

**TERRA**  
BY TRIMBLE



## OPERATION/INSTALLATION MANUAL

Trimble  
2105 Donley  
Austin, Texas 78758  
(512) 432-0400

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TRI NAV C  
COURSE DEVIATION INDICATOR  
OWNER INSTALLATION MANUAL

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## SECTION I

## 1. INTRODUCTION

## 1.1. SCOPE

This manual provides installation and operating instructions for the TRI NAV C Course Deviation Indicator manufactured by Trimble of Austin, Texas.

## 1.2. DESCRIPTION

The TRI NAV C is a micro processor based navigation instrument. It receives standard navigation and glide slope signals along with inputs from a GPS or LORAN C system. It processes these signals into a gas discharge display for pilot information. Electrical output for an autopilot coupler is also provided.

VOR bearings are calculated from the NAV input and displayed in numeric form. A selected OMNI bearing may be compared to the decoded output. The result of this comparison is a bar type display indicating course deviation.

In the ILS mode, signals are received from both the NAV and glide slope receivers. These are decoded and the bar display indicates left-right and/or up-down corrections required to center the aircraft in the approach beam.

In the LRN mode, inputs are accepted from a GPS system or a Loran C system. These inputs are processed and used to drive the left-right bar display and to give the pilot flag information.

## 1.3. SPECIFICATIONS

## MECHANICAL SPECIFICATIONS

Size:	ARINC 3ATI 4 5/8" long
Weight	1.25 lbs.

## ELECTRICAL SPECIFICATIONS

Supply Voltage:	11-32 VDC
Supply Current:	600 mA max at 13.75V 300 mA max at 27.5V
Composite Nav input impedance:	1 meg ohm
Composite Nav input level:	50mV to 10 Vrms

1.4. PERFORMANCE

VOR

Accuracy:  $\pm 2$  degrees  
 Max Deflection: 10 degrees = 14 bar deflection

VOR/LOC Composite: (In LOC mode) Factory preset to .18Vrms for Terra by Trimble TRI NAV/C Indicator.

Localizer

Deflection: 7 bars  $\pm 1$  bar deflection for 0.093 ddm  
 Centering Error:  $\pm 1$  bar

Glide Slope

Flag input: 250  $\mu$ A  
 Deflection: 8 bars  $\pm 2$  bars deflection for 78  $\mu$ A  
 Centering Error:  $\pm 1$  bar  
 Input: 1000 ohm load

GPS or LORAN C

Flag input: 250 $\mu$ A for ELC operation  
 Deflection: 150 $\mu$ A = 14 bar deflection  
 Input: 1000 ohm

1.5. EQUIPMENT SUPPLIED

The TRI NAV C is shipped with the following equipment:

<u>Description</u>	<u>Qty.</u>	<u>Part Number</u>
TRI NAV C	1	0900-1100-10
Connector, Receptacle	1	9-2190-171-00
Lockarm	1	9-1290-172-00
Screw, 6-32 x 5/8 truss hd.	3	9-2806-110-00

## SECTION II

## 2. OPERATION

## 2.1. DESCRIPTION

The TRI NAV C is an Electronic Course Deviation Indicator (ECDI) that presents VOR and ILS navigation information in a dynamic display. The ECDI is unique and very easy to use. It gives vivid and dynamic presentation of deviation from VOR, GPS, LORAN C, localizer and glide slope course centerline. The display clearly shows the deviation from the desired flight path. You will find the Terra by Trimble TRI NAV C reads easily and appears readily in your peripheral vision.

## 2.2. OPERATION

The OBS course selector is a small knob on the lower left of the instrument. The OBS course selector is a bi-directional, two speed, continuous control used to set the desired course. The slow speed rate is approximately one degree per half turn and high speed is ten degrees per half turn. This control has no effect on localizer operation other than to provide a reminder of the desired course or possibly the missed approach VOR bearing.

The course display is a three digit electronic display which indicates the selected course, bearing "TO" or radial "FROM" the VOR station. Courses from 000 to 359 may be selected in one degree increments.

The TO/OBS/FR/BC selector switch is normally positioned in the OBS position which allows the OBS course selector to be active. The TO position causes the course display to automatically change to give a continuous bearing "TO" the VOR station. The FROM position causes the course display to change automatically to indicate continuously the radial "FROM" the VOR station. During ILS operation, the TO/OBS/FR/BC selector is disabled. BC is for making a back course localizer instrument landing.

The mode display is in the upper left quadrant of the display. In VOR, the mode display indicates "T" for a bearing TO the VOR station and "F" for a radial FROM the VOR station. When making an instrument approach where only a localizer is present, the mode display will display an "L" for localizer. When both a glideslope and localizer are present, the mode display will exhibit an "I" for ILS. Should a back course localizer approach be desired, the TO/OBS/FR/BC course switch shall be set to "FR/BC"; the mode will display a "b" for back course. With a valid GPS or LORAN C signal, "C" will be shown in the mode display.

The Course Deviation Bar indicates deviation from the selected course. The ends of the display bars have arrows to point direction to fly or stay on course. The more display bars that are illuminated, left or right, up or down, the greater the deviation from course. The deviation bar indicates full scale 10 degrees right or left. There are 14 light bars each side of center in the deviation scale; therefore, each bar represents approximately 0.7 degree deviation in the VOR mode. When exactly on course, indication will be two centered vertical bars in the VOR/LOC mode.

## 2.2. OPERATION (CONTINUED)

Since the display has no meter movements and is entirely electronic, a wider course width scale is available. The actual LORAN C, VOR and localizer course widths at full scale are the same as conventional needle-type instruments; however, since the scale is larger, small off-course indications can be seen which means that corrections can begin sooner without over-correcting.

The Glide Slope Deviation Bar indicates deviation from the glide slope centerline. A flagged indication for glide slope is no vertical bar(s) up or down and only "L" displayed in mode window. On an approach mode, if a valid glide slope signal has been received, and then the glide slope signal is lost, the top 4 bars and arrow will begin flashing to indicate loss of signal. Also the mode indicator will revert to "L" for localizer instead of "I" for ILS.

A flagged indication for localizer with an ILS frequency selected is no horizontal bars and an [] displayed in the mode window. If glide slope signal is received a "g" will be displayed in the mode window with the glide slope deviation bar indicating deviation from the glide slope centerline.

The lower right toggle switch is the LORAN/TIME/OFF selector. With the switch in the off position, NAV 1 bearing and deviation will be displayed. When switching from off to timer, a 0 to 10 minute timer is activated to aid in standard rate turns, etc. The time can be reset by switching down and moving back to center. Time will immediately be restarted from zero and will count seconds and minutes. NAV 1 information will continue to be displayed.

When this switch is moved to the LRN position, deviation from NAV 1 will no longer be displayed. If the NAV 1 selector is in the TO or FROM position, the NAV 1 radial will still be digitally displayed. With a valid GPS or LORAN C signal, "C" will be shown in the mode indicator, "ELC" will be displayed in the lower right quadrant, and left-right deviation TO the GPS or LORAN C course will now also be indicated. With an invalid GPS or LORAN C signal, dashes will be displayed in the lower right quadrant.

When the switch is moved from LRN to timer, LORAN C left-right deviation will be shown by the light bars and the timer will now be operational in the lower quadrant. To display NAV 1 deviation either in the VOR or ILS mode, this switch must first be moved to the OFF position. If desired, the timer can now be used while still displaying NAV 1 information.

A push-button to the right of the LRN/TIME/OFF switch has two functions. When the NAV 1 TO/OBS/FROM/BC switch is in the TO or FR position and the OBS/TEST button is momentarily depressed and then the NAV 1 switch is moved to the OBS position, the unit will automatically center, putting you right on course centerline TO or FROM the VOR station. This feature saves rotating the OBS knob to find the radial TO or FROM the VOR.

When the OBS/TEST push-button is depressed with the NAV 1 switch in the OBS position, the unit tests all light bars and digital segments. During test, the light bars flash and 8's are displayed in each of the digit windows.

## 2.3. FLYING THE ECDI

1. Finding Aircraft Position
  1. Tune desired NAV frequency and identify.
  2. Set TO/OBS/FR/BC selector FR.
  3. Course display shows radial aircraft is on from the VOR.
  
2. Tracking Direct to the VOR station.
  1. Tune desired NAV frequency and identify.
  2. Set TO/OBS/FR/BC selector switch to "TO".
  3. Push OBS/TEST button and immediately switch "TO" switch to OBS; display will center, turn aircraft toward arrow and maintain aircraft on course "TO" the VOR.
  4. Keep course deviation bar centered by making small aircraft heading changes.  
**NOTE: Turn aircraft in direction of arrows, i.e., if bar is going left, left arrow will light, turn left to get back on course.**
  
3. Flying a VOR Airway
  1. Tune desired NAV frequency and identify.
  2. Determine aircraft position (see 2.3.1. above).
  3. Set TO/OBS/FR/BC selector to OBS.
  4. Select desired radial with OBS course selector knob.
  5. Set up intercept and fly to course radial.
  6. When deviation bar centers, turn on course.
  
4. ILS Approaches
  1. Tune desired NAV frequency and identify.
  2. Display shows deviation from localizer and glide slope center. That is, if the deviation bar indicates deviation up, then you need to fly up to return to glide slope center.
  3. The course display may be set to the localizer course as a reminder.
  
5. GPS or LORAN C
  1. Adjust GPS or LORAN C unit for heading to desired waypoint.
  2. Place the LRN/TIME/OFF switch up to LRN and note that the mode indicator display "C".
  3. Fly the horizontal deviation bars as you would a VOR course.



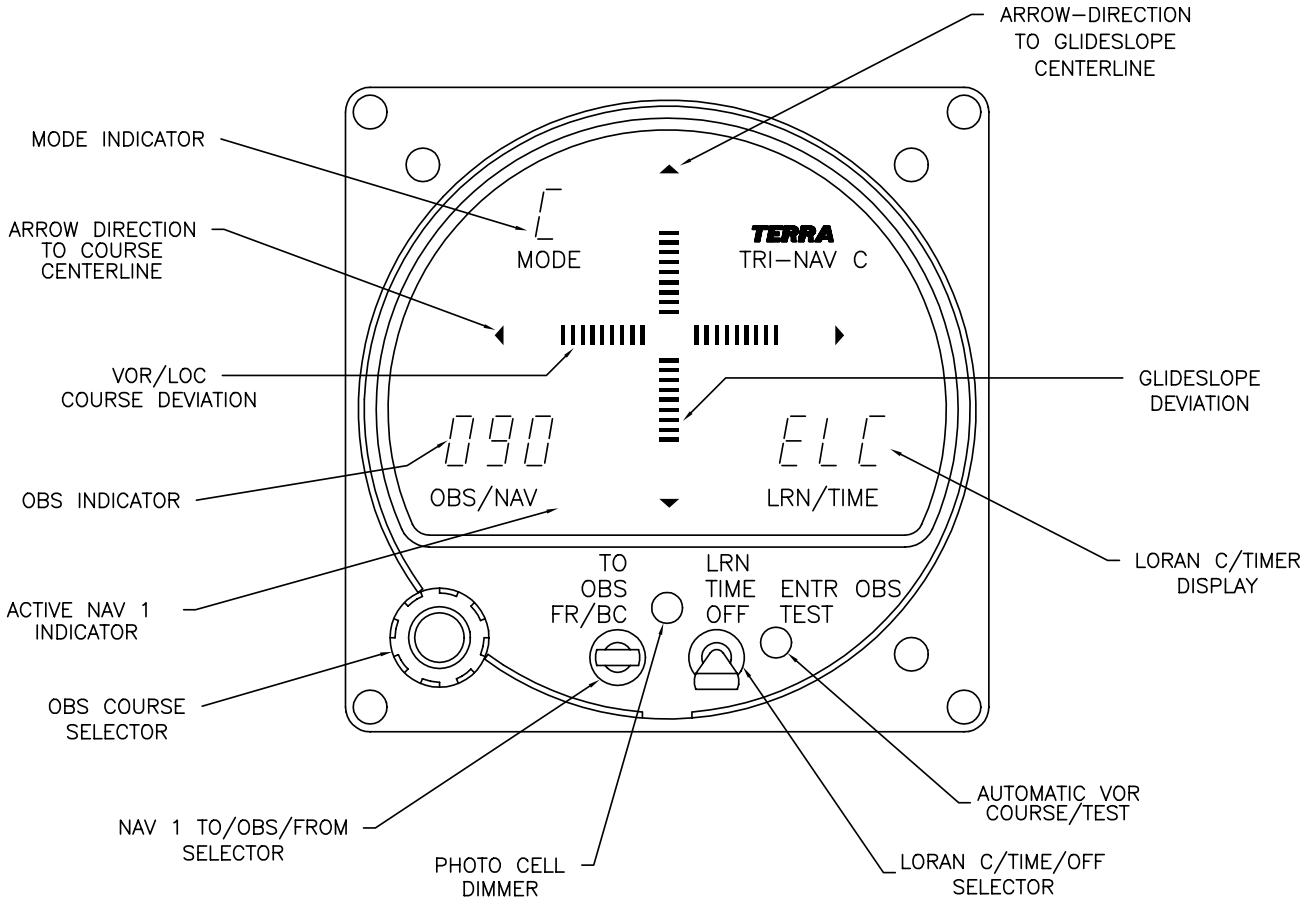


Figure 2-1  
TRI NAV C Display

## SECTION III

## 3. INSTALLATION

## 3.1. GENERAL

This section contains all necessary installation instructions and check-out procedures for the Terra by Trimble TRI NAV C Course Deviation Indicator. For the installer with little or no experience of installing avionics, Section 3.3 provides important information. Trimble recommends reading this section before continuing with the installation.

## 3.2. PREPARATION FOR USE

Every precaution has been taken to protect the TRI NAV C during shipment. Upon receipt of the equipment, perform the following inspection:

1. Remove the unit from the shipping container and visually inspect for damage.
2. Check controls and switches to determine if they may have been damaged.
3. Make sure that all hardware and connectors listed in Section I, under "Equipment Supplied" are present.

If the unit is damaged, a claim must be filed with the carrier. The carrier assumes title of the unit when accepted for shipment. Do NOT return the unit to Trimble or its representatives.

It is suggested that the package be retained for inspection by the carrier in the case of damage or for future use should it be necessary to ship the unit for service or to transfer it to another location.

## 3.3 GENERAL INSTALLATION INSTRUCTIONS FOR AVIONICS

The following paragraphs contain pertinent hints, advice, and guidance intended for use by installers of avionics equipment. These have been drafted to address common problems encountered during the installation process. Specific questions may be addressed to Trimble for technical assistance by calling 1-800-487-4662 and requesting Technical Assistance.

## 3.3.1 COAXIAL CABLES AND CONNECTORS

Improper installation of coaxial cables and connectors create many of the problems encountered during avionics installations. Refer to Figure 3-2 for guidance of typical BNC connector assembly. Refer to Figure 3-1 for instructions about connecting coax cable to the BNC connector(s) mounted at the rear of Terra by Trimble mounting trays. Problems to avoid include twisted, chafed, or pinched cables, sharp bends in cables, open or shorted center conductors or shield braid, and improper grounding of shields. Also, proper termination of antenna coaxial cables at the antenna should be carefully checked. After installing connectors, pull firmly to ensure good mechanical bonding (particularly if you use crimp-on connectors) and use your ohmmeter to insure good electrical connection with no shorting. Be sure that coax lengths and types follow the avionics manufacturer's recommendations.

### 3.3 GENERAL INSTALLATION INSTRUCTIONS FOR AVIONICS (CONTINUED)

#### 3.3.2 ANTENNAS

The three cardinal points for antenna installation are location, mounting and electrical characteristics.

##### Antenna Location:

Provide an area where shadowing of the antenna will not occur (eg. blocking of the signal by other parts of the aircraft). Remember that at VHF frequencies and above, direct line of sight signals are required from ground stations to the antenna and vice-versa for maximum effective range. Consider that close proximity of an antenna to other antennas or noise sources may create interference problems. Read carefully and follow closely the recommendations of the antenna manufacturer about antenna location.

##### Antenna Mounting:

Proper attachment of any antenna to the aircraft surface is of primary importance. Carefully clean all paint and corrosion off the mounting surface and apply an anti-corrosion treatment. Do the same to the inside surface if a backing or nut plate is to be used. Mount the antenna securely per the antenna manufacturer's recommendations and check carefully to insure good electrical bonding. Do not mount any antenna to doors, hatches, inspection plates or other moveable surfaces because proper bonding to the aircraft surface cannot be accomplished. After proper mounting and bonding is achieved, a bead of high quality RTV around the junction of the antenna base and the aircraft surface will prevent water seepage and corrosion from forming between the antenna base and aircraft surface.

##### Antenna Electrical Characteristics:

Use the antenna supplied with the avionics equipment, or if not supplied, the antenna(s) recommended by the avionics manufacturer. If no specific antenna is recommended, choose an antenna which provides good service for the frequency range and the service conditions of the aircraft (eg. speed, altitude, etc.). If a signal splitter is to be used, compare the specifications carefully to the application. Many installation problems are encountered with improper application of signal splitters! If in doubt, test the power and frequency characteristics of the splitter on the bench to be sure.

Simple antenna problems such as shorting or open circuit problems can be determined by use of an ohmmeter, although certain types of antennas may require use of ramp test equipment to check radiation. But, by far, the most common antenna problems are diagnosed to be coax or connectors, antenna bonding, or signal splitters. **Never allow an aircraft antenna to be painted.**

### 3.3 GENERAL INSTALLATION INSTRUCTIONS FOR AVIONICS (CONTINUED)

#### 3.3.3 WIRING AND HARNESSING

Construct the installation wiring harness carefully from the avionics manufacturer's wiring diagram. Be extremely careful to note recommended wire sizes, the need for shielded wiring (if any), and decide upon any optional wiring to be included. Measure carefully and plan the harness layout to avoid interference of the cable harness with existing avionics, instruments or controls.

Remove the connector plates from the rear of the trays. Connect all wires to the proper pin of each connector, checking as you go to insure that no loose strands cause shorting to adjacent pins or to ground surfaces. Be particularly careful with the shield braids of shielded wires. We recommend tubing be placed over each soldered pin connection to prevent wire strands from touching adjacent connections. Do not expose any more of the conductor than is absolutely necessary and keep the braid connection as short as possible. Remember that on shielded wires only one ground point is recommended. Follow manufacturer's recommendation about where the ground point should be located. **After completing all connections, check wiring with an ohmmeter again to ascertain that all connections are as desired and that no undesired shorting to ground or other pins has occurred.** Visually double check to see that braids on shields are not creating shorting, that no insulator melting has occurred during soldering and pull firmly on all connections to insure good mechanical bond.

Install the harness and connectors/connector plates in the aircraft with very loose dress only.

Solder all connections to power and ground and install panel components/controls and safety devices (eg. fuses or breakers). It is desirable at this point to insert all equipment in trays and perform preliminary check-out. Following a satisfactory check-out, and with all equipment in the properly installed location, complete the final dressing and routing of the harness and secure in place.

**Note:**

It is extremely important that units should be installed in trays while final dress and bundling of the harness is accomplished to assure proper alignment of connectors between tray and unit. Failure to do this may cause problems when unit is initially inserted into tray due to misalignment of connectors!

The final step is to perform a complete check of all avionics operations and insure that free movement of all cockpit controls is available.

### 3.3 GENERAL INSTALLATION INSTRUCTIONS FOR AVIONICS (CONTINUED)

#### 3.3.4 NOISE AND INTERFERENCE

The typical airframe is a small and imperfect platform for providing all of the antenna ground planes and power sources and inter-wiring required for avionics operations, particularly for a low noise and interference free expectation. This subject is far too broad and complex to address in detail in a few paragraphs. However, an approach to categorizing and defining the problem can be outlined.

Noise and/or interference is usually heard in the audio systems, although it may also be detected as an interference to indicator operation. Unless a strong suspicion of the exact source is suspected, it is best to begin a process of elimination, in the following order:

1. **Power Source:** Check for low voltage when the avionics load is applied. A high resistance battery cell in the A/C can cause numerous problems. View the avionics power line at the avionics master and at the affected unit for noise on the power line. If present, try to categorize the frequency (eg. alternator whine, which may be caused by one or more bad alternator diodes, or if interference is present only when a communication unit is transmitting, etc.). If the noise is present or worse at the affected unit than at the avionics master, investigate the harness for noise coupling between wires. If necessary, disconnect the affected unit power from the aircraft power source and connect to an external power supply or battery.
2. **Power Ground:** View the power ground line at the avionics master and the affected unit. If noise is discerned at the master source, ground strapping may be corroded or partially broken. If only at unit, a larger wire size or wire re-routing may be required.
3. **Interference:** Both noise and interference may be either conducted or radiated, and in some cases electromagnetically coupled between units. If it is determined that the noise or interference is eliminated whenever another avionics unit is not transmitting, first investigate the radiated alternative. Insure complete and proper bonding of antennas to the aircraft surface, and check the coaxial cable and all shield connections and connectors. Review the manufacturer's recommendations for antenna separations. Be aware that antenna radiation directly to conductors at the rear of mounting trays or units may occur if shields are stripped too far back from the connector or are improperly grounded. Disconnecting the interfering antenna and substituting an external dummy load may assist diagnosis. Conducted interference usually occurs through paths which are shared by the avionics equipment such as power lines, ground points, audio equipment, or induced interference between adjacent wires or harnesses. Review the manufacturer's recommendations for shielded wiring and ground points, and for separation of specific wires. Measure ground points for a small but perceptible resistance to true ground and view power lines with an oscilloscope, turning each unit on and off to detect changes. Recheck common or adjacent connections to jacks, plugs, or shared equipment such as power converters, breakers, or audio panels.

### 3.3 GENERAL INSTALLATION INSTRUCTIONS FOR AVIONICS (CONTINUED)

4. **Compromise:** In some cases noise or interference may be subdued but not eliminated. With the inefficient and imperfect platform provided by the aircraft for antennas and power source, etc, complete elimination of the problem may be very expensive or impossible (eg. if there is simply not enough space to provide ground plane or antenna separation as recommended). Or, the aircraft strobe noise is audible but not objectionable, etc. These problems should be discussed early and thoroughly with the customer.

#### 3.3.5 SUMMARY

The paragraphs above are not intended to be highly technical, completely thorough, or extensive, but serve as a reminder for certain precautionary or follow-up procedures for general avionics installations. Trimble is prepared to assist at any point with additional information, hints, or literature. Simply call 1-800-487-4662 and ask for technical assistance.

### 3.4. MECHANICAL INSTALLATION

The TRI NAV C will mount in either a standard 3 1/8" panel hole or a 3ATI instrument mount. Do not use mounting screws longer than 5/8". Failure to comply will result in internal damage to the unit.

### 3.5. ELECTRICAL INSTALLATION

The TRI NAV C connector diagram is shown on Figure 3-4.

SWITCHED POWER from receiver is wired to Pin 1. The TRI NAV C will operate directly on 11 to 32 volts DC.

Aircraft ground is connected to Pin 10.

The COMPOSITE SIGNAL from radio is attached to Pin 8. LORAN C input is attached to Pins 5, 6, 11 and 15.

TRI NAV C MOD 4 and below, when using Terra by Trimble's TN 200, TN 200D, and other similarly phased composite outputs pin 7 is grounded to pin 9 for proper phase programming. **No other source of ground for pin 7 should be used.** On Nav receivers with composite signals 180 degrees out, pin 7 is left open.

TRI NAV C Mod 5 and above, when using Terra by Trimble's TN 200, TN 200D, and other similarly phased composite outputs pin 7 is internally grounded (factory installed) for proper phase programming. On Nav receivers with composite signals 180 degrees out, cut the jumper shown on Figure 3-3.

A standard glide slope receiver (+-150  $\mu$ A full scale up, down deflection and a 250  $\mu$ A full scale on flag deflection) is attached to Pins 4, 12, 13 and 14 as shown on Figure 3-4. The internal resistance of both up-down and on-off inputs is 1000 ohms.

Pins 3 and 9 are outputs to an autopilot's coupler. The output level is 15 millivolts per degree of VOR course error, or 90 millivolts for a .093 ddm localizer signal. The autopilot output will drive any coupler with an input impedance greater than 100 ohms.

### 3.6. ADJUSTMENTS

Figure 3-5 shows the location of the adjusting pots on the back of the TRI NAV C.

When setting the TRI NAV C level, remember correct level is VERY important. A too low level will reduce range and reduce localizer deflection sensitivity; a too high level will cause instability when flying near a VOR or Localizer facility.

Inject a "Standard Localizer Deviation Signal" at 1000 microvolts into the NAV receiver. This is a signal in which the difference in the depth of modulation of the 90 and 150 Hz signals is 0.093 +- .002 ddm. Set the VOR/LOC LEVEL control such that eight bars of deflection are

showing on the Localizer display. To set the VOR/LOC level control, first rotate the adjustment fully counter clockwise, the bars will be blank at this point. SLOWLY rotate the VOR/LOC level control clockwise until eight bars are illuminated. Inject a localizer centering signal. Adjust the LOC center control until the bars are centered. Repeat the level adjustment with the "Standard Localizer Deviation Signal" set to the opposite mid scale.

Setting the Localizer level automatically sets the VOR level. The bar display will blank if the setting is either too high or too low.

Using a 2000  $\mu\text{V}$  VOR RF signal, adjust the VOR PHASE pot for a zero degree VOR error. After each adjustment is made allow eight seconds for the TRI NAV C to settle down. Phase is adjusted with the function switch in the TO (up) position.

Using a 1000  $\mu\text{V}$  "Standard Glide Slope Centering" signal, adjust the Glide Slope Centering pot until only the two center glideslope bars are on. While adjusting the glide slope, the NAV input should be either Localizer or OFF.

After the unit has been calibrated, check the Localizer function at Left Standard Deviation, Center and Right Standard Deviation. There should be no error; that is, Left and Right deflections should have eight bars activated, Center should have the two Center bars on.

Adjust external GPS or LORAN C position coordinates and destination point coordinates to simulate a zero cross track error. Now position the LRN/TIME/OFF switch to LRN and adjust the ELC center point until only the two center bars are on.



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1. Cut Outer Jacket Back 0.5"
2. Comb Shield Back and Separate into 2 Pigtailed.
3. Cut Dielectric and Center Conductor 0.26" From Shield
4. Trim off Dielectric Exposing 0.1" of Center Conductor.
5. Solder Exposed Center Conductor to Center Pin of Connector.
6. Snap Slotted Cover over Dielectric.(Large Slot Fits Over Dielectric)
7. Fold Shield Pigtailed Forward Around Connector and Solder to Body.  
Caution: Use Extreme Care While Soldering Shield to Support Coax.  
High Temperatures Will Cause the Dielectric to Melt, Shorting the  
Center Conductor Against the Connector Body.
8. Connector: Terra Part Number 9-2131-107-00

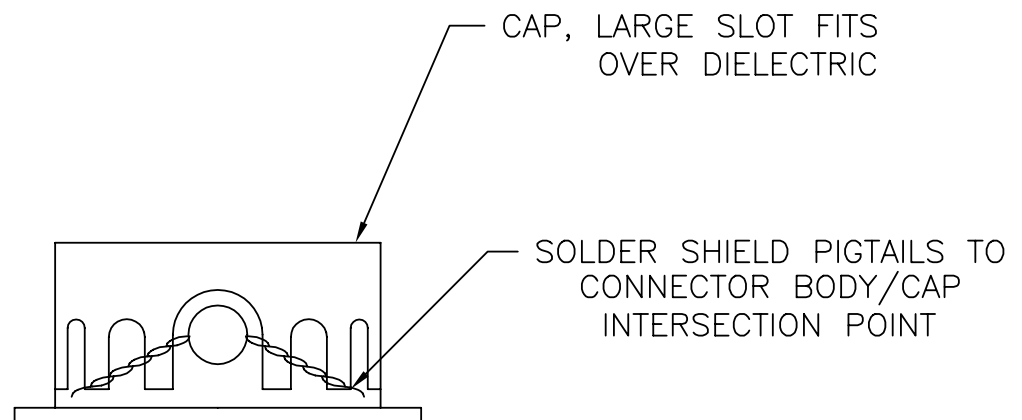
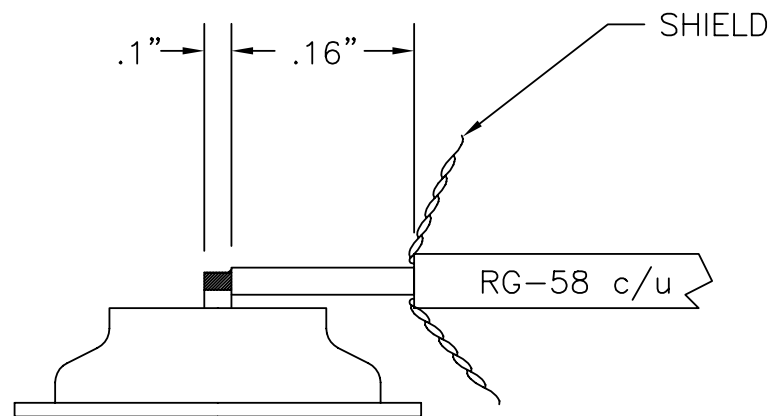
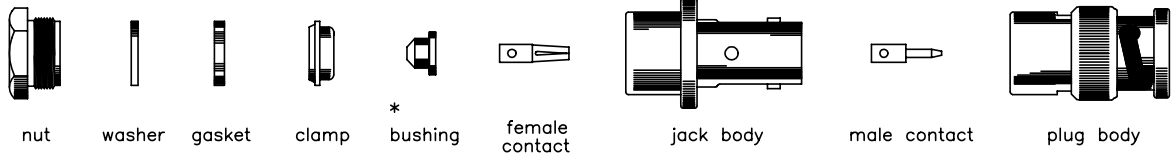


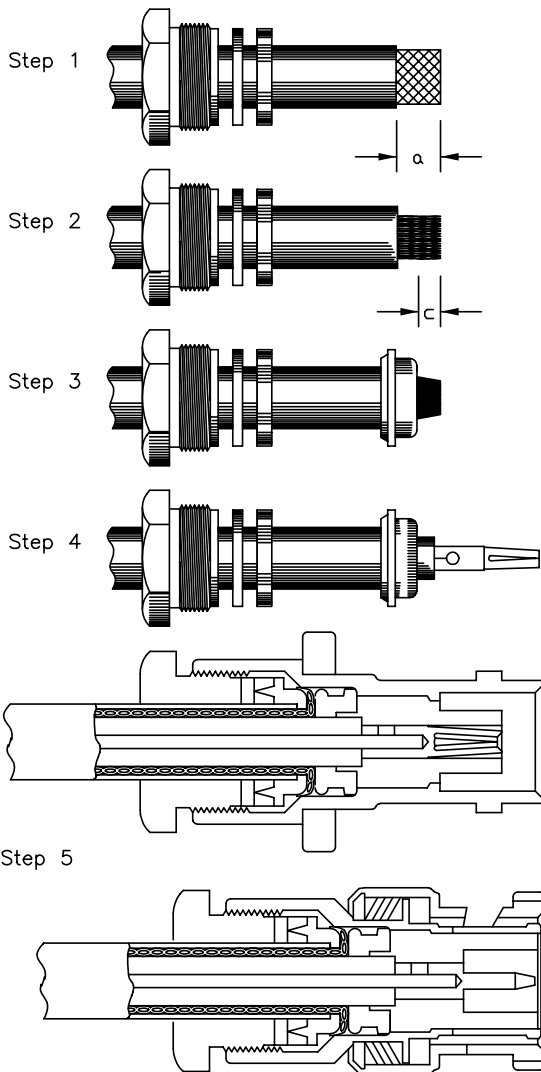
Figure 3-1  
Coax Connector Instructions

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CLAMP TYPES



\* This part is used only with RG-62 cable



Amphenol Number	Connector Type	Cable RG-/U	Stripping Dims. Inches (Millimeters)	
			a	c
31-2	BNC Plug	58	.312(7.9)	.094(2.4)
31-202			.250(6.4)	.094(2.4)
31-204	BNC Angle Plug	55,58,141,142,223,400	.281(7.1)	.109(2.8)
31-205	BNC Jack	55,58,141,142,223,400	.297(7.5)	.109(2.8)
31-206	BNC Bulkhead Jack			
31-207	BNC Bulkhead Jack	59,62,140,210	.250(6.4)	.094(2.4)
31-212	BNC Plug	59,62		
31-215	BNC Jack	59,62,140,210	.297(7.5)	.109(2.8)
31-71003	75 OHM BNC Plug	59,62,140,210	.250(6.4)	.156(4.0)
6775-75	75 OHM BNC Plug	11	.490(12.4)	.200(5.1)
8575	BNC Angle Plug	59,62,140,210	.297(7.5)	.094(2.4)
84975	BNC Plug	122,B8218	.281(7.1)	.172(4.4)
86225	BNC Angle Plug	59,62,140,210	.281(7.1)	.141(3.6)

- Step 1 Place nut, washer and gasket over cable and strip to dimension 'a' shown in table above.
- Step 2 Comb out braid and fold out. Trim insulation off center conductor to dimension 'c' shown in table above. [For RG-62, 71 and 210/U cable, trim an additional .032" (0.8mm) of insulation off center conductor and add bushing.] Tin center conductor.
- Step 3 Pull braid wires forward and taper toward center conductor. Place clamp over braid and push back against cable jacket.
- Step 4 Fold back braid wires as shown, trim to proper length [.125" (3.2mm) long] ▲ and form over clamp as shown. Solder contact to center conductor.
- Step 5 Insert cable and parts into connector body. Make sure sharp edge of clamp seats properly in gasket. Tighten nut.
- ▲ for 6775-75, trim braid to be .290" (7.4mm) long; for 31-71003, trim braid to be .219" (5.5mm) long.

Figure 3-2  
Coax, General BNC Connector Instructions

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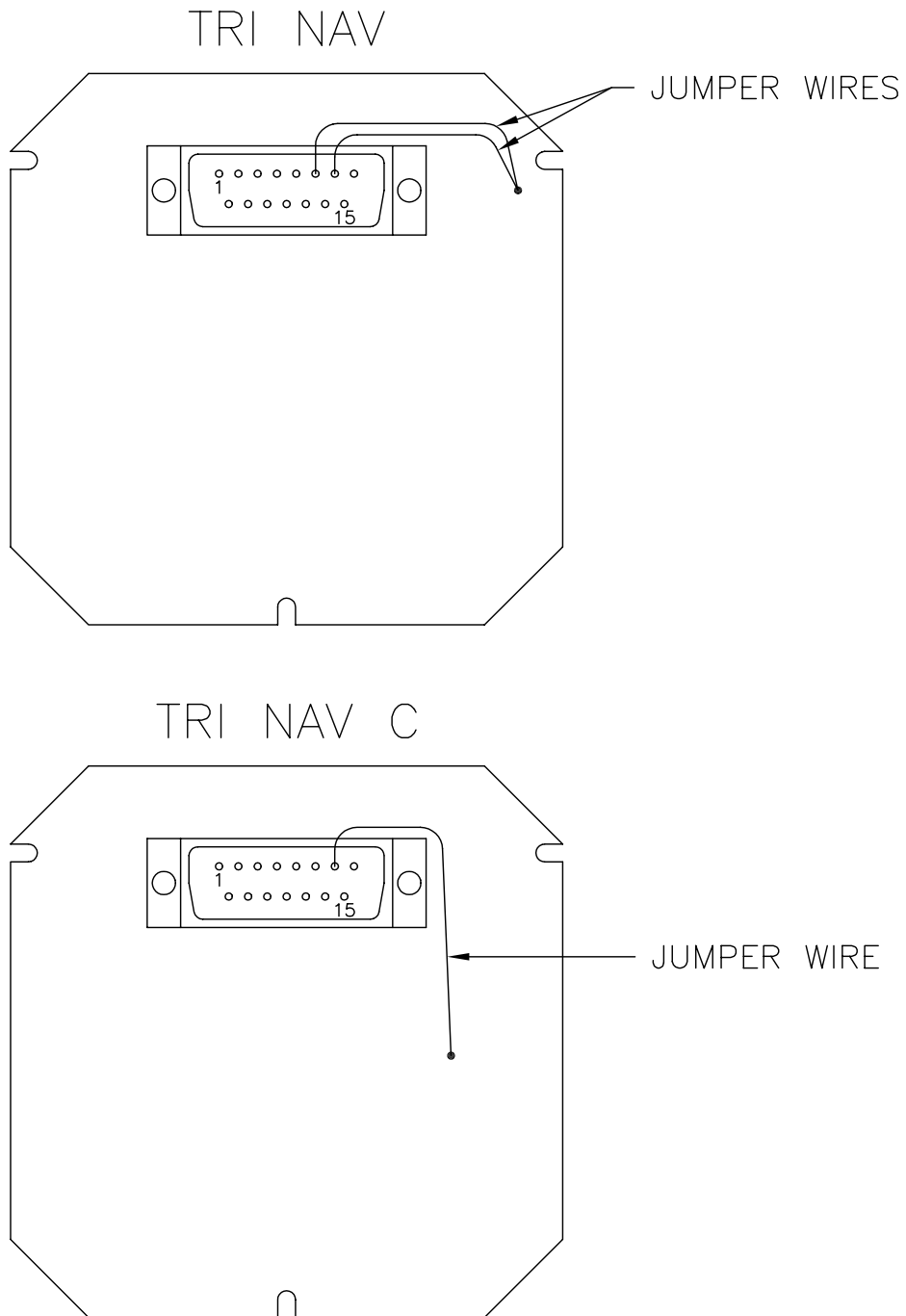
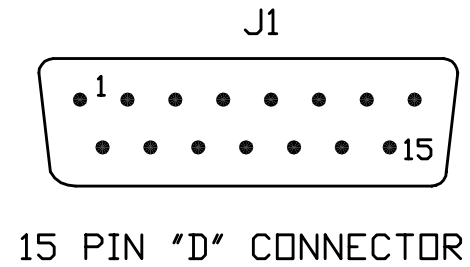
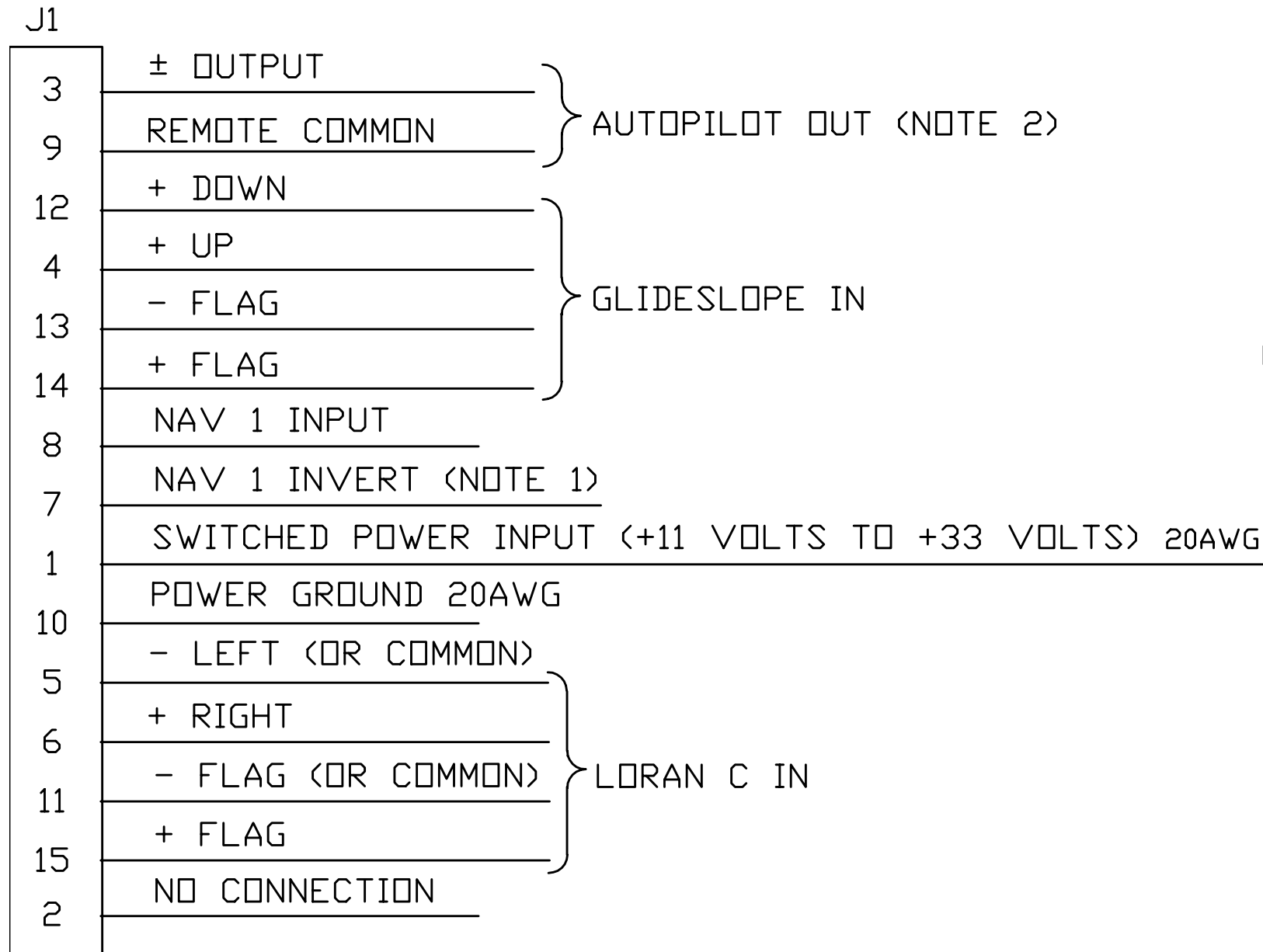


Figure 3-3  
TRI NAV C Invert Jumper Wire Location

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NOTES:

1. TRI NAVC MOD 4 AND BELOW, WHEN USING TERRA'S TN 200, TN 200D, AND OTHER SIMILARLY PHASED COMPOSITE OUTPUTS, PIN 7 IS GROUNDED TO PIN 9 FOR PROPER PHASE PROGRAMMING. NO OTHER SOURCE OF GROUND FOR PIN 7 SHOULD BE USED. ON NAV RECEIVERS WITH COMPOSITE SIGNALS 180 DEGREES OUT, PIN 7 IS LEFT OPEN.  
TRI NAVC MOD 5 AND ABOVE, WHEN USING TERRA'S TN 200, TN200D, AND OTHER SIMILARLY PHASED COMPOSITE OUTPUTS, PIN 7 IS INTERNALLY GROUNDED (FACTORY INSTALLED) FOR PROPER PHASE PROGRAMMING. ON NAV RECEIVERS WITH COMPOSITE SIGNALS 180 DEGREES OUT, CUT THE JUMPER SHOWN ON DRAWING 9-1160-0042-01.
2. AUTOPILOT OUTPUT LEVEL IS 15 MILLIVOLTS PER DEGREE OF VOR COURSE ERROR, OR 90 MILLIVOLTS FOR A .093 DDM LOCALIZER SIGNAL. THE AUTOPILOT OUTPUT WILL DRIVE ANY COUPLER WITH AN OUT PUT IMPEDENCE GREATER THAN 100 OHMS.
3. WIRE SIZE: 22AWG UNLESS OTHERWISE SPECIFIED.  
WIRE TYPE: TEFLON WIRE MIL-22759 OR EQUIVALENT.
4. LEAVE ADEQUATE LENGTH TO THE HARNESS TO ALLOW A SERVICE LOOP.

Figure 3-4  
TRI NAV C Interconnect Diagram



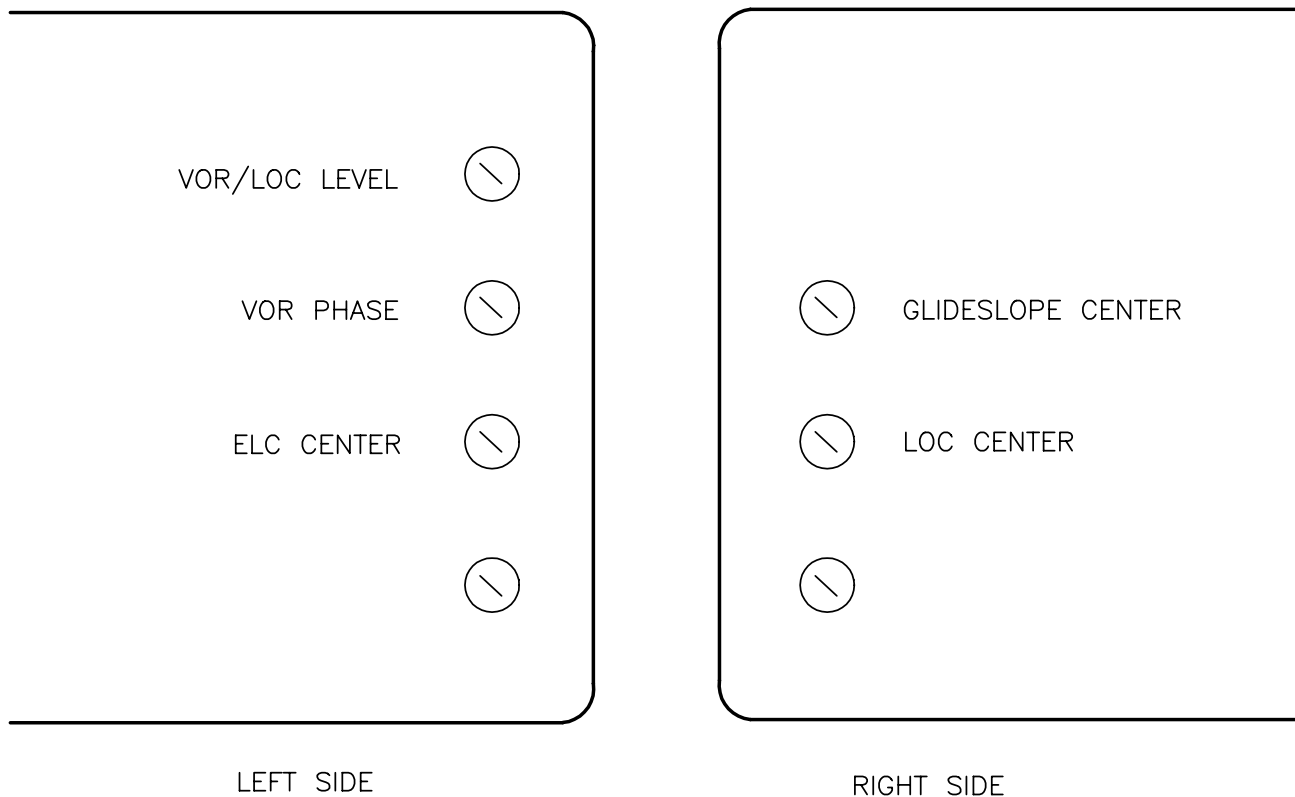


Figure 3-5  
TRI NAV C Adjustment

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## THREE YEAR UNLIMITED WARRANTY *TRIMBLE*

### What does your warranty cover?

Any defect in materials or workmanship of Terra by Trimble equipment.  
This warranty applies only to equipment sold after January 1, 1993.

### How does your warranty become effective?

Your warranty does not become effective unless you mail your completed Warranty Registration card to us within 15 days after installation of your Terra by Trimble equipment.

### For how long?

Three years from date of original installation of the equipment, but not more than four years from date of purchase.  
If you receive repair or replacement of equipment under this warranty, the warranty remains in effect on the repaired or replaced equipment for the remainder of the original three-year term.

### What will we do to correct problems?

Repair any equipment found to be defective in materials or workmanship.  
If we choose, we may replace the equipment rather than repairing it.  
We will be responsible for the cost of labor and materials for repair or replacement of any equipment found to be defective in materials or workmanship.

### How do you make a warranty claim?

Contact your nearest Authorized Terra by Trimble dealer for repair or replacement of any equipment defective in materials or workmanship.  
If directed by your Authorized Terra by Trimble dealer, or if you are unable to contact a Terra by Trimble dealer, send the equipment to our factory:  
Properly pack your equipment; we recommend using the original container and packing materials.  
Include in the package a copy of the sales receipt or other evidence of date of original purchase and installation. If the equipment was a gift, provide a statement specifying the date received and installed. Also note your name, address, daytime telephone number, and a description of the defect.  
Ship the equipment UPS or equivalent. You must prepay the shipping charges. Ship to:

Trimble  
2105 Donley Dr.  
Austin, TX 78758  
(512) 432-0400 Phone (512) 836-9413 FAX

We will pay surface shipping charges to return the equipment to you.

### What does your warranty not cover

Terra by Trimble equipment purchased "As New" from other than an Authorized Terra by Trimble Dealer or Distributor.  
Malfunctions or failures resulting from the way the equipment was installed or from installation not in accordance with factory instructions.  
Certificated Aircraft: Installation by other than an FAA Repair Station (USA), approved installation facility (non-USA) and/or without  
— Appropriate air-worthiness approval(s) as required by governing aviation authority;  
— Form 337;  
— Logbook entry.  
Experimental Category Aircraft: Installation without  
— Appropriate air-worthiness approval(s) as required by governing aviation authority;  
— Form, 8130-(x).  
— Logbook entry.  
Fuses and batteries.  
Use of equipment for purposes other than those for which is was designed.  
Accidental or deliberate damage, alterations of any kind, inadequate storage or maintenance.  
Warranty repair by anyone other than Trimble or Terra by Trimble Authorized Dealer with factory approval.

For conditions not covered by this warranty, you will receive an estimate of costs before the repair is initiated. Repairs will be billed to you at the normal repair rates of the facility that performs the repairs.

### Are there any other limitations or exclusions?

Any implied warranties are in effect only as long as this warranty is in effect.  
This warranty does not cover incidental or consequential damage such as damage to other equipment or to your aircraft that results from defects covered by this warranty.  
Some states do not allow limitations on how long an implied warranty lasts, or allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

### How does state law relate to this warranty?

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

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