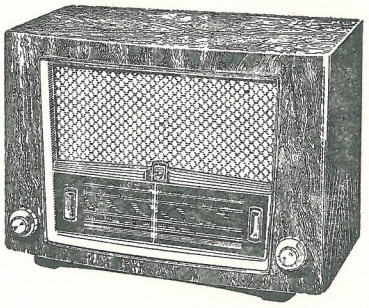
PHILIPS RADIOPLAYER: MODEL BZ456A, MULLARD 500

PHILIPS RADIOPLAYER

MODEL BZ456A



SUPERHETERODYNE RECEIVER

Mains supply: 210-250 volts 50 c/s 43 watts
Intermediate Frequency: 455 Kc/s.
Wave Range: Broadcast 535-1740 Kc/s
Short Wave 5.5-19 Mc/s
Bandspread 25 and 31 metres

REMOVAL FROM THE CABINET

The majority of service work may be carried out without removing the chassis from the cabinet. However for repairs to dial drive and replacement of volume control, etc., it will be necessary to remove the chassis from the cabinet, and the following procedure should be adopted:

Remove the mains plug from the supply.

Remove the back and bottom cover assembly, by removing the two screws at the back, and the earthing clamp screw on the bottom.

Unsolder the two speaker leads, and panel lamp leads from the terminal plate on the top of the output transformer.

Remove the four push-on type knobs.

Lift the spring clamp, and slip the DM71 tuning indicator out of its escutcheon.

Remove the pointer from the steel cable drive.

Remove the four chassis retaining screws from under the cabinet.

Slide the chassis out of the cabinet.

To replace the chassis, reverse the above procedure, but when sliding the chassis back into the cabinet, see that the pin on the lever arm fitted to the wave band switch slides into the slot on the wave band indicator plate.

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 position.

REMOVAL OF DIAL SCALE

To remove the dial scale, it is necessary to remove the chassis from the cabinet.

Remove one of the dial glass clamps, and loosen off the other. Slide the glass towards the end which has the clamp removed, until the other end appears in the opening, then remove the glass from the front of the cabinet.

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 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 callibration 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.

SHORT WAVE

Turn the wave band switch to the short wave 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 short wave 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 short wave oscillator inductance until the signal is tuned in and adjust the short wave 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 short wave oscillator trimmer and the 6 Mc/s position with the short wave 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 short wave 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 to maximum 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 5 ohm load.

VOLTAGE TABLE

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

Valve	Function	Filament	Plate		Screen	Cathode
			Conv.	Osc.		
ECH81	Frequency converter and oscillator	6.2	225	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 1000 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, short-wave	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 02	Output transformer	Primary	460 ohms
		Secondary	0.725 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

(See Fig. 1)

It is necessary when replacing the gang drive cord to remove the chassis from the cabinet. Turn the tuning condenser to the maximum capacity position, and attach the spring A3 646 57 securely to the drum by bending the lug on the drum over one end of the spring. The small diameter 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 cord (21¾in.) towards the back of the drum. When the slot on the drum is at approximately the 5 o'clock position, a hole in the shaft mounting plate will line up with a hole in the bakelite drum. A short pin or nail placed in these two holes will hold the drum in position, while further threading up operations are carried out.

The back part of the cord makes ¾ of a turn round the drum in a clockwise direction, then passes over the tuning spindle making 2½ turns in a clockwise direction progressing towards the chassis. The brass ferrule on the end of the 5⅛in. flex cable, fits into the left hand slotted hole in the mounting bracket directly above the tuning shaft, and the ferrule on the other end fits into the rear slotted hole on the pulley mounting bracket on top of the tuning condenser. The front part of the cord (18⅝in.) makes 2 turns round the small diameter bakelite drum in an anticlockwise direction, then passes under the tuning spindle, making 2½ turns in an anticlockwise direction progressing away from the chassis. The brass ferrule on the 5⅛in. flex cable fits into the left hand slotted hole in the bracket, and the ferrule on the other end of the flex cable fits into the front slotted hole on the pulley mounting bracket on top of the tuning condenser, passes round the tuning condenser drum in an anticlockwise direction, through the hole in the side of the drum, over the capstan and the cord tag on the end attaches to the end of the spring. Remove the pin holding the bakelite drum in position, then 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 pass the cord through the hole in the side of the drum round the capstan and hook the end of the cord over the spring. By turning the tuning spindle in a clockwise direction, tension will be put on the spring so that slack will appear in the back cord, which can then be placed round the pulley. Turn the drive shaft a few times to equalise the tension over the cord, and if necessary place the turns on the drums and shaft so that they do not bind.

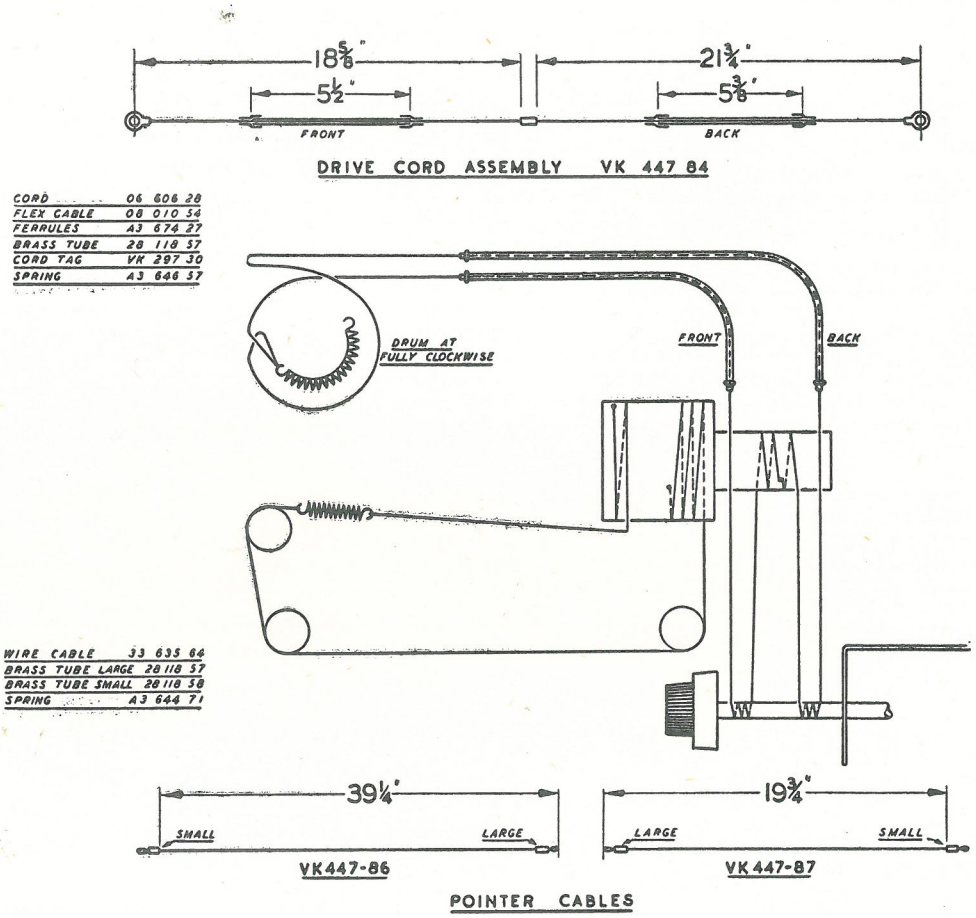


Fig 1

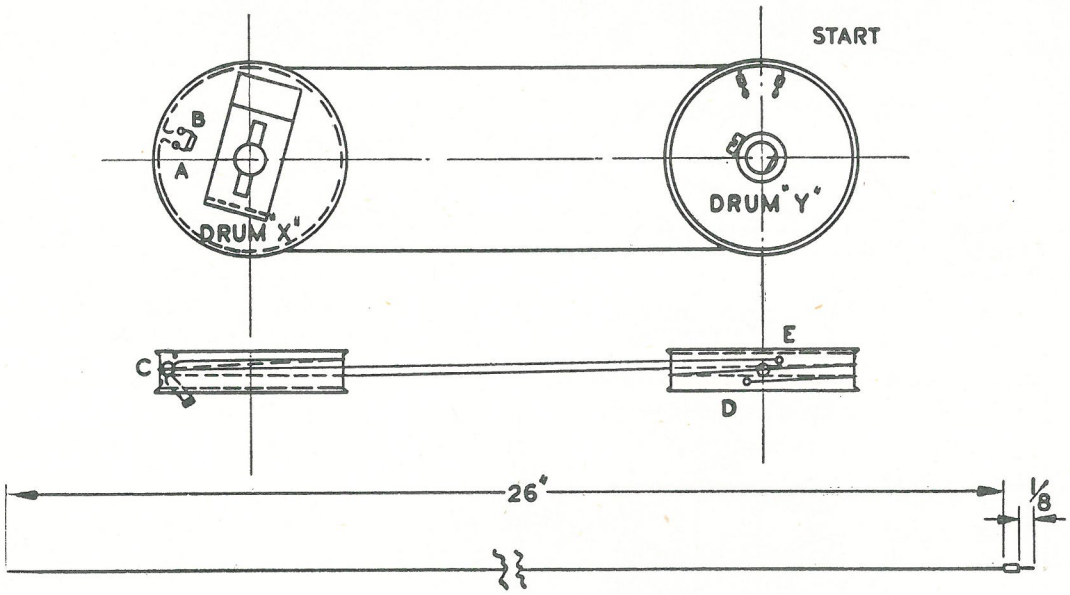
REPLACING THE POINTER DRIVE CABLES

(See Fig. 1)

When the tuning condenser is in the maximum capacity position the longest slot in the rim of the large bakelite drum should be at the 8 o'clock position. Turn the tuning condenser to the minimum capacity position, and place the small brass clamp (28 118 58) of the 39¼in. piece of cable (VK 447 86), in the longest slot in the drum, which should now be at the 3 o'clock position. The cable makes 1¾ turns round the drum in an anticlockwise direction, progressing towards the back of the drum. Pass the cable over the right hand pulley, and keeping the tension on the cable, turn the tuning condenser to the maximum capacity position, taking up the cable on the drum. Pass the rest of the cable under the lower left hand pulley, and over the upper left hand pulley, then couple the spring (A3 644 71) to the loop in the end of the cable. Couple the loop formed by the large brass tube (28 118 57) on the 19¾in. cable (VK 447 98) to the other end of the spring and pass the cable onto the bakelite drum at the 6 o'clock position, then round the drum 1½ turns in an anticlockwise direction. Stretch the spring slightly, and place the small brass clamp into the slot in the bakelite drum, at the 12 o'clock position. The cables should now be adjusted on the drum so that they do not cross, and both cables should progress towards the back of the drum when taking up cable.

REPLACING THE TONE CONTROL DRIVE CABLE (See Fig. 2.)

Turn the drums to the position shown in the diagram (tone control in the maximum anticlockwise position). With the cable length shown in the diagram, push the free end through the hole E in drum Y, then pass onto the top of drum X making 1½ turns in an anticlockwise direction. Feed the cable through holes C and B 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 A, then back through hole C, and pass round the drum for ¼ turn in an anticlockwise direction. Pass the cable under drum Y for 1½ turns in an anticlockwise direction, then through hole D. Slide a cable clamp over the cable, pull tight and clamp securely. Cut off superfluous end of the cable.



TONE CONTROL CABLE ASSEMBLY VK447-85

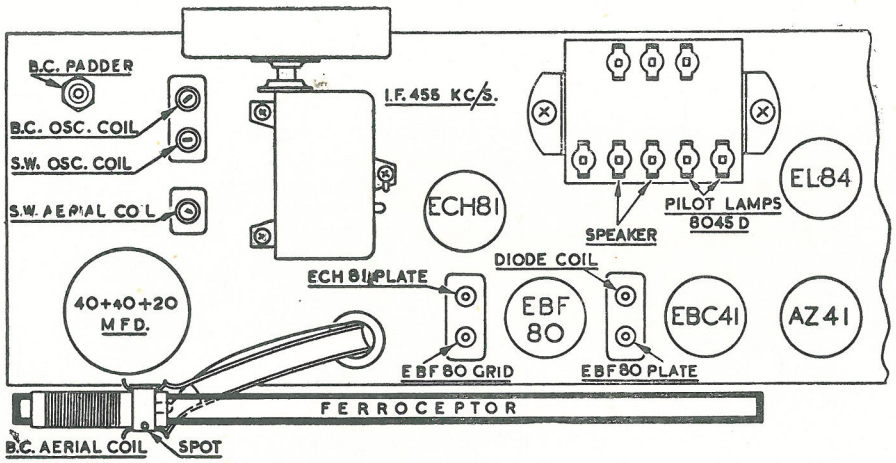
Fig. 2

LIST OF SPARE PARTS

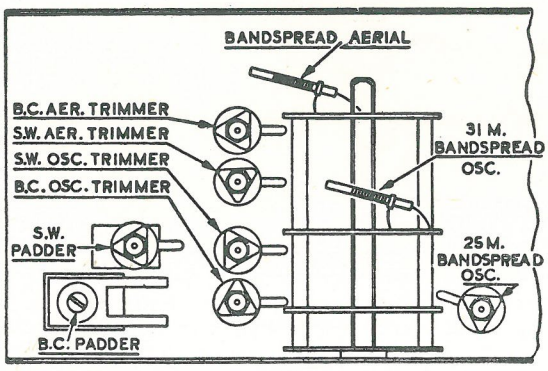
Cabinet	A3 735 98
Knob, wave band	A3 736 07
Knob, tuning and volume	A3 735 15
Knob, tone	A3 736 07.1
Knob, spring	A3 526 08
Dial scale	VK 852 12
Pilot lamp holder	VK 305 04
Wave band indicator plate	A3 724 55
Wave band switch	VK 421 45
Volume control	48 900 00/DL M4 + 1M6
Tone control	B1 639 40
Tuning condenser assembly	49 001 42
Friction spring for controls	A3 652 97
Volume control drum	VK 691 40
Tone control drum	VK 691 41
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
Back cover assembly	VK 369 77
Spring clips for back	A3 449 00

For all drive cord and cable spares, see diagrams.
For all coils and transformer part numbers, see circuit diagram.

TRIMMER LOCATION DIAGRAMS

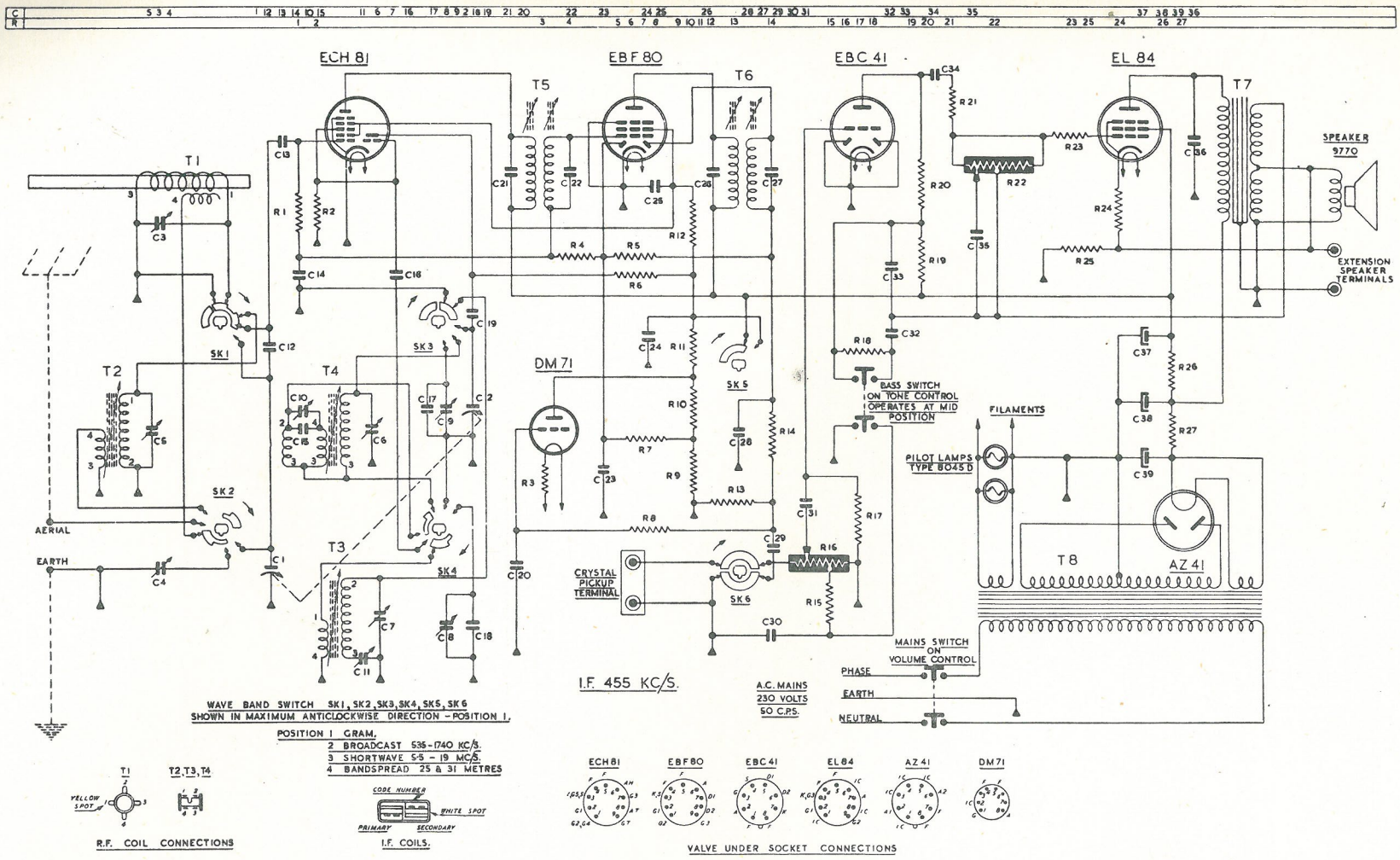


TOP VIEW



BOTTOM VIEW

PHILIPS RADIOPLAYER: MODEL BZ456A



RESISTORS

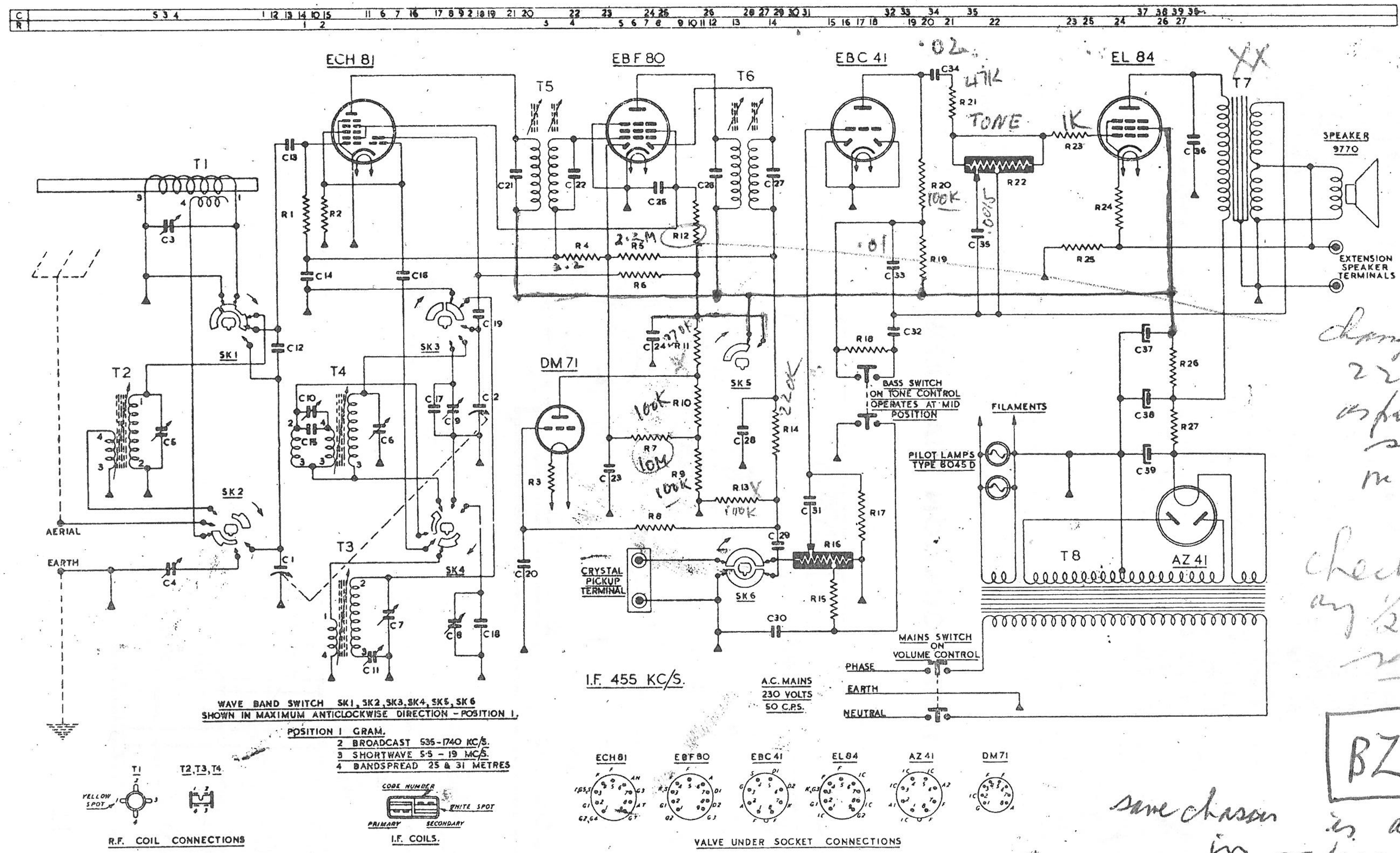
R1 1 meg. ¼w. carbon
R2 47k ¼w. carbon
R3 220 ohms ¼w. carbon
R4 2.2 meg. ¼w. carbon
R5 2.2 meg. ¼m. carbon
R6 27k 1w. carbon
R7 10 meg. ¼w. carbon
R8 4.7 meg. ¼w. carbon
R9 100k ¼w. carbon
R10 100k ¼w. carbon
R11 270k ¼w. carbon
R12 33k 1w. carbon
R13 100k ¼w. carbon
R14 220k ¼w. carbon
R15 56k ¼w.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

CONDENSERS

C1 12-500 mmfd. } ganged condenser
C2 12-500 mmfd. }
C3 3-30 mmfd. air trimmer
C4 175 mmfd. wire trimmer
C5 3-30 mmfd. air trimmer
C6 3-30 mmfd. air trimmer
C7 3-30 mmfd. air trimmer
C8 175 mmfd. wire trimmer
C9 3-30 mmfd. air trimmer
C10 4-60 mmfd. air trimmer
C11 150-750 mmfd. padder
C12 233 mmfd. 1% ceramic condenser
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. 600v. paper
C31 0.01 mfd. 600v. paper
C32 0.1 mfd. 350v. paper
C33 0.01 mfd. 500v. paper
C34 0.02 mfd. 500v. paper
C35 1500 mmfd. ceramic
C36 0.002 mfd. 750v. paper
C37 20 mfd. } 350v. triple electrolytic
C38 40 mfd. }
C39 40 mfd. }

COILS

T1 Ferroxcube rod aerial coil VK-469-70
T2 Short wave aerial coil VK-469-55
T3 Broadcast oscillator coil VK-471-50
T4 Shortwave oscillator coil 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-671-02
T8 Power transformer VK-631-02/01



changed from 22K & 33K as per 10/12/55 see Philips m'ed sheet

Check & replace any ½W IRC resistors

BZ456A

same chassis is also used in radiogram

RESISTORS

- R1 1 meg. ¼w. carbon
- R2 47k ¼w. carbon
- R3 220 ohms ¼w. carbon
- R4 2.2 meg. ¼w. carbon
- R5 2.2 meg. ¼m. carbon
- R6 27k 1w. carbon
- R7 10 meg. ¼w. carbon
- R8 4.7 meg. ¼w. carbon
- R9 100k ¼w. carbon
- R10 100k ¼w. carbon
- R11 270k ¼w. carbon
- R12 33k 1w. carbon
- R13 100k ¼w. carbon
- R14 220k ¼w. carbon
- R15 56k ¼w. carbon
- R16 2 meg. tapped at 400k potentiometer
- R17 10 meg. ¼w. carbon
- R18 4.7 meg. ¼w. carbon
- R19 100k ½w. carbon
- R20 100k ½w. carbon
- R21 47k ¼w. carbon
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- C9 3-30 mmfd. air trimmer
- C10 4-60 mmfd. air trimmer
- C11 150-750 mmfd. padder
- C12 233 mmfd. 1% ceramic condenser
- 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
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- 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. 600v. paper
- C31 0.01 mfd. 600v. paper
- C32 0.1 mfd. 350v. paper
- C33 0.01 mfd. 500v. paper
- C34 0.02 mfd. 500v. paper
- C35 1500 mmfd. ceramic
- C36 0.002 mfd. 750v. paper
- C37 20 mfd. } 350v. triple electrolytic
- C38 40 mfd. }
- C39 40 mfd. }

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