

# Test Report

www.radio-workshop.co.uk

## KOLSTER BRANDES

# R.25

### RADIO RECEIVER FR10

#### GENERAL

The Kolster-Brandes Model FR10 is an A.C. mains receiver of distinct and handsome appearance. It uses a 4-valve plus rectifier superheterodyne circuit and has three wavebands. The sound output is 3 watts, fed to an 8in. high flux permanent magnet moving-coil speaker. Gramophone pick-up sockets and connections for an extension speaker are provided, a "screw" switch enabling the internal speaker to be connected if so required. The sensitivity of the receiver is better than 150 microvolts for an output of 50 milliwatts, on all three wavebands.

The cabinet is of high quality veneered walnut and mahogany, the dimensions being: Height 15in.; width 20in.; depth 9½in. A long, coloured tuning scale has each waveband clearly indicated, and controls for wave-change, tuning, tone and volume are mounted two on either side of the cabinet. The mains switch is ganged with the tone control. The FR10 is for use on 200-250 volts, 50/100 c.p.s. and current consumption is 48 watts.

Made by Kolster-Brandes, Ltd., Footscray, Sidcup, Kent, the FR10 is priced at £25 4s. 0d, inclusive of tax.

#### CIRCUIT

Aerial input is via C1 to L1, coupled to L2 (S.W.), L3 (M.W.) and L4 (L.W.). Each tuning inductance is separately switched to the R.F. section of the gang condenser which is connected directly between the grid of V1 and chassis. L2 and L3 are tuned by variable capacity trimmers but L4 has a fixed parallel capacitor and an adjustable core. The frequency-changer, V1 (6K8GT) is a triode-hexode with electronic mixing. AVC is applied to the hexode grid on Medium and Long Waves, C2 being provided as a buffer condenser to permit the application of AVC voltages to the L.W. and M.W. grid coils. On S.W. the grid return is

#### SERVICE SNAPS OF THE FR10

Valves: 6K8GT; 6V6GT; 6K7GT; 6X5GT; 6Q7GT (all Brimar).

I.F.: 470 kc/s (peaked).

Volume Control: .5 meg. without switch.

Tone Control: .5 meg. with SP switch.

Electrolytics: 32 plus 32 mfd. in common-negative metal can.

P.U.: Crystal or Magnetic.

Ext. L.S.: Low impedance.

through L2, straight back to chassis, thereby by-passing the AVC line. V1 has also standing bias developed across R4 and R8 in series, the latter resistor being common to the cathodes of both V1 and V2.

Iron-cored coils are used in the oscillator circuit and the anode feedback coil, L6, is inductively coupled to L7 on Short Waves, while on Medium and Long Waves L8 and L9 respectively form the oscillator grid tuning inductances, both having anode capacity coupling. The S.W. and M.W. coils have variable iron-dust cores and are tuned also by capacity trimmers (T3 and T4). L9, the Long Wave oscillator coil, has an adjustable core and a fixed capacity trimmer (C15); fixed padding being provided by C10.

Both I.F. transformers are tuned by variable iron-dust cores and have fixed capacity trimmers. All four windings are peaked at 470 kc/s. Signal voltages taken to the grid of V2 (6K7GT) are amplified, and passed via the second I.F. transformer to one diode of a 6Q7GT double-diode-triode (V3), where signal rectification takes place. A.F. voltages built up across the load resistor R11 are applied to the manual volume control by way of C18 and contacts on the waveband switch, and fed to the grid of V3 by C22 and R16. The input from the pick-up sockets is taken to the top of the volume control and to chassis. R12, C19, and C21 together form an I.F. filter. R9 and R13, in conjunction with a specially-wound and tapped secondary winding of the output transformer L16, provide negative feedback, A.F. voltages 180 degrees out of phase being fed back to the grid circuit of V3. The second diode of V3 acts as a rectifier providing AVC voltages which are fed back to the grids of V1 and V2, filter components being R18/C17 and R3/C2.

The anode of V3 is coupled by C24 to the grid of a 6V6GT beam-power tetrode (V4). This valve is cathode biased, and negative feedback is provided in this stage by leaving the bias resistor R22 un-by-passed. The grid resistor of V4 is used as a variable tone control, the slider being connected by C23 to the grid of V3. The primary of L16 is damped for top note correction by R19. Low-impedance extension speaker sockets are taken from the speech coil secondary, one side of which is earthed.



#### ALIGNMENT NOTES

The oscillator operates at a higher frequency than the input signal on all bands.

The tuning pointer should be set to the datum mark with the gang condenser at maximum capacity.

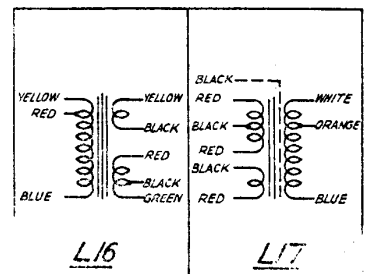
The input signal should be progressively reduced as the sensitivity increases with alignment and kept as low as is reasonable.

The tuning condenser should be rocked slightly for maximum gain whilst finally adjusting the aerial trimmers.

The operations for each wave band should be successively repeated until scale accuracy and maximum sensitivity have been attained.

Medium wave should be checked after the long wave alignment has been completed and operations 2 and 3 repeated if necessary.

#### WINDING RESISTANCES

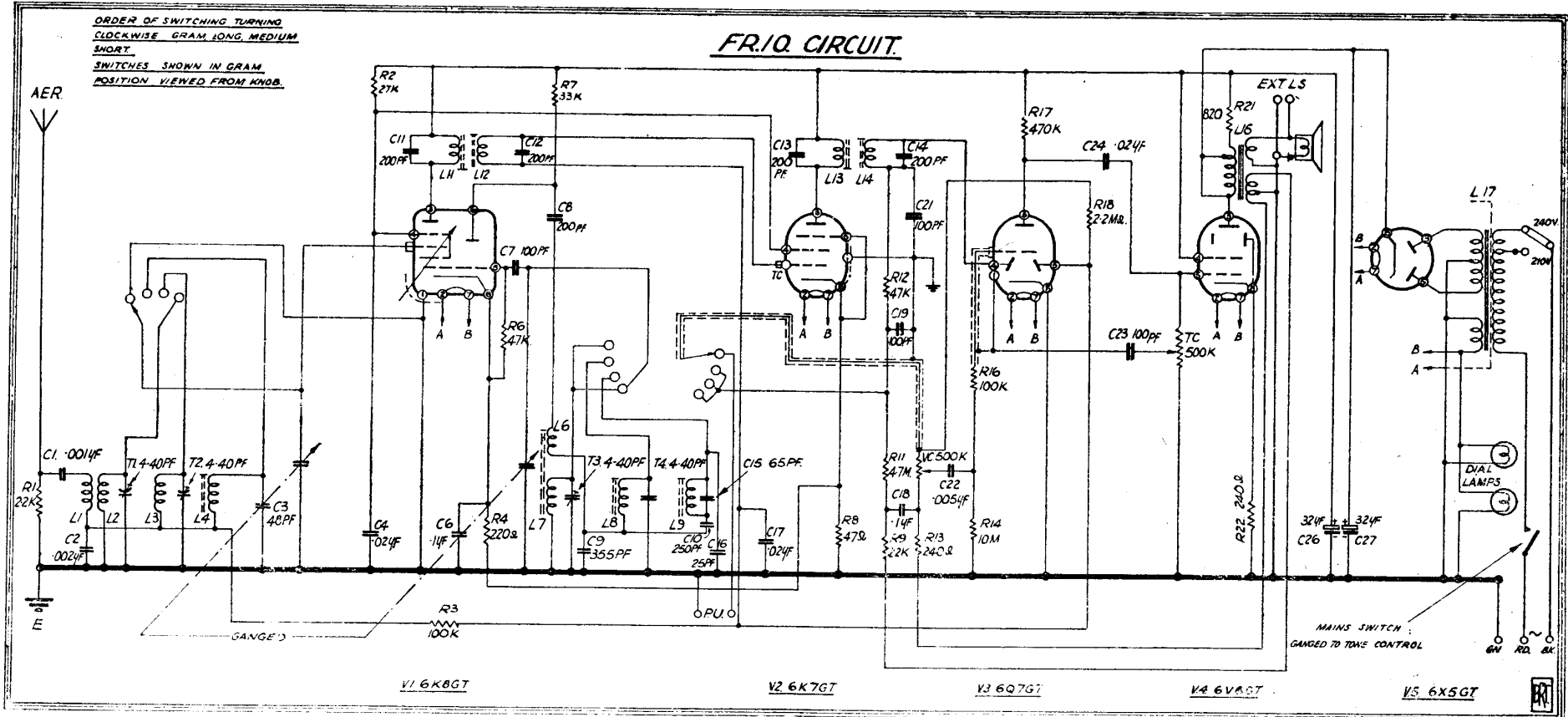


#### L16 Resistance readings—

- Blue/Yellow 510 ohms.
- Red/Yellow 1.5 ohms.
- Yellow/Black less than 1 ohm.
- Red/Green 578 ohms.
- Black/Green 49 ohms.

#### L17 Resistance readings—

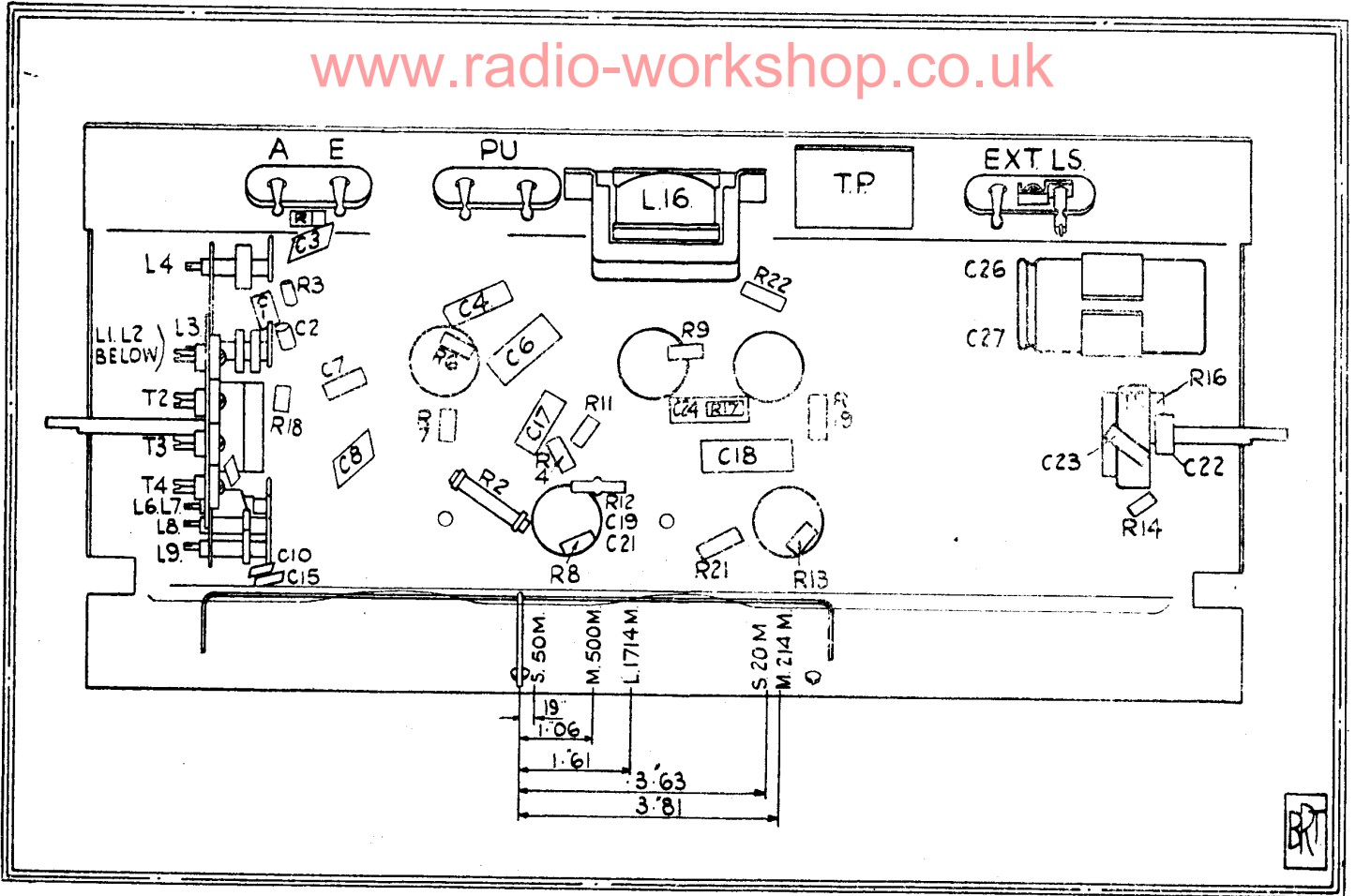
- White/Blue 45 ohms.
- Red/Red 470 ohms.
- Black/Red less than 1 ohm.
- (Heater winding)



### VOLTAGE CHART

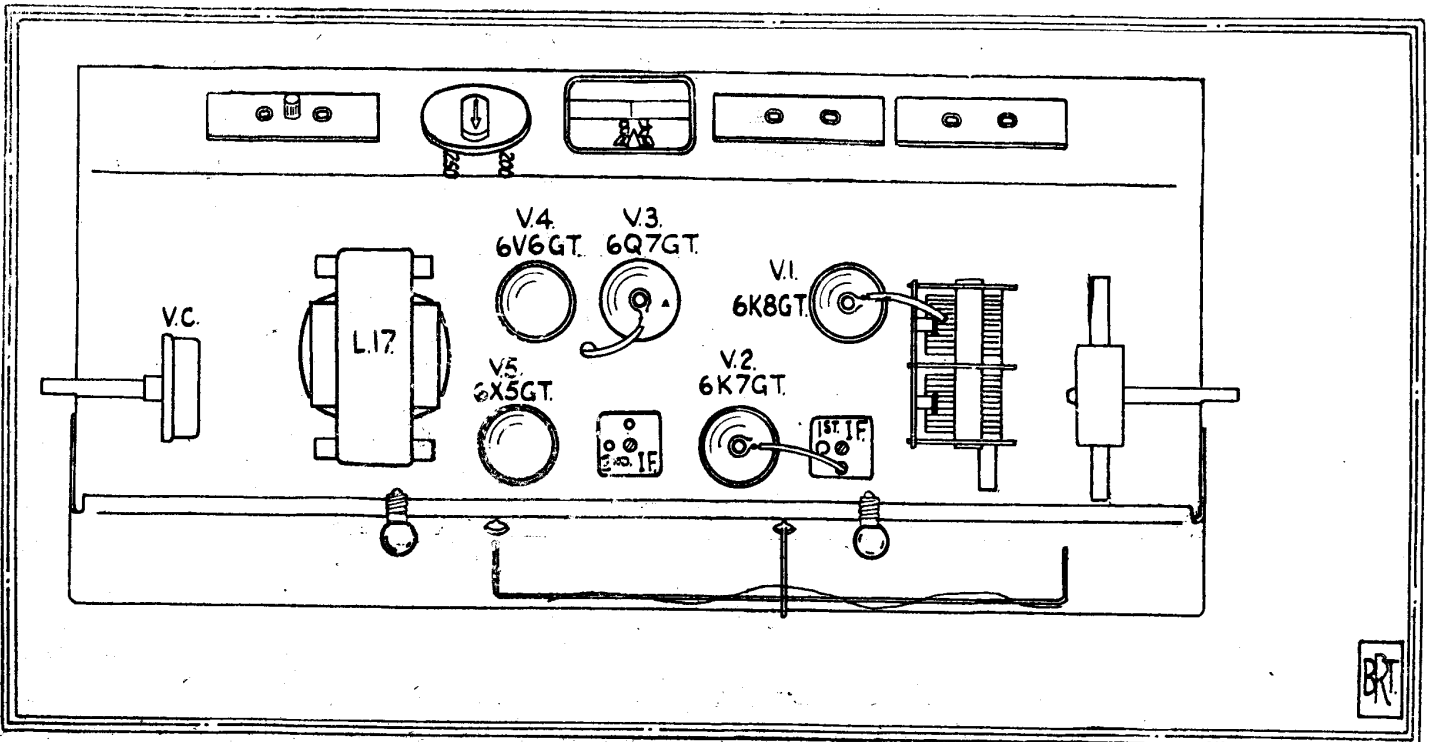
Mains Input—225v. in 240v. tap Aerial and Earth Disconnected		Band switch M.W.								Volume Control at Minimum Readings approximate	
Valve	Function	Volts measured between SOCKET and CHASSIS								Top Cap	
		1	2	3	4	5	6	7	8		
V1 6K8GT	Frequency Changer	E	E	260	97	—	114	6.3 AC	2.5	—	
V2 6K7GT	I.F. Amplifier	E	E	260	97	0.9	—	6.3 AC	0.9	—	
V3 6Q7GT	Det., AVC & L.F. Amp.	E	E	46	—	—	—	6.3 AC	E	—	
V4 6V6GT	Beam Tetrode Output	—	E	244	260	—	—	6.3 AC	11.5	—	
V5 6X5GT	Full Wave Rectifier	—	6.3 AC	265 AC	—	265 AC	—	—	280	—	
Volts across 1st Electrolytic		—	—	—	—	—	—	—	C27	280	
" 2nd		—	—	—	—	—	—	—	C26	260	
" Smoothing Resistor		—	—	—	—	—	—	—	R21	20	
" Output Transformer Primary		—	—	—	—	—	—	—	L16	20	
Total Mains Current		—	—	—	—	—	—	—	—	215 ma	
" H.T.		—	—	—	—	—	—	—	—	70 ma	
Heater Current (each valve pt Rectifier)		—	—	—	—	—	—	—	—	.3 amp.	

www.radio-workshop.co.uk



TOP VIEW OF CHASSIS

UNDERSIDE OF CHASSIS



An isolated mains transformer (L17) supplies H.T. and heater voltages, the rectifier being a full-wave type (V5-6X5GT). The heater of this is fed from a single 6-volt winding common to all valves. H.T. smoothing is provided by R21, C26 and C27. The primary of L17 is tapped at 210 and 240 volts, and a single-pole on-off switch is ganged to the tone control.

#### PICK-UP CONNECTION

The input impedance is sufficiently high to allow the use of a crystal pick-up, while the high sensitivity enables a low voltage magnetic type to be used for 78 r.p.m.

For L.P. it is satisfactory to use a crystal head. If it is desired to use a magnetic P.U. for L.P. additional bass compensation should be inserted between the pick-up and the input sockets. This may attenuate the pick-up output to such an extent as to necessitate the use of a step-up transformer.

#### CIRCUIT ALIGNMENT

*Note:* On all three wavebands the oscillator frequency is higher than that of the incoming signal.

**Preliminary.** It is necessary to remove the chassis from the cabinet in order to gain access to all trimmers. As the tuning scale is fixed to the front of the cabinet, calibration must be carried out by lines marked on the scale back-plate. Only the centre pointer is used in reference to these lines and to the datum mark. The pointer should be set to coincide with the datum mark when the gang condenser is fully closed. All trimming adjustments must be made in the order given below, and should be repeated on each waveband until no further improvement in gain or tuning accuracy can be achieved. Medium Wave tuning should be checked after Long Wave alignment has been

completed and the oscillator adjustments repeated, if necessary. When trimming the aerial circuits the gang condenser should be rocked slightly for maximum gain.

An output meter may be connected across the Extension Speaker socket, in which case the internal speaker should be disconnected during operations. The input should be kept down to as low a level as possible to avoid AVC action. Alternatively, a D.C. voltmeter may be used to give indication of tuning resonance connected between the cathode of V1 and chassis. This latter method allows an unmodulated signal to be used.

#### TRIMMING SEQUENCE

**I.F. Circuits.** Switch to M.W., set the centre tuning pointer to the datum line, connect the signal generator to the grid of V1 via a .1 mfd. condensers, and feed in a signal at 470 kc/s. Adjust cores of L14, L13, L12 and L11 for maximum output or minimum voltage drop across V1 cathode circuit.

**M.W.** Transfer signal generator leads to aerial socket, using a dummy aerial. Set tuning pointer to 500 m. line and feed in a signal at 600 kc/s. Adjust core of L8. Set pointer to 214 m. line, re-set signal generator to 1400 kc/s and trim T4 and T2.

**L.W.** Switch to L.W. and set tuning pointer to 1714 m. line. Feed in a signal at 175 kc/s and adjust cores of L9 and L4.

**S.W.** Switch to S.W. with pointer set to 50 m. line feed in a signal of 6 mc/s and adjust core of L7. Re-set pointer to 20 m. line, feed in a signal at 15 mc/s and adjust T3 and T1.

Alignment is now complete, but the calibration should be checked with the receiver in the cabinet before the trimmers are sealed.

#### COIL DATA

Circuit Ref.	Resistance
L1 ...	less than 1 ohm.
L2 ...	less than 1 ohm.
L3 ...	4 ohms.
L4 ...	18 ohms.
L6 ...	less than 1 ohm.
L7 ...	less than 1 ohm.
L8 ...	3 ohms.
L9 ...	5 ohms.
L11 ...	5 ohms.
L12 ...	5 ohms.
L13 ...	5 ohms.
L14 ...	5 ohms.

#### Colour Codings

The coils are identified by the following colour code:—

L1 and L2 ...	Red/blue.
L6 and L7 ...	Red/violet
L3 ...	Red
L8 ...	Red/orange
L4 ...	Red/yellow
L9 ...	Red/green

#### WAVEBANDS

The receiver covers wavebands of: 740-2100 metres (410-142 kc/s); 187-585 metres (1610-570 kc/s); and 16.3-51 metres (1.84-5.9 mc/s).

#### DIAL LAMPS

These are two spherical M.E.S. type bulbs rated at 6.5 volts .3 amps.

#### DISMANTLING

Remove the four control knobs by pulling outwards, no grub-screws being fitted. Unscrew the two chassis fixing screws and withdraw chassis to the rear. It will not be necessary to remove the speaker for normal bench servicing as the leads are long enough to enable the chassis to be stood to one side while it is being worked on. To reassemble; reverse the above procedure.

*Tuning drive card showing pointer in datum position and gang closed.*

