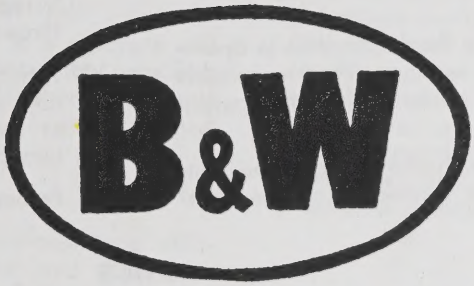


INSTRUCTION MANUAL

MODEL 5100 TRANSMITTER

BARKER & WILLIAMSON, Inc.

237 FAIRFIELD AVENUE

UPPER DARBY, PENNA.

PUTTING YOUR B&W TRANSMITTER ON THE AIR

1. After the equipment has been carefully removed from its packing box—be sure all tubes are in their respective sockets and pushed firmly into place.
2. The equipment as shipped from the factory comes to you ready to operate, with the exception of—crystals, microphone, key and antenna.
3. Before plugging the power line cord into a 115 volt A.C. 60 cycle single phase power source receptacle be sure that the A.C. line switch and the plate **on** and **off** switches are in the **off** position.
4. **Take time to be sure** you thoroughly understand the function of each control.
5. Before attempting to place the transmitter in operation and on the air, **be sure** you have a suitable antenna or dummy load connected to the output power connector.
6. For phone operation, a microphone should be connected to the microphone connector on the front panel.
7. For C.W. operation, a key with cord and suitable plug should be inserted in the key jack on the front panel.
8. For crystal operation on phone or C.W., a suitable 80 meter crystal is to be inserted in the crystal holder — located inside the cabinet on the crystal-buffer-amplifier unit and the crystal-VFO selector switch near the crystal holder is thrown in the crystal position.
9. For VFO operation on Phone or C.W., the **crystal is removed** and the Crystal-VFO selector switch is thrown in the VFO position.
10. Turn the A.C. line switch to the **on** position and make sure all tubes are lit. Allow tube filaments to run at least ten minutes when the equipment is first turned on.
11. Proceed as directed under operating instructions.

NOTICE

A FEW DONT'S TO REMEMBER

A. **Do not** turn the **Master Band Selector Switch** when the plate switch is in the **on** position.

B. **Do not** attempt to tune and operate the transmitter in VFO position unless you are sure that the Frequency **Control Dial Pointer** is correctly set on the appropriate frequency of each band corresponding to the **Master Band Selector Switch** — for crystal operation, make certain that a crystal of proper output freq. is chosen.

C. **Do not** attempt to make connections to the rear terminal strip on back of the chassis apron unless the A.C. line cord plug is removed from the power source.

D. **Do not** use the receiver disabling circuit nor the remote relay connections for conducting or breaking high current. Doing so will result in damage to the internal control relay contact points.

E. **Do not** make the error of reversing the push-to-talk connections when assembling the microphone plug, since the relay voltage present could damage the microphone. (See instructions elsewhere in this manual under microphone connector.)

F. **Do not** attempt to operate the equipment without a good ground attached to the ground terminal of the equipment.

WARNING

Death or serious injury may result if operators fail to observe safety precautions. Extreme **caution** is to be exercised during any observations or voltage measurements around live power circuits carrying *lethal voltages. Failure to observe all safety regulations may result in personal injury, if not loss of life.

*Underwriters regulations consider lethal any potential above 24 volts.

INTRODUCTION

The model 5100 transmitter has been designed for amateur communications service covering both radiotelephone and telegraph within the confines of the amateur frequency bands 80-40-20-15-11 and 10 meters. It is a compact, bandswitched, VFO or crystal controlled, self contained equipment containing all of the latest engineering advances leading toward the effective transmissions of signals with a minimum of harmonic content for prevention of television interference. Mainly intended for permanent station operation, the external source of power required for its operation is 115 volts, 50/60 A.C. It has been designed with a view toward striking appearance, high quality of workmanship, trouble free operation, ease of control and tuning and last, but not least for servicing, its unitized construction permits quick access and easy removal of any major section with minimum disturbance to other sections. The model 5100 transmitter may also be used to drive a higher powered R.F. final amplifier and class "B" audio modulator.

Its consistent operation coupled with an excellent quality of signal output, will meet all of the requirements of the most discriminating operator.

SUMMARY OF VARIOUS SECTIONS

Radio Frequency Section

The radio frequency section of the model 5100 consists of three separate units. First, the variable frequency oscillator (VFO) with the calibrated scale to read the frequency for each of the six amateur bands covered. Second, a buffer amplifier-crystal oscillator-keying tube unit which functions as a buffer amplifier when VFO operation is selected and as a crystal oscillator when operating in the crystal position. This unit also performs the function of block grid keying when either VFO or crytal operation is selected for CW operation. Third, the multiplier-final amplifier unit, the function of which is to multiply and amplify the selected output frequency.

Speech Amplifier-Modulator Unit

The speech amplifier modulator is a separate unit consisting of 4 tubes in a compact subassembly providing speech amplification from a crystal microphone and ample audio power to fully modulate the RF power output under maximum power conditions.

Power Supplies

Power supplies are of the conventional type utilizing heavy duty transformers and chokes and other components designed for typical amateur operation at maximum power. Two distinctly separate power supplies are used, the high voltage supply furnishing plate voltage for the R.F. final amplifier, modulators and multiplier stages, while a low voltage power supply provides the low potential D.C. and bias voltage as required. Provision has been made for front panel control of high voltage reduction during tune-up procedure.

TVI Suppression

Television interference suppression has been carried out to a degree found necessary by B&W's experience in this field. Precautions have been taken to prevent radiation from the more critical leads coming from the transmitter cabinet. Functional design within the R.F. section has been along lines which eliminate the source of much TVI. In addition to the details outlined above, the model 5100 contains as an integral part, a low pass filter which provides a minimum of 85 D.B. attenuation throughout the normal television channels with over 100 D.B. attenuation on channel #2.

Front Panel

The front panel contains the following controls — the A.C. line switch, tune operate switch, meter selector switch, microphone input jack, audio gain control, key jack, function switch, pilot light, plate power switch, master band selector, loading control, excitation control, plate tuning control, and main VFO frequency control dial clearly marked and printed to indicate all six bands. Also included is an all purpose meter which registers amplifier screen grid current, amplifier plate current and modulator plate current. Accessible through the rear of the cabinet are the A.C. cord, antenna connector and remote control line connection terminals. All rotating controls on the panel are equipped with richly styled machined aluminum knobs, with knurled edges.

Cabinet

The beautifully styled cabinet, finished in silver blue hammertone with gray panel, has rounded edges and corners and a hinged flush fitting lid providing access to the interior of the equipment for such functions as changing crystals and tube replacements, inspection etc. It is made of heavy gauge steel properly reinforced to adequately support the entire structure of the main chassis and associated subassemblies.

Dial Mechanism

The main frequency control dial which operates the VFO is a friction drive unit, extremely smooth in operation and permitting adjustment of frequency at the will of the operator.

SPECIFICATIONS

Frequency Coverage

80 meters	40 meters	20 meters
3.5—4.0mc	7.0—7.3mc	14.0—14.35mc
15 meters	**11 meters**	**10 meters**
21.0—21.45mc	26.96—27.23mc	28.0—29.7mc

Complete bandswitching on all bands.
VFO or crystal operation on AM or CW.
Power input — 135 watts phone — 150 watts CW.
PI-network output.
Built-in low pass filter.
TVI suppressed.
Stable VFO with accurately calibrated scale.
Output impedance — 75 ohms unbalanced.
External audio power output — 75 watts — Impedance 500 ohms.
Power source nominal — 110 volts single phase 50/60 cycles A.C.
Size — Width - 22" — Height - 11½" — Depth - 14¾".
Net weight — approximately 83 lbs.
Shipping weight — 90 lbs.

Tube Complement

VFO — 1 - Type 6BJ6

Crystal Oscillator Buffer Amplifier — 2 - Type 6BJ6

Multiplier — RF Amplifier — 4 - Type 6AQ5 - 2 Type 6146

Speech Amplifier — Modulator 1 - Type 6U8, 1 - Type 6AQ5, 2 - Type 6146

Low Voltage Power Supply — 1 - Type 5V4G

High Voltage Power Supply — 2 - Type 5R4GY

Voltage Regulators — 1 - Type VR150, 1 - Type VR105

DESCRIPTION AND FUNCTION OF VARIOUS SECTIONS

VARIABLE FREQUENCY OSCILLATOR

The variable frequency oscillator unit utilizes a type 6BJ6 tube in a Hartley type circuit, generating a fundamental frequency range between 1680 to 2005 KC.

The output frequency, through the medium of doubling is twice the value of the fundamental oscillator range, thus providing an output range equal to a low value of 3360 KC to a high of 4010 KC. This basic output range of frequencies, when multiplied covers all amateur frequencies within the limits of the amateur bands 80 - 40 - 20 - 15 - 11 and 10 meters.

The variable capacitor used in this unit has been designed to provide straight line frequency variation with respect to its rotation. The D.C. voltage for powering this unit is regulated by means of a VR-150 voltage regulator tube in the main low voltage power supply.

BUFFER-AMPLIFIER-CRYSTAL-OSCILLATOR-KEYING-TUBE-UNIT

This compact unit performs several functions. The first of two 6BJ6 type tubes used, performs as a buffer amplifier, while the second 6BJ6 is used as a crystal oscillator, second buffer and keyer tube. During VFO operation, the second 6BJ6 tube functions as an additional buffer stage, thus enhancing isolation between the VFO and the multiplier sections. In either case, VFO or crystal operation, the second 6BJ6 tube additionally functions as a keyer tube. This unit is driven by the variable frequency oscillator. The circuitry includes a band-pass filter for the purpose of attenuating fundamental oscillation frequencies, thus transferring only the desirable 80 meter signals required for the multiplier.

The VFO-crystal selector switch and crystal holder are located on the top of this unit in a convenient position for quick change-over from VFO to crystal or vice-versa. When crystal operation is desired, an 80 meter crystal providing fundamental or desired harmonic frequency, is inserted in the crystal holder and the VFO-crystal selector switch is thrown to the crystal position. When the VFO-crystal selector switch is in the crytal position, it functions to de-energize the first buffer and VFO while the second 6BJ6 tube then functions as a Pierce type oscillator.

The circuit has been designed to operate with 80 meter crystals, hence, the output frequency of the transmitter is either the basic crystal frequency or its multiples, depending on the setting of the band selector switch, which in part, functions to select the appropriate multiplier stages.

It is important to remove the crystal from its holder, during VFO operation on phone or CW.

FREQUENCY MULTIPLIER — FINAL AMPLIFIER

This unit which is driven by the output of the buffer amplifier-crystal oscillator-keyer tube unit, functions as a frequency multiplier and final amplifier.

The frequency multiplier section of this unit consists of 4 type 6AQ5 tubes in a broad-banded circuit eliminating the need of tuning each of the multiplier stages over the entire operating frequency range of the over-all equipment. This feature keeps tuning controls to a minimum. Selection of the multiplier stages is made through use of a switch which is ganged to the main band selector switch. Hence selection of the appropriate multiplier stages and final bandswitching is accomplished in one operation by the simple twist of one knob.

The power amplifier section of this unit employs two type 6146 beam power tubes in parallel providing the RF power output through a PI-network circuit.

Bandswitching is accomplished through the medium of a rotary type switch which as pointed out above is ganged to the multiplier section enabling simultaneous switching of the multiplier sections and the final amplifier. The PI-network in the output circuit enables loading and tuning adjustments to be made for compensating nominal variations in the antenna feed line system.

An excitation control in the grid circuit of the power amplifier stage is provided for effecting proper adjustment for the most efficient driving power as required for each individual band.

When the power amplifier is used in CW operation, the screen voltage is supplied by a constant source from the low voltage supply. However, when the power amplifier is modulated, the screen voltage is supplied from the high voltage supply by means of dropping resistors, so that plate and screen are modulated simultaneously. The circuitry of the multiplier and power amplifier has been designed to minimize spurious radiations.

All leads in the three units described above, constituting the complete RF section of this equipment, have been carefully filtered and shielded to minimize leakege and radiation. The mechanical construction of all three RF units as well as the speech amplifier-modulator unit have been designed with a view towards quick and easy removal of each individual unit, for purposes of inspection and service, with minimum disturbance to other functional units of the over-all equipment.

SPEECH AMPLIFIER — MODULATOR UNIT

SPEECH AMPLIFIER

The speech amplifier-section of this unit employs a type 6U8 triodepentode tube, the triode section of which is used as the preamplifier stage and the pentode section as a high gain second stage in order to obtain driving voltage for a type 6AQ5 tube functioning as a transformer coupled driver.

The volume control for governing the audio level is placed in the circuit between the triode and pentode sections of the dual purpose 6U8 speech amplifier tube. The audio power obtainable from the speech amplifier is more than ample to fully excite the 6AQ5 driver stage when a low level crystal microphone is used.

MODULATOR

The modulator portion of this unit is composed of two type 6146 beam power tubes, operating in class AB2.

The speech amplifier and modulator system provides approximately 75 watts of audio power, a greater amount than is required for 100% modulation of the R.F. amplifier operating at maximum power input. This audio power is also available for external use in driving a high powered modulator. The external output impedance through terminal strip connections on the rear chassis apron is 500 ohms. Precautions have been taken to completely shield this unit as well as filter its connecting leads in order that no difficulty due to RF feed-back is experienced.

POWER SUPPLIES

HIGH VOLTAGE SUPPLY

The high voltage power supply used for powering the RF amplifier, modulator and multiplier section delivers a nominal potential of 600 volts D.C. Two type 5R4GY tubes are employed in a full wave circuit together with a conventional type filter.

For purposes of improved filtering and better regulation, the filter reactor has been resonated at approximately 120 cycles by means of a shunt condenser. A bleeder is utilized across the output of the high voltage supply for discharging the residual charge in the filter capacitor section.

For tune up purposes, a resistor is employed in series with the primary of this supply, thus reducing the high voltage to a safe value. The control of these two levels of potential is through the panel mounted tune-operate switch.

LOW VOLTAGE SUPPLY

The low voltage power supply is a separate unit. It is used to furnish the plate power to the variable frequency oscillator, buffer-amplifier-crystal oscillator, speech amplifier, audio driver, modulator driver and the screens of the modulators.

In addition to the above, this power supply also delivers the required bias voltage for both the modulator and RF amplifier. In the CW operating position, this supply also provides the screen voltage for the RF power amplifier.

OPERATING INSTRUCTIONS

PHONE OPERATION

1. With either a suitable crystal inserted in the holder for crystal operation or the VFO adjusted to the desired frequency, the main band selector switch should be set to the proper band of operation.

2. Throw the A.C. line switch to the **on** position and allow tubes to warm up for at least two full minutes, meanwhile, throw the **tune operate switch** to the **tune position,** the meter switch to the **amp.** position and the **function switch** to phone position. The **load control knob** should be set at **zero.**

3. Throw the plate switch to the **on position** and adjust the plate tuning control to show a minimum meter reading. The **tune operate switch** should now be set to **operate.** The **loading control** should now be turned slowly toward ten and the plate tuning again adjusted for minimum. This procedure should be repeated until a reading of 200 is indicated by the meter.

4. Turn the meter switch to the **grid position** and **exc. control** until meter indicates approximately **17 mils.** Meter should now be switched to the **amp. position.** The **loading and plate tuning controls** should again be adjusted as outlined above, until a meter reading of 220 mils. is obtained. This indicates that the final is loading and power is flowing into either the dummy load or antenna, whichever is used.

5. When lower power output is desired, **the loading and plate tuning controls** should be adjusted accordingly as outlined in paragraphs 3 and 4 until the plate current as indicated by the meter registers proportionately with respect to the output power desired.

6. The transmitter is now ready to be modulated and the operator should proceed as follows:

   A) Advance the audio gain control knob.

   B) Turn meter selector switch to **mod. position.** This will indicate modulator resting plate current.

   C) While speaking into the microphone with normal voice, proceed to adjust the **audio gain control** to a point where the peak increase under modulation as indicated by the meter does not exceed 100 mils.

The modulator has sufficient audio power to more than fully modulate the maximum power input of the RF power amplifier, hence, the possibility of over-modulation should be avoided by keeping the audio gain control in a position which permits just enough audio power output to be generated for 100% modulation of the RF power amplifier.

The process as outlined above covers phone operation on crystal or VFO and applies to all bands.

OPERATING INSTRUCTIONS

C. W. OPERATION

1. Proceed to tune the transmitter as outlined in the preceding paragraphs, after which the function switch should be turned to the C.W. position.
2. In C.W. operation the microphone remains connected, but unused and a telegraph key is plugged into the key jack as follows —
   A) Insert the key plug into the **key jack.**
   B) **Retard audio gain control knob to minimum.**
   C) Turn the meter switch to the **amp. position.** When the plate switch is thrown to the **on** position, **the key** will further take control with respect to operation of the transmitter output.
3. In C.W. operation on any band, with key-up conditions, the oscillator is blocked and the power amplifier is biased to a safe value. Hence, under key-up conditions, the meter indication will be low, but normal under key down conditions.
4. Crystals for operation on the 40-20-15-11 and 10 meter amateur bands must always be of the 80 meter fundamental type. When the operator desires to operate on crystal at a specific frequency in any of these bands an 80 meter crystal which multiplies to the desired frequency of the chosen band **should be selected.**

DESCRIPTION AND FUNCTIONAL SUMMARY OF VARIOUS FRONT PANEL CONTROLS AND SWITCHES

Reading from left to right the bottom row of controls and switches functions as follows:—

1. **The A.C. line switch**
   This switch is used to break the primary circuit of the low voltage power supply. When this switch is in the **on** position the low voltage power supply is energized, thus, furnishing all filament and plate voltages for the VFO, crystal-oscillator-buffer-amplifier unit, speech amplifier, audio driver, modulator driver, screen voltage for the modulator tubes and bias voltage for modulator and RF amplifier tubes.
2. **Tune operate switch**
   This switch functions as a shunt for a resistor in the primary circuit of the high voltage power supply. When this switch is in the **tune position** it places the resistor in series with the primary winding, thus reducing the input voltage to a value sufficient for safe reduction of the high D.C. potential. When it is in the **operate** position, it shunts the resistor allowing the full primary voltage to be applied for use under normal operating conditions.
3. **Meter switch**
   This three position switch functions to place the indicating **meter** in three separate circuits. In the **grid position,** the meter is in series with the power amplifier screen circuit and thus indicates screen-grid current. In the **mod. position,** the meter is in series with the modulator plate voltage circuit, thus indicating modulator plate current. In the **amp. position,** the meter is in series with the RF amplifier plate voltage circuit, thus indicating plate current of the RF amplifier.

   Note

   When the meter switch is in the **grid position** the full scale reading of the meter **is 40 mils.** In the mod. and amp. positions the full scale reading of the meter is 400 mils.
4. **Audio gain control**
   This control is a potentiometer for use in controlling the audio level to the speech amplifier driver tube (6AQ5) and is placed in the circuit of the speech amplifier between the triode and pentode sections of the (6U8) dual purpose speech amplifier tube. **It should be in the minimum position when C.W. operation is in use.**
5. **Function switch**
   This switch is composed of two sections and is a six circuit, three position unit performing various functions as described below:—
   In the **C.W. position** it functions to short-circuit the secondary of the modulator transformer and switches the RF amplifier screen voltage to feed direct from the low voltage supply.
   In the **VFO position** it functions to disconnect the screen voltage from the RF amplifier, allowing plate voltage to remain on all other circuits. This position is used to **beat** the VFO signal selected, against the communications receiver for spot frequency operation purposes, etc.
   In the **phone position** it functions to remove the short-circuit across the secondary of the modulator transformer and switches the RF amplifier screen voltage to feed modulated voltage through dropping resistors from the high voltage supply.

   Note

   When it is desired to zero beat the transmitter operating frequency against a received signal, proceed as follows—
   A) With receiver BFO turned **on** tune to zero beat with desired incoming signal (on very strong incoming signals it may not be necessary to use receiver BFO).
   B) Set function switch on model 5100 transmitter to **VFO position** and adjust VFO to zero beat against the received signal on the communications receiver.
6. **Plate on and off switch**
   This switch functions to complete the circuit (when thrown to the **on** position) of the D.C. voltage which energizes the control relay. Two contacts of the control relay, when closed, completes the primary circuits of the high voltage supply, thus providing the required high voltage D.C. for normal operation.

Reading from left to right, the upper group of con-

trols function as follows:—

1. **Frequency control**
The large knob designated — frequency control — functions through a reduction unit whose ratio is approximately 30 to 1, to control the adjustment of the VFO variable capacitor. The velvet action of this control knob, simultaneously permits the operator to adjust the dial pointer on the frequency selector scale to the desired frequency of operation on any of the six bands.

2. **Loading control**
This control functions to adjust the high capacity variable loading condenser located across the output side of the PI-network circuit of the RF amplifier. Its adjustment determines the degree of loading throughout the tune-up procedures for each of the various bands. Graduations printed on the panel, permits a means of logging the readings for reset purposes.

3. **Exc. control**
This control functions to adjust a variable tuning condenser in the grid circuit of the RF amplifier. In tune-up procedure, it is adjusted to a point where the meter indicates not more than 17 mils. when the meter switch is in the **grid position.**

4. **Plate tuning**
The plate tuning control functions to adjust a variable tuning capacitor located at the input side of the PI-network circuit of the RF amplifier. This variable capacitor is adjusted to a point effecting resonance of the RF amplifier with respect to frequency and loading conditions as denoted by a minimum dip under loaded conditions as indicated by the meter when the meter switch is in the **amp. position.** The printed graduations on the panel, permits a means of logging the readings for reset purposes.

5. **Band selector**
This knob functions to simultaneously switch the multiplier stages and final amplifier PI-network to the desired frequency output. **This control should not be rotated when the plate switch is in the on position.**

Microphone connector

This connector unit is of the dual conductor type. One conductor is used for the high side of the microphone, while the remaining conductor is used as the push-to-talk connection. From the front view, the hole on the left side is the microphone connection, the one on the right, the push-to-talk connection.

The push-to-talk connection is a parallel conductor with the plate switch which functions to energize the control relay. Hence, when push-to-talk is used by the operator, the plate switch is left in the **off position.** A microphone with a suitable grip operated push type switch is required to place this control into operation.

Key Jack

The keying jack is of the closed circuit type, located in the grid circuit of the second buffer stage (6BJ6).

It functions to complete the circuit when not in use under phone operating conditions, while it breaks the grid circuit of the keying tube when the key plug is inserted. The on and off action in C.W. operation is then controlled by action of the key.

MAINTENANCE

B&W has exercised great care in the design and construction of this equipment in order to offer the users of its products, an equipment which will give long and satisfactory service with a minimum of care and adjustment.

Although the finest grades of materials and components have been used throughout and the equipment before shipping has been subjected to rigid factory inspection and final adjustment, a periodic check on the part of the operator is desirable in order to insure consistent and dependable service.

It is recommended that a general routine inspection be made periodically of all electrical and mechanical moving parts. Dust and other foreign particles which accumulate on and around rotary switch contacts, relays, dial mechanism and variable condenser plates, should be cleaned off with a dry brush free of oil deposits. Forced, clean dry air should be applied, wherever dirt or dust cannot be removed with a brush.

Tube failures are considered the major cause of interrupted service. Be sure and check the emission and performance of each tube at regular intervals to insure a high level and quality of signal output. Make sure all tubes are pushed firmly into place and that tube pins are free from corrosion and make good contact with the socket prongs. Take care in removing and replacing plate connectors to avoid breaking the tube seals and plate lead connection in the caps.

If possible keep an extra set of tubes on hand for spares. Such a set does not necessarily need to be a complete complement of tubes, but, one of each of the various types used in the equipment.

Removing Chassis from Cabinet

The model 5100 panel is secured to the cabinet by **six** round head screws through the front panel and **two** camlock fasteners on the chassis.

The **two** camlock fasteners are used to firmly secure the chassis to the bottom of the cabinet for shipping purposes. They are located, one on each side of the chassis directly below the front side of the two power transformers, they fasten through the outer lip of the chassis onto the cabinet reinforcement rails on which the chassis slides and rests. See drawing showing cutaway view.

To remove the chassis from the cabinet, first remove the six round head screws on the front panel. These are the screws which run through the wide trim stripe around the outer edge of the front panel. Next, the two camlock fasteners should be loosened with a screw-driver by a one-quarter turn in a counter clockwise direction. After the camlocks are loosened, both hands should be used to reach inside the cabinet gripping each of the two power transformers, one by each hand. Using an upward pull with both hands, to release the camlocks from their seat — the operator should simultaneously pull the chassis with a forward motion until the camlocks are out of their seats and the front panel overlap has been detached from the cabinet.

When placing the chassis back into the cabinet, the camlocks may be left out, if desired.

TROUBLE SHOOTING

Trouble shooting, parts replacement and repairs of a general nature, should be performed by a qualified technician or an operator with full knowledge of electrical circuits and ability to comprehend the function of each part as well as the ability to detect a defective component responsible for any erratic condition encountered, during the course of voltage and resistance tests and continuity measurements. In most cases of trouble, the difficulty can usually be isolated by means of tests and measurements and the section of the transmitter at fault, when determined, can be quickly and easily removed for repairs without in any way disturbing the other sections of the equipment. Proceed as follows:

1. In cases of interrupted service, first make a check for filament voltage when the A.C. switch is thrown to the **on** position. If tubes do not light, check the fuse and if blown, replace with one of similar value (5 amps.). Do not replace fuse with one of higher value. If fuse blows out when switch is thrown again, check primary circuit of low voltage power supply for a possible short circuit to ground. If primary checks out showing no short to ground, the secondary should be checked for a possible shorted filter capacitor or a defective rectifier tube and other components in the filter circuit.

2. Assuming that filament and low voltage D.C. potentials are normal when the A.C. switch is thrown to the **on** position, but the fuse blows out when the tune-operate switch is thrown to the operate position, the checks and procedures outlined under paragraph (1) above also apply in these instances.

3. If difficulty persists after checks given under paragraphs 1 and 2, proceed with a voltage check for each pin connection of the chassis connectors to ground and compare meter readings with those given under chassis voltage Table #1. With all power switches in the **off** position — proceed as follows:—

   A) Disconnect all male cable connectors from the chassis leading to the modulator, buffer-amplifier, VFO and multiplier-RF amplifier.

   B) With all rectifier and regulator tubes in their respective sockets, throw the A.C. line switch to the **on** position and allow rectifiers to warm up. Next throw the tune-operate switch to the operate position and last, throw the plate switch to the **on** position.

   C) The voltage reading as measured with a 20,000 ohms per volt volt-ohmmeter, between chassis and each female connector pin **on the chassis** should compare within a tolerance of plus or minus 10% of the voltage given for each respective pin of the various female chassis connectors listed under Table #1.

TABLE #1
CHASSIS CONNECTORS - VOLTAGE TABLE
FUNCTION SWITCH IN PHONE POSITION

FEMALE CONNECTORS	PINS											
PIN NO'S.	1	2	3	4	5	6	7	8	9	10	11	12
J-3	0	6.3AC	0									
J-4	+165	6.3AC	0	0								
J-5	0	0	0	-60	0	+880	0	0	0	0	6.3AC	6.3AC
J-6	6.3AC	0	-60	6.3AC	0	+300	+900	+900	0	+900	0	0

4. For continuity and resistance measurements utilizing a 20,000 ohm per volt volt-ohmmeter, proceed as follows:—

   A) With all power switches in the **off** position and A.C. line cord removed from the power source, remove all tubes and **male connector plugs** from the chassis leading to VFO, buffer-amplifier, modulator and multiplier-RF amplifier.

   B) Resistance measurements between chassis and each female connector pin and tube socket pin connection on the chassis should compare within a tolerance of plus or minus 10% of the values given for each respective value of the various female chassis connectors and socket pin connections under Table #2.

TABLE #2
FEMALE CHASSIS CONNECTORS & TUBE SOCKETS
RESISTANCE MEASUREMENTS
FUNCTION SWITCH IN PHONE POSITION

FEMALE CHASSIS CONNECTORS	PINS											
PIN NO'S.	1	2	3	4	5	6	7	8	9	10	11	12
J-3	0	0	∞									
J-4	∞	0	∞	32K								
J-5	∞	∞	∞	3700	—	60K	0	0	0	10K	0	0
J-6	0	∞	3800	0	0	—	60K	60K	∞	∞	0	0
TUBE SOCKETS												
V-14	∞	0	—	∞	∞	—	∞	∞				
V-15	∞	4800	—	∞	0	∞	4800	∞				
V-16	∞	70K	∞	40Ω	∞	37Ω	∞	60K				
V-17	∞	70K	∞	40Ω	∞	37Ω	∞	60K				
V-18	—	—	∞	—	0	—	—	—				

5. For continuity and resistance measurements of the individual units — VFO, buffer-amplifier, modulator speech amplifier and multiplier RF amplifier, proceed as follows, utilizing a 20,000 ohm per volt volt-ohm-meter—

   A) With all power switches in the **off** position and the A.C. line cord removed from the power source, disconnect the male plug connector, (of any of the units to be tested) from the female counterpart of that respective connector on the chassis and proceed with resistance measurements from each **male** connector plug pin to ground.

   B) Resistance measurements between chassis and each plug pin should compare within a tolerance of plus or minus 10% of the values for each of the connector pins listed under Table #3.

TABLE #3
RESISTANCE MEASUREMENTS WITH TUBES OUT
UNIT MALE PLUG CONNECTORS

MALE PLUG CONNECTORS	PINS											
PIN NO'S.	1	2	3	4	5	6	7	8	9	10	11	12
BUFF-AMP-P4	∞	FIL.	∞	∞								
MODULATOR-P6 SPEECH AMP.	FIL.	∞	∞	FIL.	∞	—	∞	∞	∞	∞	0	0
MULTIPLIER-P5 R.F. AMP.	∞	∞	∞	∞	∞	∞	0	0	0	∞	FIL.	FIL.
VFO - P3	0	FIL	∞									

Erratic Conditions

6. Most erratic operating conditions such as, insufficient driving power to R.F. amplifier, modulators, and low D.C. potentials including plate, screen, bias voltages and currents are normally the result of low tube output, hence, it is recommended that all or such tubes as may be suspected of causing trouble resulting in interrupted or erratic operation of a particular section, be replaced or at least tested for compliance to standard performance, before any attempt is made to seek other sources causing improper operation of any particular section.

7. When tubes have been eliminated as the possible source of any particular difficulty encountered, the schematic diagram of the equipment, provided in this manual, should be used for reference in identifying a particular defective component during the course of voltage and resistance measurements covered under paragraphs 1, 2, 3, 4, and 5 under trouble shooting above.

TERMINAL CONNECTIONS

CHASSIS APRON (Rear View)

Figure—

The information given below applies to the terminal connections located on the rear chassis apron of the model 5100 transmitter. Reading from left to right, the terminal connections are as follows:

1. R.F. power output connector
2. A.C. line connections
3. Directly below the A.C. line connections is the fuse holder
4. Terminal strip connections #11 through #1.

FUNCTIONAL SUMMARY OF REAR CHASSIS APRON

TERMINAL CONNECTIONS

The RF power output connector is an SO-239 coaxial fitting. This is the output of the built-in low pass filter. Its counterpart, PL.259 should be used with an appropriate length of 75 ohm coaxial line for power take-off.

The A.C. line connections are the external end of two high-pass type capacitors. The fuse holder is of the screw-in type housing a 5 amp. fuse cartridge, type 3AG.

The terminal strip connection #11 through #1 are as follows:

Terminals #11 and #10 are two of the internal control relay contacts. These contacts which are normally open, may be used in connection with an external antenna change-over relay circuit. When the plate switch is turned on they complete the antenna change-over energizing circuit and vice-versa.

Terminals #9 and #8 are two additional control relay contacts. These contacts which are normally closed, may be used for a communications receiver disabling circuit, choice of which is left to the operator. The internal control relay contacts #8, #9, #10 and #11 covered above have been provided for those who wish to fully utilize the control features built into the model 5100 transmitter.

In addition to the normal multiband performance herein described the model 5100 transmitter can also be utilized to provide the following:

1. Unmodulated R.F. power output for driving a higher powered final amplifier.
2. 75 watts of audio power for driving a higher powered modulator, less the R.F. driving power. Impedance value of audio output is 500 ohms.
3. Unmodualted R.F. power output in combination with 75 watts of audio power output through 500 ohms for the dual purpose of driving a higher powered final amplifier and modulator unit.

To obtain unmodulated R.F. power output for driving purposes indicated under (1) above, turn the **function switch** on the front panel to **C.W. position.** Connect a suitable coax line from R.F. output power connector to input stage of high powered final. Proceed as directed under operating instructions.

To obtain 75 watts of audio power output less the R.F. driving power indicated under (2) above, turn **function switch** on front panel to **phone position.** Open jumper connections between terminals 7 & 6, 4 & 3 on rear terminal strip. Connect a suitable 500 ohm line between terminals 7 & 5 to input of high powered modulator.

To obtain the combination of unmodulated R.F. and audio driving power as indicated under (3) above, turn **function switch** on front panel to **C.W. position.** Open jumper connections 7 & 6, 4 & 3 on rear terminal strip. Connect a suitable coax line from R.F. output power connector to input stage of high powered R.F. amplifier. Connect a suitable 500 ohm line between terminals 7 and 5 to input of high powered modualtor unit.

Terminals #2 and #1 are the extension of the push to talk circuit provided on the front panel through the microphone connector. These terminal connectors may be used for remote operation purposes as individually required by each operator. Terminal #1 also serves as the common chassis ground. It is highly recommended to tie #1 terminal down to a good ground through heavy copper wire or braid.

ALIGNMENT AND TUNING PROCEDURE

MULTIPLIER R. F. AMPLIFIER UNIT

1. Remove multiplier R.F. amplifier unit from main chassis by disconnecting power cable plug (#P 5), remove four mounting screws, all knobs and coax output cable.
2. Provide a suitable extension power cable with appropriate plug and jack connectors to match P#5, and J#5 permitting operation of unit external to chassis also a suitable extension coax line to match P#2 and J#2.
3. Set function switch on VFO position — **This is important.**
4. Place the test leads of a 20,000 ohm per volt, volt-ohmmeter across the R.F. amplifier grid resistor R 23, value 22K, located on back panel of RF amplifier unit. Set instrument scale to 250 volt D.C. and observe proper polarity.
5. Adjust excitation control — variable capacitor C 36 until its rotor plates are enmeshed approximately 60%. The unit is now prepared for alignment for each individual band and the next steps for each band are as follows—
6. **80 meter band**
   (A) Set band selector switch on 80 meter position.
   (B) Set VFO frequency to 3750 K.C.
   (C) Adjust core screw of L-6 to obtain maximum reading on meter which has been placed across R 23.
7. **40 meter band**
   (A) Set band selector switch on 40 meter position.
   (B) Set VFO frequency to 7200 K.C.
   (C) Adjust core screw of L-7 to obtain maximum reading on meter.

8. **20 meter band**
   (A) Set band selector switch on a 20 meter position.
   (B) Set VFO frequency to 14, 200 K.C.
   (C) Adjust core screw of L-8 to obtain maximum reading on meter.

9. **15 meter band**
   (A) Set band selector switch on 15 meter position.
   (B) Set VFO frequency to 21,150 K.C.
   (C) Adjust core screw of L-9 to obtain maximum reading on meter.

10. **10 meter band**
   (A) Set band selector switch on 10 meter position.
   (B) Set VFO frequency to 28,800 K.C.
   (C) Adjust core screw of L-10 to obtain maximum reading on meter.
   (D) Adjust capacitor trimmer C-31 which is across the grid of V-7 for maximum reading on meter. The C-31 capacitor trimmer is located on the underside of the multiplier RF unit.

11. **11 meter band**
   (A) Set band selector switch on 11 meter position.
   (B) Set VFO frequency to 27,120 K.C.
   (C) Adjust capacitor trimmer C-38 accessable through hole on left side of multiplier RF amplifier panel, for maximum reading on meter.
   (D) Adjust capacitor trimmer C-33 accessable through hole on right side of multiplier RF amplifier panel, for maximum reading on meter.
   (E) Repeat adjustments of C-38 and C-33 as required to obtain maximum reading on meter.

The multiplier RF amplifier unit is now completely aligned and it can be placed back in its position on the main chassis, etc.

ALIGNMENT AND TUNING PROCEDURE

VFO UNIT

The VFO unit as shipped from the factory is completely aligned. Realignment is a matter which only becomes necessary in those cases where the oscillator tube needs to be changed or the dial cord requires replacement.

In such cases where the oscillator tube has been changed, the procedure for alignment of this unit is as follows:

1. A signal source of exactly 3.6 mc. is to be tuned in on a communications receiver.
2. After the VFO unit has been allowed to warm up, turn frequency control knob and set pointer on scale to read the exact frequency used as pointed out under paragraph #1 above.
3. The last step required is to adjust the small trimmer capacitor (C3) located on the top of the VFO chassis until the VFO frequency as varied by the adjustment of (C3) zero beats exactly with the standard as monitored on the communications receiver.

This completes the alignment procedure required in cases of tube replacements.

When the VFO unit requires realignment due to a broken dial cord, the procedure is as follows:

1. After the dial has been restrung with a new cord, tune in a signal of known frequency on the communications receiver. The known frequency in this case can also be same as used above, 3.6 mcs.
2. The next step is to turn the frequency control knob until the VFO produces a zero beat against the signal tuned in on the communications receiver.
3. The last step is to move the dial pointer assembly without in any way altering the zero beat signal on the communications receiver, until the pointer reads 3.6 mcs. on the scale.

Detailed instructions covering the dial cord replacement is given in a drawing elsewhere in this manual.

ANTENNA SYSTEMS

The Model 5100 may be used with a variety of antenna systems, however, since it is factory equipped with a low pass filter whose characteristic output impedance is 75 ohms, the output power should be arranged to feed into a load of equal impedance. This does not mean that the operator is limited to use an antenna feed line system with an impedance of 75 ohms only, on the contrary, several line impedance values can be utilized effectively, the choice of which is left entirely to the operator and local conditions affecting the installations, etc.

Several typical examples of antennas and feed line systems which can be successfully used with the 5100 transmitter are illustrated under figures (1A) (2A) (3A) (4A) (5A) (6A).

SUMMARY OF VARIOUS ANTENNA SYSTEMS

Fig. (1A) SINGLE BAND HALF WAVE FOLDED DIPOLE ANTENNA

This diagram illustrates the Model 5100 transmitter connected to a half wave folded dipole antenna. The impedance match from 75 to 300 ohms and the transformation from unbalance to balance is effected through the medium of the B&W multiband balun unit assembly made up with two B&W type #3975 bifilar wound coils.

Several of these antennas may be used for such applications where local conditions provide space and the operator chooses to use a separate antenna for each band of operation.

Where space and local facilities do not provide for high gain type antennas for 20-15 and 10 meters, these fundamental types will be found to give satisfactory results.

Fig. (2A) MULTIBAND ANTENNA FOR 80-40-20 and 10 METERS

A multi-band antenna of this type provides the operator with a radiating system for each of the bands listed above. Perhaps not as effective as separate half wave antennas due to orientation restrictions, it can be considered a compromise where space limitations and other local conditions would normally confine operations to one or two bands only.

Considering that no switching or tuning is required, this compromise antenna system provides a means of quick changeover from one band to another for those who wish to fully utilize multiband operation with the Model 5100 transmitter.

Fig. (3A) **BEAM ANTENNAS**

This illustration shows the method of effectively connecting and matching the output of the Model 5100 to a beam antenna, through use of a B&W beam matching balun. 75 ohm coaxial line is used from the output of the Model 5100 to the beam matching balun which mounts at the beam. Instructions provided with the beam baluns covers installation instruction details.

Applicable baluns for the 20-15 and 10 meter bands are as follows:

20 Meter — B&W #702
15 Meter — B&W #701
10 Meter — B&W #700

Fig. (4A) **HALF WAVE SPLIT DIPOLE ANTENNA**

This illustration shows a half split dipole antenna. Its performance in every respect is similar to the folded dipole, illustrated in Fig. 1A. However, the feed line system is of the 75 ohm twin parallel wire type. The #3975 type balun in this case is wired accordingly as covered by the instruction sheets packed with these balun units. Like the folded dipole, several of these antennas can be arranged for quick switching when operation on another band is desired.

Fig. (5A & 6A) **HALF WAVE SPLIT DIPOLE AND END FED ZEPP USING OPEN WIRE FEED LINE SYSTEM**

These antennas from the operational viewpoint are basically similar to the other half wave types shown under Figs. 1A and 4A. Transformation from unbalance to balance is accomplished through the medium of the antenna coupler circuit.

The antenna coupler essentially consists of a B&W antenna coupler coil with a fixed link and a B&W JCX100E variable split stator condenser equipped with a jack bar and mounting brackets, providing a compact assembly without leads.

Feed line impedance matching is obtained by tapping of the open wire feed line at appropriate points across the antenna coupler coil, while the proper load for the transmitter is achieved by a combination of adjusting the transmitter loading and plate tuning controls and the adjustment of the antenna tuning condenser.

While this system is extremely flexible from the standpoint of its ability to match and function well with a varied collection of open wire feed line systems, the only objectional factor disliked by a few operators is the extra tuning control. However, in spite of such objections, it can be considered as the only simple and practical solution to the problem of matching an assortment of different antennas with various types of feed line systems of different impedance values.

Although this antenna coupler and matching system has been shown here as used with half wave antennas, its usefulness can also be extended in other applications with longer antennas, such as the odd or even half wave multiple types as well as the rhombic and "V" type high gain antennas, in fact, any antenna system where a resonant or non-resonant feed line system can be adapted.

A suggested method of adjusting the antenna coupler when used with the PI-network output of the B&W Model 5100 transmitter is given below:

1. With the **tune operate switch** in the **tune position,** adjust the loading control of the Model 5100 until the plates of the loading capacitor are fully meshed. The scale reading as indicated by the pointer on the knob will be "0".

2. Refer to Figs. 5A & 6A and short circuit C1 then adjust plate tuning control on Model 5100 transmitter for minimum dip as indicated by the meter, when **meter switch** is in **amp. position.**

3. Remove short circuit and adjust C1 for maximum loading.

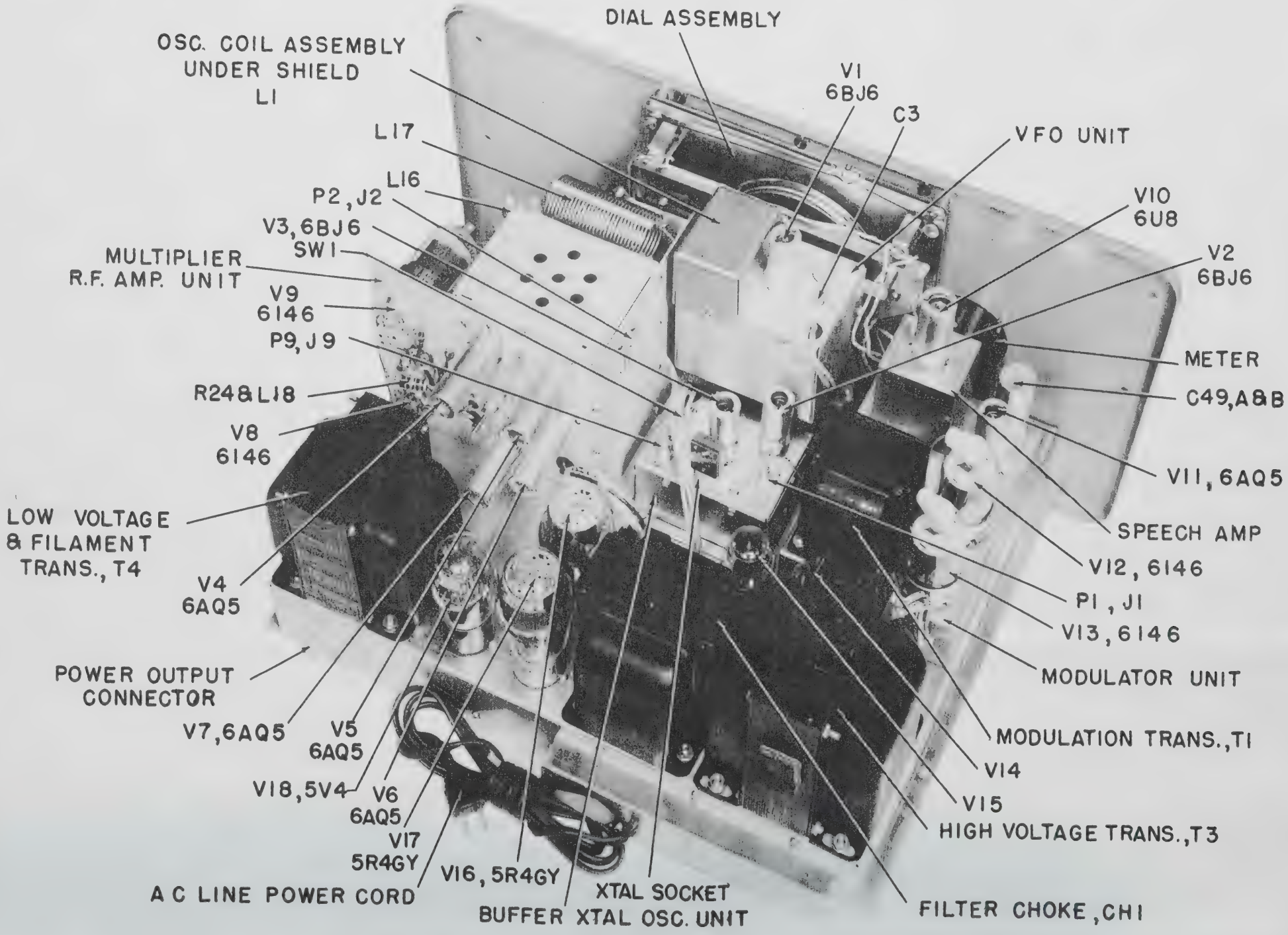
4. Tap feeders on L1, starting at extreme outer ends of coil. Locate correct tap points on coupler coil, by moving taps towards center, that gives maximum loading, corresponding with reading of C1 under paragraph #3 above.

5. Throw **tune operate switch** to the **operate position** and proceed with adjustment of loading control on Model 5100 until the final is loaded to maximum and repeat the minimum dip of the plate tuning capacitor as explained under paragraph "2" above. At this point, if the setting of C1 is same as noted under paragraph #3 above, the standing wave ratio can be considered to be satisfactory while on the other hand if the setting of C1 indicates an increase in capacity for proper load conditions, the line is inductively reactive or capacitively reactive when the setting of C1 at this condition, shows a decrease in capacity.

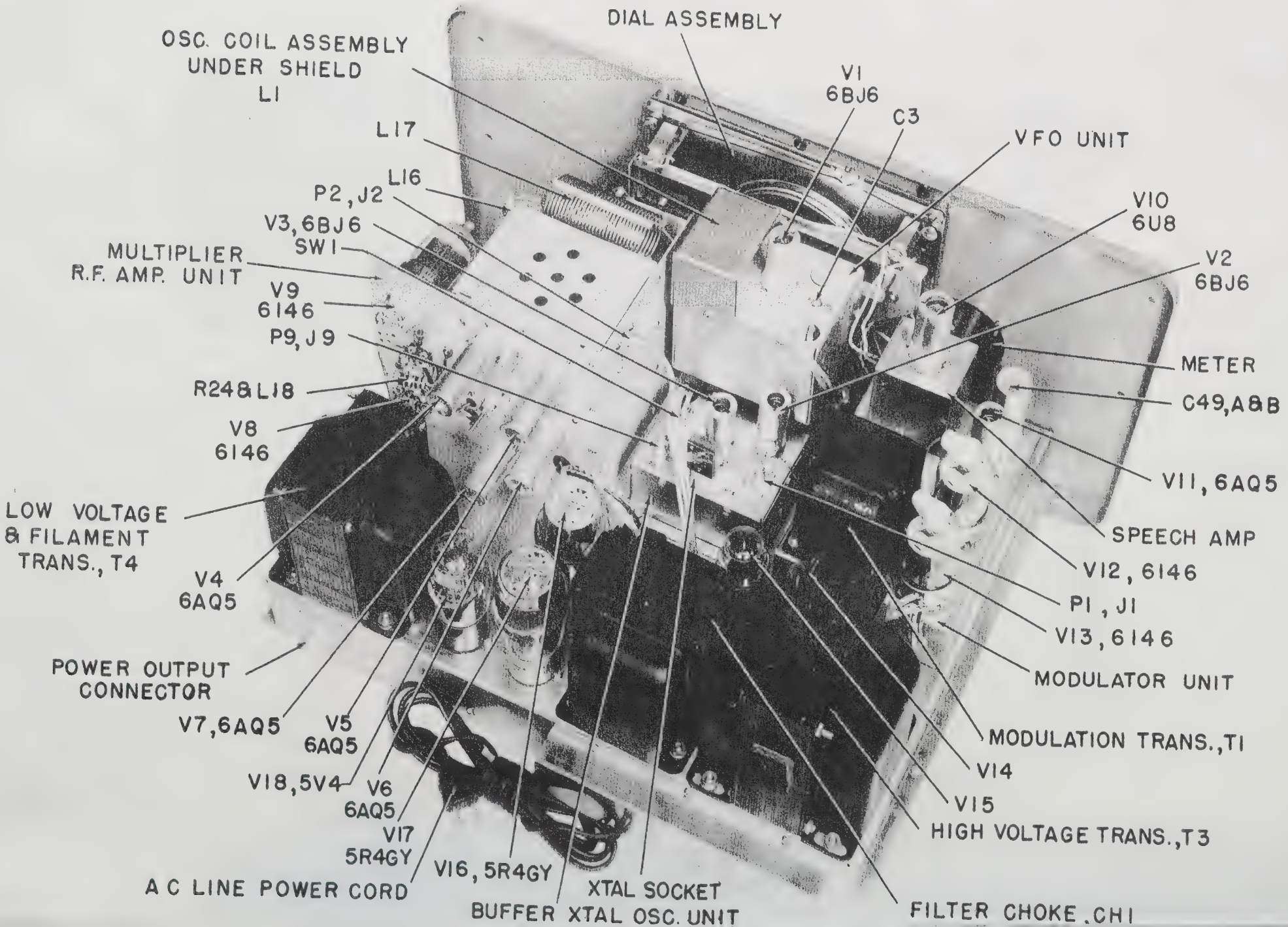
6. The correction of either inductive or capacitive reactance in cases where the operator desires to obtain a minimum SWR, is best accomplished through use of an SWR indicator placed in the coax line between the transmitter output and the antenna coupler. Repeating the matching and tuning process explained above, until a minimum SWR is obtained.

For other type antennas not covered herein, reference to the ARRL antenna handbook provides a good source of information.

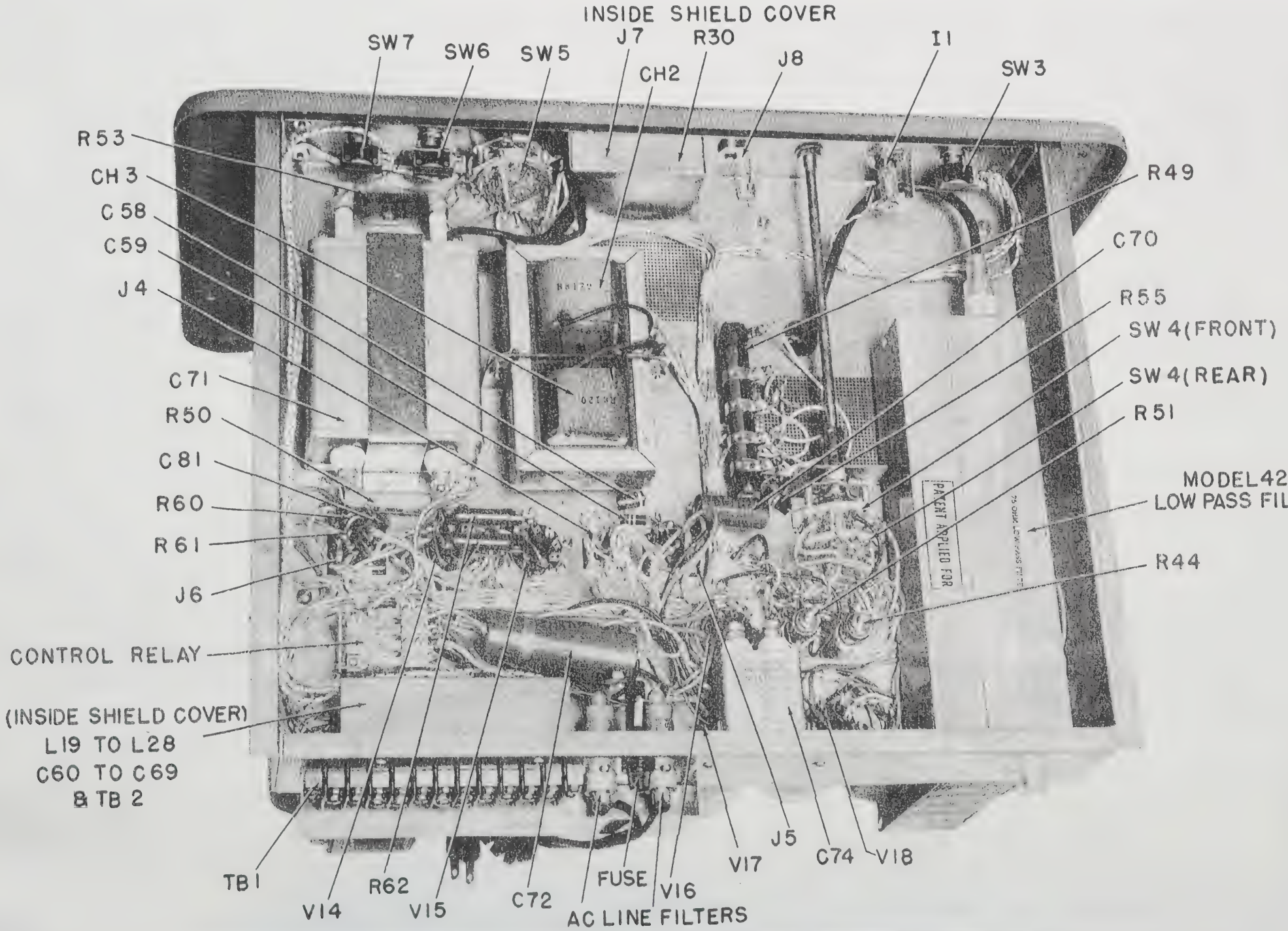
CHASSIS - TOP VIEW



CHASSIS - TOP VIEW



CHASSIS-UNDERSIDE VIEW



PARTS LIST - MODEL 5100 TRANSMITTER

Circuit Symbol	Sub. Assy. Location	Description	B & W Part #
C15	Buffer Xtal Osc.	Capacitor Ceramic Tubular 50 MMF ±5MMF —750 Neg. Temp. Coeff.	T-616
C16	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C17	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C18	Buffer Xtal Osc.	Capacitor Ceramic Tubular 95 MMF ±9.5 MMF —750 Neg. Temp. Coeff.	T-643
C19	Buffer Xtal Osc.	Capacitor Ceramic Tubular 20 MMF ±2 MMF —750 Neg. Temp. Coeff.	T-644
C20	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C75	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C76	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C21	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C22	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C23	Multiplier F. A.	Capacitor Fixed Ceramic CC21UJ430J	T-621
C24	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW ±20%	T-501
C25	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C26	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C27	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW±20%	T-501
C28	Multiplier F. A.	Capacitor Fixed Ceramic CC26UJ750J	T-622
C29	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C30	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C31	Multiplier F. A.	Trimmer Erie TS-2A-N-500-7-45	S-123
C32	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW ±20%	T-501
C33	Multiplier F. A.	Trimmer Erie TS-2A-N-500-7-45	S-123
C34	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C35	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C36	Multiplier F. A.	Capacitor Variable Air 28 MMF APC type	T-SP-160
C37	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW ±20%	T-501
C38	Multiplier F. A.	Trimmer Erie TS-2A-N-500-7-45	S-123
C39	Multiplier F. A.	Capacitor Fixed Mica VCM20B 102M Elmenco 1000 V.	T-SP-164
C40	Multiplier F. A.	Capacitor Fixed Mica .002 MMF 2500 VDC - CM50A202J	T-SP-162
C41	Multiplier F. A.	Capacitor Variable Air 325 MMF	T-SP-163
C42(A&B)	Multiplier F. A.	Capacitor Variable Dual 530 MMF	T-656
C44	Multiplier F. A.	Capacitor Fixed Mica .0051 MF 2500 VDC CM50A512 J	T-SP-161
C45	Multiplier F. A.	Capacitor Fixed Mica VCM20B 102 M 1000 Volt	T-SP-164
C46	Modulator S. A.	Capacitor Disc .001 MF	T-509
C47	Modulator S. A.	Capacitor Mica 50 MMFD	T-614
C48	Modulator S. A.	Capacitor Disc .001 MF	T-509
C49A C49B	Modulator S. A.	Capacitor Electrolytic 10-10 MFD 500V.	T-577
C50	Modulator S. A.	Tubular Paper Capacitor .1 MFD 400V.	T-617
C51	Modulator S. A.	Capacitor Disc .001 MF	T-509
C53	Modulator S. A.	Capacitor Electrolytic Single 10MF/25V	T-615
C54	Modulator S. A.	Capacitor Disc .001 MF	T-509
C55	Modulator S. A.	Capacitor Disc .001 MF	T-509
C56	Modulator S. A.	Capacitor Disc .001 MF	T-509
C57	Modulator S. A.	Capacitor Disc .001 MF	T-509
C58	Power Supply C.	Capacitor Tubular Paper .1 MFD 200V.	T-673
C59	Power Supply C.	Capacitor Disc Ceramic .01 MFD 500 V.	T-607
C60	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C61	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C62	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C63	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C64	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C65	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C66	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C67	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C68	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C69	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C70	Power Supply C.	Capacitor Electrolytic 20 MFD 150 V.	T-578
C71	Power Supply C.	Cap. oil filled paper 10 MFD 1000 V. with mtg. strap for inv. mtg.	T-579
C72	Power Supply C.	Dual Elect. Capacitor Aluminum case 20-20 MFD 450V. with mtg. strap	T-581
C74	Power Supply C.	Capacitor oil filled paper .25 MFD 2000 volts with mtg. strap for upright mtg.	T-580
C81	Power Supply C.	Capacitor Disc .001 MF	T-509
SW1	Buffer Xtal Osc.	Toggle Switch—S.P.S.T.	T-537
SW2	Multiplier F. A.	Switch 6 position 5 wafer ceramic	T-556
SW8	Multiplier F. A.	Switch 6 position 1 wafer with detent & shaft 3/8" bushing 1-5/8" shaft lgth.	T-555
SW3	Power Supply C.	Bat Handle toggle switches 3A. 125V. S.P.S.T.	T-592
SW4	Power Supply C.	Selector Switch non-shorting 3 pole 2 section	T-594
SW5	Power Supply C.	Selector Switch non-shorting 3 pole 1 section	T-595
SW6	Power Supply C.	Bat Handle toggle switches 3A. 125 V. S.P.S.T.	T-592
SW7	Power Supply C.	Bat Handle toggle switches 3A. 125 V. S.P.S.T.	T-592
P1	VFO	Phono Plug	T-288-1
P3	VFO	Cable Plug (3)	T-667
P2	Buffer Xtal Osc.	Phone Plug (Jumper between Buffer & Multiplier)	T-288-1
P9	Buffer Xtal Osc.	Phone Plug (Jumper between Buffer & Multiplier)	T-288-1
P4	Buffer Xtal Osc.	Cable Plug (4)	T-666
P5	Multiplier F. A.	12 pin Jones Plug	T-633
P6	Modulator S.A.	12 pin Jones Plug	T-633
J1	Buffer Xtal Osc.	Phono Socket	T-288
J9	Buffer Xtal. Osc.	Phono Socket	T-288
J2	Multiplier F.A.	Input Jack	T-288
J3	Power Supply C.	3 terminal Jones Socket	T-674
J4	Power Supply C.	4 terminal Jones Socket	T-591
J5	Power Supply C.	12 terminal Jones Connector	T-590
J6	Power Supply C.	12 terminal Jones Connector	T-590
J8	Power Supply C.	Jack, Key	T-593
J7	Modulator S. A.	2 contact locknut receptacle Amphenol 80-PC2F	T-611
L1	VFO	Oscillator Coil Assy.	T-715
L2	VFO	Filament Choke - RFC	T-359
L3	VFO	Plate Choke	T-712
L4	Buffer Xtal Osc.	Grid Choke	T-712
L5	Buffer Xtal Osc.	Screen Choke	T-713
L6	Multiplier F.A.	80 M 37 MH Coil Assy.	5100-2
L7	Multiplier F.A.	40 M 9.5 MH Coil Assy.	5100-3
L8	Multiplier F.A.	20 M 2.5 MH Coil Assy.	5100-4
L9	Multiplier F.A.	15 M 2 MH Coil Assy.	5100-1
L10	Multiplier F.A.	10 M .68 MH Coil Assy.	5100-5
L11	Multiplier F.A.	R. F. Choke Screen	T-711

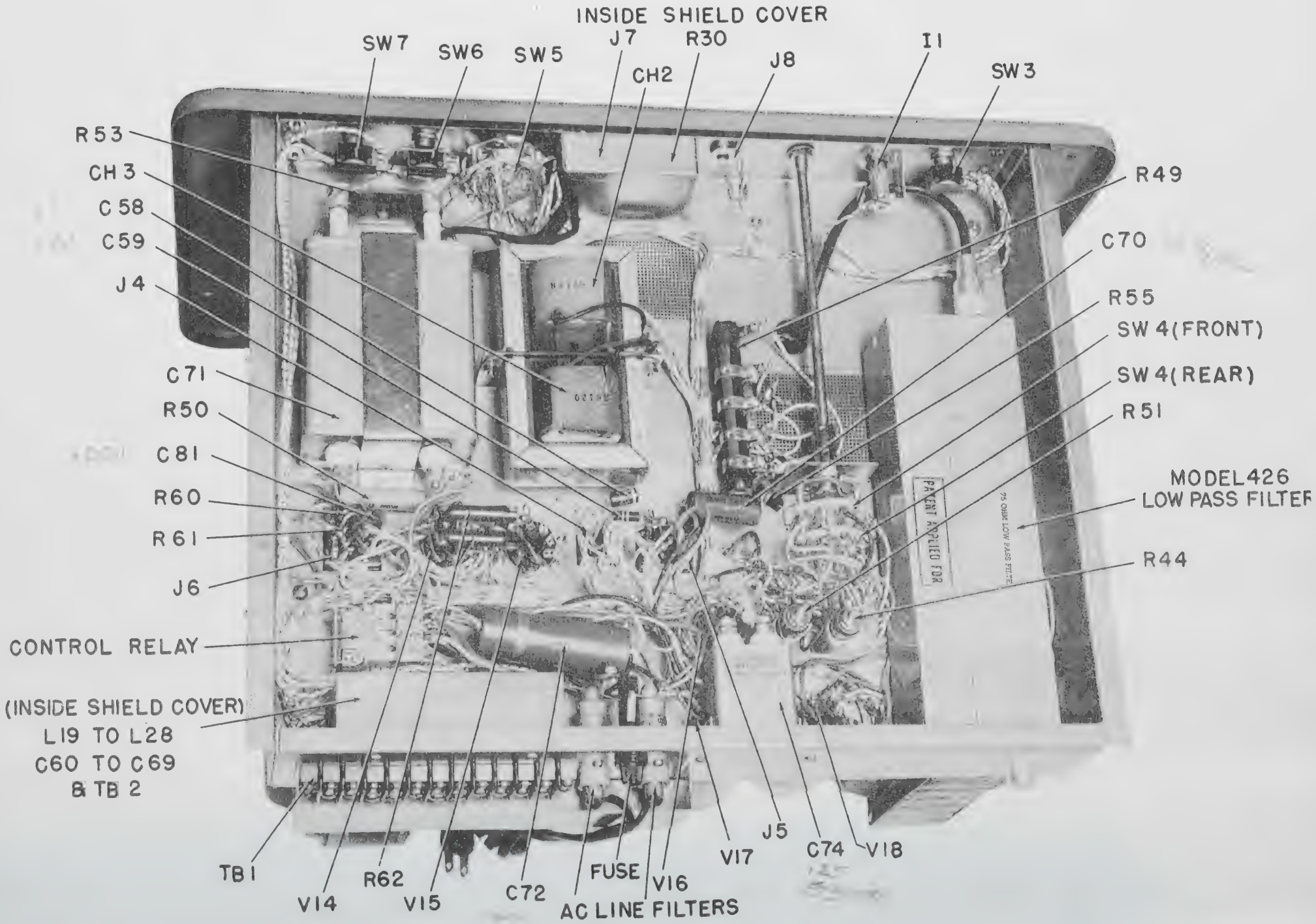
PARTS LIST - MODEL 5100 TRANSMITTER

Circuit Symbol	Sub. Assy. Location	Description	B & W Part #
R1	VFO	Resistor 100,000 ohms ½W. 5%	R-22
R2	VFO	Resistor 560 ohms ½W. 10%	T-244
R3	VFO	Resistor 10,000 ohms ½W. 5%	R-16
R4	Buffer Xtal Osc.	Resistor Composition 150 ohm ½W. 10%	R-62
R5	Buffer Xtal Osc.	Resistor Composition 5600 ohm ½W. 10%	R-63
R6	Buffer Xtal Osc.	Resistor Composition 220 ohm ½W. 20%	R-64
R7	Buffer Xtal Osc.	Resistor 100,000 ohms ½W. 5%	R-22
R8	Buffer Xtal Osc.	Resistor Composition 150 ohms ½W. 10%	R-62
R9	Buffer Xtal Osc.	Resistor Composition 1000 ohms ½W. 10%	R-65
R10	Buffer Xtal Osc.	Resistor Composition 5600 ohms ½W. 10%	R-63
R54	Buffer Xtal Osc.	Resistor Composition 220 ohm ½W. 20%	R-64
R11	Multiplier F. A.	Resistor Carbon 47,000 ohm 1 W. 10%	R-56
R12	Multiplier F.A.	Resistor Carbon 560 ohm 2 W. 10%	R-57
R13	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R14	Multiplier F.A.	Resistor Carbon 2200 ohm 2W. 10%	R-81
R15	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R16	Multiplier F.A.	Resistor Carbon 47,000 ohm 1W. 10%	R-56
R17	Multiplier F.A.	Resistor Carbon 1,000 ohm 2W. 10%	R-80
R18	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R19	Multiplier F.A.	Resistor Carbon 47,000 ohm 1W. 10%	R-56
R20	Multiplier F.A.	Resistor Carbon 1,000 ohm 2W. 10%	R-80
R21	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R22	Multiplier F.A.	Resistor 18,000 ohm 2W. 10%	R-82
R23	Multiplier F.A.	Resistor Carbon 22,000 ohm 1W. 10%	R-59
R24	Multiplier F.A.	Resistor Carbon 47 ohm 2W.10%	R-60
R25	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R26	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R56	Multiplier F.A.	Resistor Wire Wound 1500 ohm 5W. 10% Ohmite	R-79
R57	Multiplier F.A.	Resistor Carbon 47 ohm 2W. 10%	R-60
R58	Multiplier F.A.	Resistor Carbon 47 ohm 2W. 10%	R-60
R27	Modulator S. A.	Resistor 10 Meg. ½ W. ±10% insulated	R-38
R28	Modulator S. A.	Resistor Composition 5600 ohm ½W. 10%	R-63
R29	Modulator S. A.	Resistor Carbon 270,000 ohm ½W. 10%	R-49
R30	Modulator S. A.	Potentiometer Composition .5 Meg.	T-612
R31	Modulator S. A.	Resistor Composition 560 ohm ½W. 10%	T-244
R32	Modulator S. A.	Resistor Fixed Composition 1 Meg Ohm ½ W. 5%	R-7
R33	Modulator S. A.	Resistor Composition 330,000 ohm ½ W. 5%	R-32
R34	Modulator S. A.	Resistor Composition 5600 ohm ½W. 10%	R-63
R35	Modulator S. A.	Resistor Composition 470,000 ohm 1W. ±10%	R-69
R36	Modulator S. A.	Resistor Composition 470,000 ohm ½W. 10%	R-66
R37	Modulator S. A.	Resistor Composition 300 ohm 1W. ±5%	T-626
R38	Modulator S. A.	Resistor Composition 1000 ohm ½W. 10%	R-65
R39	Modulator S. A.	Resistor Composition 1000 ohm ½W. 10%	R-65
R40	Modulator S. A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R41	Modulator S. A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R42	Modulator S. A.	Resistor 5000 ohm 10 watt 20% wire wound	T-113
R43	Modulator S. A.	Resistor wire wound 4.7 ohm 1W. ±5%	R-70
R60	Modulator S. A.	Resistor Composition 100,000 ohm 2W. 10%	R-71
R61	Modulator S. A.	Resistor Composition 100,000 ohm 2W. 10%	R-71
R63	Modulator S. A.	Resistor 10,000 ohm ½W. 20%	R-102
R44	Power Supply C.	Resistor, wire wound, adj. 25,000 ohm 25 watts with one adj. lug 20%	T-584
R45	Power Supply C.	Meter Shunt to read full scale 40 MA D. C.	T-600
R46	Power Supply C.	Meter Shunt to read full scale 400 MA D. C.	T-601
R47	Power Supply C.	Meter Shunt to read full scale 400 MA D. C.	T-601
R48	Power Supply C.	Resistor Composition 33,000 ohm ½W. ±10% insulated	T-598
R49	Power Supply C.	Resistor wire wound adj. 20,000 ohms 50 watt with 2 mounting brackets and 4 adj. lugs	T-582
R50	Power Supply C.	Resistor wire wound 60,000 ohm 10W. 20%	T-587
R51	Power Supply C.	Resistor wire wound adj. 2,000 ohm 25 watts with one adj. lug	T-583
R52	Power Supply C.	Resistor Composition 100,000 ohm 2W. ±10%	R-71
R53	Power Supply C.	Resistor wire wound special heater	T-588
R55	Power Supply C.	Resistor Composition 100,000 ohm 2W. ±10%	R-71
R59	Power Supply C.	Resistor Carbon 22,000 ohm 1W. 10%	R-59
R62	Power Supply C.	Resistor 2,000 ohm 10W. 10% Ohmite	R-101
C1	VFO	Cap. Ceramic Tubular 100 MMF ±1% Zero-Temp. uninsulated type	T-727
C2	VFO	Capacitor Variable	T-620
C3	VFO	Capacitor 25 MMF APC	T-314
C4	VFO	Capacitor Ceramic Tubular 100 MMF ± 10 MMF Zero Temp. Coeff.	T-646
C5	VFO	Capacitor Disc .001 MF	T-509
C6	VFO	Capacitor Disc .001 MF	T-509
C7	VFO	Capacitor Ceramic Tubular 75 MMF ± 7.5 MMF, —750 Neg. Temp. Coeff.	T-647
C8	VFO	Capacitor Disc .001 MF	T-50
C9	VFO	Capacitor Disc .001 MF	T-50
C78	VFO	Capacitor Ceramic Tubular 75 MMF ±1% Zero Temp. Coef. uninsulated	T-75
C79	VFO	Temp. Comp. Cap. N-750 ±120K 5±0.1 MMF	T-74
C80	VFO	Temp. Comp. Cap. N-750 ±120K 50± 1 MMF	T-7
C10	Buffer Xtal Osc.	Capacitor Ceramic Tubular 50 MMF ±5MMF —750 Neg. Temp. Coeff.	T-6
C11	Buffer Xtal Osc.	Capacitor Ceramic Tubular 95 MMF ±9.5 MMF —750 Neg. Temp. Coeff.	T-6
C12	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-5
C13	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-5
C14	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-5

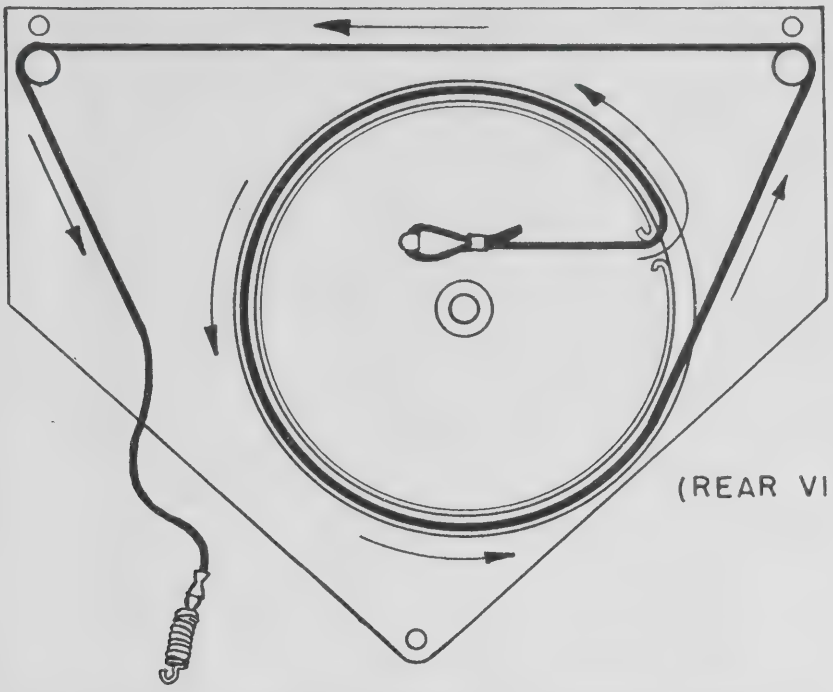
PARTS LIST - MODEL 5100 TRANSMITTER

Circuit Symbol	Sub. Assy. Location	Description	B & W Part #
L12	Multiplier F.A.	Parasitic Choke	T-714
L13	Multiplier F.A.	Parasitic Choke	T-714
L14	Multiplier F.A.	Parasitic Choke	T-714
L15	Multiplier F.A.	R. F. Choke Plate	T-710
L16	Multiplier F.A.	High Frequency Coil	T-722
L17	Multiplier F.A.	Low Frequency Coil Pi-Network	T-721
L18	Modulator S.A.	R. F. Choke Filament	T-359
L19	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L20	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L21	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L22	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L23	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L24	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L25	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L26	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L27	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L28	Power Supply C.	R. F. Choke 2.5 uhy	T-359
V1	VFC	6BJ6 Vacuum Tube	T-645
V2	Buffer Xtal Osc.	6BJ6 Vacuum Tube	T-645
V3	Buffer Xtal Osc.	6BJ6 Vacuum Tube	T-645
V4	Multiplier F. A.	6AQ5 Tube	T-284
V5	Multiplier F. A.	6AQ5 Tube	T-284
V6	Multiplier F.A.	6AQ5 Tube	T-284
V7	Multiplier F.A.	6AQ5 Tube	T-284
V8	Multiplier F.A.	6146 Tube	T-553
V9	Multiplier F.A.	6146 Tube	T-553
V10	Modulator S.A.	6U8 Vacuum Tube	T-635
V11	Modulator S.A.	6AQ5 Vacuum Tube	T-284
V12	Modulator S.A.	6146 Vacuum Tube	T-553
V13	Modulator S.A.	6146 Vacuum Tube	T-553
V14	Power Supply C.	OD3/VR150	T-128
V15	Power Supply C.	OC3/VR105	T-196
V16	Power Supply C.	5R4G Vacuum Tube	T-605
V17	Power Supply C.	5R4G Vacuum Tube	T-605
V18	Power Supply C.	5V4 Vacuum Tube	T-606
T1	Modulator S.A.	Transformer, driver	T-548
T2	Modulator S.A.	Transformer Modulation	T-549
T3	Power Supply C.	Transformer High Voltage	T-545
T4	Power Supply C.	Transformer Filament & Low Voltage	T-544
X	Buffer Xtal Osc.	Crystal Socket	T-361
CH1	Power Supply C.	Choke, power supply 5 hy	T-546
CH2	Power Supply C.	Choke, power supply 8 hy	T-547
CH3	Power Supply C.	Choke, power supply 8 hy	T-547
TB1	Power Supply C.	Barrier Strip	T-638
TB2	Power Supply C.	Terminal Strip 10 Terminal Special	T-604
I-1	Power Supply C.	Neon Lamp miniature bayonet base	T-597
	Power Supply C.	Relay Control	T-589
	Power Supply C.	Meter 3" rectangular base	T-599
	Power Supply C.	Fuse Holder	T-602
		Fuse 5 Amp. 125 volt	T-603
	Power Supply C.	2 Line Filters	T-680
	Power Supply C.	TVI Filter	Model 426
	Front Panel— Dial Assy.	2 Pilot Lights	T-703

CHASSIS-UNDERSIDE VIEW



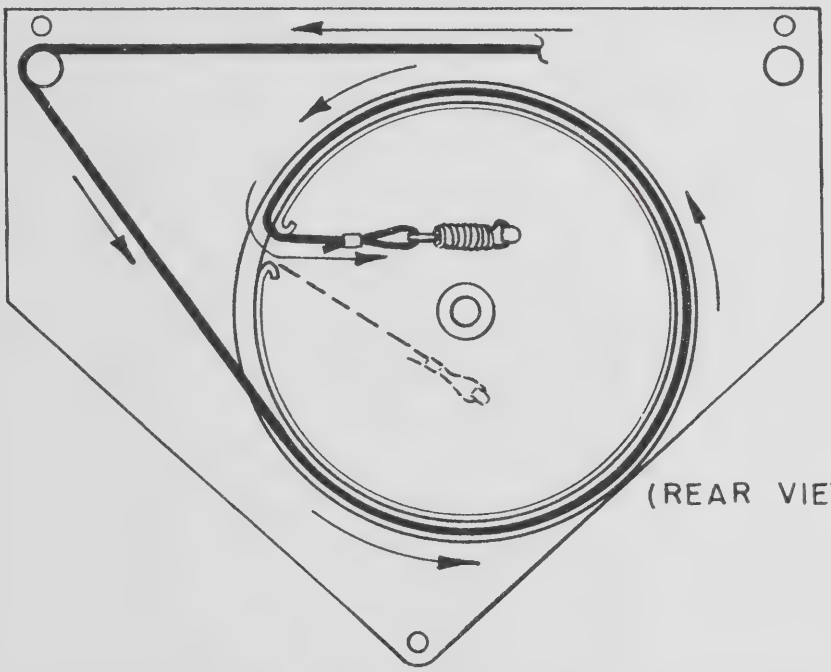
INSTRUCTIONS FOR STRINGING VFO DIAL ASSEMBLY



(REAR VIEW)

STEP 1

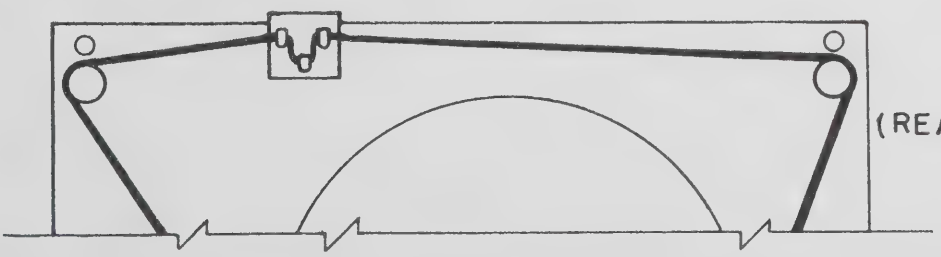
ROTATE LARGE PULLEY TO POSITION SLOT AS SHOWN. USE A HOOK-ENDED TOOL TO CATCH LOOP OF CORD IN PROJECTION ON TOP OF PULLEY.



(REAR VIEW)

STEP 2

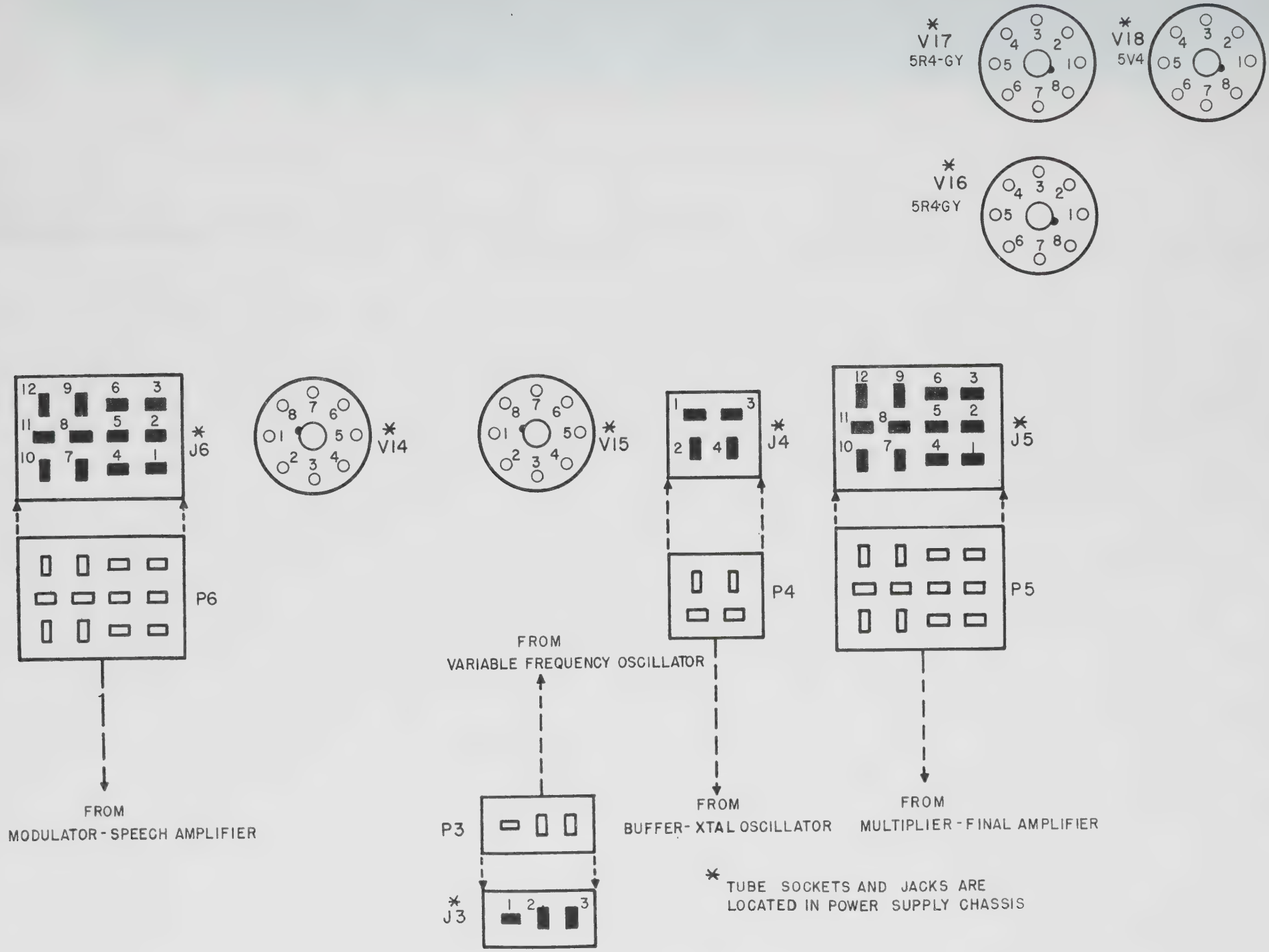
ROTATE LARGE PULLEY TO POSITION SHOWN. USE HOOK-ENDED TOOL TO SECURE SPRING LOOP IN TOP PROJECTION.



(REAR VIEW)

STEP 3

ROTATE LARGE PULLEY TO THE MID-POINT OF ITS ROTATION AND INSTALL POINTER AS SHOWN.


*V17
5R4-GY
*V18
5V4
*V16
5R4-GY
*J6
P6
*V14
*V15
*J4
P4
*J5
P5
FROM
VARIABLE FREQUENCY OSCILLATOR
P3
*J3
FROM
MODULATOR - SPEECH AMPLIFIER
FROM
BUFFER - XTAL OSCILLATOR
FROM
MULTIPLIER - FINAL AMPLIFIER
* TUBE SOCKETS AND JACKS ARE
LOCATED IN POWER SUPPLY CHASSIS

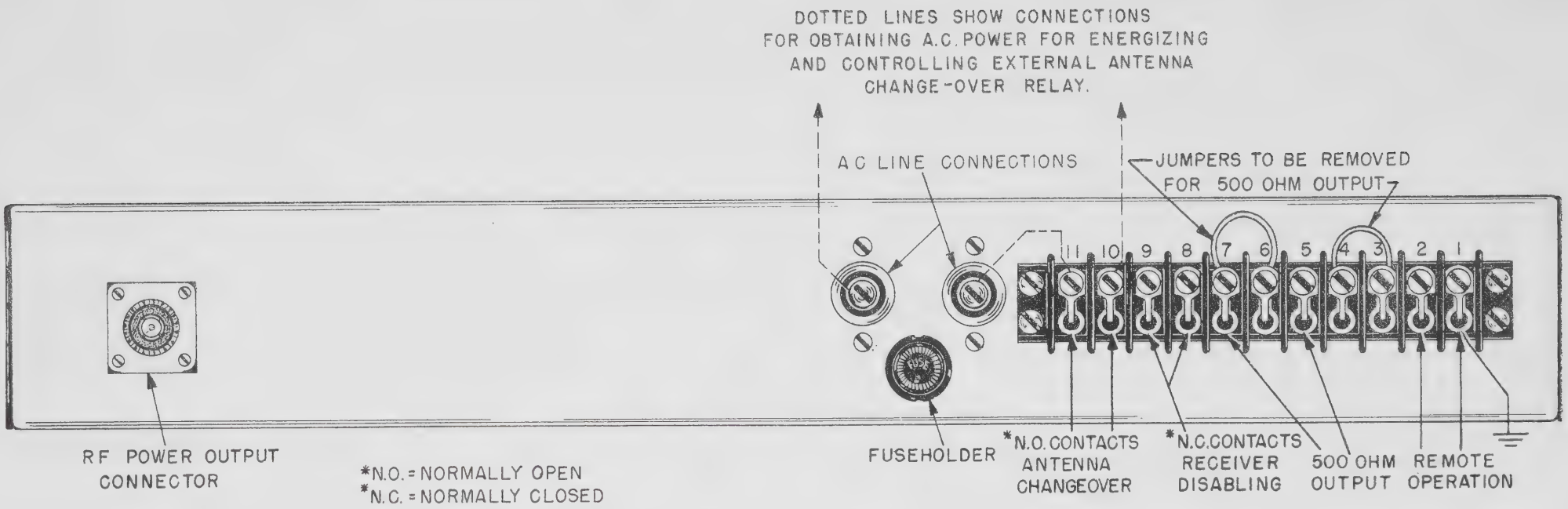


FIGURE - CHASSIS APRON (REAR VIEW)

PARTS LIST - MODEL 5100 TRANSMITTER

Circuit Symbol	Sub. Assy. Location	Description	B & W Part #
C15	Buffer Xtal Osc.	Capacitor Ceramic Tubular 50 MMF ±5MMF —750 Neg. Temp. Coeff.	T-616
C16	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C17	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C18	Buffer Xtal Osc.	Capacitor Ceramic Tubular 95 MMF ±9.5 MMF —750 Neg. Temp. Coeff.	T-643
C19	Buffer Xtal Osc.	Capacitor Ceramic Tubular 20 MMF ±2 MMF —750 Neg. Temp. Coeff.	T-644
C20	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C75	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C76	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C21	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C22	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C23	Multiplier F. A.	Capacitor Fixed Ceramic CC21UJ430J	T-621
C24	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW ±20%	T-501
C25	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C26	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C27	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW±20%	T-501
C28	Multiplier F. A.	Capacitor Fixed Ceramic CC26UJ750J	T-622
C29	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C30	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C31	Multiplier F. A.	Trimmer Erie TS-2A-N-500-7-45	S-123
C32	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW ±20%	T-501
C33	Multiplier F. A.	Trimmer Erie TS-2A-N-500-7-45	S-123
C34	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C35	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C36	Multiplier F. A.	Capacitor Variable Air 28 MMF APC type	T-SP-160
C37	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW ±20%	T-501
C38	Multiplier F. A.	Trimmer Erie TS-2A-N-500-7-45	S-123
C39	Multiplier F. A.	Capacitor Fixed Mica VCM20B 102M Elmenco 1000 V.	T-SP-164
C40	Multiplier F. A.	Capacitor Fixed Mica .002 MMF 2500 VDC - CM50A202J	T-SP-162
C41	Multiplier F. A.	Capacitor Variable Air 325 MMF	T-SP-163
C42 (A&B)	Multiplier F. A.	Capacitor Variable Dual 530 MMF	T-656
C44	Multiplier F. A.	Capacitor Fixed Mica .0051 MF 2500 VDC CM50A512 J	T-SP-161
C45	Multiplier F. A.	Capacitor Fixed Mica VCM20B 102 M 1000 Volt	T-SP-164
C46	Modulator S. A.	Capacitor Disc .001 MF	T-509
C47	Modulator S. A.	Capacitor Mica 50 MMFD	T-614
C48	Modulator S. A.	Capacitor Disc .001 MF	T-509
C49A C49B	Modulator S. A.	Capacitor Electrolytic 10-10 MFD 500V.	T-577
C50	Modulator S. A.	Tubular Paper Capacitor .1 MFD 400V.	T-617
C51	Modulator S. A.	Capacitor Disc .001 MF	T-509
C53	Modulator S. A.	Capacitor Electrolytic Single 10MF/25V	T-615
C54	Modulator S. A.	Capacitor Disc .001 MF	T-509
C55	Modulator S. A.	Capacitor Disc .001 MF	T-509
C56	Modulator S. A.	Capacitor Disc .001 MF	T-509
C57	Modulator S. A.	Capacitor Disc .001 MF	T-509
C58	Power Supply C.	Capacitor Tubular Paper .1 MFD 200V.	T-673
C59	Power Supply C.	Capacitor Disc Ceramic .01 MFD 500 V.	T-607
C60	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C61	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C62	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C63	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C64	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C65	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C66	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C67	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C68	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C69	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C70	Power Supply C.	Capacitor Electrolytic 20 MFD 150 V.	T-578
C71	Power Supply C.	Cap. oil filled paper 10 MFD 1000 V. with mtg. strap for inv. mtg.	T-579
C72	Power Supply C.	Dual Elect. Capacitor Aluminum case 20-20 MFD 450V. with mtg. strap	T-581
C74	Power Supply C.	Capacitor oil filled paper .25 MFD 2000 volts with mtg. strap for upright mtg.	T-580
C81	Power Supply C.	Capacitor Disc .001 MF	T-509
SW1	Buffer Xtal Osc.	Toggle Switch—S.P.S.T.	T-537
SW2	Multiplier F. A.	Switch 6 position 5 wafer ceramic	T-556
SW8	Multiplier F. A.	Switch 6 position 1 wafer with detent & shaft 3/8" bushing 1-5/8" shaft lgth.	T-555
SW3	Power Supply C.	Bat Handle toggle switches 3A. 125V. S.P.S.T.	T-592
SW4	Power Supply C.	Selector Switch non-shorting 3 pole 2 section	T-594
SW5	Power Supply C.	Selector Switch non-shorting 3 pole 1 section	T-595
SW6	Power Supply C.	Bat Handle toggle switches 3A. 125 V. S.P.S.T.	T-592
SW7	Power Supply C.	Bat Handle toggle switches 3A. 125 V. S.P.S.T.	T-592
P1	VFO	Phono Plug	T-288-1
P3	VFO	Cable Plug (3)	T-667
P2	Buffer Xtal Osc.	Phone Plug (Jumper between Buffer & Multiplier)	T-288-1
P9	Buffer Xtal Osc.	Phone Plug (Jumper between Buffer & Multiplier)	T-288-1
P4	Buffer Xtal Osc.	Cable Plug (4)	T-666
P5	Multiplier F. A.	12 pin Jones Plug	T-633
P6	Modulator S.A.	12 pin Jones Plug	T-633
J1	Buffer Xtal Osc.	Phono Socket	T-288
J9	Buffer Xtal. Osc.	Phono Socket	T-288
J2	Multiplier F.A.	Input Jack	T-288
J3	Power Supply C.	3 terminal Jones Socket	T-674
J4	Power Supply C.	4 terminal Jones Socket	T-591
J5	Power Supply C.	12 terminal Jones Connector	T-590
J6	Power Supply C.	12 terminal Jones Connector	T-590
J8	Power Supply C.	Jack, Key	T-593
J7	Modulator S. A.	2 contact locknut receptacle Amphenol 80-PC2F	T-611
L1	VFO	Oscillator Coil Assy.	T-715
L2	VFO	Filament Choke - RFC	T-359
L3	VFO	Plate Choke	T-712
L4	Buffer Xtal Osc.	Grid Choke	T-712
L5	Buffer Xtal Osc.	Screen Choke	T-713
L6	Multiplier F.A.	80 M 37 MH Coil Assy.	5100-2
L7	Multiplier F.A.	40 M 9.5 MH Coil Assy.	5100-3
L8	Multiplier F.A.	20 M 2.5 MH Coil Assy.	5100-4
L9	Multiplier F.A.	15 M 2 MH Coil Assy.	5100-1
L10	Multiplier F.A.	10 M .68 MH Coil Assy.	5100-5
L11	Multiplier F.A.	R. F. Choke Screen	T-711

PARTS LIST - MODEL 5100 TRANSMITTER

Circuit Symbol	Sub. Assy. Location	Description	B & W Part #
R1	VFO	Resistor 100,000 ohms 1/2W. 5%	R-22
R2	VFO	Resistor 560 ohms 1/2W. 10%	T-244
R3	VFO	Resistor 10,000 ohms 1/2W. 5%	R-16
R4	Buffer Xtal Osc.	Resistor Composition 150 ohm 1/2W. 10%	R-62
R5	Buffer Xtal Osc.	Resistor Composition 5600 ohm 1/2W. 10%	R-63
R6	Buffer Xtal Osc.	Resistor Composition 220 ohm 1/2W. 20%	R-64
R7	Buffer Xtal Osc.	Resistor 100,000 ohms 1/2W. 5%	R-22
R8	Buffer Xtal Osc.	Resistor Composition 150 ohms 1/2W. 10%	R-62
R9	Buffer Xtal Osc.	Resistor Composition 1000 ohms 1/2W. 10%	R-65
R10	Buffer Xtal Osc.	Resistor Composition 5600 ohms 1/2W. 10%	R-63
R54	Buffer Xtal Osc.	Resistor Composition 220 ohm 1/2W. 20%	R-64
R11	Multipl'er F. A.	Resistor Carbon 47,000 ohm 1 W. 10%	R-56
R12	Multiplier F.A.	Resistor Carbon 560 ohm 2 W. 10%	R-57
R13	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R14	Multiplier F.A.	Resistor Carbon 2200 ohm 2W. 10%	R-81
R15	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R16	Multiplier F.A.	Resistor Carbon 47,000 ohm 1W. 10%	R-56
R17	Multiplier F.A.	Resistor Carbon 1,000 ohm 2W. 10%	R-80
R18	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R19	Multiplier F.A.	Resistor Carbon 47,000 ohm 1W. 10%	R-56
R20	Multiplier F.A.	Resistor Carbon 1,000 ohm 2W. 10%	R-80
R21	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R22	Multiplier F.A.	Resistor 18,000 ohm 2W. 10%	R-82
R23	Multiplier F.A.	Resistor Carbon 22,000 ohm 1W. 10%	R-59
R24	Multiplier F.A.	Resistor Carbon 47 ohm 2W.10%	R-60
R25	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R26	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R56	Multiplier F.A.	Resistor Wire Wound 1500 ohm 5W. 10% Ohmite	R-79
R57	Multiplier F.A.	Resistor Carbon 47 ohm 2W. 10%	R-60
R58	Multiplier F.A.	Resistor Carbon 47 ohm 2W. 10%	R-60
R27	Modulator S. A.	Resistor 10 Meg. 1/2 W. ±10% insulated	R-38
R28	Modulator S. A.	Resistor Composition 5600 ohm 1/2W. 10%	R-63
R29	Modulator S. A.	Resistor Carbon 270,000 ohm 1/2W. 10%	R-49
R30	Modulator S. A.	Potentiometer Composition .5 Meg.	T-612
R31	Modulator S. A.	Resistor Composition 560 ohm 1/2W. 10%	T-244
R32	Modulator S. A.	Resistor Fixed Composition 1 Meg Ohm 1/2 W. 5%	R-7
R33	Modulator S. A.	Resistor Composition 330,000 ohm 1/2 W. 5%	R-32
R34	Modulator S. A.	Resistor Composition 5600 ohm 1/2W. 10%	R-63
R35	Modulator S. A.	Resistor Composition 470,000 ohm 1W. ±10%	R-69
R36	Modulator S. A.	Resistor Composition 470,000 ohm 1/2W. 10%	R-66
R37	Modulator S. A.	Resistor Composition 300 ohm 1W. ±5%	T-626
R38	Modulator S. A.	Resistor Composition 1000 ohm 1/2W. 10%	R-65
R39	Modulator S. A.	Resistor Composition 1000 ohm 1/2W. 10%	R-65
R40	Modulator S. A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R41	Modulator S. A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R42	Modulator S. A.	Resistor 5000 ohm 10 watt 20% wire wound	T-113
R43	Modulator S. A.	Resistor wire wound 4.7 ohm 1W. ±5%	R-70
R60	Modulator S. A.	Resistor Composition 100,000 ohm 2W. 10%	R-71
R61	Modulator S. A.	Resistor Composition 100,000 ohm 2W. 10%	R-71
R63	Modulator S. A.	Resistor 10,000 ohm 1/2W. 20%	R-102
R44	Power Supply C.	Resistor, wire wound, adj. 25,000 ohm 25 watts with one adj. lug 20%	T-584
R45	Power Supply C.	Meter Shunt to read full scale 40 MA D. C.	T-600
R46	Power Supply C.	Meter Shunt to read full scale 400 MA D. C.	T-601
R47	Power Supply C.	Meter Shunt to read full scale 400 MA D. C.	T-601
R48	Power Supply C.	Resistor Composition 33,000 ohm 1/2W. ±10% insulated	T-598
R49	Power Supply C.	Resistor wire wound adj. 20,000 ohms 50 watt with 2 mounting brackets and 4 adj. lugs	T-582
R50	Power Supply C.	Resistor wire wound 60,000 ohm 10W. 20%	T-587
R51	Power Supply C.	Resistor wire wound adj. 2,000 ohm 25 watts with one adj. lug	T-583
R52	Power Supply C.	Resistor Composition 100,000 ohm 2W. ±10%	R-71
R53	Power Supply C.	Resistor wire wound special heater	T-588
R55	Power Supply C.	Resistor Composition 100,000 ohm 2W. ±10%	R-71
R59	Power Supply C.	Resistor Carbon 22,000 ohm 1W. 10%	R-59
R62	Power Supply C.	Resistor 2,000 ohm 10W. 10% Ohmite	R-101
C1	VFO	Cap. Ceramic Tubular 100 MMF ±1% Zero-Temp. uninsulated type	T-727
C2	VFO	Capacitor Variable	T-620
C3	VFO	Capacitor 25 MMF APC	T-314
C4	VFO	Capacitor Ceramic Tubular 100 MMF ± 10 MMF Zero Temp. Coeff.	T-646
C5	VFO	Capacitor Disc .001 MF	T-509
C6	VFO	Capacitor Disc .001 MF	T-509
C7	VFO	Capacitor Ceramic Tubular 75 MMF ± 7.5 MMF, —750 Neg. Temp. Coeff.	T-647
C8	VFO	Capacitor Disc .001 MF	T-50
C9	VFO	Capacitor Disc .001 MF	T-50
C78	VFO	Capacitor Ceramic Tubular 75 MMF ±1% Zero Temp. Coef. uninsulated	T-75
C79	VFO	Temp. Comp. Cap. N-750 ±120K 5±0.1 MMF	T-74
C80	VFO	Temp. Comp. Cap. N-750 ±120K 50± 1 MMF	T-75
C10	Buffer Xtal Osc.	Capacitor Ceramic Tubular 50 MMF ±5MMF —750 Neg. Temp. Coeff.	T-6
C11	Buffer Xtal Osc.	Capacitor Ceramic Tubular 95 MMF ±9.5 MMF —750 Neg. Temp. Coeff.	T-6
C12	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-5
C13	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-5
C14	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-5

PARTS LIST - MODEL 5100 TRANSMITTER

Circuit Symbol	Sub. Assy. Location	Description	B & W Part #
L12	Multiplier F.A.	Parasitic Choke	T-714
L13	Multiplier F.A.	Parasitic Choke	T-714
L14	Multiplier F.A.	Parasitic Choke	T-714
L15	Multiplier F.A.	R. F. Choke Plate	T-710
L16	Multiplier F.A.	High Frequency Coil	T-722
L17	Multiplier F.A.	Low Frequency Coil Pi-Network	T-721
L18	Modulator S.A.	R. F. Choke Filament	T-359
L19	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L20	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L21	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L22	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L23	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L24	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L25	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L26	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L27	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L28	Power Supply C.	R. F. Choke 2.5 uhy	T-359
V1	VFC	6BJ6 Vacuum Tube	T-645
V2	Buffer Xtal Osc.	6BJ6 Vacuum Tube	T-645
V3	Buffer Xtal Osc.	6BJ6 Vacuum Tube	T-645
V4	Multiplier F. A.	6AQ5 Tube	T-284
V5	Multiplier F. A.	6AQ5 Tube	T-284
V6	Multiplier F.A.	6AQ5 Tube	T-284
V7	Multiplier F.A.	6AQ5 Tube	T-284
V8	Multiplier F.A.	6146 Tube	T-553
V9	Multiplier F.A.	6146 Tube	T-553
V10	Modulator S.A.	6U8 Vacuum Tube	T-635
V11	Modulator S.A.	6AQ5 Vacuum Tube	T-284
V12	Modulator S.A.	6146 Vacuum Tube	T-553
V13	Modulator S.A.	6146 Vacuum Tube	T-553
V14	Power Supply C.	OD3/VR150	T-128
V15	Power Supply C.	OC3/VR105	T-196
V16	Power Supply C.	5R4G Vacuum Tube	T-605
V17	Power Supply C.	5R4G Vacuum Tube	T-605
V18	Power Supply C.	5V4 Vacuum Tube	T-606
T1	Modulator S.A.	Transformer, driver	T-548
T2	Modulator S.A.	Transformer Modulation	T-549
T3	Power Supply C.	Transformer High Voltage	T-545
T4	Power Supply C.	Transformer Filament & Low Voltage	T-544
X	Buffer Xtal Osc.	Crystal Socket	T-361
CH1	Power Supply C.	Choke, power supply 5 hy	T-546
CH2	Power Supply C.	Choke, power supply 8 hy	T-547
CH3	Power Supply C.	Choke, power supply 8 hy	T-547
TB1	Power Supply C.	Barrier Strip	T-638
TB2	Power Supply C.	Terminal Strip 10 Terminal Special	T-604
I-1	Power Supply C.	Neon Lamp miniature bayonet base	T-597
	Power Supply C.	Relay Control	T-589
	Power Supply C.	Meter 3" rectangular base	T-599
	Power Supply C.	Fuse Holder	T-602
		Fuse 5 Amp. 125 volt	T-603
	Power Supply C.	2 Line Filters	T-680
	Power Supply C.	TVI Filter	Model 426
	Front Panel— Dial Assy.	2 Pilot Lights	T-703

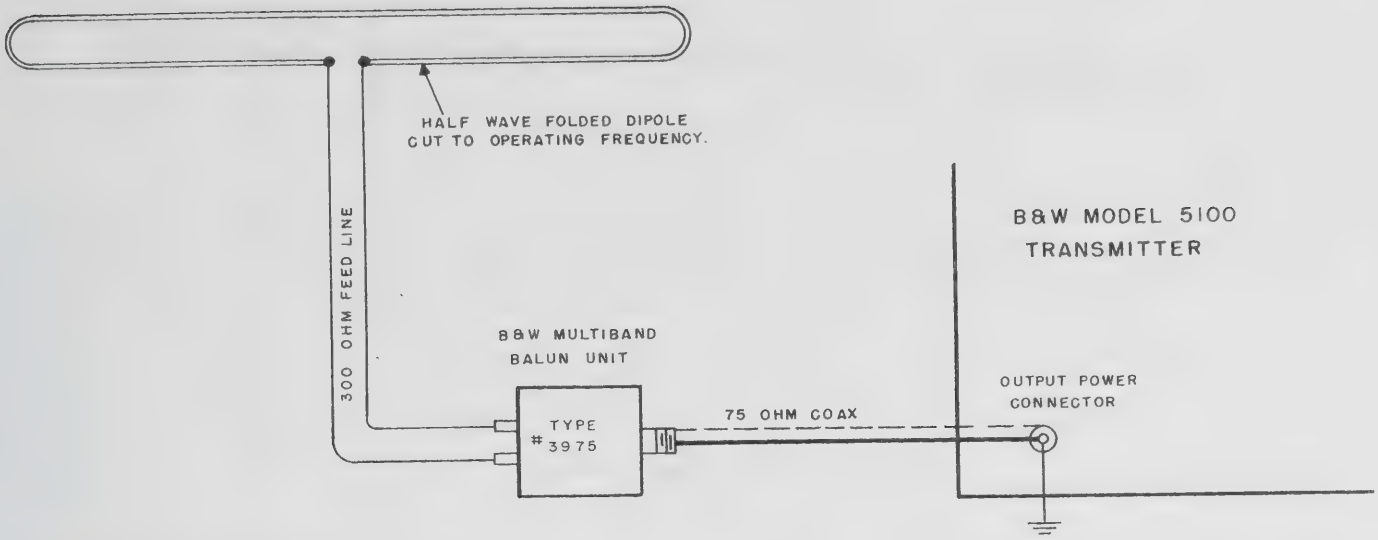


FIGURE 1A- SINGLE BAND ANTENNA

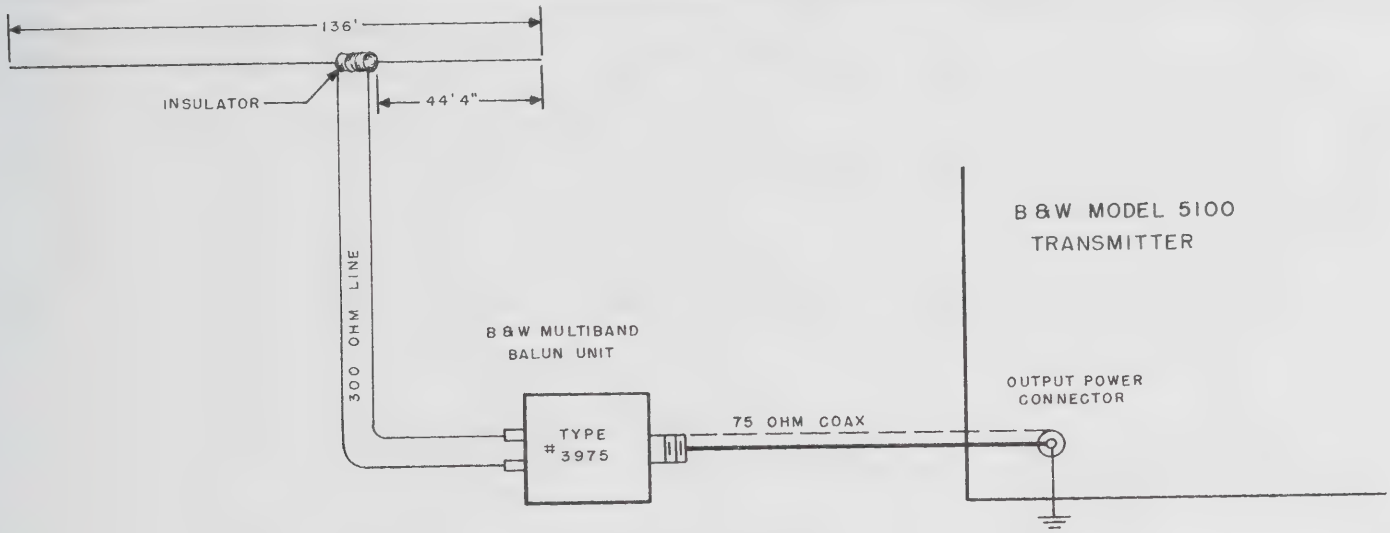


FIGURE 2A - MULTIBAND ANTENNA COVERS, 80, 40, 20 AND 10 METERS.

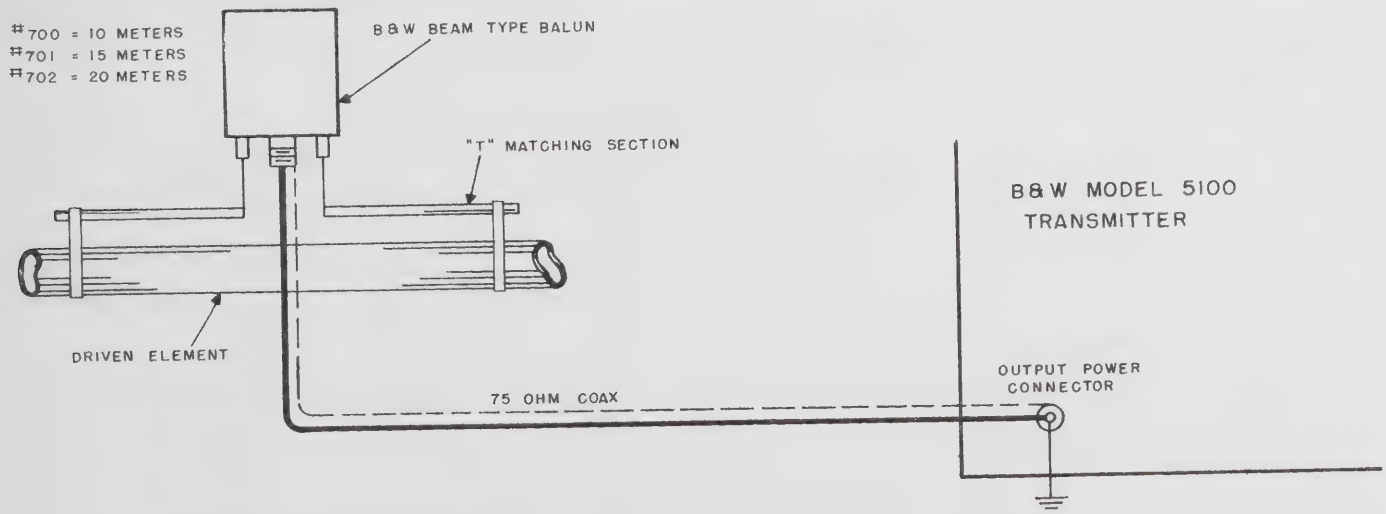


FIGURE 3A- BEAM ANTENNAS FOR EITHER 10, 15 OR 20 METERS.

INSTRUCTION MANUAL - MODEL 5100 TRANSMITTER

ADDENDA SHEET #1

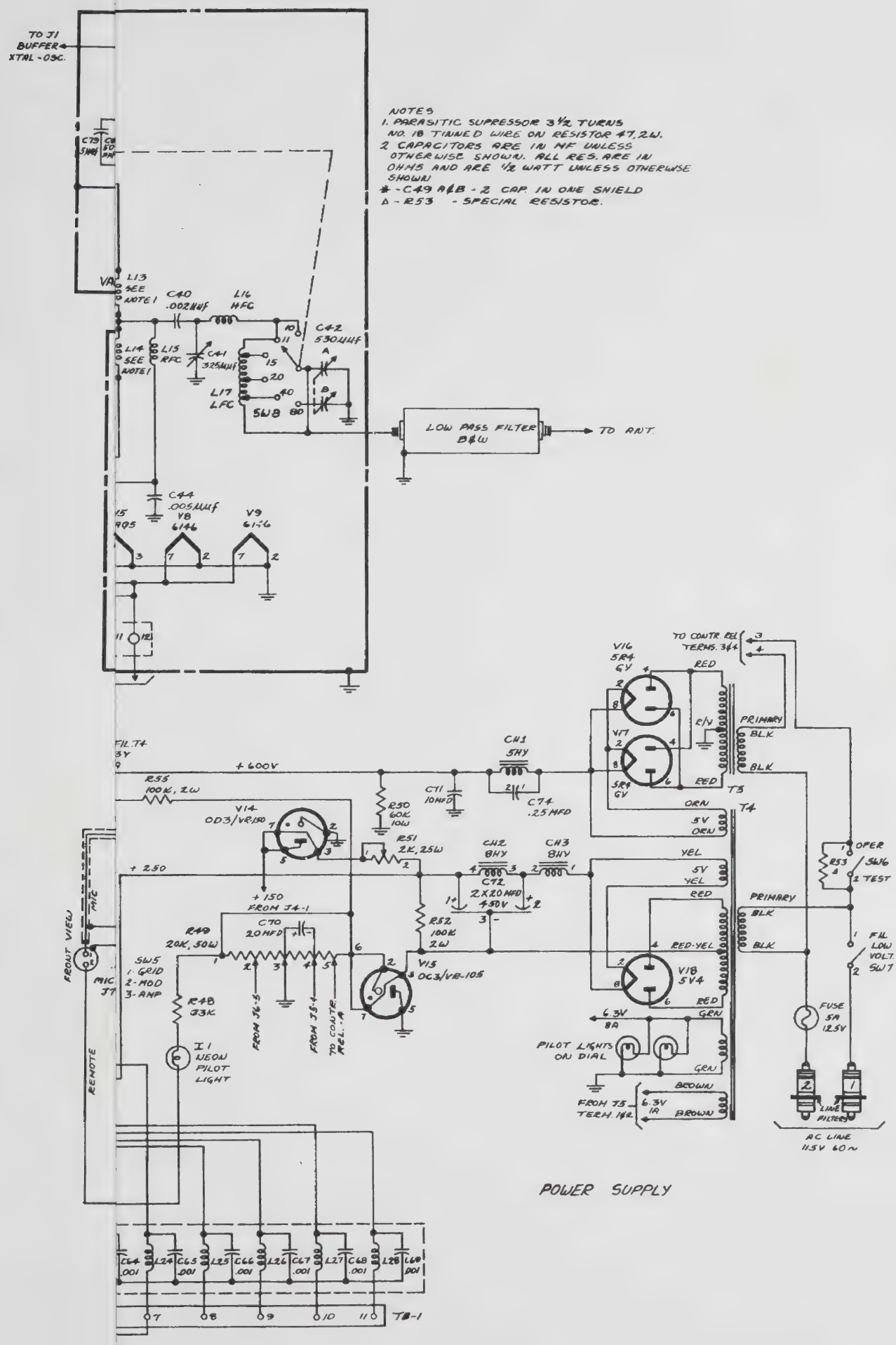
NOTE

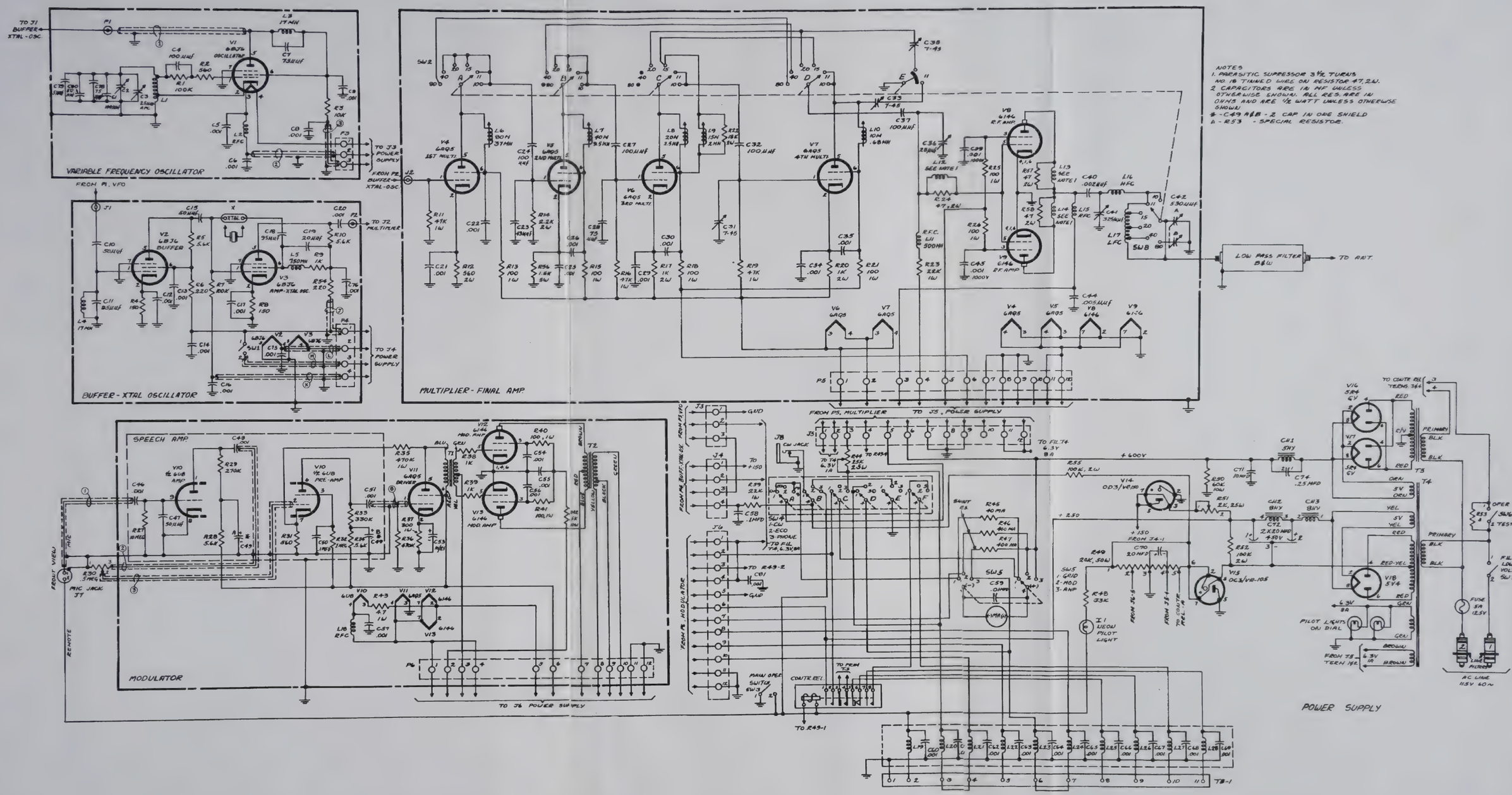
The following changes have been made to current production units. These changes are not indicated by the schematic diagram in the present instruction manual, however, the parts list is up to date and includes the items used for the changes indicated below. —

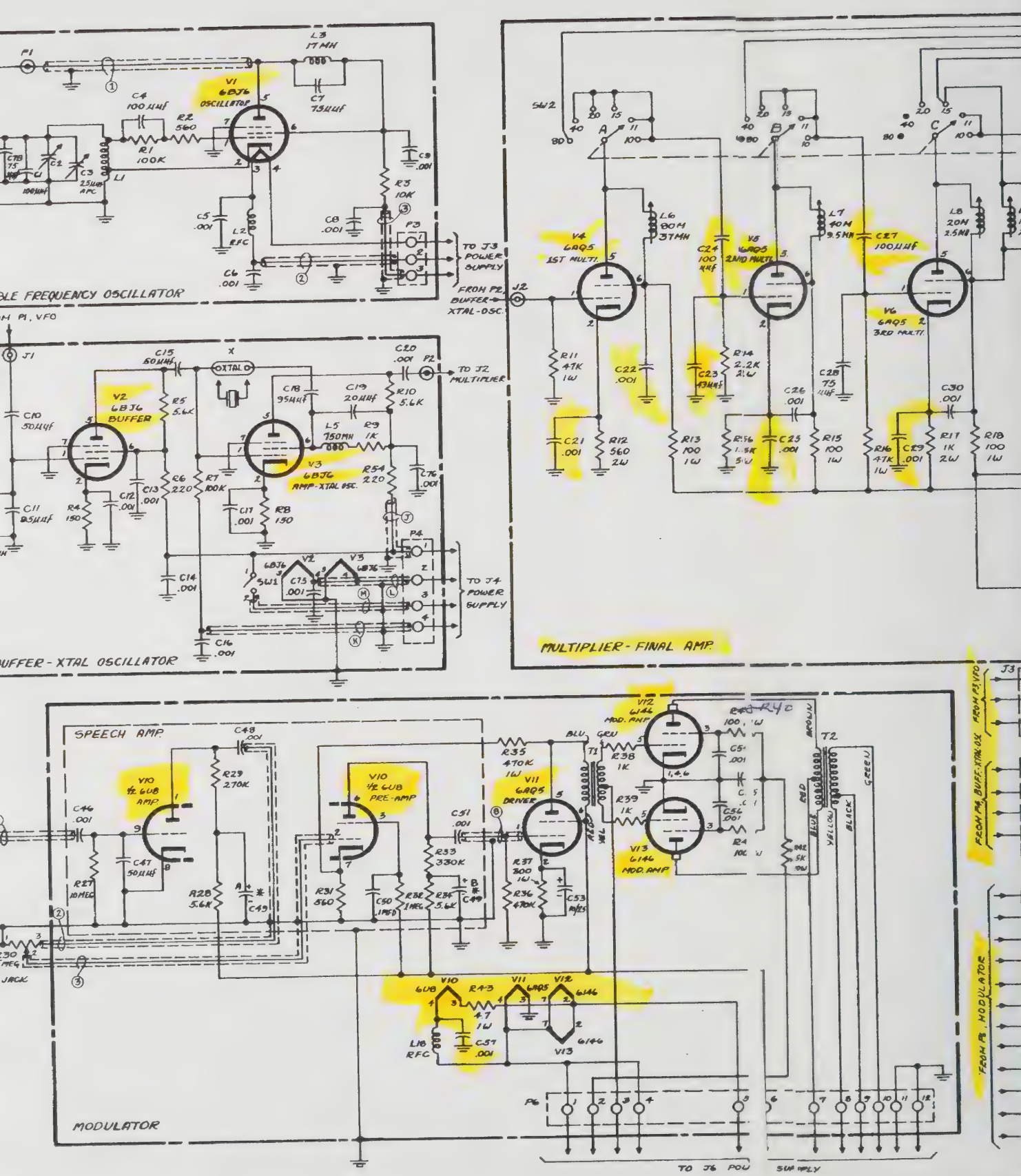
1. Add 2 Resistors R60 & R61 — 100K, 2 watts in parallel, shunted across secondary of Modulation transformer T2.
2. Add 2K Resistor 10 watts R62 from terminal #3 on V15 to ground.
3. Connection change on high voltage screen feed suppy lead — from SW4 section (C) contact #3 to J#5 terminal #3.
4. Buffer — XTAL — OSC. Unit — change circuit symbol reading P2 to read J9.
5. Multiplier Final Amplifier — change value of C44 from .005 MMF. to read .005 MF.
6. Add 10,000 ohm 1/2 watt 20% Resistor (R63) in series with high side of microphone lead. Change to take place inside of chassis, under shield cover.
7. MICROPHONE CORD CONNECTOR FITTING
   The Microphone Cord Connector (Not Supplied) is an Amphenol 80-MC2M. Refer to page 6 of the instruction Manual for proper wiring polarity.
8. CAMLOCK FASTENERS
   Reference to the 2 Camlock Fasteners and cutaway drawing contained on page 6 under the title of "Maintenance" should be deleted. These items have been omitted due to the difficulty they produced in withdrawing the chassis from the Cabinet.
9. MODEL 5100 TUNING GUIDE
   The following dial settings are average when the Model 5100 Transmitter is terminated into a 75 ohm non-inductive load circuit. Antenna loads should be such that the following settings be approximated as closely as possible.
   Final plate current for the following settings is 220 ma. in the "FONE" position. "CW" position will vary somewhat from this value.
10. CAUTION
    When no microphone is attached to the front panel connector, the audio gain control **MUST** be retarded to the full counter-clockwise position. Failure to do so may produce arcing at the modulation transformer output safety gap.

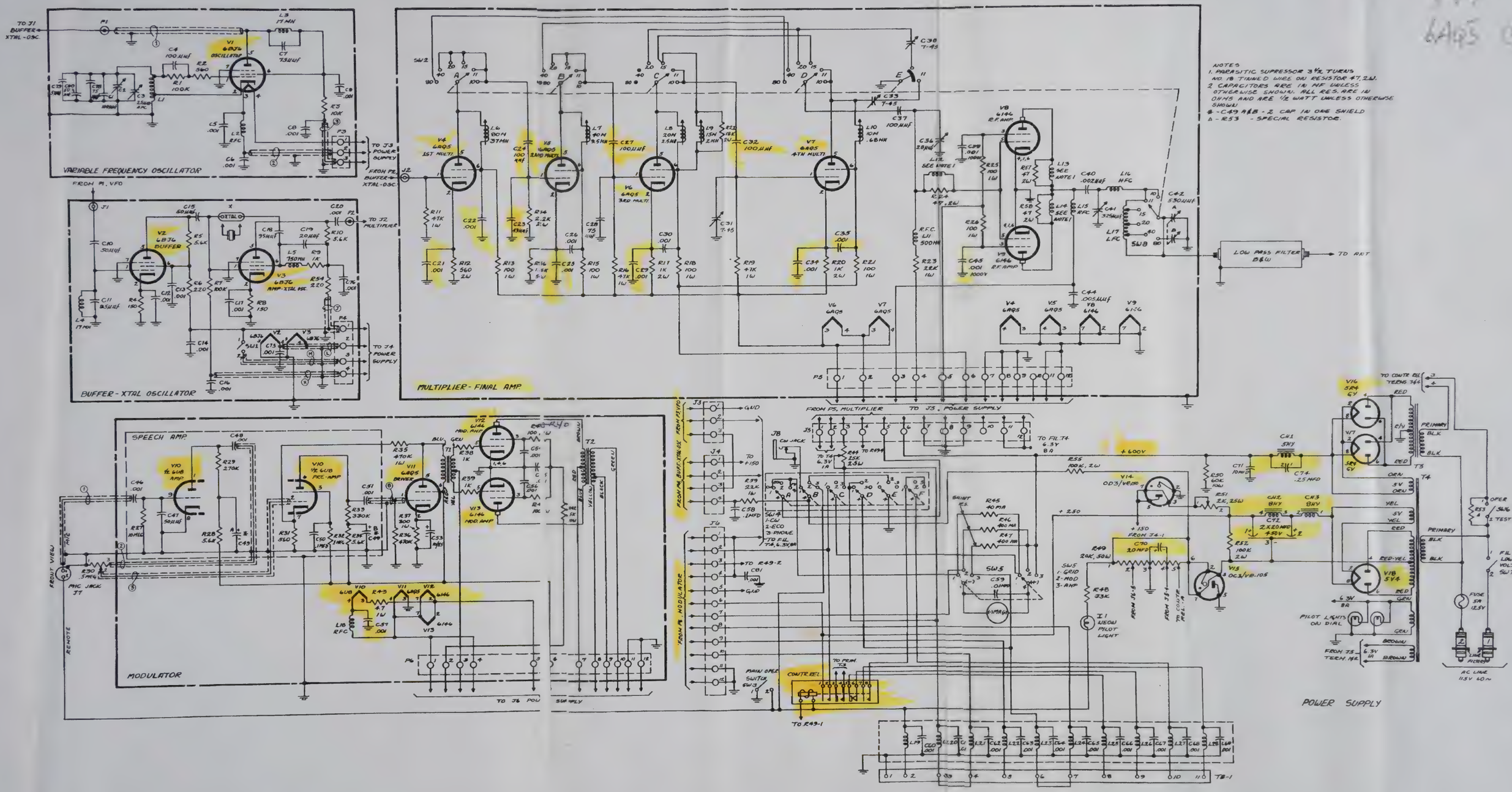
DIAL SETTINGS

Frequency (KC's)	Loading	Tuning
3500	3.0	8.0
4000	5.0	6.0
7000	2.0	5.0
7300	2.5	4.5
14000	2.0	4.5
14350	2.1	4.0
21000	3.0	2.5
21450	3.1	2.5
26960	2.0	4.0
27230	2.0	4.0
28000	2.0	3.5
29700	2.5	2.5


TO J1 BUFFER XTAL-OSC.
NOTES
1. PARASITIC SUPRESSOR 3½ TURNS NO. 18 TINNED WIRE ON RESISTOR 47, 2W.
2 CAPACITORS ARE IN MF UNLESS OTHERWISE SHOWN. ALL RES. ARE IN OHMS AND ARE ½ WATT UNLESS OTHERWSE SHOWN
* - C49 A&B - 2 CAP. IN ONE SHIELD
Δ - R53 - SPECIAL RESISTOR.
L13 SEE NOTE 1
C40 .002MMF
L16 RFC
C42 530MMF
L14 SEE NOTE 1
L15 RFC
C41 325MMF
L17 LFC
SW8
LOW PASS FILTER B&W
TO ANT.
C44 .005MMF
V8 6146
V9 6146
V16 5R4 GY
V17 5R4 GY
TO CONTR. REL TERMS. 3&4
RED
PRIMARY
BLK
T3
T4
ORN
5V ORN
YEL
5V YEL
GRN
BROWN
CH1 5HY
CH2 8HY
CH3 8HY
C72 2X20 MFD 450V
C71 10MFD
C74 .25 MFD
+600V
+250
+150 FROM J4-1
R55 100K, 2W
R50 60K 10W
R51 2K, 25W
R52 100K 2W
R49 20K, 50W
C70 20 MFD
V14 OD3/VR150
V15 OC3/VR105
V18 5V4
SW5 1-GRID 2-MOD 3-ANP
R48 33K
I1 NEON PILOT LIGHT
FROM J4-5
FROM J5-4
TO CONTR. REL. 4
FRONT VIEW
MIC
MIC J7
REMOTE
PILOT LIGHTS ON DIAL
6.3V 8A
FROM J5 TERM. 1&2
6.3V 1A
R53
SW6
OPER
TEST
FIL. LOW VOLT. SW7
FUSE 5A 125V
LINE FILTER
AC LINE 115V 60~
POWER SUPPLY
C64 .001
L24
C65 .001
L25
C66 .001
L26
C67 .001
L27
C68 .001
L28
C69 .001
TB-1


VARIABLE FREQUENCY OSCILLATOR
BUFFER - XTAL OSCILLATOR
MULTIPLIER - FINAL AMP.
MODULATOR
SPEECH AMP.
POWER SUPPLY
LOW PASS FILTER
TO ANT.
NOTES
1. PARASITIC SUPPRESSOR 3½ TURNS NO 18 TINNED WIRE ON RESISTOR 47, 2W.
2. CAPACITORS ARE 1Ø MF UNLESS OTHERWISE SHOWN. ALL RES. ARE IN OHMS AND ARE ½ WATT UNLESS OTHERWISE SHOWN.
B - C49 A&B - 2 CAP IN ONE SHIELD
A - R33 - SPECIAL RESISTOR.


SPEECH AMP.
MODULATOR
MULTIPLIER - FINAL AMP.
BUFFER - XTAL OSCILLATOR
FREQUENCY OSCILLATOR
TO J3 POWER SUPPLY
TO J4 POWER SUPPLY
TO J2 MULTIPLIER
FROM P2 BUFFER XTAL-OSC
FROM P1 VFO
FROM P4 BUFF. XTAL OSC
FROM P5 MODULATOR
TO J6 POWER SUPPLY
V1 6BJ6 OSCILLATOR
V2 6BJ6 BUFFER
V3 6BJ6 AMP-XTAL OSC.
V4 6AQ5 1ST MULTI.
V5 6AQ5 2ND MULTI.
V6 6AQ5 3RD MULTI.
V10 1/2 6U8 AMP.
V10 1/2 6U8 PRE-AMP
V11 6AQ5 DRIVER
V12 6146 MOD. AMP.
V13 6146 MOD. AMP.
XTAL
SW1
SW2
T1
T2
L1
L2 RFC
L3 17 MH
L5 750 MH
L6 80M 3.7 MH
L7 40M 9.5 MH
L8 20M 2.5 MH
L10 RFC
P1
P2
P3
P4
P5
P6
J1
J2
J3
JACK


VARIABLE FREQUENCY OSCILLATOR
BUFFER - XTAL OSCILLATOR
MULTIPLIER - FINAL AMP.
MODULATOR
SPEECH AMP.
POWER SUPPLY
LOW PASS FILTER B&W
NOTES
1. PARASITIC SUPRESSOR 3½ TURNS NO. 18 TINNED WIRE ON RESISTOR 47, 2W.
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- C49 A&B - 2 CAP IN ONE SHIELD
Δ - R53 - SPECIAL RESISTOR.

INSTRUCTION MANUAL

MODEL 5100 TRANSMITTER

BARKER & WILLIAMSON, Inc.

237 FAIRFIELD AVENUE

UPPER DARBY, PENNA.

PUTTING YOUR B&W TRANSMITTER ON THE AIR

1. After the equipment has been carefully removed from its packing box—be sure all tubes are in their respective sockets and pushed firmly into place.
2. The equipment as shipped from the factory comes to you ready to operate, with the exception of— crystals, microphone, key and antenna.
3. Before plugging the power line cord into a 115 volt A.C. 60 cycle single phase power source receptacle be sure that the A.C. line switch and the plate **on** and **off** switches are in the **off** position.
4. **Take time to be sure** you thoroughly understand the function of each control.
5. Before attempting to place the transmitter in operation and on the air, **be sure** you have a suitable antenna or dummy load connected to the output power connector.
6. For phone operation, a microphone should be connected to the microphone connector on the front panel.
7. For C.W. operation, a key with cord and suitable plug should be inserted in the key jack on the front panel.
8. For crystal operation on phone or C.W., a suitable 80 meter crystal is to be inserted in the crystal holder — located inside the cabinet on the crystal-buffer-amplifier unit and the crystal-VFO selector switch near the crystal holder is thrown in the crystal position.
9. For VFO operation on Phone or C.W., the **crystal is removed** and the Crystal-VFO selector switch is thrown in the VFO position.
10. Turn the A.C. line switch to the **on** position and make sure all tubes are lit. Allow tube filaments to run at least ten minutes when the equipment is first turned on.
11. Proceed as directed under operating instructions.

NOTICE

A FEW DONT'S TO REMEMBER

A. **Do not** turn the **Master Band Selector Switch** when the plate switch is in the **on** position.

B. **Do not** attempt to tune and operate the transmitter in VFO position unless you are sure that the Frequency **Control Dial Pointer** is correctly set on the appropriate frequency of each band corresponding to the **Master Band Selector Switch** — for crystal operation, make certain that a crystal of proper output freq. is chosen.

C. **Do not** attempt to make connections to the rear terminal strip on back of the chassis apron unless the A.C. line cord plug is removed from the power source.

D. **Do not** use the receiver disabling circuit nor the remote relay connections for conducting or breaking high current. Doing so will result in damage to the internal control relay contact points.

E. **Do not** make the error of reversing the push-to-talk connections when assembling the microphone plug, since the relay voltage present could damage the microphone. (See instructions elsewhere in this manual under microphone connector.)

F. **Do not** attempt to operate the equipment without a good ground attached to the ground terminal of the equipment.

WARNING

Death or serious injury may result if operators fail to observe safety precautions. Extreme **caution** is to be exercised during any observations or voltage measurements around live power circuits carrying *lethal voltages. Failure to observe all safety regulations may result in personal injury, if not loss of life.

*Underwriters regulations consider lethal any potential above 24 volts.

INTRODUCTION

The model 5100 transmitter has been designed for amateur communications service covering both radiotelephone and telegraph within the confines of the amateur frequency bands 80-40-20-15-11 and 10 meters. It is a compact, bandswitched, VFO or crystal controlled, self contained equipment containing all of the latest engineering advances leading toward the effective transmissions of signals with a minimum of harmonic content for prevention of television interference. Mainly intended for permanent station operation, the external source of power required for its operation is 115 volts, 50/60 A.C. It has been designed with a view toward striking appearance, high quality of workmanship, trouble free operation, ease of control and tuning and last, but not least for servicing, its unitized construction permits quick access and easy removal of any major section with minimum disturbance to other sections. The model 5100 transmitter may also be used to drive a higher powered R.F. final amplifier and class "B" audio modulator.

Its consistent operation coupled with an excellent quality of signal output, will meet all of the requirements of the most discriminating operator.

SUMMARY OF VARIOUS SECTIONS

Radio Frequency Section

The radio frequency section of the model 5100 consists of three separate units. First, the variable frequency oscillator (VFO) with the calibrated scale to read the frequency for each of the six amateur bands covered. Second, a buffer amplifier-crystal oscillator-keying tube unit which functions as a buffer amplifier when VFO operation is selected and as a crystal oscillator when operating in the crystal position. This unit also performs the function of block grid keying when either VFO or crytal operation is selected for CW operation. Third, the multiplier-final amplifier unit, the function of which is to multiply and amplify the selected output frequency.

Speech Amplifier-Modulator Unit

The speech amplifier modulator is a separate unit consisting of 4 tubes in a compact subassembly providing speech amplification from a crystal microphone and ample audio power to fully modulate the RF power output under maximum power conditions.

Power Supplies

Power supplies are of the conventional type utilizing heavy duty transformers and chokes and other components designed for typical amateur operation at maximum power. Two distinctly separate power supplies are used, the high voltage supply furnishing plate voltage for the R.F. final amplifier, modulators and multiplier stages, while a low voltage power supply provides the low potential D.C. and bias voltage as required. Provision has been made for front panel control of high voltage reduction during tune-up procedure.

TVI Suppression

Television interference suppression has been carried out to a degree found necessary by B&W's experience in this field. Precautions have been taken to prevent radiation from the more critical leads coming from the transmitter cabinet. Functional design within the R.F. section has been along lines which eliminate the source of much TVI. In addition to the details outlined above, the model 5100 contains as an integral part, a low pass filter which provides a minimum of 85 D.B. attenuation throughout the normal television channels with over 100 D.B. attenuation on channel #2.

Front Panel

The front panel contains the following controls — the A.C. line switch, tune operate switch, meter selector switch, microphone input jack, audio gain control, key jack, function switch, pilot light, plate power switch, master band selector, loading control, excitation control, plate tuning control, and main VFO frequency control dial clearly marked and printed to indicate all six bands. Also included is an all purpose meter which registers amplifier screen grid current, amplifier plate current and modulator plate current. Accessible through the rear of the cabinet are the A.C. cord, antenna connector and remote control line connection terminals. All rotating controls on the panel are equipped with richly styled machined aluminum knobs, with knurled edges.

Cabinet

The beautifully styled cabinet, finished in silver blue hammertone with gray panel, has rounded edges and corners and a hinged flush fitting lid providing access to the interior of the equipment for such functions as changing crystals and tube replacements, inspection etc. It is made of heavy gauge steel properly reinforced to adequately support the entire structure of the main chassis and associated subassemblies.

Dial Mechanism

The main frequency control dial which operates the VFO is a friction drive unit, extremely smooth in operation and permitting adjustment of frequency at the will of the operator.

SPECIFICATIONS

Frequency Coverage

80 meters	40 meters	20 meters
3.5—4.0mc	7.0—7.3mc	14.0—14.35mc
15 meters	**11 meters**	**10 meters**
21.0—21.45mc	26.96—27.23mc	28.0—29.7mc

Complete bandswitching on all bands.
VFO or crystal operation on AM or CW.
Power input — 135 watts phone — 150 watts CW.
PI-network output.
Built-in low pass filter.
TVI suppressed.
Stable VFO with accurately calibrated scale.
Output impedance — 75 ohms unbalanced.
External audio power output — 75 watts — Impedance 500 ohms.
Power source nominal — 110 volts single phase 50/60 cycles A.C.
Size — Width - 22" — Height - 11½" — Depth - 14¾".
Net weight — approximately 83 lbs.
Shipping weight — 90 lbs.

Tube Complement

VFO — 1 - Type 6BJ6

Crystal Oscillator Buffer Amplifier — 2 - Type 6BJ6

Multiplier — RF Amplifier — 4 - Type 6AQ5 - 2 Type 6146

Speech Amplifier — Modulator 1 - Type 6U8, 1 - Type 6AQ5, 2 - Type 6146

Low Voltage Power Supply — 1 - Type 5V4G

High Voltage Power Supply — 2 - Type 5R4GY

Voltage Regulators — 1 - Type VR150, 1 - Type VR105

DESCRIPTION AND FUNCTION OF VARIOUS SECTIONS

VARIABLE FREQUENCY OSCILLATOR

The variable frequency oscillator unit utilizes a type 6BJ6 tube in a Hartley type circuit, generating a fundamental frequency range between 1680 to 2005 KC.

The output frequency, through the medium of doubling is twice the value of the fundamental oscillator range, thus providing an output range equal to a low value of 3360 KC to a high of 4010 KC. This basic output range of frequencies, when multiplied covers all amateur frequencies within the limits of the amateur bands 80 - 40 - 20 - 15 - 11 and 10 meters.

The variable capacitor used in this unit has been designed to provide straight line frequency variation with respect to its rotation. The D.C. voltage for powering this unit is regulated by means of a VR-150 voltage regulator tube in the main low voltage power supply.

BUFFER-AMPLIFIER-CRYSTAL-OSCILLATOR-KEYING-TUBE-UNIT

This compact unit performs several functions. The first of two 6BJ6 type tubes used, performs as a buffer amplifier, while the second 6BJ6 is used as a crystal oscillator, second buffer and keyer tube. During VFO operation, the second 6BJ6 tube functions as an additional buffer stage, thus enhancing isolation between the VFO and the multiplier sections. In either case, VFO or crystal operation, the second 6BJ6 tube additionally functions as a keyer tube. This unit is driven by the variable frequency oscillator. The circuitry includes a band-pass filter for the purpose of attenuating fundamental oscillation frequencies, thus transferring only the desirable 80 meter signals required for the multiplier.

The VFO-crystal selector switch and crystal holder are located on the top of this unit in a convenient position for quick change-over from VFO to crystal or vice-versa. When crystal operation is desired, an 80 meter crystal providing fundamental or desired harmonic frequency, is inserted in the crystal holder and the VFO-crystal selector switch is thrown to the crystal position. When the VFO-crystal selector switch is in the crytal position, it functions to de-energize the first buffer and VFO while the second 6BJ6 tube then functions as a Pierce type oscillator.

The circuit has been designed to operate with 80 meter crystals, hence, the output frequency of the transmitter is either the basic crystal frequency or its multiples, depending on the setting of the band selector switch, which in part, functions to select the appropriate multiplier stages.

It is important to remove the crystal from its holder, during VFO operation on phone or CW.

FREQUENCY MULTIPLIER — FINAL AMPLIFIER

This unit which is driven by the output of the buffer amplifier-crystal oscillator-keyer tube unit, functions as a frequency multiplier and final amplifier.

The frequency multiplier section of this unit consists of 4 type 6AQ5 tubes in a broad-banded circuit eliminating the need of tuning each of the multiplier stages over the entire operating frequency range of the over-all equipment. This feature keeps tuning controls to a minimum. Selection of the multiplier stages is made through use of a switch which is ganged to the main band selector switch. Hence selection of the appropriate multiplier stages and final bandswitching is accomplished in one operation by the simple twist of one knob.

The power amplifier section of this unit employs two type 6146 beam power tubes in parallel providing the RF power output through a PI-network circuit.

Bandswitching is accomplished through the medium of a rotary type switch which as pointed out above is ganged to the multiplier section enabling simultaneous switching of the multiplier sections and the final amplifier. The PI-network in the output circuit enables loading and tuning adjustments to be made for compensating nominal variations in the antenna feed line system.

An excitation control in the grid circuit of the power amplifier stage is provided for effecting proper adjustment for the most efficient driving power as required for each individual band.

When the power amplifier is used in CW operation, the screen voltage is supplied by a constant source from the low voltage supply. However, when the power amplifier is modulated, the screen voltage is supplied from the high voltage supply by means of dropping resistors, so that plate and screen are modulated simultaneously. The circuitry of the multiplier and power amplifier has been designed to minimize spurious radiations.

All leads in the three units described above, constituting the complete RF section of this equipment, have been carefully filtered and shielded to minimize leakege and radiation. The mechanical construction of all three RF units as well as the speech amplifier-modulator unit have been designed with a view towards quick and easy removal of each individual unit, for purposes of inspection and service, with minimum disturbance to other functional units of the over-all equipment.

SPEECH AMPLIFIER — MODULATOR UNIT

SPEECH AMPLIFIER

The speech amplifier-section of this unit employs a type 6U8 triodepentode tube, the triode section of which is used as the preamplifier stage and the pentode section as a high gain second stage in order to obtain driving voltage for a type 6AQ5 tube functioning as a transformer coupled driver.

The volume control for governing the audio level is placed in the circuit between the triode and pentode sections of the dual purpose 6U8 speech amplifier tube. The audio power obtainable from the speech amplifier is more than ample to fully excite the 6AQ5 driver stage when a low level crystal microphone is used.

MODULATOR

The modulator portion of this unit is composed of two type 6146 beam power tubes, operating in class AB2.

The speech amplifier and modulator system provides approximately 75 watts of audio power, a greater amount than is required for 100% modulation of the R.F. amplifier operating at maximum power input. This audio power is also available for external use in driving a high powered modulator. The external output impedance through terminal strip connections on the rear chassis apron is 500 ohms. Precautions have been taken to completely shield this unit as well as filter its connecting leads in order that no difficulty due to RF feed-back is experienced.

POWER SUPPLIES

HIGH VOLTAGE SUPPLY

The high voltage power supply used for powering the RF amplifier, modulator and multiplier section delivers a nominal potential of 600 volts D.C. Two type 5R4GY tubes are employed in a full wave circuit together with a conventional type filter.

For purposes of improved filtering and better regulation, the filter reactor has been resonated at approximately 120 cycles by means of a shunt condenser. A bleeder is utilized across the output of the high voltage supply for discharging the residual charge in the filter capacitor section.

For tune up purposes, a resistor is employed in series with the primary of this supply, thus reducing the high voltage to a safe value. The control of these two levels of potential is through the panel mounted tune-operate switch.

LOW VOLTAGE SUPPLY

The low voltage power supply is a separate unit. It is used to furnish the plate power to the variable frequency oscillator, buffer-amplifier-crystal oscillator, speech amplifier, audio driver, modulator driver and the screens of the modulators.

In addition to the above, this power supply also delivers the required bias voltage for both the modulator and RF amplifier. In the CW operating position, this supply also provides the screen voltage for the RF power amplifier.

OPERATING INSTRUCTIONS

PHONE OPERATION

1. With either a suitable crystal inserted in the holder for crystal operation or the VFO adjusted to the desired frequency, the main band selector switch should be set to the proper band of operation.

2. Throw the A.C. line switch to the **on** position and allow tubes to warm up for at least two full minutes, meanwhile, throw the **tune operate switch** to the **tune position,** the meter switch to the **amp.** position and the **function switch** to phone position. The **load control knob** should be set at **zero.**

3. Throw the plate switch to the **on position** and adjust the plate tuning control to show a minimum meter reading. The **tune operate switch** should now be set to **operate.** The **loading control** should now be turned slowly toward ten and the plate tuning again adjusted for minimum. This procedure should be repeated until a reading of 200 is indicated by the meter.

4. Turn the meter switch to the **grid position** and **exc. control** until meter indicates approximately **17 mils.** Meter should now be switched to the **amp. position.** The **loading and plate tuning controls** should again be adjusted as outlined above, until a meter reading of 220 mils. is obtained. This indicates that the final is loading and power is flowing into either the dummy load or antenna, whichever is used.

5. When lower power output is desired, **the loading and plate tuning controls** should be adjusted accordingly as outlined in paragraphs 3 and 4 until the plate current as indicated by the meter registers proportionately with respect to the output power desired.

6. The transmitter is now ready to be modulated and the operator should proceed as follows:

   A) Advance the audio gain control knob.

   B) Turn meter selector switch to **mod. position.** This will indicate modulator resting plate current.

   C) While speaking into the microphone with normal voice, proceed to adjust the **audio gain control** to a point where the peak increase under modulation as indicated by the meter does not exceed 100 mils.

The modulator has sufficient audio power to more than fully modulate the maximum power input of the RF power amplifier, hence, the possibility of over-modulation should be avoided by keeping the audio gain control in a position which permits just enough audio power output to be generated for 100% modulation of the RF power amplifier.

The process as outlined above covers phone operation on crystal or VFO and applies to all bands.

OPERATING INSTRUCTIONS

C. W. OPERATION

1. Proceed to tune the transmitter as outlined in the preceding paragraphs, after which the function switch should be turned to the C.W. position.
2. In C.W. operation the microphone remains connected, but unused and a telegraph key is plugged into the key jack as follows —
   A) Insert the key plug into the **key jack.**
   B) **Retard audio gain control knob to minimum.**
   C) Turn the meter switch to the **amp. position.** When the plate switch is thrown to the **on** position, **the key** will further take control with respect to operation of the transmitter output.
3. In C.W. operation on any band, with key-up conditions, the oscillator is blocked and the power amplifier is biased to a safe value. Hence, under key-up conditions, the meter indication will be low, but normal under key down conditions.
4. Crystals for operation on the 40-20-15-11 and 10 meter amateur bands must always be of the 80 meter fundamental type. When the operator desires to operate on crystal at a specific frequency in any of these bands an 80 meter crystal which multiplies to the desired frequency of the chosen band **should be selected.**

DESCRIPTION AND FUNCTIONAL SUMMARY OF VARIOUS FRONT PANEL CONTROLS AND SWITCHES

Reading from left to right the bottom row of controls and switches functions as follows:—

1. **The A.C. line switch**
   This switch is used to break the primary circuit of the low voltage power supply. When this switch is in the **on** position the low voltage power supply is energized, thus, furnishing all filament and plate voltages for the VFO, crystal-oscillator-buffer-amplifier unit, speech amplifier, audio driver, modulator driver, screen voltage for the modulator tubes and bias voltage for modulator and RF amplifier tubes.
2. **Tune operate switch**
   This switch functions as a shunt for a resistor in the primary circuit of the high voltage power supply. When this switch is in the **tune position** it places the resistor in series with the primary winding, thus reducing the input voltage to a value sufficient for safe reduction of the high D.C. potential. When it is in the **operate** position, it shunts the resistor allowing the full primary voltage to be applied for use under normal operating conditions.
3. **Meter switch**
   This three position switch functions to place the indicating **meter** in three separate circuits. In the **grid position,** the meter is in series with the power amplifier screen circuit and thus indicates screen-grid current. In the **mod. position,** the meter is in series with the modulator plate voltage circuit, thus indicating modulator plate current. In the **amp. position,** the meter is in series with the RF amplifier plate voltage circuit, thus indicating plate current of the RF amplifier.

   Note

   When the meter switch is in the **grid position** the full scale reading of the meter **is 40 mils.** In the mod. and amp. positions the full scale reading of the meter is 400 mils.
4. **Audio gain control**
   This control is a potentiometer for use in controlling the audio level to the speech amplifier driver tube (6AQ5) and is placed in the circuit of the speech amplifier between the triode and pentode sections of the (6U8) dual purpose speech amplifier tube. **It should be in the minimum position when C.W. operation is in use.**
5. **Function switch**
   This switch is composed of two sections and is a six circuit, three position unit performing various functions as described below:—
   In the **C.W. position** it functions to short-circuit the secondary of the modulator transformer and switches the RF amplifier screen voltage to feed direct from the low voltage supply.
   In the **VFO position** it functions to disconnect the screen voltage from the RF amplifier, allowing plate voltage to remain on all other circuits. This position is used to **beat** the VFO signal selected, against the communications receiver for spot frequency operation purposes, etc.
   In the **phone position** it functions to remove the short-circuit across the secondary of the modulator transformer and switches the RF amplifier screen voltage to feed modulated voltage through dropping resistors from the high voltage supply.

   Note

   When it is desired to zero beat the transmitter operating frequency against a received signal, proceed as follows—
   A) With receiver BFO turned **on** tune to zero beat with desired incoming signal (on very strong incoming signals it may not be necessary to use receiver BFO).
   B) Set function switch on model 5100 transmitter to **VFO position** and adjust VFO to zero beat against the received signal on the communications receiver.
6. **Plate on and off switch**
   This switch functions to complete the circuit (when thrown to the **on** position) of the D.C. voltage which energizes the control relay. Two contacts of the control relay, when closed, completes the primary circuits of the high voltage supply, thus providing the required high voltage D.C. for normal operation.

Reading from left to right, the upper group of con-

trols function as follows:—

1. **Frequency control**
The large knob designated — frequency control — functions through a reduction unit whose ratio is approximately 30 to 1, to control the adjustment of the VFO variable capacitor. The velvet action of this control knob, simultaneously permits the operator to adjust the dial pointer on the frequency selector scale to the desired frequency of operation on any of the six bands.

2. **Loading control**
This control functions to adjust the high capacity variable loading condenser located across the output side of the PI-network circuit of the RF amplifier. Its adjustment determines the degree of loading throughout the tune-up procedures for each of the various bands. Graduations printed on the panel, permits a means of logging the readings for reset purposes.

3. **Exc. control**
This control functions to adjust a variable tuning condenser in the grid circuit of the RF amplifier. In tune-up procedure, it is adjusted to a point where the meter indicates not more than 17 mils. when the meter switch is in the **grid position.**

4. **Plate tuning**
The plate tuning control functions to adjust a variable tuning capacitor located at the input side of the PI-network circuit of the RF amplifier. This variable capacitor is adjusted to a point effecting resonance of the RF amplifier with respect to frequency and loading conditions as denoted by a minimum dip under loaded conditions as indicated by the meter when the meter switch is in the **amp. position.** The printed graduations on the panel, permits a means of logging the readings for reset purposes.

5. **Band selector**
This knob functions to simultaneously switch the multiplier stages and final amplifier PI-network to the desired frequency output. **This control should not be rotated when the plate switch is in the on position.**

Microphone connector

This connector unit is of the dual conductor type. One conductor is used for the high side of the microphone, while the remaining conductor is used as the push-to-talk connection. From the front view, the hole on the left side is the microphone connection, the one on the right, the push-to-talk connection.

The push-to-talk connection is a parallel conductor with the plate switch which functions to energize the control relay. Hence, when push-to-talk is used by the operator, the plate switch is left in the **off position.** A microphone with a suitable grip operated push type switch is required to place this control into operation.

Key Jack

The keying jack is of the closed circuit type, located in the grid circuit of the second buffer stage (6BJ6).

It functions to complete the circuit when not in use under phone operating conditions, while it breaks the grid circuit of the keying tube when the key plug is inserted. The on and off action in C.W. operation is then controlled by action of the key.

MAINTENANCE

B&W has exercised great care in the design and construction of this equipment in order to offer the users of its products, an equipment which will give long and satisfactory service with a minimum of care and adjustment.

Although the finest grades of materials and components have been used throughout and the equipment before shipping has been subjected to rigid factory inspection and final adjustment, a periodic check on the part of the operator is desirable in order to insure consistent and dependable service.

It is recommended that a general routine inspection be made periodically of all electrical and mechanical moving parts. Dust and other foreign particles which accumulate on and around rotary switch contacts, relays, dial mechanism and variable condenser plates, should be cleaned off with a dry brush free of oil deposits. Forced, clean dry air should be applied, wherever dirt or dust cannot be removed with a brush.

Tube failures are considered the major cause of interrupted service. Be sure and check the emission and performance of each tube at regular intervals to insure a high level and quality of signal output. Make sure all tubes are pushed firmly into place and that tube pins are free from corrosion and make good contact with the socket prongs. Take care in removing and replacing plate connectors to avoid breaking the tube seals and plate lead connection in the caps.

If possible keep an extra set of tubes on hand for spares. Such a set does not necessarily need to be a complete complement of tubes, but, one of each of the various types used in the equipment.

Removing Chassis from Cabinet

The model 5100 panel is secured to the cabinet by **six** round head screws through the front panel and **two** camlock fasteners on the chassis.

The **two** camlock fasteners are used to firmly secure the chassis to the bottom of the cabinet for shipping purposes. They are located, one on each side of the chassis directly below the front side of the two power transformers, they fasten through the outer lip of the chassis onto the cabinet reinforcement rails on which the chassis slides and rests. See drawing showing cutaway view.

To remove the chassis from the cabinet, first remove the six round head screws on the front panel. These are the screws which run through the wide trim stripe around the outer edge of the front panel. Next, the two camlock fasteners should be loosened with a screw-driver by a one-quarter turn in a counter clockwise direction. After the camlocks are loosened, both hands should be used to reach inside the cabinet gripping each of the two power transformers, one by each hand. Using an upward pull with both hands, to release the camlocks from their seat — the operator should simultaneously pull the chassis with a forward motion until the camlocks are out of their seats and the front panel overlap has been detached from the cabinet.

When placing the chassis back into the cabinet, the camlocks may be left out, if desired.

TROUBLE SHOOTING

Trouble shooting, parts replacement and repairs of a general nature, should be performed by a qualified technician or an operator with full knowledge of electrical circuits and ability to comprehend the function of each part as well as the ability to detect a defective component responsible for any erratic condition encountered, during the course of voltage and resistance tests and continuity measurements. In most cases of trouble, the difficulty can usually be isolated by means of tests and measurements and the section of the transmitter at fault, when determined, can be quickly and easily removed for repairs without in any way disturbing the other sections of the equipment. Proceed as follows:

1. In cases of interrupted service, first make a check for filament voltage when the A.C. switch is thrown to the **on** position. If tubes do not light, check the fuse and if blown, replace with one of similar value (5 amps.). Do not replace fuse with one of higher value. If fuse blows out when switch is thrown again, check primary circuit of low voltage power supply for a possible short circuit to ground. If primary checks out showing no short to ground, the secondary should be checked for a possible shorted filter capacitor or a defective rectifier tube and other components in the filter circuit.

2. Assuming that filament and low voltage D.C. potentials are normal when the A.C. switch is thrown to the **on** position, but the fuse blows out when the tune-operate switch is thrown to the operate position, the checks and procedures outlined under paragraph (1) above also apply in these instances.

3. If difficulty persists after checks given under paragraphs 1 and 2, proceed with a voltage check for each pin connection of the chassis connectors to ground and compare meter readings with those given under chassis voltage Table #1. With all power switches in the **off** position — proceed as follows:—

   A) Disconnect all male cable connectors from the chassis leading to the modulator, buffer-amplifier, VFO and multiplier-RF amplifier.

   B) With all rectifier and regulator tubes in their respective sockets, throw the A.C. line switch to the **on** position and allow rectifiers to warm up. Next throw the tune-operate switch to the operate position and last, throw the plate switch to the **on** position.

   C) The voltage reading as measured with a 20,000 ohms per volt volt-ohmmeter, between chassis and each female connector pin **on the chassis** should compare within a tolerance of plus or minus 10% of the voltage given for each respective pin of the various female chassis connectors listed under Table #1.

TABLE #1
CHASSIS CONNECTORS - VOLTAGE TABLE
FUNCTION SWITCH IN PHONE POSITION

FEMALE CONNECTORS	PINS											
PIN NO'S.	1	2	3	4	5	6	7	8	9	10	11	12
J-3	0	6.3AC	0									
J-4	+165	6.3AC	0	0								
J-5	0	0	0	-60	0	+880	0	0	0	0	6.3AC	6.3AC
J-6	6.3AC	0	-60	6.3AC	0	+300	+900	+900	0	+900	0	0

4. For continuity and resistance measurements utilizing a 20,000 ohm per volt volt-ohmmeter, proceed as follows:—

   A) With all power switches in the **off** position and A.C. line cord removed from the power source, remove all tubes and **male connector plugs** from the chassis leading to VFO, buffer-amplifier, modulator and multiplier-RF amplifier.

   B) Resistance measurements between chassis and each female connector pin and tube socket pin connection on the chassis should compare within a tolerance of plus or minus 10% of the values given for each respective value of the various female chassis connectors and socket pin connections under Table #2.

TABLE #2
FEMALE CHASSIS CONNECTORS & TUBE SOCKETS
RESISTANCE MEASUREMENTS
FUNCTION SWITCH IN PHONE POSITION

FEMALE CHASSIS CONNECTORS	PINS											
PIN NO'S.	1	2	3	4	5	6	7	8	9	10	11	12
J-3	0	0	∞									
J-4	∞	0	∞	32K								
J-5	∞	∞	∞	3700	—	60K	0	0	0	10K	0	0
J-6	0	∞	3800	0	0	—	60K	60K	∞	∞	0	0
TUBE SOCKETS												
V-14	∞	0	—	∞	∞	—	∞	∞				
V-15	∞	4800	—	∞	0	∞	4800	∞				
V-16	∞	70K	∞	40 Ω	∞	37 Ω	∞	60K				
V-17	∞	70K	∞	40 Ω	∞	37 Ω	∞	60K				
V-18	—	—	∞	—	0	—	—	—				

5. For continuity and resistance measurements of the individual units — VFO, buffer-amplifier, modulator speech amplifier and multiplier RF amplifier, proceed as follows, utilizing a 20,000 ohm per volt volt-ohm-meter—

   A) With all power switches in the **off** position and the A.C. line cord removed from the power source, disconnect the male plug connector, (of any of the units to be tested) from the female counterpart of that respective connector on the chassis and proceed with resistance measurements from each **male** connector plug pin to ground.

   B) Resistance measurements between chassis and each plug pin should compare within a tolerance of plus or minus 10% of the values for each of the connector pins listed under Table #3.

TABLE #3
RESISTANCE MEASUREMENTS WITH TUBES OUT
UNIT MALE PLUG CONNECTORS

MALE PLUG CONNECTORS	PINS											
PIN NO'S.	1	2	3	4	5	6	7	8	9	10	11	12
BUFF-AMP.-P4	∞	FIL.	∞	∞								
MODULATOR-P6 SPEECH AMP.	FIL.	∞	∞	FIL.	∞	—	∞	∞	∞	∞	0	0
MULTIPLIER-P5 R.F. AMP.	∞	∞	∞	∞	∞	∞	0	0	0	∞	FIL.	FIL.
VFO - P3	0	FIL	∞									

Erratic Conditions

6. Most erratic operating conditions such as, insufficient driving power to R.F. amplifier, modulators, and low D.C. potentials including plate, screen, bias voltages and currents are normally the result of low tube output, hence, it is recommended that all or such tubes as may be suspected of causing trouble resulting in interrupted or erratic operation of a particular section, be replaced or at least tested for compliance to standard performance, before any attempt is made to seek other sources causing improper operation of any particular section.

7. When tubes have been eliminated as the possible source of any particular difficulty encountered, the schematic diagram of the equipment, provided in this manual, should be used for reference in identifying a particular defective component during the course of voltage and resistance measurements covered under paragraphs 1, 2, 3, 4, and 5 under trouble shooting above.

TERMINAL CONNECTIONS

CHASSIS APRON (Rear View)

Figure—

The information given below applies to the terminal connections located on the rear chassis apron of the model 5100 transmitter. Reading from left to right, the terminal connections are as follows:

1. R.F. power output connector
2. A.C. line connections
3. Directly below the A.C. line connections is the fuse holder
4. Terminal strip connections #11 through #1.

FUNCTIONAL SUMMARY OF REAR CHASSIS APRON

TERMINAL CONNECTIONS

The RF power output connector is an SO-239 coaxial fitting. This is the output of the built-in low pass filter. Its counterpart, PL.259 should be used with an appropriate length of 75 ohm coaxial line for power take-off.

The A.C. line connections are the external end of two high-pass type capacitors. The fuse holder is of the screw-in type housing a 5 amp. fuse cartridge, type 3AG.

The terminal strip connection #11 through #1 are as follows:

Terminals #11 and #10 are two of the internal control relay contacts. These contacts which are normally open, may be used in connection with an external antenna change-over relay circuit. When the plate switch is turned on they complete the antenna change-over energizing circuit and vice-versa.

Terminals #9 and #8 are two additional control relay contacts. These contacts which are normally closed, may be used for a communications receiver disabling circuit, choice of which is left to the operator. The internal control relay contacts #8, #9, #10 and #11 covered above have been provided for those who wish to fully utilize the control features built into the model 5100 transmitter.

In addition to the normal multiband performance herein described the model 5100 transmitter can also be utilized to provide the following:

1. Unmodulated R.F. power output for driving a higher powered final amplifier.
2. 75 watts of audio power for driving a higher powered modulator, less the R.F. driving power. Impedance value of audio output is 500 ohms.
3. Unmodualted R.F. power output in combination with 75 watts of audio power output through 500 ohms for the dual purpose of driving a higher powered final amplifier and modulator unit.

To obtain unmodulated R.F. power output for driving purposes indicated under (1) above, turn the **function switch** on the front panel to **C.W. position.** Connect a suitable coax line from R.F. output power connector to input stage of high powered final. Proceed as directed under operating instructions.

To obtain 75 watts of audio power output less the R.F. driving power indicated under (2) above, turn **function switch** on front panel to **phone position.** Open jumper connections between terminals 7 & 6, 4 & 3 on rear terminal strip. Connect a suitable 500 ohm line between terminals 7 & 5 to input of high powered modulator.

To obtain the combination of unmodulated R.F. and audio driving power as indicated under (3) above, turn **function switch** on front panel to **C.W. position.** Open jumper connections 7 & 6, 4 & 3 on rear terminal strip. Connect a suitable coax line from R.F. output power connector to input stage of high powered R.F. amplifier. Connect a suitable 500 ohm line between terminals 7 and 5 to input of high powered modualtor unit.

Terminals #2 and #1 are the extension of the push to talk circuit provided on the front panel through the microphone connector. These terminal connectors may be used for remote operation purposes as individually required by each operator. Terminal #1 also serves as the common chassis ground. It is highly recommended to tie #1 terminal down to a good ground through heavy copper wire or braid.

ALIGNMENT AND TUNING PROCEDURE

MULTIPLIER R. F. AMPLIFIER UNIT

1. Remove multiplier R.F. amplifier unit from main chassis by disconnecting power cable plug (#P 5), remove four mounting screws, all knobs and coax output cable.
2. Provide a suitable extension power cable with appropriate plug and jack connectors to match P#5, and J#5 permitting operation of unit external to chassis also a suitable extension coax line to match P#2 and J#2.
3. Set function switch on VFO position — **This is important.**
4. Place the test leads of a 20,000 ohm per volt, volt-ohmmeter across the R.F. amplifier grid resistor R 23, value 22K, located on back panel of RF amplifier unit. Set instrument scale to 250 volt D.C. and observe proper polarity.
5. Adjust excitation control — variable capacitor C 36 until its rotor plates are enmeshed approximately 60%. The unit is now prepared for alignment for each individual band and the next steps for each band are as follows—
6. **80 meter band**
   (A) Set band selector switch on 80 meter position.
   (B) Set VFO frequency to 3750 K.C.
   (C) Adjust core screw of L-6 to obtain maximum reading on meter which has been placed across R 23.
7. **40 meter band**
   (A) Set band selector switch on 40 meter position.
   (B) Set VFO frequency to 7200 K.C.
   (C) Adjust core screw of L-7 to obtain maximum reading on meter.

8. **20 meter band**
   (A) Set band selector switch on a 20 meter position.
   (B) Set VFO frequency to 14, 200 K.C.
   (C) Adjust core screw of L-8 to obtain maximum reading on meter.

9. **15 meter band**
   (A) Set band selector switch on 15 meter position.
   (B) Set VFO frequency to 21,150 K.C.
   (C) Adjust core screw of L-9 to obtain maximum reading on meter.

10. **10 meter band**
   (A) Set band selector switch on 10 meter position.
   (B) Set VFO frequency to 28,800 K.C.
   (C) Adjust core screw of L-10 to obtain maximum reading on meter.
   (D) Adjust capacitor trimmer C-31 which is across the grid of V-7 for maximum reading on meter. The C-31 capacitor trimmer is located on the underside of the multiplier RF unit.

11. **11 meter band**
   (A) Set band selector switch on 11 meter position.
   (B) Set VFO frequency to 27,120 K.C.
   (C) Adjust capacitor trimmer C-38 accessable through hole on left side of multiplier RF amplifier panel, for maximum reading on meter.
   (D) Adjust capacitor trimmer C-33 accessable through hole on right side of multiplier RF amplifier panel, for maximum reading on meter.
   (E) Repeat adjustments of C-38 and C-33 as required to obtain maximum reading on meter.

The multiplier RF amplifier unit is now completely aligned and it can be placed back in its position on the main chassis, etc.

ALIGNMENT AND TUNING PROCEDURE

VFO UNIT

The VFO unit as shipped from the factory is completely aligned. Realignment is a matter which only becomes necessary in those cases where the oscillator tube needs to be changed or the dial cord requires replacement.

In such cases where the oscillator tube has been changed, the procedure for alignment of this unit is as follows:

1. A signal source of exactly 3.6 mc. is to be tuned in on a communications receiver.
2. After the VFO unit has been allowed to warm up, turn frequency control knob and set pointer on scale to read the exact frequency used as pointed out under paragraph #1 above.
3. The last step required is to adjust the small trimmer capacitor (C3) located on the top of the VFO chassis until the VFO frequency as varied by the adjustment of (C3) zero beats exactly with the standard as monitored on the communications receiver.

This completes the alignment procedure required in cases of tube replacements.

When the VFO unit requires realignment due to a broken dial cord, the procedure is as follows:

1. After the dial has been restrung with a new cord, tune in a signal of known frequency on the communications receiver. The known frequency in this case can also be same as used above, 3.6 mcs.
2. The next step is to turn the frequency control knob until the VFO produces a zero beat against the signal tuned in on the communications receiver.
3. The last step is to move the dial pointer assembly without in any way altering the zero beat signal on the communications receiver, until the pointer reads 3.6 mcs. on the scale.

Detailed instructions covering the dial cord replacement is given in a drawing elsewhere in this manual.

ANTENNA SYSTEMS

The Model 5100 may be used with a variety of antenna systems, however, since it is factory equipped with a low pass filter whose characteristic output impedance is 75 ohms, the output power should be arranged to feed into a load of equal impedance. This does not mean that the operator is limited to use an antenna feed line system with an impedance of 75 ohms only, on the contrary, several line impedance values can be utilized effectively, the choice of which is left entirely to the operator and local conditions affecting the installations, etc.

Several typical examples of antennas and feed line systems which can be successfully used with the 5100 transmitter are illustrated under figures (1A) (2A) (3A) (4A) (5A) (6A).

SUMMARY OF VARIOUS ANTENNA SYSTEMS

Fig. (1A) **SINGLE BAND HALF WAVE FOLDED DIPOLE ANTENNA**

This diagram illustrates the Model 5100 transmitter connected to a half wave folded dipole antenna. The impedance match from 75 to 300 ohms and the transformation from unbalance to balance is effected through the medium of the B&W multiband balun unit assembly made up with two B&W type #3975 bifilar wound coils.

Several of these antennas may be used for such applications where local conditions provide space and the operator chooses to use a separate antenna for each band of operation.

Where space and local facilities do not provide for high gain type antennas for 20-15 and 10 meters, these fundamental types will be found to give satisfactory results.

Fig. (2A) **MULTIBAND ANTENNA FOR 80-40-20 and 10 METERS**

A multi-band antenna of this type provides the operator with a radiating system for each of the bands listed above. Perhaps not as effective as separate half wave antennas due to orientation restrictions, it can be considered a compromise where space limitations and other local conditions would normally confine operations to one or two bands only.

Considering that no switching or tuning is required, this compromise antenna system provides a means of quick changeover from one band to another for those who wish to fully utilize multiband operation with the Model 5100 transmitter.

Fig. (3A) **BEAM ANTENNAS**

This illustration shows the method of effectively connecting and matching the output of the Model 5100 to a beam antenna, through use of a B&W beam matching balun. 75 ohm coaxial line is used from the output of the Model 5100 to the beam matching balun which mounts at the beam. Instructions provided with the beam baluns covers installation instruction details.

Applicable baluns for the 20-15 and 10 meter bands are as follows:

20 Meter — B&W #702
15 Meter — B&W #701
10 Meter — B&W #700

Fig. (4A) **HALF WAVE SPLIT DIPOLE ANTENNA**

This illustration shows a half split dipole antenna. Its performance in every respect is similar to the folded dipole, illustrated in Fig. 1A. However, the feed line system is of the 75 ohm twin parallel wire type. The #3975 type balun in this case is wired accordingly as covered by the instruction sheets packed with these balun units. Like the folded dipole, several of these antennas can be arranged for quick switching when operation on another band is desired.

Fig. (5A & 6A) **HALF WAVE SPLIT DIPOLE AND END FED ZEPP USING OPEN WIRE FEED LINE SYSTEM**

These antennas from the operational viewpoint are basically similar to the other half wave types shown under Figs. 1A and 4A. Transformation from unbalance to balance is accomplished through the medium of the antenna coupler circuit.

The antenna coupler essentially consists of a B&W antenna coupler coil with a fixed link and a B&W JCX100E variable split stator condenser equipped with a jack bar and mounting brackets, providing a compact assembly without leads.

Feed line impedance matching is obtained by tapping of the open wire feed line at appropriate points across the antenna coupler coil, while the proper load for the transmitter is achieved by a combination of adjusting the transmitter loading and plate tuning controls and the adjustment of the antenna tuning condenser.

While this system is extremely flexible from the standpoint of its ability to match and function well with a varied collection of open wire feed line systems, the only objectional factor disliked by a few operators is the extra tuning control. However, in spite of such objections, it can be considered as the only simple and practical solution to the problem of matching an assortment of different antennas with various types of feed line systems of different impedance values.

Although this antenna coupler and matching system has been shown here as used with half wave antennas, its usefulness can also be extended in other applications with longer antennas, such as the odd or even half wave multiple types as well as the rhombic and "V" type high gain antennas, in fact, any antenna system where a resonant or non-resonant feed line system can be adapted.

A suggested method of adjusting the antenna coupler when used with the Pl-network output of the B&W Model 5100 transmitter is given below:

1. With the **tune operate switch** in the **tune position,** adjust the loading control of the Model 5100 until the plates of the loading capacitor are fully meshed. The scale reading as indicated by the pointer on the knob will be "0".

2. Refer to Figs. 5A & 6A and short circuit C1 then adjust plate tuning control on Model 5100 transmitter for minimum dip as indicated by the meter, when **meter switch** is in **amp. position.**

3. Remove short circuit and adjust C1 for maximum loading.

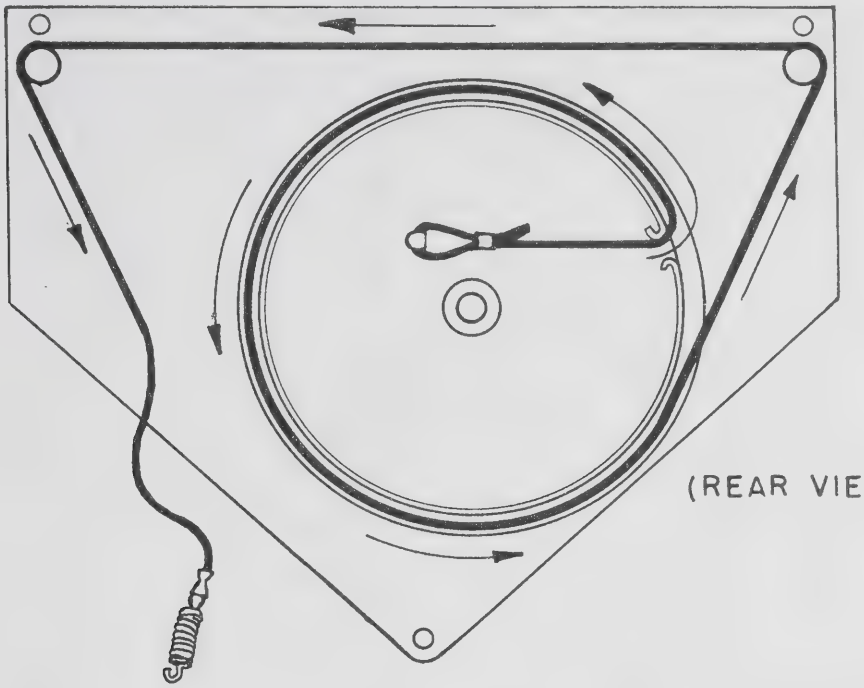
4. Tap feeders on L1, starting at extreme outer ends of coil. Locate correct tap points on coupler coil, by moving taps towards center, that gives maximum loading, corresponding with reading of C1 under paragraph #3 above.

5. Throw **tune operate switch** to the **operate position** and proceed with adjustment of loading control on Model 5100 until the final is loaded to maximum and repeat the minimum dip of the plate tuning capacitor as explained under paragraph "2" above. At this point, if the setting of C1 is same as noted under paragraph #3 above, the standing wave ratio can be considered to be satisfactory while on the other hand if the setting of C1 indicates an increase in capacity for proper load conditions, the line is inductively reactive or capacitively reactive when the setting of C1 at this condition, shows a decrease in capacity.

6. The correction of either inductive or capacitive reactance in cases where the operator desires to obtain a minimum SWR, is best accomplished through use of an SWR indicator placed in the coax line between the transmitter output and the antenna coupler. Repeating the matching and tuning process explained above, until a minimum SWR is obtained.

For other type antennas not covered herein, reference to the ARRL antenna handbook provides a good source of information.

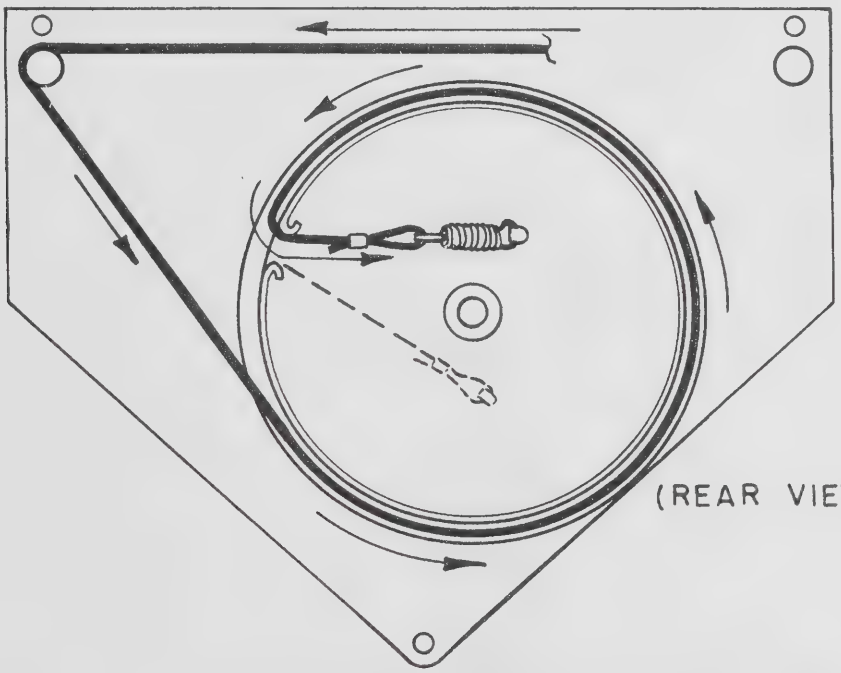
INSTRUCTIONS FOR STRINGING VFO DIAL ASSEMBLY



(REAR VIEW)

STEP 1

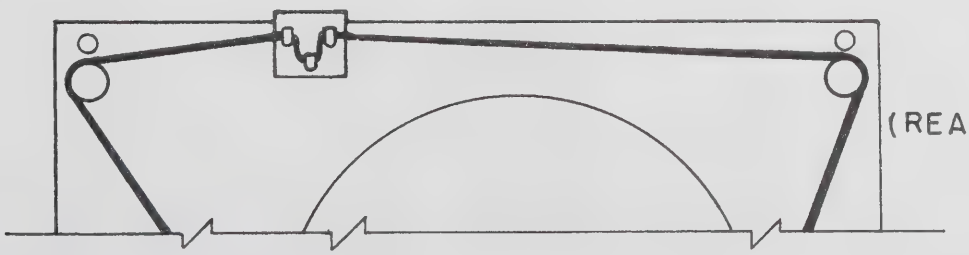
ROTATE LARGE PULLEY TO POSITION SLOT AS SHOWN. USE A HOOK-ENDED TOOL TO CATCH LOOP OF CORD IN PROJECTION ON TOP OF PULLEY.



(REAR VIEW)

STEP 2

ROTATE LARGE PULLEY TO POSITION SHOWN. USE HOOK-ENDED TOOL TO SECURE SPRING LOOP IN TOP PROJECTION.



(REAR VIEW)

STEP 3

ROTATE LARGE PULLEY TO THE MID-POINT OF ITS ROTATION AND INSTALL POINTER AS SHOWN.

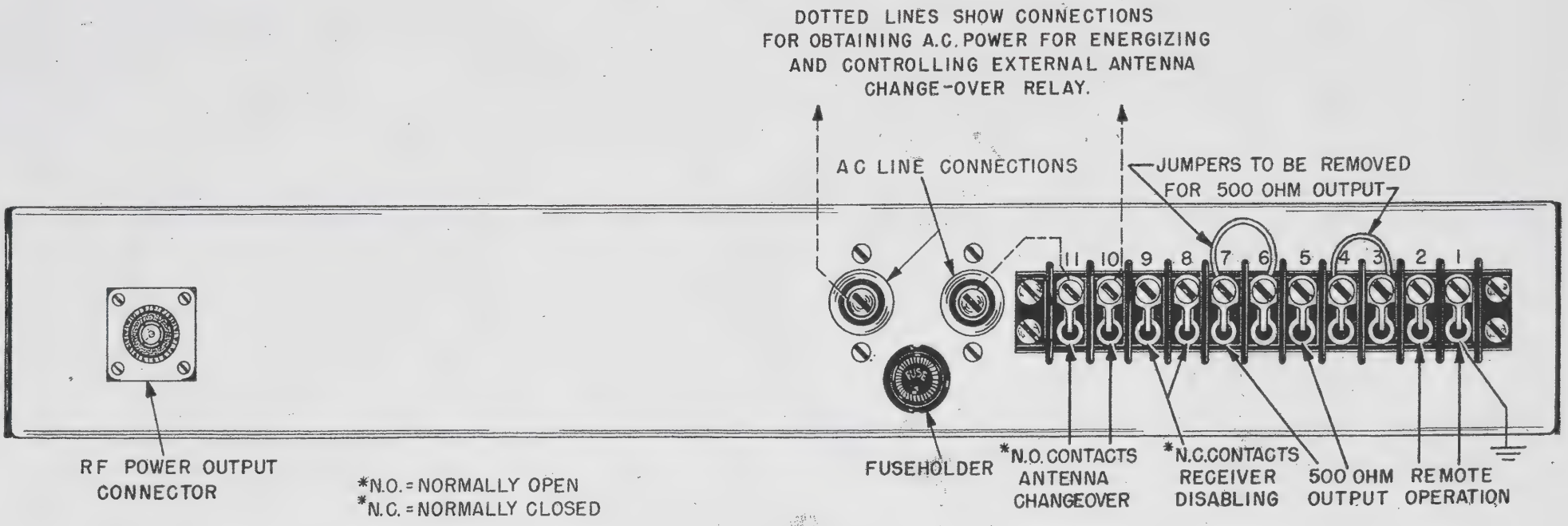
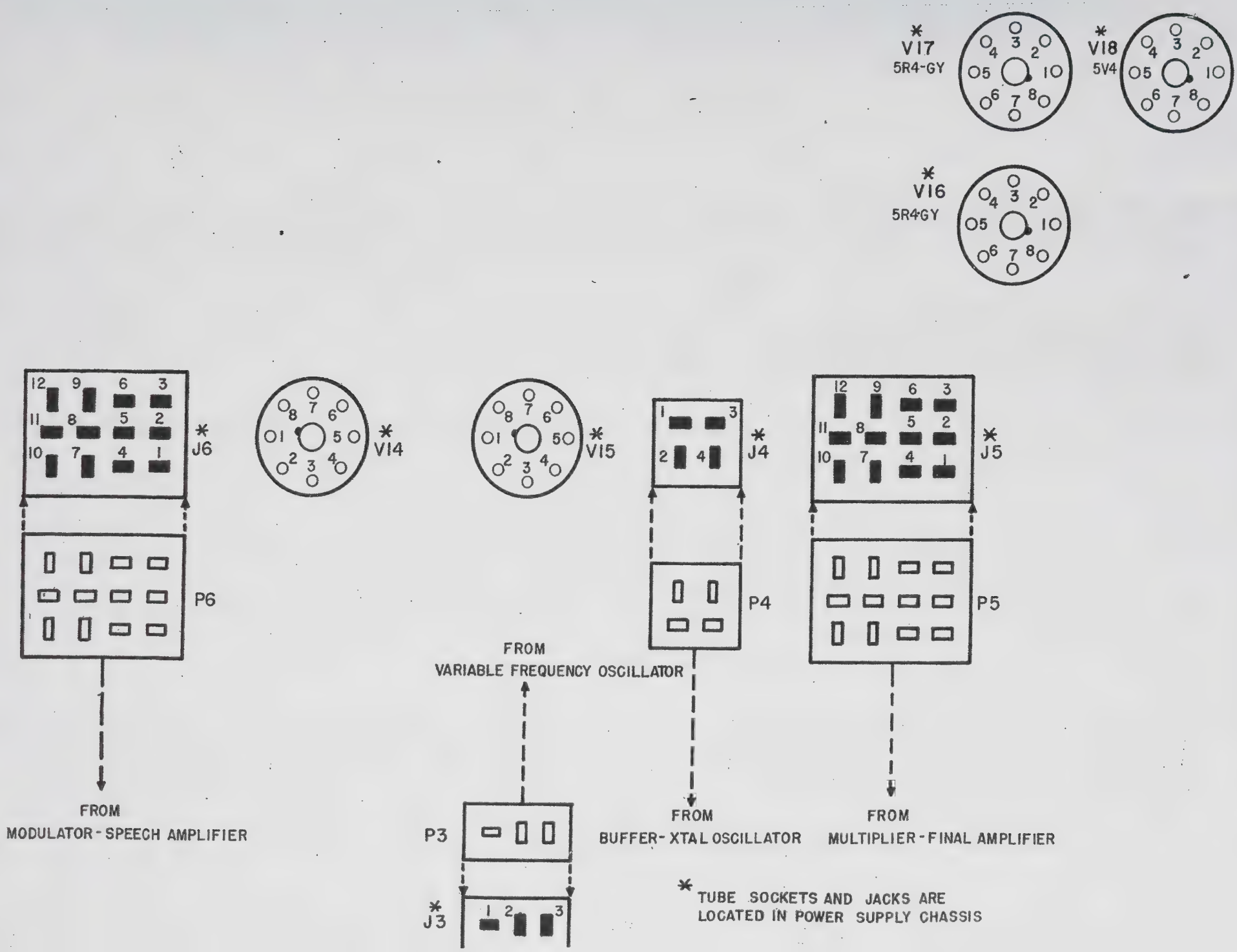


FIGURE - CHASSIS APRON (REAR VIEW)


* V17
5R4-GY
* V18
5V4
* V16
5R4GY
* J6
P6
* V14
* V15
* J4
P4
* J5
P5
FROM
VARIABLE FREQUENCY OSCILLATOR
FROM
MODULATOR - SPEECH AMPLIFIER
P3
* J3
FROM
BUFFER - XTAL OSCILLATOR
FROM
MULTIPLIER - FINAL AMPLIFIER
* TUBE SOCKETS AND JACKS ARE
LOCATED IN POWER SUPPLY CHASSIS

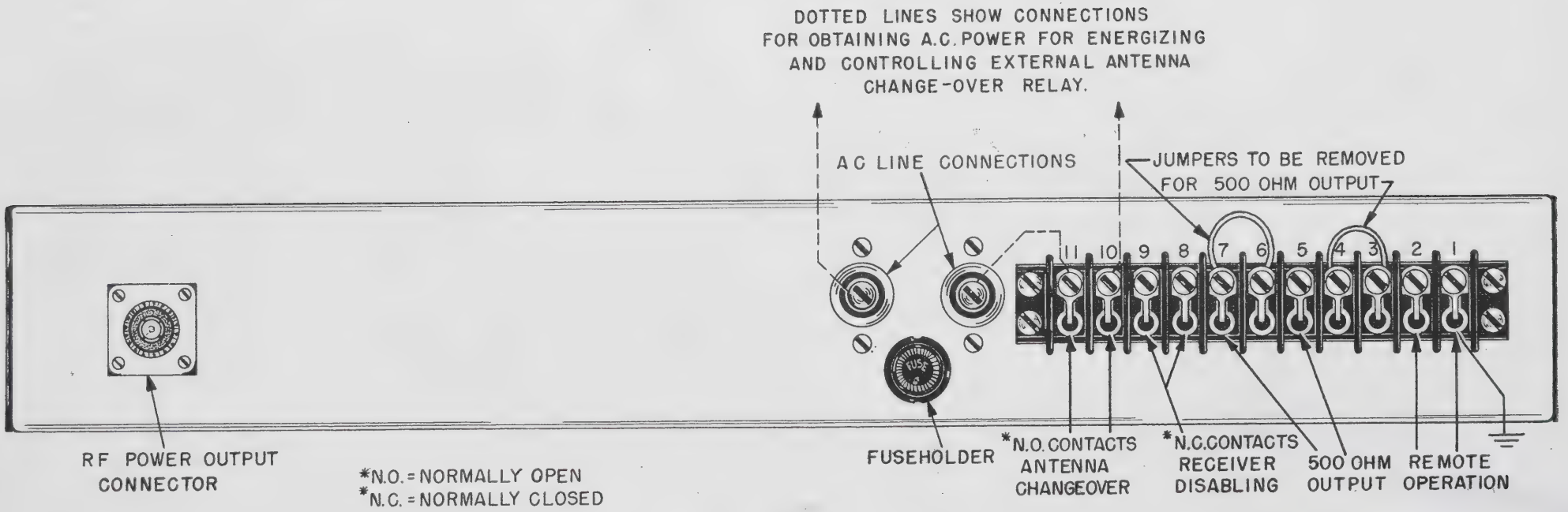


FIGURE - CHASSIS APRON (REAR VIEW)

PARTS LIST - MODEL 5100 TRANSMITTER

Circuit Symbol	Sub. Assy. Location	Description	B & W Part #
R1	VFO	Resistor 100,000 ohms ½W. 5%	R-22
R2	VFO	Resistor 560 ohms ½W. 10%	T-244
R3	VFO	Resistor 10,000 ohms ½W. 5%	R-16
R4	Buffer Xtal Osc.	Resistor Composition 150 ohm ½W. 10%	R-62
R5	Buffer Xtal Osc.	Resistor Composition 5600 ohm ½W. 10%	R-63
R6	Buffer Xtal Osc.	Resistor Composition 220 ohm ½W. 20%	R-64
R7	Buffer Xtal Osc.	Resistor 100,000 ohms ½W. 5%	R-22
R8	Buffer Xtal Osc.	Resistor Composition 150 ohms ½W. 10%	R-62
R9	Buffer Xtal Osc.	Resistor Composition 1000 ohms ½W. 10%	R-65
R10	Buffer Xtal Osc.	Resistor Composition 5600 ohms ½W. 10%	R-63
R54	Buffer Xtal Osc.	Resistor Composition 220 ohm ½W. 20%	R-64
R11	Multiplier F. A.	Resistor Carbon 47,000 ohm 1 W. 10%	R-56
R12	Multiplier F.A.	Resistor Carbon 560 ohm 2 W. 10%	R-57
R13	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R14	Multiplier F.A.	Resistor Carbon 2200 ohm 2W. 10%	R-81
R15	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R16	Multiplier F.A.	Resistor Carbon 47,000 ohm 1W. 10%	R-56
R17	Multiplier F.A.	Resistor Carbon 1,000 ohm 2W. 10%	R-80
R18	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R19	Multiplier F.A.	Resistor Carbon 47,000 ohm 1W. 10%	R-56
R20	Multiplier F.A.	Resistor Carbon 1,000 ohm 2W. 10%	R-80
R21	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R22	Multiplier F.A.	Resistor 18,000 ohm 2W. 10%	R-82
R23	Multiplier F.A.	Resistor Carbon 22,000 ohm 1W. 10%	R-59
R24	Multiplier F.A.	Resistor Carbon 47 ohm 2W.10%	R-60
R25	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R26	Multiplier F.A.	Resistor Carbon 100 ohm 1W. 10%	R-58
R56	Multiplier F.A.	Resistor Wire Wound 1500 ohm 5W. 10% Ohmite	R-79
R57	Multiplier F.A.	Resistor Carbon 47 ohm 2W. 10%	R-60
R58	Multiplier F.A.	Resistor Carbon 47 ohm 2W. 10%	R-60
R27	Modulator S. A.	Resistor 10 Meg. ½ W. ±10% insulated	R-38
R28	Modulator S. A.	Resistor Composition 5600 ohm ½W. 10%	R-63
R29	Modulator S. A.	Resistor Carbon 270,000 ohm ½W. 10%	R-49
R30	Modulator S. A.	Potentiometer Composition .5 Meg.	T-612
R31	Modulator S. A.	Resistor Composition 560 ohm ½W. 10%	T-244
R32	Modulator S. A.	Resistor Fixed Composition 1 Meg Ohm ½ W. 5%	R-7
R33	Modulator S. A.	Resistor Composition 330,000 ohm ½ W. 5%	R-32
R34	Modulator S. A.	Resistor Composition 5600 ohm ½W. 10%	R-63
R35	Modulator S. A.	Resistor Composition 470,000 ohm 1W. ±10%	R-69
R36	Modulator S. A.	Resistor Composition 470,000 ohm ½W. 10%	R-66
R37	Modulator S. A.	Resistor Composition 300 ohm 1W. ±5%	T-626
R38	Modulator S. A.	Resistor Composition 1000 ohm ½W. 10%	R-6
R39	Modulator S. A.	Resistor Composition 1000 ohm ½W. 10%	R-6
R40	Modulator S. A.	Resistor Carbon 100 ohm 1W. 10%	R-5
R41	Modulator S. A.	Resistor Carbon 100 ohm 1W. 10%	R-5
R42	Modulator S. A.	Resistor 5000 ohm 10 watt 20% wire wound	T-11
R43	Modulator S. A.	Resistor wire wound 4.7 ohm 1W. ±5%	R-7
R60	Modulator S. A.	Resistor Composition 100,000 ohm 2W. 10%	R-7
R61	Modulator S. A.	Resistor Composition 100,000 ohm 2W. 10%	R-7
R63	Modulator S. A.	Resistor 10,000 ohm ½W. 20%	R-10
R44	Power Supply C.	Resistor, wire wound, adj. 25,000 ohm 25 watts with one adj. lug 20%	T-58
R45	Power Supply C.	Meter Shunt to read full scale 40 MA D. C.	T-60
R46	Power Supply C.	Meter Shunt to read full scale 400 MA D. C.	T-601
R47	Power Supply C.	Meter Shunt to read full scale 400 MA D. C.	T-601
R48	Power Supply C.	Resistor Composition 33,000 ohm ½W. ±10% insulated	T-59
R49	Power Supply C.	Resistor wire wound adj. 20,000 ohms 50 watt with 2 mounting brackets and 4 adj. lugs	T-582
R50	Power Supply C.	Resistor wire wound 60,000 ohm 10W. 20%	T-587
R51	Power Supply C.	Resistor wire wound adj. 2,000 ohm 25 watts with one adj. lug	T-583
R52	Power Supply C.	Resistor Composition 100,000 ohm 2W. ±10%	R-71
R53	Power Supply C.	Resistor wire wound special heater	T-588
R55	Power Supply C.	Resistor Composition 100,000 ohm 2W. ±10%	R-71
R59	Power Supply C.	Resistor Carbon 22,000 ohm 1W. 10%	R-59
R62	Power Supply C.	Resistor 2,000 ohm 10W. 10% Ohmite	R-101
C1	VFO	Cap. Ceramic Tubular 100 MMF ±1% Zero-Temp. uninsulated type	T-727
C2	VFO	Capacitor Variable	T-620
C3	VFO	Capacitor 25 MMF APC	T-314
C4	VFO	Capacitor Ceramic Tubular 100 MMF ± 10 MMF Zero Temp. Coeff.	T-646
C5	VFO	Capacitor Disc .001 MF	T-509
C6	VFO	Capacitor Disc .001 MF	T-509
C7	VFO	Capacitor Ceramic Tubular 75 MMF ± 7.5 MMF, —750 Neg. Temp. Coeff.	T-647
C8	VFO	Capacitor Disc .001 MF	T-509
C9	VFO	Capacitor Disc .001 MF	T-509
C78	VFO	Capacitor Ceramic Tubular 75 MMF ±1% Zero Temp. Coef. uninsulated	T-751
C79	VFO	Temp. Comp. Cap. N-750 ±120K 5±0.1 MMF	T-749
C80	VFO	Temp. Comp. Cap. N-750 ±120K 50± 1 MMF	T-750
C10	Buffer Xtal Osc.	Capacitor Ceramic Tubular 50 MMF ±5MMF —750 Neg. Temp. Coeff.	T-616
C11	Buffer Xtal Osc.	Capacitor Ceramic Tubular 95 MMF ±9.5 MMF —750 Neg. Temp. Coeff.	T-643
C12	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C13	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C14	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509

PARTS LIST - MODEL 5100 TRANSMITTER

Circuit Symbol	Sub. Assy. Location	Description	B & W Part #
C15	Buffer Xtal Osc.	Capacitor Ceramic Tubular 50 MMF ±5MMF —750 Neg. Temp. Coeff.	T-616
C16	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C17	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C18	Buffer Xtal Osc.	Capacitor Ceramic Tubular 95 MMF ±9.5 MMF —750 Neg. Temp. Coeff.	T-643
C19	Buffer Xtal Osc.	Capacitor Ceramic Tubular 20 MMF ±2 MMF —750 Neg. Temp. Coeff.	T-644
C20	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C75	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C76	Buffer Xtal Osc.	Capacitor Disc .001 MF	T-509
C21	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C22	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C23	Multiplier F. A.	Capacitor Fixed Ceramic CC21UJ430J	T-621
C24	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW ±20%	T-501
C25	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C26	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C27	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW±20%	T-501
C28	Multiplier F. A.	Capacitor Fixed Ceramic CC26UJ750J	T-622
C29	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C30	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C31	Multiplier F. A.	Trimmer Erie TS-2A-N-500-7-45	S-123
C32	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW ±20%	T-501
C33	Multiplier F. A.	Trimmer Erie TS-2A-N-500-7-45	S-123
C34	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C35	Multiplier F. A.	Capacitor Disc .001 MF	T-509
C36	Multiplier F. A.	Capacitor Variable Air 28 MMF APC type	T-SP-160
C37	Multiplier F. A.	Capacitor Mica 100 MMF 1500 VDCW ±20%	T-501
C38	Multiplier F. A.	Trimmer Erie TS-2A-N-500-7-45	S-123
C39	Multiplier F. A.	Capacitor Fixed Mica VCM20B 102M Elmenco 1000 V.	T-SP-164
C40	Multiplier F. A.	Capacitor Fixed Mica .002 MMF 2500 VDC - CM50A202J	T-SP-162
C41	Multiplier F. A.	Capacitor Variable Air 325 MMF	T-SP-163
C42(A&B)	Multiplier F. A.	Capacitor Variable Dual 530 MMF	T-656
C44	Multiplier F. A.	Capacitor Fixed Mica .0051 MF 2500 VDC CM50A512 J	T-SP-161
C45	Multiplier F. A.	Capacitor Fixed Mica VCM20B 102 M 1000 Volt	T-SP-164
C46	Modulator S. A.	Capacitor Disc .001 MF	T-509
C47	Modulator S. A.	Capacitor Mica 50 MMFD	T-614
C48	Modulator S. A.	Capacitor Disc .001 MF	T-509
C49A C49B	Modulator S. A.	Capacitor Electrolytic 10-10 MFD 500V.	T-577
C50	Modulator S. A.	Tubular Paper Capacitor .1 MFD 400V.	T-617
C51	Modulator S. A.	Capacitor Disc .001 MF	T-509
C53	Modulator S. A.	Capacitor Electrolytic Single 10MF/25V	T-615
C54	Modulator S. A.	Capacitor Disc .001 MF	T-509
C55	Modulator S. A.	Capacitor Disc .001 MF	T-509
C56	Modulator S. A.	Capacitor Disc .001 MF	T-509
C57	Modulator S. A.	Capacitor Disc .001 MF	T-509
C58	Power Supply C.	Capacitor Tubular Paper .1 MFD 200V.	T-673
C59	Power Supply C.	Capacitor Disc Ceramic .01 MFD 500 V.	T-607
C60	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C61	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C62	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C63	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C64	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C65	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C66	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C67	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C68	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C69	Power Supply C.	Capacitor Disc Ceramicon .001 MFD 1500 V.	T-679
C70	Power Supply C.	Capacitor Electrolytic 20 MFD 150 V.	T-578
C71	Power Supply C.	Cap. oil filled paper 10 MFD 1000 V. with mtg. strap for inv. mtg.	T-579
C72	Power Supply C.	Dual Elect. Capacitor Aluminum case 20-20 MFD 450V. with mtg. strap	T-581
C74	Power Supply C.	Capacitor oil filled paper .25 MFD 2000 volts with mtg. strap for upright mtg.	T-580
C81	Power Supply C.	Capacitor Disc .001 MF	T-509
SW1	Buffer Xtal Osc.	Toggle Switch—S.P.S.T.	T-537
SW2	Multiplier F. A.	Switch 6 position 5 wafer ceramic	T-556
SW8	Multiplier F. A.	Switch 6 position 1 wafer with detent & shaft 3/8" bushing 1-5/8" shaft lgth.	T-555
SW3	Power Supply C.	Bat Handle toggle switches 3A. 125V. S.P.S.T.	T-592
SW4	Power Supply C.	Selector Switch non-shorting 3 pole 2 section	T-594
SW5	Power Supply C.	Selector Switch non-shorting 3 pole 1 section	T-595
SW6	Power Supply C.	Bat Handle toggle switches 3A. 125 V. S.P.S.T.	T-592
SW7	Power Supply C.	Bat Handle toggle switches 3A. 125 V. S.P.S.T.	T-592
P1	VFO	Phono Plug	T-288-1
P3	VFO	Cable Plug (3)	T-667
P2	Buffer Xtal Osc.	Phone Plug (Jumper between Buffer & Multiplier)	T-288-1
P9	Buffer Xtal Osc.	Phone Plug (Jumper between Buffer & Multiplier)	T-288-1
P4	Buffer Xtal Osc.	Cable Plug (4)	T-666
P5	Multiplier F. A.	12 pin Jones Plug	T-633
P6	Modulator S.A.	12 pin Jones Plug	T-633
J1	Buffer Xtal Osc.	Phono Socket	T-288
J9	Buffer Xtal. Osc.	Phono Socket	T-288
J2	Multiplier F.A.	Input Jack	T-288
J3	Power Supply C.	3 terminal Jones Socket	T-674
J4	Power Supply C.	4 terminal Jones Socket	T-591
J5	Power Supply C.	12 terminal Jones Connector	T-590
J6	Power Supply C.	12 terminal Jones Connector	T-590
J8	Power Supply C.	Jack, Key	T-593
J7	Modulator S. A.	2 contact locknut receptacle Amphenol 80-PC2F	T-611
L1	VFO	Oscillator Coil Assy.	T-715
L2	VFO	Filament Choke - RFC	T-359
L3	VFO	Plate Choke	T-712
L4	Buffer Xtal Osc.	Grid Choke	T-712
L5	Buffer Xtal Osc.	Screen Choke	T-713
L6	Multiplier F.A.	80 M 37 MH Coil Assy.	5100-2
L7	Multiplier F.A.	40 M 9.5 MH Coil Assy.	5100-3
L8	Multiplier F.A.	20 M 2.5 MH Coil Assy.	5100-4
L9	Multiplier F.A.	15 M 2 MH Coil Assy.	5100-1
L10	Multiplier F.A.	10 M .68 MH Coil Assy.	5100-5
L11	Multiplier F.A.	R. F. Choke Screen	T-711

PARTS LIST - MODEL 5100 TRANSMITTER

Circuit Symbol	Sub. Assy. Location	Description	B & W Part #
L12	Multiplier F.A.	Parasitic Choke	T-714
L13	Multiplier F.A.	Parasitic Choke	T-714
L14	Multiplier F.A.	Parasitic Choke	T-714
L15	Multiplier F.A.	R. F. Choke Plate	T-710
L16	Multiplier F.A.	High Frequency Coil	T-722
L17	Multiplier F.A.	Low Frequency Coil Pi-Network	T-721
L18	Modulator S.A.	R. F. Choke Filament	T-359
L19	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L20	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L21	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L22	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L23	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L24	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L25	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L26	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L27	Power Supply C.	R. F. Choke 2.5 uhy	T-359
L28	Power Supply C.	R. F. Choke 2.5 uhy	T-359
V1	VFC	6BJ6 Vacuum Tube	T-645
V2	Buffer Xtal Osc.	6BJ6 Vacuum Tube	T-645
V3	Buffer Xtal Osc.	6BJ6 Vacuum Tube	T-645
V4	Multiplier F. A.	6AQ5 Tube	T-284
V5	Multiplier F. A.	6AQ5 Tube	T-284
V6	Multiplier F.A.	6AQ5 Tube	T-284
V7	Multiplier F.A.	6AQ5 Tube	T-284
V8	Multiplier F.A.	6146 Tube	T-553
V9	Multiplier F.A.	6146 Tube	T-553
V10	Modulator S.A.	6U8 Vacuum Tube	T-635
V11	Modulator S.A.	6AQ5 Vacuum Tube	T-284
V12	Modulator S.A.	6146 Vacuum Tube	T-553
V13	Modulator S.A.	6146 Vacuum Tube	T-553
V14	Power Supply C.	OD3/VR150	T-128
V15	Power Supply C.	OC3/VR105	T-196
V16	Power Supply C.	5R4G Vacuum Tube	T-605
V17	Power Supply C.	5R4G Vacuum Tube	T-605
V18	Power Supply C.	5V4 Vacuum Tube	T-606
T1	Modulator S.A.	Transformer, driver	T-548
T2	Modulator S.A.	Transformer Modulation	T-549
T3	Power Supply C.	Transformer High Voltage	T-545
T4	Power Supply C.	Transformer Filament & Low Voltage	T-544
X	Buffer Xtal Osc.	Crystal Socket	T-361
CH1	Power Supply C.	Choke, power supply 5 hy	T-546
CH2	Power Supply C.	Choke, power supply 8 hy	T-547
CH3	Power Supply C.	Choke, power supply 8 hy	T-547
TB1	Power Supply C.	Barrier Strip	T-638
TB2	Power Supply C.	Terminal Strip 10 Terminal Special	T-604
I-1	Power Supply C.	Neon Lamp miniature bayonet base	T-597
	Power Supply C.	Relay Control	T-589
	Power Supply C.	Meter 3" rectangular base	T-599
	Power Supply C.	Fuse Holder	T-602
		Fuse 5 Amp. 125 volt	T-603
	Power Supply C.	2 Line Filters	T-680
	Power Supply C.	TVI Filter	Model 426
	Front Panel—Dial Assy.	2 Pilot Lights	T-703

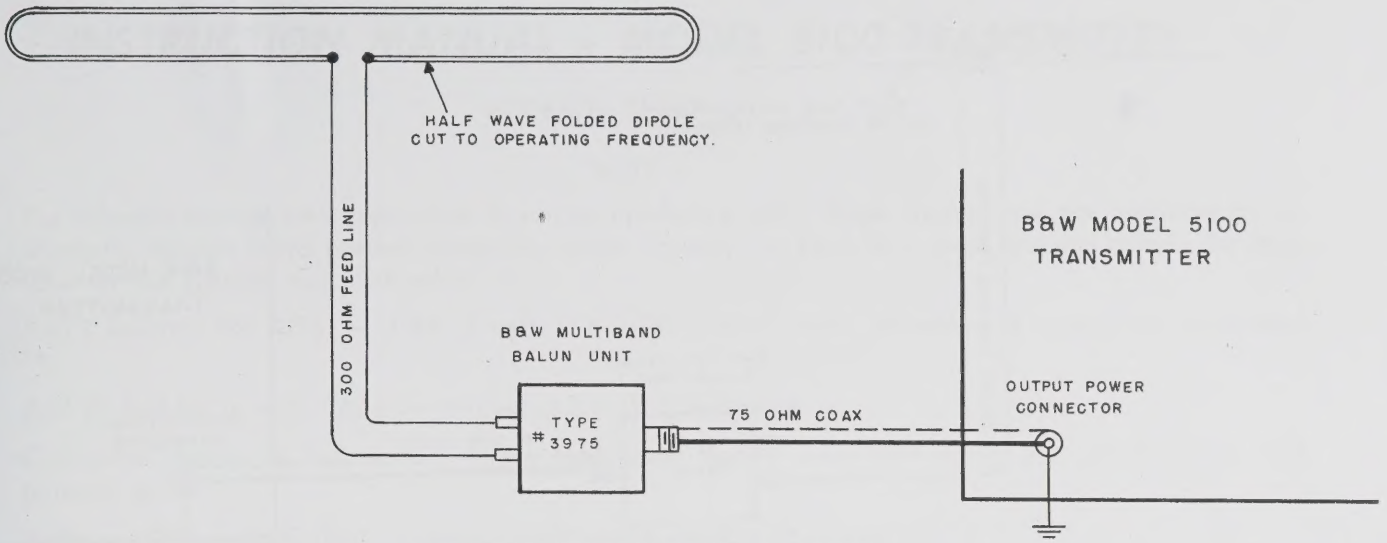


FIGURE 1A- SINGLE BAND ANTENNA

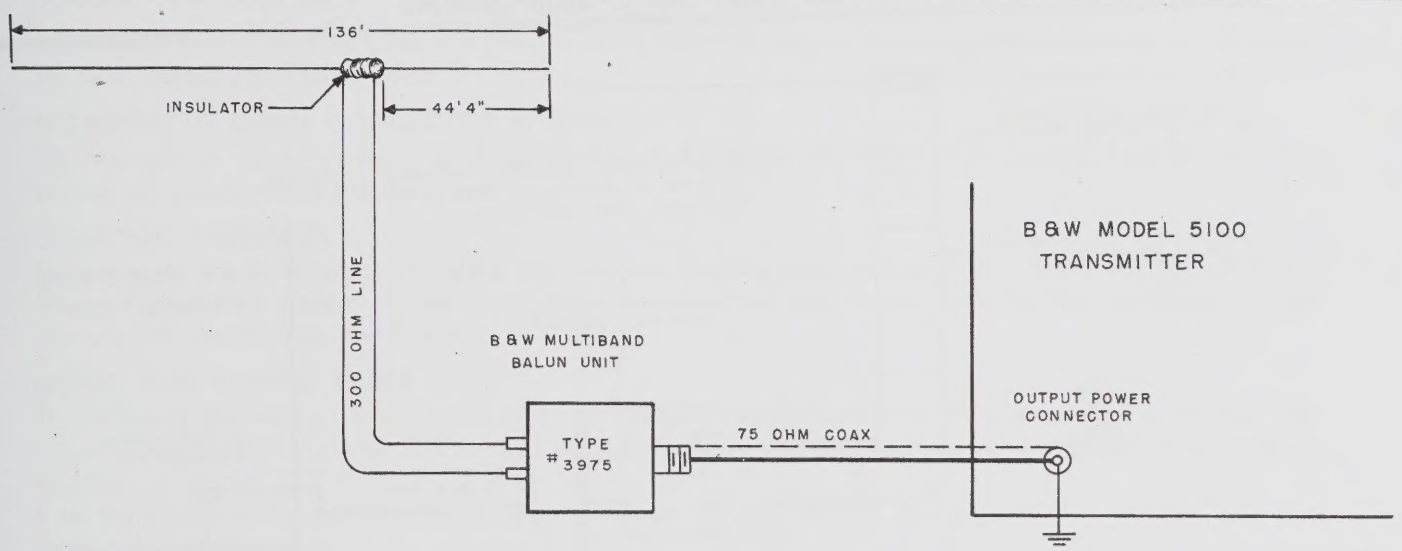


FIGURE 2A - MULTIBAND ANTENNA COVERS, 80, 40, 20 AND 10 METERS.

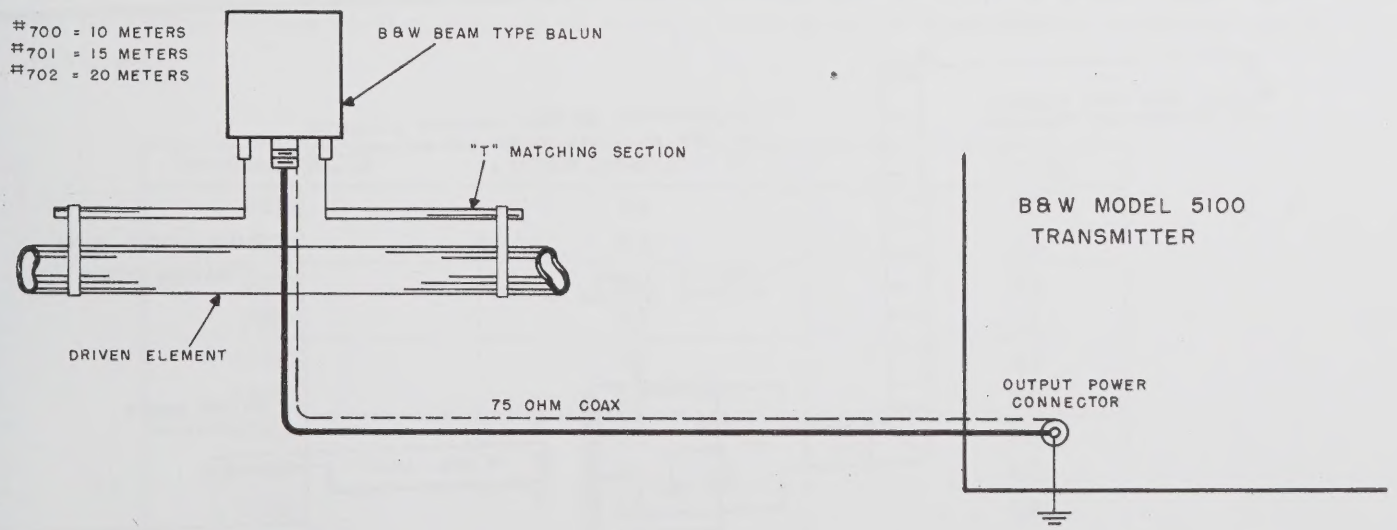


FIGURE 3A- BEAM ANTENNAS FOR EITHER 10, 15 OR 20 METERS.

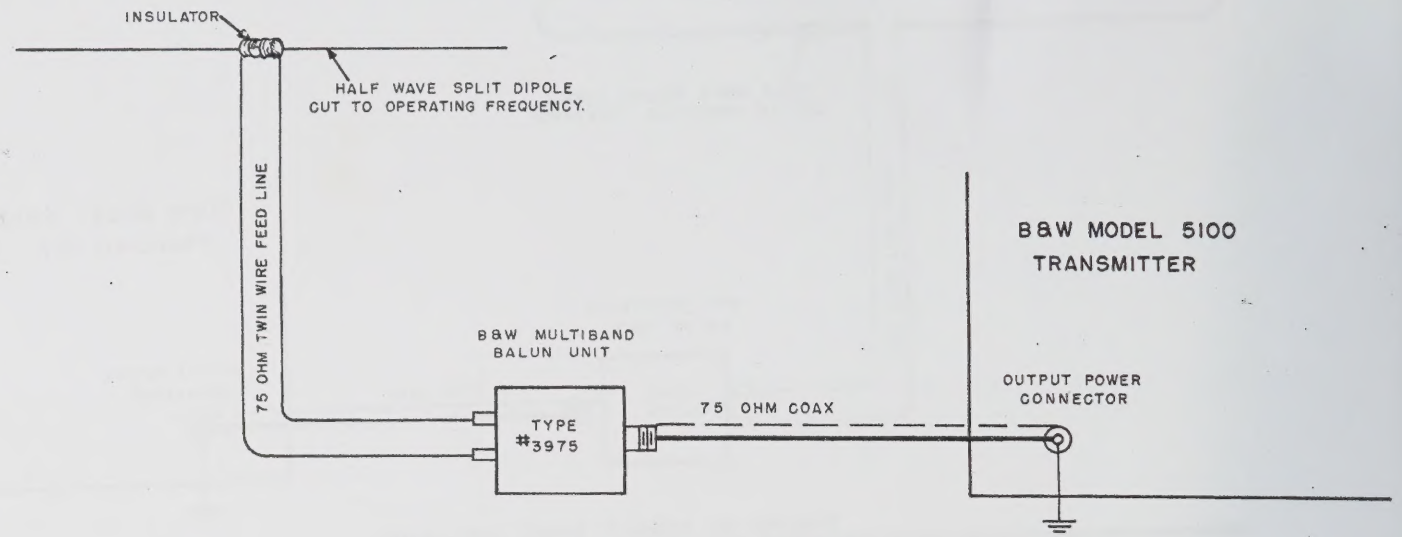


FIGURE 4A- SINGLE BAND ANTENNA

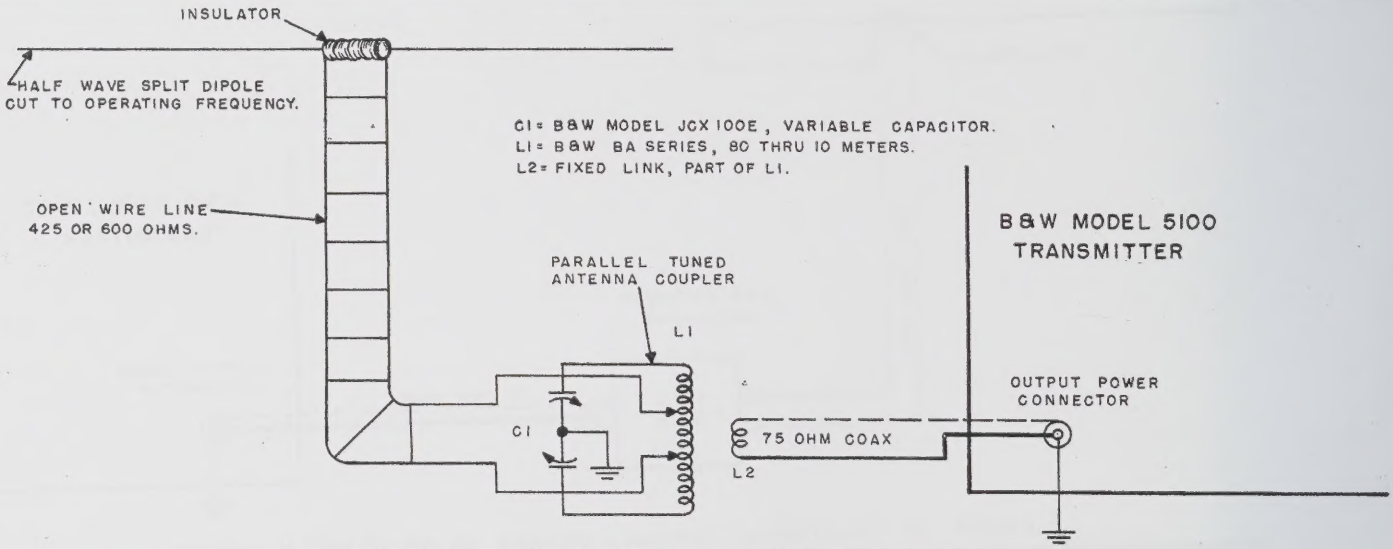


FIGURE 5A- CENTER FED, HALF WAVE SPLIT DIPOLE.

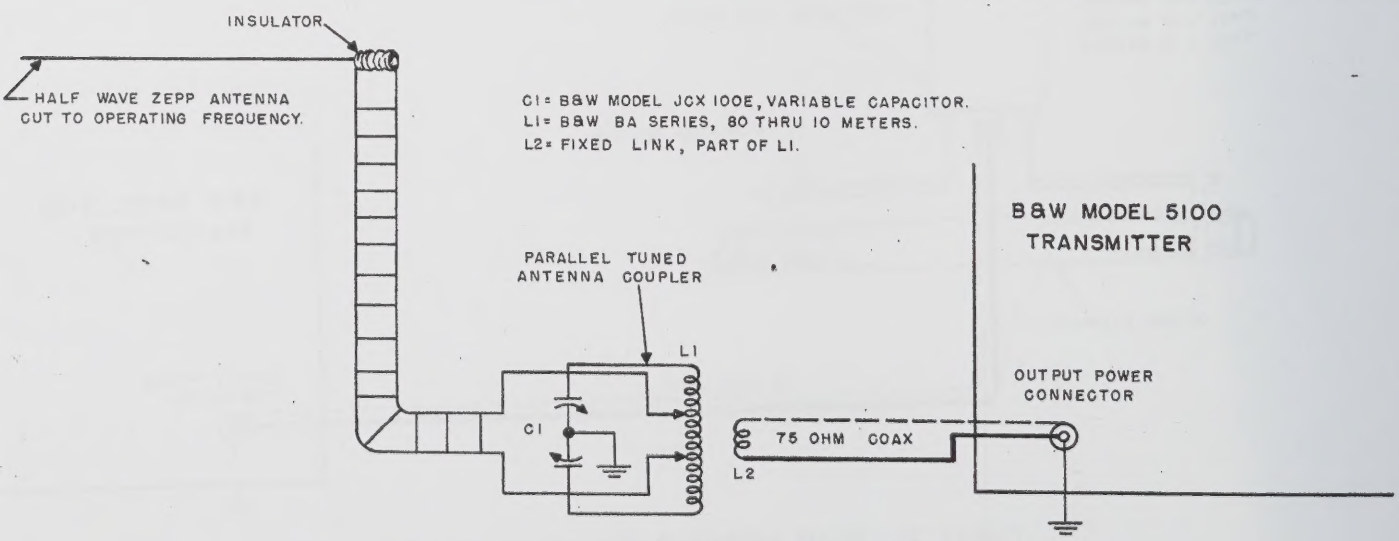


FIGURE 6A- END FED, HALF WAVE ZEPP.

INSTRUCTION MANUAL - MODEL 5100 TRANSMITTER

ADDENDA SHEET #1

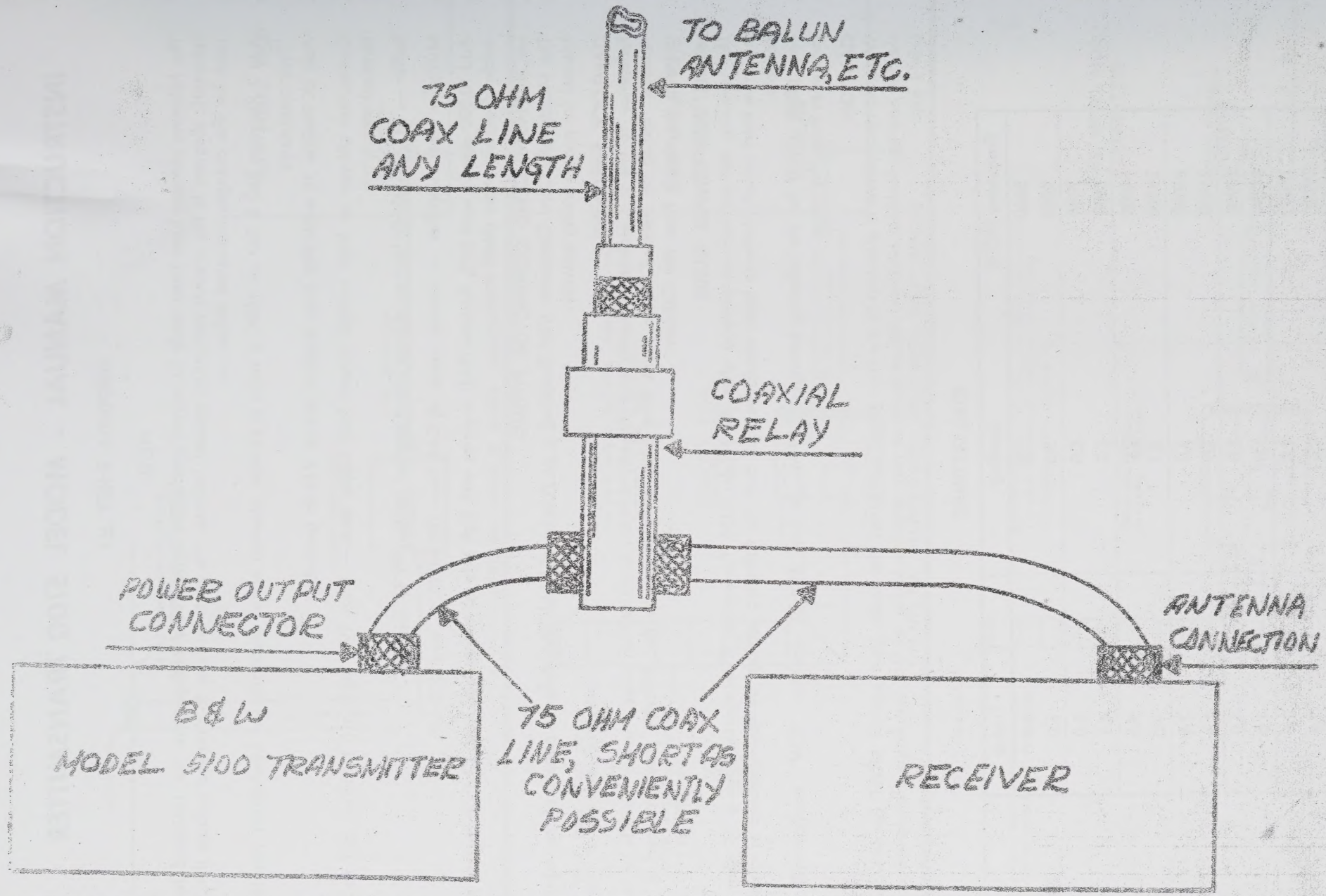
NOTE

The following changes have been made to current production units. These changes are not indicated by the schematic diagram in the present instruction manual, however, the parts list is up to date and includes the items used for the changes indicated below. —

1. Add 2 Resistors R60 & R61 — 100K, 2 watts in parallel, shunted across secondary of Modulation transformer T2.
2. Add 2K Resistor 10 watts R62 from terminal #3 on V15 to ground.
3. Connection change on high voltage screen feed suppy lead — from SW4 section (C) contact #3 to J#5 terminal #3.
4. Buffer — XTAL — OSC. Unit — change circuit symbol reading P2 to read J9.
5. Multiplier Final Amplifier — change value of C44 from .005 MMF. to read .005 MF.
6. Add 10,000 ohm 1/2 watt 20% Resistor (R63) in series with high side of microphone lead. Change to take place inside of chassis, under shield cover.
7. **MICROPHONE CORD CONNECTOR FITTING**
   The Microphone Cord Connector (Not Supplied) is an Amphenol 80-MC2M. Refer to page 6 of the instruction Manual for proper wiring polarity.
8. **CAMLOCK FASTENERS**
   Reference to the 2 Camlock Fasteners and cutaway drawing contained on page 6 under the title of "Maintenance" should be deleted. These items have been omitted due to the difficulty they produced in withdrawing the chassis from the Cabinet.
9. **MODEL 5100 TUNING GUIDE**
   The following dial settings are average when the Model 5100 Transmitter is terminated into a 75 ohm non-inductive load circuit. Antenna loads should be such that the following settings be approximated as closely as possible.
   Final plate current for the following settings is 220 ma. in the "FONE" position. "CW" position will vary somewhat from this value.
10. **CAUTION**
    When no microphone is attached to the front panel connector, the audio gain control **MUST** be retarded to the full counter-clockwise position. Failure to do so may produce arcing at the modulation transformer output safety gap.

DIAL SETTINGS

Frequency (KC's)	Loading	Tuning
3500	3.0	8.0
4000	5.0	6.0
7000	2.0	5.0
7300	2.5	4.5
14000	2.0	4.5
14350	2.1	4.0
21000	3.0	2.5
21450	3.1	2.5
26960	2.0	4.0
27230	2.0	4.0
28000	2.0	3.5
29700	2.5	2.5



TYPICAL HOOK-UP SHOWING RELATION OF RECEIVER-TRANSMITTER AND COAXIAL ANTENNA CHANGEOVER RELAY.