ALPHA/360
NAV/COM
MAINTENANCE MANUAL

CONTENTS

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

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

Price: Single Copy $20.00

SECTION 1

GENERAL INFORMATION

1-1. INTRODUCTION

This service manual contains all of the information normally required to install, operate, and maintain the GENAVE ALPHA/360 communications and navigation transceiver.

1-2. DESCRIPTION

The ALPHA/360 is a solid state 360-channel Nav/Com transceiver complete with integral power supply. Being a full 1½ system, the ALPHA/360 contains all the essentials necessary for VFR or IFR navigation and communication. The Alpha/360 employs 44 silicon transistors to provide high reliability operation on all required frequencies.

The navigation and communication channels are quartz crystal controlled and are selected by two independent digital readout dials. Both the navigation and communication receivers operate simultaneously with independent volume controls. An adjustable squelch and omni identification tone filter are also provided.

The navigation receiver receives all 100 navigation channels from 108.00 MHz to 117.9 MHz. All 80 VOR frequencies and all 20 localizer frequencies are covered by the 100 KHz spacings.

The communications receiver receives all 360 communications channels from 118.00 MHz to 135.95 MHz. The communications channel spacing is 50 KHz.

The communications transmitter is a 6 stage solid state crystal tuned unit. The transmitter transmits on all 360 communication channels from 118.00 MHz to 135.95 MHz and is modulated by an audio system which produces high level audio processed automatic limiting modulation. This modulation system provides high quality distortion free audio transmission.

Composite audio output used to drive the GENAVE THETA/100 or THETA/200 series converter indicators is provided via external cabling. In addition remote switching of DME or Glide Slope equipment is also provided via external cabling.

1-3. SPECIFICATIONS

GENERAL:

WEIGHT:	5.0 lbs
FRONT PANEL SIZE:	6½ × 2½
INPUT POWER: .75 amps @ 14VDC receive 3.1 amps @ 14 VDC Transmit (28 V adapter available)	
NUMBER OF TRANSISTORS: 44, all silicon	

NAVIGATION:

FREQUENCY RANGE:	118.00 to 135.95 MHz
NUMBER OF CHANNELS: 360 all crystal controlled.	
CHANNEL SPACING:	50 KHz
SENSITIVITY:	1-2 microvolts for 6db
$\frac{S+N}{N}$	nominal @ 30% Mod 1000 Hz
PRIMARY IMAGE AND SPURIOUS RESPONSES:	60 db nominal
SELECTIVITY:	6 db @ 30 KHz 60 db @ 200 KHz
SQUELCH:	Adjustable
AGC:	3-6 db, 10-30,000 microvolts
AUDIO OUTPUT: 6 watts nom into 3-4 ohm speaker, 50 mw nom into 60 ohm headset	

TRANSMITTER:

TRANSMITTER CIRCUIT: 6 stage solid state crystal tuned	
FREQUENCY RANGE:	118.00 — 135.95 MHz
NUMBER OF CHANELS: 360 all crystal controlled.	
CHANNEL SPACING:	50 KHz
POWER OUTPUT:	16 watts PEP NOM 4-5 watts carrier
MODULATION: Audio processed high level automatic limiting	

NAVIGATION:

FREQUENCY RANGE:	108.00 to 117.9 MHz
NUMBER OF CHANNELS: 100 all crystal controlled, 20 localizer 80 VOR	
CHANNEL SPACING:	100 KHz
SENSITIVITY:	1-2 microvolts for 6 db
$\frac{S+N}{N}$	NOM @ 30% MOD 1000 Hz
PRIMARY IMAGE AND SPURIOUS RESPONSES:	—60 db NOM
SELECTIVITY:	6db @ 40 KHz 60 DB @ 200 KHz
AGC:	3-6 db, 10-30,000 microvolts
AUDIO OUTPUT: 6 watts NOM into 3-4 ohm speaker 50 mw into 600 ohm headset	
REMOTE SWITCHING:	DME and Gildeslope available
AUDIO: aux inputs 2 (IV RM S will provide 6 watts output.	

1-4. EQUIPMENT SUPPLIED

a. 1—ALPHA/360 Radio
b. 1—Mounting tray with hardware
c. 1—Cable connector (12 pin)
d. 2—RF connectors (1 short, 1 long)

1-5. EQUIPMENT REQUIRED, BUT NOT SUPPLIED

a. 1—THETA/100 or THETA/200 Converter Indicator
b. 1—Microphone and jack
c. 1—Communications antenna (see installation manual)
d. 1—Navigation antenna
e. Cabin speaker and/or headphones
f. Coaxial cable, as required (RG 58 A/U or equivalent)
g. Wire for harness, as required
h. 1—250 Ohm, 5 watt dimmer pot (Optional)
i. 1—GENAVE PHI/20 Glide Slope Receiver, used with THETA/200 (Optional)

SECTION II

INSTALLATION MANUAL

The following Section

is reproduced

and included with every

ALPHA/360

It is made a part of

this manual

for your permanent

reference

Model: ALPHA/360

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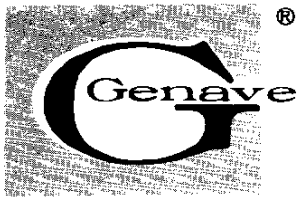


GENERAL AVIATION ELECTRONICS, INC.
4141 KINGMAN DRIVE, INDIANAPOLIS, INDIANA 46226

INSTALLATION MANUAL

ALPHA 360

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.

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.

By _____
Elmore W. Rice, III, President

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.

Specifications:

GENERAL:

WEIGHT: 5.0 lbs

FRONT PANEL SIZE: 6½ × 2½

INPUT POWER: .75 amps @ 14VDC receive 3.1 amps @ 14 VDC Transmit (28 V adapter available)

NUMBER OF TRANSISTORS: 44, all silicon

NAVIGATION:

FREQUENCY RANGE: 118.00 to 135.95 MHz

NUMBER OF CHANNELS: 360 all crystal controlled.

CHANNEL SPACING: 50 KHz

SENSITIVITY: 1-2 microvolts for 6db $\frac{S+N}{N}$ nominal @ 30% Mod 1000 Hz

PRIMARY IMAGE AND SPURIOUS RESPONSES: 60 db nominal

SELECTIVITY: 6 db @ 30 KHz
60 db @ 200 KHz

SQUELCH: Adjustable

AGC: 3-6 db, 10-30,000 microvolts

AUDIO OUTPUT: 6 watts nom into 3-4 ohm speaker, 50 mw nom into 60 ohm headset

TRANSMITTER:

TRANSMITTER CIRCUIT: 6 stage solid state crystal tuned

FREQUENCY RANGE: 118.00 — 135.95 MHz

NUMBER OF CHANELS: 360 all crystal controlled.

CHANNEL SPACING: 50 KHz

POWER OUTPUT: 16 watts PEP NOM
4-5 watts carrier

MODULATION: Audio processed high level automatic limiting

NAVIGATION:

FREQUENCY RANGE: 108.00 to 117.9 MHz

NUMBER OF CHANNELS: 100 all crystal controlled, 20 localizer 80 VOR

CHANNEL SPACING: 100 KHz

SENSITIVITY: 1-2 microvolts for 6 db $\frac{S+N}{N}$ NOM @ 30% MOD 1000 Hz

PRIMARY IMAGE AND SPURIOUS RESPONSES: —60 db NOM

SELECTIVITY: 6db @ 40 KHz
60 DB @ 200 KHz

AGC: 3-6 db, 10-30,000 microvolts

AUDIO OUTPUT: 6 watts NOM into 3-4 ohm speaker 50 mw into 600 ohm headset

REMOTE SWITCHING: DME and Glideslope available

AUDIO: aux inputs 2 (IV RM S will provide 6 watts output.

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.

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.

3. The placement of the unit should be such that all controls are readily accessible and all readouts are easily visible to the pilot.

4. The ALPHA/360 audio output may be connected in parallel with the same speaker and headset used by other equipment.

   However, considerably improved audio performance will be obtained from the speaker if the headphone outputs of other equipment are fed to the two auxiliary audio inputs of the ALPHA/360.

   Alternately, the headset output of the ALPHA/360 may be fed to an auxiliary input of another piece of equipment, or to an audio mixer panel.

   Either of these methods is preferable to direct paralleling, which will reduce the available audio power in most cases.

5. A communications antenna approved by Genave, or its equivalent, MUST be used in the installation to validate the warranty. A set of minimum specifications to aid in evaluating antennas is shown below. Genave recommends its LAMBDA/100 Com Rod antenna. It is recommended that the Factory be contacted before installing antennas of questionable characteristics.

   A "bent wire" type of antenna is NOT suitable in any case, and the use of such an antenna will VOID THE WARRANTY.

   Minimum Specifications for COM antenna:

   Impedance . . . . . 50 ohms nominal

   VSWR . . . . . 5:1 (Max) 118.00 to 135.95 MHz

   (5:1 VSWR represents a 46% loss of output power)

Installation

1. The aircraft panel cutout for the ALPHA/360 is 6 1/4 wide x 2 13/32" high. Make this cutout in the selected location.

2. Insert the supplied mounting rack into the cutout. Mark the rack mounting holes on the panel support brackets on both sides of the cutout. If the location chosen does not provide the brackets, two angle brackets must be made and Installed. Drill out the marked mounting holes with a #27 drill.

3. Install the rack in the aircraft panel, using the holes drilled in step 2, the #6-32 Binder head screws, washers, and nuts supplied. All screws must have their heads inside the rack.

4. Fabricate the power and signal cable using the connector socket 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 appropriate support points.

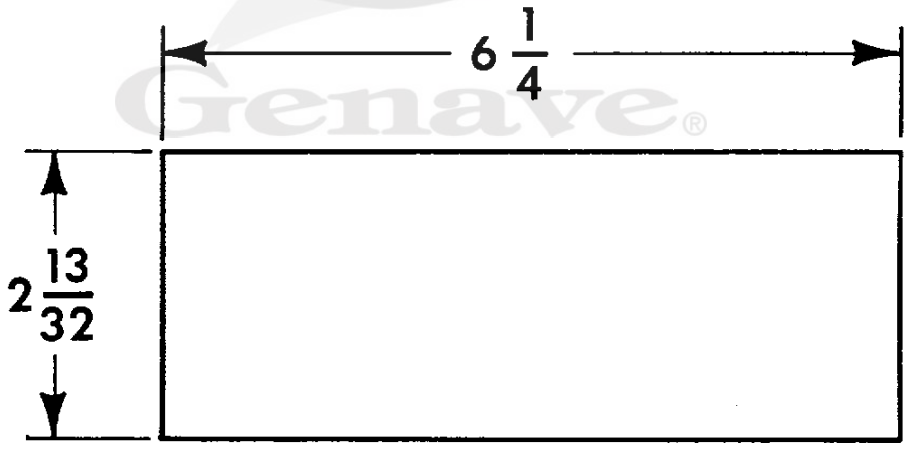
6. Insert the unit into the rack. Tighten the mounting bolt to secure the unit in the panel. Do not use excessive torque on the bolt. Tighten only until the unit is snugly secured against the front panel.

7. Update the appropriate logs and papers of the aircraft.

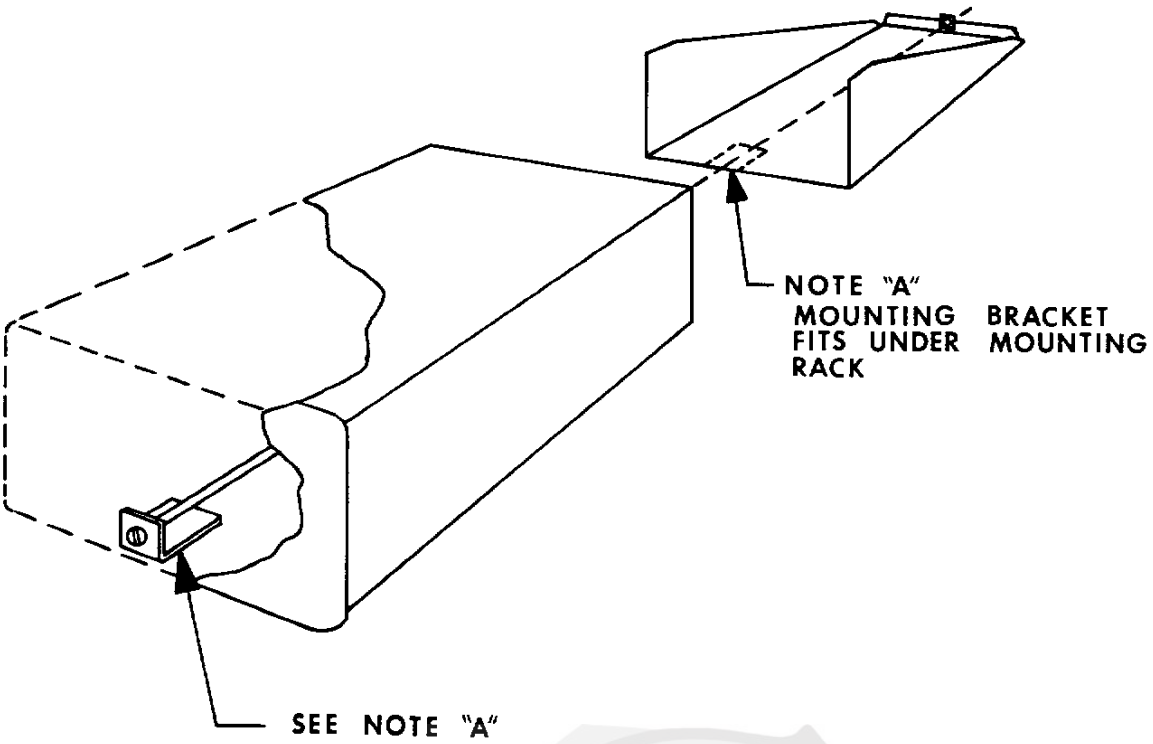
8. Fill out and return the bottom section of the warranty card.

9. Give the remainder of the warranty card to your customer. The proper sections of the warranty card MUST be completed and returned to Genave by both the dealer and the customer for the waranty to be in effect.

Panel Cutout

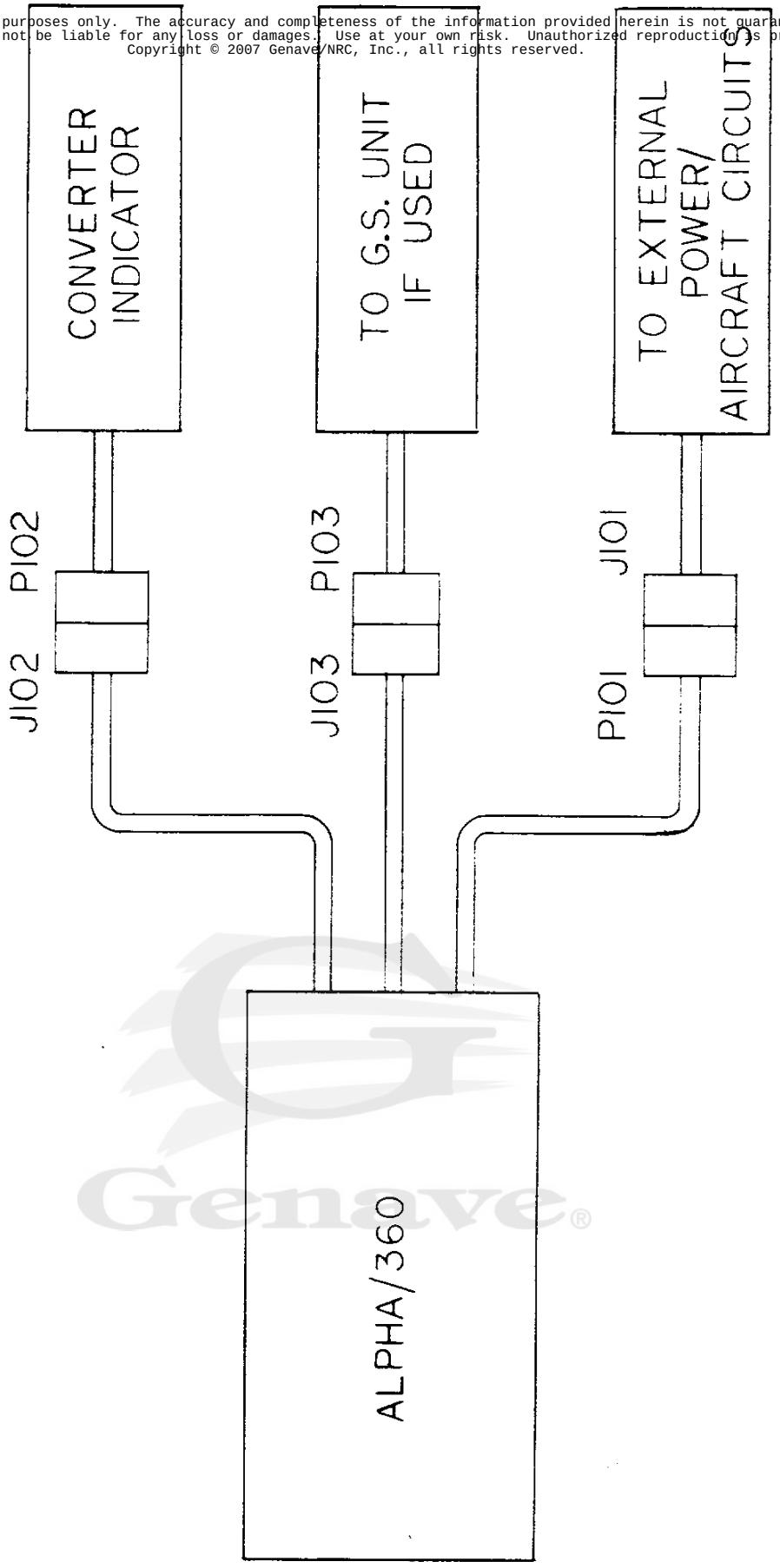


Mounting Rack



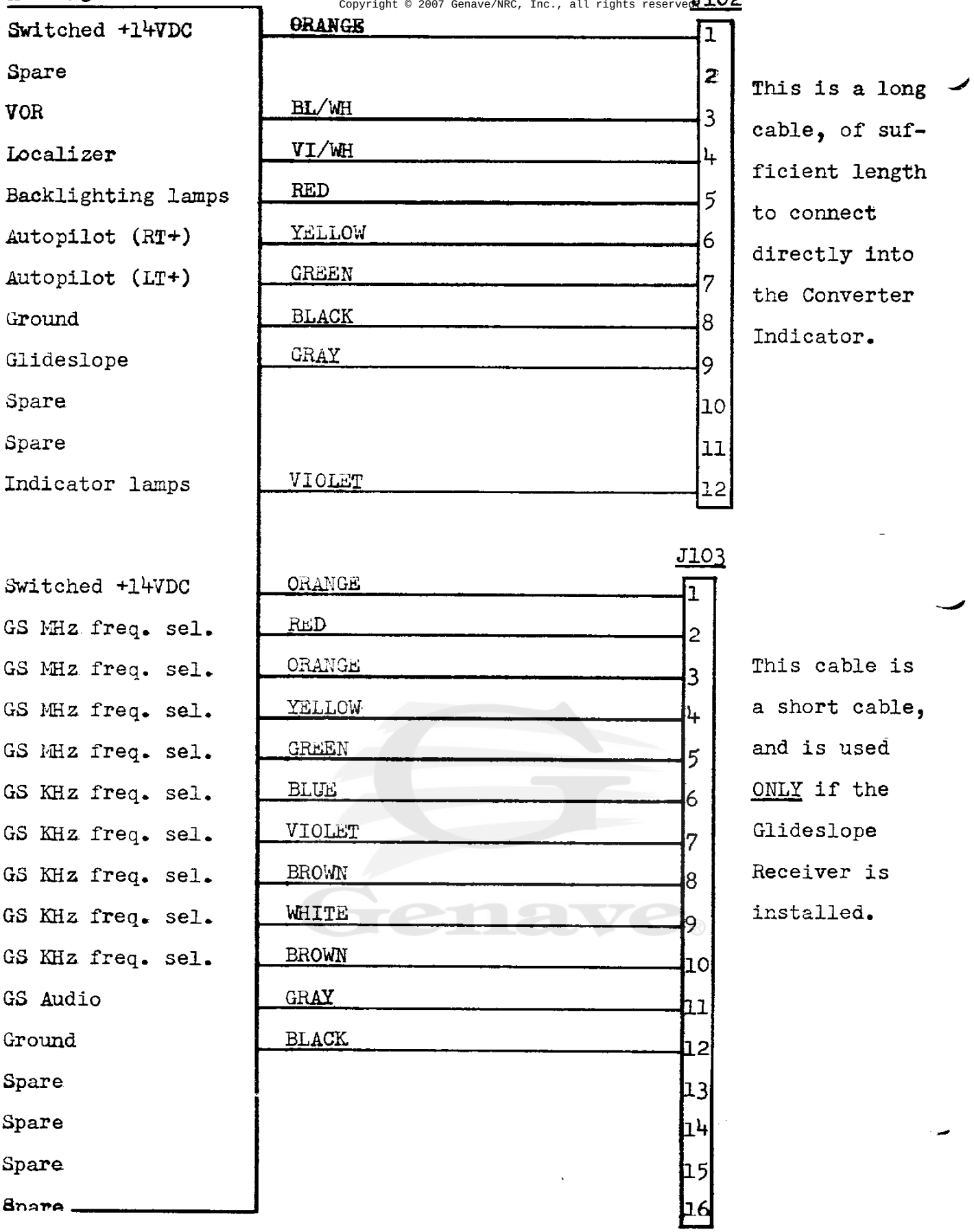
Post Installation Check

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

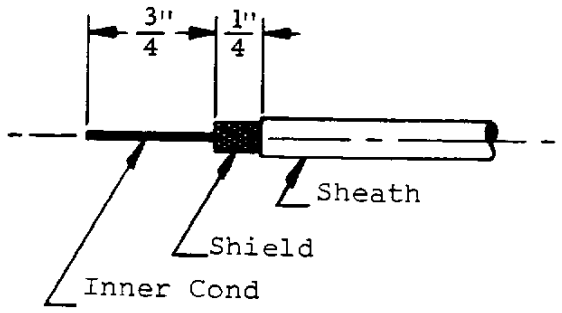


POWER AND SIGNAL CABLE CONNECTIONS (CABLES PREFABRICATED & SUPPLIED)

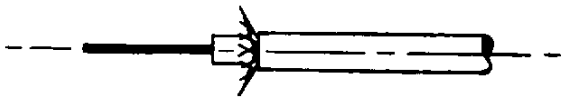
ALPHA/360



NAV Antenna Connector Assembly

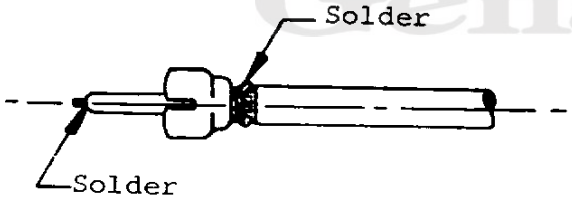


1. Cut and strip RG-58 A/U Coax as shown.



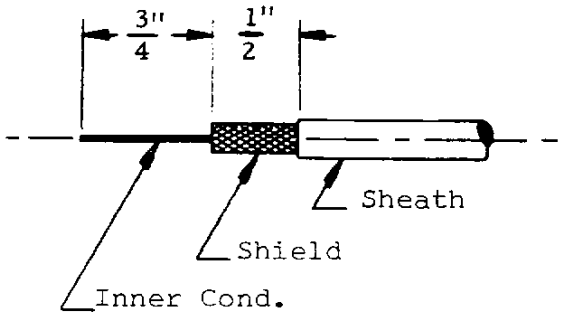
2. Spread shield. Do not pigtail.

3. Press short shank connector onto wire and against shield.

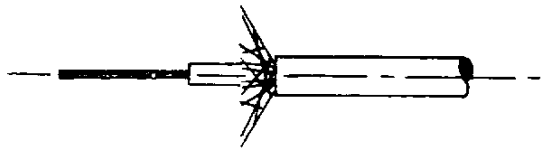


4. Fold shield over connector and solder all around. Flow solder into connector tip to secure inner conductor. Cut off tip of inner conductor which protrudes from connector.

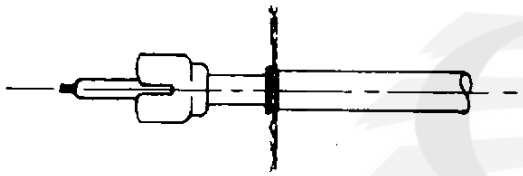
COM Antenna Connector Assembly



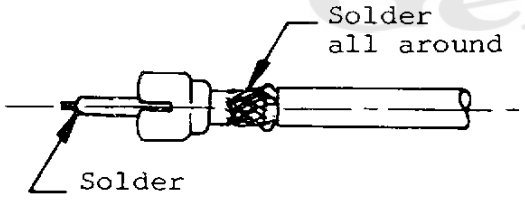
1. Cut and strip RG-58 A/U Coax as shown.



2. Spread shield. Do not pigtail.

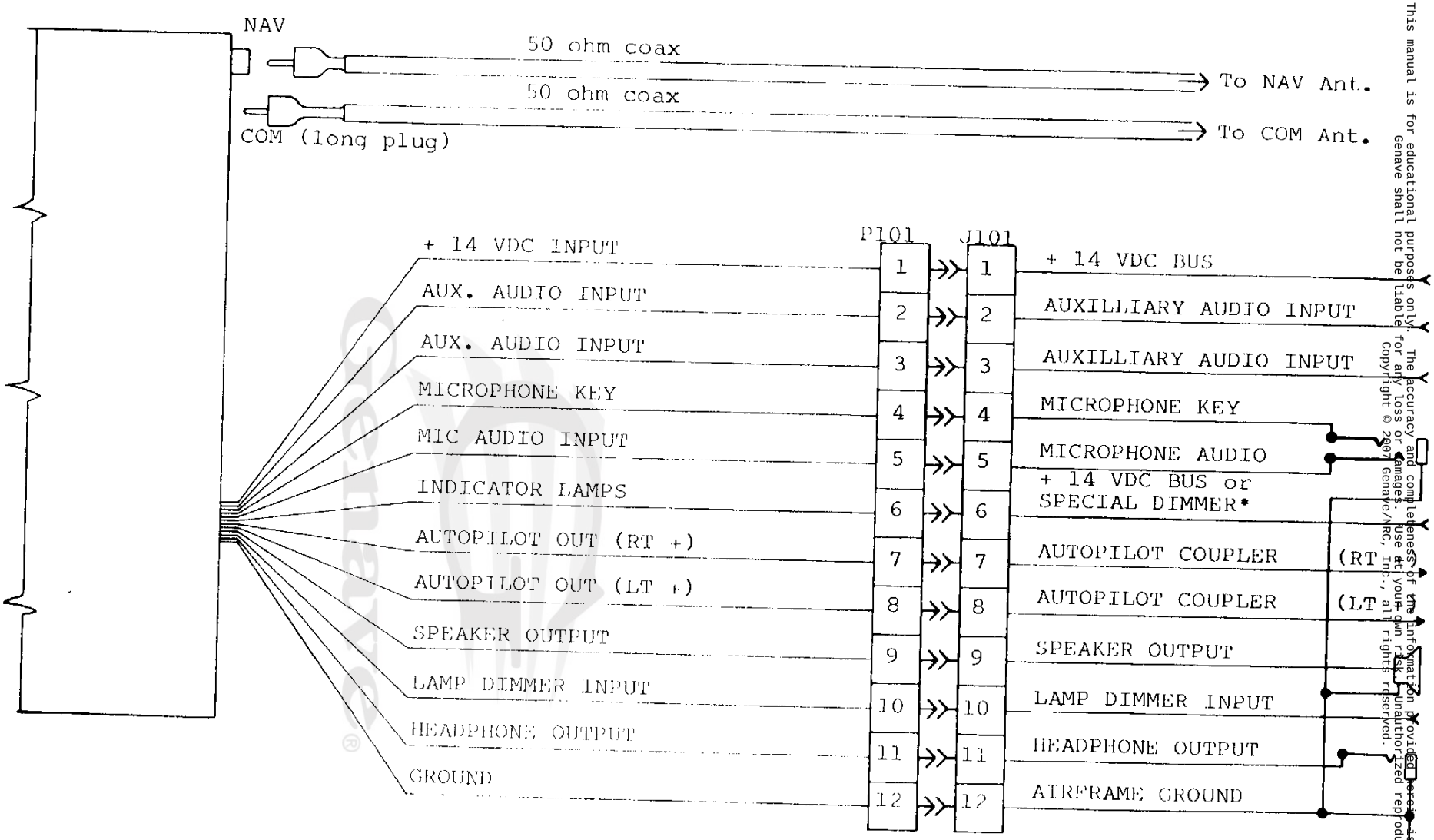


3. Press long shank connector onto wire and against shield.



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

Power and Signal Cable Connections



*This input controls the intensity of the TO-FROM-OFF lamps. The following are alternate methods of installation:

1. Connect directly to the +14 VDC BUS, and the lamps will light at full intensity.
2. Connect through an auxilliary 250 ohm series dimmer potentiometer to the +14 VDC BUS.
3. Connect to existing panel dimmer, which will require panel lights to be set at full brightness during the day for the lamps to be visible.
4. Install a DAY-NIGHT switch, connecting input to +14 VDC BUS for DAY mode and to existing panel dimmer for NIGHT mode.

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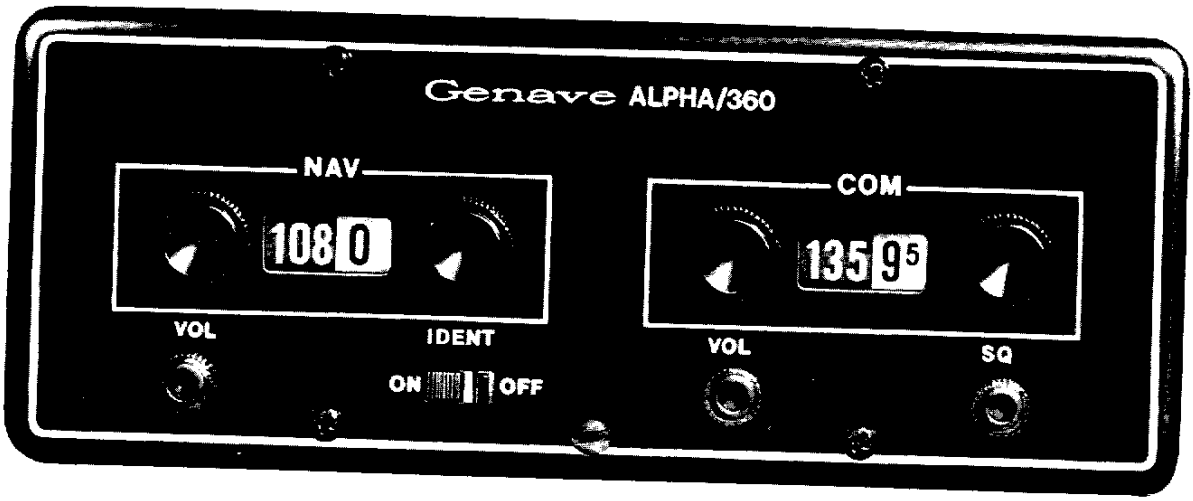
SECTION III

OPERATING MANUAL



3-1. OPERATING CONTROLS AND INDICATORS

The ALPHA/360 has eight operating controls as listed below:

1. On/Off/Com volume
2. Nav Volume
3. Squelch
4. Communications Frequency Selector, MHz
5. Communications Frequency Selector, KHz
6. Navigation Frequency Selector, MHz
7. Navigation Frequency Selector, KHz
8. Ident Filter Switch

The ALPHA/360 has two readout devices as listed below:

1. Communications Frequency Readout
2. Navigation Frequency Readout

To operate the ALPHA/360, turn the unit on by rotating the On/Off/Com volume control clockwise past the click. Both the Nav and the Com receivers operate simultaneously.

To adjust the Com receiver, rotate the squelch control to the maximum clockwise position. Set the desired communications frequency in the COM window using the COM MHz and KHz controls. Adjust the On/Off/Com Volume control counterclockwise to quiet the Com receiver when no signal is present.

To operate the communications transmitter, set the desired communications frequency in the COM window with the COM MHz and KHz controls and push the microphone switch.

To adjust the navigation receiver for Omni or Localizer reception, set the desired navigation frequency in the NAV window using the NAV MHz and KHz controls. Adjust the NAV volume control for the desired audio output level. If monitoring of the audio station identification tone is desired the IDENT switch should be placed in the On position. When the IDENT switch is placed in the Off position all audio transmissions except the tone identifier will be heard over the headphones or loudspeaker.

Duplex communication operation (transmission on a communications frequency, reception on an Omni or Localizer frequency) is affected by selection of the desired transmit frequency on the

COM frequency selectors and the desired receive frequency on the NAV frequency selectors. When the microphone switch is depressed, the unit automatically transmits on the selected communications frequency and receives on the selected navigation frequency.

Simplex communication operation (transmit and receive on the same frequency) is accomplished by selecting the desired simplex frequency on the COM frequency selectors. The ALPHA/360 will then transmit and receive on this selected frequency. In addition, if the navigation receiver is in use, simultaneous monitoring of this channel can be accomplished.

SECTION IV
MAINTENANCE MANUAL

4-1. INTRODUCTION

This section provides the basic information required to electronically test, align, and repair the ALPHA/360. It is assumed that the person working on the unit has a reasonable familiarity with the principles and terminology of communications and navigation electronics as applied to the aviation field.

4-2. THEORY OF OPERATION

I. General

The ALPHA/360 employs 44 silicon transistors and 69 diodes in all solid state design. The following is a breakdown of the functions and circuits within the unit.

A. Navigation Receiver
B. Navigation High Frequency Oscillator & Filter
C. Navigation Low Frequency Oscillator & Filter
D. Communication Receiver
E. Communication High Frequency Oscillator & Filter
F. Communication Low Frequency Oscillator & Filter
G. Exciter & Transmitter Assembly
H. Audio Amplifier/Modulator
I. Regulated Power Supply

The local oscillators and the exciter & transmitter are contained within separate, replaceable shielded modules. The receiver, the power supply, and the audio amplifier/modulator circuits are on the main circuit board.

II. Detailed Theory

A. *Navigation Receiver*—The ALPHA/360 utilizes two complete independent receivers for the NAV and COM functions. The NAV receiver is crystal tuned on 100 channels from 108.0 MHz to 117.9 MHz in 100 KHz steps. The NAV receiver is a double conversion superhetrodyne receiver with a 2.9875 MHz second IF. The first IF has a center frequency of 30.7 MHz. The NAV receiver does not utilize mechanically tracked tuned filters or an RF amplifier.

Signals from the NAV antenna are applied to the NAV input filter via J106, the NAV antenna jack. The NAV input filter is a five pole Chebyshev filter consisting of L105 through L109 and their associated tuning and coupling capacitors. This bandpass filter allows signals in the range between 108.0 and 117.9 MHz to pass to the first NAV mixer.

The NAV HFO applies a signal through C172 to the base of the first mixer Q115. The output of the NAV HFO is approximately 30.7 MHz above the frequency of the desired incoming signal. Q115's gain is controlled by means of the AGC voltage applied to it's base through R163.

The 30.7 MHz difference frequency from the mixer is amplified by the 30.7 MHz IF amplifier consisting of Q116 and associated components. The 30.7 MHz IF has a bandwidth of approximately 1 MHz. The gain of this amplifier is controlled by the AGC voltage applied through R168.

The NAV LFO is coupled through C181 to the base of the second mixer. The NAV LFO operates 2.9875 MHz above the output of the first amplifier. The exact output frequency of the NAV LFO is selected by means of the NAV tenth MHz selector located on the ALPHA/360 front panel.

The 2.9875 MHz difference signal from the second mixer is fed to the 2.9875 MHz IF amplifier consisting of Q118, Q119, Q120, and their associated circuitry. This IF amplifier has a bandwidth of approximately 35 KHz. The gain of the first amplifier stage is controlled by the AGC voltage applied to it's base through R183.

The signal from the 2.9875 MHz IF is applied to CR105, CR104, and associated circuitry, which form a voltage doubling detector. Detected audio is fed to the VOR emitter follower Q212 and to the audio emitter follower Q123 via R202, the NAV volume control. AGC voltage is obtained by reverse biasing the voltage doubling detector. This

bias voltage is determined by the voltage divider formed by R199 and R200. The resulting DC detector output is amplified by Q121 and fed to the bases of Q115, Q116, and Q118 as AGC. CR106 functions as a noise limiter.

The audio from the audio emitter follower is applied to the ident filter consisting of C110, C211, C212, and R207. This bridge T filter, when used, filters out the 1020 Hz identification tone. When tone filtering is not desired the filter is removed from the audio path by closing S201, the IDENT. switch. The resultant audio is fed to the audio amplifier circuits.

B. *NAV High Frequency Oscillator*—The NAV HFO consists of two parts—a crystal oscillator and a frequency doubler. The oscilator consisting of Q501 and associated circuitry is a modified Colpitts crystal controlled transistor oscillator. Crystal selection for this oscillator is achieved through diode switching. The crystals range in frequency from 69.5775 MHz to 74.0775 MHz in 500 KHz steps (See Oscillator Frequency Tables, Figure 4-4-11).

The crystal switching method is identical for all oscillators employed in the ALPHA/360. Crystal switching is accomplished by grounding one of the crystal switching terminals through the appropriate frequency selector on the ALPHA/360 front panel. When one of the crystal switching terminals is grounded the emitter of the oscillator transistor is pulled to nearly ground potential through the 100 ohm resistor and the forward biased diode. This action applies proper bias to the oscillator transistor and places the desired crystal in the oscillator circuit. The remaining unused crystal and diode pairs complete the capacitive feedback path.

The oscillator output signal is fed to Q502 and associated circuitry which form the frequency doubler. Output of the doubler is applied to a 3-pole Chebyshev filter. This is a bandpass filter and has a bandwidth of 139 to 148 MHz. This filter suppresses all undesirable outputs to 70 db below the output frequency. The output of the filter is matched to a 50 ohm coaxial cable which is routed to the main circuit board.

C. *NAV/VOR/LOC Receiver Crystal Oscillator*—The NAV LFO, consisting of Q601 and associated circuitry, is a modified Colpitts, crystal controlled transistor oscillator. The crystal frequencies are 27.267 MHz to 28.167 MHz in 100 KHz steps. The crystals are selected electronically by means of diode crystal switching as previously described for the NAV HFO.

T601, used to adjust the NAV LFO, is provided with a pick-up link. This link is the first element of a 9-pole Chebyshev lowpass filter consisting of the link on T601, C613, L603, C615, L604, C617, L605, C619, and L606. This filter suppresses all unwanted outputs to 70 db below the output frequency. The nominal cutoff frequency is 32 MHz. The output of this filter is matched to a 50 ohm coaxial cable which is routed to the main circuit board.

D. *Communication Receiver*—The COM receiver is crystal tuned on 360 channels from 118.0 MHz to 135.95 MHz in 50 KHz steps. The COM receiver is a double conversion superhetrodyne receiver with a 2 MHz second IF. The first IF has a center frequency of 22.9 MHz. The COM receiver does not employ mechanically tracked, tuned filters or an RF amplifier.

Signals from the COM antenna are applied to the transmit/receive relay K100 via J105 the COM antenna jack. When the T/R relay is in the receive position the signal from the COM antenna jack will be routed to the COM input filter. The COM input filter is a 5-pole Chebyshev filter consisting of L100 through L104 and their associated tuning and coupling capacitors. This bandpass filter allows signals in the range between 118.0 MHz and 135.95 MHz to pass to the first COM mixer.

The COM HFO also applies a signal to the base of Q100, the first COM mixer. This signal is 22.9 MHz above the frequency of the desired incoming signal. The gain of Q100, the first COM mixer, is controlled by means of the AGC voltage applied to the base. The 22.9 MHz difference frequency produced in the first COM mixer is fed to the first COM IF consisting of Q101 and associated circuitry. The first COM IF has a center frequency of 22.9 MHz and a bandwidth of 1 MHz. This stage is also controlled by the AGC voltage which is applied to the base of Q101 through R106.

Output of the first COM IF is applied to the second COM mixer consisting of Q102 and associated circuitry. The output of the COM LFO is applied to the transistor base through C123. The signal from the COM LFO is 2 MHz above the desired first IF frequency. The resulting 2 MHz difference signal is then fed to the COM second IF. The 3-stage COM second IF consists of Q103, Q104, Q105 and and their associated circuitry. The first two stages of the COM second IF are AGC controlled. This AGC voltage is applied to the bases of Q103 and Q104 through R120 and R127 respectively.

Output of the second IF is applied to the voltage doubling detector. The voltage doubling detector is composed of CR100, CR101, R136, R137, and C146. Audio from the voltage doubling detector is fed to the AGC amplifier, COM emitter follower, and squelch amplifier. The AGC amplifier is composed of Q107 and associated circuitry. The AGC voltage, which is fed to the AGC amplifier, is determined by back-biasing the detector diodes through R111. The varying DC voltage produced is amplified by Q107 and used to control the first mixer, first IF amplifier, and second mixer. R139, R141, CR102, and C147 form a noise limiter which removes impulse noise from the voice audio. Q108 and associated circuitry form the squelch amplifier. The squelch amplifier controls the bias level on the emitter of Q106, the voice emitter follower. The output of the voice emitter follower is fed to the audio amplier.

E. *Communication High Frequency Oscillator*—The COM HFO consists of Q301, Q302, Q303, and associated circuitry in a modified Colpitts, crystal controlled transistor oscillator. The crystal frequencies are 69.7185 to 79.2185 MHz in 500 KHz steps. Crystal selection is the same as described for the NAV HFO except that for the COM HFO crystal selection is also determined by the position of the T/R relay, K100.

The output of the oscillator is fed into the base of a Class AB frequency doubler, Q302. The output of the doubler is filtered by a 3-pole Chebyshev bandpass filter which reduces all spurious levels 70 db below the reference output frequency. The filter has a passband of 139 MHz to 159 MHz. The output of the filter is matched to a 50 ohm coaxial cable which is routed to the main circuit board and also to the exciter & transmitter assembly.

F. *Low Frequency Oscillator*—The low frequency oscillator, consisting of Q401 and associated circuitry, is a modified Colpitts, crystal controlled transistor oscillator. The crystals are selected in the same manner as described for the NAV HFO.

L401, used to adjust the low frequency oscillator, utilizes a pickup link. This link is the first element of a 9-pole Chebyshev lowpass filter consisting of the link on L401, C411, L403, C413, C404, C415, L405, C417, and L406. This filter suppresses all unwanted outputs to 70 db below the output frequency. The nominal cutoff frequency is 26.0 MHz. The output of the filter is matched to a 50 ohm coaxial cable which is routed to the main circuit board and then to the exciter assembly.

G. *Exciter & Transmitter Assembly*—Inputs from the high and low frequency COM oscillators are fed through resistive attenuators to the balanced mixer, consisting of Q901 and Q902. The low frequency input is applied through a tuned transformer, T901, and fed differentially to the transistor bases. The HFO input is applied in-phase to both bases. Using this method of feeding the mixer, the HFO input, it's harmonics, and all even order harmonics of the low frequency input are suppressed in the collector circuit. Mixing action occurs in the base-emitter junctions and produces primarily the high frequency input plus and minus the low frequency input. Harmonically related spurious outputs also occur, but at lower levels. The desired output frequency is the HFO input minus the LFO input. The sum and difference frequencies appear in the collector circuit across the primary of T902. A pickup link on T902 forms the first element in a 3-pole Chebyshev bandpass filter consisting of the link on T902, C909, C910, C913, L901, C914, C915, C916, C911, C912, and L902. The nominal bandwidth of this filter is 19 MHz centered around a frequency of 127.95 MHz. The filter suppresses all undesired higher order outputs of the mixer to 60 db below the output frequency.

The output filter drives an emitter follower consisting of Q903. The output of the emitter follower drives two common emitter amplifiers consisting of Q904 and Q905. The two amplifiers are capable of being switched into an off condition by raising the emitter voltages.

One amplifier drives a 3-pole Chebyshev bandpass filter consisting of L903, L905, L906, C927, C928, C942, C943, C944, C945, C946, and C947 with a bandwidth of 118 to 127.9 MHz. The other amplifier drives a 3-pole Chebyshev bandpass filter consisting of L904, L907, L908, C934, C935, C936, C937, C938, C939, C940, and C941 with a bandwidth of 128 to 135.95 MHz. The amplifiers are selected by another section of the COM MHz switch SW301. The changeover occuring 127/128 MHz, on the COM MHz dial. By switching the filters, the lower order spurious responses such as 2HFO-2LFO are reduced to 70 db below the desired output frequency.

The outputs of both filters are combined in a diplexer consisting of C948, R927, L909, and C949. The diplexer provides 25 db of isolation between filters thus reducing interaction to a minimum. The output of the diplexer is fed into a single-tuned bandpass amplifier Q906. At this point all undesired outputs are more than 70 db below the desired output.

The output of Q906 is fed into a single-tuned Class AB driver, Q907. The signal from Q907 is matched into the input of Q908 with a split inductor "pi" matching section, consisting of Z903, C966, C967, and Z904. Q909 is the final power amplifier stage. It is single-tuned into a 7-pole Chebyshev lowpass filter. The primary function of this filter is to remove harmonics of the output frequency which are generated in the Class C amplifier stages. The filter reduces all of the harmonics and spurious outputs to over 60db below the desired output. The output of the filter is designed to match a 50 ohm communications antenna system. The output the transmitter connects to the antenna switching relay, K100.

The entire exciter & transmitter assembly is contained in one module consisting of tin plated steel which eliminates radiation from the module.

H. *Audio Amplifier/Modulator*—The audio amplifier in the ALPHA/360 is used as a power amplifier to drive the speaker for COM and NAV receive and as a modulator for the transmitter during transmit. The switching required for the change of function is accomplished by K100 the T/R relay, which is activated by the microphone switch.

When the radio is in the receive mode the audio amplifier has four (4) inputs which may be in use simultaneously. One input is connected to the NAV receiver output and is controlled by volume control R202. The second audio input is connected to the COM receiver output and is controlled by volume control R140. The other two inputs are auxiliary inputs which may be connected to other systems in the aircraft such as marker beacon, ADF receiver, a second NAV/COM, etc. These inputs are designed to provide full audio output power with an input signal of 1 V rms.

The audio amplifier/modulator in the ALPHA/360 is a five stage direct coupled Class B complementary symmetry amplifier consisting of Q109, Q110, Q111, Q112, Q113, and Q114. The preamplifier has DC feedback to provide isolation between inputs. The modulator provides both DC and AC feedback through R158 and C156 to stabilize bias conditions of the entire amplifier over the temperature range of −50 to +100 degrees Centigrade.

High frequency band shaping is controlled by the feedback capacitor, C156, and shunt capacitor C157. R156, R157, and C155 determine the audio low frequency response at 800 Hz and below. Capacitors C158 and C159 are used to provide closed loop stability and do not affect the audio pass band responses.

Transformer T110 is used to raise the output impedance and voltage levels to properly modulate the transmitter and speaker. The output voltage is slightly less than 10 volts rms, thus assuring that the transmitter cannot be over modulated. The Class B modulation technique assures that the modulation voltages cannot exceed the voltage applied to the transmitter. R151 provides a noise free regulated current to the microphone element. It may be changed, if necessary, in the field to provide proper modulation percentage with non-standard, low, or high output microphones. The design value is proper for all new single button carbon microphones or their equivalent such as the various transistorized types designed for direct replacement of the carbon type. The up modulation as previously mentioned, is controlled by the Class B modulation and R150 prevents bottoming or carrier cutoff. The combination limits the modulation to 85% to 95% maximum.

I. *Regulated Power Supply*—The circuitry in the ALPHA/360 which are sensitive to input voltage variations are operated from a regulated power supply consisting of Q124, Q125, and Q126. CR108 determines the necessary reference voltage on the base of Q125. The output level of the regulator, nominally 8.5 volts, is set on R212 which determines the bias level on the base of Q126. The differential amplifier formed by Q125 and Q126 is used to control the series regulator transistor Q124 via the collector to base connection of Q125 and Q124. R208 supplies a portion of the load current which allows Q124 to operate well within its dissipation capabilities.

CR107, although not a direct part of the regulated supply, limits the maximum input to the supply to about 16 volts. This protects the supply and the circuits of the radio, which use the full input voltage, from the aircraft electrical system. This zenor diode prevents damage which may be caused by over-voltage spikes caused by starters, blowers, relays, etc.

4-3. TEST EQUIPMENT REQUIRED

a. Sweep Generator covering at least 22.9 MHz ± 1 MHz, 30.7 MHz ± 1 MHz, 113 MHz ± 10 MHz, and 127 MHz ± 15 MHz.
Heathkit IG-52 (Modified, Schematics available from GENAVE) or equivalent.

b. Sweep Generator covering at least 2 MHz ± 750 KHz, and 2.9875 MHz ± 750 KHz.
Texscan Model VS 20 or equivalent.

c. Frequency Counter usable to at least 159 MHz.
GENAVE Model NU/200
Computer Measurements Corp. Model 616A
Hewlett Packard Model 5254

d. Oscilloscope, low frequency, DC coupled preferred.

e. Power Supply, 13.75 VDC @ 4 amps filtered.

f. VTVM
Any accurate instrument.

g. VOM

h. R.F. Signal Generator capable of producing a navigation ident signal.
Tel-Instruments T-12A, ARCH-14, or equivalent.

i. R.F. Dummy Load 108 to 136 MHz 10 watt minimum

NOTE: Alignment procedures for the High Frequency Oscillator Doubler Filters, the Exciter Assembly, and the Transmitter Power Amplifier are not included since these are considered to be replaceable modules and not field repairable.

A. *General*—The receiver section of the ALPHA/360 employs several multi-element bandpass filters. These filters MUST be aligned using swept frequency techniques. Do not attempt to align any portion of the ALPHA/360 by "peaking" or other single frequency techniques.

B. *8.5 VDC Power Supply*

1. Connect an accurate VOM or VTVM to the output of the regulated 8.5 VDC power supply (TP-1).
2. Adjust R212, 8.5 VDC ADJUST, for an output of 8.5 VDC.

CAUTION: The 3-pole filters in the output circuit of the high frequency doublers have been prealigned at the factory. It should *not* be necessary to readjust these filters unless the components of the *filter itself* are damaged or replaced. It is recommended that repair or alignment of these filters be done at the factory.

C. *Nav H.F. Oscillator Alignment*

1. Connect the receiver to the alignment setup shown in figure 4-4-2.
2. Connect a frequency counter to the Nav high frequency oscillator output cable where it connects to the main board (TP-2).
3. Turn the receiver on. Set the Nav frequency to 108 MHz.
4. Turn the Nav HFO tuning slug (see figure 4-4-6) 2 or 3 turns counterclockwise then back clockwise to the point at which the oscillator just starts.
5. With the frequency selector set at 108.0 MHz the oscillator output should be 139.155 MHz. The allowable frequency deviation is ± 5 KHz. Count through the remaining Nav whole frequencies and simultaneously check for proper oscillator output and frequency as found in figure 4-4-11.
6. If on any frequency no oscillator output is indicated. Readjust the oscillator slug slightly until the oscillator starts. Recheck to insure operation on all channels.

D. *Nav L.F. Oscillator Alignment*

1. Connect the receiver to the alignment setup shown in figure 4-4-2.
2. Connect a frequency counter to the Nav low frequency oscillator output cable where it connects to the main board (TP-3).
3. Turn the receiver on. Set Nav Tenth Megahertz frequency selector to .0 MHz.
4. Turn the Nav LFO tuning slug (see figure 4-4-7) 2 or 3 times counterclockwise then back clockwise just to the point at which the oscillator starts.
5. With the tenth MHz frequency selector set at .0 MHz the oscillator output should be 28.167 MHz. The allowable frequency deviation is ± 1 KHz. Count through the remaining Nav tenth MHz frequencies and simultaneously check for proper oscillator output and frequency as found in figure 4-4-11.
6. If on any frequency no oscillator output is indicated readjust the oscillator slug slightly until the oscillator starts. Recheck to insure operation on all channels.
7. Turn receiver off. Disconnect.

E. *Com H.F. Oscillator Alignment*

1. Connect the receiver to the alignment setup shown in figure 4-4-2.
2. Connect a frequency counter to the Com H.F.O. output cable where it connects to the main board (TP-4).
3. Connect the 10 watt dummy load to the Com antenna jack.
4. Turn the receiver on. Set the Com whole Megahertz selector to 118 MHz.
5. With the PTT button depressed turn the slug in L306 (see figure 4-4-8) counterclockwise 2 or 3 turns then back clockwise to the point at which the oscillator starts.
6. With the Com whole MHz selector in the 118 MHz position the oscillator output should be 139.437 MHz. The allowable frequency deviation is ± 5 KHz.
7. Change Com Whole MHz selector to 119 MHz.
8. Depress PTT button and check oscillator output and frequency. The output frequency should be 140.437 MHz ± 5 KHz. Release PTT button.
9. Change Com whole MHz selector back to 118 MHz.
10. It will no longer be necessary to depress the PTT button. Instead merely check the oscillator for output and proper frequency. The output frequency should now be 141.437 MHz ± 5 KHz.
11. Continue to check oscillator output and frequency up to and including 125 MHz using the Com HFO, Com Receive data in figure 4-4-10.
12. If on any frequency no oscillator output is indicated readjust the oscillator slug of L306 slightly until the oscillator starts then go back and repeat steps 6 thru 11 to insure the oscillator operation on the lower frequencies is still unaffected.
13. Switch the Com whole MHz selector to 126 MHz.
14. Turn the slug in L301 counterclockwise 2 or 3 turns then back clockwise just to the point at which the oscillator starts.
15. Continue to check output and frequency on each channel from 126 MHz to and including 135 MHz. (See figure 4-4-10.)
16. If on any of these channels no oscillator output is indicated readjust the oscillator slug of L301 slightly until the oscillator starts then repeat step 15.
17. Turn receiver off. Disconnect.

F. *Com L.F. Oscillator Alignment*

1. Connect the receiver to the alignment setup shown in figure 4-4-2.
2. Connect a frequency counter to the Com low frequency oscillator output cable where it connects to the main board (TP-5).
3. Turn receiver on. Set Com one-hundredth MHz selector to .00 MHz.
4. Turn the Com LFO tuning slug counterclockwise 2 or 3 turns then back clockwise just to the point at which the oscillator starts.
5. With the Com one-hundredth MHz selector in the .00 MHz position the Com LFO output should be 21.437 MHz ± 1 KHz. Count through the remaining Com one-hundredth MHz frequencies and simultaneously check for proper oscillator output and frequency as found in figure 4-4-10.
6. If on any frequency no oscillator output is indicated readjust the oscillator slug slightly until the oscillator starts. Repeat step 5.
7. Turn receiver off. Disconnect.

G. *Nav Input Filter*

1. Connect the radio to the alignment and test setup.
2. Turn the radio off.
3. Connect the Heath sweep generator to the Nav antenna input jack using a 6 dB pad.
4. Set the sweep generator to band C. Set the frequency to approximately 60 MHz. Note that the second harmonic output of the sweep frequency is used.
5. Set the sweep width to maximum wide. Set the output level to maximum.
6. Connect the high impedance detector to the output tap of L109 and ground (TP-6). Use the shortest possible lead length.
7. Connect the output of high impedance detector to the vertical input of the scope.
8. Connect the horizontal output of the sweep generator to the horizontal input of the scope.
9. Connect the frequency counter to moniter the marker output frequency.
10. Set the marker switch to variable marker.
11. Set the marker amplitude to maximum.
12. Tune the Nav frequency selector to 108.0 MHz.
13. Adjust the sweep frequency and phasing controls on the generator to center the pattern.
14. Adjust C162, C164, C166, C168 and C170 to obtain the desired wave shape as shown in figure 4-4-13. Once the desired wave shape has been obtained, the entire wave form should be shifted until 108 MHz marker appears one half the distance down the low frequency edge of the wave form. This shifting can be obtained by moving each slug the same portion of a turn and then readusting until the desired wave shape is again obtained.
15. Apply a 118.0 MHz Marker and check to see that it appears somewhere along the top of the waveform.

H. *Com Input Filter*

1. Reconnect the Heath sweep generator to the Com antenna input jack using a 6 dB pad.
2. Connect the high impedance detector to the output tap of L104 and ground (TP-7).
3. Tune the Com frequency selector to 118.0 MHz.
4. Adjust the sweep frequency and phasing controls on the generator to the center of the pattern.
5. Adjust C100, C102, C104, C106 and C108 to obtain desired wave shape as shown in figure 4-4-12. Once desired wave shape has been obtained, the entire wave form should be shifted until the 118.0 MHz marker appears on the top low frequency end of the wave form as shown in figure 4-4-12. This shifting can be obtained by moving each slug the same portion of a turn and readjusting for proper wave shape. Apply a 136.0 MHz marker and check to see that it falls somewhere along the top high frequency end of the wave form. This marker should appear no further than half the distance down the high frequency end of the wave form or 6 dB down.

I. *Nav First Mixer and First IF Alignment*

1. Connect the output of the sweep generator through a .1 mfd. capacitor to the tap point on L109, the last coil of the five pole input filter (TP-6).
2. Connect the high impedance detector to the output of the first IF. This connection should be made at the junction of C180 and T114 (TP-8).
3. Set the sweep generator to band B. Set the sweep frequency oscillator to approximately 30 MHz.
4. Decrease the sweep generator output, always be sure to use the minimum signal necessary for alignment in order to prevent AGC action.
5. Adjust the marker generator to produce the 30.7 MHz marker.
6. Adjust T111, T112, T113 and T114 for proper wave shape as shown in figure 4-4-15. This adjustment is made to obtain maximum output, 1 MHz band width, and steep skirts on the wave form. Some slight sacrifice in wave shape may be necessary to obtain the 1 MHz desired band width. The final wave form should be centered on the 30.7 MHz marker.

J. *Com First Mixer and First IF Alignment*

1. Reconnect the output of the sweep generator through a .1 mfd. capacitor to the output tap of L104, the last coil in the five pole input filter (TP-7).
2. Connect the high impedance detector to the output of the first IF. This connection should be made at the junction of C120 and the top of T103 (TP-9).

3. Set the sweep generator frequency to approximately 22.9 MHz. Again, use the minimum signal necessary for alignment in order to prevent AGC action.
4. Set the marker at 22.9 MHz.
5. Adjust T100, T101, T102 and T103 to obtain the desired wave shape as shown in figure 4-4-14. This adjustment should be made to obtain maximum output, 1 MHz band width, and steep skirts on the wave shape. Again, the sacrifice of wave shape may be necessary to obtain the 1 MHz band width. The aligned wave form should be centered on the 22.9 MHz marker.

K. *Nav Second IF Alignment*

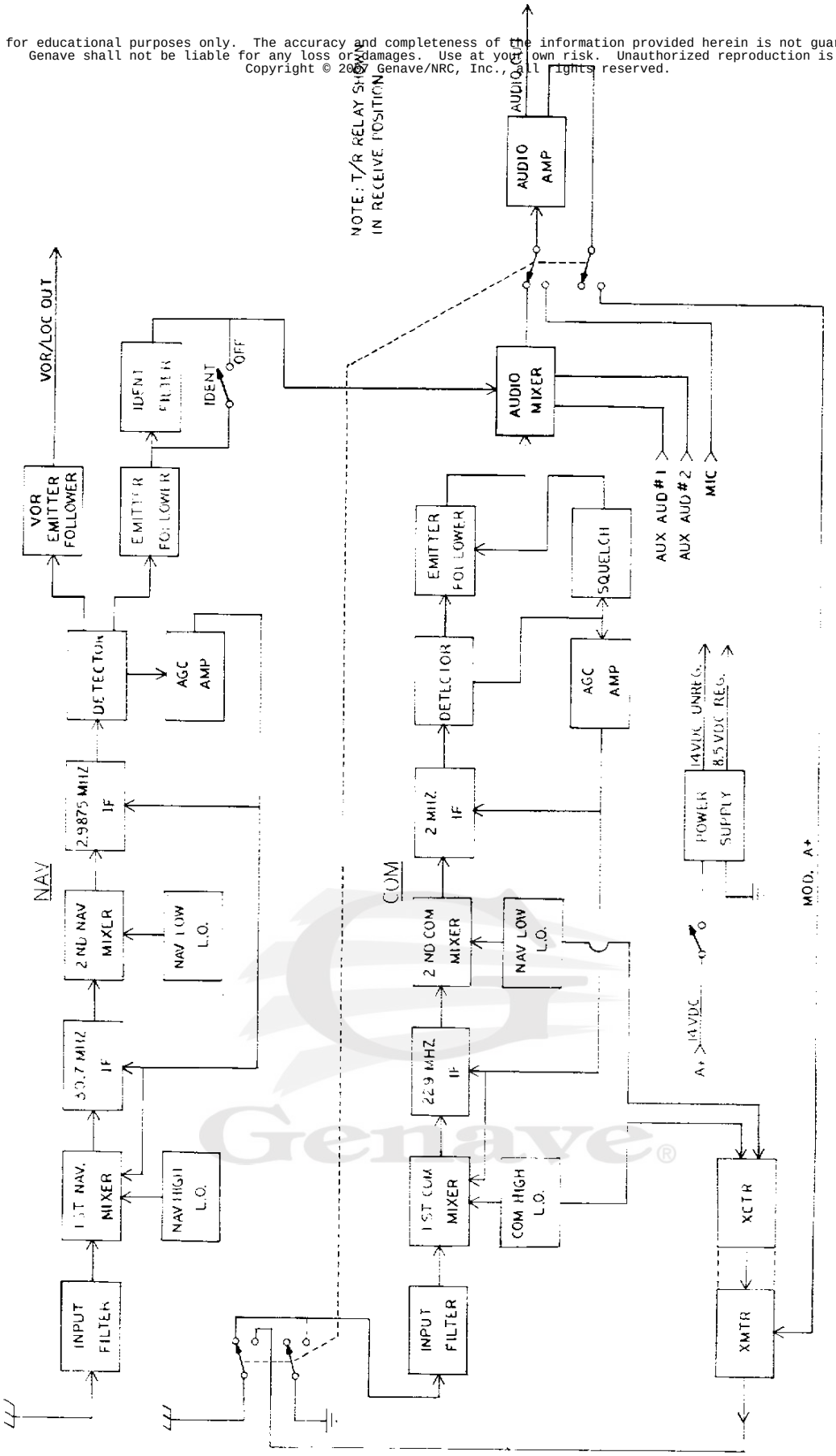
1. Connect the sweep generator output through a .1 mfd. capacitor to the base of Q117, the Nav second mixer (TP-10).
2. Connect the vertical input of the scope between the anode of CR105 the detector diode (TP-11) and ground.
3. Apply a 2.9875 MHz marker.
4. Adjust the sweep generator frequency to center on the marker. Again, use as little sweep generator output as possible to avoid AGC action.
5. Adjust T115, T116, T117, T118, T119 and T120 to obtain desired wave shape as shown in figure 4-4-17. Adjust wave form for best gain, symmetry, and 35 to 40 KHz nose band width.

L. *Com Second IF Alignment*

1. Connect sweep generator to the base of Com second mixer T102 (TP-12).
2. Connect scope vertical input to the anode of CR100, detector diode (TP-13) and ground.
3. Apply a 2 MHz marker.
4. Adjust sweep generator to center the sweep on the marker. Be sure to use the minimum generator output to prevent AGC action.
5. Adjust T104, T105, T106, T107, T108 and T109 for proper wave form as shown in figure 4-4-16. This adjustment is made to obtain best gain, symmetry, and a 20 KHz band width measured at the 3 dB down points.

M. *Ident Filter Alignment*

1. Connect the receiver to the alignment setup shown in figure 4-4-2.
2. Set up the ident signal simulator so as to produce a Nav signal with 1020 Hz modulation. Connect the simulator to the Nav antenna jack.
3. Connect an oscilloscope to the speaker output of the ALPHA/360. Turn on the receiver and adjust the oscilloscope sweep until the 1020 Hz fundamental frequency of the ident tone can be observed.
4. The two slugs of L110 are then adjusted simultaneously until the minimum level of ident tone is observed. When adjusting the two slugs move each slug the same number of turns each time. If one slug is moved 2 turns out towards one end the other slug should be moved 2 turns out towards the other end. Continue moving the two slugs equal amounts until the point of minimum tone output is reached.
5. The ident filter is now aligned. Turn off receiver. Disconnect.



Model: ALPHA/360

Figure 4-4-1
BLOCK DIAGRAM

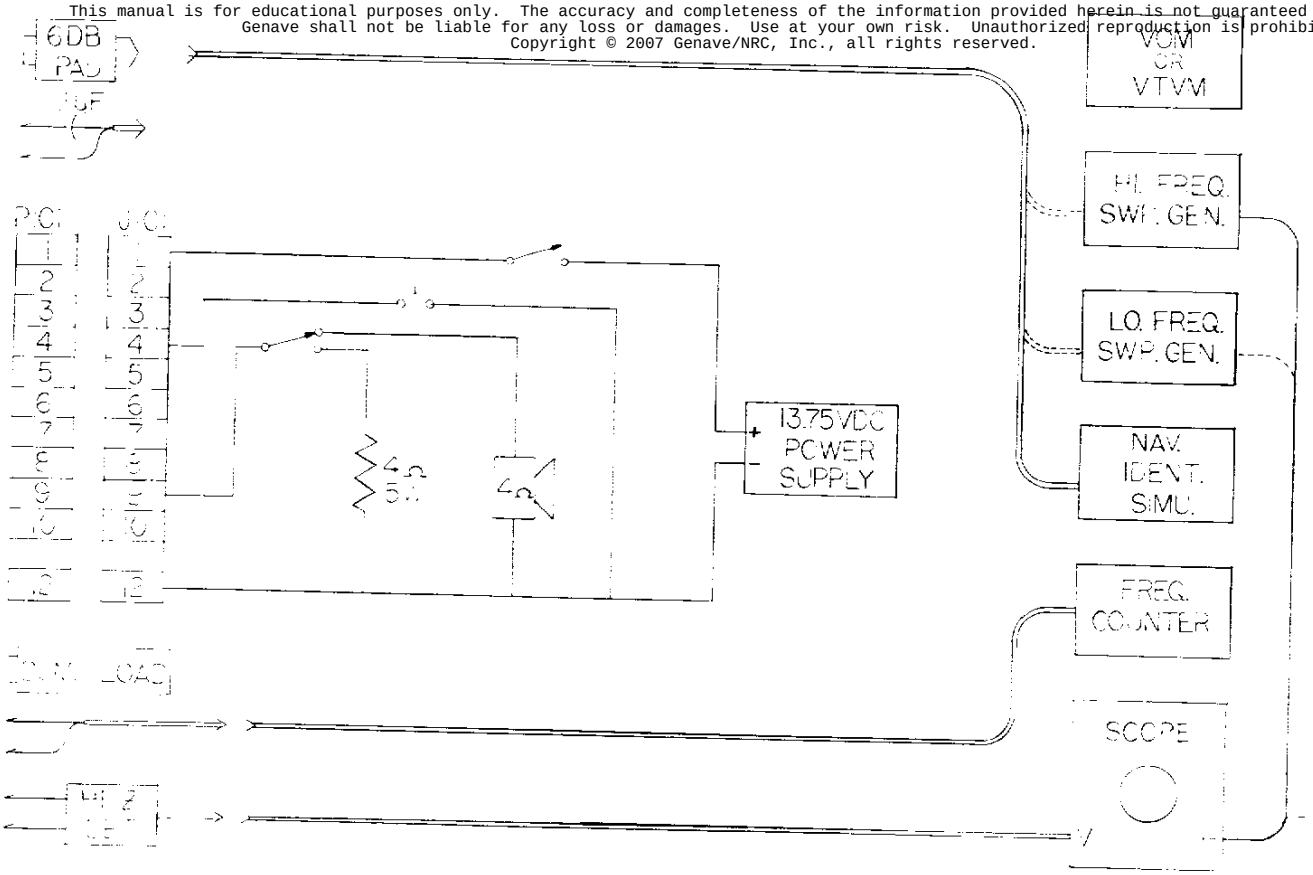


Figure 4-4-2
ALIGNMENT AND TEST SETUP

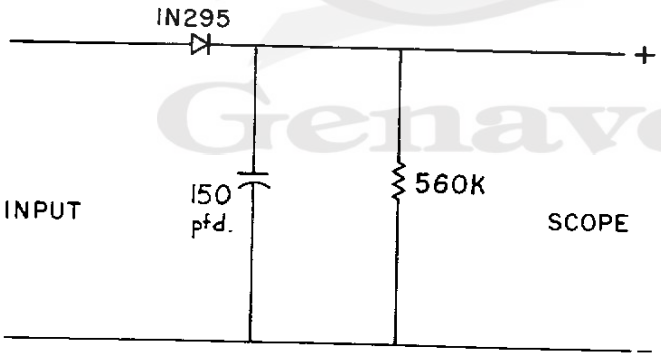


Figure 4-4-3
HIGH IMPEDANCE DETECTOR

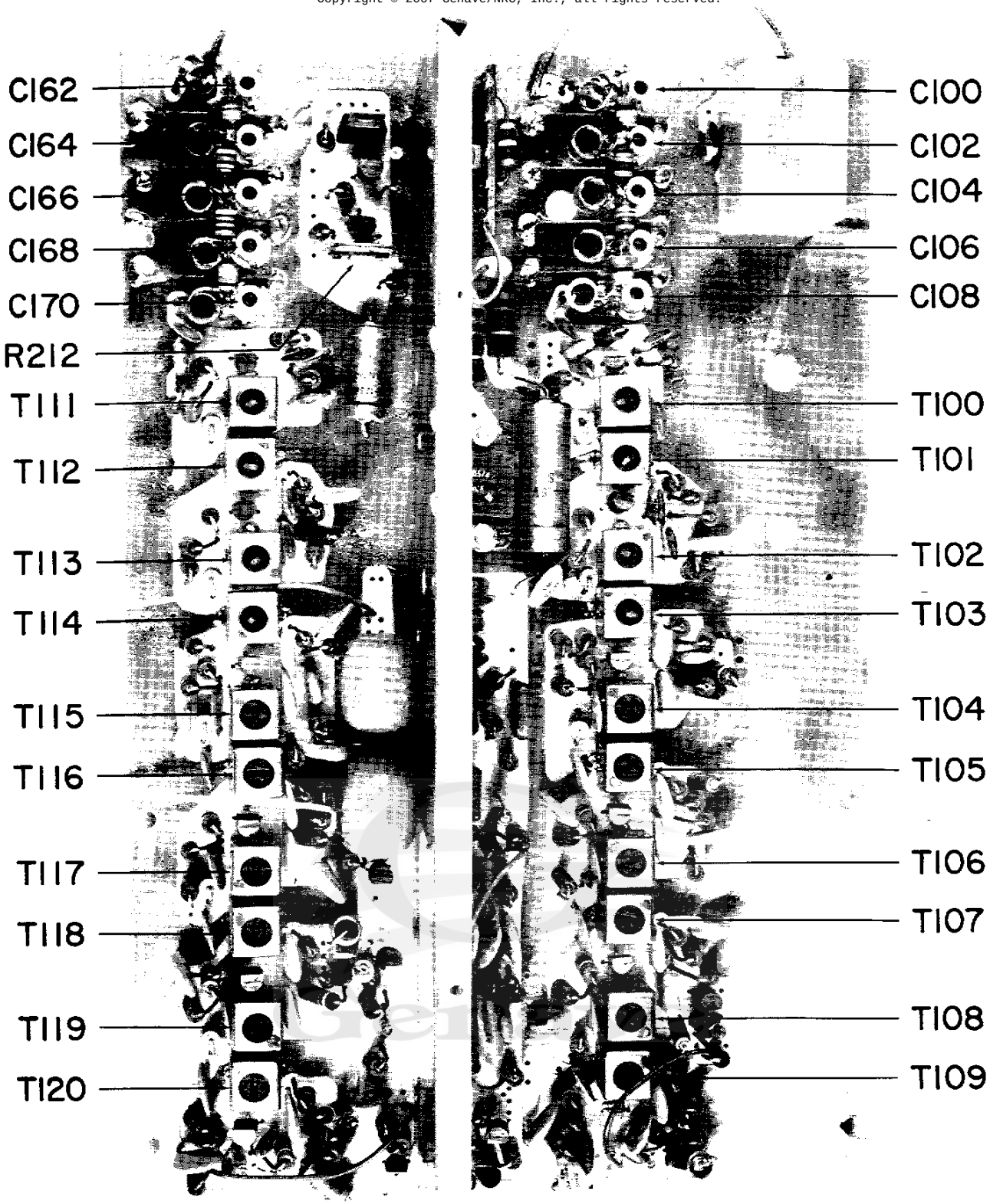


Figure 4-4-4
RADIO, TOP VIEW, ALIGNMENT ADJUSTMENTS

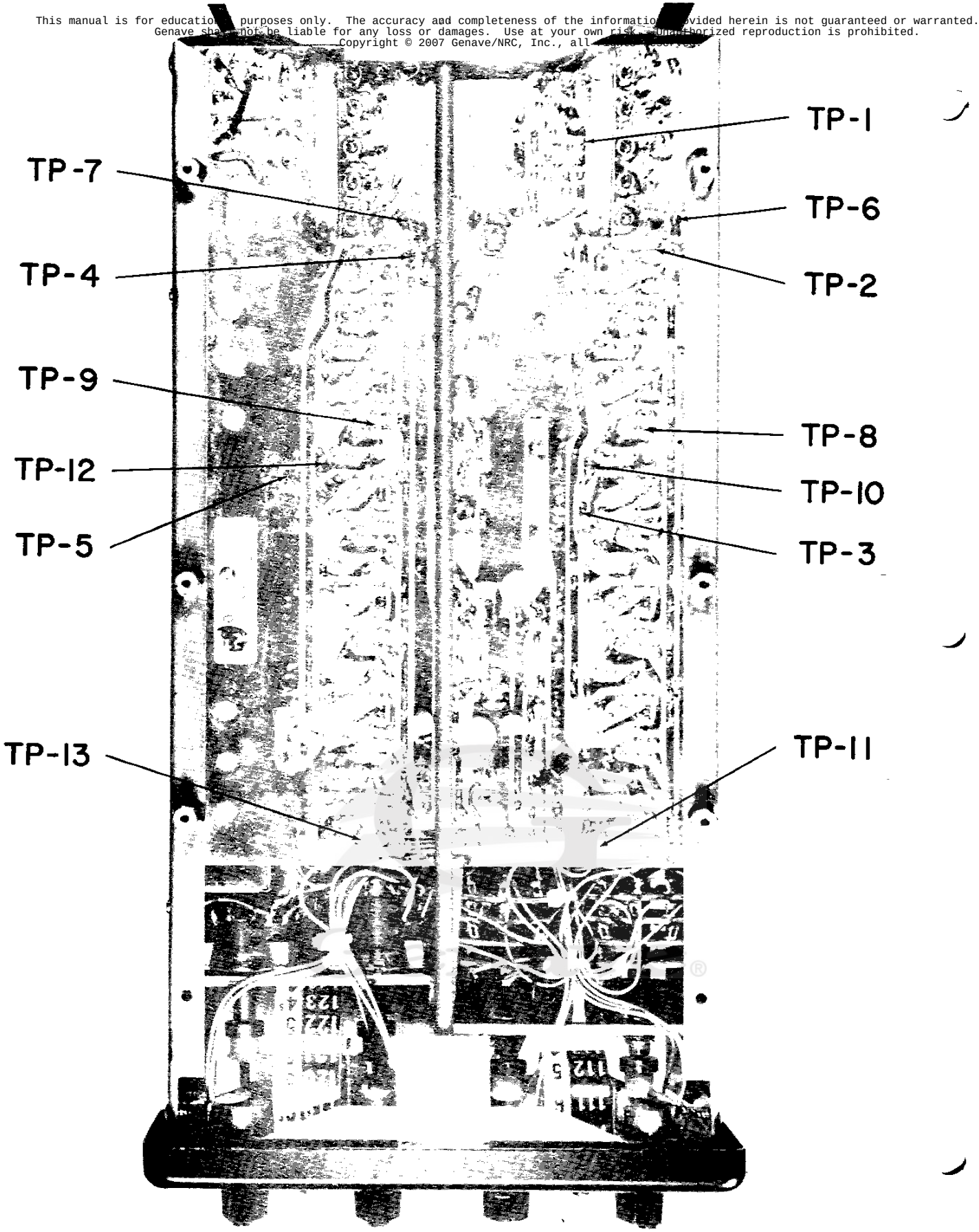
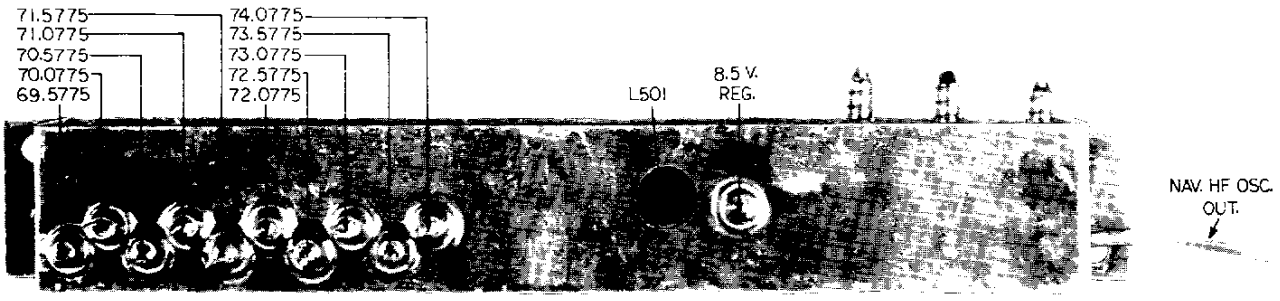


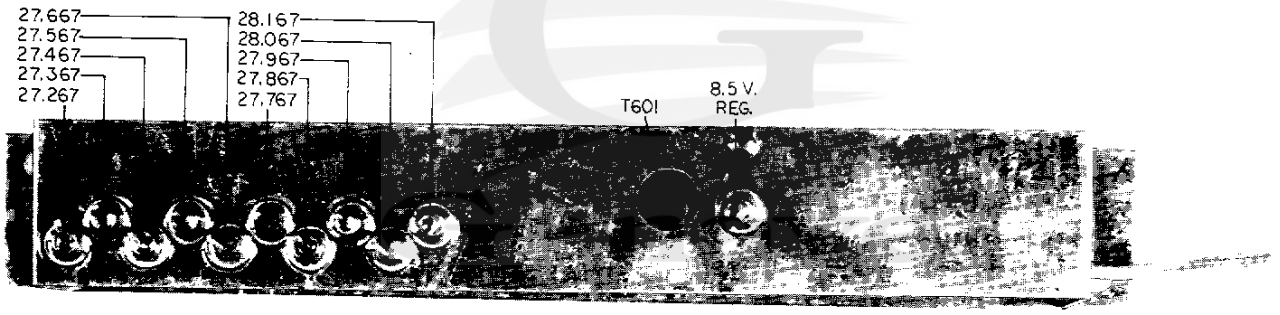
Figure 4-4-5
RADIO, BOTTOM VIEW

Model: ALPHA/360



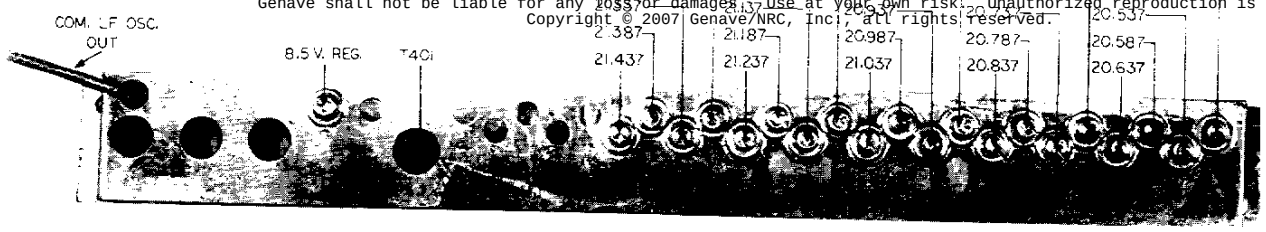
DIAL	OSC.	OUT
108	69.5775	139.155
109	70.0775	140.155
110	70.5775	141.155
111	71.0775	142.155
112	71.5775	143.155
113	72.0775	144.155
114	72.5775	145.155
115	73.0775	146.155
116	73.5775	147.155
117	74.0775	148.155

Figure 4-4-6
NAV HF OSCILLATOR



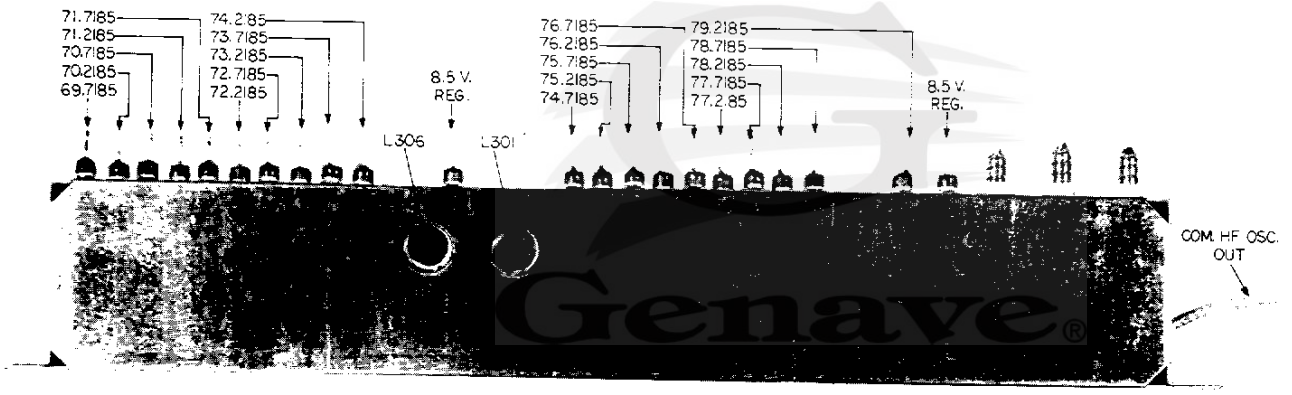
DIAL	FREQ.
0	28.167
1	28.067
2	27.967
3	27.867
4	27.767
5	27.667
6	27.567
7	27.467
8	27.367
9	27.267

Figure 4-4-7
NAV LF OSCILLATOR



DIAL	FREQ.
00	21.437
05	21.387
1	21.337
15	21.287
2	21.237
25	21.187
3	21.137
35	21.087
4	21.037
45	20.987
5	20.937
55	20.887
6	20.837
65	20.787
7	20.737
75	20.687
8	20.637
85	20.587
9	20.537
95	20.487

Figure 4-4-8
COM HF OSCILLATOR



DIAL	OSC	OUT
T 118	69.7185	139.437
T 119	70.2185	140.437
118	70.7185	141.437
119	71.2185	142.437
120	71.7185	143.437
121	72.2185	143.437
122	72.7185	144.437
123	73.2185	145.437
124	73.7185	146.437
125	74.2185	148.437
126	74.7185	149.437
127	75.2185	150.437
128	75.7185	151.437
129	76.2185	152.437
130	76.7185	153.437
33	77.2185	154.437
32	77.7185	155.437
33	78.2185	156.437
134	78.7185	157.437
135	79.2185	158.437

Figure 4-4-9
COM LF OSCILLATOR

OSCILLATOR FREQUENCY TABLES

COM LOW FREQUENCY OSCILLATOR, ALL CONDITIONS

Dial Reading	Crystal & Output Freq.	Dial Reading	Crystal & Output Freq.
00	21.437 MHz ± 1 KHz	5	20.937 MHz ± 1 KHz
05	21.387 MHz ± 1 KHz	55	20.887 MHz ± 1 KHz
1	21.337 MHz ± 1 KHz	6	20.837 MHz ± 1 KHz
15	21.287 MHz ± 1 KHz	65	20.787 MHz ± 1 KHz
2	21.237 MHz ± 1 KHz	7	20.737 MHz ± 1 KHz
25	21.187 MHz ± 1 KHz	75	20.687 MHz ± 1 KHz
3	21.137 MHz ± 1 KHz	8	20.637 MHz ± 1 KHz
35	21.086 MHz ± 1 KHz	85	20.587 MHz ± 1 KHz
4	21.037 MHz ± 1 KHz	9	20.537 MHz ± 1 KHz
45	20.987 MHz ± 1 KHz	95	20.487 MHz ± 1 KHz

COM HIGH FREQUENCY OSCILLATOR

COM RECEIVE

Dial Reading	Crystal Freq.	Osc. Output Freq.
118	70.7185 MHz ± 2.5 KHz	141.437 MHz ± 5 KHz
119	71.2185 MHz ± 2.5 KHz	142.437 MHz ± 5 KHz
120	71.7185 MHz ± 2.5 KHz	143.437 MHz ± 5 KHz
121	72.2185 MHz ± 2.5 KHz	144.437 MHz ± 5 KHz
122	72.7185 MHz ± 2.5 KHz	145.437 MHz ± 5 KHz
123	73.2185 MHz ± 2.5 KHz	146.437 MHz ± 5 KHz
124	73.7185 MHz ± 2.5 KHz	147.437 MHz ± 5 KHz
125	74.2185 MHz ± 2.5 KHz	148.437 MHz ± 5 KHz
126	74.7185 MHz ± 2.5 KHz	149.437 MHz ± 5 KHz
127	75.2185 MHz ± 2.5 KHz	150.437 MHz ± 5 KHz
128	75.7185 MHz ± 2.5 KHz	151.437 MHz ± 5 KHz
129	76.2185 MHz ± 2.5 KHz	152.437 MHz ± 5 KHz
130	76.7185 MHz ± 2.5 KHz	153.437 MHz ± 5 KHz
131	77.2185 MHz ± 2.5 KHz	154.437 MHz ± 5 KHz
132	77.7185 MHz ± 2.5 KHz	155.437 MHz ± 5 KHz
133	78.2185 MHz ± 2.5 KHz	156.437 MHz ± 5 KHz
134	78.7185 MHz ± 2.5 KHz	157.437 MHz ± 5 KHz
135	79.2185 MHz ± 2.5 KHz	158.437 MHz ± 5 KHz

COM TRANSMIT

Dial Reading	Crystal Freq.	Osc. Output Freq.
118	69.7185 MHz ± 2.5 KHz	139.437 MHz ± 5 KHz
119	70.2185 MHz ± 2.5 KHz	140.437 MHz ± 5 KHz
120	70.7185 MHz ± 2.5 KHz	141.437 MHz ± 5 KHz
121	71.2185 MHz ± 2.5 KHz	142.437 MHz ± 5 KHz
122	71.7185 MHz ± 2.5 KHz	143.437 MHz ± 5 KHz
123	72.2185 MHz ± 2.5 KHz	144.437 MHz ± 5 KHz
124	72.7185 MHz ± 2.5 KHz	145.437 MHz ± 5 KHz
125	73.2185 MHz ± 2.5 KHz	146.437 MHz ± 5 KHz
126	73.7185 MHz ± 2.5 KHz	147.437 MHz ± 5 KHz
127	74.2185 MHz ± 2.5 KHz	148.437 MHz ± 5 KHz
128	74.7185 MHz ± 2.5 KHz	149.437 MHz ± 5 KHz
129	75.2185 MHz ± 2.5 KHz	150.437 MHz ± 5 KHz
130	75.7185 MHz ± 2.5 KHz	151.437 MHz ± 5 KHz
131	76.2185 MHz ± 2.5 KHz	152.437 MHz ± 5 KHz
132	76.7185 MHz ± 2.5 KHz	153.437 MHz ± 5 KHz
133	77.2185 MHz ± 2.5 KHz	154.437 MHz ± 5 KHz
134	77.7185 MHz ± 2.5 KHz	155.437 MHz ± 5 KHz
135	78.2185 MHz ± 2.5 KHz	156.437 MHz ± 5 KHz

Figure 4-4-10
COM OSC. FREQ. TABLES

OSCILLATOR FREQUENCY TABLES

NAV LOW FREQUENCY OSCILLATOR

Dial Reading	Crystal & Output Freq.
0	28.167 MHz ± 1 KHz
1	28.067 MHz ± 1 KHz
2	27.967 MHz ± 1 KHz
3	27.867 MHz ± 1 KHz
4	27.767 MHz ± 1 KHz
5	27.667 MHz ± 1 KHz
6	27.567 MHz ± 1 KHz
7	27.467 MHz ± 1 KHz
8	27.367 MHz ± 1 KHz
9	27.267 MHz ± 1 KHz

NAV HIGH FREQUENCY OSCILLATOR

Dial Reading	Crystal Freq.	Osc. Output Freq.
108	69.5775 MHz ± 2.5 KHz	139.155 MHz ± 5 KHz
109	70.0775 MHz ± 2.5 KHz	140.155 MHz ± 5 KHz
110	70.5775 MHz ± 2.5 KHz	141.155 MHz ± 5 KHz
111	71.0775 MHz ± 2.5 KHz	142.155 MHz ± 5 KHz
112	71.5775 MHz ± 2.5 KHz	143.155 MHz ± 5 KHz
113	72.0775 MHz ± 2.5 KHz	144.155 MHz ± 5 KHz
114	72.5775 MHz ± 2.5 KHz	145.155 MHz ± 5 KHz
115	73.0775 MHz ± 2.5 KHz	146.155 MHz ± 5 KHz
116	73.5775 MHz ± 2.5 KHz	147.155 MHz ± 5 KHz
117	74.0775 MHz ± 2.5 KHz	148.155 MHz ± 5 KHz

Figure 4-4-11
NAV OSC. FREQ. TABLES

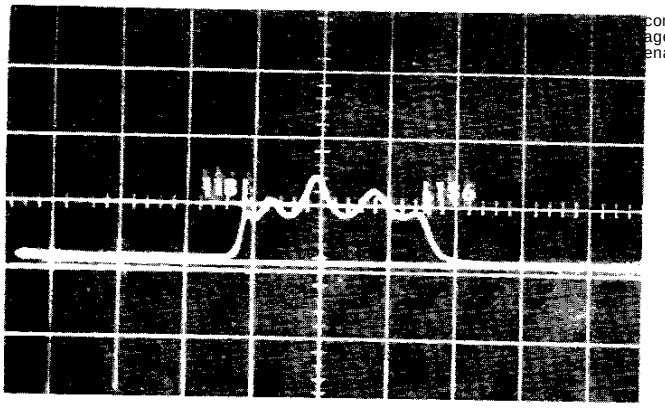


Figure 4-4-12
COM INPUT FILTER

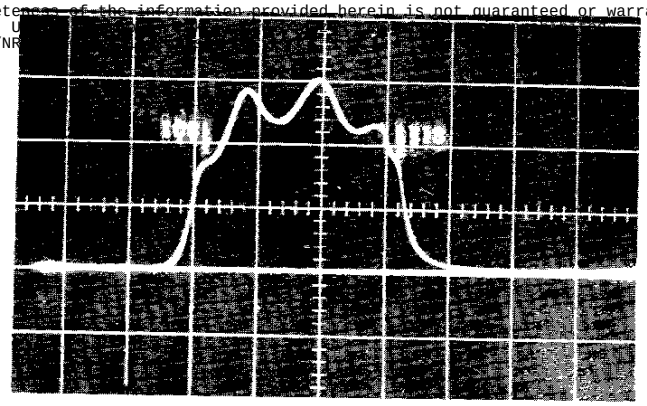


Figure 4-4-13
NAV INPUT FILTER

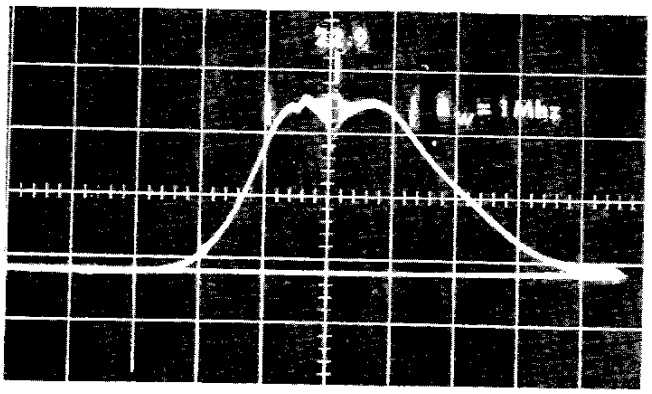


Figure 4-4-14
COM FIRST IF

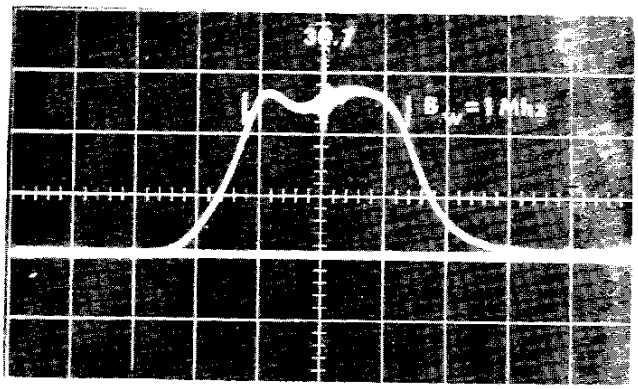


Figure 4-4-15
NAV FIRST IF

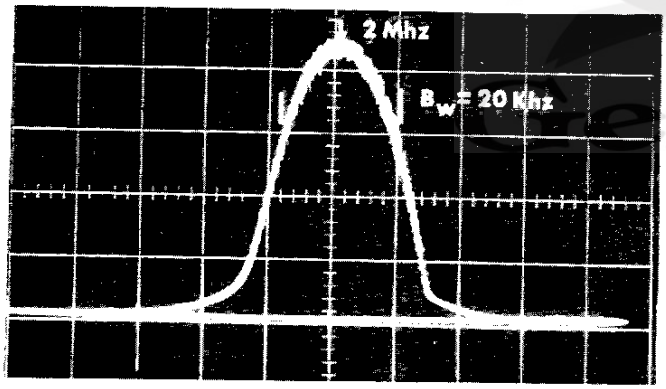


Figure 4-4-16
COM SECOND IF

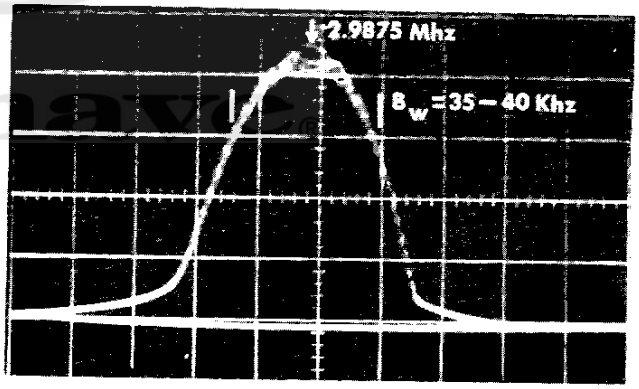


Figure 4-4-17
NAV SECOND IF

Model: ALPHA/360

4-5. TROUBLESHOOTING INFORMATION

1. 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 radio are the DC Voltage Measurements given in Table 4-5-1, the Component Location Information (figures 4-5-7 through 4-5-9), and Schematic Diagrams (Figures 4-5-2 through 4-5-6 and 4-5-10).

The use of the above aids will help locate and correct most problems. It should be remembered that a thorough knowledge of the theory of operating is an absolute must for troubleshooting. A logical troubleshooting procedure is the best assurance of a rapid solution. The maintenance manual cannot serve as a substitute for technical competency.

II. TABLE OF FIGURES

Figure 4-5-1
DC VOLTAGE MEASUREMENTS

All voltages shown in this table must be measured with a VTVM. The input voltage to the radio should be set at 13.75 VDC and the 8.5 VDC power supply should be set to 8.50 VDC. A variation of ± 20% of the measured voltage from those listed may be considered normal.

Ref. No.	Control Setting	No Signal Condition			500 microvolt signal on appropriate frequency with modulation as noted.			Notes
		E	B	C	E	B	C	
Q100		1.3	1.6	8.1	0.3	1.0	8.4	1.3 KHz, 30% modulation
Q101		1.3	2.1	6.8	0.2	0.9	8.1	1.3 KHz, 30% modulation
Q102		2.0	2.6	7.9	2.0	2.7	8.0	1.3 KHz, 30% modulation
Q103		1.4	2.1	6.8	0.3	0.9	8.2	1.3 KHz, 30% modulation
Q104		1.4	2.1	6.9	0.3	0.9	8.2	1.3 KHz, 30% modulation
Q105		3.4	4.1	8.4	3.4	4.1	8.4	1.3 KHz, 30% modulation
Q106	SQ & VOL CW	2.3	3.0	8.5	1.1	1.7	8.5	1.3 KHz, 30% modulation
Q106	SQ & VOL CCW	——	——	——	3.0	3.1	8.5	1.3 KHz, 30% modulation
Q107	SQ CW	2.2	2.7	4.2	1.0	1.5	7.4	1.3 KHz, 30% modulation
Q107	SQ CCW	——	——	——	1.0	1.5	8.0	1.3 KHz, 30% modulation
Q108	SQ CW	8.5	8.5	2.3	8.5	8.5	1.1	1.3 KHz, 30% modulation
Q106	CCW	——	——	——	3.0	3.1	8.5	1.3 KHz, 30% modulation
Q109		0	0.6	5.0	0	0.6	5.0	1.3 KHz, 30% modulation
Q110		0	0.6	6.6	0	0.5	6.3	1.3 KHz, 30% modulation
Q111		7.2	6.6	0.6	6.9	6.3	0.5	1.3 KHz, 30% modulation
Q112		0	0.6	7.2	0	0.5	6.9	1.3 KHz, 30% modulation
Q113		6.9	7.2	13.8	6.8	6.9	13.8	1.3 KHz, 30% modulation
Q114		6.9	7.2	0	6.8	6.9	0	1.3 KHz, 30% modulation
Q115		1.1	1.5	8.1	0.1	0.8	8.4	0° omni signal
Q116		1.2	2.0	6.9	0.1	0.7	8.3	0° omni signal
Q117		0.8	1.4	7.5	0.8	1.4	7.7	0° omni signal
Q118		1.3	2.0	6.9	0.1	0.8	8.3	0° omni signal
Q119		1.8	2.5	7.8	1.8	2.5	7.8	0° omni signal
Q120		3.5	4.2	8.4	3.5	4.2	8.4	0° omni signal
Q121		2.1	2.6	8.5	0.8	1.3	8.5	0° omni signal
Q122		3.2	2.5	0	1.6	0.9	0	0° omni signal
Q123	VOL CW	2.3	2.9	8.5	1.2	1.8	8.5	
Q123	VOL CCW	——	——	——	2.6	3.1	8.5	
Q124		13.8	12.8	8.5	——	——	——	
Q125		4.8	5.3	12.8	——	——	——	
Q126		4.8	5.4	8.5	——	——	——	

Figure 4-5-1
DC VOLTAGE MEASUREMENTS

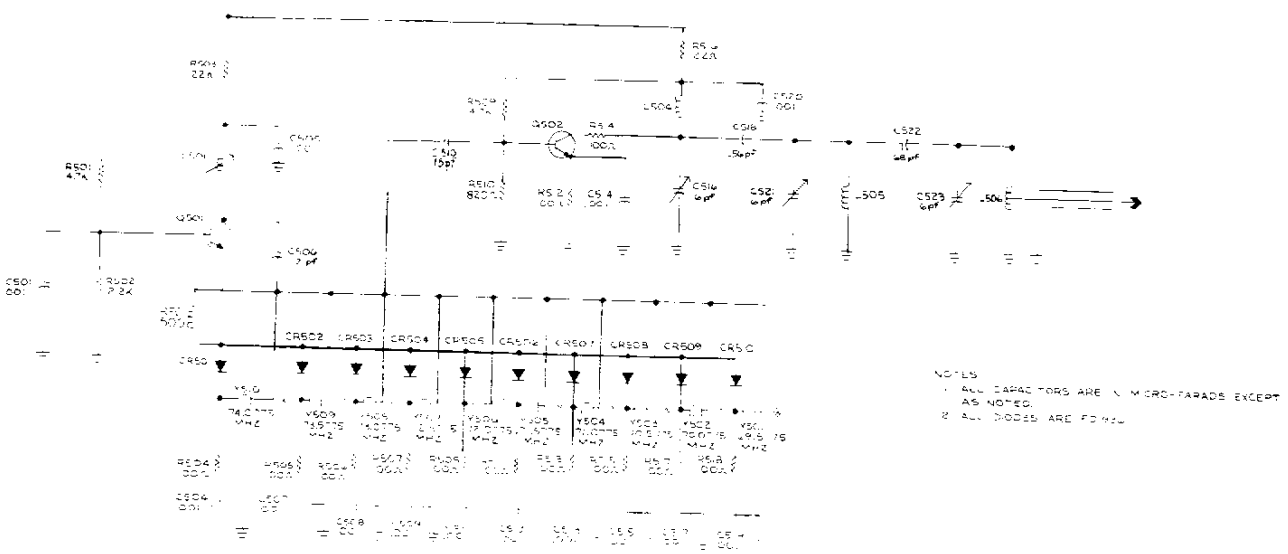


Figure 4-5-2
NAV HF OSC.

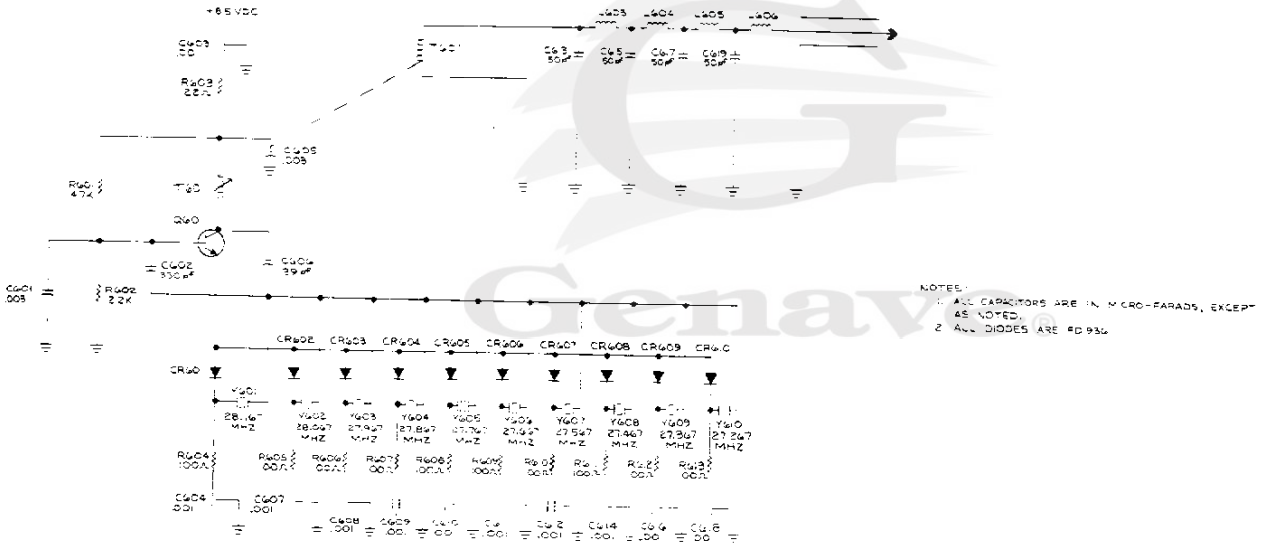


Figure 4-5-3
NAV LF OSC.

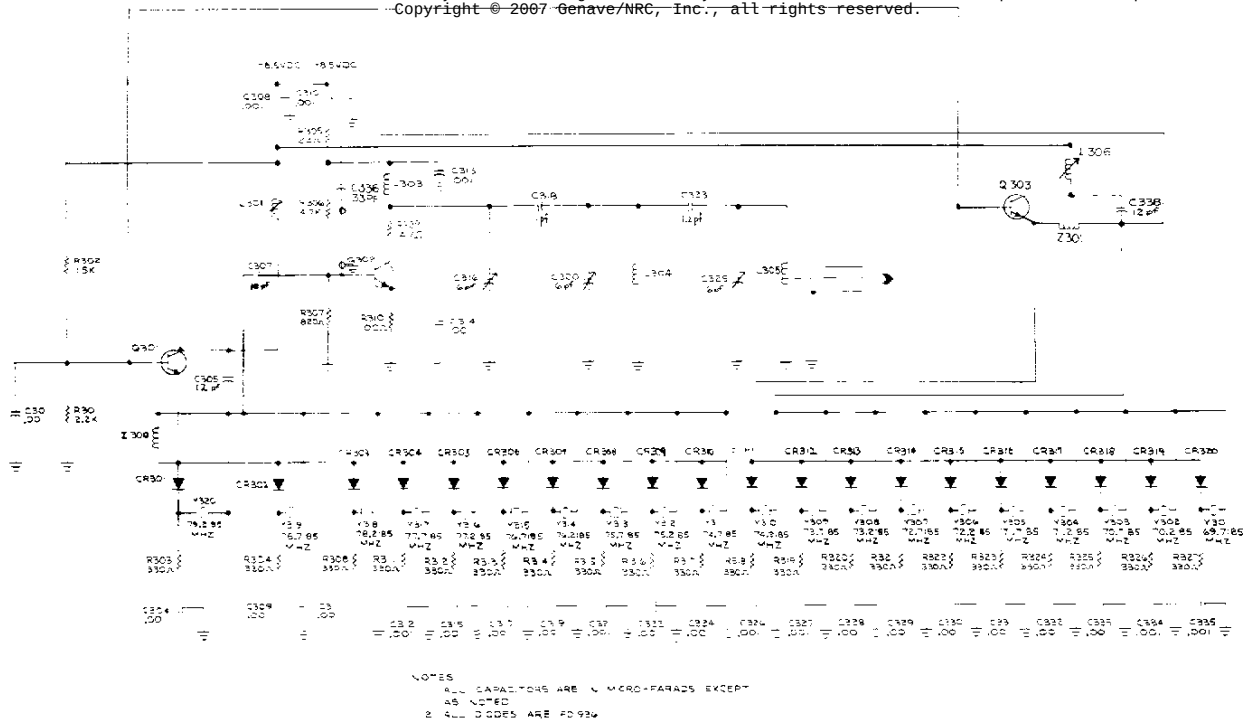


Figure 4-5-4
COM HF OSC.

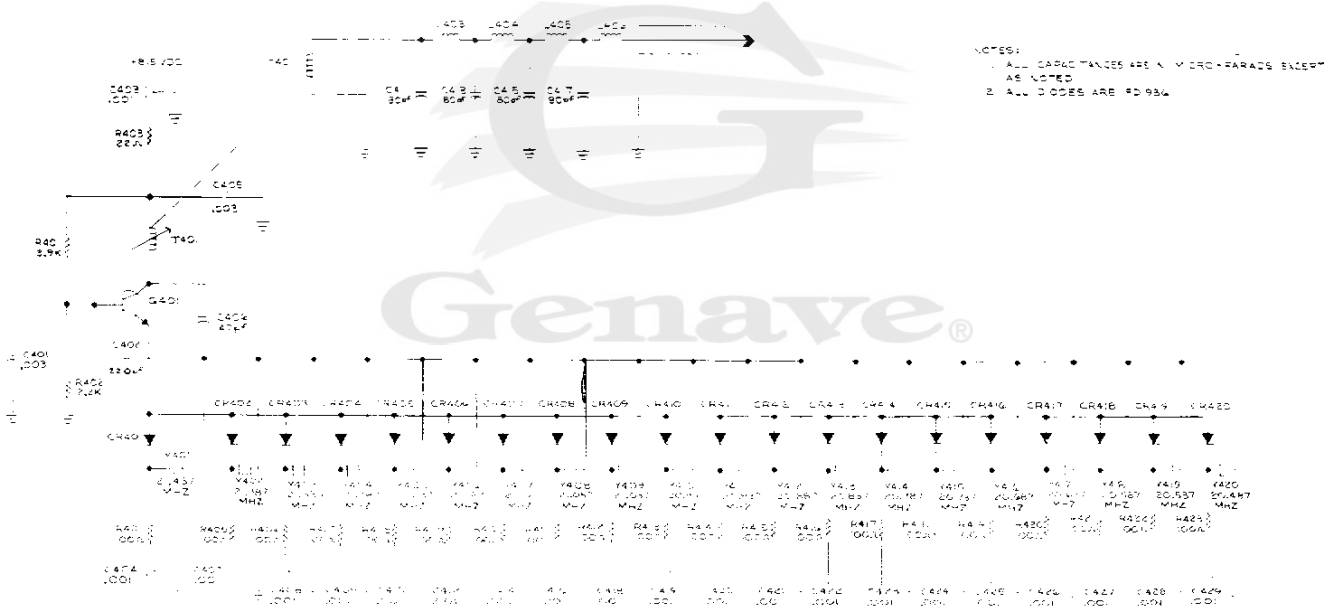


Figure 4-5-5
COM LF OSC.

SECTION V
PARTS LIST

Ref. No.	Genave Part No. A-360	Description
		CAPACITORS
C100	16	Trimmer, 0.7-9 pfd
C101	5	Gimmick, 1.0 pfd, 10%
C102	16	Trimmer, 0.7-9 pfd
C103	4	Gimmick, 0.82 pfd, 10%
C104	16	Trimmer, 0.7-9 pfd
C105	4	Gimmick, 0.82 pfd, 10%
C106	16	Trimmer, 0.7-9 pfd
C107	5	Gimmick, 1.0 pfd, 10%
C108	16	Trimmer, 0.7-9 pfd
C109	32	Z5F Disc, 220 pfd, 10%
C110	11	NPO Disc, 2.2 pfd, 10%
C111	40	X5R Disc, 0.001 mfd, 10%
C112	32	Z5F Disc, 220 pfd, 10%
C113	12	Gimmick, 3.9 pfd, 10%
C114	40	X5R Disc, 0.001 mfd, 10%
C115	48	Disc,0.1 mfd, +80%—20%
C116	48	Disc, 0.1 mfd, +80%—20%
C117	40	X5R Disc, 0.001 mfd, 10%
C118	40	X5R Disc, 0.001 mfd, 10%
C119	32	Z5F Disc, 220 pfd, 10%
C120	12	Gimmick, 3.9 pfd. 10%
C121	49	Alum. Elect. µf, 10%, 40V
C122	48	Disc, 0.1 mfd, +80% —20%
C123	28	NPO Disc, 82 pfd, 10%
C124	48	Disc, 0.1 mfd, +80%—20%
C125	48	Disc, 0.1 mfd, +80%—20%
C126	29	N220 Disc, 100 pfd, 10%
C127	48	Disc, 0.1 mfd, +80—20%
C128	7	Gimmick, 1.2 pfd, 10%
C129	29	N220 Disc, 100 pfd, 10%
C130	48	Disc, 0.1 mfd, +80%—20%
C131	29	N220 Disc, 100 pfd, 10%
C132	48	Disc, 0.1 mfd, +80%—20%
C133	7	Gimmick, 1.2 pfd, 10%
C134	29	N220 Disc, 100 pfd, 10%
C135	48	Disc, 0.1 mfd, +80%—20%
C136	48	Disc, 0.1 mfd, +80%—20%
C137	48	Disc, 0.1 mfd, +80%—20%
C138	29	N220 Disc, 100 pfd, 10%
C139	48	Disc, 0.1 mfd, +80%—20%
C140	8	Gimmick, 1.5 pfd. 10%
C141	29	N220 Disc, 100 pfd, 10%
C142	48	Disc, 0.1 mfd, +80%—20%
C143	48	Disc, 0.1 mfd, +80%—20%
C144	48	Disc, 0.1 mfd, +80%—20%
C145	52	Aluminum Electrolytic, 64 mfd, 4 VDC
C146	40	X5R Disc, 0.001 mfd, 10%
C147	49	Aluminum Electrolytic, 1 mfd, 40 VDC
C148	53	Aluminum Electrolytic, 64 mfd, 10 VDC
C149	48	Disc, 0.1 mfd, +80%—20%, 12 VDC
C150	48	Disc, 0.1 mfd, +80%—20%, 12 VDC
C151	48	Disc, 0.1 mfd, +80%—20%
C152	45	Disc, 0.01 mfd, 20—, 25 VDC
C153	48	Disc, 0.1 mfd, +80%—20%
C154	49	Aluminum Electrolytic, 1 mfd, 40 VDC
C155	46	Mylar, 0.022 mfd, 10 VDC min.
C156	43	Mylar, 0.0015 mfd, 10 VDC min.
C157	40	X5R Disc, 0.001 mfd, 10%
C158	34	Z5F Disc, 470 pfd, 10%
C159	40	X5R Disc, 0.001 mfd, 10%
C160	55	Aluminum Electrolytic, 250 mfd, 16 VDC
C161	57	Aluminum Electrolytic, 2500 mfd, 10 VDC
C162	16	Trimmer, 0.7-9 pfd
C163	1	Gimmick, 0.56 pfd, 10%
C164	16	Trimmer, 0.7-9 pfd
C165	2	Gimmick, 0.47 pfd, 10%
C166	16	Trimmer, 0.7-9 pfd
C167	2	Gimmick, 0.47 pfd, 10%
C168	16	Trimmer, 0.7-9 pfd
C169	1	Gimmick, 0.56 pfd, 10%
C170	16	Trimmer, 0.7-9 pfd
C171	32	Z5F Disc, 220 pfd, 10%
C172	11	NPO Disc, 2.2 pfd, 10%
C173	40	X5R Disc, 0.001 mfd, 10%
C174	13	Gimmick, 3.9 pfd, 10%
C175	40	X5R Disc, 0.001 mfd, 10%
C176	40	X5R Disc, 0.001 mfd, 10%
C177	40	X5R Disc, 0.001 mfd, 10%
C178	48	Disc, 0.1 mfd, +80%—20%
C179	48	Disc, 0.1 mfd, +80%—20%
C180	13	Gimmick. 3.9 pfd, 10%
C181	28	NPO Disc, 82 pfd. 10%
C182	48	Disc, 0.1 mfd, +80%—20%
C183	48	Disc, 0.1 mfd, +80%—20%
C184	48	Disc, 0.1 mfd, +80—20%
C185	29	N220 Disc, 100 pfd, 10%
C186	9	Gimmick, 1.8 pfd, 10%
C187	29	N220 Disc, 100 pfd, 10%
C188	48	Disc, 0.1 mfd, +80%—20%
C189	48	Disc, 0.1 mfd, +80%—20%
C190	48	Disc, 0.1 mfd, +80%—20%
C191	48	Disc, 0.1 mfd, +80%—20%
C192	29	N220 Disc, 100 pfd, 10%
C193	9	Gimmick, 1.8 pfd, 10%
C194	29	N220 Disc, 100 pfd, 10%
C195	48	Disc, 0.1 mfd, +80%—20%
C196	48	Disc, 0.1 mfd, +80%—20%
C197	48	Disc, 0.1 mfd, +80%—20%
C198	48	Disc, 0.1 mfd, +80%—20%
C199	29	N220 Disc, 100 pfd, 10%
C200	9	Gimmick, 1.8 pfd, 10%
C201	29	N220 Disc, 100 pfd, 10%
C202	48	Disc, 0.1 mfd, +80%—20%
C203	48	Disc, 0.1 mfd, +80%—20%
C204	32	Z5F Disc, 220 pfd, 10%
C205	52	Aluminum Electrolytic, 64 mfd, 4 VDC
C206	32	Z5F Disc, 220 pfd, 10%
C207	51	Aluminum Electrolytic, 2.5 mfd, 16 VDC
C208	52	Aluminum Electrolytic, 64 mfd, 4 VDC
C209	48	Disc, 0.1 mfd, +80%—20%
C210	40	X5R Disc, 0.001 mfd, 10%
C211	50	0.47 mfd, Mylar
C212	50	0.47 mfd, Mylar
C213	40	X5R Disc, 0.001 mfd, 10%
C214	54	Aluminum Electrolytic, 125 mfd, 16 VDC
C215	45	Disc, 0.01 mfd, 20%, 25 VDC min.
C216	45	Disc, 0.01 mfd, 20%, 25 VDC
C217	48	Disc, 0.1 mfd, +80%—20%, 12 VDC
C218	32	Z5F Disc, 220 pfd, 10%
C219	32	Z5F Disc, 220 pfd, 10%
C220	48	Disc, 0.1 mfd, +80%—20%, 12 VDC
C221	48	Disc, 0.1 mfd, +80%—20%, 12 VDC
C222	32	Z5F Disc, 220 pfd, 10%
C301	40	X5R Disc, 0.001 mfd, 10%
C302		Unassigned
C303		Unassigned
C304	41	Feedthrough, 0.001 mfd
C305	19	NPO Disc, 12 pfd, 10%
C306		Unassigned
C307	21	NPO Disc, 18 pfd, 10%
C308	41	Feedthrough, 0.001 mfd
C309	41	Feedthrough, 0.001 mfd
C310	41	Feedthrough, 0.001 mfd
C311	41	Feedthrough, 0.001 mfd
C312	41	Feedthrough, 0.001 mfd
C313	40	X5R Disc, 0.001 mfd, 10%
C314	40	X5R Disc, 0.001 mfd, 10%
C315	41	Feedthrough, 0.001 mfd
C316	15	Trimmer, 0.8-6 pfd
C317	41	Feedthrough, 0.001 mfd
C318	5	Gimmick, 1.0 pfd, 10%
C319	41	Feedthrough, 0.001 mfd
C320	15	Trimmer, 0.8-6 pfd, 10%
C321	41	Feedthrough, 0.001 mfd
C322	41	Feedthrough, 0.001 mfd
C323	7	Gimmick, 1.2 pfd, 10%
C324	41	Feedthrough, 0.001 mfd
C325	15	Trimmer, 0.8-6 pfd
C326	41	Feedthrough, 0.001 mfd
C327	41	Feedthrough, 0.001 mfd
C328	41	Feedthrough, 0.001 mfd
C329	41	Feedthrough, 0.001 mfd
C330	41	Feedthrough, 0.001 mfd
C331	41	Feedthrough, 0.001 mfd
C332	41	Feedthrough, 0.001 mfd
C333	41	Feedthrough, 0.001 mfd
C334	41	Feedthrough, 0.001 mfd
C335	41	Feedthrough, 0.001 mfd
C336	24	NPO Disc, 33 pfd, 10%
C337		Unassigned
C338	19	NPO Disc, 12 pfd, 10%
C401	44	Z5F Disc, 0.003 mfd, 20%
C402	32	Z5F Disc, 220 pfd, 10%
C403	41	Feedthrough, 0.001 mfd
C404	41	Feedthrough, 0.001 mfd
C405	44	Z5F Disc, 0.003 mfd, 20%
C406	26	N1500 Disc, 47 pfd, 10%
C407	41	Feedthrough, 0.001 mfd
C408	41	Feedthrough, 0.001 mfd
C409	41	Feedthrough, 0.001 mfd
C410	41	Feedthrough, 0.001 mfd
C411	31	N1500 Disc, 180 pfd, 10%
C412	41	Feedthrough, 0.0001 mfd
C413	31	N1500 Disc, 180 pfd, 10%
C414	41	Feedthrough, 0.001 mfd
C415	31	N1500 Disc, 180 pfd, 10%
C416	41	Feedthrough, 0.001 mfd
C417	31	N1500 Disc, 180 pfd, 10%
C418	41	Feedthrough, 0.001 mfd
C419	41	Feedthrough, 0.001 mfd
C420	41	Feedthrough, 0.001 mfd
C421	41	Feedthrough, 0.001 mfd
C422	41	Feedthrough, 0.001 mfd
C423	41	Feedthrough, 0.001 mfd
C424	41	Feedthrough, 0.001 mfd
C425	41	Feedthrough, 0.001 mfd
C426	41	Feedthrough, 0.001 mfd
C427	41	Feedthrough, 0.001 mfd
C428	41	Feedthrough, 0.001 mfd
C429	41	Feedthrough, 0.001 mfd
C430		Unassigned
C431		Unassigned

Ref. No.	Genave Part No. A-360	Description
C501	40	X5R Disc, 0.001 mfd, 10%
C502		Unassigned
C503	41	Feedthrough, 0.001 mfd
C504	41	Feedthrough, 0.001 mfd
C505	40	X5R Disc, 0.001 mfd, 10%
C506	19	NPO Disc, 12 pfd, 10%
C507	41	Feedthrough, 0.001 mfd
C508	41	Feedthrough, 0.001 mfd
C509	41	Feedthrough, 0.001 mfd
C510	20	NPO Disc, 15 pfd, 10%
C511	41	Feedthrough, 0.001 mfd
C512	41	Feedthrough, 0.001 mfd
C513	41	Feedthrough, 0.001 mfd
C514	40	X5R Disc, 0.001 mfd, 10%
C515	41	Feedthrough, 0.001 mfd
C516	15	Trimmer, 0.8-6 pfd
C517	41	Feedthrough, 0.001 mfd
C518	1	Gimmick, 0.56 pfd, 10%
C519	41	Feedthrough, 0.001 mfd
C520	40	X5R Disc, 0.001 mfd, 10%
C521	15	Trimmer, 0.8-6 pfd
C522	3	Gimmick, 0.68 pfd, 10%
C523	15	Trimmer, 0.8-6 pfd
C524		Unassigned
C601	44	Z5F Disc, 0.003 mfd, 20%
C602	33	Z5F Disc, 330 pfd, 10%
C603	41	Feedthrough, 0.001 mfd
C604	41	Feedthrough, 0.001 mfd
C605	44	Z5F Disc, 0.003 mfd, 20%
C606	25	NPO Disc, 39 pfd, 10%
C607	41	Feedthrough, 0.001 mfd
C608	41	Feedthrough, 0.001 mfd
C609	41	Feedthrough, 0.001 mfd
C610	41	Feedthrough, 0.001 mfd
C611	41	Feedthrough, 0.001 mfd
C612	41	Feedthrough, 0.001 mfd
C613	30	N1500 Disc, 150 pfd, 10%
C614	41	Feedthrough, 0.001 mfd
C615	30	N1500 Disc, 150 pfd, 10%
C616	41	Feedthrough, 0.001 mfd
C617	30	N1500 Disc, 150 pfd, 10%
C618	41	Feedthrough, 0.001 mfd
C619	30	N1500 Disc, 150 pfd, 10%
C620		Unassigned
C901	41	Feedthrough, 0.001 mfd
C902	41	Feedthrough, 0.001 mfd
C903	32	Z5F Disc, 220 pfd, 10%
C904	32	Z5F Disc, 220 pfd, 10%
C905	32	Z5F Disc, 220 pfd, 10%
C906	32	Z5F Disc, 220 pfd, 10%
C907	40	X5R Disc, 0.001 mfd, 10%
C908	40	X5R Disc, 0.001 mfd, 10%
C909	18	NPO Disc, 10 pfd, 10%
C910	15	Trimmer, 0.8-6 pfd
C911	10	Gimmick, 2.2 pfd, 10%
C912	10	Gimmick, 2.2 pfd, 10%
C913	19	NPO Disc, 12 pfd, 10%
C914	15	Trimmer, 0.8-6 pfd
C915	15	Trimmer, 0.8-6 pfd
C916	21	NPO Disc, 18 pfd, 10%
C917	32	Z5F Disc, 220 pfd, 10%
C918	32	Z5F Disc, 220 pfd, 10%
C919	22	NPO Disc, 22 pfd, 10%
C920	22	NPO Disc, 22 pfd, 10%
C921	41	Feedthrough, 0.001 mfd
C922	41	Feedthrough, 0.001 mfd
C923	32	Z5F Disc, 220 pfd, 10%
C924	41	Feedthrough, 0.001 mfd
C925	41	Feedthrough, 0.001 mfd
C926	32	Z5F Disc, 220 pfd, 10%
C927	20	NPO Disc, 15 pfd, 10%
C928	15	Trimmer, 0.8-6 pfd
C929	32	Z5F Disc, 220 pfd, 10%
C930	41	Feedthrough, 0.001 mfd
C931	41	Feedthrough, 0.001 mfd
C932	32	Z5F Disc, 220 pfd, 10%
C933	32	Z5F Disc, 220 pfd, 10%
C934	19	NPO Disc, 12 pfd, 10%
C935	15	Trimmer, 0.8-6 pfd
C936	19	NPO Disc, 12 pfd, 10%
C937	9	Gimmick, 1.8 pfd, 10%
C938	15	Trimmer, 0.8-6 pfd
C939	8	Gimmick, 1.5 pfd, 10%
C940	21	NPO Disc, 18 pfd, 10%
C941	15	Trimmer, 0.8-6 pfd
C942	9	Gimmick, 1.8 pfd, 10%
C943	8	Gimmick, 1.5 pfd, 10%
C944	20	NPO Disc, 15 pfd, 10%
C945	15	Trimmer, 0.8-6 pfd
C946	21	NPO Disc, 18 pfd, 10%
C947	15	Trimmer, 0.8-6 pfd, 10%
C948	14	NPO Disc, 4.7 pfd, 10%
C949	22	NPO Disc, 22 pfd, 10%
C950	32	Z5F Disc, 220 pfd, 10%
C951	32	Z5F Disc, 220 pfd, 10%
C952	14	NPO Disc, 4.7 pfd, 10%
C953	20	NPO Disc, 15 pfd, 10%
C954	41	Feedthrough, 0.001 mfd
C955	47	Z5F Disc, 0.05 mfd, 10%
C956	32	Z5F Disc, 220 pfd, 10%
C957	32	Z5F Disc, 220 pfd, 10%
C958	37	Trimmer, 53-300 pfd

Ref. No.	Genave Part No. A-360	Description
C959	36	Trimmer, 7-100 pfd
C960	47	Z5F Disc, 0.05 mfd, 10%
C961	41	Feedthrough, 0.001 mfd
C962	32	Z5F Disc, 220 pfd, 10%
C963	47	Z5F Disc, 0.05 mfd, 10%
C964	41	Feedthrough, 0.001 mfd
C965	32	Z5F Disc, 220 pfd, 10%
C966	37	Trimmer, 24-200 pfd
C967	37	Trimmer, 24-200 pfd
C968	39	Trimmer, 94-400 pfd
C969	36	Trimmer, 7-100 pfd
C970	23	NPO Disc, 27 pfd, 10%
C971	25	NPO Disc, 39 pfd, 10%
C972	23	NPO Disc, 27 pfd, 10%
C973		Unassigned
		COILS
L100	58	Input Filter
L101	73	Input Filter
L102	73	Input Filter
L103	73	Input Filter
L104	60	Input Filter
L105	61	Input Filter
L106	62	Input Filter
L107	62	Input Filter
L108	62	Input Filter
L109	63	Input Filter
L110	64	Ident. Notch Filter
L111		Unassigned
L301	72	Comm. HF Osc. Tuning
L302		Unassigned
L303	73	Comm. HF Osc. Filter
L304	73	Comm. HF Osc. Filter
L305	74	Comm. HF Osc. Filter
L306	65	Comm. HF Osc. Tuning
L307		Unassigned
L401		Unassigned
L402		Unassigned
L403	70	Comm. LF Osc. Filter
L404	70	Comm. LF Osc. Filter
L405	70	Comm. LF Osc. Filter
L406	71	Comm. LF Osc. Filter
L407		Unassigned
L501	72	Nav. HF Osc. Tuning
L502		Unassigned
L503		Unassigned
L504	73	Nav. HF Osc. Filter
L505	73	Nav. HF Osc. Filter
L506	74	Nav. HF Osc. Filter
L507		Unassigned
L601		Unassigned
L602		Unassigned
L603	68	Nav. LF Osc. Filter
L604	68	Nav. LF Osc. Filter
L605	68	Nav. LF Osc. Filter
L606	69	Nav. LF Osc. Filter
L901	84	Exiter Filter
L902	83	Exiter Filter
L903	84	Exiter Filter
L904	84	Exiter Filter
L905	84	Exiter Filter
L906	83	Exiter Filter
L907	84	Exiter Filter
L908	83	Exiter Filter
L909	82	Exiter Output
L910	81	Exiter Tuning
L911	80	Matching Coil
L912		Unassigned
L913	79	Matching Coil
L914	77	Transmitter Filter
L915	77	Transmitter Filter
L916	78	Transmitter Filter
L917		Unassigned
L918		Unassigned
		DIODES
CR100	94	Germanium, General Purpose 1N34
CR101	94	Germanium, General Purpose 1N34
CR102	95	Silicon, High Frequency Switching FD 1936
CR103	95	Silicon, High Frequency Switching FD 1936
CR104	94	Germanium, General Purpose 1N34
CR105	94	Germanium, General Purpose 1N34
CR106	95	Silicon, High Frequency Switching FD 1936
CR107	97	Silicon, Zener, 24 VDC ±10% 1 W
CR108	99	Silicon, Zener, 5.6 VDC ±10% 1 W
CR109	96	Silicon, General Purpose, 25V, 0.2 amp
CR110		Unassigned
CR301	95	Silicon, High Frequency Switching FD 1936
CR302	95	Silicon, High Frequency Switching FD 1936
CR303	95	Silicon, High Frequency Switching FD 1936
CR304	95	Silicon, High Frequency Switching FD 1936
CR305	95	Silicon, High Frequency Switching FD 1936
CR306	95	Silicon, High Frequency Switching FD 1936
CR307	95	Silicon, High Frequency Switching FD 1936
CR308	95	Silicon, High Frequency Switching FD 1936
CR309	95	Silicon, High Frequency Switching FD 1936
CR310	95	Silicon, High Frequency Switching FD 1936
CR311	95	Silicon, High Frequency Switching FD 1936
CR312	95	Silicon, High Frequency Switching FD 1936

Ref. No.	Genave Part No. A-368	Description
CR313	95	Silicon, High Frequency Switching FD 1936
CR314	95	Silicon, High Frequency Switching FD 1936
CR315	95	Silicon, High Frequency Switching FD 1936
CR316	95	Silicon, High Frequency Switching FD 1936
CR317	95	Silicon, High Frequency Switching FD 1936
CR318	95	Silicon, High Frequency Switching FD 1936
CR319	95	Silicon, High Frequency Switching FD 1936
CR320	95	Silicon, High Frequency Switching FD 1936
CR321		Unassigned
CR401	95	Silicon, High Frequency Switching FD 1936
CR402	95	Silicon, High Frequency Switching FD 1936
CR403	95	Silicon, High Frequency Switching FD 1936
CR404	95	Silicon, High Frequency Switching FD 1936
CR405	95	Silicon, High Frequency Switching FD 1936
CR406	95	Silicon, High Frequency Switching FD 1936
CR407	95	Silicon, High Frequency Switching FD 1936
CR408	95	Silicon, High Frequency Switching FD 1936
CR409	95	Silicon, High Frequency Switching FD 1936
CR410	95	Silicon, High Frequency Switching FD 1936
CR411	95	Silicon, High Frequency Switching FD 1936
CR412	95	Silicon, High Frequency Switching FD 1936
CR413	95	Silicon, High Frequency Switching FD 1936
CR414	95	Silicon, High Frequency Switching FD 1936
CR415	95	Silicon, High Frequency Switching FD 1936
CR416	95	Silicon, High Frequency Switching FD 1936
CR417	95	Silicon, High Frequency Switching FD 1936
CR418	95	Silicon, High Frequency Switching FD 1936
CR419	95	Silicon, High Frequency Switching FD 1936
CR420	95	Silicon, High Frequency Switching FD 1936
CR421		Unassigned
CR501	95	Silicon, High Frequency Switching FD 1936
CR502	95	Silicon, High Frequency Switching FD 1936
CR503	95	Silicon, High Frequency Switching FD 1936
CR504	95	Silicon, High Frequency Switching FD 1936
CR505	95	Silicon, High Frequency Switching FD 1936
CR506	95	Silicon, High Frequency Switching FD 1936
CR507	95	Silicon, High Frequency Switching FD 1936
CR508	95	Silicon, High Frequency Switching FD 1936
CR509	95	Silicon, High Frequency Switching FD 1936
CR510	95	Silicon, High Frequency Switching FD 1936
CR511		Unassigned
CR601	95	Silicon, High Frequency Switching FD 1936
CR602	95	Silicon, High Frequency Switching FD 1936
CR603	95	Silicon, High Frequency Switching FD 1936
CR604	95	Silicon, High Frequency Switching FD 1936
CR605	95	Silicon, High Frequency Switching FD 1936
CR606	95	Silicon, High Frequency Switching FD 1936
CR607	95	Silicon, High Frequency Switching FD 1936
CR608	95	Silicon, High Frequency Switching FD 1936
CR609	95	Silicon, High Frequency Switching FD 1936
CR610	95	Silicon, High Frequency Switching FD 1936
CR611		Unassigned
CR901	96	Silicon, General Purpose, 25V, 0.2 amp
CR902		Unassigned
		RESISTORS
R100	187	100 ohms, 10%, ½ W
R101	197	1K, 10%, ½ W
R102	197	1K, 10%, ½ W
R103	207	8.2K, 10%, ½ W
R104	190	220 ohms, 10%, ½ W
R105	186	82 ohms, 10%, ½ W
R106	197	1K, 10%, ½ W
R107	190	220 ohms, 10%, ½ W
R108	207	8.2K, 10%, ½ W
R109	190	220 ohms, 10%, ½ W
R110	186	82 ohms, 10%, ½ W
R111	216	220K, 10%, ½ W
R112	182	10 ohms, 10%, ½ W
R113	182	10 ohms, 10%, ½ W
R114	205	4.7K, 10%, ½ W
R115	201	2.2K, 10%, ½ W
R116	197	1K, 10%, ½ W
R117	204	3.9K, 10%, ½ W
R118	190	220 ohms, 10%, ½ W
R119	191	270 ohms, 10%, ½ W
R120	197	1K, 10%, ½ W
R121	190	220 ohms, 10%, ½ W
R122	204	3.9K, 10%, ½ W
R123	190	220 ohms, 10%, ½ W
R124	182	10 ohms, 10%, ½ W
R125	182	10 ohms, 10%, ½ W
R126	191	270 ohms, 10%, ½ W
R127	197	1K, 10%, ½ W
R128	190	220 ohms, 10%, ½ W
R129	204	3.9K, 10%, ½ W
R130	190	220 ohms, 10%, ½ W
R131	191	270 ohms, 10%, ½ W
R132	205	4.7K, 10%, ½ W
R133	205	4.7K, 10%, ½ W
R134	197	1K, 10%, ½ W
R135	184	47 ohms, 10%, ½ W
R136	215	39K, 10%, ½ W
R137	208	10K, 10%, ½ W
R138	211	22K, 10%, ½ W
R139	207	8.2K, 10%, ½ W
R140	212	Variable, 25K, ±20%, With Switch
R141	217	100K, 10%, ½ W
R142	201	2.2K, 10%, ½ W
R143	197	1K, 10%, ½ W
R144	213	Variable, 25K, ±20%

Ref. No.	Genave Part No. A-368	Description
R145	209	15K, 10%, ½ W
R146	200	1.5K, 10%, ½ W
R147	218	27K, 10%, ½ W
R148	218	27K, 10%, ½ W
R149	202	2.7K, 10%, ½ W
R150	211	22K, 10%, ½ W
R151	196	680 ohms, 10%, ½ W
R152	204	3.9K, 10%, ½ W
R153	210	18K, 10%, ½ W
R154	202	2.7K, 10%, ½ W
R155	201	2.2K, 10%, ½ W
R156	209	15K, 10%, ½ W
R157	203	3.3K, 10%, ½ W
R158	217	100K, 10%, ½ W
R159	205	4.7K, 10%, ½ W
R160	200	1.5K, 10%, ½ W
R161	221	22 ohms, 10%, 2 W
R162	221	22 ohms, 10%, 2 W
R163	205	4.7K, 10%, ½ W
R164	197	1K, 10%, ½ W
R165	207	8.2K, 10%, ½ W
R166	190	220 ohms, 10%, ½ W
R167	186	82 ohms, 10%, ½ W
R168	197	1K, 10%, ½ W
R169	190	220 ohms, 10%, ½ W
R170	207	8.2K, 10%, ½ W
R171	190	220 ohms, 10%, ½ W
R172	182	10 ohms, 10%, ½ W
R173	182	10 ohms, 10%, ½ W
R174	186	82 ohms, 10%, ½ W
R175	197	1K, 10%, ½ W
R176	205	4.7K, 10%, ½ W
R177	190	220 ohms, 10%, ½ W
R178	204	3.9K, 10%, ½ W
R179	190	220 ohms, 10%, ½ W
R180	184	47 ohms, 10%, ½ W
R181	182	10 ohms, 10%, ½ W
R182	191	270 ohms, 10%, ½ W
R183	197	1K, 10%, ½ W
R184	190	220 ohms, 10%, ½ W
R185	204	3.9K, 10%, ½ W
R186	190	220 ohms, 10%, ½ W
R187	182	10 ohms, 10%, ½ W
R188	191	270 ohms, 10%, ½ W
R189	197	1K, 10%, ½ W
R190	194	470 ohms, 10%, ½ W
R191	204	3.9K, 10%, ½ W
R192	190	220 ohms, 10%, ½ W
R193	191	270 ohms, 10%, ½ W
R194	205	4.7K, 10%, ½ W
R195	205	4.7K, 10%, ½ W
R196	197	1K, 10%, ½ W
R197	184	47 ohms, 10%, ½ W
R198	215	39K, 10%, ½ W
R199	208	10K, 10%, ½ W
R200	209	15K, 10%, ½ W
R201	209	15K, 10%, ½ W
R202	213	Variable, 25K, 20%
R203	217	100K, 10%, ½ W
R204	206	1.8K, 10%, ½ W
R205	197	1K, 10%, ½ W
R206	201	2.2K, 10%, ½ W
R207	192	330 ohms, 10%, ½ W
R208	195	560 ohms, 10%, ½ W
R209	192	330 ohms, 10%, ½ W
R210	197	1K, 10%, ½ W
R211	197	1K, 10%, ½ W
R212	198	Trimmer, 1K, ±20%
R213	201	2.2K, 10%, ½ W
R214	208	10K, 10%, ½ W
R215	201	2.2K, 10%, ½ W
R216	198	1K, 10%, ½ W
R217	184	47 ohms, 10%, ½ W
R301	177	2.2K, 10%, ¼ W
R302	175	1.5K, 10%, ¼ W
R303	170	330 ohms, 10%, ¼ W
R304	170	330 ohms, 10%, ¼ W
R304	170	330 ohms, 10%, ¼ W
R305	165	22 ohms, 10%, ¼ W
R306	180	4.7K, 10%, ¼ W
R307	172	820 ohms, 10%, ¼ W
R308	170	330 ohms, 10%, ¼ W
R309	166	47 ohms, 10%, ¼ W
R310	168	100 ohms, 10%, ¼ W
R311	170	330 ohms, 10%, ¼ W
R312	170	330 ohms, 10%, ¼ W
R313	170	330 ohms, 10%, ¼ W
R314	170	330 ohms, 10%, ¼ W
R315	170	330 ohms, 10%, ¼ W
R316	170	330 ohms, 10%, ¼ W
R317	170	330 ohms, 10%, ¼ W
R318	170	330 ohms, 10%, ¼ W
R319	170	330 ohms, 10%, ¼ W
R320	170	330 ohms, 10%, ¼ W
R321	170	330 ohms, 10%, ¼ W
R322	170	330 ohms, 10%, ¼ W
R323	170	330 ohms, 10%, ¼ W
R324	170	330 ohms, 10%, ¼ W
R325	170	330 ohms, 10%, ¼ W
R326	170	330 ohms, 10%, ¼ W
R327	170	330 ohms, 10%, ¼ W
R328		Unassigned
R329		Unassigned

Section V Parts List (Continued)

Ref. No.	Genave Part No. A-360	Description
R401	179	3.9K, 10%, ¼ W
R402	177	2.2K, 10%, ¼ W
R403	165	22 ohms, 10%, ¼ W
R404	168	100 ohms, 10%, ¼ W
R405	168	100 ohms, 10%, ¼ W
R407	168	100 ohms, 10%, ¼ W
R408	168	100 ohms, 10%, ¼ W
R409	168	100 ohms, 10%, ¼ W
R410	168	100 ohms, 10%, ¼ W
R411	168	100 ohms, 10%, ¼ W
R412	168	100 ohms, 10%, ¼ W
R413	168	100 ohms, 10%, ¼ W
R414	168	100 ohms, 10%, ¼ W
R415	168	100 ohms, 10%, ¼ W
R416	168	100 ohms, 10%, ¼ W
R417	168	100 ohms, 10%, ¼ W
R418	168	100 ohms, 10%, ¼ W
R419	168	100 ohms, 10%, ¼ W
R420	168	100 ohms, 10%, ¼ W
R421	168	100 ohms, 10%, ¼ W
R422	168	100 ohms, 10%, ¼ W
R423	168	100 ohms, 10%, ¼ W
R424		Unassigned
R501	180	4.7K, 10%, ¼ W
R502	177	2.2K, 10%, ¼ W
R503	165	22 ohms, 10%, ¼ W
R504	167	100 ohms, 10%, ¼ W
R505	167	100 ohms, 10%, ¼ W
R506	167	100 ohms, 10%, ¼ W
R507	167	100 ohms, 10%, ¼ W
R508	167	100 ohms, 10% ¼ W
R509	180	4.7K, 10%, ¼ W
R510	172	820 ohms, 10%, ¼ W
R511	167	100 ohms, 10%, ¼ W
R512	167	100 ohms, 10%, ¼ W
R513	167	100 ohms, 10%, ¼ W
R514	167	100 ohms, 10%, ¼ W
R515	167	100 ohms, 10%, ¼ W
R516	165	22 ohms, 10%, ¼ W
R517	167	100 ohms, 10%, ¼ W
R518	167	100 ohms, 10%, ¼ W
R519		Unassigned
R601	180	4.7K, 10%, ¼ W
R602	177	2.2K, 10%, ¼ W
R903	184	47 ohms, 10%, ½ W
R604	168	100 ohms, 10%, ¼ W
R605	168	100 ohms, 10%, ¼ W
R606	168	100 ohms, 10%, ¼ W
R607	168	100 ohms, 10%, ¼ W
R608	168	100 ohms, 10%, ¼ W
R609	168	100 ohms, 10%, ¼ W
R610	168	100 ohms, 10%, ¼ W
R611	168	100 ohms, 10%, ¼ W
R612	168	100 ohms, 10%, ¼ W
R613	168	100 ohms, 10%, ¼ W
R614		Unassigned
R901	220	220 ohms, 10%, 1 W
R902	188	120 ohms, 10%, ½ W
R903	184	47 ohms, 10% ½ W
R904		Unassigned
R905	166	47 ohms, 10%, ¼ W
R906	205	4.7K, 10%, ½ W
R907	182	10 ohms, 10%, ½ W
R908	197	1K, 10%, ½ W
R909	197	1K, 10%, ½ W
R910	187	100 ohms, 10%, ½ W
R911	205	4.7K, 10%, ½ W
R912	182	10 ohms, 10%, ½ W
R913	197	1K, 10%, ½ W
R914	178	3.3K, 10%, ¼ W
R915	173	1K, 10%, ¼ W
R916	167	100 ohms, 10%, ¼ W
R917	178	3.3K, 10%, ¼ W
R918	174	1.2K, 10%, ¼ W
R919	169	220 ohms, 10%, ¼ W
R920	169	220 ohms, 10%, ¼ W
R921	180	4.7K, 10%, ¼ W
R922	178	3.3K, 10%, ¼ W
R923	174	1.2K, 10%, ¼ W
R924	169	220 ohms, 10%, ¼ W
R925	169	220 ohms, 10%, ¼ W
R926	180	4.7K, 10%, ¼ W
R927	168	100 ohms, 10%, ¼ W
R928	176	1.8K, 10%, ¼ W
R929	169	220 ohms, 10%, ¼ W
R930	188	120 ohms, 10%, ½ W
R931	183	33 ohms, 10%, ½ W
R932	202	2.7K, 10%, ½ W
R933	184	47 ohms, 10%, ½ W
R934		Unassigned
R935	197	10K, 10%, ½ W
R936	181	6.8K, 10%, ¼ W
R937	182	10 ohms, 10%, ½ W
R938	204	3.9K, 10%, ½ W
R939	184	47 ohms, 10%, ½ W
R940	184	47 ohms, 10%, ½ W
		TRANSFORMERS
T100	234	22.5 mHz IF
T101	234	22.5 mHz IF
T102	234	22.5 mHz IF
T103	234	22.5 mHz IF
T104	235	2 mHz IF
T105	235	2 mHz IF
T106	235	2 mHz IF
T107	235	2 mHz IF
T108	235	2 mHz IF
T109	235	2 mHz IF
T110	236	Audio Output
T111	237	30.5 mHz IF
T112	237	30.5 mHz IF
T113	237	30.5 mHz IF
T114	237	30.5 mHz IF
T115	238	3 mHz IF
T116	238	3 mHz IF
T117	238	3 mHz IF
T118	238	3 mHz IF
T119	238	3 mHz IF
T120	238	3 mHz IF
T121		Unassigned
T401	67	Comm. LF Osc. Tuning
T402		Unassigned
T601	66	Nav. LF Osc. Tuning
T602		Unassigned
T901	239	Balanced Mixer LF Input
T902	240	Balanced Mixer Output
T903		Unassigned
		TRANSISTORS
Q100	222	Silicon, NPN, Blue, MPS 3563
Q101	222	Silicon, NPN, Blue, MPS 3563
Q102	223	Silicon, NPN, White, MPS 3693
Q103	223	Silicon, NPN, White, MPS 3693
Q104	223	Silicon, NPN, White, MPS 3693
Q105	223	Silicon, NPN, White, MPS 3693
Q106	224	Silicon, NPN, Orange, MPS 6514S
Q107	224	Silicon, NPN, Orange, MPS 6514S
Q108	226	Silicon, PNP, Black, 2N 5086
Q109	224	Silicon, NPN, Orange, MPS 6514S
Q110	225	Silicon, NPN, Red, MPS 6513S
Q111	226	Silicon, PNP, Black, 2N 5086
Q112	228	Silicon, NPN, (RCA) 40514
Q113	229	Silicon, NPN, SJE 5036
Q114	230	Silicon, PNP, MJE 105
Q115	222	Silicon, NPN, Blue, MPS 3563
Q116	222	Silicon, NPN, Blue, MPS 3563
Q117	223	Silicon, NPN, White, MPS 3693
Q118	223	Silicon, NPN, White, MPS 3693
Q119	223	Silicon, NPN, White, MPS 3693
Q120	223	Silicon, NPN, White, MPS 3693
Q121	224	Silicon, NPN, Orange, MPS 6514S
Q122	226	Silicon, PNP, Black, 2N 5086
Q123	224	Silicon, NPN, Orange, MPS 6514S
Q124	231	Silicon, PNP, MPS U51
Q125	224	Silicon, NPN, Orange, MPS 6514S
Q126	224	Silicon, NPN, Orange, MPS 6514S
Q127		Unassigned
Q128		Unassigned
Q129		Unassigned
Q130		Unassigned
Q301	222	Silicon, NPN, Blue, MPS 3563
Q302	222	Silicon, NPN, Blue, MPS 3563
Q303	222	Silicon, NPN, Blue, MPS 3563
Q304		Unassigned
Q401	222	Silicon, NPN, Blue, MPS 3563
Q402		Unassigned
Q501	222	Silicon, NPN, Blue, MPS 3563
Q502	222	Silicon, NPN, Blue, MPS 3563
Q503		Unassigned
Q601	222	Silicon, NPN, Blue, MPS 3563
Q602		Unassigned
Q901	227	Silicon, NPN, Yellow, MPS 6544
Q902	227	Silicon, NPN, Yellow, MPS 6544
Q903	222	Silicon, NPN, Blue, MPS 3563
Q904	222	Silicon, NPN, Blue, MPS 3563
Q905	222	Silicon, NPN, Blue, MPS 3563
Q906	222	Silicon, NPN, Blue, MPS 3563
Q907	233	Silicon, NPN, RF POWER PT 4133A (TRW Kit)
Q908	233	Silicon, NPN, RF POWER PT 4133B (TRW Kit)
Q909	233	Silicon, NPN, RF POWER PT 4133C (TRW Kit)
Q910		Unassigned
Q911		Unassigned
		CHOKES
RFC100		Unassigned
RFC101		Unassigned
RFC102		Unassigned
Z300	76	Bias Choke
Z301	76	Bias Choke
Z302		Unassigned
RFC500	75	RF Choke 1 micro henry
RFC501		Unassigned
RFC900	75	RF Choke 1 Micro Henry
Z901	85	Bias Choke
Z902	86	Bias Choke
Z903	87	Bias Choke
Z904	86	Bias Choke
Z905		Unassigned

Ref. No.	Genave Part No. A-360	Description
		CRYSTALS
Y301	159	79.2185 mHz
Y302	158	78.7185 mHz
Y303	157	78.2185 mHz
Y304	156	77.7185 mHz
Y305	155	77.2185 mHz
Y306	154	76.7185 mHz
Y307	153	76.2185 mHz
Y308	152	75.7185 mHz
Y309	151	75.2185 mHz
Y310	150	74.7185 mHz
Y311	149	74.2185 mHz
Y312	148	74.7185 mHz
Y313	147	73.2185 mHz
Y314	146	72.7185 mHz
Y315	145	72.2185 mHz
Y316	144	71.7185 mHz
Y317	143	71.2185 mHz
Y318	142	70.7185 mHz
Y319	141	70.2185 mHz
Y320	140	69.7185 mHz
Y321		Unassigned
Y401	119	21.437 mHz
Y402	118	21.387 mHz
Y403	117	21.337 mHz
Y404	116	21.289 mHz
Y405	115	21.237 mHz
Y406	114	21.187 mHz
Y407	113	21.137 mHz
Y408	112	21.087 mHz
Y409	111	21.037 mHz
Y410	110	20.987 mHz
Y411	109	20.937 mHz
Y412	108	20.887 mHz
Y413	107	20.837 mHz
Y414	106	20.787 mHz
Y415	105	20.737 mHz
Y416	104	20.687 mHz
Y417	103	20.639 mHz
Y418	102	20.587 mHz
Y419	101	20.537 mHz
Y420	100	20.486 mHz
Y421		Unassigned
Y501	139	74.0775 mHz
Y502	138	73.5775 mHz
Y503	137	73.0775 mHz
Y504	136	72.5775 mHz
Y505	135	72.0775 mHz
Y506	134	71.5775 mHz
Y507	133	71.0775 mHz
Y508	132	70.5775 mHz
Y509	131	70.0775 mHz
Y510	130	69.5775 mHz
Y511		Unassigned
Y601	129	28.167 mHz
Y602	128	28.067 mHz
Y603	127	27.967 mHz
Y604	126	27.867 mHz
Y605	125	27.767 mHz
Y606	124	27.667 mHz
Y607	123	27.567 mHz
Y608	122	27.467 mHz
Y609	121	27.367 mHz
Y610	120	27.267 mHz
Y611		Unassigned
		LAMPS
IL101	312	Lamp, Backlighting
IL102	312	Lamp, Backlighting
		SWITCHES
S101	212	Switch, Off/On, Part of R140
S201	250	Switch, Ident
SW301	246	Switch, COM mHz
SW401	247	Switch, COM kHz
SW501	248	Switch, NAV mHz
SW601	249	Switch, NAV kHz
		MISCELLANEOUS
P101	256	Connector, 12 Pin
P105	253	Connector, Phono Plug, Long Shank
P106	252	Connector, Phono Plug, Short Shank
J101	257	Connector, 12 Pin
J102	257	Connector, 12 Pin
J103	255	Connector, 16 Pin
J105	254	Connector, Phono Jack
J106	254	Connector, Phono Jack
CV101	258	Cover, (Part of P101, J101, J102, and J103)
HS907	241	Heatsink, for Q907
HS908	242	Heatsink, for Q908
HS909	243	Heatsink, for Q909
K100	163	Relay, Antenna Switching
K101	164	Relay, Transmit/Receive
		HARDWARE
	273	Grommet, Rubber, 5/16 " ID, 5/8" OD
	274	Grommet, Rubber, 1/4" ID, 5/8" OD
	275	Grommet, Rubber, 1/8" ID, 5/16" OD
	276	Clamp, Cable, Nylon, 3/4"
	277	Shield (Center Rail)
	278	Gear, Mitre, Nylon
	279	Panel, Switch
	280	Bracket, Bearing, (NAV)
	281	Bracket, Bearing, (COM)
	282	Panel, Trim
	283	Panel, Sub
	284	Panel, Rear
	285	Panel, Side
	286	Panel, Side (NAV Side)
	287	Panel, Side (COM Side)
	293	Panel, Top
	294	Guard, Filter
	298	Washer, Dial Drum
	299	Drum, Dial, COM mHz
	300	Drum, Dial, COM kHz
	301	Drum, Dial, NAV mHz
	302	Drum, Dial, NAV kHz
	303	Shaft, Dial Drum, Long
	304	Shaft, Dial Drum, Short
	305	Gear Stop
	306	Knob, (NAV & COM VOL)
	307	Knob, (Frequency Selectors)
	308	Mounting Tray

Specifications subject to change without Notice