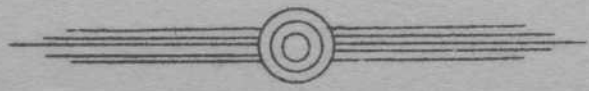


MST
MSA

DEPARTMENT OF TRANSPORT
RADIO DIVISION

REFERENCE DIAGRAM
AND
OPERATING INSTRUCTIONS
FOR

MARCONI RECEIVER and AMPLIFIER
TYPE M.S.T. TYPE M.S.A.



DESCRIPTION OF & OPERATING INSTRUCTIONS

FOR

TWO UNIT SHIP RECEIVER.

TUNER TYPE MST.

AMPLIFIER TYPE MSA.

WAVELENGTH RANGE

200 - 4,500 METRES.

CANADIAN MARCONI COMPANY,

M O N T R E A L.

DESCRIPTION OF & OPERATING INSTRUCTIONS
FOR
TWO UNIT SHIP RECEIVER.

TUNER TYPE MST.

AMPLIFIER TYPE MSA.

Wavelength Range 200 to 4,500 Metres

GENERAL:

This receiver is primarily designed for use on ships in which accurate tuning over a large range of wavelengths is required. It is capable of receiving either continuous wave, interrupted continuous wave, or spark signals.

Continuous wave reception by the beat method is arranged for by means of coupling coils incorporated in the instrument. These coupling coils are also employed in the reception of spark and interrupted continuous wave in order to obtain amplification of the incoming signal. Although a large wavelength range is covered by the set, the necessary tuning adjustments are simple, sharp tuning and efficient reception being ensured by the entire avoidance at all wavelengths of "dead-ends" in the inductances.

The receiver consists of a Tuner Unit (Type MST), and a Three-Valve Detector-Amplifier Unit (Type MSA).

TUNER:

The tuner is of the two-circuit type, the aerial and closed circuits being coupled together by an intermediate aperiodic circuit. The inductance in each circuit consists of a number of independent coils which are cut in and out of circuit by means of a special type of switch. The reaction coupling to the closed circuit inductance is made of a tapped fixed coil and a small coupling coil. The tappings of the fixed coil are thrown in and out of circuit by means of a seven-point switch. The small coupling coil, whose position in relation to the closed circuit inductance is variable provides the necessary fine adjustment to the reaction coupling.

The aerial circuit consists of an adjustable air condenser having a total capacity of .001 mfd. and an inductance. This inductance is divided into five different portions which are isolated from each other. In order to overcome "dead-ends" effects those portions which are not in use are cut completely out of circuit. Also, in every case the natural period of the unused inductance nearest to those in circuit is below the minimum tune of the circuit. A special five-point switch is provided to throw one or more of the inductances in or out of circuit as desired. This switch is of sufficiently robust construction that it would not ordinarily require attention. In case, however, a spring contact requires adjustment at any time a removable dummy stud is provided, a special key being supplied to facilitate the removal. On taking out this stud the defective blade can be brought over the space so left and bent down in order to obtain a better contact. The dummy stud is then replaced. The switch knob with the switch contacts attached complete may also be removed without difficulty by taking off the two nuts and lock washer from the spindle at the back of the panel, when the whole may be drawn out of the bushing.

In order to protect the windings from aerial discharge, a micrometer gap, with a fixed adjustment of $1/64$ " , is mounted on the left hand side of the panel, one side being connected directly to the aerial connection, and the other side to the earth connection.

The closed circuit consists of a variable condenser of .001 mfd. capacity and three inductances, two of these being laterally wound coils, and the other a small single layer coil. A special three-point switch, which operates in the same manner as that supplied in the aerial circuit, is provided for cutting these coils in and out of circuit. In order to obtain sufficient reaction coupling for beat reception on all wavelengths, one fixed tapped and one variable inductance are provided. The fixed inductance is laterally wound and has six taps connecting with a switch in the centre of the panel. The variable inductance is a small single layer coil which is rotated to obtain a fine adjustment of the coupling.

The overall dimensions of the tuner unit are - height 12", width 10" and depth 14". The weight of the unit is nineteen pounds.

AMPLIFIER:

The amplifier unit consists of the detector and two stages of audio frequency amplification. Two rheostats are provided for controlling the detector and amplifier valve filaments respectively. Either one or both stages of amplification may be used, telephone jacks being connected in the plate circuit of the respective valves. When it is desired to use only one stage of amplification the insertion of a plug in the first telephone jack automatically cuts the filament of the second valve out of circuit.

The overall dimensions of the amplifier unit are - height 12", width 10" and depth 14". The weight of the unit is eleven pounds.

METHOD OF TUNING:

The closed circuit should be adjusted to the desired wavelength by referring to the calibration chart which covers a wave range of from approximately 200 to 4,500 metres. Vary the reaction coil from the left towards the arrow. If the circuit does not oscillate or sufficiently amplify, insert additional reaction by means of the switch in the centre of the panel. As each tap is inserted the variable reaction pointer should be moved in the direction of the arrow until a setting is found where the circuit will oscillate when the reaction pointer is near maximum or within a few degrees of the arrow.

If the station with which it is desired to communicate is using spark or interrupted continuous wave, the reaction should be adjusted close to the point of oscillation. If continuous wave is being used, the reaction should be adjusted to an oscillating state. As a general rule, it will be found that up to 500 metres additional reaction is not required. Upt to 700 metres adjust switch to the second or third stop, 2,500 metres the fourth stop, and 4,500 metres the sixth stop. After the proper reaction has been found, the aerial circuit should then be brought close to the point of resonance. Owing to the different capacities of ships' aeriials, a definite calibration cannot be shipped with the receiver, but the most essential wave-lengths, such as 450, 600, 800, 2,200, 2,500 metres, will be calibrated by the Installing Engineer, and the settings marked on the calibration chart supplied with the instrument.

MAINTENANCE OF EFFICIENCY

The construction of the set is such that troubles should be a minimum, but if the behaviour of the receiver indicates faulty operation examination should be made in accordance with the following suggestions:-

AERIAL CIRCUIT:

If the aerial circuit does not tune, trace leads to the aerial and ground, and see that no conducting material has collected so as to short-circuit the micrometer gap. See that all switch blades are making contact on the studs, and that the spindle is making contact with the connector bar and lead on the rear panel. If the receiver is noisy, see that the plates of the aerial condenser are not touching and that the rotating plate spindle is making contact with the frame.

CLOSED CIRCUIT:

If the set howls when the condenser is turned towards zero, there is an open circuit. The simplest means of tracing this fault is to place a buzzer and battery across the "F" and "G" terminals on the tuner and examine the switch contacts, connector bar, etc. The location of the fault will be indicated by the operation of the buzzer. If it is doubtful as to whether the condenser is short-circuiting, the switch should be placed in an off position in between the two stops and the condenser rotated when a short-circuit due to contact between the condenser plates will be indicated by the working of the buzzer.

MISCELLANEOUS:

If the set fails to regenerate there are three probable causes (1) Faulty Valve, (11) Faulty "B" Battery or (111) Reaction Short-Circuited. If intermittent breaks occur in the received signal, the grid leak should be examined for defects. The "A" Battery should be replaced if it reads lower than $5\frac{1}{2}$ volts at the amplifier terminals when the valves' filaments are lighted.

LIST OF PARTS SUPPLIED WITH SET

- 1 - 6-V. Storage Battery.
- 2 - Battery Clips for Ditto.
- 1 - 45-V. Tapped Burgess "B" Battery.
- 3 - U.V. 201-A Radiotrons.
- 1' - No. 12 Tinned Copper Wire.
- 1 - Special Key for Switch Adjustment.
- 20' - No. 20 R.C. Flex Wire.
- 30' - No. 14 Stranded Lead Covered Wire.
- 15 - Brass Saddles to fit Ditto.
- 30 - Round Head Brass Wood Screws for above Saddles.
- 1 - Pair Telephones.
- 1 - Telephone Plug.

DESCRIPTION OF & OPERATING INSTRUCTIONS

NOTE

FOR

TWO UNIT SHIP RECEIVER.

TUNER TYPE MST.

AMPLIFIER TYPE MSA.

WAVELENGTH RANGE

200 - 4,500 METRES.

CANADIAN MARCONI COMPANY,

MONTREAL.

NOTE:

To remove the tuner unit from its case, take out the three screws on top of the panel, the top screw on the left hand side, and the two screws in the bottom of the cabinet, when the whole can be slid out by drawing the panel forward.

To remove the amplifier unit from its case, take out the three screws on top of the panel, and the two screws in the bottom of the cabinet, when the whole can be slid out by drawing the panel forward.

To adjust the contact blades of the inductance control switches, use the special key provided for the removal of the dummy stud, as described in the section under "Tuner".

DESCRIPTION OF & OPERATING INSTRUCTIONS

FOR

TWO UNIT SHIP RECEIVER.

TUNER TYPE MST.

AMPLIFIER TYPE MSA.

Wavelength Range 200 to 4,500 Metres.

GENERAL:

This receiver is primarily designed for use on ships in which accurate tuning over a large range of wavelengths is required. It is capable of receiving either continuous wave, interrupted continuous wave, or spark signals.

Continuous wave reception by the beat method is arranged for by means of coupling coils incorporated in the instrument. These coupling coils are also employed in the reception of spark and interrupted continuous wave in order to obtain amplification of the incoming signal. Although a large wavelength range is covered by the set, the necessary tuning adjustments are simple, sharp tuning and efficient reception being ensured by the entire avoidance at all wavelengths of "dead-ends" in the inductances.

The receiver consists of a Tuner Unit (Type MST), and a Three-valve Detector-Amplifier Unit (Type MSA).

TUNER:

The tuner is of the two-circuit type, the aerial and closed circuits being coupled together by an intermediate aperiodic circuit. The inductance in each circuit consists of a number of independent coils which are cut in and out of circuit by means of a special type of switch. The reaction coupling to the closed circuit inductance is made of a tapped fixed coil and a small coupling coil. The tappings of the fixed coil are thrown in and out of circuit by means of a seven-point switch. The small coupling coil, whose position in relation to the closed circuit inductance is variable, provides the necessary fine adjustment to the reaction coupling.

The aerial circuit consists of an adjustable air condenser having a total capacity of .001 mfd's. and an inductance. This inductance is divided into five different portions which are isolated from each other. In order to overcome "dead-end" effects those portions which are not in use are cut completely out of circuit. Also, in every case the natural period of the unused inductance nearest to those in circuit is below the minimum tune of the circuit. A special five-point switch is provided to throw one or more of the inductances in or out of circuit as desired. This switch is of sufficiently robust construction that it should not ordinarily require attention. In case, however, a spring contact requires adjustment at any time a removable dummy stud is provided, a special key being supplied to facilitate the removal. On taking out this stud the defective blade can be brought over the space so left and bent down in order to obtain a better contact. The dummy stud is then replaced. The switch knob with the switch contacts

attached complete may also be removed without difficulty by taking off the two nuts and lock washer from the spindle at the back of the panel, when the whole may be drawn out of the bushing.

In order to protect the windings from aerial discharge, a micrometer gap, with a fixed adjustment of $1/64$ ", is mounted on the left hand side of the panel, one side being connected directly to the aerial connection, and the other side to the earth connection.

The closed circuit consists of a variable condenser of .001 mfd. capacity and three inductances, two of these being laterally wound coils, and the other a small single layer coil. A special three-point switch, which operates in the same manner as that supplied in the aerial circuit, is provided for cutting these coils in and out of circuit. In order to obtain sufficient reaction coupling for beat reception on all wavelengths, one fixed tapped and one variable inductance are provided. The fixed inductance is laterally wound and has six taps connecting with a switch in the centre of the panel. The variable inductance is a small single layer coil which is rotated to obtain a fine adjustment of the coupling.

The overall dimensions of the tuner unit are - height 12", width 10" and depth 14". The weight of the unit is nineteen pounds.

AMPLIFIER:

The amplifier unit consists of the detector and two stages of audio frequency amplification. Two rheostats are provided for controlling the detector and amplifier valve filaments respectively. Either one or both stages of amplification may be used, telephone jacks being connected in the plate circuit of the respective valves. When it is desired to use only one stage of amplification the insertion of a plug in the first telephone jack automatically cuts the filament of the second valve out of circuit.

The overall dimensions of the amplifier unit are - height 12", width 10" and depth 14". The weight of the unit is eleven pounds.

METHOD OF TUNING:

The closed circuit should be adjusted to the desired wavelength by referring to the calibration chart which covers a wave range of from approximately 200 to 4,500 metres. Vary the reaction coil from the left towards the arrow. If the circuit does not oscillate or sufficiently amplify, insert additional reaction by means of the switch in the centre of the panel. As each tap is inserted, the variable reaction pointer should be moved in the direction of the arrow until a setting is found where the circuit will oscillate when the reaction pointer is near maximum or within a few degrees of the arrow.

If the station with which it is desired to communicate is using spark or interrupted continuous wave, the reaction should be adjusted close to the point of oscillation. If continuous wave is being used, the reaction should be adjusted to an oscillating state. As a general rule, it will be found that up to 500 metres additional reaction is not required. Up to 700 metres adjust switch to the second or third tap. 2,500 metres

the fourth stop, and 4,500 metres the sixth stop. After the proper reaction has been found, the aerial circuit should then be brought close to the point of resonance. Owing to the different capacities of ships' aeri-als, a definite calibration cannot be shipped with the receiver, but the most essential wavelengths, such as 450, 600, 800, 2,200, 2,500 metres, will be calibrated by the Installing Engineer, and the settings marked on the calibration chart supplied with the instrument.

MAINTENANCE OF EFFICIENCY.

The construction of the set is such that troubles should be a minimum, but if the behaviour of the receiver indicates faulty operation examination should be made in accordance with the following suggestions:-

AERIAL CIRCUIT:

If the aerial circuit does not tune, trace leads to the aerial and ground, and see that no conducting material has collected so as to short-circuit the micrometer gap. See that all switch blades are making contact on the studs, and that the spindle is making contact with the connector bar and lead on the rear panel. If the receiver is noisy, see that the plates of the aerial condenser are not touching and that the rotating plate spindle is making contact with the frame.

CLOSED CIRCUIT:

If the set howls when the condenser is turned towards zero, there is an open circuit. The simplest means of tracing this fault is to place a buzzer and battery across the "F" and "G" Terminals on the tuner and examine the switch contacts, connector bar, etc. The location of the fault will be indicated by the operation of the buzzer. If it is doubtful as to whether the condenser is short-circuiting, the switch should be placed in an 'off position' in between the two stops and the condenser rotated when a short-circuit, due to contact between the condenser plates, will be indicated by the working of the buzzer.

MISCELLANEOUS:

If the set fails to regenerate there are three probable causes (I) Faulty Valve, (II) Faulty "B" Battery or (III) Reaction Short-circuited. If intermittent breaks occur in the received signal, the grid leak should be examined for defects. The "A" Battery should be replaced if it reads lower than $5\frac{1}{2}$ volts at the amplifier terminals when the valves' filaments are lighted.

LIST OF PARTS SUPPLIED WITH SET.

- 1 - 6-V. Storage Battery.
- 2 - Battery Clips for Ditto.
- 1 - 45-V. Tapped Burgess "B" Battery.
- 3 - U.V.201-A Radiotrons.
- 1' - No. 12 Tinned Copper Wire.
- 1 - Special Key for Switch Adjustment.
- 20' - No. 20 R.C. Flex Wire.
- 30' - No. 14 Stranded Lead Covered Wire.
- 15 - Brass Saddles to fit Ditto.
- 30 - Round Head Brass Wood Screws for above Saddles.
- 1 - Pair Telephones.

MARCONI LONG WAVE RECEIVER

TWO UNIT

TYPE MST AND MSA

Wave range 200 -- 4000 Metres

This receiver is especially designed for purposes where accurate tuning over a wide range of wavelengths is required and is suitable for reception of either continuous waves, interrupted waves or damped waves (spark signals). It is standard equipment for use on board ships and at Coast Stations. The circuit is of the regenerative type where detection, amplification and generation of the local radio frequency oscillations occur in the circuits of a single tube. Further amplification is obtained by a two stage transformer coupled circuit.

The complete receiver consists of two units known as the Tuner and Amplifier. These are designated as Type MST and Type MSA respectively.

WAVE RANGE

The tuner covers a wave range from approximately 200 metres to 4,000 metres.

THE TUNER, TYPE MST

The tuner is housed in a polished mahogany cabinet. In the front of the cabinet a control panel is mounted. This panel is engraved and contains all the tuning controls and terminals for connection with the aerial circuit and the amplifier. The tuner is of the two circuit type, the aerial and closed circuits being coupled together by an intermediate aperiodic circuit. The inductance in each circuit consists of a number of independent coils which are connected or disconnected by means of a specially designed switch. Regeneration is obtained by means of a small variable reaction coil connected in series with a fixed tapped coil, the variable coil and the fixed coil being coupled to the closed circuit inductance. By means of a seven point switch the tapings on the fixed coil may be connected to or disconnected from the circuit. Variation of the small coupling coil provides the necessary fine adjustment to the reaction coupling.

The primary or aerial circuit consists of an adjustable air condenser (.001 mfd. max.) and an inductance which is divided into five different portions. These portions are laterally wound and isolated from each other. In order to overcome dead end effects, the portions which are not in use are completely disconnected from the circuit. The natural period of the unused inductance nearest to the inductance in use is below the resonance point of the circuit. A special five point switch with nine contactors is provided to throw one or more of the inductances in or out of the circuit as desired.

The secondary closed circuit consists of three inductances and a variable capacity (.001 mfd. max.). Two of these inductances are laterally wound, the third being single layer wound. The inductances may be thrown in or out of the circuit as desired by means of a three point switch with five contactors.

THE AMPLIFIER, Type MSA

The amplifier unit is housed in a polished mahogany cabinet in the front of which a control panel is mounted. This panel contains all the control switches, jacks, rheostats and connecting terminals.

VALVES

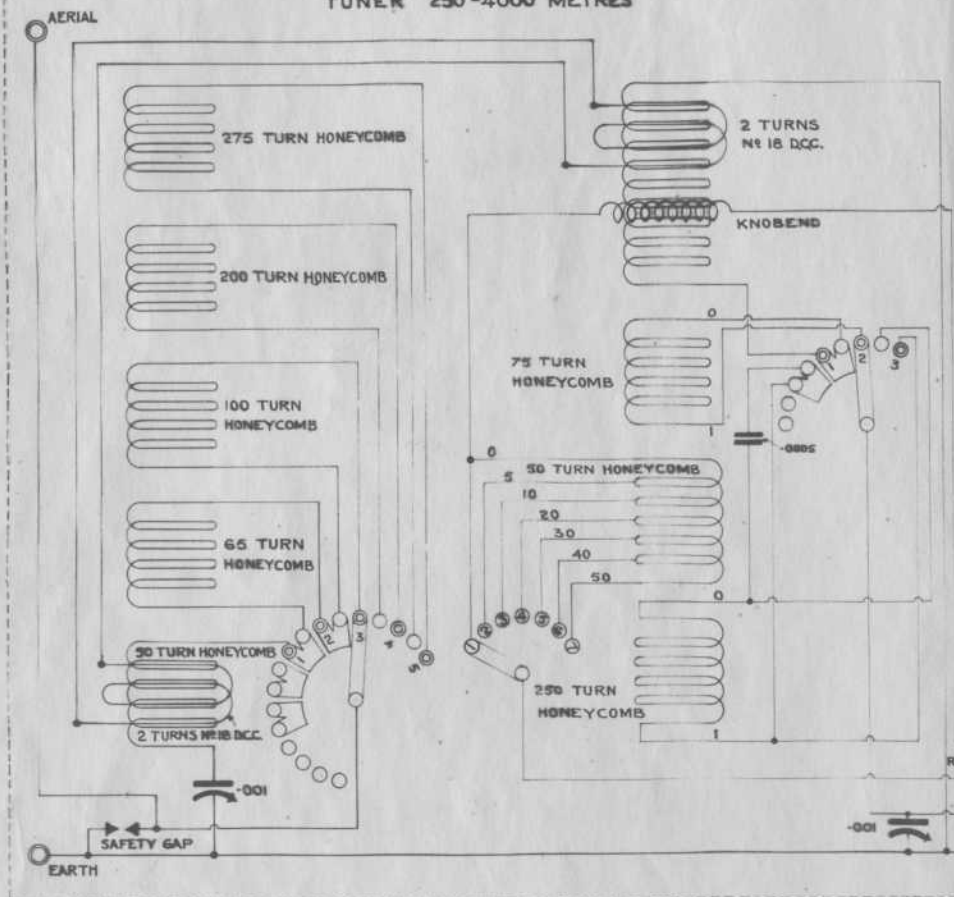
Use	Type	Number	Filament Volts	Filament Current	Plate Voltage
Amplifier	Uv-201-A	3	5.0	.75 (Total)	45

EQUIPMENT

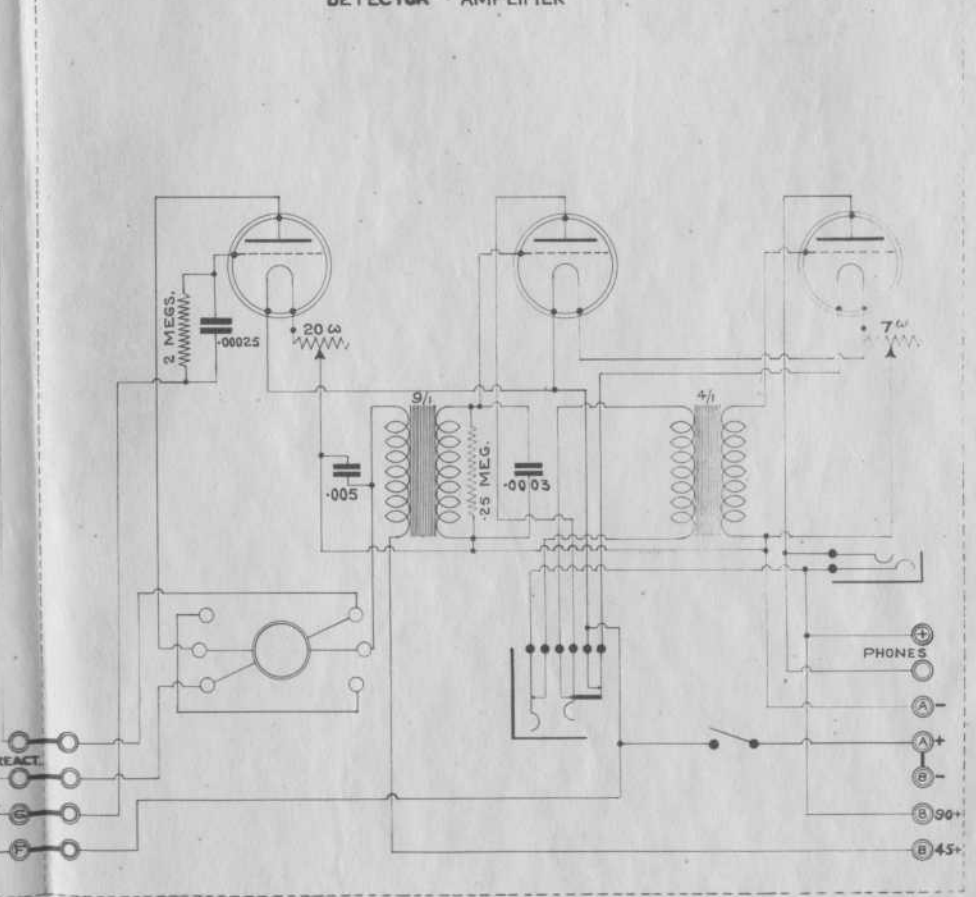
1. Tuner and Detector Amplifier Units.
2. Storage Battery (6v.80 amp.hr.).
3. High tension Battery (45 volts tapped).
4. Valves (UV-201A).
5. Telephones.
6. Telephone plugs.
7. Miscellaneous installing wire, etc.

DIMENSIONS	Height	Width	Depth
Type MS T Tuner.....	12"	15"	11 1/2"
Type MSA Amplifier.....	12"	10 1/8"	11 1/8"

TUNER 250-4000 METRES



DETECTOR - AMPLIFIER



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DIAGRAM OF CONNECTIONS
 DETECTOR-AMPLIFIER
 MSA5

USED ON

REQ TYPE N2

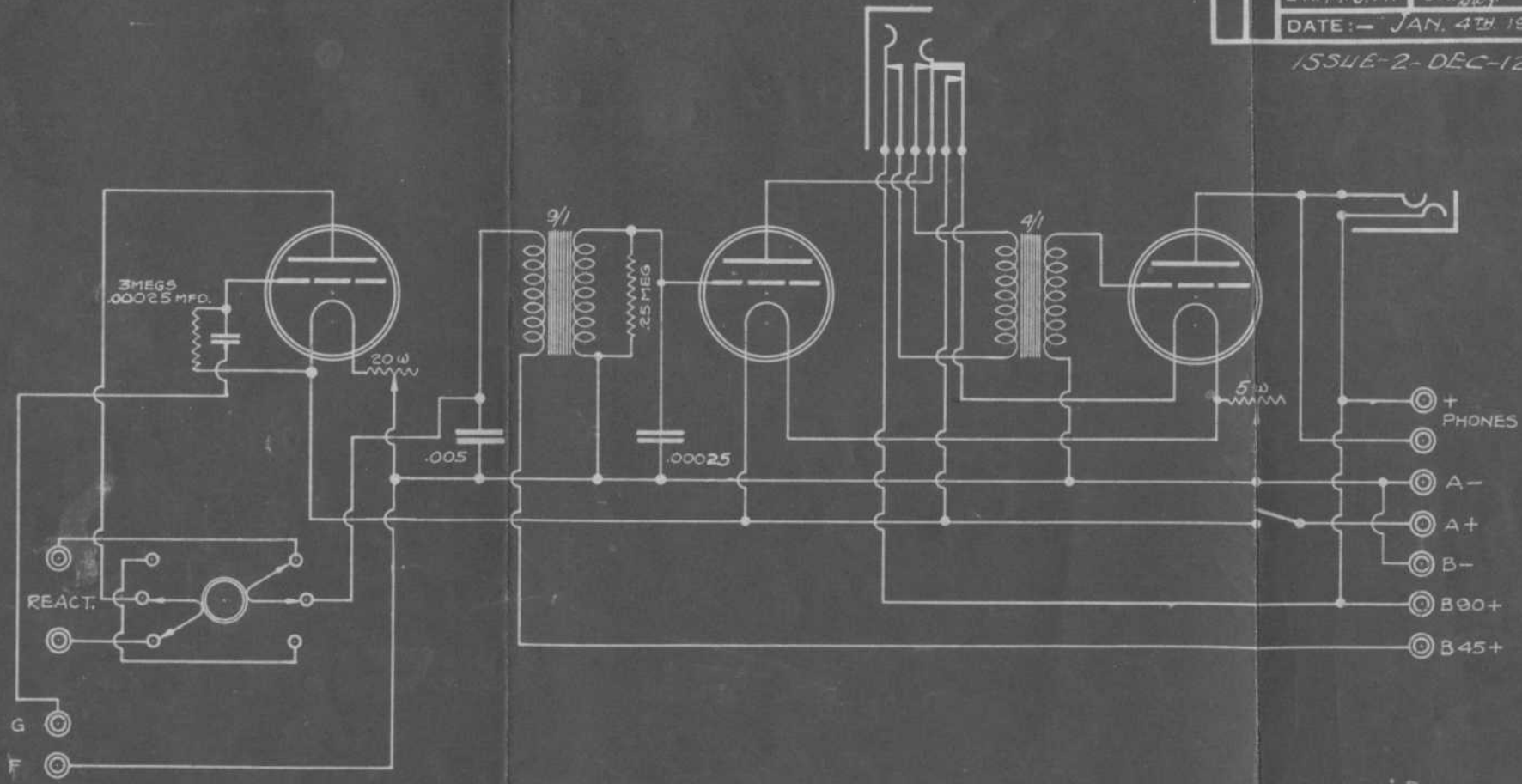
1936
 1935

CANADIAN MARCONI COMPANY
 LIMITED.

DR. M. J. M. CK. 114 AP.

DATE: - JAN. 4TH 1927

ISSUE-2-DEC-12-1927



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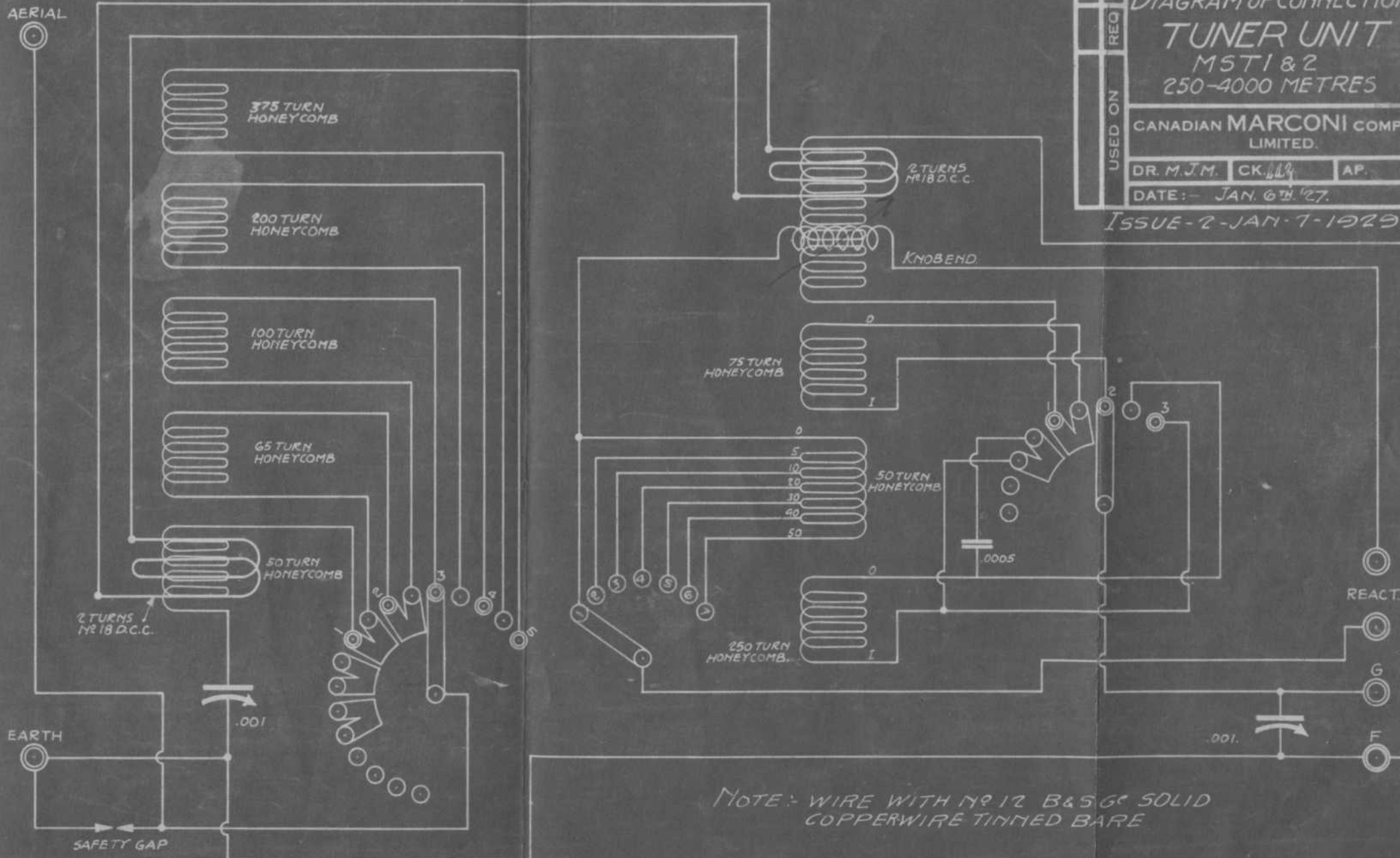
DIAGRAM OF CONNECTIONS
TUNER UNIT
MST1 & 2
250-4000 METRES

CANADIAN MARCONI COMPANY
LIMITED.

DR. M.J.M. CK. 119 AP.

DATE: - JAN. 6TH 1927.

ISSUE - 2 - JAN - 7 - 1929



NOTE: - WIRE WITH NO. 12 B & S G. SOLID
COPPERWIRE TINNED BARE