

AMATEUR RADIO TRANSMITTERS

MODEL A - 54

and

MODEL A - 54H

DESCRIPTION

TECHNICAL SPECIFICATIONS

OPERATING INSTRUCTIONS

SERVICE INFORMATION

Manufactured by

MULTI-PRODUCTS CO. INC.

559 E. TEN MILE ROAD

HAZEL PARK, MICHIGAN

MODIFICATIONS TO ELMAC TRANSMITTER A54H - Serial #2145.

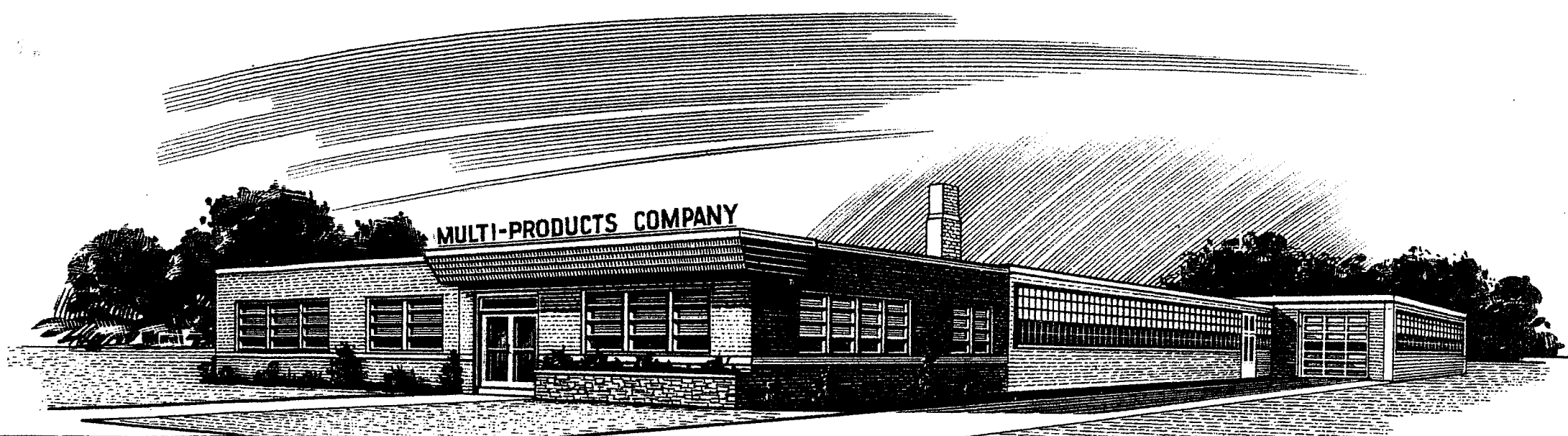
FILAMENTS - To modify to 12 volt operation:

- 2 - 6L6GA - Placed in series. White supply wire removed from rear tube along with jumper to second tube, connection retained at joint of two wires. Ground wire removed from second tube and connected to open filament connection on rear tube.
- 1 - 12AU7 - Two sections of filament originally in parallel, changed to series operation.
- 2 - 6AU6 - Speech amplifier and Vfo tubes placed in series. Supply wire to Vfo tube removed from "Power" switch, extended and fed to filament connection on speech amplifier which was originally grounded.
- 2 - 6AG5 - Placed in series.
- 1 - 807)
- 1 - 6AQ5) Placed in series. 15 ohm 10 watt resistor placed from ground to "hot" side of 6AQ5 filament which is fed from 807 terminal originally grounded.

MICROPHONE INPUT - To modify for Carbon Mike:

Speech amplifier 6AU6 changed to "triode" operation by tying originally grounded "suppressor" grid to plate and also tying "screen" grid to plate. Screen resistor left floating and also screen condenser. 100,000 ohm 1 watt resistor placed in parallel with original plate resistor. Cathode 10 mfd. condenser disconnected and left floating, lead is connected from cathode to mike terminal on mike jack, which places the carbon mike in series with cathode and ground with inconsequential 2500 ohm resistor in parallel with mike. Control grid potentiometer turned to ground end. It should be very simple to re-modify this input for high-gain operation.

S. W. Duxbury VE3AIA.



MULTI-PRODUCTS COMPANY

21470 COOLIDGE HIGHWAY • OAK PARK 37, MICHIGAN

PHONES: JOrdan 6-2377-8-9

MULTI-ELMAC

RECEIVERS

TRANSMITTERS

GARAGE DOOR
REMOTE CONTROLS

AND SPECIAL
ELECTRONIC DEVICES

October 11, 1960

S. W. Duxbury
18 Kensington Avenue
Willowdale, Ontario
Canada

Dear Sir:

The only information I have for the A-54 Transmitter in covering the 15 meter band is to convert from 11 meters to 15 meters. Perhaps the enclosed information will be of help.

I imagine it would be possible to cover 11 meters with the 10 meter band, but it would certainly be awkward to retune every time, including various coils, when you wished to switch bands.

Best wishes for good DX.

Very truly yours,

MULTI-PRODUCTS COMPANY

Harry E. Stewart
Harry E. Stewart
Sales Engineer

HES:wd
encl.
10:7--1
rcd: 10:11

18 Kensington Avenue,
WILLOWDALE, Ontario, Canada.
October 5, 1960.

Multi-Products Co.
Hazel Park, Michigan.

Gentlemen:

I would like to modify my Elmac A 54H Amateur transmitter to cover the 15 metre band. Since the "open" switch position has been utilized to cover 40 metres, it would seem logical to convert the 11-metre position to 15.

Would the trimmers be of sufficient capacity to "move" up this far or would you suggest additional trimmers? Failing this, do you have available data on substituting other coils in this switch position? I could, of course, "cut and try", but it seems a shame to disrupt the 11-metre band, when, as you know, we are permitted to operate here in Canada, if I might destroy the ability to use 11 and still not make the grade on 15!!!

I would be very much obliged for any information and if there is a charge for data sheets, etc., please let me know. I have the ~~instruction~~ manual for my unit.

Yours Very truly,

S. W. Duxbury VE3AIA

A54 TRANSMITTER

TO ADD 15 METERS IN PLACE OF THE 11 METER BAND:

Remove the existing wire from the 11 meter position on the VFO section of the band switch and then jumper the 11 meter position to the 20 meter position.

Remove the small air wound coil from the 11 meter position on the 6AG5 plate section of the band switch and jumper the now cleared 11 meter position to the 20 meter position.

Remove the smaller air wound coil from the 11 meter position on the 6AQ5 plate section of the band switch.

Add a 15 meter slug-tuned driver coil to the 11 meter position on the 6AQ5 plate section of the band switch. This coil is wound on a $3/8$ " diameter slug-tuned coil form such as UTC no. LS-3. This coil is close wound with $11\frac{1}{2}$ turns of no. 30 single cotton enameled wire. This coil can be mounted by drilling a $\frac{1}{4}$ " diameter hole between the two 6AG5 tubes and the modulation transformer. Before drilling this hole be sure to move all resistors, condensers, and wires from where the hole is going to come through the chassis.

No change is necessary in the plate circuit of the 807 final amplifier as the 11 meter plate coil will cover the 15 meter band.

After all connections are made the VFO will have to be re-aligned as shown on another page.

Use the 20 meter band dial calibrations and multiply by $1\frac{1}{2}$ for 15 meters.

Example: $14.2 \times 1.5 = 21.3$ MC

Set the VFO dial at 14.15 MC and peak the 15 meter driver coil for maximum grid drive.

If both 40 and 15 meter bands are added at the same time, do not re-align the VFO until all connections for both bands are completed.

ADDING 40 METERS TO THE A-54

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Jumper the "X" position to the 75 meter position on the VFO section of the band switch.

Jumper the "X" position to the 75 meter position on the 6AQ5 plate section of the band switch.

Add a 40 meter slug-tuned driver coil to the "X" position on the 6AQ5 plate section of the band switch. This coil is wound on a 3/8" diameter coil form such as CTC # LS-3. It is PI wound with 45 turns of #30 single cotton enameled wire. This coil should be tuned to 7.15 MC with a grid dip meter after it is soldered into the circuit and the band switch set on the "X" position. It may be necessary to remove a few turns to make it resonate at this frequency. There is an unused hole in the chassis for mounting this coil.

Jumper the "X" position to the 75 meter position on the final plate section of the band switch.

Tap the 75 meter coil 17 turns down from the plate end and connect this tap to the "X" position on the antenna section of the band switch.

After all connections are made the VFO will probably be slightly off frequency and will have to be realigned following suggestions on another sheet of instructions.

The 75 meter band calibrations on the VFO dial are used and multiplied by 2 for 40 meters. A new dial could be made and calibrated.

A-54 TRANSMITTER

VFO RECALIBRATION:

Equipment required:

- 1- Calibrated signal generator or frequency meter covering 3.0 to 30.0 MC.
- 2- Receiver capable of tuning the same frequency range as above.
- 3- Small screw driver.

Procedure:

- 1- Refer to the pictorial view of the transmitter for the location of all alignment and calibration adjustment screws.
- 2- Proceed with the calibration in the order as set up in the table below.

BAND SWITCH POSITION	SIGNAL GENERATOR AND RECEIVER FREQUENCY SETTING	ZERO BEAT WITH ADJUSTING SCREW #
75	3.5KC & 4.0 KC	3 & 5 °
20	No adjustment required	
10	28, 28.5, 29., 29.5 MC	11 & 2 °°
11	27.0 MC	1

- ° Both #3 and #5 must be adjusted until both ends of the VFO dial are correct.
- °° Both #11 and #2 must be adjusted until the four check points of the ten meter dial calibrations are correct.

MULTIPLIER AND DRIVER ALIGNMENT:

Follow pictorial view for location of adjusting screws.

BAND SWITCH POSITION	VFO FREQUENCY SETTING	ADJUST FOR MAX. P.A. GRID CURRENT WITH ADJUSTMENT SCREW #-
75	3.9MC	6
20	14.0 MC 15.0 Appx.	7 8
10	28.5 MC 29.7 MC 29.3 MC	9 10 4
11	No adjustment necessary	

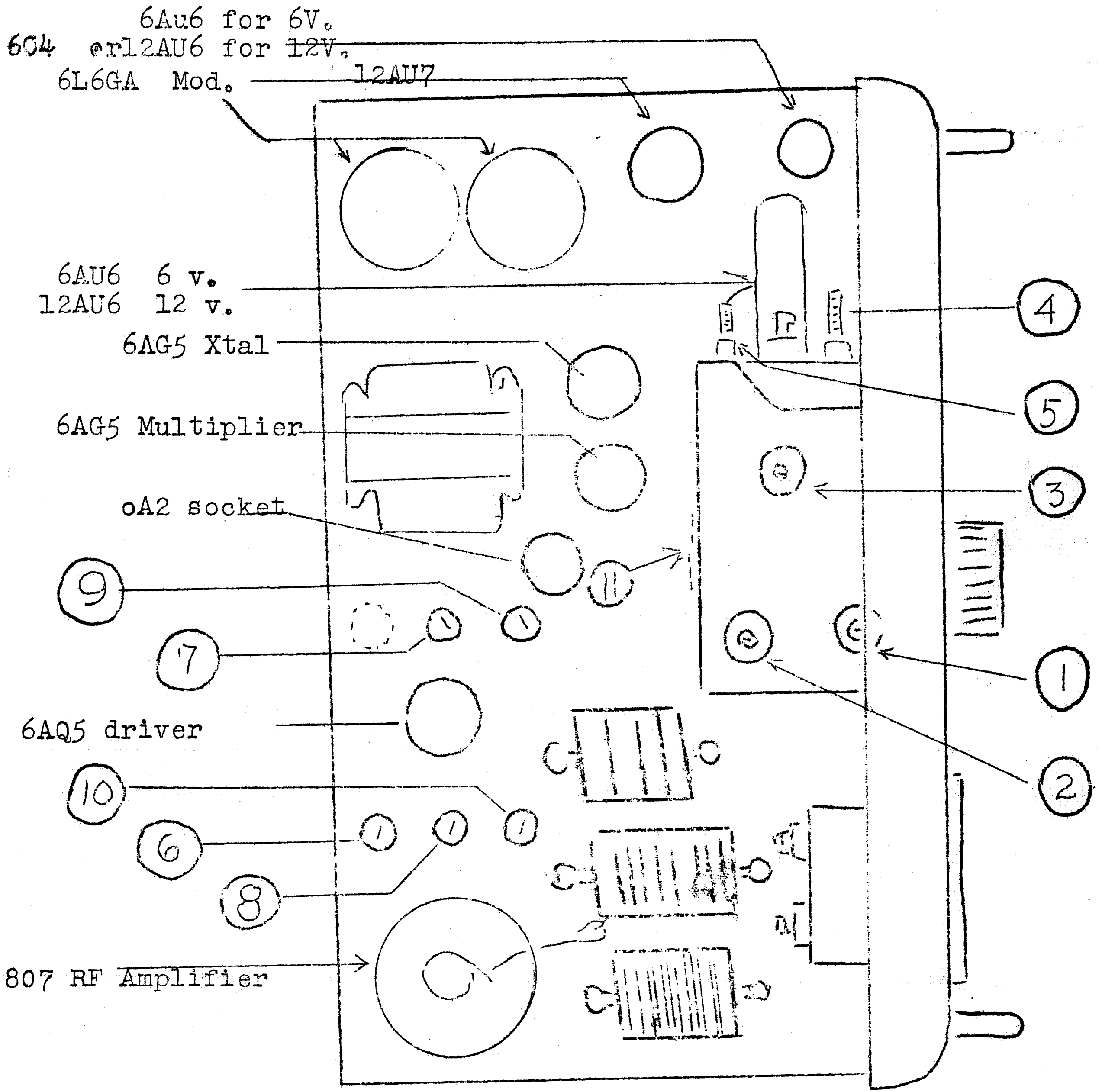


Diagram showing physical layout of tubes and other component parts on the chassis of the Model A54 and A54H transmitter.

The extreme top right hand tube is a 6C4 in the A54 and is either a 6AU6 (6 volt operation) or 12au6 (12 V. operation) for the A54H Transmitter.

The circled numbers above indicate the location of all calibration and alignment screws.

- DESCRIPTION -

The MODEL A - 54 and MODEL A- 54H

transmitters are multi-band amateur transmitters which provide every convenience proven desirable for mobile or fixed station operation. The two models are identical except that the Model A-54 is designed for use with a carbon microphone, while the Model A-54H incorporates a high gain speech amplifier to enable operation with a crystal or dynamic microphone.

Among the many features of the transmitter, the following are included:

- *Negative peak limiting to prevent overmodulation.
- *50 Watts input, phone or CW.
- *Built-in VFO or Crystal frequency control.
- *PI - NETWORK to match wide variety of antennas.
- *100% Plate modulation.
- *Mobile or fixed station operation.
- *Band switching for 75, 20, 11, and 10 meter bands.
- *Spare band-switch position for 160, 40 or 6 meters.
- *Dual-scale meter with meter switching.
- *Fixed-tuned multiplier stages pre-set at factory.
- *100% break-in operation on CW.
- *Adjustable drive for final amplifier grid current.
- *Two stages of speech amplification in Model A-54.
- *High gain speech amplification in Model A-54H.
- *Employs Nine tubes plus a voltage regulator.
- *Simplified operation.
- *May be used as an exciter for a high powered amplifier.

- TECHNICAL SPECIFICATIONS -

VFO is directly calibrated in megacycles for the 75, 20, 11 and 10 meter bands and incorporates extended band-spread for accurate frequency setting. The variable frequency oscillator operates in the 160⁸⁰ meter band for maximum stability and uses a 6AU6 in a very stable electron-coupled circuit which can be voltage regulated by an OA2 VR tube. An OA2 VR tube is not supplied with the transmitter but a socket for this tube is mounted and wired. The OA2 VR tube is required only on CW or if extreme voltage variations are encountered. The variable frequency oscillator may be turned on for frequency setting or zero beating with another signal without applying power to the final R.F. power amplifier.

CRYSTAL OSCILLATOR control may be employed by operating a front panel switch. This oscillator uses a separate 6AG5 tube in a Peirce circuit designed to operate satisfactorily even with low activity crystals. The crystal is plugged in on the front panel which allows quick changing of crystal frequencies. The above mentioned OA2 VR tube also regulates the plate supply voltage for this oscillator for maximum stability. Any crystal may be used that will work straight-through, double, or quadruple to the desired frequency.

MULTIPLIER STAGES are of the fixed tuned broad-band type which are pre-tuned at the factory and use a 6AG5 in the first stage and a 6AQ5 in the second or driver stage. The 6AQ5 is capable of supplying more than enough grid drive for the final RF amplifier on all bands and the correct amount of drive is set by adjusting a drive control potentiometer located on the front panel.

BAND SWITCHING allows operation on 75, 20, 11 or 10 meters by means of a five position switch located on the front panel. The fifth position on the band switch marked "X" has been left unused to allow the owner of the transmitter to add coils for an additional band, either 160, 40, or 6 meters if desired. Instructions on how to add these bands is given elsewhere in this instruction manual.

METER SWITCHING of a meter mounted on the front panel is used to measure the final RF amplifier grid and plate currents. The meter has two scale calibrations 0 - 5 milliamperes and 0 - 150 milliamperes. When the meter is switched from grid to plate circuit the proper shunts are inserted automatically to make the meter read on the correct scale.

PHONE OR CW operation may be selected by plugging either a microphone into the "MIKE" jack or a key into the "KEY" jack. Crystal or VFO control may be used with either phone or CW operation. When CW is used the filaments of the speech amplifier and modulator tubes may be turned off to conserve power. This is an important feature when the transmitter is powered by batteries, such as during field day operations.

MOBILE OR FIXED STATION operation may be employed with this transmitter. The transmitter is designed for under the dash mounting in automobiles as well as table top operation. All controls have been placed on the front panel for convenience in both mobile or fixed station operation.

POWER SUPPLY - PSA 500 is designed to operate either model transmitter from a 115 volt 60 cycle power source. This power supply delivers 450 volts D.C. at 250 milliamperes. It incorporates an A.C. power switch and a transmit - receive switch having an additional set of contacts wired to a terminal strip for receiver disabling. A 5Z3 tube is used as a rectifier. All necessary cables and connectors are supplied as a part of the power supply.

POWER SUPPLY REQUIREMENTS:

CW operation - 500 volts D.C. Max. at 165 ma.
6.3 volts AC/DC at 2.2 amperes.

Phone operation - 500 volts D.C. Max. at 225 ma.
6.3 volts AC/DC at 4.45 amperes.

The transmitter will operate satisfactorily with a plate voltage appreciably reduced from the values shown above, but will have correspondingly reduced output.

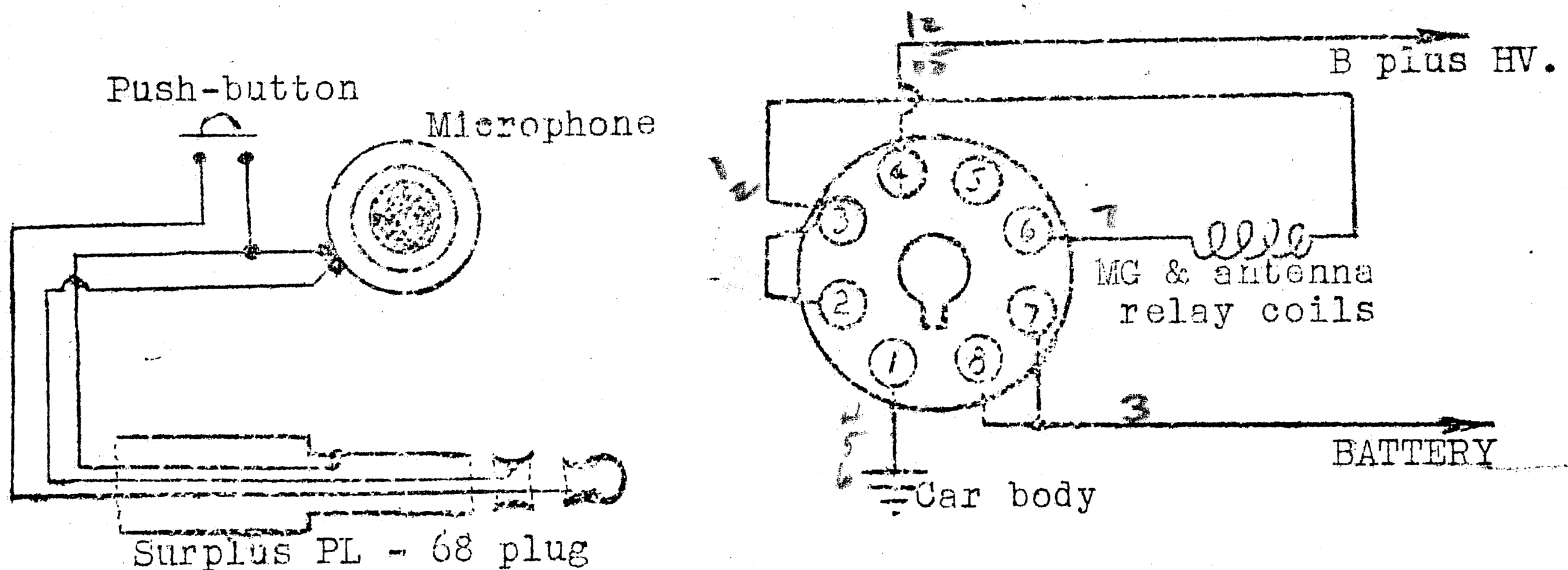
SURPLUS PE - 103 DYNAMOTOR may be employed as the high-voltage power source for mobile operation. When the PE - 103 is used a 25 ohm 1 watt resistor must be connected across the winding of the plate current overload circuit breaker which is located in the dynamotor. If this modification is not made to the PE - 103 it will be impossible to fully load the transmitter because the circuit breaker will operate at approximately 165 ma. It is also desirable to remove the unused set of 12 volt brushes from the PE - 103 to reduce friction and thereby, also reduce battery drain. There is no danger of burning out the PE - 103 since under normal Amateur use the duty cycle is low.

- OPERATING INSTRUCTIONS -

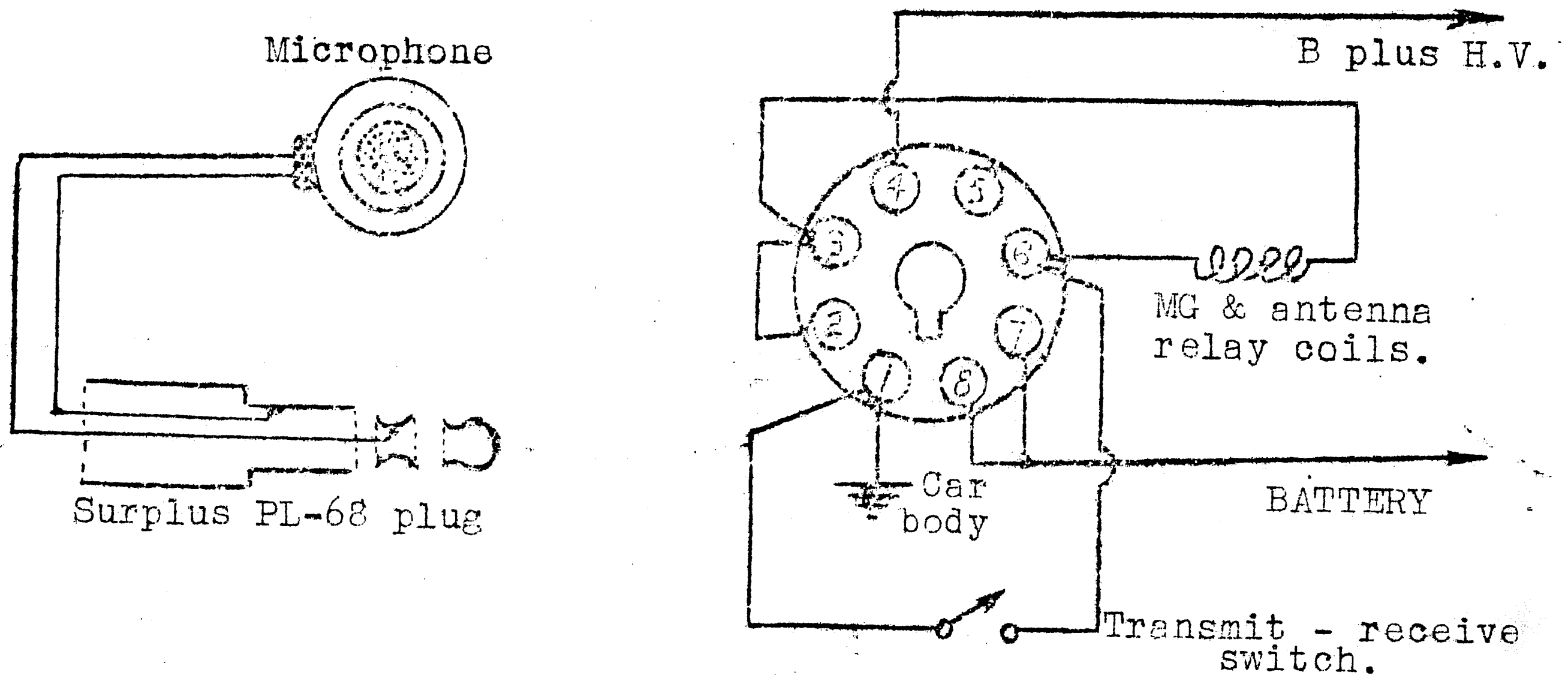
POWER CONNECTIONS are made to the male octal connector located on the side of the transmitter by means of a female octal plug. All voltages are applied with ground as a return.

<u>PIN NO.</u>	<u>CONNECTION</u>
1	Ground (common)
*2	6.3 volts AC/DC (Speech and modulator tubes only)
3	Control. MG and antenna relay.
4	B plus- High voltage.
5	No connection
6	Control. MG and antenna relay.
7	6.3 volts AC/DC from battery or transformer.

* Pin #2 should be connected to pin #3 for phone operation. Or through a switch to pin #3 to reduce filament power during CW operation. Provision for this connection is made in the Model PSA - 500 power supply.



PLUG CONNECTIONS FOR MOBILE OPERATION WITH PUSH-TO-TALK.



PLUG CONNECTIONS FOR MOBILE OPERATION WITH-OUT PUSH-TO-TALK.

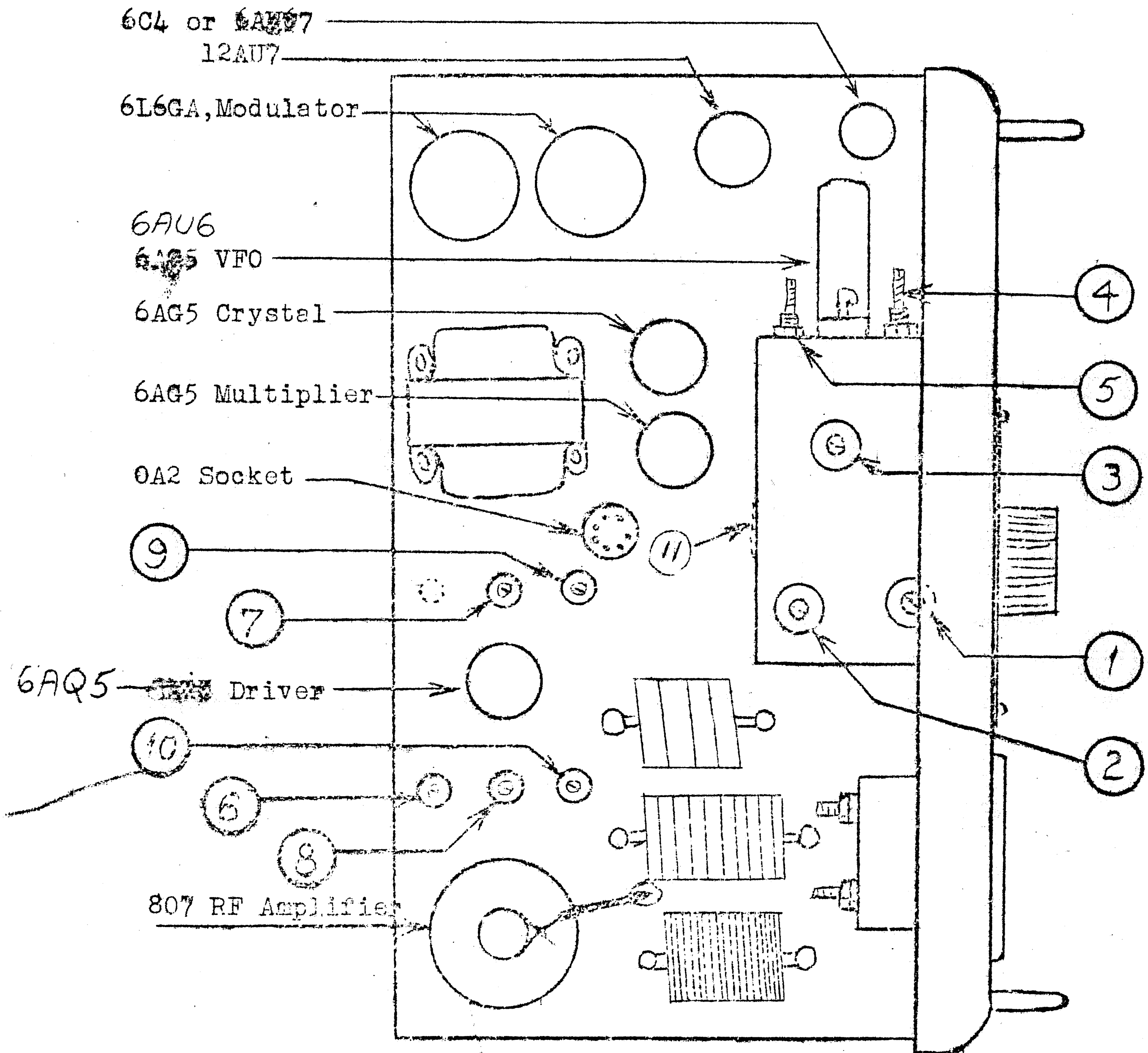
TUNING PROCEDURE after an antenna, ground, power supply and microphone/ or key have been connected to the transmitter is as follows.

- 1 - Switch POWER to OFF.
- 2 - Switch P.A.ON - P.A.OFF to P.A.OFF.
- 3 - Set bandswitch to desired band.
- 4 - Switch VFO - CRYSTAL to VFO.
- 5 - Set VFO dial to desired frequency.
- 6 - Switch Ig - Ip to Ig.
- 7 - Set ~~LOADING~~ control on 10.
- 8 - Switch POWER to ON.
- 9 - Operate key or push to talk switch. 2 To
- 10- Adjust DRIVE control for approximately 13 milliamperes.
- 11- Switch Ip - Ig to Ip.
- 12- Switch P.A.ON - P.A.OFF to P.A.ON.
- 13- Adjust PLATE TUNING for minimum plate current (Ip).
- 14- Adjust ~~LOADING~~ towards 0 until plate current increases to 100 milliamperes and readjust PLATE TUNING for minimum again. Repeat this operation until the minimum dip obtainable is 100 milliamperes or as high as possible if 100 can not be reached.

The same procedure as above should be followed for crystal control except that in step 4 above the VFO - CRYSTAL should be switched to CRYSTAL. Crystals may be in the 160 or 80 meter band for 80 meter operation. In 80, 40 or 20 meter band for 20 meter operation. And in the 40 or 20 meter band for 10 meter operation.

NOTE----When using the Model PSA-500 power supply a push-to-talk switch is not required as the power supply is equipped with a transmit - receive switch and all necessary connections are made in the plug and cable which are supplied.

- SERVICE INFORMATION -



DIACRAM showing physical layout of tubes and other component parts on the chassis of the Model A-54 and Model A-54H. The extreme top right hand tube is a 6C4 in the Model A-54 and a ~~6AV6~~ in the Model A-54H.

The circled numbers above show the location of all calibration and alignment adjusting screws.

VFO RECALIBRATION if it becomes necessary is as follows;

- Equipment required;
 - 1 - Calibrated signal generator or frequency meter covering 3.0 to 30.0 Megacycles.
 - 2 - Receiver capable of tuning the same frequency range as above.
 - 3 - Small screw driver.
- Procedure;
 - Refer to the diagram on page 6 for the location of all alignment and calibration adjustment screws.
 - Proceed with the calibration in the order as set up in the table below;

BAND SWITCH POSITION	SIGNAL GENERATOR AND RECEIVER FREQUENCY SETTING	ZERO BEAT WITH ADJUSTING SCREW #
75	3.5 Mc and 4.0 Mc	3 and 5*
20	No adjustment required	
10	28, 28.5, 29. and 29.5 Mc.	11 and 2 **
11	27.0 Mc.	1

* Both #3 & #5 must be adjusted until both ends of the VFO dial are correct.

** Both #11 & #2 must be adjusted until the four check points of the ten meter dial calibration are correct.

MULTIPLIER AND DRIVER ALIGNMENT

- Equipment required; Small screw driver.
- Procedure;
 - Refer to the diagram on page 6 for the location of all alignment and calibrating screws.
 - Proceed with the alignment in the order set up below.

BAND SWITCH POSITION	VFO FREQUENCY SETTING	ADJUST FOR MAX. P.A. GRID CURRENT WITH ADJUSTMENT SCREW #-
75	3.9 Mc	6
20	14.0 Mc	7
	15.0 Approx.	8
10	28.7 Mc.	9
	29.7 Mc	10
	29.3 Mc	4
11	No adjustment necessary	

- MODIFICATIONS -

TO ADD 160, 40, or 6 METERS.

The models A - 54 and A - 54H transmitters may be modified by the owner to operate either on 160 40 or 6 meters in addition to the four bands normally supplied in the transmitter. The parts required are readily available from amateur supply houses, and the step-by-step procedure for adding an additional band is as follows;

FOR 160 METER OPERATION -

- 1 - Jumper position "X" on the VFO section of the band switch to the 75 meter position. The top (grid) end of the oscillator coil must be opened and enough inductance added to bring the oscillator frequency down to 1.75 to 2.0 KC. This added inductance can be shorted out for the other bands by using the extra switch section on the center gang of the band-switch. If the added inductance is adjusted correctly without disturbing any of the condenser settings the 75 meter calibration when divided by two will be correct for the 160 meter band.
- 2 - Jumper position "X" of the bandswitch in the 6AG5 multiplier stage plate circuit to the 75 meter position of the same bandswitch section.
- 3 - Add a 160 meter broad-band slug tuned coil in the plate circuit of the 6AG5 driver stage on position "X" of the bandswitch. COIL DESIGN; 160 turns of # 32 SCE wire on a CTC coil form.
- 4 - Add a 160 meter coil to the position "X" - "X" of the bandswitch in the 807 plate circuit. COIL DESIGN; 85 turns of B & W Mini-Juctor #3016. It may be necessary to add a 365 mmf. variable condenser (broadcast type) between the antenna terminal and ground (chassis) to properly load the antenna.

FOR 40 METER OPERATION -

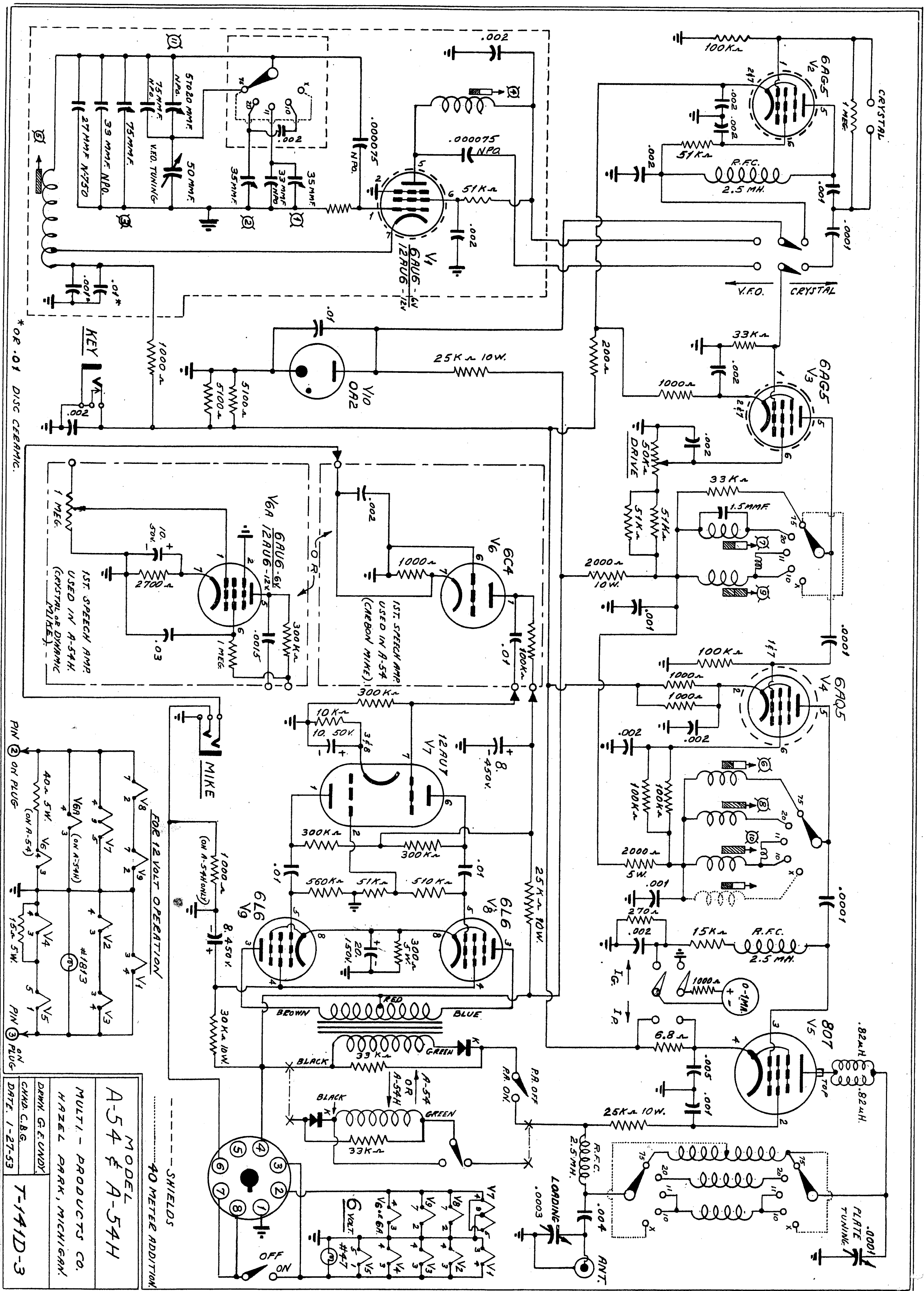
- 1 - Jumper position "X" to the 75 metre position of the VFO section of the bandswitch. Multiply the 75 meter calibration by two for 40 meters.
- 2 - Jumper position "X" of the bandswitch in the 6AG5 multiplier stage plate circuit to the 75 meter position.
- 3 - Add a 40 meter broad-band slug tuned coil in the plate circuit of the 6AG5 driver stage on position "X" of the bandswitch. COIL DESIGN; 50 turns of # 30 SCE wire on a CTC coil form.

- 4 - Add a 40 meter coil across the position "X" - "X" of the bandswitch in the 807 plate circuit. COIL DESIGN; 22 turns of B & W Mini-ductor #3016.
- 5 - Peak the coil added above at 7150 KC.

FOR 6-METER OPERATION -

- 1 - Add a good quality midget 100 mmf variable condenser from position "Z" on the VFO section of the bandswitch to ground.
- 2 - Jumper position "Y" of the bandswitch in the 6AG5 multiplier stage plate circuit to the 11 meter position.
- 3 - Jumper position "X" of the bandswitch in the 6AG5 driver stage plate circuit to the 11 meter position.
- 4 - Add a 6 meter coil across the position "X" - "X" of the bandswitch in the 807 plate circuit. COIL DESIGN; 2 turns of # 14 wire 1/2" dia. spaced 1/2" long. Solder this coil directly across the bandswitch terminals keeping the leads as short as possible. Avoid sharp bends or turns.
- 5 - Recalibrate the VFO to cover from 3125 KC to 3375 KC, by adjusting only the condenser added in step 1 above. (The 16th harmonic of the above frequencies will cover 50 to 54 megacycles).
- 6 - The 6 meter calibrations can be marked on the blank space on the dial face. The dial window and frame can be removed by first removing the tuning knob and then the 4 screws that hold the frame in place.
- 7 - If extensive six meter operation is contemplated the adjusting screws #9 and #10 (see page 6 for location) should be re-peaked at 52 megacycles. This will increase the 807 grid drive on 6 meters but will reduce the drive on 10 and 11 meters.

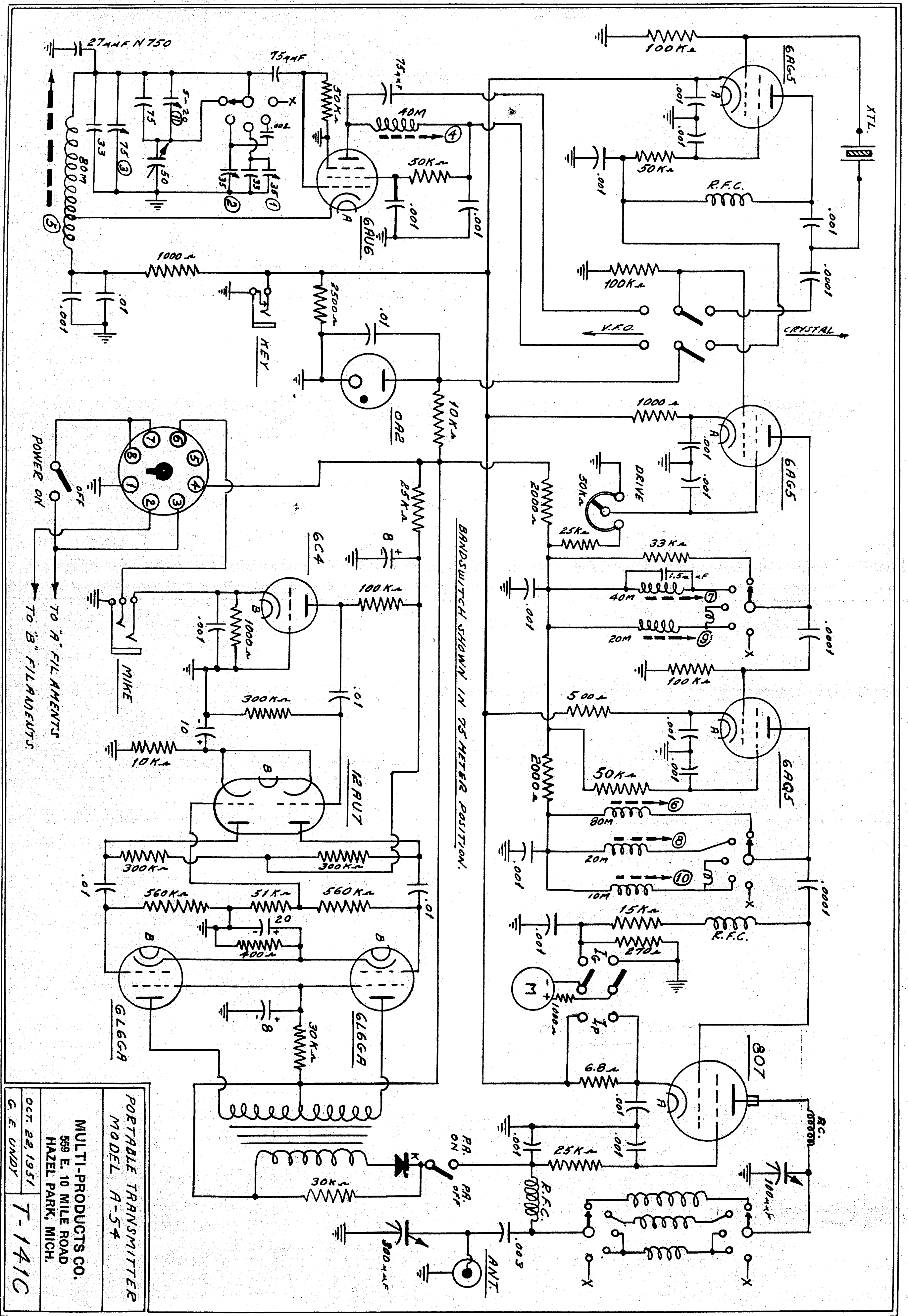
Any crystal that is normally used for 6 meter operation will work satisfactorily in this transmitter when crystal control is desired on 6 meters.



MODEL A-54 & A-54H
 MULTI-PRODUCTS CO.
 HAZEL PARK, MICHIGAN
 DRAWN G.E. CUNDY
 CHKD. C.B.G.
 DATE. 1-27-53
 T-141D-3

SHIELDS
 40 METER ADDITION

*OR .01 DISC CERAMIC.



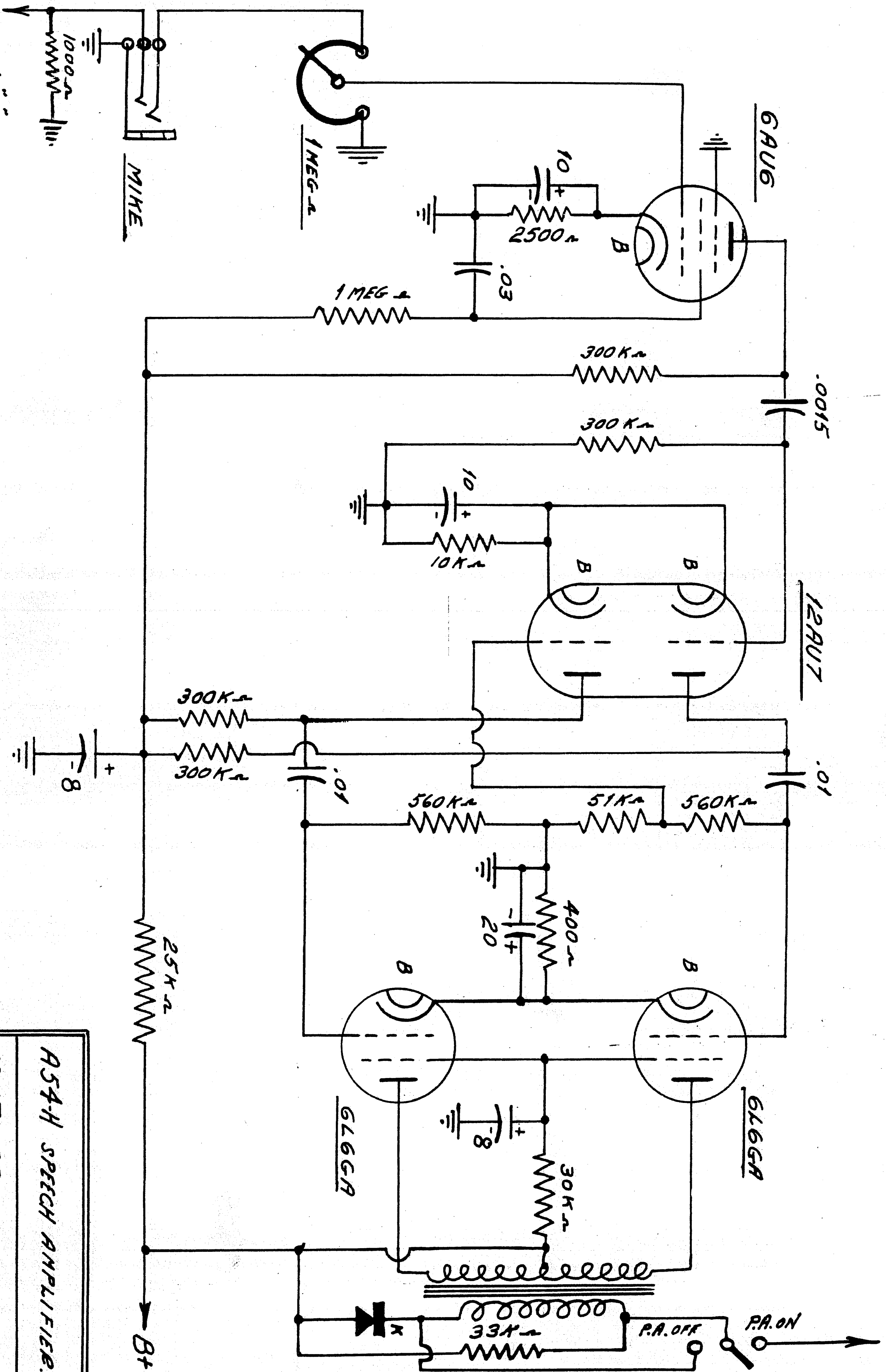
BANDSWITCH SHOWN IN 75 HETZER POSITION.

PORTABLE TRANSMITTER
MODEL A-54

MULTI-PRODUCTS CO.
559 E. 10 MILE ROAD
HAZEL PARK, MICH.

OCT. 22, 1951
C. E. UNDY
T-141C

TO PIN 6
ON POWER
PLUG.



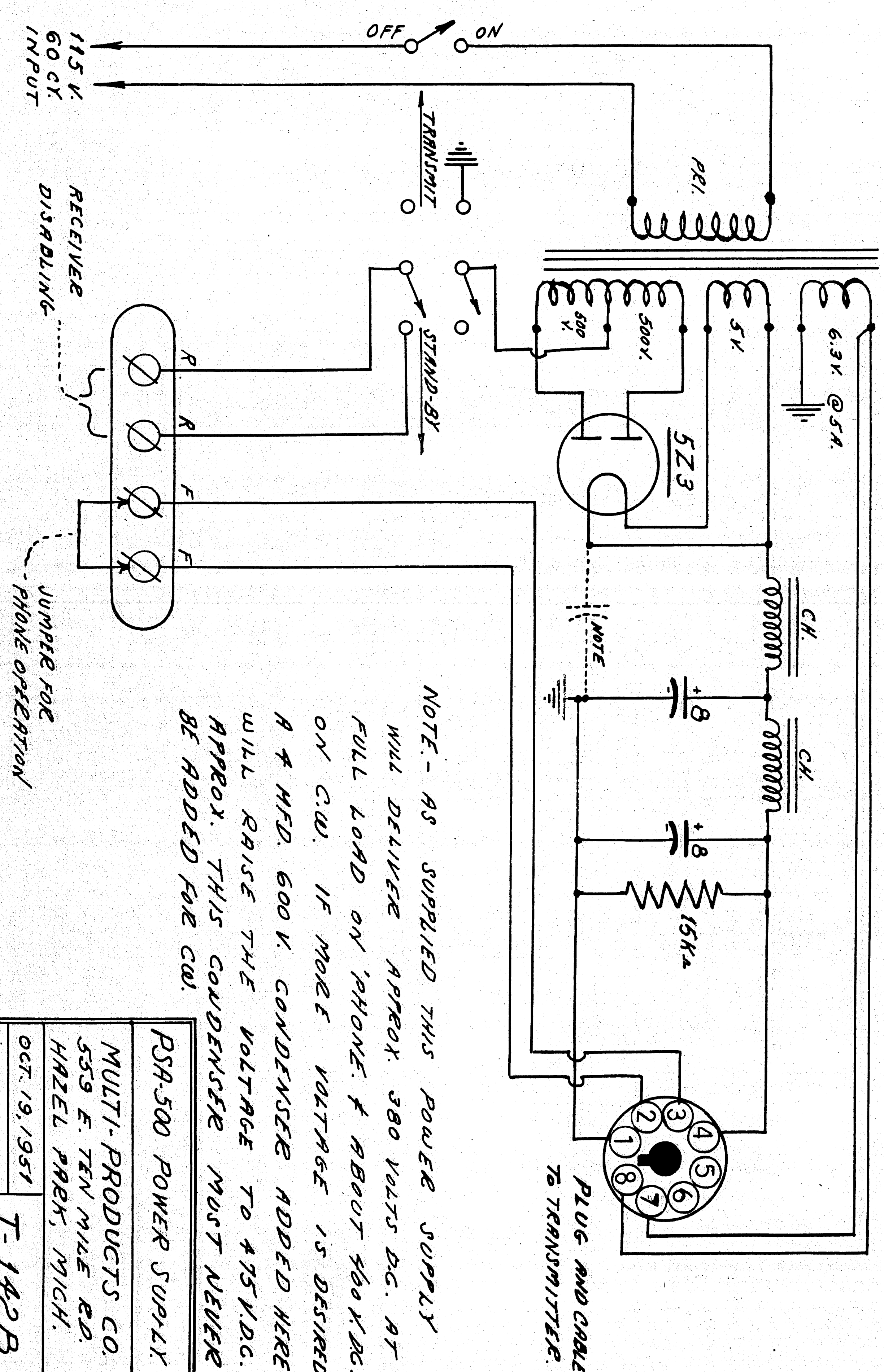
A54-H SPEECH AMPLIFIER.

MULTI-PRODUCTS CO.
559 E. TEN MILE RD.
HAZEL PARK, MICH.

OCT. 20 1941

G. E. OWBY

T-143B



NOTE - AS SUPPLIED THIS POWER SUPPLY WILL DELIVER APPROX. 380 VOLTS D.C. AT FULL LOAD ON 'PHONE. & ABOUT 400 V.D.C. ON C.W. IF MORE VOLTAGE IS DESIRED A 4 MFD. 600 V. CONDENSER ADDED HERE WILL RAISE THE VOLTAGE TO 475 V.D.C. APPROX. THIS CONDENSER MUST NEVER BE ADDED FOR C.W.

PSA-500 POWER SUPPLY
 MULTI-PRODUCTS CO.
 559 E. TEN MILE RD.
 HAZEL PARK, MICH.
 OCT. 19, 1951
 G. E. UNDY
 T-1422B