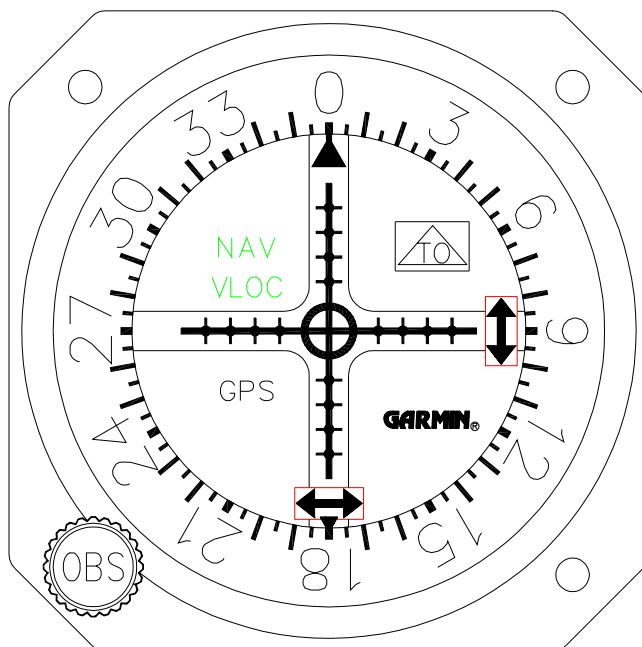




# GI 102A/106A INSTALLATION MANUAL



(GI 106A Course Deviation Indicator shown)



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## RECORD OF REVISIONS

Revision	Revision Date	Description	ECO #
A	4/9/99	Initial Release	----
B	7/14/99	Add C.G. measurements, annunciator dimming adjustment, miscellaneous corrections	11422
C	4/20/01	Shorten recommended screw length, update Mid-Continent part numbers for connector kits.	15610

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# 1. GENERAL DESCRIPTION

## 1.1 INTRODUCTION

This Manual describes the physical, mechanical, and electrical characteristics and the installation requirements for the GI 102A and GI 106A Course Deviation Indicators. After installation of the GI 102A/106A, FAA Form 337 must be completed by an appropriately certificated agency to return the aircraft to service.

## 1.2 EQUIPMENT DESCRIPTION

The GARMIN GI 102A and GI 106A Course Deviation Indicators are designed to operate with VHF and GPS navigational equipment to provide VOR, Localizer (LOC), GPS, and Glideslope (GS) information.

The GI 102A is designed to accept DC Left-Right, To-From and Left-Right warning flag signals from a remote mounted VOR converter or GPS receiver. Additionally, the GI 106A will accept DC signals from a glideslope or WAAS GPS receiver which will drive the Up-Down needle along with an Up-Down warning flag. Both units incorporate NAV, GPS and VLOC (VOR/LOC as displayed on the GARMIN GNS 430) annunciation with photocell dimming.

When GPS is selected for display, the GI 102A/106A receives inputs from compatible GPS/navigation receivers or Flight Management Systems to provide a visual presentation to the pilot. All information presented on the navigation indicator is generated from this external receiver.

## 1.3 TECHNICAL SPECIFICATIONS

### 1.3.1 Physical Characteristics

<b>Mounting</b>	Panel, 3.125 inches round instrument hole
<b>Width</b>	3.25 inches
<b>Height</b>	3.25 inches
<b>Depth Behind Panel</b>	4.75 inches maximum
<b>Weight (GI 102A and GI 106A)</b>	1.4 lbs.

### 1.3.2 General Specifications

<b>Regulatory Compliance</b>	TSO C34e (GI 106A only), C36e, C40c JTSO C34e (GI 106A only), C36e, 2C40c
<b>Applicable Documents</b>	RTCA DO-192 (GI 106A only), DO-195, DO-196
<b>Operating Temperature Range</b>	-55°C to +70°C. For more details see Environmental Qualification Form
<b>Humidity</b>	95% non-condensing
<b>Altitude Range</b>	0 to 55,000 ft
<b>Operating Current (GI 102A and GI 106A)</b>	0.10 A (with one annunciator lamp illuminated)
<b>Lighting Current (GI 102A and GI 106A)</b>	0.155 A maximum at 28 Vdc 0.310 A maximum at 14 Vdc
<b>Environmental Testing</b>	RTCA DO-160B. For more details see Environmental Qualification Form

### 1.3.3 Lateral Deviation

<b>OBS Resolver</b>	Omni Range Zero: 300°, calibrated at 30 Hz
<b>Deviation Input Impedance</b>	1 kΩ ± 10%
<b>Deviation Deflection Sensitivity</b>	150 mV ± 10% for full scale deflection
<b>Valid Flag Input Impedance</b>	1 kΩ ± 10%
<b>Valid Flag Sensitivity</b>	125 mV minimum for flag to leave stop 260 mV ± 10% maximum, flag fully concealed
<b>TO/FROM Flag Input Impedance</b>	200 Ω ± 10%
<b>TO/FROM Flag Sensitivity</b>	±40 mV ± 15% at 25°C flag fully in view

### 1.3.4 Vertical Deviation (GI 106A Only)

<b>Deviation Input Impedance</b>	1 kΩ ± 10%
<b>Deviation Deflection Sensitivity</b>	150 mV ± 10% for full scale deflection
<b>Valid Flag Input Impedance</b>	1 kΩ ± 10%
<b>Valid Flag Sensitivity</b>	125 mV minimum for flag to leave stop 260 mV ± 10% maximum, flag fully concealed

## 2. INSTALLATION

### 2.1 INTRODUCTION

Careful planning should be applied to achieve the desired performance and reliability from the GI 102A/106A. Any deviations from the installation instructions prescribed in this document shall be accomplished in accordance with the requirements set forth in FAA AC 43.13-2A.

### 2.2 EQUIPMENT LOCATION

The GI 102A/106A course deviation indicator must be mounted as close to the pilot's field of view as possible. The unit depth, with connector attached, must also be taken into consideration.

### 2.3 COOLING AIR

No direct cooling is required. As with any electronic equipment, overall reliability may be increased if the GI 102A/106A is not located near any high heat source or crowded next to other equipment.

### 2.4 ROUTING OF CABLES

Care must be taken not to bundle the GI 102A/106A logic and low level signal lines with any high energy sources. Examples of these sources include 400 HZ AC, COM, DME, HF and transponder transmitter coax. Always use shielded wire when shown on the installation drawings in section 4.3.

Avoid sharp bends in cabling and routing near aircraft control cables.

### 3. INSTALLATION PROCEDURES

#### 3.1 GENERAL INFORMATION

This section contains interconnect diagrams, mounting dimensions and other information pertaining to the installation of the GI 102A/106A. After installation of cabling and before installation of the equipment, ensure that power is applied only to the pins specified in the interconnect diagram.

#### 3.2 UNPACKING AND INSPECTING EQUIPMENT

When unpacking equipment, make a visual inspection for evidence of damage incurred during shipment. The GI 102A and GI 106A indicators are manufactured by Mid-Continent Instruments (MCI), and both MCI and GARMIN part numbers are listed below. The following parts should be included:

##### Units without Course Datum Option:

Item	MCI Part Number	GARMIN Part Number	Qty
GI 102A (Unit Only)	MD200-202	013-00048-01	1
GI 106A (Unit Only)	MD200-206	013-00049-01	1
Connector Kit (25-pin)	013-00050-00	013-00050-00	1
GI 102A/106A Installation Manual	--	190-00180-00	1

##### Units with Course Datum Option:

Item	MCI Part Number	GARMIN Part Number	Qty
GI 102A Unit w/Course Datum Option	MD200-203	013-00048-11	1
GI 106A Unit w/Course Datum Option	MD200-207	013-00049-11	1
Connector Kit (9-pin and 25-pin)	013-00050-10	013-00050-10	1
GI 102A/106A Installation Manual	--	190-00180-00	1

#### 3.3 MOUNTING THE GI 102A/106A INDICATOR

Plan a location in the aircraft for the GI 102A/106A course deviation indicator to be mounted as close to the pilot's field of view as possible. Avoid mounting close to heater vents or other high heat sources. Allow a clearance of at least 3 inches from back of unit for plug removal.

The indicator is secured in place behind the panel since it is designed for rear mount only. Make a panel cutout as shown in Figure 3-1. Secure the indicator in place with three 6-32 x 0.875" screws (not provided). For panel thickness of 0.125" or greater, ensure that the screws protrude a maximum of 0.875" into the unit.

#### 3.4 INSTALLATION LIMITATIONS

Wire the aircraft harness according to the appropriate figure. Use at least 24 AWG wire for all connections. You MUST use shielded wire where shown. Avoid sharp bends and routing cable near high energy sources. Care must be taken to tie the harness away from aircraft controls and cables. Normal installation techniques should be applied.

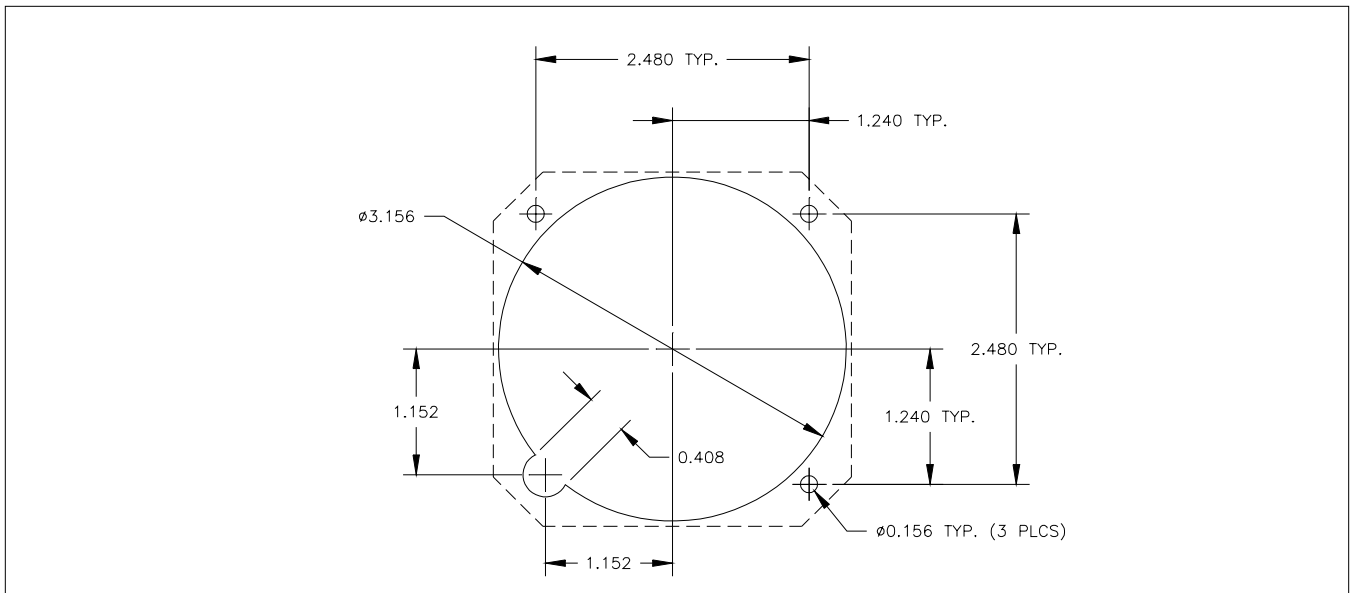


Figure 3-1. Cutout Dimensions for Panel Mounting

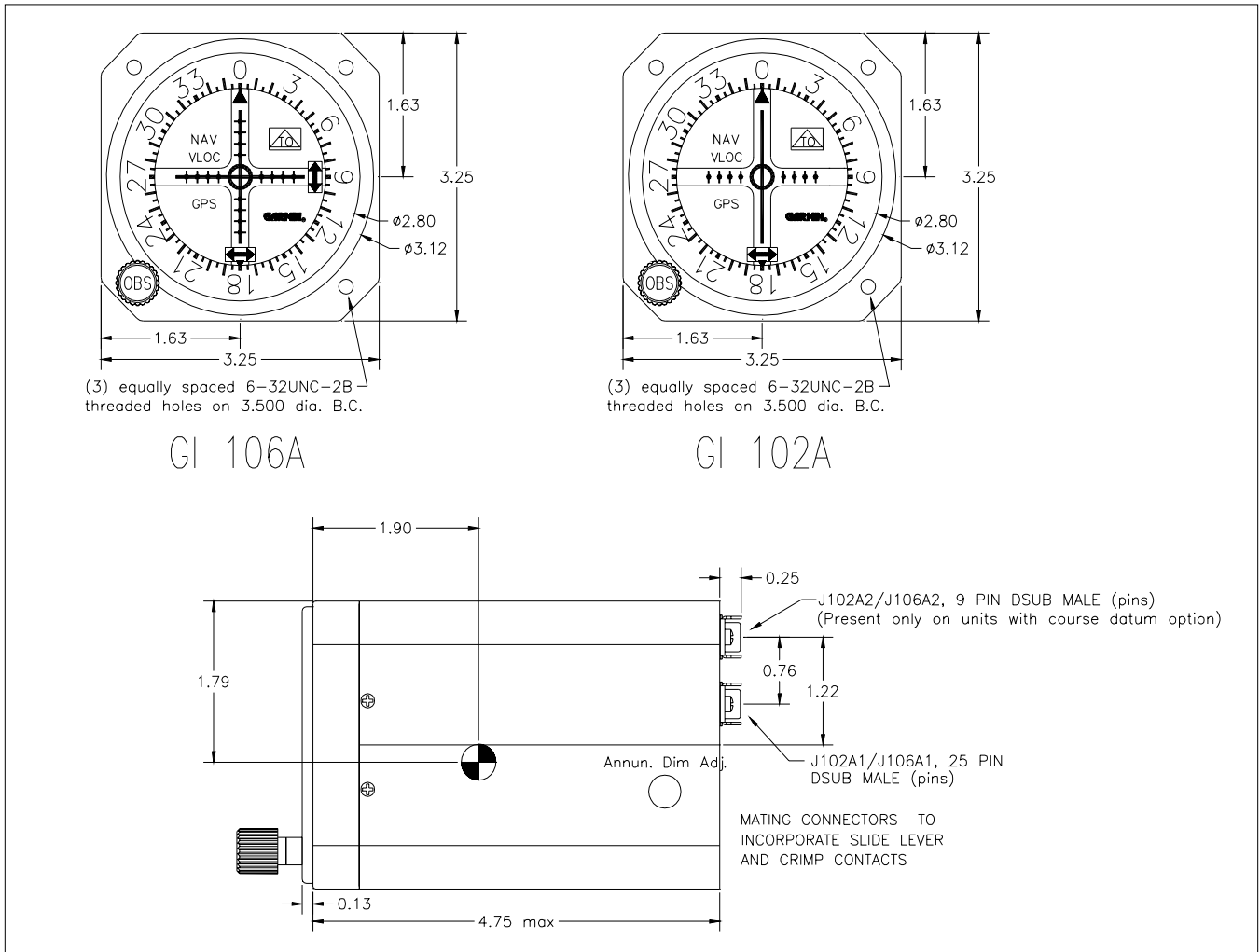


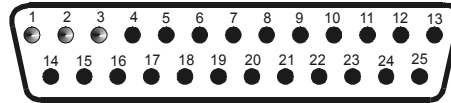
Figure 3-2. GI 102A/106A Outline Drawing

## 4. SYSTEM INTERCONNECTS

### 4.1 PIN FUNCTION LIST

#### 4.1.1 P106A1

View of unit connector J106A1 from back of unit

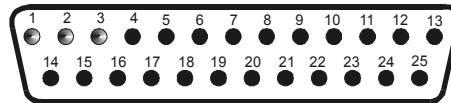


Pin	Pin Name	I/O
1	RESOLVER H	In
2	RESOLVER C	In
3	RESOLVER D	Out
4	RESOLVER F	Out
5	RESOLVER E (NAV COMMON REF)	Out
6	RESOLVER G (NAV COMMON REF)	Out
7	LATERAL +FLAG	In
8	LATERAL -FLAG	In
9	+TO	In
10	+FROM (NAV COMMON REF)	In
11	+LEFT	In
12	+RIGHT (NAV COMMON REF)	In
13	+UP	In
14	+DOWN (GS COMMON REF)	In
15	VERTICAL +FLAG	In
16	VERTICAL -FLAG (GS COMMON REF)	In
17	GPS ANNUNCIATOR (GND = ACTIVE)	In
18	VLOC ANNUNCIATOR (GND = ACTIVE)	In
19	14 VOLT ANNUNCIATOR POWER	In
20	28 VOLT ANNUNCIATOR POWER	In
21	POWER GROUND	In
22	28 VOLT DIMMER/14 VOLT DIMMER LO	In
23	14 VOLT DIMMER	In
24	NAV ANNUNCIATOR (GND = ACTIVE)	In
25	SPARE	--



## 4.1.2 P102A1

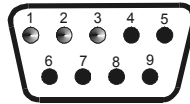
View of unit connector J102A1 from back of unit



Pin	Pin Name	I/O
1	RESOLVER H	In
2	RESOLVER C	In
3	RESOLVER D	Out
4	RESOLVER F	Out
5	RESOLVER E (COMMON REF)	Out
6	RESOLVER G (COMMON REF)	Out
7	LATERAL +FLAG	In
8	LATERAL -FLAG	In
9	+TO	In
10	+FROM (COMMON REF)	In
11	+LEFT	In
12	+RIGHT (COMMON REF)	In
13	NOT USED	--
14	NOT USED	--
15	NOT USED	--
16	NOT USED	--
17	GPS ANNUNCIATOR (GND = ACTIVE)	In
18	VLOC ANNUNCIATOR (GND = ACTIVE)	In
19	14 VOLT ANNUNCIATOR POWER	In
20	28 VOLT ANNUNCIATOR POWER	In
21	POWER GROUND	In
22	28 VOLT DIMMER/14 VOLT DIMMER LO	In
23	14 VOLT DIMMER	In
24	NAV ANNUNCIATOR (GND = ACTIVE)	In
25	SPARE	--

### 4.1.3 P102A2/P106A2 (Units with Course Datum Option Only)

View of unit connector J102A2/J106A2 from back of unit



Pin	Pin Name	I/O
1	COURSE DATUM H	In
2	COURSE DATUM C	In
3	COURSE DATUM X	Out
4	COURSE DATUM Z	Out
5	COURSE DATUM Y	Out
6	SPARE	--
7	SPARE	--
8	SPARE	--
9	SPARE	--

## 4.2 NAVIGATION SOURCE ANNUNCIATORS

The GI 102A/106A is commonly installed so it can alternately display navigation data from a GPS navigator or a VHF navigation receiver (RNAV or VOR/ILS). To aid the pilot in determining the source of displayed navigation data, the GI 102A/106A includes three annunciators on its face: GPS, VLOC, and NAV.

If the GI 102A/106A is used with a GARMIN GNS 430, the navigation source may be selected on the front panel of the GNS 430 unit. When GPS is selected using the CDI key on the GNS 430, the GPS annunciator should also light on the GI 102A/106A. Likewise, if VLOC (VOR/Localizer/Glideslope) is selected using the GNS 430 CDI key, the VLOC annunciator should also light on the GI 102A/106A. The VLOC nomenclature is used for consistency with the display of the GNS 430. Refer to Figure 4-2 for an interconnect that provides for this type of function.

If the GI 102A/106A is shared between a GPS and a VHF navigation receiver, a panel-mounted switch with relay contacts (such as the MD 41 Annunciator/Control Unit) may be used to switch the deviation, flags, and OBS resolver signals. In a case like this, one of the relay contacts should be used to ground the correct pin on the GI 102A/106A and illuminate the GPS or NAV annunciator. Refer to Figure 4-3 for an interconnect that provides for this type of function.

### 4.3 GI 102A/106A INTERCONNECT DRAWINGS

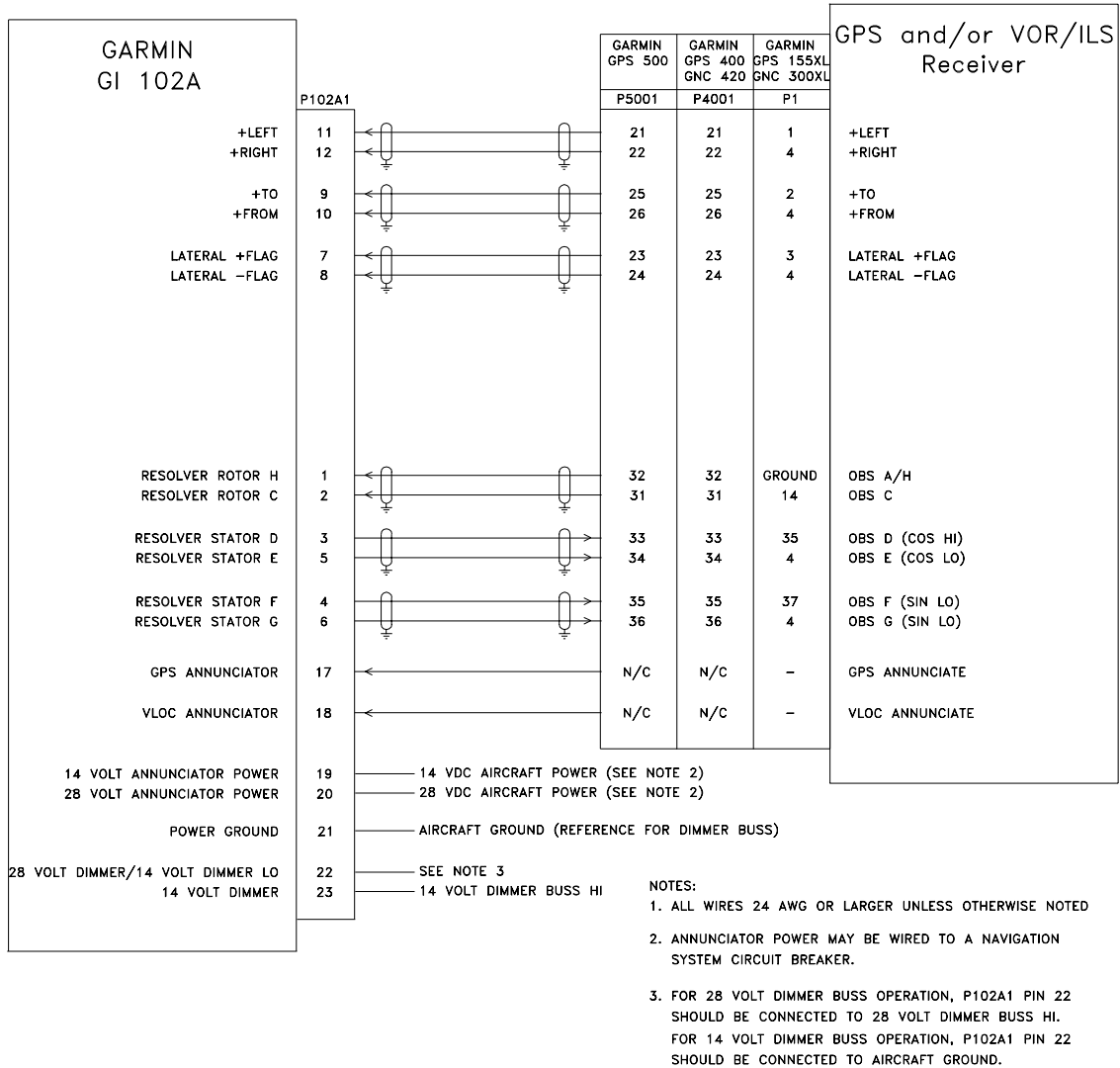


Figure 4-1. GI 102A Interconnect Drawing

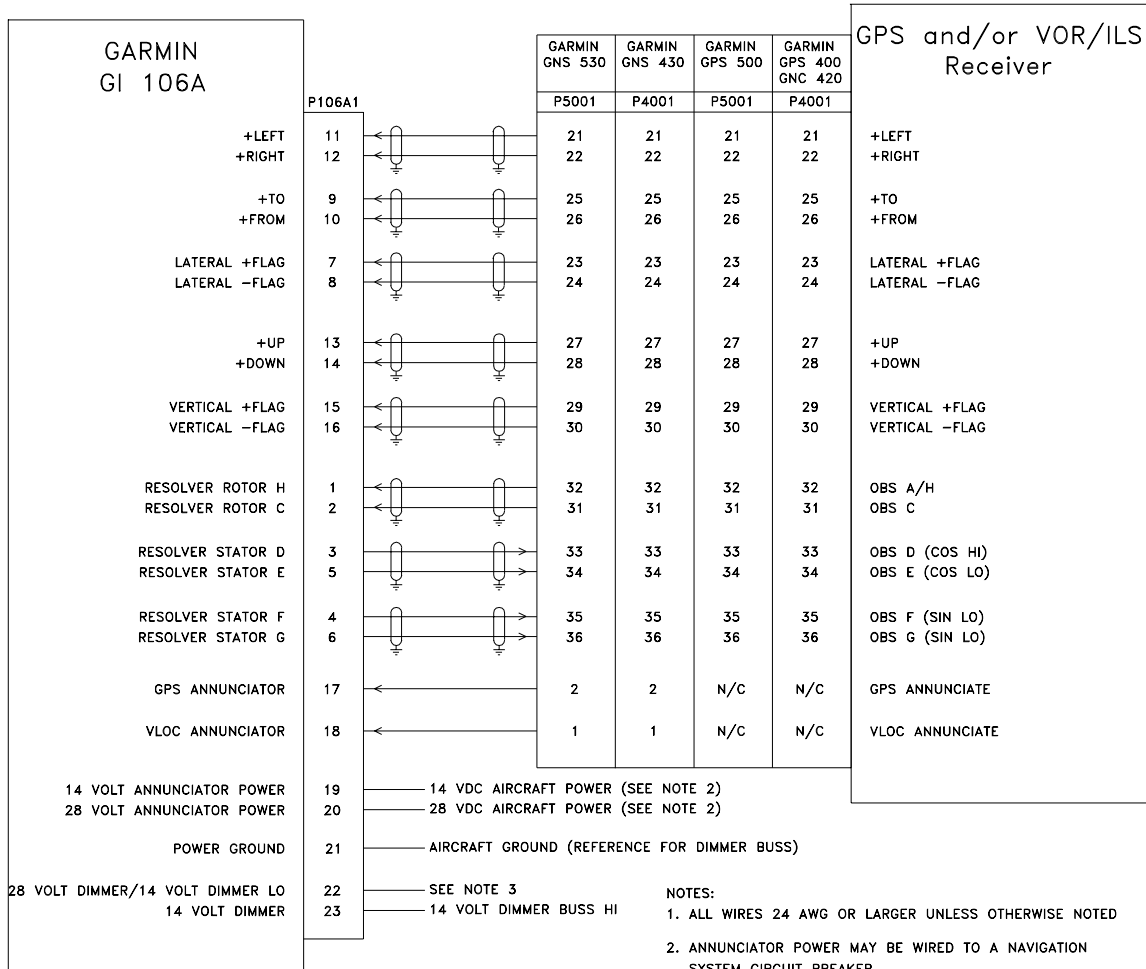


Figure 4-2. GI 106A Interconnect Drawing

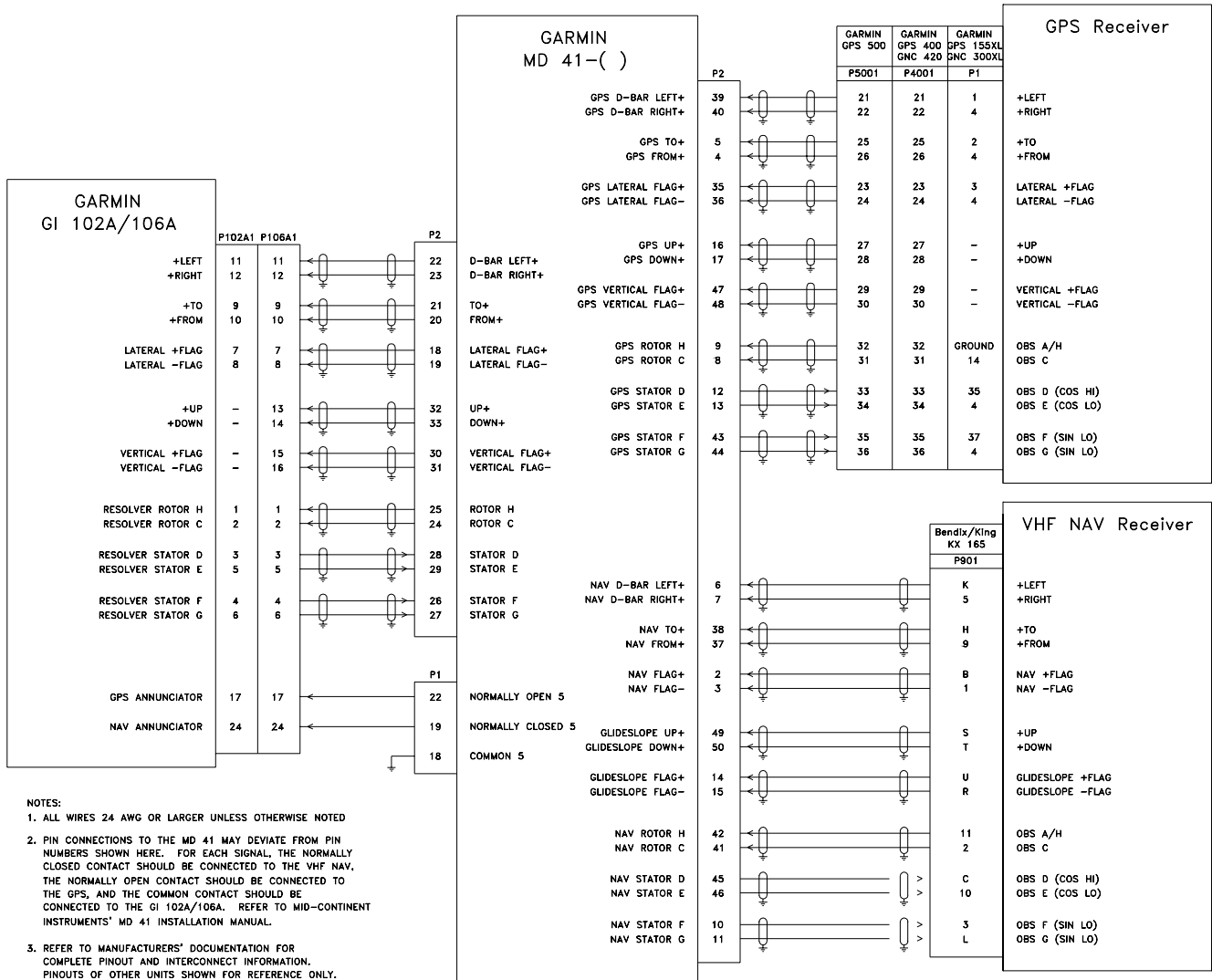


Figure 4-3. GI 102A/106A with NAV/GPS Switching Interconnect Drawing

## **5. POST-INSTALLATION CHECK**

### **5.1 PRE-INSTALLATION TESTS**

With the GI 102A/106A disconnected, turn on the avionics master switch and verify that aircraft power on J102A1/J106A1 pin 19 is 14 Vdc or pin 20 is 28 Vdc. Using an ohmmeter, verify pin 21 is aircraft ground.

### **5.2 ANNUNCIATOR DIMMING ADJUSTMENT**

Following installation of the GI 102A/106A, check the brightness of the GPS, VLOC, and NAV annunciations as necessary with the ambient and aircraft panel lighting levels set to simulate minimum-light night operations. If required, the dimming adjustment is located on the side of the GI 102A/106A unit, and is labelled “ANNUN DIM ADJ”.

### **5.3 OPERATING INSTRUCTIONS**

All controls required to operate the GI 102A/106A course deviation indicator are located on the unit's front panel, on the front panel of the related navigation receiver, and on the associated annunciator/control unit if the aircraft is so equipped.

#### **5.3.1 VOR OPERATION**

Channel the VOR/ILS receiver to the desired VOR frequency and positively identify the station by listening to received audio. Determine the left/right warning flag is out of view.

Flying inbound to a VOR station is accomplished by first rotating the OBS knob to center the deviation indicator, and determining the TO-FROM meter is in the TO condition. The aircraft is then turned to a magnetic heading which is the same as the selected course with proper allowance for wind correction. When the aircraft is on course, the vertical pointer will be centered. If the aircraft moves off course, the deviation indicator will move away from the center position and flying in the direction of pointer deflection (left or right) is required to re-intercept the course.

The procedure for flying outbound from a VOR station is the same as flying inbound, except the OBS knob is first rotated to cause a “FROM” indication to appear with the pointer centered.

To intercept a selected VOR radial (from the station) and fly outbound, turn the OBS control to set the desired radial under the top indicator index. Maneuver the aircraft to fly the selected radial magnetic heading plus or minus 45° which will provide a sufficient intercept angle. The intercept angle should be reduced as the deviation needle approaches an on course condition (center) to prevent excessive course bracketing.

#### **5.3.2 LOCALIZER OPERATION**

Select the desired localizer frequency and observe that the localizer warning flag is concealed. The TO-FROM flag is not functional for localizer operation. When flying on the front course or outbound on the back course make corrections toward the localizer (vertical) needle deflection. The localizer path narrows as the approach end of the runway becomes closer. When flying inbound on the backcourse or outbound on the front course, the corrections are made away from the direction of needle deflection. A helpful hint when flying the localizer is to set the localizer heading on the OBS dial under the lubber line for quick reference.

#### **5.3.3 GLIDESLOPE OPERATION (GI 106A Only)**

The glideslope (horizontal) needle provides the pilot with vertical steering information during ILS approaches. The glideslope circuitry is energized when the associated localizer frequency is selected on the navigation receiver. Observe that the glideslope warning flag is concealed. The glideslope needle deflects towards the direction the pilot must fly to remain on the glide path.

If the glideslope needle deflects upward the aircraft is below the glide path and the pilot must climb to again intercept the glide path and center the needle. If the needle deflects downward the aircraft is above the glide path and the pilot must descend to again intercept the glide path and center the needle. When the needle is centered the aircraft is on the glide path.

## Appendix A. ENVIRONMENTAL QUALIFICATION FORM, RTCA / DO-160B

**NOMENCLATURE:** MD200-( ) COURSE DEVIATION INDICATOR

**MODEL NO:** MD200-( )

**TSO COMPLIANCE:** C40c (VOR)  
C36e (Localizer)  
C34e (Glideslope, MD200-206 and MD200-207 only)

**MANUFACTURER'S TEST SPECIFICATION:**  
MPS 8014565

**MANUFACTURER:** Mid-Continent Instrument Co., Inc.

**ADDRESS:** 9400 E. 34th Street N., Wichita, Kansas 67226

**PHONE:** (316) 630-0101

Conditions	Section	Description of Conducted Tests
Temperature and Altitude	4.0	Equipment tested to Categories F2 except as noted  Not Tested Not Tested
Low Temperature	4.5.1	
High Temperature	4.5.2 & 4.5.3	
Altitude	4.6.1	
Decompression	4.6.2	
Overpressure	4.6.3	
Temperature Variation	5.3	Equipment tested to Category B
Humidity	6.0	Equipment tested to Category A
Shock	7.0	Equipment tested per DO-160B 6 G 15 G
Operational	7.2.1	
Crash Safety	7.3.1	
Vibration	8.0	Equipment tested without shockmounts to Categories M and N (Table 8-1)
Explosion	9.0	Equipment identified as Category X, no test required
Waterproofness	10.0	Equipment identified as Category X, no test required
Fluids Susceptibility	11.0	Equipment identified as Category X, no test required
Sand and Dust	12.0	Equipment identified as Category X, no test required
Fungus	13.0	Equipment identified as Category X, no test required
Salt Spray	14.0	Equipment identified as Category X, no test required
Magnetic Effect	15.0	Equipment tested to Class Z
Power Input	16.0	Equipment tested to Category B
Voltage Spike	17.0	Equipment tested to Category B
Audio Frequency Susceptibility	18.0	Equipment tested to Category B
Induced Signal Susceptibility	19.0	Equipment tested to Category B
Radio Frequency Susceptibility	20.0	Equipment tested to Category B
Radio Frequency Emissions	21.0	Equipment tested to Category B
Lightning Induced Transient Susceptibility	22.0	Equipment identified as Category X, no test required
Lightning Direct Effects	23.0	Equipment identified as Category X, no test required
Icing	24.0	Equipment identified as Category X, no test required