



ECOM-40 VHF-FM OWNER'S MANUAL

LIMITED

 **WARRANTY** 

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 merchantability 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

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Genave

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SECTION I

GENERAL INFORMATION

1-1. INTRODUCTION

This manual contains all the information normally required to license, implement, and operate the Genave Model ECOM-40 VHF-FM transceiver.

The maintenance manual contains all the above information, in addition to unit schematics, alignment data, and parts lists.

1-2. DESCRIPTION

NOTE: The ECOM-40 transceiver has the capability of transmitting and receiving on frequencies assigned by the F.C.C. to the various Business Radio Services, such as: Land Transportation, Industrial Radio, and Public Safety, and thus MUST BE LICENSED PRIOR TO ACTUAL USE. While the seller may assist in filing the license application, the responsibility lies solely with the prospective licensee to assure that transmitting equipment is covered by a valid station license.

The ECOM-40 is a handheld, portable VHF transceiver designed for the transmission and reception of frequency modulated (16F3) radio signals on any one of four channels within the range from 143.9 to 173.4 MHz. A four-position slide switch selects the desired operating channel -- each of which may be either simplex or duplex, depending upon crystal frequencies installed within the unit. Note, however, the maximum spread between highest and lowest frequencies installed in the unit is 2 MHz for either receive or transmit.

The receiver and transmitter circuits each utilize standard quartz crystals with a frequency-netting trimmer provided for each receive and each transmit crystal to allow precise frequency adjustment.

If the transceiver is equipped with the CTCSS sub-audible tone option, a tone-override switch on the unit's top panel is provided to permit communications with other transceivers NOT equipped with your sub-audible tone frequency, and to permit monitoring the frequency prior to initiating a call.

The transmitter provides a typical RF output of 1.5 watts minimum into a 52-ohm standard antenna system over the frequency range from 143.9 MHz to 173.4 MHz. The frequency accuracy is adjustable to ± 100 Hz, and the frequency stability is $\pm .001\%$ from -30°C to $+50^{\circ}\text{C}$. A 1-kHz modulating audio signal will give a deviation of ± 5 kHz maximum.

The receiver is a crystal-controlled, dual-conversion superheterodyne employing a 4-pole monolithic crystal filter for good selectivity. A single integrated circuit performs 2nd mixer, 2nd IF amplification, limiting, and detection functions. The 10.7 MHz 1st IF provides good image rejection, while the 455 kHz 2nd IF improves receiver stability. The receiver frequency accuracy is adjustable within ± 500 Hz, and the frequency stability is $\pm .001\%$. The receiver audio output power typically is 350 mW at less than 10% distortion.

A self-contained battery pack, consisting of 8 nicad cells, supplies 9.6 VDC to operate the unit. An external charging jack and a diode, which prevents "reversed-polarity" charging, provide for charging the battery pack while installed in the transceiver.

The transceiver is housed in a rugged Lexan case -- this easily-removed, two-piece, durable plastic cover protects the instrument from dirt and physical damage while maintaining the unit's light weight (less than 2 pounds).

The transceiver is complete with antenna, 9.6V nicad battery pack, battery charger, and built-in speaker/microphone. A helically-loaded, rubber-clad flexible antenna with an 8-32 threaded mounting is standard equipment with the ECOM-40; however, a helically loaded, rubber-clad flexible antenna with a BNC mounting is available as an option at time of purchase.

All circuitry employed is the latest state-of-the-art design, using the latest in semiconductor and integrated-circuit technology.

All transceiver components are mounted on a single "double-sided," printed-circuit board.

Operating controls for the unit (Volume, Squelch, Charging Jack and Antenna or connector) are mounted on top panel. The Frequency Selector switch is located in the lower, right-hand corner of the front panel. Thus, the controls are easily accessible when needed, yet do not interfere with the portability or operation of the instrument. The push-to-talk switch is mounted on the left-hand side of case for easy one-handed operation.

1-3. SPECIFICATIONS

GENERAL:

Over-all Dimensions:	8.625" (21.9 cm) High; 2.938" (7.46 cm) Wide; 1.830" (4.65 cm) Deep
Power Supply:	Internal battery pack; 8 nicad cells, 9.6 volts
Current Drain:	Standby: 25 mA; Receive: 63 mA; Transmit: 700 mA
Battery Operating Time:	1.5 Watts = 6 hrs, based on 5% transmit, 5% receive, and 90% standby duty cycle
Frequency Range:	143.9 to 173.4 MHz
Temperature Range:	-30°C to +50°C
Number of Channels:	4, maximum
Weight:	Approx. 1 Lb (0.45 kg)

RECEIVER:

Sensitivity:	0.35 uV max. (12 dB SINAD)
Adjacent Channel Rejection:	-55 dB minimum at 25 kHz (12 dB SINAD)
Image Rejection:	55 dB minimum
Spurious Rejection:	55 dB
Intermodulation:	60 dB, minimum

RECEIVER (Cont'd):

Modulation Acceptance Bandwidth:	<u>±</u> 7.5 kHz, maximum
Squelch Threshold:	0.35 uV, maximum
Hum and Noise Level	More than 35 dB below 0.25 watts
Audio Output Power:	350 mW at less than 10% distortion
Frequency Accuracy:	Adjustable within <u>±</u> 500 Hz
Frequency Stability:	<u>±</u> .001%
Maximum Channel Separation:	2 MHz

TRANSMITTER:

Output Power	1.5 watts, minimum
Output Impedance:	50-ohms, nominal
Spurious & Harmonics:	More than 46 dB below 1.5 watts
Frequency Accuracy:	Adjustable to <u>±</u> 100 Hz
Frequency Stability:	<u>±</u> .001% from -30°C to +50°C
Modulation:	Type 16F3, <u>±</u> 5 kHz for 100% modulation with 1000 Hz audio
Deviation:	<u>±</u> 5 kHz maximum, with 1 kHz audio
Subaudible Tone :	Optional
Frequency Range:	143.9 to 173.4 MHz
Maximum Channel Separation:	2 MHz

1-4. EQUIPMENT FURNISHED

- a. ECOM-40 VHF-FM Transceiver
- b. Helically - loaded, flexible antenna
- c. 9.6 volt battery pack (8 nicad cells) - PSI-32
- d. Battery charger - PSI-16
- e. Crystal, receive (1) -- specify frequency
- f. Crystal, transmit (1) -- specify frequency

1-5. OPTIONAL EQUIPMENT AVAILABLE

- a. Antenna, helically-loaded, rubber-clad flexible with BNC connector
- b. SA-44 CTCSS sub-audible tone squelch module.
- c. Leather holster for Ecom-40 (GLC-4)
- d. Leather flap for holster (GLC-5)
- e. Speaker/Microphone (G22)
- f. Spare battery pack (PSI-32)



SECTION II

INSTALLATION MANUAL

2-1. INTRODUCTION

This manual section provides installation and charging data for the nicad battery pack supplied with the VHF-FM handheld transceiver. Information concerning the antenna supplied with the unit is also given.

2-2. BATTERY INSTALLATION

The 9.6-volt nicad battery pack is not installed in unit at time of shipment from the factory, but is packaged in shipping container with transceiver. The battery pack must be installed in instrument, and charged for a minimum of 8 hours, prior to using transceiver.

NOTE: Nicad batteries supplied with instrument must be installed in the transceiver in order to charge them with battery charger that is supplied with unit. This charger will NOT overcharge the nicad cells. DO NOT TRANSMIT WITH CHARGER CONNECTED TO TRANSCEIVER.

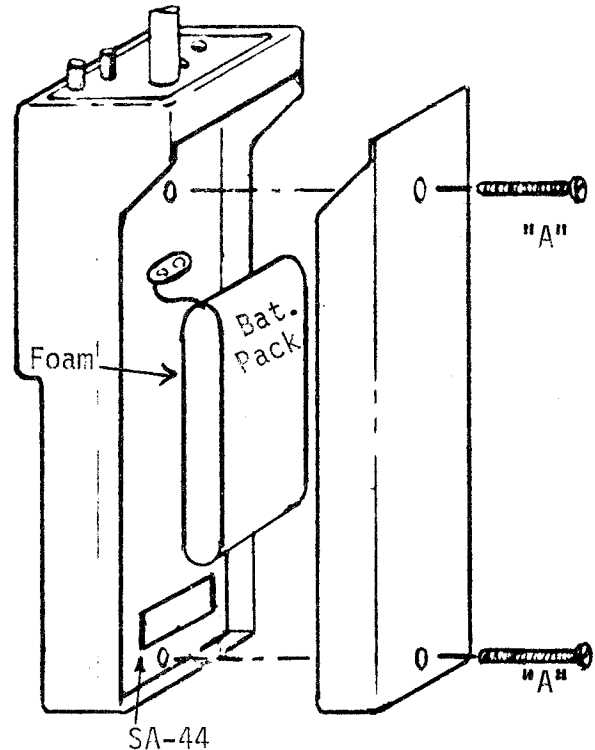


Figure 2-1. Unit Rear View

Remove plastic BACK cover from transceiver in order to install batteries. This cover is easily removed as follows (See Figure 2-1):

1. Carefully lay transceiver on its FRONT on suitable work surface. Be SURE unit is turned OFF.
2. Remove two #4-40 x 1" pan-head machine screws which secure back cover to transceiver (item "A" Fig. 2-1).
3. Lift cover up and off transceiver.
4. Connect battery-pack to mating connector which is attached to ECOM-40 main PC board. Lay battery pack on rear of transceiver main PC board, using foam material supplied to protect PC board.

5. Re-install transceiver rear cover. Be sure cover does not pinch battery wires; then replace two #4-40 x 1" screws removed in step 2 above.
6. Plug cord from battery charger into charging jack on top of unit; then, insert charger into 120 VAC, 50/60 Hz, receptacle.
7. Be SURE volume control is turned fully counterclockwise to its OFF position. Allow batteries to charge for a minimum of 8 hours, and preferably overnight.

NOTE: Disconnect charger from 120 V source prior to connecting or disconnecting charger and transceiver.

2-3. ANTENNA INFORMATION

All VHF communications are basically limited to "line-of-sight" distances. The range to be expected with any particular system will depend primarily upon two factors: (1) Antenna heights, both at the transmitting station and at the receiving station and, (2) ground terrain between transmitting and receiving stations.

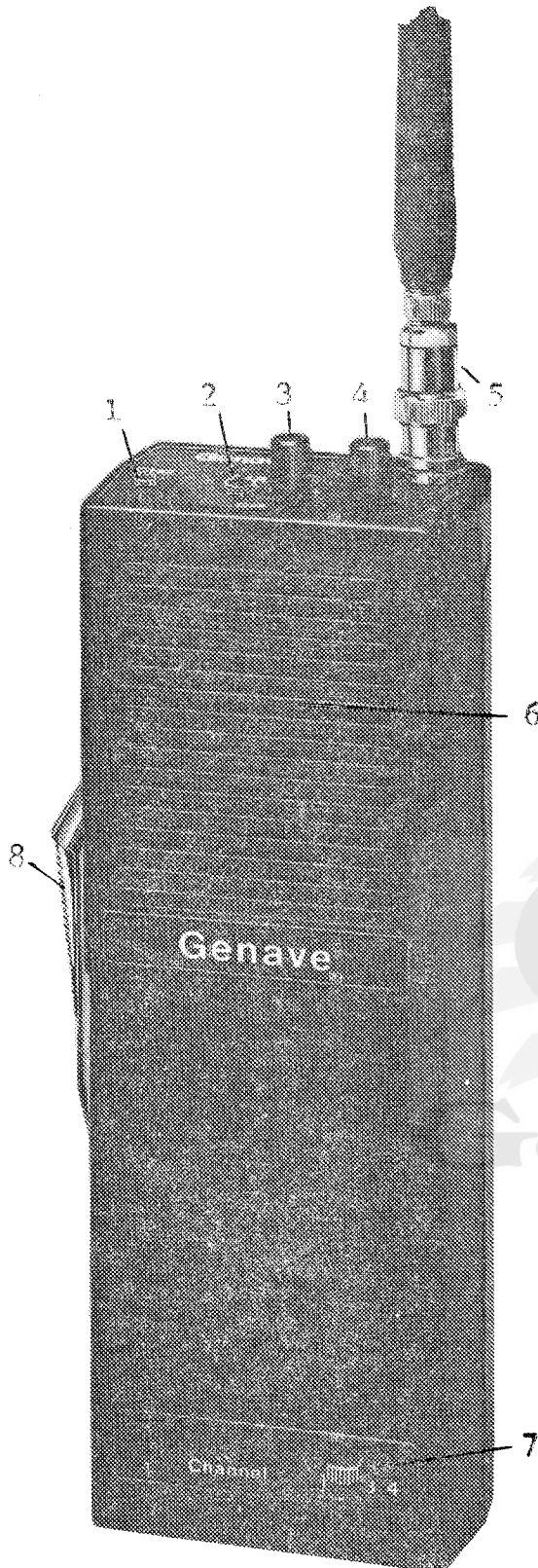
As a general estimate, two handheld, 2-watt transceivers can communicate in a normal urban environment over approx. 1.5 miles. A 2-watt handheld communicating directly with a 25-watt mobile unit can transmit approx. 2.8 miles to the mobile, but can receive the mobile for approx. 5.8 miles. If a 2-watt unit is working through a VHF Repeater having a 6-dB gain antenna mounted 100 ft. above average terrain, and with transmitter power of 90-watts, the handheld can expect to raise the repeater over a radius of 14 miles; however, the handheld will receive the repeater over a distance of approx. 25 miles.

The ECOM-40 is designed to operate into a 52-ohm antenna system. The unit is normally supplied with a rubber-clad, flexible, helically-loaded antenna with an 8-32 threaded mounting; however, the same antenna, except equipped with a BNC connector, is available as an option at time of purchase.



SECTION III

OPERATING MANUAL



3-1. OPERATING CONTROLS

For reliability and operating convenience, only essential operating controls are installed on the unit's external surfaces. The functions of these controls are as follows:

1. Charging jack to permit charging the internal nicad battery pack
2. Earphone jack
3. Volume control/On-Off switch
4. Squelch control, and tone-squelch override switch.
5. Flexible antenna, or BNC antenna connector.
6. Built-in Speaker/Microphone
7. Channel-Selector switch
8. Push-to-talk switch

The unit is designed to fit comfortably in the palm of the hand -- permitting easy, one-handed operation.

3-2. OPERATING INSTRUCTIONS

1. To operate transceiver, turn unit ON by rotating the Volume Control (3) clockwise until switch clicks.
2. Select desired transmit/receive frequency by sliding Channel-Selector Switch (7) to desired operating position.
3. Check that helically-loaded, flexible, rubber-clad antenna is properly connected to transceiver.
4. If transceiver is equipped with the SA-44 subaudible-tone option, deactivate tone-squelch by pulling the squelch-control knob OUT to its MONITOR position.
5. Rotate Squelch Control (4) counter-clockwise until noise is heard in speaker (6). Adjust Volume Control for desired audio level; then, re-adjust Squelch Control clockwise until receiver just quiets. DO NOT

ADJUST SQUELCH WHILE A SIGNAL IS BEING RECEIVED.

6. To activate tone-squelch, PUSH the squelch-control knob (4) IN to its SQUELCH position (Do NOT turn knob from position selected in step 5).
7. To transmit, depress Push-to-Talk Switch (8) and speak into microphone (6). Release Push-to-Talk Switch to listen.

NOTE: The carrier-level squelch circuit, which is adjusted by the TOP-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.

The CA-44 Subaudible-Tone System is a tone-activated circuit designed to squelch receiver audio until a transmitted signal containing the proper subaudible tone is received. Thus, calls by other licensees who share the channel will not be heard unless transceiver is manually set to its MONITOR position by pulling squelch knob (4) OUT. Note that the channel MUST be monitored prior to initiating a call, to insure that frequency is NOT in use; if channel is clear, PUSH squelch knob (4) IN and proceed to originate call.

8. If an optional, external speaker/microphone is desired, it may be connected to Earphone Jack (2) on unit top panel.
9. To charge internal batteries, plug charger into Charging Jack (1). Now, insert charger into 120 VAC, 60 Hz, receptacle. Be SURE Volume Control is turned fully counterclockwise to its OFF position.

3-3. LICENSING INFORMATION

Licensing requirements vary with the service for which this unit will be used; however, all services require the station transmitter to be licensed. Further, all transmitter adjustments or tests during or coincident with the installation, servicing, or maintenance of a radio station, which may affect the proper operation of such station, shall be made by or under the immediate supervision and responsibility of a person holding a first- or second-class commercial radio operator license, either radiotelephone or radiotelegraph, who shall be responsible for the proper functioning of the station equipment. Note, however, that in many services an unlicensed person, after having been authorized to do so by the station licensee, may operate from a control point a mobile, base, or fixed station or from a dispatch point a base or fixed station, during the course of normal rendition of service. The minimum class of operator authorization required for each specific classification of station is set forth in the appropriate F.C.C. rule part.

If this transceiver is to become part of a new radio-communications system, it should be included as a portable or mobile unit on the initial station license application. Information concerning modification of an existing license (that is, adding additional portable or mobile units, or changing transmitter-type of portable or mobile units) can be found in the F.C.C. Rules and Regulations governing the service in which the system is used.

The following technical information is intended to aid ECOM-40 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.

Type Accepted: Yes
Type Acceptance/Model No: ECOM-40
Type of Unit: Transceiver
Frequency Range (MHz): 143.9 to 174.0
Frequency Tolerance: $\pm 0.001\%$
Emission: 16F3
Transmitter Input Power: ---
Transmitter Output Power: 1.5 watts
Approved under Rule Part Numbers: 22, 74, 81, 87, 90

Form 405-A may be used in applying for license RENEWAL in the Aviation, Public Safety, Industrial, Land Transportation and Disaster radio services when there has been no change, other than mailing address or licensee's name.

For answers to specific licensing questions, contact the Engineer-in-Charge at nearest Federal Communications Commission Field Engineering Office as listed below -- they will also supply the appropriate form(s).

For additional information on filling out the appropriate application forms, consult the F.C.C. instruction sheet provided with the form.

The procedures for obtaining necessary licenses are found in the Federal Communications Commission Rules and Regulations. These volumes may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

F.C.C. Form 400 and F.C.C. Form 405-A are normally used to apply for a license for the ECOM-40. The Form 400 is used to apply for a NEW station authorization in the Public Safety, Industrial, and Land Transportation Radio Services under F.C.C. Rule Part 90.

The services and the corresponding F.C.C. rule part numbers, under which the ECOM-40 transceiver can be used, are as follows:

3-3-1. F.C.C. Rule Part Numbers

Public Mobile Radio Services

F.C.C. Rules & Regulations, Volume VII, Part 22

Domestic Public Land Mobile Radio Service
Rural Radio Service

Private Land Mobile Radio Services

F.C.C. Rules & Regulations, Volume V, Part 90

Local government radio service Subpart B
Police radio service
Fire radio service
Highway maintenance radio service
Forestry-conservation radio service

Medical services Subpart C
Rescue organizations
Veterinarians
Disaster relief organizations
School buses
Beach patrols
Paging operations

Subpart D

Subpart E

F.C.C. Rules & Regulations, Volume IV, Part 81

Stations Operated in the Land Mobile Service for Maritime Purposes

F.C.C. Rules & Regulations, Volume V, Part 87

Civil Air Patrol Stations

3-4. F.C.C FIELD ENGINEERING OFFICES

Anchorage District Office
1011 E. Tudor Road, Room 240,
P.O. Box 2955
Anchorage, Alaska 99510

Atlanta District Office
Room 440, Massell Building,
1365 Peachtree Street, NE,
Atlanta, Georgia 30309

Baltimore District Office
1017 Federal Building,
31 Hopkins Plaza,
Baltimore, Maryland 21201

Beaumont Office
Jack Brooks Federal Building, Room 323
300 Willow Street,
Beaumont, Texas 77701

Boston District Office
1800 Customhouse,
165 State Street,
Boston, Massachusetts 02109

Buffalo District Office
1307 Federal Building
111 West Huron Street,
Buffalo, New York 14202

Chicago District Office
230 S. Dearborn Street, Room 3935,
Chicago, Illinois 60604

Cincinnati Office
3620 Winton Road,
Cincinnati, Ohio 45231

Dallas District Office
Earle Cabell Federal Building,
U.S. Courthouse, Room 13E7
1100 Commerce Street,
Dallas, Texas 75242

Denver District Office
The Executive Tower, Room 2925
1405 Curtis Street,
Denver, Colorado 80202

Detroit District Office
1054 Federal Building,
231 W. LaFayette Street,
Detroit, Michigan 48226

Honolulu District Office
Prince Kuhio Federal Building,
300 Ala Moana Blvd., Room 7304,
P.O. Box 50223
Honolulu, Hawaii 96850

Houston District Office
New Federal Office Building,
515 Rusk Ave., Room 5636,
Houston, Texas 77002

Kansas City District Office
Brywood Office Tower, Room 320
8800 East 63rd Street,
Kansas City, Missouri 64133

Long Beach District Office
3711 Long Beach Blvd., Room 501
Long Beach, California 90807

Miami District Office
51 S.W. First Ave., Room 919,
Miami, Florida 33130

New Orleans District Office
1007 F. Edward Hebert Federal Bldg.,
600 South Street,
New Orleans, Louisiana 70130

New York District Office
201 Varick Street,
New York, New York 10014

Norfolk District Office
Military Circle,
870 N. Military Highway,
Norfolk, Virginia 23502

Philadelphia District Office
11425 James A. Byrne Federal Courthouse
601 Market Street,
Philadelphia, Pennsylvania 19106

Pittsburgh Office
3755 William Penn Highway,
Monroeville, Pennsylvania 15146

Portland District Office
1782 Federal Building
1220 S.W. Third Avenue,
Portland, Oregon 97204

St. Paul District Office
691 Federal Bldg., & U.S. Courthouse,
316 North Robert Street,
St. Paul, Minnesota 55101

San Diego Office
7840 El Cajon Blvd., Room 405,
La Mesa, California 92041

San Francisco District Office
323-A Customhouse,
555 Battery Street,
San Francisco, California 94111

San Juan District Office
747 Federal Building,
Hato Rey, Puerto Rico 00918

Savannah Office
238 Post Office Bldg. and Courthouse
P.O. Box 8004 (125 Bull Street)
Savannah, Georgia 31412

Seattle District Office
3256 Federal Building,
915 Second Avenue,
Seattle, Washington 98174

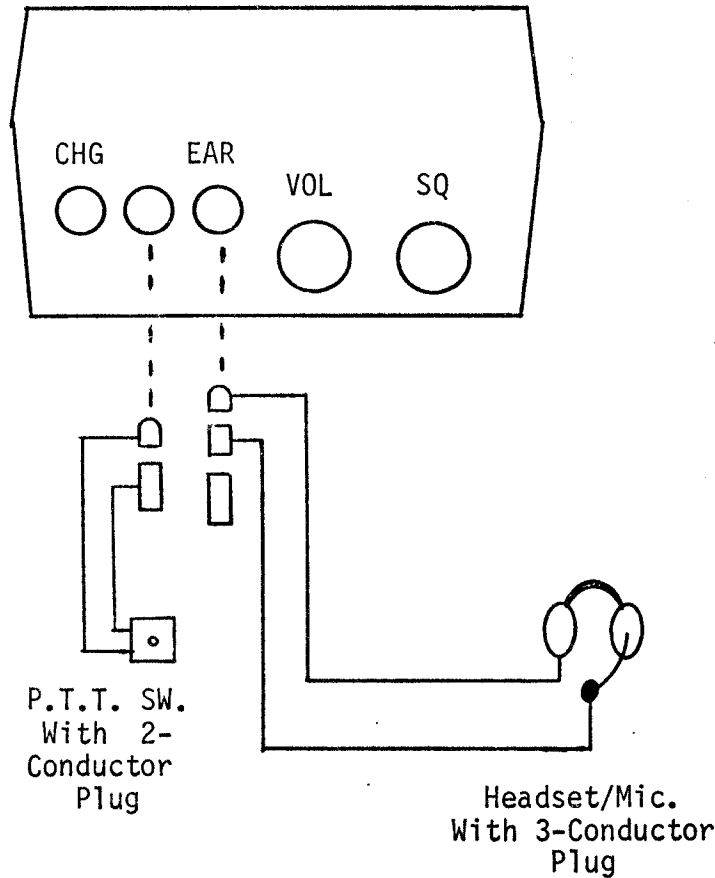
Tampa Office
ADP Building, Room 601,
1211 N. Westshore Blvd.,
Tampa, Florida 33607

Washington District Office
6525 Belcrest Road, Room 901-B
P.O. Box 1789,
Hyattsville, Maryland 20788

HEADSET/BOOM MIC. INFORMATION (AIRCOM & ECOM-40's)

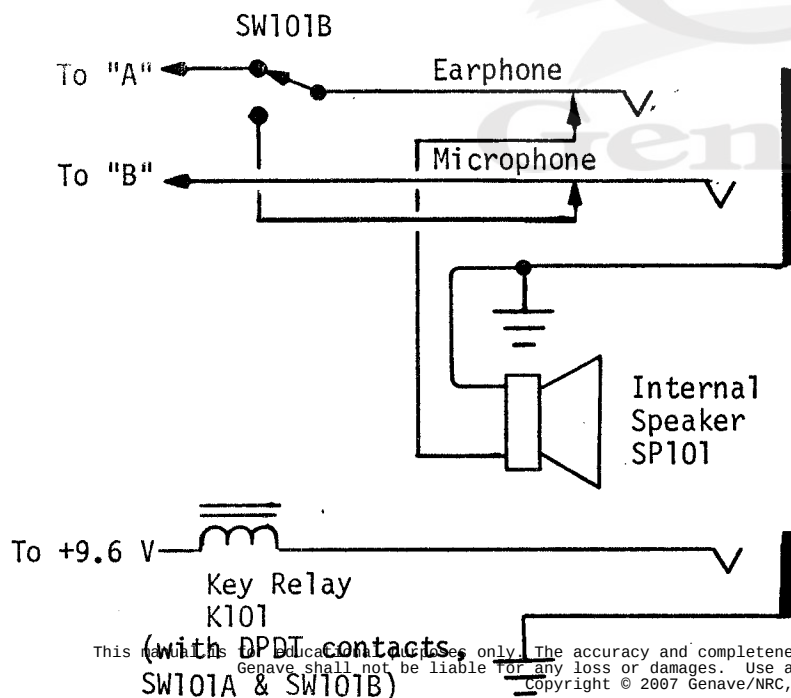
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For use with Reverse "Hush-A-Com" Headset/Mic.



1. Headset/Mic connects to EAR jack on unit top panel by means of a 3.5 mm Stereo Plug (3-conductor) as shown at left.
2. Push-to-talk switch connects to the unmarked jack between CHG and EAR as shown at left. The plug is a 3.5 mm Monaural (2-conductor) unit.

NOTE: Physically these plugs could be interchanged; however, use care to connect them ONLY as shown at left. Otherwise, the unit will be inoperative, and may be damaged.



For troubleshooting purposes, refer to the proper unit schematic in applicable Maintenance Manual.

Relay K101 replaces P.T.T. switch sections SW101A and SW101B. An external P.T.T. switch will now activate K101 which contains SW101A and SW101B.

"A" is receiver audio output and "B" is microphone input on unit schematics (connection of various optional speaker/mic. combinations)

Installation Sheet: 0830048

Aug. 30, 1982

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(with DPDT contacts, SW101A & SW101B)

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