WIRELESS INFORMATION SHEET NO. 14

RECEPTION SET R.106

Alignment Procedure and Performance Testing

In the absence of any official information the following is suggested as giving satisfactory results.

1. IF Alignment

(a) Set up an S.S.G. at 456 Kc/s, and connect it direct to the frequency changer grid, and with the crystal off, the selectivity control vertical, and the A.V.C. off, adjust all the IF trimmers, for maximum output, judged aurally. Switch to C.W., and adjust the trimmer 15 and 16 for zero beat.

Remove the S.S.G., and connect a G.O. in its place. Connect a C.R.O., using one amplifier, to the junction of R.13 and C.14. Set the time base frequency to 10 c/s and tune the G.O. until the response curve appears on the C.R.O. screen. Switch in the crystal, and set the phasing control to 5. Unscrew the coupling condenser (No.9) two turns from maximum. On the side of the response curve, a small sharp peak should be observed. This is the peak due to the crystal, and all the I.F. trimmers (Nos. 14, 13, 12, 11 and 10) should be adjusted very carefully for maximum height of this peak. It is advisable to go over the adjustments a second time, to ensure that "pulling" effects are eliminated. Now adjust the selectivity control for maximum height of this peak, and note the shape of the curve at settings of 1 and 10. At each setting, there should be a subsidiary, less sharp peak, separated from the main peak by a rejection dip, the subsidiary peak being on the L.F. side with the phasing control at 1, and on the H.F. side with the phasing control at 10. Increase the capacity of the coupling condenser (No.9) half a turn at a time, readjusting trimmer 10 to bring the peak up to its maximum height, until the two curves obtained at the two settings of the phasing control, are as nearly as possible, mirror images of each other, and the curve is nearly symmetrical at a setting of about 5. Rotating the phasing control should have little effect on the height of the main curve, which at all settings should be very sharply peaked.

(b) Check the I.F. sensitivity as follows

Remove the C.R.O. and G.O. and reconnect the S.S.G. Switch off the crystal; tune the S.S.G. and adjust the selectivity control for maximum output on an output meter offering a load of 7,000 ohms to the output stage. This output meter must be transformer* coupled to the receiver. The input required to give an output of 2 watts should not exceed the figures given.

x. The Transformer primary Inductance must be at least 10.H. with 30 m.a. d.c.

Input to	FC grid	1st IF grid	2nd IF grid
Input μV	150 μV	7.5 mV	150 mV

With the S.S.G. and receiver switched to C.W., switch on the crystal, set the phasing control to 1, and carefully tune the S.S.G. about 456 Kc/s. until a sharp peak is obtained on the output meter. (If no peak can be obtained, it may be due to the peak occuring at a frequency too high to operate the meter, and the CW oscillator should be retuned). The CW oscillator trimmers 15 and 16 should now be adjusted until zero beat is obtained with the control at a setting of 5 on the dial. Adjust the control until the beat note is 1000 c/s, and check that the S.S.G. is still tuned accurately to the crystal peak. Adjust the selectivity control for maximum output, and check the S.S.G. input required to give an output of 2 watts from the receiver. The input required should not exceed 50 uV. Switch off the crystal, reset the selectivity control for maximum output and again check the input required to give 2 watts output. This should be about the same as with the crystal in, and should not exceed 50 uV.

(c) Check the bandwidth as follows

With the S.S.G. connected as above, switch on the modulation, switch off the receiver CW oscillator, and the crystal, and adjust the S.S.G. tuning and the selectivity control to give maximum output. Set the S.S.G. input to 50 uV, and adjust the receiver L.F. gain control to give an output of 1 watt. Increase the S.S.G. frequency by about 20 Kc/s. and increase its output to 100 uV. The frequency of S.S.G. is now gradually decreased until 1 Watt is again recorded on the output meter. The difference between S.S.G. setting and 456 Kc/s. should be noted. Repeat on the other side of resonance and obtain the total bandwidth. This should be within the limits stated in the table. Repeat at levels of 500 uV, 5,000 uV, 50,000 uV.

Input uV	Bandwidth Kc/s
100	4 max.
500	9 "
5,000	16 "
50,000	24 "

2. Calibration and RF Alignment

(a) Plug in the coil unit to be adjusted, and connect the S.S.G. to the aerial terminal through a 500 ohm resistance. Set the receiver dial to 490 and set up the S.S.G. (mod. 30% at 400 c/s.) at the frequency indicated by the calibration chart. Switch off the crystal, switch off the AVC and set the selectivity control vertical. Adjust the oscillator trimmer (No.8) and the RF trimmers (Nos. 6, 4 and 2) for max. receiver output.

N.B. On the highest frequency band, two settings of the oscillator trimmer are possible, the more anti-clockwise one being correct.

Set up the S.S.G. at the frequency corresponding to a receiver dial reading of 50, and tune the receiver for max. output. If the dial reading is below 50, more inductance is needed on the oscillator coil. If above 50, less inductance is needed. (On the five lowest frequency bands, a padding condenser is provided, and may be adjusted instead of the inductance). If the inductance requires alteration, it must be removed from the set and adjustments made by trial and error. The adjustments available are shown in the table.

Band	Adjustment of Oscillator	Adjustment of RF coils
A	End turn of coil	End Turn of coil
B	Loop inside coil	Loop inside coil
C	Brass disc inside coil	No Adjustment Provided
D		
E	Loop outside coil, and padding condenser	
F		
G		
H		
J	(Trimmer No. 7)	

N.B. A non-metallic tool must be used when adjusting and padding condensers.

When the calibration is correct, adjust the three RF trimmers (6, 4, and 2) at the HF end (dial reading 490) for Maximum output. Tune in a signal from the S.S.G. at a dial reading of 50, and check the ganging of the RF ccts. by gently moving the vanes of each tuning condenser sideways in turn. If the output increases when the vanes are moved outwards, less inductance is needed on the associated coil, and vice versa. In the case of the bands where no adjustment is provided, slight errors may be ignored. Large corrections may be made by adding a short s.c.c.d. turn to reduce the inductance, or adding a few turns to the coil to increase the inductance.

All the adjustments should be carried out at each end of the band in turn until no improvement can be obtained.

The bandspread range (in the case of the four highest frequency bands) may now be adjusted. Set the screws in the coil block to give bandspread, set the dial at 490, and set the S.S.G. to the corresponding frequency. Adjust the oscillator bandspread trimmer (No. 7) and the RF bandspread trimmers (Nos. 5, 3, and 1) for maximum output. Set the dial at 50 and the S.S.G. to the corresponding frequency, and adjust the bandspread padding condensers for maximum output. These are accessible through the end of the can when the coil unit is removed.

(b) Check the RF sensitivity as follows

Set the dial at 450 and tune the S.S.G. for maximum output. Adjust the selectivity control for maximum output, and check the input required to give 2 watts output. Repeat at a dial setting of 50. Repeat on each band.

Repeat with the S.S.G. input direct to the grid of the 1st and 2nd RF valves in turn. The inputs required should not exceed those given in the table.

Input to	Aerial Terminal	1st RF valve	2nd RF valve
Input µV. H.F. end.	2	25	200
Input µV. L.F. end.	5	50	400

(c) Check the signal/noise ratio as follows

Tune the S.S.G. and receiver to a frequency about mid-scale on one band, and with the S.S.G. modulated 30% at 400 c/s adjust it to give 5 µV input. Adjust the LF gain control to give 1 watt output. Switch off the S.S.G. modulation. The output should then fall by at least 12 dB.

3. Miscellaneous

(a) A.V.C. Test

Apply an input from the S.S.G. of 1 µV. and note the receiver output with A.V.C. on. Increase the S.S.G. input to 100 mV. The output should be within 10 dB. of its original value.

(b) "S" Meter adjustment

Switch off the A.V.C., set the R.F. gain control to 9½ and short the aerial and earth terminals. Adjust the semi-variable resistance (No.17) until the S. meter reads zero. Remove the aerial short-cct., switch on the AVC, and tune in a signal from the S.S.G. At a level of 2 µV. the meter should give an appreciable reading. At a level of 55 µV., the meter should read about 9, and at a level of 1 mV., the meter should read about 30 dB above 9.