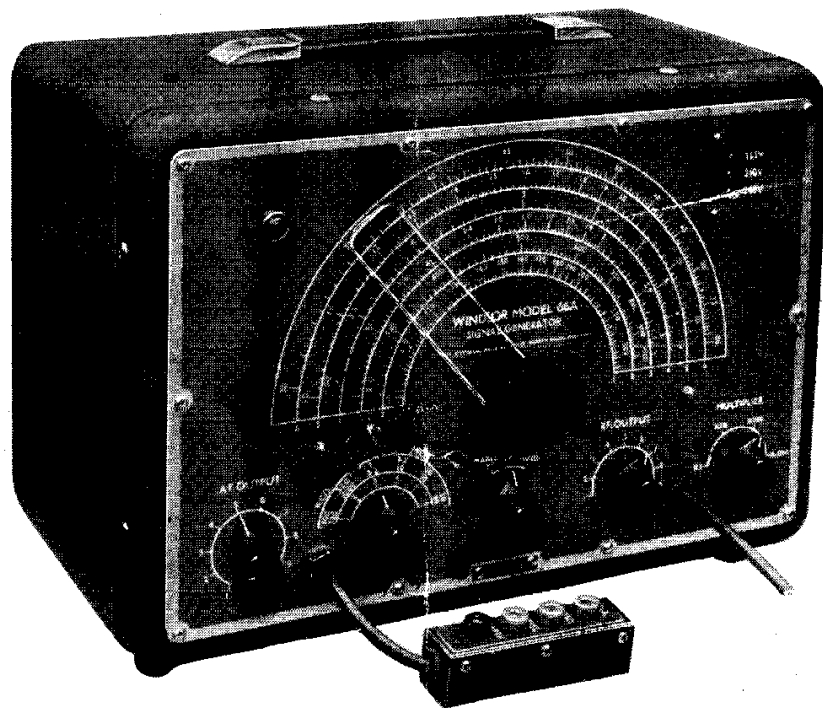


# INSTRUCTION MANUAL

FOR

WINDSOR MODEL 66A

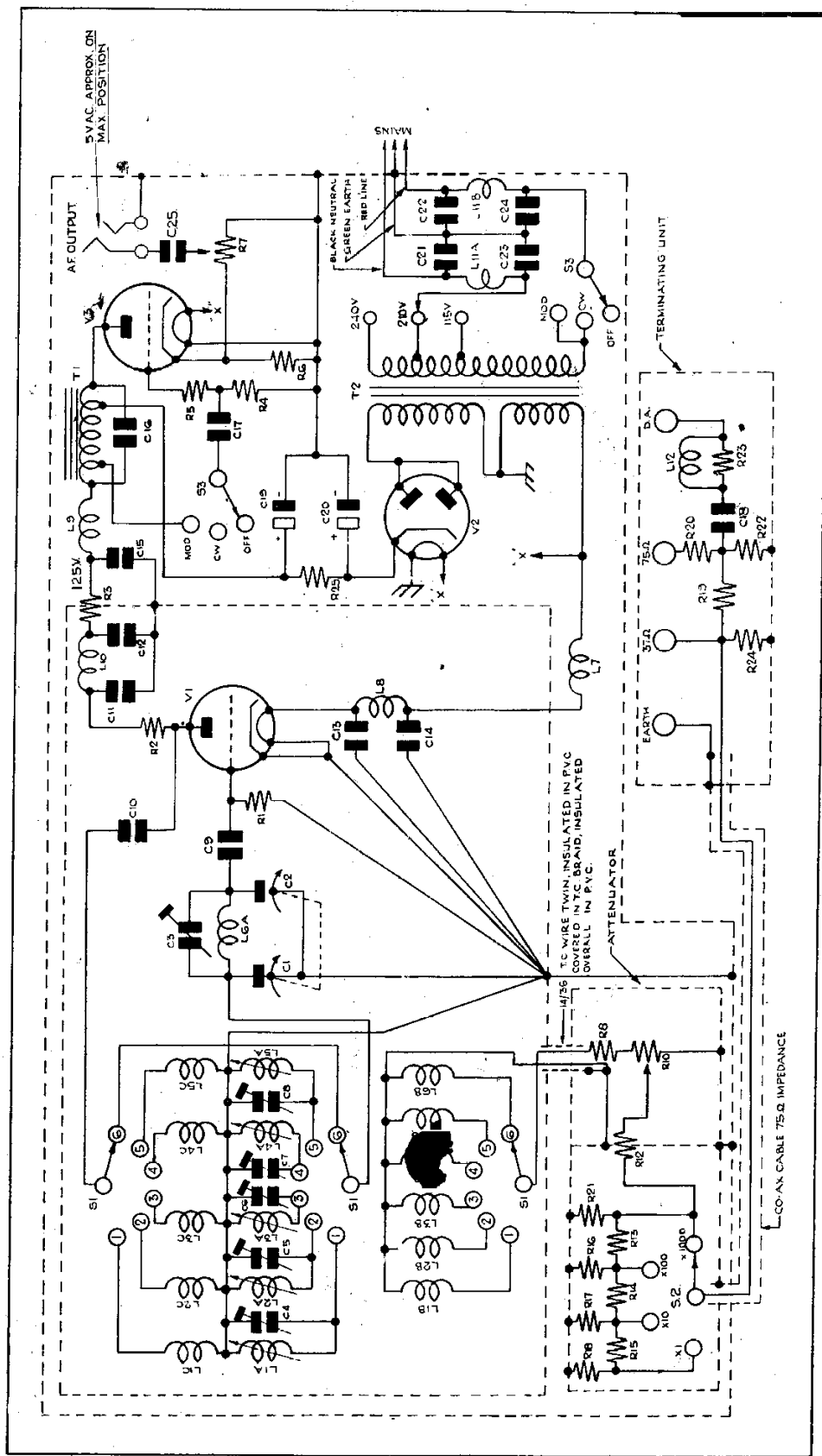


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PRICE 2/6



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# 1. DESCRIPTION

## 1/1. GENERAL

This instrument is a general purpose R.F. Signal Generator of advanced design. It covers a very wide frequency range and is suitable for professional work on both radio and television receivers. Special attention has been paid to attenuation, and the unwanted external radiation is extremely low, due to the efficient double screening and careful filtration.

The R.F. oscillator uses a triode in a Hartley circuit on the first 5 ranges but on the 6th range this becomes a Colpitts oscillator. Low impedance pickup coils are loosely coupled to the oscillator coils. Owing to the loose coupling and the fact that these coils are separately switched there is negligible frequency shift when the attenuator setting is altered. Modulation at 400 cycles to a depth of 30 per cent. is effected by another triode Hartley oscillator.

## 1/2. CONTROLS

The central tuning control operates through a slow motion drive and carries a perspex pointer over the 6 large scales, which are clearly marked in Kc/s and Mc/s. The pointer also carries range numbering which greatly facilitates reading.

From left to right along the lower row of controls, there is first the A.F. OUTPUT control, by means of which the 400 cycle signal, available at the adjacent jack, can be varied. The divisions are numbered arbitrarily.

The RANGE SELECTOR controls the selection of the six frequency ranges.

The central switch enables the type of signal—modulated or unmodulated—to be selected, and incorporates the mains ON/OFF switch.

The R.F. OUTPUT and MULTIPLIER knobs control the R.F. output voltage from the instrument.

## 1/3. FREQUENCY RANGES

The Six frequency ranges are as follows :—

1. 100—320 Kc/s.
2. 320—1,000 Kc/s.
3. 1—3.2 Mc/s.
4. 3.2—10 Mc/s.
5. 10—30 Mc/s.
6. 30—80 Mc/s.

These are all fundamentals, no harmonic calibrations being given. The calibration accuracy is  $\pm 1$  per cent.

## 1/4. TERMINATING UNIT

This is connected to the generator via a length of matched 75 ohm co-axial cable and carries four sockets marked EARTH, 37 ohms, 75 ohms and D.A. (i.e. Dummy Aerial).

For tests on the (high impedance) aerial terminals of most radio receivers the Earth and D.A. sockets are normally used. The impedance is approximately that of the average open aerial over a wide frequency range, as internationally standardized.

For receivers with aerial input connections designed for a 75 ohm transmission line (such as the majority of television receivers and some communication receivers) the 75 ohm socket should be used. The 37 ohm socket is used only when extra high output voltage is required. (See next Section.)

There are D.C. paths inside the unit from the 37 ohm and 75 ohm sockets to earth, but none from the D.A. socket.

## 1/5. OUTPUT VOLTAGE

On the 75 ohm or D.A. sockets the open-circuit microvolts R.F. output is given approximately by multiplying together the settings of the R.F. OUTPUT control and the MULTIPLIER switch.

For example, if these settings are 7 and X10, the output is 70 microvolts. On the 37 ohm socket the output is 10 times higher than this.

It should be understood that the terminal voltage drops when a load is connected, in fact with a matched load it drops 50 per cent. The microvolt indication of the instrument is nevertheless the true figure to take for sensitivity measurement, since the latter is defined so that the receiver input impedance is taken into account. (See Section 3/3.)

The audio frequency output is about 5 volts maximum. The internal impedance varies with the setting of the A.F. OUTPUT control but cannot exceed 5,000 ohms. Modulation is at 400 cycles to a depth of 30 per cent. approximately.

# 2. OPERATION

## 2/1. MAINS ADJUSTMENT

Before the instrument is put into use the mains voltage and frequency must be ascertained. A 3-pin plug should be fitted to suit the available sockets.

Red—Line.  
Black—Neutral.  
Green—Earth.

If a 2-pin plug is used the green wire is preferably connected to a separate safety earth.

The instrument is designed to operate from supplies of 105-125 or 200-250 volts, 40-100 cycles. The voltage adjustment panel is fitted at the top right-hand corner of the front panel and the bakelite screw should be screwed firmly into the socket most nearly corresponding to the actual voltage, i.e. :—

For 105-125 volts use the 115V. socket.
„ 200-224 „ „ „ 210V. „
„ 225-250 „ „ „ 240V. „

The consumption is approximately 18 watts.

## 2/2. CONNECTION TO RECEIVER

The instrument is supplied complete with two small plugs to fit the terminating unit, and a telephone plug to fit audio output jack.

The R.F. leads from the terminating unit should be as short as possible. The terminating unit can then be brought very close to the point of connection to avoid errors and losses at high frequencies.

Under certain conditions the use of condensers is essential in series with one or both of these leads, in order to block D.C. or to isolate mains voltages. Taking first the case of a receiver with chassis isolated from the mains supply, i.e. intended to be earthed; the black and red R.F. leads can be connected directly to chassis and aerial socket respectively. If it is desired to feed the signal to a grid from the D.A. socket, this may be done by direct connection but it may be advisable temporarily to interpose a resistor of about 100,000 ohms in the existing grid connection, close to the grid pin. A lead from the 37 ohm or 75 ohm sockets may be taken direct to a grid provided that its connection is known to return to chassis. If this is not certain, a mica condenser of about  $\cdot 002 \mu\text{F}$  should be used in series with the red lead, and the 100,000 ohm resistor should temporarily be interposed in the grid lead as described above, in order to preserve the grid bias.

Similarly the D.A. socket may be connected directly to an anode, but the  $\cdot 002 \mu\text{F}$  condenser should be used in series with the 37 ohm or 75 ohm sockets.

In the case of a receiver with chassis not isolated from the mains (e.g. most A.C./D.C. sets) it should be plugged in with polarity such as to produce "neutral" mains voltage on the chassis, which is usually possible. Test on the aerial socket may then be done reasonably satisfactorily with  $\cdot 05 \mu\text{F}$  paper condensers in series with both red and black leads. Some hum trouble may arise and it is bad practice to attempt to overcome this by removing the earth connection to the signal generator. The recommended procedure in such cases is to use a one-to-one double-wound mains isolating transformer. All tests may then be done as described in the last paragraph with chassis earthed, including those tests on grids and anodes

which are otherwise impracticable due to hum troubles.

The leads from the audio plug can of course be several yards long. That from the barrel of the plug is earthed. The other is connected via a condenser inside the instrument and may therefore be clipped direct to any grid without further isolation. There is, however, no D.C. path inside the generator. If therefore the signal is to be fed to a grid whose normal connection is removed, a grid leak of about 100,000 ohms must temporarily be used to preserve the grid bias.

### 3. APPLICATIONS

#### 3/1. GENERAL

Among the tests for which the Signal Generator may be used are the following:—

- Sensitivity.
- Selectivity.
- Alignment and ganging.
- Image rejection.
- Harmonic response.
- Modulation hum.
- Correctness of intermediate frequency.
- Stage gain.
- A.G.C. action and overloading.
- Frequency calibration.
- Cross-modulation (with a second Generator).
- Signal to noise ratio.

This section does not attempt to cover the complete theory and practice of receiver testing. Reference should be made to any suitable text book such as one of the following:—

<i>Title.</i>	<i>Author.</i>	<i>Publisher.</i>
Testing Radio Sets	J. H. Reyner	Chapman & Hall.
Wireless Servicing Manual	W. T. Cocking	Illiffe.
Radio Receiver Servicing and Maintenance	E. J. G. Lewis	Pitman.
Practical Wireless Servicing Manual	F. J. Camm	Geo. Newnes.

#### 3/2. ALIGNMENT AND GANGING

An output indicator of some sort is essential. It is usually sufficient to clip a suitable A.C. voltmeter across the secondary of the output transformer.

The set manufacturer's instructions must be followed. Usually the gain is set to maximum and the lowest modulated input signal used that will give a reading on the output meter. This is to avoid overloading and A.V.C. action.

When the receiver is already in approximate alignment it is only necessary to inject a signal to the aerial socket and adjust the various trimmers and dust cores for maximum output in accordance with the service leaflet.

When, however, proper alignment has been entirely lost for some reason, such as for example replacement of an I.F. transformer, it may be necessary to align the I.F. amplifier stage by stage. This necessitates a knowledge of the proper I.F. for the particular receiver. Often the Signal Generator output has to be set at first to maximum.

Ganging may be checked on each waveband by seeing that the sensitivity at intermediate points on the dial can be only slightly improved by re-tuning the R.F. trimmers. If it is found that a trimmer must be moved more and more, going from the H.F. end to the L.F. end the associated coil is almost certainly at fault.

For visual alignment, Model 66A may be used in conjunction with a suitable Wobbulator such as Windsor Model 55A.

Mention should also be made here of the new Windsor Model 260A Television Wobbulator, built specifically for the visual alignment of Television sets.

### 3/3. SENSITIVITY MEASUREMENTS

The sensitivity of a receiver means its ability to respond to small signals.

It is defined as the smallest R.F. input, modulated at 400 cycles to a depth of 30 per cent., and applied through the appropriate dummy aerial (see Section 1/5), which will produce standard output (usually 50 milliwatts).

For accurate work therefore the loudspeaker must be disconnected and a suitable output meter, such as Windsor Model 150A, substituted for it.

Stage gain may be measured by determining the ratio of the inputs required to the grid of the stage concerned, and the succeeding grid, for the same power output; e.g. if 200 microvolts on the grid of a valve produces the same output as 18 millivolts on the succeeding grid, the stage gain is 90. However, misleading results will nearly always be obtained if the stage concerned is followed by another on the same frequency, because feedback, positive or negative, tends to modify the results.

### 3/4. SELECTIVITY MEASUREMENTS

Often selectivity is wanted in the form, "Bandwidth for x db down." After re-alignment the A.G.C. is put out of action and the input voltage is set for an output preferably of



about 50 milliwatts. The signal is then increased by  $x$  db and the generator is detuned so that the output is again exactly 50 milliwatts and the frequency noted carefully. This is repeated on the "other side" of the peak, and the difference between these two frequencies gives the bandwidth.

## 4. SERVICE

### 4/1. VALVE REPLACEMENT

The valves in this instrument operate under low-power conditions and can be expected to have a long life. They are standard octal-base types not specially selected.

H.F. Oscillator	—type 6J5GT.
Modulator	—type 6J5GT.
Rectifier	—type 6X5GT.
Pilot lamp	—6.3V. 0.2A. MES cap.

It is unlikely that the frequency calibration will be much affected by replacement of the H.F. oscillator, but it may put it slightly outside the  $\pm 1$  per cent. limits which each instrument must pass when it is new.

# APPENDIX

## FREQUENCY CONVERSION TABLES

<i>Metres.</i>	<i>Kc/s.</i>	<i>Metres.</i>	<i>Kc/s.</i>	<i>Metres.</i>	<i>Mc/s.</i>	<i>Metres.</i>	<i>Mc/s.</i>
3000	100.0	650	462	110	2.73	19	15.78
2900	103.4	600	500	100	3.00	18	16.67
2800	107.1	550	546	95	3.16	17	17.65
2700	111.1	500	600	90	3.33	16	18.75
2600	115.4	450	667	85	3.53	15	20.00
2500	120.0	400	750	80	3.75	14.5	20.7
2400	125.0	350	858	75	4.00	14	21.4
2300	130.4	300	1000	70	4.29	13.5	22.2
2200	136.4	290	1034	65	4.62	13	23.1
2100	142.9	280	1071	60	5.00	12.5	24.0
2000	150.0	270	1111	55	5.46	12	25.0
1900	157.8	260	1154	50	6.00	11.5	26.1
1800	166.7	250	1200	48	6.25	11	27.3
1700	176.5	240	1250	46	6.52	10.5	28.6
1600	187.5	230	1304	44	6.82	10	30.0
1500	200	220	1364	42	7.15	9.5	31.6
1400	214	210	1429	40	7.50	9.0	33.3
1300	231	200	1500	38	7.89	8.5	35.3
1200	250	190	1578	36	8.33	8.0	37.5
1100	273	180	1667	34	8.82	7.5	40.0
1000	300	170	1824	32	9.37	7.0	42.9
950	316	160	1875	30	10.00	6.8	44.1
900	333	150	2000	28	10.71	6.6	45.5
850	353	140	2143	26	11.54	6.4	46.9
800	375	130	2308	24	12.50	6.2	48.4
750	400	125	2400	22	13.64	6.0	50.0
700	429	120	2500	20	15.00	5.8	51.7

# Service Guarantee

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We hereby guarantee each new instrument manufactured by us to be free from defective materials and workmanship and agree to rectify any such defects free of charge for a period of six months from date of registered purchase. This guarantee is subject to the following conditions:—

1. That the instrument has had, at all times, normal use and has not been tampered with.
2. That the registration card has been correctly completed and returned to us within seven days of purchase.
3. That in cases of complaint the instrument is returned to us with seals intact, securely packed and carriage paid.
4. That this guarantee is non-transferable and applies only to the registered user.
5. That any Valves, Rectifiers or Components not of our manufacture but incorporated in our instruments and subject to their Manufacturer's Guarantee are not covered by this guarantee.
6. In the event of repairs being carried out by the purchaser, the Company cannot be held liable for any expense incurred.
7. Under no circumstances can the Company be held responsible for indirect damage caused by any defect. Our liability in all cases is limited to making good any defective part.
8. That this guarantee is only applicable to instruments used in Gt. Britain and Northern Ireland.
9. In the event of any dispute arising as to the interpretation of this guarantee, the decision of the Company must be accepted as final.



TAYLOR ELECTRICAL INSTRUMENTS LIMITED

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**PARTS LIST**  
**FOR**  
**WINDSOR MODEL 66A**

Capacitors

C1  
C2  
C3  
C4  
C5  
C6  
C7  
C8  
C9  
C10  
C11  
C12  
C13  
C14  
C15  
C16 0.01ufd  
C17 6800pf  
C18  
C19 4ufd  
C20 4ufd  
C21  
C22  
C23  
C24  
C25

Resistors

R1 47k  
R2 4.7k  
R3 1k  
R4 47k  
R5 10K  
R6 3.3k  
R7 10K potentiometer  
R8 82  
R9  
R10 100 potentiometer  
R11  
R12 80  
R13 680  
R14 680  
R15 680  
R16 89  
R17 80  
R18 80  
R19 80 + 110  
R20 47  
R21 180  
R22 22  
R23  
R24 110  
R25 8.2K

Voltages

215 Volts across C20  
145 Volts across C19 C.W.  
140 Volts across C19 MOD.

Valves

V1 6J5GT  
V2 6X5GT  
V3 6X5GT

A.J.Strike G8AUX