd 500v paper
C35 1500 mmfd ceramic
C36 0.01 mfd 500v paper
C37 0.002 mfd 750v paper
C38 20 mfd } 350v triple electrolytic
C39 40 mfd }
C40 40 mfd }

RESISTORS

R1 150 ohms 1w wire-wound
R2 1 meg ¼w carbon
R3 47k ¼w carbon
R4 220 ohms ¼w carbon
R5 2.2 meg ¼w carbon
R6 2.2 meg ¼w carbon
R7 27k 1w carbon
R8 10 meg ¼w carbon
R9 4.7 meg ¼w carbon
R10 100k ¼w carbon
R11 100k ¼w carbon
R12 270k ¼w carbon
R13 33k 1w carbon
R14 100k ¼w carbon
R15 220k ¼w carbon
R16 2 meg tapped at 400k potentiometer
R17 56k ¼w carbon
R18 10 meg ¼w carbon
R19 4.7 meg ¼w carbon
R20 100k ½w
R21 100k ½w
R22 47k ¼w carbon
R23 1 meg centre-tapped potentiometer
R24 1000 ohms ¼w carbon
R25 100 ohms ¼w carbon
R26 370 ohms 4w wire-wound
R27 1500 ohms 4w wire-wound

COILS

T1 Ferrite rod aerial VK 469-66
T2 Shortwave aerial VK 469-55
T3 Broadcast oscillator VK 471-50
T4 Shortwave oscillator VK 471-37
T5 Micro "12" I.F. transformer A3 126-84
T6 Micro "12" I.F. transformer A3 126-84
T7 Output transformer VK 671-03
T8 Power transformer VK 631-02/01