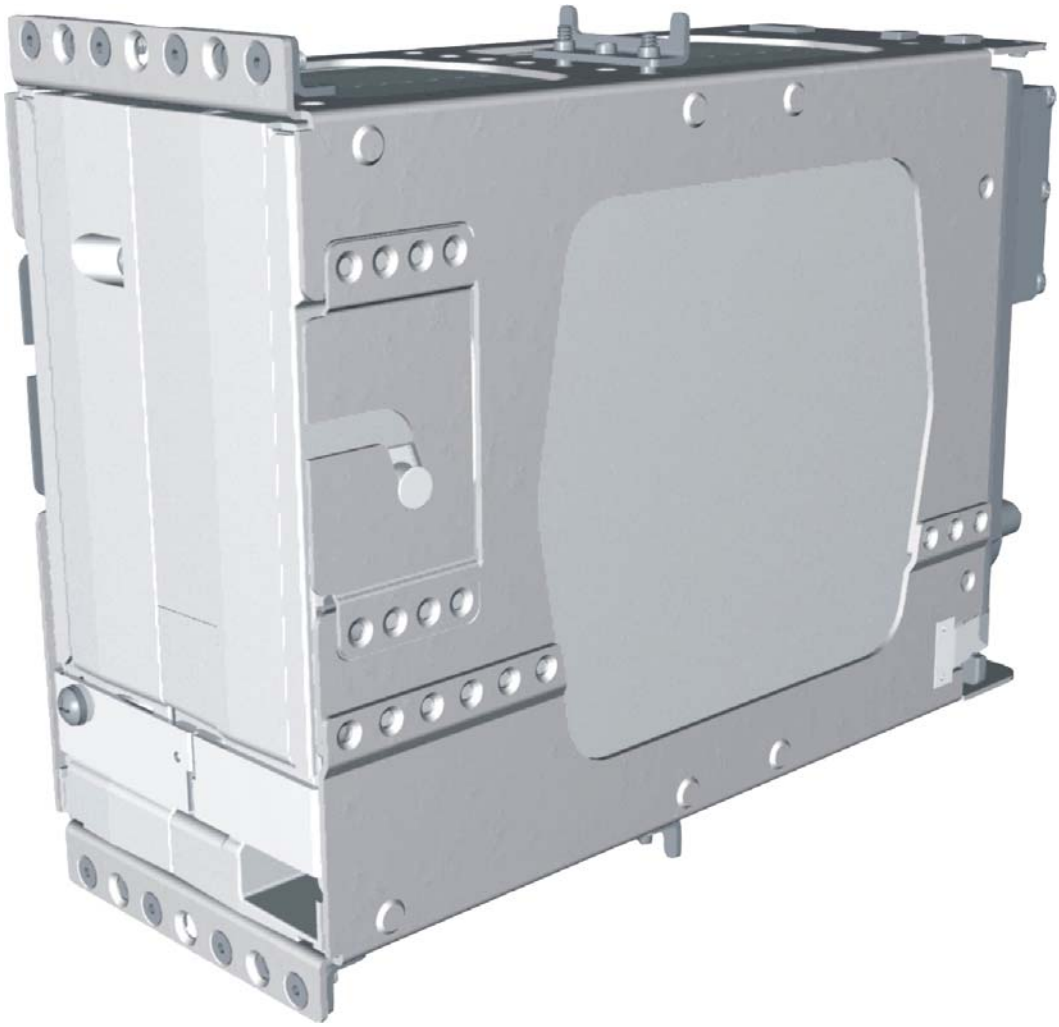
GARMIN

GIA 63/GIA 63W
Installation Manual



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RECORD OF REVISIONS

Revision	Revision Date	Description
A	11/15/04	Production Release
B	3/16/05	Updated pinout list, removed EQF and ETSO 2C37e deviation
C	6/23/05	Added additional interconnects, TSO-C9c, and TSO-C52b
D	10/26/05	Added TSO-C151b and boot block instructions
E	6/8/06	Edited document to include the GIA 63W
F	7/21/06	Corrected WAAS TSO
G	9/19/06	Added RTCA/DO-229C deviation
H	10/18/06	Added Comant antennas
J	4/10/07	Added Comant antenna and revised ICAW
K	6/6/07	Added the 011-01105-01 unit
L	8/23/07	Changed operational limitations and added antennas
M	2/29/08	Added ETSO information
N	5/27/09	Added TSO-C92c and other TSO info
P	09/09/09	Added Level A CLD information
Q	12/29/09	Added antenna note
R	03/23/10	Added standalone rack info

CURRENT REVISION DESCRIPTION

Revision	Page Number(s)	Section Number	Description of Change
R	1-3	1.4.2	Added standalone rack info
	2-1	2.1, 2.1.2	Added standalone rack info
	2-2	2.1.3	Added hardware items
	2-13	2.8, 2.8.1	Updated for standalone rack
	2-14, 2-15	2.8.2	Added standalone rack info and Figures 2-3 and 2-4
	3-1	3.2	Updated items in Table 3-2
	3-3	3.6	Updated for standalone rack
	B-1, B-3	Appdx B	Updated drawings for modular rack
	B-5, B-7	Appdx B	Added drawings for standalone rack

DOCUMENT PAGINATION

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This manual reflects the operation of main software version 5.31 for the GIA 63 and main software version 6.00 for the GIA 63W. Some differences in operation may be observed when comparing the information in this manual to earlier or later software versions.

INFORMATION SUBJECT TO EXPORT CONTROL LAWS

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WARNING

This product, its packaging, and its components contain chemicals known to the State of California to cause cancer, birth defects, or reproductive harm. This Notice is being provided in accordance with California's Proposition 65. If you have any questions or would like additional information, please refer to our web site at www.garmin.com/prop65.

WARNING

Perchlorate Material – special handling may apply, See www.dtsc.ca.gov./hazardouswaste/perchlorate.

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The following table identifies hardware modification (Mod) Levels for the GIA 63. Mod Levels are listed with the associated service bulletin number, service bulletin date, and the purpose of the modification. The table is current at the time of publication of this manual (see date on front cover) and is subject to change without notice. Authorized Garmin Sales and Service Centers are encouraged to access the most up-to-date bulletin and advisory information on the Garmin Dealer Resource web site at www.garmin.com using their Garmin-provided user name and password.

APPLICABLE LRU PART NUMBER	MOD LEVEL	SERVICE BULLETIN NUMBER	SERVICE BULLETIN DATE	PURPOSE OF MODIFICATION
011-00781-00	1	0416	9/13/2004	This modification consists of modifying the voice alert audio output circuit, enabling it to power down when not in use.
	2	0418	9/8/2004	This Service Bulletin consists of visually inspecting the GIA 63 Main2 board for incorrectly installed capacitors.
	3	0505	1/19/2005	This modification addresses a potential GIA 63 COM transceiver interference condition.
	4	N/A	N/A	More robust capacitors installed in the power supply backup circuit.
011-00781-01	1	N/A	N/A	More robust capacitors installed in the power supply backup circuit.

GIA 63W HARDWARE MOD LEVEL HISTORY

The following table identifies hardware modification (Mod) Levels for the GIA 63W. Mod Levels are listed with the associated service bulletin number, service bulletin date, and the purpose of the modification. The table is current at the time of publication of this manual (see date on front cover) and is subject to change without notice. Authorized Garmin Sales and Service Centers are encouraged to access the most up-to-date bulletin and advisory information on the Garmin Dealer Resource web site at www.garmin.com using their Garmin-provided user name and password.

APPLICABLE LRU PART NUMBER	MOD LEVEL	SERVICE BULLETIN NUMBER	SERVICE BULLETIN DATE	PURPOSE OF MODIFICATION
011-01105-00	1	N/A	N/A	More robust capacitors installed in the power supply backup circuit.

1 GENERAL DESCRIPTION

1.1 Introduction

This manual presents mechanical and electrical installation requirements for installing the GIA 63(W) as part of a Garmin Integrated Flight Deck. The GIA 63(W) can be integrated into a variety of airframes under an appropriate TC or STC. Each airframe installation may vary. Use only approved (type or supplemental type) data for specific installation instructions in a particular aircraft.

1.2 Equipment Description

The GIA 63(W) is a microprocessor-based input/output Line Replaceable Unit (LRU) used in a Garmin Integrated Flight Deck. The GIA 63(W) communicates with the GDU via Ethernet high-speed data bus (HSDB), and with other LRUs using RS-232, RS-485/422, and ARINC 429. All configuration is done through the GDU. The GIA 63(W) contains the following sub-assemblies:

- A main processor that interfaces with all LRUs in the G1000 sub-system and performs calculations for the GFC 700 autopilot (if equipped).
- A twelve channel parallel GPS receiver that simultaneously tracks and uses up to 12 satellites. The GIA 63W includes a 15 channel WAAS certified GPS receiver.
- A VHF COM transceiver that provides tuning from 118.00 to 136.992 MHz in 25 kHz or 8.33 kHz spacing for 760 or 2280 channel configuration respectively.
- A VOR/ILS localizer receiver that provides tuning from 108.00 to 117.95 MHz in 50 kHz increments.
- An ILS glideslope receiver that provides tuning from 328.6 to 335.4 MHz as paired with the frequency tuned on the VOR/ILS localizer receiver.

CAUTION

The operation of unapproved cellular telephones or other unapproved cellular devices aboard aircraft while airborne is prohibited by FCC rules. Due to the potential for interference with onboard systems, the operation of unapproved cellular communication devices while onboard an aircraft that is on the ground is subject to FAA regulations 14 CFR 91.21.

FCC regulation 47 CFR 22.925 prohibits airborne operation of unapproved cellular telephones installed in or carried aboard aircraft. Unapproved cellular telephones must not be operated aboard any aircraft while the aircraft is off the ground. When any aircraft leaves the ground, all unapproved cellular telephones on board that aircraft must be turned off.

Unapproved cellular telephones that are on, even in a monitoring state, can disrupt GPS performance.

1.3 Interface Summary

1.3.1 Primary Interfaces

The GIA 63(W) is designed as an open architecture system that provides the following interfaces:

- 1 dedicated Ethernet High-Speed Data Bus (HSDB) input/output channel
- 2 Controller Area Network (CAN) I/O channels
- 8 Main ARINC 429 inputs
- 3 Main ARINC 429 outputs
- 1 VOR/ILS ARINC 429 input
- 1 VOR/ILS ARINC 429 output
- 5 RS-485 input/output channels (2 channels are configurable to RS-422)
- 8 RS-232 input/output channels
- 41 Discrete inputs
- 14 Discrete outputs

1.3.2 Additional Interfaces

The GIA 63(W) can provide interfaces for the following additional equipment:

- Autopilot
- Altitude encoder/serializer
- Fuel management systems
- Lightning detection systems
- Traffic awareness systems
- Data link systems
- External annunciators
- DME (including King Serial)
- ADF

1.4 Technical Specifications

1.4.1 Environmental Qualification Form

It is the responsibility of the installing agency to obtain the latest revision of the GIA 63(W) Environmental Qualification Form. This form is available directly from Garmin under the following part number:

GIA 63 Environmental Qualification Form, Garmin part number 005-00148-02
GIA 63W Environmental Qualification Form, Garmin part number 005-00235-00

To obtain a copy of this form, see the dealer/OEM portion of the Garmin web site (www.garmin.com).

1.4.2 Physical Characteristics

Characteristics	Specifications
Modular Rack Width	3.83 inches (9.73 cm)
Modular Rack Height	7.26 inches (18.44 cm)
Standalone Rack Width	3.88 inches (9.86 cm)
Standalone Rack Height	6.91 inches (17.55 cm)
Depth w/connectors (Modular and Standalone)	10.20 inches (25.91 cm)
Unit Weight	5.3 lbs. (2.40 kg)
Modular Rack & Connector Weight	1.9 lbs. (0.86 kg)
Standalone Rack & Connector Weight	2.2 lbs. (1.01 kg)

1.4.3 General Specifications

For detailed specifications, see the Environmental Qualification Form.

Characteristics	Specifications
Operating Temperature Range	-40°C to +65°C. For more details see Environmental Qualification Form.
Humidity	95% non-condensing
Altitude Range	-1,500 ft to 50,000 ft

1.4.4 GPS Specifications (GIA 63 only)

Characteristics	Specifications
Acquisition Time	a) Search-the-Sky (without almanac, without initial position or time): 5 minutes b) AutoLocate™ (with almanac, without initial position or time): 5 minutes c) Cold Start (position known to 300 nm, time known to 10 minutes, with valid almanac): 45 seconds d) Warm Start (position known to 10 nm, time known to 10 minutes, with valid almanac and ephemeris): 15 seconds
Max Velocity	1000 knots
Dynamics	6 g
Antenna power supply	20 mA typical, 40 mA max at 4.6 VDC

1.4.5 WAAS Specific GPS Specifications (GIA 63W only)

Characteristics	Specifications
Number of channels	15 (12 GPS and 3 GPS/WAAS/SBAS)
Frequency	1575.42 MHz L1, C/A code
Sensitivity (acquisition)	-116 dBm to -134.5 dBm GPS -116 dBm to -134.5 dBm WAAS
Sensitivity (drop lock)	-144 dBm
Lat/Long position accuracy	<1.25 meter RMS horizontal, <2 meter vertical, with WAAS
Velocity	1000 knots maximum (above 60,000 ft)
TTFF (time to first fix)	1:45 min. typical with current almanac, position, and time
Reacquisition	10 seconds typical for signal outages of 30 seconds or less
Position update interval	0.2 sec (5 Hz)
1 pps (pulse per second)	±275 nsec of UTC second during steady-state navigation
Datum	WGS-84
SATCOM compatibility	Compatible on aircraft equipped with SATCOM (see Section 2.1.3.2 for SATCOM compatible antennas)
Antenna power supply at GPS port	Vout = 4.6V+/- 0.3 VDC, min 4.3V at 60mA

1.4.6 COM Transceiver Specifications

Characteristics	Specifications
Audio Output	100 mW minimum into a 500 Ω load.
Audio Response	Less than 6 dB of variation between 350 and 2500 Hz.
Audio Distortion	The distortion in the receiver audio output shall not exceed 25% at all levels up to 100 mW.
AGC Characteristics	The audio output shall not vary by more than 6 dB when the level of the RF input signal, modulated 30% at 1000 Hz, is varied from 5 μV to 100,000 μV (hard).
Sensitivity	(S+N)/N on all channels shall be greater than 6 dB when the RF level is 2 μV (hard) modulated 30% at 1000 Hz at rated audio.
Squelch	2 μv (hard) ±6 dB for 25 kHz channels. 3 μv (hard) ±6 dB for 8.33 kHz channels.
Selectivity	6 dB BW is greater than ±8 kHz for 25 kHz channeling. 60 dB BW is less than ±25 kHz for 25 kHz channeling. 6 dB BW is greater than ±2.778 kHz for 8.33 kHz channeling. 60 dB BW is less than ±7.37 kHz for 8.33 kHz channeling.
Spurious Response	Greater than 80 dB.
Transmitter Power	At Least 16 watts.
Transmitter Duty Cycle	Recommended 10% maximum.
Modulation Capability	The modulation shall not be less than 70% and not greater than 98% with a standard modulator signal applied to the transmitter.
Carrier Noise Level	Shall be at least 45 dB (S+N)/N.
Frequency Stability	0.0005%
Demodulated Audio Distortion	Less than 10% distortion when the transmitter is modulated at least 70%.
Sidetone	1.4 V_{RMS} into a 500 Ω load when the transmitter is modulated at least 70%.
Demodulated Audio Response	Shall be less than 6 dB when the audio input frequency is varied from 350 to 2500 Hz.

1.4.7 VOR Specifications

Characteristics	Specifications
Receiver Audio Sensitivity	At -103.5 dBm (S+N)/N shall not be less than 6 dB.
Course Deviation Sensitivity	At –103.5 dBm deviation output shall not be less than 60% of standard deflection (90 mV) when a VOR deviation test signal is applied (10 degrees course difference).
Flag	The VLOC Course Deviation Flag must be flagged: a) in the absence of an RF signal. b) in the absence of the 9960 Hz modulation. c) in the absence of either one of the two 30 Hz modulations. d) When the level of a standard VOR deviation test signal produces less than a 50% of standard deflection.
AGC Characteristics	From -99 dBm to -13 dBm input of a Standard VOR Audio Test Signal, audio output levels shall not vary more than 3 dB.
Spurious Response	Greater than 60 dB.
VOR OBS Bearing Accuracy	The bearing information as presented to the pilot shall not have an error in excess of 2.7° as specified by RTCA DO-196 and EuroCAE ED-22B.
Audio Output	A minimum 100 mW into a 500 Ω load.
Audio Response	Less than 6 dB of variation between 350 and 2500 Hz. In voice mode, an ident tone of 1020 Hz shall be attenuated at least 20 dB.
Audio Distortion	The distortion in the receiver audio output shall not exceed 10% at all levels up to 100 mW.
Selectivity	6 dB BW is greater than 16.5 kHz.

1.4.8 LOC Specifications

Characteristics	Specifications
Receiver Audio Sensitivity	At -103.5 dBm (S+N)/N shall not be less than 6 dB.
Course Deviation Sensitivity	At –103.5 dBm, deviation output shall not be less than 60% of standard deflection when a LOC deviation test signal is applied.
Flag	The VLOC Course Deviation Flag must be flagged: a) When the level of a standard deviation test signal produces 50% or less of standard deflection of the deviation indicator. b) In the absence of 150 Hz modulation. c) In the absence of 90 Hz modulation. d) In the absence of both 90 Hz and 150 Hz modulation. e) In the absence of RF.
AGC Characteristics	From –99 dBm and –13 dBm input of a Standard VOR Audio Test Signal, audio output levels shall not vary more than 3 dB.
Selectivity	6 dB BW is greater than 9 kHz. 69 dB BW is less than 36 kHz.
Standard Deflection	a) With a standard deflection 'FLY LEFT' condition (90 Hz dominant), the output shall be +90 mV ± 9 mV. b) With a standard deflection 'FLY RIGHT' condition (150 Hz dominant), the output shall be -90 mV ± 9 mV.
Spurious Response	Greater than 60 dB.
Centering Accuracy	Typical 0 ± 3 mV (Max error 9.9 mV per RTCA DO-195).
Audio Output	A minimum 100 mW into a 500 Ω load.
Audio Response	Less than 6 dB of Variation between 350 and 2500 Hz. In voice mode, an ident tone of 1020 Hz shall be attenuated at least 20 dB.
Audio Distortion	The distortion in the receiver audio output shall not exceed 10% at all levels up to 100 mW.

1.4.9 Glideslope Specifications

Characteristics	Specifications
Sensitivity	At –93 dBm, deviation output shall not be less than 60% of standard deflection when glideslope deviation test signal is applied.
Centering Accuracy	0 ± .0091 ddm or 0 ± 7.8 mV.
Selectivity	6 dB BW is greater than 17 kHz. 69 dB BW is less than 132 kHz.
Standard deflection	a) With a standard deflection 'FLY DOWN' condition (90 Hz dominant), the output shall be -78 mV ± 7.8 mV. b) With a standard deflection 'FLY UP' condition (150 Hz dominant), the output shall be +78 mV ± 7.8 mV.
Flag	The GS Course Deviation Flag must be flagged: a) When the level of a standard deviation test signal produces 50% or less of standard deflection of the deviation indicator. b) In the absence of 150 Hz modulation. c) In the absence of 90 Hz modulation. d) In the absence of both 90 Hz and 150 Hz modulation. e) In the absence of RF.

1.4.10 Power Requirements

Characteristics	Specifications
Input Voltage Range	28 Vdc for J601 14/28 Vdc for J605 See the Environmental Qualification Form for details on surge ratings and minimum/maximum operating voltages.
Power Requirements for P601 (COM Connector)	0.3 A max @ 27.5 Vdc (not transmitting); 4.3 A max @ 27.5 Vdc (transmitting)
Superflag Power Requirements for P605 (Main 2 Connector)	Power depends upon loads present on Superflag output pins (see Sections 4.7.2.1 and 4.10.7)
Power Requirements for P605 (Main 2 Connector)	1.0 A @ 27.5 Vdc (Without Superflags Active) 2.0 A @ 13.75 Vdc (Without Superflags Active)

1.4.11 Power Interrupt

Unit Name	Unit Part Number	Mod Status*	Long Term Power Interrupt Category Per RTCA DO-160D**
GIA 63	011-00781-00	4	A (200mS)
		0, 1, 2, 3	B (50mS)
	011-00781-01	1	A (200mS)
		0	B (50mS)
GIA 63W	011-01105-00	1	A (200mS)
		0	B (50mS)
	011-01105-01	0	A (200mS)

* Refer to Mod Status Table in front of manual for applicable mod levels.

** Refer to the Section 3.8 for Continued Airworthiness.

1.5 License Requirements

The Telecommunications Act of 1996, effective February 8, 1996, provides the FCC discretion to eliminate radio station license requirements for aircraft and ships. The GIA 63(W) installation must comply with current transmitter licensing requirements. To find out the specific details on whether a particular installation is exempt from licensing, please visit the FCC web site http://wireless.fcc.gov/aviation.

Transmitter Description:	Aviation-band VHF transceiver with 25 and 8.33 kHz channel spacing.
Antenna Characteristics:	Broad band, 50 ohm, vertically polarized.
Rated Power:	16 Watts
Emission Type:	6K00A3E
Frequency of Operation:	118.00 – 136.992 MHz

If an aircraft license is required, make application for a license on FCC form 404, application for Aircraft Radio Station License. The FCC also has a fax-on-demand service to provide forms by fax. The GIA 63(W) owner accepts all responsibility for obtaining the proper licensing before using the transmitter.

International transmitter license procedures vary by country. Contact the local spectrum agency for license requirements.

CAUTION

The VHF transmitter in this equipment is guaranteed to meet federal communications commission acceptance over the operating temperature range. Modifications not expressly approved by Garmin could invalidate the license and make it unlawful to operate the equipment.

1.6 Certification

The GIA 63 GPS receiver is certified for IFR enroute, terminal, and non-precision approaches. The GIA 63W GPS receiver is WAAS certified.

The GIA 63(W) has been qualified to RTCA/DO-160 Section 20 RF susceptibility and Section 22 lightning requirements. Special installation considerations are required, refer to the Environmental Qualification Form.

The GIA 63(W) meets the requirements for GPS as a Primary Means of Navigation for Oceanic/Remote Operations per FAA Notice N8110.60.

The GIA 63(W) is eligible for B-RNAV in accordance with AMC 20-4.

Eligible for PRNAV in accordance with PRNAV requirements: JAA Administrative & Guidance Material Section One: General Part 3: Temporary Guidance Leaflets, Leaflet No 10: Airworthiness and Operational Approval for Precession RNAV Operations in Designated European Airspace 7.1 Required Functions.

The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in an aircraft. The article may be installed only if performed under 14 CFR part 43 or the applicable airworthiness requirements. At the time of publication, installations of this TSO approved article are only approved when installed in an aircraft as part of a Garmin Integrated Flight Deck.

1.6.1 GIA 63 TSO/ETSO Compliance

Function	TSO/ETSO	Category	Applicable LRU SW Part Numbers		Applicable CLD Part Numbers
Automatic Pilots	TSO-C9c ETSO-C9c		All 006-B0190-() except 006-B0190-00 through 006-B0190-19		006-C0046-() 006-C0044-() 006-C0047-() 006-C0039-01
Glideslope Receiver	TSO-C34e ETSO-2C34f		All 006-B0190-() except 006-B0190-00 through 006-B0190-04	006-B0083-01	006-C0046-() 006-C0044-() 006-C0047-() 006-C0039-01
Localizer Receiver	TSO-C36e ETSO-2C36f	Class A	All 006-B0190-() except 006-B0190-00 through 006-B0190-04	006-B0082-02	006-C0046-() 006-C0044-() 006-C0047-() 006-C0039-01 006-C0053-00
VHF COM Transmitter	TSO-C37d ETSO-2C37e	Class 3 and 5	All 006-B0190-() except 006-B0190-00 through 006-B0190-04	All 006-B0081-() except 006-B0081-00 through 006-B0081-04	006-C0046-() 006-C0044-() 006-C0047-()
VHF COM Receiver	TSO-C38d ETSO-2C38e	Class C and E			006-C0039-01
VOR Receiver	TSO-C40c ETSO-2C40c		All 006-B0190-() except 006-B0190-00 through 006-B0190-04	006-B0082-02	006-C0046-() 006-C0044-() 006-C0047-() 006-C0039-01 006-C0053-00
Flight Director Equipment	TSO-C52b ETSO-C52b		All 006-B0190-() except 006-B0190-00 through 006-B0190-19		006-C0046-() 006-C0044-() 006-C0047-() 006-C0039-01
Ground Proximity Warning – Glide Slope Deviation Alerting Equipment	TSO-C92c		All 006-B0190-() except 006-B0190-00 through 006-B0190-29		006-C0046-() 006-C0044-() 006-C0047-() 006-C0039-01
GPS	TSO-C129a ETSO-C129a	Class A1	All 006-B0190-() except 006-B0190-00 through 006-B0190-04	006-B0093-00 006-B0093-01	006-C0046-() 006-C0044-() 006-C0047-()
TAWS	TSO-C151b	Class A and B	All 006-B0190-() except 006-B0190-00 through 006-B0190-29		006-C0046-() 006-C0044-()
	ETSO-C151a	Class B			006-C0047-() 006-C0039-01

1.6.2 GIA 63W TSO/ETSO Compliance

Function	TSO/ETSO	Category	Applicable LRU SW Part Numbers		Applicable CLD Part Numbers
Automatic Pilots	TSO-C9c ETSO-C9c		All 006-B0544-() except 006-B0544-00 through 006-B0544-09		All 006-C0084-() except 006-C0084-00
					006-C0072-()
					006-C0085-()
					All 006-C0039-() except 006-C0039-00 through 006-C0039-02
Glideslope Receiver	TSO-C34e ETSO-2C34f		All 006-B0544-() except 006-B0544-00 through 006-B0544-09	All 006-B0083-() except 006-B0083-00 through 006-B0083-01	All 006-C0084-() except 006-C0084-00
					006-C0072-()
					006-C0085-()
					All 006-C0039-() except 006-C0039-00 through 006-C0039-02
Localizer Receiver	TSO-C36e ETSO-2C36f	Class A	All 006-B0544-() except 006-B0544-00 through 006-B0544-09	All 006-B0082-() except 006-B0082-00 through 006-B0082-02	All 006-C0084-() except 006-C0084-00
					006-C0072-()
					006-C0085-()
					All 006-C0039-() except 006-C0039-00 through 006-C0039-02
					All 006-C0053-() except 006-C0053-00

GIA 63W TSO/ETSO Compliance, Continued					
Function	**TSO/ETSO**	**Category**	**Applicable LRU SW Part Numbers**		**Applicable CLD Part Numbers**
VOR Receiver	TSO-C40c ETSO-2C40c		All 006-B0544-() except 006-B0544-00 through 006-B0544-09	All 006-B0082-() except 006-B0082-00 through 006-B0082-02	All 006-C0084-() except 006-C0084-00
					006-C0072-()
					006-C0085-()
					All 006-C0039-() except 006-C0039-00 through 006-C0039-02
					All 006-C0053-() except 006-C0053-00
Flight Director Equipment	TSO-C52b ETSO-C52b		All 006-B0544-() except 006-B0544-00 through 006-B0544-09		All 006-C0084-() except 006-C0084-00
					006-C0072-()
					006-C0085-()
					All 006-C0039-() except 006-C0039-00 through 006-C0039-02
Ground Proximity Warning – Glide Slope Deviation Alerting Equipment	TSO-C92c		All 006-B0544-() except 006-B0544-00 through 006-B0544-09		All 006-C0084-() except 006-C0084-00
					006-C0072-()
					006-C0085-()
					All 006-C0039-() except 006-C0039-00 through 006-C0039-02
Airborne Navigation Sensors Using the Global Positioning System Augmented by the Wide Area Augmentation System*	TSO-C145a ETSO-C145	Class 3	All 006-B0544-() except 006-B0544-00 through 006-B0544-09	All 006-B0339-() except 006-B0339-00 through 006-B0339-03	All 006-C0084-() except 006-C0084-00
					006-C0072-()
					006-C0085-()

GIA 63W TSO/ETSO Compliance, Continued					
Function	**TSO/ETSO**	**Category**	**Applicable LRU SW Part Numbers**		**Applicable CLD Part Numbers**
TAWS	TSO-C151b	Class A and B	All 006-B0544-() except 006-B0544-00 through 006-B0544-09		All 006-C0084-() except 006-C0084-00
					006-C0072-()
					006-C0085-()
	ETSO-C151a	Class B			All 006-C0039-() except 006-C0039-00 through 006-C0039-02
VHF Radio Communications – Transceiver Equipment	TSO-C169 Equivalent to ETSO-2C37e & ETSO-2C38e	Class 3 and 5 (transmitter) Class C and E (receiver)	All 006-B0544-() except 006-B0544-00 through 006-B0544-09	All 006-B0081-() except 006-B0081-00 through 006-B0081-04	All 006-C0084-() except 006-C0084-00
					006-C0072-()
					006-C0085-()
					All 006-C0039-() except 006-C0039-00 through 006-C0039-02

* GIA63W ARINC output labels 310 and 311 are not to be used as navigation data per RTCA/DO-229c.

1.6.3 GIA 63 TSO/ETSO Deviations

TSO/ETSO	Deviation
TSO-C9c	1. Garmin was granted a deviation from TSO-C9c to use SAE AS 402B instead of AS-402A.
	2. Garmin was granted a deviation from TSO-C9c to use DO-160D instead of specified environmental tests.
	3. Garmin was granted a deviation from TSO-C9c subpart A (c), which requires marking the weight of the unit on the unit. Garmin will provide this information in the installation manual in lieu of marking on the serial tag. Garmin does not currently list the weight on other avionics units.
	4. Garmin was granted a deviation from SAE AS 402B paragraph 4.4.1 to limit autopilot engagement to attitudes considered safe for the certified aircraft.
	5. Garmin was granted a deviation from SAE AS 402B paragraph 4.3.2 to not provide servo effort indications when the automatic pilot is not engaged.
ETSO-C9c	1. Garmin was granted a deviation from ETSO-C9c to use SAE AS-402B instead of AS-402A.
	2. Garmin was granted a deviation from ETSO-C9c to use DO-160D instead of the specified environmental tests.
	3. Garmin was granted a deviation from AS-402B paragraph 4.3.2 to not provide servo effort indications when the automatic pilot is not engaged.
	4. Garmin was granted a deviation from AS-402B paragraph 4.4.1 to limit autopilot engagement to attitudes considered safe for the certified aircraft.
TSO-C34e	1. Garmin was granted a deviation from TSO-C34e to use DO-160D Change 3 instead of DO-160B, and DO-178B instead of DO-178A.
TSO-C36e	1. Garmin was granted a deviation from TSO-C36e to use DO-160D Change 3 instead of DO-160B, and DO-178B instead of DO-178A.
TSO-C37d	1. Garmin was granted a deviation from TSO-C37d to use DO-160D Change 3 instead of DO-160B, and DO-178B instead of DO-178A.
	2. Garmin was granted a deviation from TSO-C37d paragraph (a)(1) to allow using RTCA document DO-186a Change 2 instead of RTCA document DO-186 to specify minimum performance standards.
	3. Garmin was granted a deviation from TSO-C37d by allowing a 6dB reduction of transmitter power during the Normal Operating Conditions - Emergency Operation Voltage as described in RTCA document DO-186a paragraph 2.5.13.1 and RTCA document DO-160C paragraph 16.5.2.1.
	4. Garmin was granted a deviation from TSO-C37d paragraph (a)(5) to allow 8.33 kHz spacing in addition to the 25 kHz spacing.
	5. Garmin was granted a deviation from TSO-C37d paragraph (b)(1) to allow the marking to call out 8.33 kHz spacing in addition to the 25 kHz spacing.
TSO-C38d	1. Garmin was granted a deviation from TSO-C38d to use DO-160D Change 3 instead of DO-160B, and DO-178B instead of DO-178A.
	2. Garmin was granted a deviation from TSO-C38d paragraph (a)(1) to allow using RTCA document DO-186a Change 2 instead of RTCA document DO-186 to specify minimum performance standards.
	3. Garmin was granted a deviation from TSO-C38d paragraph (a)(5) to allow 8.33 kHz spacing in addition to the 25 kHz spacing.
TSO-C40c	1. Garmin was granted a deviation from TSO-C40c to use DO-160D Change 3 instead of DO-160B, and DO-178B instead of DO-178A.
TSO-C52b	1. Garmin was granted a deviation from SAE AS 8008 paragraph 3.6 to limit flight director operation to attitudes considered safe for the certified aircraft.
	2. Garmin was granted a deviation from TSO-C52b to use DO-160D instead of DO-160C.
ETSO-C52b	1. Garmin was granted a deviation from AS-8008 paragraph 3.6 to limit flight director operation to attitudes considered safe for the certified aircraft.

TSO/ETSO Deviations, continued	
TSO/ETSO	**Deviation**
TSO-C92c	1. Garmin was granted a deviation from TSO-C92c to use DO-160D Change 3 instead of DO-160C.
	2. Garmin was granted a deviation from TSO-C92c to not include the version and levels of software or the modification status of hardware in the appliance number.
TSO-C129a	1. Garmin was granted a deviation from TSO-C129a to use DO-160D Change 3 instead of DO-160C.
	2. Garmin was granted a deviation from TSO-C129a to eliminate the annunciation for pending CDI scale change 3.0 NM from the FAF.
	3. Garmin was granted a deviation from TSO-C129a involving the use of GPS calibrated altitude in approach mode based on the enclosed TSO deviation request dated August 24, 1994 and the approval letter dated November 29, 1994.
	4. Garmin was granted a deviation from TSO-C129a to extend automatic CDI sensitivity changes to non-approach mode navigation.
	5. Garmin was granted a deviation from TSO-C129a to eliminate the requirement in (a)(3)(xi)1.b.ii to “alert the pilot of the need to manually insert the barometric pressure”.
	6. Garmin was granted a deviation from TSO-C129a to eliminate the requirement in (a)(3)(xv)4.b to provide a “means to manually identify a satellite that is expected to be unavailable at the destination (for scheduled maintenance as identified in FAA Notice to Airmen) shall be provided” for the RAIM prediction process.
	7. Garmin was granted a deviation from TSO-C129a to change the requirement in (a)(6)(iii) from “The navigation data contains all 1’s or 0’s” to “All data bits in subframe 1, 2, or 3 are 0’s”.
	8. Garmin was granted a deviation from TSO-C129a to change the requirement in paragraph (a)(7)(ii) to match the WAAS TSO-C145a and DO-229 requirements for Power input testing.
ETSO-C129a	1. Garmin was granted a deviation from ED-72A 3.2.2.1.f (list item 3) and 3.2.2.4.j.4 to eliminate the annunciation for pending CDI scale change 3.0 nm from the FAF.
	2. Garmin was granted a deviation from ED-72A 3.2.2.4.j.3 to extend automatic CDI sensitivity changes for approach mode navigation to non-approach mode navigation as well.
	3. Garmin was granted a deviation from ED-72A 3.2.2.1.f (list item 4) and 3.2.2.3.e.4 and 3.2.2.4.j.2 to eliminate the requirement to alert the pilot of the need to manually insert the barometric pressure.
	4. Garmin was granted a deviation from ED-72A 3.2.2.3.d.2 to eliminate the requirement to provide a means to manually identify a satellite that is expected to be unavailable at the destination (for scheduled maintenance as identified in FAA Notice to Airmen) for the RAIM prediction process.
	5. Garmin was granted a deviation from ED-72A 3.1.4.1.c to change the requirement from “the navigation data contains all 1’s or 0’s” to “all data bits in subframe 1,2, or 3 are 0’s”.
	6. Garmin was granted a deviation from ED-72A 4.16.2 to eliminate the requirement for valid position within 10 seconds of power interrupt for abnormal operating conditions power input tests. For abnormal operating conditions power input tests, satellite acquisition time of 5 minutes applies.
TSO-C151b	1. Garmin was granted a deviation from TSO-C151b 4.a. to mark the unit with the serial number instead of the date of manufacture.

1.6.4 GIA 63W TSO/ETSO Deviations

TSO/ETSO	Deviation
TSO-C9c	1. Garmin was granted a deviation from TSO-C9c to use SAE AS 402B instead of AS-402A.
	2. Garmin was granted a deviation from TSO-C9c to use DO-160E instead of specified environmental tests.
	3. Garmin was granted a deviation from TSO-C9c subpart A (c), which requires marking the weight of the unit on the unit. Garmin will provide this information in the installation manual in lieu of marking on the serial tag. Garmin does not currently list the weight on other avionics units.
	4. Garmin was granted a deviation from SAE AS 402B paragraph 4.4.1 to limit autopilot engagement to attitudes considered safe for the certified aircraft.
	5. Garmin was granted a deviation from SAE AS 402B paragraph 4.3.2 to not provide servo effort indications when the automatic pilot is not engaged.
ETSO-C9c	1. Garmin was granted a deviation from ETSO-C9c to use SAE AS-402B instead of AS-402A.
	2. Garmin was granted a deviation from ETSO-C9c to use DO-160E instead of the specified environmental tests.
	3. Garmin was granted a deviation from AS-402B paragraph 4.3.2 to not provide servo effort indications when the automatic pilot is not engaged.
	4. Garmin was granted a deviation from AS-402B paragraph 4.4.1 to limit autopilot engagement to attitudes considered safe for the certified aircraft.
TSO-C34e	1. Garmin was granted a deviation from TSO-C34e to use DO-160E instead of DO-160B, and DO-178B instead of DO-178A.
ETSO-2C34f	1. Garmin was granted a deviation from ETSO-2C34f to use DO-160E instead of DO-160D.
TSO-C36e	1. Garmin was granted a deviation from TSO-C36e to use DO-160E instead of DO-160B, and DO-178B instead of DO-178A.

TSO/ETSO Deviations, continued	
TSO/ETSO	**Deviation**
ETSO-2C36f	1. Garmin was granted a deviation from ETSO-2C36f to use DO-160E instead of DO-160D
	2. Garmin was granted a deviation from ETSO-2C36f to use ED-46B amendment 2 in addition to ED 46B
ETSO-2C37e	1. Garmin was granted a deviation from ETSO-2C37e to use DO-160E instead of DO-160D.
	2. Garmin was granted a deviation from ETSO-2C37e to use ED-23B amendment 3 in addition to ED-23B.
ETSO-2C38e	1. Garmin was granted a deviation from ETSO-2C38e to use DO-160E instead of DO-160D.
	2. Garmin was granted a deviation from ETSO-2C38e to use ED-23B amendment 3 in addition to ED-23B.
TSO-C40c	1. Garmin was granted a deviation from TSO-C40c to use DO-160E instead of DO-160B, and DO-178B instead of DO-178A.
ETSO-2C40c	1. Garmin was granted a deviation from ETSO-2C40c to use DO-160E instead of DO-160D.
TSO-C52b	1. Garmin was granted a deviation from SAE AS 8008 paragraph 3.6 to limit flight director operation to attitudes considered safe for the certified aircraft.
	2. Garmin was granted a deviation from TSO-C52b to use DO-160E instead of DO-160C. The justification for this deviation is to use the latest accepted environmental standards.
ETSO-C52b	1. Garmin was granted a deviation from ETSO-C52b to use DO-160E instead of DO-160D.
	2. Garmin was granted a deviation from AS-8008 paragraph 3.6 to limit flight director operation to attitudes considered safe for the certified aircraft.
TSO-C92c	1. Garmin was granted a deviation from TSO-C92c to use DO-160E instead of DO-160C.
	2. Garmin was granted a deviation from TSO-C92c to not include the version and levels of software or the modification status of hardware in the appliance number.

TSO/ETSO Deviations, continued	
TSO/ETSO	**Deviation**
TSO-C145a	1. Garmin was granted a deviation from TSO-C145a to use DO-160E instead of DO-160D.
	2. Garmin was granted a deviation from RTCA/DO-229C paragraphs 2.1.1.10, 2.1.1.7, 2.1.1.8.1, 2.1.1.8.2, 2.1.1.9, 2.1.2.1, 2.1.3.1, 2.1.4.1.4, 2.1.4.1.5 and 2.1.5.1 in the form of an operational limitation to achieve an equivalent level of safety. This operational limitation applies to the GIA63W with GPS software version 2.40 or earlier, or GIA63W installations with certain models of GPS/WAAS antennas identified in Section 2.1.3.2. The operational limitation is based on: 1. The ability to use antennas that may not meet the minimum gain performance requirements of DO-228. 2. The ability to mitigate the effects of the different gain characteristics of those antennas by increasing the effective mask angle through operational limitations. 3. The ability to further increase the effective mask angle, through operational limitations, to a level commensurate with test conditions used in the original TSO qualification tests. 4. The ability to use -128 dBmic as the minimum GPS satellite signal-in-space for the purpose of assessing the operational limitation. 5. The ability to use -128 dBmic as the minimum SBAS satellite signal-in-space for the purpose of assessing the operational limitation.
	3. Garmin was granted a deviation from RTCA/DO-229C paragraph 2.1.1.9 to use a 20 second satellite reacquisition time instead of a 10-second reacquisition time.
ETSO-C145	1. Garmin was granted a deviation from ETSO-C145 to use DO-160E instead of DO-160D
	2. Garmin was granted a deviation from ETSO-C145 to use DO-229C instead of DO-229A
	3. Garmin was granted a deviation from DO-229C paragraphs 2.1.1.10, 2.1.1.7, 2.1.1.8.1, 2.1.1.8.2, 2.1.1.9, 2.1.2.1, 2.1.3.1, 2.1.4.1.4, 2.1.4.1.5 and 2.1.5.1 in the form of an operational limitation to achieve an equivalent level of safety. This operational limitation applies to the GIA63W with GPS software version 2.40 or earlier, or GIA63W installations with certain models of GPS/WAAS antennas identified in Section 2.1.3.2. The operational limitation is based on: 1. The ability to use antennas that may not meet the minimum gain performance requirements of DO-228. 2. The ability to mitigate the effects of the different gain characteristics of those antennas by increasing the effective mask angle through operational limitations. 3. The ability to further increase the effective mask angle, through operational limitations, to a level commensurate with test conditions used in the original TSO qualification tests. 4. The ability to use -128 dBmic as the minimum GPS satellite signal-in-space for the purpose of assessing the operational limitation. 5. The ability to use -128 dBmic as the minimum SBAS satellite signal-in-space for the purpose of assessing the operational limitation.
	4. Garmin was granted a deviation from RTCA/DO-229C paragraph 2.1.1.9 to use a 20 second satellite reacquisition time instead of a 10-second reacquisition time.
TSO-C151b	1. Garmin was granted a deviation from TSO-C151b to use DO-160E instead of DO-160D.
	2. Garmin was granted a deviation from TSO-C151b 4.a. to mark the unit with the serial number instead of the date of manufacture.

TSO/ETSO Deviations, continued	
TSO/ETSO	**Deviation**
ETSO-C151a	1. Garmin was granted a deviation from ETSO-C151a to use DO-160E instead of DO-160D.
TSO-C169	1. Garmin was granted a deviation from TSO-C169 to use DO-160E instead of DO-160D.
	2. Garmin was granted a deviation to TSO-C169, paragraph 4.d requirement to mark the installation procedures drawing number on the equipment. Garmin will mark as follows, which Garmin believes meets the intent of the requirement. The Install Manual is part of the furnished data package. TSO-C145a See Install Manual for additional appliance approvals
	3. Garmin was granted a deviation to TSO-C169, paragraph 4.e requirement to mark (DEV) after the TSO number on the equipment. Garmin will mark as follows, as TSO-C169 is not the primary TSO and the Install Manual contains all of the TSO-C169 information including deviations. TSO-C145a See Install Manual for additional appliance approvals
	4. Garmin was granted to deviate from TSO-C169 by allowing a 6dB reduction of transmitter power during the Normal Operating Conditions – Emergency Operation Voltage as described in RTCA document DO-186a paragraph 2.5.13.1 and RTCA document DO-160E paragraph 16.6.1.1.

1.6.5 AFM/AFMS/POH Considerations

Per TSO-C9c deviation, the applicable AFM, AFMS, and/or POH shall list autopilot engagement envelope for the certified aircraft.

Per TSO-C52b deviation, the applicable AFM, AFMS, and/or POH shall state that the system is not designed to perform unusual attitude recoveries from attitudes outside this range (as defined in the TSO-C52b deviation above). Ensure pilot operating guidance also states the FD operating envelope.

Due to the equipment's TSO qualified performance in tracking low-elevation-angle satellites, the following limitations must be included in the Aircraft Flight Manual or Aircraft Flight Manual Supplement for GIA63W installations with GPS software version 2.40 or earlier, or in GIA63W installations with antennas that require operational limitations (identified in Section 2.1.3.2):

> This equipment does not comply with US 14 CFR Part 91, SFAR 97 requirements for TSO-C145a/TSO-146a equipment when installed with certain models of GPS/WAAS antennas identified in Section 2.1.3.2. Until complete compliance is demonstrated and approved by the FAA, authorization to conduct any GPS or WAAS operation under Instrument Flight Rules (IFR) requires that:
>
> 1. Aircraft using the GPS or WAAS capability of the GIA 63W navigation equipment under IFR must be equipped with an approved and operational alternate means of navigation appropriate to the flight with the exception of oceanic and remote operations.
>
> 2. For flight planning purposes, if an alternate airport is required, it must have an approved instrument approach procedure other than GPS or RNAV that is anticipated to be operational and available at the estimated time of arrival. All equipment required for this procedure must be installed and operational.
>
> 3. For flight planning purposes, Garmin Prediction Program 006-A0154-01 with the <***insert installed antenna part number***> antenna selection should be used to confirm the availability of RAIM for the intended flight in accordance with the local aviation authority guidelines for TSO-C129a equipment. WAAS NOTAMs (or their absence) and generic prediction tools do not provide an acceptable indication of the availability for the GIA 63W equipment.
>
> 4. When flight planning an LNAV/VNAV or LPV approach, operators should use the Garmin Prediction Program 006-A0154-01 with the <***insert installed antenna part number***> antenna selection in addition to any NOTAMs issued for the approach.

The applicable AFM, AFMS, and/or POH shall also state the following instructions regarding the use of the G1000 WFDE prediction program, which is required to be used for flight planning purposes for Oceanic/Remote operations and when operating under the operational limitations listed above:

> The G1000 WFDE prediction program works in combination with the Route Planning Software (version 1.2 or later approved version). The route planning and WFDE prediction programs can be downloaded from www.garmin.com. For information on using the WFDE prediction program, refer to the WFDE Prediction Program Instructions Garmin part number 190-00643-01.

1.6.6 Other Regulatory Criteria (GIA 63)

RTCA/DO-178B Level B, C, D	(Software)
EUROCAE ED 12B	(Software)
RTCA/DO-160D	(Environmental Conditions)
EUROCAE ED 14D	(Environmental Conditions)
RTCA/DO-161A	(Airborne Ground Proximity Warning Equipment)
RTCA/DO-208 Class A1	(GPS)
RTCA/DO-186a Class 3 and 5	(VHF Com Transmitter)
RTCA/DO-186a Class C and E	(VHF Com Receiver)
RTCA/DO-196	(VOR Receiver)
RTCA/DO-195 Class A	(Localizer Receiver)
RTCA/DO-192	(Glideslope Receiver)
ICAO Annex 10 Volume III, EUROCAE ED-23B	(VHF Com Transceiver)
ICAO Annex 10 Volume I, EUROCAE ED-22B	(VOR Receiver)
ICAO Annex 10 Volume I, EUROCAE ED-46B	(Localizer Receiver)
EUROCAE ED-47B	(Glideslope Receiver)
EUROCAE ED-72A	(GPS)
SAE AS 402B	(Automatic Pilots)
SAE AS 8008	(Flight Director Equipment)

1.6.7 Other Regulatory Criteria (GIA 63W)

RTCA/DO-254 Level A and C	(CLD devices)
RTCA/DO-178B Level A*, B, C, D	(Software)
EUROCAE ED 12B	(Software)
RTCA/DO-160E	(Environmental Conditions)
EUROCAE ED 14E	(Environmental Conditions)
RTCA/DO-161A	(Airborne Ground Proximity Warning Equipment)
RTCA/DO-229c Class Beta 3	(GPS/WAAS)
RTCA/DO-186a Class 3 and 5	(VHF Com Transmitter)
RTCA/DO-186a Class C and E	(VHF Com Receiver)
RTCA/DO-196	(VOR Receiver)
RTCA/DO-195 Class A	(Localizer Receiver)
RTCA/DO-192	(Glideslope Receiver)
ICAO Annex 10 Volume III, EUROCAE ED-23B	(VHF Com Transceiver)
ICAO Annex 10 Volume I, EUROCAE ED-22B	(VOR Receiver)
ICAO Annex 10 Volume I, EUROCAE ED-46B	(Localizer Receiver)
EUROCAE ED-47B	(Glideslope Receiver)
SAE AS 402B	(Automatic Pilots)
SAE AS 8008	(Flight Director Equipment)

*RTCA/DO-178B Level A is only supported through use of GIA software part numbers 006-B0544-3( ) and later. All other GIA software part numbers support RTCA/DO-178B Levels B, C and D only.

1.7 Referenced Documents

The following publications are sources of additional information for installing the GIA 63(W). Before installing the GIA 63(W), the technician should read all referenced materials along with this manual.

Part Number	Document
190-00303-00	G1000 System Installation Manual
190-00303-04	G1000 Line Maintenance and Configuration Manual
560-5047-00	Apollo A-34 GPS Antenna Installation Manual
II A258002	Comant CI 2580-410 Installation Instructions
II A258005	Comant CI 2580-200 Installation Instructions
II A42803	Comant CI 428-410 Installation Instructions
II A42809	Comant CI 428-200 Installation Instructions
II A272803	Comant CI 2728-410 Installation Instructions
II A272806	Comant CI 2728-200 Installation Instructions
190-00848-00	GA 35, GA 36, and GA 37 Antenna Installation Instructions
190-00355-02*	GDL 69/69A Installation Manual
190-00522-01	GA 55A, GA 56A, GA 57 Installation Instructions
190-00483-01	GA 56W Antenna Installation Instructions
004-00287-00	Antenna Minimum Performance Specification for Garmin's GPS/WAAS Receiver System

* GA 55 technical specifications and antenna performance is contained in the GDL 69/69A Installation Manual.

1.8 Limited Warranty

All Garmin avionics products are warranted to be free from defects in materials or workmanship for: two years from the date of purchase for new Remote-Mount and Panel-Mount products; one year from the date of purchase for new portable products and any purchased newly-overhauled products; six months for newly-overhauled products exchanged through a Garmin Authorized Service Center; and 90 days for factory repaired or newly-overhauled products exchanged at Garmin in lieu of repair. Within the applicable period, Garmin will, at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost. This warranty does not apply to: (i) cosmetic damage, such as scratches, nicks and dents; (ii) consumable parts, such as batteries, unless product damage has occurred due to a defect in materials or workmanship; (iii) damage caused by accident, abuse, misuse, water, flood, fire, or other acts of nature or external causes; (iv) damage caused by service performed by anyone who is not an authorized service provider of Garmin; or (v) damage to a product that has been modified or altered without the written permission of Garmin. In addition, Garmin reserves the right to refuse warranty claims against products or services that are obtained and/or used in contravention of the laws of any country.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS, IMPLIED OR STATUTORY, INCLUDING ANY LIABILITY ARISING UNDER ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUTORY OR OTHERWISE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, WHICH MAY VARY FROM STATE TO STATE.

IN NO EVENT SHALL GARMIN BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE OR INABILITY TO USE THE PRODUCT OR FROM DEFECTS IN THE PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

Garmin retains the exclusive right to repair or replace (with a new or newly-overhauled replacement product) the product or software or offer a full refund of the purchase price at its sole discretion. SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

Online Auction Purchases: Products purchased through online auctions are not eligible for warranty coverage. Online auction confirmations are not accepted for warranty verification. To obtain warranty service, an original or copy of the sales receipt from the original retailer is required. Garmin will not replace missing components from any package purchased through an online auction.

International Purchases: A separate warranty may be provided by international distributors for devices purchased outside the United States depending on the country. If applicable, this warranty is provided by the local in-country distributor and this distributor provides local service for your device. Distributor warranties are only valid in the area of intended distribution. Devices purchased in the United States or Canada must be returned to the Garmin service center in the United Kingdom, the United States, Canada, or Taiwan for service.

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2 INSTALLATION OVERVIEW

2.1 Introduction

This section provides hardware equipment information for installing the GIA 63(W), related hardware, and antennas. Installation of the GIA 63(W) should follow the aircraft TC or STC requirements. Cabling is fabricated by the installing agency to fit each particular aircraft. The guidance of FAA advisory circulars AC 43.13-1B and AC 43.13-2B, where applicable, may be found useful for making retro-fit installations that comply with FAA regulations. Refer to the G1000 System Installation Manual, Garmin part number 190-00303-00 for further details on the mechanical aspects. For installation in an aircraft using the remote mounted standalone rack, refer to Appendix B for rack drawings and dimensions.

2.1.1 Unit Configurations

The GIA 63(W) is only available as a single unit under the following part number:

Item	Garmin P/N
GIA 63 Unit Only, (011-00781-00)	010-00335-00
GIA 63 ETSO Unit Only, (011-00781-01)	010-00335-10
GIA 63W Unit Only, (011-01105-00)	010-00386-00
GIA 63W A2/B2 Audio Lightning Unit Only (011-01105-01)	010-00386-10

2.1.2 Required Accessories

Each of the following accessories is provided separately from the GIA 63(W). Either rack (modular or standalone) and remainder of the accessories are required for installation.

Item	Garmin P/N
GIA 63 Modular Install Rack or GIA 63 Standalone Install Rack	115-00426-00 115-01239-00
G1000 Rack Nutplate Kit (Modular Rack Only)	011-00915-01 (preferred) or 011-01148-01
GIA 63 Back Plate	011-00963-00
GIA 63 Connector Kit w/ Spider	011-01000-00
GIA 63 Connector Kit w/ Shield Block	011-01000-01

2.1.3 Additional Equipment Required

The following installation accessories are required but not provided:

COM Antenna:	Shall meet TSO-C37(), C38(), and C-169()*. Broad band, 50 Ω, vertically polarized with coaxial cable
GPS Antenna:	GIA 63 (Non-WAAS) shall meet TSO-C129a. TSO-C144 antennas can also meet TSO-C129a requirements for the GIA 63 (Refer to Section 2.1.3.1).
	GIA 63W (WAAS) shall meet TSO-C144 and additional system requirements specified by TSO-C145a. Refer to Section 2.1.3.2 for approved antennas
VOR/LOC Antenna:	Shall meet TSO-C40() and C36(). Broad band, 50 Ω, horizontally polarized with coaxial cable
Glideslope Antenna:	Shall meet TSO-C34(). Broad band, 50 Ω, horizontally polarized with coaxial cable or low-loss splitter used with the VOR/LOC antenna
Headphones:	500 Ω nominal impedance Microphone: Low impedance, carbon or dynamic, with transistorized pre-amp
Hardware:	#6-32 x 100°Flathead SS Screw [(MS24693, AN507R or other approved fastener) (4 ea.)] for horizontal mounting of the standalone rack.
Hardware:	#8-32 Panhead Machine Screw [(MS35206, AN526 or other approved fastener) (4 ea.)] for vertical mounting of the standalone rack.

* GIA 63W only

2.1.3.1 Required Antennas for the GIA 63

Antennas used with the GIA 63 (non-WAAS) must meet the antenna specifications shown in Section 2.6.

In addition, TSO-C144 antennas can also meet TSO-C129a requirements for the GIA 63 (non-WAAS) if their additional gain (which is about 16dB at 1.5 GHz for antennas produced by Garmin) is offset by added attenuation in-line with the GIA 63 (non-WAAS). If an in-line attenuator is used, it must pass DC current (40 mA max at 4.6 VDC) which is provided from the GPS receiver to the antenna pre-amplifier.

2.1.3.2 Required WAAS Antennas for the GIA 63W

The following is a list of TSO-C144 antennas that allow the GIA 63W with GPS software version 3.00 or later to meet TSO-C145a requirements without requiring the operational limitations specified in Section 1.6.5 of this manual:

Model	Mount Style	Conn Type	SATCOM Compatible [3]	Mfr	Antenna Part Number	Garmin Order Number	Additional Requirements
GA 35 GPS WAAS Antenna [6]	Screw Mount, Teardrop Footprint [2]	TNC	Yes	Aero Antenna	AT575-93GW-TNCF-000-RG-27-NM	013-00235-00	None
				Garmin	013-00235-00		
GA 36 GPS WAAS Antenna [6]	Screw Mount, ARINC 743 Footprint	TNC	Yes	Aero Antenna	AT575-326GW-TNCF-000-RG-27-NM	013-00244-00	
				Garmin	013-00244-00		
GA 37 FIS/WAAS Antenna [6]	Screw Mount, ARINC 743 Footprint	TNC	Yes	Aero Antenna	AT2300-126GW-TNCF-000-RG-27-NM	013-00245-00	
				Garmin	013-00245-00		
Comant 2580-200 WAAS and COM Antenna [6] [8]	Screw Mount, Teardrop Footprint [2]	BNC TNC [5]	Yes	Comant	CI 2580-200	N/A	
Comant 2580-410 FIS/WAAS /COM Antenna [6] [8]					CI 2580-410		
Comant 428-200 WAAS Antenna [6] [8]	Screw Mount, ARINC 743 Footprint	TNC	Yes	Comant	CI 428-200	N/A	
Comant 428-410 FIS/WAAS Antenna [6] [8]					CI 428-410		
Comant 2728-200 WAAS and COM Antenna [6] [8]	Screw Mount, Teardrop Footprint [7]	BNC TNC [5]	Yes	Comant	CI 2728-200	N/A	
Comant 2728-410 FIS/WAAS /COM Antenna [6] [8]					CI 2728-410		

The following is a list of known TSO-C144 antennas that allow the GIA 63W with any version of GPS software version to meet TSO-C145a requirements with the operational limitations specified in Section 1.6.5 of this manual:

Model	Mount Style	Conn Type	SATCOM Compatible [3]	Mfr	Antenna Part Number	Garmin Order Number	Additional Requirements
A-34 GPS WAAS Antenna	Screw Mount, Teardrop Footprint [2]	TNC	Yes	Aero Antenna	AT575-93W-TNCF-000-05-26-NM	013-00113-00	The operational limitation described in Section 1.6.5 requires use of 006-A0154-01 as the Prediction Program in conjunction with these antennas.
				Garmin AT	590-1112		
GA56A GPS WAAS Antenna	Screw Mount, ARINC 743 Footprint	BNC	No	Garmin	011-01154-00	010-10599-00	
GA56W GPS WAAS Antenna	Stud Mount, Teardrop Footprint [1]	BNC	No	Garmin	011-01111-00	010-10561-01	
GA57 GPS WAAS and FIS Antenna	Screw Mount, ARINC 743 Footprint	BNC TNC [4]	No	Garmin	011-01032-00	010-10604-00	

[1] Same footprint and mounting hole pattern as GA 56.

[2] Same mounting hole pattern as the GA 56, but has a physically larger footprint.

[3] SATCOM compatibility requirements are as specified by RTCA/DO-229C Section 2.5.6.1, Section 2.5.8.2, Appendix C.2.1, and Appendix C.2.2.

[4] The WAAS GPS antenna connector is a BNC type. The XM antenna connector is a TNC type.

[5] The WAAS GPS antenna connector (and XM antenna connector where applicable) is TNC type. The VHF COM antenna connector is BNC type.

[6] Not approved for use with the GIA 63 (non-WAAS) since max DC current specification exceeds 40 mA.

[7] Larger footprint and mounting hole pattern than GA 56, GA 35 or CI 2580.

[8] It is the installer's responsibility to ensure the antenna complies with Antenna Minimum Performance Specification for Garmin's GPS/WAAS Receiver System Antenna (004-00287-00) by communicating the requirement to the supplier and obtaining a certificate of compliance to 004-00287-00 from the supplier. An antenna that complies only with TSO-C144 requirements is not adequate for this installation.

Other TSO-C144 antennas may meet the installation requirements of the GIA 63W. Contact Garmin to ensure compatibility and applicable operation limitations before beginning the installation.

2.2 Installation Considerations

The GIA 63(W) interfaces with the G1000 system and with various avionics equipment. Fabrication of a wiring harness is required. Sound mechanical and electrical methods and practices are required for installation of the GIA 63(W).

2.2.1 Antenna Considerations

Antenna installations on pressurized cabin aircraft require FAA approved installation design and engineering substantiation data whenever such antenna installations incorporate alteration (penetration) of the cabin pressure vessel by connector holes and/or mounting arrangements. For needed engineering support pertaining to the design and approval of such pressurized aircraft antenna installations, it is recommended that the installer proceed according to any of the following listed alternatives:

1. Obtain approved antenna installation design data from the aircraft manufacturer.
2. Obtain an FAA approved STC, pertaining to, and valid for the antenna installation.
3. Contact the FAA Aircraft Certification Office in the appropriate Region and request identification of FAA Designated Engineering Representatives (DERs) who are authorized to prepare and approve the required antenna installation engineering data.
4. Obtain FAA Advisory Circular AC-183C and identify a DER from the roster of individuals in it.
5. Contact an aviation industry organization such as the Aircraft Electronics Association for assistance.

2.2.2 GPS Antenna Location

The GPS antenna is a key element in the overall system performance and integrity for a GPS/WAAS navigation system. The mounting location, geometry, and surroundings of the antenna can affect the system performance and/or availability. The following guidance provides information to aid the installer in ensuring that the most optimum location is selected for the installation of the GPS antenna. The installation guidelines presented here meet the intent of AC 20-138A section 16. The greater the variance from these guidelines, the greater the chance of decreased availability. Approach procedures with vertical guidance are the most sensitive to these effects. LNAV only approaches, terminal operations, and enroute operations may also be affected. Because meeting all of these installations guidelines may not be possible on all aircraft, these guidelines are listed in order of importance to achieve optimum performance. Items 4 below are of equal importance and their significance may depend on the aircraft installation. The installer should use their best judgment to balance the installation guidelines.

For rotorcraft, locate the GPS antenna as far as possible from the main rotor hub. This reduces the percentage of time the blade blocks the antenna. Also mount it as far below the blade surface as possible if installing the antenna under the blade. This reduces signal distortion caused by the blades.

1. Mount the antenna as close to level as possible with respect to the normal cruise flight attitude of the aircraft. If the normal flight attitude is not known, substitute the waterline, which is typically referenced as level while performing a weight and balance check.
2. The GPS antenna should be mounted in a location to minimize the effects of airframe shadowing during typical maneuvers. Typically mounting farther away from the tail section reduces signal blockage seen by the GPS antenna.
3. The GPS antenna should ideally be located at the opposite end of the aircraft from the COM unit in order to make the GPS less vulnerable to harmonics radiated from the COM itself.

4a. The GPS antenna should be mounted no closer than two feet (edge to edge) and ideally three feet from any VHF COM antenna or any other antenna which may emit harmonic (or other) interference at the L1 frequency of 1575.42 MHz. An aircraft EMC check (reference VHF COM interference check in Post Installation Checkout procedures) can verify the degradation of GPS in the presence of interference signals. If an EMC check reveals unacceptable interference, insert a GPS notch filter in line with the offending VHF COM or the (re-radiating) ELT transmitter.
Note: The separation requirement does not apply to GPS and COM combination antennas, provided the antenna model is TSO authorized and has been tested to meet Garmin's minimum performance standards. The separating requirement includes the combination with an XM antenna element as well.

4b. The GPS antenna should be mounted no closer than two feet (edge to edge) and ideally three feet from any antennas emitting more than 25 watts of power. An aircraft EMC check can verify the degradation of GPS in the presence of interference signals.

4c. To minimize the effects of shadowing at 5° elevation angles, the GPS antenna should be mounted no closer than 6 inches (edge to edge) from other antennas, including passive antennas such as another GPS antenna or XM antenna.

5. To maintain a constant gain pattern and limit degradation by the windscreen, avoid mounting the antenna closer than 3 inches from the windscreen.
6. For multiple GPS installations, the antennas should not be mounted in a straight line from the front to the rear of the fuselage. Also varying the mounting location will help minimize any aircraft shading by the wings or tail section (in a particular azimuth, when one antenna is blocked the other antenna may have a clear view).

Figure 2-1 shows the recommended placement of antennas.

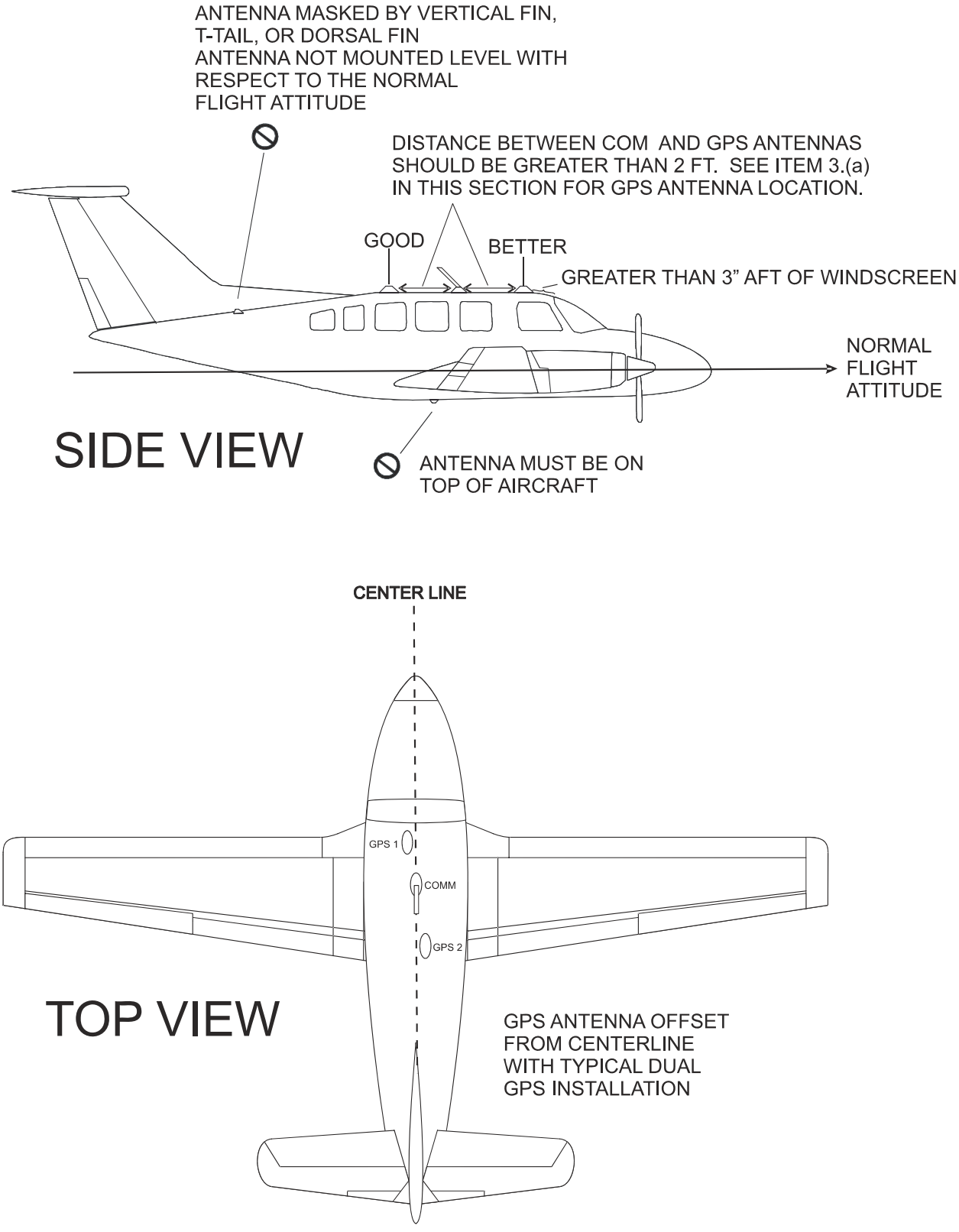

Figure 2-1. GPS Antenna Considerations

2.2.3 Com Antenna Location

The GIA 63(W) COM antenna should be well removed from all projections, engines and propellers. The ground plane surface directly below the antenna should be a flat plane over as large an area as possible (18 inches square, minimum). The antenna should be mounted a minimum of six feet from any DME or other COM antennas, four feet from any ADF sense antennas, and three feet from the GIA 63(W) and its GPS antenna.

If simultaneous use of two COM transceivers is desired (split- COM or simulcomm), use of the TX interlock function is mandatory. In addition, the COM antennas should be spaced for maximum isolation. A configuration of one topside antenna and one bottom side antenna is recommended.

Split COM performance varies significantly across installations and is affected by both the distance between the antennas and the separation of the tuned frequencies. In small aircraft particularly, receiver sensitivity is typically reduced and squelch breaks are affected. Each installation should be individually examined to determine the expected performance of split COM.

2.2.4 VOR/LOC Antenna Location

The GIA 63(W) VOR/LOC antenna should be well removed from all projections, engines and propellers. It should have a clear line of sight if possible. The antenna must be mounted along the centerline of the aircraft, minimizing the lateral offset.

2.2.5 Glideslope Antenna Location

The GIA 63(W) Glideslope antenna should be well removed from all projections, engines and propellers. It should have a clear line of sight if possible.

2.2.6 Electrical Bonding

No special precautions need to be taken to provide a bonding path between the GPS antenna and the aircraft structure. Follow the manufacturers' instructions for the COM, VOR/LOC and Glideslope antennas.

2.2.7 VHF COM/GPS Interference

On some installation VHF COM transceivers, Emergency Locator Transmitter (ELT) antennas, and Direction Finder (DF) receiver antennas can re-radiate through the GPS antenna. The GIA 63(W) COM does not interfere with its own GPS section. However, placement of the GA 56 GPS antenna (or other comparable antenna) relative to a COM transceiver and COM antenna (including the GIA 63(W) COM antenna), ELT antenna, and DF receiver antenna is critical.

Use the following guidelines, in addition to others in this document, when locating the GIA 63(W) and its antennas.

- GPS Antenna—Locate as far as possible from all COM antennas and all COM transceivers (including the GIA 63(W) COM), ELT antennas, and DF antennas. The GPS antenna is less susceptible to harmonic interference if a 1.57542 GHz notch filter is installed on the COM transceiver antenna output.
- Locate the GIA 63(W) as far as possible from all COM antennas.

If a COM antenna is found to be the problem, a 1.57542 GHz notch filter (Garmin P/N 330-00067-00) may be installed in the VHF COM coax, as close to the COM as possible. This filter is not required for the GIA 63(W) transmitter.

If a COM is found to be radiating, the following can be done:

1. Replace or clean the VHF COM rack connector to ensure good coax ground.
2. Place grounding straps between the GIA 63(W) unit, VHF COM and a good ground.
3. Shield the VHF COM wiring harness.

2.3 Rack Considerations

A location away from heating vents or other sources of heat generation is optimal. The GIA 63(W) can be mounted using the G1000 system rack. The unit may be mounted remotely if desired.

2.4 Cabling and Wiring

Use AWG #24 or larger wire for all connections unless otherwise specified by the aircraft manufacturer or Garmin. The standard pin contacts supplied in the connector kit are compatible with up to AWG #22 wire. In cases where some installations have more than one unit sharing a common circuit breaker, sizing and wire gauge is based on aircraft circuit breaker layout, length of wiring, current draw of units, and internal unit protection characteristics. Do not attempt to combine more than one unit on the same circuit breaker unless it is specified on aircraft manufacturer approved drawings.

In these cases, a larger gauge wire such as AWG #16, #18, or #20 may be needed for power connections. Special thin-wall heat shrink tubing is also provided to insulate the extended barrels inside the backshell. If using AWG #16 or #18 barrel contacts, ensure that no two contacts are mounted directly adjacent to each other. This minimizes the risk of contacts touching and shorting to adjacent pins and to ground.

Ensure that routing of the wiring does not come in contact with sources of heat, RF or EMI interference. Check that there is ample space for the cabling and mating connectors. Avoid sharp bends in cabling and routing near aircraft control cables.

Coaxial cable with 50 Ω nominal impedance and meeting applicable aviation regulations should be used for the installation. A typical maximum cable length for the GPS antenna is 40 feet. The installer shall insure that the attenuation does not exceed 10 dB at 1.5 GHz for the GIA63, and falls between 3 dB and 7 dB inclusive at 1.5 GHz for the GIA63W.

Check that there is ample space for the cabling and mating connectors. Avoid sharp bends in cabling, particularly the COM antenna cable, and routing near aircraft control cables. Cabling for the GIA 63(W) should not be routed near components or cabling which are sources of electrical noise. Do not route the COM antenna coax near any ADF antenna cables. Route the GPS, VOR/LOC, and Glideslope antenna cables as far as possible away from all COM transceivers and antenna cables.

2.5 Cooling Air

The GIA 63(W) meets all TSO requirements without external cooling. However, as with all electronic equipment, lower operating temperatures extend equipment life. On the average, reducing the operating temperature by 15-20 °C (25 to 35 °F) doubles the mean time between failure (MTBF). Recommended airflow rating is 1 CFM (cubic foot per minute) at a pressure equivalent to 0.1 inches of water. Potential damage to your GIA 63(W) may occur by using outside forced air to cool the equipment. Therefore, it is recommended that an electric forced air fan be installed, of the indicated rating, to cool this equipment.

Units tightly packed in the avionics stack heat each other through radiation, convection, and sometimes by direct conduction. Even a single unit operates at a much higher temperature in still air than in moving air. Fans or some other means of moving the air around electronic equipment are usually a worthwhile investment. A 5/8” diameter air fitting is provided on the rear of the mounting rack for the purpose of admitting cooling air under such conditions. If a form of forced air cooling is installed, make certain that rainwater cannot enter and be sprayed on the equipment. Refer to the G1000 System Installation manual, Garmin part number 190-00303-00, for information on cooling requirements.

2.6 GIA 63 Minimum Installation Requirements

Below is a list of required devices for TSO-C129a category A1 certification.

Pressure Altitude Device
This device delivers pressure altitude data to the GIA 63. This data comes from the Garmin GDC 74A Air Data Computer.

Manual Course Device
This device delivers the manual course select to the GIA 63, which is required for the VOR receiver, and optional for the GPS receiver. Course information can come from an analog resolver, or from the GDU PFD/MFD via Ethernet HSDB.

HSI/CDI Indicator or GDU
This device displays Nav Flag, Left/Right, To/From, Glideslope Flag, and Up/Down.

Qualified GPS Antenna
This antenna must meet the following requirements:

1. DO-160C Environmental Conditions
The antenna shall meet the environmental conditions listed below and shall conform to the test requirements of RTCA DO-160C.

Environmental Condition		Category	Description
Temperature	(operating)	F2	-55 to +70°C
	(ground survival)	F2	-55 to +85°C
Altitude		F2	55,000 feet
Temperature Variation		A	10°C per minute
Humidity		C	95% at +55°C
Vibration		CLMY	Turbo/Reciprocating/Helicopter
Waterproofness		S	Continuous Stream
Fluids		F	Deicing Fluid
Lightning		2A	Direct Effects
Icing		C	0.15” thick

2. Electrical Characteristics

LNA Supply voltage	4.5 ± 0.5 V_{DC}
LNA Supply Current	20 mA Maximum
LNA Operating Frequency	1575.42 ± 2.00 MHz
LNA Gain	20 dB Maximum, 12dB Minimum
LNA Noise Figure	3.0 dB Maximum
LNA Output VSWR (50 Ω)	2:1 Maximum
LNA Input power at -1 dB Gain Compression	-6 dB Minimum
LNA Bandwidth	
(-3 dB)	40 MHz Maximum
(-20 dB)	100 MHz Maximum
(-40 dB)	250 MHz Maximum

3. Radiation Characteristics

Polarization	RHCP
Operating Frequency	1575.42 ± 2.00 MHz
Gain (on axis)	2.0 dBic Minimum
(at 160° beam width)	-6.0 dBic Minimum
Cross Pole Gain (LHCP)	
(on axis)	-8 dBic Maximum
(at 160° beam width)	-9 dBic Maximum

4. Mounting Requirements

Cable connection	BNC Female
Mounting studs	Four 8-32 UNC-2A studs 0.50” long

2.7 GIA 63W Minimum Installation Requirements

Below is a list of required devices for TSO-C145a Class 3 certification.

Manual Course Device
This device delivers the manual course select to the GIA 63W, which is required for the VOR receiver, and optional for the GPS receiver. Course information can come from an analog resolver, or from the GDU PFD/MFD via Ethernet HSDB.

GDU PFD/MFD
This device displays Nav Flag, Left/Right, To/From, Glideslope Flag, and Up/Down as well as integrity messages. In addition it provides manual course selection to the GIA, which is required for the VOR receiver and optional for the GPS receiver.

Qualified GPS Antenna
Refer to Section 2.1.3.2 for a list of approved antennas.

2.8 Mounting Requirements

The GIA 63(W) mounting surface must be capable of providing structural support and electrical bond to the aircraft to minimize radiated EMI and provide protection from High-Intensity Radiation Fields (HIRF). The GIA 63(W) can be mounted using the G1000 modular system rack, or may be mounted remotely using the Standalone rack (refer to drawings in Appendix B).

2.8.1 Modular Rack Considerations

Figure 2-2 and Figure B-2 show the GIA 63(W) G1000 modular rack. The modular rack is fastened to the main system rack using the nutplate kit listed in Section 2.1.2. Refer to Figure B-2 for nutplate placement locations. Figure B-1 gives the GIA 63(W) modular rack dimensions.

The unit may also be mounted outside of the G1000 system rack. The number and positions of screws noted in Figure B-2 are to be used when mounting the GIA 63(W) modular rack outside of the G1000 system rack. Aircraft manufacturer must fabricate any additional mounting equipment needed, use outline and installation drawings in Appendix B for reference.

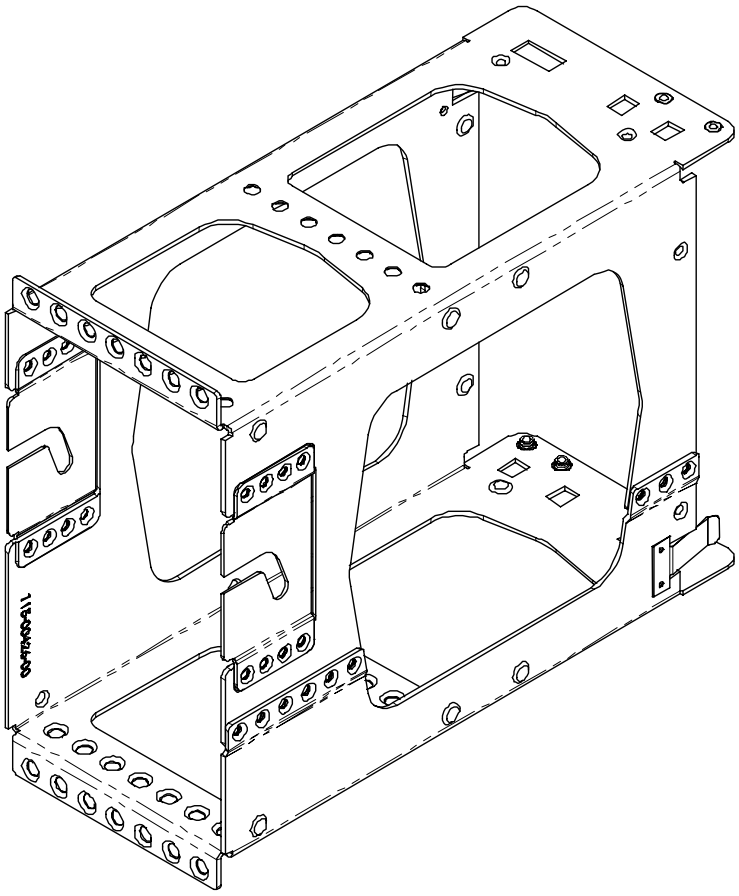

Figure 2-2 GIA 63(W) Modular Rack

2.8.2 Remote Mounted Stand-Alone Rack Considerations

Figure 2-3 and Figure B-4 show the GIA 63(W) remote mounted stand-alone rack. The remote rack can be installed in a variety of locations, such as the electronics bay, under a seat, or on an avionics shelf behind the rear baggage area. Refer to Figure 2-4 for suggested mounting locations. Leave sufficient clearance between the GIA 63(W) and any obstruction. The rack should be mounted to a surface known to have sufficient structural integrity to withstand additional inertia forces imposed by a 7.5-pound (3.4 kg) unit. Figure B-3 gives the GIA 63(W) stand-alone rack dimensions.

The rack can be mounted vertically using four #8-32 pan head screws (MS35206, AN526, or other approved fastener). It can also be mounted horizontally using four #6-32 100° counter-sunk flathead screws (MS24693, AN507R, or other approved fastener). Ensure that the GIA 63(W) chassis has a ground path to the airframe by having at least one mounting screw in contact with the airframe.

After the cable assemblies are made and wiring installed to the rack back plate, route wiring bundle as appropriate. Use cable ties to secure the cable assemblies and coax to provide strain relief for the cable assemblies.

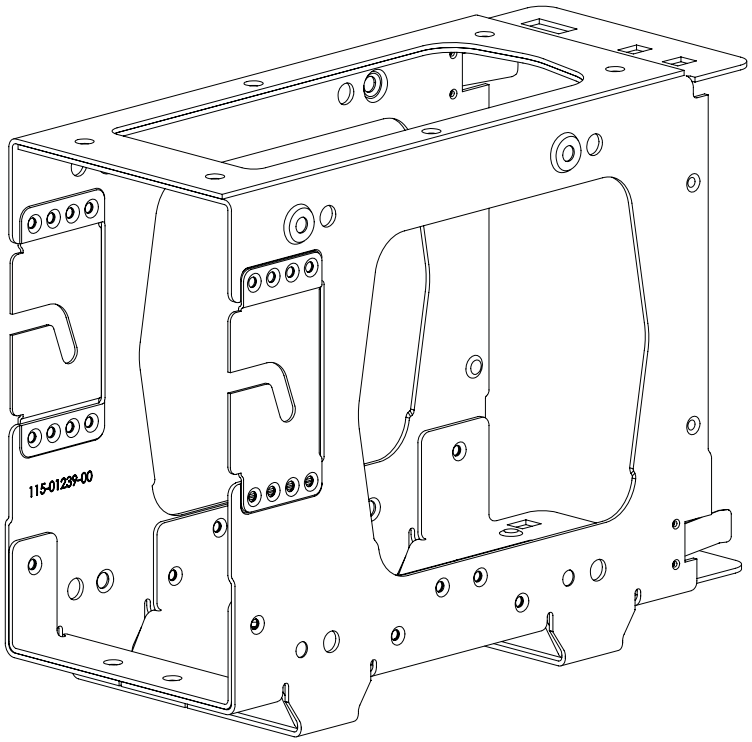

Figure 2-3 GIA 63(W) Standalone Rack

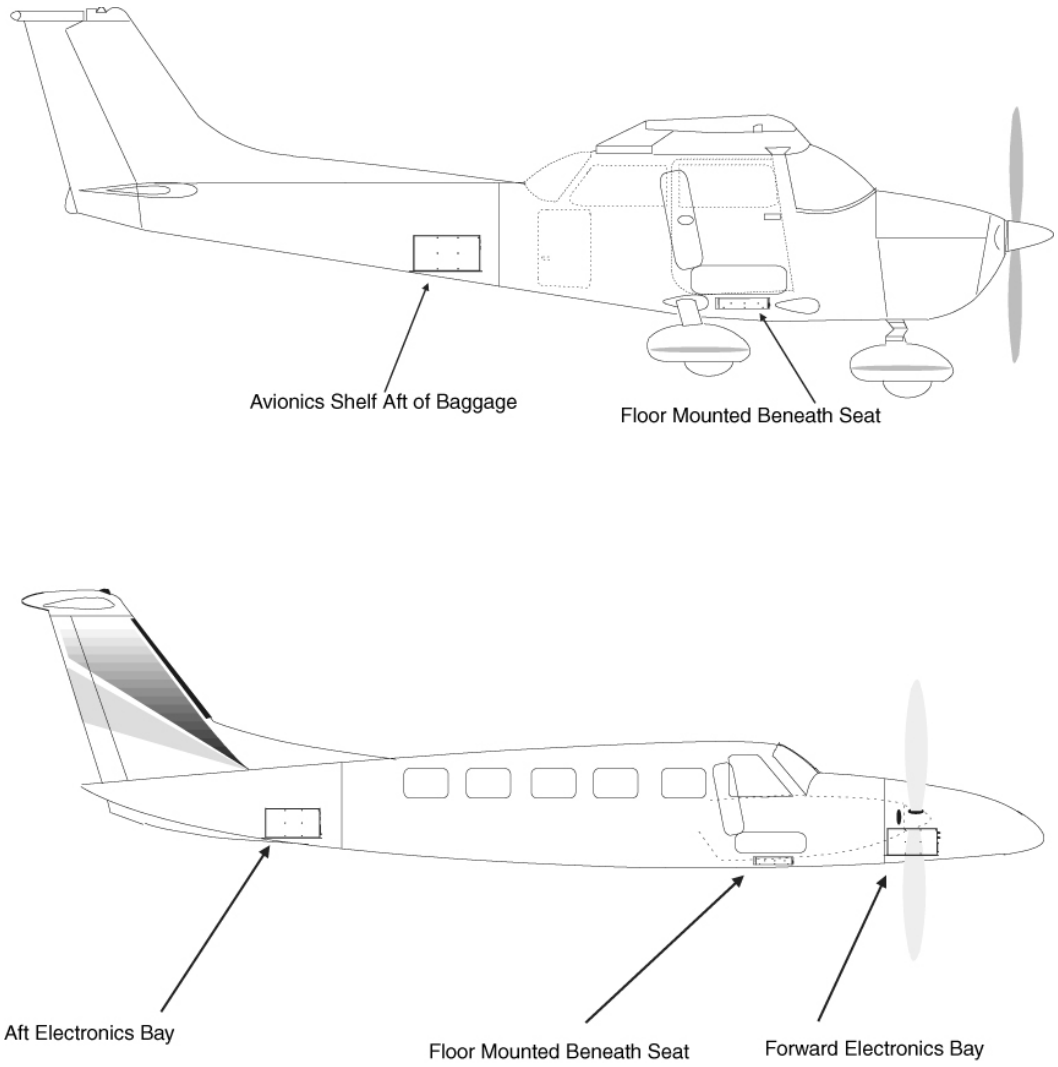

Figure 2-4 GIA 63(W) Standalone Rack, Suggested Mounting Locations

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3 INSTALLATION PROCEDURE

3.1 Unpacking Unit

Carefully unpack the equipment and make a visual inspection of the unit for evidence of damage incurred during shipment. If the unit is damaged, notify the carrier and file a claim. To justify a claim, save the original shipping container and all packing materials. Do not return the unit to Garmin until the carrier has authorized the claim.

Retain the original shipping containers for storage. If the original containers are not available, a separate cardboard container should be prepared that is large enough to accommodate sufficient packing material to prevent movement.

3.2 Wiring Harness Installation

Allow adequate space for installation of cables and connectors. The installer shall supply and fabricate all of the cables. All electrical connections are made through 44, 62, and 78-pin D subminiature connectors. Section 4 defines the electrical characteristics of all input and output signals. Required connectors and associated hardware are supplied with the connector kit.

See Appendix C for examples of interconnect wiring diagrams. Construct the actual harnesses in accordance with aircraft manufacturer authorized interconnect standards.

Table 3-1. Pin Contact Part Numbers

Manufacturer	78 pin connectors (P603, 605, 606), 62 pin connectors (P602), 44 pin connectors (P604 and P601)		
	16 AWG (Power Only)	18-20 AWG (Power Only)	22-28 AWG
Garmin P/N	336-00044-01	336-00044-00	336-00021-00
Military P/N	N/A	N/A	M39029/58-360
AMP	N/A	N/A	204370-2
Positronic	N/A	N/A	MC8522D
ITT Cannon	N/A	N/A	030-2042-000

Table 3-2. Recommended Crimp Tools

Manufacturer	Hand Crimping Tool	18-20 AWG		22-28 AWG	
		Positioner	Insertion/ Extraction Tool (note 2)	Positioner	Insertion/ Extraction Tool
Military P/N	M22520/2-01	N/A	M81969/1-04	M22520/2-09	M81969/1-04
Positronic	9507	9502-11	M81969/1-04	9502-4	M81969/1-04
ITT Cannon	995-0001-584	N/A	N/A	M22520/2-09	274-7048-000
AMP	601966-1	N/A	91067-1	601966-6	91067-1
Daniels	AFM8	K774	M81969/1-04	K42	M81969/1-04
Astro	615717	N/A	M81969/1-04	615725	M81969/1-04

NOTES

1. Non-Garmin part numbers shown are not maintained by Garmin and consequently are subject to change without notice.
2. Extraction of 16 and 18 AWG contacts requires cutting off the wire barrel from the contact. It may also be necessary to push the pin out from the face of the connector when using an extractor.
3. For applications using 16 AWG wire, contact Garmin for information regarding connector crimp positioner tooling.

3.3 Antenna Installation

For the COM, VOR/LOC, and Glideslope antennas, follow the manufacturers' instructions. Avoid running other wires and coaxial cables near the VOR/LOC antenna cable.

CAUTION

Do not use construction grade RTV sealant or sealants containing acetic acid. These sealants may damage the electrical connections to the antenna. Use of these type sealants may void the antenna warranty.

3.4 Cable Installation

1. Route the coaxial cable to the rack location keeping in mind the recommendations of Section 2. Secure the cable in accordance with good aviation practice.

2. Trim the coaxial cable to the desired length and install the BNC connector (330-00087-00) per the cabling instructions on Figure 3-1. If the connector is provided by the installer, follow the connector manufacturer's instructions for cable preparation.

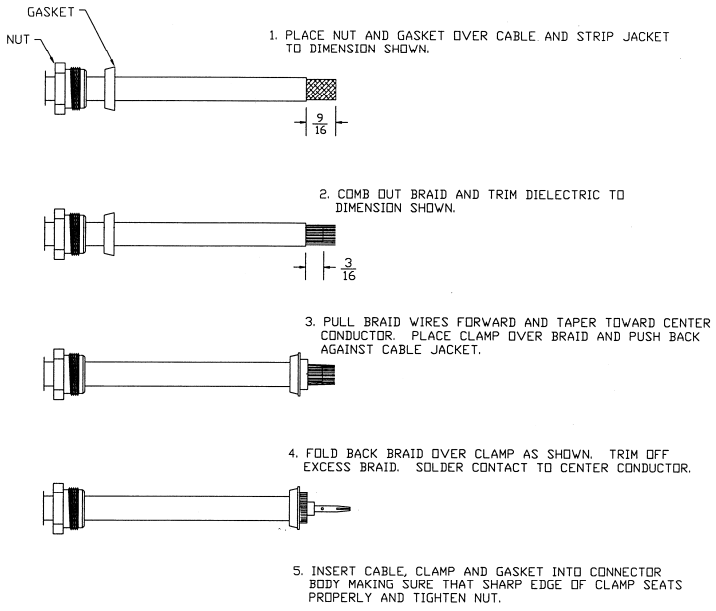

Figure 3-1. Coaxial Cable Installation

3. Contacts for the 78, 62, and 44 pin connectors must be crimped onto the individual wires of the aircraft wiring harness. Tables 3-1 and 3-2 list contact part numbers (for reference) and recommended crimp tools.

3.5 Backshell Assembly

The GIA 63(W) connector kit includes six Garmin backshell connectors. The backshell assemblies house the configuration module/temperature sensor, if applicable. Garmin's backshell also gives the installer the ability to easily terminate shield grounds at the backshell housing using one of two methods available (SPIDER or Shield Block). To assemble the backshell and configuration module refer to instructions provided in the G1000 System Installation Manual (190-00303-00), as well as the SPIDER Installation Instructions (190-00313-03) and Shield Block Installation Instructions (190-00313-09).

NOTE

Information about the SPIDER grounding system is provided in support of existing installations. All new installations shall use the SHIELD BLOCK grounding system.

3.6 Unit Installation

For installation and assembly, refer to the outline and installation drawings shown in Appendix B of this manual.

1. Assemble the backshell connectors, refer to Section 3.5.

2. Connect backshell connectors to the rear plate using the provided screws.

3. Mount the unit rack to the main system rack or other suitable mounting location, using the nutplates provided for the modular rack or appropriate hardware from Section 2.1.3 for the standalone rack.

4. Assemble the NAV and Main rear plates into the GIA 63(W) unit rack.

5. Carefully slide the GIA 63(W) into the rack. Ensure that the orientation of the unit allows for the engagement of the locking stud in the channel on the rack. The unit can only be installed in one direction.

6. Push the GIA 63(W) lever down towards the bottom of the unit. This engages the locking stud with the dogleg slot and locks unit into the rack. If there is excessive resistance, do not force the unit.

7. Lock the handle into the GIA 63(W) body and tighten the Phillips screw (or push in the D-Ring and twist clockwise 90°, for units with a D-Ring).

CAUTION

Do not use excessive force when inserting the GIA 63(W) into the rack. This may cause damage to the connectors, unit and/or unit rack. If excessive resistance is felt during installation, stop! Remove the GIA 63(W) and identify the source of resistance. The rear plates are designed to float in the unit rack. Check to ensure the rear plates are not bound by the connectors or spring clip.

3.7 Post Installation Configuration & Checkout

All configuration and checkout procedures take place upon completion of the installation of the Garmin Integrated Flight Deck. The GDU serves as the graphics user interface to the installer configuring the system. For sample configuration and checkout procedures, refer to the G1000 Line Maintenance and Configuration Manual, Garmin part number 190-00303-04. Always use aircraft manufacturer approved checkout documents when performing actual checkout.

3.8 Continued Airworthiness

Maintenance of the GIA 63(W) is "on condition" for all units installed in airframes that require power interrupt Category B (50mS). For airframes that require the GIA 63(W) to comply with RTCA/DO-160D power interrupt Category A (200mS), one of the following two actions must be taken to ensure backup time is adequate:

- Comply with the applicable GIA 63(W) Mod Status (refer to Table 3-3).

Table 3-3. Long Term Power Interrupt Category A (200 mS) Mod Status

Unit	Unit Part Number	Long Term Power Interrupt Category A (200 mS) Mod Status
GIA 63	011-00781-00	4
GIA 63	011-00781-01	1
GIA 63W	011-01105-00	1
GIA 63W	011-01105-01	0

Or

- Perform the power interrupt annual inspection as described in Section 3.8.1.

3.8.1 Category A Long Term Power Interrupt Annual Inspection

NOTE

In order to comply with this procedure GIA 63 main software version must be 5.30 or later, GIA 63W main software version must be 5.21 or later, and GDU main software version must be 7.10 or later.

1. Verify the air temperature around both GIA's is at least 70° Fahrenheit.
2. Apply power to both GIA's.
3. Leave both GIA's on for 10 minutes.
4. Remove power from both GIA's.
5. Wait 30 seconds.
6. Apply power to both GIA's.
7. Place the G1000 in Configuration mode by holding the ENT key on the GDU's while applying power.
8. Using the FMS knob go to the GIA STATUS page (Figure 3-2) on the PFD.
9. Verify the GIA #1 BKUP CAPS light is green. If the BKUP CAPS light is red, replace GIA #1 with a unit of mod status indicated in Table 3-3.
10. Using the FMS knob select GIA2 in the 'SELECT GIA UNIT' field.
11. Verify the GIA #2 BKUP CAPS light is green. If the BKUP CAPS light is red, replace GIA #2, with a unit of mod status indicated in Table 3-3..

Figure 3-2. GIA STATUS Page

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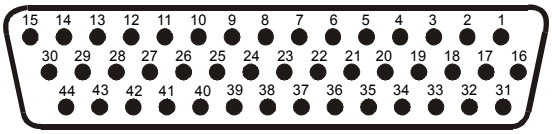
4 SYSTEM INTERCONNECTS

4.1 Pin Function List

4.1.1 P601 (COM)

View of J601 connector from back of unit

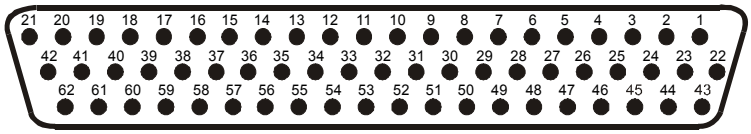


Pin	Pin Name	I/O
1	RESERVED (UNSQUELCHED AUDIO TEST)	--
2	RESERVED	--
3	RESERVED	--
4	COM MIC KEY*	In
5	INTERCOM MIC IN HI	In
6	INTERCOM MIC IN LO (GROUND)	--
7	COM MIC AUDIO IN HI	In
8	COM MIC AUDIO IN LO (GROUND)	--
9	COM 500Ω AUDIO OUT HI	Out
10	COM 500Ω AUDIO OUT LO (GROUND)	--
11	TRANSMIT INTERLOCK*	In
12	COM REMOTE TRANSFER*	In
13	COM DIGITAL AUDIO OUT	Out
14	COM MIC DIGITAL AUDIO IN	In
15	SIGNAL GROUND	--
16	COM REMOTE POWER OFF	In
17	AIRCRAFT POWER 1	In
18	SPARE	--
19	AIRCRAFT POWER 1	In
20	SPARE	--
21	AIRCRAFT POWER 1	In
22	SPARE	--
23	AIRCRAFT POWER 2	In
24	SPARE	--
25	AIRCRAFT POWER 2	In
26	SPARE	--
27	AIRCRAFT POWER 2	In
28	RESERVED	--
29	RESERVED	--
30	POWER GROUND	--
31	POWER GROUND	--
32	RESERVED	--
33	RESERVED	--
34	RESERVED	--

Connector P601, continued		
Pin	**Pin Name**	**I/O**
35	RESERVED	--
36	RESERVED	--
37	RESERVED	--
38	RESERVED	--
39	RESERVED	--
40	RESERVED	--
41	RESERVED	--
42	RESERVED	--
43	POWER GROUND	--
44	POWER GROUND	--

4.1.2 P602 (VOR/ILS)

View of J602 connector from back of unit

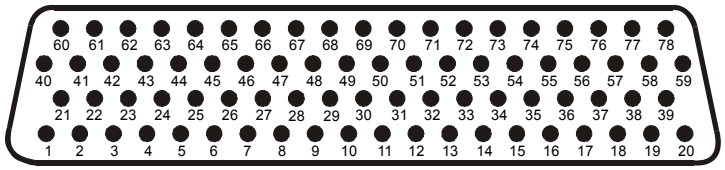


Pin	Pin Name	I/O
1	VOR/LOC +TO	Out
2	VOR/LOC +FROM (VOR/LOC COMMON)	--
3	VOR/LOC +FLAG	Out
4	VOR/LOC -FLAG (VOR/LOC COMMON)	--
5	VOR/LOC +LEFT	Out
6	VOR/LOC +RIGHT (VOR/LOC COMMON)	--
7	RESERVED	--
8	VOR/LOC COMPOSITE OUT	Out
9	VOR OBS ROTOR C	Out
10	VOR OBS ROTOR H (GROUND)	--
11	VOR OBS STATOR E (VOR/LOC COMMON)	--
12	VOR OBS STATOR F	In
13	VOR OBS STATOR D	In
14	VOR OBS STATOR G (VOR/LOC COMMON)	--
15	VOR/LOC SUPERFLAG	Out
16	VOR/LOC 500Ω AUDIO OUT HI	Out
17	VOR/LOC 500Ω AUDIO OUT LO	--
18	KING SERIAL DME CLOCK	Out
19	KING SERIAL DME DATA	Out
20	KING SERIAL RNAV REQUEST	In
21	KING SERIAL RNAV* MODE	In
22	SIGNAL GROUND	--
23	VOR/ILS ARINC 429 OUT B	Out
24	VOR/ILS ARINC 429 OUT A	Out
25	VOR OBI CLOCK	Out
26	VOR OBI SYNC	Out
27	VOR OBI DATA	Out
28	VOR/ILS REMOTE TRANSFER*	In
29	ILS ENERGIZE*	Out
30	RESERVED	--
31	RESERVED	--
32	GLIDESLOPE +FLAG	Out
33	PARALLEL DME 1 MHZ-D	Out
34	GLIDESLOPE +UP	Out
35	VOR/ILS ARINC 429 IN B	In
36	VOR/ILS ARINC 429 IN A	In
37	PARALLEL DME 100 KHZ-A	Out

Connector P602, continued		
Pin	**Pin Name**	**I/O**
38	GLIDESLOPE SUPERFLAG	Out
39	PARALLEL DME 100 KHZ-B	Out
40	PARALLEL DME 100 KHZ-C	Out
41	DME COMMON	In
42	PARALLEL DME 100 KHZ-D	Out
43	PARALLEL DME 50 KHZ	Out
44	SPARE	--
45	PARALLEL DME 1 MHZ-A	Out
46	PARALLEL DME 1 MHZ-B	Out
47	PARALLEL DME 1 MHZ-C	Out
48	RESERVED	--
49	SIGNAL GROUND	--
50	RESERVED	--
51	SPARE	--
52	SPARE	--
53	GLIDESLOPE –FLAG (GLIDESLOPE COMMON)	--
54	PARALLEL DME 100KHZ-E	Out
55	GLIDESLOPE +DOWN (GLIDESLOPE COMMON)	--
56	PARALLEL DME 1MHZ-E	Out
57	RESERVED	--
58	SPARE	--
59	VOR/LOC DIGITAL AUDIO OUT	Out
60	SIGNAL GROUND	--
61	POWER GROUND	--
62	POWER GROUND	--

4.1.3 P603 (Main Serial)

View of J603 connector from back of unit

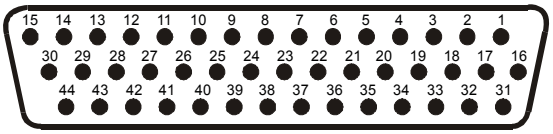


Pin	Pin Name	I/O
1	RESERVED	--
2	ETHERNET OUT A	Out
3	ETHERNET OUT B	Out
4	RS-485 4 A	I/O
5	RS-485 4 A	I/O
6	RS-485 4 B	I/O
7	RS-485 4 B	I/O
8	MAIN ARINC 429 IN 3 A	In
9	MAIN ARINC 429 IN 3 B	In
10	MAIN ARINC 429 IN 4 A	In
11	MAIN ARINC 429 IN 4 B	In
12	MAIN ARINC 429 IN 5 A	In
13	MAIN ARINC 429 IN 5 B	In
14	MAIN ARINC 429 IN 6 A	In
15	MAIN ARINC 429 IN 6 B	In
16	MAIN ARINC 429 IN 7 A	In
17	MAIN ARINC 429 IN 7 B	In
18	MAIN ARINC 429 IN 8 A	In
19	MAIN ARINC 429 IN 8 B	In
20	CAN BUS 1 HI	I/O
21	RESERVED	--
22	CAN BUS 1 LO	I/O
23	RS-485 1 A	I/O
24	RS-485 1 B	I/O
25	RS-485 2 A	I/O
26	RS-485 2 B	I/O
27	RS-485 3 A/RS-422 IN A	I/O
28	RS-485 3 B/RS-422 IN B	I/O
29	MAIN ARINC 429 IN 1 A	In
30	CAN BUS 2 LO	I/O
31	MAIN ARINC 429 IN 1 B	In
32	CAN BUS 2 HI	I/O
33	MAIN ARINC 429 IN 2 A	In
34	CAN BUS 1 TERMINATION	--
35	MAIN ARINC 429 IN 2 B	In
36	RS-485 5 A/RS-422 OUT A	I/O

Connector P603, continued		
Pin	**Pin Name**	**I/O**
37	RS-485 5 B/RS-422 OUT B	I/O
38	RESERVED	--
39	CAN BUS 2 TERMINATION	--
40	RESERVED	--
41	MAIN RS-232 IN 1	In
42	SIGNAL GROUND	--
43	MAIN RS-232 OUT 1	Out
44	MAIN RS-232 IN 2	In
45	SIGNAL GROUND	--
46	MAIN RS-232 OUT 2	Out
47	MAIN RS-232 IN 3	In
48	SIGNAL GROUND	--
49	MAIN RS-232 OUT 3	Out
50	MAIN RS-232 IN 4	In
51	SIGNAL GROUND	--
52	MAIN RS-232 OUT 4	Out
53	MAIN RS-232 IN 5	In
54	SIGNAL GROUND	--
55	MAIN RS-232 OUT 5	Out
56	MAIN RS-232 IN 6	In
57	SIGNAL GROUND	--
58	MAIN RS-232 OUT 6	Out
59	MAIN RS-232 IN 7	In
60	RESERVED	--
61	SIGNAL GROUND	--
62	MAIN RS-232 OUT 7	Out
63	MAIN RS-232 IN 8	In
64	SIGNAL GROUND	--
65	MAIN RS-232 OUT 8	Out
66	RESERVED	--
67	GPS PPS OUT	Out
68	RESERVED	--
69	VOICE ALERT DIGITAL AUDIO OUT	Out
70	MAIN ARINC 429 OUT 1 B	Out
71	MAIN ARINC 429 OUT 1 A	Out
72	MAIN ARINC 429 OUT 2 B	Out
73	MAIN ARINC 429 OUT 2 A	Out
74	MAIN ARINC 429 OUT 3 B	Out
75	MAIN ARINC 429 OUT 3 A	Out
76	ETHERNET IN A	In
77	ETHERNET IN B	In
78	RESERVED	--

4.1.4 P604 (Main Discrete)

View of J604 connector from back of unit

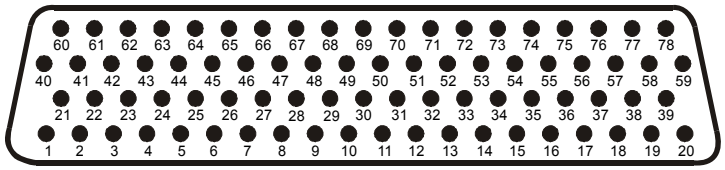


Pin	Pin Name	I/O
1	ANNUNCIATE* 22	Out
2	VOICE ALERT 500Ω AUDIO OUT HI	Out
3	VOICE ALERT 500Ω AUDIO OUT LO (GROUND)	--
4	DISCRETE IN 13	In
5	DISCRETE IN 14	In
6	ANNUNCIATE* 1	Out
7	DISCRETE IN* 1	In
8	DISCRETE IN* 2	In
9	DISCRETE IN* 3	In
10	DISCRETE IN 15	In
11	AUTOPILOT DISCONNECT IN	In
12	DISCRETE IN* 4	In
13	DISCRETE IN* 5	In
14	DISCRETE IN* 6	In
15	DISCRETE IN 16	In
16	DISCRETE IN 17	In
17	DISCRETE IN* 7	In
18	DISCRETE IN* 8	In
19	DISCRETE IN* 9	In
20	DISCRETE IN* 10	In
21	DISCRETE IN* 11	In
22	GIA SYSTEM ID PROGRAM* 1	In
23	GIA SYSTEM ID PROGRAM* 2	In
24	DISCRETE IN* 12	In
25	ANNUNCIATE* 2	Out
26	ANNUNCIATE* 3	Out
27	ANNUNCIATE* 4	Out
28	ANNUNCIATE* 5	Out
29	ANNUNCIATE* 6	Out
30	ANNUNCIATE* 7	Out
31	ANNUNCIATE* 8	Out
32	ANNUNCIATE* 9	Out
33	ANNUNCIATE* 10	Out
34	ANNUNCIATE* 11	Out
35	ANNUNCIATE* 12	Out
36	ANNUNCIATE* 13	Out
37	ANNUNCIATE* 14	Out
38	ANNUNCIATE* 15	Out
39	ANNUNCIATE* 16	Out

Connector P604, continued		
Pin	**Pin Name**	**I/O**
40	ANNUNCIATE* 17	Out
41	ANNUNCIATE* 18	Out
42	ANNUNCIATE* 19	Out
43	ANNUNCIATE* 20	Out
44	ANNUNCIATE* 21	Out

4.1.5 P605 (I/O 1)

View of J605 connector from back of unit

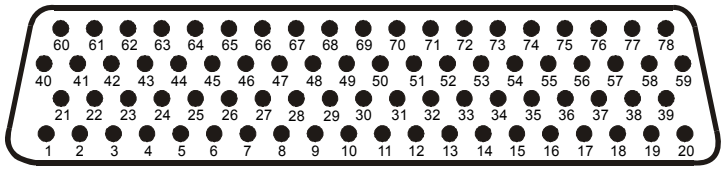


Pin	Pin Name	I/O
1	RADAR ALTIMETER DC HI	In
2	RADAR ALTIMETER DC LO	In
3	DISCRETE IN 18A	In
4	SPARE	--
5	SPARE	--
6	SPARE	--
7	SPARE	--
8	FLIGHT DIRECTOR PITCH +UP	In
9	FLIGHT DIRECTOR PITCH +DOWN	In
10	FLIGHT DIRECTOR ROLL +RIGHT	In
11	FLIGHT DIRECTOR ROLL +LEFT	In
12	DISCRETE IN 19A	In
13	POTENTIOMETER SIGNAL IN	In
14	POTENTIOMETER REF IN HI	In
15	POTENTIOMETER REF IN LO	In
16	DISCRETE IN 20A	In
17	MAIN LATERAL DEVIATION +LEFT	Out
18	MAIN LATERAL DEVIATION +RIGHT (MAIN COMMON)	Out
19	MAIN LATERAL +FLAG	Out
20	MAIN LATERAL –FLAG (MAIN COMMON)	Out
21	SPARE	--
22	SPARE	--
23	MAIN VERTICAL DEVIATION +UP	Out
24	MAIN VERTICAL DEVIATION +DOWN (MAIN COMMON)	Out
25	MAIN VERTICAL +FLAG	Out
26	MAIN VERTICAL –FLAG (MAIN COMMON)	Out
27	SPARE	--
28	SPARE	--
29	AIRCRAFT POWER 1	In
30	POTENTIOMETER SIGNAL OUT	Out
31	AIRCRAFT POWER 1	In
32	POTENTIOMETER REF OUT HI	Out
33	AIRCRAFT POWER 2	In
34	POTENTIOMETER REF OUT LO (GROUND)	Out
35	AIRCRAFT POWER 2	In
36	GIA REMOTE POWER OFF	In

Connector P605, continued		
Pin	**Pin Name**	**I/O**
37	DISCRETE IN* 1A	In
38	DISCRETE IN* 2A	In
39	DISCRETE IN* 3A	In
40	DISCRETE IN* 4A	In
41	DISCRETE IN* 5A	In
42	DISCRETE IN* 6A	In
43	DISCRETE IN* 7A	In
44	DISCRETE IN* 8A	In
45	DISCRETE IN* 9A	In
46	DISCRETE IN* 10A	In
47	DISCRETE OUT* 1A	Out
48	SIGNAL GROUND	--
49	DISCRETE IN* 11A	In
50	DISCRETE IN 21A	In
51	DISCRETE IN 22A	In
52	DISCRETE IN* 12A	In
53	DISCRETE IN* 13A	In
54	DISCRETE IN* 14A	In
55	DISCRETE IN* 15A	In
56	OUTER MARKER LAMP IN	In
57	MIDDLE MARKER LAMP IN	In
58	AIRWAY/INNER MARKER LAMP IN	In
59	DISCRETE IN* 16A	In
60	DISCRETE IN 23A	In
61	SIGNAL GROUND	--
62	MAIN LATERAL SUPERFLAG	Out
63	MAIN VERTICAL SUPERFLAG	Out
64	SUPERFLAG 4A	Out
65	SPARE	--
66	SPARE	--
67	SUPERFLAG 1A	Out
68	DISCRETE OUT* 2A	Out
69	DISCRETE OUT* 3A	Out
70	DISCRETE OUT* 4A	Out
71	ANNUNCIATE* 1A	Out
72	ANNUNCIATE* 2A	Out
73	DISCRETE IN* 17A	In
74	DISCRETE IN 24A	In
75	SUPERFLAG 2A	Out
76	POWER GROUND	--
77	SUPERFLAG 3A	Out
78	POWER GROUND	--

4.1.6 P606 (I/O 2)

View of J606 connector from back of unit



Pin	Pin Name	I/O
1	26 VAC VERTICAL GYRO REF HI	In
2	26 VAC VERTICAL GYRO REF LO	In
3	26 VAC ADF REF HI	In
4	26 VAC ADF REF LO	In
5	26 VAC AFCS REF HI	In
6	26 VAC AFCS REF LO	In
7	DIRECTIONAL GYRO MOTOR A	In
8	DIRECTIONAL GYRO MOTOR B	In
9	SIGNAL GROUND	--
10	ADF X/COS	In
11	ADF Y/SIN	In
12	ADF Z (GROUND)	In
13	SIGNAL GROUND	--
14	HEADING X	In
15	HEADING Y	In
16	HEADING Z (GROUND)	In
17	SIGNAL GROUND	--
18	PITCH ATTITUDE X	In
19	PITCH ATTITUDE Y	In
20	PITCH ATTITUDE Z (GROUND)	In
21	ROLL ATTITUDE X	In
22	ROLL ATTITUDE Y	In
23	ROLL ATTITUDE Z (GROUND)	In
24	SIGNAL GROUND	--
25	SPARE	--
26	SPARE	--
27	SPARE	--
28	SPARE	--
29	RESERVED	--
30	SIGNAL GROUND	--
31	RESERVED	--
32	ADF DC REF IN	In
33	RESERVED	--
34	ANALOG ROLL STEERING HI	Out
35	RESERVED	--
36	ANALOG ROLL STEERING LO (GROUND)	Out

Connector P606, continued		
Pin	**Pin Name**	**I/O**
37	HEADING BOOTSTRAP OUT X	Out
38	HEADING BOOTSTRAP OUT Y	Out
39	HEADING BOOTSTRAP OUT Z (GROUND)	Out
40	AC ROLL ATTITUDE OUT HI	Out
41	AC ROLL ATTITUDE OUT LO (GROUND)	Out
42	AC PITCH ATTITUDE OUT HI	Out
43	AC PITCH ATTITUDE OUT LO (GROUND)	Out
44	YAW RATE +RIGHT	Out
45	YAW RATE +LEFT (GROUND)	Out
46	HEADING DATUM HI	Out
47	HEADING DATUM LO (GROUND)	Out
48	COURSE DATUM HI	Out
49	COURSE DATUM LO (GROUND)	Out
50	SIGNAL GROUND	--
51	26 VAC DIRECTIONAL GYRO REF HI	In
52	26 VAC DIRECTIONAL GYRO REF LO	In
53	REMOTE ANNUNCIATE CLOCK	In
54	REMOTE ANNUNCIATE DATA	In
55	REMOTE ANNUNCIATE SYNC	In
56	MAIN OBI CLOCK	Out
57	MAIN OBI DATA	Out
58	MAIN OBI SYNC	Out
59	MAIN KING SERIAL DME DATA	I/O
60	MAIN KING SERIAL DME CLOCK	I/O
61	MAIN KING SERIAL DME HOLD* OUT	Out
62	MAIN KING SERIAL DME REQUEST	I/O
63	MAIN KING SERIAL DME ON* OUT	Out
64	MAIN KING SERIAL RNAV REQUEST	In
65	RESERVED	--
66	RESERVED	--
67	DISCRETE OUT* 1B	Out
68	DISCRETE OUT* 2B	Out
69	DISCRETE OUT* 3B	Out
70	DISCRETE OUT* 4B	Out
71	DISCRETE OUT* 5B	Out
72	DISCRETE OUT* 6B	Out
73	DISCRETE OUT* 7B	Out
74	DISCRETE OUT* 8B	Out
75	DISCRETE OUT* 9B	Out
76	RESERVED	--
77	DISCRETE OUT* 10B	Out
78	RESERVED	--

4.2 Power and Antennas

4.2.1 Power Functions

This section covers the power input requirements.

4.2.1.1 Aircraft Power

Pin Name	Connector	Pin	I/O
AIRCRAFT POWER 1	P601	17	In
AIRCRAFT POWER 1	P601	19	In
AIRCRAFT POWER 1	P601	21	In
AIRCRAFT POWER 2	P601	23	In
AIRCRAFT POWER 2	P601	25	In
AIRCRAFT POWER 2	P601	27	In
AIRCRAFT POWER 1	P605	29	In
AIRCRAFT POWER 1	P605	31	In
AIRCRAFT POWER 2	P605	33	In
AIRCRAFT POWER 2	P605	35	In
POWER GROUND	P601	30	--
POWER GROUND	P601	31	--
POWER GROUND	P601	43	--
POWER GROUND	P601	44	--
POWER GROUND	P602	61	--
POWER GROUND	P602	62	--
POWER GROUND	P605	76	--
POWER GROUND	P605	78	--

Pins 17, 19, and 21 of P601 are internally connected to form AIRCRAFT POWER 1. Pins 23, 25, and 27 of P601 are internally connected to form AIRCRAFT POWER 2. AIRCRAFT POWER 1 and AIRCRAFT POWER 2 are "diode ORed" to provide power redundancy. The same applies to pins 29/31 and pins 33/35 of P605. Use of more than one AIRCRAFT POWER and POWER GROUND pins is required for installations where current through a single connector pin will exceed 5A.

4.2.1.2 Remote On/Off

Pin Name	Connector	Pin	I/O
GIA REMOTE POWER OFF	P605	36	In
COM REMOTE POWER OFF	P601	16	In

INACTIVE: Vin $\leq$ 3.5VDC
ACTIVE: 10 $\leq$ Vin $\leq$ 33VDC with $\geq$ 75 uA source current
Source current is internally limited to 1.5 mA max for a 10-33VDC input

4.2.1.3 Antennas

Pin Name	Connector	I/O
GPS ANTENNA	P611	In
COM ANTENNA	P612	I/O
VOR/LOC ANTENNA	P613	In
GLIDESLOPE ANTENNA	P614	In

4.3 GIA System ID Program

The GIA 63(W) utilizes a hard strapping method to assign a unit ID to a unit. Unit ID's identify a unit as a #1, #2, #3, or #4 GIA.

GIA SYSTEM ID PROGRAM 1 (P604, Pin 22)	GIA SYSTEM ID PROGRAM 2 (P604, Pin 23)	UNIT NUMBER
Open	Open	#1
Ground	Open	#2
Open	Ground	#3
Ground	Ground	#4

4.4 Serial Data

4.4.1 Serial Data Electrical Characteristics

4.4.1.1 RS-232

Pin Name	Connector	Pin	I/O
MAIN RS-232 IN 1	P603	41	In
MAIN RS-232 OUT 1	P603	43	Out
MAIN RS-232 IN 2	P603	44	In
MAIN RS-232 OUT 2	P603	46	Out
MAIN RS-232 IN 3	P603	47	In
MAIN RS-232 OUT 3	P603	49	Out
MAIN RS-232 IN 4	P603	50	In
MAIN RS-232 OUT 4	P603	52	Out
MAIN RS-232 IN 5	P603	53	In
MAIN RS-232 OUT 5	P603	55	Out
MAIN RS-232 IN 6	P603	56	In
MAIN RS-232 OUT 6	P603	58	Out
MAIN RS-232 IN 7	P603	59	In
MAIN RS-232 OUT 7	P603	62	Out
MAIN RS-232 IN 8	P603	63	In
MAIN RS-232 OUT 8	P603	65	Out

The RS-232 outputs conform to EIA Standard RS-232C with an output voltage swing of at least ± 5V when driving a standard RS-232 load.

4.4.1.2 RS-485/422

Pin Name	Connector	Pin	I/O
RS-485/422 IN A	P603	27	In
RS-485/422 IN B	P603	28	In
RS-485/422 OUT A	P603	36	Out
RS-485/422 OUT B	P603	37	Out
GEA RS-485 1 A	P603	23	I/O
GEA RS-485 1 B	P603	24	I/O
GEA RS-485 2 A	P603	25	I/O
GEA RS-485 2 B	P603	26	I/O
SERVO RS-485 A	P603	4	I/O
SERVO RS-485 A	P603	5	I/O
SERVO RS-485 B	P603	6	I/O
SERVO RS-485 B	P603	7	I/O

The GIA 63(W) contains a total of 5 channels of RS-485 serial data communications. Two of these channels can also be configured as RS-422 mode channels to allow for system flexibility. These data busses conform to EIA standard RS-485, or RS-422, depending on which mode they are currently operating in.

4.4.1.3 ARINC 429

Pin Name	Connector	Pin	I/O
MAIN ARINC 429 IN 1 A	P603	29	In
MAIN ARINC 429 IN 1 B	P603	31	In
MAIN ARINC 429 IN 2 A	P603	33	In
MAIN ARINC 429 IN 2 B	P603	35	In
MAIN ARINC 429 IN 3 A	P603	8	In
MAIN ARINC 429 IN 3 B	P603	9	In
MAIN ARINC 429 IN 4 A	P603	10	In
MAIN ARINC 429 IN 4 B	P603	11	In
MAIN ARINC 429 IN 5 A	P603	12	In
MAIN ARINC 429 IN 5 B	P603	13	In
MAIN ARINC 429 IN 6 A	P603	14	In
MAIN ARINC 429 IN 6 B	P603	15	In
MAIN ARINC 429 IN 7 A	P603	16	In
MAIN ARINC 429 IN 7 B	P603	17	In
MAIN ARINC 429 IN 8 A	P603	18	In
MAIN ARINC 429 IN 8 B	P603	19	In
MAIN ARINC 429 OUT 1 B	P603	70	Out
MAIN ARINC 429 OUT 1 A	P603	71	Out
MAIN ARINC 429 OUT 2 B	P603	72	Out
MAIN ARINC 429 OUT 2 A	P603	73	Out
MAIN ARINC 429 OUT 3 B	P603	74	Out
MAIN ARINC 429 OUT 3 A	P603	75	Out
VOR/ILS ARINC 429 OUT B	P602	23	Out
VOR/ILS ARINC 429 OUT A	P602	24	Out
VOR/ILS ARINC 429 IN B	P602	35	In
VOR/ILS ARINC 429 IN A	P602	36	In

The MAIN and VOR/ILS ARINC 429 outputs conform to ARINC 429 electrical specifications when loaded with up to 5 standard ARINC 429 receivers.

4.4.1.4 Can Bus

Pin Name	Connector	Pin	I/O
CAN BUS 1 HI	P603	20	I/O
CAN BUS 1 LO	P603	22	I/O
CAN BUS 1 TERMINATION	P603	34	--
CAN BUS 2 HI	P603	32	I/O
CAN BUS 2 LO	P603	30	I/O
CAN BUS 2 TERMINATION	P603	39	--

This data bus conforms to the BOSCH standard for Controller Area Network 2.0-B. This bus complies with ISO 11898. CAN BUS TERMINATION should be connected to CAN BUS LO if GIA is located at the end of the bus.

4.4.1.5 Ethernet HSDB

Pin Name	Connector	Pin	I/O
ETHERNET OUT A	P603	2	Out
ETHERNET OUT B	P603	3	Out
ETHERNET IN A	P603	76	In
ETHERNET IN B	P603	77	In

This Ethernet based high speed data bus (HSDB) provides communications capability with the GDU. HSDB meets the hardware aspects of IEEE standard 802.3 for 10 base T Ethernet communications.

4.5 Discrete I/O

Pin Name	Connector	Pin	I/O
DISCRETE IN	P604	4, 5, 10, 15, 16	In
	P605	3, 12, 16, 50-51, 60, 74	In
DISCRETE IN*	P604	7-9, 12-14, 17-21, 24	In
	P605	37-46, 49, 52-55, 59, 73	In
DISCRETE OUT*	P605	47, 68-70	Out
	P606	67-75, 77	Out
ANNUNCIATE	P605	71, 72	Out
ANNUNCIATE	P604	6, 25-44	Out

DISCRETE IN* pins:
INACTIVE: $10 \leq Vin \leq 33VDC$ or $Rin \geq 100k\Omega$
ACTIVE: $Vin \leq 1.9VDC$ with ≥ 75 uA sink current, or $Rin \leq 375\Omega$
Sink current is internally limited to 200 uA max for a grounded input

DISCRETE IN pins:
INACTIVE: $Vin \leq 3.5VDC$
ACTIVE: $10 \leq Vin \leq 33VDC$ with ≥ 75 uA source current
Source current is internally limited to 1.5 mA max for a 10-33VDC input

DISCRETE OUT pins:
INACTIVE: Floating (can be pulled up to externally sourced Vout in the range $0 \leq Vout \leq 33VDC$)
Leakage current in the INACTIVE state is typically ≤ 10 uA to ground
ACTIVE: $Vout \leq 0.5VDC$ with ≤ 20 mA sink current
Sink current must be externally limited to 20 mA max

ANNUNCIATE pins:
INACTIVE: Floating (can be pulled up to externally sourced Vout in the range $0 \leq Vout \leq 33VDC$)
Leakage current in the INACTIVE state is typically ≤ 250 uA to ground
ACTIVE: $Vout \leq 0.5VDC$ with ≤ 500 mA sink current
Sink current must be externally limited to 500 mA max

4.6 COM/VOR/ILS/Digital Audio

4.6.1 COM/VOR/ILS/Digital Audio Function and Emergency Mode

Activation of COM MIC KEY enables COM MIC AUDIO and causes the transceiver to transmit.

500Ω COM AUDIO and 500Ω VOR/ILS AUDIO are 100 mW audio outputs that are intended to drive a headset or an audio panel. Digital audio outputs from the GMA 1347 are 3.87 Vrms into 150 ohms.

Momentarily depressing the COM REMOTE TRANSFER button toggles the active and standby COM frequencies. Momentarily depressing the VLOC REMOTE TRANSFER button toggles the active and standby VLOC frequencies.

The COM REMOTE TRANSFER input may be used for EMERGENCY operation of the COM transmitter. If the remote transfer switch is depressed for two seconds, the active COM frequency changes to 121.50 MHz. Once the emergency frequency is activated through COM REMOTE TRANSFER, the GIA 63(W) ignores inputs from the front panel controls for COM selections only. The pilot may exit this independent mode—restoring COM selection control to the front panel knobs and buttons—by momentarily depressing the COM REMOTE TRANSFER switch.

When TRANSMIT INTERLOCK is active, the GIA 63(W) COM receiver sensitivity is decreased. This input is intended to reduce interference from other transmitters in the aircraft. The TRANSMIT INTERLOCK input should be connected to the PTT input of other transmitters in the aircraft. If connected to multiple PTT inputs, these connections must include diode isolation or multiple radios transmit simultaneously.

For digital audio installations, all of this information is transferred in the digital audio data stream.

4.6.2 Com/VOR/ILS/DIGITAL Audio Electrical Characteristics

4.6.2.1 Com Mic Key

Pin Name	Connector	Pin	I/O
COM MIC KEY	P601	4	In

INACTIVE: $10 \leq Vin \leq 33VDC$ or $Rin \geq 100k\Omega$
ACTIVE: $Vin \leq 1.9VDC$ with ≥ 75 uA sink current, or $Rin \leq 375\Omega$
Sink current is internally limited to 200 uA max for a grounded input

4.6.2.2 Com Mic Audio, Intercom Mic Audio

Pin Name	Connector	Pin	I/O
INTERCOM MIC IN HI	P601	5	In
INTERCOM MIC IN LO (GROUND)	P601	6	--
COM MIC AUDIO IN HI	P601	7	In
COM MIC AUDIO IN LO (GROUND)	P601	8	--

COM MIC AUDIO and INTERCOM MIC each have a 520 Ω AC input impedance and supply the microphone with a 9 V bias through 620 Ω.

COM MIC AUDIO is set in the factory for 275 mV_{RMS} to modulate the transmitter at 80% nominally. The microphone gain adjustment is accessible through the top cover.
When a 125 mV_{RMS} signal at 1000 Hz is applied to the INTERCOM MIC input, the level on the COM AUDIO output is not less than 7.07 V_{RMS}.

4.6.2.3 Com/VOR/ILS Audio

Pin Name	Connector	Pin	I/O
COM 500Ω AUDIO OUT HI	P601	9	Out
COM 500Ω AUDIO OUT LO (GROUND)	P601	10	--
VOR/LOC 500Ω AUDIO OUT HI	P602	16	Out
VOR/LOC 500Ω AUDIO OUT LO (GROUND)	P602	17	--
VOICE ALERT 500Ω AUDIO OUT HI	P604	2	Out
VOICE ALERT 500Ω AUDIO OUT LO (GROUND)	P604	3	--

500Ω COM AUDIO and 500Ω VOR/ILS AUDIO each supply 100 Mw into a 500 Ω load. These are balanced outputs and the LO output must be connected.

500Ω COM AUDIO is the summation of the COM receiver audio, COM sidetone audio, and INTERCOM MIC audio.

4.6.2.4 Digital Audio

Pin Name	Connector	Pin	I/O
COM DIGITAL AUDIO OUT	P601	13	Out
COM MIC DIGITAL AUDIO IN	P601	14	In
VOICE ALERT DIGITAL AUDIO OUT	P603	69	Out
VOR/LOC DIGITAL AUDIO OUT	P602	59	Out

When interfaced to a GMA 1347 audio panel, these can be used in place of analog audio lines.

4.6.2.5 Discrete Inputs

Pin Name	Connector	Pin	I/O
TRANSMIT INTERLOCK	P601	11	In
COMM REMOTE TRANSFER	P601	12	In
VLOC/ILS REMOTE TRANSFER	P602	28	In

INACTIVE: $10 \leq Vin \leq 33VDC$ or $Rin \geq 100k\Omega$
ACTIVE: $Vin \leq 1.9VDC$ with ≥ 75 uA sink current, or $Rin \leq 375\Omega$
Sink current is internally limited to 200 uA max for a grounded input

COM REMOTE TRANSFER and VLOC REMOTE TRANSFER are momentary inputs.

4.6.2.6 Marker Beacon

Pin Name	Connector	Pin	I/O
OUTER MARKER LAMP IN	P605	56	In
MIDDLE MARKER LAMP IN	P605	57	In
AIRWAY/INNER MARKER LAMP IN	P605	58	In

Active high inputs used for outer/middle/inner marker lamp inputs.

4.7 VOR/ILS Indicator

4.7.1 VOR/ILS Indicator Function

The VOR/ILS indicator displays both lateral and vertical, To/From indications, lateral flags, vertical flags, and superflags.

VOR/LOC COMPOSITE OUT is a standard VOR/Localizer Composite signal which may be used to drive the Left/Right, TO/FROM, and Flag indications of certain navigational indicators that contain an internal converter.

The ILS ENERGIZE output goes low when the VLOC frequency is channeled to a localizer channel.

4.7.2 VOR/ILS Indicator Electrical Characteristics

4.7.2.1 Superflags

Pin Name	Connector	Pin	I/O
VOR/LOC SUPERFLAG	P602	15	Out
GLIDESLOPE SUPERFLAG	P602	38	Out

The output supplies not less than 500 mA on a 28 volt system with the output voltage not less than (AIRCRAFT POWER – 1.5 V_{DC}) when the flag is to be OUT OF VIEW. The output voltage with respect to ground is less than 0.25 V_{DC} when the flag is to be IN VIEW.

4.7.2.2 Deviation

Pin Name	Connector	Pin	I/O
VOR/LOC +LEFT	P602	5	Out
VOR/LOC +RIGHT (VOR/LOC COMMON)	P602	6	--
GLIDESLOPE +UP	P602	34	Out
GLIDESLOPE +DOWN (GLIDESLOPE COMMON)	P602	55	--

The deviation outputs are each capable of driving up to three 1000 Ω meter loads with ±150 mV_{DC} ±10% with respect to 2.5V Common for full-scale deflection. The drive circuit provides for more than full-scale deflection with a maximum course deviation output voltage of ±300 mV_{DC} ±10%.

4.7.2.3 To/From

Pin Name	Connector	Pin	I/O
VOR/LOC +TO	P602	1	Out
VOR/LOC +FROM (VOR/LOC COMMON)	P602	2	--

The output is capable of driving up to three 200 Ω meter loads. When indicating TO, the output is +225 ±75 $mV_{DC.}$ When indicating FROM, output is -225 ±75 $mV_{DC.}$ When invalid information is present (Flag IN VIEW) the TO/FROM output is 0 ±10 $mV_{DC.}$

4.7.2.4 Flag

Pin Name	Connector	Pin	I/O
VOR/LOC +FLAG	P602	3	Out
VOR/LOC -FLAG (VOR/LOC COMMON)	P602	4	--
GLIDESLOPE +FLAG	P602	32	Out
GLIDESLOPE -FLAG (GLIDESLOPE COMMON)	P602	53	--

The Flag output is capable of driving up to three 1000 Ω meter loads. When valid information is present (Flag OUT OF VIEW) the Flag output is 375 ±80 $mV_{DC.}$ When invalid information is present (Flag IN VIEW) the Flag output is 0 ±25 $mV_{DC.}$

4.7.2.5 OBS

Pin Name	Connector	Pin	I/O
VOR OBS ROTOR C	P602	9	Out
VOR OBS ROTOR H (GROUND)	P602	10	--
VOR OBS STATOR E (VOR/LOC COMMON)	P602	11	--
VOR OBS STATOR F	P602	12	In
VOR OBS STATOR D	P602	13	In
VOR OBS STATOR G (VOR/LOC COMMON)	P602	14	--

VOR OBS ROTOR C and H are a buffered 500 Hz output that is intended to drive the OBS rotors. VOR OBS STATOR D and VOR OBS STATOR F are each phase and amplitude shifted version of the VOR ROTOR C output. Each pair is intended to read one of the two windings of the indicator's OBS stator.

4.7.2.6 VOR/LOC Composite

Pin Name	Connector	Pin	I/O
VOR/LOC COMPOSITE OUT	P602	8	Out

With a Standard VOR Test Signal applied, VOR/LOC COMPOSITE OUT is 0.5 ±0.1 V_{RMS} into a 10 kΩ load. With a Standard Localizer Centering Test Signal applied, VOR/LOC COMPOSITE OUT is 0.350 ±0.05 V_{RMS} into a 10 kΩ load.

4.7.2.7 ILS Energize

Pin Name	Connector	Pin	I/O
ILS ENERGIZE	P602	29	Out

INACTIVE: Floating (can be pulled up to externally sourced Vout in the range 0 ≤ Vout ≤ 33VDC)
Leakage current in the INACTIVE state is typically ≤ 10 uA to ground
ACTIVE: Vout ≤ 0.5VDC with ≤ 20 mA sink current
Sink current must be externally limited to 20 mA max

4.8 RMI/OBI

4.8.1 RMI/OBI Function

The MAIN OBI output provides bearing information from the active waypoint based upon GPS navigation information. The MAIN OBI output may be configured so that it sends VOR/ILS bearing information when VLOC is selected.

The VOR OBI output provides bearing information from the active waypoint based upon the VOR receiver.

When a localizer channel is tuned on the VLOC window, there is a bit in the data stream set to indicate that a localizer frequency is tuned which stows the needle or drives it to the 3 o'clock position.

4.8.2 RMI/OBI Electrical Characteristics

Pin Name	Connector	Pin	I/O
MAIN OBI CLOCK	P606	56	Out
MAIN OBI SYNC	P606	57	Out
MAIN OBI DATA	P606	58	Out

Pin Name	Connector	Pin	I/O
VOR OBI CLOCK	P602	25	Out
VOR OBI SYNC	P602	26	Out
VOR OBI DATA	P602	27	Out

INACTIVE: Floating (can be pulled up to externally sourced Vout in the range 0 ≤ Vout ≤ 33VDC)
Leakage current in the INACTIVE state is typically ≤ 10 uA to ground
ACTIVE: Vout ≤ 0.5VDC with ≤ 20 mA sink current
Sink current must be externally limited to 20 mA max

4.9 DME Tuning and ADF

4.9.1 DME Tuning Function

The GIA 63(W) can channel a DME based on the tuned VLOC frequency. The GIA 63(W) outputs 2 of 5, BCD or Slip parallel DME and King Serial DME channeling format. When DME COMMON is held low, the GIA 63(W) actively tunes the DME.

4.9.2 DME Interface and ADF Electrical Characteristics

4.9.2.1 Parallel DME Tuning

Pin Name	Connector	Pin	I/O
PARALLEL DME 1 MHZ-D	P602	33	Out
PARALLEL DME 100 KHZ-A	P602	37	Out
PARALLEL DME 100 KHZ-B	P602	39	Out
PARALLEL DME 100 KHZ-C	P602	40	Out
PARALLEL DME 100 KHZ-D	P602	42	Out
PARALLEL DME 50 KHZ	P602	43	Out
PARALLEL DME 1 MHZ-A	P602	45	Out
PARALLEL DME 1 MHZ-B	P602	46	Out
PARALLEL DME 1 MHZ-C	P602	47	Out
PARALLEL DME 100KHZ-E	P602	54	Out
PARALLEL DME 1MHZ-E	P602	56	Out
NAV DME COMMON	P602	41	In

For each of the parallel DME tuning discrete outputs:

INACTIVE: Floating (can be pulled up to externally sourced Vout in the range $0 \lesssim Vout \lesssim 33VDC$)
Leakage current in the INACTIVE state is typically ≤ 10 uA to ground
ACTIVE: $Vout \leq 0.5VDC$ with $\lesssim 20$ mA sink current
Sink current must be externally limited to 20 mA max

NAV DME COMMON must be pulled low to indicate to the NAV module that it is the device channeling the DME.

INACTIVE: $10 \lesssim Vin \lesssim 33VDC$ or $Rin \geq 100k\Omega$
ACTIVE: $Vin \leq 1.9VDC$ with $\gtrsim 75$ uA sink current, or $Rin \leq 375\Omega$
Sink current is internally limited to 200 uA max for a grounded input

4.9.2.2 King Serial DME Interface

Pin Name	Connector	Pin	I/O
KING SERIAL DME CLOCK	P602	18	Out
KING SERIAL DME DATA	P602	19	Out
KING SERIAL RNAV REQUEST	P602	20	In
KING SERIAL RNAV MODE	P602	21	In
MAIN KING SERIAL DME DATA	P606	59	I/O
MAIN KING SERIAL DME CLOCK	P606	60	I/O
MAIN KING SERIAL DME HOLD OUT	P606	61	Out
MAIN KING SERIAL DME REQUEST	P606	62	I/O
MAIN KING SERIAL DME ON OUT	P606	63	Out
MAIN KING SERIAL RNAV REQUEST	P606	64	In

These pins are used when the GIA 63(W) is configured for King Serial DME tuning.
Input logic levels are:
High 6.5 Vdc or greater
Low 3.5 Vdc or less

4.9.2.3 Automatic Direction Finder Inputs

Pin Name	Connector	Pin	I/O
ADF X/COS	P606	10	In
ADF Y/SIN	P606	11	In
ADF Z (GROUND)	P606	12	--
ADF DC REF IN	P606	32	In

ADF (Automatic Direction Finder) inputs which is configurable as either XYZ (AC) or SIN/COS (DC).

	AC	DC
Frequency:	400 Hz ±10%	--
Amplitude:	0 to 11.8 Vrms max	-8 V to +8 V
Input Impedance:	> 80 kΩ	> 80 kΩ
Range:	0 to 360 degrees	0 to 360 degrees
Resolution:	±0.1 degree or better	±0.1 degree or better
Accuracy:	±3.0 degrees	±3.0 degrees
DC Reference Input:	--	0 to 5 Vdc maximum (>40 kΩ)

4.10 Auto Pilot

4.10.1 Radar Altimeter

Pin Name	Connector	Pin	I/O
RADAR ALTIMETER DC HI	P605	1	In
RADAR ALTIMETER DC LO	P605	2	In

Provides altitude information during approach.

4.10.2 Flight Instruments

Pin Name	Connector	Pin	I/O
FLIGHT DIRECTOR PITCH +UP	P605	8	In
FLIGHT DIRECTOR PITCH +DOWN	P605	9	In
FLIGHT DIRECTOR PITCH +RIGHT	P605	10	In
FLIGHT DIRECTOR PITCH +LEFT	P605	11	In

Inputs from AFCS that direct the pilot through the PFD.

Pin Name	Connector	Pin	I/O
HEADING BOOTSTRAP OUT X	P606	37	Out
HEADING BOOTSTRAP OUT Y	P606	38	Out
HEADING BOOTSTRAP OUT Z (GROUND)	P606	39	--

Outputs to backup VOR/ILS/GPS indicator.

Pin Name	Connector	Pin	I/O
AC ROLL ATTITUDE OUT HI	P606	40	Out
AC ROLL ATTITUDE OUT LO (GROUND)	P606	41	--
AC PITCH ATTITUDE OUT HI	P606	42	Out
AC PITCH ATTITUDE OUT LO (GROUND)	P606	43	--

Outputs roll and pitch attitude information to AFCS or weather radar.

4.10.3 Barometric Setting/Altitude

Pin Name	Connector	Pin	I/O
POTENTIOMETER SIGNAL IN	P605	13	In
POTENTIOMETER REF IN HI	P605	14	In
POTENTIOMETER REF IN LO	P605	15	In
POTENTIOMETER SIGNAL OUT	P605	30	Out
POTENTIOMETER REF OUT HI	P605	32	Out
POTENTIOMETER REF OUT LO (GROUND)	P605	34	Out

Inputs and outputs for barometric pressure correction.

4.10.4 26 Volt AC References

Pin Name	Connector	Pin	I/O
26 VAC VERTICAL GYRO REF HI	P606	1	In
26 VAC VERTICAL GYRO REF LO	P606	2	In
26 VAC ADF REF HI	P606	3	In
26 VAC ADF REF LO	P606	4	In
26 VAC AFCS REF HI	P606	5	In
26 VAC AFCS REF LO	P606	6	In
26VAC DIRECTIONAL GYRO REF HI	P606	51	In
26VAC DIRECTIONAL GYRO REF LO	P606	52	In

Used to sample AC inputs and provides reference for AC outputs. A vertical gyro gives pitch and roll information and a directional gyro gives heading information.

This signal must be the same phase and frequency as the indicator being driven.

Frequency: 400 Hz ± 10%
Voltage: 22.6 Vrms to 28.6 Vrms
Input Impedance: 50 kΩ

4.10.5 Inputs From Gyros

Pin Name	Connector	Pin	I/O
HEADING X	P606	14	In
HEADING Y	P606	15	In
HEADING Z (GROUND)	P606	16	--

Inputs heading information from a directional gyro.
3-wire synchro magnetic heading input, with HEADING Z grounded. Index reference is 0° as specified by ARINC 407.

Frequency: 400Hz ± 10%
Voltage: 11.8 Vrms nominal, 13.0 Vrms maximum
Input Impedance: 80 kΩ
Resolution: ± 0.1° or better
Accuracy: ± 3°

Pin Name	Connector	Pin	I/O
PITCH ATTITUDE X	P606	18	In
PITCH ATTITUDE Y	P606	19	In
PITCH ATTITUDE Z	P606	20	--

Inputs pitch attitude information from a vertical gyro.

Pin Name	Connector	Pin	I/O
ROLL ATTITUDE X	P606	21	In
ROLL ATTITUDE Y	P606	22	In
ROLL ATTITUDE Z	P606	23	--

Inputs roll attitude information from a vertical gyro.

4.10.6 Automatic Flight Control System Outputs

Pin Name	Connector	Pin	I/O
ANALOG ROLL STEERING HI	P606	34	Out
ANALOG ROLL STEERING LO (GROUND)	P606	36	--

Variable-amplitude output, which is proportional to the aircraft roll command from the GPS navigation system.

	AC	DC
Frequency:	400 Hz ±10%	--
Amplitude:	0 to 11.8 Vrms max	-15 to +15 Vdc
Load Impedance:	$\geq$ 5 kΩ	$\geq$ 5 kΩ
Scaling:	393 mVrms per degree of roll command	2.0 Vdc per degree of roll command
Range:	0 ± 30 degrees of roll	0 ± 7.5 degrees of roll
Resolution:	± 0.05° or better	± 0.05° or better
Accuracy:	± 0.5°	± 0.3°

Pin Name	Connector	Pin	I/O
YAW RATE +RIGHT	P606	44	Out
YAW RATE +LEFT (GROUND)	P606	45	--

Outputs yaw rate (DC) information to AFCS.

Pin Name	Connector	Pin	I/O
HEADING DATUM HI	P606	46	Out
HEADING DATUM LO (GROUND)	P606	47	--

Outputs heading datum (AC or DC) information to AFCS.

	AC	DC
Frequency:	400 Hz ±10%	--
Amplitude:	0 to 11.8 Vrms max	-15 to +15 Vdc
Load Impedance:	$\geq$ 5 kΩ	$\geq$ 5 kΩ
Scaling:	TBD	0.55 Vdc per degree of heading error
Range:	TBD	0 ± 27 degrees
Resolution:	± 0.02°	± 0.15° or better
Accuracy:	± 1°	± 1°

Pin Name	Connector	Pin	I/O
COURSE DATUM HI	P606	48	Out
COURSE DATUM LO (GROUND)	P606	49	--

Outputs course datum (AC or DC) information to AFCS.

	AC	DC
Frequency:	400 Hz ±10%	--
Amplitude:	0 to 11.8 Vrms max	-15 to +15 Vdc
Load Impedance:	$\geq$ 5 kΩ	$\geq$ 5 kΩ
Scaling:	TBD	0.21 Vdc per degree of course error
Range:	TBD	0 ± 71 degrees
Resolution:	± 0.02°	± 0.15° or better
Accuracy:	± 1°	± 1°

4.10.7 Main Deviation Outputs

Pin Name	Connector	Pin	I/O
MAIN LATERAL DEVIATION +LEFT	P605	17	Out
MAIN LATERAL DEVIATION +RIGHT (MAIN COMMON)	P605	18	Out
MAIN VERTICAL DEVIATION +UP	P605	23	Out
MAIN VERTICAL DEVIATION +DOWN (MAIN COMMON)	P605	24	Out

The deviation output is capable of driving up to three 1000 Ω loads with ±150 mV_{DC} ±5% for full-scale deflection. The drive circuit provides for more than full-scale deflection with a maximum course deviation output voltage of ±300 mV_{DC} ±5%.

Pin Name	Connector	Pin	I/O
MAIN LATERAL +FLAG	P605	19	Out
MAIN LATERAL -FLAG (MAIN COMMON)	P605	20	Out
MAIN VERTICAL +FLAG	P605	25	Out
MAIN VERTICAL –FLAG (MAIN COMMON)	P605	26	Out

The Flag output is capable of driving up to three 1000 Ω loads. When valid information is present (Flag OUT OF VIEW) the Flag output is 375 ±80 $mV_{DC.}$ When invalid information is present (Flag IN VIEW) the Flag output is 0 ±25 $mV_{DC.}$

Pin Name	Connector	Pin	I/O
MAIN LATERAL SUPERFLAG	P605	62	Out
MAIN VERTICAL SUPERFLAG	P605	63	Out
SUPERFLAG 1A	P605	67	Out
SUPERFLAG 2A	P605	75	Out
SUPERFLAG 3A	P605	77	Out
SUPERFLAG 4A	P605	64	Out

The output supplies not less than 500 mA on a 28 volt system with the output voltage not less than (AIRCRAFT POWER –2.0 V_{DC}) when the flag is to be OUT OF VIEW. The output voltage with respect to ground is less than 0.25 V_{DC} when the flag is to be IN VIEW.

4.10.8 Digital Inputs

Pin Name	Connector	Pin	I/O
DIRECTIONAL GYRO MOTOR A	P606	7	In
DIRECTIONAL GYRO MOTOR B	P606	8	In

Inputs from a pulsed directional gyro, which gives heading.

4.10.9 Remote Annunciate Data Bus

Pin Name	Connector	Pin	I/O
REMOTE ANNUNCIATE CLOCK	P606	53	In
REMOTE ANNUNCIATE DATA	P606	54	In
REMOTE ANNUNCIATE SYNC	P606	55	In

These inputs read the remote annunciate data bus that the autopilot uses to tell its remote annunciator panel what mode it is operating in.

The GIA 63 requires 4.7 kΩ pull-up resistors to +28 V_{DC} in the aircraft harness for each of these inputs. No pull-up resistors are required for the GIA 63W.

NOTE

The GIA 63W will function properly if the pull-up resistors are installed in the aircraft harness.

APPENDIX A GIA 63 MAIN BOOT BLOCK UPLOADING INSTRUCTIONS

NOTE

This appendix applies to the GIA 63 only, and does not apply to the GIA 63W.

A.1 Introduction

This appendix contains instructions on how to upgrade main boot block software for the GIA 63. Boot block version 4.01 is required for GIA Main Software Version 4.00 or later.

CAUTION

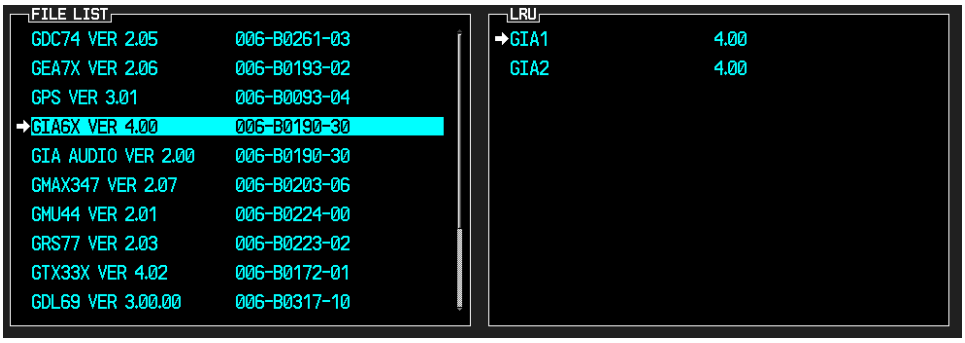
While performing this procedure ensure the aircraft is connected to and drawing power from a power cart. A loss of power during this procedure may result in a defective GIA 63.

A.2 Determining Current Boot Block

1. Ensure the G1000 is powered off.
2. Insert the airframe specific approved software loader card (containing GIA main software version 4.00 or later) into the top slot of the PFD.
3. While holding the ENT key on the PFD, restore power to the PFD.
4. When the words INITIALIZING SYSTEM appear in the upper left corner of the PFD, release the ENT key.
5. Press the CLR key at the "DO YOU WANT TO UPDATE SYSTEM FILES?" prompt.
6. Repeat step 3 and 4 for the MFD.
7. Restore power to all remaining G1000 LRUs.
8. On the MFD use the FMS knob to highlight 'GIA 1' on the System Status page.

9. On the PFD use the FMS knob to turn to the Software Upload page.

10. Use the FMS knob to highlight GIA 6X software.



11. Press the LRU softkey and highlight ‘GIA 1’.
12. Press the ENT key to begin loading software.
13. The boot block version should now appear on the MFD.
14. If GIA main boot block version is 4.00 or earlier press the CANCEL softkey on the PFD and select ‘YES’ at the prompt. Continue to Section A.3 for instructions on loading GIA main boot block version 4.01.

NOTE

If GIA main boot block version is 4.01, do not cancel the software upload.

15. Repeat steps 7 through 13 for GIA 2.

A.3 Loading Boot Block Version 4.01

1. Remove power from the PFD only.

NOTE

If power is removed from the entire G1000 system GIA 2 may appear as GIA 1.

2. Insert the GIA 63 boot block version 4.01 loader card into the top slot of the PFD.
3. While holding the ENT key on the PFD, restore power to the PFD.
4. When the words INITIALIZING SYSTEM appear in the upper left corner of the PFD, release the ENT key.
5. Use the FMS knob to turn to the Software Upload page on the PFD.
6. Verify ‘GIA 6X Boot Block 4.01’ appears in the File List.
7. Verify ‘GIA 1’ and ‘GIA 2’ appears in the LRU window.
8. Press the FMS knob to highlight ‘GIA 6X Boot Block 4.01’.
9. Press the LOAD softkey.
10. Press the ENT key at the “BEGIN FILE UPLOAD?” prompt.

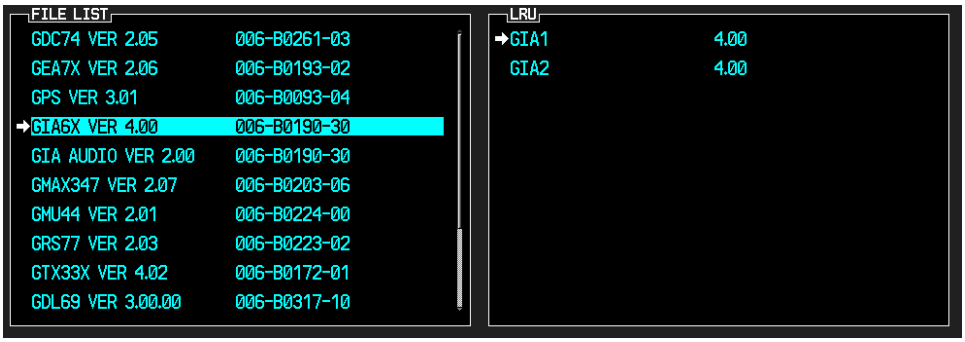
CAUTION

Do not turn power off or cancel the software upload while the boot block is loading.

11. Confirm update completion and press the ENT key.
12. On the MFD use the FMS knob to turn to the System Status page.
13. Highlight ‘GIA 1’.
14. Verify ‘G1000 GIA 6X SYS’ is being reported in the description field.
15. Power down the G1000.
16. Remove the GIA 63 boot block version 4.01 loader card form the PFD.
17. Continue to Section A.4.

A.4 Loading GIA Main Software (only if GIA main software was cancelled in Section A.2)

1. Insert the airframe specific approved software loader card (containing GIA main software version 4.00 or later) into the top slot of the PFD.
2. While holding the ENT key on the PFD, restore power to the PFD.
3. When the words INITIALIZING SYSTEM appear in the upper left corner of the PFD, release the ENT key.
4. Press the CLR key at the “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt.
5. Repeat step 2 and 3 for the MFD.
6. Restore power to all remaining G1000 LRUs.
7. On the PFD use the FMS knob to turn to the Software Upload page.
8. Use the FMS knob to highlight GIA 6X software.



9. Press the LOAD softkey.
10. Press the ENT key at the “BEGIN FILE UPLOAD?” prompt.
11. Confirm update completion and press the ENT key.

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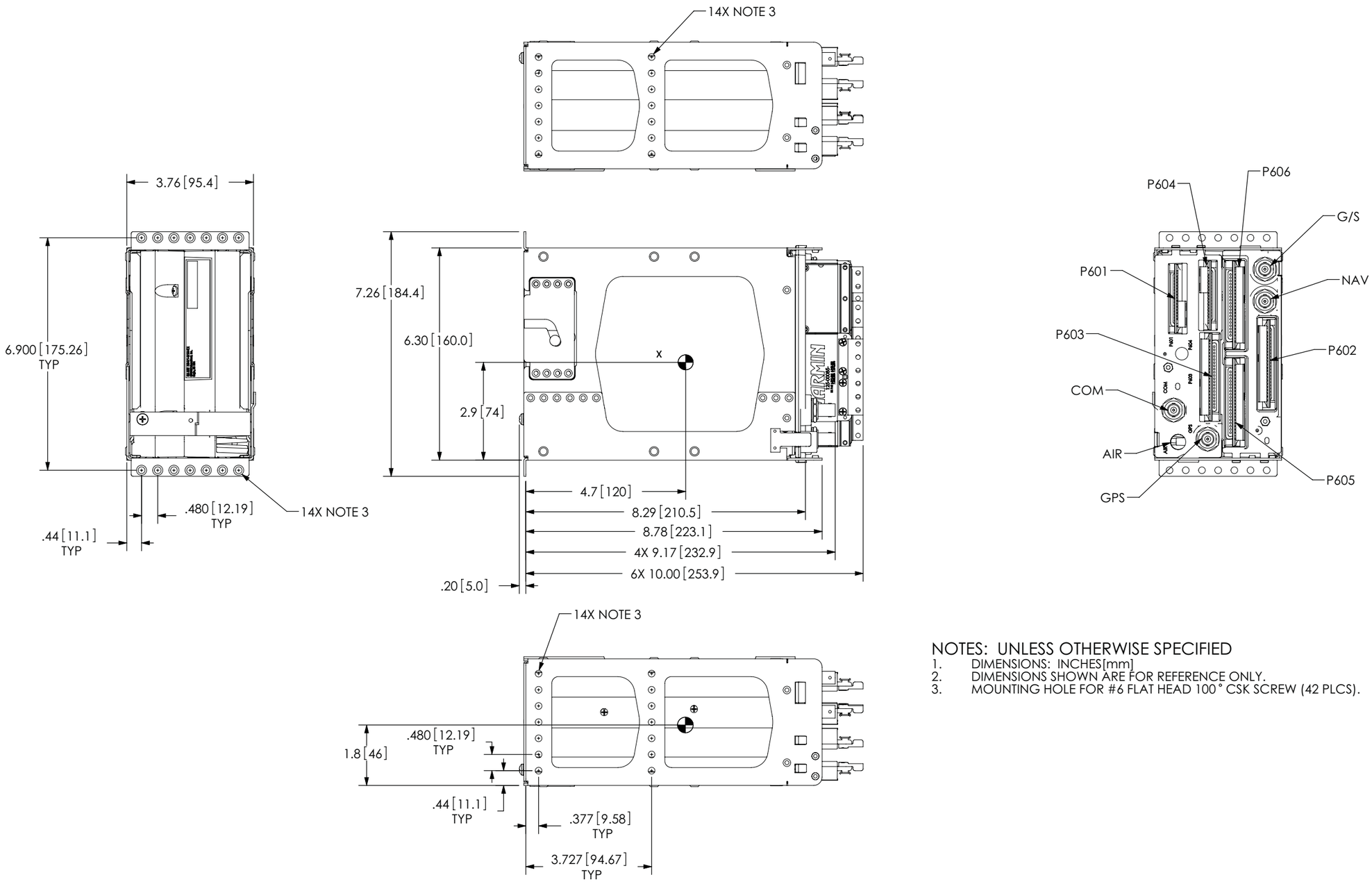
MODULAR INSTALLATION



NOTES: UNLESS OTHERWISE SPECIFIED
1. DIMENSIONS: INCHES[mm]
2. DIMENSIONS SHOWN ARE FOR REFERENCE ONLY.
3. MOUNTING HOLE FOR #6 FLAT HEAD 100° CSK SCREW (42 PLCS).

Figure B-1. GIA 63(W) Modular Installation Outline Drawing

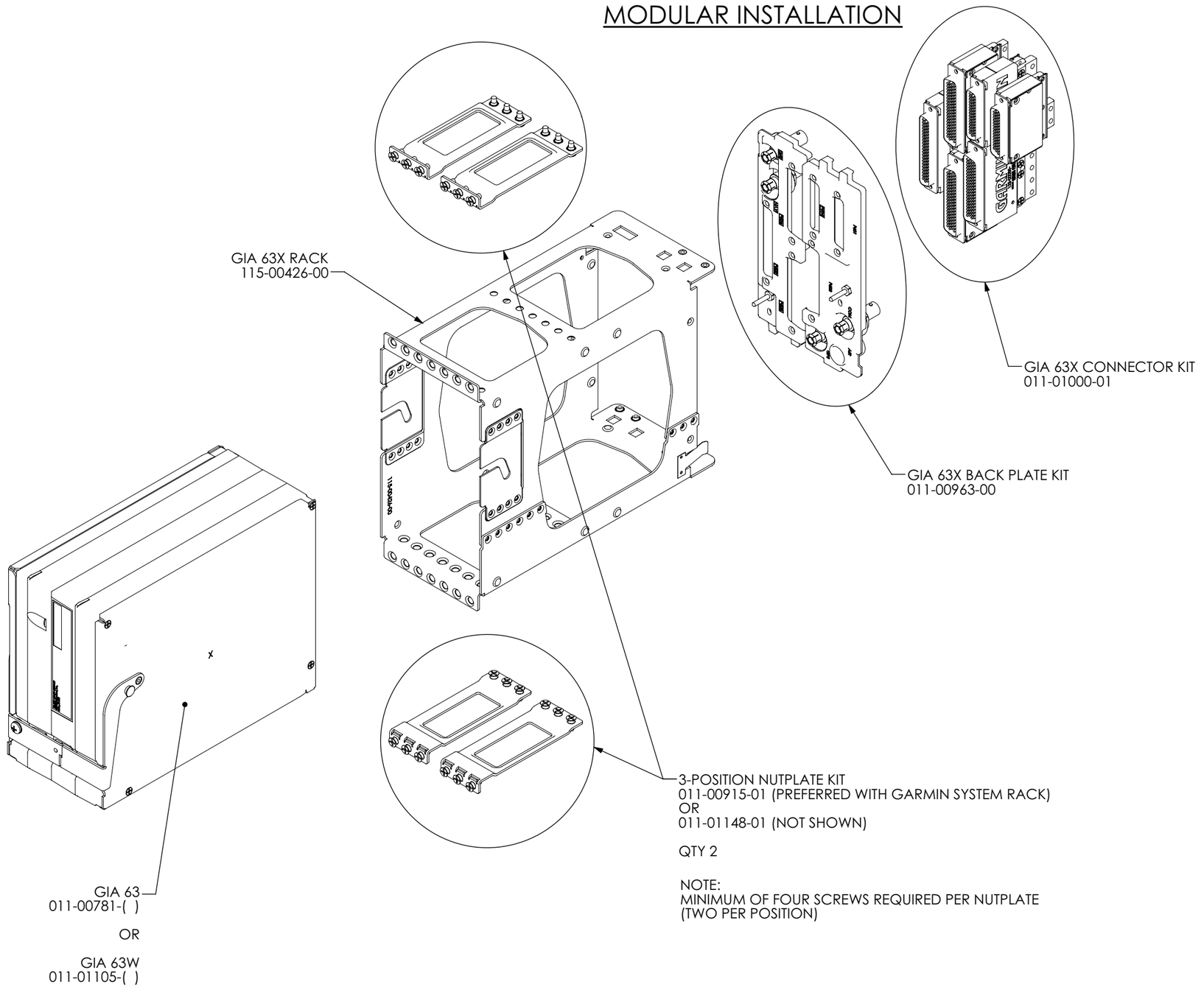
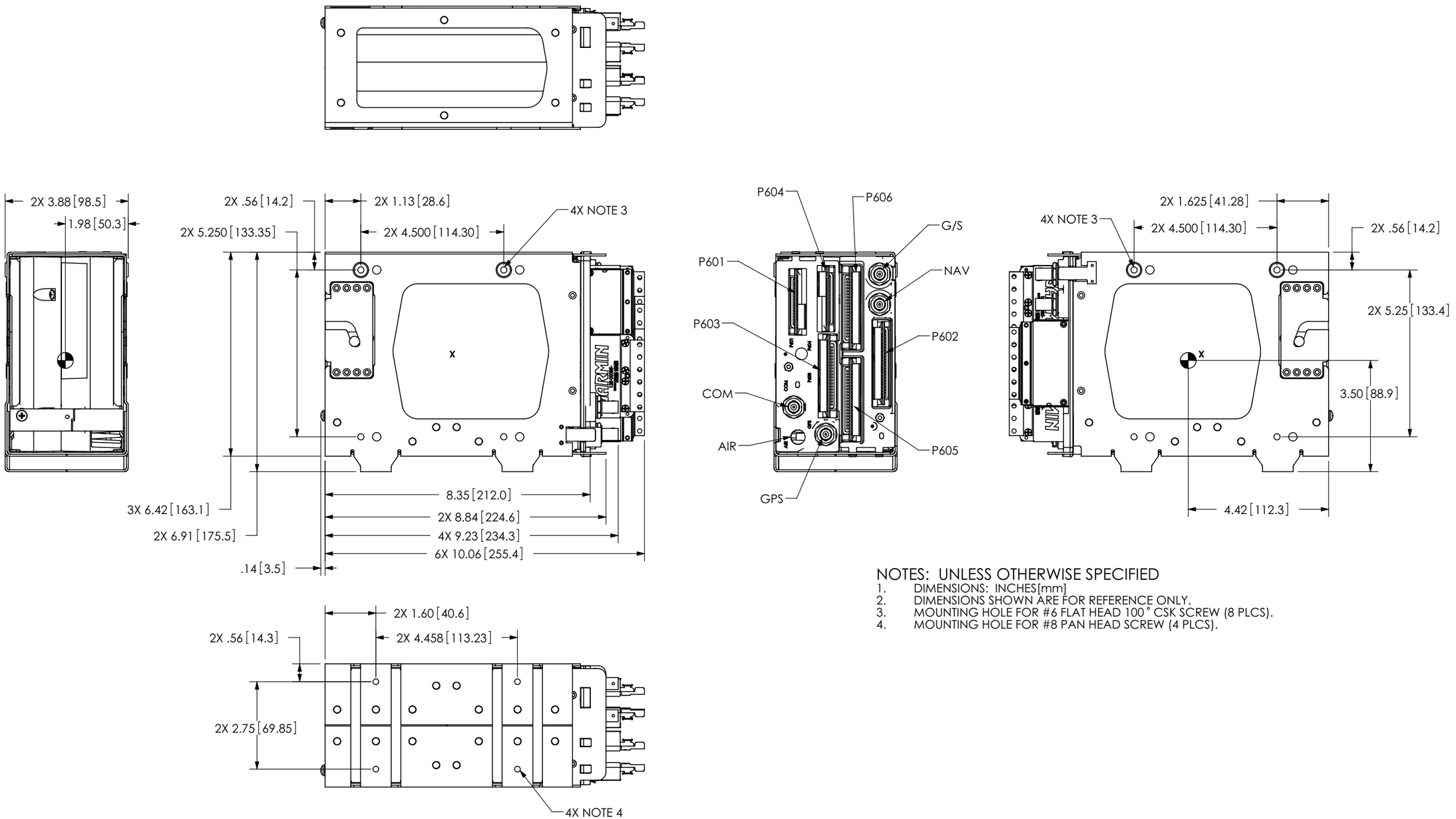


Figure B-2. GIA 63(W) Modular Installation Drawing

STANDALONE INSTALLATION



NOTES: UNLESS OTHERWISE SPECIFIED
1. DIMENSIONS: INCHES[mm]
2. DIMENSIONS SHOWN ARE FOR REFERENCE ONLY.
3. MOUNTING HOLE FOR #6 FLAT HEAD 100° CSK SCREW (8 PLCS).
4. MOUNTING HOLE FOR #8 PAN HEAD SCREW (4 PLCS).

Figure B-3. GIA 63(W) Standalone Installation Outline Drawing

STANDALONE INSTALLATION

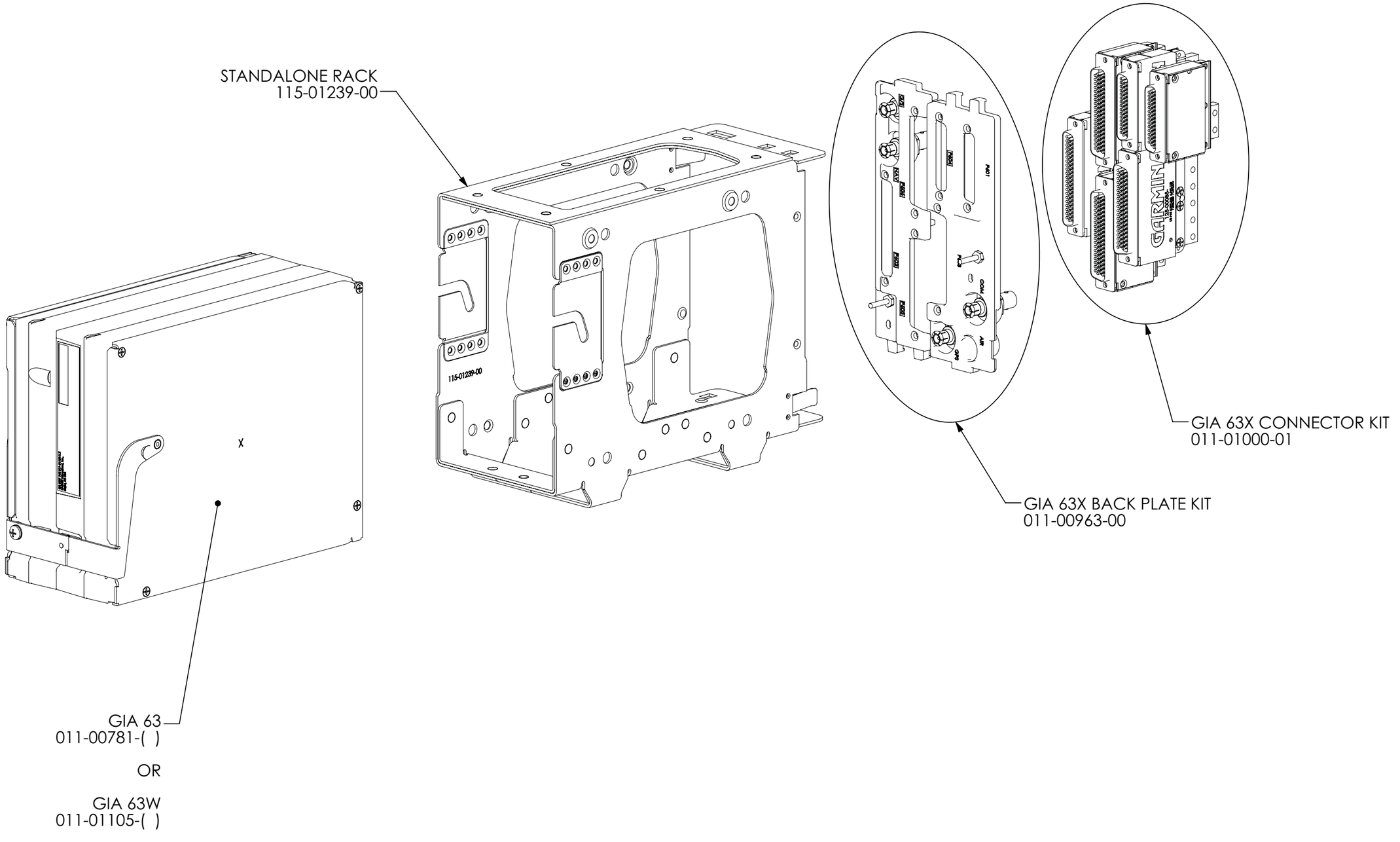
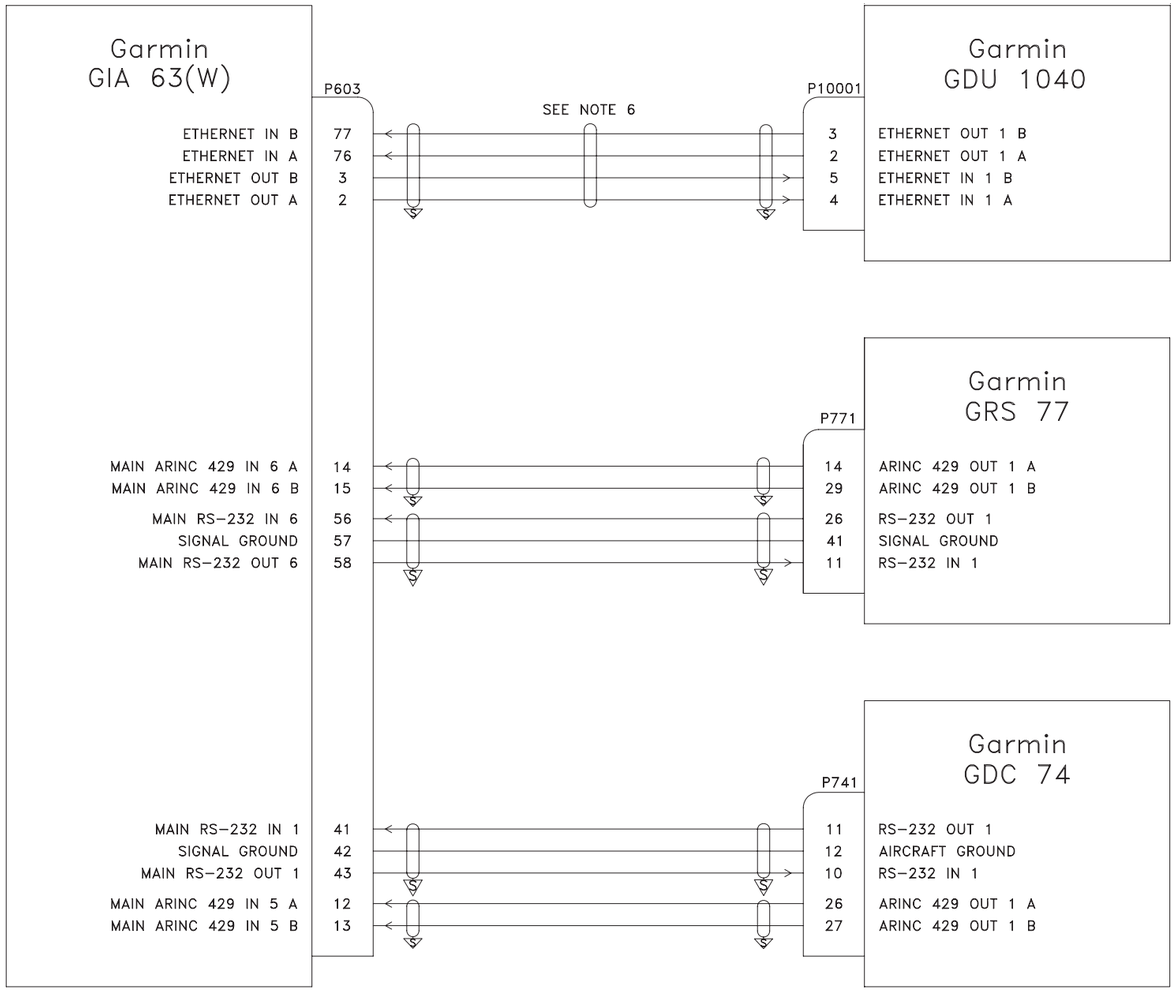


Figure B-4. GIA 63(W) Standalone Installation Drawing



NOTES:

1. UNLESS OTHERWISE NOTED, ALL STRANDED WIRE MUST CONFORM TO MIL-W-22759/16 OR EQUIVALENT
2. UNLESS OTHERWISE NOTED, ALL SHIELDED WIRE MUST CONFORM TO MIL-C-27500 OR EQUIVALENT
3. UNLESS OTHERWISE NOTED, ALL WIRES ARE 24 GAUGE MINIMUM.
4. SYMBOL DESIGNATIONS

TWISTED SHIELDED SINGLE CONDUCTOR SHIELD TERMINATED TO GROUND

TWISTED SHIELDED SINGLE CONDUCTOR SHIELD FLOATS

WHT BLU TWISTED SHIELDED PAIR SHIELD TERMINATED TO GROUND

WHT BLU TWISTED SHIELDED PAIR SHIELD FLOATS

WHT BLU ORN TWISTED SHIELDED 3 CONDUCTOR SHIELD TERMINATED TO GROUND

WHT BLU ORN TWISTED SHIELDED 3 CONDUCTOR SHIELD FLOATS

TWISTED SHIELDED 4 CONDUCTOR SHIELD TERMINATED TO GROUND

TWISTED SHIELDED 4 CONDUCTOR SHIELD FLOATS

AIRCRAFT GROUND

GARMIN (SHIELD BLOCK) GROUND PLEASE REFER TO 190-00313-09

WIRE SPLICE CONNECTION

COAXIAL CABLE

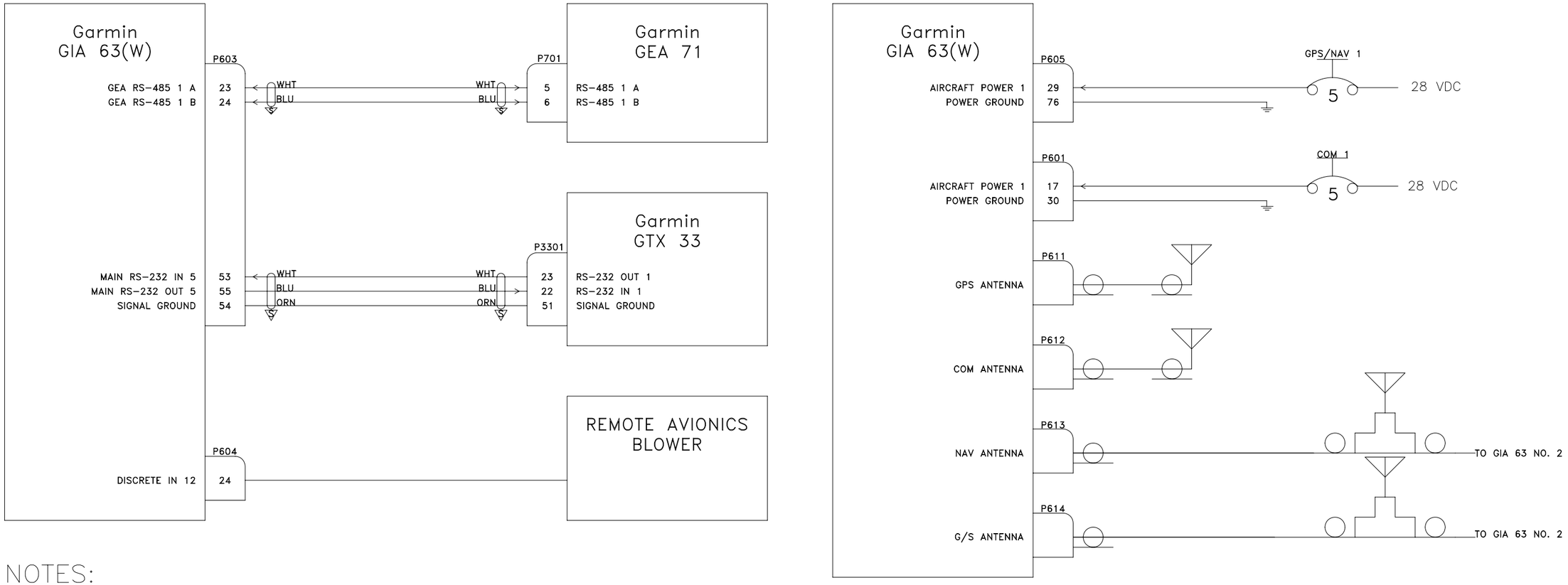
N/C = NO CONNECTION

5. UNLESS OTHERWISE NOTED, ALL SHIELD GROUNDS MUST BE MADE TO THE RESPECTIVE UNIT BACKSHELLS. ALL OTHER GROUNDS SHOULD BE TERMINATED TO AIRCRAFT GROUND AS CLOSE TO THE RESPECTIVE UNIT AS POSSIBLE.

6. USE AIRCRAFT GRADE CATEGORY 5 ETHERNET CABLE. THESE INCLUDE ELECTRONIC CABLE SPECIALIST P/N 392404.

MANUFACTURER	P/N
PIC WIRE AND CABLE	E10422 (22 GAUGE)
PIC WIRE AND CABLE	E10424 (24 GAUGE)
ELECTRONIC CABLE SPECIALIST	392404 (24 GAUGE)

Figure C-1. GIA 63(W) Example Interconnect (Sheet 1 of 7)



NOTES:

1. USE OF A HIGHER CURRENT CIRCUIT BREAKER AND MORE THAN ONE AIRCRAFT POWER AND POWER GROUND WIRES IS REQUIRED FOR INSTALLATIONS WHERE CURRENT THROUGH A SINGLE POWER WIRE WILL EXCEED 5A.

Figure C-1. GIA 63(W) Example Interconnect (Sheet 2 of 7)

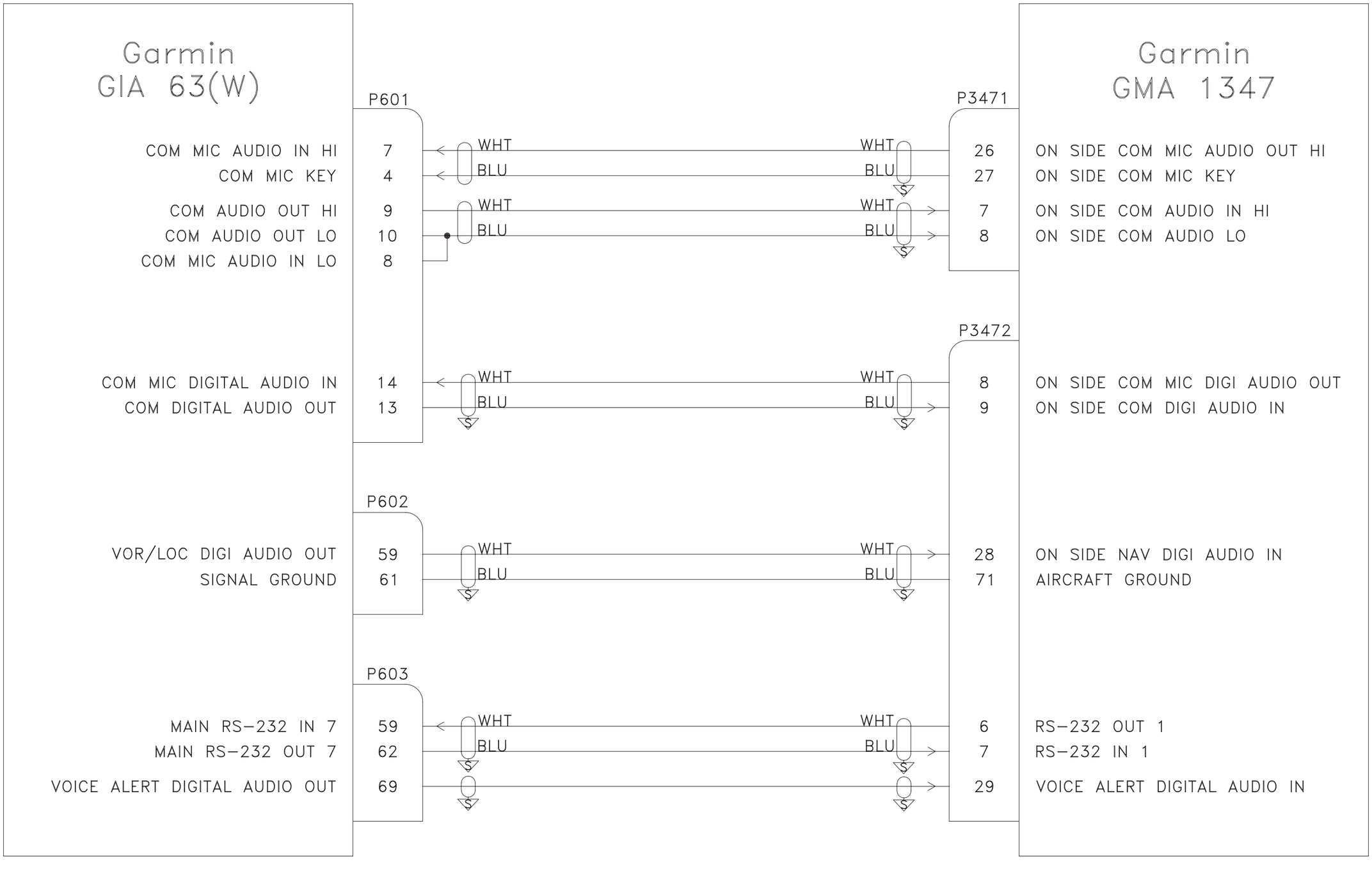


Figure C-1. GIA 63(W) Example Interconnect (Sheet 3 of 7)

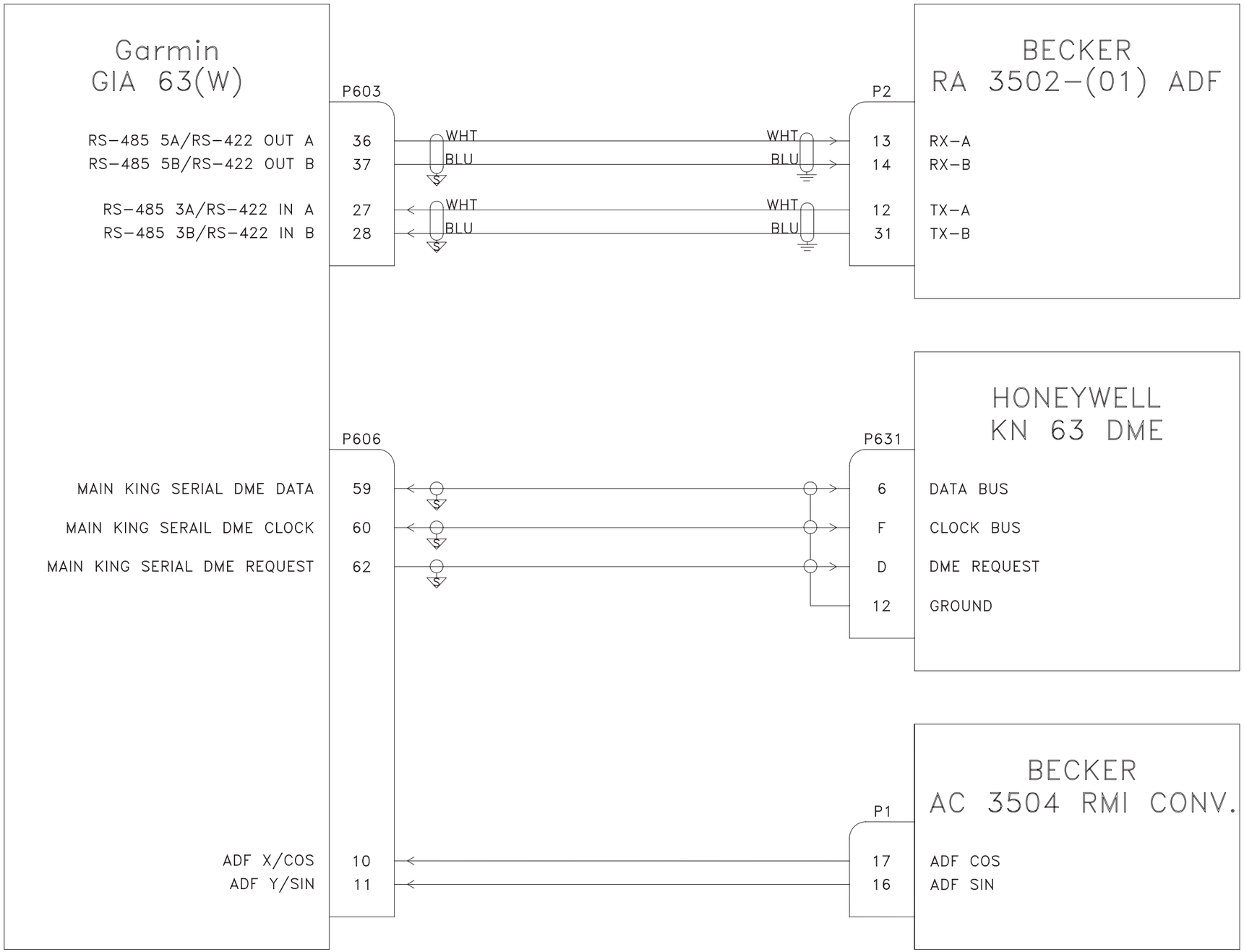


Figure C-1. GIA 63(W) Example Interconnect (Sheet 4 of 7)

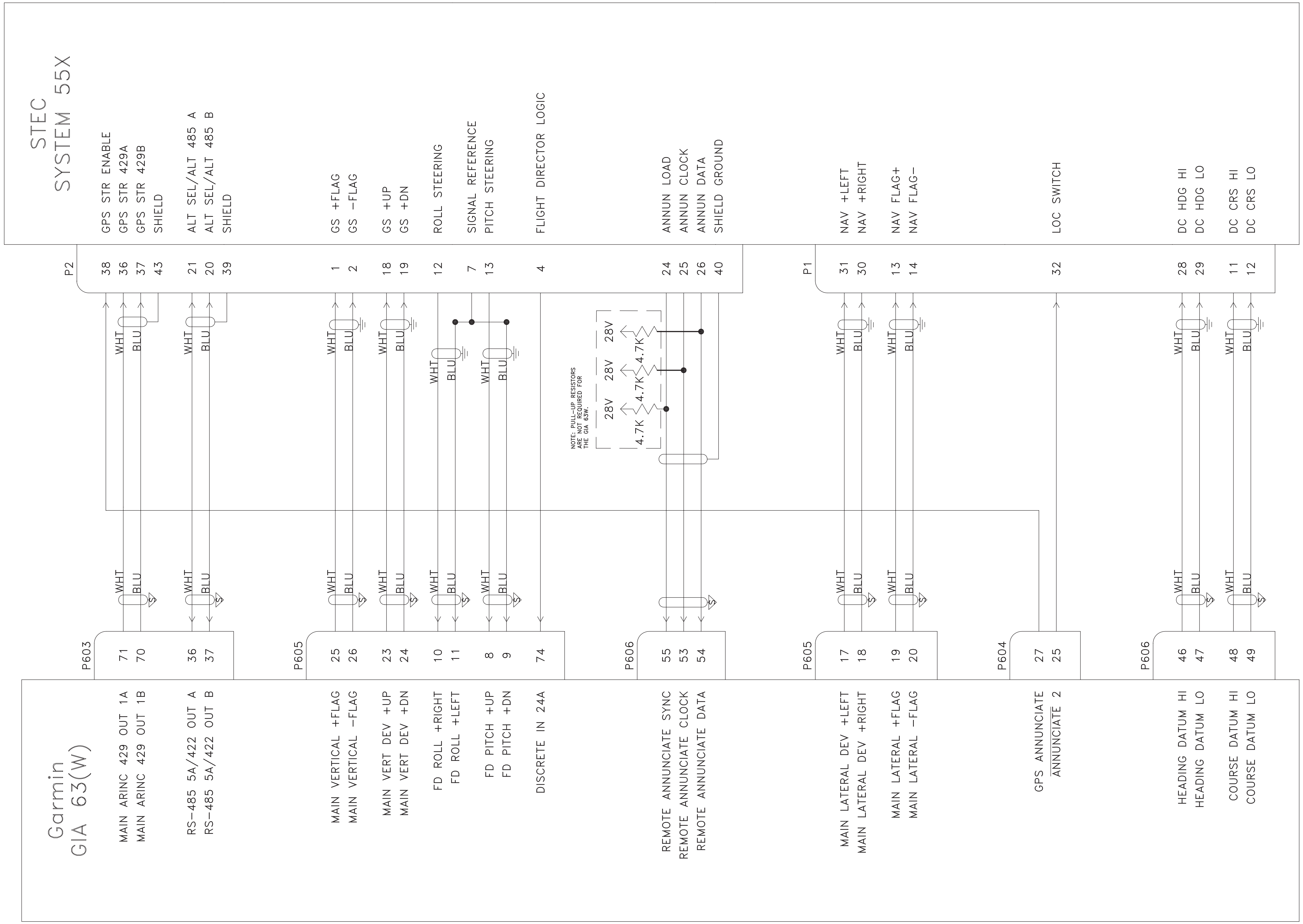
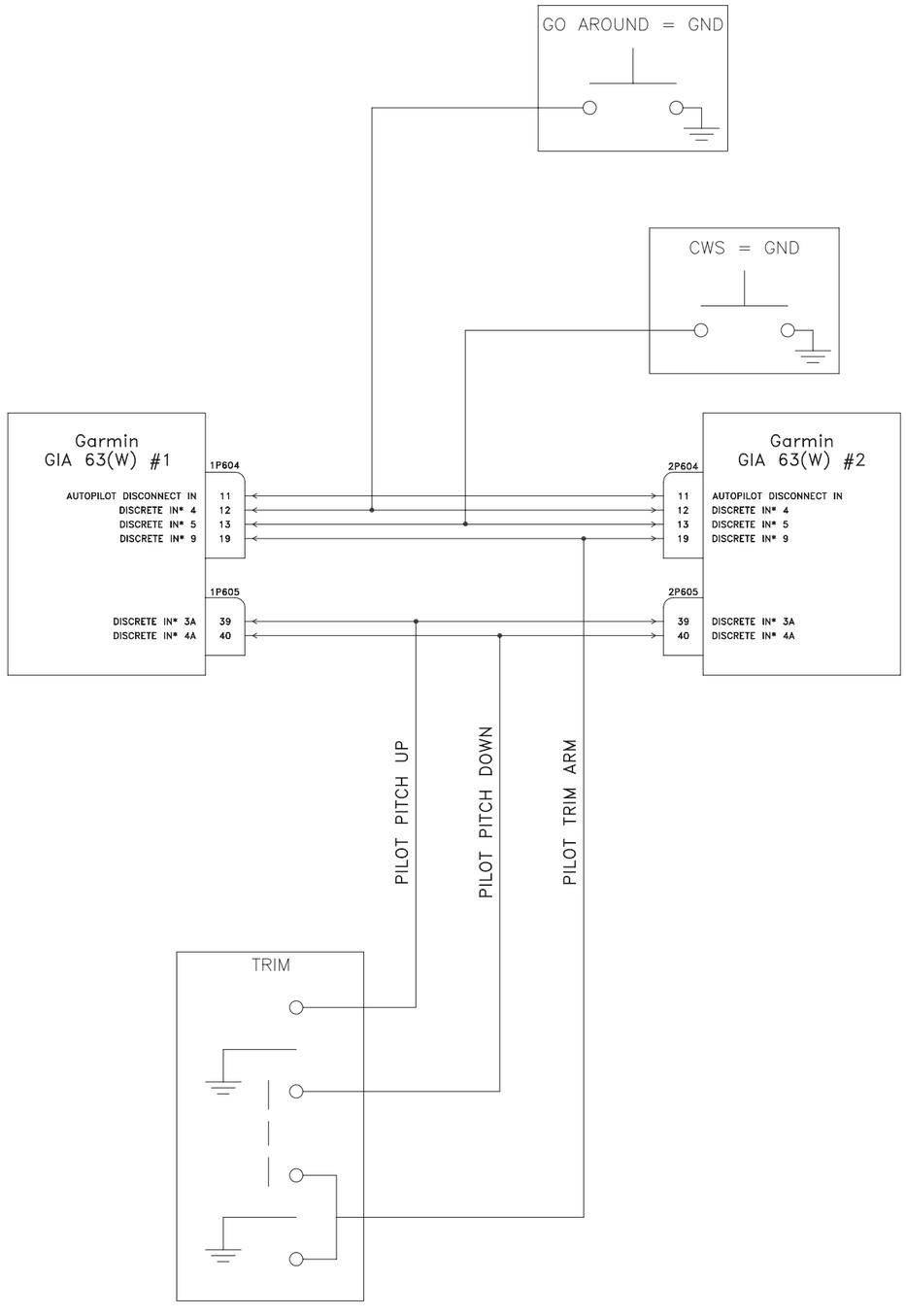


Figure C-1. GIA 63(W) Example Interconnect (Sheet 5 of 7)



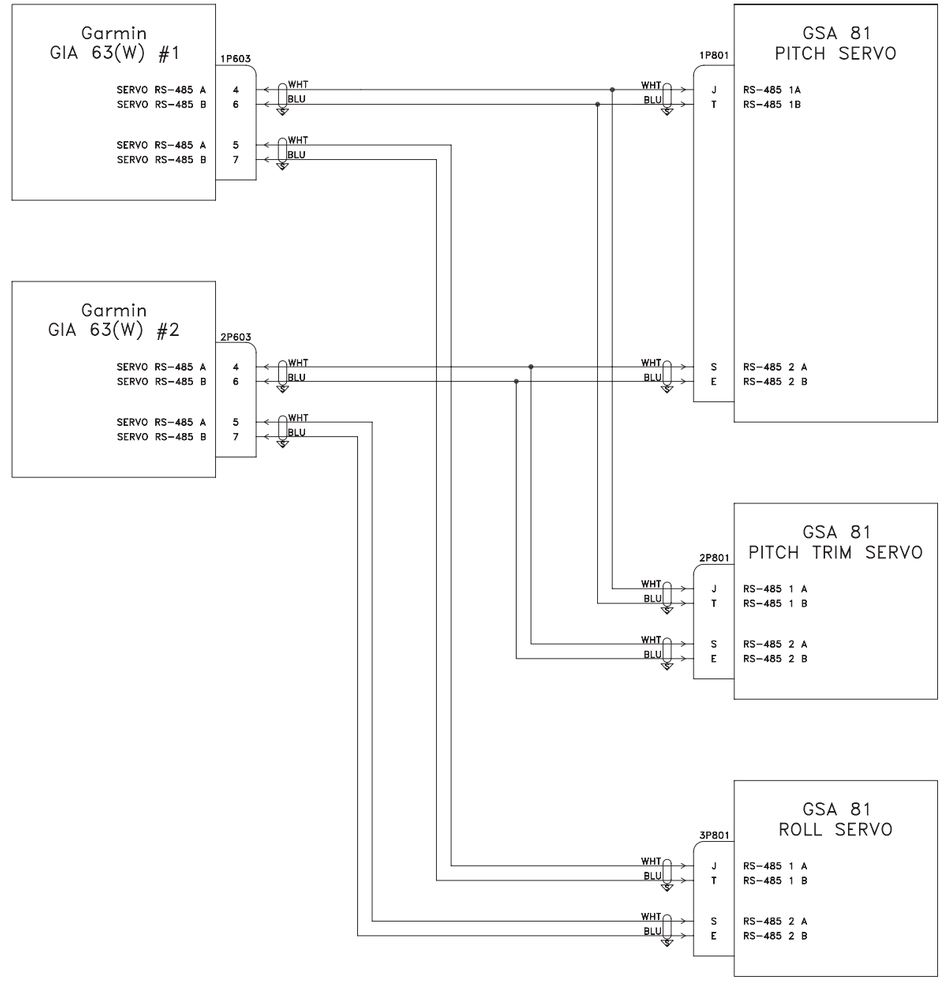


Figure C-1. GIA 63(W) Example Interconnect (Sheet 6 of 7)

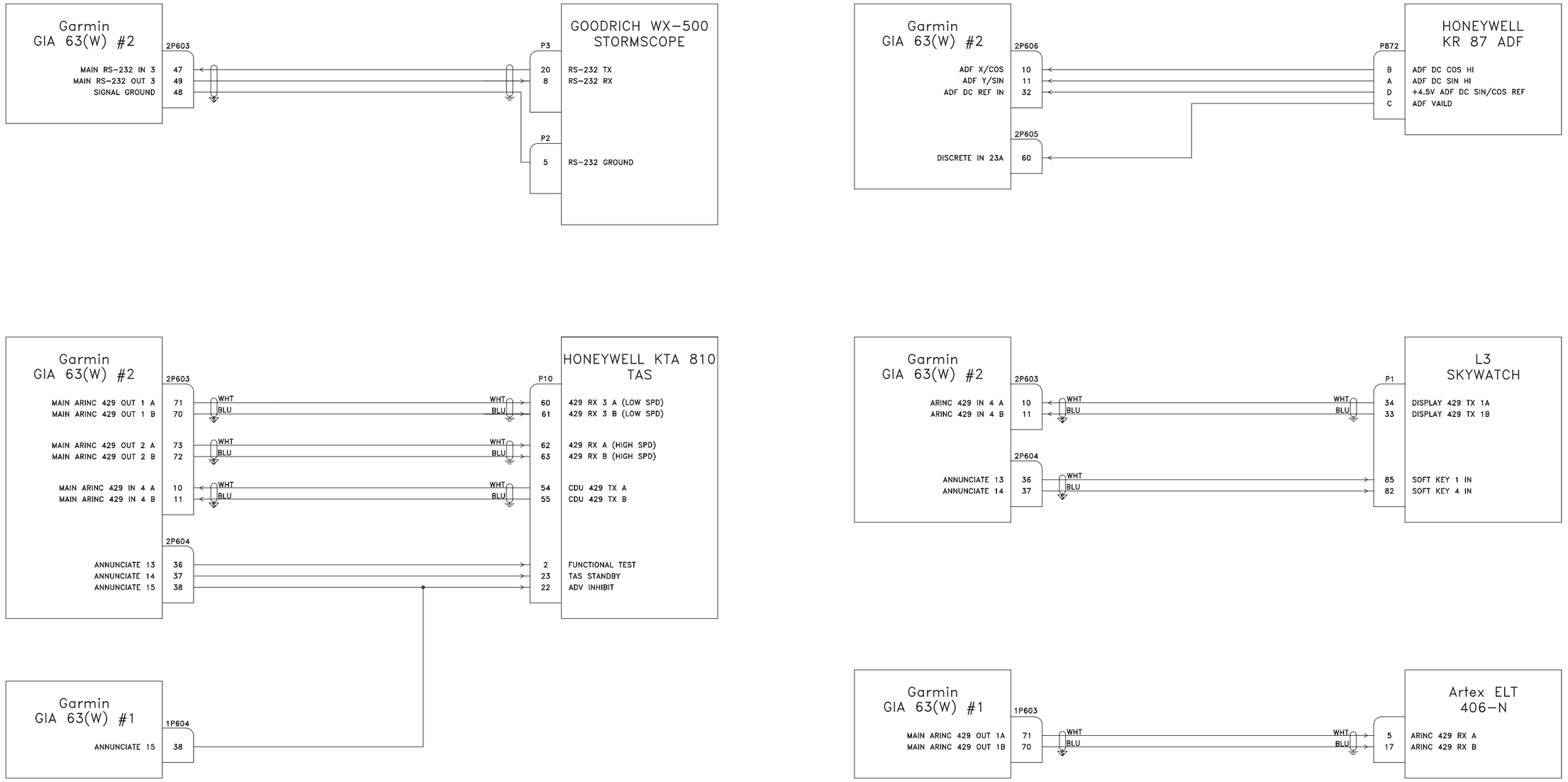


Figure C-1. GIA 63(W) Example Interconnect (Sheet 7 of 7)