

PP31/I  
OP21/I

PP31/I  
OP21/I



# SERVICE MANUAL

MODELS

**PP31/I** and **OP21/I**

ISSUED: JUNE, 1960.

**KOLSTER-BRANDES LIMITED**  
FOOTSCRAY                      SIDCUP                      KENT

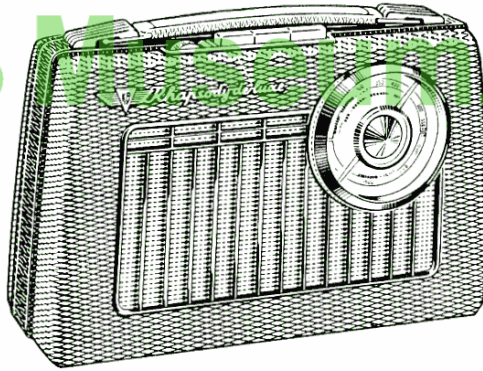
SERVICE DEPOTS

41, BENT STREET,  
CHEETHAM, MANCHESTER  
Telephone: BLAckfriars 1751 (3 lines)

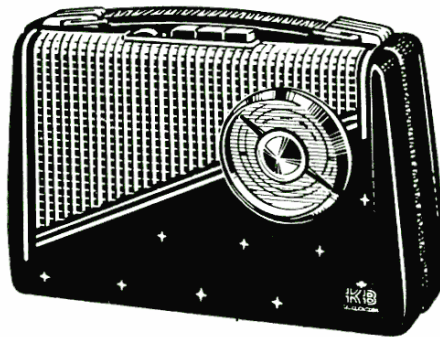
FOOTSCRAY,  
SIDCUP, KENT  
FOOTscray 3333 (10 lines)

87, McALPINE STREET,  
GLASGOW  
CENTral 1779

КВМ [www.kvm.org.uk](http://www.kvm.org.uk)



PP31/1



OP21/1

# Service Data

for

## PP31/I and OP21/I

### GENERAL INFORMATION

These receivers are six-transistor, two waveband portables for operation from self-contained batteries.

BATTERIES: 2 × 9v. Nominal life: 600 hours.

<i>Make</i>	<i>Type No.</i>
Ever Ready	PP9
Drydex	DT9
Vidor	T6009

#### TRANSISTOR COMPLEMENT:

			FUNCTION
TX1	S.T.C.	TK1000C	Oscillator-Mixer
TX2	S.T.C.	TK1000C	1st I.F. Amplifier
TX3	S.T.C.	TK1000C	2nd I.F. Amplifier
TX4	G.E.C. or Mullard	GET.114 OC81	Audio Driver
TX5, TX6	G.E.C. (Matched Pair) or Mullard	GET.114 OC81	Push-pull Output
Diode Detector:		Brimar GD3	

WAVERANGES: Medium Waveband 150–270 Kc/s. (2,000–1,100 metres).

Long Waveband 520–1,610 Kc/s. (577–185 metres).

POWER OUTPUT: 700 mW for 10% distortion.

Standing current: 7 mA.  
 50 mW output: 20 mA.  
 700 mW output: 65 mA.  
 Average listening level: 14 mA.

**CONTROLS:**

**Press buttons :**

- Long waveband and On.
- Medium waveband and On.
- Off.
- Volume Control (Thumb drive).

**DIMENSIONS:**

**PP31/1**

<b>Height</b>	<b>Width</b>	<b>Depth</b>
7 inches (18 cms)	10 $\frac{1}{4}$ inches (26 $\frac{1}{2}$ cms)	3 $\frac{1}{2}$ inches (9 cms)

**OP21/1**

7 inches (18 cms)	9 $\frac{3}{4}$ inches (25 cms)	3 $\frac{1}{2}$ inches (9 cms)
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**WEIGHT:**

**PP31/1**

Without batteries 3 lbs. 8 ozs. (1.59 Kg)  
 With batteries 5 lbs. 4 ozs. (2.39 Kg)

**OP21/1**

Without batteries 3 lbs. 6 ozs. (1.53 Kg)  
 With batteries 5 lbs. 2 ozs. (2.33 Kg)

1. Open cabinet and remove batteries.
2. Unsolder car aerial socket leads.
3. Remove tuning knob and pointer, these are push fits on the gang condenser spindle.
4. Remove the three chassis fixing screws.
5. Withdraw the chassis from the cabinet.

### CIRCUIT DESCRIPTION

These receivers are six-transistor superhet receivers. A ferrite rod aerial is provided, having separate windings for Long and Medium Waveband reception. L1 is the medium wave aerial coil. On Long Waves L1 and L3 are connected in series and the circuit is padded out by means of capacitors C1 and C2. Additional coils are provided for use with an external car aerial. L5 is the Medium Wave coil and L6 the Long Wave coil.

The connection between receiver and external aerial should be made by means of a standard cable. The output of the aerial is matched to the input impedance of the mixer-oscillator transistor, TX1 by means of the coupling windings L2 and L4. Transistor TX1 operates as an inductively coupled oscillator. The emitter winding is coupled to the collector winding through the tuned winding L7.

The I.F. is 470 Kc/s. and the oscillator frequency is higher than the signal on both bands. Two stages of I.F. amplification are used, each fed from one battery. The I.F. transformers have tuned primaries and untuned secondaries. The primaries are tapped for correct matching. The 2nd and 3rd I.F. transformer primaries have another tap to which neutralising condensers, C8 and C12, are connected.

A germanium point-contact diode is used as detector and also provides a positive voltage which is applied to the base of transistor TX2 for A.G.C. purposes.

The D.C. load of the diode is a potentiometer which also acts as volume control. Transistor TX4 feeds the output stage through the phase-splitting transformer, L11. The output stage is a "single-ended push-pull" class B. circuit. The two output transistors TX5, TX6 are biased almost to collector current cut-off and stabilised by means of resistors, R14, R15, R16, R17, R18, R19 and two thermistors, KS19W.

Negative feedback is provided from the speaker voice coil into the base of the driver transistor, TX4.

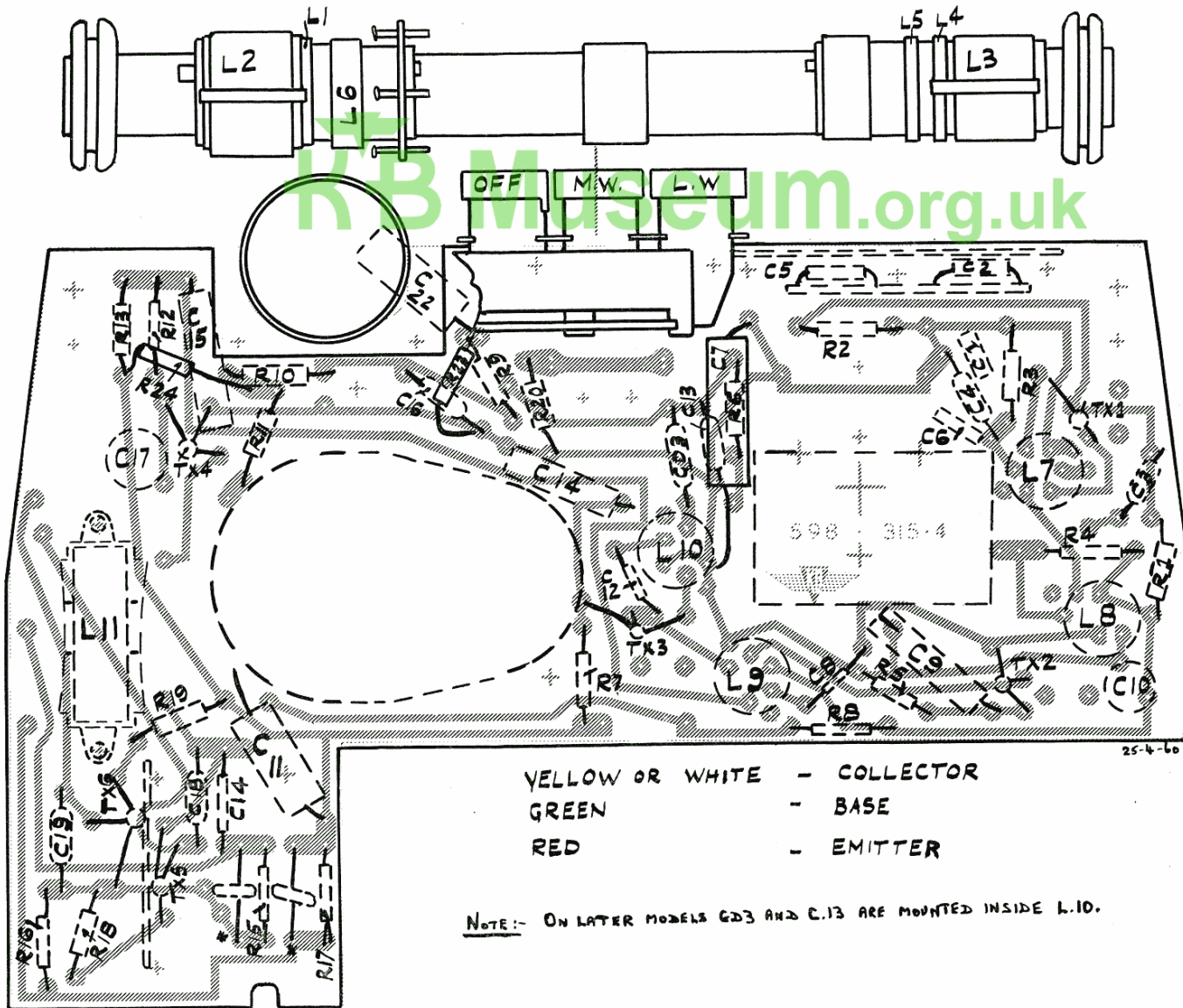
The speaker is connected between the collector of TX6 and the centre tap of the batteries. The D.C. current through the speaker is negligible, being only the out-of-balance current through two output transistors. The input is applied in antiphase from the two secondary windings of L11 between base and emitter of the two input transistors, so that one transistor is conducting when the other is not. The speaker impedance is  $40\Omega$  in order to provide the transistors with the optimum load for maximum power output and minimum distortion. A magnetic screen is provided by means of a copper layer on one side of the board. This screen is held at  $-9V$  with respect to the positive line.

1. The following equipment will be required:
  - (a) A.M. signal generator covering the range 140–1700 Kc/s.
  - (b) Power output meter, 40 Ω impedance.
  - (c) Shielded test coil (12 turns of insulated wire on 2 inch diameter former).
2. Set the tuning pointer to datum with the gang condenser at maximum capacity.
3. Progressively reduce the signal input as the sensitivity increases with alignment. The output should be maintained at 50mW the volume control being at maximum.
4. All measurements are to be made with an R.F. signal modulated 30 per cent. at 400 c/s.
5. The oscillator operates at a higher frequency than the signal on both bands.
6. I.F. ALIGNMENT.
  - (a) Set the signal generator to 470 Kc/s. and connect it via an 0.1 μF. condenser to the base of TX1, TK.1000C. The gang condenser of the receiver should be at maximum capacity, and the set switched to medium wave.
  - (b) Adjust the cores of the I.F. coils for maximum sensitivity in the following order: L10, L9, L8.  
Repeat this adjustment as necessary to optimum.
7. R.F. ALIGNMENT.
  - (a) Couple the signal generator to the receiver via the test coil which should be mounted axially in line with the ferrite rod aerial.
  - (b) The following operations should be carried out in the order indicated, being repeated as necessary until scale accuracy with maximum sensitivity is attained.

<i>Operation</i>	<i>Input Frequency</i>	<i>Wave Band</i>	<i>Pointer Position</i>	<i>Adjustments</i>
1.	600 Kc/s.	M.W.	500 M. Mark	Osc. Core L7. Aerial Winding L3.
2.	1350 Kc/s.	M.W.	222 M. Mark	Osc. Trimmer T2. Aerial Trimmer T1.
3.	225 Kc/s.	L.W.	1335 M. Mark	Aerial Coil L1. Whilst rocking gang for optimum.
4.	176 Kc/s.	L.W.	1700 M. Mark	Aerial Coil L1. Whilst rocking gang for optimum.

Operation 4 should be carried out only in case the output at 175 Kc/s. is more than 3dB. below that at 225 Kc/s.

Component	Colour Code	Circuit Ref.	Part No.	Price "R"
Cabinet Assy. (criss cross)			538/4/1	105/-
Cabinet Assy. (Pink)			538/4/1A	105/-
Cabinet Assy. (Green)			538/4/1B	105/-
Cabinet Assy. (Blue) OP21/I only			605/4	50/-
<b>COILS</b>				
Osc. Coil Assy.	Yellow		519/48/1	7/6
1st I.F. Coil Assy.	White		519/50	8/3
2nd I.F. Coil Assy.	Brown Green		519/50/1	8/9
Final I.F. Coil Assy.	Brown Blue		519/51/1	8/9
Gang Condenser			505/210/1	18/-
Knob Assy.			505/132	7/6
Pointer			505/188	2/3
Diode (GD3)			12/1	7/6
Potentiometer			9/25	3/3
Push Button Unit PP31/I			457/123/2	6/-
" " " OP21/I			574/123/1	6/-
Battery Lead Assy.			565/128/1	1/9
Red Aerial Assy.			598/30	19/6
Scale			519/200	3/6
Speaker Assy.			598/251	23/3+ P.Tax
Interstage Transformer			565/83	11/3
Thermistor			565/252	2/3
Resistor 5Ω 10% ½W			R050FE	1/-
Handle Assy Wine			480/142/W	7/6
" " Grey			480/142/Gy	7/6
" " Beige			480/142/Be	7/6
" " Midnight Blue			480/142/M.B	7/6



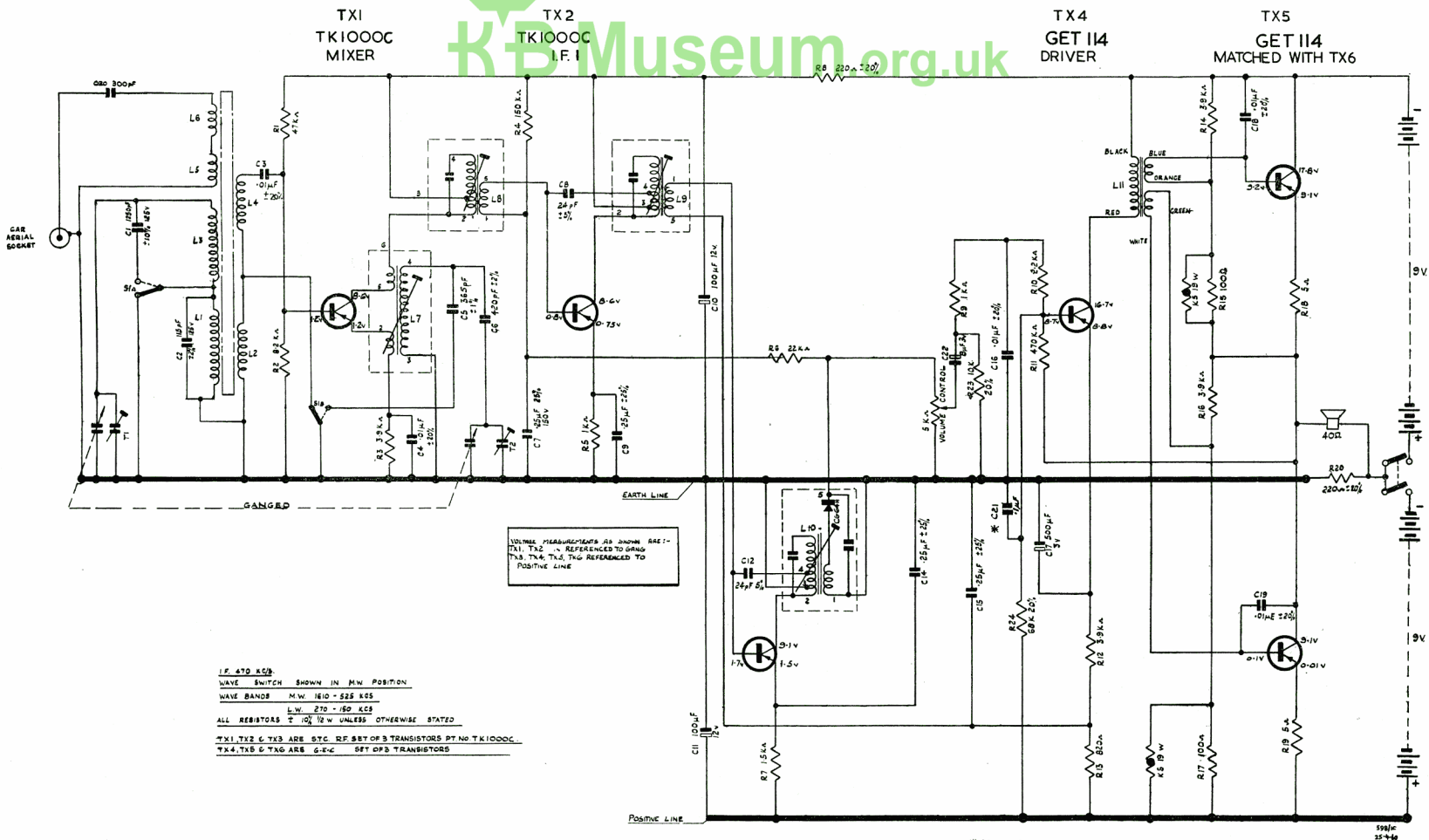
YELLOW OR WHITE - COLLECTOR  
 GREEN - BASE  
 RED - EMITTER

NOTE: ON LATER MODELS C23 AND C13 ARE MOUNTED INSIDE L10.

\* KS19W

**PRINTED CIRCUIT BOARD**





I.F. 470 KCS  
 WAVE SWITCH SHOWN IN M.W. POSITION  
 WAVE BANDS M.W. 1E10 - 525 KCS  
 L.W. 270 - 150 KCS  
 ALL RESISTORS  $\pm 10\%$   $\frac{1}{2}$  W UNLESS OTHERWISE STATED  
 TX1, TX2 & TX3 ARE 5TC RF SET OF 3 TRANSISTORS BY NO TK1000C  
 TX4, TX5 & TX6 ARE 6-C-C SET OF 3 TRANSISTORS

**CIRCUIT DIAGRAM for PP31/1 & OP21/1**

**TX3  
TK1000C  
I.F. 2**

**TX6  
GET 114  
MATCHED WITH TX5**