First 25. 1959/1960.
- Rochester.
R. A. Franklin - alignment / Final Tester.
L. G. Knight - Boxing (Prodn Supt.) - used 3 a Tr Spkr instead of 33 a Spkr.!!

QP21

SERVICE DATA

MODEL

QP21

ISSUED: NOVEMBER, 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

Service Data
for QP21

SPECIFICATION

The QP.21 is a six transistor, two waveband portable receiver for operation from self-contained batteries.

BATTERIES: 2 x 9V. Nominal life: 800 hours for 4 hours/day.

MAKE	TYPE No.
Ever Ready	PP9
Drydex	DT9
Vidor	T6009

WAVERANGES: Long Waveband—150–270 Kc/s. (2,000–1,100 M.).
Medium Waveband—520–1,620 Kc/s. (577–185M.).

CONTROLS: Press Buttons—LW and On. MW and On. Off.
Volume Control (Rim Drive).

TRANSISTOR COMPLEMENT:

			FUNCTION
TX1	G.E.C.	GET.874	Oscillator Mixer.
TX2	G.E.C.	GET.873	1st I.F. Amplifier.
TX3	G.E.C.	GET.873	2nd I.F. Amplifier.
TX4	G.E.C.	GET.114	Audio Driver.
TX5 TX6	G.E.C.	GET.114 (Matched pair)	Push-Pull Output.
Diode Detector :		BRIMAR GD3	

DIMENSIONS: Height $4\frac{1}{4}$ inches.
Width $9\frac{1}{8}$ inches.
Depth $8\frac{1}{4}$ inches.
Weight Without Batteries, 3 lbs. 15 oz.
With Batteries, 5 lbs. 11 oz.

REMOVAL OF CHASSIS FROM CABINET

1. Remove lid by lifting and sliding sideways.
2. Lift out batteries cover by means of finger clearances at ends.
3. Unclip and remove batteries.
4. Remove the two fixing screws on control panel.
5. Ease slightly backwards and lift out vertically complete chassis assembly.

If necessary to divorce chassis from the cabinet completely unsolder leads to speaker and car aerial socket.

Should access to the printed circuit become necessary, remove knobs and pointer and release control panel by means of the four securing screws. Care should be taken when replacing the panel to ensure that the longer screw is placed in the switch/volume control junction.

COIL AND TRANSFORMER DATA

Circuit Ref. No.	*Function*	*Approximate Resistance in ohms*
L3	L.W. Aerial Coil	3
L11	Interstage Transformer :	
	1st Winding	600
	2nd Winding	60
	3rd Winding	60
	All others less than one ohm.	

VOLTAGE CHART

Voltages measured with a voltmeter having 20,000 ohms/V impedance.

Transistor	*Circuit Ref.*	*Base*	*Emitter*	*Collector*	*Referred To*
GET.874	Osc.-Mixer	·95	·99	8·3	Gang
GET.873	1st IF Amp.	1	·92	8·3	Gang
GET.873	2nd IF Amp.	1·63	1·62	9	Positive Line
GET.114	Audio Driver	9	8·9	16·3	Positive Line
GET.114	Push-Pull	8·55	8·5	17·5	Positive Line
GET.114	Push-Pull	·13	·01	8·5	Positive Line

Total H.T. Current, 7 mA. Power output 700 mW. for 10 per cent. distortion.

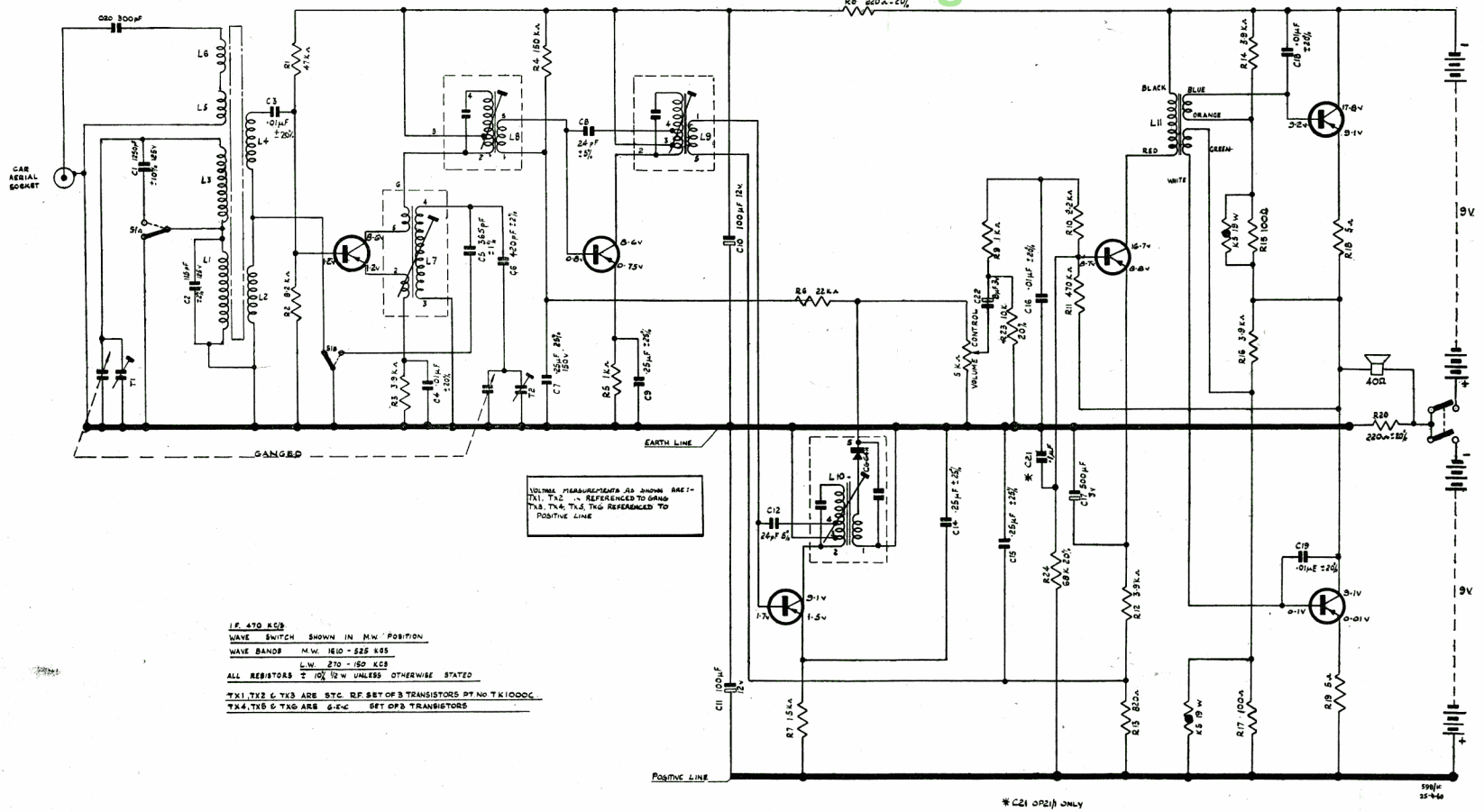
SPARES LIST

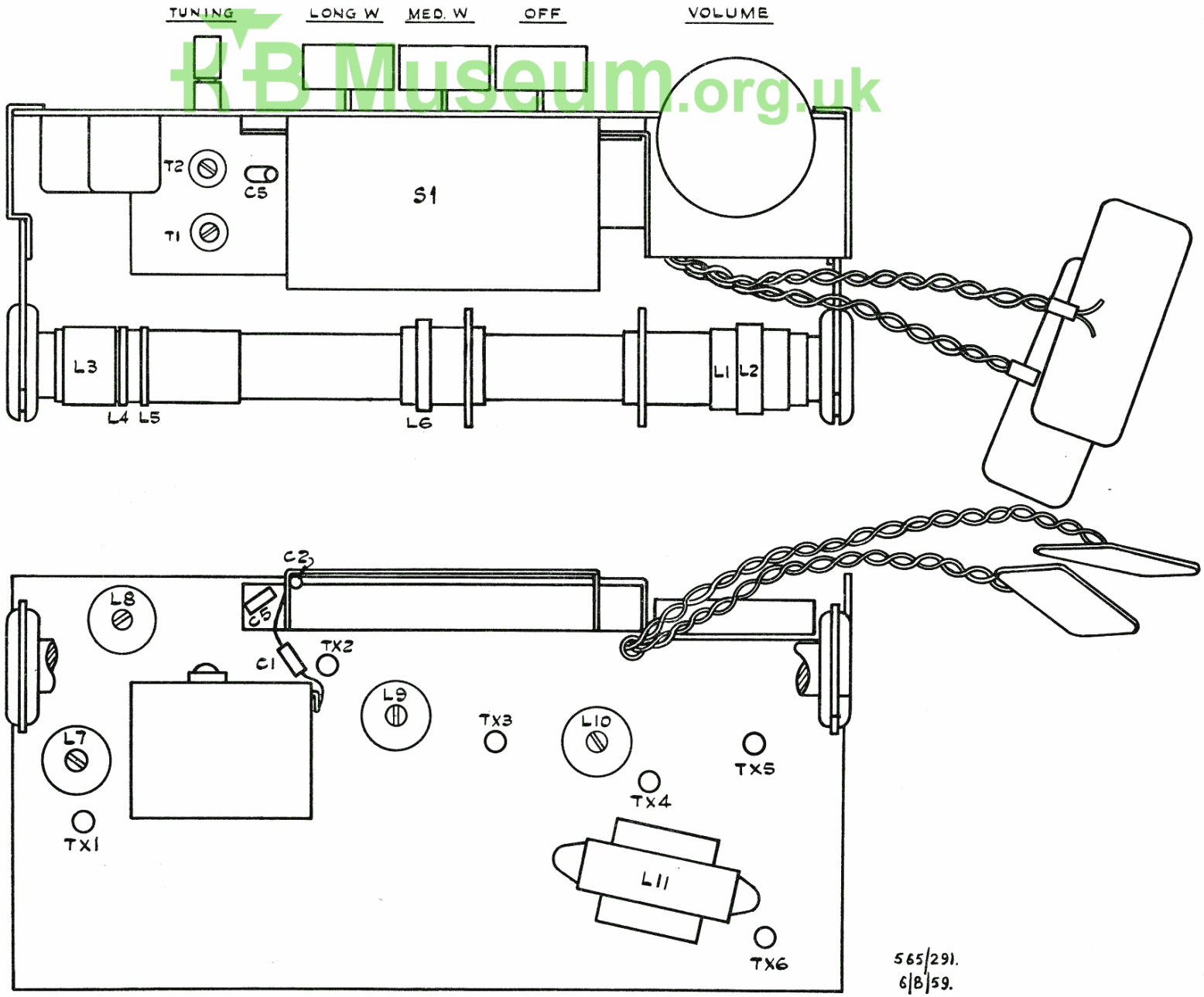
PRICES ARE SUBJECT TO ALTERATION WITHOUT NOTICE

Component	Colour Code	Circuit Ref.	Part No.	Price
Cabinet Assy. ...	Red/Grey	...	564/4/2	85/–
	Blue/Grey		564/4/3	85/–
COILS:				
Osc. Coil Assy. ...	Green ...	L7	519/48	7/3
Ist I.F. Coil Assy. ...	White ...	L8	519/50	8/6
2nd I.F. Coil Assy. ...	Brown/Green	L9	519/50/1	8/9
Final I.F. Coil Assy. ...	Brown/Blue	L10	519/51/1	8/9
Rod Aerial Assy.	MW. Yellow Yellow	L1 2, 3, 4, 5, 6	~~565/30~~ 595/30	17/6
	LW. Yellow Green			
Interstage Transformer		L11	565/83	10/6
CONDENSERS:				
16 pF. ±5% 350V. ...	... ...	C8, 11	KST280	1/6
115 pF. ±2% 125V. ...	... ...	C2	KST276	1/6
360 pF. ±2% 125V. ...	... ...	C5	KST277	1/6
420 pF. ±2% 125V. ...	... ...	C6	KST278	1/6
1250 pF. ± 10% 125V. ...	... ...	C1	KST279	1/6
·01 μF. ±20% 150V. ...	... ...	C3, 4, 13, 15, 17, 18	KPM19	1/6
·25 μF. ±25% 150V. ...		C9, 12, 4	KPM1	2/–
8 μF. 3V. ...	... ...	C7	KEM146	1/6
100 μF. 12V. ...	... ...	C19	KEM147	1/6
100 μF. 12V. ...	... ...	C10	KEM149	1/6
500 μF. 3V. ...	... ...	C16	KEM148	1/9
Tuning Condenser ...	... ...	...	564/210/1	17/–
Knob Assy.	... ...	...	564/132	3/3
Pointer Bush	... ...	...	564/190	6
Pointer	... ...	...	511/204/1	6
Push Button W/C Sw.	... ...	...	564/203	13/6

Component	Colour Code	Circuit Ref.	Part No.	Price
Switch Cover	... ...	...	565/188	9
Control Panel Mldg. ...	... ...	...	564/211	3/9
Battery Cover Mldg. Assy.	... ...	...	564/146	3/6
Scale	... ...	...	565/200/S	1/–
			565/200/U	2/9
Loudspeaker	... ...	...	565/250	23/3
			(Alt565/251)	+ P.T.
Cabinet Handle ...	... ...	...	564/196	4/–
Battery Lead Assy. ...	... ...	...	565/128	3/–
RESISTORS:				
5Ω ± 10% ½W. ...	... ...	R18, 19	R050FEH	1/–
15Ω ± 10% ½W. ...	... ...	R11	R150FEM	1/–
100Ω ± 10% ½W. ...	... ...	R15, 16	R101FEM	1/–
220Ω ± 20% ½W. ...	... ...	R8, 20	R221HEM	1/–
820Ω ± 10% ½W. ...	... ...	R13	R821FEM	1/–
1 KΩ ± 10% ½W. ...	... ...	R5, 9, 10	R102FEM	1/–
1·5 KΩ ± 10% ½W. ...	... ...	R7	R152FEM	1/–
3·9 KΩ ± 10% ½W. ...	... ...	R3, 12, 14, 16	R392FEM	1/–
8·2 KΩ ± 10% ½W. ...	... ...	R2, 6	R822FEM	1/–
47 KΩ ± 10% ½W. ...	... ...	R1, 4	R473FEM	1/–
Thermistor KS19W ...	... ...	...	565/252	2/3
Potentiometer 5 KΩ ...	... ...	...	9/9/1	2/9
TRANSISTORS:				
GET874	... ...	TX1	7/6	26/–
GET873	... ...	TX2, 3	7/7	22/3
GET114	... ...	TX4	7/8	16/6
GET114 (Matched Pairs)	... ...	TX5, 6	7/8/P	33/–
Diode GD3	... ...	...	409/206	3/6

CIRCUIT DIAGRAM QP21





565/291.
6/B/59.

ALIGNMENT INSTRUCTIONS

The following equipment will be required:

1. A.M. signal generator covering the range 140–1,630 Kc/s.
2. Power output meter or A.C. voltmeter.

Alignment

1. The oscillator operates at a higher frequency than the signal on both bands.
2. Set the tuning pointer to the datum mark with gang fully in.
3. Keep the input signal as low as possible reducing it progressively as the sensitivity increases with alignment.
4. Measurements to be made with the R.F. signal modulated 30 per cent. at 400 c/s.
5. I.F. alignment should be carried out as follows:
   Connect signal generator via 0·5 μF. capacitor to the mixer base available at the edge of the board, taking care that the clip does not touch the copper screen on the other side of board—feed in 470 Kc/s. signal, gang fully in, on medium wave.
   Adjust cores for maximum gain in the following order—L10, L9, L8.
   Repeat this adjustment as necessary to optimum.
6. Connect the signal generator to a test coil (twelve turns of P.V.C. insulated connecting wire on a 2-inch diameter former) situated axially in relation to the aerial coils on the ferrite rod. This is necessary as no aerial or earth terminals are provided.
7. R.F. alignment should be carried out in the order shown below. Operations should be repeated as necessary until scale accuracy, with maximum sensitivity, is attained.

Operation	*Input Frequency*	*Wave Band*	*Pointer Position*	*Adjustments*
1.	600 Kc/s.	M.W.	500M. Mark	Osc. core L7. Move aerial winding L1 along ferrite rod.
2.	1,350 Kc/s.	M.W.	222M. Mark	Osc. trimmer T2. Aerial trimmer T1.
3.	225 Kc/s.	L.W.	1,335M. Mark	Move aerial coil L3 along ferrite rod, whilst rocking gang for optimum.
4.	175 Kc/s.	L.W.	1,700M. Mark	Move aerial coil L3 along ferrite rod, whilst rocking gang for optimum.

Operation 4 should be carried out only in case the output at 175 Kc/s. is more than 6 dB. down on that at 225 Kc/s.

CIRCUIT DESCRIPTION

The QP.21 is a six-transistor superhet receiver. 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 external car aerial. L5 is the medium wave coil and L6 the long wave coil, which is shorted out in medium wave operation.

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 C11 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 transistors TX5 and TX6 are biased almost to collector current cut-off and stabilised by means of resistors R14, R15, R16, R17, R18, R19 and two termistors KS19W.

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 the two output transistors. The input is applied in antiphase from the two secondary windings of L11 between base and emitter of the two output transistors, so that one transistor is conducting when the other is not. The speaker impedance is 40 Ω 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.