

GTS™: Garmin Traffic Systems

GTS 800 TAS • GTS 820 TAS • GTS 850 TCAS I

Advanced air traffic surveillance and collision avoidance systems.





The advantages of ADS-B:

All Garmin GTS™ 800/820/850 series products feature built-in Automatic Dependent Surveillance - Broadcast (ADS-B) receiver technology which is enabled with installation of a Garmin GTX 330 Extended Squitter (ES) transponder, or other complementary class of ADS-B "Out" equipment, such as Garmin's GDL 90 Universal Access Transceiver (or UAT). To be full "participants" in the ADS-B system, aircraft must be both "Out" and "In" equipped. ADS-B "Out" means the aircraft has the technology to broadcast its position data automatically. ADS-B "In" means the aircraft is equipped to receive other aircraft broadcasts, as well as transmissions from the ground, and then properly display that information in the cockpit.

With ADS-B "Out" and "In" capability, aircraft are able to automatically report, receive and show more useful, more accurate, and more stable traffic surveillance data – including aircraft flight ID, GPS-based positioning, relative direction and altitude, plus trend vectors for target aircraft (on compatible displays). Thus, instead of just seeing random targets on a display, pilots can now identify and track specific aircraft flight trajectories. Targets within the active surveillance range that are correlated with ADS-B data can be displayed with far greater accuracy. So, pilots are given a much clearer tactical picture of their current air traffic situation. Datalinks in the U.S. "NextGen" system relay this information to other ADS-B equipped aircraft, as well as ADS-B ground stations that connect to ATC in real time. Thus, everyone in the ADS-B loop can see and react to the same dynamic traffic picture, for smoother, more interactive navigation and separation. Unlike ATC radar, ADS-B is not affected by an aircraft's altitude from the tracking station. Plus, with a typical once-per-second update rate, active surveillance with ADS-B refreshes the target display considerably faster than traditional radar – which can take as long as 12 seconds per sweep.



When flying in busy airspace – with fast-moving aircraft converging in sometimes less-than-ideal visibility conditions – pilots need every possible advantage to “see and avoid” traffic conflicts. Alertness and vigilance are essential. But for enhanced safety, nothing beats having an extra set of “electronic eyes” to help detect and display the position of any transponder- equipped aircraft approaching on a potential collision course.

That’s where the Garmin GTS™ family of Traffic Advisory (TAS) and Traffic Collision Avoidance (TCAS I) Systems can make all the difference.

[Garmin GTS™: A new direction in traffic detection.]

Based on technology originally developed for air-transport category aircraft, the Garmin GTS series provides an array of affordable collision warning products tailored to the needs (and budgets) of most GA aircraft – from business jets and helicopters to light piston singles. Featuring Garmin’s exclusive, patent-pending CLEAR CAS™ technology, these new systems combine both active and passive surveillance (including 1090 MHz ADS-B “In”) to correlate target data and provide more advanced real-time traffic information to the pilot. Displaying traffic symbols and advisories on a variety of compatible navigation or multi-function display products, the GTS series creates a 360° zone of detection around your aircraft – enabling you to see and identify transponder-equipped airspace intruders in time to take prompt corrective action. Targets are displayed using familiar TCAS-defined symbology, with aural traffic alerts provided through your aircraft’s cockpit audio system. Mode S interrogation enables the system to receive the target aircraft’s flight ID, range, bearing, and relative altitude, plus vertical and course trend vectors (if available). What’s more, the system can utilize this information to provide expanded audio alerts, in an ATC-like spoken format: “Traffic: 10 O’Clock, High (or Low or Same Altitude), 2 miles.” If surveillance bearing information is not available on the intruder, “Traffic, No Bearing” is annunciated. Some earlier-generation traffic systems only provided a basic “Traffic, Traffic” audible alert. So, pilots had to visually locate the intruder aircraft on the display before looking out the window to verify its position. Obviously, Garmin-style expanded aural alerts that tell the pilot precisely where to look for traffic can save vital “eyes down” time in a fast-converging situation.

Let's look at the systems:

The Garmin GTS lineup features three distinct system configurations, each tailored to a specific range of aircraft and cost/performance requirements. All three Garmin systems will operate to 55,000 feet – so they're not constrained by the much lower altitude limits imposed on some competitive TAS/TCAS systems.

GTS 800 TAS: A lower-cost option with performance suited to most light aircraft and helicopters², the GTS 800 offers 40 watts of transmit power, a +/- 10,000-foot vertical separation maximum, and a typical active interrogation range of 12 nm in the forward direction. Passive surveillance is provided with available 1090 MHz extended squitter ADS-B "In" capability. The basic GTS 800 system consists of a remote transmitter/receiver computer LRU and a single top-mounted directional antenna. Flexibility is provided for optional dual directional antenna configurations, as well.

GTS 820 TAS: With 250 watts of nominal power output and up to 40 nm of active interrogation range in the forward direction, the GTS 820 is recommended for faster and higher-performing aircraft². The 820 can actively track up to 60 targets simultaneously, and depending on the specific cockpit display being used, will depict up to 30 of the most relevant traffic threats. Passive surveillance is provided with available 1090 MHz extended squitter ADS-B "In" capability. And the typical installation includes both top-mount directional and optional bottom-mount antennas (directional or omni) to reduce the potential for antenna "shading" of TAS interrogations. This shading effect can cause targets to drop out during turns or maneuvers, or when threat aircraft are positioned directly below you. In addition to the remote computer LRU, the GTS 820 package includes a 4-channel GPA 65 power amplifier/low noise amplifier (PA/LNA) that is remotely installed near the top directional antenna to boost antenna performance while minimizing power consumption for better efficiency.

GTS 850 TCAS I: Featuring the same componentry, tracking range and 250-watt nominal power output of the GTS 820 TAS, the TCAS I certified GTS 850 is recommended for today's higher-capability cabin class turboprops and business jets². For commuter aircraft (those with 10 to 30 passenger seats), TCAS I capability is mandated by the FAA. The Garmin GTS 850 system satisfies all TCAS I collision avoidance criteria, while enabling both active and passive (via ADS-B) surveillance of fast-closing aircraft in high-traffic airspace.

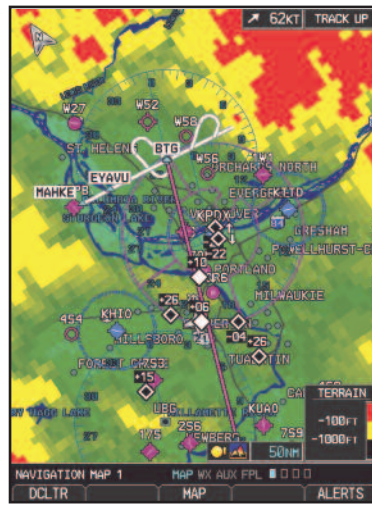
GARMIN TAS/TCAS COMPARISON:	GTS 800	GTS 820	GTS 850
• Traffic system type	TAS	TAS	TCAS 1
• Transmitter power output (nominal)	40 watt	250 watt	250 watt
• Active surveillance range (typical)	12 nm	40 nm	40 nm
• Number of targets tracked	60	60	60
• Number of targets displayed (dependent on display system capability)	30	30	30
• Display range	2/6/12	2/6/12/24/40	2/6/12/24/40
• Range accuracy	+/- .05 nm	+/- .05 nm	+/- .05 nm
• Bearing accuracy	5° RMS	5° RMS	5° RMS
• Altitude accuracy	+/- 200 ft	+/- 200 ft	+/- 200 ft
• Altitude resolution	+/- 100 ft	+/- 100 ft	+/- 100 ft
• Max vertical separation	+/- 10,000 ft	+/- 10,000 ft	+/- 10,000 ft
• Audible target threat position callouts	Yes	Yes	Yes
• 1090ES ADS-B receiver (requires ADS-B "Out" capability)	Yes	Yes	Yes
• Correlated display capability	Yes	Yes	Yes
• Selective Mode-S interrogation	No	Yes	Yes
• Maximum Operating Altitude	55,000 ft.	55,000 ft.	55,000 ft.

¹GTX 330, GDL 90 or other ADS-B "Out" equipment sold separately.

²Check with your Garmin dealer for compatibility information.



With Garmin's SVT-capable flight displays (sold separately), traffic can be depicted in a 3-D format. As targets get closer, the symbols get larger.



Integration of traffic, terrain and obstacle alerting on a Garmin moving-map display gives pilots a comprehensive picture of potential flight path conflicts.



GTS 800 series traffic alerts can be displayed on Garmin's popular 400W and 500W series navigators.

Antennas that clear the air:

The antennas and technology used by Garmin TAS and TCAS are designed to help minimize frequency congestion while enhancing signal reception. Moreover, an array of available antenna configurations allows performance to be optimized for specific types of aircraft. The system works by sending out a transponder interrogation signal from your aircraft – an interrogation that is picked up by another aircraft's transponder, which in turn sends back a reply. Your system's traffic computer uses that reply to calculate distance, direction, relative altitude, etc., of the replying aircraft. Should the other aircraft pose a collision threat, a traffic advisory is displayed and audibly announced.

The antennas incorporated by Garmin TAS/TCAS include a top-mounted directional antenna that is used to determine distance and relative bearing to the intruder aircraft. (Bottom-mount directional antennas are also optionally available to help prevent target drop out during turns and maneuvers. For high-speed aircraft, optional low-profile directional antennas are also available.) By making these antenna transmissions directional, the system is able to reduce the number of transponders being interrogated simultaneously, and thus reduce potential garbling of replies on the 1090 MHz frequency band. With the capability supplied by a Garmin GTX 33(D) or GTX 330 transponder, Mode-S detection techniques enable the GTS 820 and GTS 850 systems to provide interference-limiting "selective interrogation" that apportions transmission rates to give higher priority to the nearest and fastest-closing targets.

The net result of these selective/directional surveillance technologies is that the Garmin GTS traffic systems work to reduce the number and frequency of undesired transponder transmissions. These so-called "FRUIT" replies (False Replies Uncorrelated In Time = FRUIT) add to the noise, garble and congestion in high-density airspace. So, by minimizing these forms of interference, Garmin technology helps "clear the air" to help ensure the most accurate possible traffic data communications.

Better technology for higher safety.

The Garmin GTS family of TAS and TCAS I systems offers a full range of traffic surveillance capabilities to fit your specific aircraft and operational requirements. Plus, the Garmin network of worldwide sales and support facilities adds even more confidence and peace-of-mind to every flight. For more information on the latest and best in traffic tracking solutions, just give your Garmin dealer a call. Or visit our website at www.garmin.com.

FEATURES AT A GLANCE

- Choice of 12 nm or 40 nm forward-looking coverage
- Generates both aural and visual traffic advisories
- Expanded aural alerts can specify relative target bearing, relative altitude (above/below) and range
- Active and passive (ADS-B) surveillance technologies
- Tracks up to 60 traffic targets simultaneously
- Displays up to 30 intruder threats
- Selectable horizontal display ranges
- ± 10,000 ft. max. relative altitude reference
- Uses TCAS-like symbology
- Interfaces with a variety of compatible MFDs and cockpit displays (not included)
- Selective/directional interrogation reduces frequency congestion
- High-Speed Data Bus (HSDB) or ARINC 429 interface capabilities
- Vertical or horizontal LRU rack mounting
- 14/28 VDC power capability

GTS 800/820/850 Processor LRU

Unit Size: 6.25"W x 2.7"H x 12.7"D
(15.87 x 7.11 x 32.25 cm) excluding mounting rack

Weight: 9 lbs (4.08 kg) LRU; excludes connectors
Vertical rack - 1.05 lbs (0.48 kg)
Horizontal rack - 1.94 lbs (0.88 kg)

Temperature: -55°C to +70°C

Operating Altitude: To 55,000 feet

Power input: 14 or 28 VDC
40 watts max. (GTS 800); 45 watts max. (GTS 820, 850)

Cooling input: Integrated

Environmental Compliance: RTCA DO-160E

Software Compliance: RTCA DO-178B Level C

Hardware Compliance: RTCA DO-254, Level C

TSO Compliance:
GTS 800,820 TAS: TSO-C147, TSO-C166a, DO-197A, DO-260A
GTS 850 TCAS I: TSO-C118, TSO-C166a, DO-197A, DO-260A

GA 58 Directional Antenna

Unit Size: 4.03"W x 2.97"H x 5.63"D
(10.24 x 7.54 x 14.30 cm)

Weight: 0.8 lb (0.36 kg); excludes connectors

Omni-Directional Antenna (optional)

Unit Size: 0.98"W x 3.30"H x 4.00"D
(2.49 x 8.38 x 10.16 cm)

Weight: 0.24 lb (0.10 kg); excludes connectors

GPA 65 PA/LNA Module (GTS 820/850 only)

Unit Size: 4.25"W x 1.00"H x 8.00"D
(10.8 x 2.54 x 20.32 cm)

Weight: 1.75 lb (0.79 kg); excludes connectors



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