AIRCOM

TRANSCEIVER MAINTENANCE 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 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

Genave

4141 Kingman Drive, Indianapolis, Indiana 46226

AREA (317) 546-1111

Specifications subject to change without notice

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CONTENTS

SECTION I
GENERAL INFORMATION

1-1. INTRODUCTION

This manual contains all the information normally required to license, install, operate, and maintain the Genave AIRCOM VHF/AM aviation-band handheld transceiver.

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

1-2. DESCRIPTION

NOTE: The AIRCOM transceiver has the capability of transmitting and receiving on frequencies assigned by the F.C.C. to the aeronautical service, 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 Genave AIRCOM is a small, handheld portable transceiver, designed to provide reliable, high-quality communications for various functions in the aviation services authorized by Part 87 of the F.C.C. Rules and Regulations. The radio was under strict quality control during its fabrication, and was thoroughly checked prior to shipment from the factory. It is sturdily constructed, and will provide many years of satisfactory operation if given reasonable care and handling.

The AIRCOM portable transceiver is designed for the transmission and reception of amplitude-modulated radio signals on any of four channels within the range from 118.000 to 135.975 MHz. A four-position slide switch selects any one of four possible operating frequencies --- the frequencies being dependent upon crystals installed within the instrument; however, the maximum channel separation is approximately 10 MHz.

The transceiver is complete with helically loaded, rubber-clad flexible antenna, nicad-battery pack, AC charger for battery pack, and built-in speaker/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.

The transmitter provides a typical RF output of 0.75 watts (3 watts PEP) into a standard 52-ohm antenna over the frequency range from 118 to 136 MHz. The frequency stability is $\pm$.002% from -30°C to +50°C. Amplitude modulation (6A3) is employed, with percentage of modulation not less than 70%. The unit is type accepted under Part 87 of the F.C.C. Rules; complete licensing data will be found in Section 3 of this manual.

The receiver is a crystal-controlled, dual-conversion superheterodyne employing a 2-pole monolithic crystal filter at 10.7 MHz and a 4-pole ceramic filter at 455 kHz. A single integrated-circuit chip performs 2nd L.O., 2nd mixer, and 2nd IF (455 kHz) amplification functions. The 10.7 MHz 1st IF provides good image rejection, while the 455 kHz 2nd IF improves receiver stability. The receiver audio output power is approx. 500 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). All transceiver components are mounted on a single printed-circuit board.

Operating controls for the unit (Volume, Squelch, Charging Jack and Antenna Jack) are mounted on top panel; thus, they 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
Battery Operating Time:	8 hours, based on "squelched receiver" 90%; transmit 5%; and receive 5% duty cycle
Frequency Range:	118.00 to 135.975 MHz (118 - 128 MHz is standard)
Number of Channels:	4, maximum
Channel Separation:	10 MHz , maximum
Temperature Range:	-30°C to +50°C
Weight:	Less than 2 lbs. (0.907 kg)

RECEIVE:

Sensitivity:	0.4 µV for 6 dB (S + N)/N
Selectivity:	More than 60 dB at 30 kHz
Squelch Sensitivity:	0.2 µV to 2 µV, adjustable
Intermodulation Response:	60 dB, minimum
Image Response:	55 dB, minimum
Spurious Response:	55 dB, minimum
Audio Output Power:	500 mW @ less than 10% distortion
Frequency Stability:	±.003% -30°C to +50°C
Maximum Channel Separation:	10 MHz

1-3. SPECIFICATIONS (Cont'd)

TRANSMIT:

Power Output:	0.75 Watt (3 Watt PEP)
Frequency Range:	118 MHz to 136 MHz
Output Impedance:	50 ohms, nominal
Frequency Stability:	$\pm$.002% -30°C to +50°C
Maximum Channel Separation:	10 MHz
Modulation:	6A3

1-4. EQUIPMENT FURNISHED

a. AIRCOM VHF-AM Transceiver.

b. Helically-loaded, rubber-clad flexible antenna (8-32 threaded mounting).

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. Speaker/microphone (G22)

b. Leather carrying case (GLC-4)

c. Leather front cover for item b (GLC-5)

d. Spare battery pack (PSI-32)

e. Flexible antenna, with BNC connector.

SECTION II

INSTALLATION MANUAL

2-1. INTRODUCTION

This manual section provides installation and charging data for the nicad battery pack supplied with the VHF-AM 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.

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. 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 AIRCOM 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.

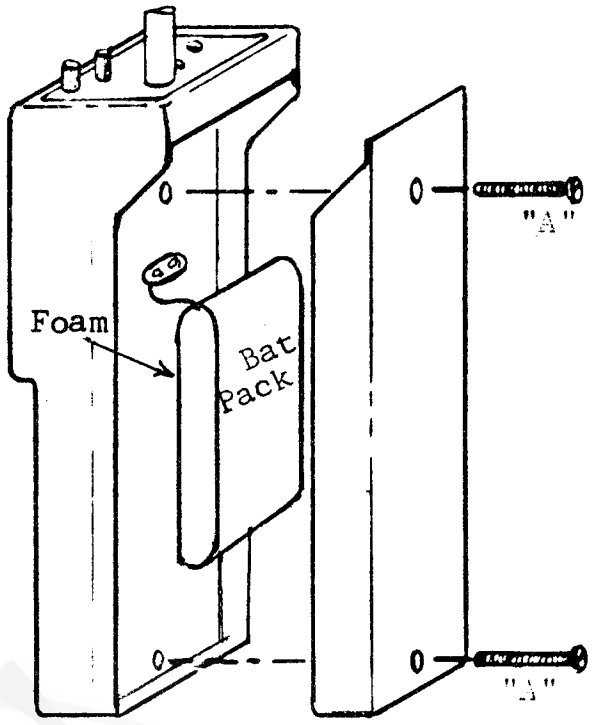


Figure 2-1. Unit Rear View

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

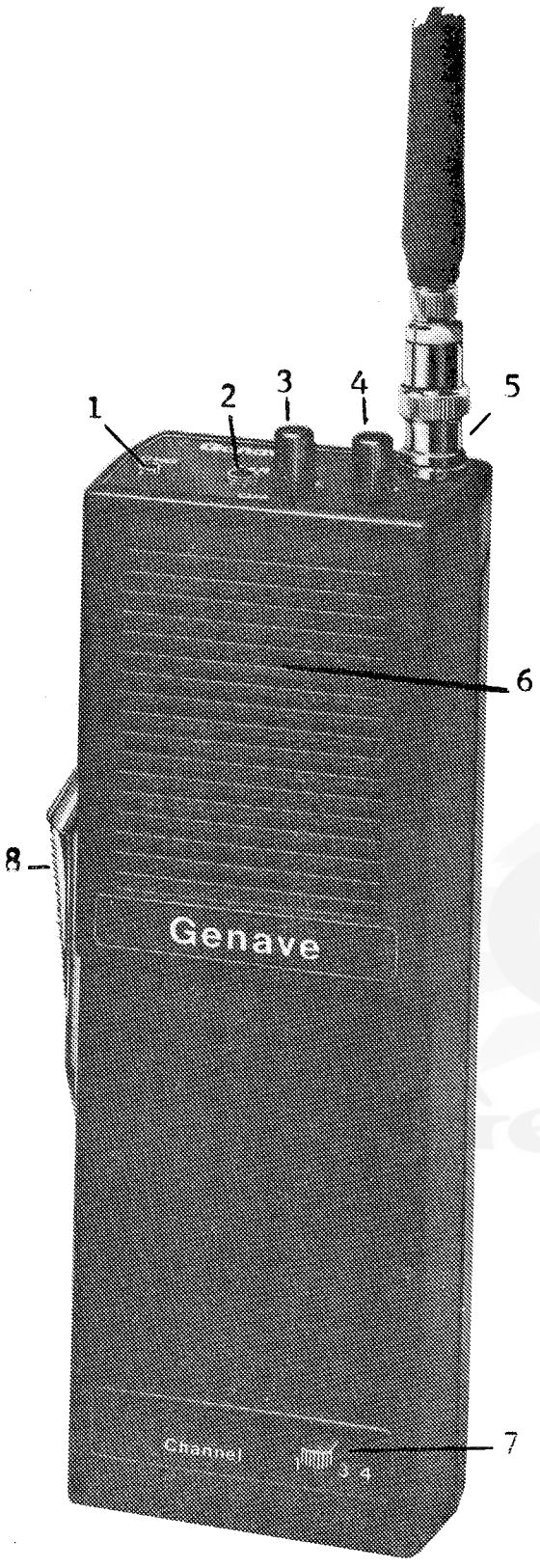
All VHF communications are basically limited to "line-of-sight" distances.

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.

The AIRCOM is designed to operate into a 52-ohm antenna system. The unit normally is supplied with an 8-32 threaded mounting for the antenna; however, a BNC connector mounting for the antenna 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
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 (5) is not damaged, and is properly tightened.

4. Rotate Squelch control (4) counter-clockwise until noise is heard in speaker (6). Adjust Volume control for desired audio level. Readjust Squelch control clockwise until receiver just quiets.

5. To transmit, depress push-to-talk switch (8) and speak into microphone (6). Release push-to-talk switch to receive.

6. 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.

In addition to the STATION license, the FCC Rules normally require OPERATORs to hold some type of authorization. The minimum class of operator authorization required for each specific classification of station is set forth in the appropriate FCC rule part. The most common authorization permitted by Rules Part 87, under which the AIRCOM is approved, is the "restricted radiotelephone operator permit" (FCC Form 753).

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 Part 87 of the FCC Rules.

The following technical information is intended to aid AIRCOM 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:	AIRCOM
Type of Unit:	Transceiver
Frequency Range((MHz):	118.00 to 135.975
Frequency Tolerance:	±.002%
Emission:	6A3
Transmitter Output Power:	0.75 W
Approved under Rule Part:	87

The procedures for obtaining necessary licenses are found in the Federal Communications Commission Rules and Regulations. The service and the corresponding FCC rule part number, under which the AIRCOM transceiver can be used, is as follows:

Aviation Services

FCC Rules & Regulations, Volume V, Part 87

This volume may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

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

3-4. F.C.C FIELD ENGINEERING OFFICES (Engineer-In-Charge)

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

Atlanta District Office
Room 440, Massell Building,
1365 Peachtreet 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 Strret,
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, Mossouri 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

SECTION IV
MAINTENANCE MANUAL

4-1. INTRODUCTION

This Section of the Maintenance Manual contains theory of operation, alignment data, and schematics. Lists of replacement parts are given in Section 5 of this manual.

The Genave Model AIRCOM transceiver is a hand-held, amplitude-modulated VHF unit designed to transmit and receive between 118.0 and 135.975 MHz. The instrument supplies a typical RF power output of 3 watts PEP on any of four possible channels, with 100% modulation.

Basically, the receiver is a dual conversion superheterodyne employing a 2-pole monolithic crystal filter at 10.7 MHz and a 4-pole ceramic filter at 455 kHz. A single integrated-circuit chip performs 1st IF (10.7 MHz) amplification, 2nd mixer, 2nd L.O., and 2nd IF (455 kHz) amplification functions.

In conjunction with the following circuit description, refer to the block diagram of Figure 4-1, and to transceiver schematic in this section of the manual.

4-2. THEORY OF OPERATION - GENERAL

4-2-1. Power Supply

A self-contained battery pack supplies power to operate the instrument. This battery pack supplies 9.6 volts DC, and uses eight (8) Nickel-Cadmium cells.

The battery pack may be charged while installed in transceiver case by means

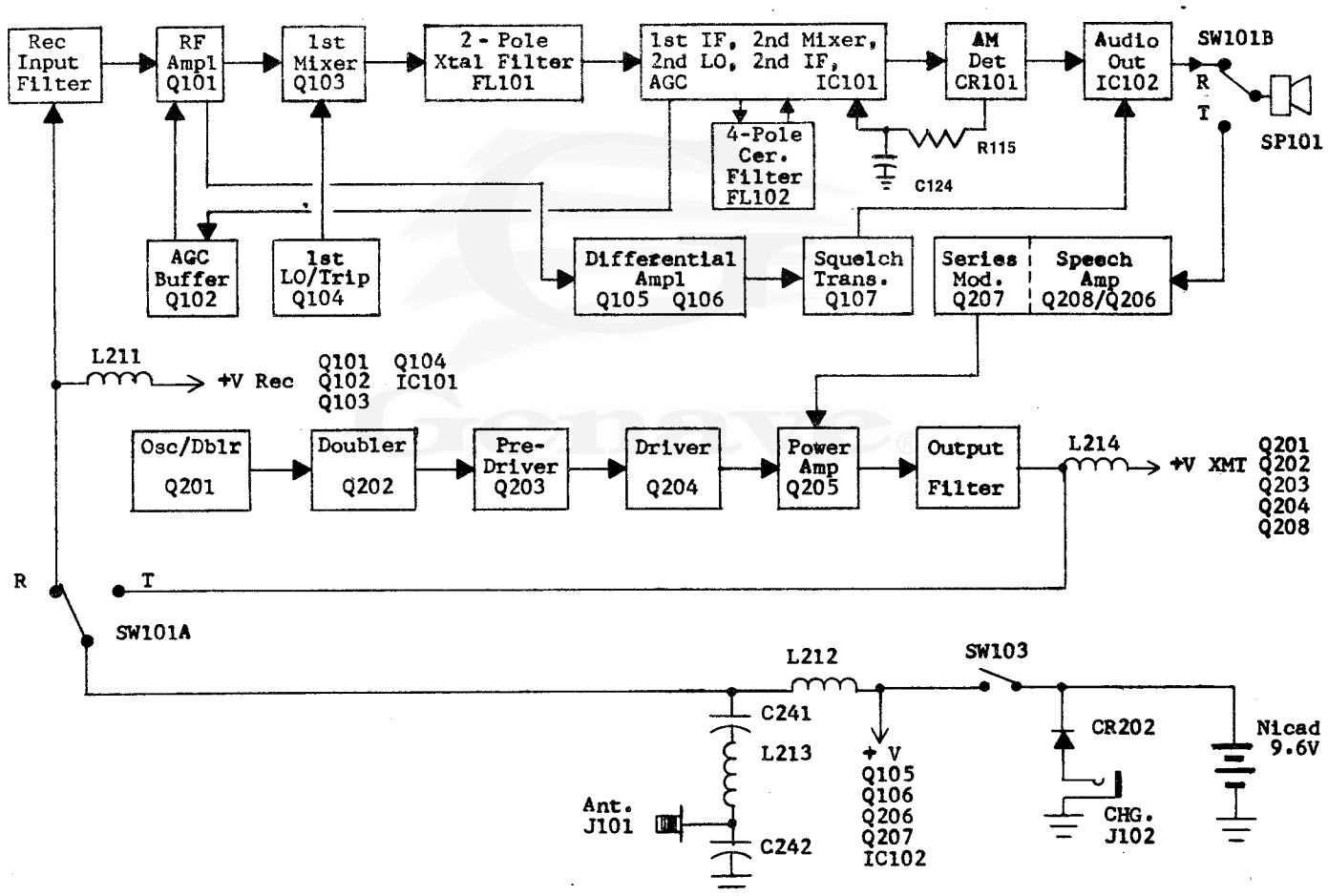


Figure 4-1. Block Diagram

of a CHG jack, J102, located on top panel of the AIRCOM case. A series diode, CR202, prevents "reversed polarity" charging of nicad battery pack.

The +V XMIT and +V REC lines are each supplied with 9.6 volts DC through On-Off switch SW103, Push-To-Talk switch SW101, and isolating chokes L212, L211, or L214.

4-2-2. Push-To-Talk Circuitry

On-Off Switch SW103, located on Volume Control R116, applies +9.6-volts to the receiver or transmitter circuitry via Push-To-Talk Switch SW101A. Also P.T.T. SW101A switches antenna between receiver and transmitter circuitry. P.T.T. Switch SW101B connects speaker/microphone SP101 to receiver output when the switch is in its normal resting position, or to transmitter audio input when switch is depressed.

Isolating chokes L211, L212, and L214 allow SW101A to switch DC and RF currents simultaneously. In receive mode, the 9.6-volt supply is applied to Q101, Q102, Q103, Q104 and IC101 through SW-103, L212, SW101A, and L211. At the same time, the RF signal from the antenna is applied to the 2-pole, receiver input filter through L213, C241, and SW101A. Note that L211 and L212 prevent the incoming RF signal from entering receiver DC circuits.

In the transmit mode, the 9.6-volt supply is switched to transistors Q201, Q202, Q203, Q204, and Q208 by means of L212, SW101A, and L214. Simultaneously, transmitter RF output from the output filter is routed to the antenna by SW-101A, C241, and L213. Chokes L214 and L212 prevent transmitter RF output from appearing across the battery pack or other DC circuitry.

4-3. THEORY OF OPERATION - RECEIVER

4-3-1. Input Filter and RF Amplifier

A signal from the Antenna first passes through L213, C241, and P.T.T. SW101A to C101, which couples incoming signal to receiver-input filter comprised of L101, C102, C103, C104, L102 and L103. This filter then applies the signal to common base RF amplifier Q101. The amplified signal is then applied to a two section filter consisting of L104, C-108, C109, L105 and C110. C111 couples the signal to a bi-polar mixer, Q103.

4-3-2. 1st Local Oscillator and Tripler

Q104 and associated components form a modified Colpitts, crystal-controlled, local oscillator. A 4-position, slide switch, SW102A, selects proper crystal in the 35.76 to 41.75 MHz range to produce desired injection frequency. L107, C133, C134, L108 and C138 tune output circuit of Q104 to three times the crystal oscillation frequency. C136 then couples the LO signal to base of mixer Q103.

NOTE: The first LO injection frequency is 10.7 MHz BELOW desired "receive" frequency.

The crystal frequency can be calculated from the following formula, where F_c is the crystal frequency and F_o is the operating frequency:

$$F_c = (F_o - 10.7)/3$$

4-3-3. 1st Mixer and 2-Pole Filter

The amplified RF input signal and the LO injection signal are each applied to the base circuit of mixer Q103. The 10.7 MHz difference signal, produced in the first mixer, is coupled by T101 to a 2-pole monolithic crystal filter, FL-101. T102 matches the filter output to input of an IF amplifier (10.7 MHz) in IC101.

4-3-4. 10.7 MHz IF Amp., 2nd LO, 2nd Mixer, and 455 kHz IF Amp.

IC101 is a multifunction AM IF integrated circuit, which includes the 1st IF amplifier (10.7 MHz), 2nd mixer, 2nd LO, and 2nd IF amplifier (455 kHz). The 10.7 MHz IF signal from T102 is applied to input of 1st IF amplifier (pins 1

4-14. SPEAKER/MIC. WIRING OPTIONS

4-14-1. Optional External Speaker/Mic.

Standard audio wiring for the AIRCOM utilizes INTERNAL speaker/mic., SP101. Plugging an EXTERNAL speaker/mic. into J103 disables the internal unit. Note 1 on the Schematic (Figure 4-7) depicts these audio connections, while Figure 4-6 shows physical location of jumpers and jacks.

4-14-2. Optional Ext. Speaker/Earphone

This option utilizes INTERNAL speaker/mic. SP101, until an EXTERNAL speaker or earphone is plugged into jack J103; then, reception is by means of the external unit, while the internal unit serves as the microphone. Note 2 on the Schematic (Figure 4-7) illustrates the speaker/mic. connections, while Figure 4-6 shows physical location of jumpers and jacks.

4-14-3. Optional Ext. Microphone

This wiring option uses the INTERNAL speaker/mic., SP101, until an EXTERNAL microphone is plugged into jack J104. The internal unit then functions as the speaker, while the external unit becomes the microphone. Note 3 on AIRCOM Schematic (Figure 4-7) gives audio wiring connections, while Figure 4-6 shows physical location of jumpers and jacks.

4-14-4. External Earphone and/or Mic.

Again, this wiring utilizes INTERNAL speaker/mic. SP101, if earphone jack J-103 and mic. jack J104 are NOT used. An earphone or speaker may be plugged into J103 for reception, while the internal unit functions as the microphone. If desired, an external microphone can be plugged into J104, while the internal unit functions as the speaker. One of the more practical uses for this option is with a headset having an attached boom microphone; the headset is plugged into J103 and the microphone is plugged into J104.

Note 4 on the Schematic (Figure 4-7) depicts these audio connections, and Figure 4-6 shows physical placement of jumpers and jacks.

4-14-5. Optional Ext. Speaker/Mic/PTT

With this option the INTERNAL speaker/mic., SP101, performs the usual receive and transmit functions if headset jack J103 and mic. jack J104 are NOT used. Basically, this option is designed to provide remote speaker, microphone, and push-to-talk operation, with a minimum number of connecting wires, while the transceiver is carried in a belt mounted holster. The speaker or earphone plugs into J103 and the microphone/PTT plugs into mic. jack J104. The normal PTT switch SW101 MUST BE replaced by DPDT relay K101. An auxilliary PTT switch can be added to AIRCOM case, if desired.

Note 5 on Schematics (Figures 4-7 and 4-8) shows the audio wiring required for this option. Figure 4-6 shows the physical location of jumpers and jacks.

and 2) in IC101. Y105, C117, C119 and R109, with IC101 pins 4, 6 and 8, form an untuned crystal oscillator which operates 455 kHz BELOW the 1st IF frequency. The LO signal (10.245 MHz) is applied to a balanced mixer to provide a 455 kHz 2nd IF signal at pin 15 of IC101.

FL102, a 455 kHz, 4-pole ceramic filter, couples 2nd mixer output (pin 15 of IC101) to input of 455 kHz IF amplifier (pin 12 of IC101). The 455 kHz output of the 2nd IF amplifier appears on pin 7 of IC101.

4-3-5. AM Detector and Audio Output

T103 couples the 455 kHz output from pin 7 of IC101 to AM detector, CR101; then, R112 and C126, at output of detector CR101, filter the recovered audio. The audio is then applied across volume control R116, which couples a selected portion of the audio through C127 to audio output IC102. C130 then applies output of IC102 through P.T.T. SW101B to speaker/mic. SP101. R118 and C131 set gain of the amplifier, while R117 and C132 are used to prevent high-frequency oscillation of the amplifier.

NOTE: A ground applied to pin 1 of IC102 (by Q107) disables the output stage to mute receiver.

4-3-6. Noise Limiter, AGC, and Squelch

CR102 functions as a noise limiter by clipping noise peaks at the detector output. The clipping level automatically increases with an increase in RF input signal, since the cathode of CR-102 is connected to AGC voltage on pin 3 of IC101.

The DC level present at the output of AM detector CR101 controls AGC action. R115 and C124 filter the detected output to remove audio variations and then apply the resulting DC signal, which is proportional to the carrier amplitude, to an AGC amplifier in IC101 via pin 9.

This AGC amplifier is internally connected to the 455 kHz IF amplifier in IC101. R113 and C123 filter AGC output from pin 10 of IC101, and then apply AGC voltage to the 10.7 MHz IF amplifier in IC101 via pin 3.

Output of the AGC amplifier, from pin 10 of IC101, is also connected to base of AGC transistor Q102, which, with R103, forms a variable voltage divider to supply base bias for RF amplifier Q101. The voltage at junction of Q102 and R103 varies with input-signal amplitude; that is, as the input signal increases in amplitude, the base bias for Q101 increases. Thus, gain of RF amplifier Q101 is controlled to provide additional AGC action.

NOTE: Q101 is specifically designed for use with "forward AGC"; that is, INCREASING its emitter current will DECREASE its gain.

RF amplifier Q101 also functions as a DC amplifier to increase AGC voltage applied to squelch differential amplifier. As the input signal increases in amplitude, current through Q101 and its collector-supply resistor R104 also increases, thus lowering voltage at base of Q105.

The differential amplifier consists of Q105, Q106, and associated components. Squelch hysteresis is provided by returning R126 to junction of Q105 and R123 rather than directly to ground. The squelch differential amplifier compares AGC voltage on base of Q105 to the DC voltage on base of Q106 set by squelch control R128.

When no input signal is present, the voltage on base of Q105 is high enough to turn Q105 OFF; this lowers voltage on base of Q106 and it turns ON. The resultant voltage across R124 turns ON squelch transistor Q107. As the input signal increases, current through Q101 and R104 also increases, thus lowering voltage applied to base of Q105 which turns ON. The voltage developed across R123 raises base voltage on Q106, causing it to turn OFF. This removes base bias from Q107 which also turns OFF. The setting of squelch control R128

determines squelch threshold by amount of DC voltage the control applies to base of Q106.

With Q107 turned ON, it pulls pin 1 of IC102 to ground and the amplifier turns OFF which squelches receiver audio; but when Q107 turns OFF, pin 1 of audio amplifier IC102 goes HIGH, and the amplifier turns ON.

4-4. THEORY OF OPERATION - TRANSMITTER

4-4-1. Transmit Oscillator/Doubler

Q201 and associated components form a modified Colpitts, crystal-controlled oscillator circuit. A 4-position, slide switch, SW102B, selects proper crystal in the 29.5 to 33.99 MHz range to produce the desired transmit frequency. L201, C201, C210, L203, C209, and C208 tune collector circuit of Q201 to two times the crystal-oscillation frequency and match collector of Q201 to base of doubler Q202.

4-4-2. Doubler Stage

The doubler consists of a silicon, NPN transistor, Q202, having a slight forward bias supplied by R204 and R207. L204, C215, C213, L205, C214, and C217 tune output of doubler Q202 to fourth harmonic of crystal frequency (118 to 135.975 MHz), and match output impedance of Q202 to base of Pre-Driver Q-203.

4-4-3. Pre-Driver Stage

The pre-driver stage also consists of a silicon, NPN transistor, Q203, which operates "straight-through" on the output frequency. R212 and R209 provide a slight forward bias for Q203. L206 and C225 tune output of Q203 to the frequency range, 118 to 136 MHz, and match collector of Q203 to base of driver Q204.

4-4-4. Driver Stage

Silicon, NPN transistor, Q204 and associated components form a Class C amplifier stage. L207 tunes collector of Q204 to the operating frequency range between 118 and 136 MHz. C224 couples output of the driver stage to base of power amplifier Q205.

4-4-5. Power Amplifier

The Class C power-amplifier stage, utilizes an NPN silicon transistor, Q205, which amplifies the RF signal to rated transmitter output power of 0.75 watts. Collector voltage for Q205, equal to approximately one half of the battery potential, is supplied by the series modulator.

L209 and C230 filter the amplifier output, and match it to 50-ohms; then, the RF signal is applied to input of an eliptic-function lowpass filter comprised of C232, C231, C233, and L210. This filter reduces level of all spurious outputs above the operating frequency as required by F.C.C. Rules Part 87. RF output from the filter is routed to antenna or antenna connector, J101, through push-to-talk switch SW101A, and DC blocking capacitor C241.

4-4-6. Audio Amp. and Series Modulator

In "transmit mode," the push-to-talk switch, SW101B, connects the speaker/microphone, SP101, to input stage, Q-208, of the audio amplifier.

Q208, Q206, Q207, and associated components amplify and shape microphone-audio signal for application to RF power amplifier, Q205.

Series modulator Q207 is in series with power amplifier Q205 across the 9.6V battery supply; thus, a DC supply with audio modulation superimposed, and which has a mean value equal to one half of the battery potential, provides collector voltage for power amplifier Q205.

4.5 DISASSEMBLY

Prior to performing any service work on the instrument, the plastic BACK cover must be removed. This will allow battery pack to be replaced, and also provides access to screws which secure PC board to FRONT cover. Any further work will necessitate removing plastic FRONT cover also.

The transceiver covers are easily removed; refer to Figure 4-2 below and proceed as follows:

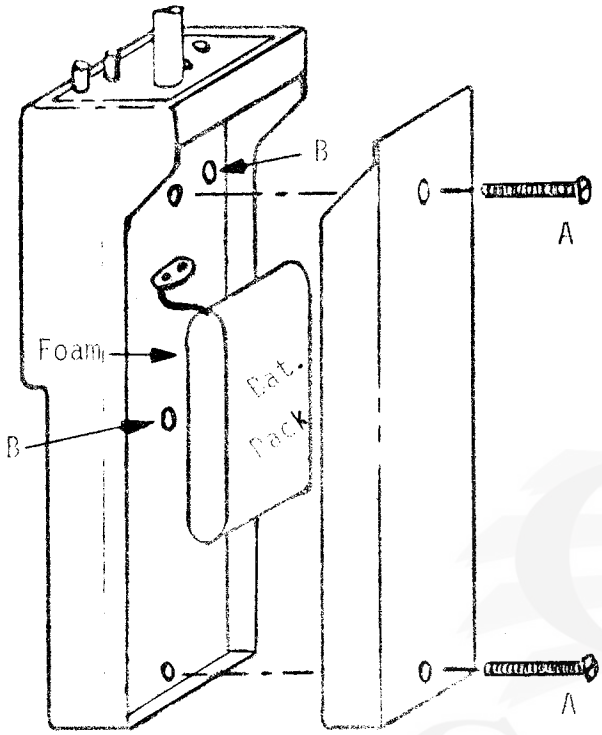


Figure 4-2. Disassembly

4-5-1. BACK Cover Removal

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 (Fig. 4-2, item "A").

3. Lift cover up and off transceiver.

4-5-2. FRONT Cover Removal

1. Unscrew the antenna from its 8-32 threaded mounting stud; then, use 0.050" Allen wrench to loosen two setscrews in each control knob. Remove both knobs.

2. Remove BACK cover as given above to gain access to PC-board mounting screws.

3. Disengage battery connector from its mating connector; then, remove battery pack from AIRCOM transceiver.

4. Remove two #4-40 pan-head machine screws (Figure 4-2, item "B") which secure PC board to FRONT cover.

5. Place hand across open back-side of transceiver. Carefully grasp unit and turn it over. The PC-board may drop into the palm; but it it does not, push gently on channel-selector switch. Hold PC-board, while sliding FRONT cover off over jacks and control shaves.

CAUTION: The speaker/microphone is simply lying in position on the PC board - DO NOT drop speaker or damage leads.

4-6. UNIT REASSEMBLY

As a general rule, items are reassembled on the AIRCOM transceiver by reversing the disassembly procedure. However, a few points require special attention.

4-6-1. FRONT Panel

1. Place the PC board, foil side down, on the palm. Lay speaker/microphone in proper position on the PC board, with its magnet resting on PC board (some boards may have "guide pins" installed to facilitate the speaker placement on PC board).

2. Rotate speaker so that its two solder terminals face in the general direction of the Charging Jack. Be sure speaker terminals DO NOT short

against resistor leads or coils; then, check routing of speaker wires to insure they will not be pinched when mounting screws "B" or "A" (Figure 4-2) are installed.

3. Align holes in top panel with controls and jacks on PC board; then, carefully slide FRONT cover into position. BE SURE Push-to-Talk button is in its normal-resting position (NOT depressed), otherwise the P.T.T. switch may be damaged.

4. Turn transceiver over on its front side and be sure PC board is fully seated in FRONT cover. Now install two 4-40 machine screws (Figure 4-2, item "B").

4-6-2. Battery Pack Installation

1. Turn Volume Control fully counter-clockwise to the OFF position.

2. Lay nicad battery pack on rear of transceiver main PC board, with the foam material toward PC board.

3. Connect battery-pack to mating connector which is attached to AIRCOM main PC board. BE SURE BACK COVER WILL NOT PINCH BATTERY WIRES.

4. Install BACK cover.

4-7. ALIGNMENT PROCEDURE - GENERAL

The unit is properly aligned when shipped from the factory, and realignment should never be necessary during normal life of the unit unless components are replaced within the instrument. In conjunction with the following alignment instructions, refer to the Component Location Diagram in this Section of the manual for location of the adjustment points.

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

4-7-1. Preparation for Alignment

1. Remove BACK and FRONT covers as explained in section 4-6-1.

2. Power may be supplied by either a fully charged 9.6V battery pack, or a regulated bench supply capable of 1 Amp at 9.6 volts. CAUTION: Observe correct polarity of power supply.

NOTE: External DC power can be supplied through Charging Jack; however, this voltage MUST BE approx. 10.3 volts to compensate for voltage drop across CR202.

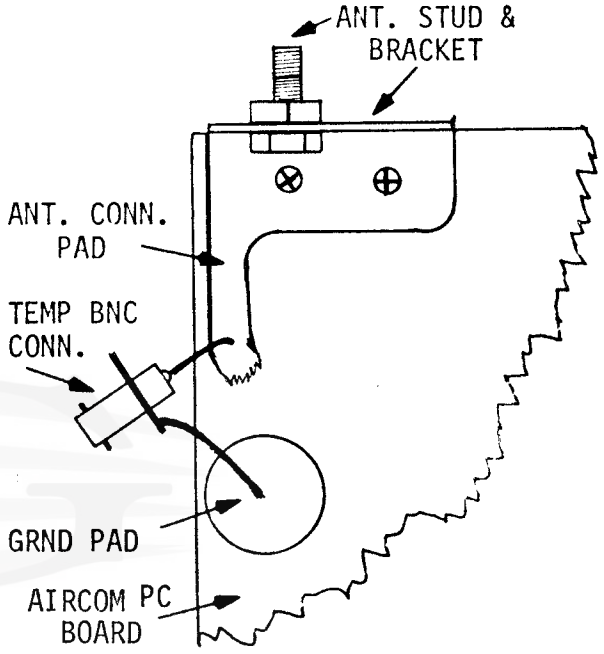


Figure 4-3. Temporary Ant. Conn.

4-7-2. Recommended Test Equipment

The following test equipment is recommended for use in servicing and aligning the AIRCOM transceiver. Equipment with equivalent specifications can be substituted, of course.

a) Frequency Counter, .001% tolerance (HP-5382A, or equiv.).

b) RF Wattmeter, 50-ohms, (Bird Model 43C with 5C element).

c) VTVM, Low Voltage range of 0 - 1.5 volts DC (RCA Voltohmyst).

d) Audio Voltmeter, Low range of 0 - 3 volts RMS (Heath IM-38).

e) Oscilloscope, calibrated sweep and vert. sens. (Tektronix 465).

f) Audio Signal Generator, 300 - 3000 Hz range (Heath IG-72).

g) RF Signal Generator, 118 to 136 MHz range, calibrated output level from 0.2 uV to 100K uV, (HP-608, Wavetek 3001, or equiv.).

h) 10.7 MHz Signal Generator, crystal controlled (Inter. Crystal C-12).

i) High-Impedance Detector, (Refer to Figure 4-4).

j) Modulation-Measuring Equipment. A Bird Model 4311 Peak-Reading Wattmeter can be substituted for the Model 43C listed in "b" above.

k) 0 - 12 volt, 1 A, current-limited Power Supply or Batteries supplied with unit. (Be sure batteries are fully charged).

l) Sweep Generator, 118 - 150 MHz, 0 dBm output -- with 10.7 MHz for IF alignment.

4-8. ALIGNMENT PROCEDURE - RECEIVER

4-8-1. IF Alignment

Normally, IF alignment will not be necessary unless components have been replaced in the IF circuitry. If alignment is required, follow steps given below:

1. Connect RF output of sweep generator to base of mixer Q103 through a .001 uF blocking capacitor.

2. Set sweep generator center-frequency to 10.7 MHz; sweep width for approx. ±25 kHz; and a sweep rate of not more than 40 Hz.

3. Connect input of High-Impedance Detector (Figure 4-4) to pin 1 of IC-101; then, connect detector output to scope VERTICAL input.

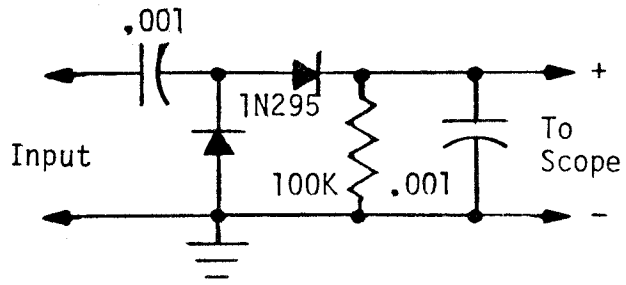


Figure 4-4. High-Impedance Detector

4. Adjust T101 and T102 to provide a 15 kHz passband, centered at 10.7 MHz.

NOTE: During alignment of monolithic crystal filters, keep sweep signal below level that will overdrive the detector.

5. Remove High-Impedance Detector from pin 1 of IC101, and remove the sweep generator from base of Q103.

6. Connect the output of RF generator to base of mixer Q103 through a .001 uF capacitor.

7. Set RF generator to produce a 10.7 MHz AM signal, modulated 30% with 1 kHz. Adjust T103 for maximum audio voltage at the top of volume control R116.

NOTE: Use minimum RF signal to prevent AGC action.

8. Disconnect RF generator and AC meter from transceiver.

4-8-2. RF Alignment

RF alignment is seldom needed unless components have been replaced, or the frequency range of the unit is being changed from the standard 118 - 128 MHz range set at time of manufacture.

1. Remove short bus wire which connects collector of Q102 to ground (bottom-

side of PC board) in order to disable AGC action. Solder a 1.5K resistor from the emitter of Q102 to ground.

2. Connect input of High-Impedance Detector to base of Q103, and connect detector output to scope VERTICAL input.

3. Connect sweep generator to temporary BNC ant. connector. Set generator to sweep at least 116 to 130 MHz, unless frequency range of unit is to be changed.

NOTE: The transceiver can be aligned to cover any 10 MHz range between 118.0 and 135.975 MHz.

4. Adjust receiver filter coils L101, L102, L104 and L105 for a response curve on scope similar to Figure 4-5 below. A slight amount of ripple may be apparent on scope pattern.

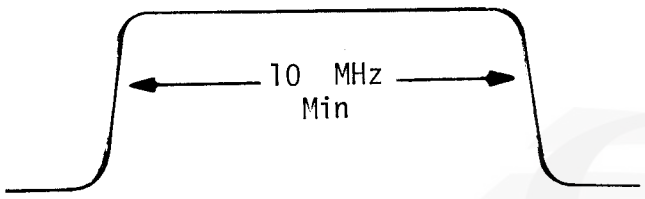


Figure 4-5. Input-Filter Response

5. Remove 1.5K resistor installed in step 1 above, and re-connect the bus wire between collector of Q102 and ground.

6. Remove sweep generator from antenna connector, but KEEP the detector and scope connected to base of Q103.

4-8-3. 1st Local Oscillator Adjustment

1. Slide channel-selector switch to an unused switch position (no crystal installed). If all crystal positions are filled, remove a crystal.

2. Temporarily disable L105 by connecting top-side of coil to ground.

3. Connect the sweep-generator output through a .001 uF capacitor to crystal position selected above in step 1.

4. With detector and scope still connected to base of Q103, adjust L107 and L108 for a scope pattern 10 MHz in width, and 10.7 MHz BELOW the operating range of the receiver.

5. Unground L105; Recheck unit per Secs 4-8-2 & 4-8-3 account interaction.

6. Remove sweep generator and install crystal(s) for desired frequencies.

7. Connect frequency counter through a .001 uF capacitor to output of C136; then, measure L.O. output frequency for each crystal installed. The frequency will be:

(Rec. Freq. - 10.7 MHz) $\pm$ .003%

Receiver alignment is now complete, and crystals can be installed or changed within the 10 MHz operating range of the receiver without changing alignment of RF amplifier or 1st L.O.

4-9. ALIGNMENT PROCEDURE - TRANSMITTER

The transmitter was properly aligned at the factory, and alignment should not be necessary unless parts have been replaced or the frequency range has been changed.

In the following procedure, KEY transmitter ONLY while making adjustments or taking readings.

1. Connect a VTVM to emitter of doubler Q202.

2. Connect a 50-ohm Power Meter to AIR-COM antenna connector.

3. Set channel-selector switch to position containing the LOWEST-FREQUENCY crystal.

4. Adjust L201 and L203 for maximum indication on VTVM.

5. Move voltmeter probe to emitter of Q203. Adjust L204 and L205 for maximum indication on the voltmeter.

6. Adjust L206, L207, and L209 for maximum power output as indicated on the RF Power Meter.

7. Switch channel-selector alternately to positions containing the LOWEST- and the HIGHEST-FREQUENCY channels installed in the unit. Adjust L206, L207, and L209 slightly to obtain equal power on the two channels.

8. Modulate transmitter by speaking into speaker/microphone. Use a peak-reading RF wattmeter or other equipment for measuring modulation percentage, to observe that modulation is at least 70%, but NOT MORE than 100%.

9. Key transmitter, and note RF power output reading. Typically, the UNMODULATED power should be approx. 0.75 watts on each channel installed in unit. The MODULATED power output should be 2.25 watts to 3.00 watts PEP.

10. Check each installed transmit crystal for a freq. accuracy of $\pm$.002% or better.

11. Disconnect all test equipment from the AIRCOM transceiver and install FRONT cover, battery pack, and REAR cover as outlined in Section 4-6.

4-10. FREQUENCY CHANGES

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

NOTE: To aid in obtaining proper crystals for the AIRCOM, complete crystal specifications are given in Section 4-11 of this manual.

1. Remove BACK and FRONT covers from AIRCOM, as explained in Section 4-5 of this manual.

2. Locate mounting position for the new crystal(s), by refering to Component Layout Dwg. of Figure 4-6 for TRANSMIT and RECEIVE crystal locations.

NOTE: When installing new crystals, BE SURE that transmit and receive crystals are properly paired.

3. Insert leads of new crystal through appropriate holes in PC board; then, carefully solder leads to copper pads on back (foil) side of board.

NOTE: Crystal leads MUST BE trimmed close to PC board, to prevent them from cutting into battery pack.

4. If these new frequencies differ appreciably from original alignment frequencies, it may be necessary to completely re-align transmitter and receiver circuits as detailed in Sections 4-8 and 4-9 of this Manual.

4-11. CRYSTAL SPECIFICATIONS

To add or change a transmit and/or receive operating frequency in the Model AIRCOM 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 AIRCOM VHF 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:

4-11-1. Transmit Crystals

Parallel Mode:	C_p = 32 pF
Third Overtone Tolerance:	±.001% Max. Calibration Tolerance at 25°C ±1°C ±.001% Max. Drift over temperature range
Temperature Range:	-30° to +60°C
Holder:	HC-18/U
Crystal Frequency:	(Operating Freq.) ÷ 4
Series Resistance:	25 ohms, maximum
Genave Part Number:	2300233

4-11-2. Receive Crystals

Parallel Mode:	C_p = 32 pF
Third Overtone Tolerance:	±.001% Max. Calibration Tolerance at 25°C ±1°C ±.001% Max. Drift over temperature range
Temperature Range:	-30° to +60°C
Holder:	HC-18/U
Crystal Frequency:	(Operating Freq. - 10.7 MHz) ÷ 3
Series Resistance:	40 ohms, maximum
Genave Part Number:	2300234

4-12. AIRCOM DC VOLTAGES

4-12-1. Receiver Voltages

a) Channel-Switch set to any operative channel (Receiver Unsquelched).
b) No signal input.
c) P.T.T. Switch in "Rec." position
d) Unit connected to 9.6V supply.
e) Voltages measured with 10 Meg. input VTVM.
f) Voltages may vary ±20%.

Device	E	B	C
Q101	0.2V	0.7V	5.5V
Q102	0.7V	0.14	0.0V
Q103	0.0V	0.6V	4.2V
Q104	1.3V	2.0V	6.4V
Q105	5.8V	5.2V	0.6V
Q106	5.8V	7.2V	0.0V
Q107	0.0V	0.0V	1.4V

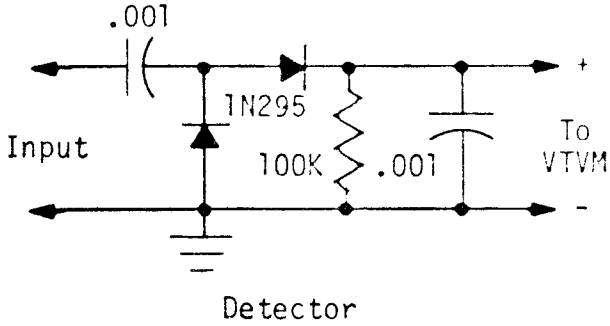
Pin #	IC101	IC102
1	2.2V	1.4V
2	2.2V	0.0V
3	0.1V	0.0V
4	2.0V	0.0V
5	2.0V	4.8V
6	5.4V	9.6V
7	0.0V	4.9V
8	0.0V	1.4V
9	0.13	
10	0.13	
11	2.0V	
12	2.0V	
13	2.0V	
14	6.0V	
15	4.6V	
16	6.0V	

4-12-2. Transmitter Voltages

a) Channel-Switch set to any operative channel.
b) P.T.T. Switch in "Xmit" position (depressed).
c) Unit connected to 9.6V supply.
d) Voltages measured with 10 Meg. input VTVM; detector used to measure Q203, Q204, & Q205.
e) Voltages may vary ±20%.

**) Measured WITHOUT detector

Q201	E - 0.88V	Q205	E - 0.00V
	B - 1.10V		B - 2.20V
	C - 9.00V		C - 10.2V
Q202	E - 0.56V	Q206	E - 4.40V
	B - 1.10V		B - 5.00V
	C - 9.20V		C - 7.60V
Q203	E - 0.70V **	Q207	E - 9.00V
	B - 1.50V		B - 7.60V
	C - 5.00V		C - 4.10V
Q204	E - 0.0V	Q208	E - 0.0V
	B - 2.00V		B - 0.52V
	C - 11.6V		C - 8.00V



4-13. COMPONENT LAYOUT AND SCHEMATIC

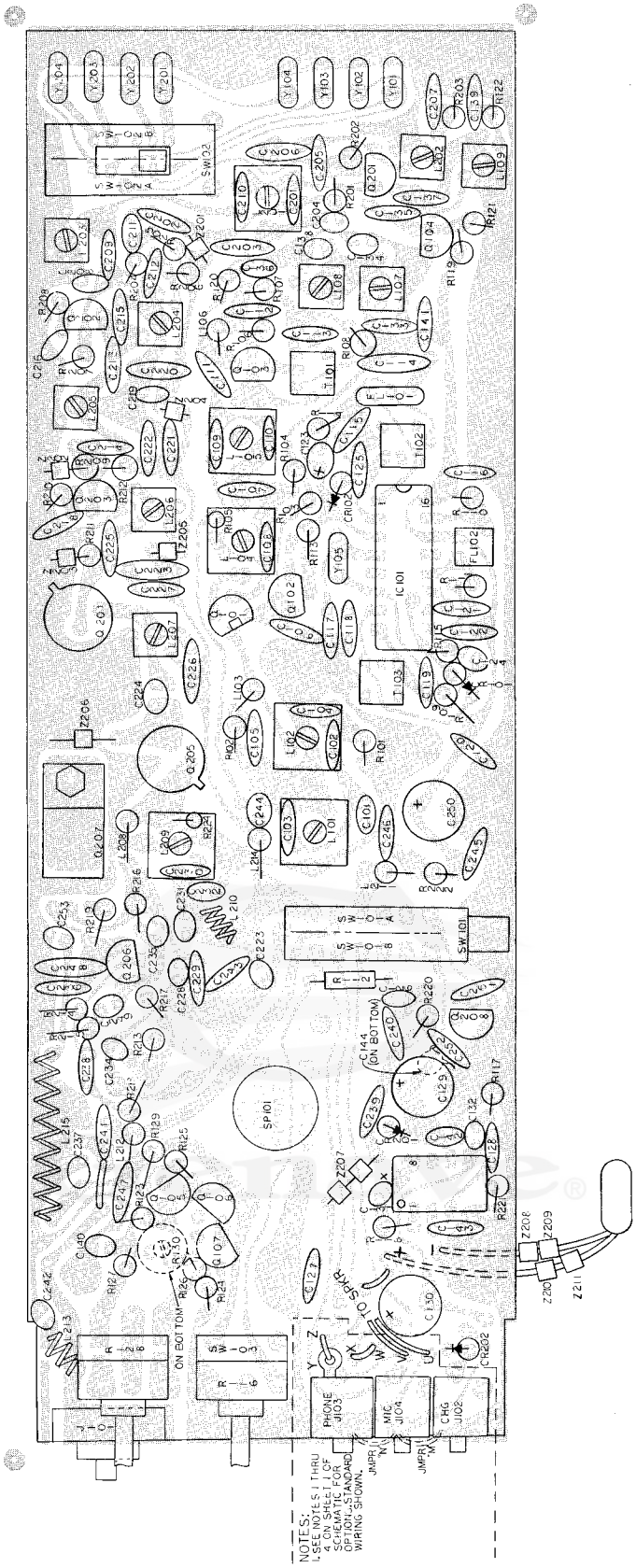
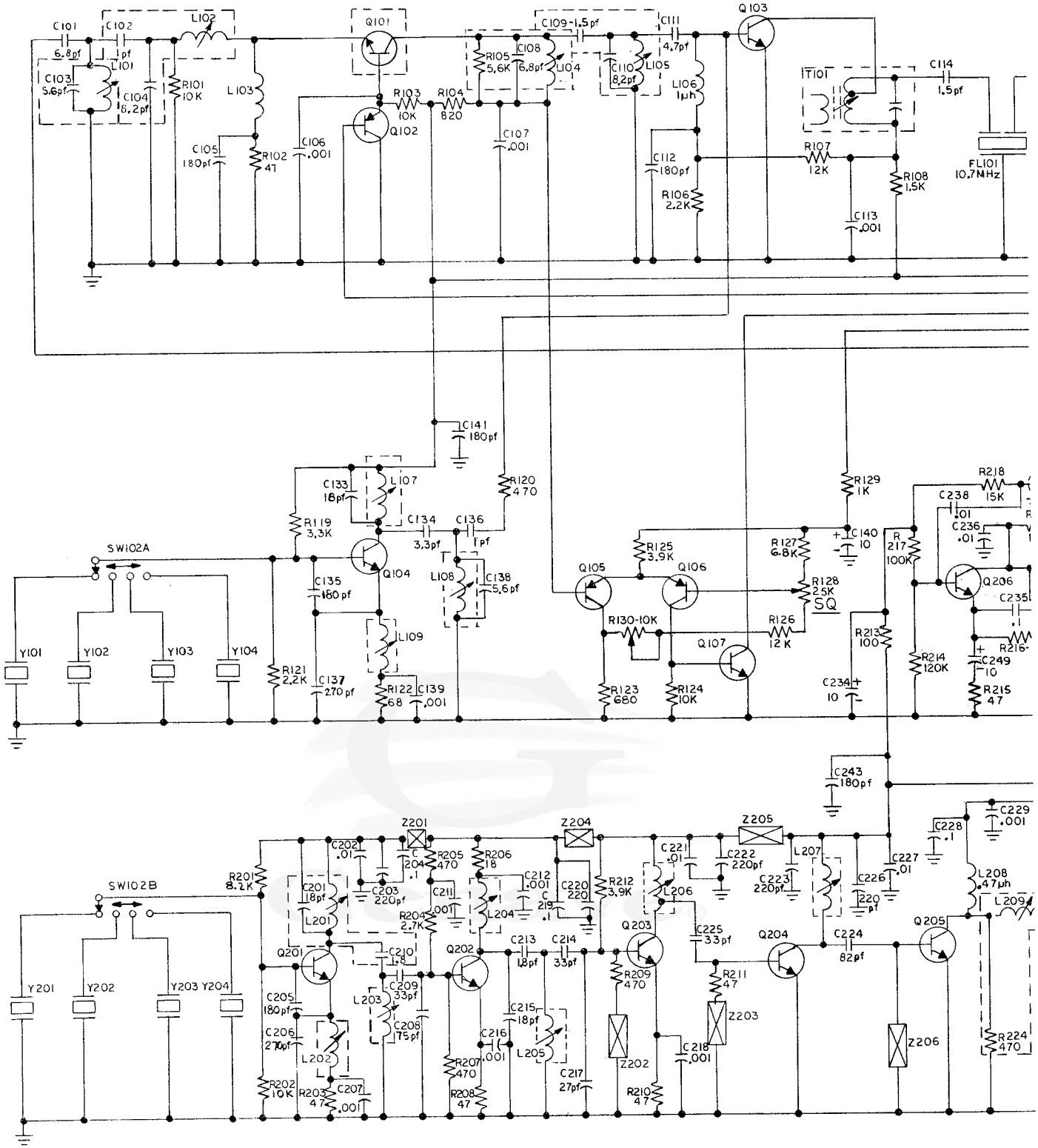
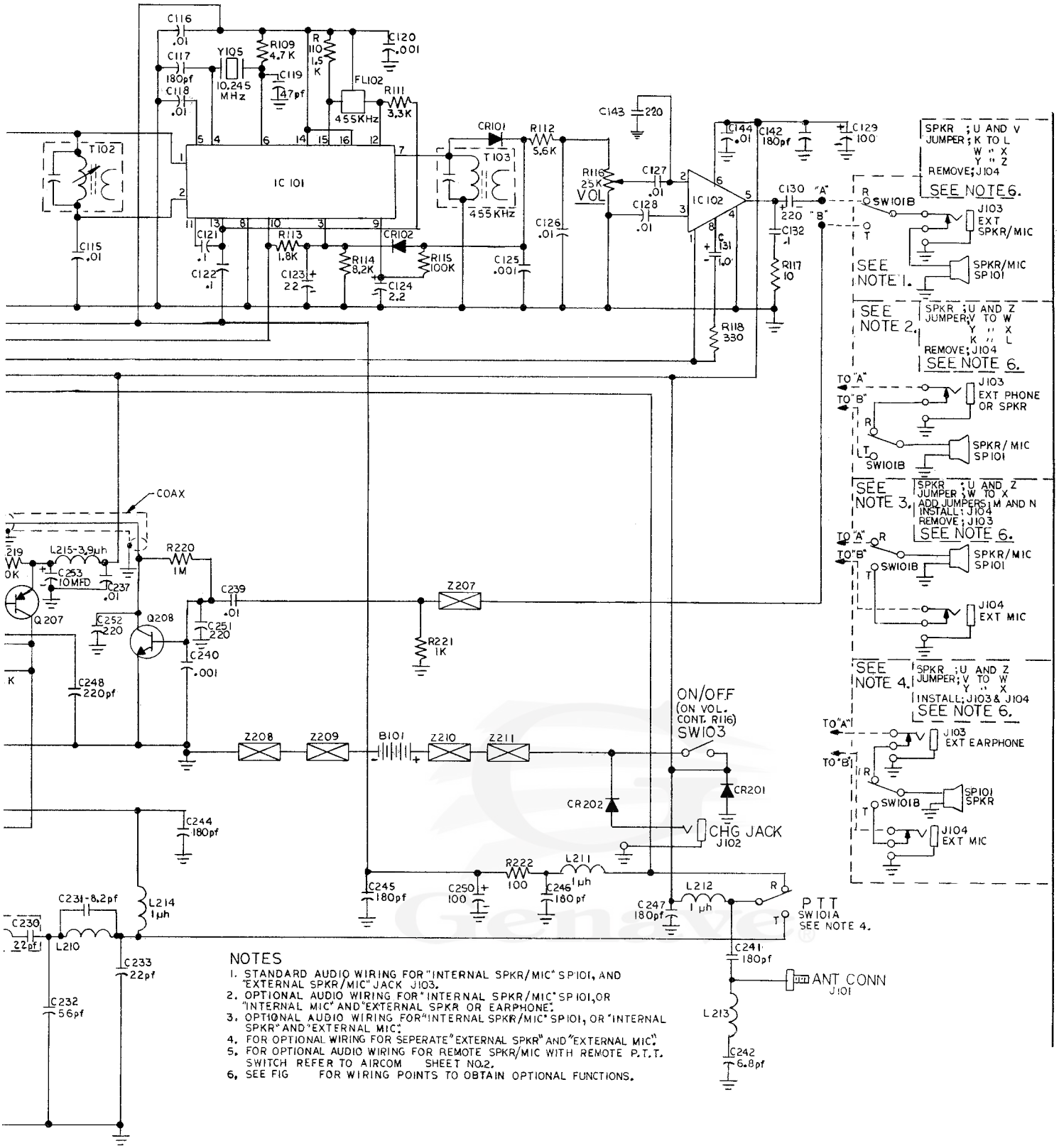


Figure 4-6. AIRCOM PC Board Component Layout





NOTES

1. STANDARD AUDIO WIRING FOR "INTERNAL SPKR/MIC" SP101, AND "EXTERNAL SPKR/MIC" JACK J103.
2. OPTIONAL AUDIO WIRING FOR "INTERNAL SPKR/MIC" SP101, OR "INTERNAL MIC" AND "EXTERNAL SPKR OR EARPHONE".
3. OPTIONAL AUDIO WIRING FOR "INTERNAL SPKR/MIC" SP101, OR "INTERNAL SPKR" AND "EXTERNAL MIC".
4. FOR OPTIONAL WIRING FOR SEPERATE "EXTERNAL SPKR" AND "EXTERNAL MIC".
5. FOR OPTIONAL AUDIO WIRING FOR REMOTE SPKR/MIC WITH REMOTE P.T.T. SWITCH REFER TO AIRCOM SHEET NO.2.
6. SEE FIG FOR WIRING POINTS TO OBTAIN OPTIONAL FUNCTIONS.

Figure 4-7. AIRCOM Transceiver Schematic

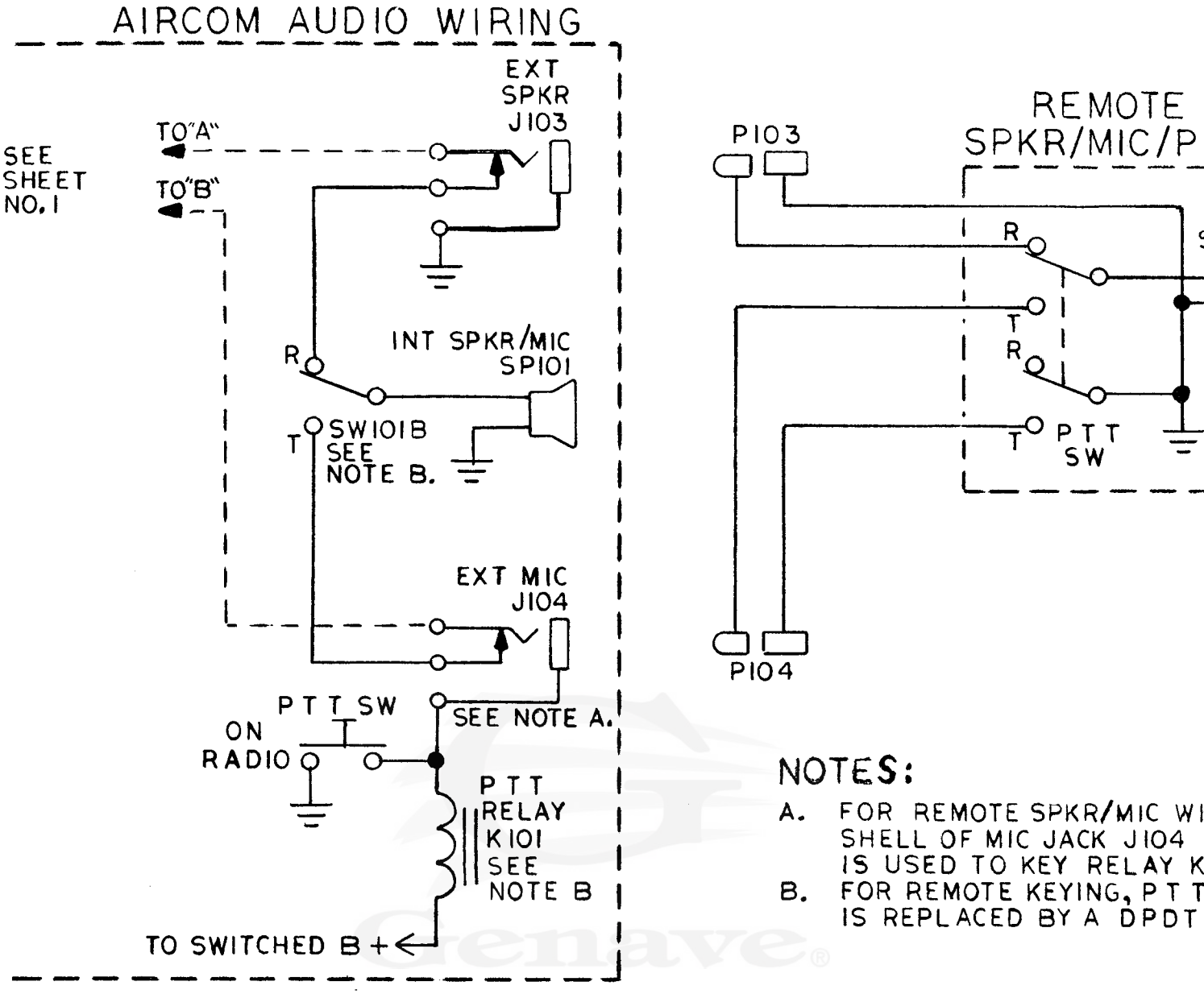
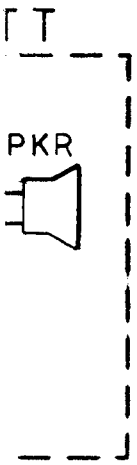


Figure 4-8. Remote Speaker, Microphone, and PTT Wiring



'H REMOTE KEYING, THE
S NOT GROUNDED, BUT
01.
SWITCH SW101 (A & B)
RELAY K101.

4-14. SPEAKER/MIC. WIRING OPTIONS

4-14-1. Optional External Speaker/Mic.

Standard audio wiring for the AIRCOM utilizes INTERNAL speaker/mic., SP101. Plugging an EXTERNAL speaker/mic. into J103 disables the internal unit. Note 1 on the Schematic (Figure 4-7) depicts these audio connections, while Figure 4-6 shows physical location of jumpers and jacks.

4-14-2. Optional Ext. Speaker/Earphone

This option utilizes INTERNAL speaker/mic. SP101, until an EXTERNAL speaker or earphone is plugged into jack J103; then, reception is by means of the external unit, while the internal unit serves as the microphone. Note 2 on the Schematic (Figure 4-7) illustrates the speaker/mic. connections, while Figure 4-6 shows physical location of jumpers and jacks.

4-14-3. Optional Ext. Microphone

This wiring option uses the INTERNAL speaker/mic., SP101, until an EXTERNAL microphone is plugged into jack J104. The internal unit then functions as the speaker, while the external unit becomes the microphone. Note 3 on AIRCOM Schematic (Figure 4-7) gives audio wiring connections, while Figure 4-6 shows physical location of jumpers and jacks.

4-14-4. External Earphone and/or Mic.

Again, this wiring utilizes INTERNAL speaker/mic. SP101, if earphone jack J-103 and mic. jack J104 are NOT used. An earphone or speaker may be plugged into J103 for reception, while the internal unit functions as the microphone. If desired, an external microphone can be plugged into J104, while the internal unit functions as the speaker. One of the more practical uses for this option is with a headset having an attached boom microphone; the headset is plugged into J103 and the microphone is plugged into J104.

Note 4 on the Schematic (Figure 4-7) depicts these audio connections, and Figure 4-6 shows physical placement of jumpers and jacks.

4-14-5. Optional Ext. Speaker/Mic/PTT

With this option the INTERNAL speaker/mic., SP101, performs the usual receive and transmit functions if headset jack J103 and mic. jack J104 are NOT used. Basically, this option is designed to provide remote speaker, microphone, and push-to-talk operation, with a minimum number of connecting wires, while the transceiver is carried in a belt mounted holster. The speaker or earphone plugs into J103 and the microphone/PTT plugs into mic. jack J104. The normal PTT switch SW101 MUST BE replaced by DPDT relay K101. An auxilliary PTT switch can be added to AIRCOM case, if desired.

Note 5 on Schematics (Figures 4-7 and 4-8) shows the audio wiring required for this option. Figure 4-6 shows the physical location of jumpers and jacks.

SECTION V
PARTS LIST

5-1. INTRODUCTION

This section of the Maintenance Manual lists replacement electronic parts, as well as major mechanical components, for use in the AIRCOM VHF-AM Aviation-Band Handheld Transceiver.

The first column in the Parts List contains component reference numbers. The three-digit circuit reference on the schematic is represented in the REFERENCE NUMBER column by the last one or two digits. The first digit represents the assembly, or section, of unit in which the part is located.

The assembly or section number (100, 200, ...) is indicated next to the reference number heading; that is, CAPACITORS C100, or CAPACITORS C200, etc.

In general, 100-series numbers pertain to receiver components, while the 200-series numbers are used for transmitter parts. Genave part numbers for replacement items appear in the PART NUMBER column, while a brief description for each part is shown in the DESCRIPTION column.

Reference Number	Part Number	Description
CAPACITORS C100		
1, 8	1520089	NPO EDPT, 6.8 pF ±.25 pF
2, 36	1520102	NPO EDPT, 1.0 pF ±.25 pF
3, 38	1520093	NPO EDPT, 5.6 pF ±.25 pF
4, 10	1520088	NPO EDPT, 8.2 pF ±.25 pF
5, 12, 17, 41, 42	1520208	N2200 Disc, 180 pF
6, 7, 13, 20, 25, 39	1520196	Z5U Disc, .001 uF ±10%, 25V
9	1520103	NPO EDPT, 1.5 pF ±.25 pF
11	1520183	NPO Disc, 4.7 pF ±10%
14	1510013	NPO Gimmick, 1.5 pF ±10%
15, 16, 18, 26, 27, 28	1540215	Mylar, .01 uF ±10%, 100V
19	1520202	N750 Disc, 47 pF ±10%
21, 22, 32	1520243	Z5U Disc, .1 uF +80-20%, 25V
23	1540217	Elect., 22 mfd, 10V
24	1550015	Tant., 2.2 uF ±20%, 5V

Reference Number	Part Number	Description
29	1540204	Elect., 100 uF, 16V
30	1540221	Elect., 220 uF, 25V
31	1550002	Tant., 1 uF ±20%, 35V
33	1520189	N220 Disc, 18 pF ±10%
34	1520094	NPO EDPT, 3.3 pF ±.25 pF
35	1520030	N1500 Disc, 180 pF ±10%, 25V
37	1520038	N1500 Disc, 270 pF ±10%
40	1540202	Elect., 10 uF, 16V
43	1520033	Z5F Disc, 220 pF ±10%, 500V
44	1520051	Y5U Disc, .01 uF ±20%, 25V
CAPACITORS C200		
1, 15	1520189	N220 Disc, 18 pF ±10%
2, 21, 27, 36, 37, 38, 39	1540215	Mylar, .01 uF ±10%, 100V
3, 20, 22, 23, 26, 48, 51, 52	1520033	Z5F Disc, 220 pF ±10%, 500V
4, 19, 28, 35	1520243	Z5U Disc, .1 uF +80 -20%, 25V
5, 41, 43, 44, 45 46, 47	1520208	N2200 Disc, 180 pF
6	1520038	N1500 Disc, 270 pF ±10%, 25V
7, 11, 12, 16, 18, 29, 40	1520196	Z5U Disc, .001 uF ±10%, 25V
8	1520204	N750 Disc, 75 pF ±5%, 25V
9, 14, 25	1520191	N750 Disc, 33 pF ±10%, 25V
10, 13	1520100	NPO EDPT, 1.8 pF ±.25 pF
17	1520064	N750 Disc, 27 pF ±10%
24	1520205	N750 Disc, 82 pF ±5%, 25V
30, 33	1520092	NPO EDPT, 22 pF ±.25 pF
31	1520088	NPO EDPT, 8.2 pF ±.25 pF
32	1520203	N330 Disc, 56 pF ±5%, 25V
34, 49, 53	1540202	Elect., 10 uF, 16V

Reference Number	Part Number	Description
42	1520089	NPO EDPT, 6.8 pF ±.25 pF
50	1540204	Elect., 100 uF, 16V
DIODES CR100		
1, 2	4810017	Sil., Switching, 1N4148
DIODES CR200		
1, 2	4810013	Gen. Purpose, 100 PRV, 1A, 1N4001
FILTERS FL100		
1	2303504	10.7 MHz Monolithic Crystal (1/2 of matched set)
2	2350050	455 kHz Ceramic
INTEGRATED CIRCUITS IC100		
1	3130374	AM Mixer, LO, and IF; TCA440N
2	3130025	Audio Amplifier, LM386
INDUCTORS L100		
1, 2, 4, 5, 7, 8	1800126	Coil, 5-1/2T, P. Smith
3	1800268	Coil, 3-1/2T, .1" I.D.
6	1800350	Coil, 1 uH, Wilco ML10G
9	1800306	Coil, 6-1/2T, P. Smith
INDUCTORS L200		
1, 3	1800308	Coil, 8-1/2T, P. Smtih
2	1800306	Coil, 6-1/2T, P. Smith
4, 5, 7, 9	1800322	Coil, 4-1/2T, P. Smith
6	1800126	Coil, 5-1/2T, P. Smith
8	1800338	Coil, .47 uH

Reference Number	Part Number	Description
10	1800421	Coil, 4-1/2T, .1" I.D.
11, 12, 14	1800350	Coil, 1 uH, Wilco ML10G
13	1800422	Coil, 8-1/2T, .1" I.D.
15	1800358	Coil, 3.9 uH, Wilco W-39G
TRANSISTORS Q100		
1	4800077	NPN, Silicon, MPS-H07
2, 5, 6	4800043	PNP, Silicon, 2N5227
3	4800064	NPN, Silicon, MPS-H20
4	4800024	NPN, Silicon, MPS-3563
7	4800033	NPN, Silicon, 2N5172
TRANSISTORS Q200		
1, 2, 3	4800024	NPN, Silicon, MPS-3563
4	4804427	NPN, Silicon, 2N4427
5	4806089	NPN, Silicon, RF Power MRF 629 or SD1444
6, 8	4800033	NPN, Silicon, 2N5172
7	4800076	PNP, Silicon, TIP-125
RESISTORS R100		
1, 3, 24	4710029	Comp, 10K ±10%, 1/4W
2	---	Selected Value
4	4710016	Comp, 820 ohms ±10%, 1/4W
5, 12	4710026	Comp, 5.6K ±10%, 1/4W
6, 21	4710021	Comp, 2.2K ±10%, 1/4W
7	4710050	Comp, 12K ±10%, 1/4W
8, 10	4710019	Comp, 1.5K ±10%, 1/4W
9	4710025	Comp, 4.7K ±10%, 1/4W
11, 19	4710023	Comp, 3.3K ±10%, 1/4W

Reference Number	Part Number	Description
13	4710020	Comp, 1.8K ±10%, 1/4W
14	4710028	Comp, 8.2K ±10%, 1/4W
15	4710038	Comp, 100K ±10%, 1/4W
16	4760081	Pot, 25K with SW103 (Vol.)
17	4710001	Comp, 10 ohm ±10%, 1/4W
18	4710012	Comp, 330 ohm ±10%, 1/4W
20	4710013	Comp, 470 ohms ±10%, 1/4W
22	4710007	Comp, 68 ohms ±10%, 1/4W
23	4710015	Comp, 680-ohms ±10%, 1/4W
25	4710024	Comp, 3.9K ±10%, 1/4W
26	4710050	Comp, 12K ±10%, 1/4W
27	4710027	Comp, 6.8K ±10%, 1/4W
28	4760082	Pot. 25K (Squelch)
29	4710017	Comp, 1K ±10%, 1/4W
30	4760083	Pot. 10K (Squelch Adj.)
RESISTORS R200		
1	4710028	Comp, 8.2K ±10%, 1/4W
2, 19	4710029	Comp, 10K ±10%, 1/4W
3, 8, 10, 11, 15	4710005	Comp, 47 ohms ±10%, 1/4W
4	4710022	Comp, 2.7K ±10%, 1/4W
5, 7, 9, 24	4710013	Comp, 470 ohms ±10%, 1/4W
6	4710003	Comp, 18 ohms ±10%, 1/4W
12	4710024	Comp, 3.9K ±10%, 1/4W
13, 22	4710008	Comp, 100 ohms ±10%, 1/4W
14	4710054	Comp, 120K ±10%, 1/4W
16, 21	4710017	Comp, 1K ±10%, 1/4W
17	4710038	Comp, 100K ±10%, 1/4W
18	4710030	Comp, 15K ±10%, 1/4W
20	4710042	Comp. 1 Meg ±10%, 1/4W

Reference Number	Part Number	Description
SWITCHES SW100		
1	5100096	4PDT, Push-to-talk
2	5100125	2-pole, 4 position; ALCO, MSS-2450; Chan. Selector
TRANSFORMERS T100		
1, 2	5600044	10.7 MHz IF
3	5600043	455 kHz IF
CRYSTALS Y100		
1, 2, 3, 4	2300234	Crystal, Quartz- receive Specify frequency
5	2300342	10.245 MHz, 2nd L.O.
CRYSTALS Y200		
1, 2, 3, 4	2300233	Crystal, Quartz - transmit Specify frequency
CHOKES Z100		
1	---	Not Assigned
CHOKES Z200		
1 thru 7	1870003	Core, Ferrite Bead 57-0180 (2 ea)
8, 9, 10, 11	1870004	Core, Ceramag 57-1362 (1 ea)
JACKS J100		
1	---	Not Assigned
2	2100263	Jack, Charging SJ-465
3	2100095	Jack, Earphone Or Spkr/Mic.

Reference Number	Part Number	Description
MISCELLANEOUS		
---	2510586	Knob, Vol. or Squelch
---	2510533	Cover, Front
---	2510534	Cover, Rear
---	2510587	Bracket, Antenna
---	2100249	Connector, BNC, w/Hdwre (Option)
---	1200013	Antenna, w/#8 screw Mounting
---	2509661	Frame, Pushbutton
---	2509681	Pushbutton
SP101	2509991	Speaker/Microphone
---	2100298	Connector, Battery (9V type)
---	4000010	Battery Pack, 9.6 volts
---	4000007	Charger, Battery