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Price $2.00

OWNERS MANUAL

CONGRATULATIONS!

You now own one of the finest pieces of electronics equipment available for amateur radio use. The GTX-600 is the end product of research, design and engineering by General Aviation Electronics, Inc. (Genave)—space age innovators in electronic equipment for general aviation, marine and the communications industries.

GTX-600 6 Meter FM Transceiver

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Warranty

General Aviation Electronics, Inc., warrants this product to be free from material defects for a period of 90 days from the date of purchase.

Our obligation under this warranty is to replace any parts (except service items such as bulbs, fuses, etc.) which upon our examination appear to us to be defective in materials or workmanship, with any labor charges involved at the cost of the owner, provided the unit is delivered to the Factory within the specified time period.

The owner may elect to have the unit repaired at an authorized Genave dealer, in which case Genave will replace only those defective parts returned shipping pre-paid to the Factory, and will not be responsible in any way for payment of any labor or other charges incurred therein.

This warranty does not apply to defects, malfunction, or breakage due to improper installation or to the servicing thereof by other than an authorized Genave dealer, or due to abuse, misuse, tampering, submersion in water or willful destruction of the unit.

The Company offers no other guarantees or warranties expressed or implied.

The GTX-600 was designed for fixed, mobile, and portable operation. The GTX-600 features paired or independent frequency selection at the flip of a single mode selector switch. In the "unlocked" mode the operator can independently select the transmit and receive frequencies desired. The "locked" mode allows the operator to transmit and receive on a preselected frequency pair.

Specifications:

GENERAL:

Front Panel Size: 6½″ x 2½″
Over-all Size: 9″ deep x 6½″ wide x 2½″ high
Components: 10 transistors, 6 diodes, 2 zeners, 6 FETs, 3 ICs
Power Supply: 12v DC system, negative ground
Frequency Range: 50 to 54 MHz
Number of Channels: 100 possible combinations. (Includes 52.525 MHz. Additional crystals $6.50 each.)
Weight: Approximately 5 lbs.

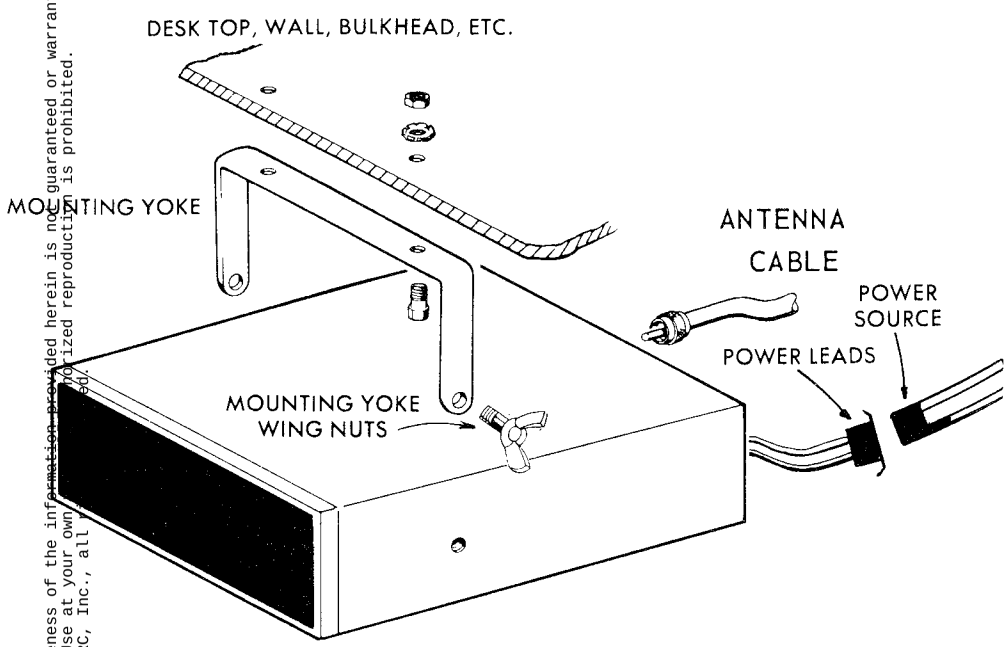
RECEIVE:

Sensitivity: .2 microvolt for 12 db SINAD, .25 microvolts for 20 db quieting.
Image: More than 45 db
Spurious: More than 50 db
Selectivity: ±8kHz, 3 db or less
Adj. Ch. Rejection: ±30 kHz, more than 65 db
Receiver Circuit: Double conversion superheterodyne, crystal controlled
Audio Output: 1.5 watts at less than 5% distortion
Mod. Acceptance: More than 7.5 kHz
Current Drain: .09 amps

TRANSMIT:

Frequency Range: 50 to 54 MHz
Power Output: 35 watts, nom. 30 watts, min. @ 14v DC input
Output Impedance: Matches standard 50 ohm amateur antennas
Deviation: Adjustable to 10 kHz max.

INSTALLATION



FIXED OPERATION

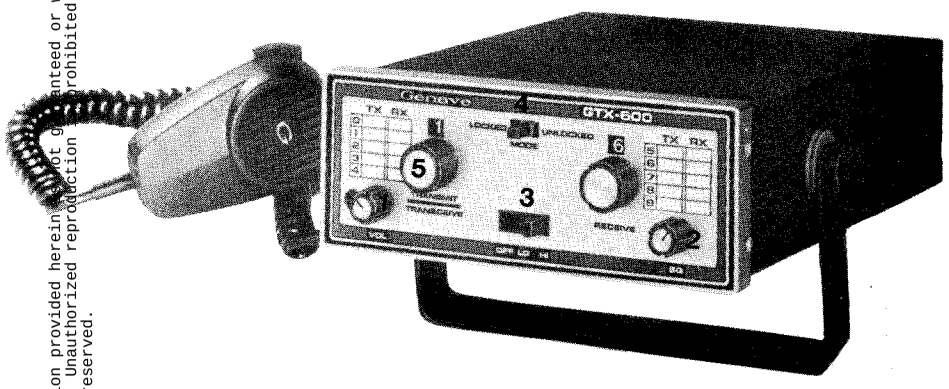
1. Remove the mounting yoke from the top of unit and reposition the mounting yoke on the bottom side of the unit to function as a supporting stand.
2. Connect the color coded power leads to the power source. The power source can consist of a battery or a well regulated power supply (1.5 V max. peak ripple) such as the Genave PSI-10. The unit will only operate on a supply with negative ground. If it is necessary to extend the power leads, use #14 gauge or heavier insulated copper wire. If polarity is reversed the unit will be inoperative. If this occurs check wiring polarity (RED to positive and BLACK to negative) and the protective fuse. A blown fuse should be replaced with a 7½-amp, type 3AG fuse only.
3. If desired, attach the microphone mounting clip to the selected mounting surface using two small screws or bolts.
4. Plug the microphone into the microphone jack located on the front left side of the unit. The microphone supplied with the unit is recommended, however, most standard high impedance ceramic microphones will work.
5. Connect the antenna to the antenna connector located on the rear panel. The unit is designed to match standard 50 ohm 6-meter amateur antennas. In the interest of good engineering practice and maximum efficiency, the antenna system should exhibit a low VSWR.

MOBILE OPERATION

1. Remove the unit from the mounting yoke.
2. With screws or bolts securely fasten the yoke in the desired location (under dash, on console, overhead, etc.). Unit performance is not affected by mounting position.
3. Replace the unit in the mounting yoke and tighten the thumbscrews.
4. Connect the color-coded power leads to the power source. Take care to use RED for positive and BLACK for negative. Unit will only operate on a supply with negative ground. If it is necessary to extend power leads, use #14 gauge or heavier insulated copper wire. If polarity is reversed the unit will be inoperative if this occurs check wiring polarity (RED to positive and BLACK to negative) and the protective fuse. A blown fuse should be replaced with a 7.5-amp, type 3AG fuse only.
5. Attach the microphone mounting clip to the desired mounting surface using two small screws or bolts.
6. Plug the microphone into the microphone jack located on the front left side of the unit. The microphone supplied with the unit is recommended, however, most standard high impedance ceramic microphones will work.
7. Connect the antenna to the antenna connector located on the rear panel. The unit is designed to match standard 50 ohm 6-meter amateur antennas. In the interest of good engineering practice and maximum efficiency, the antenna system should exhibit a low VSWR.

PORTABLE OPERATION

The easiest method of portable operation is to utilize the Genave HamPak-2 Portable-Power Case. For instructions on utilization of the HamPak-2 see the instruction sheet supplied with the HamPak-2. Portable operation of the unit requires the same considerations as fixed and mobile operations (power supply, antenna, etc.). Battery operation of the unit is possible and the low power feature reduces power drain to a minimum.



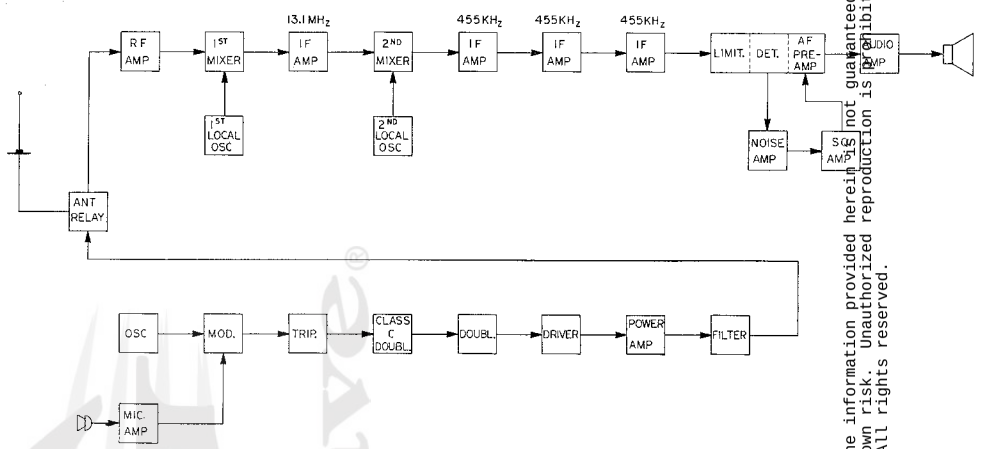
OPERATING INSTRUCTIONS

1. Turn volume (#1) and squelch control (#2) knobs completely counterclockwise.
2. Move the OFF/LO/HIGH switch (#3) to the LO position.
3. Turn the volume control clockwise to adjust the volume to the desired level.
4. Turn the squelch control clockwise until the background sounds just disappear. Don't adjust squelch when a signal is being received.
5. Select the desired frequency mode on the Mode Selector Switch (#4). The "unlocked" mode permits selection of the transmit frequency on the Transmit/Transceive frequency selector (#5) and selection of the receive frequency on the Receive frequency selector (#6). When operating in the "locked" mode prepaired receive and transmit frequencies are selected on the Transceive frequency selector (#5).
6. To transmit: depress microphone button, hold microphone 4 to 6 inches from mouth, and talk in a normal voice.
7. Release the microphone button to listen.

The GTX-600 comes with 52.525 Mhz transmit and receive crystals installed. The remaining 9 transmit and 9 receive frequencies can be installed by the owner or the factory, at a nominal charge.

MAINTENANCE

Keep the unit dry and check electrical connections regularly to insure satisfactory operation under normal conditions.



BLOCK DIAGRAM

THEORY OF OPERATION

INTRODUCTION

The Genave GTX-600 is a VHF FM transceiver intended for use in the amateur radio services. It transmits and receives 16F3 emission in the frequency range from 50.0 to 54.0 MHz on any one of ten possible selected transmit/receive frequency pairs. The unit provides a nominal 35 watts of output power to a 50 ohm load. The unit was designed for fixed, mobile, or portable operation.

RECEIVER

The receiver is basically a dual conversion superheterodyne type utilizing a single integrated circuit to perform the limiting and detection functions.

The received signal is applied from the antenna connector to the three pole low pass filter comprised of C168, C169, L107, and C167. This filter also functions as a low pass filter for the transmit function. The signal from the low pass filter is applied to pin 15 of K101, the T/R relay. In the receive mode the signal is fed to the input filter of the receiver via pin 14 of the T/R relay.

The receiver input is applied accross T201, C201, C202, and C247, which form a parallel tuned input circuit. The signal passes through the RF amplifier, Q201, and is coupled to the base of Q202, the first mixer, by the interstage coupling transformer, T202.

The first local oscillator consists of Q209 and associated circuitry. The desired crystal in the 36.9 to 40.9 MHz range is selected by means of the frequency

selection switch, SW101B or SW201. The collector circuit of Q209 is capacitively coupled to the base of Q202.

The 13.1 MHz difference signal produced in the first mixer is coupled to the first IF amplifier consisting of Q203 and associated circuitry. The output of the first IF amplifier is fed to Q205, a dual gate FET which together with its associated circuitry functions as the second mixer.

The second local oscillator consists of Q204 and associated circuitry. The second local oscillator operates at the crystal controlled frequency of 12.645 MHz. This 12.645 MHz signal produced is mixed with the 13.1 MHz signal from the first IF in the second mixer. The 455 KHz difference frequency produced by the second mixer is applied to the second IF amplifiers of Q206, Q207, Q208, and associated circuitry.

The 455 KHz second IF signal is applied to pins 1 and 2 of IC201. IC201 performs the limiting and detection functions in the receiver. C244 sets the de-emphasis level in the detection circuitry. T213, R222, and C227 form the quadrature detector transformer circuit. Detected audio is fed from pin 8 on IC201 through C228 and R223 to the audio amplification circuits via pin 14. Detected audio from pin 8 is also fed to the noise amplifier consisting of Q210 and associated circuitry. The amplified noise from Q210 is fed to the voltage doubling detector of CR201, CR202, and C233. The detected noise level is fed to the base of Q211. R228, the squelch control, controls the authority of the detected noise level on the base of Q211. As Q211 begins to turn on, the audio level at the output (pin 12) of IC201 is reduced.

R231, the volume control, sets the level of audio fed to IC202, the audio amplifier. R232, C236, R234, and C237 perform the frequency response shaping of the audio amplifier while C240, C239, and C238 provide feedback to various stages within IC202. Output audio from IC202 is applied from pin 12 through C243 to the speaker.

TRANSMITTER

The modulator audio amplifier in the unit is built around a single integrated circuit, IC101. This IC is a dual operational amplifier and is shown on the schematic diagram as IC101A and IC101B. The audio output of the ceramic microphone is amplified by IC101B, a 6 db/octave rising characteristic is given to the audio frequencies by loading the 1500 pfd microphone capacitance with the bias resistors R131 and R130. IC101 also provides the clipping function required for limiting the modulation by saturating symmetrically against the supply voltage and ground. The regulated supply voltage for the modulator is obtained by applying 13.75 VDC primary power through R122 and across a 6.8 volt zener diode, CR106.

The output from IC101B is applied to IC101A which acts as an active, 2-pole, Chebyshev low pass filter with a cutoff frequency of 3 KHz. R125 and C150 add a third pole to the filter to give the required −18 db/octave rolloff above 3 KHz.

R124 controls the audio level applied to the modulator varactor diode, CR102. R123 and C105 convert the audio signal applied to the modulation diode to the form required to produce phase modulation.

DC bias for the modulation diode is provided by IC101A through R125, R124, and R123. The audio return from R124 is provided by C149.

Q101 is the oscillator transistor and accordingly generates the required RF signal. Power for the oscillator is derived from an independent voltage regulator (R101 and CR101). The oscillator is a basic Colpitts or Clapp crystal circuit. Variable capacitors are used in series with each crystal to allow exact setting of the generated frequency. Output from the oscillator is from 4.166 MHz to 4.500 MHz. The oscillator output is multiplied by 12 in the multiplier stages, resulting in a final output frequency from 50 to 54 MHz.

Frequency modulation of the carrier signal is accomplished by CR102. A signal from Q101, the oscillator transistor, is applied to CR102 by a tuned transformer, T101. As an audio signal is applied to the varactor diode, CR102, from the modulation audio amplifier; the capacitance of the diode changes thus varying the resonant frequency of the tuned transformer, T201. This results in phase modulation of the carrier signal. The audio signal is de-emphasized before application to CR102, however, resulting in the appearance of frequency modulation of the carrier rather than phase modulation.

The output of the modulator is first applied to Q102, an RF tripler. In this stage the input frequency of 4.166 MHz is multiplied to 12.5 MHz. Other harmonics and subharmonics are filtered out by a double-tuned transformer, T102.

The output of T102 is fed to Q103, a Class C doubler, which increases the signal frequency to 25 MHz. The undesired signals generated in this stage are removed by the tuned transformer, T103.

The output of T103 is applied to the base of Q104, the last multiplier stage. Q104 doubles the signal frequency to 50 MHz. The output of Q104 is matched to the input of Q105 by a resonant "L" section consisting of L101, C117 and C118. This circuit also provides some degree of subharmonic suppression.

The power amplifier in the transmitter consists of Q105, Q106, and associated circuitry. This complement of devices increases the output from Q104, nominally 50 milliwatts, to the rated output of the transmitter, 35 watts. Frequency selective matching networks are used between each of the stages to effectively couple power between devices and to reject the unwanted spurious responses from the desired signal.

SW102A switches R120 into a series connection between the collector supply and Q105 when the switch is in the "LO" position. This reduces the output power of the transmitter to approximately 5 watts for short distance, low power drain operation.

A relatively complex filter is used to remove subharmonic spurious outputs and harmonic radiations from the RF signal prior to transmission. C125, L105, and C126 comprise a resonant matching network which matches the output of Q106 to the 50 ohm antenna impedance. The remainder of the components up to the output connector form an eliptic function, low pass filter which reduces the level of all spurious outputs, above the output frequency to less than −13 dbm.

CRYSTAL SWITCHING

Crystal switching for the transmit and receive oscillators is accomplished through the use of switches SW101A, SW101B, and SW201. SW101A selects the desired transmit frequency by placing the appropriate transmit crystal and trimmer in shunt with the base circuit of Q101, the transmit oscillator.

SW202 connects either SW101B or SW201 to the base circuit of the receive oscillator, Q209. In the "unlocked" mode SW 201 is connected to the base circuit of the receive oscillator and connects the receive crystals in shunt with the oscillator base circuit. When operating in the "unlocked" mode with SW201 in the 0 position, the receive crystal in the 0 position on the printed circuit board is placed into operation (See Figure 5). The 9 position of the RECEIVE selector connects the receive crystal in the 9 position on the printed circuit board to the receive oscillator circuit.

In the "locked" mode SW101B is connected to the oscillator base circuitry, and since this switch is mechanically connected to the transmit selector, allows the positioning of the TRANSMIT/TRANSCEIVE frequency selector to select the receive crystal. When the TRANSMIT/TRANSCEIVE switch is in the 0 position, it selects the transmit and receive crystals in the 0 positions on the printed circuit board (See Figure 5).

PRIMARY POWER

Power to operate the unit is supplied from the 13.75 VDC external power source via the input connector, F101, and SW102B. The 13.75 VDC line supplies power to operate the relay, K101; the panel backlighting lamp, IL101; and the transmitter and receiver circuitry, via Pins 11, 12, and 13 of K101.

The transceiver is protected against a reversed polarity input voltage by means of CR103 and CR105. CR104 prevents the feedback of induced voltage spikes generated by K101, on the 13.75 VDC line. C242 and Z102 act as a filter on the 13.75 VDC line.

ALIGNMENT PROCEDURE

GENERAL

The unit comes prealigned from the factory and realignment should never be necessary during the normal life of the unit unless components within the unit have been replaced due to damage.

NEVER attempt to realign the circuitry of the unit unless the test equipment specified for each section is available.

RECEIVER ALIGNMENT

To properly align the receiver of the unit the following test equipment or its equivalent is required:

a. Oscilloscope, DC to 8 MHz, DC coupled, Calibrated vertical attenuator, (Heathkit IO-14, or equivalent).
b. FM Signal Generator, 52.525 MHz with ± 5 KHz deviation of 1 KHz audio modulation.
c. RF Signal Generator, 13.1 MHz and 52.525 MHz, unmodulated (May be same generator as above).
d. Frequency Counter, DC to 54 MHz.
e. AC VTVM, any accurate instrument.
f. DC Power Supply, 13.75 VDC at 7 ampere, low ripple.
g. Attenuator Pad, 10 or 20 db

PREPARATION

1. Prepare an external speaker plug with an 8 ohm, 5 watt resistor attached as an external audio load (See Figure 1).
2. Remove the microphone plug from the unit and leave the microphone disconnected throughout the receiver alignment to prevent accidental transmitter keying.
3. Remove the unit from the cover by removing the two mounting thumbscrews. When tuning the receiver, place the unit, circuit board down, on top of the cover removed in step 3, above. This will insure the same circuit board capacity as when the unit is mounted within the case.
4. Connect the transceiver to the power supply.

IF ALIGNMENT

1. Connect the RF signal generator output to the emitter of Q202, the first mixer, but do not apply a signal.
2. Connect the 8 ohm external audio load to the external speaker jack, J 201.
3. Attach the input leads of the AC VTVM to the 8 ohm load resistor.
4. Turn the radio on, by placing the OFF/LO/HIGH switch in the LO position.
5. Adjust the squelch for full open by rotating the squelch control knob fully counter clockwise.
6. Adjust the volume control until the AC VTVM indicates a noise level of 0 db.
7. Adjust the RF signal generator to produce a 13.1 MHz signal and increase the level of this signal until the AC VTVM shows a 10 db decrease in the noise level.
8. Tune the IF transformers in the following order—T203, top and bottom; T204, top and bottom; T205, T206, T207, T208, T209, T210, T211—to produce a minimum noise reading. Readjust the level of 13.1 MHz signal injected to keep the indicated noise level as near the −10 db level as possible while tuning. Do not tune T213 at this time.
9. Turn transceiver off. Disconnect test equipment.

MIXER AND PREAMPLIFIER ALIGNMENT

1. Connect the external speaker load to the external speaker jack, J201.
2. Connect the AC VTVM to the load resistor.
3. Place the OFF/LO/HIGH switch in the LO position, select 52.525 MHz receive, and set the squelch to the fully counter-clockwise position.
4. Adjust the volume control for a 0 db noise level indication on the AC VTVM.
5. Connect the RF signal generator to the antenna jack, J101, through the 10 or 20 db pad to insure proper termination impedance.
6. Set the signal generator to 52.525 MHz and adjust the generator output for a 10 db reduction in noise level.
7. Adjust T202 and C202 for a minimum noise level as indicated on the AC VTVM. Reduce the generator output as necessary to maintain as near a −10 db indication as possible.
   NOTE: Be sure to perform these adjustments with the unit setting on top of the metal case.
8. Readjust transformers T203 through T212 for a minimum noise indication. Reduce generator output level as necessary to maintain as near a −10 db indication on the AC VTVM as possible.
9. Turn the transceiver off. Disconnect the test equipment.

DETECTOR TRANSFORMER ADJUSTMENT

1. Connect the external speaker load to the external speaker jack.
2. Connect the oscilloscope vertical input across the load resistor.
3. Connect the FM generator to the antenna connector.
4. Adjust the generator to produce a signal on 52.525 MHz with 1 KHz modulation adjusted to produce ± 5 KHz deviation.
5. Turn-on the transceiver and select 52.525 MHz receive.
6. Adjust the oscilloscope to display a few cycles of the demodulated signal.
7. Adjust T213 to produce the best sinesoidal output possible. Look for maximum amplitude, symmetry, and minimum distortion of the displayed waveform.
8. Turn the transceiver off. Disconnect the test equipment.

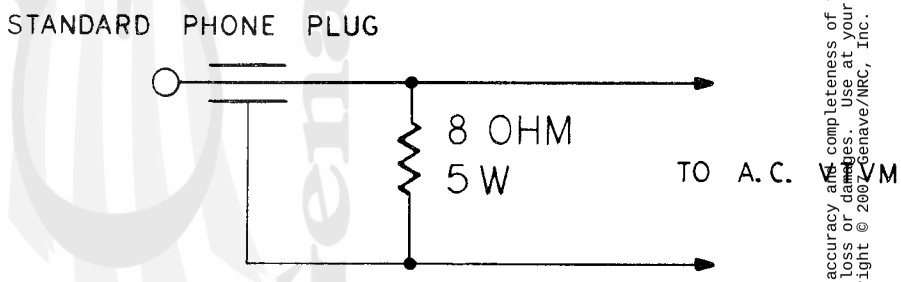


Figure 1
SPEAKER LOAD

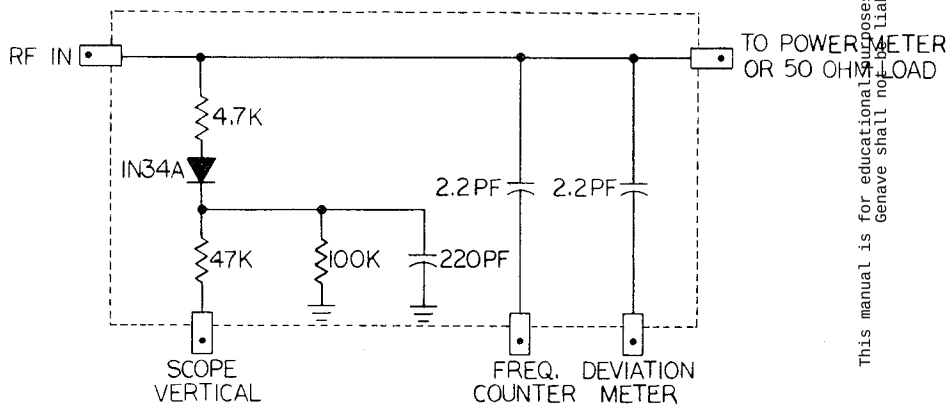


Figure 2
RELATIVE OUTPUT INDICATOR

RF INPUT FOR 20 DB QUIETING

1. Connect the external speaker load to the external speaker jack, J201.
2. Attach the input leads of the AC VTVM to the load resistor.
3. Connect the RF signal generator to the antenna connector, J101.
4. Adjust the signal generator to produce a 52.525 MHz unmodulated signal. Reduce the generator output to zero.
5. Turn-on the transceiver, select 52.525 MHz receive, and rotate the squelch control to the fully counter clockwise position.
6. Adjust the volume control on the transceiver to produce a 0 db indication on the AC VTVM.
7. Increase the level of the 52.525 MHz signal until the audio level indicated on the AC VTVM drops by 20 db.
8. The signal level necessary to produce 20 db quieting should be between .2 microvolts (—121 dbm) and .25 microvolts (—119 dbm).
9. Turn the transceiver off. Disconnect the test equipment.

RECEIVER FREQUENCY MEASUREMENT

1. Attach a short coaxial cable to the frequency counter.
2. Connect the frequency counter cable braid to the transceiver chassis ground and the center conductor to the tap on the secondary of T202 (Test Point #1, See Figure 3).
3. Turn-on the transceiver.
4. Select 52.525 MHz receive.
5. The frequency counter should read the crystal oscillator frequency.
6. The oscillator frequency should be 13.1 MHz lower than the desired operating frequency. The frequency tolerance should be ± 1.5 KHz.
7. Repeat the above procedure for all receive frequencies.
8. Turn-off the transceiver. Disconnect the test equipment.

SQUELCH OPERATION CHECK

1. Connect the FM signal generator to the antenna connector, J101.
2. Adjust the generator to produce a 52.525 MHz output with 1 KHz modulation at ± 5 KHz deviation.
3. Reduce the generator output to zero.
4. Turn the transceiver on.
5. Select 52.525 MHz receive on the transceiver and turn the squelch control fully clockwise. The receiver volume control should be set for maximum volume. The receiver should remain fully squelched with no audio being heard.
6. Reduce the DC input voltage to the transceiver to approximately 11 volts. The receiver should remain fully squelched.
7. Return the DC input to 13.75 VDC and set the volume control at midrange.
8. Increase the signal generator output until the 1 KHz modulation just becomes audible. This should occur at a signal level between .3 microvolts (—117 dbm) and .4 microvolts (—115 dbm).
9. Turn-off the transceiver. Disconnect test equipment.

AUDIO OUTPUT POWER

1. Connect the FM signal generator to the antenna connector, J101.
2. Adjust the generator to produce a 52.525 MHz output with 1 KHz modulation at ± 5 KHz deviation. Set generator output to approximately 5 microvolts.
3. Connect the external speaker load to the external speaker jack, J201.
4. Connect the AC VTVM across the load resistor.
5. Turn-on the transceiver and select 52.525 MHz on the frequency selector.
6. Rotate the volume control to the fully clockwise position. The AC VTVM should indicate no less than 1.41 volts rms (1 Watt).
7. Turn the transceiver off. Disconnect the test equipment.

TRANSMITTER ALIGNMENT

To properly align the transmitter, the following test equipment or its equivalent is required:

a. Power Meter, 50 Watts @ 54 MHz, and/or Relative Output Indicating Device (See Figure 2).
b. Dummy Load, 50 ohm, 50 Watt (May be incorporated into power meter, above).
c. Frequency Counter, DC to 54 MHz, or other accurate frequency measuring device.
d. Deviation Meter, to read ± 7.5 KHz.
e. DC Power Supply, 13.75 VDC at 7 ampere, low ripple.
f. VTVM, Any accurate instrument.
g. Audio Generator, 1700 Hz.

PREPARATION

To prepare the unit for alignment perform the following steps:

1. Remove the microphone plug from the unit.
2. Remove the unit from the cover by removing the two mounting thumbscrews.
3. When tuning the transmitter, place the unit, circuit board down, on top of the cover removed in step 2 above. This will insure the same circuit board capacity as when the unit is mounted within the case.
4. Reconnect the microphone plug to the unit.
5. Attach a 50 ohm dummy load to the RF output connector, J101, through the power meter or the relative output indicating device.
6. Set the OFF/LO/HIGH switch to the HIGH position.
7. Preset the deviation potentiometer, R124, to its lowest setting (potentiometer rotated fully clockwise when viewed from rear of unit).
8. Connect the unit to the 13.75 VDC power supply.

POWER ALIGNMENT

1. Select 52.525 MHz on the transmit frequency selector.
   NOTE: The signal peak voltage measurements in the following steps of this section were made with a VTVM and DC probe. Key the transmitter *only* when adjustments are being made.
2. Connect the DC probe to the emitter of Q102, key the transmitter and adjust the top slug of T101 for a peak voltage indication on the VTVM. The lower slug must be fixed in a position such that it is centered in the lower coil winding, while the top slug tunes at a point between the top of the coil form and the first coil winding.
3. Move the DC probe to the emitter of Q103. Key the transmitter and adjust the slugs of Q102 for a peak voltage indication on the VTVM. This peak should occur with one slug positioned at the lower end of the coil form between the circuit board and the lower coil winding. The remaining core should be positioned between the top end of the coil form and the top coil winding. Avoid positioning either core between the two coil windings as this will result in an overcoupled condition.
4. Move the DC probe to the emitter of Q104. Key the transmitter and adjust T103 for a peak indication on the VTVM. This peak should occur with the slug positioned at the lower end of the coil form between the circuit board and the lower coil winding. The remaining core should be positioned between the top end of the coil form and the top coil winding. Avoid positioning either core between the two coil windings as this will result in an overcoupled condition. An output indication should now be present on the power meter.
5. Adjust C115, the last doubler trimmer, for maximum output as indicated on the power meter.
6. Adjust C122 and C124, the driver trimmers, for maximum output as indicated on the power meter.
7. Adjust C125 and C126, the final amplifier trimmers, for maximum output as indicated on the power meter. The power output should be no less than 30 watts.
8. Repeak all adjustments for maximum. The core position notes for transformers T101, T102, and T103 will still apply.

9. Check power in LO position of the OFF/LO/HIGH switch. The low power position should produce approximately 5 watts of output power. The LO power output can be adjusted by changing the value of R120.

NOTE: Careful peaking of all adjustments will insure that all spurious responses are at the lowest level possible.

FREQUENCY NETTING

1. Connect the transceiver to the 50 ohm dummy load through the relative output indicating device (See Figure 2).
2. Connect the frequency counter to the frequency counter output port of the relative output indicating device.
3. Place the OFF/LO/HIGH selector in the HIGH position.
4. Select 52.525 MHz transmit, key the transmitter, and adjust the corresponding crystal netting trimmer until the frequency counter displays 52.525 MHz. The crystal trimmer should allow setting the crystal frequency within 200 Hz.
5. If difficulty in netting a particular crystal is encountered, the value of the padder capacitor paralleling the trimmer may be changed as necessary to bring the crystal onto the desired operating frequency.
6. Repeat the above steps for all transmit crystals installed.

DEVIATION ADJUSTMENT

1. Connect the transceiver to the 50 ohm dummy load through the relative output indicating device (See Figure 2).
2. Connect the deviation meter to the deviation meter output of the relative output indicating device.
3. Set the OFF/LO/HIGH selector to the HIGH position.
4. Feed an audio signal of 1700 Hz into the transceiver microphone.
5. Key the transmitter, observe the frequency deviation meter, and increase the audio input until no further increase in deviation is indicated. The modulator stage is now saturated.
6. With the frequency deviation meter set to read either + or — deviation, key the transmitter and adjust the top slug of T101 slightly for a peak reading. The deviation potentiometer, R124, can be adjusted to maintain an on-scale deviation meter reading.
7. Set the deviation potentiometer, R124, for a deviation reading of 5 KHz. Switch the deviation meter to read + and — deviation.
8. If a difference exists between + and — deviation levels, adjust T101 slightly until the two levels are brought into balance. The difference between deviation levels should not exceed 0.4 KHz.
9. Turn-off transceiver. Disconnect test equipment.

FREQUENCY CHANGES

GENERAL

To add an additional receive frequency to the unit it is only necessary to install the additional receive crystal. When a transmit crystal is added it will be necessary to adjust the corresponding netting capacitor to center the transmitter on the desired frequency.

CRYSTAL SELECTION

The receive and transmit crystals used in the unit must meet the following specifications:

TRANSMIT

Parallel Mode: $C_p = 20$ pfd.
Fundamental Cut
Tolerance: ± .002%

$$\text{Crystal Frequency} = \frac{\text{Operating Frequency}}{12}$$

(eg.) Operating Frequency = 52.525 MHz
Crystal Cut Frequency = 4.37708 MHz

RECEIVE

Parallel Mode: $C_p = 39$ pfd.
Third Overtone
Tolerance: ± .003%
Crystal Frequency = Operating Frequency — 13.1 MHz
(eg.) Operating Frequency = 52.525 MHz
Crystal Frequency = 52.525 MHz — 13.1 MHz = 39.425 MHz

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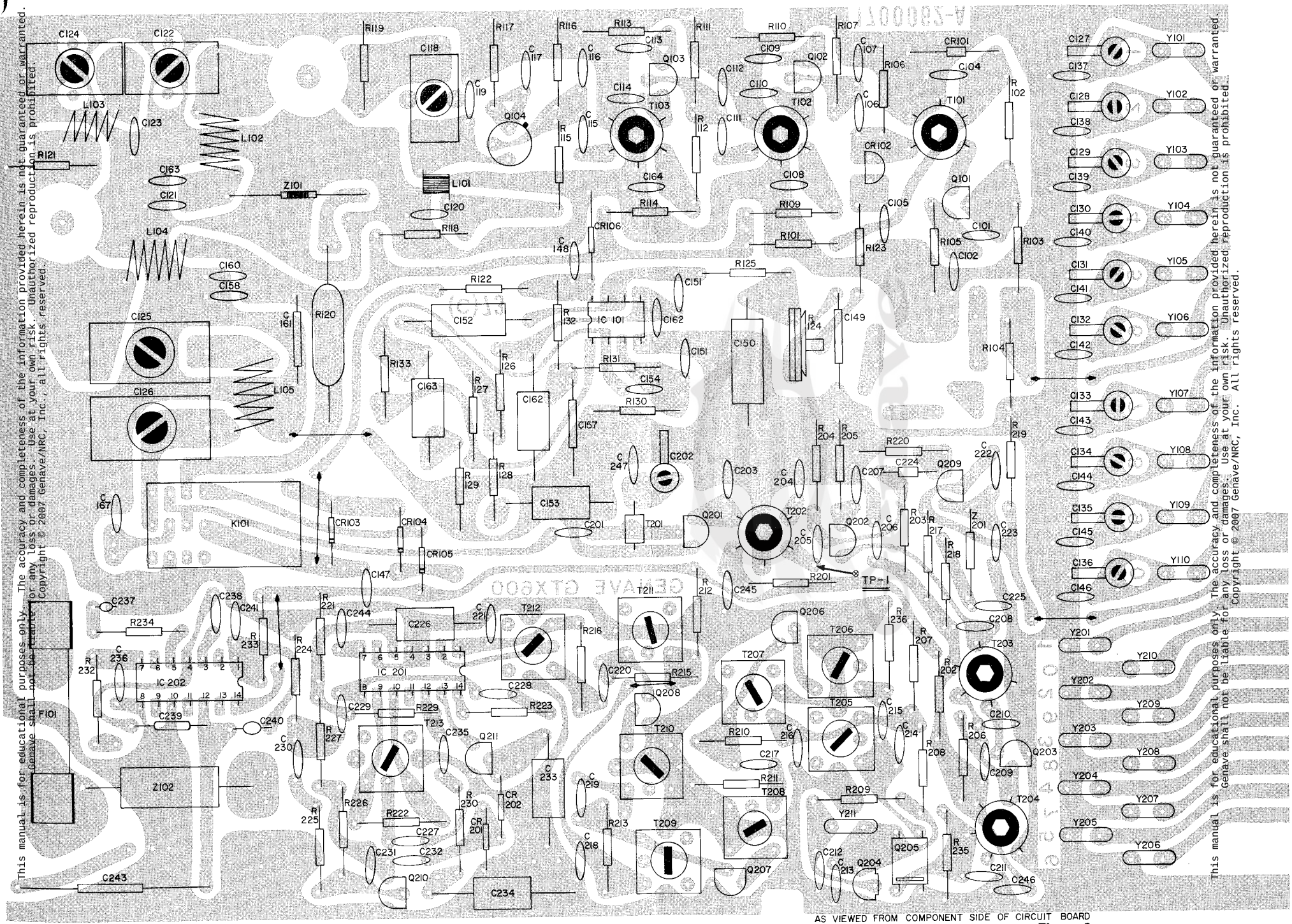

AS VIEWED FROM COMPONENT SIDE OF CIRCUIT BOARD

Figure 3
COMPONENT LOCATION DIAGRAM

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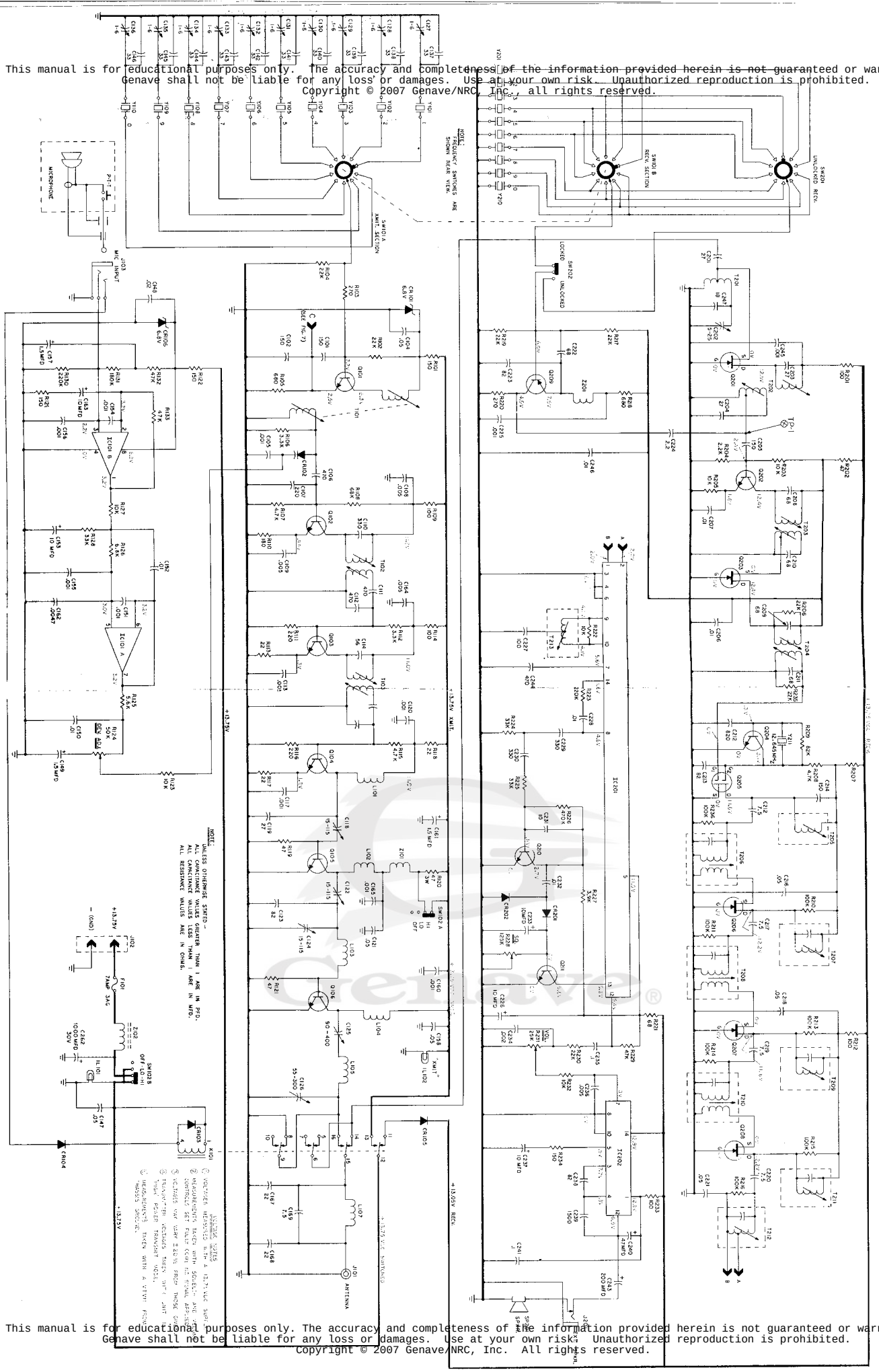
Figure 4
SCHEMATIC DIAGRAM
WITH VOLTAGES



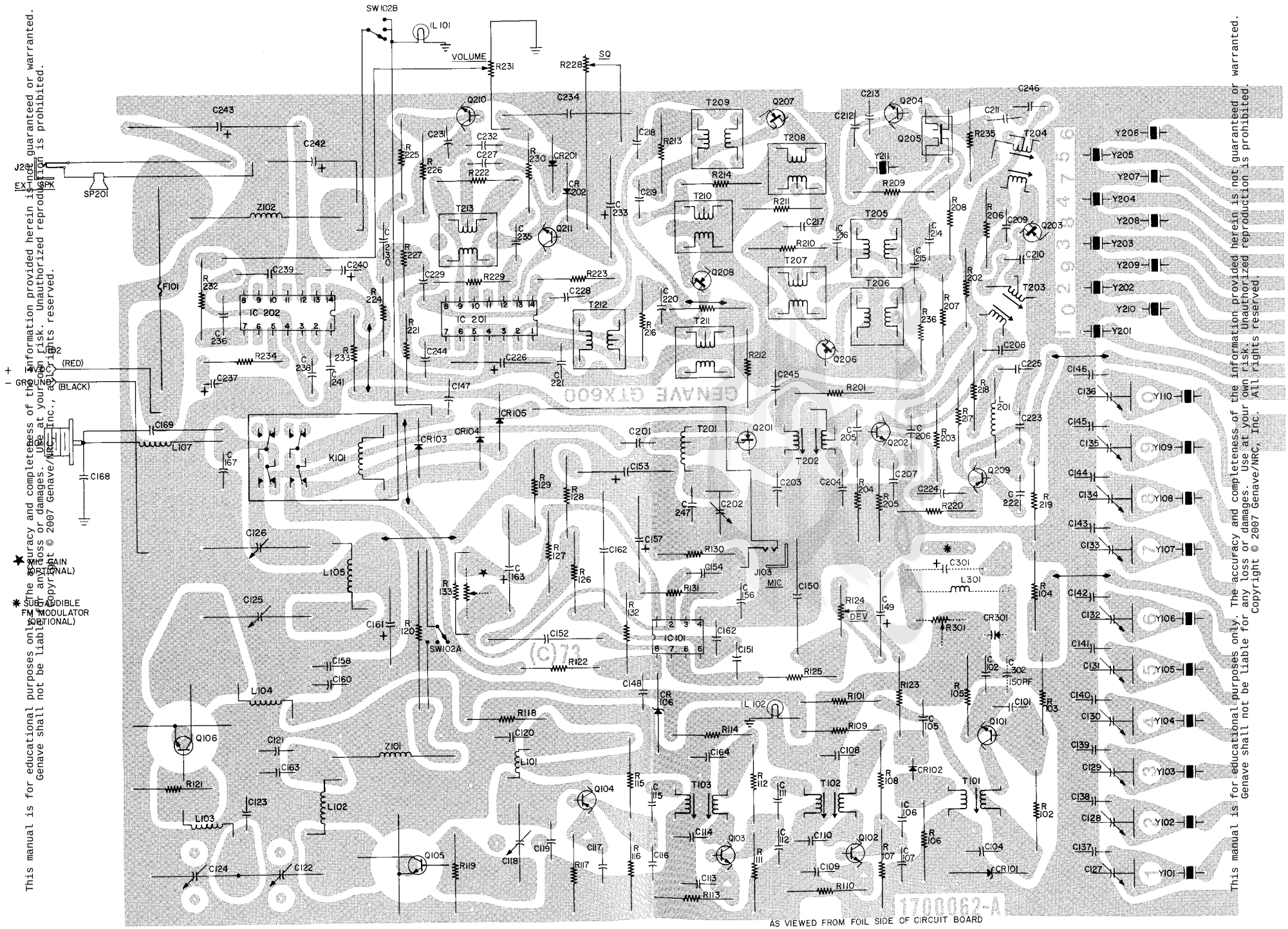


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Figure 5
PARTS/TRACK MAP

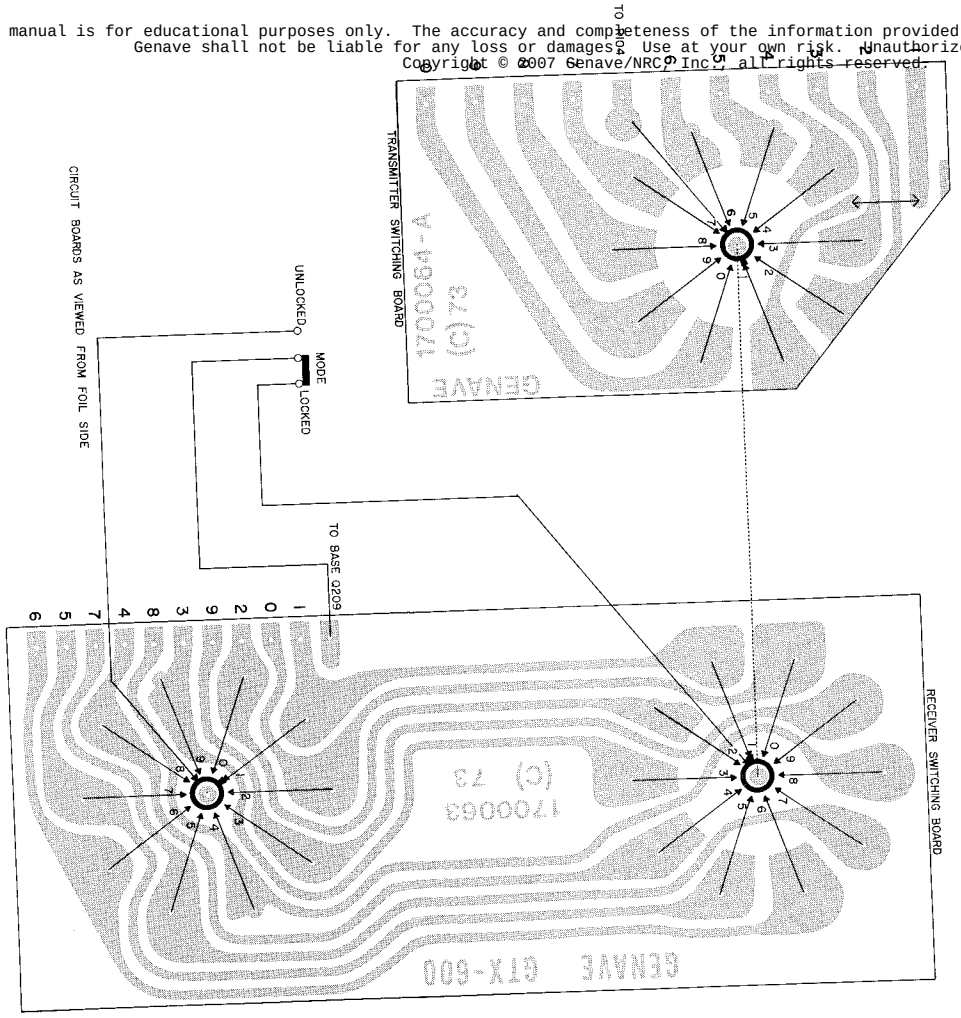

Figure 6
Frequency Switching

SUB-AUDIBLE MODULATOR OPTION

INTRODUCTION

Provisions were made during the designing of the GTX-600 to accommodate components to allow sub-audible deviation of the FM carrier. Due to the audio roll-off characteristics of the modulator in the GTX transceivers, the additional circuitry is required to achieve sufficient deviation when using modulating frequencies below 300 Hz.

The added modulator circuitry will work equally well with either tone-burst or continuous-tone systems.

INSTALLATION

Make sure solder is removed from the holes where components are to be inserted. Insert the components in to the proper holes as indicated by Figure 8. Solder all leads and check the circuit foil to make sure there are no short circuits.

ADJUSTMENT INSTRUCTIONS

The amount of deviation obtainable is controlled by the level of the audio signal applied to the modulators' input circuit. An input level range of .5 volts p-p to 2 volts p-p should give a deviation range of from 400 Hz to approximately 1400 Hz when modulating a 52 MHz carrier with a 100 Hz modulating signal.

To adjust the sub-audible modulator, connect a deviation meter to the transceiver as indicated in Figure 2 and proceed as follows:

1. Observe the deviation meter and vary the input level until the proper deviation is achieved.
2. Adjust R301 while alternately switching the deviation meter between + and − deviation until a symmetrical swing is indicated.
3. This completes the adjustment procedure. Disconnect the test equipment and reinstall the transceiver in its protective case.

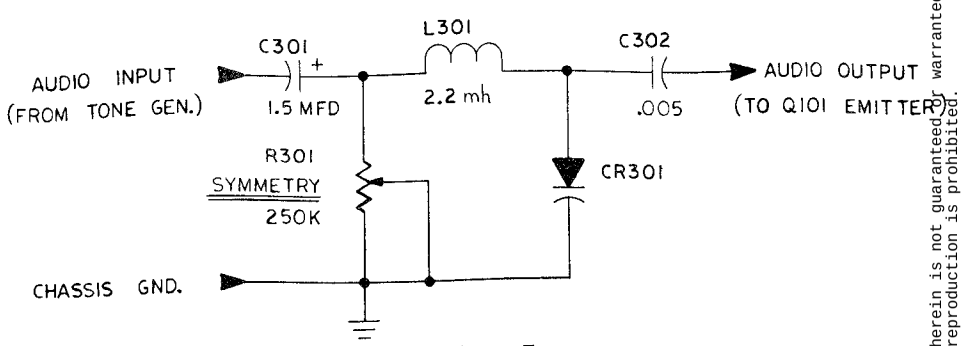

Figure 7
SCHEMATIC

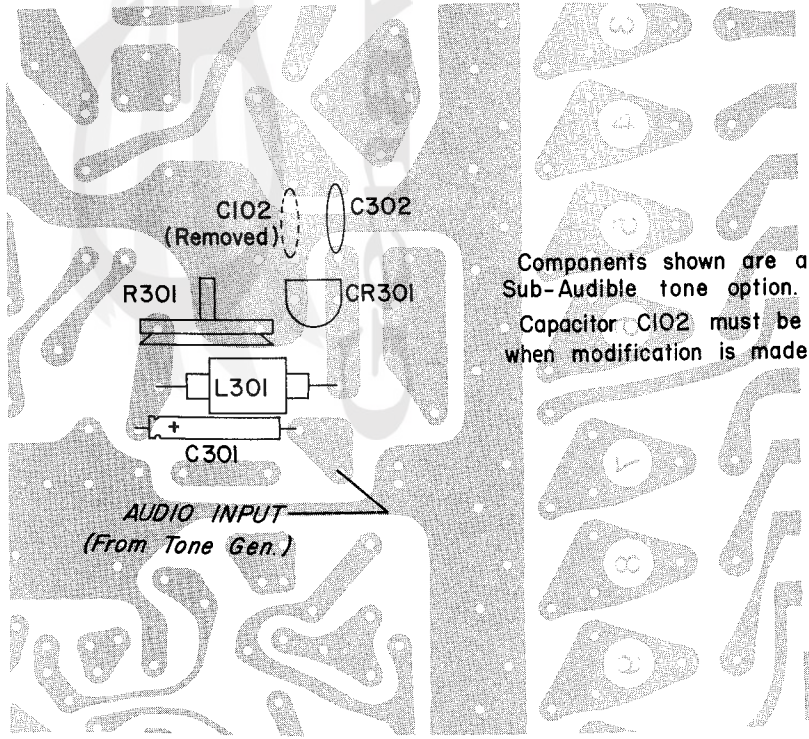

Figure 8
COMPONENT LOCATION

SUB-AUDIBLE MODULATOR PARTS LIST

Ref. No.	GENAVE Part No.	Description
		CAPACITORS
C301	1540002	Aluminum Electrolytic, 1.5 mfd, 63V
C302	1500079	Disc, .005 mfd, ±10%
		DIODES
CR301	4812113	Varicap, MV2113
		COILS
L301	1800355	2.2 mh
		RESISTORS
R301	4760022	250k ohm, Minipot, 20%

GTX-600 PARTS LIST

Ref. No.	Genave Part No.	Description
		CAPACITORS
C101	1520027	N750, Disc, 150 pf, 10%
C102	1520027	N750, Disc, 150 pf, 10%
C103		Unassigned
C104	1520054	Disc, .05 mfd, 10%
C105	1520071	Disc, .001 mfd, 10%
C106	1520042	Y5E, Disc, 470 pf, 10%
C107	1520033	Z5F, Disc, 220 pf, 10%
C108	1500079	Disc, .005 mfd, 10%
C109	1500079	Disc, .005 mfd, 10%
C110	1520037	Y5E, Disc, 330 pf, 10%
C111	1520042	Y5E, Disc, 470 pf, 10%
C112	1520042	Y5E, Disc, 470 pf, 10%
C113	1500079	Disc, .005 mfd
C114	1520018	N220, Disc, 56 pf, 10%
C115	1520176	N330, Disc, 82 pf, 10%
C116	1520027	N750, Disc, 150 pf, 10%
C117	1520071	Disc, .001 mfd, 10%
C118	1560406	Trimmer, Mica, 115 pf
C119	1520012	NPO, Disc, 27 pf, 10%
C120	1520071	Disc, .001 mfd, 10%
C121	1520054	Disc, .05 mfd
C122	1560406	Trimmer, Mica, 115 pf
C123	1520176	N330, Disc, 82 pf, 10%
C124	1560406	Trimmer, Mica, 115 pf
C125	1560005	Trimmer, Mica, 90-400 pf
C126	1560004	Trimmer, Mica, 55-300 pf
C127	1570120	Trimmer, 1-6 pf
C128	1570120	Trimmer, 1-6 pf
C129	1570120	Trimmer, 1-6 pf
C130	1570120	Trimmer, 1-6 pf
C131	1570120	Trimmer, 1-6 pf
C132	1570120	Trimmer, 1-6 pf
C133	1570120	Trimmer, 1-6 pf
C134	1570120	Trimmer, 1-6 pf
C135	1570120	Trimmer, 1-6 pf
C136	1570120	Trimmer, 1-6 pf
C137	1520013	NPO, Disc, 33 pf, 10%
C138	1520013	NPO, Disc, 33 pf, 10%
C139	1520013	NPO, Disc, 33 pf, 10%
C140	1520013	NPO, Disc, 33 pf, 10%
C141	1520013	NPO, Disc, 33 pf, 10%
C142	1520013	NPO, Disc, 33 pf, 10%
C143	1520013	NPO, Disc, 33 pf, 10%
C144	1520013	NPO, Disc, 33 pf, 10%
C145	1520013	NPO, Disc, 33 pf, 10%
C146	1520013	NPO, Disc, 33 pf, 10%
C147	1520054	Disc, .05 mfd, 10%
C148	1520053	Disc, .02 mfd, 10%
C149	1540002	Aluminum Electrolytic, 1.5 mfd, 63V
C150	1500018	Mylar, .01 mfd, 10%
C151	1520071	Disc, .001 mfd, 10%
C152	1500018	Mylar, .01 mfd, 10%
C153	1540014	Aluminum Electrolytic, 10 mfd, 25V
C154	1520071	Disc, .001 mfd, 10%
C155	1520071	Disc, .001 mfd, 10%
C156	1520071	Disc, .001 mfd, 10%
C157	1540002	Aluminum Electrolytic, 1.5 mfd, 63V
C158	1520054	Disc., .05 mfd, 10%
C159		Unassigned
C160	1520071	Disc, .001 mfd, 10%
C161	1520002	Aluminum Electrolytic, 1.5 mfd, 63V
C162	1500013	Mylar, .0047 mfd, 10%
C163	1540014	Aluminum Electrolytic, 10 mfd, 25V
C164	1500079	Disc, .005 mfd, 10%
C165	1520071	Disc, .001 mfd, 10%
C166		Unassigned
C167	1520011	NPO, Disc, 22 pf, 10%
C168	1520011	NPO, Disc, 22 pf, 10%
C169	1520175	NPO, Disc, 7.5 pf, 5%
C170		Unassigned
C201	1520012	NPO, Disc, 27 pf, 10%
C202	1570121	Trimmer, 5-25 pf
C203	1520012	NPO, Disc, 27 pf, 10%
C204	1520012	NPO, Disc, 27 pf, 10%
C205	1520027	N750, Disc, 150 pf, 10%
C206	1520051	Y5U, Disc, .01 mfd, 20%

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Ref. No.	Genave Part No.	Description
C207	1520051	Y5U, Disc, .01 mfd, 20%
C208	1520019	NPO, Disc, 68 pf, 10%
C209	1520019	NPO, Disc, 68 pf, 10%
C210	1520019	NPO, Disc, 68 pf, 10%
C211	1520019	NPO, Disc, 68 pf, 10%
C212	1520047	Y5Z, Disc, 820 pf, 10%
C213	1520176	N330, Disc, 82 pf, 10%
C214	1520027	N750, Disc, 150 pf, 10%
C215	1520175	NPO, Disc, 7.5 pf, 10%
C216	1520054	Disc, .05 mfd, 10%
C217	1520175	NPO, Disc, 7.5 pf, 10%
C218	1520054	Disc, .05 mfd, 10%
C219	1520175	NPO, Disc, 7.5 pf, 10%
C220	1520175	NPO, Disc, 7.5 pf, 10%
C221	1520054	Disc, .05 mfd, 10%
C222	1520019	NPO, Disc, 68 pf, 10%
C223	1520176	N330, Disc, 82 pf, 10%
C224	1520015	NPO, Gimmick, 2.2 pf, 10%
C225	1520071	Disc, .001 mfd, 10%
C226	1540014	Aluminum Electrolytic, 10 mfd, 25V
C227	1520022	N220, Disc, 100 pf, 10%
C228	1520051	Y5U, Disc, .01 mfd, 20%
C229	1520037	Y5E, Disc, 330 pf, 10%
C230	1520037	Y5E, Disc, 330 pf, 10%
C231	1520007	NPO, Disc, 10 pf, 10%
C232	1520051	Y5U, Disc, .01 mfd, 20%
C233	1540014	Aluminum Electrolytic, 10 mfd, 25V
C234	1500024	Mylar, .022 mfd, 10%
C235	1520055	Disc, .1 mfd, +80%−20%
C236	1500079	Z5U, Disc, .005 mfd, 20%
C237	1550004	Tant, 10 mfd, 10%
C238	1520176	N330, Disc, 82 pf, 10%
C239	1500004	Poly, .0015 mfd, 10%
C240	1550005	Tant, 47 mfd, 10%
C241	1520055	Disc, .1 mfd, +80%−20%
C242	1540038	Aluminum Electrolytic, 1000 mfd, 30V
C243	1540212	Aluminum Electrolytic, 200 mfd, 12V
C244	1520042	Y5E, Disc, 470 pf, 10%
C245	1520071	Disc, .001 mfd, 10%
C246	1520051	Y5U, Disc, .01 mfd, 20%
C247	1520010	NPO, Disc, 18 pf, 10%
C248		Unassigned
C249		Unassigned
C250		Unassigned
		DIODES
CR101	4810007	Zener, 6.8V, 10%
CR102	4812113	Varicap, MV2113
CR103	4810013	Gen. Purpose, 100V @ 1 amp
CR104	4810013	Gen. Purpose, 100V @ 1 amp
CR105	4810013	Gen. Purpose, 100V @ 1 amp
CR106	4810007	Zener, 6.8V, 10%
CR201	4810021	IN34A, Germanium
CR202	4810021	IN34A, Germanium
		INTEGRATED CIRCUITS
IC101	3130012	Op. Amp., N5558V
IC201	3136666	Silicon, TISN76666N
IC202	3136001	Silicon, Audio Output, 5N76001N
		LAMPS
I101	3900025	Clear—14.4V #53
I102	3900025	Clear—14.4V #53
		COILS
L101	1800110	Coil Transmitter, 52 MHz Mult
L102	1800216	Coil Transmitter, Driver
L103	1800203	Coil Transmitter, 52 MHz Driver
L104	1800216	Coil, Transmitter
L105	1800215	Coil, Transmitter
L106		Unassigned
L107	1800214	Coil, Transmitter
		TRANSISTORS
Q101	4800044	Silicon, 2N5172
Q102	4800026	Silicon, MPS 3693
Q103	4800027	Silicon, MPS 6511
Q104	4804427	Silicon, 2N4427
Q105	4806080	Silicon, 2N6080
Q106	4806082	Silicon, 2N6082
Q201	4805484	JFET, N. Channel, 2N5484
Q202	4800024	Silicon, MPS 3563
Q203	4805484	JFET, N. Channel, 2N5484
Q204	4800044	Silicon, 2N5172
Q205	4800122	MOSFET, N. Channel, Dual Gate, MPF 122
Q206	4805458	JFET, N. Channel, 2N5458
Q207	4805458	JFET, N. Channel, 2N5458
Q208	4805458	JFET, N. Channel, 2N5458

Ref. No.	Genave Part No.	Description
Q209	4800043	Silicon, 2N5227
Q210	4800028	Silicon, 2N5227
Q211	4800028	Silicon, 2N5227
		RESISTORS
R101	4700015	150 ohm, 10%, ½ W
R102	4700041	22K ohm, 10%, ½ W
R103	4700018	270 ohm, 10%, ½ W
R104	4700018	270 ohm, 10%, ½ W
R105	4700023	680 ohm, 10%, ½ W
R106	4700031	3.3K ohm, 10%, ½ W
R107	4700033	4.7K ohm, 10%, ½ W
R108	4700047	68K ohm, 10%, ½ W
R109	4700013	100 ohm, 10%, ½ W
R110	4700016	180 ohm, 10%, ½ W
R111	4700017	220 ohm, 10%, ½ W
R112	4700031	3.3K ohm, 10%, ½ W
R113	4700006	22 ohm, 10%, ½ W
R114	4700013	100 ohm, 10%, ½ W
R115	4700033	4.7K ohm, 10%, ½ W
R116	4700017	220 ohm, 10%, ½ W
R117	4700006	22 ohm, 10%, ½ W
R118	4700006	22 ohm, 10%, ½ W
R119	4700009	47 ohm, 10%, ½ W
R120	4700079	47 ohm, 3 W
R121	4700009	47 ohm, 10%, ½ W
R122	4700015	150 ohm, 10%, ½ W
R123	4700037	10K ohm, 10%, ½ W
R124	4760021	50K ohm, Variable Minipot, 20%
R125	4700034	5.6K ohm, 10%, ½ W
R126	4700035	6.8K ohm, 10%, ½ W
R127	4700037	10K ohm, 10%, ½ W
R128	4700043	33K ohm, 10%, ½ W
R129	4700015	150 ohm, 10%, ½ W
R130	4700053	220K ohm, 10% ½ W
R131	4700052	180K ohm, 10%, ½ W
R132	4700045	47K ohm, 10%, ½ W
R133	4700045	47K ohm, 10%, ½ W
R201	4700013	100 ohm, 10%, ½ W
R202	4700009	4.7 ohm, 10%, ½ W
R203	4700037	10K ohm, 10%, ½ W
R204	4700029	2.2K ohm, 10%, ½ W
R205	4700025	1K ohm, 10%, ½ W
R206	4700041	22K ohm, 10%, ½ W
R207	4700013	100 ohm, 10%, ½ W
R208	4700033	4.7K ohm, 10%, ½ W
R209	4700048	82K ohm, 10%, ½ W
R210	4700049	100K ohm, 10%, ½ W
R211	4700049	100K ohm, 10%, ½ W
R212	4700013	100K ohm, 10%, ½ W
R213	4700049	100K ohm, 10%, ½ W
R214	4700049	100K ohm, 10%, ½ W
R215	4700049	100K ohm, 10%, ½ W
R216	4700049	100K ohm, 10%, ½ W
R217	4700041	22K ohm, 10%, ½ W
R218	4700023	680 ohm, 10%, ½ W
R219	4700041	22K ohm, 10%, ½ W
R220	4700018	270 ohm, 10%, ½ W
R221	4700011	68 ohm, 10%, ½ W
R222	4700037	10K ohm, 10%, ½ W
R223	4700053	220K ohm, 10%, ½ W
R224	4700043	33K ohm, 10%, ½ W
R225	4700043	33K ohm, 10%, ½ W
R226	4700057	470K ohm, 10%, ½ W
R227	4700032	3.9K ohm, 10%, ½ W
R228	4760024	25K, Variable linear Taper, 20% (SQ)
R229	4700045	47K ohm, 10%, ½ W
R230	4700041	22K ohm, 10%, ½ W
R231	4760025	25K ohm, Variable, Audio Taper, 20% (Vol.)
R232	4700037	10K ohm, 10%, ½ W
R233	4700013	100 ohm, 10%, ½ W
R234	4700015	150 ohm, 10%, ½ W
R235	4700041	22K ohm, 10%, ½ W
R236	4700049	100K ohm, 10%, ½ W
		TRANSFORMERS
T101	5600041	Osc
T102	5600042	Tripler
T103	5600042	Doubler
T201	1800111	52 MHz
T202	5600040	52 MHz
T203	5600080	13.1 MHz IF
T204	5600080	13.1 MHz IF
T205	5600076	455 KHz IF
T206	5600012	455 KHz IF, White Core

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Ref. No.	Genave Part No.	Description
T207	5600012	455 KHz IF, White Core
T208	5600012	455 KHz IF, White Core
T209	5600012	455 KHz IF, White Core
T210	5600012	455 KHz IF, White Core
T211	5600012	455 KHz IF, White Core
T212	5600012	455 KHz IF, White Core
T213	5600012	455 KHz IF, White Core
		CRYSTALS
Y101		Crystal Quartz, Transmit, HC25U, Specify Frequency
Y201		Crystal Quartz, Receive, HC25U, Specify Frequency
Y211	2300251	12.654 MHz, HC18
		CHOKES
Z101	1800034	R.F., Transmitter
Z201	1800035	1 microhenry, 200 series
		MISCELLANEOUS
K101	4500007	Relay, 4PDT
SW101	5100080	Switch, Rotary, Locked
SW201	5100080	Switch, Rotary, Unlocked
SW102	5100051	Switch, Slide, Off/Lo/Hi
SW202	5100039	Switch, Slide, Mode
	2508931	Panel Front
	2502311	Panel Trim
	2502331	Knob, Vol & Sq
	2508211	Knob, Freq. Selectors
	2508072	Bracket Sub Panel
	2502281	Bracket Transistor
	2502292	Bracket Mtg. (Handle)
	2502321	Cover
	1325069	Microphone (Ceramic)
	1340408	Speaker, 1.5W, 8 ohm
P102	2100246	Male Plug #1625-2P

DC VOLTAGE MEASUREMENTS

All voltages shown in this table were measured with a VTVM from chassis ground. The DC input to the radio should be set to 13.75 VDC. The squelch control should be in the full off position and the volume control in the minimum position. No signal should be applied. The receiver A+ line should measure 12.0 VDC. A variation of ± 20% of the measured voltages from those listed may be considered normal.

Ref. No.	E	B	C	or	D	S	G	G
Q202	1.8	2.4	12.4					
Q201					12.8	0	0	
Q203					12.4	0	0	
Q205					11.6	0	0	
Q206					12.2	0	0	
Q207					11.6	0	0	
Q208					12.2	0	0	
Q209	7.5	6.8	4.5					
Q210	0	0.6	2.7					
Q211	0	0	5.8					
Q204	0	0.3	3.1					
Q101	2.5	3.2	6.8					

Pin	1	2	3	4	5	6	7	8	9	10	11	12	13	14
IC201	2.0	2.0	0	0	11.5	—	5.6	4.8	4.1	4.1	—	5.4	5.8	12.0
IC202	12.8	—	7.7	0.8	0.6	—	0	0	—	0	—	6.5	—	12.0

RECEIVER SENSITIVITY & GAIN MEASUREMENTS

Frequency	Input Point	Measurement Point	Measured Value
52.525 MHz	Ant. Conn.	Across Speaker	—115 dbm or better for 20 db quieting
13.1 MHz	Tap, T202	Sec. T212	190 uv or less for 0.2 Vp-p (Scope)
13.1 MHz	G_1, Q205	Pri. T206	1 mv for 0.3 Vp-p (Scope)
13.1 MHz	G_1, Q205	S, Q206	40 mv for 0.3 Vp-p (Scope)
13.1 MHz	G_1, Q205	D, Q206	.7 mv for 0.3 Vp-p (Scope)
13.1 MHz	G_1, Q205	Pri. T208	.7 mv for 0.3 Vp-p (Scope)
13.1 MHz	G_1, Q205	S, Q206	10 mv for 0.3 Vp-p (Scope)
13.1 MHz	G_1, Q205	D, Q206	.2 mv for 0.3 Vp-p (Scope)
13.1 MHz	G_1, Q205	Pri. T210	.5 mv for 0.3 Vp-p (Scope)
13.1 MHz	G_1, Q205	S, Q208	7 mv for 0.3 Vp-p (Scope)
13.1 MHz	G_1, Q205	D, Q208	.08 mv for 0.3 Vp-p (Scope)
13.1 MHz	G_1, Q205	Pri. T212	.4 mv for 0.3 Vp-p (Scope)
13.1 MHz	G_1, Q205	Output, T212	8 mv for 0.3 Vp-p (Scope)
52.425 MHz	Ant. Conn.	Across Speaker	2 uv or better for 1 watt output, 400 to 3000 Hz.

TECHNICAL BULLETIN

GENERAL AVIATION ELECTRONICS INC.

4141 KINGMAN DRIVE
INDIANAPOLIS, IND. 46226
AREA 317 • 546-1111

TB 7403 — 28 August 1974

SUBJECT: GTX-2, GTX-10, GTX-100, GTX-200 and GTX-600 Owners Manual Update

The information contained here is intended to update the data published in the GTX-2, GTX-10, GTX-100, GTX-200 and GTX-600 Owners Manuals.

1) Change the GTX-2, GTX-10 and GTX-200 Parts Lists to read as follows:

R136 Selected Value (Nominal P/N 4700037, 10K, 10%, 1/2W)

2) Change the GTX-100 Parts List to read as follows:

R126 Selected Value (Nominal P/N 4700037, 10K, 10%, 1/2W)

3) Change the GTX-600 Parts List to read as follows:

R222 Selected Value (Nominal P/N 4700037, 10K , 10%, 1/2W)

TECHNICAL BULLETIN

GENERAL
AVIATION
ELECTRONICS
INC.

4141 KINGMAN DRIVE
INDIANAPOLIS, IND. 46226
AREA 317 • 546-1111

TB7408 November 25, 1974

SUBJECT: Reduction of Channel 3 T.V. Reception Interference in GTX-600's.

Effective 12 November 1974 (Serial No. 10-90 and all subsequent units) all GTX-600's built will incorporate high-side injection of the first local oscillator signal. This change will greatly reduce any receiver interference caused when GTX-600's are operated near television stations transmitting on channel 3.

Modification kits are available from the factory to convert all units built prior to this change. Modification kits can be obtained by contacting the Genave Parts Department.

The modifications described above are performed as follows:

1) Z201 is changed from a 1 uHy choke (Genave P/N 1800035) to a .33 uHy choke (Genave P/N 1800030).

2) R220 is changed from a 270 ohm, 10%, 1/2 W resistor (Genave P/N 4700022) to a 150 ohm, 10%, 1/2 W resistor (Genave P/N 4700015).

3) New receive crystals will have to be installed to receive the disired frequency. The new crystal specifications are as follows:

   Parallel Mode: C_p = 39 pfd.

   3rd Overtone
   Tolerance: ± .003% Total Max.
   Temperature Range: 0° to +50° C
   Holder: HC-25/U
   Crystal Frequency = Operating Frequency + 13.1 MHz.

The parts changes described above should be noted in the Crystal Information, Schematic Diagram, and Parts List of the GTX-600 Owners Manual.