

WAVEMETER OUTFITSWAVEMETER OUTFIT GN

2.

(a) This outfit comprises Wavemeter G73 and Oscillator G42. It is portable and consists of:-

- (i) A heterodyne wavemeter.
- (ii) A signal generator.
- (iii) An audio-frequency test oscillator.

- (b) (i) Frequency Range 100 kcs - 25 mcs.
- (ii) Accuracy $\pm 2\frac{1}{2}\%$
- (iii) Power Supplies 115, 125, 200 or 230v 50-60 c/s AC
OR
Three 2v batteries for LT and
One 99v dry battery for HT.

(c) Functions

- (i) To set up a receiver to a desired frequency. Used as a CW or MCW local oscillator.
- (ii) To measure the frequency of an incoming signal. Used as a heterodyne wavemeter in conjunction with a receiver.
- (iii) To measure the frequency of a local oscillator. Used as a heterodyne wavemeter.
- (iv) To set up a transmitter or a receiver to a particular frequency. Used as a heterodyne oscillator, having been previously set accurately from the GJ.
- (v) To supply a CW or MCW signal of known magnitude for receiver measurements and tests.
- (vi) To supply 400 c/s at 2 volts RMS to test audio frequency amplifiers.

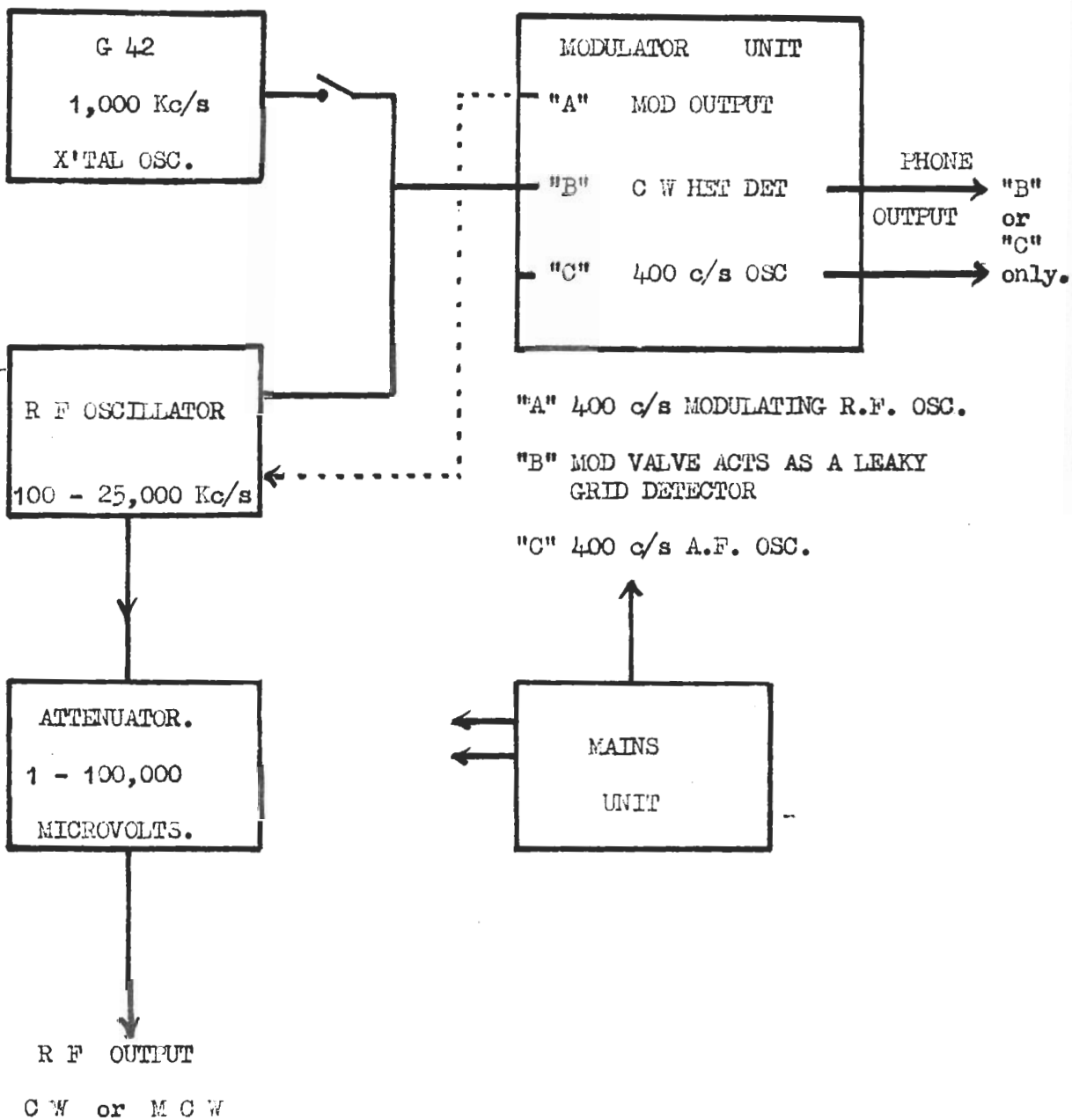
(d) Block Diagram

See plate on page 273.

(e) Calibration Curves

Supplied with each outfit and have an accuracy within $\pm 2\frac{1}{2}\%$ over the whole frequency range.

BLOCK DIAGRAM



2. (f) Controls and Switches

- (i) Mains Supply On/Off Switch When on AC supply, connects the supply from plug to mains transformer.
- (ii) HT LT On/Off Switch Controls HT and LT supplies to the wavemeter in both battery AND AC supplies.
- (iii) Range Switch A 6-position switch operating a turret drum, selecting requisite coils to cover the frequency of the range required.
- (iv) Tuning Dial Variable capacitance for fine tuning within range selected by the Range Switch.
- (v) Operational Switch Has 3 positions:-
1. Mod Output
The radio frequency selected by (iii) and (iv) above is modulated at 400 c/s.
 2. CW Hot Det
The modulating valve is used as a leaky grid detector for heterodyne purposes.
 3. 400 c/s
HF to RF oscillator disconnected. Modulation valve at 400 c/s for testing AF amplifiers.
- (vi) Attenuator Controls Variable
Varies output of attenuator diode between 1 and 10 microvolts.
- Multiplier
A 5-position switch, multiplying above output by 1, 10, 100, 1000, or 10,000, thus giving continuous output between 1 and 10,000 microvolts.
- (vii) Carrier Control Varies HT to RF oscillator.
IF VARIED AFTER FREQUENCY HAS BEEN SET, IT WILL ALTER THE FREQUENCY OF THE RF OSCILLATOR.

iii) Meter Switch

Has 2 positions:-

1. Read Carrier -- Reads output of RF oscillator.
2. Read Mod .. Reads depth of modulation applied to RF oscillator.

x) Meter

Used to measure the rectified output of the RF oscillator or modulator circuit.

) Telephone Jack

1. Telephones are connected in the modulator valve circuit when it is used as a leaky grid detector (CW HET DET positions).
2. The output jack for 400 c/s 2v AF output when in the 400 c/s position.

i) Input Frequency Socket

Rod aerial normally in this position. Used to couple the input frequency to the modulator valve when it is acting as a leaky grid detector (CW HET DET positions).

ii) Attenuator Output Socket

Provides output of 1-100,000 microvolts at the frequency of the RF oscillator, either CW or MCW.

2.

(g) G N TUNING INSTRUCTIONS

Before using outfit GN, the following checks should have been made.

Check Alignment

- (i) Place operational switch to "Mod Output" or "CW HET DET", meter switch to "Read Carrier". Carrier control midway.
- (ii) A reading should appear in the meter.
- (iii) ALLOW AT LEAST 5 MINUTES FOR WARM-UP PERIOD.

Check

- (iv) With operational switch in the 400 c/s position, the meter should read zero. If not, adjust "Set zero" control until zero is obtained.
- (v) With the operational switch in the "Mod Output" position, the RF oscillator set to 12 mc/s, and the meter switch to "Read Carrier", meter should read 120 microamps. If not, adjust the "Carrier control" until meter reads 120 microamps.
- (vi) Set the meter switch to "Read Modulation". The meter should read 120 microamps. If not, adjust "Set Mod Control" until it reads 120 microamps.

THE OUTFIT IS NOW READY FOR USE

(h) Check Calibration

- (i) Switch on the crystal oscillator.
- (ii) Place the operational switch to "CW HET DET".
- (iii) Select check points from the calibration book either side of the desired frequency.
- (iv) Adjust the tuning dial to those settings where a beat note should be heard.
- (v) Tune to the dead space.
- (vi) Note the error between the tuning dial and the calibration book, and apply it to the graph reading of the frequency required.
- (vii) Switch off the crystal oscillator.

(i) To Tune a Transmitter to a Required Frequency

- (i) Place the operational switch to "CW HET DET".
- (ii) Connect the rod aerial to the input frequency socket.
- (iii) Set the G 73 to the desired frequency and apply correction, if any.
- (iv) Place the wavemeter near the transmitter and tune the transmitter until a beat note is heard in the phones.
- (v) Tune the transmitter to the dead space.

j) To Check the Frequency of a Local Transmitter

- (i) Carry out the same procedure as in (i) above except that the wavemeter tuning dial should be adjusted for dead space in the phones.
- (ii) Note the dial reading and read the frequency given by the calibration book.
- (iii) Correction, if any, must be applied.

k) To Tune a Receiver to Required Frequency

- (i) Set G73 to the desired frequency.
- (ii) Place the operation switch to "Mod Output".
- (iii) Plug one end of the connecting lead into the attenuator output socket and the other into the receiver aerial jack and aerial exchange.
- (iv) Tune the receiver until a modulated note is heard in the receiver phones.
- (v) Place the operation switch to "CW HET DET".
- (vi) Tune the receiver to the dead space of the CW signal injected into the receiver.

Note: The strength of the modulated or CW signal injected may be altered by the attenuator multiplier and variable controls.

l) To Measure the Frequency of an Incoming Signal

- (i) Carry out the same procedure as in (k) above except that the wavemeter should be set to "CW HET DET" and the G73 lined up to the approximate frequency. The tuning dial of the G73 should be adjusted for dead space in the receiver phones, the dial readings noted and correction, if any, applied.

m) To Measure the Frequency of Incoming CW Signals

- (i) Carry out the same procedure as in (k) above until a double beat note is heard in the phones (Caused by receiver BFO).
- (ii) Switch off the BFO in the receiver and adjust the tuning dial of the wavemeter for dead space.
- (iii) Apply correction.
- (iv) Read off the frequency from the calibration book.

n) To Supply an AF Oscillation

- (i) Plug the connecting lead into the Phone jack.
- (ii) Operation switch to 400 c/s position.
- (iii) A 400 c/s output at 2v RMS (which cannot be varied) is now being supplied for testing AF amplifiers.

3. WAVEMETER OUTFIT GJ

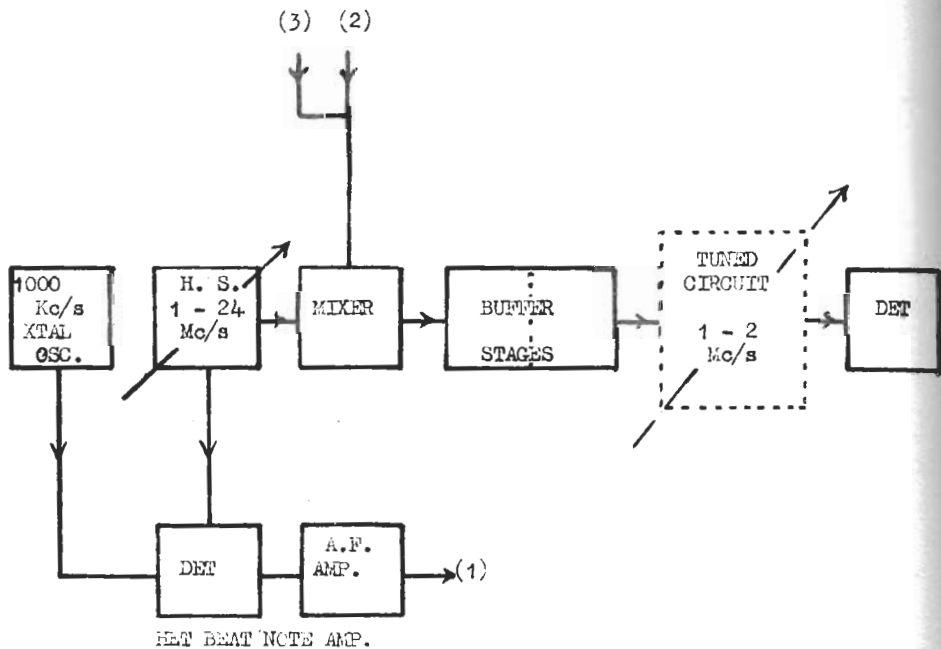
(a) This outfit comprises wavemeters G61, G62 and oscillator G35. It is rack mounted.

(b) Capabilities

(i) <u>Frequency Range</u>	G 61.	1 - 25 mcs
	G 62.	15 - 2500 kcs
	G 35.	15 - 25000 kcs
(ii) <u>Accuracy</u>	G 61.	± 1 kcs
	G 62.	± 0.1 kcs
(iii) <u>Power Supplies</u>		230 v 50 c/s AC

(c) Functions

- (i) To set a transmitter to a desired frequency by wavemeter.
- (ii) To set a transmitter to a desired frequency using heterodyne method.
- (iii) To set a receiver to a desired frequency.
- (iv) To measure the frequency of an incoming signal.

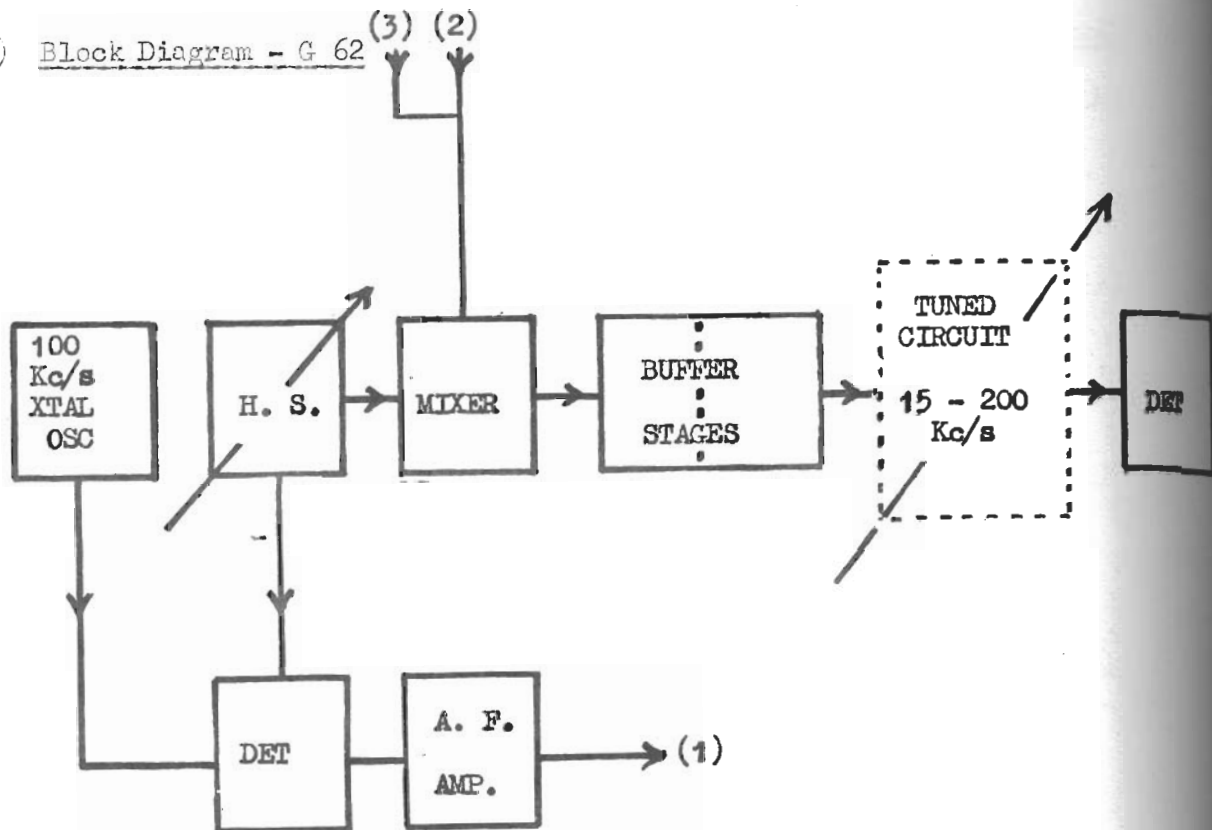
(d) Block Diagram

The difference between the 2 inputs to the mixer is measured by the tuned circuit, visual indication being given by a DC milliammeter in the detector anode circuit (with another in parallel at the remote indicator).

Controls - G 61

- (i) Thousands Selector Switch A 5-position switch covering the frequency range from 1-25 mcs by altering tapping points on Anode and Grid coils of harmonic selector oscillator.
- (ii) Thousand Selector A variable selector for fine tuning the harmonic selector oscillator, within each range, to an exact multiple of 1000 kcs.
NOT USED ON RANGE 1.
- (iii) Phonos Jack Connected in the heterodyne beat note amplifier circuit for checking that the "thousands selector" is tuned exactly to a selected harmonic of the crystal oscillator.
- (iv) Wavemeter Tuning A variable capacitor (either 1 or 2, depending on the position of the Red/Blue capacitor switch) altering the frequency between 1000 kcs and 2000 kcs.
- (v) Red/Blue Capacitor Switch Red position - This position covers 1000 - 1550 kcs.
Blue position - This position covers 1550 - 2000 kcs.
- (vi) Valve Balance Adj. Varies cathode bias potentiometer in the push-pull mixer stage to ensure that each valve passes the same current.
- (vii) RF Input Control Varies cathode bias resistor in the detector stage so that a suitable reading may be obtained on the DC milliammeter.
- (viii) RF Input Jack For coupling the G35 into the grids of the mixer stage.

3.

(f) Block Diagram - G 62

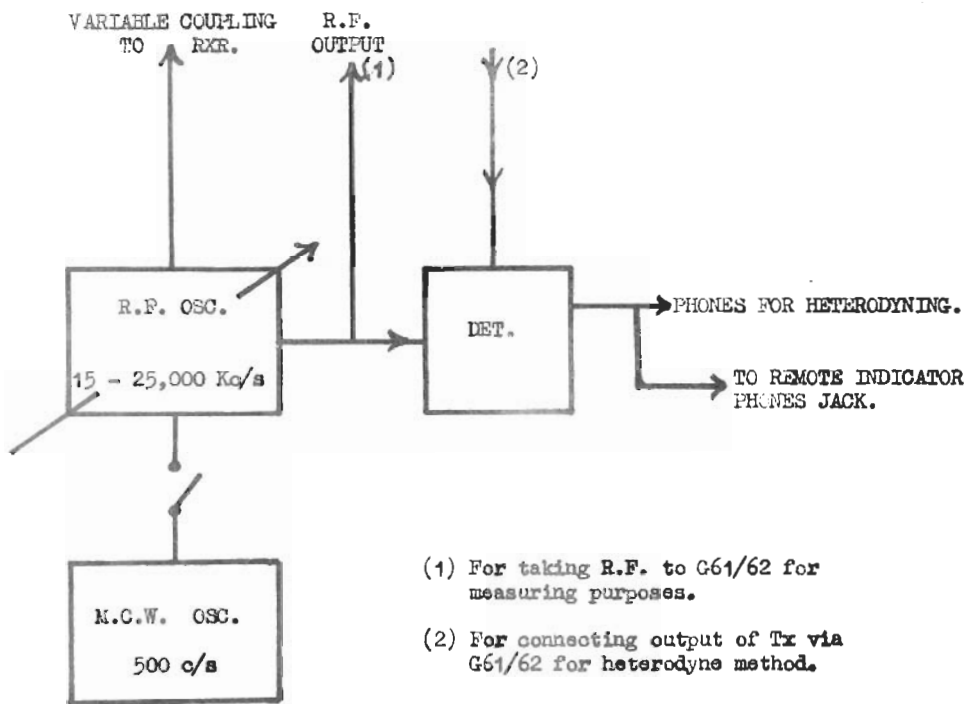
- (i) (1) - Phones used when tuning harmonic selector to dead space of the crystal harmonic.
- (2) - R.F. Input.
- (3) - R.F. Input, via transmitter wavemeter, to remote indicator at the Local transmitter.

(ii) The difference between the 2 inputs to the mixer is measured by the tuned circuit, visual indication being given by det., with a DC milliammeter in its anode circuit, (with another in parallel at the remote indicator).

(g) Controls G 62

- (i) Hundreds Selector Switch An 8-position switch, covering the frequency band 15 - 2500 kes by altering the tapping points of anode and grid coils of harmonic selector oscillator and also the coil in the absorption wavemeter.
- (ii) Hundreds Selector A variable capacitor, fine tuning the harmonic selector oscillator within each range to an exact multiple of 100 kes. NOT USED ON RANGES 1,2,3 or 4.
- (iii) Wavemeter Tuning A variable capacitor (either 1 or 2, depending on position of Red/Blue capacitor switch) altering the frequency between 15 - 200 kes, depending on the position of "Hundreds Selector" switch.
- (iv) Red/Blue Capacitor Switch Red Position - This position covers the lower half of range selected.
Blue Position - Covers upper half of

Block Diagram - G 35



- (1) For taking R.F. to G61/62 for measuring purposes.
- (2) For connecting output of Tx via G61/62 for heterodyne method.

Oscillator G 35 - Controls

- (i) Range Switch An 11-position turret switch, selecting grid, anode and coupling coils for the RF oscillator.
- (ii) Oscillator Tuning Varies capacitors in grid and anode of the RF oscillator for fine tuning within each range.
- (iii) Modulation Switch Completes the MCW oscillator circuits, by earthing the cathode bias resistor and modulating the RF oscillator at 500 c/s.
- (iv) Variable Coupling to Receiver Provides attenuated output of RF oscillator, the sliding plug giving variable capacitive coupling to receiver aerial input jack.
- (v) Radio Frequency Output Used for coupling the RF oscillator into either G 61 or G 62.
- (vi) Phones for Heterodyning Telephones are coupled into the anode circuit of the detector stage.
- (vii) Gate Switches Break H.T. supply to all the valves.

3.

(j)

Tuning GuideValve Balance Adjustment - G 61

- (i) This should be checked periodically and must be checked if either of the mixer valves are changed.
- (ii) With No transmitter (or oscillator G35) connected to G 61, set "Thousands Selector" dial to number 3 graduation mark and the "Thousands Selector Switch" to position 2.
- (iii) With the valve balance adjustment well off its centre position marked "0", set wavemeter tuning control to approximately 70° on Blue range and adjust for maximum deflection in the millimeter indicator.
- (iv) Then rotate the valve balance adjustment for minimum deflection in the millimeter indicator.
- (v) IT SHOULD NORMALLY BE LEFT IN THIS POSITION and need not be repeated for each frequency change.

(k) Valve Balance Adjustment - G 62

- (i) This should be checked periodically and must be checked if either of the mixer valves are changed.
- (ii) With No transmitter (or oscillator G 35) connected to G 62, set "Hundreds Selector" dial to number 3 graduation mark and the "Hundreds Selector Switch" to position 5.
- (iii) Then as for paragraphs (j) (iii) (iv) and (v) above.

Note: In both paragraphs, the exact setting should be obtained by placing telephones in the "Phone Jack" and tuning for dead space.

TUNING INSTRUCTIONSTo set a Transmitter to a Desired Frequency

- (i) Switch on 230V AC supply on rectifier 1204B.

WAIT AT LEAST ONE MINUTE FOR VALVE HEATERS TO WARM UP

Note:- The even supply is separate from the above and should be on AT LEAST ONE HOUR before attempting to use G61 on G62.

- (ii) Check that the Valve Balance adjustment is correctly set.
- (iii) Couple the wavemeter to the transmitter via the wavemeter transmitter exchange and transmitter coupling socket on the remote indicator.
- (iv) Set the thousands selector switch and the thousands selector dial, wavemeter tuning, and Red/Blue capacitor switch to give the required frequency from the calibration book.
- (v) Adjust the RF input control to give a milliammeter deflection of about 0.1 mA and tune the transmitter to give a vigorous deflection on the milliammeter, starting with the transmitter at a higher frequency than that required and working downwards in frequency until deflection is found.

To Measure The Frequency of an Incoming Signal.

- (i) Connect the G 35 to the receiver via "Variable coupling to Receiver".
- (ii) Set the G 35 range switch to a position covering the frequency indicated by the receiver.
- (iii) Adjust the oscillator tuning control, starting at maximum clockwise position and turn it slowly anti-clockwise, until a beat note is heard in the receiver phones; then tune to the dead space of this note.
- (iv) Connect RF output of G 35 to RF input of G61/G62 and measure the frequency.

To Set a Receiver to a Desired Frequency

- (i) Set G61/G62 to the desired frequency.
- (ii) Connect RF input of G61/G62 to RF output of G35.
- (iii) Set G35 range switch to cover the required frequency.
- (iv) Tune G35 oscillator tuning control, commencing at maximum clockwise position, until a vigorous deflection is obtained in G61 or G62 milliammeter indicator.
- (v) Couple G35 to the receiver via variable coupling to receiver.
- (vi) Tune receiver to the dead space of the oscillator.
- (vii) The MCW oscillator may be used for initial setting up of the receiver.

3.

(1) Tuning a Transmitter by Heterodyne Method.

- (i) Set the required frequency on G61 or G62.
- (ii) Connect G35 to G61/G62 and tune for maximum deflection.
- (iii) Connect G61/G62 via wavemeter-transmitter exchange.

Note: The G35 is now connected to the remote indicator.

- (iv) Connect transmitter to remote indicator via "transmitter coupling".
- (v) Place telephones into phone jack on remote indicator.
- (vi) When the transmitter has been tuned to the frequency of the G35, a beat note will be heard in the telephones. Tune to the dead space.

To Check Frequency of a Transmitter by Heterodyne Method.

- (i) Connect the transmitter to G35 as above.
- (ii) Place telephones into G35 phone jack.
- (iii) Adjust G35 controls for dead space in phones.
- (iv) Check frequency of G35 using either G61 or G62 as appropriate.