FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT
or
SUPPLEMENTAL AIRPLANE FLIGHT MANUAL
for the
Garmin GDL 84/88 ADS-B Transceiver
as installed in

_____
Make and Model Airplane

Registration Number: _____ Serial Number: _____

This document serves as an Airplane Flight Manual Supplement or as a Supplemental Airplane Flight Manual when the aircraft is equipped in accordance with Supplemental Type Certificate SA02119SE for the installation and operation of the Garmin GDL 84/88 ADS-B Transceiver. This document must be incorporated into the FAA Approved Airplane Flight Manual or provided as an FAA Approved Supplemental Airplane Flight Manual.

The information contained herein supplements the information in the FAA Approved Airplane Flight Manual. For limitations, procedures, loading and performance information not contained in this document, refer to the FAA Approved Airplane Flight Manual, markings, or placards.

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LOG OF REVISIONS		
Revision Number	Date	Description
1	12/18/2012	Complete Supplement
2	01/07/2015	Updated document to include “GDL 84” where applicable.
3	10/22/2015	Updated document to include data for the following: • GDL 88 software v3.32 • Single lamp ADS-B annunciator • Added Barometric Altitude Source to required equipment table • Removed External ADS-B annunciators from GDL 84 required equipment table • Removed ABNORMAL PROCEDURE steps to verify valid position when GDL 84/88 annunciates a loss of position data • Clarified System Descriptions • Changed labeling for circuit breakers and switches.

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Section 1. GENERAL

1.1 Garmin GDL 84/88 UAT Transceiver

The Garmin GDL 84/88 UAT Transceiver is an ADS-B system comprised of a Garmin TSO-C154c GDL 84/88, one or two UAT/1090 antenna(s), optional Garmin approved GPS/SBAS antenna, optional Garmin GPS/SBAS position source, and other interfaces as shown in the following block diagram.

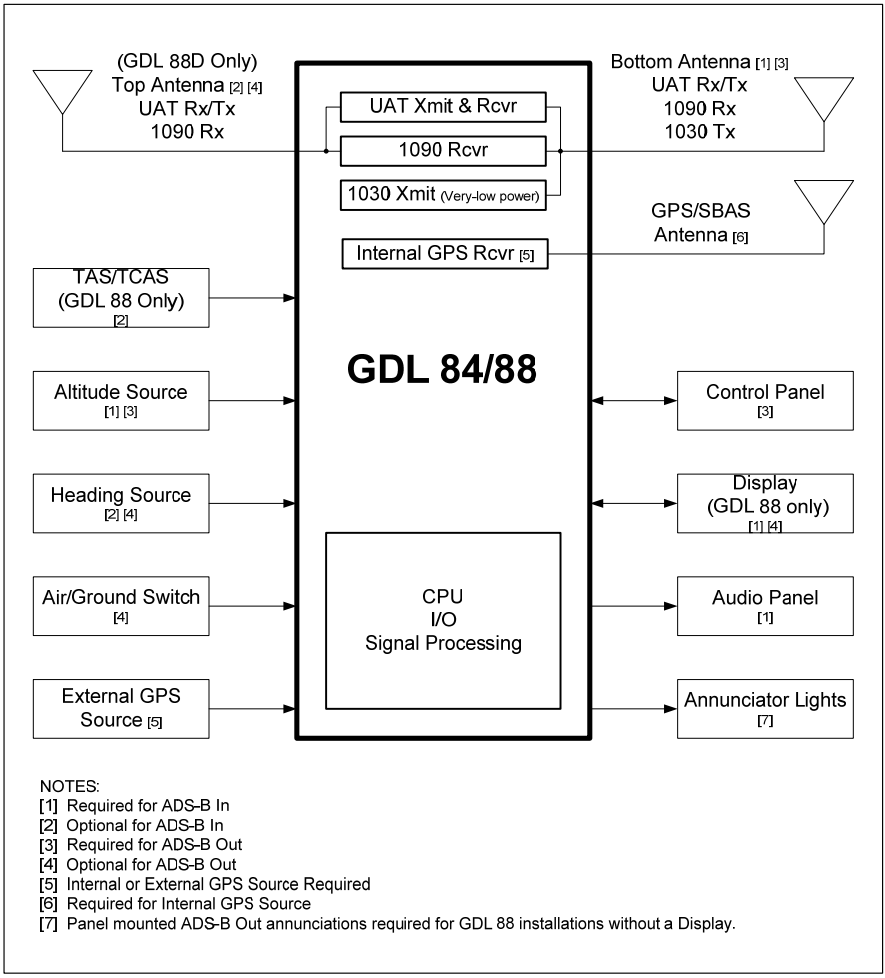

Figure 1 – GDL 84/88 Block Diagram

The GDL 84/88 system performs following functions:

- Transmission of ADS-B out data on UAT (978 MHz)
  - Integration of data from internal and external sources to transmit the following data per 14 CFR 91.227
    - GPS Position, Altitude, and Position Integrity
    - Ground Track and/or Heading, Ground Speed, and Velocity Integrity
    - Air Ground Status
    - Flight ID, Call Sign, ICAO Registration Number
    - Capability and Status Information
  - Transponder squawk code, IDENT, and emergency status
  - Anonymous Mode (When not installed in conjunction with a Mode S transponder)
  - Pressure Altitude Broadcast Inhibit
- Reception of ADS-B In data on UAT (978 MHz)
  - ADS-B (Data directly from another transmitting aircraft)
  - ADS-R (Rebroadcast of ADS-B data from a ground station)
  - TIS-B (Broadcast of secondary surveillance radar (SSR)-derived traffic information from a ground station)
  - FIS-B (Broadcast of aviation data from a ground station)
- Reception of ADS-B In data on 1090 MHz
  - ADS-B (Data directly from another transmitting aircraft)
  - ADS-R (Rebroadcast of ADS-B data from a ground station)
- Provide traffic alerting to the pilot via an optional annunciator lamp and audio output.

The GDL 88 system performs the following additional functions:

- Provide traffic information and alerting to the pilot via an optional display
  - Correlation and consolidation of traffic data from multiple traffic sources
    - Output of traffic data to an external display
    - Aural and visual traffic alerting
- Provide FIS-B data to the pilot via an optional display
  - Processing and output of FIS-B data to an external display
    - Graphical and textual weather products
      - NEXRAD
      - PIREPs
      - AIRMET/SIGMETs
      - METARs
      - TAFs
      - Winds Aloft

- Aviation Data
  - TFRs
  - NOTAMs

The GDL 84/88 may be installed as a stand-alone ADS-B Out system. The GDL 88 may be, optionally, integrated with a compatible display for the display and control of traffic, FIS-B weather, and aviation data. Capabilities of the interfaced display determines which of the above listed functions are provided.

1.2 Capabilities

The GDL 84/88 ADS-B OUT system meets the equipment requirements of 14 CFR 91.227 when operating in accordance with Sections 2.1 and 2.2 of this supplement.

As installed in this aircraft, the Garmin GDL 84/88 system complies with the requirements of AC 20-165A.

The GDL 84/88 meets the requirements of TSO-C154c for ADS-B Out operation.

> ***Applicable to installations consisting of a GDL 88 interfaced with one or more GTNs with software version 3.00 or later:***
>
> The GDL 88 meets the requirements of TSO-C195a Class C1, C2, C3, C5, TIS-B Services TSO-C166b Class A1, and FIS-B TSO-C157a for ADS-B In Operation and AC 20-172A for Airworthiness Approval for ADS-B In Systems and Applications

1.3 Installation Configuration

This aircraft is equipped with a GDL 84/88 system with the following interfaces/ features:

Equipment Installed:

☐ GDL 84

☐ GDL 88

Interfaced Active Traffic System (GDL 88 Only):

☐ None

☐ TCAD

☐ TAS/TCAS I

Interfaced Transponder(s):

☐ Single Transponder serially interfaced to the GDL 88

☐ Dual Transponders serially interfaced to the GDL 88

☐ Single Transponder interfaced to the GDL 88 via self-interrogation

Interfaced GPS/SBAS Position Source(s):

GPS #1:

☐ GNS 400W/500W Series Unit

☐ GTN 6XX/7XX

☐ GNS 480

☐ None

GPS #2:

☐ GNS 400W/500W Series Unit

☐ GTN 6XX/7XX

☐ GNS 480

☐ None

PABI Control

☐ External Switch

☐ Transponder control (ALT vs. ON)

☐ Controlled via display

Anonymous Mode

☐ Not Available

☐ External Switch

☐ Controlled via display

Definitions

The following terminology is used within this document:

ADS-B:	Automatic Dependent Surveillance-Broadcast
ADS-R:	Automatic Dependent Surveillance-Rebroadcast
CSA:	Conflict Situational Awareness
FIS-B:	Flight Information Service-Broadcast
GDL:	Garmin Datalink
GPS:	Global Positioning System
GTN:	Garmin Touchscreen Navigator
LRU:	Line Replaceable Unit
PABI:	Pressure Altitude Broadcast Inhibit
SBAS:	Satellite-Based Augmentation System
TAS:	Traffic Awareness System
TCAD:	Traffic Collision Avoidance Device
TCAS:	Traffic Collision Avoidance System
TIS-B:	Traffic Information Service-Broadcast
UAT:	Universal Access Transceiver
VFR:	Visual Flight Rules

Section 2. LIMITATIONS

2.1 Minimum Equipment

The **GDL 84** must have the following system interfaces fully functional in order to be compliant with the requirements for 14 CFR 91.227 ADS-B Out operations:

Interfaced Equipment	Number Installed	Number Required
Transponder	1 or more	1
Barometric altitude source	1 or more	1

Table 1 – Required Equipment

The **GDL 88** must have the following system interfaces fully functional in order to be compliant with the requirements for 14 CFR 91.227 ADS-B Out operations:

Interfaced Equipment	Number Installed	Number Required
GPS SBAS Position Source (Interfaced or internal)	1 or more	1
Transponder	1 or more	1
Barometric altitude source	1 or more	1

Table 2 – Required Equipment

2.2 ADS-B Out

The GDL 84/88 only complies with 14 CFR 91.227 for ADS-B Out when all required functions are operational as indicated by external annunciators not illuminated or interfaced display ADS-B messages not being present.

2.3 Anonymous Mode

Anonymous Mode must only be operated while operating under VFR while squawking a VFR code. If requested by Air Traffic Control, Anonymous Mode must be turned off.

2.4 Applicable System Software

This AFMS/SAFM is applicable to the software versions shown in Table 3.

The Main software version is displayed on the External LRU page available on some interfaced display devices.

Software Version *(or later FAA Approved versions for this STC)*
3.32

Table 3 - Software Versions

2.5 Pressure Altitude Broadcast Inhibit (PABI)

While operating within airspace requiring an ADS-B Out compliant transmitter, per 14 CFR 91.227, Pressure Altitude Broadcast Inhibit shall only be enabled when requested by Air Traffic Control.

2.6 Traffic Alerting

Traffic alerting is an aid to visual acquisition and may not be used as the sole basis for aircraft maneuvering.

Section 3. EMERGENCY PROCEDURES

3.1 Emergency Procedures

None.

3.2 Abnormal Procedures

3.2.1 Abnormal Indications

The loss of an interfaced input to the GDL 84/88 may cause the GDL 84/88 to stop transmitting ADS-B Out data or providing ADS-B In function.

Depending on the nature of the fault or failure, the GDL 84/88 may no longer be transmitting all of the required data in the ADS-B Out messages and Traffic Alerts may not be provided by the system.

- For GDL 84 and No Display GDL 88 installations:

  If the GDL 84/88 detects any internal faults or failures, the GDL 84/88 will annunciate this event via the external annunciation (if installed).

  ADS-B annunciator illuminated:

  Transponder..... .....**VERIFY ON**
  ADS-B Circuit Breaker.....**VERIFY CLOSED**

  For configurations with two annunciator lamps:

  Using two lights, three messages/states are capable of being conveyed to the flight crew: NO POSN, FAULT, and TX FAIL.

  If the GDL 84/88 detects any failures that affect compliance of 91.227, the following annunciations are provided:

  - NO POSN illuminated - the GDL 88 has detected that it does not have a valid position from the internal or any of the external GPS/SBAS sources. (See Section 3.2.3 for further information.)
  - Both NO POSN and FAULT illuminated- the GDL 84/88 is annunciating TX FAIL.

The following annunciation indicates that the requirements of 91.227 may not be met:

- FAULT - the GDL 84/88 has detected a loss of an input or internal fault resulting in the GDL 84/88 not transmitting full ADS-B information or degradation in performance. Contact service to resolve the fault.

For configurations with one ADS-B annunciator lamp:

If the GDL 84/88 detects any failures that affect compliance with the requirements of 91.227, the ADS-B annunciator will be steadily illuminated.

When the GDL 84/88 detects a FAULT that does not affect compliance with requirements of 91.227 this will be annunciated to flight crew at the beginning of subsequent power cycles by flashing the ADS-B annunciator on/off for approximately 20 seconds after power up. Contact service to resolve the fault.

- For GDL 88 Installations with an interfaced display:

  Reference Display Device documentation for applicable annunciations.

3.2.2 LOSS OF AIRCRAFT ELECTRICAL POWER GENERATION

Loss of electrical power generation…..**REMOVE POWER FROM GDL 84/88**

If the GDL 84/88 is load shed due to a loss of electrical power generation, ADS-B Out, ADS-B In, and the display of interfaced traffic system data will no longer be available.

NOTE

This guidance is supplementary to any guidance provided in the POH or AFM for the installed aircraft for loss of power generation.

3.2.3 LOSS OF GPS/SBAS POSITION DATA

When the GPS/SBAS receiver is inoperative or GPS position information is not available or invalid, the GDL 84/88 will no longer be transmitting ADS-B Out data and ADS-B traffic alerting functions will be unavailable.

3.2.4 VISUAL/AURAL TRAFFIC ALERT

Traffic Alert Annunciation and Aural

Traffic……..……..…….**VISUALLY ACQUIRE**

Section 4. NORMAL PROCEDURES

The procedures described below are specific only to the GDL 88. Cockpit Reference Guides and Pilot Guides for interfaced displays will provide additional operating information specific to the displays or other traffic systems.

4.1 Unit Power On

GDL 84/88 Annunciations..... **CONSIDERED**

NOTE

If installed, the GDL 84/88 single lamp ADS-B Annunciator will flash on/off for approximately 20 seconds after power up if a fault was present during a previous power cycle. This indicates the unit requires service but does not indicate that the unit will not comply with 91.227.

The GDL 84/88 only complies with 14 CFR 91.227 for ADS-B Out when all required functions are operational as indicated by external annunciators not illuminated.

4.2 Before Takeoff

GDL 84/88 Annunciations..... **CONSIDERED**

Section 5. PERFORMANCE

No change.

Section 6. WEIGHT AND BALANCE

See current weight and balance data.

Section 7. SYSTEM DESCRIPTIONS

7.1 Pilot's Guide

The Garmin GDL 84/88 Pilot's Guide, part number and revision listed below, contain additional information regarding GDL 84/88 system description, control, and function. Cockpit Reference Guides and Pilot Guides for interfaced displays provide additional operating information.

- GDL 84/88 ADS-B Transceiver Pilot's Guide
  P/N 190-01122-03 Rev E or later

7.2 Mode 3/A Code, IDENT, and Emergency Status

Mode 3/A Code, IDENT, and Emergency Status data that is included in the ADS-B OUT message is obtained automatically by the GDL 84/88. No pilot action except normal use of the transponder is required.

7.3 Flight ID

Flight Identification will default to the aircraft registration. If interfaced with a Garmin transponder or GTN an alternate Flight ID can be entered via those interfaces and will automatically be updated at the GDL 84/88.

7.4 Pressure Altitude Broadcast Inhibit

For aircraft with an interfaced Garmin GTX 33/330/32/327 or SL 70 transponder the broadcast of pressure altitude is controlled by the transponder mode. Turning the transponder to ALT will also broadcast pressure altitude in the ADS-B output. Turning the transponder to ON will inhibit pressure altitude from being broadcast.

For aircraft without a Garmin GTX 33/330/32/327 or SL 70 transponder pressure altitude broadcast is controlled via a separate switch or interfaced GNS or GTN display.

7.5 Traffic Sources and Alerting

The GDL 84/88 is capable of receiving ADS-B, ADS-R, and TIS-B traffic reports in order to track traffic around the aircraft and provide alerts to the flight crew to aid in visual acquisition and avoidance.

Traffic alerting is provided via a visual annunciation and audio callouts for these alerts. The audio callout will include any available information regarding the

intruder, to include direction, range, and relative altitude (high, low, same altitude).

Due to the nature of TIS-B, its service volumes, and incomplete equipage/adoption of ADS-B Out equipment, not all traffic will be tracked by the GDL 84/88. This is much like an active traffic system and does not track non-transponder equipped aircraft. The flight crew must use "see and avoid" procedures to visually acquire and avoid other aircraft.

7.6 Interfaced Active Traffic System (Optional, GDL 88 Only)

When an active traffic system is interfaced with a GDL 88, the GDL 88 receives traffic from the active traffic system and attempts to correlate – or match – this traffic with ADS-B traffic the GDL 88 has received and is already tracking. When a correlation is made, the active traffic system or ADS-B target with the most accurate information is displayed to the flight crew. Any active traffic system or ADS-B traffic that is not correlated will also be displayed for the flight crew. The correlation of traffic by the GDL 88 ensures that only the most accurate, and no duplicate, traffic targets are displayed for the flight crew's situational awareness.

In addition, the GDL 88 will use its air-ground logic or inputs to automatically switch the active traffic from Standby to Operate when transitioning from ground to air, and from Operate to Standby when transitioning from air to ground.

If the GDL 88 fails then external traffic device data is no longer sent to the display, however aural traffic alerts from these traffic systems may continue to be received.

When interfaced to an active traffic system, traffic alerts are provided as follows:

- Alerts will be provided by the TCAS system for targets tracked solely via TCAS AND targets that are tracked via TCAS and ADS-B which are correlated.
- Alerts will be provided by the GDL 84/88 for targets that are tracked solely by ADS-B.

The optional interfaced display's Pilot's Guides and supplements provide additional information regarding the functionality and control of the traffic device.

7.7 Power

Power to the GDL 84/88 is provided through a circuit breaker labeled "ADS-B" or "UAT"

7.8 External Switches

External switches may be installed in conjunction with the GDL 84/88. Table 4 lists the switches and function they perform:

Switch Label	Function
UAT ALT RPTG ON/OFF	Enables and disables Pressure Altitude Broadcast Inhibit functionality.
UAT ANONYMOUS ENABLED / DISABLED	Enables and disables Anonymous Mode functionality.
TRAFFIC MUTE	Acknowledges and mutes a currently playing aural Traffic Alert.
BRT/DIM	Enables GDL 88 annunciators to be dimmed appropriately for lighting conditions.

Table 4 – External Switches