

EFESCAPHONE

INSTRUCTIONS

for

Operating and Installing

THE

Nelson Grand
Model

FOUR VALVE
EFESCAPHONE
RECEIVING SET

P.1080

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Instructions for Operation of **2 and 3 Valve** **EFESCAPHONE** **Wireless Receiving Sets** **With Variable Reaction.**

NELSON, RODNEY AND HOOD MODELS.

Connect the Accumulator (Low Tension Battery) to the terminals marked L.T. and the High Tension Battery to the terminals marked H.T. taking care that the positive and negative terminals are connected to the correct terminals of the Instrument, as reversed polarity will prevent reception. The positive terminal is indicated by the mark + and the negative terminal by the mark —.

A 6 Volt Accumulator and a 60 Volt High Tension Battery is the standard equipment supplied with the Set, and are intended for use with "R" Type Valves. A "D.E. 5" or "B. 4" power valve is recommended for use in the L.F. stage of a Three Valve Set for greater power, particularly with a Loud Speaker, and a 100 volt High Tension Battery should be used in such cases. When Dull Emitter Valves are used refer to footnote.

The position of Valves when facing Set is as follows:

2 Valve Set.
Detector, H.F.

3 Valve Set.
"L.F., Detector, H.F.

The Accumulator is supplied uncharged, and must be charged before it is ready for use. Most Garages, Electricians and Electricity Supply Stations undertake the charging of Accumulators at a small cost.

The capacity of the Accumulator is 30 Actual Ampere Hours (60 Ampere Hours Ignition), but on first charging it will not give its full discharging capacity, and will need to be recharged once or twice before doing so.

Before inserting the Valves in sockets see that the H.T. Switch is in the "off" position.

The legs of the Valve are fitted eccentrically, and the correct position of the corresponding sockets of the Valve Holders should be observed before inserting the Valve.

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The Reaction Coil is said to be tight coupled or loose coupled according to its position. Its effective position is when it is just short of the buzzing indicating too tight a coupling. When this is heard, move the knob back the most minute fraction necessary to eliminate the buzz, and which brings in the signals best.

The Filament Control should be adjusted concurrently with the Reaction Coil, and it will be found that as the Reaction Coil is more loosely coupled, the Filament Control will respond in signal strength when turned more fully on, while as the Filament Control is turned back, the Reaction Coil can be more tightly coupled. Both should be delicately adjusted as a very slight movement effects the desired results.

When selecting between Stations the power of the Station sought for must be brought up by correct adjustment of the Reaction Coil to submerge, and thereby eliminate signals from any other Station of close wave length.

If signals are not obtained with the Aerial Tuning Switch and Reactance Switch on the starting combinations 3 and C, the same procedure should then be followed with the Aerial Tuning Switch on stud 3, and the Reactance Switch between studs D/E. The next combination to be tried out should be 4/5 and D/E, followed by 4/5 and D, 4 and D/E, 4 and D and so on, bearing in mind that as stated above, when the switch is between two studs, the wave length is between the lower of the two studs and the preceding one.

Each combination must be deliberately tried out with a *slow* complete rotation of the condenser until the best position is determined.

The following is an approximate indication of the position of Aerial Tuning Switch for the wave length given, with standard Post Office Aerial:

No. 1 stud	150 metres.	No. 6 stud	1,000 metres.
" 2 "	220 "	" 7 "	1,500 "
" 3 "	350 "	" 8 "	2,000 "
" 4 "	450 "	" 9 "	3,000 "
" 5 "	600 "	" 10 "	4,000 "

A note should be made of the combination of studs, and the position of the Condenser and Reaction Coil for any particular Station, which will enable the same Station to be immediately located subsequently.

After Tuning, re-adjust the position of the Filament Rheostat nearest to the off position which gives the best results. It will in most cases be found that the best position for the Filament Rheostat is between marks 7 and 8. When the Accumulator is freshly charged care should be taken not to turn the Rheostat too far on at first.

Two pairs of Telephone Terminals are provided, which can be used either for more than one pair of Telephones, or in the case of a three Valve Set for a Loud Speaker. It does not make any difference which pair of terminals is used for the Headphones or for the Loud Speaker. If the Headphones are disconnected when using Loud Speaker it will give more volume.

When used with a Loud Speaker it will be found an advantage to increase the High Tension Voltage to 100 volts.

The useful life of the High Tension Battery is from 4 to 6 months with "R" Type Valves. If a D.E. 5 Type Valve is used with a Three Valve Set the battery life will be shorter. It should be replaced when reception becomes gradually weaker or when cracking noises are experienced indicating exhaustion.

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NOTES.

When using D.E.R. or similar Dull Emitter Valves which consume 4 amps. at 1.8 to 2 volts, a 2 Volt Accumulator should be used with a 2 Valve Set, but a 4 Volt Accumulator is necessary with a 3 Valve Set owing to the voltage drop and current consumption of 3 Valves.

A suitable capacity for both types is 20 or 30 ampere hours (actual).

When a Dry Battery is used with these Valves a special type of large capacity is necessary, and ordinary Cells are quite unsuitable.

If D.E.3 or other similar type of Valves are used consuming .06 amps. at 3 volts a 4 Volt Accumulator of 10 ampere hours (actual) capacity is the best means of filament supply, although a Dry Battery comprising 3 Cells of suitable capacity may be used.

It must be carefully observed that when a 4 Volt Accumulator, or a 4½ Volt Dry Battery (3—1.5 Volt Cells) is used, that an auxiliary resistance must be employed between the Accumulator or the Dry Battery and the Low Tension Terminals of the Set. A suitable resistance (W 90603) which can be fixed by simply screwing on to one of the L.T. Terminals can be supplied at the price of 2/6.

This special resistance is only necessary with Valves consuming .06 amps., and is not required with D.E.R. or other similar Valves consuming 4 amps.

AERIAL HINTS.

It is most important that the Aerial Wire should be erected as high as possible and in any case not lower than 20 ft. If it is possible to erect one 40 or 50 ft. high, correspondingly better results will be obtained. The pole end of the Aerial should preferably be higher than the house end. If a choice of position is available the Aerial should run in line with the direction of the Broadcasting Station.

Either one or two wires may be used and where space permits a run of 80 to 100 ft., a single wire should be used. It is simple to erect, stable, and is quite as efficient for broadcasting purposes as a double Aerial. Where space is more limited, a double Aerial may be used when the wires should be spaced 6 ft. apart by spreaders and adequately insulated.

The "lead-in" end of the Aerial should be brought to a "lead-in" insulator fixed in the window frame of the receiving room, and an insulated wire brought therefrom to the Aerial terminal of receiving instrument.

Care must be taken that the "lead-in" wire does not touch anything nor come too close to a wall, etc.

The Earth wire may be either insulated or bare wire and a piece of the Aerial wire which may be left over is quite suitable. It is not necessary to protect the Earth wire from contact with walls, etc. See that the water pipe to which the Earth wire is connected is scraped clean. A soldered connection is best, but an Earthing Clip tightly clamping the wire to pipe is quite satisfactory.

It is better to have a longer lead-in from the Aerial and a short Earth wire, rather than a longer Earth wire, and short Aerial lead-in, if conditions allow of the choice.

Note of Tuning Position.

Name of Station	Call Sign	Aerial Tuner	Reactance	Condenser	Reaction
Danby	8.604.3	4/8	D	0	4
"	491.8	7/4	D	100	15
London	491.8	4	D	3 1/2	15
Paris	2650	7/6	F.G.	60	15
Hamburg	2650	3	C.D.	68	17
Berlin	566.483.9	4	D	83	17
Paris		8	14	20	18
Rugby	C	5	3	150	10
National	E	5	5	150	15

WHAT "REACTION" MEANS.

By P. F. DIXON, Chief Engineer of the B.B.C.

I should like to try and explain exactly, and in simple words, what reaction means.

1. The terms reaction, oscillation, heterodyning, howling, mean the same thing.
2. Any valve receiver may be made to oscillate, and so cause interference by reaction, oscillation, heterodyning, howling, etc. A crystal set can never offend. When a valve receiver is handled in this way, it may cause a howling noise in every receiver in an area of 75 square miles around the offender.

3. If a howling noise is heard in your own receiver, it may be you, or it may be someone else. To test if it is you, perform the following operation:—

After the tuning of your aerial and listen to the howl. If the howl changes its note sympathetically with your tuning, it is you. If the intensity only of the note changes, it is not you.

The tuning adjustment must not be confused with the reaction adjustment; the tuning adjustment means, probably, altering of a condenser or variometer in the aerial circuit.

4. Reaction occurs on a set by the following means:—

A SINGLE VALVE SET.

A coil is connected in the lead from the high-tension battery to the anode of the valve and the 'phones. This coil is coupled variably to the aerial circuit. The tighter the coil is coupled, the louder the signals up to a point (and provided the set is working properly).

After a certain degree of coupling is obtained, the set will oscillate and cause howling, and the signals will be distorted. It is useless to use too much reaction, both from your point of view and that of your neighbours.

A TWO-VALVE SET (TUNED ANODE).

Use only reaction on the second valve, if you must use it. The reaction coil is coupled to the tuned anode circuit inductance. This circuit can interfere just as badly as any other if the reaction coil is too tightly coupled. It can also oscillate without a reaction coil. Keep down the coupling between stray leads to avoid this, and avoid stray wiring everywhere.

It is not in the scope of this article to go more fully than this into the subject, but if from the above you find you are oscillating, please, for the sake of the enjoyment of hundreds of others around you, take steps to stop it.

If in trouble, consult your local Radio Society.

DON'TS FOR LISTENERS.

Don't do it.

Don't think that a two-valve set with reaction on the second valve will not interfere. Without special precautions, it will.

Don't tune in a station by receiving its howl first, tuning to the silent point, and then relaxing the reaction coil.

Don't have a set that can only be adjusted in this way, unless it is guaranteed by the makers not to offend.

Don't have a home-made set that has not got an adequate factor of safety, and therefore requires intense reaction.

Don't, PLEASE, do it.

SUPPLEMENTARY INFORMATION *re* OSCILLATION.

If you have a manufactured set stamped B.B.C. and this was bought before October, 1923, you have less chance of interfering, but it is unwise even then to let your set oscillate.

Briefly, the following is the way to test if you are oscillating:—

You hear a howl in your 'phones or loud speaker.

If the note of the howl varies sympathetically with the movement of the handles on your set you are oscillating. The note (or pitch) of the howl will be chiefly influenced by your tuning adjustment probably a condenser variometer.

If you have a manufactured set stamped B.B.C. or a home-made set you should experiment with your adjustments until the howling note (changed sympathetically with your tuning) vanishes. If you hear howls over which you have no control it is someone else. If you know who it is, a personal call armed with this pamphlet might do some good, but great tact is obviously required.

Once more—if the note of the tuneful howl varies with your tuning adjustments it is you. Twist your adjustments so that the howl vanishes. If broadcasting is not on you can't howl, but you can tell if you are oscillating by tapping the aërial with your finger. If you are oscillating you will hear clicks in the 'phones, rubbing the finger on the rough part of the terminal will give a rasping sound. This is a good test to try adjustments when broadcasting is not on—and will help you to find out what makes your set oscillate.