GMT-125, GMT-225, & GMT-240

VHF FM COMMUNICATIONS TRANSCEIVER MAINTENANCE MANUAL

CONTENTS

(Note: All figures are printed on white within their appropriate sections.)

Published by: General Aviation Electronics, Inc.
4141 Kingman Drive
Indianapolis, Indiana 46226
Area (317) 546-1111

Tech. Pub. No. 0540039 A

Price: Single Copy $20.00

GMT-125, GMT-225 & GMT-240

VHF-FM COMMUNICATIONS TRANSCEIVER INSTALLATION MANUAL

LIMITED

Genave WARRANTY Genave

General Aviation Electronics, Inc. (Genave), warrants this product to be free from material defects for a period of 90 days from the date of purchase, provided the warranty registration card properly filled out is returned by the purchaser to Genave within 10 days after purchase. This warranty is limited to the original retail purchaser and is not extended to second owners of the product.

Our obligation under this warranty is limited to replacement of any parts (except periodic maintenance items such as bulbs, fuses, etc.) which, upon our examination, appear to us to be defective in materials or workmanship. The parts will be replaced within 45 days after receipt of the unit, provided the unit is delivered to the Factory (Customer Service Dept., General Aviation Electronics, 4141 Kingman Drive, Indianapolis, Indiana 46226) within 90 days after the date of purchase, shipping prepaid. All shipping costs and labor charges shall be born by the purchaser.

The owner may elect to have the unit repaired at an authorized Genave repair facility in which case Genave, within 45 days after receipt of the unit, will replace only those defective parts returned shipping prepaid to the Factory (Customer Service Dept., General Aviation Electronics, 4141 Kingman Drive, Indianapolis, Indiana 46226). Purchaser shall bear any and all other costs including but not limited to labor, transportation and freight.

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 nor to units that have been damaged by lightning or other acts of God, excess current, or any units that have had serial number altered or removed. Abuse, misuse, tampering, submersion in water or willful destruction of the unit will also void this warranty.

This warranty gives you specific legal rights. You also have implied warranty rights. In the event of a problem with warranty service or performance, you may be able to go to a small claims court, a State court, or a Federal District court.

Genave offers this warranty in lieu of any and all other guarantees or warranties, either EXPRESSED or IMPLIED, including but not limited to warranties of merchantibility and/or fitness for a particular purpose. Any implied warranties are specifically and expressly limited to the 90-day period specified herein. Damages for breach of any warranties, either expressed or implied are limited to replacement of any defective parts as specified herein and any other incidental or consequential damages are expressly excluded.

General Aviation Electronics, 4141 Kingman Drive, Indianapolis, Indiana 46226 – Area 317 - 546-1111

General Aviation Electronics, Inc., 4141 Kingman Drive, Indianapolis, Indiana 46226

Specifications subject to change without notice.

TECH. PUB. NO. **0830032** A Printed in U.S.A. 1976

2-1. INTRODUCTION

The GMT-series communications transceivers are designed to provide high-quality, two-way communications at a moderate price. The high band VHF-FM transceivers are capable of fixed, mobile, or portable operation, and can be equipped with a number of available options to custom-tailor the communications system to the licensee's needs. A 15-pin connector mounted on transceiver rear panel contains 10 unused pins to facilitate connecting a variety of options or custom wiring to the instrument. These transceivers are fully compatible with all other high band FM communications systems, including the tone-squelch option.

To aid in completing the technical information required on the station-license application, the following data is supplied:

ITEM	GMT-125	GMT-225	GMT-240
Type Acceptance/Model No.:	T-7012500	T-7022500	T-7024100
Usable under F.C.C. Parts:	21, 87, 89, 91, 93	21, 81, 87, 89, 91, 93	21, 81, 87, 89, 91, 93
Output Power:	25 Watts	25 Watts	40 Watts
Emission:	16F3	16F3	16F3

This Section provides installation instructions and recommendations for fixed, mobile, or portable operation. For complete specifications on this transceiver, consult the appropriate owner's manual, maintenance manual, or catalog sheet.

2-2. EQUIPMENT SUPPLIED

a. GMT-series Communications Transceiver.
b. Mounting Bracket with hardware.
c. Hand Microphone with hang-up clip.
d. Mounting Lock.
e. Accessory Connector, 15-pin Female

2-3. EQUIPMENT REQUIRED, BUT NOT SUPPLIED

a. Vehicle or Base Antenna (See appropriate catalog sheets).
b. Antenna Cable, RG-8 A/U or RG-58 A/U, as required.
c. Cabling for Power and Signal Harness, as required.

2-4. OPTIONAL EQUIPMENT

a. ED-33, Sub-Audible Tone Squelch.
b. PSI/11, Portable Operation Package.
c. PSI/10, AC Power Supply.
d. Desk Microphone (Split Bar, if used with ED-33).
e. Telephone-Style Handset.
f. Remote Speakers: SP-5, or SP-6

SECTION 1

GENERAL INFORMATION

1-1. INTRODUCTION

This service manual contains all the information normally required to install, operate, and maintain Genave Model GMT-125, GMT-225, or GMT-240 VHF-FM transceivers.

1-2. DESCRIPTION

The GMT-series units are solid-state VHF-FM transceivers intended for use in the VHF bands from 143.9 MHz to 173.4 MHz. The units are designed for the transmission and reception of 16F3 (Frequency Modulated) radio signals; the GMT-125 operates on a single frequency, whereas the GMT-225 and GMT-240 each have provisions for two operating frequencies.

The GMT-125 and GMT-225 transceivers each employ a transmitter capable of supplying 25-watts of RF power to a standard 50-ohm antenna system, while the GMT-240 is rated at a power output of 40-watts.

The GMT-125 transceiver has two front-panel controls which can be activated by the operator: The volume control/power switch, and the squelch control. The GMT-225 and GMT-240 also have a front-panel channel-selector switch to select either of two operating frequencies. All GMT-series transceivers are equipped with a front-panel transmit-indicator lamp which illuminates when the transmitter is activated.

All three GMT-model units feature an internally-mounted speaker which can be disconnected and replaced by an external speaker via connections to a rear-panel mounted Accessory Plug. The GMT-125 is equipped with a captive hand microphone; whereas the GMT-225 and GMT-240 models are equipped with a plug-in microphone receptacle, providing a convenient method for connecting optional Genave microphones to the unit. The optional microphone styles include: A standard hand microphone, a desk-style unit, and a telephone-type handset.

Provisions are made within each transceiver for the addition of an optional ED-33 Subaudible Tone Encoder-Decoder. This subaudible tone squelch system keeps the receiver squelched until a signal containing the proper subaudible tone is received. The ED-33 board generates the subaudible tone used to modulate the transmitter to activate the receivers in the system, and also decodes incoming signals.

> NOTE: If the subaudible tone system is used, the carrier is automatically modulated by the subaudible tone during the entire time that transmission is taking place. Also, the operating frequency must be monitored to ascertain that it is NOT in use prior to originating a call. This monitoring is accomplished automatically by any of the Genave microphones utilized with the subaudible tone system.

The GMT-model transceivers are designed to operate on +13.75 volts DC primary power. The Genave PSI-10 power supply can be utilized when it is desired to operate the unit from a 117 volt, 50-60 Hz source. For portable operation, the transceiver can be powered by the optional PSI-11 Portable Power Pack.

Each transceiver is enclosed in a vinyl-clad, two-piece, aluminum wrap-around cover designed to protect the **instrument** from physical damage.

1-3. SPECIFICATIONS

GENERAL	GMT-125, GMT-225, GMT-240
Front-Panel Size:	6.5" (16.51 cm) x 2.5" (6.35 cm)
Over-all Dimensions:	11.5" (29.21 cm) deep x 6.5" (16.51 cm) wide x 2.5" (6.35 cm) high
Power Supply:	13.75 VDC, negative ground; 11.5 volts minimum
Current Drain:	Receive: 0.2 amps Transmit: 5.0 amps (GMT 125, GMT-225) 8.0 amps (GMT-240)
Frequency Range:	143.9 MHz to 173.4 MHz
Number of Channels:	1 (GMT-125) 2 (GMT-225, GMT-240)
Channel Separation:	1 MHz maximum (GMT-225, GMT-240)
Temperature Range:	-30°C to +60°C
Weight:	Approx. 6 lbs. (2.73 kg)
RECEIVE	
Sensitivity:	0.25 µV for 12 dB SINAD - less than 0.5 µV for 20 dB quieting
Selectivity:	±7.5 KHz
Squelch Threshold:	Less than 0.5 µV
Tight Squelch Threshold:	2 µV maximum
Modulation Acceptance Bandwidth:	More than 5 kHz
Adjacent Channel Rejection	40 dB min. @ ±25 kHz (EIA); 55 dB for 20 dB quieting (GMT-125, GMT-225) 70 dB min. @ ±25 kHz (EIA); 85 dB for 20 dB quieting (GMT-240)
Intermodulation Response:	70 dB minimum (EIA)
Image Response:	65 dB min. (EIA); 80 dB for 20 dB quieting

RECEIVE (Cont'd)

Spurious Response:	65 dB min. (EIA); 80 dB for 20 dB quieting
Audio Output Power:	5 watts; 4 watts @ 15% distortion
Hum & Noise Level:	Better than 35 dB below rated output
Frequency Accuracy:	±500 Hz
Frequency Stability:	±0.001%

TRANSMIT

Power Output:	25 watts typical; 143.9 to 160.0 MHz = 20 watts min; 160.0 to 173.4 MHz = 15 watts min. (GMT-125, and GMT-225) 40 watts typical; 35 watts min. (GMT-240)
Output Impedance:	50-ohms
Deviation:	5 kHz maximum; 4 kHz minimum
Frequency Accuracy:	±200 Hz
Frequency Stability:	0.0005%
Subaudible Tone:	Subaudible Deviation: 1 kHz ±200 Hz Subaudible Freq. Tolerance: ±0.3 Hz

1-4. EQUIPMENT LISTS

Section 2 of this manual contains lists of equipment normally supplied with each transceiver, equipment required but NOT supplied, as well as optional equipment available for use with the GMT-series units.

Technical information needed for the F.C.C. station-authorization applicat is also listed in Section 2, as well as in Section 3-3.

SECTION II

INSTALLATION MANUAL

The following Section

is reproduced

and included with every

GMT-125, GMT-225, GMT-240

It is made a part of

this manual

for your permanent

reference

Model: GMT-125, GMT-225, GMT-240

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2-5. PRE-INSTALLATION CHECK

VISUALLY INSPECT the unit for any obvious external damage - such as dents, broken knobs, etc. Any damage NOT related to shipping should be reported to General Aviation Electronics, Inc., 4141 Kingman Drive, Indianapolis, Indiana (46226), Area Code (317) 546-1111, as soon as possible.

If the packing case shows damage, make a notation to that effect on the express receipt or freight bill. Report to the transportation company any damage due to shipping, and file a claim promptly.

All units are shipped in perfect operating condition. However, a pre-installation electrical test may be performed to assure that the unit has suffered no internal damage during shipment. For a detailed test procedure, refer to the Maintenance Section of the Service Manual. DO NOT ATTEMPT to bench-test the unit without the proper equipment as specified in the Maintenance Manual.

The unit has been prealigned at the factory on the transmit and receive frequency (cies) listed on the tag attached to the unit. If it should be necessary to change the transmit or receive frequency, the alignment procedures contained in the transceiver maintenance manual should be performed by an authorized technician, using the proper test equipment. However, if the new frequency differs from the factory-alignment frequency by not more than one half of the maximum channel separation listed in the Specifications (normally 1 MHz), it will only be necessary to install the new crystals and net the transmit crystal, and the receive crystal.

If this unit is equipped with the "Sub-Audible Tone Squelch System" (ED-33), the subaudible tone frequency will be listed on the tag attached to the unit, and also on a label affixed to the inside of the transceiver. The subaudible tone squelch board plugs into the right-center of the transceiver circuit board. If it should be necessary to readjust the subaudible tone squelch frequency from the factory-set frequency, refer to Figure 2-6.

2-6. INSTALLATION

Before starting installation of the transceiver, determine the desired mounting location and method; ascertain that the required AC or DC power is available; determine location for antenna installation and routing of co-axial cable to the transceiver.

> NOTE: In choosing an operating point for the transceiver, remember that F.C.C. Rules require that: "Each transmitter shall be so installed and protected that it is not accessible to or capable of operation by persons other than those duly authorized by the licensee," and "The operating position must be under the control and supervision of the licensee."

The GMT - transceiver may be mounted in any convenient position; unit performance is not affected by the mounting position. However, the unit should not be mounted directly above a hot-air register or radiator.

2-6-1. Fixed or Mobile Installation

1. Remove transceiver from the mounting yoke. For fixed operation, the yoke may be repositioned on the bottom side of the unit to function as a supporting stand. For either fixed or mobile operation, the yoke may be secured in the desired location (under dash or shelf, on console or desk top, overhead, etc.) with screws or bolts through the two holes provided in the mounting yoke.

2. Connect the color-coded power leads, terminated in the rear-panel 15-pin connector, to a power source. For fixed operation, the source may be a well-regulated, low-ripple AC power supply, such as the Genave Model PSI/10. For mobile operation, the source may be a battery or the vehicle electrical system. The transceiver is designed to operate ONLY on a supply with negative ground.

   BE SURE to connect the RED power lead to +13.75 volts, and the BLACK lead to -13.75 volts (ground). If it is necessary to extend the power leads, use #14 or heavier gauge insulated copper wire.

   If supply polarity is reversed accidentally, the unit will be inoperative. In this event, check wiring polarity (RED to positive, BLACK to negative), and check the protective fuse located on the transceiver circuit board just below the rear-panel power connector. A blown fuse should be replaced ONLY with the following types:

GMT-125	3AG 7A
GMT-225	3AG 7A
GMT-240	3AG 10A

3. The GMT-125 has a hand microphone permanently wired to the transceiver, whereas Models GMT-225 and GMT-240 are each equipped with a plug-in microphone receptacle. This allows either a standard Genave hand microphone or desk-style microphone to be used without modifying the transceiver.

   NOTE: If the standard hand microphone is to be used with the ED-33 "subaudible tone squelch," the microphone-mounting clip should be attached to the selected mounting surface; then the clip MUST BE electrically connected to the chassis ground in order to provide "hang-up" receiver squelching.

   A Genave telephone-type handset can be connected to the microphone receptacle; however, if transceiver audio is to be cut-off from the speaker during two-way communications, or if the ED-33 subaudible tone squelch is used, a handset hanger with internal switching is required. Recommended handset wiring changes are shown in Figure 2-5.

4. After any optional or custom wiring has been completed, replace transceiver in mounting yoke, and tighten both thumbscrews, or install mounting lock.

5. Connect microphone or handset to transceiver, if not already connected, and insert 15-pin plug into the mating rear-panel receptacle.

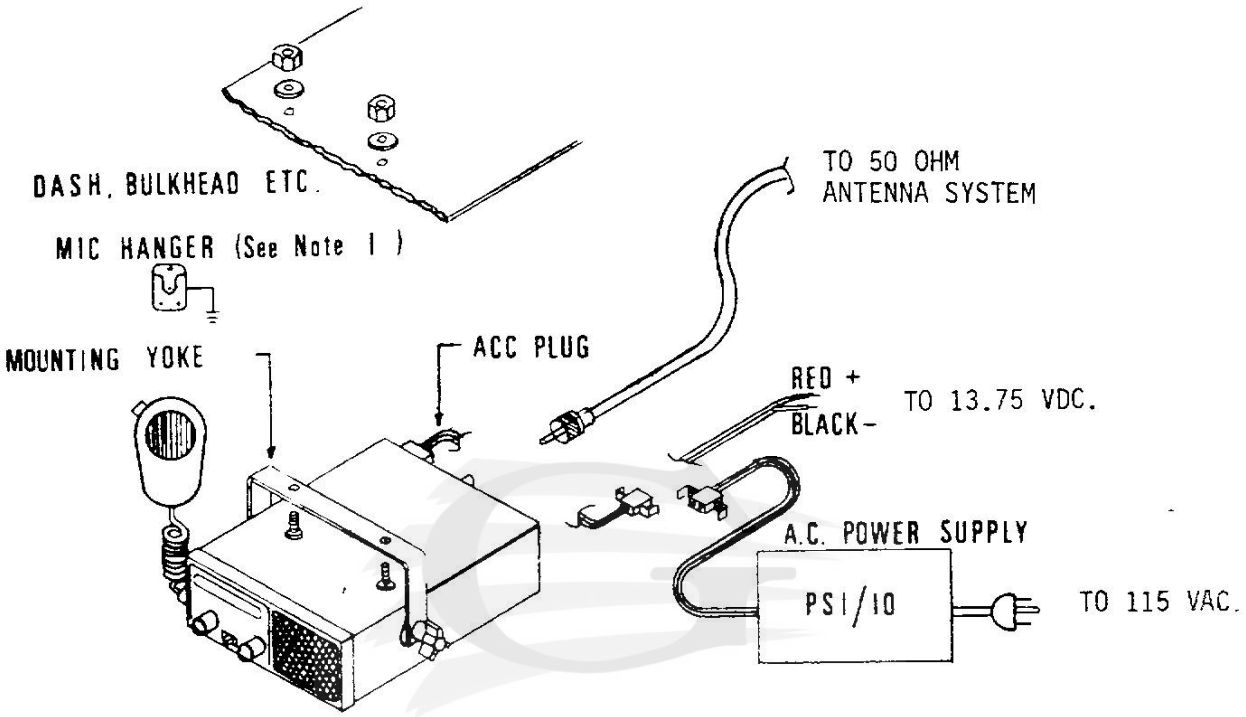
6. Connect antenna cable to the rear-panel antenna connector. See Figure 2-2.

NOTE: The transceiver is designed to match standard 50-ohm VHF communications antennas. In the interest of maximum efficiency, the antenna system should exhibit a low VSWR.

2-6-2. Portable Operation

1. The easiest method of portable operation is to utilize the Genave PSI-11 Portable Power Pack. The PSI-11 includes a rechargeable battery, AC-powered charger, carrying handle with microphone clip and portable antenna.

2. Portable operation of the transceiver requires the same basic considerations as fixed or mobile operations, that is, connections to the power source, antenna system, and microphone.



NOTES.

1. HANGER MUST BE CONNECTED TO CHASSIS GROUND WHEN USING TONE SQUELCH.

Figure 2-1. Installation Illustration

2-6-3. Antenna Coaxial-Connector Assembly

1. Trim end of cable flush; then, remove outer jacket from cable to dimension shown in Figure 2-2. Slide connector ring and adapter sleeve on cable.

2. Fan out braid, and fold back as shown.

3. Remove a 5/8" length of insulation from the center conductor as shown. Tin center conductor; then, press braid over adapter sleeve and trim to dimension shown.

4. Screw the plug assembly onto adapter sleeve, and solder braid to plug assembly through solder holes in side of sleeve. Next, solder center conductor to plug assembly center pin. To complete assembly, screw connector ring over plug assembly.

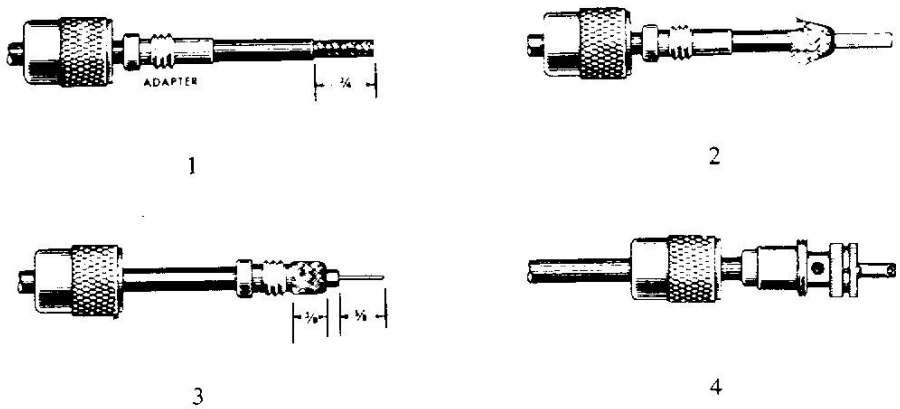


Figure 2-2. Antenna Coaxial-Connector Assembly

2-6-4. Mounting-Lock Installation

If desired, the mounting lock can be used to secure transceiver to the mounting bracket when unit is attached to a desk-top, bulkhead, overhead, or under-panel configuration. The lock can be used when transceiver is secured through either the top or bottom mounting holes of bracket, however, the bottom mounting holes will assist in concealing heads of the screws used to secure bracket to the mounting surface. To install mounting lock, proceed as follows:

1. Remove mounting screw and nylon washer from side of the transceiver-mounting bracket to which mounting lock is to be attached.

2. Position mounting lock so that hole in the lock and locking tab are aligned with the two holes in the mounting bracket.

3. Secure mounting lock to unit, using one of the hex-head mounting screws provided. Be sure that screw passes through correct hole in the mounting bracket. See Figure 2-3.

4. Attach a padlock through holes in the sides of mounting lock, as shown in Figure 2-4; then, latch padlock to prevent removal of unit from mounting bracket.

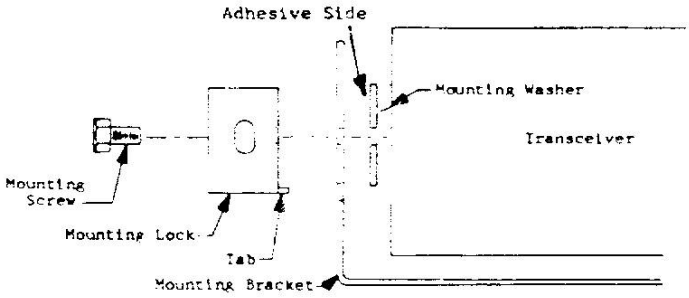


Figure 2-3. Mounting-Lock Installation

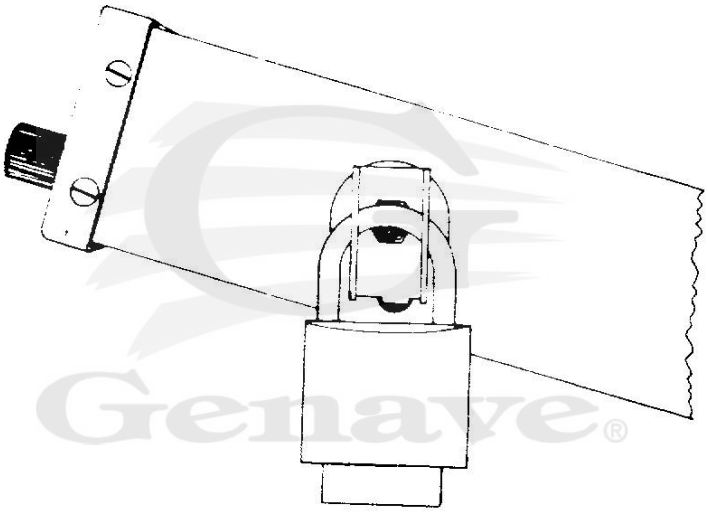


Figure 2-4. Lock Placement

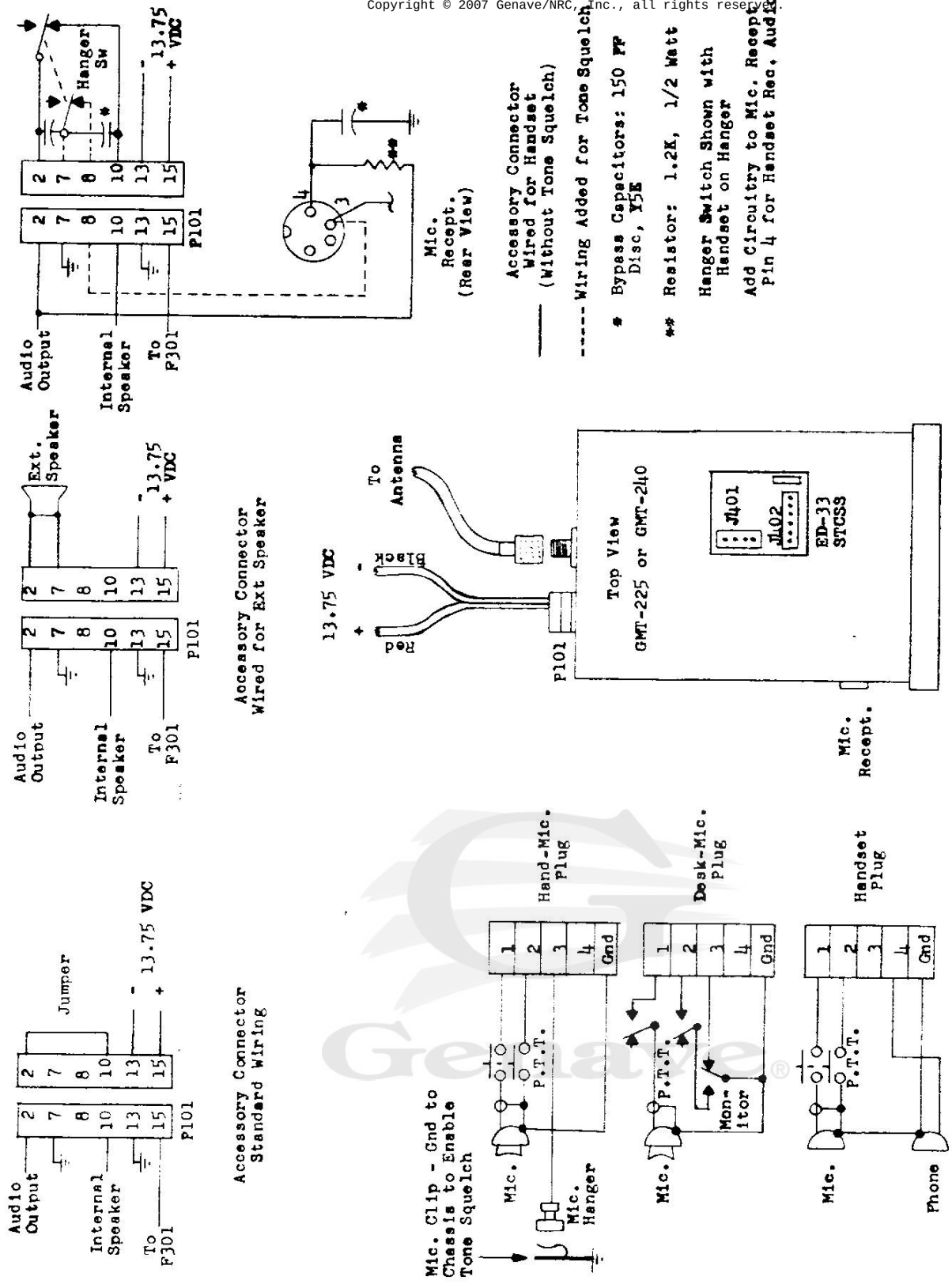


Figure 2-5. Accessory Connector & Mic. Wiring

2-7. ACCESSORY CONNECTOR, P101

The 15-pin male plug mounted on rear panel of the GMT- transceiver is designated as the "Accessory Connector," and mates with a 15-pin female connector to provide a convenient method of connecting power or optional accessories to the unit. Standard wiring of the accessory connector utilizes five pins, leaving ten pins available for options or customized installation. Figure 2-5 illustrates standard wiring of the accessory connector, and the recommended connections for use with a handset-hanger switch. The connections to the accessory-connector pins are described below:

PIN 1 - No connection

PIN 2 - High-level audio output from receiver section of transceiver; this audio is applied either to the internal speaker or to an external 4-ohm speaker, as determined by wiring of the accessory connector. To use the internal speaker, a jumper is connected between pins 2 and 10 of the female connector; to connect an external speaker, the speaker leads are connected between pins 2 and 7 of the 15-pin female connector.

If a telephone-style handset is used with the transceiver, the handset-hanger switch should be connected between pins 2 and 10 of the female connector to disable the internal speaker when the handset is removed from its hanger. The handset has an internal earphone which is wired through the microphone plug; thus, cutting off the internal speaker allows the operator some privacy.

PIN 3 - No connection

PIN 4 - No connection

PIN 5 - No connection

PIN 6 - No connection

PIN 7 - A chassis ground, particularly intended for audio circuitry such as external speaker, tone-squelch enable, etc.

PIN 8 - No connection, normally; however, if a handset AND "subaudible tone squelch" are both used with the transceiver, pin 8 of the male plug should be connected to pin 3 of the microphone receptacle inside the transceiver to provide a "tone-squelch enable" wire. The handset hanger "tone-squelch enable" switch is then connected to pins 7 and 8 of the 15-pin female connector as shown in Figure 2-5. Therefore, pin 8 will be held at ground potential when the handset is in place on its hanger. Pin 8 will be ungrounded when the handset is removed from the hanger; thus, the tone squelch is disabled to allow monitoring of the operating frequency prior to starting transmission.

PIN 9 - No connection

PIN 10 - Input connection to the internal 4-ohm speaker in the transceiver. This pin is normally jumpered to pin 2. See Figure 2-5.

PIN 11 - No connection

PIN 12 - No connection

PIN 13 - Chassis ground, and DC-input voltage negative connection. The female connector has a black lead, approx. four feet in length, attached to this pin for connection to the DC-power source.

PIN 14 - No connection

PIN 15 - DC-input voltage positive connection. The female connector has a red lead, approx. four feet in length, attached to this pin for connection to the DC-power source.

2-8. MICROPHONE RECEPTACLE

The microphone receptacle is a 5-conductor jack (4 pins plus shell) mounted on the left-side panel of GMT-225 and GMT-240 transceivers. Internal connections are made to this receptacle so that standard Genave hand microphones, desk-style microphones, or telephone-type handsets can be used interchangeably. However, if a handset is to be used, receiver audio for the handset earphone should be connected to mic. receptacle pin 4 as described below (see Figure 2-5). The connections to the microphone receptacle pins are described below:

Pin 1 - Microphone-audio connection to input of transmitter-modulator circuitry.

Pin 2 - Microphone push-to-talk switch connection. When switch is closed, one side of transmitter keying relay is grounded; thus energizing relay and applying power to transmitter.

Pin 3 - Tone-squelch enable connection. If transceiver is NOT equipped with the ED-33 Subaudible Tone Squelch, this pin has no function; however, if the tone-squelch option is to be used, this pin must be grounded for the tone-squelch circuitry to squelch the receiver. Removing the ground from this pin disables the tone squelch - allowing the frequency to be monitored.

The method of grounding pin 3 is dependent upon type microphone being used: The hand microphone grounds this pin through the mic. hanger and mic. mounting clip; the desk-style microphone grounds pin 3 through contacts on the "monitor" switch; while the handset grounds pin 3 by means of switch contacts in the handset hanger. Refer to Figure 2-5.

NOTE: If a handset hanger and tone squelch are to be used with the transceiver, a wire must be connected between pin 8 of the rear-panel Accessory Plug and pin 3 of the mic. receptacle as shown in Figure 2-5.

Pin 4 - No connection, normally; however, if a telephone-style handset is used, receiver audio should be connected to this pin as shown in Figure 2-5. Provisions have been made on the printed-circuit board to mount the 1.2 K resistor - a copper track on the board extends from the resistor mounting pad to the receiver audio output. A wire must be connected from the other resistor mounting pad to pin 4 on the mic. receptacle, and a 150 PF disc capacitor should be connected from pin 4 to chassis ground, using short leads.

NOTE: The value of the 1.2K resistor may be increased or decreased as desired to set the maximum earphone volume.

GND - Provides a chassis ground connection for the microphone audio and push-to-talk circuits.

2-9. SUBAUDIBLE TONE-FREQUENCY ADJUSTMENT

If the transceiver is equipped with the ED-33 Subaudible Tone Squelch option, the tone frequency will be listed on the tag attached to the unit, and also on a label affixed to the inside of the transceiver. The tone-squelch board is located at the right-center of the main PC board, as shown in Figure 2-5. If it should be necessary to readjust the tone frequency from the factory-set value, proceed as follows:

1. With cover removed from transceiver, connect unit to its power source.

2. If another unit with the correct subaudible tone frequency is available, it may be used for on-the-air alignment; otherwise, set a signal generator for a 10-microvolt signal on the appropriate operating frequency with ±1 kHz deviation at the desired subaudible tone frequency.

3. If on-the-air alignment of the tone frequency is to be performed, connect transceiver to the antenna; otherwise, connect transceiver to signal-generator.

NOTE: It is NOT necessary to change any of the level adjustments on the ED-33 board unless the ED-33 board has not been previously aligned in the transceiver. All ED-33 boards shipped from the factory with the unit have been aligned with the transceiver, and the level settings will NOT need adjustment. If an ED-33 tone-squelch board is removed from one transceiver and placed into another unit, it must be realigned. For alignment procedures, refer to the appropriate Maintenance Manual.

4. Connect an AC VTVM to pin 3 of J402 on the ED-33 tone-squelch board, Figure 2-6.

5. Adjust R417, tone-frequency adjustment, for maximum AC voltage as indicated on the VTVM. Potentiometer R417 is accessible, using a long-shank screwdriver, from over the top of the transceiver front panel.

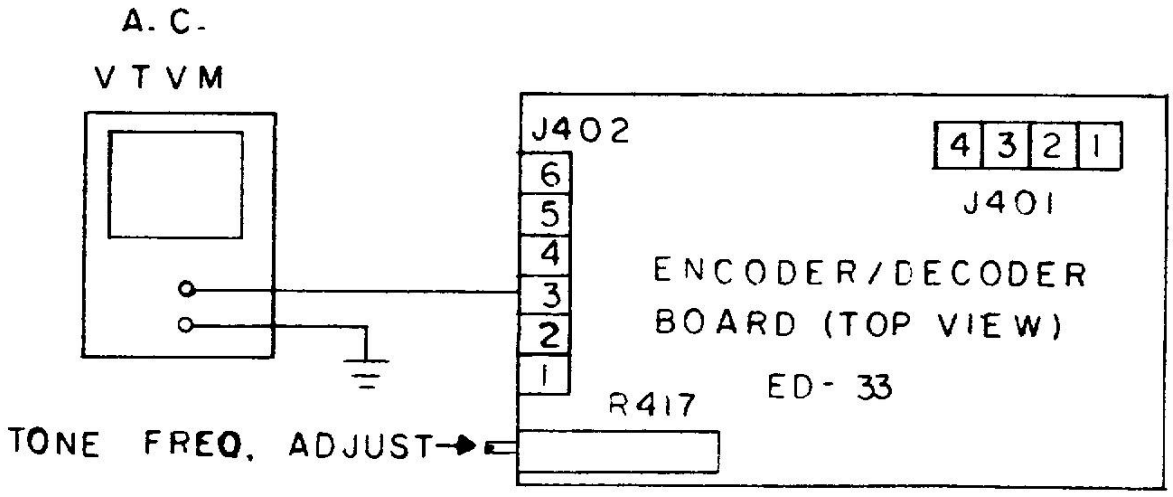
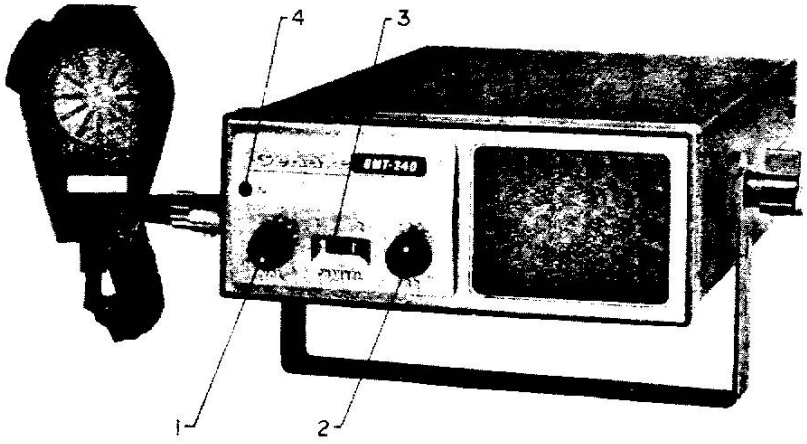


Figure 2-6. Tone-Frequency Adjustment

SECTION III
OPERATING MANUAL



3-1. OPERATING CONTROLS

For reliability and operating convenience, the GMT-series units employ a minimum of front-panel operating controls. These controls are as follows:

1. Volume Control/Power Switch
2. Squelch Control
3. Channel-Selector Switch (GMT-225 & GMT-240 only)
4. Transmit-Indicator Lamp

The push-to-talk button on the microphone also functions as an operating control. Unit operation is quite simple, and the following operating instructions apply both to those units equipped with the ED-33 subaudible tone squelch, and those NOT equipped.

3-2. OPERATING INSTRUCTIONS

1. Turn VOLUME control (#1) and SQUELCH control (#2) fully counterclockwise.

2. Move CHANNEL SELECTOR (#3) to the desired operating frequency on Models GMT-225 or GMT-240.

   NOTE: The GMT-125 does NOT have a Channel Selector, since it is a single-channel unit.

3. Rotate VOLUME control clockwise until switch clicks; this applies operating power to the transceiver - no warmup time is required

4. If transceiver is equipped with the ED-33 "subaudible tone squelch," it is necessary to deactivate tone squelch temporarily by removing the microphone from its hanger, or by depressing the MONITOR button on the desk-style microphone.

5. Now, rotate VOLUME control clockwise to adjust receiver volume to desired level.

6. Turn SQUELCH control clockwise until the background noise just disappears.

   NOTE: DO NOT adjust squelch control further clockwise than necessary to eliminate background noise, and do NOT attempt to adjust squelch control while a signal is being received.

7. To transmit, depress the microphone "transmit" pushbutton. If unit is equipped with the "subaudible tone squelch system," it is important to monitor the channel before transmitting to insure that channel is not in use. The microphone circuitry is designed to be installed in such a manner that receiver squelching is deactivated when the microphone or handset is removed from its hanger (see Figure 2-5); while the G-11 desk-style microphone is designed so that the TRANSMIT button can not function unless the MONITOR switch is depressed first.

8. The TRANSMIT-INDICATOR LAMP (#4) will illuminate when the transmitter is operating; then, hold microphone 3 to 6 inches from your mouth, and talk in a normal voice.

9. Release the TRANSMIT button to listen.

   NOTE: The squelch circuit, which is adjusted by the front-panel SQUELCH control, quiets the receiver in the absence of an incoming signal on the assigned operating frequency; however, any station in your vicinity, operating on this frequency, will be heard. With the tone-squelch system, however, only transmitted signals carrying the proper subaudible, continuous tone are heard.

3-3. LICENSING INFORMATION

Licensing requirements vary with the service for which this unit will be used, however, all services require that the station transmitter be licensed. Further, some services require the operators to hold a valid commercial radio operator license or permit - the minimum class of radio operator authorization required for operation of each specific classification of station is set forth in the appropriate F.C.C. rule part.

The GMT-125, GMT-225, and GMT-240 are approved for use in the services provided by F.C.C. Rules and Regulations, Parts 21, 87 (Civil Air Patrol Stations), 89, 91, and 93; in addition, Models GMT-225 and GMT-240 are approved under Part 81, also.

The procedures for obtaining the necessary licenses are found in the Federal Communications Commission Rules and Regulations, and vary with the service and rule part under which the intended operation is authorized. The services and their corresponding F.C.C. rule part numbers, under which the GMT-series transceivers can be used, are as follows:

Domestic Public Radio Services (Other than Maritime Mobile) - F.C.C. Rules and Regulations, Volume VII, Part 21
- Domestic Public Land Mobile Radio Service
- Rural Radio Service

Stations on Land in the Maritime Services - F.C.C. Rules and Regulations, Volume IV, Part 81
- Public Coast Stations
- Marine Utility Stations
- Fixed Stations Associated with the Maritime Mobile Service
- Stations Operated In the Land Mobile Service for Maritime Purposes

Aviation Services - F.C.C. Rules and Regulations, Volume V, Part 87
- Civil Air Patrol Stations

Public Safety Radio Services - F.C.C. Rules and Regulations, Volume V, Part 89
- Local Government Radio Service
- Police Radio Service
- Fire Radio Service
- Highway Maintenance Radio Service
- Forestry-Conservation Radio Service
- Special Emergency Radio Service

Industrial Radio Services - F.C.C. Rules and Regulations, Volume V, Part 91
- Power Radio Service
- Petroleum Radio Service
- Forest Products Radio Service
- Motion Products Radio Service
- Relay Press Radio Service
- Special Industrial Radio Service
- Business Radio Service
- Manufacturers Radio Service
- Telephone Maintenance Radio Service

Land Transportation Radio Services - F.C.C Rules and Regulations, Volume V, Part 93
Motor Carrier Radio Service
Railroad Radio Service
Taxicab Radio Service
Automobile Emergency Radio Service

Any of the above volumes may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Answers to specific licensing questions can be answered by the Engineer in Charge at any Federal Communications Commission Field Engineering Office. The locations of these offices are given here for your convenience.

Alabama, Mobile 36602
439 U.S. Courthouse & Custom House

Alaska, Anchorage 99501
54 U.S. Post Office and Courthouse
Bldg., Box 644

California, Los Angeles 90012
U.S. Courthouse, Rm. 1758
312 North Spring St.

California, San Diego 92101
Fox Theatre Bldg.
1245 - 7th Avenue

California, San Francisco 94111
323 - A Custom House
555 Battery Street

California, San Pedro 90731
300 So. Ferry St., Rm. 2525,
PO Box 3009, Terminal Island

Colorado, Denver, 80202
504 New Custom House
19th between California & Stout Sts.

District of Columbia, Wash. 20554
Room 216
1919 M St., N.W.

Florida, Miami 33130
51 S.W. First Ave., Rm. 919

Florida, Tampa 33602
809 Barnett Office Bldg.
1000 Ashley Drive

Georgia, Atlanta 30303
1602 Gas Light Tower
235 Peachtree Street, N.E.

Georgia, Savannah 31402
238 Post Office Bldg., PO Box 8004

Hawaii, Honolulu, 96808
502 Federal Bldg., PO Box 1021

Illinois, Chicago 60604
3935 New Federal Bldg.
230 So. Dearborn Street

Louisiana, New Orleans 70130
829 Federal Office Bldg.
600 South Street

Maryland, Baltimore 21201
819 Federal Bldg.
31 Hopkins Plaza

Massachusetts, Boston 02109
1600 Custom House

Michigan, Detroit 48226
1054 New Federal Building

Minnesota, St. Paul 55101
691 Federal Bldg & U.S. Courthouse
4th & Robert St.

Missouri, Kansas City 64106
1703 Federal Building
601 East 12th Street

New York, Buffalo 14203
328 Federal Building

New York, New York 10014
748 Federal Building
641 Washington Street

Oregon, Portland 97204
314 Multnomah Bldg.
319 S.W. Pine St.

Pennsylvania, Philadelphia, 19106
1005 U.S. Custom House

Puerto Rico, San Juan 00903
322-323 Federal Bldg, PO Box 2987

Texas, Beaumont 77701
323 Federal Bldg.
300 Willow Street

Texas, Dallas 75202
Federal Courthouse & Office Bldg.
1100 Commerce St., Room 13E7

Texas, Houston 77002
New Federal Office Bldg.
515 Rusk Avenue Room 5636

Virginia, Norfolk 23502
Military Circle
870 No. Military Highway

Washington, Seattle 98104
8012 Federal Office Bldg.
1st Avenue and Marion

The following technical information is intended to aid GMT-transceiver users in completing the application for radio-station authorization. Only technical data pertaining to the transceiver are shown below; all other station particulars must be furnished by the licensee.

Some items required for completion of the F.C.C. application forms depend upon calculations from technical data relating to other equipment used in conjunction with the GMT-transceiver - e.g., the antenna, feedline, etc. Consult the antenna and cable manufacturers' data sheets for these specifications.

For additional information on filling out the appropriate application forms, consult the F.C.C. instruction sheet provided for that form. Note that some forms may be completed either by printing in ink or by typing; whereas, typing is mandatory for certain F.C.C. application forms. Two of the more common forms used to apply for a license for the GMT-series transceiver are F.C.C. Forms 400 or 425, depending upon the usage and/or geographic location of the proposed station. To determine which form is required, contact the nearest F.C.C. Field Engineering Office as listed previously - they will also supply the appropriate forms.

ITEM	GMT-125	GMT-225	GMT-240
Transmitter Input Power (Watts)	60	60	80
Transmitter Output Power (Watts)	25	25	40
Type of Unit	T R A N S C E I V E R		
Emission Designator	16F3	16F3	16F3
Equip. Manufacturer's Name	General Aviation Electronics, Inc.		
Type Accepted	Yes	Yes	Yes
Type Acceptance/Model Number	T-7012500	T-7022500	T-7024100
Tone Squelch Freq (If used)	If unit is equipped with ED-33, tone freq is shown on tag attached to transceiver.		

SECTION IV
MAINTENANCE MANUAL

4-1. INTRODUCTION

The Genave transceivers, Models GMT-125; GMT-225; and GMT-240, are VHF-FM units designed to transmit and receive 16F3 emissions in the various land mobile or business radio services between 143.9 and 173.4 MHz. The GMT-125 provides a power output of 25 watts into a 50-ohm load on a single operating frequency. The two-channel GMT-225 supplies a power output of 25 watts into a 50-ohm load, whereas, the GMT-240 is rated at 40 watts output into 50-ohms on either of two channels.

Basically, the receiver is a dual-conversion superheterodyne, utilizing a single integrated circuit to perform the limiting and detection functions. In conjunction with the following circuit description, refer to the appropriate GMT-transceiver schematic and the block diagram of Figure 4-1.

4-2. THEORY OF OPERATION - RECEIVER

4-2-1. Low-Pass Filter

From the antenna connector, the received signal is applied to the low-pass filter comprised of C387, L315, and C386. After the signal leaves the low-pass filter, it is routed to pin 15 of the T/R relay, K301. In the receive mode, pin 14 of the T/R relay feeds the incoming signal to the receiver input filter.

NOTE: The low-pass filter is utilized to filter both the received and transmitted signals.

4-2-2. Input Filter and RF Amplifier

The single-tuned receiver input filter consists of C103 and L102, with the output tap on L102 coupled to RF amplifier Q101. The RF amplifier output is applied to a double-tuned circuit comprised of L103, C106, C109, and L104; then, the tap on L104 is coupled to a second RF amplifier, Q102. The output of Q102 is applied to another double-tuned circuit consisting of L105, C111, L106, and C114. The output tap on L106 routes the amplified signal to a dual-gate FET first-mixer, Q103.

4-2-3. First Local Oscillator and Tripler

The first local oscillator consists of Q109 and its associated circuitry. The proper crystal in the 44.4 MHz to 54.2333 MHz range is used in the oscillator circuit to produce the desired injection frequency. The collector circuit of Q109 is tuned to the crystal frequency, and the output is coupled to the base of tripler Q110. The output of Q110 is tuned by C155 and the primary of T109 to cover the frequency

range from 133.2 to 162.7 MHz; then, the secondary of T109 is connected to Gate 2 of dual-gate first-mixer Q103. The first injection frequency is 10.7 MHz below the desired "receive" frequency.

4-2-4. First Mixer and First IF Amplifier

The 10.7 MHz difference signal produced in the first mixer is coupled by T101 to a 4-pole monolythic crystal filter consisting of FL101 and FL102. The output of the filter is transformer coupled by T102 to the first stage, Q104, of the first IF amplifier. In Models GMT-125 and GMT-225, the output of Q104 is coupled to the second stage, Q105, of the first IF amplifier by a double-tuned circuit comprised of T103 and T104. In the GMT-240, the output of Q104 is coupled by T103 to another 4-pole monolythic crystal filter consisting of FL103 and FL104. The output of the filter is then transformer coupled by T104 to the second stage, Q105, of the first IF amplifier.

NOTE: The second crystal filter, FL103 and FL104, is available as an option in Models GMT-125 and GMT-225.

4-2-5. Second Mixer/Autodyne Converter

The output of Q105 is transformer coupled by T105 to the second mixer, Q106, which operates as an autodyne converter with crystal Y123 oscillating at 10.245 MHz to produce a second IF of 455 kHz.

4-2-6. Second IF Amplifier

Transformer T106 applies the resultant 455 kHz difference frequency to IC101, which functions as a high-gain 455 kHz IF amplifier.

4-2-7. Audio Limiter, Detector and Squelch

The output of IC101 is coupled by T107 to IC102 pins 1 and 2 - IC102 performs the limiting and detection functions in the receiver. C130 sets the de-emphasis level in the detection circuitry, while T108, R121, and C131 form the quadrature-detector circuit. Detected audio on pin 8 of IC102 is fed through C132 and R122 to the audio amplification circuits via pin 14 on IC102. Detected audio from pin 8 is also applied to a noise amplifier consisting of Q107 and associated circuitry. The amplified noise from Q107 is fed to the voltage-doubling detectors CR103 and CR104. The detected noise then charges C137 and biases the base of Q108. The Squelch Control, R127, determines the authority of the detected-noise level on the base of Q108 - as Q108 begins to turn on, it begins to pull pin 6 of IC103 to ground. This action turns IC103 off, and completely silences the receiver.

4-2-8. Audio Amplifier

The Volume Control, R131, sets the level of audio fed to IC103, the audio amplifier. R132 and C142 perform the frequency-response shaping of the audio amplifier, while C144, C145, and C147 provide feedback to the various stages within IC103. Audio output from pin 12 of IC103 is applied through C149 to the speaker.

To quiet receiver audio during transmission, T/R relay K301 removes all receiver DC-input voltages, and grounds the receiver DC-supply line through a low-value resistance, R145, while transmitter circuits are energized.

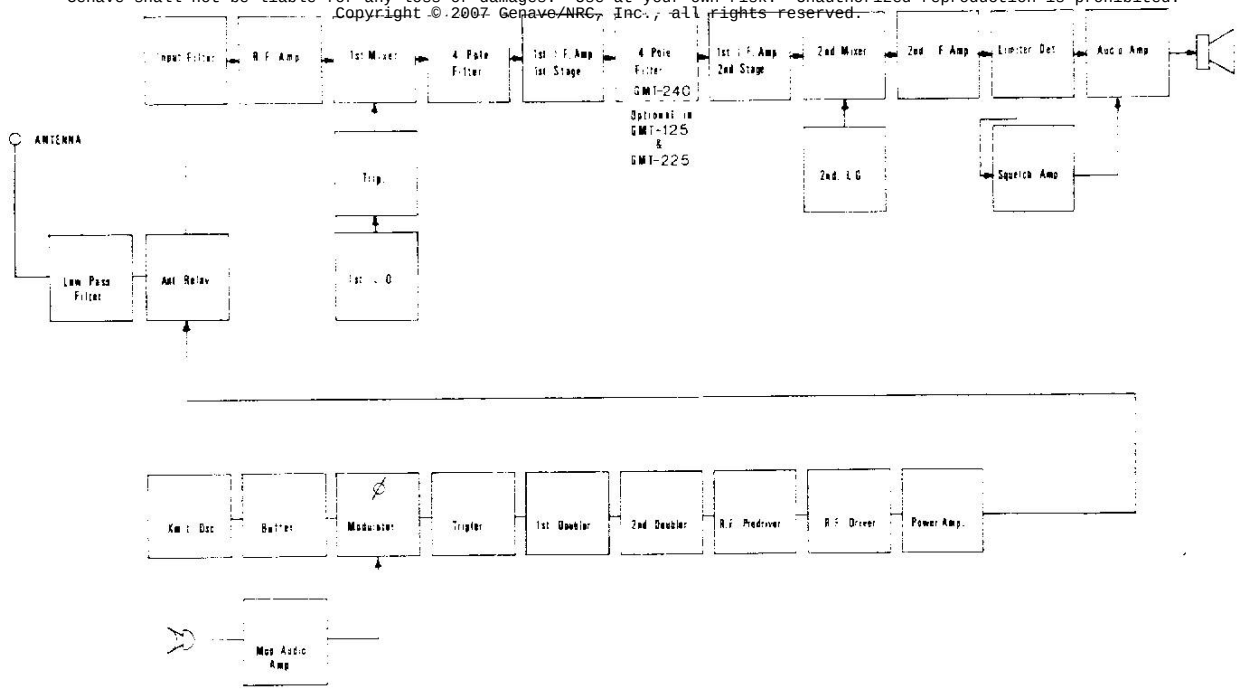


Figure 4-1. Block Diagram

4-3. THEORY OF OPERATION - TRANSMITTER

4-3-1. Microphone Amplifier/Limiter

The audio amplifier/modulator in the transmitter is built around a single integrated-circuit, IC301. This IC is a dual operational amplifier, and is shown on the schematic diagram as IC301A and IC301B. Audio output of the ceramic microphone is amplified by IC301A - a 6 dB per octave rising characteristic is given to the audio frequencies by loading the 1500 PF microphone capacitance with the bias resistor, R331. IC301 also provides the clipping required for limiting modulation by saturating symmetrically against supply voltage and ground. The 6.8 volt regulated-supply voltage for the modulator is obtained by applying 13.75 VDC primary power through series resistor R332 and across 6.8 volt zener diode, CR305.

The output from IC301A is applied to IC301B - which acts as an active, 2-pole, Chebyshev low-pass filter with a cutoff frequency of 3 kHz. R338 and C400 add a third pole to the filter, and ensure an 18 dB per octave roll-off above 3 kHz. Voice Dev. control, R339, sets the audio level applied to the modulator diodes, while C401 provides an audio return for R339.

4-3-2. Voice Modulator

CR302 and CR311 function as the phase modulators. DC bias for the modulation diodes is provided by IC301B through R338, R339, and R340, while R340 and C346 perform pre-emphasis of the audio applied to the phase-modulator circuitry.

A signal between 11.991 and 14.45 MHz from the transmit crystal oscillator is applied to CR302 and CR311 by tuned transformer T301. As an audio signal from the modulation amplifier is applied to the varactor diodes, the capacitance of the diodes

changes - thus varying the resonant frequency of tuned transformer T301. This results in phase modulation of the carrier signal.

4-3-3. Subaudible Tone Modulator

The circuitry composed of C412, C411, R349, R348, R350, CR310, L316, and C410 is used to frequency modulate the transmit crystal oscillator when the subaudible-tone encoder is employed. The amount of frequency modulation which results from the subaudible-tone input is limited by the applied-tone level. R349 is used to change the conduction angle of CR310 and, therefore, the symmetry of the subaudible modulation. This circuitry is used ONLY when the ED-33 Subaudible Tone Encoder/Decoder circuit board is installed in the unit.

4-3-4. Transmit Crystal Oscillator

Q301 and associated circuitry form the "transmit" oscillator, which is a basic Colpitts crystal circuit. A variable capacitor is used in series with the crystal to allow exact setting of the generated frequency.

4-3-5. Crystal Oven

The circuitry comprised of R344, R347, R345, and Q310 is used to provide heat to the "transmit" oscillator crystal. Thermistor R347 controls transistor Q310 in a manner that causes resistor R345 to produce heat when the ambient temperature drops below 0° C. R345 is held in contact with the crystal; thus, by heating the crystal, the frequency does not change as radio is subjected to colder temperatures.

4-3-6. Buffer

Q302 is a P-channel JFET which functions as a buffer to isolate the "transmit" oscillator circuitry from the phase modulator.

4-3-7. Tripler

The output from the modulator is applied via C347 to the base of Q303, which functions as an RF tripler. In this stage, for example, a modulated 13 MHz signal is multiplied to 39 MHz. The double-tuned transformer, T302, functions as a filter to reduce all harmonics and subharmonics of the desired 39 MHz output.

4-3-8. First Doubler

The filtered 39 MHz output from the secondary of T302 is applied to the base of Q304, the first doubler. This Class C doubler stage multiplies the modulated 39 MHz output signal, from the tripler, to a frequency in the 78 MHz range. The output circuit of Q304 is tuned by means of a double-tuned transformer, T303, which filters all undesired harmonics and subharmonics from the 78 MHz first doubler output.

4-3-9. Second Doubler

The 78 MHz signal from the first doubler is applied to the base of Q305, another Class C doubler stage. Here, the modulated 78 MHz RF signal from the first doubler is again doubled to the final output frequency in the 156.0 MHz range. The output of Q305 is matched to the following amplifier stages by a resonant "L" section consisting of L302 and C360. This circuit also provides suppression of any subharmonics of the desired output signal.

4-3-10. RF Predriver

The 156 MHz signal from the final multiplier stage is applied to the base of Q306, which functions as the first RF-power amplifier. This Class C amplifier increases the RF-signal level from 50 milliwatts to approximately 500 milliwatts. The predriver output is coupled to the following driver stage by means of a filter network formed by L303, C365, C366, and L304. This circuit provides both filtering of any undesired spurious responses, and impedance matching into the driver stage.

4-3-11. RF Driver

Q307 and associated circuitry function as an RF driver in a Class C configuration. L305, C368, L306, C369 and C370 form a frequency-selective matching network which also reduces any undesired outputs.

4-3-12. Final Power Amplifier

Q308 functions as the final RF-power amplifier - the power output being dependent upon the transceiver model: In the GMT-125 and GMT-225, Q308 develops 25 watts of RF power; whereas, Q308 develops 40 watts of RF output in the GMT-240. C373, C374, L309, and C406 comprise a resonant matching network, which matches the output from Q308 to the 50-ohm antenna impedance. The remainder of the components up to the output connector form an elliptic-function filter, which reduces the level of all spurious outputs to less than -13 dBm.

4-3-13. Power Supply

Power to operate the transceiver is obtained from an external 13.75 volt DC-power source via input connector P101, fuse F301, and switch SW302. The 13.75 volt line supplies power to the following circuits: Crystal-Oven Heater; Transmit-Indicator LED; ED-33 Subaudible-Tone Board; T/R Relay K301; All Transmitter Stages, through pins 12 and 13 of K301; Receiver Output IC and Receiver 9.5 volt Regulator, through K301 pins 5 and 6.

Power to operate the "transmit" oscillator is regulated to 6.8 volts DC by R301 and CR301, prior to application to the oscillator circuit. Regulated 6.8 volts DC for the modulation amplifier is provided by R332 and CR305.

Voltages for all receiver stages, except receiver output IC103, are obtained from a zener-diode stabilized pass-transistor regulator, consisting of R150, R151, CR106, and Q111. The output of this regulator is approximately 9.5 volts DC.

NOTE: Units manufactured prior to January 1977 may NOT contain this regulator; thus, receiver circuits operate on 13.75 VDC.

4-4. ALIGNMENT PROCEDURE

The unit is properly aligned when shipped from the factory, and realignment should never be necessary during normal life of the unit unless components within the unit have been replaced.

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

4-5. RECEIVER ALIGNMENT

4-5-1. RF & Input Filter Alignment - Standard Front-end

1. Connect a signal generator to the antenna-input connector, and set generator to desired frequency with ±5 KHz deviation at 1 KHz.

2. Turn radio on and adjust C103, C106, C111, C109, and C114 for best SINAD. Refer to Figure 4-3 for adjustment locations.

4-5-2. Reserved

4-5-3. First Local Oscillator Alignment

1. Preset L107 by setting top of slug even with top of coil form, and then turning slug four turns into form.

2. Connect a VTVM RF probe to gate 2 of Q103.

3. Turn the transceiver power switch on and adjust slug in T109 for a maximum reading on the VTVM. NOTE: This is a preliminary adjustment. L107 and T109 will be touched-up later for best quieting.

4. Turn the transceiver power switch off, and disconnect the VTVM probe.

5. Connect the frequency counter to gate 2 of Q103.

6. For GMT-225 or GMT-240, select one of the two possible receiver channels. Turn the transceiver power switch on and note reading on the frequency counter. This reading should be within ±.001% of the LO injection frequency. The injection frequency can be found by subtracting 10.7 MHz from the channel or operating frequency. If the frequency is not within appropriate tolerance, adjust the associated netting trimmer. Repeat this step for the second channel, if used.

   EXAMPLE: LO freq = 151.625 - 10.7
   LO freq = 140.925
   Tolerance = 140.925 x .00001
   Tolerance = ±1409.25 Hz

7. Turn the transceiver power switch off, and remove the frequency counter.

4-5-4. 10.7 MHz and 455 kHz IF Alignment

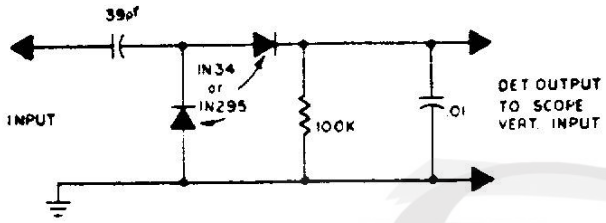
1. Connect a high-impedance detector (See below) to drain of FET amplifier Q105; then, connect detector output to scope vertical input. Set scope vertical attenuator to its most sensitive position.

2. The connection point for the sweep-input signal depends upon frequency range of the sweep generator being used: If the generator covers 10.7 MHz, the sweep signal can be applied through a 39 pF capacitor to Gate 1 of mixer Q103; however, if the generator covers the operating frequency of the transceiver, the sweep signal can be applied directly to the antenna-input connector J301. Turn transceiver power switch ON.

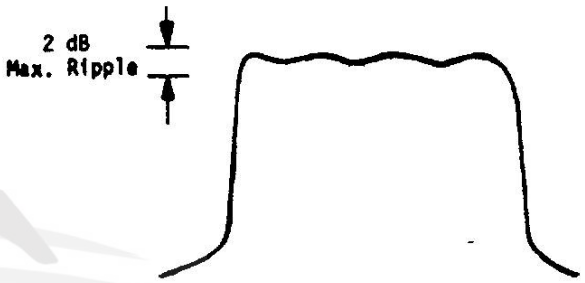
   NOTE: During alignment of the monolythic crystal filters, keep sweep-signal input level low enough to prevent overdriving the detector - signal level at the detector should be approximately 10 - 20 mV. Set sweep generator sweep width for approximately 25 kHz at a sweep rate of not more than 40 Hz.

3. Adjust T101, T102, T103, T104, and T105 for a bandpass response similar to that shown below. The ripple should not exceed 2 dB, and in most cases will be 1 dB or less.

   NOTE: T103, T104, and T105 simply adjust the response amplitude, and should be adjusted for MAXIMUM amplitude. It may NOT be possible to observe all 4 poles on the scope.



High-Z Detector



IF Response

4. Turn transceiver power OFF and disconnect sweep generator, detector, and scope.

   NOTE: After the 10.7 MHz crystal filters have been properly aligned using a swept signal, DO NOT change adjustments of T101 through T105.

5. Connect an AC voltmeter across transceiver speaker terminals; turn squelch and volume controls fully counterclockwise.

6. Apply a 10.7 MHz CW signal by either of the following methods:

   Method 1: Inject an accurate 10.7 MHz CW signal into Gate 1 of mixer Q103 through a 39 pF capacitor. Short the secondary of T109 to ground.

Method 2: Connect a signal generator, set to desired "receive" frequency, to antenna connector J301, and connect a frequency counter to pin 1 of IC101. Turn transceiver power switch ON, and increase signal generator output level until 2nd IF frequency is read on the frequency counter. "Fine-tune" signal generator until the 2nd IF frequency reads 455 kHz.

7. Disconnect RF generator from transceiver, and with transceiver power switch ON, adjust volume control for a 0.5-volt noise level on the AC voltmeter.

8. Reconnect signal generator to transceiver, and increase the unmodulated signal from signal generator until noise level drops to 0.25 volts.

9. Adjust T106 and T107, in that order, for maximum quieting as indicated on the AC voltmeter.

   If using "Method #2," also adjust the slugs in L107 and T109 for maximum quieting. Decrease RF input, as necessary, to maintain a usable reading on AC voltmeter during alignment. Repeat step 9 until no further quieting is obtained.

10. Turn transceiver power OFF and disconnect AC voltmeter. Now, connect an oscilloscope across the speaker terminals, and turn transceiver power ON.

11. FM modulate signal generator with a 1 kHz tone at ±5 kHz deviation. Adjust generator RF output to a 10-microvolt level and adjust scope-input sensitivity to cover about 3/4 of scope screen vertically with the 1 kHz tone.

12. Adjust T108 for maximum amplitude of the 1 kHz tone on the scope screen.

13. If "Method #1" is used for alignment, turn transceiver power OFF and remove shorting jumper from secondary of T109. Again connect an AC voltmeter across transceiver speaker terminals.

14. Connect transceiver as given in steps 7 and 8 above; then, adjust slugs in L107 and T109 for maximum quieting.

15. Turn transceiver power OFF, and disconnect all test equipment.

4-5-5. RF Input for 20-dB Quieting

1. Turn the FM-signal generator modulation off, and set the signal-generator RF attenuator for minimum output; RF input into receiver must be zero.

2. Adjust transceiver volume control so that receiver background noise indicates -10 dB on the AC VTVM (no RF input into receiver).

3. Slowly increase setting of the FM-signal generator RF attenuator, until the AC VTVM indicates -30 dB. Note the RF level shown on the signal-generator attenuator. This is the RF input required to produce 20 dB receiver quieting. An input of -112 dBm (0.45 μV) will quiet the receiver 20 dB.

4-5-6. Squelch Operation

1. Set signal generator to the desired receive frequency, and set modulation for ±5-kHz deviation at 1 kHz. Set RF attenuator for minimum RF output.

2. Turn squelch control fully clockwise. Set receiver audio control for maximum volume. Receiver is fully squelched, and should be completely silent. Increase setting of generator RF attenuator until squelch just fully opens. The attenuator should show 2 µV or less. Remove signal from receiver.

3. Reduce DC-input voltage to approximately 11 volts, and note that receiver is still fully squelched. Return DC input to 13.75 VDC, set volume control at midrange, and adjust squelch control fully counterclockwise; then set squelch clockwise until receiver background noise just disappears.

4. Increase setting of signal-generator RF attenuator until the squelch just fully opens. The RF attenuator should show -121 dBm (0.2 µV) or better.

4-5-7. Audio-Output Power

1. Set the FM-signal generator on the desired receive frequency, and set modulation for ±5 kHz deviation at 1 kHz. Set RF attenuator in the vicinity of 5 microvolts.

2. Turn volume control fully clockwise. The AC VTVM should indicate not less than 4 volts (4 watts).

3. Set signal generator for ±5 kHz deviation at 500 Hz, and note that AC VTVM indicates at least 4 volts with the transceiver volume control fully clockwise.

4. Set signal generator for ±5 kHz deviation at 3 kHz. Again the AC VTVM should indicate at least 4 volts at maximum setting of the transceiver volume control.

5. Turn off transceiver power switch, and disconnect AC VTVM and oscilloscope from the transceiver.

4-6. TRANSMITTER ALIGNMENT

To prepare the unit for alignment, perform the following steps:

1. Attach a 50-ohm dummy load to the RF-output connector through a power meter or relative output indicating device (Figure 4-2).

2. Preset the deviation potentiometer (R339) to its lowest setting (potentiometer rotated toward the receiver side of mainboard).

3. Connect the unit to a 13.75 VDC power source.

4. Adjust Subaudible Symmetry potentiometer R349 to its approx. midrange position.

> NOTE: This pot. will require no further adjustment unless a Subaudible Tone Encoder/Decoder is installed later. Do NOT adjust this pot. after netting transmit crystals.

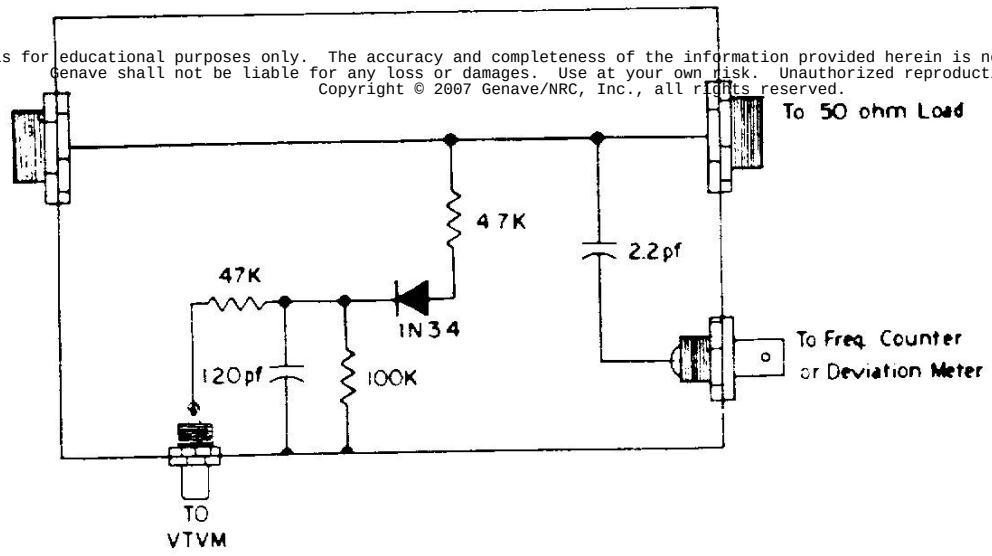


Figure 4-2. Relative Output Indicating Device

4-6-1. Frequency and Power Alignment

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.

1. Connect the DC probe to the emitter of Q303, key transmitter, and adjust the slug in T301 for a peak at the fundamental frequency. Adjust VTVM attenuator for an on-scale reading. The peak should reach approximately 1.5 volts.

2. Move DC probe to the emitter of Q304. Key transmitter, and adjust the 2 slugs in T302 for a peak, centered on third harmonic. Each slug should adjust between the winding and the outside end of the coil form. The signal should peak at about 0.2 volts.

3. Adjust T303 by connecting DC probe to the emitter of Q305, keying transmitter and adjusting the 2 slugs in T303 for a peak, centered on the 6th harmonic. Each slug should adjust between its winding and the outside end of the coil form. The signal should peak at about 1.2 volts.

4. If the relative output indicating device of Figure 4-2 is used, connect VTVM DC probe to the relative output terminal. Otherwise, observe the wattmeter or other relative output indicator.

5. Preset C366 by tightening the adjustment screw down firmly; then, backing it off 1/2 turn.

6. Key transmitter, and adjust C360, C365, C366, C368, C370, C374, and C406 for maximum relative output indication. This step may be repeated as necessary.

7. After the unit has been on for 10 minutes to stabilize the crystal oven, select an operating channel, key transmitter, and adjust the crystal netting trimmer for a correct frequency reading on the frequency measuring device. Repeat this step for the second channel, if used.

4-6-2. Power-Measurement Procedure

1. Key transmitter, and note the RF power-output readings. For the GMT-125 and GMT-225, the power should be as follows: 143.9 to 160.0 MHz - 20 watts minimum; 160.0 to 173.4 MHz - 15 watts minimum. For the GMT-240, typically the power should be 40 watts at center of operating range, and no less than 20 watts at high or low end of range.

4-6-3. Subaudible-Tone Deviation Adjustment (If Used)

1. Connect deviation meter to "Freq. Counter/Deviation Meter" output of the relative output indicating device.

2. Key transmitter and adjust "Subaudible-Tone Deviation Adjustment" (located on subaudible-tone board) to produce an output deviation of ±1 kHz, as indicated on the deviation meter. R349, the "Subaudible Symmetry Adjustment" (located on main PC board) should be adjusted simultaneously to produce identical + and - deviation.

   NOTE: After any adjustment of R349, BE SURE to perform step 7 of 4-6-1 to ensure XMIT crystal is netted to proper frequency.

4-6-4. Carrier-Deviation Adjustment

1. Feed an audio signal of 1700 Hz into transceiver microphone. Set Mic. Gain potentiometer, R333, to maximum resistance (max. gain) by rotating its wiper toward receiver side of main circuit board. Do NOT key transmitter during this step. Connect vertical-input lead of oscilloscope to pin 1 of IC301 and adjust R331, the symmetry adjustment, until displayed waveform limits symmetrically on both top and bottom of the waveform.

2. Connect deviation meter to "Freq. Counter/Deviation Meter" output of the relative output indicating device.

3. Key transmitter, observe frequency deviation meter, and increase microphone audio input until no further increase in deviation is indicated. The modulator stage is now saturated.

4. With frequency-deviation meter set to either + or - deviation, key the transmitter and adjust slug in T301 for a peak reading. The deviation potentiometer, R339, can be adjusted for an on-scale reading of the deviation meter.

5. Set deviation potentiometer, R339, as follows:

   Without subaudible tone: Set R339 for a deviation reading of ±5 kHz with the 1700 Hz tone applied to microphone.

   With subaudible tone: Set R339 for a combined subaudible and 1700 Hz tone deviation reading of ±5 KHz

   Switch deviation meter to the + and - positions and check amount of deviation in each position.

6. If a difference exists between + and - deviation levels, adjust T301 by rocking its slug slightly until the two levels are brought into balance. The difference in deviation levels should not exceed 0.4 kHz.

7. For normal operation, the mic. gain potentiometer is set at maximum gain. If unit is going to be operating in an area having a high acoustic noise level, the mic. gain can be reduced by rotating the gain pot. away from the maximum gain position. This will help reduce the amount of noise being transmitted along with the voice.

4-7. FREQUENCY CHANGES

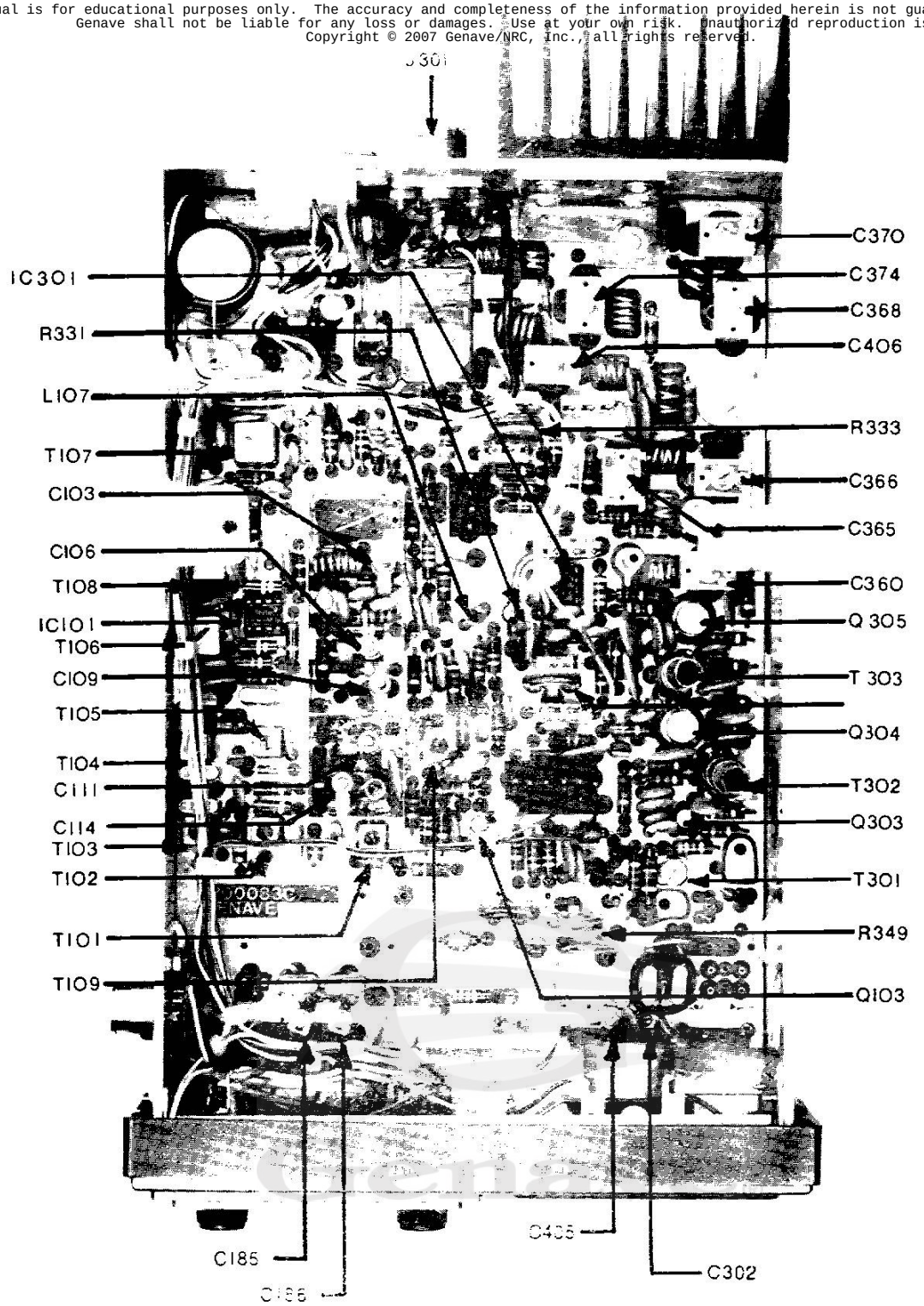
Installation of new frequencies in this unit can be easily accomplished by performing the following steps:

1. Remove unit from its protective cover.

2. Install new transmit and/or receive crystals into their appropriate sockets.

3. To bring the receive crystal(s) "on frequency," perform steps 5 and 6 given in Section 4-5-3.

4. To adjust transmit crystal(s) "on frequency," perform step 7 given in Section 4-6-1.



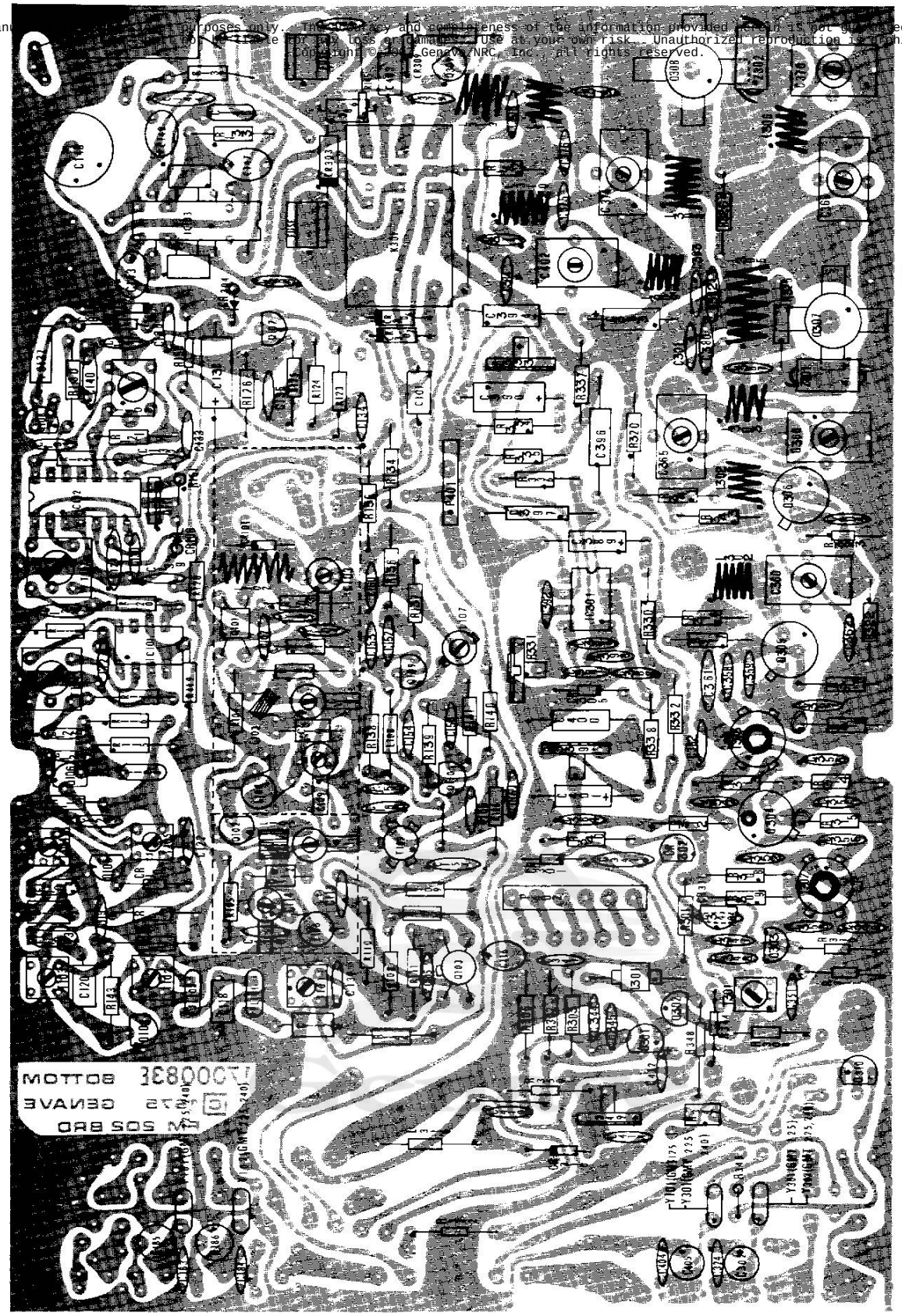


Figure 4-4. Component Location Diagram

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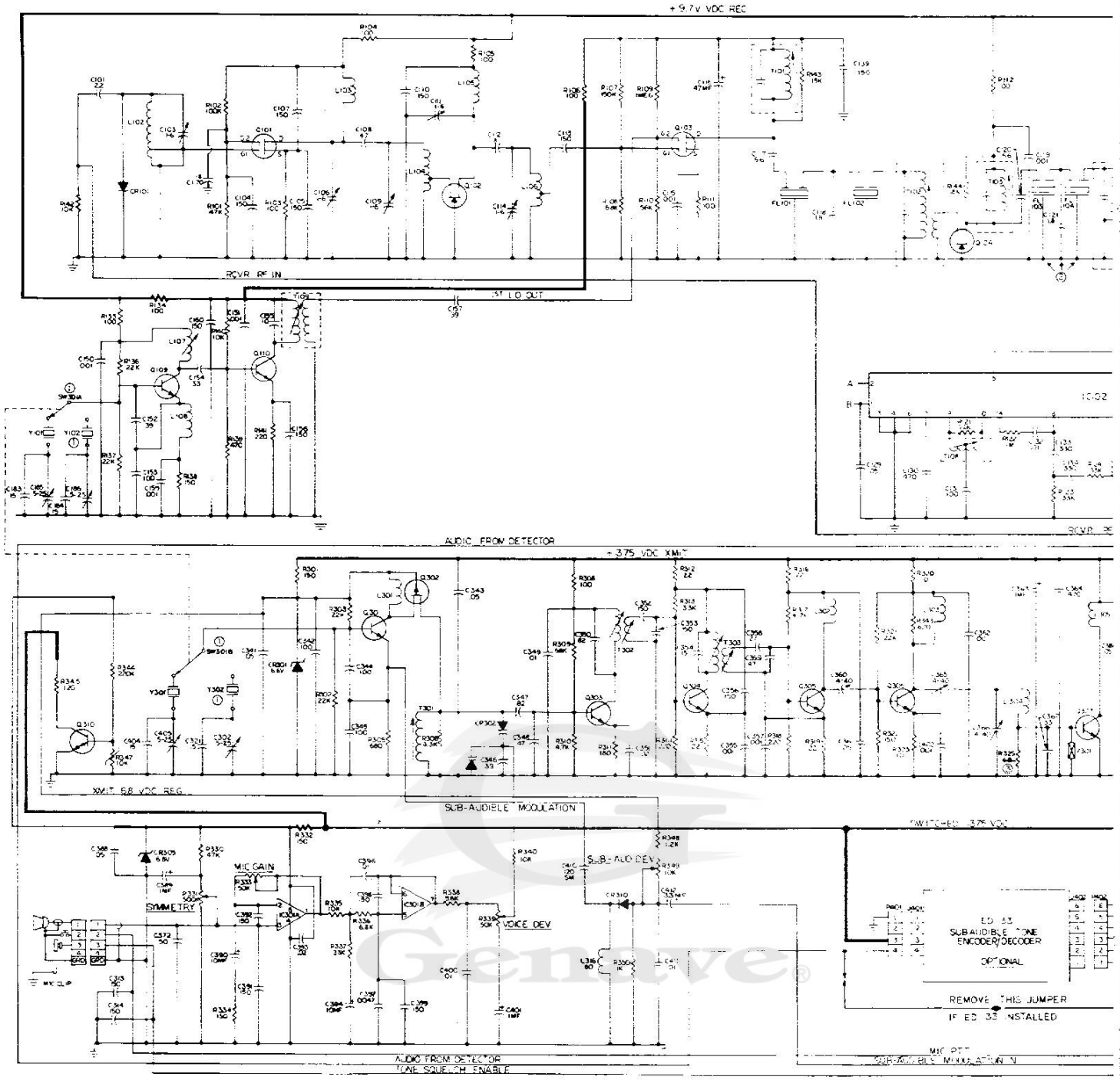


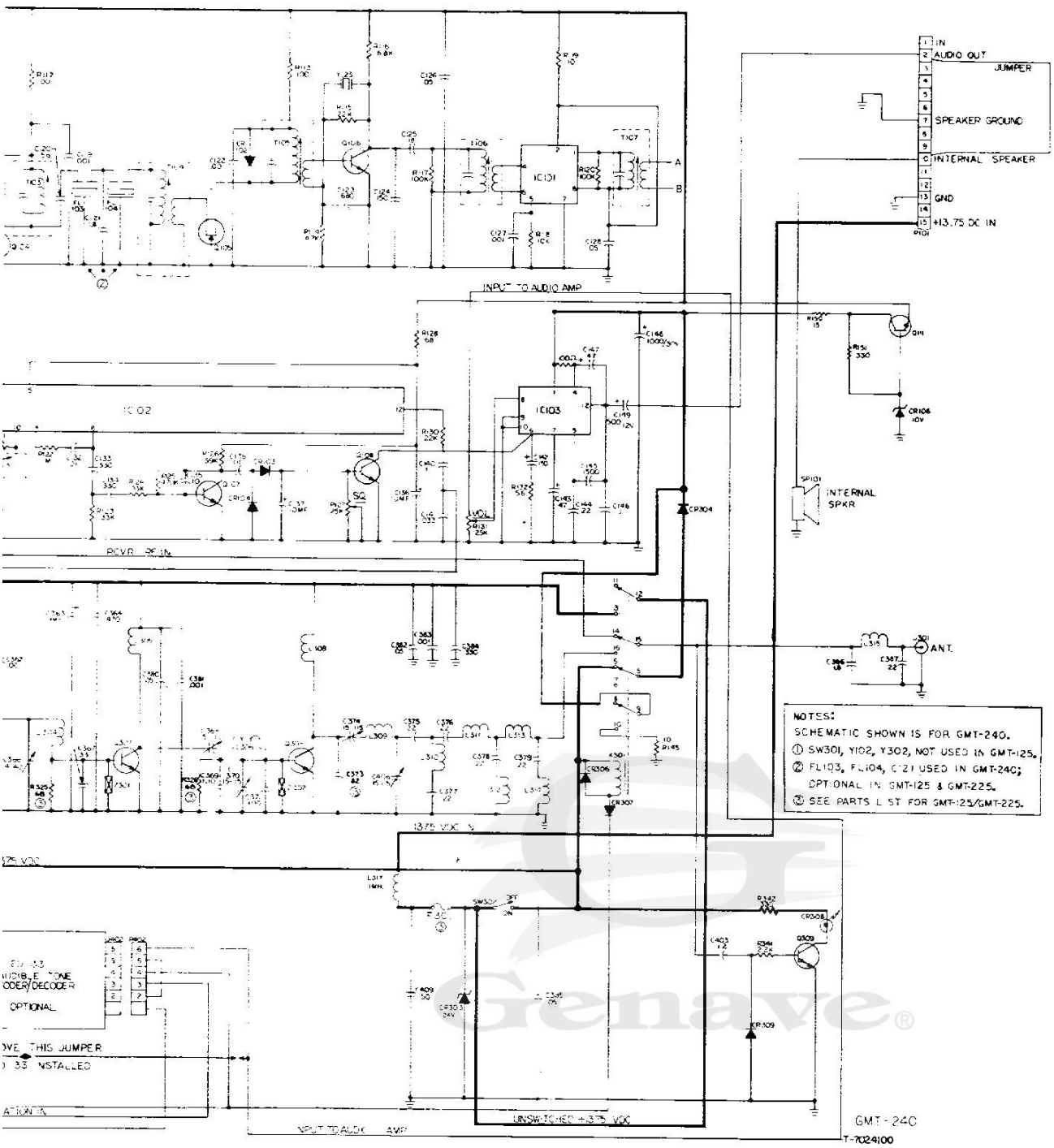


Figure 4-5. GMT- Schematic Diagram

SECTION V
PARTS LIST

This section of the Maintenance Manual lists replacement electronic parts, as well as major mechanical components, for the GMT-series transceivers. Unless otherwise indicated, the items are applicable to all three models, i.e., GMT-125, GMT-225, and GMT-240. Parts that pertain only to one or two models are indicated by including the appropriate model number at the end of the description.

Because of the similarity of all three models, only one schematic is included in this section. This schematic is for the more complex GMT-240; notes on the schematic indicate the components deleted or changed for models GMT-125 or GMT-225. Parts values that vary between models are indicated in the parts list as follows:

R325 4700009 47 ohm, ±10% 1/2 W (GMT-125, GMT-225)
4700011 68 ohm, ±10% 1/2 W (GMT-240)
R326 4700009 47 ohm, ±10% 1/2 W (GMT-125, GMT-225)
4700011 68 ohm, ±10% 1/2 W (GMT-240)

Reference Number	Part Number	Description
Capacitors		
C101	1520003	NPO, Disc, 3.9 pF ±10%
C102	1570120	Trimmer, 1-6 pf (Optional - Broadband front end)
C103	1570120	Trimmer, 1-6 pf
C104	1520028	Y5E, Disc, 150 pf, ±10%
C105	1520028	Y5E, Disc, 150 pf, ±10%
C106	1570120	Trimmer, 1-6 pf
C107	1520028	Y5E, Disc, 150 pf, ±10%
C108	1510007	Gimmick, 0.47 pf, NPO
C109	1570120	Trimmer, 1-6 pf
C110	1520028	Y5E, Disc, 150 pf, ±10%
C111	1570120	Trimmer, 1-6 pf
C112	1510002	NPO, Gimmick, 0.18 pf
C113	1520028	Y5E, Disc, 150 pf, ±10%
C114	1570120	Trimmer, 1-6 pf
C115	1520071	Z5P, Disc, .001 mfd, ±10%
C116	1550005	Tant., 47 mfd, ±10%, 15V
C117	1510026	NPO, Gimmick, 5.6 pf, ±10%
C118	1510014	NPO, Gimmick, 1.8 pf, ±10%
C119	1520071	Z5P, Disc, .001 mfd, ±10%
C120	1510026	NPO, Gimmick, 5.6 pf, ±10%
C121	1510014	NPO, Gimmick, 1.8 pf, ±10% (GMT-240)
C122	1520071	Z5P, Disc, .001 mfd, ±10%
C123	1530007	Silver Mica, 680 pf, ±10%
C124	1520176	N330, Disc, 82 pf, ±10%
C125	1520010	NPO, Disc, 18 pf, ±10%
C126	1520054	M25, Disc, .05 mfd, 25V, +80-20%
C127	1520071	Z5P, Disc, .001 mfd, ±10%

C128	1520054	M25, Disc, .05 mfd, 25V, +80-20%
C129	1520054	M25, Disc, .05 mfd, 25V, +80-20%
C130	1520042	Y5E, Disc, 470 pf, ±10%
C131	1520022	N220, Disc, 100 pf, ±10%
C132	1520051	Y5U, Disc, .01 mfd, 25V, ±20%
C133	1520037	Y5E, Disc, 330 pf, ±10%
C134	1520037	Y5E, Disc, 330 pf, ±10%
C135	1520007	NPO, Disc, 10 pf, ±10%
C136	1520051	Y5U, Disc, .01 mfd, 25V, ±20%
C137	1540014	Electrolytic, 10 mfd, 25V, ±10%
C138	1540014	Electrolytic, 10 mfd, 25V, ±10%
C139	1520028	Y5E, Disc, 150 pf, ±10%
C140	1520057	Disc,.22 mfd, +80-20%, 12V
C141	1520083	Y5T, Disc, .003 mfd, ±20%
C142	1540024	150 MFD, Electro., ±10%
C143	1550005	Tant., 47 mfd, 15V, ±10%
C144	1520057	Disc, .22 mfd, +80-20%
C145	1500004	Mylar, .0015 mfd, ±10%
C146	1520055	Disc, .1 mfd, +80-20%, 12V
C147	1550005	Tant., 47 mfd, 15V, ±10%
C148	1540038	Electrolytic, 1000 mfd, 30V
C149	1540049	Electrolytic, 500 mfd, 12V, ±10%
C150	1520071	Z5P, Disc, .001 mfd, ±10%
C151	1520071	Z5P, Disc, .001 mfd, ±10%
C152	1520014	NPO, Disc, 39 pf, ±10%
C153	1520024	N1500, Disc, 100 pf, ±10%
C154	1520013	NPO, Disc, 33 pf, ±10%
C155	1520007	NPO, Disc, 10 pf, ±10%
C156	1520028	Y5E, Disc, 150 pf, ±10%
C157	1520014	NPO, Disc, 39 pf, ±10%
C158	1510006	NPO, Gimmick, 0.39 pf, ±10% (Broadband Front End)
C159	1520071	Z5P, Disc, .001 mfd, ±10%
C160	1520028	Y5E, Disc, 150 pf
C170	1520010	NPO, Disc, 18 pf, ±10%
C183	1520009	NPO, Disc, 15 pf, ±10%
C184	1520009	NPO, Disc, 15 pf, ±10% (GMT-225, GMT-240)
C185	1570121	Trimmer, 5-25 pf
C186	1570121	Trimmer, 5-25 pf (GMT-225, GMT-240)
C302	1570121	Trimmer, 5-25 pf (GMT-225, GMT-240)
C313	1520028	Y5E, Disc, 150 pf, ±10%
C314	1520028	Y5E, Disc, 150 pf, ±10%
C321	1520009	NPO, Disc, 15 pf, ±10% (GMT-225, GMT-240)
C341	1520054	Disc, .05 mfd, +80-20, 12V
C342	1520022	N220, Disc, 100 pf, ±10%
C343	1520054	Disc, .05 mfd, +80-20%, 12V
C344	1520022	N220, Disc, 100 pf, ±10%
C345	1520022	N220, Disc, 100 pf, ±10%
C346	1520192	N1500, Disc, 39 pf, ±10%
C347	1520176	N330, Disc, 82 pf, ±10%
C348	1520015	N1500, Disc, 47 pf, ±10%
C349	1520051	Y5U, Disc, .01 mfd, 25V, ±20%
C350	1520176	N330, Disc, 82 pf, ±10%
C351	1520053	M25, Disc, .02 mfd, 25V, ±10%
C352	1520027	N750, Disc, 150 pf, ±10%
C353	1520027	N750, Disc, 150 pf, ±10%

C354	1520009	NPO, Disc, 15 pf, ±10%
C355	1520071	Z5P, Disc, .001 mfd, ±10%
C356	1520027	N750, Disc, 150 pf, ±10%
C357	1520071	Z5P, Disc, .001 mfd, ±10%
C358	1520012	NPO, Disc, 27 pf, ±10%
C359	1520015	N1500 Disc, 47 pf, ±10%
C360	1560403	Trimmer, 40 pf
C361	1520054	M25, Disc, .05 mfd, +80-20%
C362	1520071	Z5P, Disc, .001 mfd, ±10%
C363	1540002	Electro., 1 mfd, 35V, 10%
C364	1520042	Y5E, Disc, 470 pf, ±10%
C365	1560403	Trimmer, 40 pf
C366	1560403	Trimmer, 40 pf
C367	1520013	NPO, Disc, 33 pf, ±10%
C368	1560406	Trimmer, 115 pf
C369	1520022	N220, Disc, 100 pf, ±10%
C370	1560406	Trimmer, 115 pf
C371	1520022	N220, Disc, 100 pf, ±10%
C372	1520028	Y5E, Disc, 150 pf, ±10%
C373	1520176	N330, Disc, 82 pf, ±10% (GMT-240)
	1520014	NPO, Disc, 39 pf, ±10% (GMT-125, GMT-225)
C374	1560406	Trimmer, 115 pf
C375	1520011	NPO, Disc, 22 pf, ±10%
C376	1520011	NPO, Disc, 22 pf, ±10%
C377	1520011	NPO, Disc, 22 pf, ±10%
C378	1520011	NPO, Disc, 22 pf, ±10%
C379	1520011	NPO, Disc, 22 pf, ±10%
C380	1520054	M25, Disc, .05 mfd, +80-20%
C381	1520071	Z5P, Disc, .001 mfd, ±10%
C382	1520054	M25, Disc, .05 mfd, +80-20%
C383	1520071	Z5P, Disc, .001 mfd, ±10%
C384	1520037	Y5E, Disc, 330 pf, ±10%
C385	1520054	M25, Disc, .05 mfd, +80-20%
C386	1510014	NPO, Gimmick, 1.8 pf, ±10%
C387	1520011	NPO, Disc, 22 pf, ±10%
C388	1520054	M25, Disc, .05 mfd, +80-20%
C389	1540002	Electro., 1 mfd, 35V, ±10%
C390	1540014	Electrolytic, 10 mfd, 25V, ±10%
C391	1520028	Y5E, Disc, 150 pf, ±10%
C392	1520028	Y5E, Disc, 150 pf, ±10%
C393	1520053	M25, Disc, .02 mfd, 25V, ±10%
C394	1540014	Electrolytic, 10 mfd, 25V, ±10%
C395		Not Assigned
C396	1500018	Mylar, .01 mfd, 100V, ±10%
C397	1500013	Mylar, .0047 mfd, 100V, ±10%
C398	1520028	Y5E, Disc, 150 pf, ±10%
C399	1520028	Y5E, Disc, 150 pf, ±10%
C400	1500018	Mylar, .01 mfd, 100V, ±10%
C401	1540002	Electro., 1 mfd, 35V, ±10%
C402	1520071	Z5P, Disc, .001 mfd, ±10%
C403	1510012	NPO, Gimmick, 1.2 pf, ±10%
C404	1520009	NPO, Disc, 15 pf, ±10%
C405	1570121	Trimmer, 5-25 pf
C406	1560406	Trimmer, 115 pf
C407		Not Assigned

C408		Not Assigned
C409	1520028	Y5E, Disc, 150 pf, ±10%
C410	1530002	Silver Mica, 120 pf, ±5%
C411	1520051	Y5U, Disc, .01 mfd, 25V, ±20%
C412	1550003	Tant., 3.3 mfd, 35V

Diodes

CR101	4810017	High Frequency Switching, 1N4148
CR102	4810017	High Frequency Switching, 1N4148
CR103	4810021	1N34A
CR104	4810021	1N34A
CR301	4810007	Zener, 6.8V, 3/4W, ±5%
CR302	4812109	Varicap, MV2109
CR303	4810011	Zener, 24V, 1W, ±10%
CR304	4810013	General Purpose, 100V, 1A
CR305	4810007	Zener, 6.8V, 3/4W, ±5%
CR306	4810013	General Purpose, 100V, 1A
CR307	4810013	General Purpose, 100V, 1A
CR308	3900030	Light Emitting Diode, FLV 110
CR309	4810017	High Frequency Switching, 1N4148
CR310	4810017	High Frequency Switching, 1N4148
CR311	4812113	Varicap, MV2113
CR106	4810008	Zener, 10V, ZS10A
CR107	4810013	General Purpose, 100 PRV, 1N4001

Integrated Circuits

IC101	3130017	MC1350P, IF amplifier
IC102	3130024	CA3075, Quadrature detector
IC103	3130020	CA810Q, Audio amplifier
IC301	3130012	N5558, Dual op-amp

Inductors

L101	1800226	Coil Rec, RF amp input (Broadband Front End)
L102	1800225	Coil Rec, RF amp
L103	1800116	Coil Rec, RF amp
L104	1800117	Coil Rec, RF amp
L105	1800118	Coil Rec, RF amp
L106	1800119	Coil Rec, RF amp
L107	1800308	Coil, Rec. osc.
L108	1800350	Coil, 1 µh choke, ML10G
L301	1800032	Coil, 80 µh choke
L302	1800203	Coil, 3 1/2 T, LHH
L303	1800201	Coil, 2 1/2 T, LHH
L304	1800201	Coil, 2 1/2 T, LHH
L305	1800202	Coil, 3 1/2 T, RHH
L306	1800201	Coil, 2 1/2 T, LHH (GMT-125, GMT-225)
	1800218	Coil, 1 1/2 T, LHH (GMT-240)
L307		Not Assigned
L308	1800204	Coil, 4 1/2 T, LHH

L309	1800201	Coil, 2 1/2 T, LHH
L310	1800204	Coil, 4 1/2 T, LHH (GMT-125, GMT-225)
	1800257	Coil, 4 1/2 T, LHH (GMT-240)
L311	1800201	Coil, 2 1/2 T, LHH
L312		Coil etched on PC board
L313	1800203	Coil, 3 1/2 T, LHH
L314		Coil etched on PC board
L315	1800205	Coil, 2 T, LHH
L316	1800032	Coil, 80 µH choke
L317	1800247	Coil, .65 mH min. @ 1 kHz & 7 Amps DC

Transistors

Q101	4800068	MOSFET, DualGate 3N201 (SFE 801)
Q102	4805486	J-FET, N-channel, 2N5486
Q103	4800068	MOSFET, DualGate 3N201 (SFE801)
Q104	4805484	J-FET, N-channel, 2N5484
Q105	4805484	J-FET, N-channel, 2N5484
Q106	4800026	Silicon, NPN, MPS-3693
Q107	4800028	Silicon, NPN Red Dot, MPS-6514S
Q108	4800028	Silicon, NPN Red Dot, MPS6514S
Q109	4800026	NPN Silicon, MPS3693
Q110	4800024	NPN Silicon, Blue Dot, MPS3563
Q111	4800018	NPN Silicon, MPS-U01
Q301	4800033	NPN Silicon, MPS5172
Q302	4805461	J-FET, P-channel 2N5461
Q303	4800026	NPN Silicon, MPS 3693
Q304	4804427	NPN Silicon, 2N4427
Q305	4804427	NPN Silicon, 2N4427
Q306	4804427	NPN Silicon, 2N4427 (GMT-125, GMT-225)
	4800045	NPN Silicon, SD1144-1 (GMT-240)
Q307	4806080	NPN Silicon, RF Power, 2N6080 (GMT-125, GMT-225)
	4806087	NPN Silicon, RF Power, SD1133 (GMT-240)
Q308	4806082	NPN Silicon, RF Power, 2N6082 (GMT-125, GMT-225)
	4806088	NPN Silicon, RF Power, SD1278 (GMT-240)
Q309	4800051	NPN Silicon, Darlington, MPSA13
Q310	4800051	NPN Silicon, Darlington, MPSA13

Resistors

R101	4700045	47K, ±10%, 1/2 W
R102	4700049	100K, ±10%, 1/2 W
R103	4700013	100 ohm, ±10%, 1/2 W
R104	4700013	100 ohm, ±10%, 1/2 W
R105	4700013	100 ohm, ±10%, 1/2 W
R106	4700013	100 ohm, ±10%, 1/2 W
R107	4700051	150K, ±10%, 1/2 W
R108	4700035	6.8K, ±10%, 1/2 W
R109	4700058	1M, ±10%, 1/2W
R110	4700046	56K, ±10%, 1/2 W
R111	4700013	100 ohm, ±10%, 1/2 W
R112	4700013	100 ohm, ±10%, 1/2 W
R113	4700013	100 ohm, ±10%, 1/2 W

R114	4700033	4.7K, ±10%, 1/2 W
R115	4700041	22K, ±10%, 1/2 W
R116	4700035	6.8K, ±10%, 1/2 W
R117	4700049	100K, ±10%, 1/2 W
R118	4700037	10K, ±10%, 1/2 W
R119	4700003	10 ohm, ±10%, 1/2 W
R120	4700049	100K, ±10%, 1/2 W
R121	4700041	22K, ±10%, 1/2 W
R122	4700058	1M, ±10%, 1/2 W
R123	4700043	33K, ±10%, 1/2 W
R124	4700043	33K, ±10%, 1/2 W
R125	4700057	470K, ±10%, 1/2 W
R126	4700032	3.9K ±10%, 1/2 W
R127	4760051	25K, variable +30% Linear
R128	4700011	68 ohm, ±10%, 1/2 W
R129		Not Assigned
R130	4700041	22K, ±10%, 1/2 W
R131	4760052	25K, variable ±30%, audio taper, with SW302
R132	4700010	56 ohm, ±10%, 1/2 W
R133	4700013	100 ohm, ±10%, 1/2 W
R134	4700013	100 ohm, ±10%, 1/2 W
R135	4700013	100 ohm, ±10%, 1/2 W
R136	4700041	22K, ±10%, 1/2 W
R137	4700041	22K, ±10%, 1/2 W
R138	4700015	150 ohm, ±10%, 1/2 W
R139	4700021	470 ohm, ±10%, 1/2 W
R140	4700037	10K, ±10%, 1/2 W
R141	4700017	220 ohm, ±10%, 1/2 W
R142	4700037	10K, ±10%, 1/2 W
R143	4700040	18K, ±10%, 1/2 W
R144	4700040	18K, ±10%, 1/2 W
R145	4700003	10 ohm, ±10%, 1/2 W
R150	4710002	15 ohm, ±10%, 1/4 W
R151	4710012	330 ohm, ± 5%, 1/4 W
R301	4700015	150 ohm, ±10%, 1/2 W
R302	4700041	22K, ±10%, 1/2 W
R303	4700041	22K, ±10%, 1/2 W
R304		Not Assigned
R305	4700023	680 ohm, ±10%, 1/2 W
R306	4700031	3.3K, ±10%, 1/2 W
R307		Not Assigned
R308	4700013	100 ohm, ±10%, 1/2 W
R309	4700047	68K, ±10%, 1/2 W
R310	4700033	4.7K, ±10%, 1/2 W
R311	4700016	180 ohm, ±10%, 1/2 W
R312	4700006	22 ohm, ±10%, 1/2 W
R313	4700031	3.3K, ±10%, 1/2 W
R314	4700017	220 ohm, ±10%, 1/2 W
R315	4700006	22 ohm, ±10%, 1/2 W
R316	4700006	22 ohm, ±10%, 1/2 W
R317	4700033	4.7K, ±10%, 1/2 W
R318	4700017	220 ohm, ±10%, 1/2 W
R319	4700006	22 ohm, ±10%, 1/2 W
R320	4700003	10 ohm, ±10%, 1/2 W
R321	4700029	2.2K, ±10%, 1/2 W

R322	4700015	150 ohm, ±10%, 1/2 W
R323	4700003	10 ohm, ±10%, 1/2 W
R324		Not Assigned
R325	4700009	47 ohm, ±10%, 1/2 W (GMT-125, GMT-225)
	4700011	68 ohm, ±10%, 1/2 W (GMT-240)
R326	4700009	47 ohm, ±10%, 1/2 W (GMT-125, GMT-225)
	4700011	68 ohm, ±10%, 1/2 W (GMT-240)
R327		Not Assigned
R328		Not Assigned
R329		Not Assigned
R330	4700045	47K, ±10%, 1/2 W
R331	4760039	500K, Variable, ±20%
R332	4700015	150 OHM, ±10%, 1/2 W
R333	4760021	50K, Variable, ±20%
R334	4700015	150 ohm, ±10%, 1/2 W
R335	4700037	10K, ±10%, 1/2 W
R336	4700035	6.8K, ±10%, 1/2 W
R337	4700043	33K, ±10%, 1/2 W
R338	4700034	5.6K, ±10%, 1/2 W
R339	4760021	50K, Variable, ±20%
R340	4700037	10K, ±10%, 1/2 W
R341	4700029	2.2K, ±10%, 1/2 W
R342	4700019	330 ohm, ±10%, 1/2 W
R343	4700024	820 ohm, ±10%, 1/2 W
R344	4710054	120K, ±5%, 1/4 W
R345	4700014	120 ohm, ±10%, 1/2 W
R346		Not Assigned
R347	4760034	10K, Thermistor
R348	4700026	1.2K, ±10%, 1/2 W
R349	4760019	10K, Variable, ±20%
R350	4700025	1K, ±10%, 1/2 W

Transformers

T101	5600098	10.7 MHz IF
T102	5600098	10.7 MHz IF
T103	5600098	10.7 MHz IF
T104	5600098	10.7 MHz IF
T105	5600046	10.7 MHz IF
T106	5600012	455 kHz IF
T107	5600012	455 kHz IF
T108	5600012	455 kHz IF
T109	5600048	Tripler - local oscillator
T301	5600072	Transmit oscillator
T302	5600082	Transmit Tripler
T303	5600083	Transmit First Doubler

Crystals

Y101	2300226	See Crystal Info, following Parts List
Y102	2300226	See Crystal Info, following Parts List (GMT-225,-240)
Y123	2300252	Second L.O., 10.245 MHz

Y301	2300211	See Crystal Info, following Parts List
Y302	2300211	See Crystal Info, following Parts List (GMT-225,-240)

Switches

SW301	5100039	Switch, DPDT Slide (GMT-225, GMT-240)
SW302		ON-OFF, Part of R131

Chokes

Z301	1800063	Ferrox Cube, VK-200-19-4B
Z302	1800063	Ferrox Cube, VK-200-19-4B

Miscellaneous

FL101	2303504	Crystal Filter - 10.7 MHz, monolythic
FL102	2303504	Crystal Filter - 10.7 MHz, monolythic
FL103	2303504	Crystal Filter - (GMT-240; opt GMT-125,-225)
FL104	2303504	Crystal Filter - (GMT-240; opt GMT-125,-225)
K301	4500008	Relay, 4PDT, 12 VDC
J101	2100252	Connector, Molex, 15-pin Female
----	2100254	Terminal, Female, for J101
P101	2100255	Connector, Molex, 15-pin Male
----	2100253	Terminal, Male, for P101
J301	2100239	Receptacle, Co-ax - Amphenol SO239
F301	5140008	Fuse, 3AG, 7 Amp (GMT-125, GMT-225)
	5140021	Fuse, 3AG, 10 Amp (GMT-240)
SP101	1320020	Speaker, 3-ohm, 3-watt, Quam 72-5276
	1325069	Microphone, Ceramic
	2100076	Microphone Plug, Male (GMT-225, GMT-240)
	2510122	Panel, Front (GMT-125)
	2510111	Panel, Front (GMT-225, GMT-240)
	2510134	Insert, Front Panel (GMT-125)
	2510135	Insert, Front Panel (GMT-225)
	2510136	Insert, Front Panel (GMT-240)
	2510156	Knob, Volume and Squelch
	2510152	Panel, Sub.
	2510129	Chassis, Side Panel
	2510128	Chassis, Side Panel
	2510165	Chassis, Rear Plate
	2510130	Cover, Chassis (Top)

	2510131	Cover, Chassis (Bottom)
	2502051	Foot, Bumper
	2510158	Frame, Front
	2502281	Bracket, Transistor
	2510165	Chassis Rear Plate - Heatsink
	2508532	Bracket, Lock
	2400023	Knob, Thumbwheel
	2510162	Bracket, Mounting Handle
P402	2100069	Connector, 6-pin plug for ED-33
P401	2100070	Connector, 4-pin plug for ED-33

Specifications Subject to Change Without Notice

2510327	Cover, Switch
2510328	Spacer, Slide Switch

5-1. CRYSTAL INFORMATION

To change a transmit and/or receive operating frequency in a GMT-transceiver requires that a new transmit and/or receive crystal be installed in the unit. The transceiver may also require some realignment to insure proper operation of the new frequency.

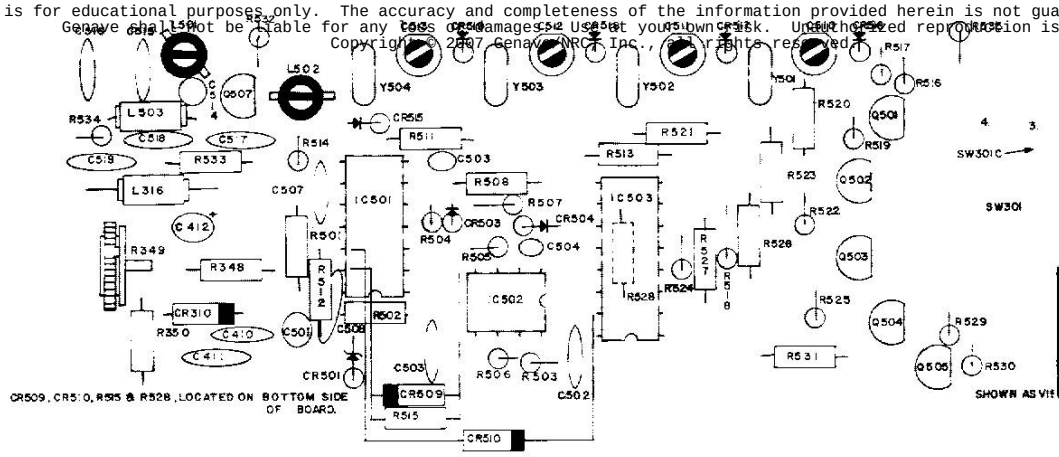
Crystals for the GMT-series transceivers are available from the factory at nominal cost by calling the factory "Parts Department," and specifying the Model number, desired operating frequency, and whether for transmit or receive. Crystals may also be obtained from other sources; therefore, the information necessary for ordering these crystals is given below:

5-1-1. Transmit Crystals

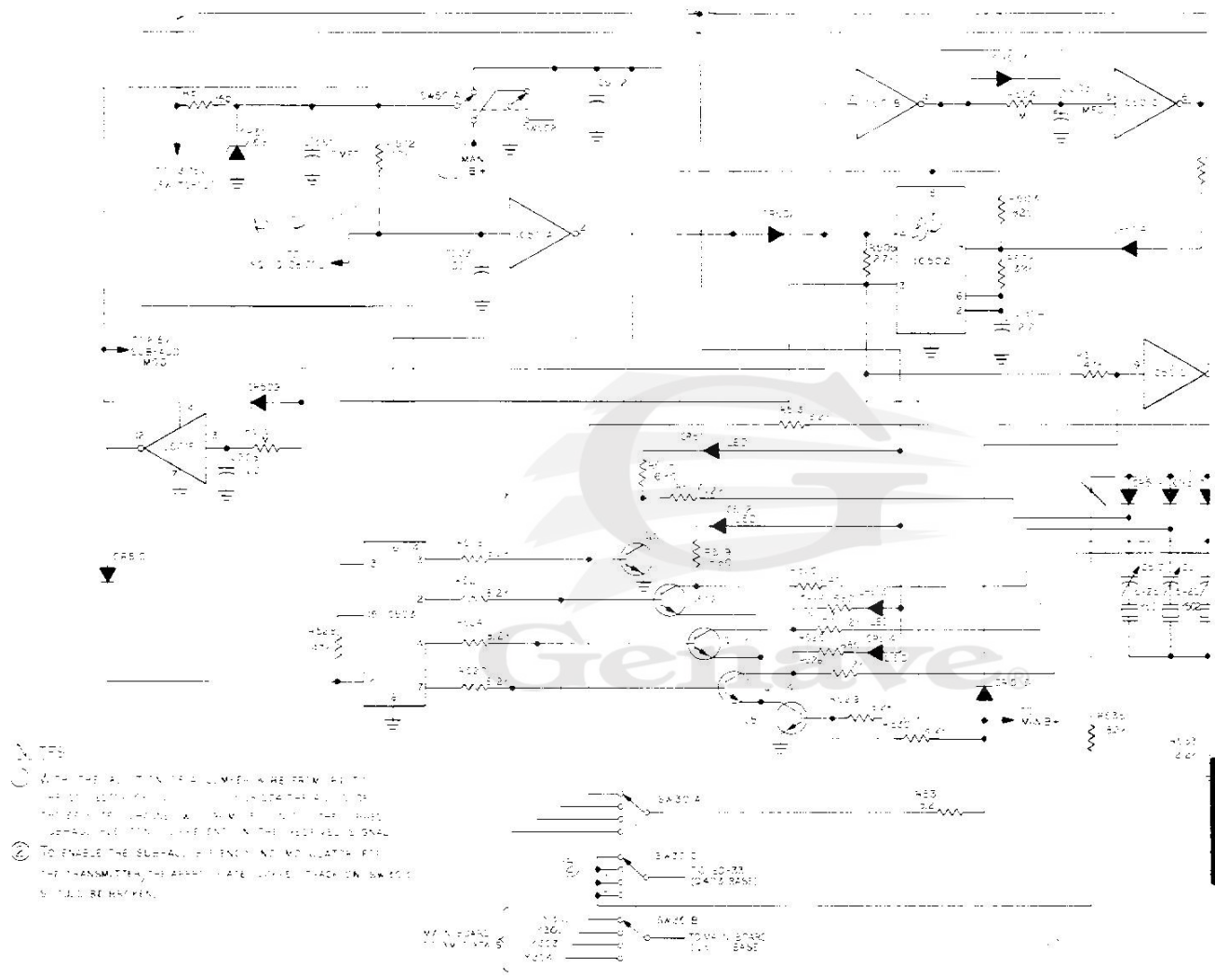
Parallel Mode:	C_p = 32 pfd.
Fundamental Cut Tolerance:	±.001% Max. Calibration Tolerance at 25°C ±1°C. ±.001% Max. Drift Over Temperature Range.
Temperature Range:	-30° to +60° C.
Holder:	HC-25/U
Crystal Frequency:	$\frac{\text{Operating Frequency}}{12}$
Series Resistance:	25 ohms Maximum.
Genave Part Number:	2300211

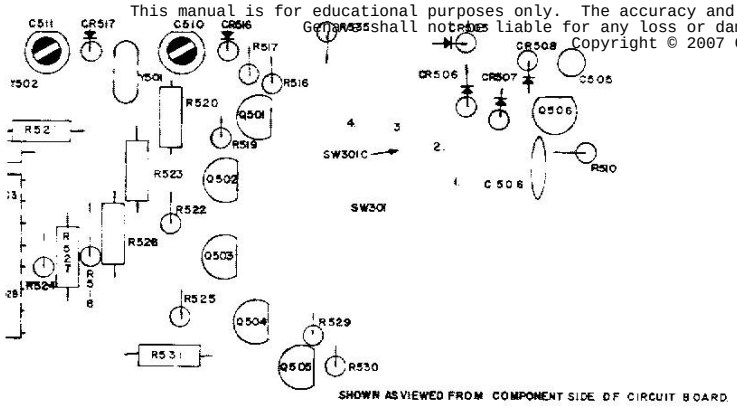
5-1-2. Receive Crystals

Parallel Mode:	C_p = 32 pfd.
Third Overtone Tolerance:	±.001% Calibration Tolerance at 25° C ±1°C. ±.001% Max. Drift Over Temperature Range.
Temperature Range:	-30° to +60° C.
Holder:	HC-25/U
Crystal Frequency:	$\frac{\text{Operating Frequency - 10.7 MHz}}{3}$
Series Resistance:	40 ohms Maximum.
Genave Part Number:	2300226



SCANNER BOARD COMPONENT LAYOUT





SHOWN AS VIEWED FROM COMPONENT SIDE OF CIRCUIT BOARD.

BOARD COMPONENT LAYOUT