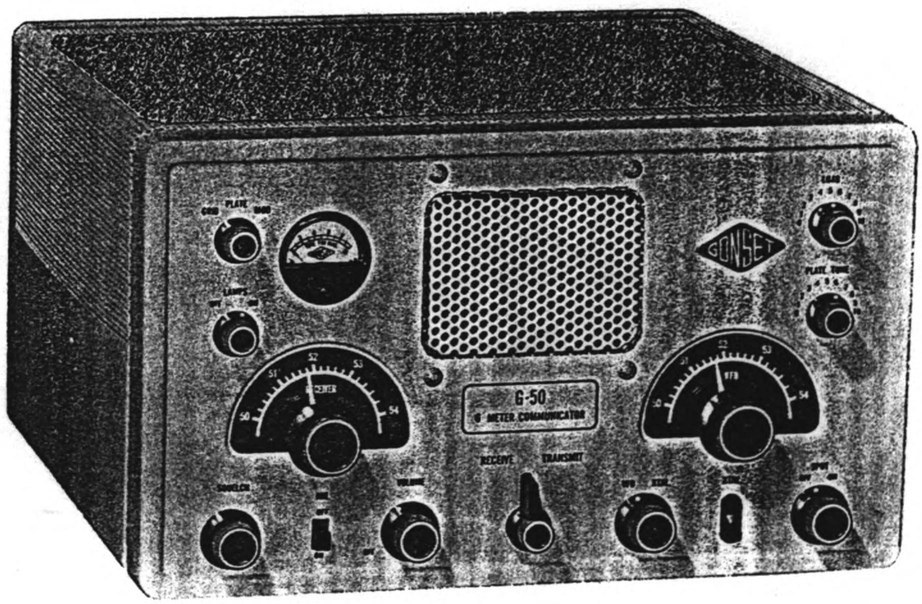
GONSET 6 METER fixed station COMMUNICATOR

G-50



GONSET

DIVISION OF YOUNG SPRING & WIRE CORPORATION
BURBANK, CALIFORNIA

GONSET 6 METER FIXED-STATION COMMUNICATOR
MODEL G-50

GENERAL

The GONSET fixed-station communicator is a complete, compact, AM amateur station for use in the 6 meter amateur band, from 50.000 to 54.00 mc. The transmitter frequency is controlled by a stable built-in VFO, or by a crystal inserted in the XTAL socket on the front panel. All transmitter multiplier tuned circuits are ganged to the VFO tuning and only the power amplifier tuning and loading control must be adjusted separately when the operating frequency is changed. The receiver uses an extremely sensitive double conversion superheterodyne circuit, with intermediate frequencies of 2300 kc and 455 kc. The receiver audio section includes an automatic noise limiter and squelch circuit to improve operating ease and convenience.

Two 6L6GB beam tetrode amplifiers provide high-level audio amplification for both the receive and transmit functions. The power supply is also common to both functions, providing high voltage output during transmitter operation, and operating at reduced voltage while receiving.

A low-pass filter, attached to the rear panel of the communicator, attenuates transmitter harmonics and spurious emissions above 65 mc. by 80 db or more, reducing the possibility of interference to television reception and other services caused by harmonic and spurious radiation. Maximum efficiency occurs only when the SWR on the line is reasonably low (2:1 or less). The filter may be removed from the transmission line, if desired, and the line attached directly to the output of the power amplifier Pi-network tank circuit. When properly matched, loss through the filter is less than .3 db.

A front-panel meter provides a measurement of carrier strength while receiving, and measures power amplifier cathode current, grid current, or modulation percentage while transmitting.

TRANSMITTER

Frequency Coverage:	50.0 - 54.0 mc.
Type of Modulation:	A-3 (AM)
PA Power input:	48 watts
PA Power output:	27 watts (nominal)
Modulation Capability:	90 - 95% (with integral speech clipping)
Output impedance:	50-70 ohms unbal.
Frequency Control:	Internal VFO or XTAL

RECEIVER

Frequency Coverage:	50.0 - 54.0 mc.
Signal-plus-noise to noise ratio:	6 db. with 2uv. input
Image Ratio:	Better than 200 X (46 db. down)
Overall Selectivity:	6 db. down at 7 kc.
Input impedance:	50 - 70 unbalanced.

PERTINENT DATA

INSTALLATION

Connect RG-8/U or similar 50 ohm or 70 ohm coaxial transmission line from a matched 6 meter antenna or coaxial connector on filter box attached to the rear of the cabinet. Use type 83-1SP or 83-850 transmission line connector.

Insert power cord into any 115V AC 60 cycle outlet. Connect high-impedance dynamic, crystal, or ceramic microphone to microphone connector on rear of cabinet. Use type 75 MC1F microphone connector or equivalent.

OPERATION

INITIAL:
Set RECEIVE-TRANSMIT switch to RECEIVE. Set DIAL LAMPS switch to on. Turn receiver VOLUME control clockwise.

RECEIVER:
Allow two minutes warm-up. Turn SQUELCH control fully clockwise. Turn receiver VOLUME control clockwise until signal or noise is heard. Rotate RECEIVER tuning dial to tune signals. If pulse-type noise is present and objectionable, turn ANL switch to ON.

While receiving, front panel meter reads relative strength of received signals. Operation of the SQUELCH control for net operation and similar functions requiring long standby periods is discussed under SQUELCH operation paragraphs in the manual.

TRANSMITTER -- VFO CONTROL:
Switch XTAL-VFO switch to VFO. Rotate TRANSMITTER tuning dial to desired output frequency. To spot transmitter frequency on receiver dial, switch SPOT switch to ON. Rotate TRANSMITTER tuning dial or RECEIVER tuning dial for pronounced "kick" on front panel meter, indicating presence of VFO 6 meter harmonic on receiver frequency. Turn SPOT switch to OFF to remove SPOT signal for normal reception. Turn GRID-PLATE-MOD METER switch to PLATE. Rotate LOAD control fully counter-clockwise to 0. Turn RECEIVE-TRANSMIT switch to TRANSMIT. Meter will indicate relative final amplifier cathode current. Quickly rotate PLATE TUNE control for pronounced dip (minimum) in meter reading. Reading should dip below 3. Rotate LOAD control slowly clockwise until meter reading increases to between 5 and 6. Again rotate PLATE TUNE control for pronounced dip in meter reading. When in dip, meter will read somewhat higher than formerly. Continue rotating LOAD control clockwise, while rotating PLATE TUNE control for minimum reading, until meter reads approximately 5.5 while in the dip (at resonance).

CAUTION

If you are unable to adjust the PLATE TUNE and LOAD controls for proper current (5.5) at resonance, the SWR on the transmission line is probably too high for correct matching to the output network of the transmitter. Refer to the ANTENNA paragraphs in manual.

When transmitter is properly loaded, set GRID-PLATE-MOD switch to MOD position. The transmitter modulation control is the black, knurled shaft on the rear panel of the equipment. Speak into the microphone in a normal voice, adjusting the modulation control until the meter peaks at approximately half-scale (5). If the control is adjusted properly, the meter will rise to at least 9 while whistling. To operate, after transmitter is fully tuned, use the RECEIVE-TRANSMIT switch as required. Each time the operating frequency is changed, re-adjust the PLATE TUNE and LOAD controls as detailed above.

TRANSMITTER -- CRYSTAL CONTROL

Crystals used must have a fundamental frequency of 1/6 the desired output frequency. For AM operation, the crystal frequency must fall between 8.333 mc. and 9.000 mc. to multiply into the 50.000 mc. to 54.000 mc. range. For crystal controlled transmitter operation, insert the crystal into the XTAL socket. Switch the XTAL-VFO switch to XTAL position. Rotate the TRANSMITTER tuning control to the approximate multiple of the frequency in the 6 meter band. To spot the output frequency on the receiver dial, turn SPOT switch to ON. Rotate the RECEIVER tuning dial for pronounced "kick" on front panel meter, indicating presence of crystal 6 meter harmonic on receiver frequency. Turn SPOT switch to OFF to remove spot signal for normal reception.

Switch RECEIVE-TRANSMIT switch to TRANSMIT and adjust PLATE TUNE and LOAD controls in same manner as in TRANSMITTER VFO CONTROL above. When loading is correct with RECEIVE-TRANSMIT switch still in TRANSMIT position, turn GRID-PLATE-MOD METER switch to GRID position and rotate TRANSMITTER tuning dial for maximum meter reading. This resonates the tracked tuned circuits following the oscillator stage. To operate, after transmitter is full tuned, use RECEIVE-TRANSMIT switch as required. Each time a new crystal of different frequency is installed, repeat tune-up procedure before commencing normal operation.

CAUTION

Do not place any object on top or along the sides of the Communicator cabinet that will block air flow through the perforated venting. The unit could become overheated if this venting is obstructed, causing damage to components. The transmitter should not be operated for more than 5 minutes in any ten minute period. Extended transmitter "ON" time may cause damage to components.

TUBE COMPLEMENT

TYPE	SYMBOL	FUNCTION
6AU6	V1	Transmitter variable-frequency oscillator-tripler
6AQ5	V2	Transmitter frequency doubler
6146	V3	Transmitter Power Amplifier
12AX7	V4	Transmitter Microphone Amplifier (one triode section) Transmitter and receiver audio amplifier (one triode section)
(2) 6L6GB	V5, V6	Transmitter Modulators Receiver Audio Power Amplifiers
6BZ6	V7	Receiver RF Amplifier
6U8	V8	Receiver 1st mixer (pentode section) Receiver high-frequency oscillator (triode section)

(More)

TUBE COMPLEMENT - Continued

TYPE	SYMBOL	FUNCTION
6BE6	V9	Receiver second converter
6BH6	V10	Receiver 455 kc I.F. amplifier
6AV6	V11	Receiver Second detector (one diode section) Receiver AVC Protector (one diode section) Receiver 1st audio amplifier (triode section)
6AL5	V12	Automatic noise limiter (one diode section) Squelch limiter (one diode section)

CONTROLS AND FUNCTIONS

The following table details the controls and their functions as an aid to a thorough understanding of the transceiver operation. "Reduced" B+ is power supply output during receive conditions, "Normal" B+ is power supply output during transmit condition.

CONTROL	FUNCTION
TRANSMITTER tuning control	Rotates the VFO tuning capacitor and VFO plate circuit tuning capacitor, and the multiplier grid circuit tuning capacitor. The three tuned circuits are properly tracked for single-shaft tuning. The multiplier plate and power amplifier grid circuits are broad-band, requiring no tuning when the operating frequency is changed.
RECEIVER tuning control	Rotates the antenna coil tuning capacitor, the RF amplifier plate circuit tuning capacitor, and the high-frequency oscillator tuning capacitor. The three tuned circuits are properly tracked for single-shaft tuning. All other receiver tuned circuits are fixed-tuned.
GRID-PLATE-MOD switch	Selects circuit to be monitored by the front panel meter during TRANSMIT function, as follows: GRID position Meter reads relative grid current of power amplifier (6146) by measuring voltage drop across metering resistor (R-11) in 6146 grid return. PLATE position: Meter reads relative current through power amplifier (6146) by measuring voltage drop across metering resistor (R-14) in 6146 cathode return. MOD position: Meter reads relative modulation percentage by measuring rectified audio voltage built up by 6L6 audio power amplifiers across low-impedance winding on audio transformer T3 during transmission. Normal voice modulation of the proper level will cause the meter to peak at approximately mid-scale (5), while sinusiodal modulation (whistling, etc.), of the proper level results in a meter reading of 9 or more. Either type of audio represents a modulation percentage of more than 90%.

LAMPS ON-OFF switch	Switch turns dial lamps on and off.
PLATE TUNE control	Rotates input capacitor of power amplifier Pi-network plate tank circuit. Controls resonant frequency of circuit.
LOAD control	Rotates output capacitor of power amplifier Pi-network plate tank circuit. Controls match of network to antenna transmission line input impedance.
RECEIVE-TRANSMIT switch	Switches function of transmitter from receive conditions to transmit condition. Switch is 12 pole 2-position. Functions switched as follows:

SWITCH SECTION	RECEIVE	TRANSMIT
A & B		
Voltage control, reduced (receive) B+, or normal (Transmit) B+	Dropping resistor included in B+ lead, power supply delivers reduced B+.	Dropping resistor shorted in B+ lead, power supply delivers normal B+.
C		
V7, V8A, and V10 plate and screen	B+ applied to V7, V8A, and V10 plate and screen.	B+ removed from V7, V8A, and V10 plate and screen.
D		
B+ control on V8B (rcvr. Hi-Freq. Osc.)	Reduced B+ applied directly to V8A plate circuit (R46 shorted).	Normal (transmit) B+ applied to V8A plate through dropping resistor R46.
E		
Low-level stage B+ distribution	Reduced B+ applied to Receiver stages V9, V11, and V12.	Normal (transmit) B+ applied to transmitter stages V2 and V4A.
F		
Transmitter VFO B+ line.	VFO B+ applied to SPOT switch	VFO B+ applied directly to VFO
G		
Audio input to V4B	Receiver audio output (V11) applied to input of V4B.	Microphone Audio output (V4A) applied to input of V4B.

H		
6146 Cathode	Cathode lead broken, de-activating tube.	Cathode lead connected, activating tube.
I & J		
Meter leads	Meter leads connected to "S" meter circuit.	Meter leads connected to PLATE-GRID-MOD switch for transmitter metering.
K		
Low-impedance audio output	Audio output to speaker circuit completed.	"Hot" speaker lead grounded. Modulation monitor circuit connected.
L		
Antenna	Antenna connected to receiver input.	Antenna connected to transmitter output.

CONTROL	FUNCTION
SPOT OFF-ON switch	Switches on transmitter oscillator stage during receive function to permit spotting of transmitter frequency on receiver dial. Switch is single-pole double throw, with functions as follows: SPOT position: Reduce B+ from power supply applied to VFO tube (V1). OFF position: Normal (transmit) B+ from power supply applied to VFO tube (V1) plate and screen through 8.2 K resistor R5 when RECEIVE-TRANSMIT switch in TRANSMIT position. B+ removed from V1 when RECEIVE-TRANSMIT switch in RECEIVE position. NOTE The value of R5 is selected to provide identical plate and screen voltages on V1 during receive and transmit condition, as power supply voltage varies from reduced to normal level.
VFO-XTAL switch	Double pole throw switch. Selects type of frequency control used with transmitter, as follows: VFO position: Cathode of oscillator tube V1 connected to feed-back tap on VFO tuned circuit. Grid of oscillator tube V1 connected to high-impedance end of VFO tuned circuit. XTAL position: Cathode of oscillator tube connected to cathode divider capacitor for crystal feed-back. Grid of oscillator tube connected to high-impedance side of crystal through isolating capacitor.
SQUELCH control	Potentiometer. Adjusts squelch action by varying conduction threshold of squelch diode V12B.
ANL OF-ON switch	Single-pole double-throw switch, positions as follows: ON position: ANL diode (V12A) inserted in series with second detector audio output. Noise peaks bias the diode, halting conduction. OFF position: Diode shorted out, audio path uninterrupted.

VOLUME-OFF control and switch	Single-pole single-throw switch removes 115 VAC input when control is in extreme counter-clockwise position. Switch on in other settings. Potentiometer controls receiver audio level.

ANTENNA

The communicator transmitter output network and low-pass filter are designed to deliver power to a load impedance of 50-70 ohms, with reasonably low reactance. Coaxial transmission line with a characteristic impedance of 50 or 70 ohms should be used, terminated with an antenna or antenna matching network that matches this impedance reasonably well. RG-58/U or RG-59/U line is satisfactory for short runs of 40 or 50 feet, but RG-8/U or RG-11/U should be used when the run is longer to prevent excessive power loss on the line.

The efficiency of the communicator installation will be substantially improved if a directional rotary beam antenna for the 6 meter amateur band is used. The GONSET 10 element 6 meter beam, Model 3282 is available for this purpose at moderate cost.

If the communicator does not load properly, i.e., the LOAD control cannot be adjusted for approximately 5.5 on the meter at resonance, the SWR on the transmission line is probably too high for satisfactory operation. This can result from a shorted or open coaxial connector, transmission line of the wrong characteristic impedance, or an improperly tuned antenna. The line SWR can be checked with any one of a number of instruments designed for this purpose, available commercially, or home-built from directions in the RADIO AMATEURS HANDBOOK (ARRL) or similar publications. If the SWR is greater than 3:1, the transmitter usually cannot be loaded properly. In addition, a high line SWR decreases the efficiency of the low-pass filter installed on the rear panel of the transmitter. Under severe mismatched conditions, it is possible to damage components in the transmitter output network and low-pass filter. Do not operate the transmitter for more than a few seconds unless the power amplifier plate current, at resonance, is less than 6 or more than 4 on the meter. Methods of adjusting antennas for best match to the transmission line are given in detail in the ANTENNA HANDBOOK (ARRL) and similar publications.

CAUTION

Do not under any conditions operate the transmitter without a load connected to the antenna terminal.

SQUELCH OPERATION

The 6 meter Communicator employs a highly effective carrier-actuated squelch circuit which may be used or not as desired. In the absence of a signal, the exceptionally flat AVC characteristic of the 6 meter Communicator receiver normally will cause a high background noise which becomes objectionable if prolonged, as when maintaining a standby watch on local net frequencies. The squelch facility permits muting of this background noise.

The squelch circuit employs a biased series-gate diode which is indirectly actuated by the AVC voltage. The combination is very effective, gating cleanly on an AVC voltage change as small as .01 volt when the threshold control is set carefully. The circuit is designed so that compensating factors tend to hold the threshold setting substantially constant over a moderate change in supply voltage to the communicator.

To disable the squelch, just turn the squelch control slightly past the point where the gate "opens" on background noise with no station tuned in. It is not necessary to turn it full clockwise.

To use the squelch, back off the threshold control counter-clockwise just to the point where the background noise disappears, and stop there. This makes the squelch the most sensitive (so that it will open on weak signals). Unfortunately, this also makes the squelch sensitive to electrical noise that is sufficiently strong to cause the AVC voltage to change. This means that, if such noise (such as very strong ignition noise or interference from a nearby commutator motor) is intermittent in nature, the threshold control must be backed off enough to prevent the intermittent noise from triggering the squelch. It will then take a stronger carrier to open the squelch. In extremely noisy locations it may be necessary to turn the threshold control full counter-clockwise to prevent triggering of the squelch by noise. Such operation will be possible only if the desired signals are quite strong.

Certain limitations to the operation of the squelch should be kept in mind. For instance, the normal change in quiescent AVC voltage that occurs as the receiver is tuned over the band will cause the threshold setting to change slightly as one tunes over the band. For this reason, it is recommended that the squelch be used only after a station is tuned in.

RECEIVER AUDIO SYSTEM

The second detector, noise clipper, and audio system of the COMMUNICATOR receiver have been designed for maximum intelligibility of weak signals. Because the individual characteristics all have been engineered to complement each other as an overall system, often it will be found that it is possible to copy weak signals which are not intelligible on a receiver having a comparable sensitivity. This is true even in a quiet location where a noise clipper ordinarily would not be needed for suppression of impulse type noise.

It is recommended that the noise clipper be left on all the time, the clipper in-out switch being provided primarily to assist in aligning the RF and IF coils on background noise when a signal generator is not available.

TRANSMITTER AUDIO SYSTEM

It will be noted that Class A single-ended beam tetrodes are used in preference to a Class B modulator. The reason for this is that when "square wave" audio is involved, as when heavy speech clipping is employed at high modulation percentages, the former type modulator compares very favorably with the latter, with the advantages of more constant plate current drain and elimination of a driver stage and its transformer. It also facilitates designing the modulator for integral speech clipping, making the incorporation of a separate speech clipper unnecessary (as well as adjustment thereof).

The speech system of the COMMUNICATOR is designed so that to obtain maximum practical speech clipping one need only talk closer to or louder into the microphone, up to the point where the maximum tolerable distortion is obtained.

With voice waveforms and sufficient audio input to produce heavy speech clipping, the percentage modulation is held to approximately 90 per cent, and under no condition is it possible to exceed this modulation percentage. This means that "splatter" from negative peak clipping is avoided, and no cricital adjustments are involved.

The audio characteristics of the transmitter, from microphone input through the modulator, having been engineered to provide maximum utilization of the carrier power from the standpoint of intelligibility under favorably receiving conditions.

CIRCUIT DESCRIPTION

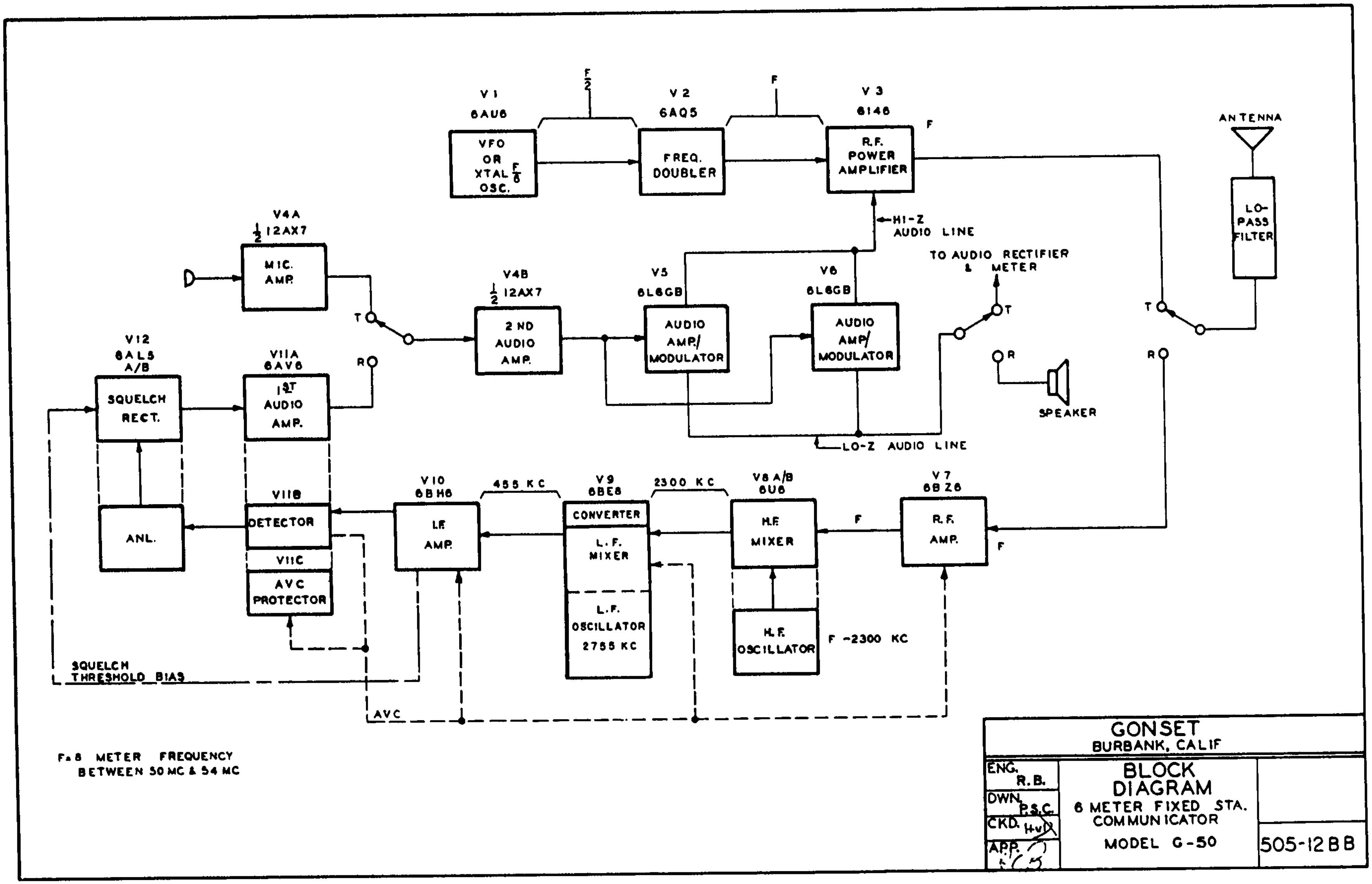
BLOCK DIAGRAM

The arrangement of stages and the major transmit-receive switching is shown functionally in the accompanying block diagram. The switches are shown in TRANSMIT (T) position. The operating frequency in the 6 meter band (between 50.00 and 54.00 mc.) is designated "F" on the diagram.

When transmitting, the VFO or crystal oscillator, V1, generates a carrier at F/6 or one-sixth of the output frequency. The third harmonic of this frequency, F-2, is selected by the plate circuit of V1 and forms the excitation for the frequency doubler stage, V2.

The output of V2, at the final operating frequency F, drives power amplifier stage V3. This final stage operates "straight through" on 6 meters. The RF output from the power amplifier stage is fed to the antenna through the low-pass filter.

Microphone amplifier stage V4A drives the second audio amplifier stage V4B. The output of V4B drives parallel modulator stage V5-V6. The high-impedance audio output line from this stage modulates the RF amplifier stage V3. The low impedance audio output from this stage is rectified and the resulting DC


V1
6AU6
VFO OR XTAL OSC. F/8
F/2
V2
6AQ5
FREQ. DOUBLER
F
V3
6146
R.F. POWER AMPLIFIER
F
ANTENNA
LO-PASS FILTER
HI-Z AUDIO LINE
V4A
1/2 12AX7
MIC. AMP.
T
R
V4B
1/2 12AX7
2 ND AUDIO AMP.
V5
6L6GB
AUDIO AMP./ MODULATOR
V6
6L6GB
AUDIO AMP/ MODULATOR
TO AUDIO RECTIFIER & METER
T
R
SPEAKER
T
R
LO-Z AUDIO LINE
V12
6AL5 A/B
SQUELCH RECT.
V11A
6AV6
1ST AUDIO AMP.
ANL.
V11B
DETECTOR
V11C
AVC PROTECTOR
V10
6BH6
I.F. AMP.
455 KC
V9
6BE6
CONVERTER
L.F. MIXER
L.F. OSCILLATOR 2755 KC
2300 KC
V8 A/B
6U8
H.F. MIXER
H.F. OSCILLATOR
F -2300 KC
F
V7
6BZ6
R.F. AMP.
F
SQUELCH THRESHOLD BIAS
AVC
F=8 METER FREQUENCY BETWEEN 50 MC & 54 MC
GONSET
BURBANK, CALIF
ENG. R.B.
DWN. P.S.C.
CKD.
APP.
BLOCK DIAGRAM
6 METER FIXED STA. COMMUNICATOR
MODEL G-50
505-12BB

actuates the front panel meter as indication of modulation percentage, when the meter switch is in MOD position.

When receiving, signal input (F) from the antenna is applied to RF amplifier stage V7 through the low-pass filter. The amplified output of V7 forms one injection to the high frequency mixer V8A. The second injection to this mixer is the output of the high-frequency oscillator, V8B. The tuned circuits in the RF amplifier stage are tracked with the oscillator tuning, such that the oscillator frequency is always removed from the RF amplifier-tuned circuit frequency by 2300 kc. This difference frequency is the IF, fixed-tuned in the plate circuit of the HF mixer V8A. This IF is converted by V9. The 455 kc IF, in the plate circuit of V9, is amplified by V10, and forms the signal input for detection by V11B, one diode section of V11. The other diode section, V11C, protects the AVC line from positive voltage that could appear as a result of tube or component failure. The AVC voltage, derived from V11B, is applied to the grids of V7, V9, and V10.

The audio output recovered by V11B is filtered for residual RF and fed through to the 1st audio amplifier V11A through series diode sections of V12. The first diode section, V12B, limits noise-pulsed audio, while the second section, V12A, uses a variable conduction level to control the squelch threshold. The bias level for squelch action is derived from plate and screen voltage variation in V10. These variations are in turn controlled by the magnitude of the AVC bias on the grid of V10, rendering the squelch action proportional to the received carrier level.

The amplified audio output of V11A is applied to second audio amplifier V4B, and V4B output drives the parallel audio amplifiers V5 and V6. The low impedance output of V5-V6 drives the receiver internal speaker and the jack on rear of chassis, for external speaker or phones.

CIRCUIT DETAILS

Most of the circuitry used in the COMMUNICATOR is conventional, requiring no special explanation. The transmit-receive switching is detailed in the CONTROLS AND FUNCTIONS table, and reference to this table, together with the schematic diagram, will clarify this circuitry. Operation of two of the receiver circuits, the automatic-noise-limiter and the squelch, may not be immediately evident. These circuits are described in the following paragraphs. Refer to the schematic diagram for component references.

Automatic Noise Limiter V12A.
Detected audio appears at pin B of IF output transformer T8, adjacent to V11. When the ANL switch S6 is OFF (closed), the ANL diode V12A is shorted out. The detector audio output appears uninterrupted at pin 1 of V11, to be coupled off through C72. The audio path is through R64. The voltage divider composed of R61 and R63 to ground reduces the audio voltage level by a ratio of two-to-one. C70 removes residual RF present on the detected audio. Resistors R62, R64, and capacitor C71 are not

effective in the circuit when the ANL switch is OFF.

A negative potential of approximately -1 volt or more is always present between pin B of T8 and ground, as a result of space charge in the diode detector, residual noise and detected carrier level (AVC). When the ANL switch S6 is on (ANL position), diode V12A is in series with the audio path. The resistive divider R61-R63 places a negative potential on the plate of V12A of 1/2 the static detector output. The entire static output appears on the cathode of V12A through resistors R62 and R64. The plate of the diode is therefore positive with respect to the cathode, the diode conducts, and audio couples through via the electron stream.

When a noise pulse appears at the detector output, the negative potential between pin B of T8 and ground instantaneously changes to more than the static level. One-half of the pulse level appears immediately at the plate of V12A (pin 7). This time constant of the network of R62-C71-R64 prevents the pulse voltage change from appearing on the cathode of V12A, and this level does not change during the short duration of the pulse. The plate of V12A is thus negative with respect to the cathode while the pulse lasts, the diode is biased, or "cut off", and the audio path is interrupted. Pulse duration is so short that the "cut off" time is not noticeable in the audio output, and the only detectable change is the reduction of the noise output in the audio.

The audio introduces some distortion in the normal audio output, since the diode conduction curve is not linear over the range of operating levels encountered.

<u>Squelch</u> <u>Rectifier</u> <u>V12B</u>.
Audio output from the noise limiter stage is coupled to the cathode of squelch rectifier V12B (pin 5) through capacitor C72. Assuming that V12B is conducting, this audio output is coupled through the electron stream in the tube, through capacitor C69, and appears at the grid of V11A for amplification. When V12B is not conducting, the audio path is interrupted, and no audio appears at the grid of V11A, i.e., the audio is silenced.

The conduction of V12B is controlled by regulating the potential between the plate and the cathode. A fixed positive potential approximately +100 volts is always present on the cathode (pin 5). This voltage is divided down from the receiver B+ line through resistors R65 and R66. The voltage on the plate (pin 2) is derived from squelch potentiometer setting (R54), connected from the plate and screen supply point for IF amplifier tube V10 to ground between R53 and R55. This supply point is terminal D of transformer T8, supplied from the receiver B+ line through dropping resistors R56 and R57. In the absence of received carrier, the squelch control is adjusted until the positive potential between the arm and ground, appearing on the plate of V12B, is just slightly less than the fixed potential on the cathode of the tube. This renders the plate negative with respect to the cathode, the diode is biased or "cut off", and the audio path is interrupted.

When a received carrier is present at the detector, AVC voltage is produced and applied to the control grid of the IF amplifier tube, V10. The plate and screen current of the tube decreases as a result of the AVC bias. This results in an increased potential at the plate and screen supply point, terminal D of transformer T8, as the current through dropping resistors R56 and R60 decreases. The voltage between the arm of squelch control R54 and ground therefore increases, and consequently, the potential on the plate of V12B increases, rendering the plate now positive with respect to the cathode. The diode conducts, and the audio couples through to the audio amplifier stages.

TROUBLE SHOOTING AND ALIGNMENT

The information in this section is to be used whenever the transceiver becomes defective, and must be repaired before it can be used on the air. The procedures outlined, in the order given, represent a systematic approach to servicing, and a great deal of time and effort can be saved if the unit is serviced as indicated. Do not attempt to do detailed servicing without using the equipment listed, or equivalent equipment.

EQUIPMENT REQUIRED

To perform the procedures given in this section the following equipment is required:

Vacuum tube voltmeter with 1 volt or 3 volt scale, reversible polarity.

Tube tester or set of replacement tubes.

Signal generator for receiver RF and IF alignment touch-up, calibrated on the 6 meter band (50-54 mc.) and at the receiver IF frequencies, 2300 kc and 455 kc. Accuracy required at 54 mc.: ±25 kc.

Calibrated grid-dip meter with DIODE (absorption) position.

Transmitting crystal (quartz), 8750 kc. approximate frequency.

50 ohm and 27 ohm resistor (1/2 watt) and .01 mfd. capacitor.

Dummy load, non-reactive at 54 mc., 50 or 70 ohms, 25 watts.

Alignment tool, GC type 8606 or equivalent.

680 ohm 1/2 watt resistor.

TROUBLE SHOOTING PROCEDURE

Whenever your GONSET 6 METER COMMUNICATOR is not operating properly, there are several external checks that should be made before the unit is removed from the cabinet, as listed below. Check-out of these items will often reveal the trouble externally.

If the receiver and transmitter both are operating improperly, check out the antenna, feed line, and any connectors in the feed system to make sure they are not faulty. Try loading the transmitter into the dummy load (a 100 watt light bulb can be used; it should glow a dull red with full transmitter output) to check for normal operation. Connect the antenna directly to the RF output terminal, by-passing the low-pass filter, to check for operation in this condition, and to determine if parts in the filter are faulty.

Check transmitter power amplifier grid current. If low or zero, check to make sure XTAL-VFO switch is in VFO position, or if in XTAL position, that there is a crystal of proper frequency in the XTAL socket and that the dial is tuned to the crystal multiplied frequency.

If transmitter audio is not present

(meter shows no reading when switch is in MOD position while talking), check mike cord and plug, remove the microphone plug. With MIC GAIN full on, touch center connection of mike jack with finger. If meter then reads, audio system is operating, and microphone or cord may be faulty.

If the above checks indicate the unit is internally faulty, remove the unit from the cabinet as detailed below, and proceed as indicated in the following paragraphs.

BEFORE STARTING DETAILED TROUBLE SHOOTING PROCEDURE, CHECK ALL TUBES AND TUBE FILAMENTS IN A TUBE TESTER, OR BY SUBSTITUTION WITH KNOWN GOOD TUBES. DO NOT RELY COMPLETELY ON TUBE TESTER RESULTS, BUT REPLACE SUSPICIOUS TUBES WITH KNOWN GOOD TUBES AND RECHECK PERFORMANCE. OVER 90% OF EQUIPMENT FAILURES ARE THE RESULT OF FAULTY TUBES.

REMOVAL AND REPLACEMENT OF THE TRANSCEIVER CHASSIS AND PANEL ASSEMBLY

To remove the transceiver chassis from the cabinet, perform the following steps:

1. Remove the two #10 screws from the rear of the cabinet. These screws are located on either side of the back panel near the base.

2. Remove connectors from the rear panel (mike and antenna). Remove the low-pass filter plug from the antenna jack. Remove the power-line plug from the AC outlet.

3. Grasp the main body of the cabinet firmly with one arm. Push on antenna jack and/or the microphone connector with the thumb until the cabinet works free of the main panel-and-chassis assembly. A great deal of pressure on the connectors is required to free the cabinet, as a pressure-contact surface exists around the mating lips of the cabinet and panel.

   CAUTION

   Be extremely careful not to damage the MIC GAIN control shaft (black knurled shaft) as the cabinet is withdrawn.

4. When the cabinet and panel are initially separated, withdraw the cabinet carefully, feeding the AC line cord through the clearance hole as the cabinet is removed.

5. To replace cabinet, reverse steps 1 through 4 above.

   NOTE

   If transmitter VFO tube V1 is replaced, use tube from same manufacturer as in equipment when shipped from the factory. Tubes from some manufacturers cause the VFO output signal to be frequency-modulated or amplitude-modulated during transmitter operation.

DETAILED TROUBLE SHOOTING

If the tubes check out in good condition, the trouble can be assumed to be a faulty component in the transceiver circuitry. Before attempting detailed trouble shooting, become thoroughly familiar with the operation of all circuits in the equipment by reference to the CONTROLS AND FUNCTIONS chart, the CIRCUIT DESCRIPTION information, and the schematic diagram. When circuitry is fully understood, the location of faulty components consists of systematic and intelligent use of the voltage references on the schematic diagram, and in case of faulty tuned circuits, the alignment data.

Do not attempt to align the equipment unless it is evident that alignment is incorrect, or you have replaced a tuned circuit, part of a tuned circuit, or an RF or oscillator tube. In most cases it is not necessary to align the entire equipment. Individual tuned circuits can, in most cases, be aligned by adjusting the tuned circuit individually, using the applicable steps in the alignment procedure. Individual IF transformers can be aligned without a signal generator by "peaking" the tuned circuits for maximum noise in the speaker. Be sure the ANL switch is in OFF position while adjusting transformers in this manner. If more than one transformer or tuned circuit is to be adjusted, perform the applicable detailed alignment procedure.

ALIGNMENT PROCEDURE

For complete alignment, always align the receiver first. Do not attempt to align the transmitter unless the receiver is in good alignment. Referenced parts can be located by using the call-out photographs in the back of the manual. Before starting alignment, set the controls to the following positions:

SQUELCH:	Full Clockwise
VOLUME:	One-quarter open from full counter-clockwise
RECEIVE-TRANSMIT switch:	RECEIVE position
ANL OFF-ON switch:	OFF position (up)
VFO-STAL switch:	XTAL position
SPOT OFF-ON switch:	OFF position (counter-clockwise)
GRID-PLATE-MOD switch:	PLATE position
LAMPS-OFF-ON switch:	ON position
MIC GAIN control (rear panel):	Full counter-clockwise

Adjust all slugs with type 8606 (general Cement) tool or equivalent.

RECEIVER ALIGNMENT

GENERAL:
Transformer slugs must always be adjusted for the tuning peak with the slug towards the "outside" of the coil, near the top or bottom of the can.

After turning unit on, wait at least five minutes before starting alignment procedure. Place a .01 UF capacitor in series with the signal generator output and the signal injection point in the receiver.

All receiver alignment procedures are based on the negative AVC voltage developed by the detector. This voltage is measured with a VTVM connected to terminal B on IF transformer T8. While adjusting transformers, vary the signal generator output level to keep the VTVM reading at -3 volts or less (down to approximately -1/2 volt, where static diode bias is always present).

RECEIVER ALIGNMENT STEPS:

1. Set signal generator to 455 kc. Inject signal on Pin 1 to V10. Adjust both slugs (top and bottom) of IF transformer T8 for maximum meter reading.

2. Leave signal generator at 455 kc. Inject signal on Pin 1 of V9. Adjust both slugs of IF transformers T6 and T7 for maximum meter indication.

3. Set signal generator to 2300 kc., ±10 kc. Calibration accuracy is important. If calibration is in doubt, check signal generator against a frequency standard or a good communications receiver. With signal generator set to 2300 kc., inject signal on Pin 2 of V8. Adjust slugs of T4, T5, and L12 for maximum meter reading. Readjust as necessary until no further increase in meter reading can be obtained. Readjust slugs of T4, T5, T6, T7, T8, and L12 for maximum meter reading.

NOTE

L12, which is not shown on the parts location photographs, is located adjacent to the V9 tube socket, toward the rear of the chassis.

4. Connect a 47 ohm composition resistor across the signal generator output line. Connect a 27 ohm resistor between the antenna terminal and the signal generator output.

NOTE

A 47 ohm resistor is sometimes included in signal generator output cable.

5. Set the dial pointer on the RECEIVER TUNING dial to 50.0 mc. Set the signal generator output to 50.0 mc. Signal generator output should be 250 uv. or greater. Adjust the slug of the high frequency oscillator transformer, T10, for maximum meter indication. On factory prealigned units, this adjustment should not exceed 1/2 turn of the slug.

CAUTION

Beware of setting oscillator on a spurious peak. Correct peak is of much greater amplitude than spurious peaks, and is much "broader".

To check oscillator coil settings, use a grid-dip meter in DIODE (absorption) position and check oscillating frequency Meter should register at 47700 kc. (47.7 mc.). In lieu of this set signal generator to image frequency, 45400 kc. (45.4 mc.), increase generator output considerably, and check for response on VTVM. Though much weaker, this response should be readable with high generator output level.

6. Set receiver dial pointer to 54.0 mc. Swing signal generator frequency between 53 and 55 mc., with output reduced to that used in step 5. Note signal generator frequency when signal is tuned, i.e., when VTVM "peaks."

7. If in step 6, signal generator frequency is 54.0 mc., proceed to step 9. If signal generator frequency is <u>lower</u> than 54.0 mc., <u>increase</u> capacity of C52 (on top of oscillator section of ganged tuning capacitor) by no more than 1 uuf (9 degrees rotation) and repeat steps 5 and 6. If signal generator frequency (in step 6) is <u>higher</u> than 54.0 mc., <u>decrease</u> capacity of C52 by no more than 1 uuf (9 degrees rotation) and repeat steps 5 and 6.

8. Repeat steps 5, 6, and 7 until signal generator frequency of 50.0 mc. and 54.0 mc corresponds exactly with the 50.0 and 54.0 mc. setting of the dial pointer.

NOTE

If the tracking does not improve, but gets worse as steps 5, 6, and 7 are continually repeated, capacitor C52 is being turned in the <u>wrong direction</u>, i.e., clockwise when rotation should be counter-clockwise, or vice-versa. Minimum capacity occurs when the "slot" on C52 is toward the rear of the chassis.

9. Set the receiver dial pointer to 50.0 mc. Set the signal generator to the same frequency ("peak" generator on VTVM). Keeping signal generator output as low as possible, peak transformer T9 and coil L7 for maximum meter reading. The position of the slug in T9 should be approximately between the coil and link windings.

CAUTION

Correct slug setting of antenna coil of T9 corresponds with the second VTVM peak reading as the slug enters from the open end of the coil.

NOTE

Tuning of L7 will pull oscillator frequency (T10) slightly. To compensate, tune signal generator slightly to one side ($\pm$ 10.0 kc.) of alignment frequency, and repeak L7 and T9. If meter reading increases, continue this procedure until no further increase can be obtained. If meter reading decreases, adjust signal generator frequency to opposite side of original frequency, and adjust L7 as described, until no further increase in VTVM reading is obtained. L7 may also be tuned by noting the amount of noise increase from the receiver, when peaking the coil, in the absence of a signal.

10. Using a crystal calibrator, repeat steps 5, 6, 7, and 8, while "zero-beating" the signal generator against the proper crystal calibrator harmonic.

11. Disconnect the signal generator and VTVM. Set the dial pointer to 50.0 mc. Adjust the S-meter potentiometer R56 for zero meter reading.

TRANSMITTER ALIGNMENT

GENERAL:
The receiver must be in complete alignment before commencing the transmitter alignment procedure, because the receiver calibration is used to align the transmitter VFO. Set the controls as listed in the beginning of the alignment section. After turning unit on, wait at least five minutes before starting alignment procedure to allow oscillator frequencies to stabilize.

ALIGNMENT PROCEDURE:
(All alignment should be done with the VFO box cover in place, except as otherwise noted.)

1. Place a crystal of approximately 8750 kc (8.75 mc) in the XTAL socket. Turn the VFO-XTAL switch to XTAL position. Turn the SPOT switch to ON. Turn the LOAD control to 0 (maximum counter-clockwise).

2. Turn the RECEIVER tuning dial to the sixth multiple of the crystal frequency (approximately 52.5 mc) to make sure the crystal is oscillating, as indicated by the presence of the crystal multiple as a signal in the receiver.

3. Turn the TRANSMITTER tuning dial to the approximate crystal multiplied frequency.

4. Connect the 50-70 ohm dummy load to the antenna jack. Turn the RECEIVE-TRANSMIT switch to TRANSMIT. "Dip" the final amplifier plate current to minimum, and load the transmitter into the dummy load in the normal manner, as explained in the front of the manual.

   If no resonance point can be found (PA plate current will not dip), tracked transmitter tuned circuits are probably far out of alignment.

   Turn off transmitter. Remove the VFO compartment bottom plate. Set the transmitter tuning dial to 52.5 mc. With a grid-dip meter, adjust the slugs of L2, and L3, to the following frequencies:

L2:	26.25 mc
L3:	26.25 mc

   Lightly solder ("tack") a 680 ohm 1/2 watt resistor across the coil terminals. Replace the VFO bottom plate.

   Connect a VTVM (-3 volt scale) between the junction of R10-R11 and ground. With TRANSMIT-RECEIVE switch in TRANSMIT position, carefully adjust the slug of coil L5 for maximum meter reading. Quickly turn switch back to RECEIVE. Remove the VFO bottom plate. Remove the 680 ohm resistor from T4 and solder it across the terminals of coil L5. Replace the VFO bottom plate. Turn the switch to TRANSMIT and quickly but carefully adjust the slug of L4 (through hole in VFO bottom plate) for maximum meter reading. Turn the switch to RECEIVE. Remove the 680 ohm resistor from L5. Disconnect VTVM. Repeat step 4, first paragraph.

5. Turn the meter switch to GRID position. Adjust the slugs in L2, and L3 for maximum meter reading. With VFO dial (still) set to 52.5 mc repeat the adjustment of these coils until no further increase in meter reading can be obtained. Final meter reading should be between 4 and 6 (with a final amplifier loaded to 5.5 on meter at resonance.)

6. Turn the RECEIVE-TRANSMIT switch to RECEIVE. Turn the XTAL-VFO switch to VFO. Turn the RECEIVER and

TRANSMITTER tuning dials to 50.0 mc. Turn the SPOT switch to ON.

7. Adjust the slug in the VFO grid circuit L1 for maximum reading on the front panel meter.

8. Set the transmitter tuning dial to 54.0 mc. Tune the receiver dial from 53.6 mc to the upper end of the scale (54.0+ mc) until the transmitter VFO signal is located.

9. If the VFO signal is at exactly 54.0+ mc, proceed to step 11. If the VFO signal is heard below 54.0 mc, decrease the capacity of C3 (the ceramic trimmer located on top of the transmitter ganged capacitor assembly) by no more than 1 uuf (9 degrees rotation). Repeat steps 6 through 8. If the VFO signal is not heard (as when it is above 54.0 mc), increase the capacity of C3 by no more than 1 uuf (9 degrees rotation). Repeat steps 6 through 8.

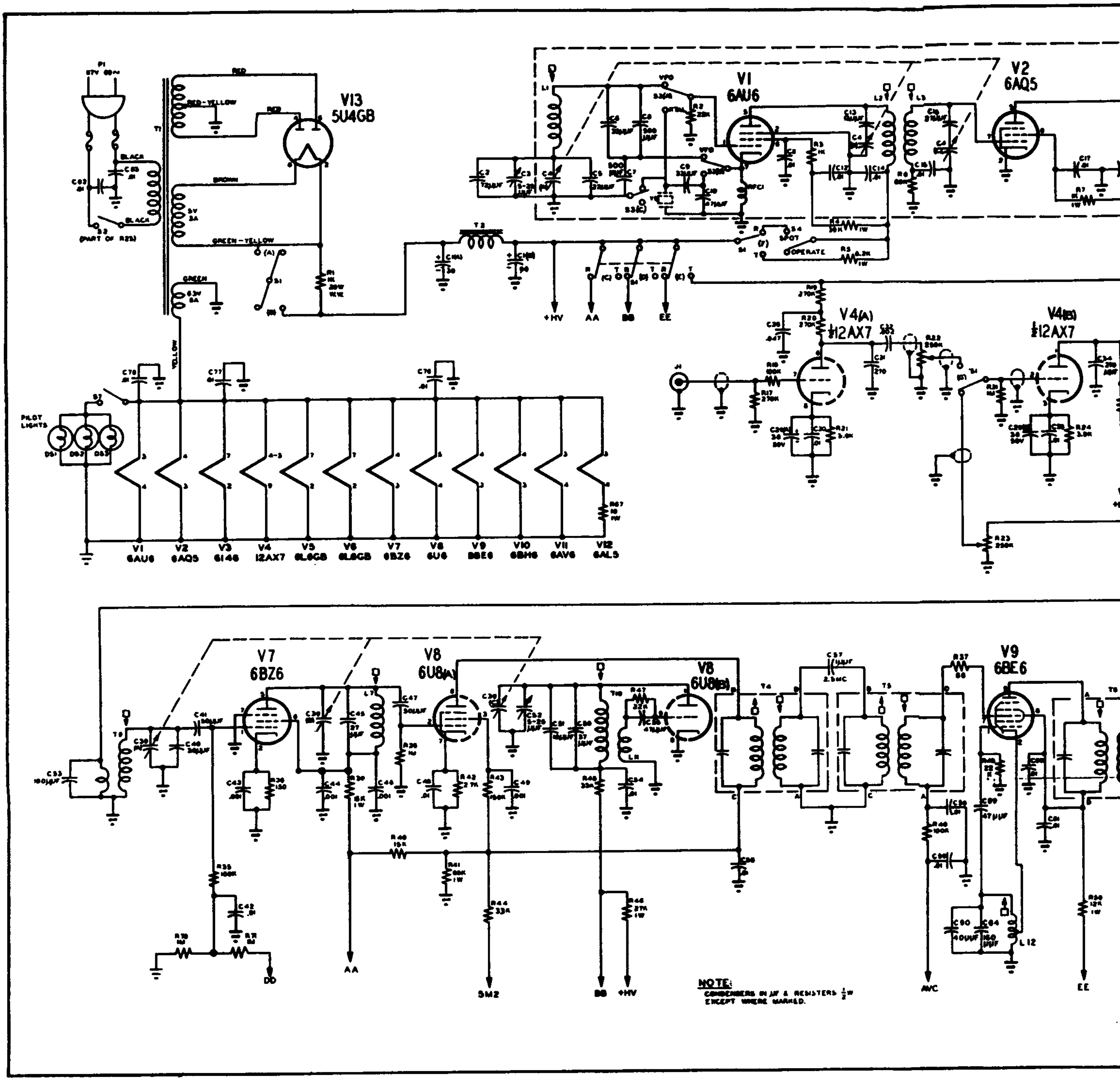
10. Continue adjusting C3 in 1 uuf increments or less until the VFO signal at 50.0 mc and 54.0 mc exactly tracks with the receiver tuning at the same points. Recheck receiver against crystal calibrator at 50.0 mc. and 54.0 mc.

NOTE

If the frequency "spread" does not improve, but gets worse, as C3 is adjusted, you are turning the capacitor in the wrong direction (increasing capacity when you should be decreasing capacity, or vice-versa). Minimum capacity occurs when the "slot" on C3 is towards the rear of chassis.

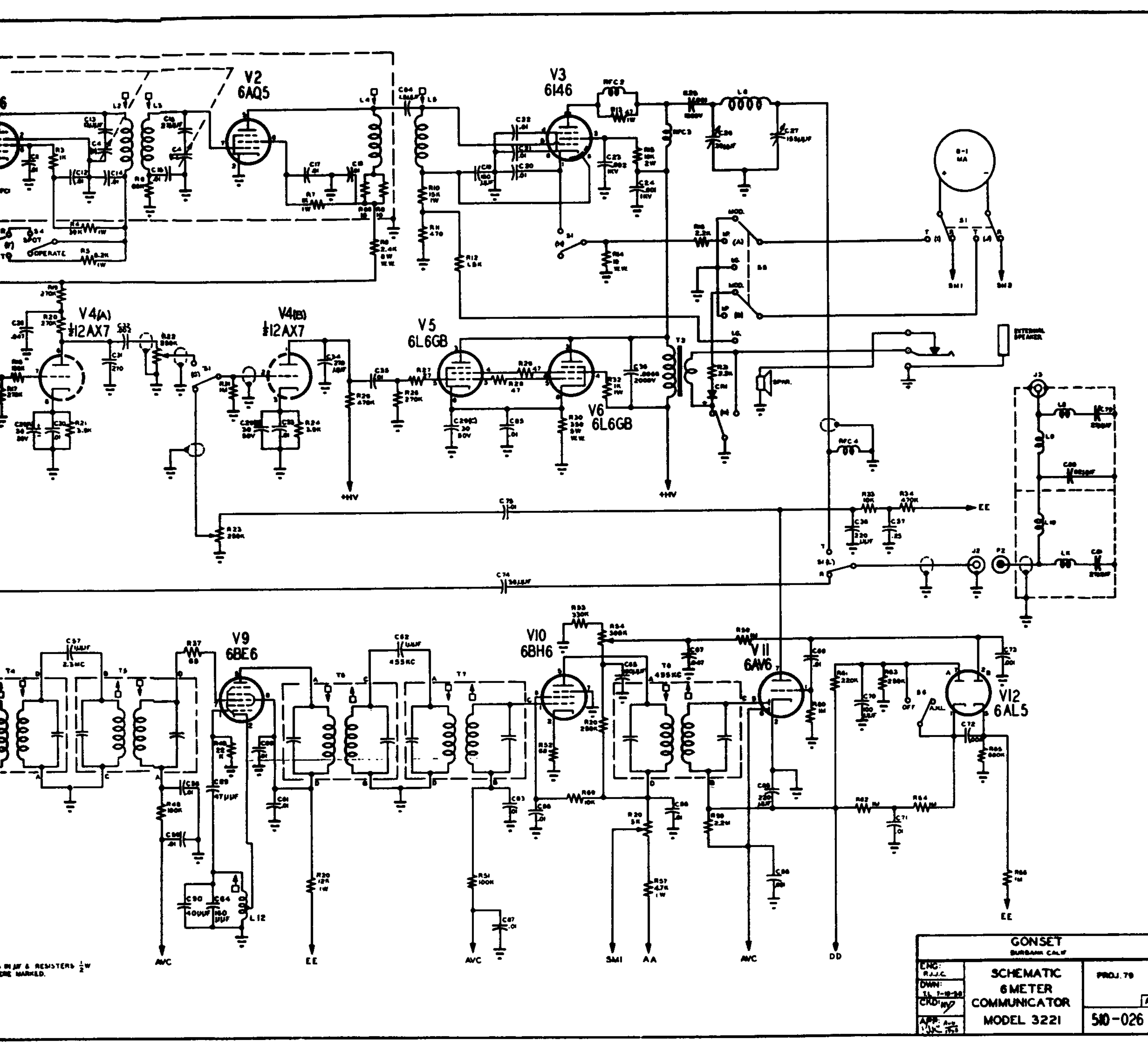
11. Turn the RECEIVE-TRANSMIT switch to TRANSMIT. Turn the TRANSMITTER tuning dial to 52.0 mc. Adjust the PLATE TUNE and LOAD controls for normal loading into the dummy load. Turn the meter switch to GRID position. Meter should read more than 4. If reading is too low, repeat steps 4 and 5, using the VFO signal.

12. Alignment is complete. Remove the dummy load, install the unit back in the cabinet, and check for normal operation into the antenna as described in the front of the manual.



C1A 30 µF, @ 500 WVDC } Electrolytic
C1B 60 µF, @ 500 WVDC } Electrolytic
C2 72 µµF, Disc, NPO ± 3%
C3 5-25 µµF, Ceramic Trimmer, NPO
C4 Variable Capacitor, 3 Gang (Transmitter)
C5 22 µµF, Tubular, N330 ± 3%
C6 33 µµF, Tubular, N330 ± 3%
C7 500 µµF, Silver Mica, 1%
C8 500 µµF, Silver Mica, 1%
C9 33 µµF, Tubular, GPSL
C10 47 µµF, Tubular, GPSL
C11 .01 µF, Disc Ceramicon, GMV
C12 .01 µF, Disc Ceramicon, GMV
C13 13 µµF, Tubular, NPO
C14 .01 µF, Disc Ceramicon, GMV
C15 .01 µF, Disc Ceramicon, GMV
C16 27 µF, Tubular, NPO
C17 .01 µF, Disc Ceramicon, GMV
C18 .01 µF, Disc Ceramicon, GMV
C19 100 µµF, Silver Mica, 5%
C20 .01 µF, Disc Ceramicon, GMV
C21 .01 µF, Disc Ceramicon, GMV
C22 .01 µF, Disc Ceramicon, GMV
C23 .002 µF, Disc Ceramicon, 1 KV, GMV
C24 .001 µF, Disc Ceramicon, 1 KV, GMV
C25 .001 µF, Silver Mica, 1500 WVDC
C26 35 µµF, Variable Capacitor, APC
C27 155 µµF, Variable Capacitor
C28 .047 µF, Molded Tubular, 400 WVDC
C29A 30 µF, @ 50 V } Electrolytic, WP Type
C29B 30 µF, @ 50 V } Electrolytic, WP Type
C29C 30 µF, @ 50 V } Electrolytic, WP Type
C30 .01 µF, Disc Ceramicon, GMV
C31 270 µµF, Tubular, GPSL
C32 .032 µF, Disc Ceramicon, GMV
C33 .01 µF, Disc Ceramicon, GMV
C34 270 µµF, Tubular, GPSL
C35 .01 µF, Disc Ceramicon, GMV
C36 .0005 µF, Tubular 2000 V
C37 .25 µF, Molded Tubular, 120 WVDC
C38 220 µµF, Tubular, GPI
C39 Variable Capacitor, 3 Gang (Receiver)
C40 30 µµF, Tubular, NPO, 1%
C41 50 µµF, Tubular, GPI
C42 .01 µF, Disc Ceramicon, GMV
C43 .001 µF, Disc Ceramicon, GMV
C44 .001 µF, Disc Ceramicon, GMV
C45 27 µµF, Tubular, 1%, NPO
C46 .001 µF, Disc Ceramicon, GMV
C47 50 µµF, Tubular, GPI
C48 .01 µF, Disc Ceramicon, GMV
C49 .001 µF, Disc Ceramicon, GMV
C50 37 µµF, Tubular, N150
C51 10 µµF, Tubular, NPO
C52 5-25 µµF, Ceramic Trimmer, NPO
C53 100 µµF, Tubular, GPSL
C54 .01 µF, Disc Ceramicon, GMV
C55 47 µµF, Tubular, NPO
C56 .01 µF, Disc Ceramicon, GMV
C57 1.0 µµF, Tubular, ± .25 µµF, NPO
C58 .01 µF, Disc Ceramicon, GMV
C59 .01 µF, Disc Ceramicon, GMV
C60 .01 µF, Disc Ceramicon, GMV
C61 .01 µF, Disc Ceramicon, GMV
C62 1.0 µµF, Tubular, ± .25 µµF, NPO
C63 .01 µF, Disc Ceramicon, GMV
C64 100 µµF, Silver Mica, 1%
C65 100 µµF, Tubular, GPSL
C66 .01 µF, Disc Ceramicon, GMV
C67 .047 µF, Molded Tubular, 200 WVDC
C68 220 µµF, Silver Mica
C69 .01 µF, Disc Ceramicon, GMV
C70 100 µµF, Tubular, GPSL
C71 .01 µF, Disc Ceramicon, GMV
C72 .001 µF, Disc Ceramicon, GMV
C73 .001 µF, Disc Ceramicon, GMV
C74 30 µµF, Tubular, GPSL
C75 .01 µF, Disc Ceramicon, GMV
C76 .01 µF, Disc Ceramicon, GMV
C77 .01 µF, Disc Ceramicon, GMV
C78 .01 µF, Disc Ceramicon, GMV
C79 27 µµF, Disc Ceramicon, ± 3%, GPSL
C80 32 µµF, Disc Ceramicon, ± 3%, GPSL
C81 27 µµF, Disc Ceramicon, ± 3%, GPSL
C82 .01 µF, Disc Ceramicon, 1.5 KV, GMV
C83 .01 µF, Disc Ceramicon, 1.5 KV, GMV
C84 1.5 µµF, Min. Tubular, 5%
C85 .01 µF, Disc Ceramicon, GMV
C86 .01 µF, Disc Ceramicon, GMV
C87 .01 µF, Disc Ceramicon, GMV
C88 .001 µF, Disc Ceramicon, GMV
C89 47 µµF, Tubular, NPO
C90 40 µµF, Tubular, 5%, N330

R1 1000Ω, 20 Watt, 5%, W.W.
R2 22K, ½ Watt
R3 1000Ω, ½ Watt
R4 39K, 1 Watt
R5 82K, 1 Watt
R6 68K, ½ Watt
R7 1000Ω, 1 Watt
R8 10Ω, ½ Watt, 5%
R9 2.4K, 8 Watt, W.W.
R10 15K, 1 Watt
R11 470Ω, ½ Watt
R12 1500Ω, ½ Watt
R13 47Ω, 1 Watt
R14 10Ω, ½ Watt, 5%, W. W.
R15 18K, 2 Watt.
R16 2.2K, ½ Watt
R17 270K, ½ Watt
R18 100K, ½ Watt
R19 270K, ½ Watt
R20 270K, ½ Watt
R21 3.9K, ½ Watt
R22 250K, A.T., Potentiometer
R23 250K, A.T., Potentiometer, With Switch
R24 3.9K, ½ Watt
R25 470K, ½ Watt
R26 270K, ½ Watt
R27 27Ω, ½ Watt
R28 47Ω, ½ Watt
R29 47Ω, ½ Watt
R30 350Ω, 5 Watt, 5%, W. W.
R31 2.2K, 1 Watt
R32 1000Ω, 1 Watt
R33 10K, ½ Watt
R34 470K, ½ Watt
R35 100K, ½ Watt
R36 150Ω, ½ Watt
R37 68Ω, ½ Watt
R38 15K, 1 Watt
R39 1 Megω, ½ Watt
R40 15K, ½ Watt
R41 60K, 1 Watt
R42 2.7K, ½ Watt
R43 150K, ½ Watt
R44 33K, ½ Watt
R45 33K, ½ Watt
R46 27K, 1 Watt
R47 22K, ½ Watt
R48 100K, ½ Watt
R49 22K, ½ Watt
R50 12K, 1 Watt
R51 100K, ½ Watt
R52 6.8M, ½ Watt
R53 330K, ½ Watt
R54 500K, L.T., Potentiometer
R55 220K, ½ Watt
R56 5K, L.T., Potentiometer



R9 2.4K, 8 Watt, W.W.
R10 15K, 1 Watt
R11 470Ω, ½ Watt
R12 1500Ω, ½ Watt
R13 47Ω, ½ Watt
R14 10Ω, ½ Watt, 5%, W. W.
R15 18K, 2 Watt.
R16 2.2K, ½ Watt
R17 270K, ½ Watt
R18 100K, ½ Watt
R19 270K, ½ Watt
R20 270K, ½ Watt
R21 3.9K, ½ Watt
R22 250K, A.T., Potentiometer
R23 250K, A.T., Potentiometer, With Switch
R24 3.9K, ½ Watt
R25 470K, ½ Watt
R26 270K, ½ Watt
R27 27Ω, ½ Watt
R28 47Ω, ½ Watt
R29 47Ω, ½ Watt
R30 350Ω, 5 Watt, 5%, W. W.
R31 2.2K, ½ Watt
R32 1000Ω, 1 Watt
R33 10K, ½ Watt
R34 470K, ½ Watt
R35 100K, ½ Watt
R36 150Ω, ½ Watt
R37 68Ω, ½ Watt
R38 15K, 1 Watt
R39 1 Megω, ½ Watt
R40 15K, ½ Watt
R41 68K, 1 Watt
R42 2.7K, ½ Watt
R43 150K, ½ Watt
R44 33K, ½ Watt
R45 33K, ½ Watt
R46 27K, 1 Watt
R47 22K, ½ Watt
R48 100K, ½ Watt
R49 22K, ½ Watt
R50 12K, 1 Watt
R51 100K, ½ Watt
R52 6.8Ω, ½ Watt
R53 330K, ½ Watt
R54 500K, L.T., Potentiometer
R55 220K, ½ Watt
R56 5K, L.T., Potentiometer

R57 4.7K, 1 Watt
R58 2.2 Megω, ½ Watt
R59 1 Megω, ½ Watt
R60 1 Megω, ½ Watt
R61 220K, ½ Watt
R62 1 Megω, ½ Watt
R63 220K, ½ Watt
R64 1 Megω, ½ Watt
R65 680K, ½ Watt
R66 1 Megω, ½ Watt
R67 10Ω, 1 Watt
R68 10Ω, ½ Watt, 5%
R69 10K, ½ Watt
R70 1 Megω, ½ Watt
R71 1 Megω, ½ Watt

RFC1 R.F. Choke, 50 µH
RFC2 R.F. Choke, Parasitic
RFC3 R.F. Choke, Final
RFC4 R.F. Choke, 50 µH

T1 Transformer, Power
T2 Choke, Filter
T3 Transformer, Modulation
T4 I.F. Transformer, 2.3 MC
T5 I.F. Transformer, 2.3 MC
T6 I.F. Transformer, 455 KC
T7 I.F. Transformer, 455 KC
T8 I.F. Transformer, 455 KC

L5 Coil, Final Amp., Grid
L6 Coil, Final Amp., Plate
L7 Coil, R.F. Plate, RCVR
L8 Coil, "M" Section Output
L9 Coil, "K" Section Output
L10 Coil, "K" Section Input
L11 Coil, "M" Section Input
L12 Coil, 2nd Oscillator, Receiver
DS1 Pilot Lamp, G.E. #47
DS2 Pilot Lamp, G.E. #47
DS3 Pilot Lamp, G.E. #47

CR1 Selenium Rectifier

M1 Meter, Ruggedized, #43-023-005

SPKR1 Speaker, 4 inch, #4-103

T7 I.F. Transformer, 2.3 MC
T8 I.F. Transformer, 2.3 MC
T9 Coil, Antenna Input RCVR
T10 Coil, 1st Osc. RCVR

J1 Connector, Mic. Receptacle, #75-PC1M
J2 Connector Socket, Antenna, #[illegible]-1R
J3 Connector Socket, Antenna, #[illegible]-1R

P1 AC Cord with Fused Plug
P2 Plug, Coax, Connector, #83-776

S1 Switch, T-R, 12 Pole, 2 Pos., 3 Sec.
S2 Switch, P.O. R23 - 1 Pole, 1 Pos.
S3 Switch, VFO-Xtal, 3 Pole, 2 Pos., 1 Sec.
S4 Switch, VFO Spot, 1 Pole, 2 Pos., 1 Sec.
S5 Switch, Meter, 2 Pole, 3 Pos., 1 Sec.
S6 Slide Switch, 1 Pole, 1 Pos.
S7 Switch, Dial Lamp, 1 Pole, 2 Pos., 1 Sec.

L1 Coil, VFO Grid
L2 Coil, VFO Plate
L3 Coil, R.F. Driver Grid
L4 Coil, R.F. Driver Plate