

DELTA/303 MARKER BEACON RECEIVER MAINTENANCE MANUAL

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Published by: **General Aviation
Electronics, Inc.**

4141 Kingman Dr.
Indianapolis, Ind. 46226
(Area 317-546-1111)

SB7301

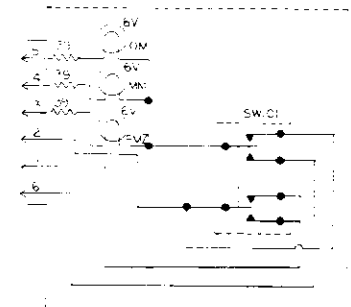
March 1, 1973



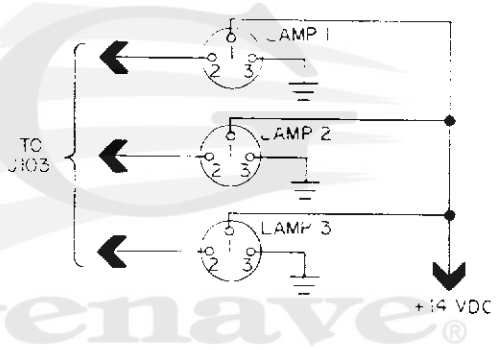
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DELTA/303 INSTALLATION NOTES

1. To operate 6 volt, 200 ma. lamps with the DELTA/303, insert 39 ohm, 1 Watt resistors between bulbs and P103 connections as shown: *



2. Any 14 volt lamp up to 200 ma. may be used in conjunction with the DELTA/303 without the addition of a series dropping resistor. *
3. To utilize the DELTA/303 with a standard, manual dimming, push-to-test lamp and socket combination such as a Dialco 801-1030, connect as shown:



4. The common +14 VDC line to the lamps may be connected directly to +14 VDC without going back to SW101, however, this arrangement prevents the use of the lamp dimming feature. This situation may occur when the DELTA/303 is used to drive the marker beacon indicator lamps within a converter-indicator unit if the lamps are internally connected to +14 VDC.

* When utilizing lamps which require greater than 100 ma. of current, change the value of R132 to 4.7 ohm, 1/2 W.

SECTION I

GENERAL INFORMATION

1-1. Introduction

This service manual contains all of the information normally required to install, operate, and maintain the Genave DELTA/303 Marker Beacon Receiver.

1-2. Description

The DELTA/303 consists of a self-contained, remote or panel mounted, Marker Beacon Receiver complete with indicator lamps and a power/lamp intensity switch.

The DELTA/303 uses 2 integrated circuits, 1 FET, and 5 silicon transistors in an all solid state

design. The receiver is crystal controlled at 75.00 MHz and was designed with an extra margin of sensitivity to compensate for the lower output level of flush mounted, "boat-type" marker beacon antennas. The sensitivity control has a range of over 24 db which will be more than adequate for any practical situation.

The DELTA/303 will operate on either 14 or 28 VDC without internal wiring changes. In addition, the DELTA/303 is designed to be the companion marker beacon receiver with the Genave TAU/200 Master Audio Control Panel.

1-3. Specifications

GENERAL:

Weight:	6 oz. (.375 lb.)
Size:	5 1/4" x 2 1/2" x 1 3/16"
Input Power:	0.125 amps @ 14V or 28V
Number of Transistors:	5
Number of Integrated Circuits:	2

RECEIVER:

Sensitivity:	1,000 microvolts
Frequency:	75.000 MHz
Lamp Test:	Automatically activated each time unit is switched on
Spurious Response:	-60 db below 73 MHz and above 77 MHz
Selectivity:	-6 db \pm 9 kHz -60 db -1.3 MHz, +1.2 MHz nom.
AGC Range:	10 db, 1,000 to 50,000 microvolts
Audio Output:	0 to 10 milliwatts into 600 ohms, service level adjustable

Meets requirements of RTCA Specification DO-143

1-4. Equipment Supplied

- 1—DELTA/303 Marker Beacon Receiver
- 1—Horizontal mounting front panel
- 1—Vertical mounting front panel
- 1—Cable Connector (4-pin) female
- 1—Cable Connector (6-pin) male
- 1—RF Connector (Phono Type)
- Mounting Hardware

1-5. Equipment Required, But Not Supplied

- 1—LAMBDA/75, Marker Beacon Antenna or equivalent
- Coaxial Cable, RG-58A/U or equivalent (as required)
- Wire for Harness, as required

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SECTION II

INSTALLATION MANUAL

**The following Section
is reproduced
and included with every**

DELTA/303

**It is made a part of
this manual
for your permanent
reference**

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Model: DELTA/303



GENERAL AVIATION ELECTRONICS, INC.
4141 KINGMAN DRIVE, INDIANAPOLIS, INDIANA 46226

INSTALLATION MANUAL

DELTA/303 Marker Beacon Receiver

Please Note:

THIS UNIT MUST BE INSTALLED BY a properly certificated and authorized person in accordance with the Federal Aviation Regulations, Part 43. No responsibility for improper installation of this unit is either implied or assumed by the manufacturer. Units shown to be installed in violation of the FARs will not be covered by the warranty and will remove any and all responsibility from the manufacturer for such equipment.

SPECIFICATIONS:

GENERAL:

Weight:	6 oz. (.375 lb.)
Size:	5 1/4" x 2 1/2" x 1 3/16"
Input Power:	0.125 amps @ 14V or 28V
Number of Transistors:	6
Number of Integrated Circuits:	2

RECEIVER:

Sensitivity:	1,000 microvolts
Frequency:	75.000 MHz
Lamp Test:	Automatically activated each time unit is switched on
Spurious Response:	-60 db below 73 MHz and above 77 MHz
Selectivity:	-6 db \pm 9 kHz -60 db \pm 1.3 MHz, \pm 1.2 MHz nom.
AGC Range:	10 db, 1,000 to 50,000 microvolts
Audio Output:	0 to 10 milliwatts into 600 ohms, service level adjustable

Meets requirements of RTCA Specification DO-143

Warranty

Products bearing the trademark "GENAVE" or the trade name "GENERAL AVIATION ELECTRONICS, INC." have been fabricated by skillful technicians, under the strictest quality control conditions, using the finest materials and component parts available.

When properly adjusted and competently operated according to factory specifications and instructions, General Aviation Electronics Inc. unconditionally guarantees and warrants all parts and bench service labor for one (1) full year from the date of the original installation.

This warranty shall not apply to malfunction, which in the opinion of General Aviation Electronics, Inc. is the result of abusive use, accident, willful destruction, improper or unauthorized repair or installation. All service under this warranty must be performed by an Authorized Genave Distributor, or by returning the unit or units, freight pre-paid, to the factory at Indianapolis, Indiana.

GENERAL AVIATION ELECTRONICS, INC.

The Company offers no other guarantees or warranties expressed or implied

Proper Installation Will Assure Quality

The unit you are installing is a high quality, rugged, complex piece of electronic equipment. It has been manufactured under rigid quality control and has been fully tested and operated at high temperatures to stabilize the component parts.

Proper installation of the unit into your customer's aircraft is essential to complete the quality assurance program under which the unit was manufactured.

Unpacking

CAREFULLY REMOVE the unit and its mounting accessories from the shipping container by removing the staples from the top of the carton and lifting the contents straight out. The carton should be saved until the installation is complete in the event that damage is discovered or return of the unit is necessary for some reason. Any damage due to shipping should be reported and a claim filed as soon as possible with the shipping company. (If it is necessary to re-ship, use our container which is specifically designed for that purpose.)

Pre-Installation Check

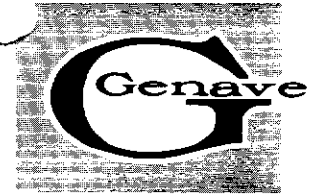
VISUALLY INSPECT the unit for any obvious external damage, such as dents, loose wires, etc. Any damage not related to shipping should be reported to General Aviation Electronics, Inc., 4141 Kingman Drive, Indianapolis, Indiana (46226), Area Code 317-546-1111, as soon as possible.

Damage due to shipping should be reported to and a claim should be filed promptly with the transportation company.

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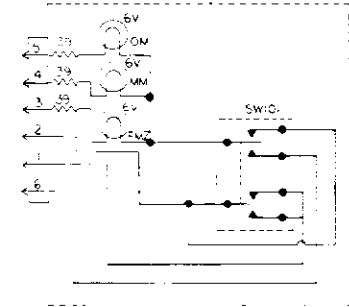
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DELTA/303 INSTALLATION NOTES

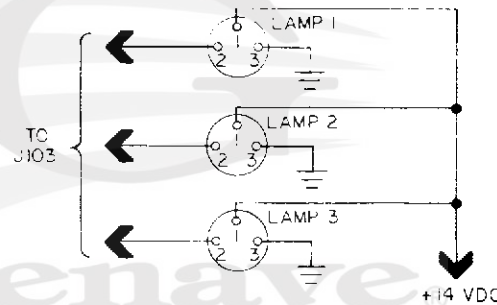


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1. To operate 6 volt, 200 ma. lamps with the DELTA/303, insert 39 ohm, 1 Watt resistors between bulbs and P103 connections as shown:



2. Any 14 volt lamp up to 200 ma. may be used in conjunction with the DELTA/303 without the addition of a series dropping resistor.
3. To utilize the DELTA/303 with a standard, manual dimming, push-to-test lamp and socket combination such as a Dialco 801-1030, connect as shown:



4. The common +14 VDC line to the lamps may be connected directly to +14 VDC without going back to SW101, however, this arrangement prevents the use of the lamp dimming feature. This situation may occur when the DELTA/303 is used to drive the marker beacon indicator lamps within a converter-indicator unit if the lamps are internally connected to +14 VDC.

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

Installation Planning

THE LOCATION of the Unit in the aircraft should be carefully selected with due consideration to the following:

1. The unit generates only a very small amount of heat and, as such, does not require any type of cooling. However, the unit must NOT be mounted directly above a vacuum tube device or any other equipments that generate a large amount of heat unless such equipments have cooling provisions installed to keep the heat generated therein from coming in contact with other equipments mounted in close proximity to them.

MOUNTING THE UNIT DIRECTLY OVER UNCOOLED VACUUM TUBE EQUIPMENT OR IN THE HOT AIR BLAST OF ANY DEVICE, INCLUDING CABIN HEATERS, WILL AUTOMATICALLY VOID THE WARRANTY

2. The placement of the unit should be such that all controls are easily accessible.

Installation

GENERAL

The DELTA/303 was designed for remote or panel mounting.

The DELTA/303 is shipped complete for panel mounting and needs only the following parts to complete the installation:

Marker Beacon Antenna (Genave LAMBDA/75, Recommended)
Cabling (As Required)

When remote mounting the DELTA/303 the following parts will be needed:

Marker Beacon Antenna (Genave LAMBDA/75, Recommended)
Cabling (As Required)
Indicator Lamps (If not presently installed in A/C)
Brite/Off/Dim Switch (DPDT, Center-Off)
2--#4 Mounting Screws, Nuts, and Lockwashers

PANEL MOUNTING

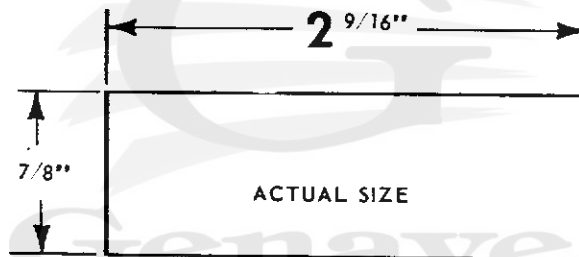
1. The aircraft panel cutout for the DELTA/303 is 2-9/16" wide x 7/8" high. Make this cutout in the selected location.
2. Insert the receiver into the panel cutout. Mark the two receiver mounting holes.
3. Remove the receiver and drill the mounting holes in the panel using a #30 drill.
4. Replace the receiver in the panel cutout. Slide the mounting plate over the receiver from the rear.

5. Place the trim panel over the front of the receiver. Using the two black #4 screws provided, secure the unit by tightening the screws, through the trim panel and receiver brackets and into the mounting panel fasteners.
6. Fabricate the power and signal cable using the connector socket supplied. A wiring diagram is shown in this manual.
7. Connect the cable just fabricated to the appropriate points in the aircraft's electronic system. Mechanically secure the cable at the appropriate tie points.
8. Update the appropriate logs and papers of the aircraft.

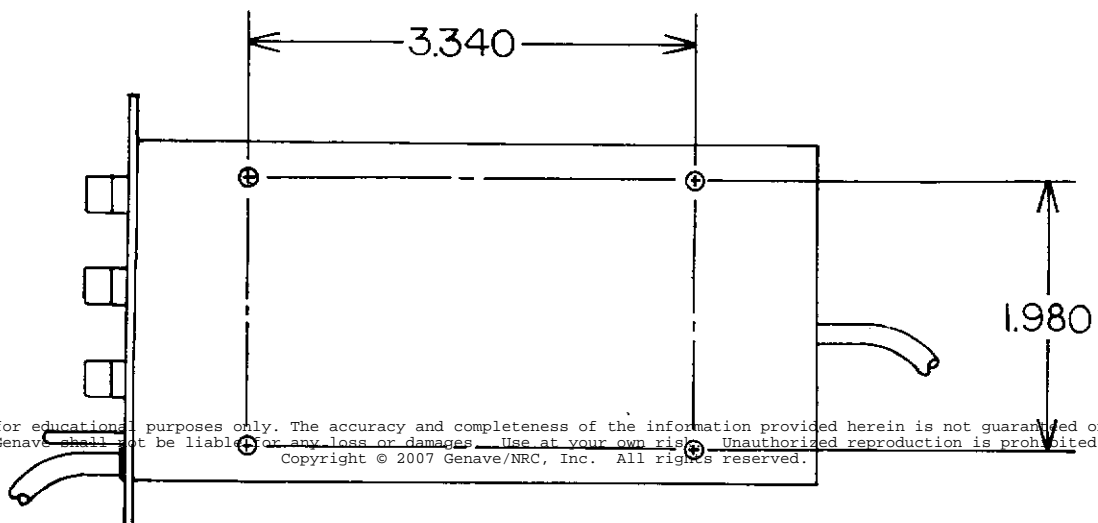
REMOTE MOUNTING

1. Drill two mounting holes, using the remote mounting drilling template shown in this manual, at the selected mounting location.
2. Remove the top cover from the DELTA/303 by removing the two #4 screws. Disconnect the 6-pin connector within the receiver and route the disconnected cable from the receiver circuit board, through the rubber grommet in the receiver front panel. Replace the receiver top cover.
3. Mount the receiver in the selected location using two #4 screws, nuts, and lockwashers.
4. Fabricate the power and signal cables using the connectors supplied. A wiring diagram is shown in this manual.
5. Connect the cable just fabricated to the appropriate points in the aircraft's electronic system. Mechanically secure the cable at the appropriate tie points.
6. Update the appropriate logs and papers of the aircraft.

Panel Cutout



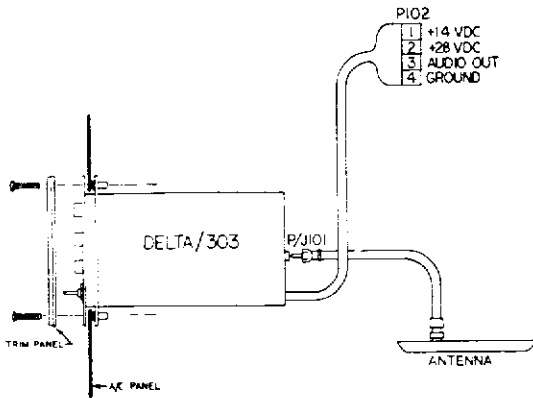
Remote Mounting Template



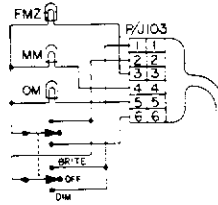
Cable Connections

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Note: For 14 VDC operation apply power to Pin 1 of P102 only.
 For 28 VDC operation apply power to Pin 2 of P102 only.
 Audio output at Pin 3 of P102 adequate to drive headphones or amplifier.

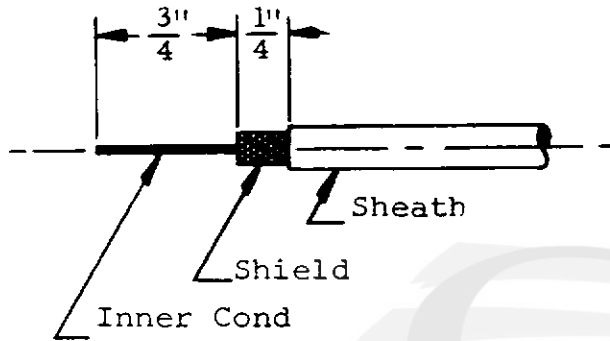


Panel Mounting



Remote Mounting

Antenna Connector Assembly



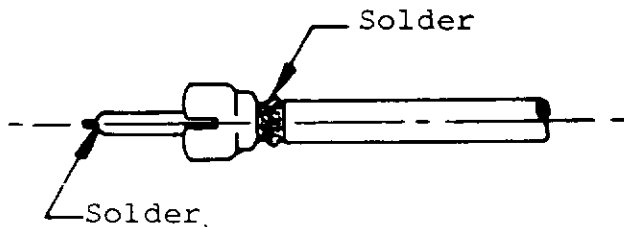
① Cut and strip RG-58 A/U Coax as shown.



② Spread shield. Do not pigtail.



③ Press connector onto wire and against shield.

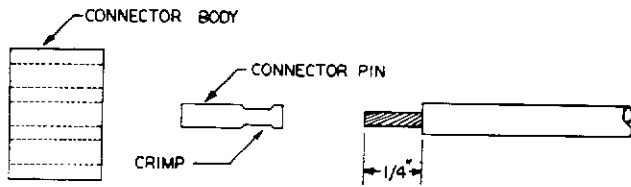


④ Fold shield over connector and solder all around. Flow solder into connector tip to secure inner conductor. Cut off tip of inner conductor which protrudes from connector.

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Multi-Pin Connector Assembly

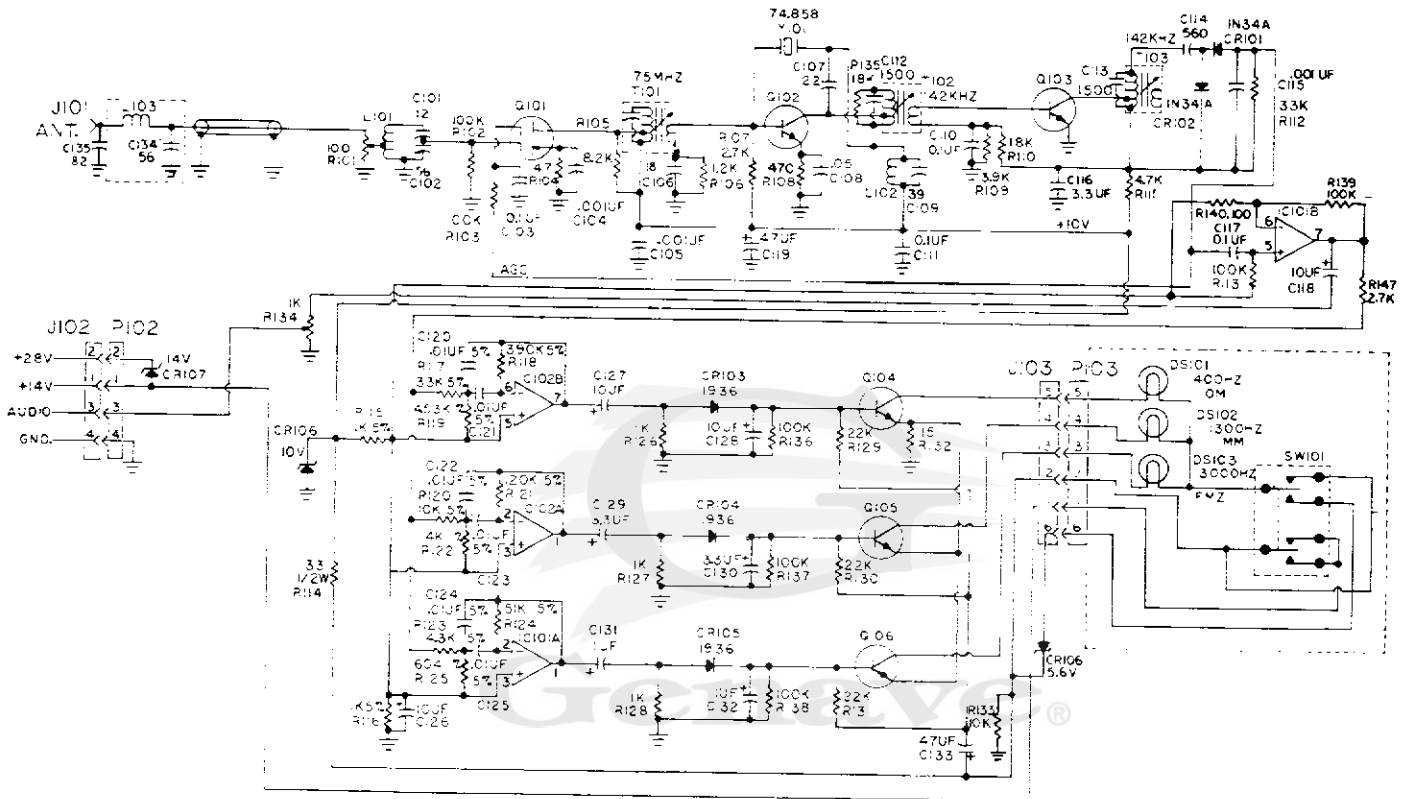
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MULTI-PIN CONNECTOR ASSEMBLY

1. Strip approximately 1/4" of insulation from wires.
2. Slide connector pins over stripped wire ends and crimp securely to wire.
2. Insert connector pins into connector body. Pins will snap into connector body and be securely locked in place.

Schematic Diagram



NOTES:
 ALL RESISTANCE VALUES ARE IN OHMS.
 ALL CAPACITANCE VALUES ARE IN PICO FARADS
 EXCEPT AS NOTED.

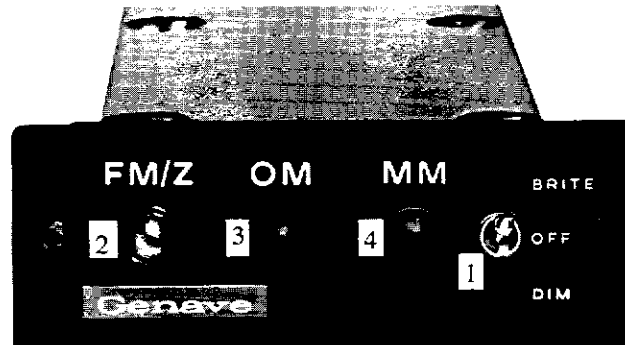
Post Installation Check

UPON COMPLETION of the installation, a flight test is desirable to insure that the unit is operating properly.

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SECTION III

OPERATING MANUAL



3-1. Operating Controls and Indicators

The DELTA/303 has a total of four operating controls and indicators. These controls and indicators are as follows:

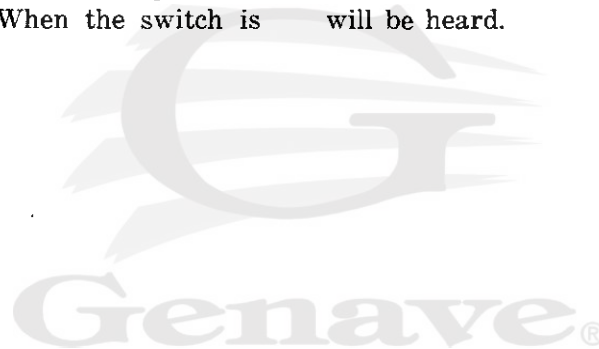
1. On/Off/Intensity Switch
2. Fan/Inner Marker Lamp
3. Outer Marker Lamp
4. Middle Marker Lamp

To operate the DELTA/303 place the function switch to either the "Brite" or "Dim" position. This will turn-on the unit. When the switch is

placed in the "Dim" position the brilliance of the indicator lamps will be reduced. This provides ease-of-viewing during night-time operations.

If the audio output is applied to an audio amplifier, it may be necessary to adjust the amplifier's volume control to the desired listening level.

When the unit is operating, the indicator lamps will illuminate to indicate the aircraft's passage over a marker beacon station. If the provision for marker beacon receiver audio output has been utilized the distinctive marker beacon signal tones will be heard.



SECTION IV

MAINTENANCE MANUAL

4-1. INTRODUCTION

This section provides the basic information required for electronic testing, alignment, and repair of the DELTA/303. It is assumed that the person working on the unit has a reasonable familiarity with the principles and terminology of avionics.

4-2. THEORY OF OPERATION

I. General

The DELTA/303 employs 2 integrated circuits, 1 FET, 5 silicon transistors, and 8 diodes in an all solid state design. It operates on either 14 or 28 VDC without adapters. It was designed for ease of alignment and installation. Active, fixed-tuned, RC tone filters are used to eliminate aging errors, reduce weight, and simplify alignment procedures.

The circuit is basically a single conversion, superheterodyne design with amplified AGC followed by active tone separation filters. The tone signals activate the transistor lamp driver circuits. The lamp circuits are designed to operate 14 volt, 80 milliamp. lamps.

II. Detailed Theory

A. *Receiver*—The receiver section of the DELTA/303 is a single conversion, crystal controlled design. The receiver antenna is connected to J101, the antenna jack. The receiver input is designed to operate from a standard 52 ohm antenna system. The input signal is first adjusted by R101, the RF Sensitivity Control, and then coupled to Q101 by L101 and capacitors C101 and C102.

Q101 is an RF amplifier which provides gain and isolates the input circuits from the autodyne converter, Q102. The output of Q101 is coupled to Q102 via T101, the RF output transformer. T101 is tuned to 75 MHz. Q102 and associated circuitry function as the autodyne converter (combined oscillator and mixer). The autodyne converter oscillates at 74.858 MHz as controlled by Y101.

The output of Q102 is passed through T102, the first IF transformer, which is tuned to 142 KHz.

Q103 is the 142 KHz IF amplifier and feeds T103, the second IF transformer. The second IF transformer is also tuned to 142 KHz. It should be noted that the secondary of T103 is not used. The detector stage consists of CR101, CR102, C115, and C116; all of which function as a voltage doubling detector.

The DC output level at the detector is fed to Q101 via R103 as the AGC voltage. The detected audio is fed to IC101B, which functions as the audio amplifier. The audio amplifier output is fed directly to the tone circuitry and to pin 3 of P102 through C118.

B. *Lamp Logic Circuitry*—The input to the tone circuitry is applied in parallel to a low-frequency bandpass filter, a high-frequency bandpass filter, and a mid-frequency bandpass filter.

IC102B and associated circuitry functions as the low-frequency bandpass filter, IC102A and associated circuitry functions as the mid-frequency bandpass filter, and IC101A and associated circuitry function as the high-frequency bandpass filter.

The output of the RC active bandpass filters are applied to DC rectifiers comprised of CR103, CR104, CR105, and their respective circuitry. The DC output signals from the rectifiers are applied to the lamp drivers consisting of Q104, Q105, Q106, and their associated circuitry. The emitter biasing technique utilized provides logic switching of the lamp driver transistors. The lamp driver with the greatest base voltage applied will turn on, thereby illuminating the corresponding lamp.

The following is a table of marker beacon lamp operation:

Type of Marker	Frequency Modulation	Lamp Illuminated
Fan/Inner	3000 Hz	White
Outer	400 Hz	Blue
Middle	1300 Hz	Amber

4-3. TEST EQUIPMENT REQUIRED

- VTVM, any accurate instrument
- VOM, any accurate instrument

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1. Marker Beacon Simulator, Instrument Flight Research, Model MB-100 or equivalent.
2. Tel-Instrument Electronic Co. Model T-12A NAV/COM Generator.
3. RF Signal Generator (Set at 75.00 MHz \pm 3.75 KHz) and an audio generator for modulation.
4. Connect an AC VTVM to the audio output, pin 3 of P102. Set the VTVM to a 3 VAC scale or lower.
5. Adjust the RF signal input level until the VTVM reads 1 VAC.
6. Refer to Figure 4-4-3 and adjust L101, T101, T102, and T103 for maximum output indicated on the VTVM. Readjust the RF input level as required to maintain the output below 1.5 VAC.
7. Adjust the RF signal input to the desired sensitivity level. (Factory setting is 1000 Microvolts.)
8. Adjust the RF Sensitivity Control, R101, until the amber lamp shows about half-brilliance.
9. Check the sensitivity of the blue lamp with 95% modulation at 400 Hz and the clear lamp at 3000 Hz. The difference in illumination between any two lamps shall not exceed 2:1.
10. Set the 75.000 MHz RF input level to 1000 microvolts.
11. Adjust the Audio Level Control for the desired output voltage. Do not exceed a setting of 3.2 VAC across a 600 ohm load or severe distortion will occur.

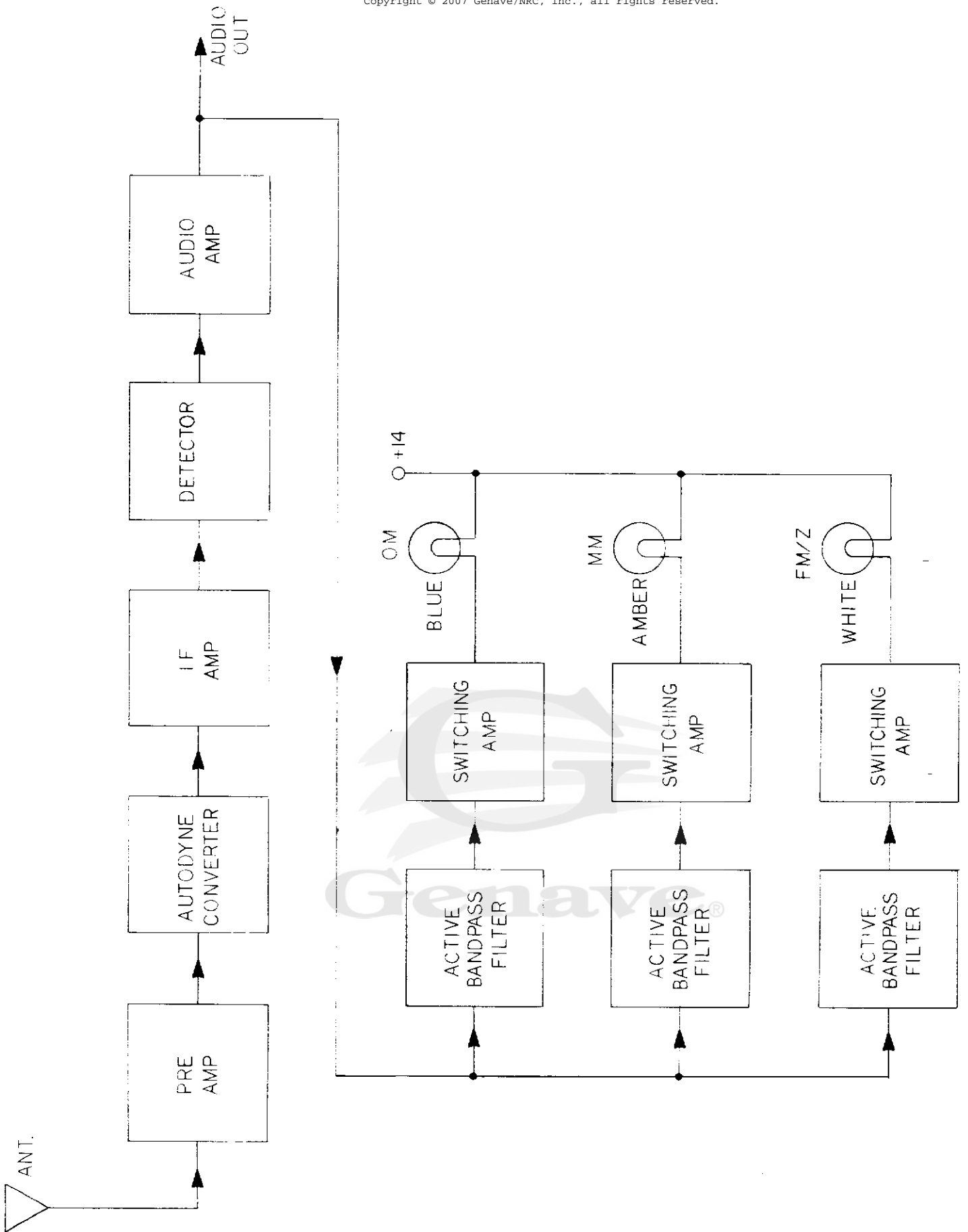
NOTE: The RF generator must not exhibit any appreciable FM modulation when 95% amplitude modulated.

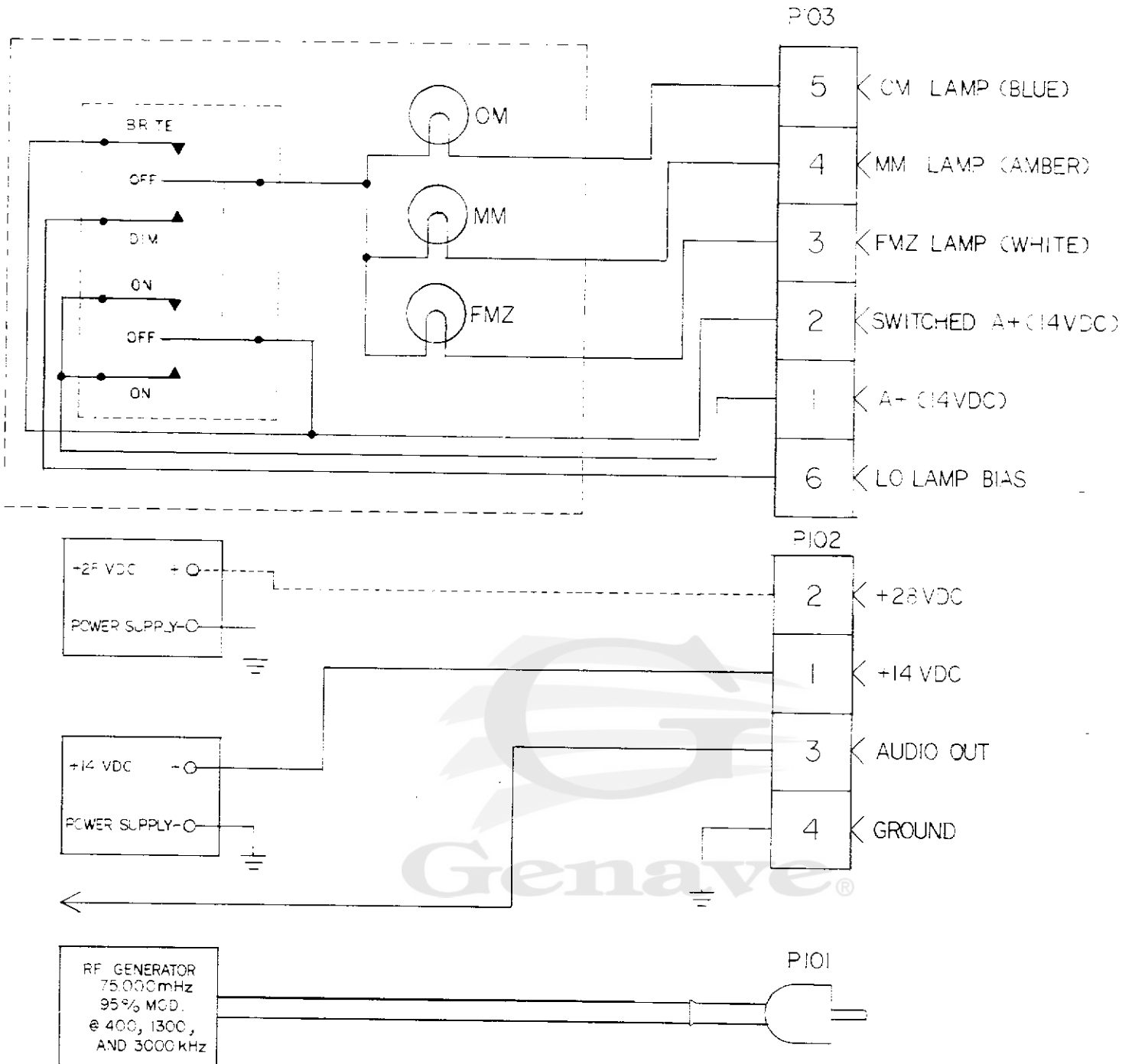
d. Power Supply, 14 or 28 VDC, 200 ma, Filtered.

4-4. ALIGNMENT PROCEDURE

1. Connect the receiver to the Alignment and Test Setup shown in Figure 4-4-2.
2. Set the Audio Level Control, R134, fully counterclockwise. (See Figure 4-4-3.) The audio output is at maximum when the Audio Level Control is set fully counterclockwise.
3. Set the RF Sensitivity Control, R101, fully clockwise. The receiver sensitivity is greatest with this control set fully clockwise.
4. Turn-on the power supply and calibrate the RF Generator or Test Set.
5. Set the RF signal to 75.000 MHz with 1300 Hz, 95% modulation.







TROUBLESHOOTING INFORMATION

I. General

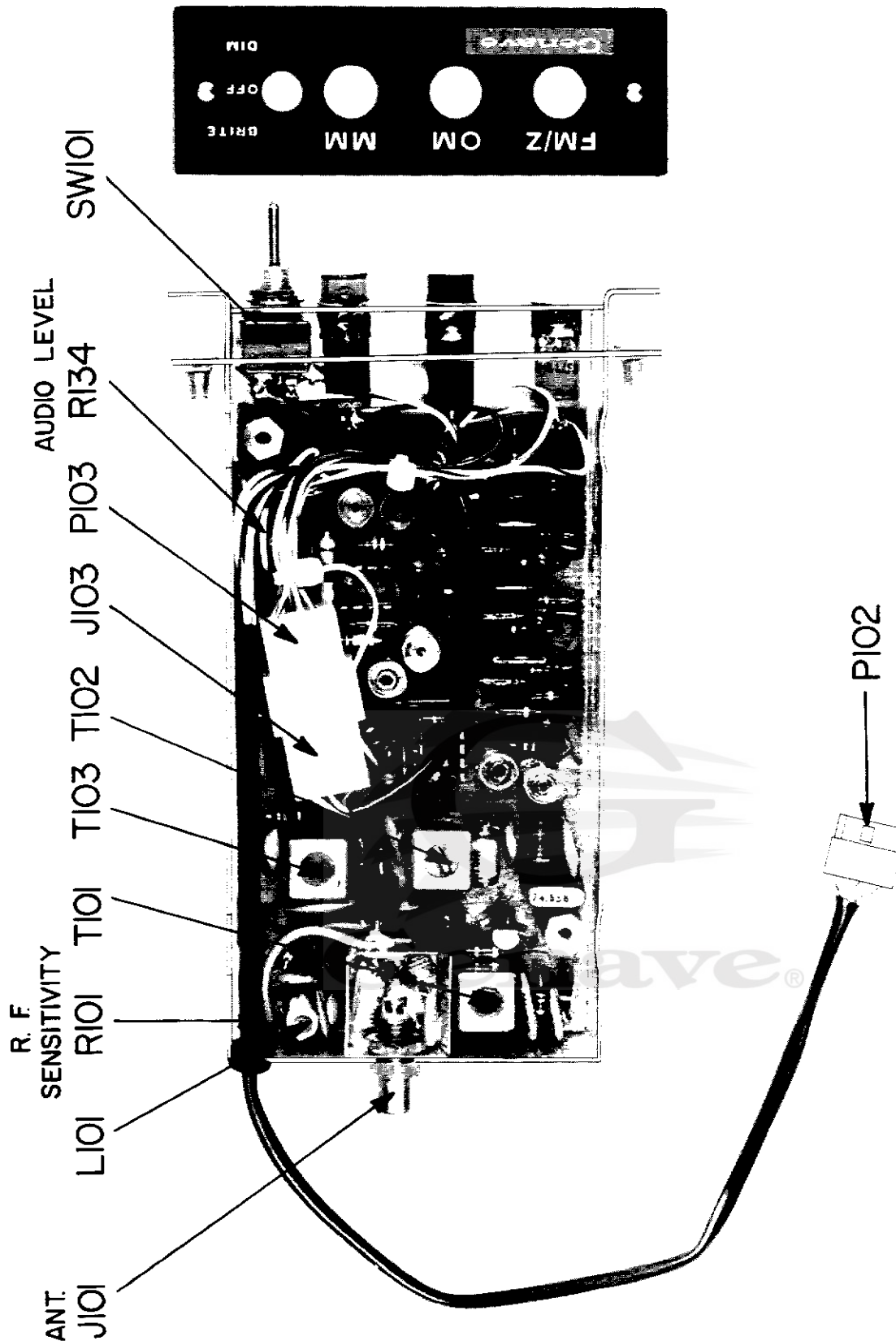
It is assumed that the technician performing any troubleshooting or repair work on the unit is familiar with the principles of aviation electronics and the procedures of troubleshooting electronic equipment. It is further assumed that he has a working knowledge of transistorized circuitry and the use of all the normal test equipment found in the field.

The primary aids to troubleshooting the unit are the DC Voltage Measurements given in Figure 4-5-1, The Component Location Diagram, Figure 4-5-4; Schematic Diagram, Figure 4-5-3; and the Parts/Track Map, Figure 4-5-2.

II. Table of Figures

- A. DC Voltage Measurements
 - 4-5-1 DC Voltage Measurements
- B. Parts/Track Map
 - 4-5-2 Parts/Track Map
- C. Schematic Diagram
 - 4-5-3 Schematic Diagram, Mainboard
- D. Component Location Diagrams
 - 4-5-4 Component Location Diagram





STEP-BY-STEP

ALIGNMENT PROCEDURE

Receiver Alignment

1. Set R134 Fully CCW.
2. Set R101 Fully CW.
3. Apply Power.
4. Calibrate Test Set.
5. Set Generator to: 75 MHz, 1.3 KHz 95% Modulation.
6. Set AC VTVM to 3 VAC scale.
7. Connect VTVM to P101, pin 2.
8. Adjust generator for 1 VAC on VTVM.
9. Peak L101, T101, T102, & T103. Maintain output below 1.5 VAC.

Sensitivity Adjustment

1. Set generator to: 75 MHz, 1.3 KHz 95% Modulation.
2. Set generator output to sensitivity level.
3. Adjust R101 for half-brilliance of clear lamp.
4. Check 400 Hz and 3.0 KHz sensitivity (less than 2:1 difference).

Audio Output Adjustment

1. Set generator to: 1000uv, 75 MHz, 1.3 KHz, 95% Modulation
2. Adjust R134 for desired output. (Do not exceed 3.2 VAC.)

Figure 4-5-1
DC VOLTAGE MEASUREMENTS

All voltages shown in this table must be measured with a VTVM or equivalent. The input voltage was set to 14.00 VDC and the Sensitivity and Vol-

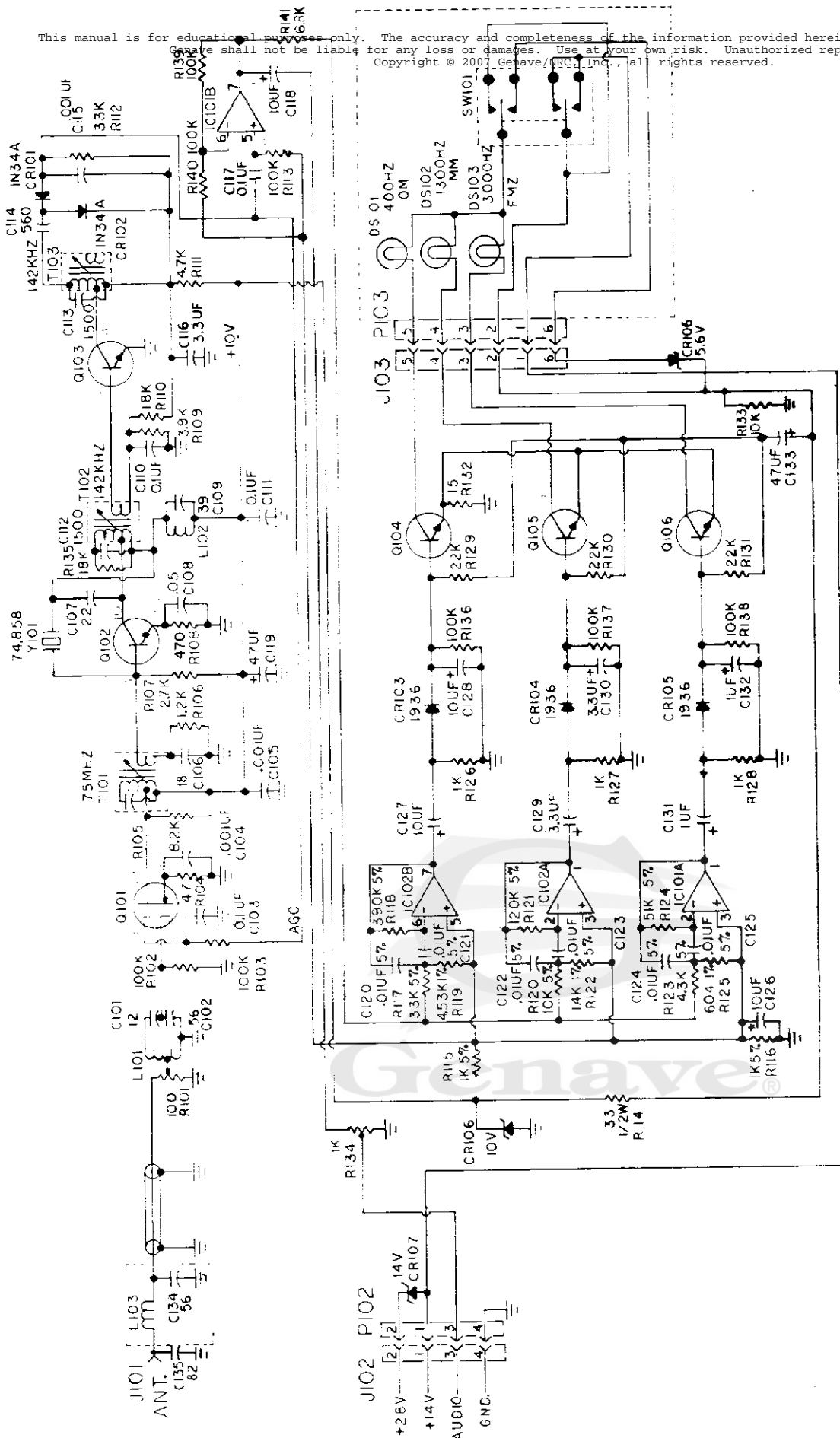
ume Controls were set to maximum. A variation of $\pm 20\%$ of the measured values from those listed may be considered normal.

Ref. No.	Switch Setting	S	No Signal			3000 Hz, 95 % Modulated, 75 MHz Signal				Notes
			G1	G2	D	S	G1	G2	D	
Q101	Brite	0.2	4.1	0	10.0	0.2	2.4	0	9.8	

Ref. No.	Switch Setting	E	No Signal			75 MHz Signal with 95 % Modulation as Noted			Notes
			B	C	E	B	C		
Q102	Brite	2.6	3.0	10.0	2.5	3.0	9.9	1300 Hz Modulation	
Q103	Brite	0	0.7	4.1	0	0.7	4.0	1300 Hz Modulation	
Q104	Brite	0	0	14.0	1.1	2.5	1.8	400 Hz Modulation	
	Dim	0	0	11.7	0.8	2.2	1.5	400 Hz Modulation	
	Brite	.....	.....	.....	1.1	1.4	14.0	1300 Hz Modulation
	Dim	.....	.....	.....	0.8	1.3	8.3	1300 Hz Modulation
	Brite	.....	.....	.....	1.1	1.4	14.0	3000 Hz Modulation
	Dim	.....	.....	.....	0.8	1.3	8.3	3000 Hz Modulation
	Brite	.....	.....	.....	1.1	1.4	14.0	3000 Hz Modulation
Q105	Brite	0	0	14.0	1.1	1.4	14.0	400 Hz Modulation	
	Dim	0	0	11.7	0.8	1.3	8.3	400 Hz Modulation	
	Brite	.....	.....	.....	1.1	2.5	1.8	1300 Hz Modulation
	Dim	.....	.....	.....	0.8	2.1	1.5	1300 Hz Modulation
	Brite	.....	.....	.....	1.1	1.4	14.0	3000 Hz Modulation
	Dim	.....	.....	.....	0.8	1.3	8.3	3000 Hz Modulation
	Brite	.....	.....	.....	1.1	1.4	14.0	3000 Hz Modulation
Q106	Brite	0	0	14.0	1.1	1.4	14.0	400 Hz Modulation	
	Dim	0	0	11.7	0.8	1.3	8.3	400 Hz Modulation	
	Brite	.....	.....	.....	1.1	1.4	14.0	1300 Hz Modulation
	Dim	.....	.....	.....	0.8	1.3	8.3	1300 Hz Modulation
	Brite	.....	.....	.....	1.1	2.4	1.8	3000 Hz Modulation
	Dim	.....	.....	.....	0.8	2.1	1.5	3000 Hz Modulation
	Brite	.....	.....	.....	1.1	1.4	14.0	3000 Hz Modulation

Ref. No.	Pin No.	1	2	3	4	5	6	7	8	Notes
IC101		5.0	5.0	5.0	0	5.0	5.0	5.0	10.0	No Signal
IC102		5.0	5.0	5.0	0	5.0	5.0	5.0	10.0	No Signal

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NOTES:
 ALL RESISTANCE VALUES ARE IN OHMS.
 ALL CAPACITANCE VALUES ARE IN PICOFARADS
 EXCEPT AS NOTED.

Figure 4-5-2 SCHEMATIC DIAGRAM
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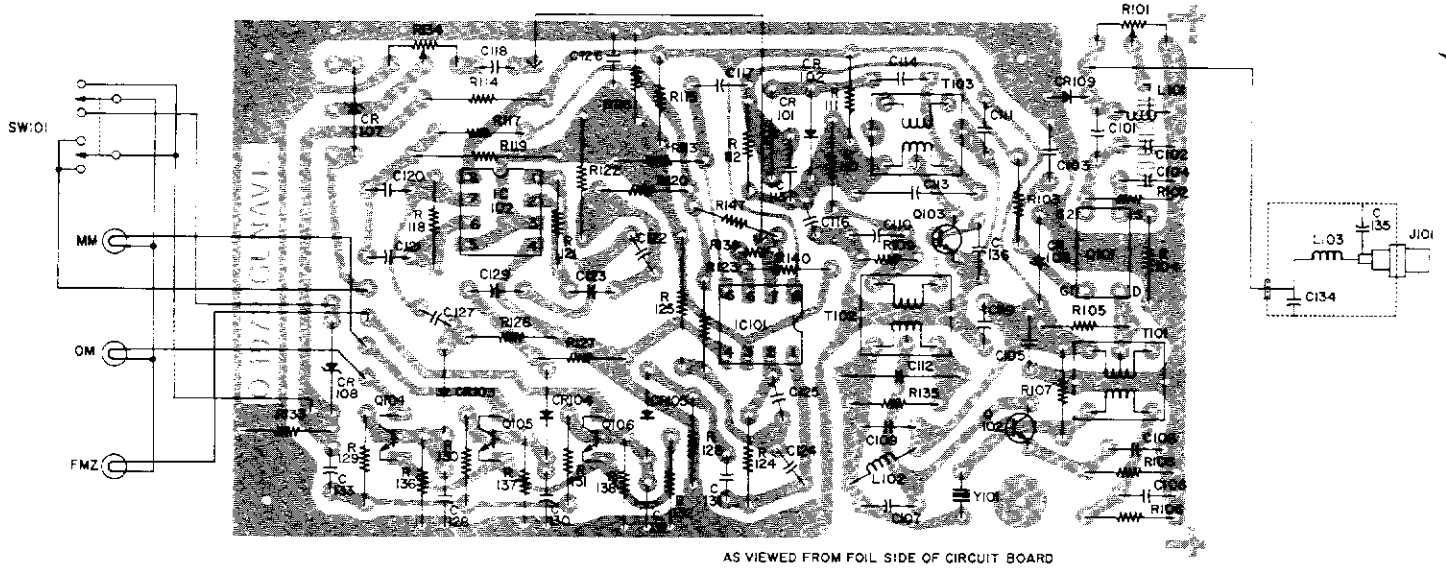
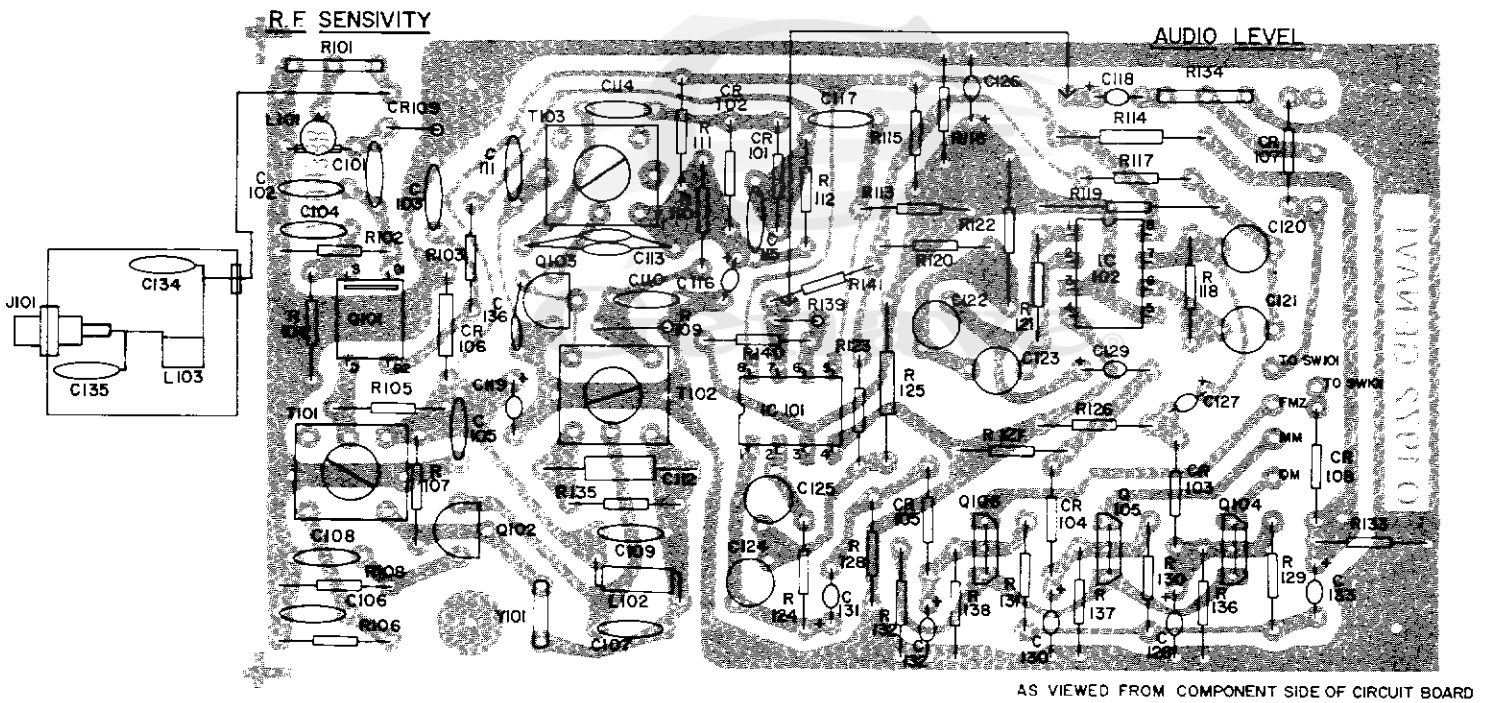


Figure 4-5-3
PARTS/TRACK MAP



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Figure 4-5-4
COMPONENT LOCATION DIAGRAM

Model: DELTA/303

SECTION V

DELTA/303 PARTS LIST

Ref. No.	Genave Part No.	Description	Ref. No.	Genave Part No.	Description
CAPACITORS			RESISTORS		
C101	1520008	NPO Disc, 12 pfd, ± 10%	R101	4760027	Potentiometer, 100 ohm, SENSITIVITY
C102	1520018	N220 Disc, 56 pfd, ± 10%	R102	4710038	100K ohm, ¼ W, ± 10%
C103	1520055	Disc, .1 mfd, +80—20%, 10V	R103	4710038	100K ohm, ¼ W, ± 10%
C104	1520048	Z5P Disc, .001 mfd, ± 10%	R104	4710005	47 ohm, ¼ W, ± 10%
C105	1520048	Z5P Disc, .001 mfd, ± 10%	R105	4710028	8.2K ohm, ¼ W, ± 10%
C106	1520010	NPO Disc, 18 pfd, ± 10%	R106	4710018	1.2K ohm, ¼ W, ± 10%
C107	1520011	NPO Disc, 22 pfd, ± 10%	R107	4710022	2.7K ohm, ¼ W, ± 10%
C108	1520054	M25 Disc, .05 mfd, +80—20%, 25V	R108	4710013	470 ohm, ¼ W, ± 10%
C109	1520015	N1500 Disc, 47 pfd, ± 10%	R109	4710024	3.9K ohm, ¼ W, ± 10%
C110	1520055	Disc, .1 mfd, +80—20%, 10V	R110	4710031	18K ohm, ¼ W, ± 10%
C111	1520055	Disc, .1 mfd, +80—20%, 10V	R111	4710025	4.7K ohm, ¼ W, ± 10%
C112	1500076	N200 Poly, 1500 pfd, ± 10%	R112	4710033	33K ohm, ¼ W, ± 10%
C113	1500076	N200 Poly, 1500 pfd, ± 10%	R113	4710038	100K ohm, ¼ W, ± 10%
C114	1520043	Y5E Disc, 560 pfd, ± 10%	R114	4700008	33 ohm, ½ W, ± 10%
C115	1520048	Z5P Disc, .001 mfd, ± 10%	R115	4720044	1K ohm, ¼ W, ± 5%
C116	1550003	Tant., 3.3 mfd, 35V	R116	4720044	1K ohm, ¼ W, ± 5%
C117	1520055	Disc, .1 mfd, +80—20%, 10V	R117	4720063	33K ohm, ¼ W, ± 5%
C118	1550004	Tant., 10 mfd, 25V	R118	4720066	390K ohm, ¼ W, ± 5%
C119	1550005	Tant., 47 mfd, ± 10%, 15V	R119	4720069	4.53K ohm, ¼ W, ± 1%, Film
C120	1500078	Poly, .01 mfd, ± 5%, 63V	R120	4720047	10K ohm, ¼ W, ± 5%
C121	1500078	Poly, .01 mfd, ± 5%, 63V	R121	4720065	120K ohm, ¼ W, ± 5%
C122	1500078	Poly, .01 mfd, ± 5%, 63V	R122	4720068	1.4K ohm, ¼ W, ± 1%, Film
C123	1500078	Poly, .01 mfd, ± 5%, 63V	R123	4720062	4.3K ohm, ¼ W, ± 5%
C124	1500078	Poly, .01 mfd, ± 5%, 63V	R124	4720064	51K ohm, ¼ W, ± 5%
C125	1500078	Poly, .01 mfd, ± 5%, 63V	R125	4720067	604 ohm, ¼ W, ± 10%
C126	1550004	Tant., 10 mfd, 25V	R127	4720067	604 ohm, ¼ W, ± 10%
C127	1550004	Tant., 10 mfd, 25V	R128	4720067	604 ohm, ¼ W, ± 10%
C128	1550004	Tant., 10 mfd, 25V	R129	4710032	22K ohm, ¼ W, ± 10%
C129	1550003	Tant., 3.3 mfd, 35V	R130	4710032	22K ohm, ¼ W, ± 10%
C130	1550003	Tant., 3.3 mfd, 35V	R131	4710032	22K ohm, ¼ W, ± 10%
C131	1550002	Tant., 1 mfd, 35V	R132	4710002	15 ohm, ¼ W, ± 10%
C132	1550002	Tant., 1 mfd, 35V	R133	4710029	10K ohm, ¼ W, ± 10%
C133	1550005	Tant., 47 mfd, ± 10%, 15V	R134	4760005	Potentiometer, 1K ohm, VOLUME
C134	1520018	N220 Disc, 56 pfd, ± 10%	R135	4710031	18K ohm, ¼ W, ± 10%
C135	1520176	N330 Disc, 82 pfd, ± 10%	R136	4710038	100K ohm, ¼ W, ± 10%
C136	1520048	Z5P Disc, .001 mfd, ± 10%	R137	4710038	100K ohm, ¼ W, ± 10%
DIODES			R138	4710038	100K ohm, ¼ W, ± 10%
CR101	4810021	Germanium, General Purpose, IN34A	R139	4710038	100K ohm, ¼ W, ± 10%
CR102	4810021	Germanium, General Purpose, IN34A	R140	4710038	100K ohm, ¼ W, ± 10%
CR103	4810017	Silicon, High Speed Switching, FD1936	R141	4710027	6.8K ohm, ¼ W, ± 10%
CR104	4810017	Silicon, High Speed Switching, FD1936	SWITCHES		
CR105	4810017	Silicon, High Speed Switching, FD1936	SW101	5100041	Toggle, FUNCTION
CR106	4810008	Zener, 10V, ZS10A	TRANSFORMERS		
CR107	4810009	Zener, 14V, ± 10%, 1 W, ZS14A	T101	5600075	75 MHz RF
CR108	4810005	Zener, 5.6V, ± 5%, ¾ W, BZY88-C5V6	T102	5610094	142 KHz IF
CR109	4810017	Silicon, High Speed Switching, FD1936	T103	5610094	142 KHz IF
LAMPS			CRYSTALS		
DS101	3900026	Blue	Y101	2300426	74.858 MHz
DS102	3900007	Amber	MISCELLANEOUS		
DS103	3900004	Clear	J101	2100021	Connector, Phono, Threaded
INTEGRATED CIRCUITS			J102	2100052	Connector, 4 pin, Female
IC101	3130012	N5558V, Duo Op-Amp	J103	2100057	Connector, 6 pin, Female
IC102	3130012	N5558V, Duo Op-Amp	P101	2100023	Connector, Phono, Male
COILS			P102	2100051	Connector, 4 pin, Male
L101	1800207	RF Input	P103	2100056	Connector, 6 pin, Male
L102	1800206	Oscillator	6070060		Clip, Lamp
L103	1800012	Input Filter, .1uh	250381-2C		Chassis
TRANSISTORS			250536-2C		Cover, Chassis
Q101	4800122	N-Channel, Dual-Gate, FET, MPF122 or FT0601	2507632-B		Trim Panel, Front, Vertical
Q102	4800024	Silicon, NPN, MPS3563, Blue Dot	2507633-B		Trim Panel, Front, Horizontal
Q103	4800027	Silicon, NPN, MPS6511	250535-2B		Plate, Mounting
Q104	4800053	Pwr. Darl., MPSU45	2502641-A		Logo, GENAVE
Q105	4800053	Pwr. Darl., MPSU45	250539-1A		RF Shield Assembly
Q106	4800053	Pwr. Darl., MPSU45			

Specifications Subject to Change