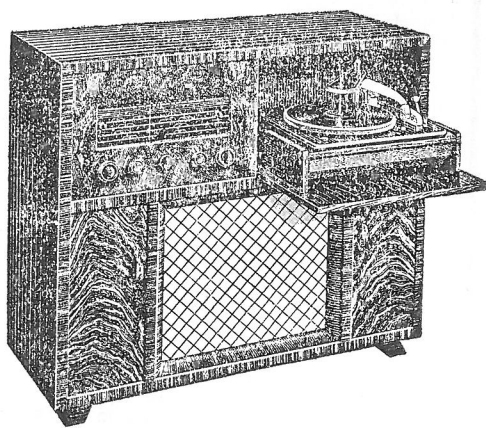


PHILIPS RADIOGRAM: MODEL FZ937A

11 Valve Superheterodyne Receiver.
 Mains Supply—210-250 volts 50 C/s. A.C.
 Wave Ranges—Broadcast 545-1620 Kc/s.
 Short Wave I 1.66-5.1 Mc/s.
 Short Wave II 5-10.1 Mc/s.
 Short Wave III 9.8-15.5 Mc/s.
 Short Wave IV 14.9-22.2 Mc/s.
 Intermediate Frequency 455 Kc/s.



REMOVING THE RECORD CHANGER FROM THE CABINET

The three-speed record changer Type AG1000 is fitted to this radiogram. If this unit should require adjustment then reference should be made to the special service information on the Type AG1000 3-speed record changer.

To remove the unit from the cabinet, remove the back cover by unscrewing the wood screws at the back of the cabinet. When this cover is removed, it is possible to effect a number of minor adjustments. However, if the unit requires further adjustments then it is advisable to remove it completely from the cabinet and place it in a suitable jig which should keep the mechanism clear of the bench and allow enough room underneath for adjustments to be carried out.

Release the two counter loading springs at the rear of the motor board. Release the clamp holding the motor power cord and pickup cable. Pull out the appropriate plugs from their sockets in the back of the chassis.

Remove the four mounting screws which are located one at each corner of the unit.

The unit may now be lifted clear of the mounting board.

To replace the unit reverse the above procedure.

REMOVING THE CHASSIS FROM THE CABINET

As all adjustments are accessible only beneath the chassis, it is necessary to remove the chassis from the cabinet for most service work to be carried out, and the following procedure should be adopted:—

Remove the mains plug from the supply.

Remove the five control knobs by loosening the grub screws, and sliding the knobs off the shafts.

Remove the speaker plug, pickup plug, and mains supply plug from the record changer from their sockets on the back of the chassis.

Remove the two screws which go right through the two chassis support blocks and the base board of the radio compartment.

The chassis will now slide out on the support blocks which can be left attached to the chassis.

To replace the chassis reverse the above procedure.

ALIGNMENT OF THE RECEIVER

The only alignment adjustments accessible while the chassis is in its cabinet are the intermediate frequency slugs.

Unless the intermediate frequency filters only have to be aligned it is advisable to remove the chassis from the cabinet.

Switch on the receiver and allow it to warm up for a few minutes.

Turn the tone control in a clockwise direction until the fidelity switch operates, then turn in an anti-clockwise direction until the switch just clicks again so that the intermediate frequency filters are operating in the narrow bandwidth position.

Place the tuning condenser in the maximum capacity position, the wave band switch in number I—Broadcast position—and the centre switch in the Radio position.

Turn the volume control to the maximum position and apply a signal of 455 Kc/s., modulated 30% through a capacity of 0.01 mfd to the control grid of the ECH81.

Unscrew the adjusting slugs of the intermediate frequency filters almost right out.

Adjust in succession, for maximum output (see trimmer position diagram).

1. Diode coil.
2. EAF42 Plate coil.
3. ECH81 Plate coil.
4. EAF42 Grid coil.

It is essential to follow the above order very carefully, and peak the circuits accurately, to obtain a symmetrical response curve in the wide band position.

Disconnect the coupling condenser from the control grid of ECH81 and connect the signal generator through a standard dummy aerial to the aerial and earth wires of the receiver.

Set the pointer to the reference point where thick lines reduce to narrow at the low frequency end of the Broadcast band.

Apply a modulated R.F. signal and adjust the R.F. circuit as indicated in the following table:—

1. Wave band switch in position	B.C.	SW1	SW2	SW4	SW3
2. Turn pointer with tuning knob to the frequency indicated and apply the correct frequency	600 Kc/s.	1.8 Mc/s.	5.5 Mc/s.	16 Mc/s.	10 Mc/s.
3. Adjust for maximum output	Padder C34	Padder C35	L11	L9 L2 (Low end)	L10 L2 (High end)
				L1 "	L1 "
4. Turn pointer with tuning knob to frequency indicated and apply the correct frequency	1400 Kc/s.	4.5 Mc/s.	10 Mc/s.	15 Mc/s.	22 Mc/s.
5. Adjust for maximum output	C38 Osc C16 Trans C15 Ant	C37 Osc C17 Trans C14 Ant	C39 Osc C11 Trans C9 Ant	C21 Osc C12 Trans C10 Ant	C20 Osc C4 Trans C3 Ant

Repeat the points above until correct calibration and good sensitivity are obtained over each band. When all adjustments are correct seal all trimmers. Adjustment of coil inductances is obtained by moving the loop inside the coil. Note that on Broadcast, SW1, SW2 and SW3 the oscillator frequency is 455 Kc/s. above the signal frequency while on SW4 the oscillator frequency is 455 Kc/s. below the

signal frequency. It is important to remember the above when checking whether the image is on the correct side of the fundamental signal. Maximum sensitivity figures are given below. These are given mainly as a guide, and final sensitivities should if anything be better than the figures quoted. The standard output is 50 milliwatts into a 7 ohm load.

VOLTAGE TABLE

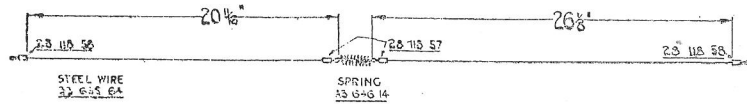
All readings taken with a primary input of 230 volts 50 C/s. A.C. Primary current 350 mA. Primary power 75 watts.
 Voltage across R52 = 25 ohms — 2.25 volts.
 Voltage across R51 + R52 = 100 ohms — 8.8 volts.

VALVE	FUNCTION	FILAMENT	CATHODE	SCREEN	PLATE
EF41	Pentode—R.F. Signal Amplifier	6.3	0	55	210
ECH81	Triode—oscillator, Hexode—frequency changer	6.3	0	70	Triode 70 Hexode 210
EAF42	Pentode—Intermediate frequency amplifier	6.3	0	70	210
EBC41	Diode—Demodulator	6.3	0	—	165
EBC41	Diodes—A.V.C., Triode—Audio voltage amplifier	6.3	32	—	175
EBC41	Triode—Audio phase inverter	6.3	1	—	85
EBC41	Triode—Pickup equalising amplifier	6.3	0	250	285
EL41	Pentode—Power output	6.3	0	250	285
EL41	Pentode—Power output	6.3	290	—	A.C. per plate
EZ40	Fullwave rectifier	6.3	290	—	260
EZ40	Fullwave rectifier	6.3	0	Target	260
EM34	Tuning indicator—dual sensitivity	6.3	0	250	per plate 30

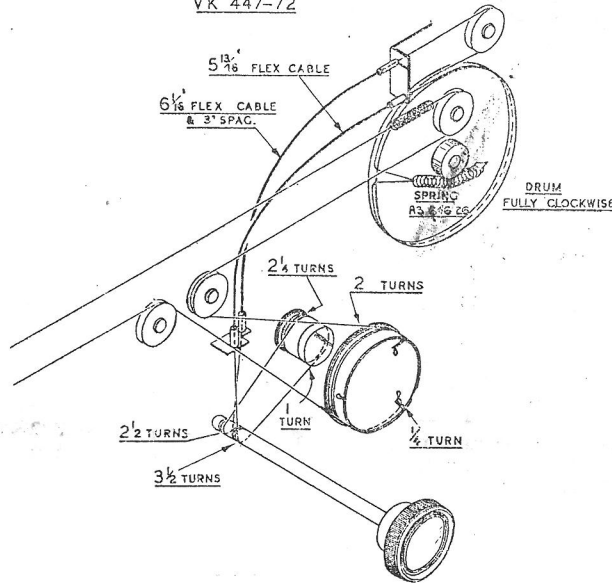
The above voltages are measured between the points indicated and chassis with a meter having a resistance of 20,000 ohms per volt on D.C. ranges and 1000 ohms per volt on A.C. ranges.
 Variations up to $\pm 5\%$ are permissible. Wave band switch in position BROADCAST and tuning condenser at maximum capacity.

COIL AND TRANSFORMER RESISTANCES

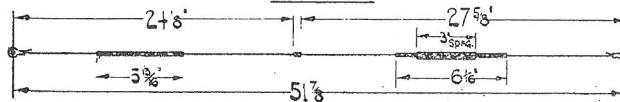
VK-469-60	L8 B.C. AERIAL	Primary	36 ohms
	L7 SW1 AERIAL	Secondary	4.4 ohms
		Primary	0.5 ohms
VK-469-61	L6 SW2 AERIAL	Secondary	0.465 ohms
		Primary	0.33 ohms
		Secondary	0.125 ohms
VK-473-16	L5 B.C. TRANSLATOR	Tap	0.055 ohms
		Primary	0.23 ohms
		Secondary	0.043 ohms
VK-473-17	L4 SW1 TRANSLATOR	Tap	0.0275 ohms
		Primary	80 ohms
		Secondary	4.4 ohms
VK-471-40	L3 SW2 TRANSLATOR	Primary	0.5 ohms
		Secondary	0.465 ohms
		Tap	1.3 ohms
VK-471-41	L2 SW4 and SW5 TRANSLATOR	Primary	0.125 ohms
		Secondary	0.055 ohms
		Tap	0.34 ohms
A3-122-38	L13 B.C. OSCILLATOR	Primary	0.043 ohms
		Secondary	0.0275 ohms
		Tap	4 ohms
VK-476-36	L12 SW1 OSCILLATOR	Tuned	1.1 ohms
		Feedback	0.242 ohms
		Tuned	0.7 ohms
VK-660-00	L11 SW2 OSCILLATOR	Feedback	0.034 ohms
		Tuned	0.35 ohms
		Feedback	0.031 ohms
VK-670-85	L10 SW3 OSCILLATOR	Tuned	0.35 ohms
		Feedback	0.022 ohms
		Tuned	0.28 ohms
VK-630-78	L9 SW4 OSCILLATOR	Feedback	7.4 ohms
		Primary	4.5 ohms
		Secondary	0.5 ohms
VK-670-85	T1 Intermediate frequency filter	Coupling	7.25 ohms
		Each winding	4.4 ohms
		Tap	0.22 ohms
VK-670-85	T2 Intermediate frequency filter	Primary	2750 ohms
		Secondary	215 ohms } 480 ohms
		Primary	265 ohms } ohms
VK-670-85	T3 Audio input transformer	Secondary	0.75 ohms
		Primary	17.5 ohms
		Secondary	86 ohms } 180 ohms
VK-670-85	T4 Audio output transformer	Primary	94 ohms } ohms
		Secondary	0.075 ohms
		Filament x	0.09 ohms
VK-670-85	T5 Power transformer	Filament y	0.09 ohms



POINTER CABLE ASSEMBLY
VK 447-72



CORD 06 606 28
FLEX CABLE 08 010 54
BRASS TUBE A3 487 39
CORD TAG VK 287-30
DRIVE CORD ASSEMBLY
VK 447-69



REPLACING THE GANG DRIVE CORD

It is necessary when replacing the gang drive cord to remove the dial, and backplate, and the pointer drive cable drum. Loosen off the pointer drive clamping screw and release the cable.

Release the pointer cable spring and remove the pointer drive cable from the driving drum and pulleys. Slip the cable loop off the wave band indicator drum, and slide the flex cable out of its socket.

Loosen off the tuning indicator clamp screw and slide the tube back off its support bracket.

Slide the three pilot lamp holders off their support brackets. Remove the four 4 mm. screws holding the dial mounting brackets, and lift off the complete dial assembly. Remove the pointer drive cable drum by removing the three fixing screws and sliding the drum forward.

Place the tuning condenser to the maximum capacity position and attach the spring A3-646-26 (see diagram) securely to the drum by bending the lug on the drum over one end of the spring.

The small bakelite driving drum has a slot across the rim with two small grooves to position the cord VK-447-69. Under the slot is a round hole into which the brass tube on the cord is fitted, with the long end (27 5/8") of the cord towards the rear of the drum.

With the slot at the top of the drum the back cord is passed round the drum two and a quarter turns in an anti-clockwise direction towards the front of the drum. The front cord is passed round the drum approximately one and a quarter turns in a clockwise direction. A small piece of sellotape placed over the turns and drum will assist in keeping the cord in place while further threading operations are carried out.

The back cord is next fed over the drive shaft in an anti-clockwise direction for two and a half turns towards the chassis, and the flex cable 6 1/8" is fitted into the right-hand cable socket on the chassis bracket, and the upper cable socket on the tuning condenser pulley bracket. This end of the cord is then fed round the pulley on to the tuning condenser drum in an anti-clockwise direction, through the slot in the drum, and the cord tag fixed over the end of the spring. The tuning condenser should now be opened slightly to take up the slack in the cord, without placing any tension on the small driving drum. The front cord of the driving drum is next fed under the drive shaft in a clockwise direction for three and a half turns towards the front of the shaft, and the flex cable (5 13/16") is fitted into the left-hand cable socket on the chassis bracket, and the lower socket on the tuning condenser bracket. This cord is now placed round the tuning condenser drum on the front edge in a clockwise direction. Remove the sellotape from the small driving drum, at the same time taking up the slack in the free end of the cord until it can be continued round the drum, and passed through the

slot in the drum, and the tag placed over the end of the spring.

Release the spring and see that the cord is positioned on the drive shaft in such a way that it does not bind in the chassis bearing and close up any gaps between adjacent turns. Turn the drive shaft a few times so that the tension is equalised over the cord.

Turn the tuning condenser to the minimum capacity position and replace the pointer driving drum so that the longest slot in the rim of the drum is approximately at 2 o'clock.

Replace the pointer drive cable as follows:—

Remove the dial and backplate from the end support brackets and attach the brackets with the pointer slide bar and pointer to the chassis with the four 4mm. screws. Place the smaller brass clamp (28-116-58) of the 20 1/8" length of the cable assembly VK-447-72 in the longest slot in the rim of the pointer driving drum. The cable then makes approximately one-eighth of a turn round the drum in an anti-clockwise direction and is fed under and over the right-hand pulley on the double pulley bracket and under and over the pulley on the right-hand dial mounting bracket.

Turn the tuning condenser to maximum capacity by means of the tuning shaft, keeping tension on the cable feeding into the driving drum. The 26 3/8" length of cable is next fed parallel with the pointer slide rod over the pulley in the left-hand dial mounting bracket and over the left-hand pulley on the double pulley bracket. Stretch the spring slightly so that the cable can be placed round the drum in a clockwise direction and the brass clamp fitted into the slot at approximately 5 o'clock on the driving drum. The cables should now be adjusted on the drum so that they do not cross, and the rear cable should progress towards the front of the rim when it is taking up cable.

Slightly loosen the four 4mm. screws holding the left- and right-hand dial mounting brackets and the pointer slide rod nut.

Mount the dial backplate and when properly adjusted tighten up the 4mm. screws and the pointer slide rod.

Replace the dial scale and slide the three pilot lamp holders into position.

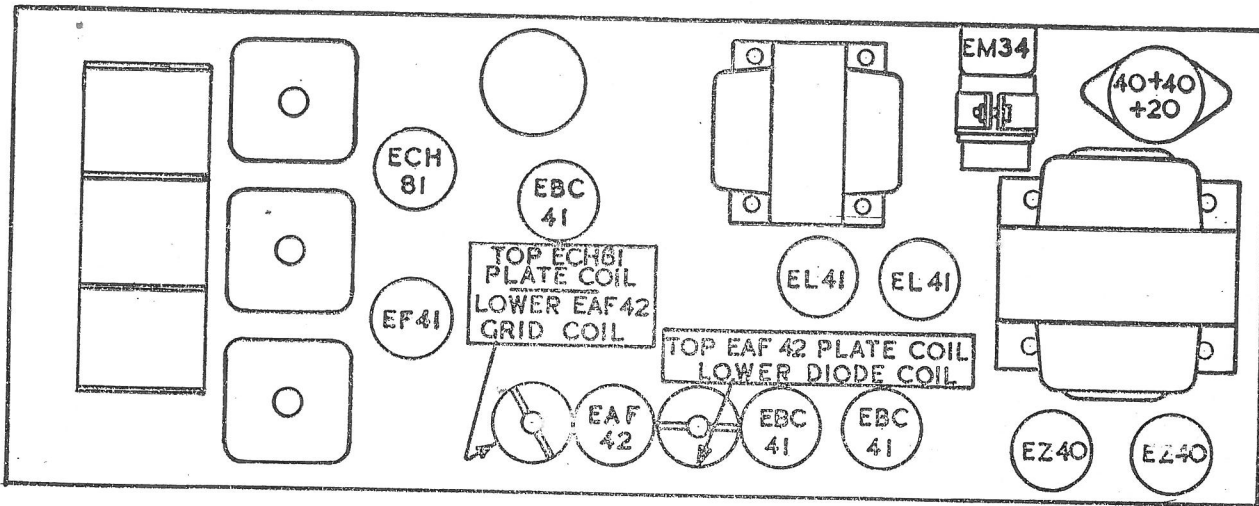
Place the flex cable from the wave band indicator drum in the socket and slide the cable round the drum in a clockwise direction, placing the loop over the projection in the drum. If the indicator is considerably out of adjustment loosen off the two clamp screws and rotate the drum on the wave band switch shaft. If the indicator is only slightly out of adjustment, loosen off the locknut and adjust the thumb screw behind the indicator. Tighten the locknut.

Turn the tuning condenser to the maximum capacity position and place the cable under the square clamping washer. Place the pointer on the reference point at the low frequency end of the broadcast band and tighten the clamp screw.

MAXIMUM SENSITIVITY FIGURES

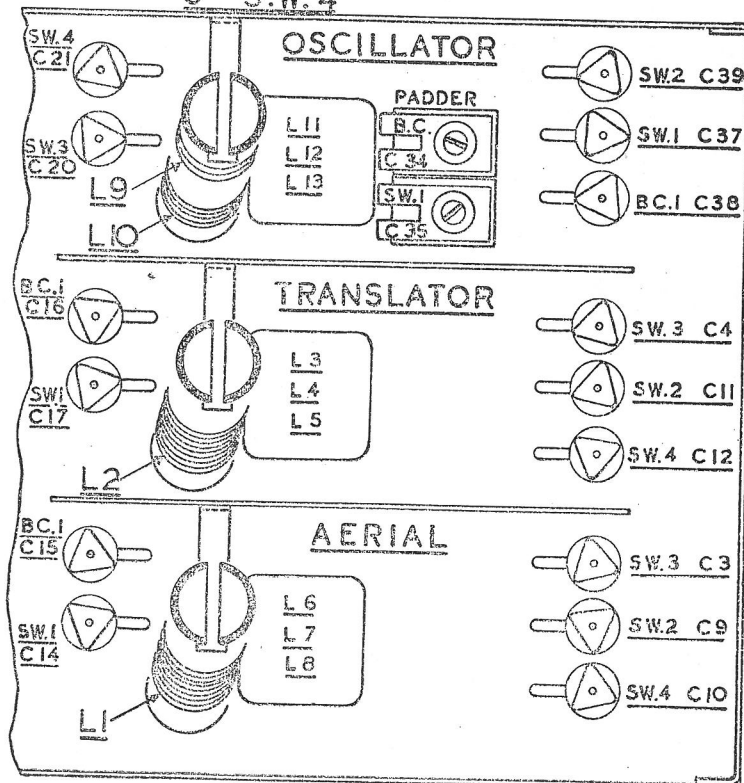
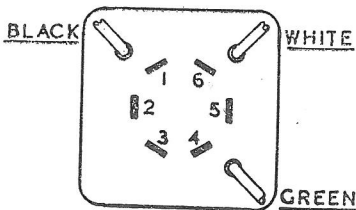
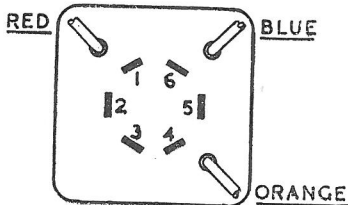
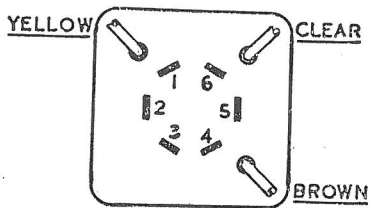
455 Kc/s.	Narrow bandwidth position, signal applied to the control grid of ECH81	25 μ V
Broadcast	Signal applied via dummy aerial to aerial and earth wires	
SW1	" " " " " " " "	2 μ V
SW2	" " " " " " " "	3 μ V
SW3	" " " " " " " "	3 μ V
SW4	" " " " " " " "	4 μ V
	" " " " " " " "	4 μ V

CHASSIS LAYOUT



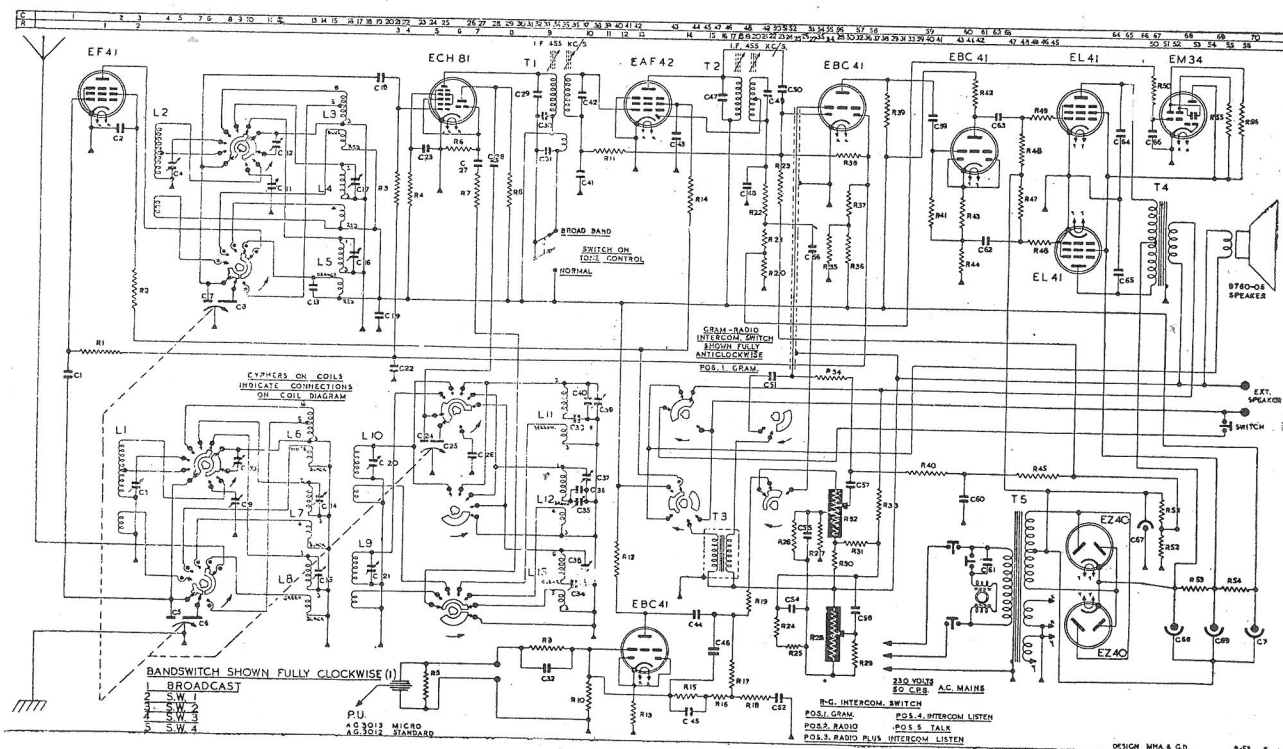
TRIMMER AND COIL DIAGRAM

SCALE POS. 1	B.C.
2	S.W. 1
3	S.W. 2
4	S.W. 3
5	S.W. 4



PHILIPS RADIOGRAM: MODEL FZ937A

PHILIPS RADIOGRAM: MODEL FZ937A



RESISTOR VALUES

- R1 470K 1/2W. Carbon
- R2 100K 1/2W. Carbon
- R3 470K 1/2W. Carbon
- R4 25K 1W. Carbon
- R5 0.5 Meg. 1/2W. Carbon on Changer
- R6 47K 1/2W. Carbon
- R7 100 ohm 1/2W. Carbon
- R8 33K 1W. Carbon
- R9 680K 1/2W. Carbon
- R10 1 Meg. 1/2W. Carbon
- R11 1 Meg. 1/2W. Carbon
- R12 250K 1/2W. Carbon
- R13 1800 ohm 1/2W. Carbon
- R14 100K 1/2W. Carbon
- R15 4.7 Meg. 1/2W. Carbon
- R16 1 Meg. 1/2W. Carbon
- R17 680K 1/2W. Carbon
- R18 33K 1/2W. Carbon
- R19 680K 1/2W. Carbon
- R20 150K 1/2W. Carbon
- R21 150K 1/2W. Carbon
- R22 68K 1/2W. Carbon
- R23 1 Meg. 1/2W. Carbon
- R24 7500 ohm 1/2W. Carbon
- R25 47K 1/2W. Carbon
- R26 220K 1/2W. Carbon
- R27 47K 1/2W. Carbon
- R28 0.5 Meg. Tone Con. plus special I.F. switch
- R29 470K 1/2W. Carbon
- R30 27 ohm 1/2W. Carbon
- R31 27 ohm 1/2W. Carbon
- R32 0.65 2 Meg. Volume Con. & switch
- R33 330 ohm 1/2W. Carbon
- R34 100K 1/2W. Carbon
- R35 100K 1/2W. Carbon
- R36 470K 1/2W. Carbon
- R37 10 Meg. 1/2W. Carbon
- R38 1 Meg. 1/2W. Carbon
- R39 100K 1/2W. Carbon
- R40 2.2 Meg. 1/2W. Carbon
- R41 1 Meg. 1/2W. Carbon
- R42 47K 1/2W. Carbon
- R43 2700 ohm 1/2W. Carbon
- R44 47K 1/2W. Carbon
- R45 330K 1/2W. Carbon
- R46 2.2K 1/2W. Carbon
- R47 680K 1/2W. Carbon
- R48 680K 1/2W. Carbon
- R49 2.2K 1/2W. Carbon
- R50 470K 1/2W. Carbon
- R51 75 ohm 1W. Carbon
- R52 25 ohm 1/2W. Carbon
- R53 1000 ohm 4W. Wire Wound
- R54 1800 ohm 4W. Carbon
- R55 1 Meg. 1/2W. Carbon
- R56 1 Meg. 1/2W. Carbon
- L1 Band 4 & 5 Aerial Coil VK-469-61
- L2 Band 4 & 5 Transl. Coil VK-473-17
- L3 Band 3 Translator Coil
- L4 Band 2 Translator Coil
- L5 Band 1 B.C. Transl. Coil
- L6 Band 3 Aerial Coil
- L7 Band 2 Aerial Coil
- L8 Band 1 B.C. Aerial Coil
- L9 Band 5 Oscillator Coil
- L10 Band 4 Oscillator Coil
- L11 Band 3 Oscillator Coil
- L12 Band 2 Oscillator Coil
- L13 Band 1 B.C. Osc. Coil
- T1 Special I.F. Transformer A3-122-38
- T2 I.F. Transformer VK-476-36
- T3 Intercom. Input Trans. Assy.
- T4 Output Transformer VK-660-09
- T5 Power Transformer VK-670-85

CONDENSER VALUES

- C1 150 mmfd Ceramic
- C2 0.01 mfd 500V. Paper
- C3 3-30 mmfd Air Dielectric Trimmer
- C4 3-30 mmfd Air Dielectric Trimmer
- C5 60.3 mmfd Max. Cap Aerial Small Sect.
- C6 381.9 mmfd Max. Cap Aerial Large Sect.
- C7 60.3 mmfd Max. Cap Translator Small Sect.
- C8 381.9 mmfd Max. Cap Translator Large Sect.
- C9 3-30 mmfd Air Dielectric Trimmer
- C10 3-30 mmfd Air Dielectric Trimmer
- C11 3-30 mmfd Air Dielectric Trimmer
- C12 3-30 mmfd Air Dielectric Trimmer
- C13 100 mmfd Mica
- C14 3-30 mmfd Air Dielectric Trimmer
- C15 3-30 mmfd Air Dielectric Trimmer
- C16 3-30 mmfd Air Dielectric Trimmer
- C17 3-30 mmfd Air Dielectric Trimmer
- C18 150 mmfd Ceramic
- C19 0.01 mfd 500V. Paper
- C20 3-30 mmfd Air Dielectric Trimmer

Gang

- C21 3-30 mmfd Air Dielectric Trimmer
- C22 0.05 mfd 500V. Paper
- C23 0.01 mfd 500V. Paper
- C24 120.6 mmfd Max. Cap Osc. Small Sect.
- C25 321.6 mmfd Max. Cap Osc. Large Sect.
- C26 50 mmfd Ceramic Special
- C27 80 mmfd Silver Mica
- C28 100 mmfd Silver Mica
- C29 115 mmfd In I.F. Transformer
- C30 1500 mmfd Silver Mica
- C31 1500 mmfd Silver Mica
- C32 100 mmfd Ceramic
- C33 0.007 mfd Silver Mica 2 1/2%
- C34 150-750 mmfd Variable Padder
- C35 150-750 mmfd Variable Padder
- C36 0.0012 mfd Mica 2 1/2%
- C37 3-30 mmfd Air Dielectric Trimmer
- C38 3-30 mmfd Air Dielectric Trimmer
- C39 3-30 mmfd Air Dielectric Trimmer
- C40 47 mmfd Ceramic
- C41 0.05 mfd 500V. Paper
- C42 230 mmfd In I.F. Transformer
- C43 0.01 mfd 500V. Paper
- C44 0.01 mfd 500V. Paper

Gang

- C45 600 mmfd Silver Mica
- C46 10 mfd Ceramic
- C47 110 mmfd In I.F. Transformer
- C48 80 mmfd Silver Mica
- C49 110 mmfd In I.F. Transformer
- C50 10 mmfd Ceramic
- C51 0.001 mfd 500V. Paper
- C52 7000 mmfd Paper
- C53
- C54 400 mmfd Mica
- C55 0.02 mfd 500V. Paper
- C56 0.005 mfd 350V. Paper
- C57 0.01 mfd 500V. Paper
- C58 0.02 mfd 500V. Paper
- C59 0.01 mfd 500V. Paper
- C60 0.25 mfd 400V. Paper
- C61 0.01 mfd. 750V. Paper
- C62 0.05 mfd 500V. Paper
- C63 0.05 mfd 500V. Paper
- C64 0.001 mfd 750V. Paper
- C65 0.001 mfd 750V. Paper
- C66 0.05 mfd 750V. Paper
- C67 100 mfd 12V. Electrolytic
- C68 40 mfd 350V.
- C69 40 mfd 350V.
- C70 20 mfd 350V.

Triple Electrolytic