



JOHNSON ELECTRONIC EQUIPMENT

**E. F. JOHNSON COMPANY
WASECA MINNESOTA**

**OPERATING MANUAL
JOHNSON VIKING
MOBILE
TRANSMITTER**

Instructions for Modifying the Viking Mobile Transmitters,
previously wired for 6 volt Filament Operation,
to 12 volt Filament Operation

Refer to Figures 1A, 3A thru 3E and 6A at the rear of the Viking Mobile Operating Manual

1. Remove the ground connection from pin 5 of the 807 modulator socket, X7.
2. Move the green lead, Y4, from pin 1 of X7 to pin 5 of X7. Solder the connection at pin 5.
3. Disconnect and remove the green harness lead which connects pin 3 of the 6BH6 oscillator socket X₁ to the filament toggle switch, SW5. This lead may be identified by tracing it in the harness between X₁ and SW5.
4. Remove the ground connection on pin 5 of the 807 modulator socket, X8.
5. Connect pin 5 of X8 to pin 3 of X₁ with a lead (green preferred) running along the harness. Solder the connections at both ends and tie the new lead to the harness in several places with lacing cord or narrow tape.
6. Remove the outer side of the bias supply can, SH4, and make the following modifications:
 - a. Remove the ground connection from pin 5 of the 12AU7 bias tube socket, X4.
 - b. Replace the green connecting lead, Y41, between the lower terminal on the terminal strip, X13, and pin 9 of X4 with another lead 2 3/4" long connected between the lower terminal of X13 and pin 5 of X4. Solder the lead at both ends. Leave pin 9 open.
 - c. Reposition the #6 teardrop terminal near pin 5 of X4 so that there will be no danger of pin 5 contacting the teardrop.
7. Remove the green lead on pin 7 of the VFO power socket, J4, and connect it to pin 5 of J4.
8. If a VFO with a .300 ampere, 6 volt filament requirement (such as the Viking VFO) is to be used with the Viking Mobile, connect two 39 ohm, 2 watt resistors in parallel between pins 5 and 7 of J4. Solder at both pins.
9. Connect and solder one 47 ohm 2 watt resistor in series with the black lead on the meter illuminating socket, X21. Tape and train the lead at the resistor connection to avoid shorting other components in the vicinity of the meter.

The 47 ohm, 2 watt resistor is unnecessary if a 12 to 18 volt, .07 to .2 ampere, T3 1/4 type, miniature bayonet based pilot lamp can be procured to replace the #47 lamp supplied with the transmitter.

ERRATA
Viking Mobile Operating Manual

- Figure 1A Lead from center terminal of X11 should connect to center terminal of X14 instead of end terminal (corrected in Assembly Details).
- Figure 8 R38 should appear between pin 3 of X7 and pin 3 of X8 instead of as shown.
- Page 22, 11a Add "one 300 mmfd \pm 5%, 500VW, silver mica condenser (CM20 type case)" to the list of materials needed.
- Page 23, 11b (3) Change to read: Connect a 300 mmfd silver mica condenser (ruby body) between contacts 1 and 5 of SW2C. Refer to Figures 3E and 4A and mount the condenser horizontally just under Bkt 4 and Bkt 5 in a manner which provides maximum clearance to C23 when X20 is mounted as shown in Figure 4A. Solder at both contact terminals.
- Page 26, f (4) Third sentence, change word performing to preforming.
- Page 26, f (5) Insert after second sentence and preceding step (a), "At this point, the channel cabinet should be pushed over the chassis to the panel as some detuning effect is noticeable with the channel in position. This detuning is primarily due to oscillator detuning and should be corrected by small adjustments of the oscillator condenser. This should be done by withdrawing the cabinet channel slightly, adjusting the condenser, re-engaging the channel and panel and checking for adequate grid drive or "tracking".

Viking Mobile Transmitter Installation and Operation

The installation and operation instructions are intended to make the operator familiar with the Viking Mobile transmitter. It is impossible to anticipate all conditions or problems which may be encountered, but it is hoped the discussions will suggest solutions to most of the questions which may arise and will allow the operator of the transmitter to utilize the flexibility and operating ease of the equipment to the best advantage. The main parts of the Operating Manual are:

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WARNING

The power supply used with this equipment should be properly fused to protect the transmitter and the power supply. The power supplies usually will have output voltages high enough to cause serious or even fatal injury! Be certain the dynamotor or other power source is turned off before doing any work on the cabling or in the exposed transmitter during testing.

STANDARD WARRANTY

Adopted and Recommended by the
Radio and Television Manufacturers Association

The E. F. Johnson Company warrants each new radio product manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service disclosed such defect, provided the unit is delivered by the owner to us or to our authorized radio dealer or wholesaler from whom purchased, intact, for our examination, with all transportation charges prepaid to our factory, within ninety days from the date of sale to original purchaser and provided that such examination disclosed in our judgment that it is thus defective.

This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by the authorized radio dealer or wholesaler without charge to the owner.

This warranty is in lieu of all other warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our radio products.

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This warranty does not extend to any of our radio products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory, nor to cases where the serial number thereof has been removed, defaced or changed, nor to accessories used therewith not of our own manufacture.

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1. Preparation for the Initial Installation.

a. NOTICE: The regulations of the Federal Communications Commission require a suitable license for the operation of this equipment. Refer to publications of the F.C.C. or the American Radio Relay League for the latest rules governing station and operator licensing.

b. Be sure to return the WARRANTY REGISTRATION card. This will register your transmitter at the factory and facilitates correspondence referred to by your transmitter serial number.

c. REMOVE the CHANNEL CABINET by unscrewing the twelve pan head screws which hold it to the panel, the back, the shield brackets and the bottom plate. Slide the transmitter out of the channel. Remove the bottom plate by unscrewing the four screws (at the panel and the spacers). Remove loose packing material and any shipping supports. Examine the transmitter for damage. Report any damage to the transportation company immediately. Look for shorted leads or components which have been obviously moved out of position.

d. ATTACH the KNOBS to the control shafts at the front panel if they have not already been attached before shipping. The setscrew can be anchored securely in place (after the knob has been properly positioned) by first tightening down, loosening slightly and retightening. The knobs should be put on and positioned as follows:

- (1) TUNE-REC-SEND - a skirt dial with single marker. The marker is located at TUNE when the shaft is in the maximum counterclockwise position.
- (2) AUDIO - An aluminum knob with a maroon marker dot. The marker should be 30° clockwise from the straight down position when the shaft is in the maximum counterclockwise position.
- (3) METER - the MOD PLT GRID BFR OSC OFF skirt dial. The OFF position is located on the maximum counterclockwise shaft position.
- (4) COUPLING - a phenolic knob (no skirt). The marker is located on 0 when the shaft is in the maximum counterclockwise position.
- (5) 75-20-10 (Bandswitch) - a phenolic knob (no skirt). The marker is located on 75 when the switch is turned to the maximum counterclockwise position.
- (6) DRIVE - a phenolic knob (no skirt). The marker is located on 0 when the shaft is in the maximum counterclockwise position.
- (7) FINAL TRIMMER (above the bandswitch) - an aluminum knob with a maroon marker dot. The trimmer condenser, C23, rotor should be exactly 1/2 engaged into the stator at the bottom part of the stator. The condenser may be viewed from the right side in front of the Bias Supply. Now locate the knob marker straight up in the 12:00 o'clock position. C23 should now be at maximum capacity at 9:00 and minimum at 3:00.
- (8) GANG TUNE - a 100-0 skirt dial. The 0 is located on the maximum capacity (low frequency) position.
- (9) CRYSTAL SELECTOR - an aluminum knob with a maroon marker dot. The marker should be located straight down in the 6:00 o'clock position when the switch is in its middle/position (120° from either the counterclockwise or clockwise extreme). VFO

e. INSTALL the TUBES and TUBE SHIELDS in their positions as shown in Figures 6A, 6B, and 3C. The following list is referred to the socket designations of Figure 1A and 3A. Insert the tubes and place the shields over the sockets as listed below:

- (1) The 6BH6 oscillator in X₁ with a 1 3/4" shield.

- (2) The 6AQ5 buffer in X2 with a 2 1/4" shield.
- (3) The 6BH6 speech amplifier in X5 with a 1 3/4" shield.
- (4) The 6BH6 audio driver in X6 with a 1 3/4" shield.
- (5) The 12AU7 in X4 of the Bias Oscillator Supply. The outside shield of the Bias oscillator must be removed to place the tube in X4. An offset screw driver will aid in removing of the three screws at the rear of the shield. Be certain the shakeproof washers are used and the screws are tightened securely when the shield is replaced.
- (6) The 807 final amplifier in X3. Connect the plate cap.
- (7) Two 807 modulators in X7 and X8. Connect the brown plate lead to the inner 807 modulator tube (in X7) and the blue plate lead to the outside modulator tube.

The Viking Mobile should now be ready for its initial operation, but do not connect it to a power supply and apply power until the Operating Directions have been studied and have been understood.

2. Description of the Viking Mobile Circuits.

- a. The VIKING MOBILE BLOCK DIAGRAM is shown in Figure 10A. Study it to learn how the circuits of the transmitter are interconnected before studying the description of the various stages. Basically the Viking Mobile is designed for operation in the 75, 20 and 10 meter Amateur Phone Bands with provision for 40 meter and 15 meter operation as described in part 11. The transmitter has a low voltage requirement of 250 to 300 DC volts at 55 to 70 ma, a high voltage requirement of 300 to 600 DC volts at 130 to 150 ma and a filament requirement of 4.0 amperes at 6 volts. Internal switching is provided to disable the receiver on "send", to transfer the antenna lead from the transmitter to the receiver on "rec" and "tune", to disconnect the high voltage source on "tune" and to disable the power supply on "rec". Additional combinations of power supply switching are discussed in part 9. A push-to-talk circuit has been included at the microphone jack to facilitate a single push-to-talk antenna transfer and receiver disabling relay installation.
- b. The OSCILLATOR: The crystal switch will select any of four crystals on the crystal socket or connect the 6BH6 RF input circuit to the VFO receptacle at the rear of the transmitter. With crystal operation, the 6BH6 screen, grid and cathode become a Pierce oscillator. The plate is electron coupled to the other elements which makes it a good frequency doubler. The oscillator tank is tuned to the 75 meter range when the bandswitch is on 75 meters, to the 40 meter range when the bandswitch is on 20 and to the 20 meter range when the bandswitch is on 10.
- c. The BUFFER: The 6AQ5 buffer serves as a straight through amplifier on 75 meter operation and as a frequency doubler on 20 and 10 meters. The 6AQ5 screen potential is varied by the Drive Control to provide an adjustment for the Final grid current. Some fixed voltage is applied to the grid of the 6AQ5 grid to limit the buffer no signal current.
- d. The R.F. POWER AMPLIFIER: The grid circuit bias for the 807 final is provided by the grid current drop across the 10,000 ohm grid resistor and a negative voltage of 25 to 35 volts from the Bias Oscillator Supply. It will be noted that the grid current specified for the Viking Mobile operation and the bias voltage are less than those shown in the tube handbook under typical operating conditions. The values used were found to be the best values for maximum efficiency and good output over the whole voltage range of the Viking Mobile.

d. The final tank consists of a coil for each of the 75, 20, and 10 meter bands and a tuning condenser which is ganged to the buffer and oscillator condensers. The 75 meter band is padded by fixed condensers to bring the loaded 75 meter tank Q to within a good operating range. The final plate has a series D.C. high voltage feed so that the coils and final condenser rotor have modulated D.C. voltage on them when the transmitter is operating with the "tune-rec-send" switch in the "send" position. The screen of the final 807 is fed from the modulation transformer secondary through a series dropping resistor. The value of the dropping resistor required depends on the DC voltage applied to the final, 5,000 ohms being used for an applied high voltage of 300 volts while 45,000 ohms is used with 600 volts. Intermediate values of resistance are used with voltages between these extremes.

e. The OUTPUT COUPLING CIRCUITS: Each tank coil has a concentric coupling coil with a relatively high coupling coefficient in the maximum coupling position. The coupling coils are moved in and out of the tank coil by the Coupling Control. The coupling coils are switched to the output cable and jack J2. Capacitance compensation is provided in each coupling circuit to cancel the coupling coil reactance and provide some reactance correction for a 50 ohm feedline approximately 15 feet long. The nominal antenna resistances (at the end of the 15 feet of line) used for design centers are as follows:

75 meters - 15 ohms
20 meters - 25 ohms
10 meters - 50 ohms

These values were found on a typical mobile antenna setup. The coupling capability of the Viking Mobile, however, extends in a range several times the nominal center design resistance value both for resistance variance and reactance which might appear at the antenna.

f. The MODULATOR: The modulator consists of a pair of 807's operating in Class AB₁ push-pull driven by a transformer coupled 6BH6 driver and a 6BH6 resistance-capacitance coupled speech amplifier. The "Audio" control is a potentiometer which adjusts the audio input to the driver stage. The input speech amplifier may be wired to have a very low gain for carbon microphone use or may be wired to have a relatively high gain for a crystal or a high level dynamic microphone. The gain of the speech amplifier is sufficient in either case for close talking into most good quality microphones. The biasing current for the carbon microphone is the cathode current of the speech amplifier stage.

g. The BIAS SUPPLY: The bias supply consists of one section of a 12AU7 tube operating as an RF oscillator and the other section which operates as a rectifier of the oscillator output voltage. The R.F. frequency is in the neighborhood, of 4.5 mc. All leads are carefully bypassed and filtered to prevent any of the R.F. voltage from reaching the exciter stage of the transmitter. The oscillator can be picked up by a receiver in the vicinity of the transmitter but it will be noted that the signal is quite weak (several thousand times smaller than any signal voltages on the exciter stages of the transmitter). The bias supply provides approximately 25 volts of bias to the modulator and final stage grids. The value of the fixed bias voltage depends on the low voltage B+ source.

h. RECEPTACLES FOR POWER SUPPLY, RECEIVER INTERCONNECTION, VFO, AND TRANSMITTER OUTPUT: The receptacles at the rear of the transmitter provide a convenient means of connecting the Viking Mobile with the other components of the mobile system. The receptacle connections are grouped as follows:

(1) J1 is the VFO RF input receptacle.

(2) J4 is an octal Female receptacle which provides power connections to a VFO

- (2) similar to the Viking VFO.
- (3) J3 is the transmitter output receptacle.
- (4) J5 is an octal male receptacle which has all of the connections to the power supply including the power supply input relay, two low voltage B+ connections (to provide for a separate dropping resistor value on "tune"), the high voltage B+, and the filament 6 volt connection.
- (5) J6 provides the receiver antenna connection, a receiver disabling circuit, and jumper connections for push-to-talk circuits.

i. POWER and RECEIVER SWITCHING CIRCUITS: The tune-rec-send switch provides the necessary circuits to operate the Viking Mobile without additional relays or circuit transfer. The switching during normal operation consists of turning the tune-rec-send switch between the rec and send positions (an operation less involved than turning down receiver gain during "send" in some mobile installations). Push-to-talk operation may be had with a relatively simple installation of an antenna switching and receiver disabling relay. The tune-rec-send switch normally provides the following switch functions:

- (1) On "tune" - removes HVB+, energizes the receiver (optional), connects the antenna to the receiver (usually a converter), and applies LVB+ to the exciter stages and VFO.
- (2) On "rec" - removes all B+ voltage from the transmitter, de-energizes the transmitter power supply input relay, energizes the receiver and connects the antenna to the receiver.
- (3) On "send" - applies LVB+ to the exciter stages and the modulator screens of the transmitter, connects the antenna to the transmitter output, de-energizes the receiver (usually at the input to the vibrator), and energizes the transmitter power supply input relay.

j. METERING: The cathode currents of the oscillator, buffer, final and modulator stages may be read on the meter when the meter switch is turned to the indicated positions. All meter shunts and series resistors are values which provide 100 mv for a full meter reading. The "osc" current is read on the top scale-calling the full scale reading 20 ma. The "bfr" current is read on the 0-40 ma scale, the "grid" current is read on the 0-10 ma scale and the "mod" and "plt" currents are read on the top 0-200 ma scales.

k. VFO EXCITATION: The straight down position of the crystal selector switch knob connects the VFO receptacle, J1, at the rear of the transmitter to the input (oscillator) 6BH6 grid. When a VFO other than a Viking VFO is used, the output of the VFO should have an isolating capacitor of 50 to 150 mmfd to avoid placing a DC short on the input grid. The RG59U cable, the twisted leads between the VFO receptacle and the 6BH6, and the 6BH6 grid present a capacity in the neighborhood of 35 mmfd at the VFO receptacle which must be taken into account when connecting a VFO to the Viking Mobile. The Viking VFO output circuits are already adjusted for approximately 30 to 35 mmfd.

3. Power Supplies for the Viking Mobile.

a. The Viking Mobile Final and Modulator stages can be operated with applied voltages of 300 to 600 volts. At no time should more than 600 volts be applied when the transmitter is being modulated. The final screen dropping resistor of the final stage (R15, R16, and R17) must be adjusted to the operating voltage range. This adjustment is described and tabulated later in part d of this section. The Exciter and Speech Amplifier stages are normally fed through a dropping resistor in the power supply at a voltage of 250 to 300 volts during operation. The total current requirement is nominally 200 ma.

- b. Figure 10B shows the basic power supply diagram for a normal installation of the Viking Mobile. The cabling applies for push-to-talk operation as well as when no push-to-talk facilities are installed. The push-to-talk connections are made at the receptacle J6 which will be discussed under Overall System Connections. The dynamotor or vibrator power supply is usually installed as near to the battery as possible to eliminate voltage drop on the 6 volt leads. #8 leads from the battery to the relay may be satisfactory for short runs of less than 2 ft. but heavier leads (up to single 0) should be used where the leads must be longer. Figure 10B shows the + terminal of the auto battery grounded. If the - terminal of the battery is grounded, simply reverse the input leads of the H.V. dynamotor or vibrator supply. The polarity of the voltage to filaments in the transmitter is unimportant.
- c. The components of the Johnson Dynamotor Base Kit which is available for the Viking Mobile have suitable ratings for the dynamotors which will be encountered. When a power supply is built up with available equipment, components should have ratings to provide ample protection and long life. The following list may be used as a guide in determining the ratings of the power supply components.
- (1) The fuse, F1, should have a rating high enough to keep it from burning out when the dynamotor is started but small enough to open with a continuous overload of approximately 50%. Dynamotors supplying 300 volts to 450 volts should be fused for 15 to 25 amperes. Dynamotors or vibrator supplies supplying 300 to 450 volts should be fused for 25 to 30 amperes. The fuse, F2, should be rated at 6 amperes (no more than 7 1/2 amperes).
 - (2) The 6 volt relay at the input to the power supply should have contacts capable of carrying and breaking the current of the fuse rating. The coil of the relay should require less than 1 ampere (preferably .3 to .5) when 6 volts DC are placed across it.
 - (3) The filter condenser, C₀, should have a DC working voltage rating higher than that of the output voltage of the dynamotor. A capacity value of 4 mfd or greater probably will be satisfactory for most dynamotors but the manufacturer's recommendations for a filter should be followed whenever the filter is not included with the power supply.
 - (4) The dropping resistor R_D should be capable of carrying up to 70 ma of current. It provides a voltage drop from the output voltage of the dynamotor sufficient to limit the low voltage (LV#1 or LV#2) applied to the exciter to 300 volts under normal operating conditions. R_D can be 6,000 ohms, 50 watts for dynamotor output voltages of 450 to 600 volts, 3,000 ohms for dynamotor voltages above 300 volts but less than 450 volts. R_D is not needed when the power supply output is 300 volts. The LV#1 and LV#2 tap may be a common tap where the dynamotor output is less than 400 volts and the regulation of the dynamotor is good. It will be noted in the Viking Mobile Schematic, Figure 8, that the Modulator 807 screen grids are connected to the low voltage B⁺ (LV#1) when the tune-rec-send switch is in the "send" position only. The value of dropping resistance to the LVB #1 tap is set to a value smaller than to tap LVB#2 by an amount necessary to roughly compensate for the dynamotor regulation and the modulator screen voltage. The low voltage B⁺ voltages should be kept below 350 volts under all conditions of operation or tuneup on the Viking Mobile low voltage stages. The following table shows typical settings of taps on R_D. They will usually be close enough if the regulation of the dynamotor is good between 50 ma and 200 ma of load. The VFO drain assumed is 8 to 12 ma. The Drive Control should be set for a buffer current of 15 to 18 ma while setting the taps on R_D.

Status of Optional Low Voltage Circuits

Dynamotor or Vibrator Power Supply Output Voltage	No VFO	No VFO	With VFO	With VFO
	Wired for Crystal Mike	Wired for Carbon Mike	Wired for Crystal Mike	Wired for Carbon Mike
600 volts LV#1 (maximum) LV#2 590	6000 ohms 5300 4000 (MIN)	5600 ohms 4900	5200 ohms 4500 3300 MIN	4800 ohms 4200
500 volts LV#1 (nominal) LV#2 400 + V	5000 4500	4600 4100	4100 3600 2000 Ω (10W)	3700 3300
400 volts LV#1 (nominal) LV#2	2200	2000	1800	1600
350 volts LV#1 (nominal) LV#2	1000	900	800	700
300 volts LV#1 (nominal) LV#2	none	none	none	none

(5) The power supply cabling can consist of 7 conductors, A through G, as shown in Figure 10B, and labeled Cable I. Conductors A and D should be #18 or larger, others #22 or larger. The plug, PL5, is a female Octal connector (similar to Amphenol 78PF8) which is supplied with the Johnson Dynamotor Base Kit or is readily available at any radio jobber. PL5 plugs to J5 at the rear of the Viking Mobile. Lead C may be eliminated if Push-to-Talk is not used. The side of the relay connected to lead C may be connected directly to the ground lead D at the dynamotor. Lead E may be eliminated when the dynamotor output is 400 volts or less as indicated by the table in part (4), by connecting pins 3 and 5 together at PL5. When the power supply output voltage is 300 volts, leads E and G may be both eliminated and pins 3, 4 and 5 may be connected together at PL5.

d. The screen dropping resistor in the Viking Mobile must be set to the correct value for the output high voltage of the power supply. If no specific output voltage has been specified, the resistor (R15, R16, and R17) will be connected for a value of 30,000 ohms for operation in the 500 volt range. Refer to Figures 1A, 5B and the table below for the information necessary to change the final screen connections for operation at voltage other than 500 volts.

Power Supply Output Voltage Range	Required Final Screen Dropping Resistance	Directions for Connecting R15, R16, and R17 on terminal strip X12. Refer to Figure 1A and number the terminals 1 through 5, 5 being the terminal near X25.
530 to 600 volts	45000 ohms	Connect the blue lead Y6 to terminal 5
450 to 530 volts	30000 ohms	Connect the blue lead, Y6, to terminal 5. Jumper terminals 3 and 4.
380 to 450 volts	15000 ohms	Connect the blue lead, Y6, to terminal 4.
330 to 380 volts	7500 ohms	Connect the blue lead, Y6, to terminal 4. Jumper terminals 2 and 3.

300 to 330 volts 5000 ohms

Connect the blue lead, Y6, to terminal 4.
Jumper terminals 2 and 3 and terminals 4
and 5.

Solder all connections made in connecting R15, R16, and R17.

WARNING: All insulated leads around R15, R16 or R17 should be moved away from the resistor leads so that the vinyl insulation does not touch the resistor leads, as these resistors may become warm under conditions of no final loading. The vinyl insulation may soften with the possibility of short circuits occurring.

4. Installation in an Automobile

- a. The location of the Viking Mobile will depend on the dashboard layout of the auto, the location of the other components of the system (particularly the short wave converter) and suitability to the driver-operator. It would be impossible to make suggestions to cover all automobiles. Figure 11A shows the channel drilling and bracket used to mount the Viking Mobile directly below the auto receiver of a 1950 Ford. The mounting was made at an angle of approximately 30° from the dash board to make the front panel accessible and in clear view to the driver. The short wave converter was mounted on the left side of the steering post on the underside of the dash board. By the use of properly shaped brackets, tilting the transmitter in the vertical or horizontal, and fastening the cabinet channel at convenient points to the dash board or other support member of the car, the Viking Mobile can be mounted for optimum operating ease and accessibility.
- b. The cabinet channel, CH2, has a clearance of approximately 3/16" at the top, and 1/8" at the sides which may be used for screw heads of mounting screws used to mount the cabinet channel to the auto dash board, brackets, or other support member. All mounting screws and support brackets should be secured to CH2 so that the transmitter may be moved in and out of the channel for tube replacement or inspection. Figure 11A shows how the cabinet was drilled and a bracing bracket was attached to the channel for a typical installation. Enough paint should be removed from CH2 and the auto support member at the mounting point to assure good electrical bonding. The RF and power cabling to the Viking Mobile should be made as short and simple as ease of attachment and convenient training from one component to another will allow. The description of the cabling will be found in Part 6.

5. Mobile Antenna and Feedline Discussion.

- a. The Viking Mobile will operate nicely into the conventional amateur Mobile center loaded whip antennas available from most jobbers. The design centers of the output circuit of the transmitter allowed for approximately 15 feet of 50 ohm transmission line. The transmission line should be kept within 14 and 17 feet for best transmitter loading conditions.
- b. The antenna should be mounted according to the manufacturer's instructions in a location which will make the terminating connections and the loading coil accessible, and which will keep the top of the whip as far from any part of the car body as possible while the whip is in the upright position. An antenna location at the forward part of the trunk on the driver's side can be recommended for most installations. See Figure 11B.
- c. The 50 ohm coaxial cable connection at the antenna base terminal should be made

with little or no inner conductor exposure through a PL259 connector, a good solder connection or a tight screw connection. The outer shield of the coaxial cable should be well grounded to the auto body right at the base of the antenna. Body paint should be scraped off at the base connection to assure good electrical contact.

- d. 10 METER ANTENNA: Little difficulty should be experienced in coupling power into a 10 meter whip antenna of the proper length (usually a little over 100 inches). The impedance characteristic of this antenna is broad enough so that the entire 10 meter band should be covered without any antenna length adjustment.
 - e. 20 METER ANTENNA: The conventional 20 meter whip requires a loading coil (usually near the middle of the whip). The coil must be adjusted to a value which will resonate the whip near the middle of the 20 meter band. The manufacturer's instruction should be followed in making this adjustment. The final setting of this coil should be made with the Viking Mobile, with feedline connected as directed in the Operating Directions of Part 7 rather than depending on a grid dipper whose calibration may be questionable. After this coil has been properly set, the antenna should be broad enough to cover the 20 meter band without further coil adjustment.
 - f. 75 METER ANTENNA: The conventional 75 meter whip also requires a loading coil (usually near the middle of the whip). The coil adjustment in the 75 meter case will prove quite critical. A single coil adjustment will usually allow an excursion of only roughly 10KC while maintaining optimum coupling conditions at the transmitter, therefore the coil inductance must be made adjustable if the whole 75 meter phone band is to be covered. The settings of the coil adjustment should be determined with the Viking Mobile, with feedline connected, as described in the Operating Instructions of Part 7. The coil tap point for the several settings in the 75 meter band should be recorded for future use during 75 meter operation. Objects in the vicinity of the antenna (roughly within 10 or 15 ft.), coil lead and tap positions, angle of the antenna with respect to the auto, and a cover over the coil all become important factors in 75 meter tuning. The loading coil Q should be high and its distributed capacitance should be low to obtain the highest efficiency and the broadest tuning characteristic from the antenna.
6. Overall System Connections - Including Receiver Interconnection. (In all cases be sure that the tune-rec-send switch is "rec" before making connections to the Viking Mobile).
- a. SEND-RECEIVE SWITCHING AT THE TRANSMITTER ONLY: The cabling which allows the tune-rec-send switch to transfer the antenna circuit, switch the dynamotor and disable the receiver is shown in Figure 11C. Cable II runs from the receiver power supply to the transmitter receptacle, J6. A 7 pin plug, PL6, similar to an Amphenol 78PF7S is used to connect cables II and III to J6. The cable connections shown in Figure 11C are described below:
 - (1) Leads H and I are the auto receiver disabling circuit to the transmitter. The schematic diagram and the wiring of the auto receiver should be examined to determine the best point to break the vibrator input circuit. Leads H and I should be shielded conductors (#20 or larger) or a shielded pair connected to pins 7 and 6 respectively on PL6. The shield braid is connected to pin 2. Solder all connections.

- (2) Solder jumper wires across pins 4 and 5 and across pins 3 and 2 of PL6 to complete the dynamotor relay connections through SW3 of the Viking Mobile.
- (3) Cable III 3 is a shielded antenna lead between pin 1 of PL6 and the antenna input terminal of the short wave converter. Make good soldered connections at both ends of the conductor and ground the braid to pin 2 of PL6 and the chassis of the shortwave converter. Solder both ground connections.

b. PUSH-TO-TALK RELAY SWITCHING: A push-to-talk installation is shown in Figure 12A. The push-to-talk relay and associated terminals can be mounted in a convenient place behind the dashboard, on the firewall, or on the transmitter cabinet channel, preferably near the transmitter to keep the antenna lead length between the converter and the transmitter short and to keep the overall coaxial line from the transmitter to the mobile antenna as near 15 feet as possible.

The components and cabling are suggested below.

- (1) The antenna relay (ANT RLY) can be a simple DPDT 6 volt relay capable of carrying the output RF voltage and current of the Viking Mobile. Relays similar to the Leach 227, Leach 1077BF, Advance 1604, or Ward Leonard 507-532 probably will be adequate in most applications. More elaborate installations may include coaxial type relays with auxiliary contacts for receiver disabling. The relay coil should demand no more than 1/2 ampere of current at 6 volts. To facilitate mounting and connecting the relay, a terminal strip similar to the Jones 140 series and the relay can be mounted on a 3" x 3" or 4" x 4" piece of aluminum or bakelite. Then cables IV, VI, and III and the relay wiring can be completed before the relay is installed in the auto.
- (2) Cable IV from the ANT RLY to PL6, the female 7 pin connector (similar to Amphenol 78PF7S) is made up of a shielded pair (K and L), an individually shielded antenna conductor (M) and two unshielded conductors (N and O). Solder all leads at PL6 and solder the shield braid connections together and to pin 2 of PL6. Trim, dress, and solder terminal lugs on the cable leads and connect the leads and shields at the relay end to the terminal strip. Cable II consists of a shielded pair of conductors, G and H, from the receiver vibrator input to the ANT RLY terminal strip. Solder the conductors and grounding shield securely at the receiver. Trim, dress, solder on terminal lugs, and connect the leads at the relay end of the cable to the terminal strip. Cable V is the antenna feedline, an RG8U or an RG58U (RG8U preferred) cable, from the antenna to one of the common relay contacts of the ANT RLY. Cable VI is the transmitter output line (RG8U or RG58U) connected to the normally open contact on the set of contacts to which Cable V was connected. Cables VI and V should be fastened very near the ANT RLY contacts to minimize the exposure of the inner conductor due to an inductive loop in the inner conductor through the relay contacts. Connect a short heavy (#18 or larger) jumper between the outer conductors of the cable at the relay. The combined length of Cables V and VI should be between 14 and 17 feet in length for best transmitter loading. Terminate the transmitter end of cable VI in a PL259 coax. plug. Solder all connections on cables V and VI carefully.

c. The overall complete system cabling is shown in Figure 12B. The system may be simplified by eliminating the push-to-talk ANT RLY. Cables II and III are then connected to PL6 and cable V is terminated in the PL259 coax plug at the transmitter. Cable VI is eliminated. The system can be further simplified by disconnecting cables VII and VIII of the VFO and operating with crystals, leaving cables I, II, III, V and IX as the only connections necessary. The cable references or functions are listed below:

- (1) Cable I is shown in Figure 10B and described in part 3c (5).
- (2) Cables II and III are shown in Figure 11C and described in part 6a (1) (2) for no push-to-talk operation. They are shown in Figure 12A and described in part 6b (2) where a push-to-talk system is used.
- (3) Cable IV is shown in Figure 12A and described in part 6b (2). It is not necessary where a push-to-talk ANT RLY is not installed.
- (4) Cable V is the antenna feedline to the mobile antenna. It should be made up of a 50 ohm RG8U or RG58U (RG8U preferred) coax line of 14 to 17 ft. length when connected directly to the Viking Mobile or of a combined length with cable VI of 14 to 17 feet where a push-to-talk ANT RLY is used. Cable V should be trained along the floor or chassis of the car by the most direct path connecting the transmitter and the antenna.
- (5) Cable VI is the 50 ohm line (RG8U or RG58U) connection from the transmitter to the ANT RLY (used only with push-to-talk operation). Cable VII is the VFO R.F. lead - usually an RG59U lead terminated in a PL259 coax plug for connection to J1. Cable VIII is a 3 conductor shielded power cable to supply power and to close the keying circuit of the VFO (similar to the Viking VFO). An octal male connection similar to the amphenol 86PMS should terminate the cable.
- (6) Cable IX is the power source to the shortwave converter from the auto broadcast receiver. The converter manufacturer's recommendations should be consulted before making these connections.
- (7) The microphone and cable X complete the mike and push-to-talk circuits. Cable X should be a shielded two conductor cable connecting the case of the mike to the sleeve of a 3 circuit PL68 type plug via the shield, the button of a carbon mike or the "active" element of a crystal or high level dynamic mike to the ring, and the push-to-talk button to the tip terminal.

7. Operating Directions

- a. PRE-OPERATING CHECKOFF LIST: Review the following checkoff list carefully before attempting to operate the Viking Mobile in test or in initial operation to prevent damage of equipment and to obtain maximum operating satisfaction.
 - (1) _____ Make certain all tubes and knobs are in place as directed in part 1 of these Operating Instructions. Do not operate with a partial tube complement.
 - (2) _____ Make certain that the Final Power Amplifier screen dropping resistor (R15, R16, R17) is set for the voltage range of the power supply as directed in part 3d.
 - (3) _____ When operating the transmitter normally or during the antenna system tuneup place the transmitter in the cabinet and secure it with all the screws and shakeproofs including the oscillator and buffer shield grounding brackets at the upper sides of the cabinet.
 - (4) _____ Make certain that the dropping resistor in the power supply has tap settings to provide the proper operating voltage on the exciter stages as directed in part 3c.
 - (5) _____ Make certain the power supply used is properly fused before using it to feed the Viking Mobile. Fusing suggestions for mobile power supplies are given in part 3c.
 - (6) _____ If the power supply used is suspected of having poor regulation, check the operating voltages with a voltmeter under operating conditions of light final loading and heavy final loading to make sure the low voltage stages do not have more than 350 volts applied to them at any time. If a 600 volt power supply is used, make certain the lightly loaded conditions do not allow the voltage to exceed 650 volts in any case. Do not modulate

the Viking Mobile when more than 600 volts are applied to the Final and Modulator plates.

- (7) Have the antenna nearly resonated so that the Viking Mobile will not be operated for any length of time with the Final Stage unloaded. A dummy load should be used during testing to present a partial load to the Final. A 100 watt or 200 watt lamp bulb with short connections will provide sufficient loading for most checkout purposes.
- (8) Do not operate the Viking Mobile on "send" for long periods (over 2 or 3 minutes) without final grid drive if it can be avoided.
- (9) If the Viking Mobile is wired for a carbon microphone, be sure that the microphone is connected and the button is in the circuit before operating on "tune" or "send". The audio control may be turned down.
- (10) When the push-to-talk system is used, the push-to-talk switch on the mike (or external circuit) must be operated on either "tune" or "send".
- (11) When the transmitter is not tuned up for proper Final grid current (2.0 to 2.5 while on send) set the Drive Control on "5" so that the buffer tube will draw current and improve the LVB+ regulation.
- (12) Check the battery, regulator, and generator on the auto during operation to make sure that the battery will not be quickly run down by mobile transmitter operation. The car should be run during any mobile transmission of more than two or three minutes.

b. TUNEUP TO OBTAIN GRID DRIVE. The procedure is the same for all bands.

- (1) Connect crystals, or a VFO capable of applying 5 to 6 volts of RF, at the grid of the input 6BH6 stage of the transmitter (A VFO similar to the Viking VFO). The Viking or VFO frequency for operation in the 75, 20, and 10 meter phone bands are listed below:

<u>Viking Mobile on:</u>	<u>Crystal or VFO Frequency</u>
75 meter band	160 meter or 75 meter
20 meter band	80 meter or 40 meter (160 meters will work in most cases)
10 meter band	40 meters (80 meter crystal or VFO output will work in some cases)

To connect the crystal desired, turn the crystal selector knob until the marker is toward the crystal. Turn the knob until the marker is straight down for VFO connection.

- (2) Turn the Drive Control to "5" the bandswitch to the band desired (75, 20, or 10), and the Meter switch to "grid".
- (3) Turn the tune-rec-send switch to "tune" and tune the Gang Tune control for maximum grid current. Adjust the Drive control for a grid current of 3 ma on the 10 ma scale. If no grid current is indicated turn the meter switch to the "osc" and "bfr" positions for indications of proper operation in the exciter stages. The table chart below shows approximate settings for maximum grid current on 75, 20, and 10 meter bands over most of the Gang Tune range:

<u>*75 meters</u>	<u>20 meters</u>	<u>10 meters</u>
3.75 mc - 16 dial setting	14 mc - 20 dial setting	21 mc - 13 dial setting
3.80 - 25	15 - 36	24 - 26
3.85 - 37	16 - 55	24 - 48
3.90 - 48	17 - 72	26 - 62
3.95 - 54	18 - 83	28 - 73
4.00 - 75	19 - 92	30 - 85

*(Taken with cabinet off. Cabinet lowers reading 6-9 division) -----

c. 10 METER FINAL STAGE TUNEUP AND LOADING.

- (1) Make the proper antenna adjustments (short lower frequency loading coils or place the proper length whip rod in the mounting base) to bring the antenna to 10 meter resonance.
- (2) Turn coupling to "2" and the Final Trimmer Knob (above the bandswitch) to the 12 o'clock position.
- (3) Tune up the exciter on "10" according to preceding part b and turn the Meter to "plt".
- (4) Turn the tune-rec-send switch to "send" and immediately tune the Final Trimmer for a dip in "plt" current.
- (5) Recheck the "grid" current, retuning Gang Tune for maximum grid current with the final stage on and set the Drive Control for 2.0 to 2.5 ma of "grid" current.
- (6) Turn the Meter to "plt" and advance the Coupling Control until 70 to 80 ma of "plt" current are indicated (unless this amount is already indicated). Redip the Final with the Final Trimmer and advance the Coupling Control until the "plt" current begins to increase very slowly as the Coupling Control is advanced (usually between 95 and 120 ma - depending on the final tube, applied voltages, and metering tolerances). Do not advance the Coupling much beyond this point as overcoupling reduces efficiency and tends to detune the final.
- (7) Operate with the meter in "grid" position when the modulation is not being monitored in the "mod" position.

d. 20 METER FINAL STAGE TUNEUP AND LOADING.

- (1) Set the antenna and loading coil up according to the manufacturer's instructions. If a grid dipper is available, short the antenna to the auto body at the coax connection with a small jumper (no more than 1 1/2" effective length) and trim the antenna for a grid dip indication at the jumper at 14 mc. Remove the jumper.
- (2) Turn the Coupling to "2" and the Final Trimmer Knob (above the bandswitch) to the 12 o'clock position.
- (3) Tune up the exciter on 20 (initially near 14.25 mc) according to preceding part b and turn the meter to "plt".
- (4) Turn the tune-rec-send switch to "send" and immediately tune the Final Trimmer for a dip in "plt" current.
- (5) Recheck the "grid" current, retuning the Gang Tune for maximum grid indication with the Final Stage on and set the Drive Control for 2.0 to 2.5 ma "grid" current.
- (6) Turn the meter to "plt" and advance the coupling control until 70 or 80 ma of "plt" current are available unless this amount is already indicated (if the loading isn't sufficient to bring the "plt" to 70 or 80 ma, the antenna probably is not near resonance). Retune the Final Trimmer for the "plt" dip. If the Final Trimmer dips between 10 and 2 o'clock, the antenna tuning

may be close enough. If the Final trimmer is out of the 10 to 2 range adjust the loading coil inductance in small steps until the Final Trimmer moves toward 12 o'clock or slightly on the opposite side of 12 from the original position. When the correct loading inductance is found make the setting permanent. Advance the Coupling Control until the increase in plate current with Coupling Control advance becomes slow (usually 95 to 120 ma - depending on the final tube, applied voltages, and metering tolerance). Do not advance the Coupling much beyond this point as overcoupling reduces efficiency and tends to detune the final. The antenna may present a relatively low impedance to the Viking Mobile when it is in tune. In this case it will "demand" considerable "plt" current with very low coupling (near zero). This is a condition of good energy transfer and should cause no alarm even though the "plt" dip is not too distinguishable.

e. 75 METER FINAL STAGE TUNEUP AND LOADING.

- (1) Set the antenna and loading coil up according to the manufacturer's instructions. If operation over a considerable part of the 75 meter band is anticipated (more than 20KC), arrange the loading coil termination so that the inductance can be varied by means of a tap, by means of a shorted turn or by spreading turns to tune the antenna system over the 75 meter phone band. If a grid dipper is available, short the antenna to the auto body at the coax connection with a loop jumper only large enough to couple the grid dipper in effectively. Adjust the loading coil inductance for a grid dip indication at the frequency you wish to operate on. Remove the jumper. This is at best a rather rough adjustment but it should be near enough so that the antenna will absorb some power at the operating frequency.
- (2) Turn the Coupling to "2" and the Final Trimmer Knob (above the bandswitch) to the 12 o'clock position (on test with the cabinet off, this setting should be 3 o'clock).
- (3) Tune up the exciter on 75 (at operating frequency desired) according to preceding part b and turn the Meter to "plt".
- (4) Note the Gang Tune Dial setting (call it T_0) and turn tune-rec-send switch to "send". Set the Coupling control until 70 to 80 ma of plate current are indicated (unless this amount is already indicated or the loading isn't sufficient to bring the "plt" to 70 or 80 ma). Retune the Final Trimmer and the Gang Tune Knob for a plate dip. Call the new setting of the Gang Tune T_1 . If T_1 is within two or three divisions of the original setting T_0 the antenna may be nearly in tune if the final stage can be loaded with more plate current or may not be near resonance if the antenna does not "demand" plate current. If T_1 and T_0 differed more than four or five divisions or if the coupling must be advanced beyond 4 for an appreciable plate current rise go on to step (5) or step (6).
- (5) Set the Gang Tune Knob at the T_0 setting found in (4), set the final trimmer at 12 o'clock and set the Coupling Control at "0". Now adjust the antenna loading coil inductance in very small steps until the "plt" current rises markedly. This inductance setting is very near the resonant value but may be such that a high reactance is reflected into the final tank. Re-adjust the loading coil inductance so that the Gang Tune "plt" dip occurs within 5 divisions of the T_0 setting when the coupling is advanced to a 70 or 80 ma "plt" indication. The minimum Coupling setting may "demand" a higher "plt" current than 80 ma. In this case look for the Gang Tune "plt" dip at the "0" coupling setting. When the proper loading coil inductance is found, the setting should be recorded. Loading coil settings for other frequencies can be determined from the point found at the initial tuneup.

The inductance is less for higher frequencies and greater for lower frequencies. When new loading coil settings are found, they should be recorded for future operating. When the correct antenna loading coil setting has been found, adjust the Drive Control for 2.0 to 2.5 ma of grid current and advance the Coupling control until the "plt" current increase begins to level off (between 95 and 120 ma depending on the tube, voltages, and metering tolerance). Do not advance the Coupling beyond the leveling off point as poor efficiency and detuning result.

- (6) If difficulty was encountered in finding the 75 meter antenna resonance point by means of the Viking Mobile "plt" indications as discussed in step (5), an external detector such as a nearby communications receiver with a short antenna, a simple resonated loop, crystal, and microammeter combination or a small antenna whip with a crystal and microammeter detector combination may prove helpful in comparing field strengths as the initial antenna loading coil and Gang Tune settings are made. Again set the Gang Tune to the maximum grid current setting, T_0 , and the Coupling to 0. Observe the detector, each time after the antenna coil has been varied, to determine the setting for the best field strength. That setting is very near the desired setting. Slight readjustment may be necessary to allow the antenna to present a resistive load to the transmitter as evidenced by a "plt" dip near T_0 when the Gang Tune is tuned. In some cases the antenna resistance may be so low that the transmitter is nearly fully loaded with the Coupling at 0. In these cases, a "plt" dip may not be found but the evidence of the antenna "demanding" plate current is usually sufficient assurance that the final plate is near resonance and that power is being taken from the plate circuit. When the antenna loading coil setting has been found, adjust the Drive Control and the Coupling as directed in the last part of (5).
- (7) 75 METER FINAL TUNING AND LOADING AS THE OPERATING FREQUENCY IS MOVED AWAY FROM THE ANTENNA LOADING COIL ADJUSTMENT FREQUENCY. A frequency excursion of 10KC can usually be made without retuning the antenna loading coil. The Coupling control, the Final Trimmer, the Gang Tune control, and the Drive control must be adjusted at each frequency change of more than several KC from the setting frequency. At the extremes of the frequency excursion the broad grid drive characteristic of the Viking Mobile may be utilized after the Final Trimmer has been adjusted to either extreme (9:00 or 3:00 o'clock) in attempting to reach plate resonance, by turning Gang Tune for a "plt" dip (with "plt" at 70 to 80 ma). The Drive Control should be adjusted with each adjustment of Gang Tune to keep the "grid" current between 2 and 2.5 ma. More than 10KC excursions can be made with the Final stage near resonance but not perfectly "dipped" with little or no fall off in output. The 75 meter tuning appears very broad because only a small part of the total stage capacities appear at the tuning condensers. Experience in operating the unit will facilitate 75 meter loading considerably.
- (8) MODULATION: Speak closely into the microphone and turn up the audio control until peaks of 90 to 110 ma are noted in the "mod" current. These peaks correspond to modulation near 100%. The quality of carbon mike modulation will usually be limited by the microphone itself. The classic F1 carbon microphone button has brought excellent carbon microphone quality reports. Crystal or dynamic microphones should have an output level of -52 db or greater. The modulator no signal current should fall between 15 and 40 ma.

8. Typical Operating Values and Trouble Shooting

The schematic diagram, photos and charts of Figures 1 through 8 will be helpful

in locating components and analyzing symptoms of trouble in the Viking Mobile. The typical operating values should be used as guides only. Values on individual transmitters can vary 10 to 20% due to component and metering tolerances.

BE CAREFUL while operating the transmitter out of the cabinet. The voltages on all stages are exposed and can be very dangerous. When tests are made with a fixed power supply for the high or low voltage stages, REMEMBER that the FIL. switch DOES NOT TURN OFF THE HIGH VOLTAGE SOURCE.

a. TYPICAL OPERATING VALUES: Voltage measurements were made with a 20,000 ohm per volt voltmeter.

- (1) Output Frequency 28.868 mc
- Crystal used 7.217 mc
- Carbon microphone connected

High Voltage source 520 volts on "tune"
500 volts on "send"

Power Supply Dropping Resistor to LV#2 4600 ohms
to LV#1 4200 ohms

Viking Mobile Meter Indications	On "Tune"	On "Send"
Osc	7.9 ma	7.9 ma
bfr	11.0	12.8
grid	3.0	2.5
plt		109
mod		24

Voltage Measurements

Low Voltage B+	LVB+#2 (tune)	LVB+#1 (send)
	297 volts	293 volts

Buffer (6AQ5) screen +83 volts (this will run higher where a higher "Drive" setting is required)
pin 5 of X2

Speech Amplifier plate +205
pin 5 of X5

Speech Amplifier screen +130
pin 6 of X5

Speech Amplifier cathode +0.8
pin 2 of X5

Audio Driver screen +150
pin 6 of X6

Audio Driver plate +287
pin 5 of X6

Audio Driver cathode +1.5
pin 2 of X6

Buffer Bias Voltage -17.5
second terminal from the middle of the chassis on X10

Modulator Bias voltage -36
third terminal from the middle of the chassis on X10

Final Bias voltage -63 (with 2.5 ma grid current)
fifth terminal from the middle of the chassis on X10

Power Output 32 watts in a 50 ohm load.

- (2) As in part (1) but with the speech amplifier wired for a crystal microphone and the power supply low voltage dropping resistors set at the recommended values of:
- | | |
|------|-----------|
| LV#2 | 5000 ohms |
| LV#1 | 4600 ohms |

Speech Amplifier plate +110 volts
pin 5 of X5

Speech Amplifier screen +100

- (3) As in part (1) with a Viking VFO used to drive the Viking Mobile and the low Voltage Dropping Resistors set at the recommended values of:
- | | |
|------|-----------|
| LV#2 | 3800 ohms |
| LV#1 | 3300 ohms |
- "Osc" current 10.4 ma
Other readings essentially as in part (1)

- (4) Transformer winding resistances

T1 Driver transformer primary red to blu	900 ohms
secondary gn to blk	1200
yel to blk	1100

T2 Modulation Transformer primary brn to red	97 ohms
blue to red	103
secondary red to ivory	97

b. TROUBLE SYMPTOMS AND CORRECTIONS: No attempt has been made to anticipate all causes of possible trouble but it is hoped that the following listings will aid in suggesting means of locating most of the trouble symptoms which are not probable but are possible.

- (1) Fuse, F2 (see Figure 10B). blows when the "Fil" switch is turned on and SW3 is on "rec".
(a) Check filament wiring, tube sockets and J4.
- (2) Fuse, F2 (see Figure 10B), blows when the "fil" switch is on and SW3 is turned to "tune" from "rec".
(a) Check Cable I, conductor B, or the Dynamotor Relay, Dyn Rly.
- (3) Fuse, F1 (see Figure 10B), blows when SW3 is turned to "tune".
(a) Check all dynamotor leads, the dynamotor, or the dynamotor relay, Dyn Rly, for short circuits.
- (4) Fuse, F1 (see Figure 10B) blows when SW3 is turned to send but does not blow on "tune".
(a) If the fuse blows immediately, check the High Voltage B+ line at Cable I (conductor F), SW3B, the Final Tank Coils, C22, C23, the modulation transformer, T2, and the Modulator and Final tubes.

- (b) If F_1 blows shortly after SW3 is turned to "send" but not immediately, F_1 may be marginal in rating or the fuse holder may be faulty.
- (5) The dynamotor does not come on with "fil" up and SW2 on "tune" or "send".
 (a) Check the jumper or push-to-talk circuits with Figures 11C or 12A to make sure the Dyn Rly circuit is complete.
 (b) Check the dynamotor relay, Dyn Rly, and the dynamotor input fuse, F_1 .
- (6) The dynamotor comes on but no "osc" or "bfr" current indication is noted on "tune".
 (a) The LVB line of the transmitter may be shorted or open. Trace the LVB line for the LVB #2 source (see Figure 10B) through J5, SW3A, the oscillator and buffer tanks, the bias supply and the audio amplifier plates.
- (7) "Osc" and "bfr" current is indicated but no "grid" current can be obtained even at high settings of "Drive".
 (a) Check the crystal for oscillation or the VFO excitation by turning the crystal switch and observing the "osc" current drop when the crystal or VFO is connected. If no change of "osc" current takes place, check the oscillator circuit, the crystal, or VFO.
 (b) Check the "bfr" current for change as the gang tune knob is adjusted through the oscillator frequency range. If no change is noted, check the bandswitch positioning, or look for short circuits or open circuits on the oscillator tank components.
 (c) If the "bfr" current change is noted, check the final tube for filament lighting, the final grid connections and the grid DC return circuit L5, R12, R13, R22, and R23 for continuity to the chassis.
- (8) Crystal drops out of oscillation while tuning on 20 and 75 meters:
 (a) The feedback from the plate to screen on the 6BH6 is high enough to block oscillations on some crystals when the gang tune is tuned slightly higher than the crystal frequency. Setting the gang tune knob slightly on the low dial number side of the indicated resonance will prevent a crystal, with this tendency, from "falling out".
- (9) "Grid" current weak (below 2 ma maximum) on 10 and 20 meters:
 (a) Check alignment of the ganged condensers. Loosen the coupling at the rear of C3 (see Figure 6B), readjust C3 for maximum grid current on 10 meters and tighten the coupling setscrews securely with the C3 rotor held rigidly in the maximum 10 meter grid current positions.
 (b) Check the LVB voltage at the top pin of L1 or at the dynamotor. It should be 250 to 300 volts--preferably 275 to 300 volts.
 (c) Check for "cold" solder joints in the oscillator or buffer RF circuits.
 (d) Check the VFO input or crystal activity by noting the drop in "osc" current as described in (7) (a). The current drop should normally be more than 2 ma if adequate drive is provided by a VFO or 4 ma if a crystal of good activity is used.
- (10) Final tuning is erratic. The plate dip occurs at the extremes of the final trimmer knob on 10 and 20 meters or the gang tune "plt" dip is away from the maximum grid current setting by more than 6 to 8 divisions on 75 meters:
 (a) The antenna is not resonant due to incorrect length or loading coil settings.
 (b) An open or shorted transmission line may be suspected.
 (c) The transmission line outer shield bonding may be poor.
- (11) No Modulator drive as indicated by no "mod" current swings:
 (a) Check the microphone connections to the mike plug.
 (b) Check the wiring and tubes of the audio amplifiers.

- (12) High Modulator current indications (over 40 ma) when the final has 2 to 2.5 ma of grid current and rises to over 100 ma when the drive control is turned down:
- (a) Check the bias supply on "tune" for output bias voltage. It should be greater than 20 volts (usually between 20 and 30 volts depending on the applied LVB+).
 - (b) If "grid" current of 2.5 ma is easily obtained on all bands, the "mod" current runs high (around 40 to 50 ma), and the bias supply seems to be normal except that a low bias voltage is indicated, move the yellow lead to the second tap from the top on L1⁴ (see Figures 3B and 3C) of the bias supply. The bias supply shield must be replaced before rechecking the operation of the unit with the transmitter, as the shield lowers the output to a small extent.
- (13) Carbon quality poor or noisy.
- (a) This is usually the limitation of the microphone itself. Try another carbon microphone if available. The F₁ type microphone has received excellent quality reports in the Viking Mobile.
 - (b) Check connections at the microphone and jack plug. Check the shield connections on the microphone cord.
 - (c) Clean the microphone jack and plug.
 - (d) Experiment with the method of talking into the microphone.
- (14) Audio oscillation or hum takes place when the speech amplifier is wired for high gain and a crystal or dynamic microphone is connected.
- (a) Check the microphone and cord for good case and shield ground connections.
 - (b) Some small microphones may have ungrounded cases. They usually cannot be operated without connecting the case to the ground shield.

9. Use of external power supplies as low voltage B+ sources for the exciter, speech amplifiers and VFO. Use of a common power supply for receiving and transmitting.

The flexible switching of the Viking Mobile allows use of a separate low voltage power supply or the receiver power supply in some cases where this may prove to be advantageous to the user. The following parts a, b, c and d, outline several possibilities of using such external sources. Part e discusses means of using the transmitter power supply as a receiver source when that power supply and associated noise suppression devices are suitable for receiver use.

- a. Use of a power supply, other than the high voltage plate supply, to supply all low voltage plates on "tune" and "send".

The separate power supply must have a voltage over 250 volts under a load of 65 ma. To use push-to-talk operation, the external power supply input must be connected with that of the high voltage plate supply. Make the other connections as follows:

- (1) Refer to Figure 10B. Disconnect the LVB+ conductors F and G.
- (2) Connect pins 3 and 5 of PL5 together and to the separate low voltage plate source.

- b. Use of a power supply, other than the high voltage plate power supply, to supply all the low voltage plates on "tune" but the normal dropping resistor arrangement is used on "send".

The receiver power supply might be used if it has the additional power capability and voltage requirements (over 250 volts under 65 ma load).

- (1) Refer to Figure 10B. Disconnect conductor G.

- (2) Connect pin 5 of PL5 to the LV source to be used on "tune".
- c. Power for the VFO obtained from the receiver power supply on "tune". The receiver must be able to supply from 10 to 12 ma of additional current at 200 volts or more to operate the VFO. The advantage of this connection is that the VFO frequency can be set without starting the dynamotor. The receiver antenna coupling to the VFO must be adjusted in the transmitter or externally so that the signal to be monitored can be heard in the receiver. This signal may be the fourth harmonic in some cases. It is probable that a rough exciter setting at the transmitter can be made by turning the gang tune knob to the position of maximum receiver signal. Refer to Figure 8, 1A, 5B and 10B while carrying out the following steps:
- (1) Connect conductor G at pin 5 of PL5 to the receiver power supply instead of LVB+#2 (figure 10B).
 - (2) Move the red lead, now on contact 11, of the front wafer SW3A of the tune-rec-send switch to the next contact, 12, in a clockwise direction (viewed from the front). The yellow and red leads will now be connected together. Solder the connection at contacts 11 and 12.
 - (3) Move the green lead on contact 11 of the rear wafer SW3B to the next counter-clockwise contact, 10 (viewed from the front).
- d. Power for the VFO obtained as in c, but with receiver B+ also applied to the 6BH6 oscillator stage of the transmitter to increase receiver pickup on "tune". The drain from the receiver may run from 15 to 25 ma depending on the B voltage. Refer to Figures 8, 1A, 5B and 10B.
- (1) Make the two changes listed in c.
 - (2) Remove the jumper between the middle terminal and the second terminal from the rear on terminal strip, X9, (Figure 1A).
 - (3) Move the connection of L3, a single pi RFC, from the middle terminal on X9 to the second terminal from the rear on X9.
 - (4) Run a connecting lead from the VFO power socket J4, pin 3, to the middle terminal on X9. Solder all connections of parts (2) through (4).
- e. Use of a common power supply for transmitting and receiving.
- The possibility of operating the Viking Mobile at relatively low modulator and final plate voltages may make operating the transmitter and receiver on a common power supply desirable in some cases. The output voltage of the power supply should be below 400 volts under light loading to assure safe switching and reasonable receiver plate voltage regulation. The noise suppression of such a common power supply must be sufficient to bring the noise level below the receiving signal level. The receiver filaments should be turned on before the transmitter filaments are turned on in all cases. Turning on the transmitter filament switch, SW5, energizes the common power supply. SW3 should initially be on "rec" or "tune". The normal connections at the Viking Mobile are modified as follows:
- (1) Conductors H and I of cable II are not connected as shown in Figures 11C and 12A. Instead, connect pin 4 of J5 to pin 7 of J6 (preferably through the plugs). Connect pin 7 to the inner conductor of a shielded lead, the other end of which is connected through a suitable dropping resistor to the receiver B+ terminal. The dropping resistor value must be adjusted to provide the recommended B+ voltage at the receiver plates. The shield of the connecting lead can provide the ground B- connection. If push-to-talk operation is used, the Ant Rly contacts must break the B+ voltage to the receiver rather than appear across conductors H and I as shown in Figure 12A.

- (2) Connect pin 4 of J6 to pin 7 of J4 (preferably through the plugs) to energize the common power supply during receiving or sending.
10. Instructions for changing the Audio Input Circuit to Carbon Microphone or to High Level Crystal and Dynamic Microphone Operation. Refer to Figures 8, 5A and 1A.
- a. Changing the speech amplifier from a low gain carbon microphone circuit to a high gain circuit for high level crystal or dynamic microphones.
- (1) Remove the ground connection on pin 1 of the speech amplifier, X5, and move the inner conductor of W7 from pin 2 to pin 1 on X5.
 - (2) Connect R26, a 1 megohm, 1/2 watt resistor, between pin 1 and 7 of X5.
 - (3) Connect R27, a 1,000 ohm, 1/2 watt resistor, between pins 2 and 7 of X5 (it may be more convenient to ground R27 on the bus wire connected to pin 7 rather than on pin 7 directly).
 - (4) Replace the 47,000 ohm 1/2 watt resistor, R28B, between pin 6 of X5 and the middle terminal of terminal strip, X14, with a 470,000/1/2 watt resistor, R28A.
 - (5) Replace the 10,000 ohm, 2 watt resistor, between pin 5 of X5 and the middle terminal of terminal strip X14 with a 220,000 ohm, 1 watt resistor, R29A.
 - (6) Replace the jumper between the rear and middle terminals on X14 with a 22,000 ohm, 1/2 watt resistor.
 - (7) Solder all connections made above.
- b. Changing the speech amplifier from a high gain circuit to the low gain circuit for carbon microphone operation:
- (1) Remove R27, a 1,000 ohm, 1/2 watt resistor, connected between pins 2 and 7 of the speech amplifier socket, X5.
 - (2) Move the input lead, W7, inner conductor to pin 2 of X5 and connect a jumper between pins 1 and 7 of X5.
 - (3) Replace R28A, a 470,000 ohm 1/2 watt resistor with a 47,000 ohm 1/2 watt resistor, R28B.
 - (4) Replace R29A, a 220,000 ohm, 1 watt resistor with a 10,000 ohm, 2 watt resistor, R29B.
 - (5) Connect a jumper across the rear and middle terminals of the terminal strip, X14, shorting out the 22,000 ohm resistor.
- c. The microphone cable connections are similar on the carbon and crystal microphones. The connections are described in part 6c (7) on page 12 of the Operating Manual.
11. 40 Meter Band addition at the "40" bandswitch position (parts a through e) and a discussion of 15 meter tracking on the 10 meter band position of the Viking Mobile (part f).
- a. Step b of this part should be completed with the assembly of the transmitter starting at parts 13 and 14 of the Assembly details. No extra parts beyond those furnished with the kit are necessary for step b, but if the 40 meter addition is to be completed at this time the following extra parts should be on hand:

one 4700 ohm 2 watt resistor (1/4" x 1 1/4" IRC)
 one 6800 ohm 2 watt resistor (1/4" x 1 1/2" IRC)
 one 2 watt resistor (1/4" x 1 1/4" IRC) of 4700 ohms
 or greater resistance for use as a coil form.
 ten feet of #28 enamelled, formex, cotton or silk
 covered magnet wire.

1 - 300 MMFD $\pm 5\%$ 500WV SILVER MICA CM20 CASE

PARTS SUPPLIED
 WITH KIT

one small 3-12 mmfd ceramic or mica trimmer condenser or three small 4.7 to 5 mmfd fixed tubular ceramic condensers.

b. 40 meter additions referred to in the Assembly Details, parts 13 and 14 on page 17. These additions can be made later but some disassembly and inconvenience will be involved.

- (1) Before the oscillator shield, SH1, (see Figure 1C) is mounted, connect and solder a 2 1/2" lead of black plastic wire to contact 4 of SW2B. Train the lead upward if the 40 meter connections are to be completed at this time or fold the lead back on itself neatly if later connection is intended.
- (2) If contacts are not already attached to position 10 (between 9 and 11 -- see Figure 2F) on SW2D, turn the rotor sector away from positions 9 and 11, and add the contacts found in a separate envelope to position 10. Secure the contacts with the 2-56 screw (inserted from the rear), the #2 shake-proof and a 2-56 nut. Reset the rotor sector to its original position where it should now engage contacts 9, 10 and 11.
- (3) Place a connection between contacts 1 and 5 of SW2C (see Figure 2E). Use #18 tinned wire and bridge the connection over contact 3 and down to 5 to avoid extending any leads in front of SW2C. Solder at both contact terminals.

c. 40 meter final stage wiring to utilize the 75 meter coil for 40 meters (the 75 meter coil presents a high loaded Q at 75 meters, hence it provides a good compromise for 40 meter tuning). The following two steps supplement those of part 18N, page 40, of the Assembly Details:

- (1) Do not connect C24 to the lead, Y28, just above contact 9 of SW2D as directed but connect the lower lead of C24 to contact 10 (see Figures 2F and 5A) instead and solder it.
- (2) Connect a jumper of #18 tinned wire between lead Y28 (at contact 9) and contact 1 of SW2D (refer to Figures 2C, 2F and 5A). Space the jumper 1/16" from other leads or contacts. Solder both ends of the jumper.

d. Complete the following connections to the "40" band position on the buffer and oscillator bandswitches, SW2B and SW2A respectively, before tuneup of the Viking Mobile. If the 40 meter band is added after original tuneup, detuning due to stray capacities will take place only on 75 meters and will generally be small enough to be ignored.

- (1) Refer to Figure 5A. Drill a 1/8" hole through the phenolic board 1/2" behind the right rear (looking from front) stator terminal of C11. Mount a #6 teardrop solder terminal (pointed toward the front of the chassis) above the phenolic board with a 1/4" 4-40 screw and a 4-40 nut at the hole just drilled.
- (2) Connect the 2 1/2" lead on contact 4 of SW2B to the teardrop just mounted, as directly as possible, while clearing transformer, T2, and the condenser mounting board. Remove any excess lead.
- (3) Temporarily connect the 4700 ohm, 2 watt, resistor between the teardrop mounted in step (2) and the third pin from the top of L2B (lower terminal of the upper coil) by solder, tacking the leads of the resistor at the terminals.
- (4) Connect and solder the 6800 ohm 2 watt resistor between the second terminal from the bottom of L1, the oscillator coil, and contact 10 of the oscillator switch wafer SW2A (see Figure 1B). The resistor should be between the wafer and the shield, SH1.

e. 40 Meter Tuneup.

- (1) Tune up the 10, 20 and 75 meter band positions as outlined under part 26 of the Assembly and Tuneup Details with the exception that the 75 meter padding condenser C24D is connected directly across one of the outer 500 mmfd condensers of C24 rather than as shown in Figure 9E.
- (2) Turn SW3 to "rec", Fil switch up, SW2 to "40", the final trimmer to 1:30, and the Drive control to 7 or 8.
- (3) Connect a 40 or 80 meter crystal or VFO through SW1 to the first RF, 6BH6, stage to excite the transmitter in the 40 meter phone band.
- (4) Turn SW3 to "tune" and adjust Gang Tune for a maximum indication of "grid" current. Record this setting as B₄₀ 43 dial setting at 7168 mc. *42/7188*
- (5) Turn SW3 to "send" and adjust Gang Tune for a dip in "plt" current and record this setting as P₄₀ 52 dial setting at _____ mc. Turn SW3 to "rec". *42-5188*
- (6) Determine the difference of P₄₀ - B₄₀ = D_B. If D_B is 3 divisions or greater, the B₄₀ reading should be brought to a value within 3 divisions P₄₀ by adding capacity across the 4700 ohm resistor behind C11. Approximately one mmfd of capacity per dial division difference, D_B, will correct the buffer Gang Tune setting to the desired value. If 4.7 or 5 mmfd fixed tubular ceramic condensers are available connect them directly across the 4700 ohm resistor or in series-parallel combinations to approximate the capacity needed.
 - (a) If D_B is 3 divisions -- Connect two 5 mmfd units in series but less than 5
 - (b) If D_B is 5 divisions -- Connect one 5 mmfd unit but less than 7
 - (c) If D_B is 7 divisions -- Connect one 5 mmfd unit in parallel but less than 9 with two in series
 - (d) If D_B is 9 divisions -- Connect two 5 mmfd units in parallel but less than 12
 - (e) If D_B is 12 divisions -- Connect three 5 mmfd units in parallel but less than 16

If a small 3-12 mmfd ceramic trimmer is available connect it across the 4700 ohm resistor in a manner to keep the stray capacity to the buffer condenser, C11, and the condenser mounting board at a minimum and adjust the condenser by trial until the new setting of B₄₀ is near P₄₀ (within 3 divisions). Record B₄₀ 43 dial setting. Solder the 4700 ohm resistor and condenser connections permanently after making certain that the new maximum "grid" current setting, B'40, is within 3 divisions of P₄₀.

- (7) Turn SW3 to "rec" and loosen the coupling, D19, behind the oscillator condenser, C3. Reset the buffer and final condensers approximately to the B'40 position. Turn SW3 to "tune" and adjust the oscillator condenser with the Gang Tune knob for maximum "grid" current indication. Record this setting as O₄₀ _____ dial setting at f₄₀ _____ mc.
- (8) Make up an inductor on the 2 watt 1 1/4" x 1/4" coil form resistor (4700 ohms or greater) according to the following schedule:

If O₄₀ - B'40 is:

less than 3 divisions	Do not make up the inductor - consider the oscillator in tune.
more than 3 divisions but less than 6	closewind 70 turns of #28 wire on the resistor

more than 6 divisions
but less than 10

close wind 40 turns of #28
wire on the resistor

more than 10 divisions
but less than 14

closewind 22 turns of #28 wire
on the resistor

more than 14 divisions
but less than 18

closewind 10 turns of #28
wire on the resistor

Solder both ends of the coil at the leads at the end of the resistor.
Secure the turns with tape or coil dope to keep the coil from unwinding.

- (9) Mount the coil just made over the flexible trimmer shaft between contact 11 (see Figure 1B for contact numbering) of the oscillator wafer SW2A and the second pin from the top of the oscillator coil (lower terminal of the upper winding), L1. Remove the 6BH6 speech amplifier and oscillator tubes to facilitate this connection. Solder the coil form leads at both terminals. Recheck the oscillator tuning setting O_{40} . It should now be within 4 divisions of B'_{40} . If a closer setting of O_{40} is desired, remove the coil and adjust the number of turns to bring the oscillator setting O_{40} closer to the buffer setting B_{40} .
- (10) Realign the ganged condensers at their fully meshed position and tighten the coupling, D19, setscrews securely.
- (11) The operating and antenna tuneup of 40 meters will be essentially the same as that of 75 meters described in part 7e on page 15 of this Operation Manual.

f. 15 meter tracking discussion. The 15 meter band may be tracked at the maximum capacity end of the 10 meter band position by adjusting the 10 meter components to allow the ganged condensers to track near the extremes of the condenser travel (hitherto unnecessary). Detailed instructions will not be given but the expected initial conditions and generally what may be done to track each stage will be discussed.

- (1) Drive requirements for 15 meter operation. A VFO or crystal in the 5.250 to 5.3625 mc range is the basic normal requirement for 15 meter drive where doubling takes place both in the oscillator and buffer stage. A 3.5 to 3.575 mc crystal or VFO (fundamental) may provide useful excitation to drive the final sufficiently for reasonable output efficiency. In this case the frequency is tripled in the oscillator and doubled in the buffer. 5313
5363
- (2) The oscillator stage tank probably will be found to tune 10 meters (oscillator output on 20 meters) at dial settings of 75 to 85, and 15 meters (oscillator output at one half the 15 meter frequency) in the 10 to 15 dial setting region. 15 meter dial settings can be found by observing small buffer current variations at those dial settings or much more easily observed by decoupling the oscillator condenser and setting the buffer condenser independently of the oscillator condenser (REMEMBER B+ VOLTAGE APPEARS ON THE CONDENSER STATORS when SW3 is on "tune"). The maximum "grid" current indication may then be found as the oscillator condenser is turned. If the oscillator tuning is found to be in the dial regions mentioned above these settings will be used as reference points for the buffer and final tracking.
- (3) The buffer will probably be found initially to resonate at 15 meters in the region of 30° to 35° (dial settings of 16 to 20 when ganged) from the maximum capacity setting. The buffer stage must be adjusted to resonate at 15 meters in the region of 8 to 12 dial setting and 10 meters at or just above

the previous 10 meter resonant position. To accomplish this, move the buffer 6AQ5 plate tap on the 10 meter buffer coil, L2A, to the 7/8 turn position (from the 1 1/2 turn position). The eye on the connecting tap can be opened with a knife blade as heat is applied with a soldering iron. Now retune the buffer to the oscillator by spreading the 10 meter coil at both ends until the maximum "grid" current is obtained at or just above (1 or 2 divisions above) the previous 10 meter gang tune setting, or even better at the Gang Tune setting of "plt" dip when the final trimmer is set between 10 and 11 o'clock.

- (4) The final "plt" dip at 15 meters probably will be initially found at the maximum engaged position of the final condenser, C22. The tuning can be changed by replacing the lead connecting the final 10 meter coil, L10, to the final switch wafer, SW2D, contact 7, with a small coil made of two turns of solid #18 wire wound on a lead pencil, with 3/4" extensions from the two turns for mounting. There is little room to mount the coil but by carefully performing the leads of the two turn coil and crimping the leads to the coil and switch terminals with a long nose pliers, the soldering can be completed with a curved extension of heavy copper wire on a soldering iron. The effect of the two turn coil is to move the final tuning condenser nearly to the desired 8 to 12 dial setting region for 15 meter tuning while the 10 meter tuning position is moved less than half that of the 15 meter position and can likely be accommodated with the final trimmer. The two turn coil can now be spread or pushed together until the final "plt" dip occurs well within the range of the final trimmer condenser on both 10 and 15 meters when the transmitter is tuned for maximum "grid" current and the final is tuned for a maximum dip under minimum coupling conditions.
- (5) When the above adjustments have been made so that the tracking between the buffer and oscillator stages is within three dial divisions or closer, further touchup can be made by increasing or decreasing the spacing of the outer rotor plates on the buffer and oscillator condensers. The plates should not be spread more than 1/32" from the present spacing.
- (a) If more spread between the 15 and 10 meter dial settings is required at the buffer condenser, spread the outer plates of the buffer condenser and retune the buffer to the tracking position on 10 and 15 meters by pushing the 10 meter buffer coil L2A together.
- (b) If more spread between the 15 and 10 meter dial settings is required at the oscillator condenser, spread the outer plates of the oscillator condenser and retune the stage by moving the outer turns of the lower oscillator coil winding toward the winding until 10 and 15 meter tracking is accomplished.
- (c) If the spacing of the outer rotor plates of either the oscillator or buffer condensers appears to be greater than the other plates and less spread between the 15 and 10 meter positions is desirable, push the outer rotor plates toward the stators and retune the coil of the stage involved by spreading turns.
- (6) The 20 meter tuning may have been upset slightly by the 15 meter tracking adjustments. In this case, it is probable that spreading the outer turns of the lower buffer coil, L2B, to track the buffer to the final stage, and spreading the turns of the 20 meter padding coil, Y65, on the oscillator coil, L1, to track the oscillator to the buffer stage will be the adjustments required. The 40 and 75 meter band tuning should remain relatively unaffected.

*Stack changed
Cabinet in place
Resistor and Cond
for adequate
adjusting*

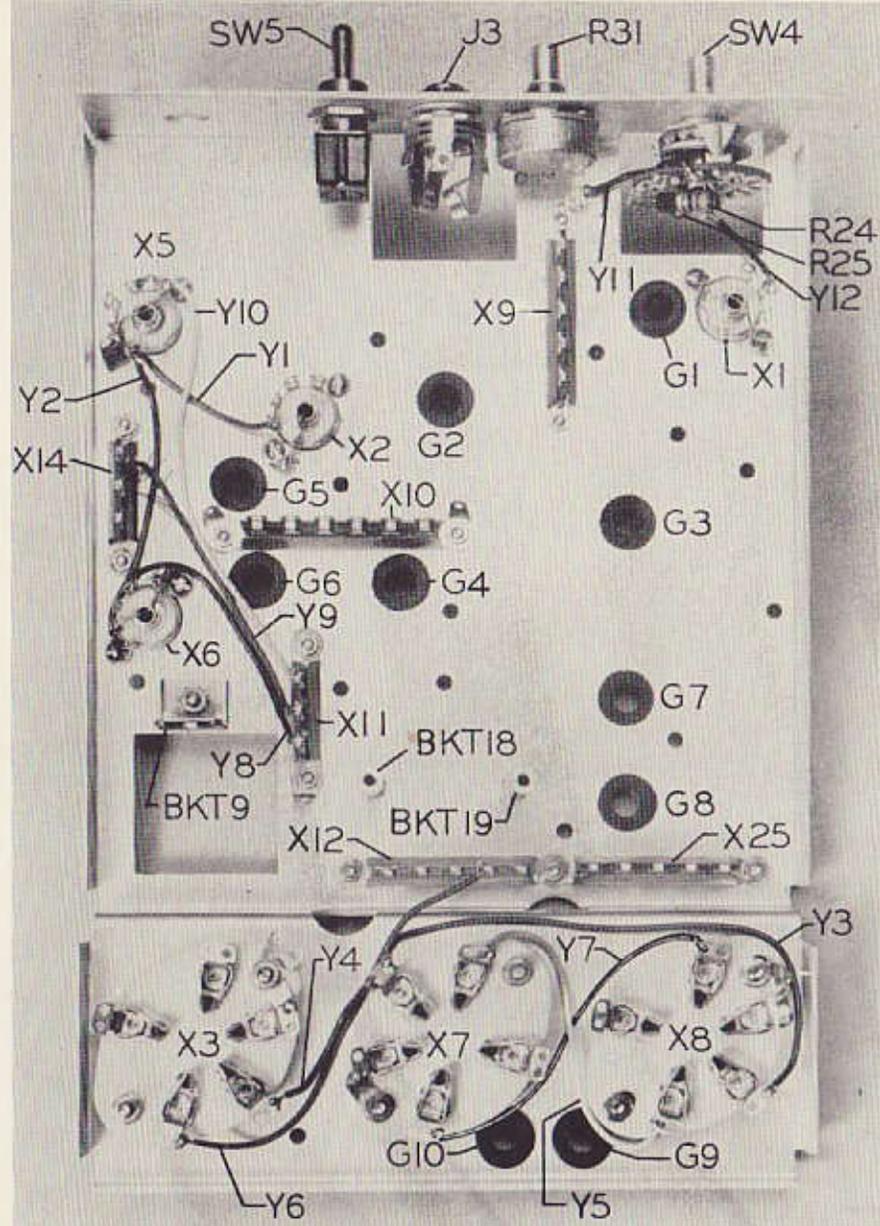


FIG. 1A BOTTOM CHASSIS

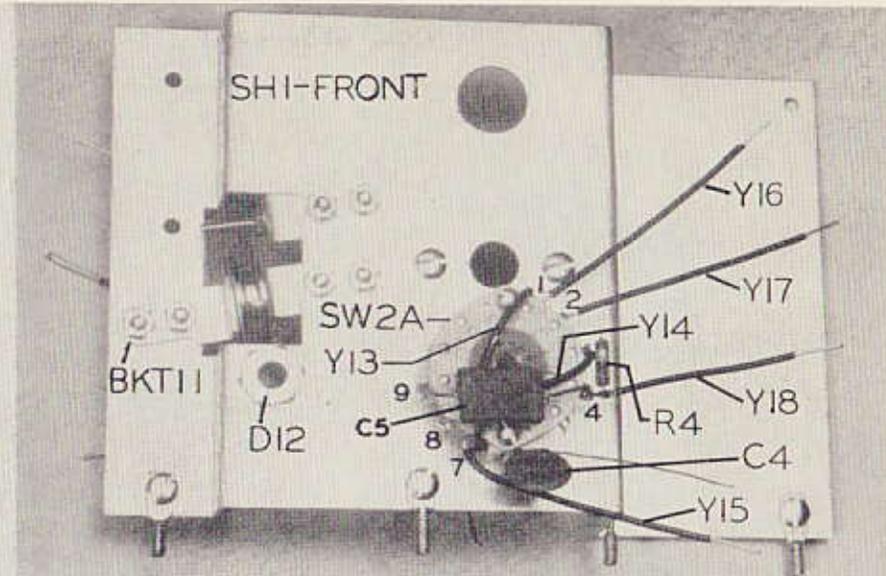


FIG. 1B OSCILLATOR SHIELD-FRONT

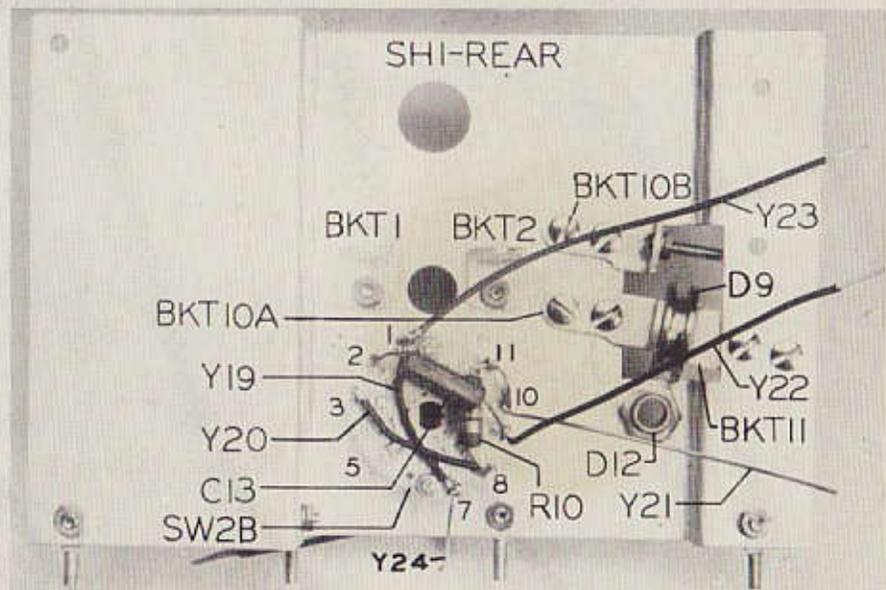


FIG. 1C OSCILLATOR SHIELD-REAR

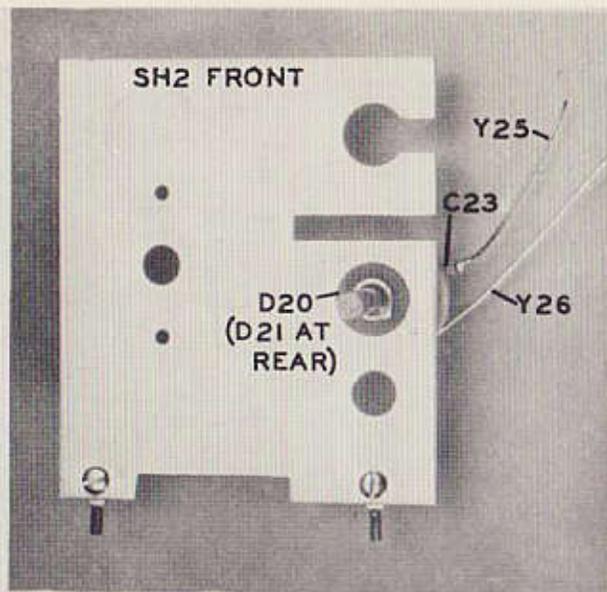


FIG. 2A BUFFER SHIELD-FRONT

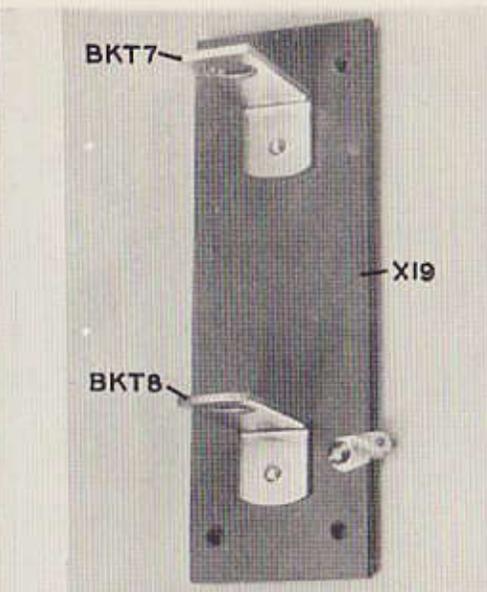


FIG. 2D CONDENSER BOARD

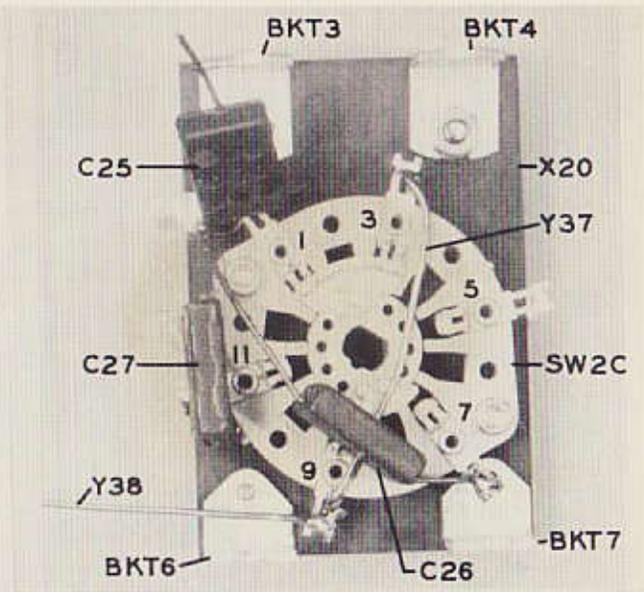


FIG. 2E COUPLING SWITCH

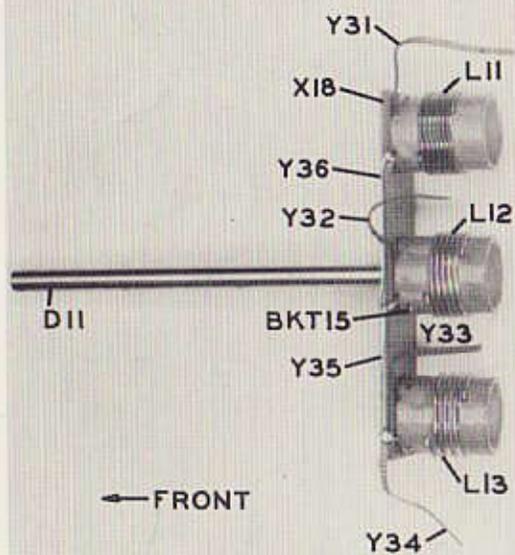


FIG. 2B COUPLING COILS

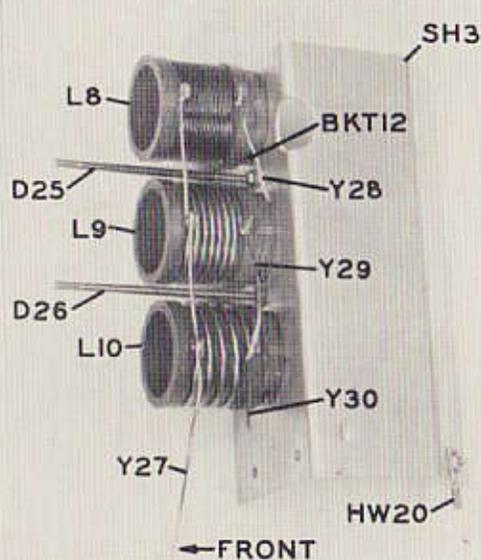


FIG. 2C FINAL SHIELD AND TANK

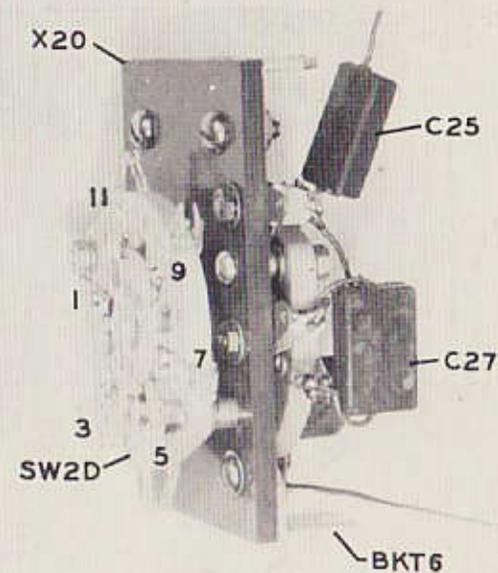


FIG. 2F FINAL SWITCH

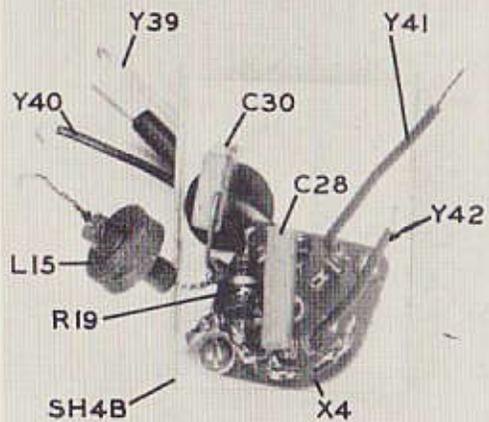


FIG. 3A BIAS SUPPLY SHELF

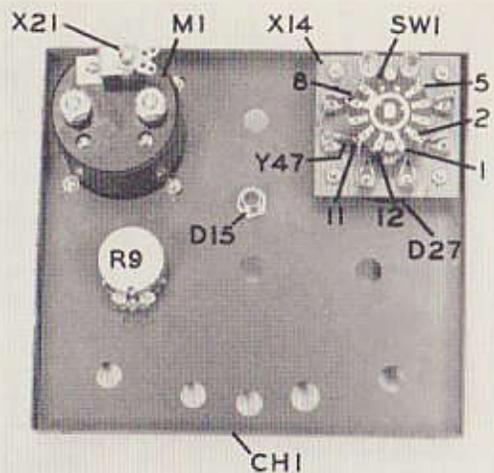


FIG. 3D PANEL-REAR VIEW

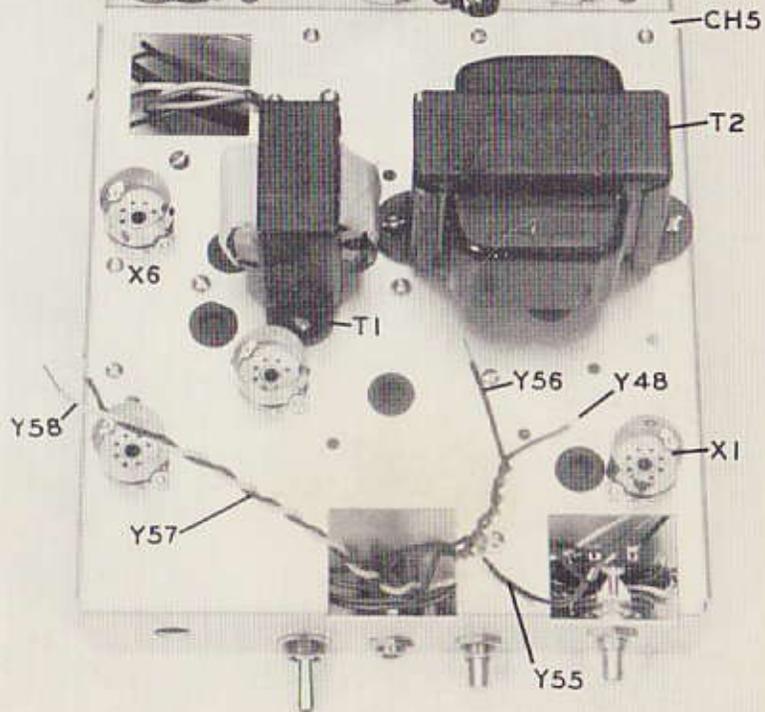
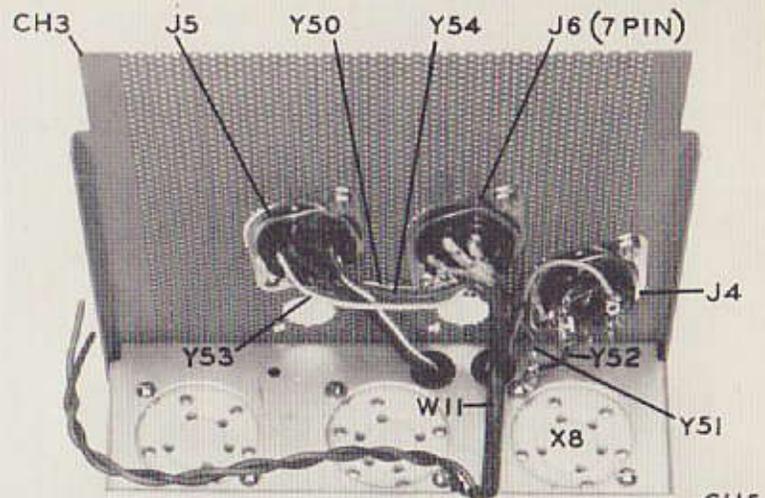


FIG. 3E TOPSIDE CHASSIS AND BACK

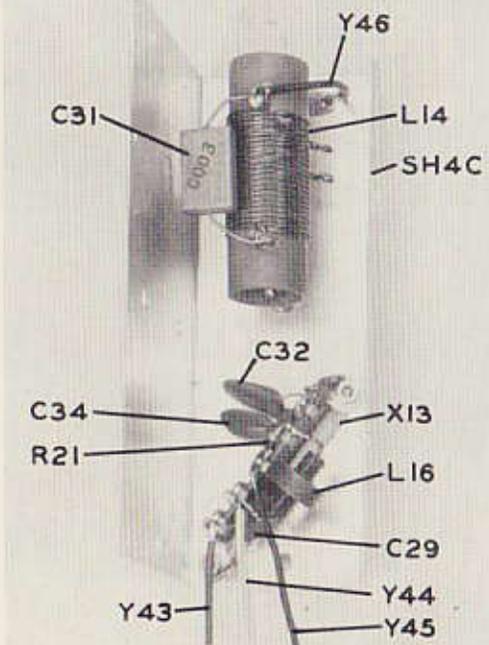


FIG. 3B BIAS SUPPLY INNER S.

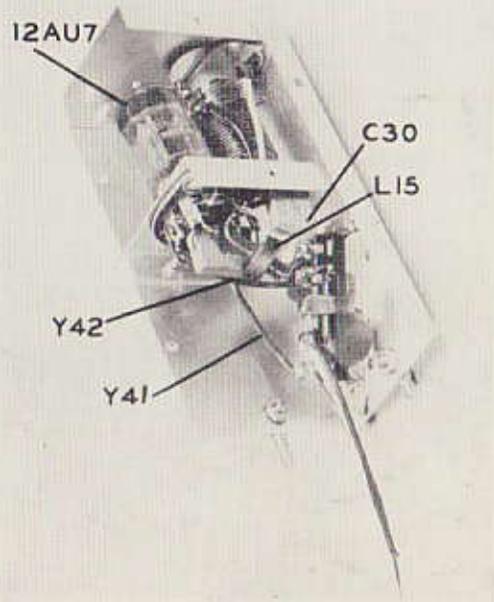


FIG. 3C BIAS SUPPLY ASS'Y

FIG. 4B SUBASSEMBLY MOUNTING-LEFT VIEW

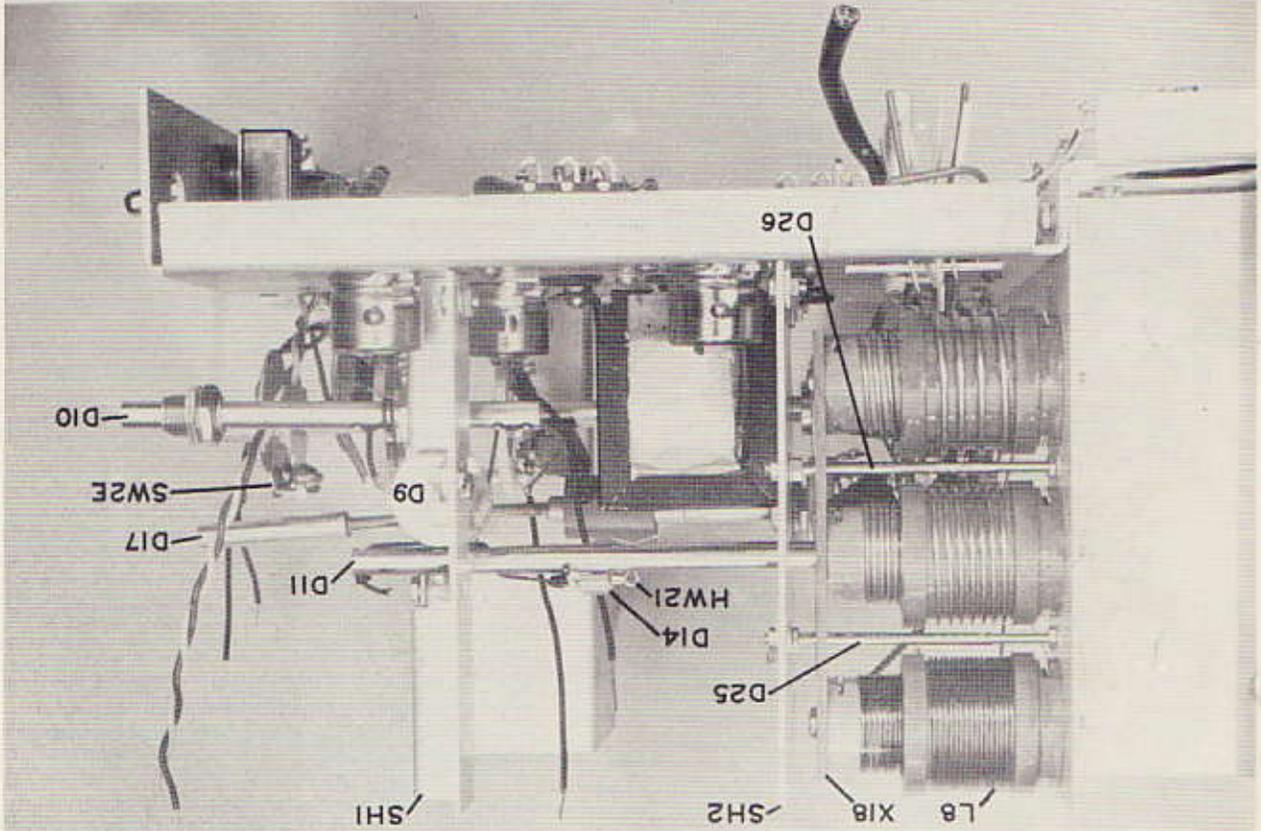
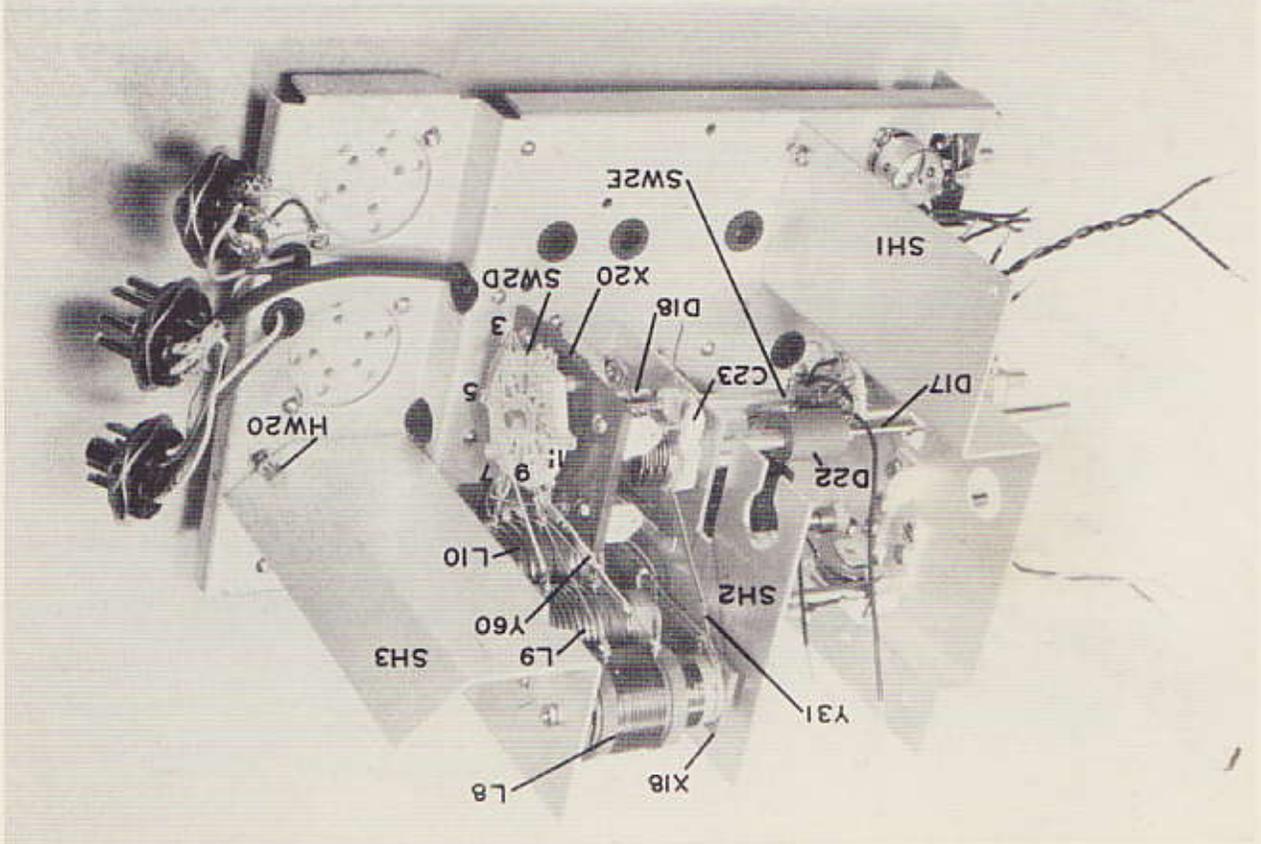


FIG. 4A SUBASSEMBLY MOUNTING-RIGHT VIEW



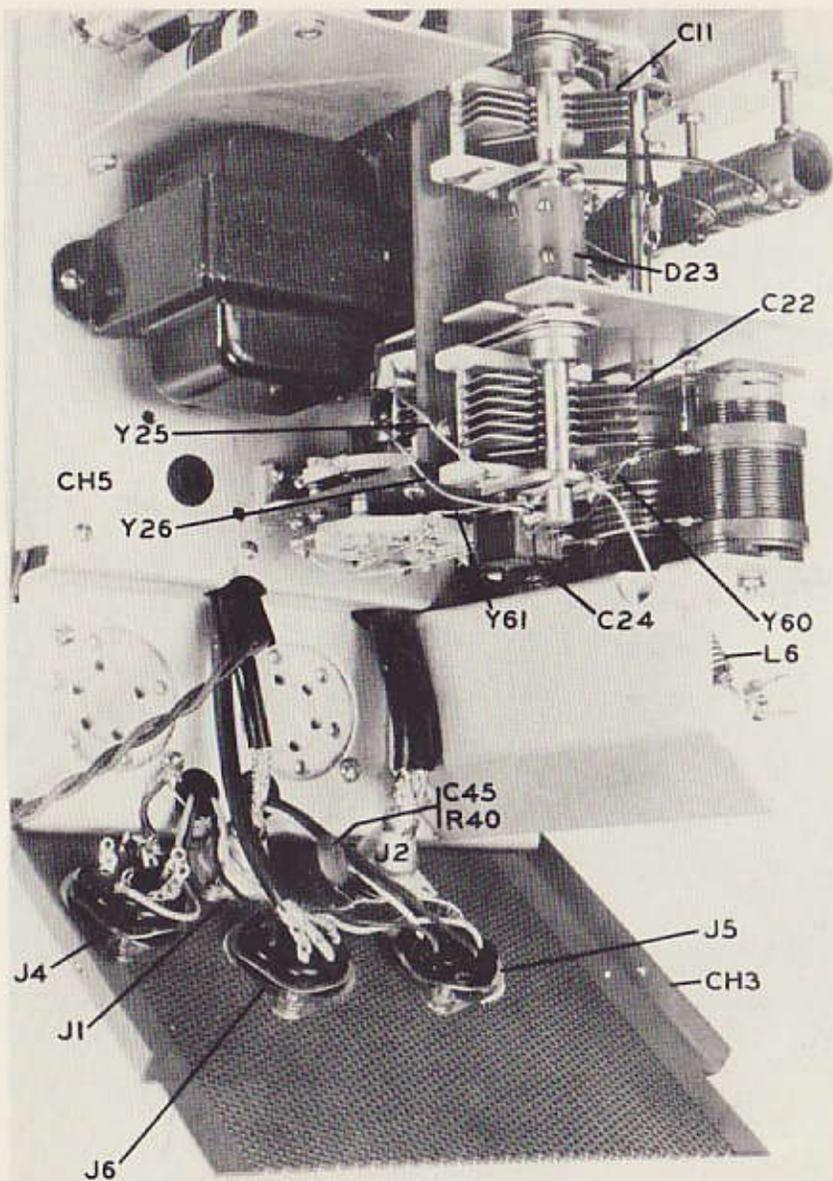


FIG. 5A FINAL STAGE AND COAX ASSEMBLY

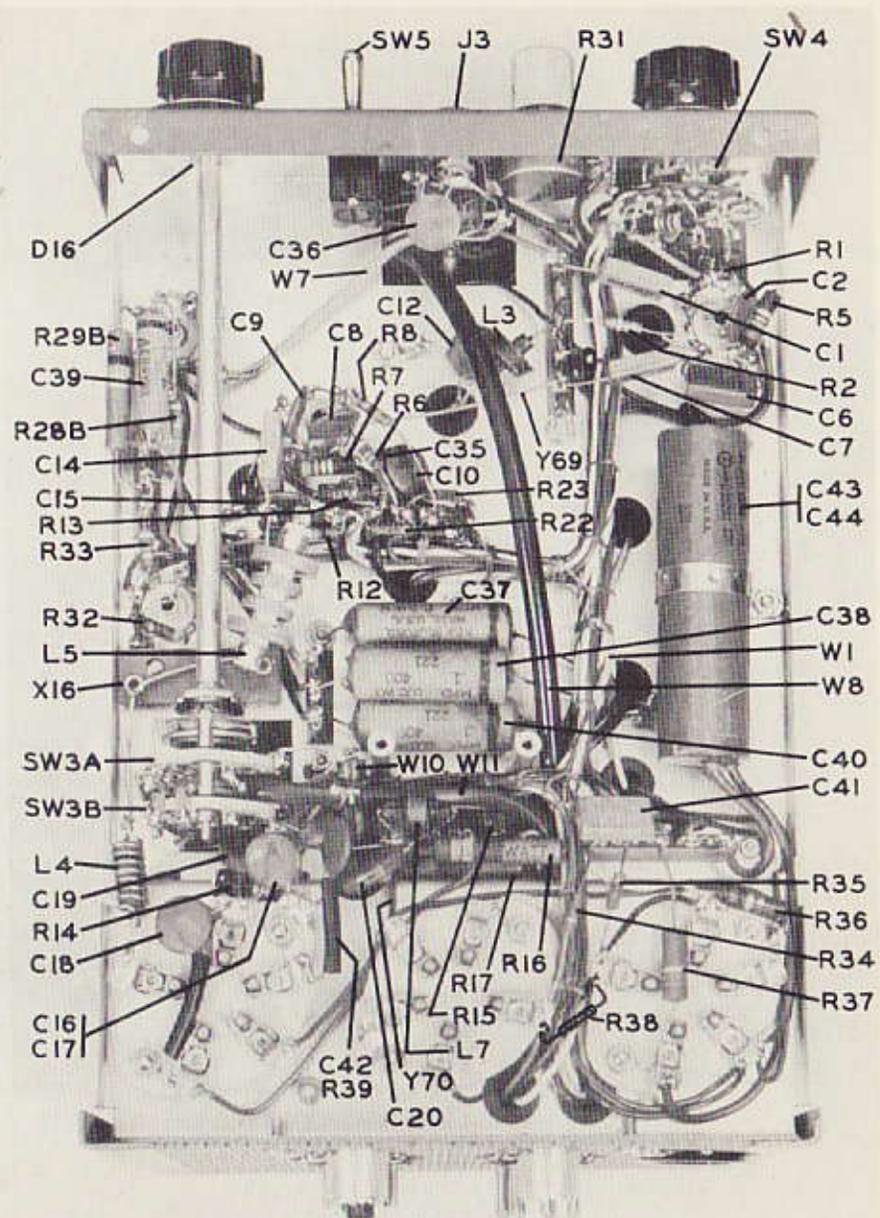


FIG. 5B BOTTOM CHASSIS - COMPLETE ASSEMBLY

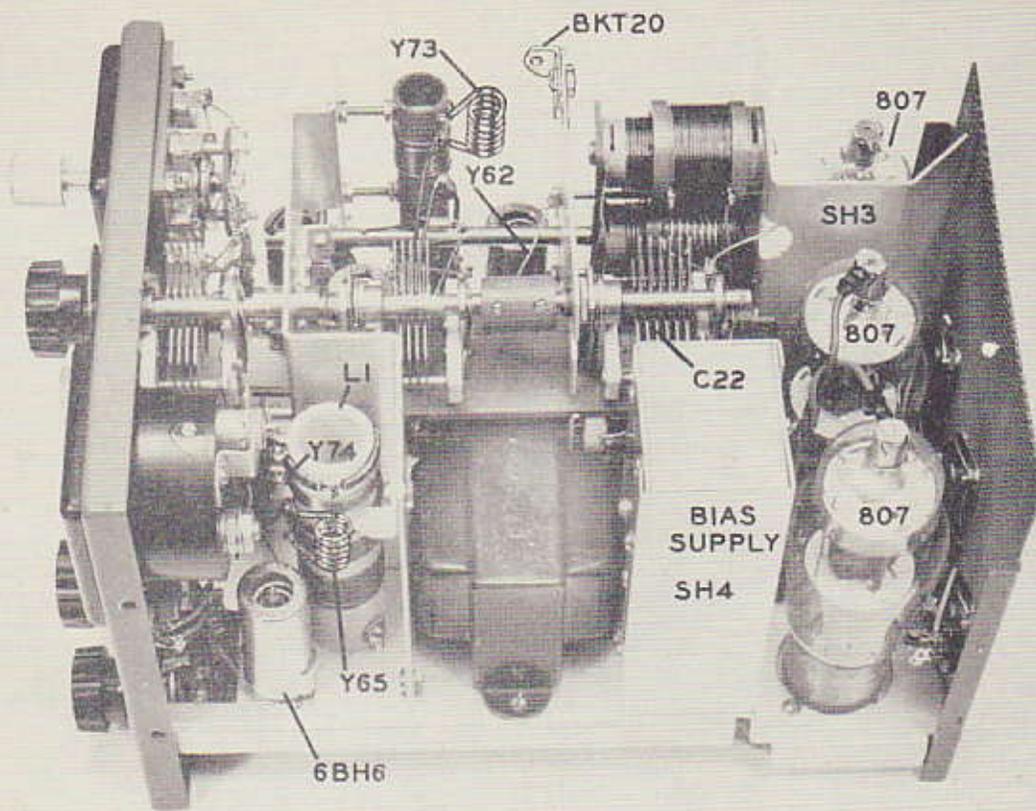


FIG. 6A RIGHT VIEW OF COMPLETED ASSEMBLY

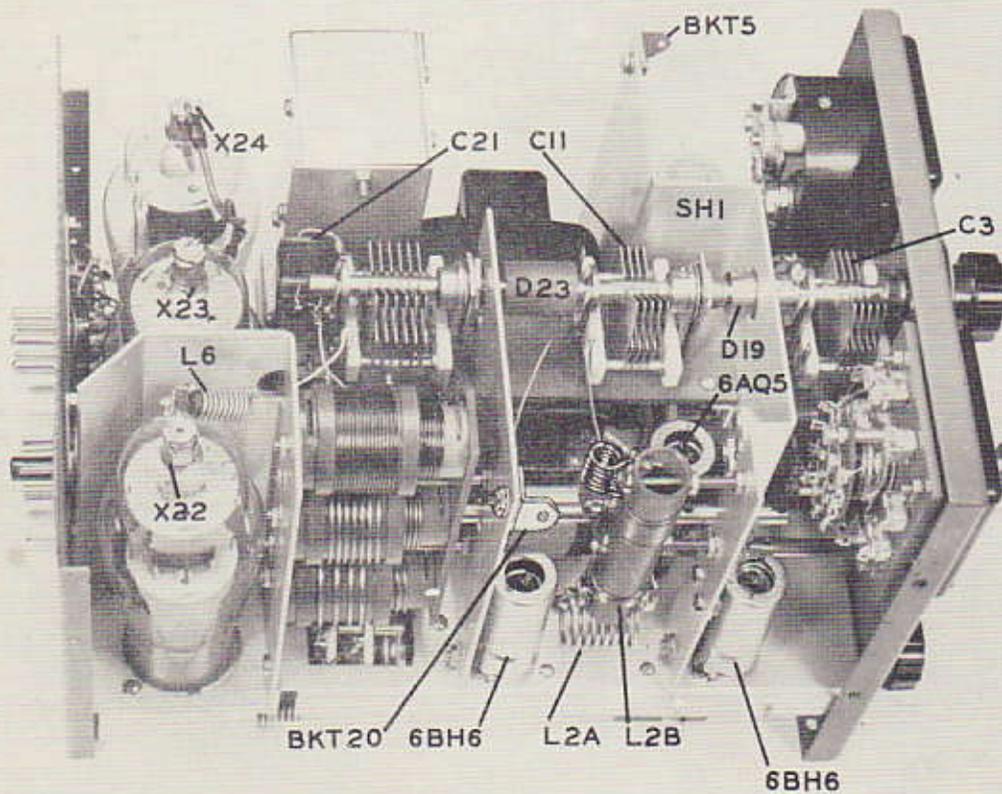


FIG. 6B LEFT VIEW OF COMPLETED ASSEMBLY

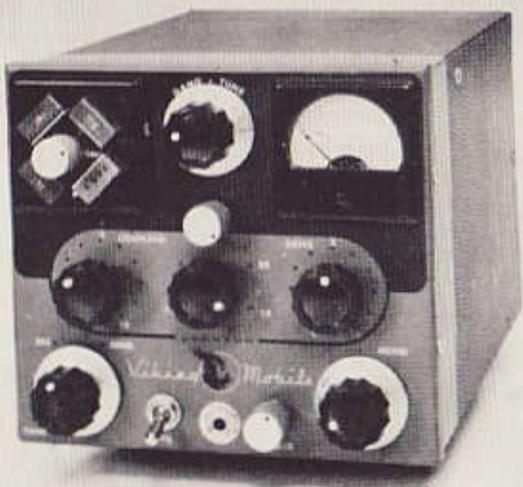


FIG. 7A FRONT VIEW-ASSEMBLED CABINET

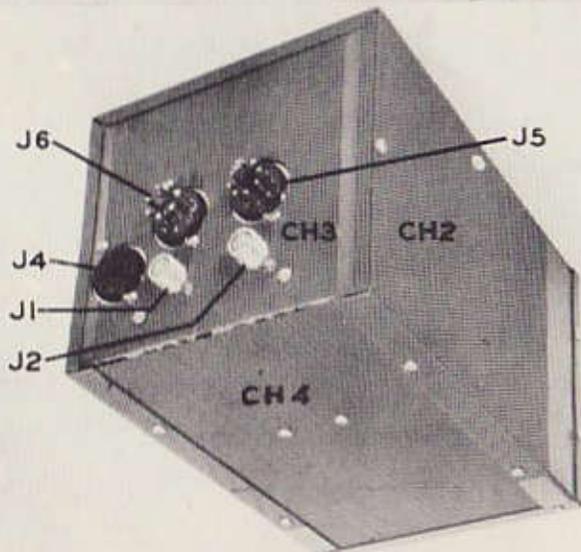
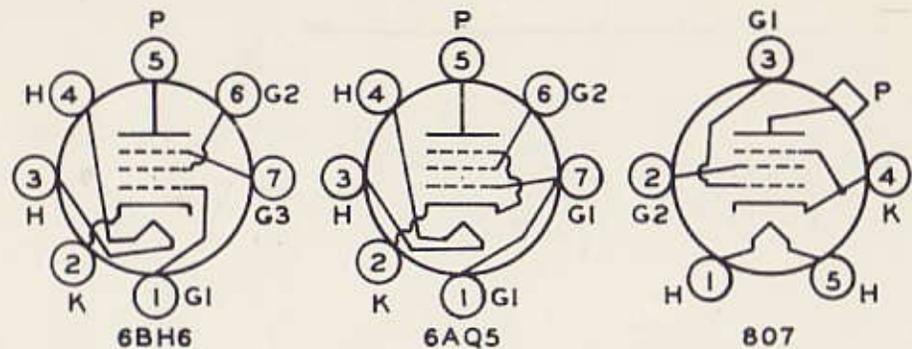
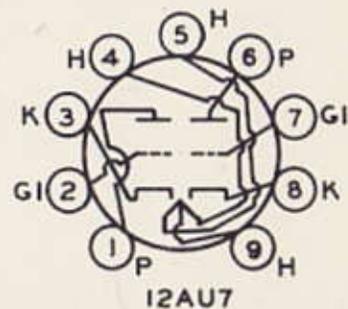


FIG. 7B REAR BOTTOM VIEW



P-PLATE
K-CATHODE
H-HEATER
G1-CONTROL GRID
G2-SCREEN GRID
G3-SUPPRESSOR GRID

FIG. 7C TUBE SOCKET CONNECTIONS
BOTTOM VIEW



COLOR	SIGNIFICANT FIGURE	DECIMAL MULTIPLIER
BLACK	0	1
BROWN	1	10
RED	2	100
ORANGE	3	1,000
YELLOW	4	10,000
GREEN	5	100,000
BLUE	6	1,000,000
VIOLET	7	10,000,000
GRAY	8	100,000,000
WHITE	9	1,000,000,000
GOLD	—	0.1
SILVER	—	0.01
NO COLOR	—	—

FIG. 7D RESISTOR COLOR CODE



COLOR CODING OF FIXED RESISTORS
A-FIRST SIGNIFICANT FIGURE OF RESISTANCE IN OHMS
B-SECOND SIGNIFICANT FIGURE
C-DECIMAL MULTIPLIER
D-RESISTANCE TOLERANCE IN PERCENT.
IF NO COLOR SHOWN
TOLERANCE IS $\pm 20\%$
GOLD IS $\pm 5\%$, SILVER IS $\pm 10\%$

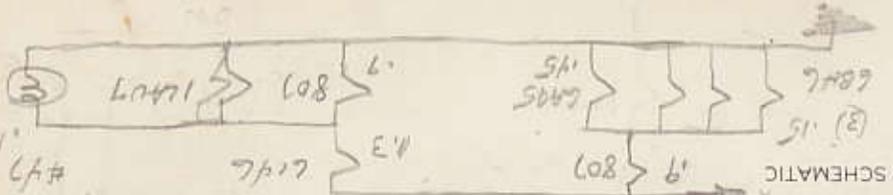
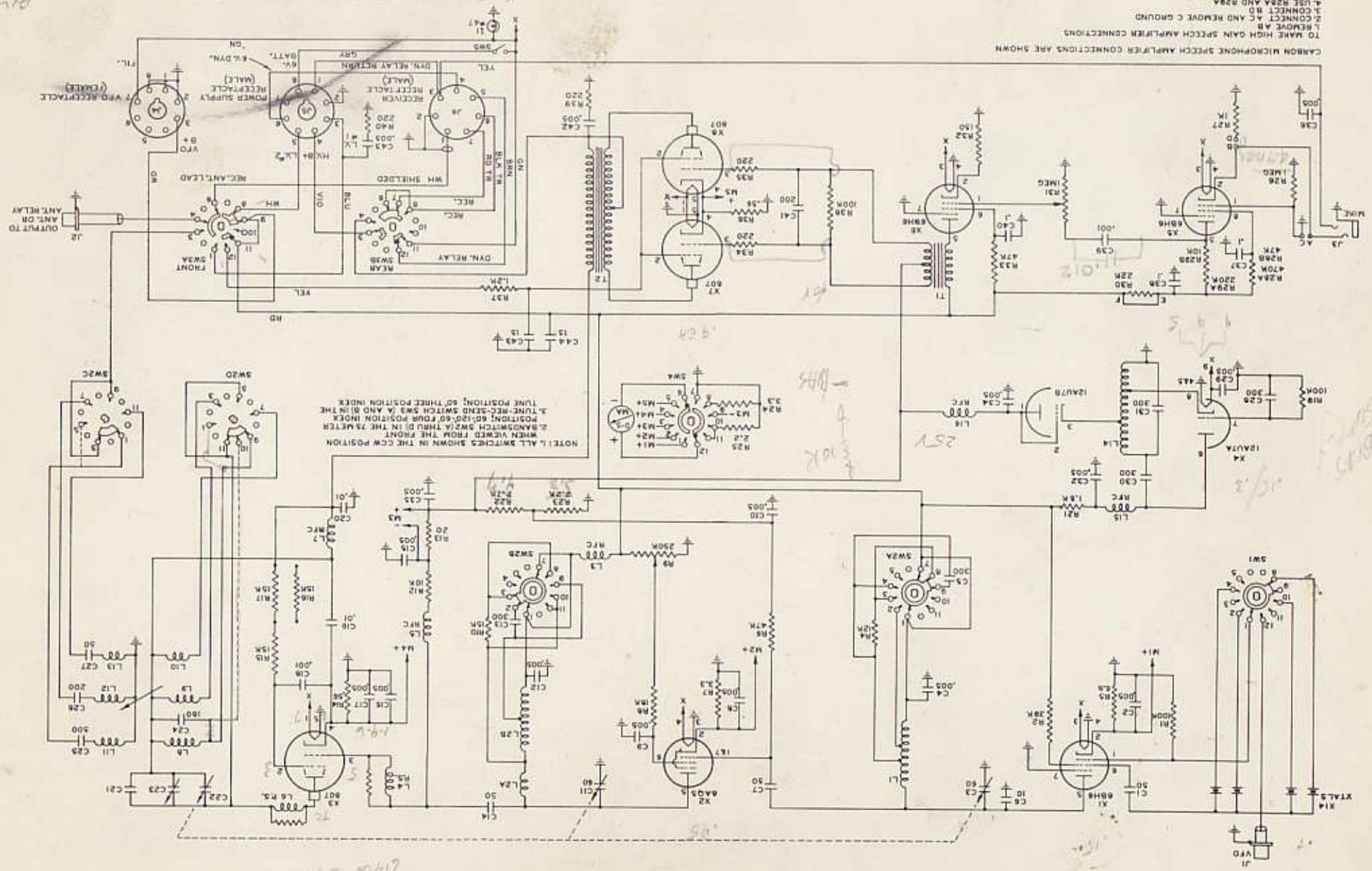


FIG. 8 - VIKING MOBILE SCHEMATIC

- CARBON MICROPHONE SPEECH AMPLIFIER CONNECTIONS ARE SHOWN
1. REMOVE A.C. AND REMOVE C. GROUND
 2. CONNECT B.D.
 3. CONNECT B.D.
 4. USE R22A AND R23A
 5. CONNECT R30 REMOVE E.F.



NOTE 1. ALL SWITCHES SHOWN IN THE CCW POSITION
 2. BANGSWITCH SW2A THRU D IN THE FRONT VIEW WHEN VIEWED FROM THE FRONT
 3. TUNE-REC-SEND SWITCH SW3 (A AND B) IN THE POSITION 80-120 KHZ POSITION INDEX
 4. TUNE-REC-SEND SWITCH SW3 (A AND B) IN THE 3. TUNE POSITION; 80 THREE POSITION INDEX

11407 = 11407

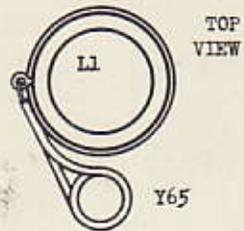
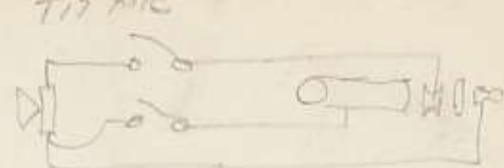


FIG. 9A
MOUNTING OF Y65
TRIMMER COIL FOR
20 METER ADJUSTMENT

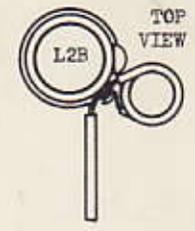


FIG. 9B
MOUNTING OF Y73
TRIMMER COIL FOR
75 METER BUFFER
ADJUSTMENT

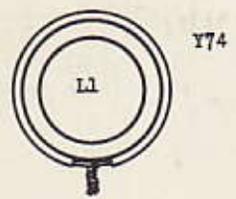
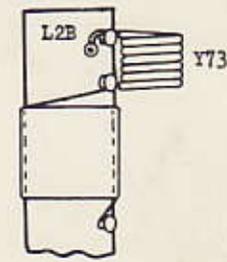
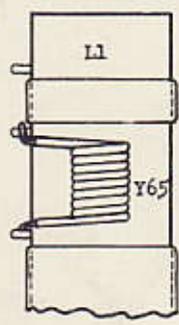


FIG. 9C
MOUNTING OF SHORTING
LOOP Y74 ON L1 FOR 75
METER OSCILLATOR TRIMMING

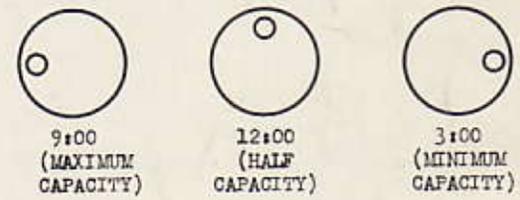
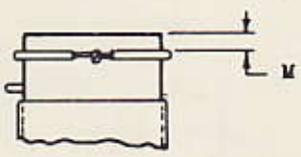


FIG. 9D
TRIMMER CONDENSER CONTROL KNOB POSITION
WITH CLOCK TERMINOLOGY USED IN THE TEXT

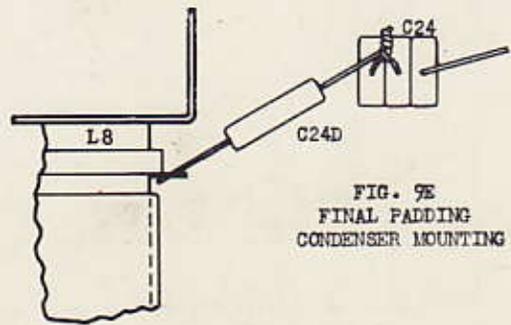


FIG. 9E
FINAL PADDING
CONDENSER MOUNTING

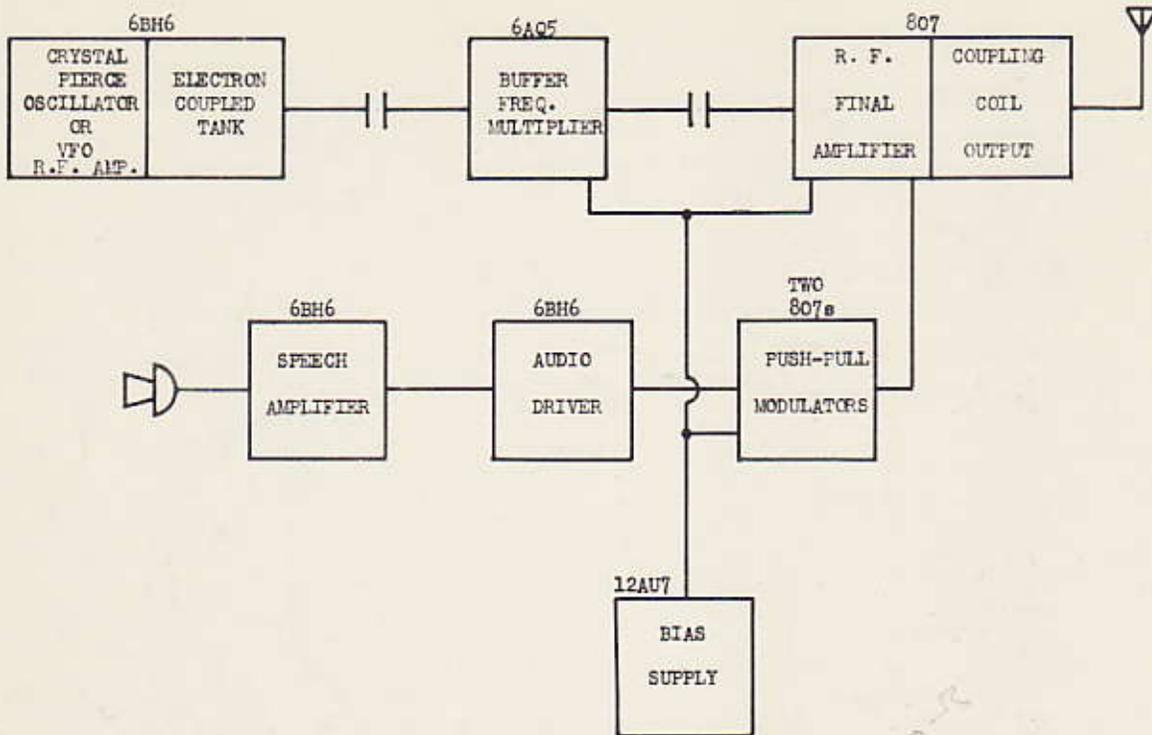


FIG. 10A VIKING MOBILE BLOCK DIAGRAM

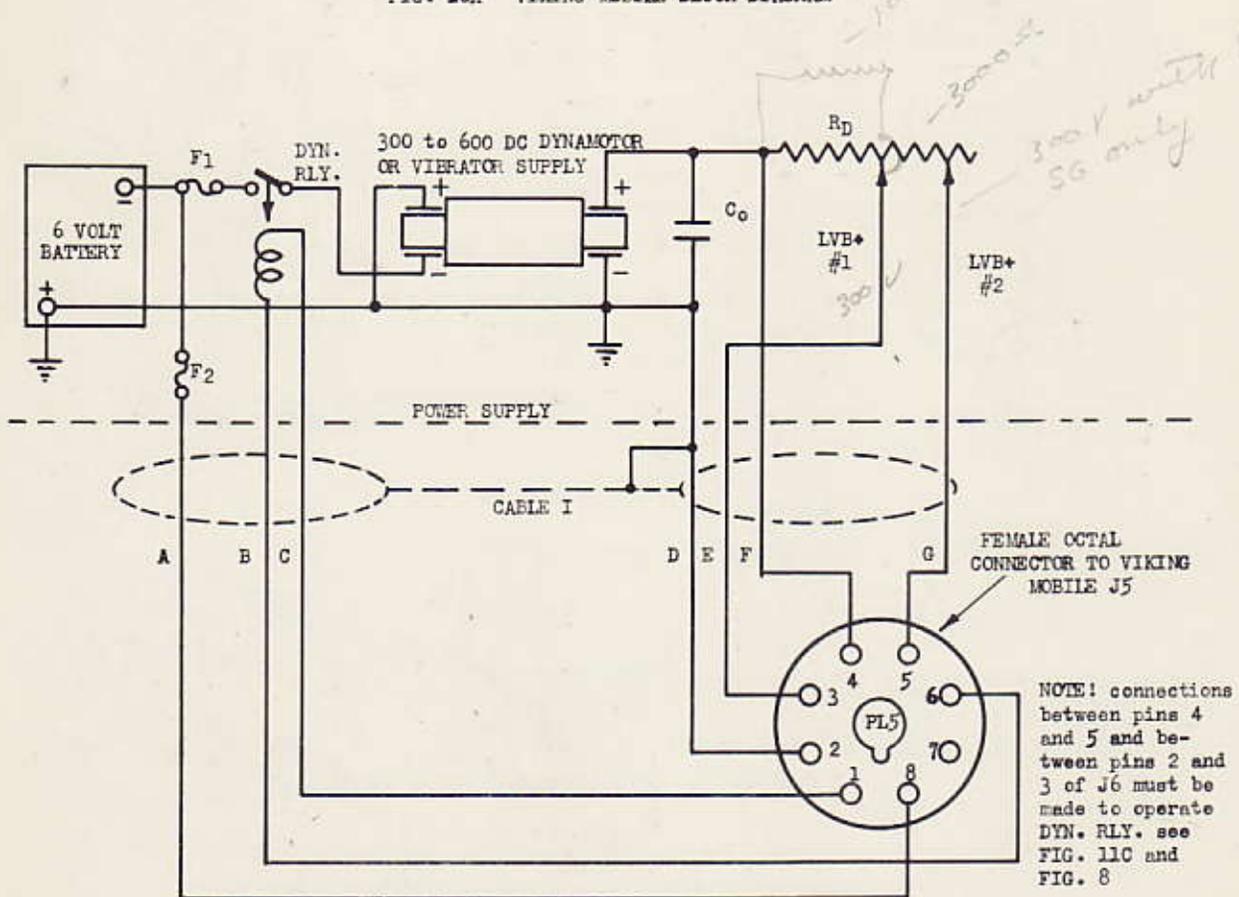


FIG. 10B TYPICAL POWER SUPPLY AND POWER SUPPLY CABLING

FIG. 11C BASIC RECEIVER INTERCONNECTION - - NO PUSH TO TALK

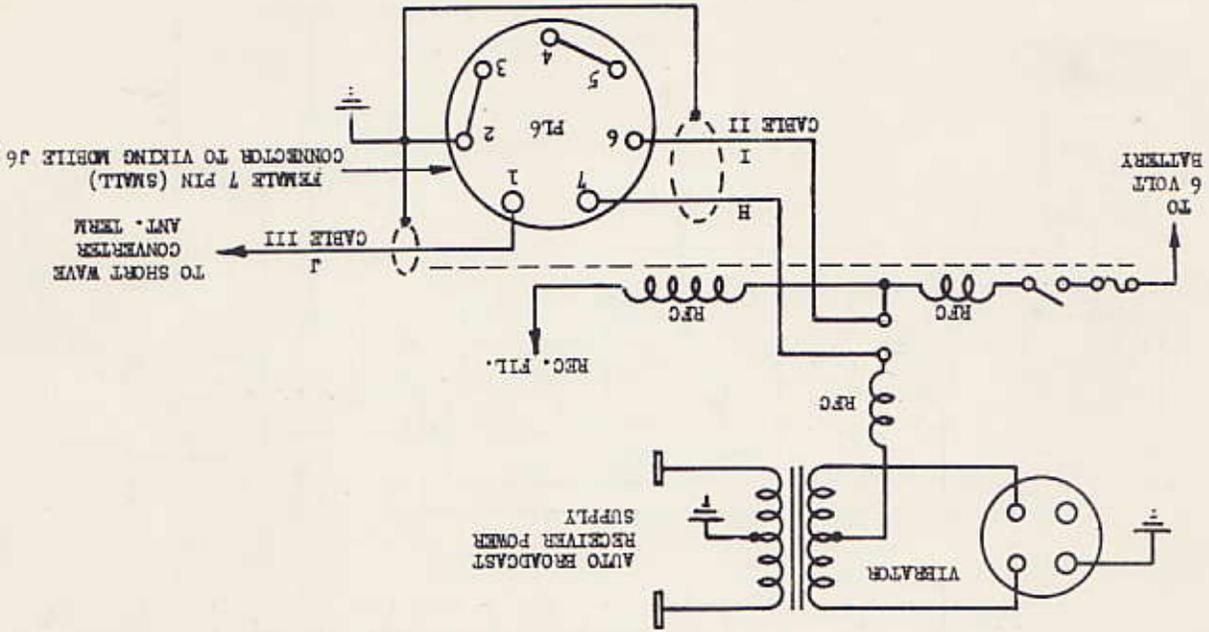


FIG. 11B MAJOR COMPONENT LOCATION

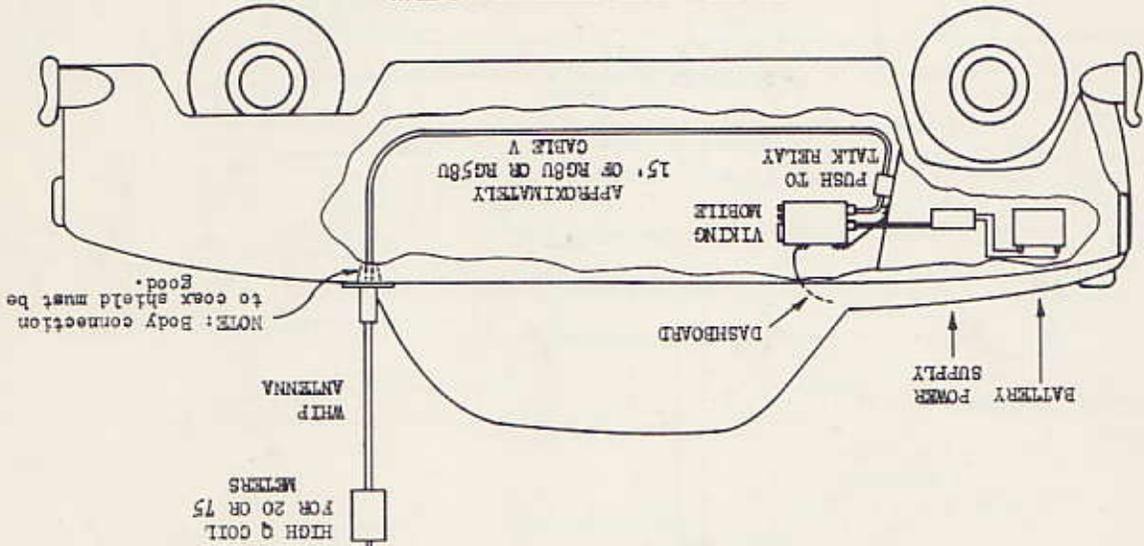
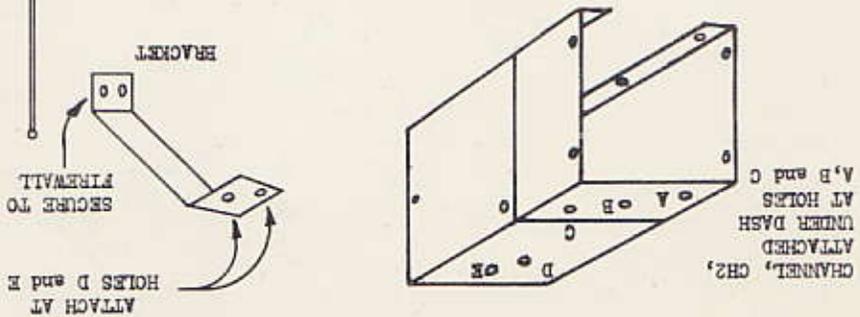


FIG. 11A ILLUSTRATION OF HOLES AND BRACKET FOR UNDERDASH MOUNTING BELOW THE BROADCAST RECEIVER OF A 1950 FORD



VIKING MOBILE

Parts List

<u>Part No. or Drawing No.</u>	<u>Item No.</u>	<u>Qty</u>	<u>Description</u>
17.827-3	CH1	1	Panel
17.828-1	CH2	1	Cabinet Enclosure Channel
17.829-1	CH3	1	Cabinet Back
17.830-1	CH4	1	Cabinet Bottom
17.831-1	CH5	1	Chassis
17.832-1	SH1	1	Oscillator Shield
17.833-1	SH2	1	Buffer Shield
17.834-1	SH3	1	Final Shield
17.835-1	SH4A	1	Bias Supply Top
17.835-2	SH4B	1	Bias Supply Shelf
17.836-1	SH4C	1	Bias Supply Inner Side
17.836-2	SH4D	1	Bias Supply Outer Side
16.85-4	BKT6-7	2	Final Switch Mounting Bracket
16.85-4	BKT1-5	5	Condenser and Switch Board Bracket
16.1001-3	BKT7-8	2	Buffer and Final Condenser Bracket
16.1096	BKT9	1	Tune-Rec.-Send Switch Bracket
16.26	BKT10-11	3	Coupling Pulley Brackets
16.1095-1	BKT12-14	3	Coil Mounting Springs 1 1/8"
14.31-62	BKT18-19	2	1 3/8 x 6-32 Chassis Support Spacers
16.1095-2	BKT15-17	3	Coil Mounting Springs 3/4"
23.907-32	D1	1	100-0 Skirted Dial Knob
23.907-34	D2	1	Single Marker Skirted Dial Knob
23.907-37	D3	1	Meter Switch Skirted Dial Knob
23.1007	D4-6	3	Phenolic Knobs
23.1008	D7-8-28	3	Aluminum Knobs
13.758	D9	1	Coupling Pulley
23.1009	D10	1	Coupling Dial Shaft and Bushing
14.486	D11	1	Coupling Coil Support Shaft
13.123-7	D12,15,16	3	3/8-32 Bushing
42.49-148	D13	1 1/2 ft.	Coupling Drive Cord (General Cement No. 74)
16.1027-1	D14	1	Coupling Drive Spring
23.1011	D17	1	Final Trimmer Flexible Shaft
104-14-11	D22,23	2	Insulated Shaft Coupling
104-13-11	D18-19	2	Metal Shaft Coupling
29.207-1	D20-21	2	Insulating Washers
18.660	D24	1	Final Switch Insulated Shaft
14.487	D25-26	2	4-40 Coupling Coil Guide Rod (drawing)
32.60-2	D27	1	Crystal Socket Escutcheon
			#4 Hardware Envelope
			#6 Hardware Envelope
			3/8" Hardware Envelope
			Small Misc Hardware Envelope
120-277-1	X1-2,5-6	4	Shielded 7 Pin Miniature Socket
133-278-7	X1A,5A-6A	3	1 3/4 Miniature Tube Shield
133-278-8	X2A	1	2 1/4 Miniature Tube Shield

122-225	X3, 7-8	3	5 Pin Wafer Socket
22.880	X4	1	9 Pin Phenolic Miniature Socket
22.740-5	X9,12,13	4	"2005" Jones Terminal Strip
	25		
22.740-6	X10	1	"2006" Jones Terminal Strip
22.740-3	X11,14-15	2	"2003" Jones Terminal Strip
23.1019	X16	1	Final Grid Lead Support
23.1020	X17	1	Crystal Selector Socket
18.661	X18	1	Coupling Coil Mtg. Board
18.662	X19	1	Final and Buffer Tuning Mtg. Board
18.663	X20	1	Final Switch Mtg. Board
147-610-13	X21	1	Indicator Light Socket
16.35-1	X22-24	3	Tube Caps
22.855	I1	1	#47 Indicator Lamp
22.854	M1	1	0-40-10-200 ma Scale 5 Ma 100 MV Meter
26.233	W1	1	Wire Harness
71.91-100	W2	9 ft.	#20 Black Plastic Covered Copper Wire
71.91-105	W3	4 ft.	#20 Green Plastic Covered Copper Wire
71.91-104	W4	3 ft.	#20 Yellow Plastic Covered Copper Wire
71.91-106	W5	3 ft.	#20 Blue Plastic Covered Copper Wire
71.27-120	W6	7 ft.	#18 Tinned Copper Wire
71.49-105	W7	1/2 ft.	#20 Stranded Shielded Wire
71.32-178	W8	1 1/4 ft.	RG59U Coaxial Cable
71.43-095	W9	1/2 ft.	Braided Tinned Copper
71.32-170	W10	3 1/2 in.	RG8U Coaxial Cable
71.32-203	W11	11 in.	3 Conductor Cable (Belden 8734)
42.24-107	W12	1 ft.	.133 ID Black Extruded Tubing
22.113-1	W13	12	5/16 ID Rubber Grommet
42.49-140	W15	4 ft.	#4 Waxed Lacing Cord
22.845	SW1	1	Crystal Switch 5 Position Miniature 60°
22.846-1	SW2A-2B	2	Osc., Buff., Switch Wafer 4 Pos. 60°-120°-60°
22.846-2	Sw2C-2D	2	Final, Coupling Switch Wafer 4 Pos. 60°-120°-60°
22.846-3	SW2E	1	Bandswitch Index
22.846-4	SW2F	1	Bandswitch Hardware Envelope
22.848	SW3	1	Tune-Rec.-Send 3 Pos. Miniature 2 Wafers 60° Index
22.847	SW4	1	Meter Switch 6 Pos. Miniature 30°
22.755	SW5	1	SPST Toggle Switch
22.746	J1A-2A	2	83-1R Receptacle
22.747	J1B-2B	2	83-1H Hood
22.881	J3	1	3 Ckt Jack Similar to Mallory SCA-2B
22.849	J4	1	Octal Female Receptacle
22.850	J5	1	Octal Male Receptacle
22.851	J6	1	7 Pin Male Receptacle
22.842	T1	1	Driver Transformer SNC P2233
22.843	T2	1	Modulation Transformer SNC P2240
23.1012	L1	1	Oscillator Coil Assembly
23.1013	L2	1	Buffer Coil Assembly
22.844	L3,7,15,	4	Radio Freq. Choke 200 Micro H
	16		
102-750	L5	1	Radio Freq. Choke
23.1015	L4	1	Grid Parasitic Suppressor

23.912	L6	1	Plate Parasitic Suppressor
23.1016-1	L8	1	75M Main Coil
23.1016-2	L9	1	20M Main Coil
23.1016-3	L10	1	10M Main Coil
23.1017-1	L11	1	75M Coup. Coil
23.1017-2	L12	1	20M Coup. Coil
23.1017-3	L13	1	10M Coup. Coil
23.1018	L14	1	Bias Osc. Tank Coil
22.773	C1,7,14 24D	4	50 mmfd 500 VW Molded Mica Condensers 20% Tolerance
22.827		17	.005 Mfd 600 WV Ceramic Disc Cond. GMV Centralab or Similar
22.859	C5,C13	2	300 mmfd 500VW Silvered Mica Cond. 5% Tolerance
22.856	C6	1	10 mmfd 500VW Silvered Mica Cond. 5% Tolerance
22.828	C18	1	.001 mfd 1500VW Ceramic Disc Cond. \pm 20% Centralab DA048 or Similar
22.826	C19,20	2	.01 mfd 1500VW Ceramic Disc Cond. \pm 20% Centralab DA146 or Similar
22.777	C21A-C	3	25 mmfd 500VW Silvered Mica Cond. 5% Tolerance
22.860	C24A-B C25	3	500 mmfd 500VW Silvered Mica Cond. 5% Tolerance
22.861	C24C	1	700 mmfd 500VW Silvered Mica Condenser 5% Tolerance
22.858	C26	1	200 mmfd 500VW Silvered Mica Cond. 5% Tolerance
22.774	C28,30,31	3	300 mmfd 500VW Mica Cond. 20% Toler- ance
22.862	C41	1	200 mmfd 500V Mica Cond. 20% Tolerance
22.776	C27	1	50 mmfd 500V Silvered Mica Cond. 5% Tolerance
22.857	C24E	1	100 mmfd 500V Silvered Mica Cond. 5% Tolerance
22.768	C37,38,40	3	.1 mfd Tubular Paper Condenser 400VW
22.835	C39	1	.001 mfd Tubular Paper Cond. 400VW
22.764	C43,44	1	15-15 mfd Dual Electrolytic Cond. 450VW
149-12-3	C3,11	2	60R12 Variable Condenser
149-26-3	C22	1	60R18 Variable Condenser
158-27-2	C23	1	10K30 Variable Condenser
22.572	R1,19,38	3	100,000 \pm 10% ohms 1/2W Carbon Resis- tor
22.874	R2	1	39,000 \pm 10% 1/2W Carbon Resistor
22.872	R4	1	12,000 \pm 10% ohms 1/2W Carbon Resis- tor
22.866	R5	1	6.8 \pm 10% ohm 1/2 W Resistor
22.717	R6,28B,33	3	47,000 \pm 10% 1/2 W Carbon Resistor
22.865	R7,24	2	3.3 \pm 10% ohm 1/2 W Carbon Resistor
22.873	R8	1	18,000 \pm 10% 1/2 W Carbon Resistor
22.876	R10	1	15,000 \pm 10% ohm 1 W Carbon Resistor
22.239	R12	1	10,000 \pm 10% ohm 1/2 W Carbon Resistor

22.867	R13	1	20 ± 5% ohm 1/2 W Resistor
22.863-2	R14	1	0.56 ± 5% ohm 1/2 W Resistor
22.877	R15-17	3	15,000 ± 10% 2 W Carbon Resistor
22.716	R30	1	22,000 ± 10% ohm 1/2 W Carbon Resistor
22.715	R21	1	1800 ± 10% ohm 1/2 W Carbon Resistor
22.883	R22	1	2700 ± 10% ohm 1/2 W Carbon Resistor
22.882	R23	1	2200 ± 10% ohm 1/2 W Carbon Resistor
22.864	R25	1	2.2 ± 10% ohms 1/2 W Resistor
22.719	R26	1	1 megohm ± 10% ohms 1/2 W Carbon Resistor
22.353	R27	1	1000 ± 10% ohms 1/2 W Carbon Resistor
22.718	R28A	1	470,000 ± 10% ohms 1/2 W Carbon Resistor
22.728	R29A	1	220,000 ± 10% ohms 1 W Carbon Resistor
22.863-1	R36	1	.56 ± 10% ohms 1/2 W Resistor
22.868	R32	1	150 ± 10% ohms 1/2 W Carbon Resistor
22.714	R39,40 34,35	4	220 ± 10% ohms 1/2 W Carbon Resistor
22.871	R29B	1	10,000 ± 10% ohms 2 W Carbon Resistor
22.875	R37	1	1200 ± 10% ohms 1 W Carbon Resistor
22.878	R9	1	250,000 ± 30% 2 W Composition Potentiometer
22.879	R31	1	1 meg ± 30% 1/4 W Composition Potentiometer

REPRESENTATIVES:

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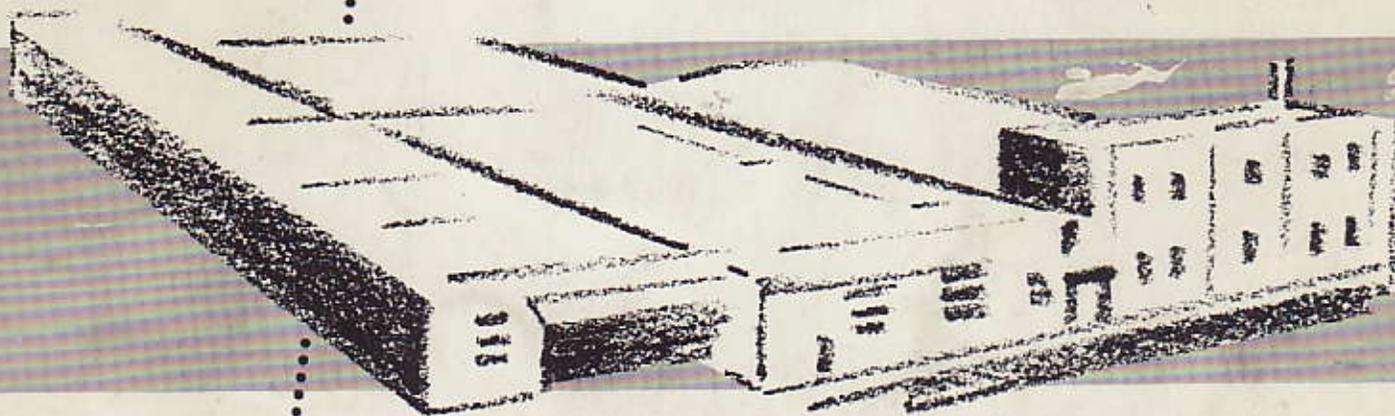
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