BRIMAR

RECEIVING VALVE

12AH8

APPLICATION REPORT VAD/520.2

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Standard Telephones and Cables Limited

FOOTSCRAY, KENT, ENGLAND

Issued March, 1952
1.0 INTRODUCTION: The Brimar 12AH8 is a miniature, Noval based, triode-heptode frequency changer intended for use in all wave broadcast and communication receivers. Particular attention has been paid to the attainment of high conversion conductance and impedance and good oscillator performance. The valve has been designed to operate from either a 250 volt or a 100 volt HT rail, and may be used in both AC and AC/DC type equipment. A centre tapped heater is provided so that the valve may be operated at 12·6 volts 0·15 ampere or 6·3 volts 0·3 ampere.

This report contains characteristics of the valve and details of its uses as a frequency changer in superheterodyne receivers.

2.0 DESCRIPTION: The valve consists of two units mounted one above the other having common heater and cathode connections. The lower unit is the heptode mixer and the upper the triode oscillator. The triode grid is internally connected to grid 3 of the heptode. The whole is enclosed in a T6½ bulb and mounted on a standard B9A (Noval) nine pin base.

3.0 CHARACTERISTICS:

3.1 Cathode: Indirectly heated
Voltage
Current
Max. DC Heater to Cathode potential
Max. Cathode Current

3.2 Dimensions:
Max. Overall Length
Max. Diameter
Max. Seated Height

3.3 Base:
Type B9A (Noval) Nine Pin

3.4 Basing Connections:
Pin 1 Screen g2 + g4
Pin 2 Heptode Control Grid g1h
Pin 3 Cathode and Suppressor Grid k + g5
Pin 4 Heater h
Pin 5 Heater h
Pin 6 Heptode Anode a1h
Pin 7 Triode Grid and Heptode Grid 3 g4 + g3
Pin 8 Triode Anode a2h
Pin 9 Heater Centre Tap h tap

3.5 Ratings:

HEPTODE SECTION:
Max. Anode Voltage
Max. Screen Voltage
Max. Anode Dissipation
Max. Screen Dissipation

TRIODE SECTION:
Max. Anode Voltage
Max. Anode Dissipation
3.6 Inter-electrode Capacitances (approx.) Measured with close fitting external shield:

- RF Input $C_{gh}$, all: 5.0 pF
- IF Output $C_{ah}$, all: 8.0 pF
- Triode Input: 7.0 pF
- Triode Output: 2.5 pF
- Heptode Grid to Heptode Anode: 0.025 pF (max.)
- Triode Grid to Triode Anode: 1.2 pF
- Control Grid to Triode Anode: 0.1 pF
- Control Grid to Triode Grid: 0.2 pF

3.7 Characteristic Curves: Curves are attached to this report as follows:

- $I_{ah}$ and $I_{g2+g4}$ versus $V_{gh}$ with $V_{ah}$ 100 volts and various values of $V_{g2+g4}$: 320.14
- Ditto with $V_{ah}$ 250 volts: 320.15
- Conversion Conductance and Impedance versus $V_{gh}$ with $V_{ah}$ 100 volts and various values of $V_{g2+g4}$: 320.16
- Ditto with $V_{ah}$ 250 volts: 320.17
- Conversion Conductance and Impedance versus $I_{gc}$ with $V_{ah}$ 100 volts and various values of $V_{g2+g4}$: 320.18
- Ditto with $V_{ah}$ 250 volts: 320.19
- $I_{ah}$ and $I_{g2+g4}$ versus $I_{gc}$ with $V_{ah}$ 100 volts and various values of $V_{g2+g4}$: 320.20
- Ditto with $V_{ah}$ 250 volts: 320.21
- $I_{ah}$ and $I_{g2+g4}$ versus $V_{g3}$ with $V_{a}$ 250 $V_{g2+g4}$ 100 and various values of $V_{gh}$: 320.22
- Ditto versus $V_{gh}$ with various values of $V_{g3}$: 320.23
- $I_{a}/V_{a}$ Triode: 320.24

4.0 TYPICAL OPERATION:

4.1 TYPICAL OPERATING CONDITIONS:

- Heptode Anode Voltage $V_{ah}$: 100 250 volts
- Heptode Screen Voltage $V_{g2+g4}$: 100 100 volts
- Control Grid Voltage $V_{gh}$: $-3$ $-3$ volts
- Cathode Bias Resistor $R_{k}$: 220 220 ohms
- Triode Anode Supply Voltage $V_{at(b)}$: 100 250 volts
- Triode Anode Series Resistor $R_{at}$: 0 27,000 ohms
- Triode Anode Voltage $V_{at}$: 100 100 volts
- Heptode Anode Current $I_{ah}$: 2.5 2.6 mA
- Heptode Screen Current $I_{g2+g4}$: 4.5 4.4 mA
- Triode Grid Current $I_{gt}$: 200 200 $\mu$A
- Triode Grid Resistor $R_{gt}$: 47 47 $k\Omega$
- Conversion Conductance $g_{c}$: 0.52 0.55 mA/V
- Control Grid Bias for $\frac{g_{c}}{V_{gh}}$: $-22$ $-22$ volts
- Conversion Impedance $r_{c}$: 0.6 1.5 $M\Omega$
- Equivalent Noise Resistance (approx. $r_{eq}$): 100 100 $k\Omega$

4.11 TRIODE CHARACTERISTICS:

- Anode Voltage $V_{a}$: 100 volts
- Grid Voltage $V_{g}$: 0 volts
- Anode Current $I_{a}$: 14.6 mA
- Anode Impedance $r_{a}$: 4850 ohms
- Mutual Conductance $g_{m}$: 3.5 mA/V
- Amplification Factor $\mu$: 17

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4.2 GENERAL RECOMMENDATIONS:

4.21 Triode Grid Current: The oscillator section of the 12AH8 has a relatively high mutual conductance so that normally there is no difficulty in obtaining adequate grid current. The optimum value of grid current is 200 µA and the coils should be designed so that an average valve operates at this value. At the weakest point of oscillation the grid current must not fall below 125 µA. Inspection of the Curves 320-18 and 320-19 shows that a rapid drop in conversion takes place below 150 µA grid current, and this region should be avoided if large variations in gain on production chassis are to be avoided.

It is desirable to place a maximum limit on oscillator grid current, as too high a value often leads to parasitic oscillations and, in particular, to tunable whistles due to the generation of oscillator harmonics. It is suggested that the oscillator grid current be held below 400 µA for these reasons.

If, due to the type of oscillator circuit used, a large variation in triode grid current is encountered over the tuning range, a low value resistor may be wired in series with either grid or anode directly to the valve holder tag to stabilise the feed back.

4.22 Application of A.V.C.: A.V.C. may be applied to the control grid, and its effect on the characteristics is shown in the curves. On 320-14 and 320-15 is shown the relation between anode and screen currents and A.V.C., and on 320-16 and 17 the effect of A.V.C. on the conversion conductance and impedance.

The DC resistance in the control grid circuit should be kept below 3MΩ. This is particularly important on the short waves as a high value grid leak increases the tendency for the control grid to draw current due to pick-up of the oscillator voltage through stray coupling or capacity within the valve.

In communication receivers it is best to operate the frequency changer without A.V.C., as its application causes a small amount of pulling of the oscillator frequency (Curve 320-31). If no RF amplifier exists before the frequency changer the bulk of the receiver noise originates in the mixer valve; running this at maximum gain reduces its noise level to a minimum.

4.23 Screen Voltage: The method of supplying the screen voltage has a great effect on the A.V.C. characteristics of the 12AH8. When the valve is operated from a 100 volt HT rail the screen is generally connected directly to this, or if any series resistance exists it is of low value purely for decoupling. Variations in the screen current due to the A.V.C. action then have no effect on the screen voltage, but if the screen supply is obtained by way of a dropping resistor from a higher voltage HT rail, the variations in screen current affect the screen voltage in such a way as partially to offset the A.V.C. action. The fall in screen current is accompanied by a rise in screen voltage which tends to maintain the level of anode current and conversion conductance. This effect is shown on graphs 320-15 and 320-17 where curves are given for operation with a series screen resistor. If a potential divider is used to derive the screen voltage the steady current drawn by the bottom resistor assists in stabilising the screen voltage. If both the frequency changer valve and IF amplifier valve have their screens fed through a common series resistor the A.V.C. control is extremely poor, as two valves are now opposing the A.V.C. action and assisting each other in the process. A common potential divider for the two valves, however, offers a solution which gives adequate A.V.C. control. On 320-28 are curves illustrating these effects, and the long cut-off tail of the sliding screen can be compared with that of the direct and potential divider supply. The curve showing the control when the potential divider is common to the frequency changer and IF amplifier includes the gain of the IF amplifier, whereas the other three curves are for the frequency changer alone.
Another reason why a common series screen resistor for the two valves is not recommended is because variations in the screen current of one valve necessarily affect the screen potential of both valves. Excessive variations in gain will then be experienced with valves with normal spread of screen current.

4.24 Methods of Bias: Bias for the control grid should be derived from a cathode bias resistor exclusive to the 12AH8. The practice of sharing a cathode bias resistor with another valve is not recommended as it makes the receiver gain too reliant on the total cathode current of the two valves.

Bias should not be obtained wholly from the contact potential of the A.V.C. diode as this is subject to very wide variations, in extreme cases being non-existent.

4.3 High Frequency Performance: The 12AH8 is very suitable as a frequency changer for broadcast type receivers in the V.H.F. 88 to 108 Mc/s band. Its signal to noise performance precludes its use from V.H.F. communication type equipment and television, but it has very definite possibilities for low and medium priced receivers for broadcast reception of FM or AM stations in the international V.H.F. band. Details of a suitable circuit and performance figures are given later in this report.

4.31 Input Impedance and Capacity: A curve showing the change of input impedance and capacity plotted against A.V.C. voltage at 90 Mc/s is given on 320-32. This indicates that it is undesirable to apply A.V.C. when the valve is used at high frequency because not only is the change in input capacity significant compared with the total circuit capacity, but the large change in input resistance will upset the damping controlling the bandwidth of the tuned circuit. At frequencies below 30 Mc/s the input impedance is sufficiently high to be neglected and the change in input capacity is small compared with the total capacity of the circuit.

4.32 Oscillator Stability: The three main factors affecting oscillator stability are the effects of temperature as the circuit warms up, the effect of mains supply voltage fluctuations, and the effect of the A.V.C. voltage.

The Curves 320-30 show the change of oscillator frequency with time as the circuit warms up after an initial 30 seconds have been allowed for the supply voltages to settle at their proper values. These curves, taken at signal frequencies of 18 and 90 Mc/s, are typical of the circuits shown on 320-57 and 320-58, and assume adequate ventilation and components of good quality which do not change their values through self heating. The exception to this last rule is at 90 Mc/s where a small amount of temperature compensation is provided by a negative temperature coefficient condenser across the oscillator tuned circuit.

Change of oscillator frequency with mains supply voltage variations is linear over all normal variations encountered, and is approximately 1 kc/s for 10% change in supply voltage. There is a further, but much smaller, frequency variation as the circuit settles down under the new conditions. This again applies to the typical circuits shown at the end of this report.

The effect of A.V.C. on the oscillator frequency at a frequency of 18 Mc/s is shown on 320-30 for the circuit shown on 320-57. This curve was taken with a well regulated HT supply, if the supply is poorly regulated the frequency shift may be increased.
4.33 **Cross Modulation:** When a receiver is tuned to a wanted signal and the signal grid of the mixer simultaneously receives another signal at some other frequency, a certain amount of interaction takes place between the two signals. If the unwanted signal is modulated, some of the modulation is impressed on the carrier of the wanted signal. If one assumes the two signals are modulated to the same depth the percentage of cross modulation is the ratio, expressed as a percentage, of the unwanted modulation appearing on the wanted signal to the wanted modulation. It is the custom to express the result as the level of interfering signal required to produce 1% cross modulation, and to modulate to a depth of 30% at 400 c/s. The level of the wanted signal does not affect the answer provided it is small enough not to exceed the linear range of the valve characteristic. For test purposes a level of 100 mV was used.

The curve on 320-33 shows for the 12AH8 the level of interfering signal for 1% cross modulation plotted against conversion conductance. For a given level of signal the cross modulation increases as the A.V.C. voltage is raised because the curvature of the characteristics increases. At low levels of conversion conductance where the A.V.C. voltage is very high the signals are wholly around the bend of the curve and the cross modulation decreases.

All valves are, to some extent, liable to produce cross-modulation due to non-linearity of their characteristics. Especially is this so when A.V.C. is applied, unless, by careful design, a smooth variable-µ characteristic is obtained. In the 12AH8 particular attention has been paid to this problem of providing a smooth A.V.C. characteristic without, at the same time, making the cut-off so remote as to require an excessive control voltage.

4.4 **Typical Circuit Applications:** Circuits are attached showing typical arrangements of a broadcast receiver for long, medium and short wave bands, and for the frequency changer of a V.H.F. receiver for 88 to 108 Mc/s. Data are given for aerial and oscillator coils for these circuits and curves are provided showing the variations in gain and oscillator grid current over each tuning range.

4.41 **Long and Medium Waves:** The circuit 320-57 shows an aerial and oscillator circuit of a 12AH8 frequency changer for normal broadcast reception. The coil data are given on pages 3 and 2 of 320-59. The gain figures and oscillator grid currents are shown on 320-27 and 320-26. When the HT voltage is 100 volts the screen and oscillator anode voltage dropping resistors are omitted, the connections being taken directly to the HT rail. The gain figures at signal frequency do not include the step-up in the aerial coil, being taken with a low impedance signal source connected directly to the signal grid.

4.42 **Short Waves:** The same circuit 320-57 is used for short wave operation. Coil data and gain figures are given for two wave bands. The normal short wave band found on receivers employing only one short wave band is 6 to 18 Mc/s. The coil data for this band is given on Sheet 1 of 320-59, and the gain and grid current curves are on 320-25. The gain figures do not include the step-up in the aerial coil.

Coil data for a further short wave band covering 18 to 30 Mc/s are given on Sheet 4 of 320-59. The gain and grid current figures are on 320-29.

On the short wave bands, when the oscillator must cover a wide frequency range, large variations in oscillator grid current are encountered as the tuning condenser is tuned from maximum to minimum. These variations can be reduced by including some series stabilising resistance in the feed-back circuit as shown on 320-57, where a 220 ohm resistor is connected in series with the oscillator anode on the short wave band. The optimum value of this resistor may, in practice, be different due to differences in circuit layout and coil construction, and account must be taken of its presence when the oscillator coil is designed so that more feedback may be provided in compensation.
4.43 V.H.F. Performance: A circuit is shown on 320-58 of the 12AH8 used as the frequency changer for a receiver to cover the international V.H.F. broadcast band of 88 to 108 Mc/s. For a cheaply priced receiver this valve could be used without a preceeding RF amplifier. Its equivalent noise resistance of 100 kΩ then sets a limit to the sensitivity of the receiver, as the noise voltage produced by the valve in a 200 kc/s bandwidth is approximately 18 μ volts. For local station FM reception this noise level is sufficiently below the threshold to be ignored.

The gain obtainable, including the aerial circuit step-up, is 16 times at mid band position, the extremes of the band yielding 15·8 and 18 times. The IF gain at 10·7 Mc/s is 11 times when the oscillator grid current is 200 μA. The IF bandwidth for these measurements was 200 kc/s which is that normally employed for FM of ±75 kc/s deviation.

The coil details are as follows. Both coils are wound with 18 SWG tinned copper wire. The aerial coil consists of 2 turns, 1/2 in. internal diameter, 3/8 in. long. The tappings are, aerial 1/2 turn from earthy end, signal grid 1-3/4 turns from earthy end. The oscillator coil primary is wound on a 1/4 in. diameter form and has 3 turns. The coupling winding is 2-1/2 turns of insulated wire wound over the primary with a few layers of insulation such as "Alkathene" film in between.

The oscillator frequency is set lower than the signal frequency by the difference of the IF, as this simplifies the requirements for frequency stability. To compensate for the change in capacity across the oscillator coil as the circuit warms up in the cabinet a negative temperature coefficient condenser is shunted across the tuning condenser. The exact value of this condenser will depend on the tuning and trimming condensers, but normally something of the order of 5 pF with a negative temperature coefficient of 30 parts per million is required. On 320-30 is shown the oscillator frequency drift due to the valve warming up. The circuit here was adequately cooled so that the majority of the frequency shift was due to the valve. No negative temperature coefficient condenser was used for this test. Normally this condenser is connected close to the valve holder so that it warms up at about the same rate as the valve. In practice the frequency drift during warm up can thus be held to within 20 kc/s.

The purpose of the choke in the live filament lead is to reduce the possibility of regeneration at IF when, as is often the case, a high gain IF amplifier follows the mixer.

5.0 Other Applications: Triode Heptode frequency changer valves are not generally used for other than their intended purpose, as their characteristics are so specialised as to make them of little use in other applications.

One field, however, where they often find use is in circuits where control is required individually and/or jointly from two separate signals without mutual interaction. Signals are supplied to the heptode grid 1 and grid 3, so the anode current is controlled by either signal and is also a function of their relative values and phase. Two sets of static characteristic curves are given for the 12AH8, Nos. 320-22 and 320-23, which show the control of both grid 1 and grid 3 over the anode and screen voltage. It should be noted that as the bias is increased on grid 3 the screen current rises, as most of the electrons are diverted to the grid 2 part of the screen which preceeds grid 3.
BRIMAR 12AH8

ANODE & SCREEN CURRENTS versus
CONTROL GRID VOLTAGE

Heptode anode voltage \( V_{ah} = 100 \text{ Volts} \)

Triode anode voltage \( V_{at} = 100 \text{ Volts} \)

Oscillator grid current \( I_{gt} = 200 \mu \text{A} \)

Oscillator grid resistor \( R_{gt} = 47 \text{k}\Omega \)

\[ I_a \]

\[ I_{g2+g4} \]

SCREEN VOLTAGE \( V_{g2+g4} = 100 \text{ VOLTS} \)

-20

-15

-10

-5

0

0.01

CONTROL GRID VOLTAGE \( V_{gl} \) VOLTS

ANODE & SCREEN CURRENTS \( I_a \) & \( I_{g2+g4} \) mA
BRIMAR 12A18B
CONVERSION CONDUCTANCE & IMPEDANCE
versus CONTROL GRID VOLTAGE

Heptode anode voltage $V_{an} = 100$ Volts
Triode anode voltage $V_{an} = 100$ Volts
Oscillator grid current $I_{gt} = 200\mu A$
Oscillator grid resistor $R_{gt} = 47k\Omega$
BRIMAR 12AH8
CONVERSION CONDUCTANCE & IMPEDANCE
versus CONTROL GRID VOLTAGE
Heptode anode voltage $V_{ah} = 250$ Volts
Triode anode voltage $V_{at} = 100$ Volts
Oscillator grid current $I_{gt} = 200 \mu A$
Oscillator grid resistor $R_{gt} = 47 \Omega$

$g_c$
$r_c$

SCREEN VOLTAGE $V_{g2+g4}=100$ VOLTS
SCREEN SUPPLY VOLTAGE $V_{g2+g4}=250$ VOLTS
RESISTOR $R_{g2+g4}=33 \Omega$

CONVERSION CONDUCTANCE $g_c$ $\mu A/V$
CONVERSION IMPEDANCE $r_c$ $\Omega$

CONTROL GRID VOLTAGE $V_{gl}$ VOLTS

-20 -15 -10 -5 0 1

100 10 1 0.1
BRIMAR 12AH8

CONVERSION CONDUCTANCE & IMPEDANCE
versus OSCILLATOR GRID CURRENT

Heptode anode voltage $V_{an} = 100$ Volts
Control grid voltage $V_{g1} = -3$ Volts
Triode anode voltage $V_{an} = 100$ Volts
Oscillator grid resistor $R_{g4} = 47$ kΩ

SCREEN VOLTAGE $V_{g2+g4} = 100$ Volts

CONVERSION IMPEDANCE $r_C$, mΩ
CONVERSION CONDUCTANCE $g_C$, mS
OSCILLATOR GRID CURRENT $i_t$, µA
BRIMAR 12A18
CONVERSION CONDUCTANCE & IMPEDANCE
versus OSCILLATOR GRID CURRENT
Heptode anode voltage $V_{a}=250$ Volts
Control grid voltage $V_{g}=3$ Volts
Triode anode voltage $V_{at}=100$ Volts
Oscillator grid resistor $R_{gt}=47k\Omega$

$g_{c}$
$R_{c}$

SCREEN SUPPLY VOLTAGE $V_{g2+g4}=250$ Volts
& SCREEN RESISTOR $R_{g2+g4}=33k\Omega$

SCREEN VOLTAGE $V_{g2+g4}=50$ Volts

$V_{g2+g4}=75$ Volts

$V_{g2+g4}=100$ Volts

$V_{g2+g4}=250$ & $R_{g2+g4}=33k\Omega$

CONVERSION IMPEDANCE $g_{c}$ M$\Omega$

CONVERSION CONDUCTANCE $g_{c}$ mA/V

OSCILLATOR GRID CURRENT $I_{gt}$ $\mu A$

0 50 100 150 200 250 300
BRIMAR 12AH8

ANODE & SCREEN CURRENTS versus
OSCILLATOR GRID CURRENT

Heptode anode voltage $V_{ch} = 100$ Volts
Control grid voltage $V_{g1} = -3$ Volts
Triode anode voltage $V_{at} = 100$ Volts
Oscillator grid resistor $R_{gt} = 47k\Omega$

$I_a$ --- $I_{g2+g4}$ ---

SCREEN VOLTAGE $V_{g2+g4} = 100$ VOLTS
BRIMAR 12AHB

ANODE & SCREEN CURRENTS versus
CONTROL GRID VOLTAGE

Heptode anode voltage $V_{ah} = 250$ Volts
Screen voltage $V_{g2+g4} = 100$ Volts

$\mathcal{I}_a$ $\mathcal{I}_{g2+g4}$

GRID 3 VOLTAGE = 0 Volts

CONTROL GRID VOLTAGE $V_{g1}$ VOLTS

ANODE & SCREEN CURRENTS $\mathcal{I}_a$ & $\mathcal{I}_{g2+g4}$
BRIMAR 12 AH B
A.V.C. CHARACTERISTIC
Vg1h = -3 volts
Vat = 100
Rgt = 47 kΩ

Curve 1. Vgfh = 250 volts. Vg2+g4 = 100 V at zero A.V.C., via series resistor 33 kΩ.
Curve 2. Vgfh = 250 V. Vg2+g4 = 100 V at zero A.V.C., via potentiometer with 10 kΩ in each arm.
Curve 3. Vgfh = Vg2+g4 = 100 V direct.
H.T. rail 250 V. Screens via common potentiometer with 10 kΩ in upper arm, 18 kΩ in lower arm.
BRIMAR 12AH8
OSCILLATOR FREQUENCY DRIFT versus WARM-UP TIME
SIGNAL FREQ. = 18 & 90MC/S
After initial 30 secs. from cold start

Drift at 18MC/S
I.F. = 465KC/S. Osc. high

Drift at 90MC/S
I.F. = 10.7 MC/S. Osc. low
BRIMAR 12AH8
OSCILLATOR FREQUENCY DRIFT
VERSUS
A.V.C. VOLTAGE
SIGNAL FREQ. = 18MC/S, IF = 465kC/S
BRIMAR 12AH8
INPUT RESISTANCE &
CAPACITY AT 90 MC/S
VERSUS
A.V.C. VOLTAGE
I_{gt} = 200 \mu A \quad R_{gt} = 47 k \Omega
V_{ah} = 250 \text{V}, \quad V_{g2+g4} = 100 \text{V}
V_{at} = 100 \text{V}
**BRIMAR I2AH8**

**SHORT-WAVE COIL DATA**

**S.W. AERIAL**

**Former:** 1/2" outside diameter moulded bakelite, threaded 10 turns per cm.

**Iron Dust Core:** Neosid Z.11.B.

**Secondary:** 9 turns of 22 SWG En. Cu. wire wound in grooving, clockwise from start in the direction of arrow.

Start taken through hole in former to tag “a”.

Finish taken through hole in former to tag “b”.

**Primary:** 4 turns of 38 SWG D.S.C. wire close wound on two layers of Bitumenised paper, 3/16" wide, placed over the earthy end of the coil, clockwise from start in direction of arrow.

Start taken to tag “c”.

Finish taken to tag “d”.

**Trimmer:** C.1. 4—40 pF.

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**S.W. OSCILLATOR**

**Former:** As above.

**Iron Dust Core:** As above.

**Secondary:** 8-1/2 turns of 22 SWG En. Cu. wire wound in grooving, clockwise from start in direction of arrow.

Start taken through hole in former to tag “a”.

Finish taken through hole in former to tag “c”.

**Primary:** 4 turns of 38 SWG D.S.C. wire close wound on two layers of Bitumenised paper, 3/16" wide, placed over the earthy end of the coil, clockwise from start in the direction of arrow.

Start taken to tag “b”.

Finish taken to tag “d”.

**Trimmer:** C.4. 4—40 pF.
BRIMAR 12AH8
MEDIUM-WAVE COIL DATA

M.W. AERIAL

Former: 1/2" outside diameter moulded bakelite.

Iron Dust Core: Neosid Z.11.B.

   Single-wave wound, in two sections 1/8" wide, spaced 1/8".
   Start taken to tag "c".
   Finish taken to tag "d".

Gears: (Douglas) 50—32—34—50: 60—60.

Primary: L.3. 30 turns of 38 SWG D.S.C. wire.
   Double-wave wound, 1/8" wide, spaced 1/8" from L.4.
   Start taken to tag "b".
   Finish taken to tag "a".

Gears: 50—41—42—50: 40—80.

Trimmer: C.2. 4—40 pF.

M.W. OSCILLATOR

Former: As above.

Iron Dust Core: As Above.

   Start taken to tag "c".
   Finish taken to tag "d".

Gears: 50—41—42—50: 40—80.

Primary: L.10. 28 turns of 38 SWG D.S.C. wire.
   Start taken to tag "b".
   Finish taken to tag "a".

Gears: As for L.9.

Trimmer: C.5. 4—40 pF.
BRIMAR 12AH8
LONG-WAVE COIL DATA

L.W. AERIAL

Former: 1/2" outside diameter moulded bakelite.

Iron Dust Core: Neosid Z.11.8.

Start taken to tag "c".
Finish taken to tag "d".

Gears: (Douglas) 50—41—42—50: 60—60.

Primary: L.5. 100 turns of 38 SWG D.S.C. wire, double-wave wound, 1/8" wide, spaced 1/8" from L.6.
Start taken to tag "b".
Finish taken to tag "a".

Gears: 50—41—42—50: 40—80.

Trimmer: C.3. 40—80 pF.

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L.W. OSCILLATOR

Former: As above.

Iron Dust Core: As above.

Secondary: L.11. 97 + 97 turns of 38 SWG D.S.C. wire, double-wave wound in two sections, 1/8" wide, spaced 1/8".
Start taken to tag "c".
Finish taken to tag "d".

Gears: 50—41—42—50: 40—80.

Start taken to tag "b".
Finish taken to tag "a".

Gears: As for L.11.

Trimmer: C.6. 40—80 pF.
BRIMAR 12AH8

18—30 MC/S BAND COIL DATA

AERIAL

**Former:** 1/2” outside diameter moulded bakelite, threaded 10 turns per cm.

**Secondary:** 5-1/2 turns of 22 SWG En. wire wound in grooving clockwise from start in direction of arrow.

Start taken through hole in former to tag "a".

Finish taken through hole in former to tag "c".

**Primary:** 3 turns of 38 SWG D.S.C. wire close wound on two layers of Bitumenised paper, 1/4” wide, placed over the earthy end of secondary, clockwise from start in direction of arrow.

Start taken to tag "b".

Finish taken to tag "d".

**Trimmer:** 4—40 pF.
Secondary inductance = 0.56 μH

OSCILLATOR

**Former:** As above.

**Secondary:** As for Aerial.

**Primary:** 4 turns of 38 SWG D.S.C., otherwise same as Aerial.

Tag "a"—Earth: tag "b"—osc. anode via 150Ω: tag "c"—Tuning condenser: tag "d"—100 volt HT line.

**Trimmer:** 4—40 pF.

**Tuning Condenser:** 12—136 pF.