

500  
W M 3

DEPARTMENT OF TRANSPORT  
RADIO DIVISION

REFERENCE DIAGRAM  
AND  
OPERATING INSTRUCTIONS  
FOR

MARCONI 500 WATT RADIO TRANSMITTER  
TYPE 500 W.M.3 C.W. I.C.W.



INSTRUCTIONS FOR CONNECTING  
POWER AMPLIFIER & MODULATOR UNIT  
TO 500 WATT WM 3 MARCONI VALVE TRANSMITTER.

INSTRUCTIONS

The MT-12A valve is arranged to be heated from the same source as the valves on the Transmitter being connected to terminals 1 & 2 on the main terminal board. Reference to the wiring diagram will show that the feed milliammeter on the transmitter will read the total current to the oscillator and modulator tubes. It may be necessary to re-set the overload relay to take care of the increased current due to the modulator. The H.T. should not exceed 2000 volts. The bias to the modulator should be adjusted until the modulator plate current is not more than 30 mils at 2000 volts. The bias required will be in the neighbourhood of 125v. To secure the best modulation depth under the circumstances, the power should be cut considerably to a recommended value of oscillator feed of about 200 mils. An even more preferable value of oscillator feed would be 100 mils. This latter will give a depth of modulation of about 40% (peak). Increasing oscillator input will result in considerably reduced modulation depth, and from standpoint of range, is probably not as good as low oscillator power and increased modulation depth.

In connecting up; the link between terminals "A" and "B" on the H.T. terminal board in the back of the transmitter should be removed and connections from the modulator made to them as shown in the diagram.

The power amplifier will require 3v for its filament and 6v for the hand microphone. The former will be a storage battery, and the latter a group of four dry cells. The bias battery is adjusted until plate current to the UX-210 valve is not more than 20 mils. The bias voltage will be in the neighbourhood of 27v.

The volume control on the power amplifier should be run up slowly, while speaking into the microphone, until there is evidence of modulation. The modulator feed meter will show this by a sudden motion of its needle, as speech is impressed on the system. Too great a deflection should be avoided, as it is an indication of distortion.

It is suggested that the modulator valve be inverted mounted in the clips supplied. The clips will be spaced away from a small board by means of the insulators supplied. In assembling the equipment, care should be taken to avoid accidental contact with the modulator feed meter, as it is at high potential.



INSTALLING AND OPERATING INSTRUCTIONS FOR  
500-WATT, 2000-VOLT SHIP TRANSMITTER, 110-  
VOLT D.C. POWER SUPPLY - TYPE 500 WM-3  
ASSEMBLY 19940/1400

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General.

The type 500 WM3 Ship Transmitter is a single unit set. It comprises a rigid angle iron framework, upon which are mounted the oscillatory circuits, valves, control circuits and supporting panels. The overall size of the unit is 2' x 3' x 5'6".

Two motor-generators are supplied with the transmitter, one delivering high tension direct current to the oscillator plates, the other low voltage direct current for heating the valve filaments. These two machines are independent of the transmitter.

Power Supply.

The high tension direct current voltage for the oscillator valves is supplied by a 2000 volt, 1500 watt generator directly coupled to a 3 H.P. 110 volt D.C. motor. This machine is equipped with an automatic starter located on the transmitter control panel, and is controlled from the operator's table by push buttons. A generator field switch, also on the operator's table, permits the field circuit of the high tension generator to be opened while receiving.

The valve filaments are heated by a low voltage D. C. generator direct connected to a 110 volt D. C. motor. In the standard set this machine is started directly from the mains but where a modulator panel or short wave transmitter is installed, an automatic starter is used.

The field rheostat for the 2000 volt generator is located on the transmitter control panel. The field control for the filament generator is placed on a separate panel, located on the operator's desk. This panel also carries a fused line switch.

Oscillator Valves.

Two T-250 valves in parallel, rated at 250 watts dissipation each, are used as oscillators in a standard oscillatory circuit.

Wave Range.

The transmitter will operate on any wavelength between 600 and 2400 metres when used on an aerial having a natural period of 250 metres and a capacity of .0007 mfd. By means of a single operation wave change switch any one of four wavelengths in this band is immediately available. The set is normally wired up to permit of two wavelengths in the band 600 - 1300 metres, and two in the band 1200 - 2400 metres.

Keying.

A relay mounted on the transmitter panel is used for keying in the grid circuit of the oscillator valves, and is operated by a standard hand key. A standard hand key controls the

### Tone Wheel.

A motor driven tone wheel is mounted on the transmitter frame. It is connected in series with the grid circuit of the oscillator valves and gives a clear 500 cycle completely modulated output. The tone wheel is equipped with an automatic governor switch which shorts the wheel brushes while the motor is at rest. To change from C.W. to I.C.W., the tone wheel motor is started. A switch on the operator's table controls this motor.

### Overload Protection.

The Motor generators are protected against overloads by fuses in the D.C. Lines. An instantaneous overload relay in series with the valve negative return lead, protects the valves against overload.

### Meters.

Three Weston meters are mounted on the transmitter panel and indicate, respectively, radio frequency amperes, high tension voltmeter and feed milliamperes. Shorting switches are used on such meters as require them. A filament voltmeter is located on the same panel as the filament generator field rheostat.

### Aerial Change-over Switch.

A manually operated serial change-over switch, of standard type, is supplied with the transmitter.

### Installation.

When the set has been unpacked and examined for breakage it should be placed in the radio cabin and the side brackets bolted to the frame. The brackets are made to project behind the frame and they hold the transmitter three inches from the wall. The set may then be placed in position and bolted to bulkhead and floor.

The two motor generator sets may be placed where convenient, but preferably close to the transmitter. They should be raised six to eight inches from the floor. If at all feasible the leads from the M/G unit to the transmitter should be run in well-grounded conduit, or failing this lead-covered wire should be used.

The stop-start button and generator field switch and tonic train meter switch are mounted side by side and require lead-covered wire. All conduit, lead sheathing, transmitter and machine frames must be properly grounded.

Having completed the wiring of the transmitter and checked it, the next step is to test the component parts of the set. Turn all generator field rheostats to minimum field current and open the 2000 volt generator field switch. Place the valves in position. Now close the line switch. The filament motor-generator will start; the valves will then light. Vary the filament generator

It is now in order to test the motor of the 2000 volt machine press the control buttons and see that the motor starts and stops.

The transmitter is now ready for tuning. In a transmitter of this type where several wave changes are available by switches, the placing of additional tuning clips on the various coils after tuning to any wave will alter the wavelengths slightly, particularly at the shorter waves. To overcome this difficulty, it is best to place all clips in their approximate positions and start tuning at the longest wave.

Two aerial coupling coils are provided as stated above. The larger is used on the wave range from 1200 to 2400 metres. Moving the wave change switch to position "D" and place the tuning clips to include both the loading coils and about half the fine tuning inductance. The plate coil clips should include the whole of the plate coil, and the grid tap may be tentatively placed about half way up the lower loading coil. Start the 2000 volt M/G and close the generator field switch. The generator field rheostat is at minimum so that the line voltage is only about 1000 volts. Place the aerial change-over switch in the transmit position and check the filament voltage. Now press the key. If the radio frequency ammeter does not indicate, move the grid tapping further up the loading coil. If the valves oscillate at once, lower the grid tap until the oscillations cease, then raise it till stable oscillations are obtained. Observe the plate feed. This should not exceed 200 milliampers ordinarily.

The wavelength at the stage of the tuning need not be fixed accurately. If the feed current is too low, it may be increased by varying the number of turns in the plate coil. It will now be found that the filament voltage shows a tendency to drop. To correct this lower the filament volts by an amount equal to the drop under load, making use of the small separate rheostat, then re-adjust the main rheostat until the voltage is again correct. If the relay contacts make as they should, the variation in filament voltage will be small when the key is again pressed. This procedure will have to be repeated at full load.

Raise the line voltage to 2000 by cutting out all the field rheostat and press the key. The feed current should not exceed 600 milliampers; correct for filament variation. Irrespective of the feed current, however, the temperature of the valve plate must not be such as to cause it to show more than a medium red heat on a long dash. After obtaining approximately the correct feed the grid tap may be raised with a view to obtaining greater efficiency. It is not advisable to make adjustments of taps on full voltage.

The procedure in tuning for the shorter waves is identical with that used for the long. The grid tap will be at the top of the fine tuning inductance and fewer turns will be needed on the plate coil.

On both long and short wave aerial coupling coils all plate coil tappings are variable. This had been done to obtain a variation in coupling between plate and aerial coils. For example, at 600 metres a decided increase in efficiency is noticed when the plate coil taps are shifted away from the earth end of the coupling coil, the turns between the taps being kept constant.

Care of the transmitter.

It is hardly necessary to say that the transmitter will work best if kept clean and dry. An occasional dusting off of insulations, oils, etc., will help to keep the set efficient. No moisture should be permitted to touch the 2000 volt generator, and care should be taken that the bearings are not filled so full that oil penetrates to the machine windings. Dirt and loose connections are much more serious on a valve Transmitter than on a Spark Set, and must be guarded against.

Precautions.

Do not run the M/C set at full voltage if it has been idle for a long period of several days, or if it is damp. Dry it out, running with low field for a couple of hours.

Do not attempt to make adjustments to the transmitter except at reduced power.

Do not handle the transmitter with power on.

Do not touch the glass of the valves with the set in operation, as a very nasty shock will result.

Do not attempt to clean the commutator of the 2000 volt machine with the field on when the machine is running.

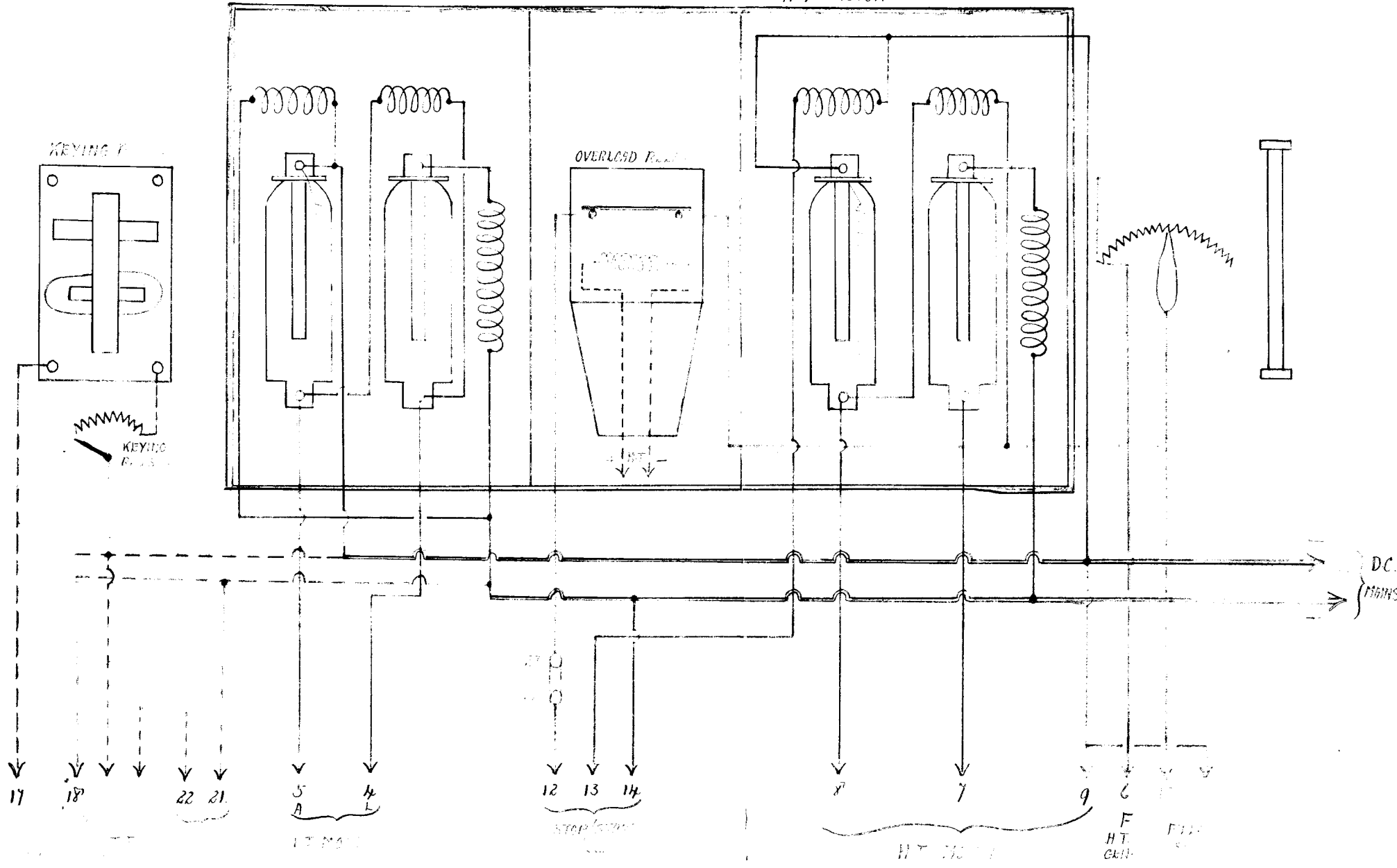
Do not wait till the ship is at sea before trying out spare valves,

Do not run the transmitter with the filament voltage under normal or over normal.

Do not overheat the valve plate.

FILE MOTOR STARTER.

H.T. MOTOR STARTER.

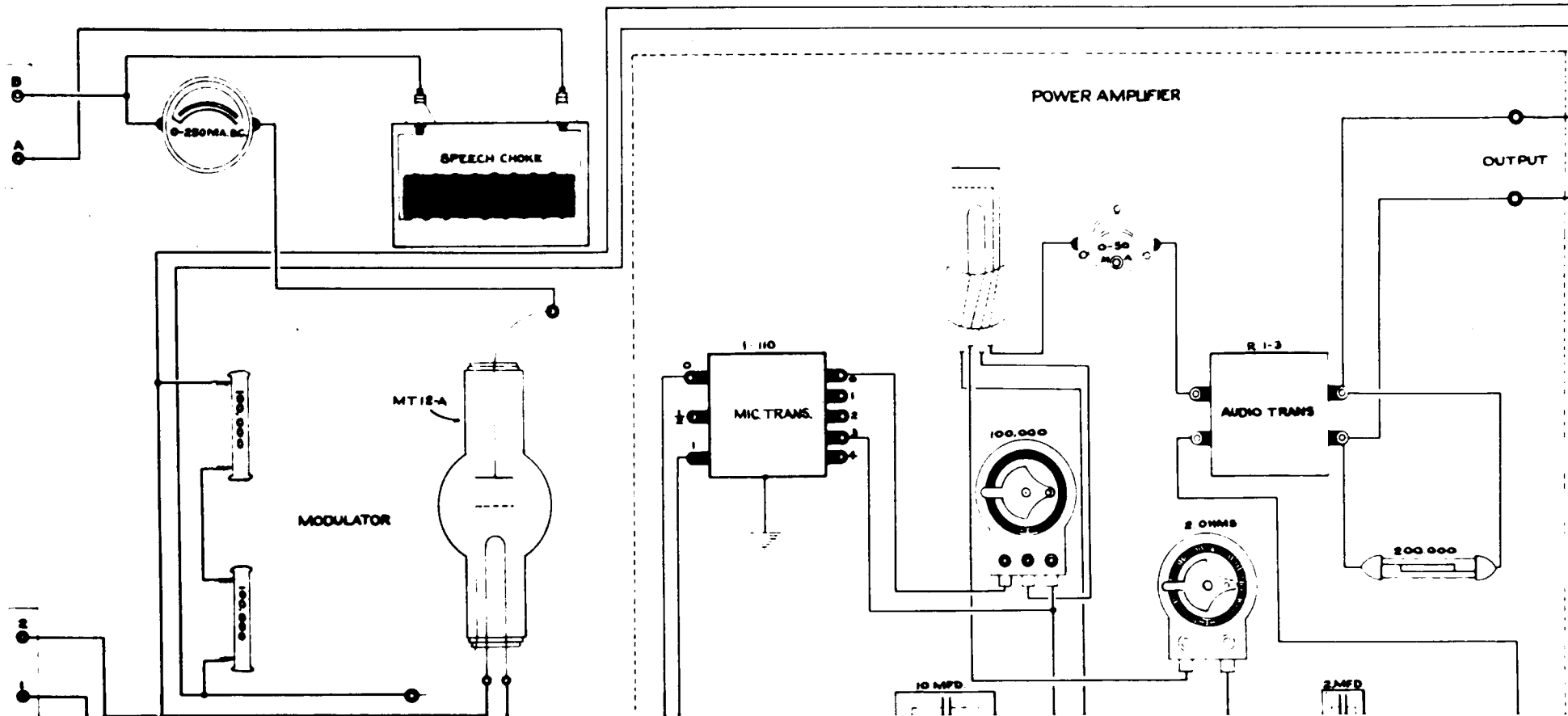


Department of Marine

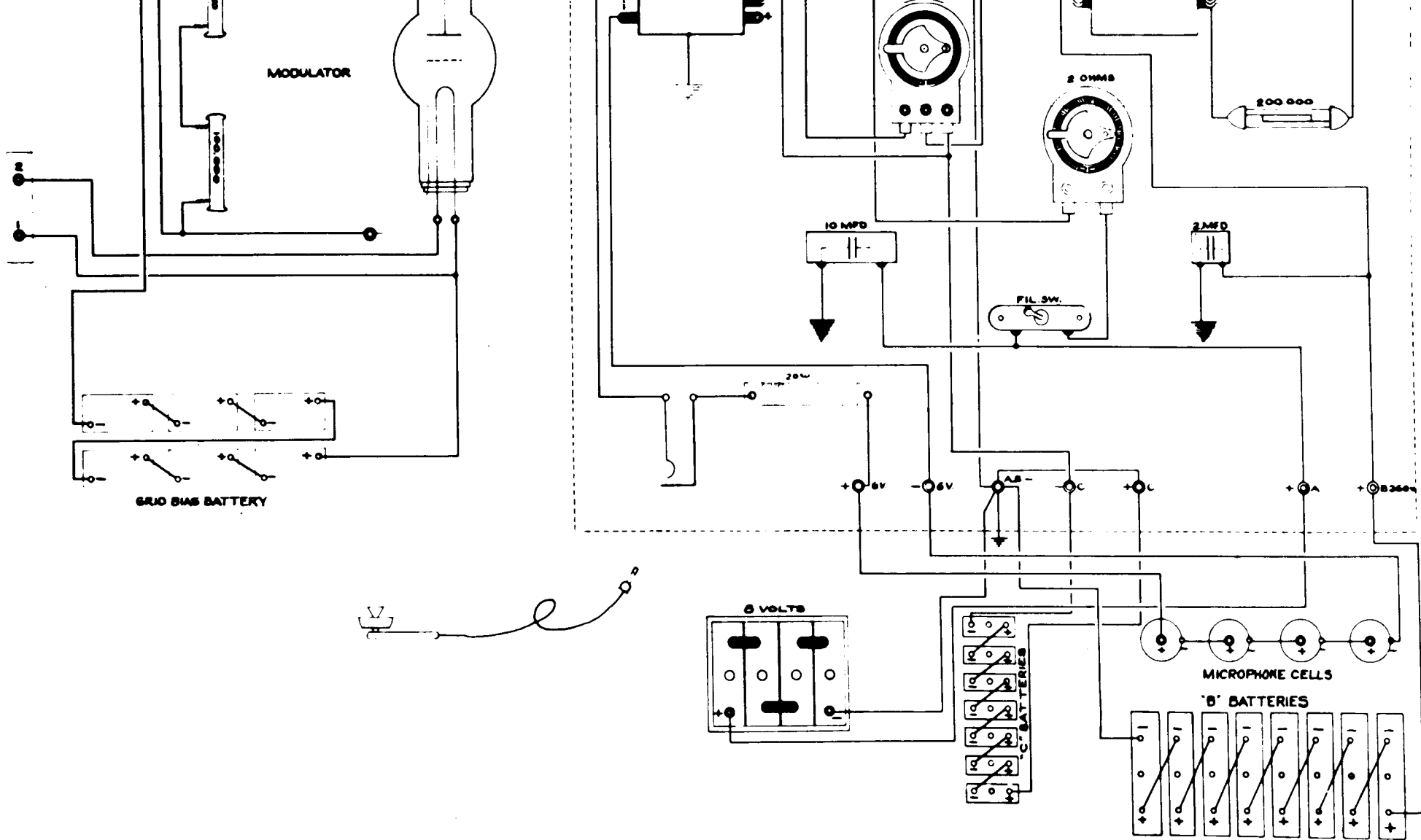
Radio Branch.

Radiotelephone Adapter:

Marconi Marine Type 500 W 163 Valve Transmitt







The candidate is to complete this diagram of connections by filling in the wiring in black lines. Draw all lines vertically or horizontally.

Name of Candidate  
 Date of Examination  
 Examining Officer

Modulator



○ B

To 2000 V. Terminals  
ON MAIN SET

○ A



○ 2

To TERMINAL BOARD  
ON MAIN SET

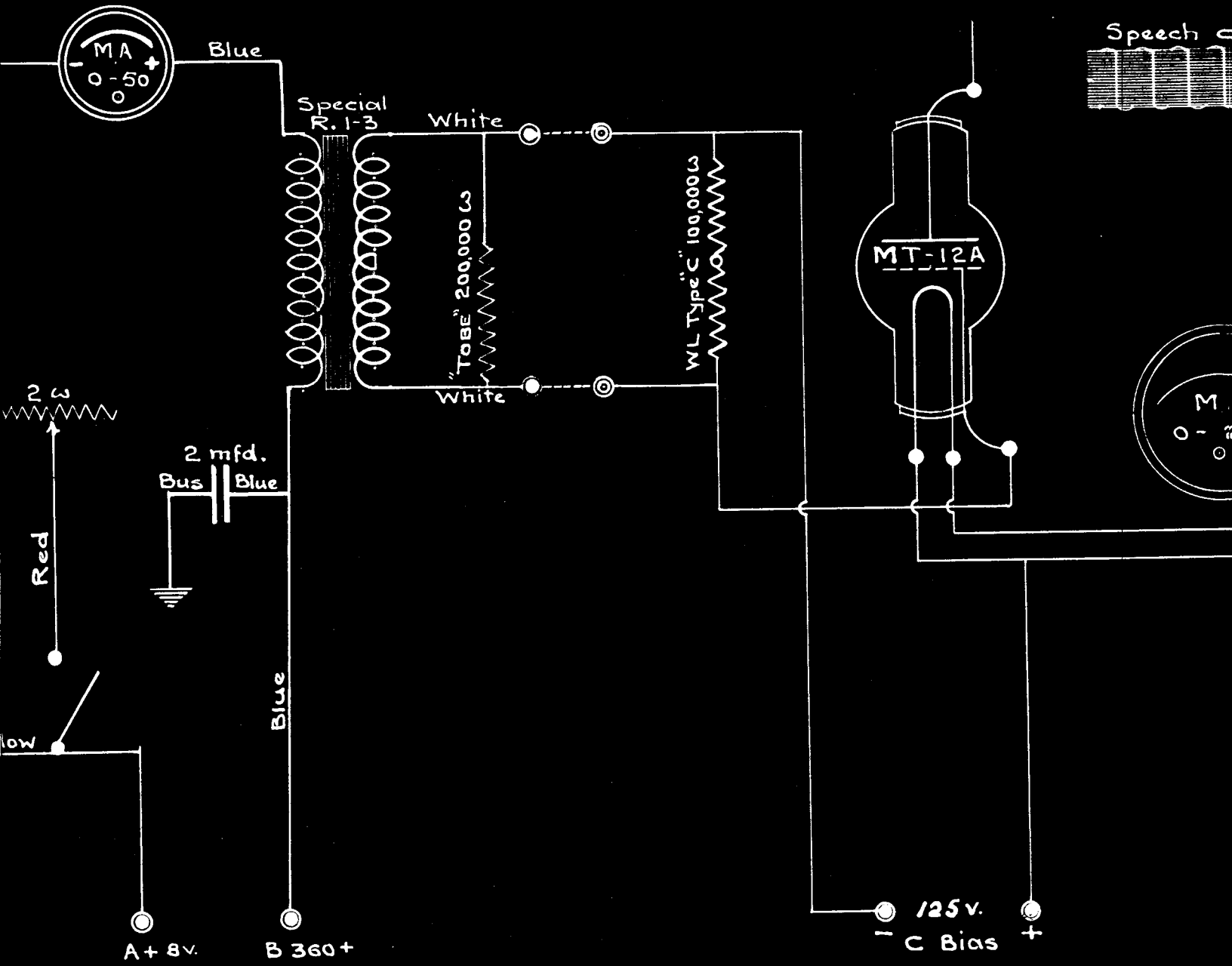
○ 1

DEPT OF MARINE - RADIO BRANCH  
Radiotelephone Adapter for  
Marconi Marine Type  
500 WM3 Valve Transmitter

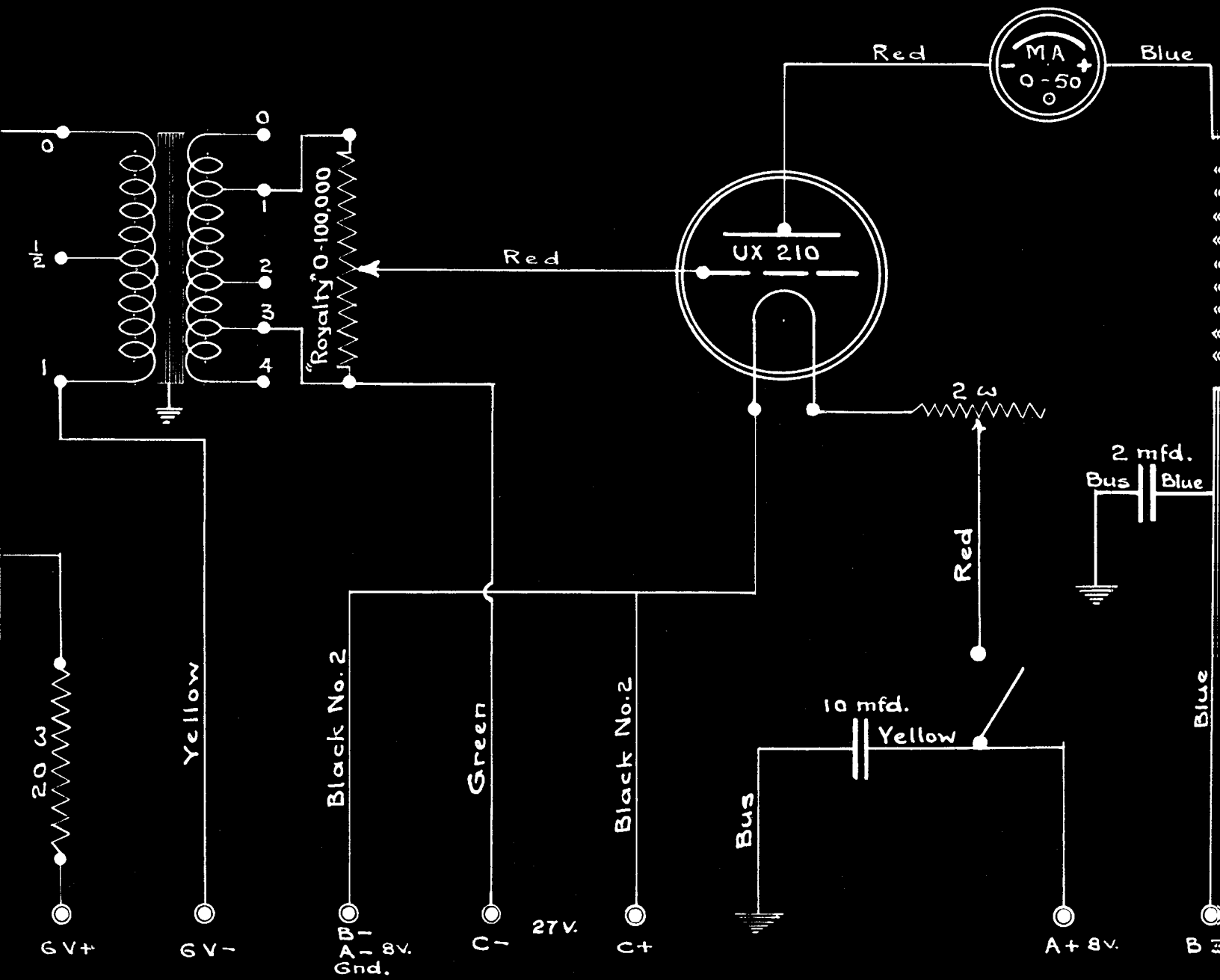
Checked *R.S.M.W.*  
Approved *C.W.D.*

OF RADIO INSPECTORS ONLY.

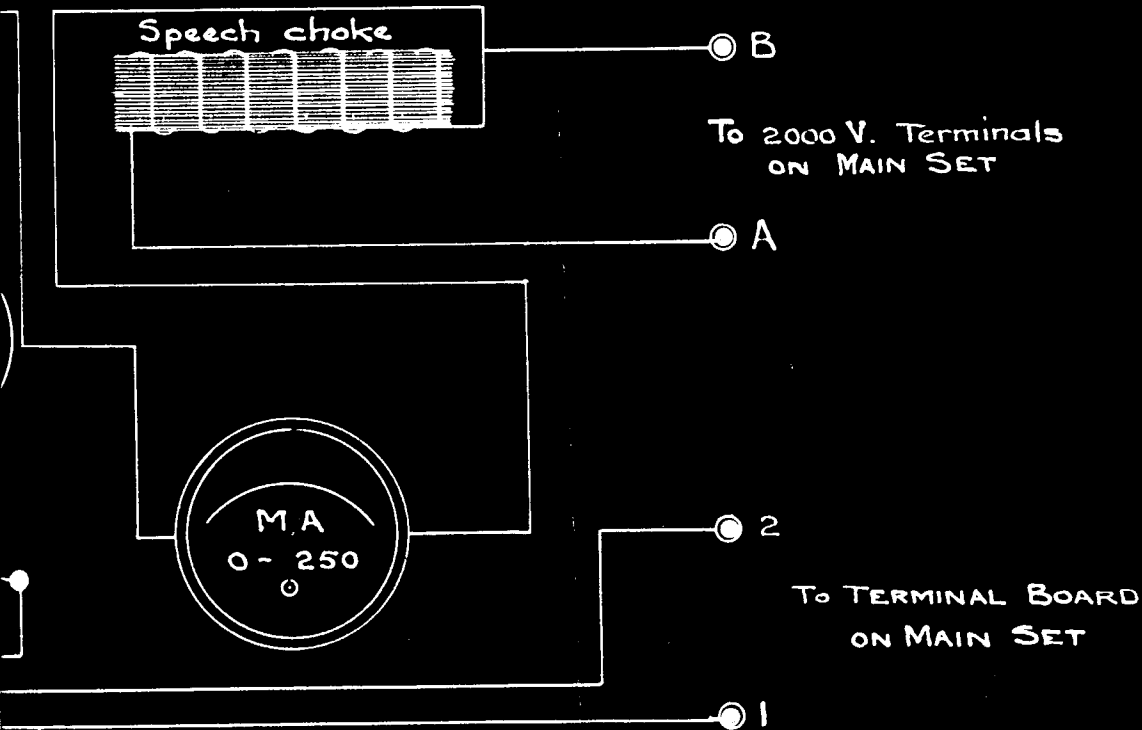
Modulator



### Power Amplifier



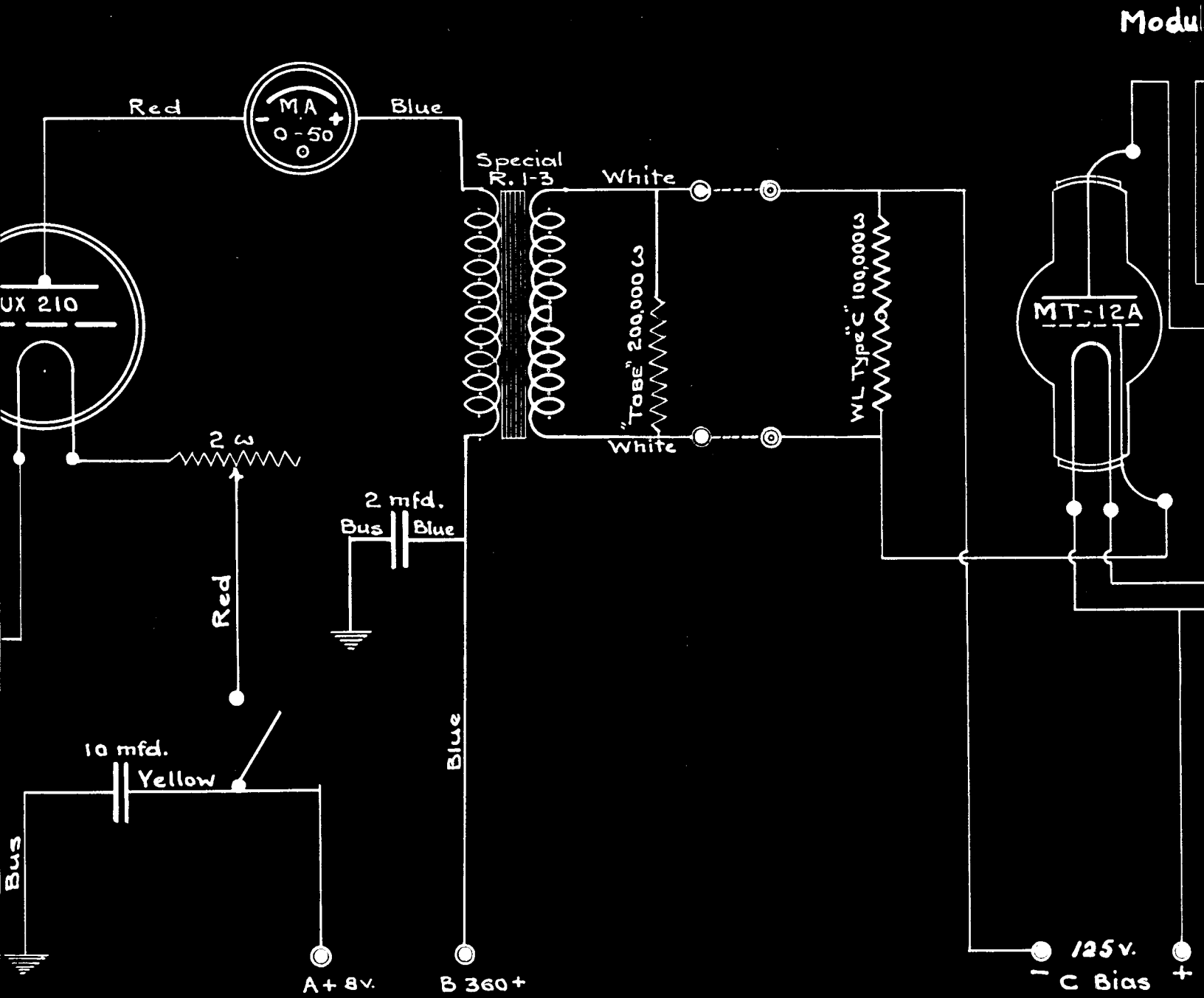
Modulator



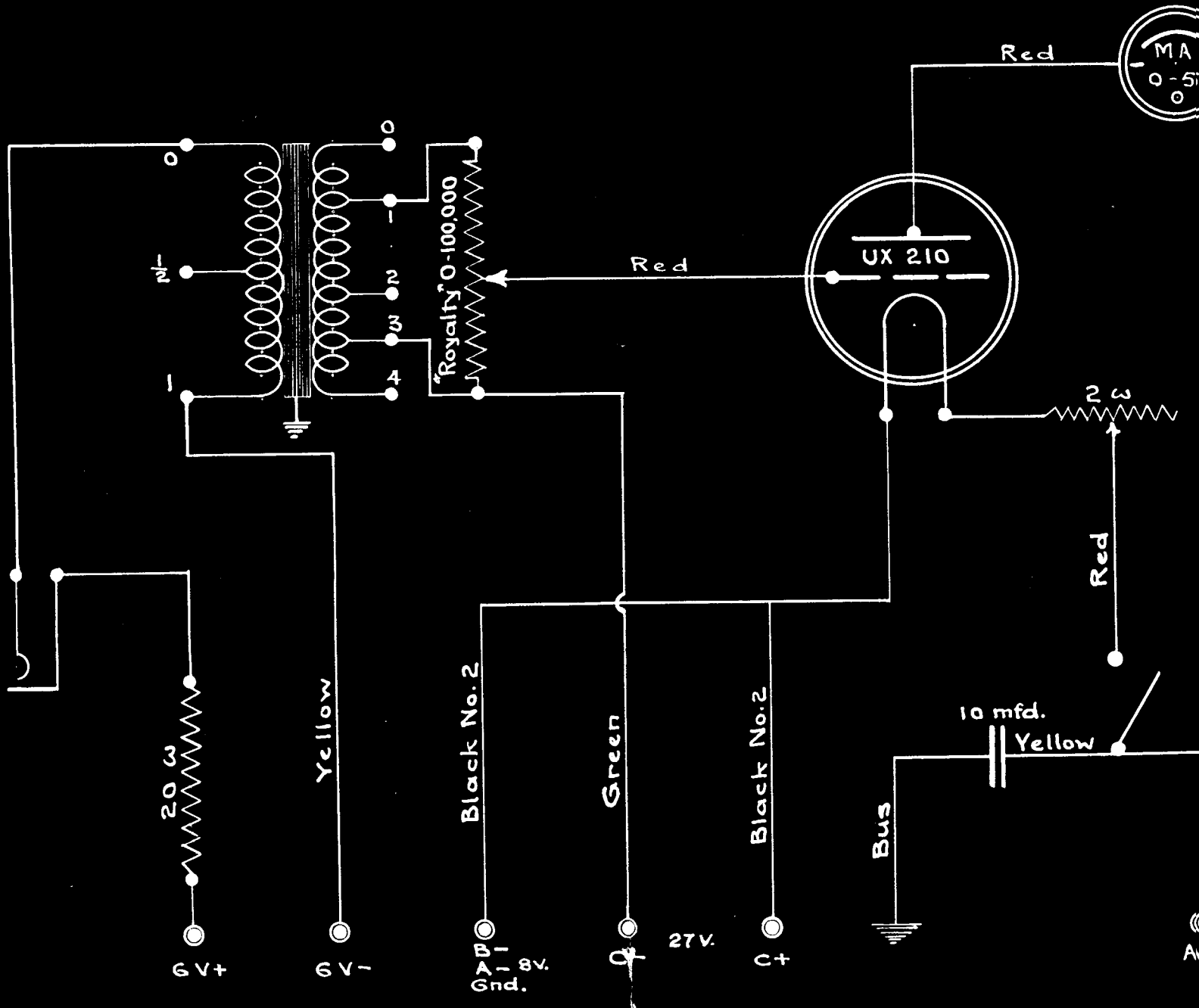
DEPT OF MARINE - RADIO BRANCH  
Radiotelephone Adapter for  
Marconi Marine Type  
500 WM3 Valve Transmitter

Checked *R.S.McW.*  
Approved *C.W.S.*

FOR USE OF RADIO INSPECTORS ONLY.



# Power Amplifier



20022

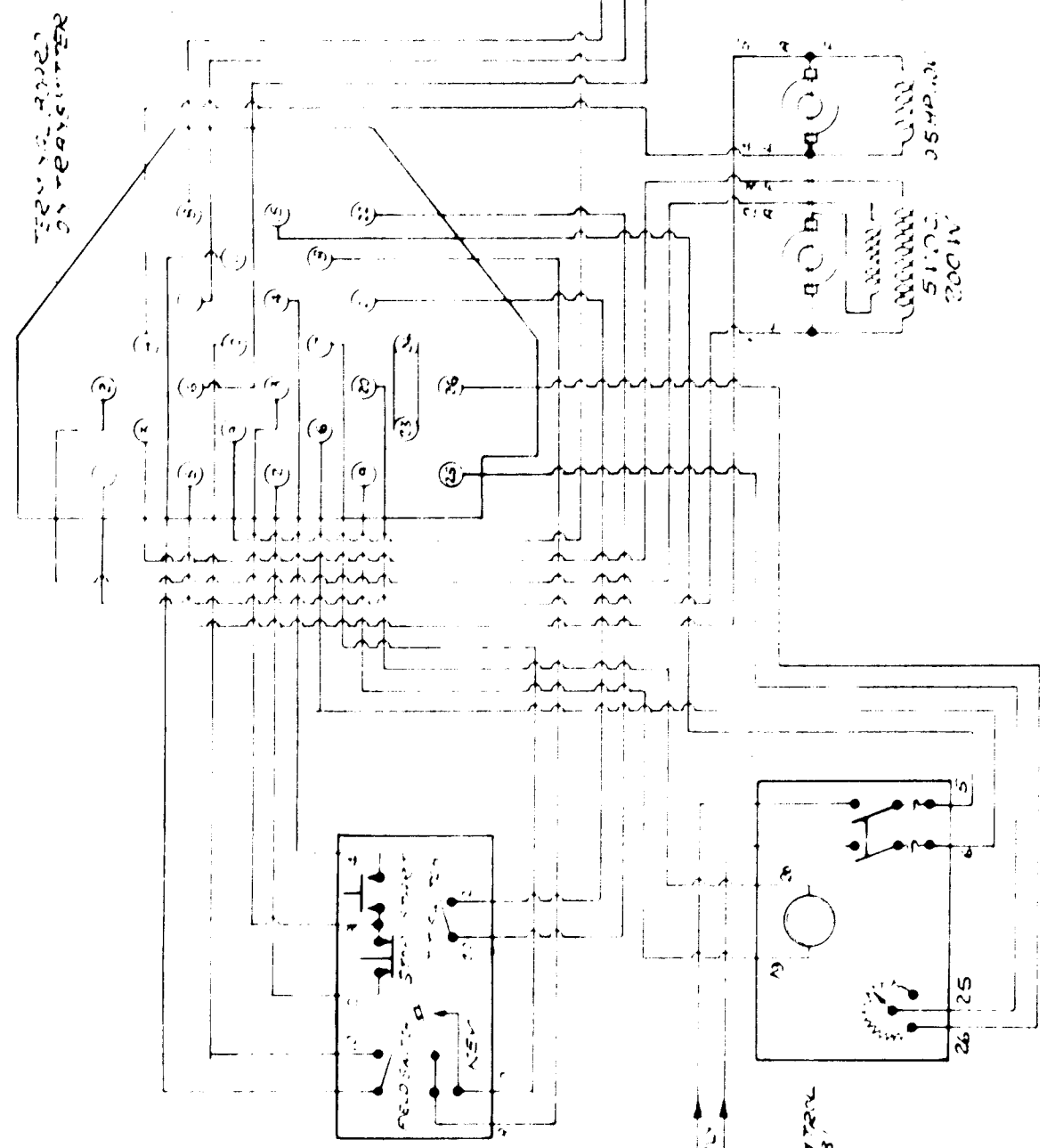
SYSTEM OF CONNECTIONS  
500 WATT  
TRANSFORMER  
STANDARD EXTERNAL

CANADIAN MARCONI COMPANY  
LIMITED

DRIVER CK TAC AP  
DATE MARCH 31 1927

WATER TIGHT ENCASEMENT  
GENERATOR AND MOTOR

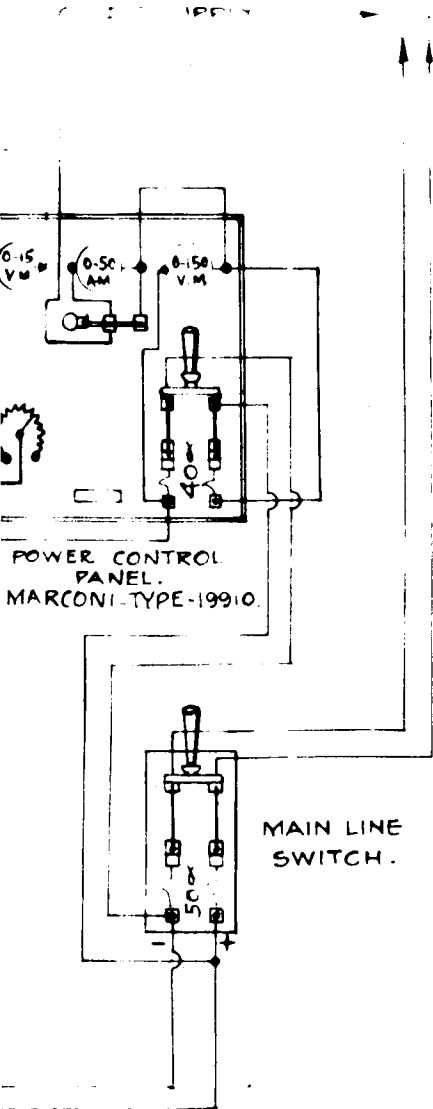
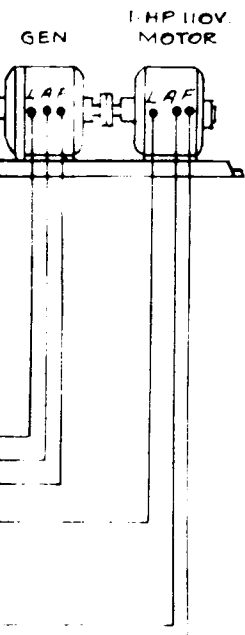
NO.	REC.	DATE



WATER TIGHT ENCASEMENT  
ON TRANSFORMER

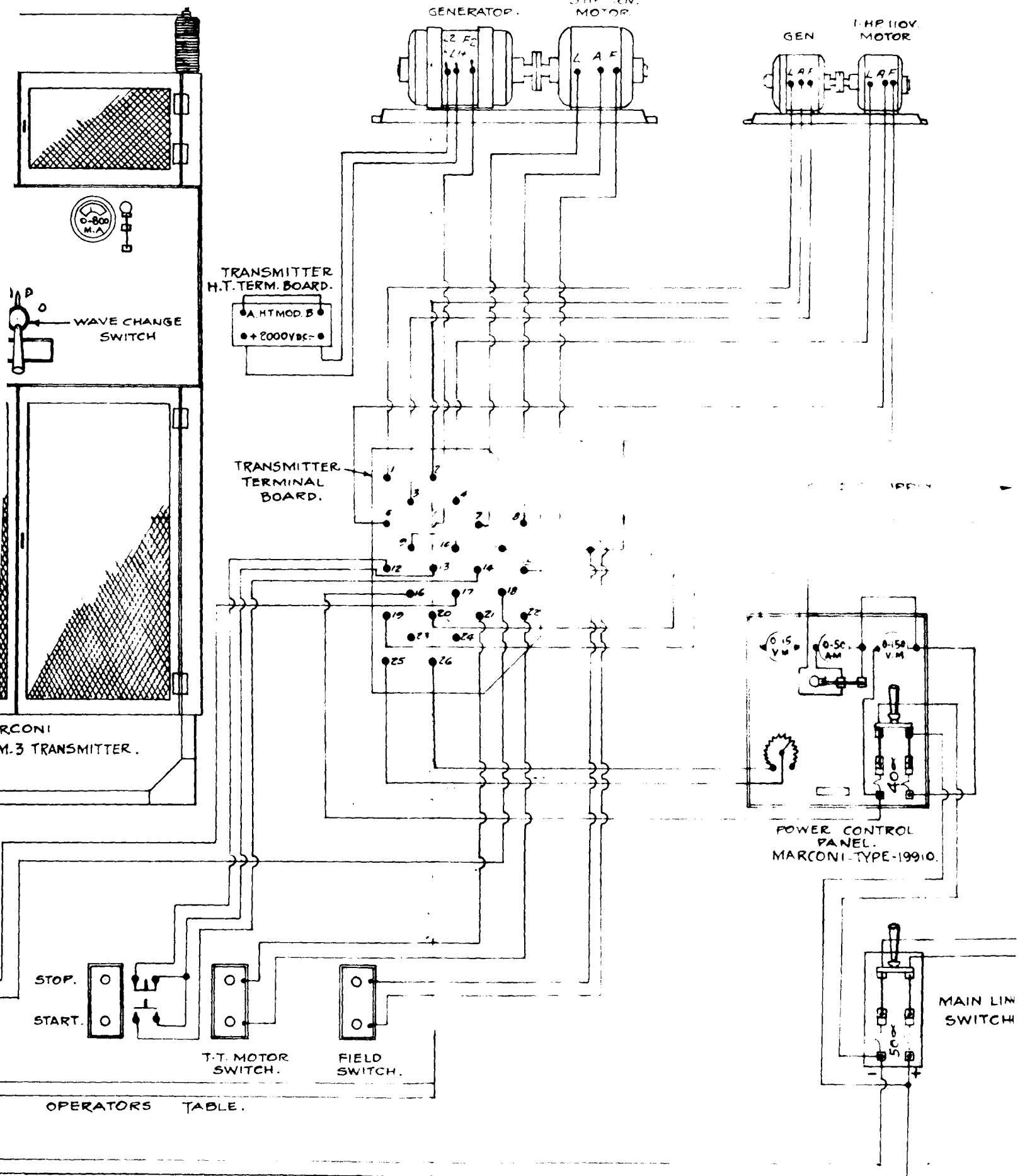
FOR SYSTEM  
493

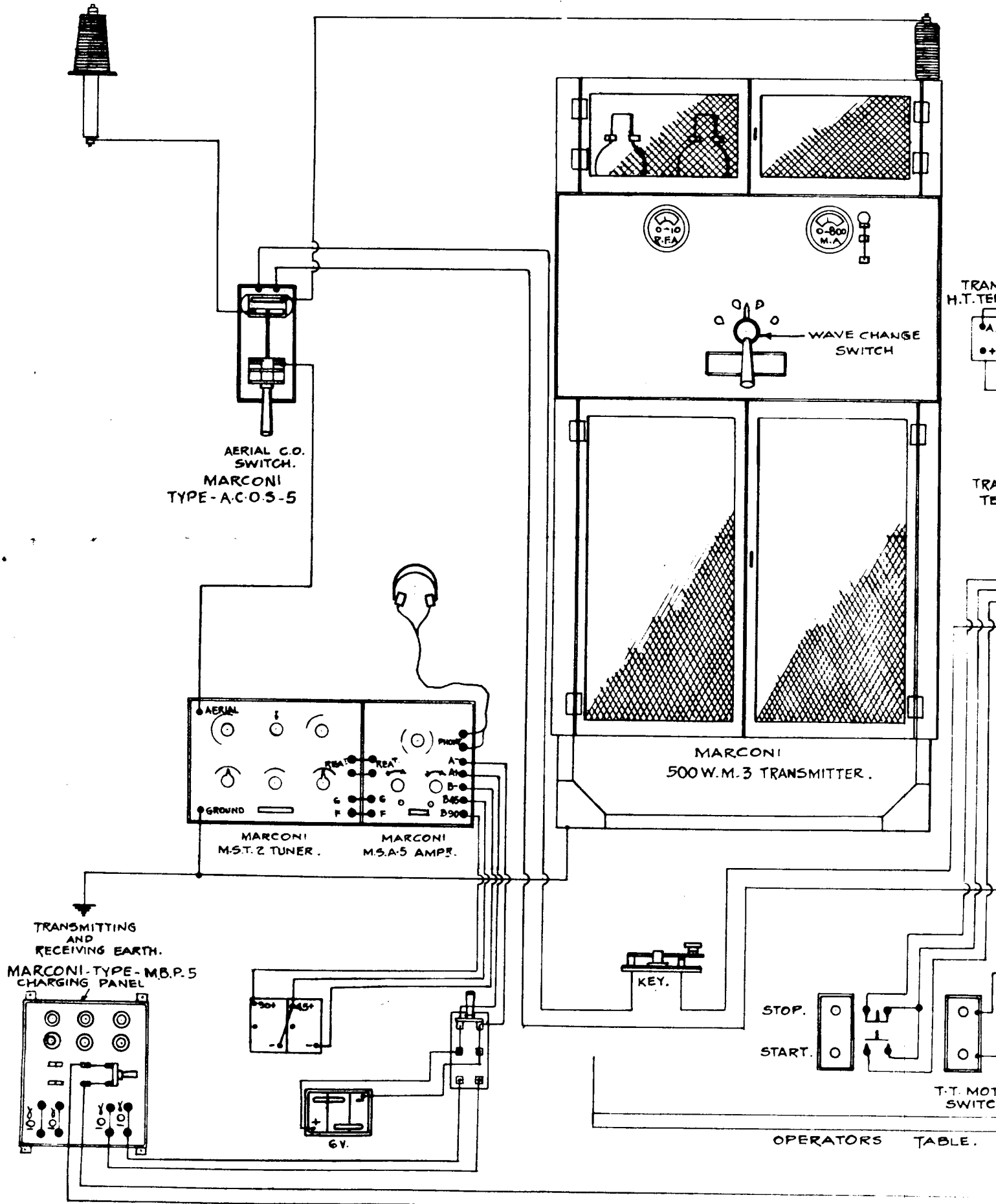




INSTRUCTION SHEET.  
500W. C.W. AND T. T. TRANSMITTER.

1597	DRAWN BY <i>Paul</i>
	TRACED BY <i>Paul</i>
	CHECKED BY <i>T. R.</i>
	APPROVED
	DATE - NOV-21-1928.





POWER AMPLIFIER & MODULATOR UNIT

TO 500 WATT WM 3 MARCONI VALVE TRANSMITTER.

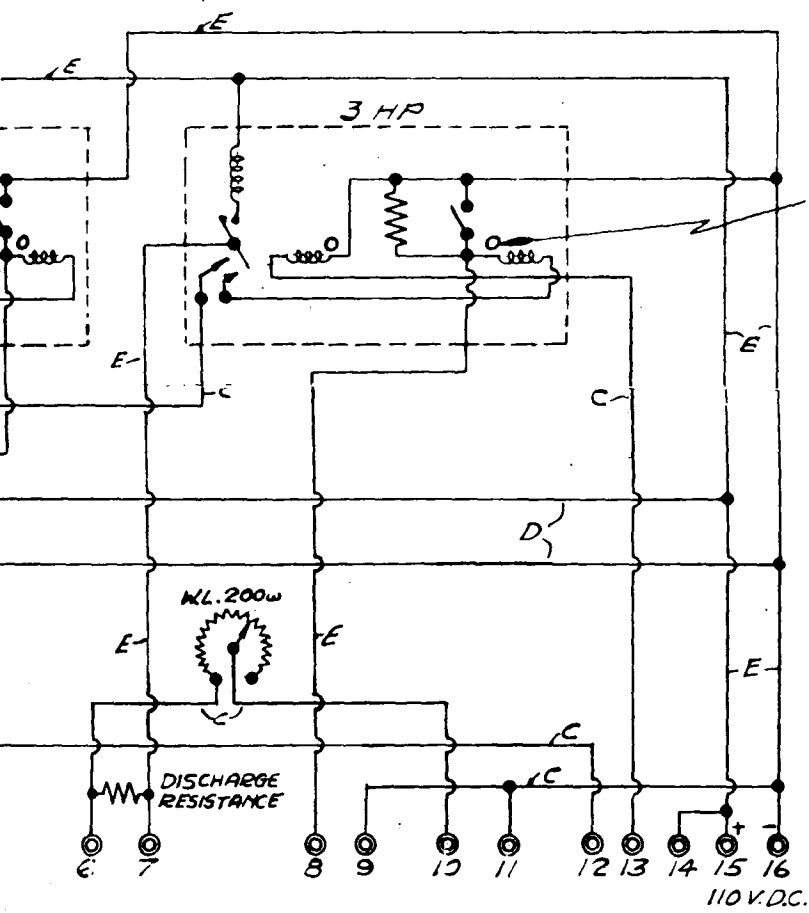
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In connecting up; the link between terminals "A" and "B" on the H.T. terminal board in the back of the transmitter should be removed and connections from the ~~power~~ made to them as shown in the diagram.

The power amplifier will require 8v for its filament and 6v for the hand microphone. The former will be a storage battery, and the latter a group of four dry cells. The bias battery is adjusted until plate current to the UX-210 valve is not more than 20 mils. The bias voltage will be in the neighbourhood of 27v.

The volume control on the power amplifier should be run up slowly, while speaking into the microphone, until there is evidence of modulation. The modulator feed meter will show this by a sudden motion of its needle, as speech is impressed on the system. Too great a deflection should be avoided, as it is an indication of distortion.

It is suggested that the modulator valve be inverted mounted in the clips supplied. The clips will be spaced away from a small board by means of the insulators supplied. In assembling the equipment, care should be taken to avoid accidental contact with the modulator feed meter, as it is at high potential.



NOTE: "D" OUTSIDE OF  
COILS ON STARTERS  
CONNECTED TO  
RESISTORS

# 500 WATT SHIP TRANSMITTER

110 VOLTS D.C.

APPROVED BY

DRAWN BY J.M.C.

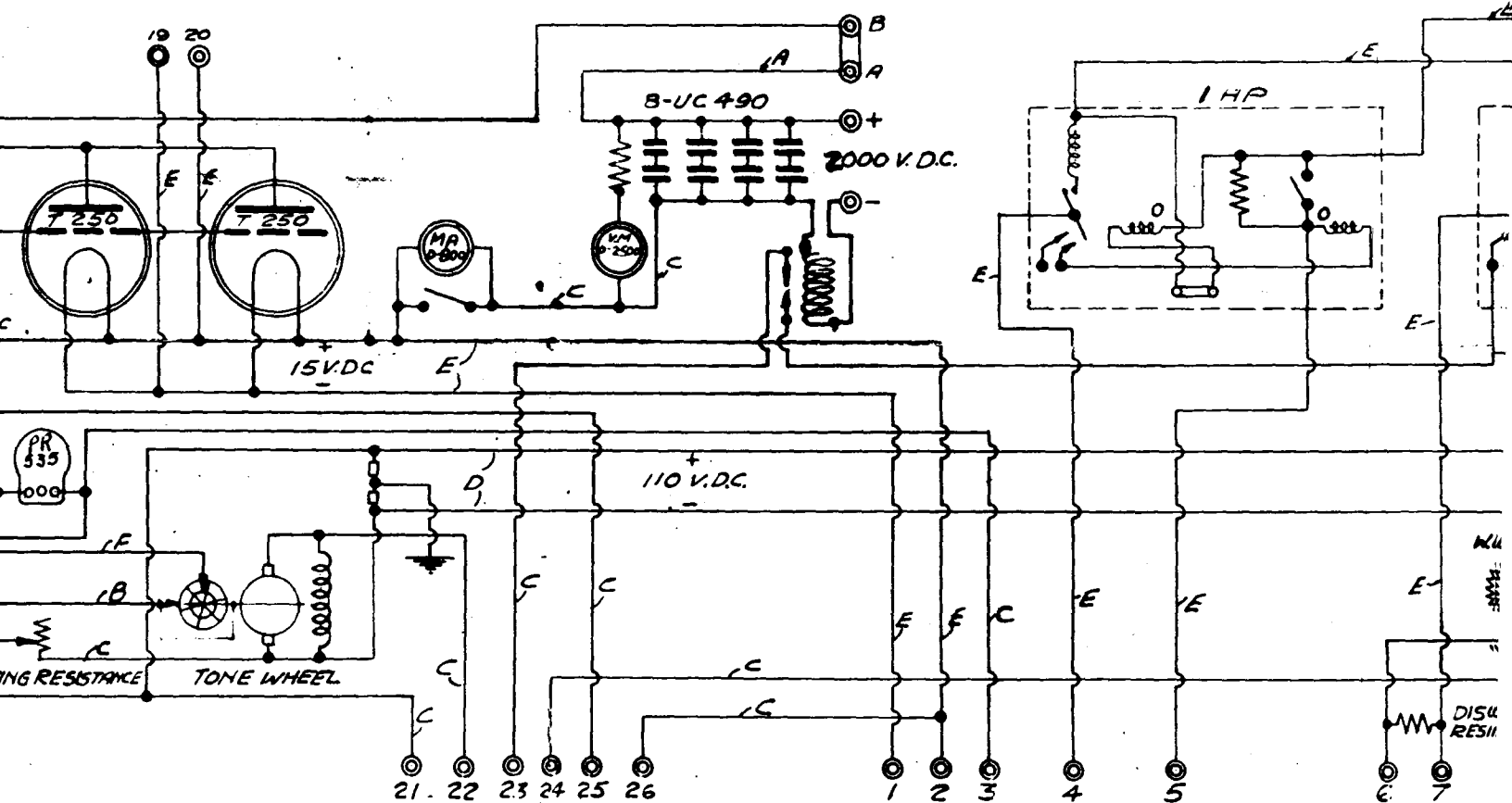
TRACED BY B.C.P.

CHECKED BY J.M.S.

THE MARCONI WIRELESS TELEGRAPH CO.  
OF CANADA, LIMITED

500 WATT FILAMENT  
MOTOR-GENERATOR

- A: No 8. BARE COPPER WIRE, TINNED.
  - B: No 6. S.B.-P.C. SOLID WIRE
  - C: No 14
  - D: No 12
  - E: No 8
  - F: IGNITION CABLE - M.E. TYPE BLS 37/30
- USE TRANSMITTING FLEX FOR VARIABLE TAPS.



2000

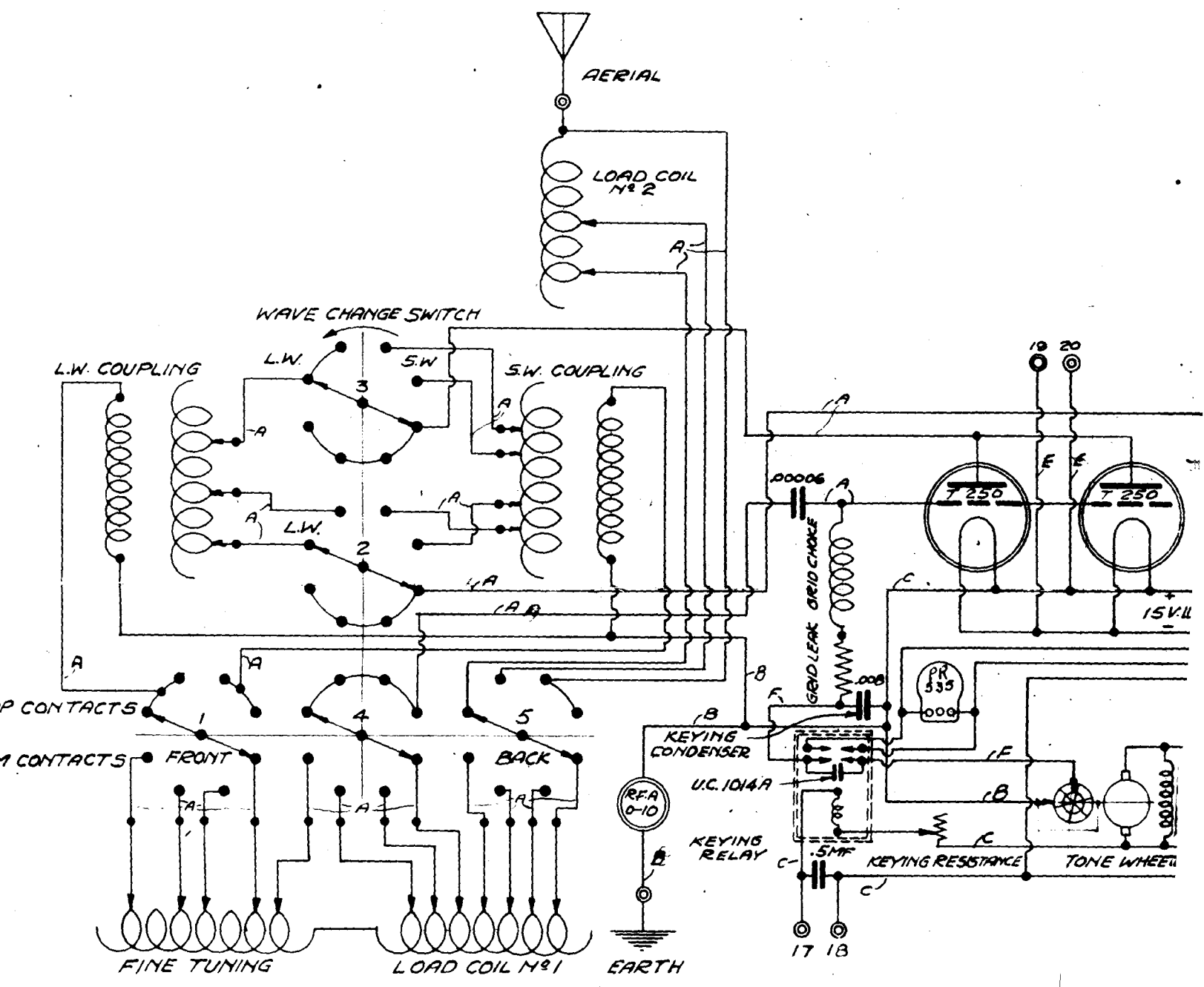
# DIAGRAM OF CONNECTIONS 500 WATT SPARK TRANSMITTER 110 VOLTS D.C.

USED ON \_\_\_\_\_  
REQ. \_\_\_\_\_  
D.W.G. \_\_\_\_\_

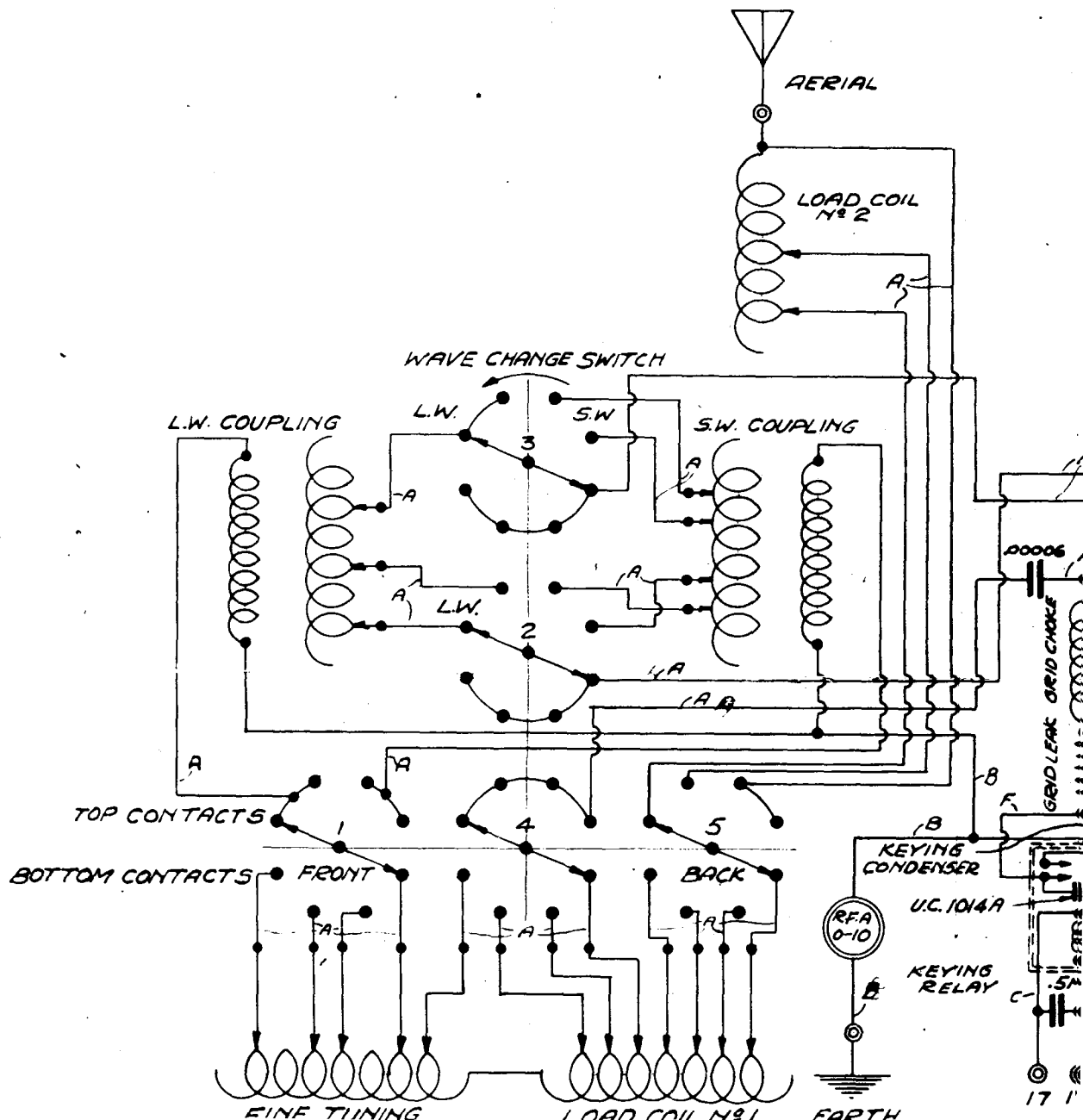
APPROVED BY \_\_\_\_\_  
DRAWN \_\_\_\_\_  
TRACED \_\_\_\_\_  
CHECKED \_\_\_\_\_

THE MARCONI WIRELESS TELEGRAPH COMPANY  
OF CANADA, LIMITED

500 WATT FILAMENT  
MOTOR-GENERATOR

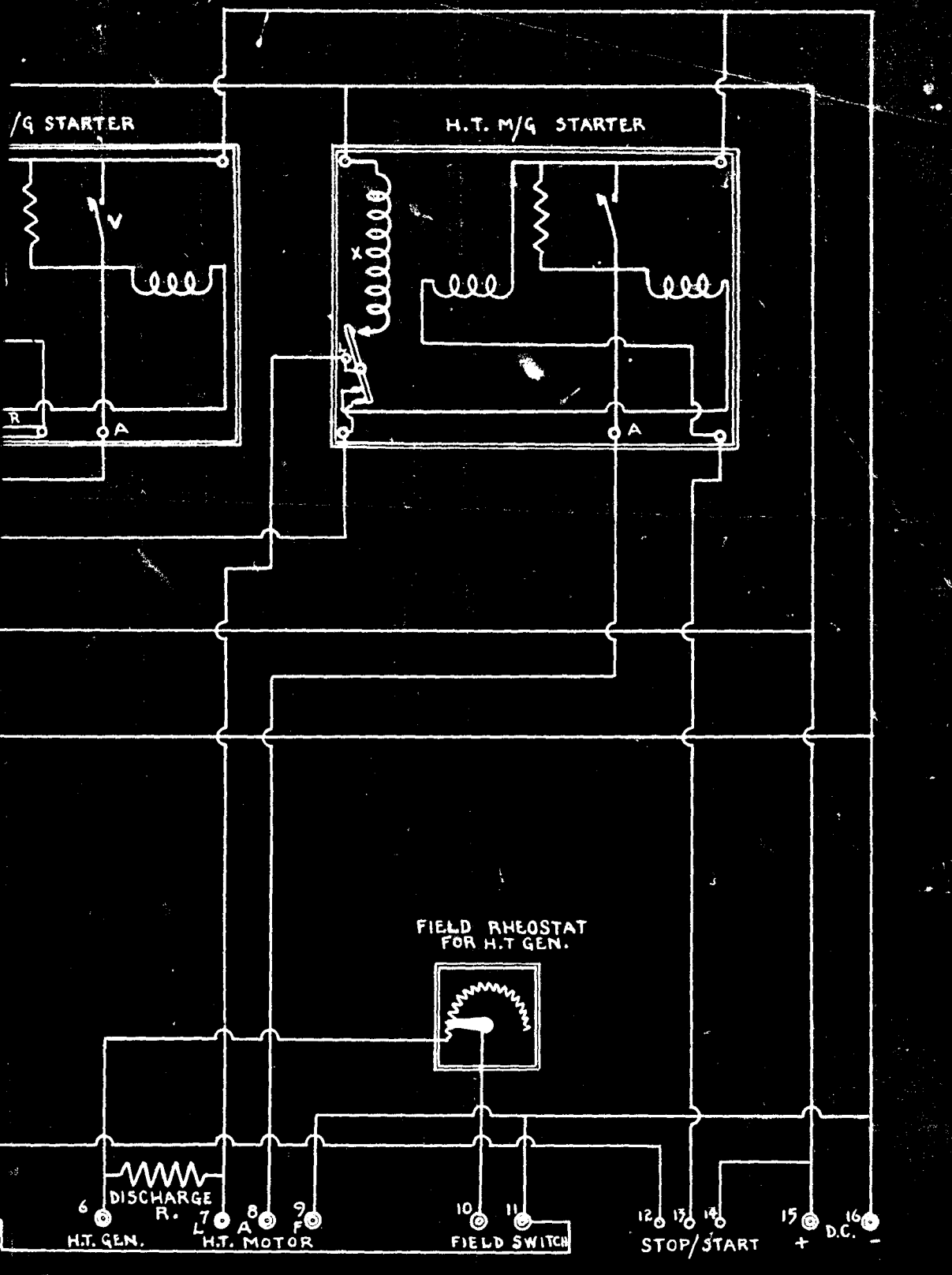


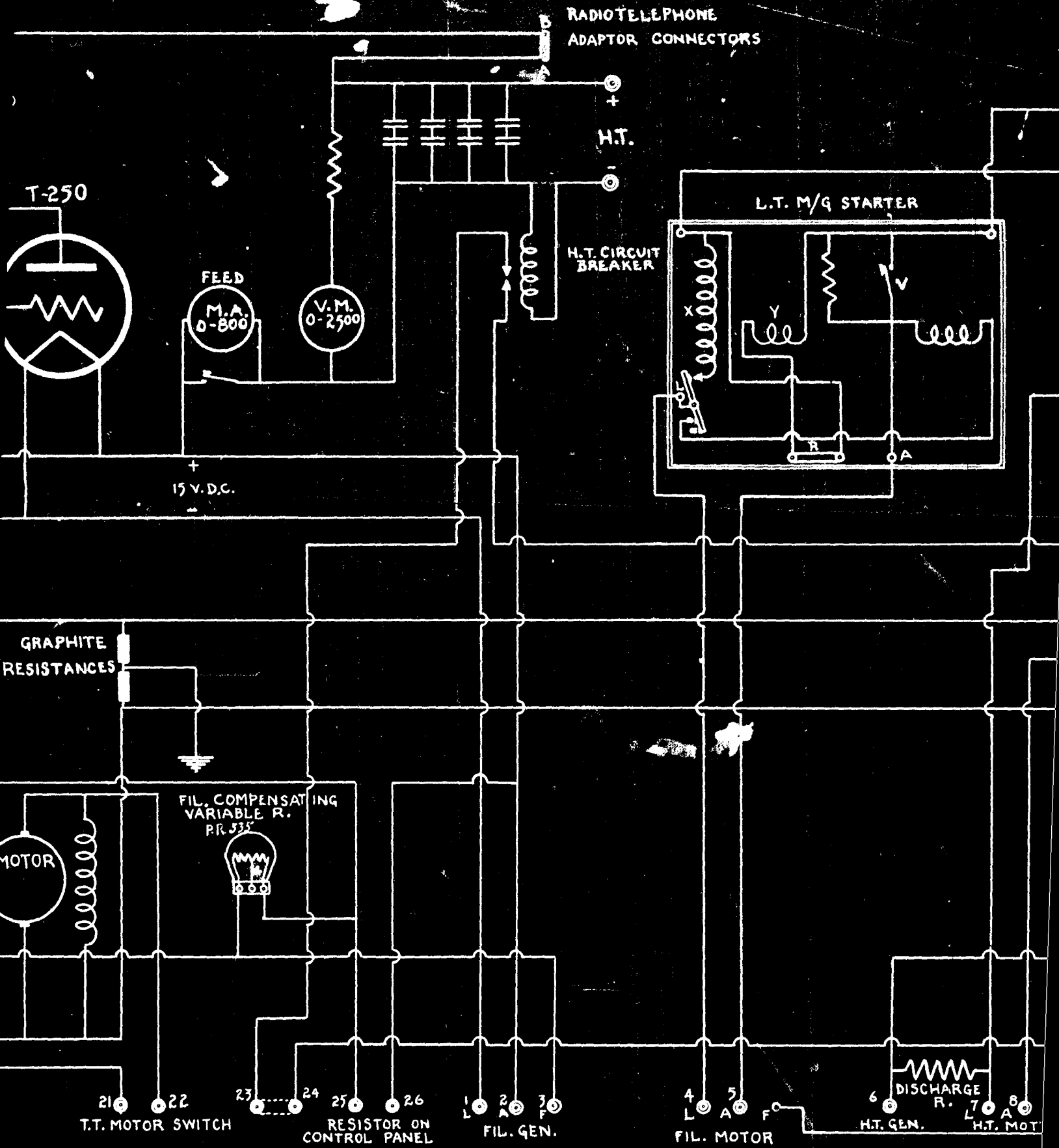
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 ISSUE-3- Oct. - '28.  
 ISSUE-4- Oct-4 - 28  
 ISSUE-5- JUNE-10-1929

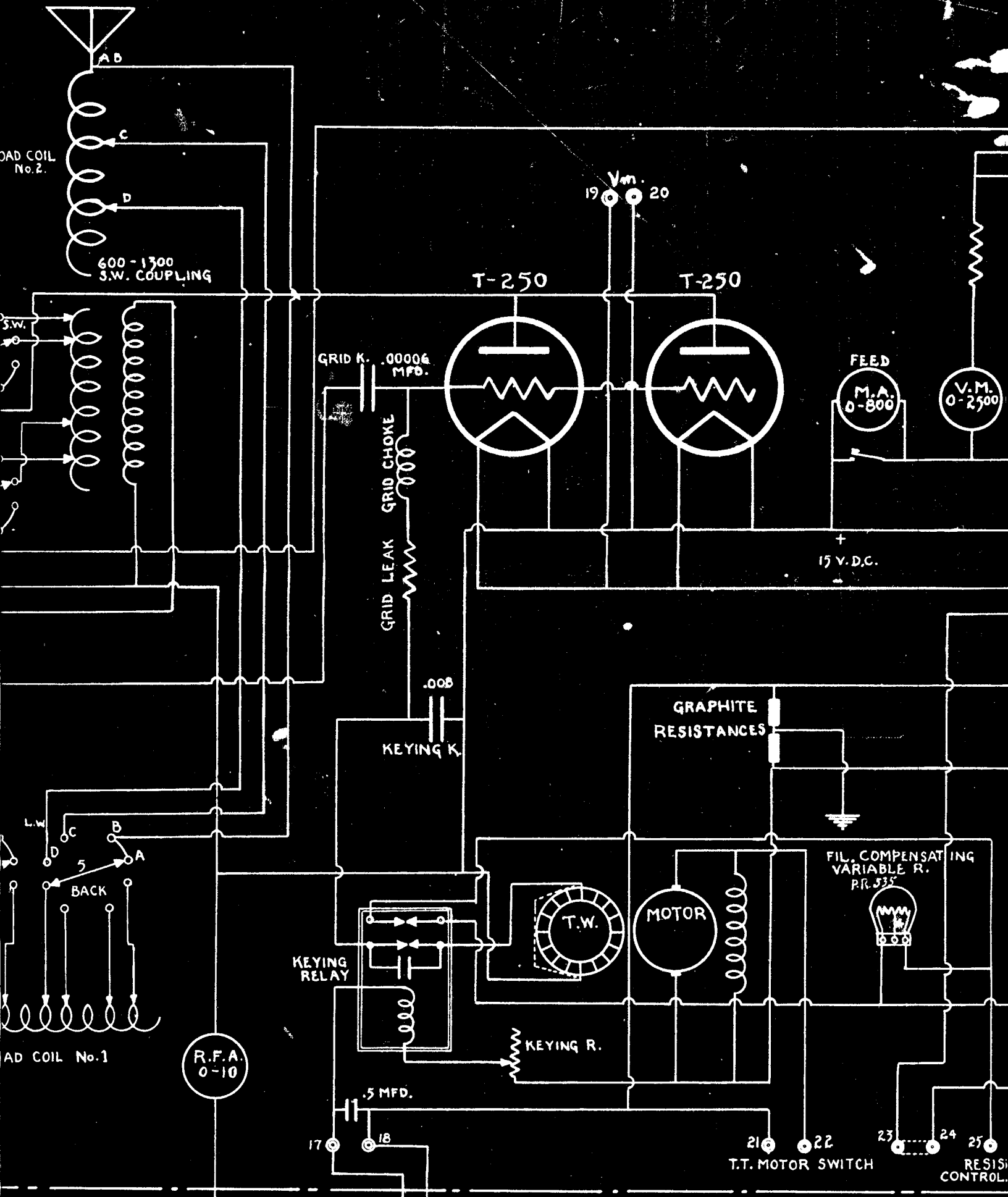


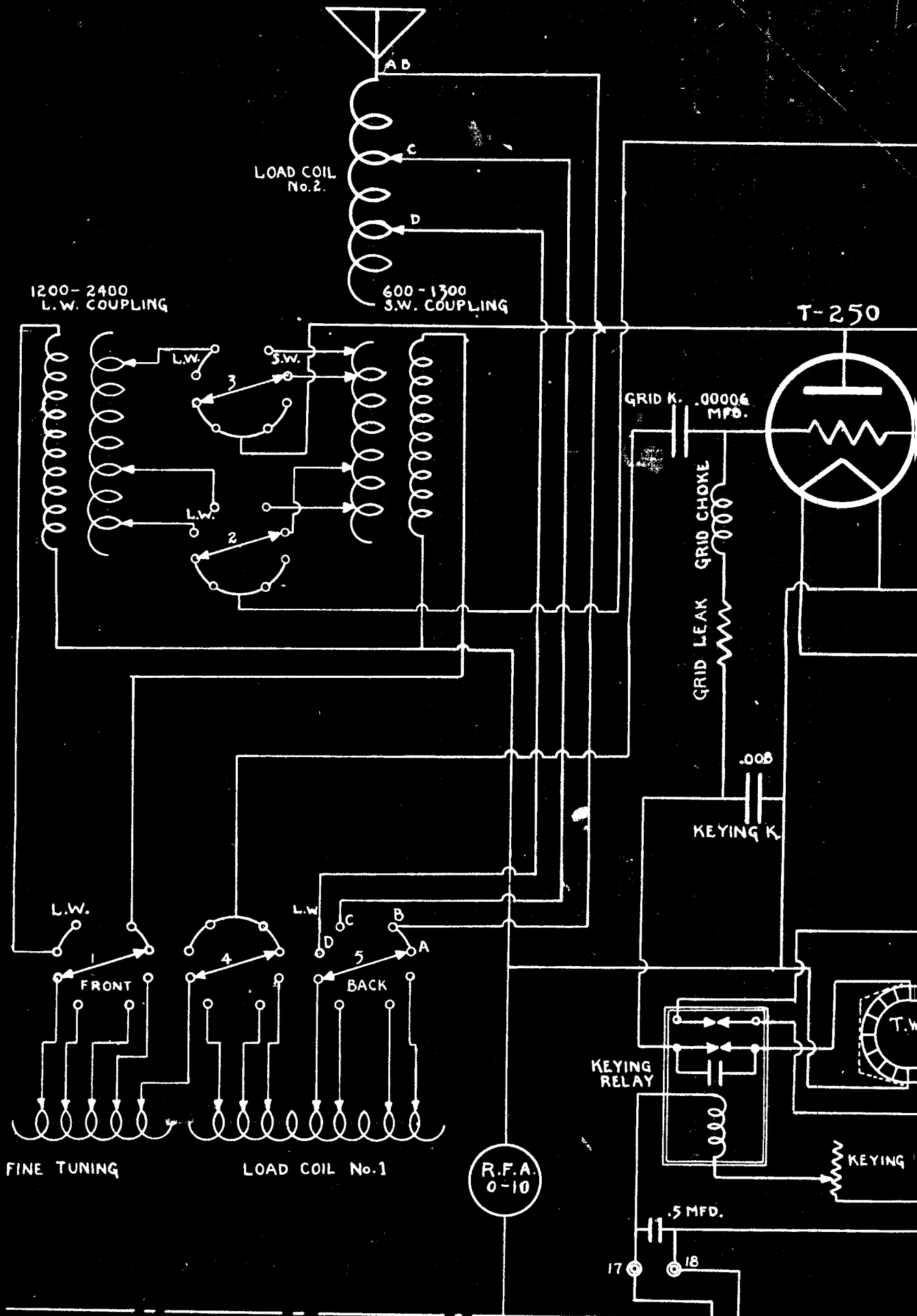


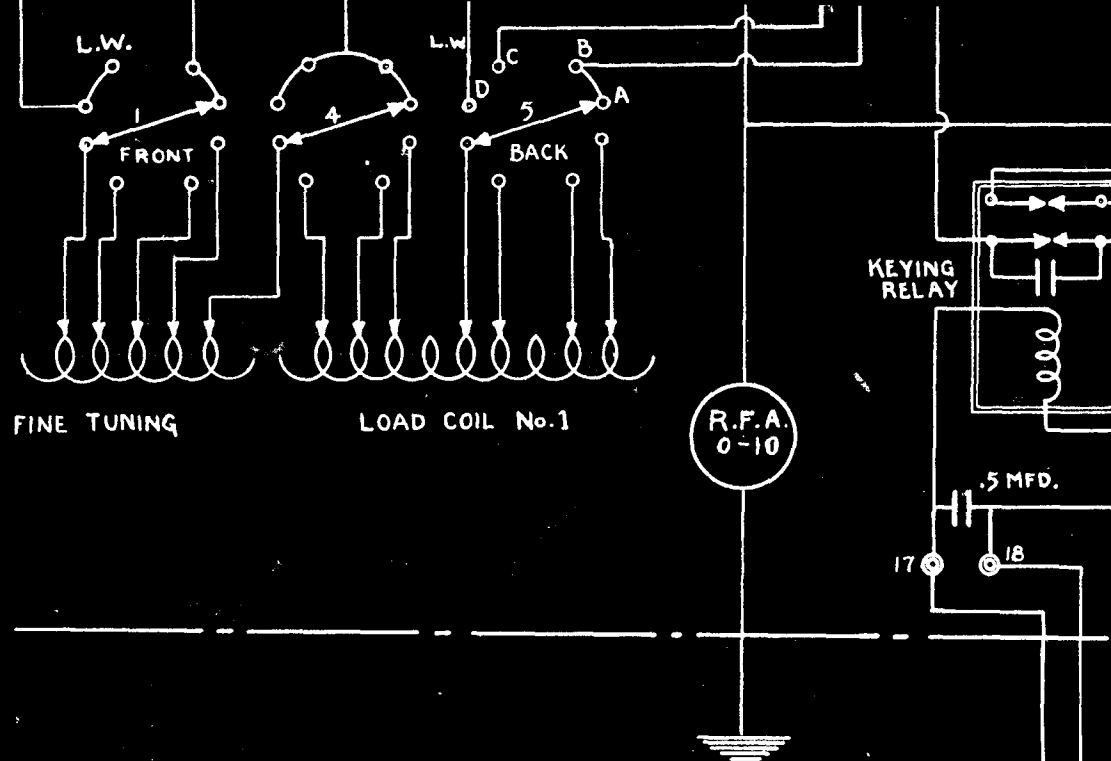

RADIO DEPARTMENT  
 ST. JOHN VOCATIONAL SCHOOL  
 DRAWN BY A.S.R.R. TRACED BY C.J.  
 FEB. 15/40



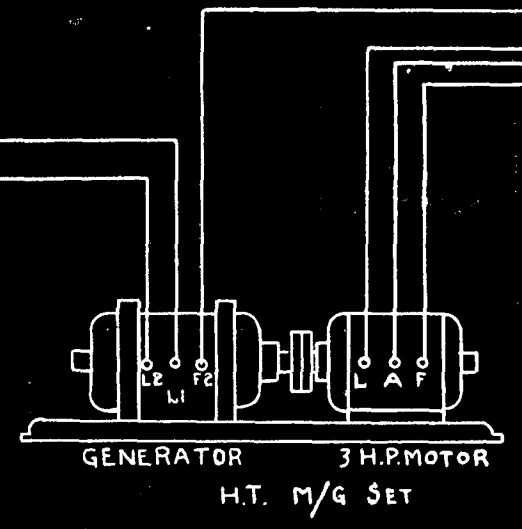
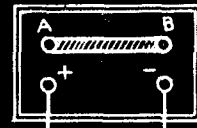




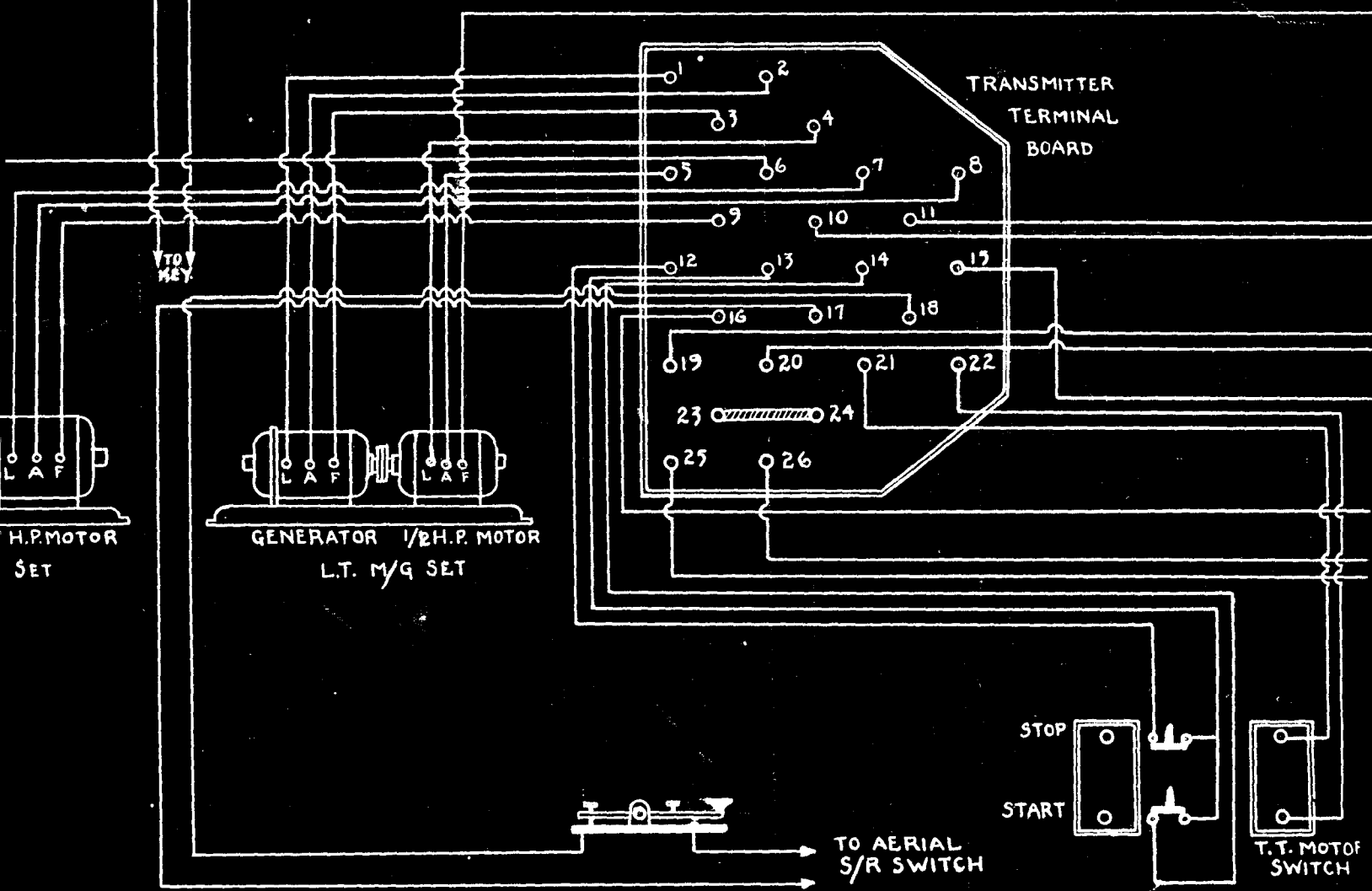
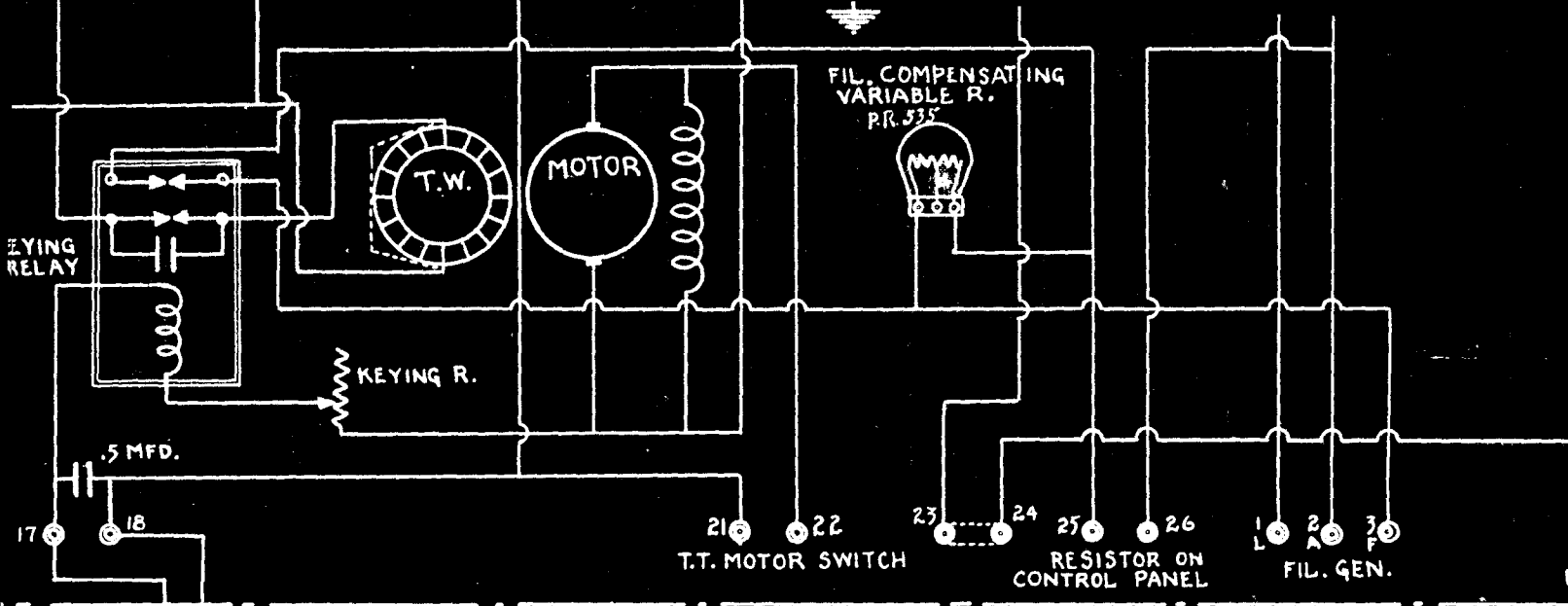




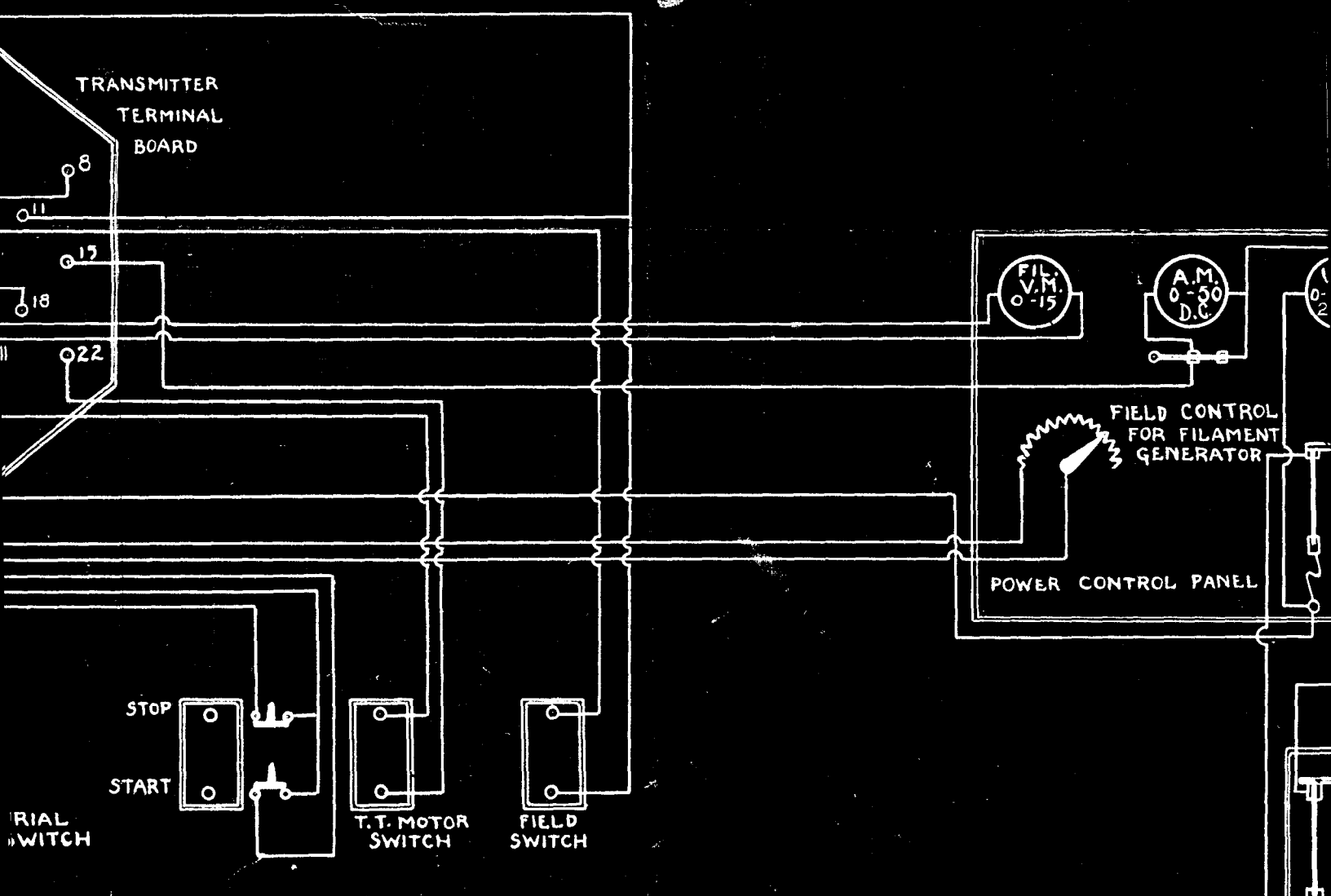
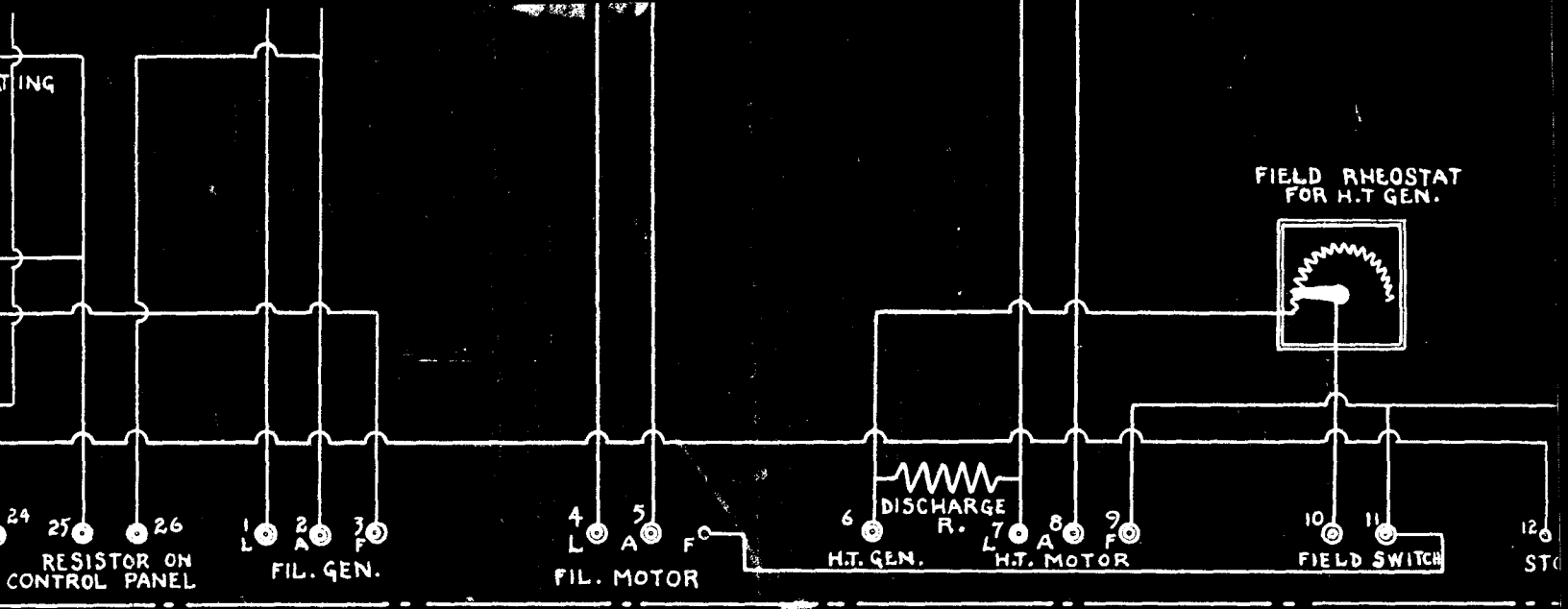
TRANSMITTER  
TERMINAL BOARD



# 500 WATT CW/ICW TRANSMITTER



OPERATORS TABLE



OPERATORS TABLE

TO CHARGING PANEL

