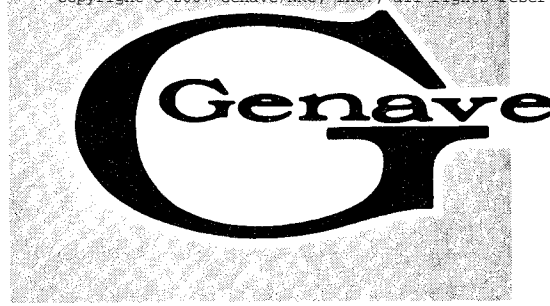




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ECOM - 4 HANDHELD VHF-FM TRANSCEIVER OWNER'S MANUAL

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

MARINE & LAND MOBILE Marine Pub. No. 0910009; Land Mobile Pub. No. 0910010

GENERAL AVIATION ELECTRONICS, INC.

4141 Kingman Drive, Indianapolis, Indiana 46226

AREA (317) 546-1111

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Tech. Pub. No. 0820033

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SECTION I

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GENERAL INFORMATION

1-1. INTRODUCTION

This manual contains all the information normally required to license, implement, and operate the Genave ECOM-4 VHF-FM transceiver.

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

1-2. DESCRIPTION

The ECOM-4 is designed to provide reliable, high-quality communications for various business radio services, such as: Public Safety, Industrial Radio, and Land Transportation. The radio was under strict quality control during its fabrication, and was thoroughly checked prior to shipment from the factory. It will provide many years of satisfactory operation, if given reasonable care and handling.

The Genave ECOM-4 is a handheld, portable VHF transceiver designed for the transmission and reception of frequency modulated radio signals on any 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 the crystal frequencies installed within the unit.

The transceiver is complete with detachable antenna, nicad batteries, battery charger, carrying case, built-in speaker and microphone. All circuitry employed is the latest state-of-the-art design, using the latest in semiconductor and integrated-circuit technology. 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.

The transmitter provides a typical RF output of 2 watts (1.5 watts minimum) into a standard 52-ohm antenna system over the frequency range from 143.9 MHz to 173.4 MHz. The frequency accuracy is adjustable to ± 200 Hz and the frequency stability is $\pm 0.0005\%$. 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 $\pm 0.001\%$. The minimum receiver audio output power is 250 mW.

Power to operate the unit is supplied by the self-contained battery pack, which supplies 7.2-volts DC when nicad cells are used. While six size AA Alkaline penlight batteries can be used, nicad cells are recommended for optimum performance. Provision for charging the transceiver is made by means of an external charging jack and a diode which prevents reversed-polarity charging.

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 recessed, low-profile controls do not protrude above the radio's surface, and are located on front panel to facilitate one-hand operation. The front panel is designed so that an optional touch-tone encoder can be installed, if desired.

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1-3. SPECIFICATIONS

GENERAL:

Control Area Size:	1.7" (4.32 cm) x 1.7" (4.32 cm)
Over-all Dimensions:	8" (20.32 cm) x 2.875" (7.303 cm) x 1.175" (2.98 cm)
Power Supply:	6 AA-size penlight batteries - Nicad or Alkaline
Battery Operating Time:	2 watt 6 hours (Based on "squelched receiver" 90%; transmit 5%; and receive 5% duty cycle)
Frequency Range:	143.9 to 173.4 MHz
Number of Channels:	4
Channel Separation:	2 MHz, maximum
Temperature Range:	-30°C to +60°C
Weight:	Less than 2 Lbs. (0.907 kg)

RECEIVE:

Sensitivity:	0.5 μ V maximum for 12 dB SINAD
Selectivity:	+7.5 kHz, typical
Squelch Threshold:	0.5 μ V maximum
Modulation Acc. Bandwidth:	+7.5 kHz maximum
Adjacent Chan. Rejection:	-35 dB minimum at 25 kHz (12-dB SINAD) -40 dB minimum at 30 kHz (12-dB SINAD)
Intermodulation Response:	-45 dB minimum (E.I.A. method)
Image Response:	-40 dB minimum
Spurious Response:	-40 dB
Audio Output Power:	250 mW minimum
Hum & Noise Level:	35 dB below 0.25 watts, minimum
Frequency Accuracy:	Adjustable within \pm 500 Hz
Frequency Stability:	\pm .001%

TRANSMIT:

Power Output:	2 watts typical (1.5 watts minimum)
Frequency Range:	143.9 to 173.4 MHz
Output Impedance:	50-ohms, typical
Deviation:	+5kHz maximum with 1 kHz audio
Frequency Stability:	\pm .0005%
Frequency Accuracy:	Adjustable to \pm 200 Hz
Touch Tone:	External option

1-4. EQUIPMENT FURNISHED

- a. Antenna, Helically-loaded, rubber-clad flexible (1)
- b. Crystal, Receive (1)
- c. Crystal, Transmit (1)
- d. Carrying Case (1)
- e. Battery, Penlight, 1.2 V nicad (6)
- f. Charger, Battery (1)

SECTION II

INSTALLATION MANUAL

2-1. INTRODUCTION

This manual Section provides installation and charging data for the nicad batteries supplied with this VHF-FM handheld transceiver. Some information concerning the antenna supplied with the unit is also given.

2-2. BATTERY INSTALLATION

The six 1.2-volt nicad penlight batteries are not installed in unit at time of shipment from the factory, but are packaged in shipping container with transceiver. The batteries 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.

If the transceiver must be used before the nicad batteries have had time to charge, the nicad cells may be removed and replaced with six size AA alkaline penlight batteries.

The plastic front cover of the transceiver must be removed in order to install batteries. This cover is easily removed as follows (see Figure 2-1):

1. Unscrew antenna (A) from its threaded mounting stud.
2. Remove one #4-40 oval-head machine screw (B) from bottom-center of rear cover.
3. Carefully lay transceiver on its back; now, lift bottom of front cover upward and slide cover off antenna mounting stud.

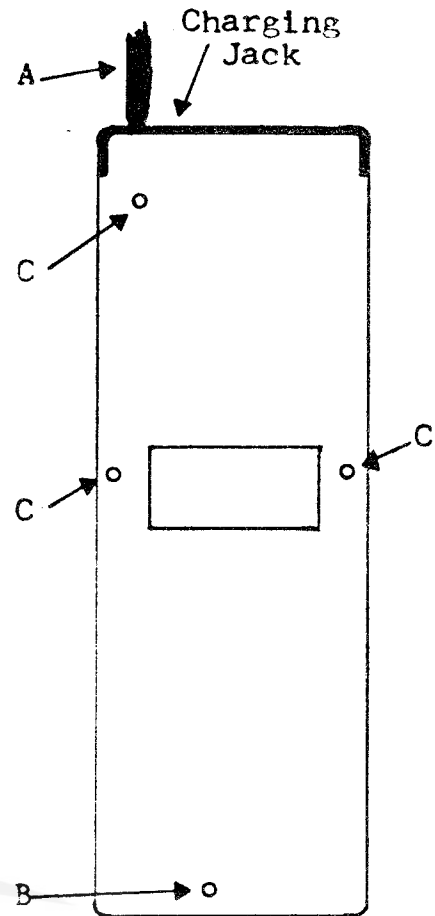
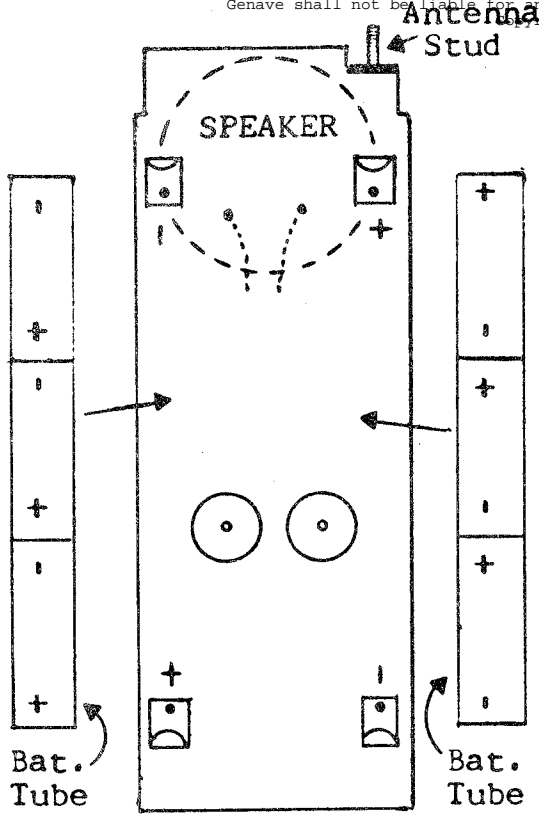


Figure 2-1. Unit Rear View

4. Insert three batteries in each of the two phenolic battery tubes furnished with the radio (Figure 2-2).
5. Insert battery tubes in place between appropriate battery clips on transceiver PC board. PROPER BATTERY POLARITY IS SHOWN IN FIGURE 2-2, AND IS MARKED ON PC BOARD.

NOTE: When front cover is removed, speaker is only held in place on PC board by adhesive tape; thus, during battery installation, speaker can be removed, if desired. To reinstall speaker, locate leads approximately as shown in Figure 2-2. BE SURE terminals do NOT touch coil cans or shields.



terrain between transmitting and receiving stations.

The ECOM-4 is designed to operate into a 52-ohm antenna system. The unit is fitted with a threaded 8-32 stud, accessible through a hole in top of unit, for antenna connection. The unit is supplied with a helically-loaded, vinyl clad, flexible antenna which is pre-cut for the proper frequency.

If it should be necessary to replace antenna, the following cutting chart can be used to insure that antenna is adjusted for the desired frequency. To use this chart, find the operating center frequency along the bottom edge of chart; then, read upward to the point at which the curve intersects the frequency line. Now, read across to vertical edge of chart to determine proper antenna length. This is the length from bottom of antenna (see illustration).

Figure 2-2. Battery Location

6. Replace unit front cover by reversing removal procedure above.
7. Plug cord from battery charger into charging jack (top of unit, adjacent to antenna). Next, insert charger into 120 VAC, 50/60 Hz, receptacle.
8. 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 INSTALLATION

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

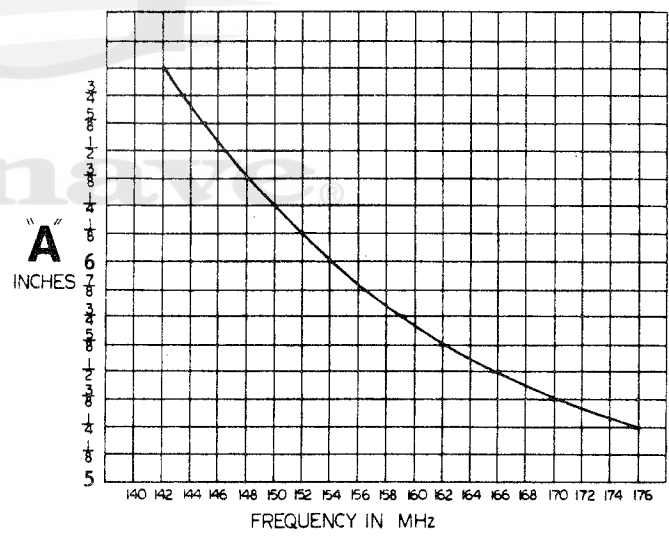
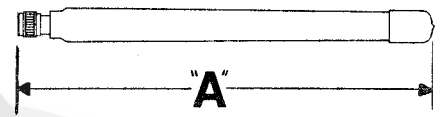


Figure 2-3. Antenna Chart

SECTION III

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OPERATING MANUAL

3-1. OPERATING CONTROLS

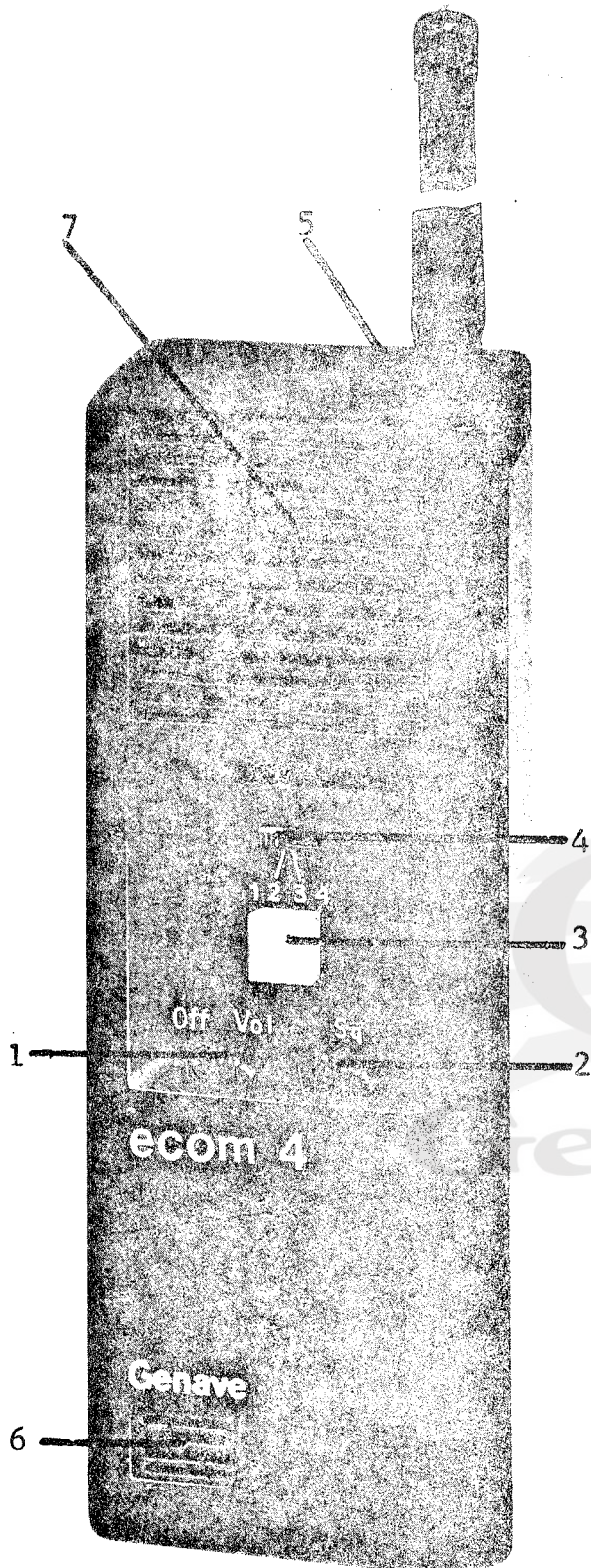
For reliability and operating convenience, only essential operating controls are installed on the unit's front panel. The functions of these controls are as follows:

1. Volume control/On-Off switch
2. Squelch control
3. Push-to-talk switch
4. Channel-selector switch
5. Charging jack to permit charging the internal nicad batteries
6. Built-in microphone
7. Internal loudspeaker

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

3-2. OPERATING INSTRUCTIONS

1. To operate transceiver, turn unit ON by rotating the Volume control (1) clockwise until switch clicks.
2. Select desired transmit/receive frequency by sliding Channel-Selector switch (4) to desired operating position. Check that ant. is connected.
3. Rotate Squelch control (2) counterclockwise until noise is heard in speaker (7). Adjust Volume control for desired audio level. Readjust Squelch control clockwise until receiver just quiets.
4. To transmit, depress push-to-talk switch (3) and speak into microphone (6). Release push-to-talk switch to receive.
5. To charge internal batteries, plug charger into Charging Jack (5). Now, insert charger into 120 VAC, 60 Hz, receptacle. Be SURE Volume control is turned fully counterclockwise to its OFF position.



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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-4 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:	T-7040400
Type of Unit:	Transceiver
Frequency Range (MHz):	143.9 to 173.4
Frequency Tolerance:	.0005%
Emission:	16F3
Transmitter Input Power:	4 Watts
Transmitter Output Power:	2 Watts
Approved under Rule Part Numbers:	21, 81, 87, 89, 91, 93

For additional information on filling out the appropriate application forms, consult the F.C.C. instruction sheet provided with 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 ECOM-4 VHF 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, or for answers to specific licensing questions, contact Engineer in Charge at nearest Federal Communications Commission Field Engineering Office as listed below -- they will also supply the appropriate forms.

The procedures for obtaining necessary licenses are found in the Federal Communications Commission Rules and Regulations. The services and the corresponding F.C.C. rule part numbers, under which the ECOM-4 transceiver can be used, are as follows:

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

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

Domestic Public Radio Services (Other than Maritime Mobile)

F.C.C. Rules & 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 & 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 & Regulations, Volume V, Part 87
Civil Air Patrol Stations

Public Safety Radio Services

F.C.C. Rules & 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 & Regulations, Volume V, Part 91
Power Radio Service
Petroleum Radio Service
Forest Products Radio Service
Motion Picture 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 & Regulations, Volume V, Part 93
Motor Carrier Radio Service
Railroad Radio Service
Taxicab Radio Service
Automobile Emergency Radio Service

3-3-2. F.C.C. Field Engineering Offices

ALASKA, ANCHORAGE 99510
G-63 U.S.P.O. and Courthouse Bldg.
Box 644, 4th and F Streets

CALIFORNIA, LONG BEACH
Room 501
37]] Long Beach Blvd.

CALIFORNIA, SAN DIEGO 92101
Fox Theatre Bldg.
1245 7th Ave.

CALIFORNIA, SAN FRANCISCO 94111
323-A Customhouse
555 Battery St.

COLORADO, DENVER 80202
Suite 2925, The Executive Tower
1405 Curtis St.

DISTRICT OF COLUMBIA, WASHINGTON 20554
Room 411
1919 M St. NW.

FLORIDA, MIAMI 33130
Room 919
51 Southwest 1st Ave.

FLORIDA, TAMPA 33602
809 Barnett Office Bldg.
1000 Ashley Dr.

GEORGIA, ATLANTA 30309
440 Massell Bldg.
1365 Peachtree St. NE.

HAWAII, HONOLULU 96808
502 Federal Bldg.
Box 1021, 355 Merchant St.

ILLINOIS, CHICAGO 60604
3935 New Federal Bldg.
230 South Dearborn St.

LOUISIANA, NEW ORLEANS 70130
829 F. Edward Hebert Federal Bldg.
600 South St.

MARYLAND, BALTIMORE 21201
819 Federal Bldg.
31 Hopkins Plaza

MASSACHUSETTS, BOSTON 02109
1600 Customhouse
165 State St.

MICHIGAN, DETROIT 48226
1054 Federal Bldg.
231 West LaFayette St.

MINNESOTA, ST. PAUL 55101
691 Federal Bldg. & U.S. Courthouse
316 North Robert St.

MISSOURI, KANSAS CITY 64106
1703 Federal Bldg.
601 East 12th St.

NEW YORK, BUFFALO 14202
1307 Federal Bldg.
111 West Huron St.

NEW YORK, NEW YORK 10014
201 Varick St.

OHIO, CINCINNATI 45231
8620 Winton Road

OREGON, PORTLAND 97204
1782 Federal Office Bldg.
1220 Southwest 3d Ave.

PENNSYLVANIA, MONROEVILLE 15146
(Pittsburgh Area)
William Penn Highway

PUERTO RICO, HATO REY 00918
747 Federal Bldg.

TEXAS, DALLAS 75242
13E7 Earle Cabell Federal Bldg.
1100 Commerce St.

TEXAS, HOUSTON 77002
5636 New Federal Office Bldg.
515 Rusk Ave.

VIRGINIA, NORFOLK 23502
Military Circle
870 North Military Highway

WASHINGTON, SEATTLE 98174
3256 Federal Bldg.
915 2d Ave.

PENNSYLVANIA, PHILADELPHIA 19106
James A. Byrne Federal Courthouse
601 Market St.