



OBD

Aftermarket Devices:

Geotab Advances Safety through Design, Manufacture, and Testing for Reliable Performance

This whitepaper outlines some of Geotab’s device design requirements and features that provide increased efficiency in vehicle fleet management, and importantly, advance the safety of fleet vehicle operation.

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Geotab's GO Devices Help Keep Drivers Safe

For over a decade, Geotab has been a proven industry leader in the area of GPS and computer enabled fleet management and vehicle tracking, also known as telematics. Fortune 500 companies, including 40% of the top ten fleet and 18% of the top 100 fleets in North America, rely on Geotab's technology. In recent years, the Geotab solution has increasingly been deployed globally - this includes European installations by worldwide operating large fleet customers. Geotab's installation base numbers, as of September 2014, are well over 300,000 vehicles.

One of the significant benefits of deploying a telematics solution is safety. The Geotab solution empowers fleet managers to monitor several safe driving practices:

- Speed, harsh braking, seat belt use and many others
- Manage towards improving driver safety records
- Provide accurate data to aid accident reconstruction

One of Geotab's key customers, for example, have seen their accident frequency ratio decrease from 13.3 accidents per million miles to 8, and the cost of risk reducing from 6.0% of revenue to 2.5% since the addition of Geotab's fleet management technology. Additional benefits of Geotab's telematics solution include the enhancement of fleet productivity and efficiency.

The success of telematics in improving driver behavior, reducing accidents, and minimizing employee injury occurrences has attracted the attention of the auto insurance industry, which has a vested interest in improving driver safety. As a result, large insurance companies have started to provide incentives for the installation of telematics and have active programs to drive their further adoption. For instance, Zurich, an insurance market leader, provides a solution called Zurich Fleet Intelligence to the commercial fleet market, and has reported studies showing that telematics solutions can reduce collisions by up to 20%¹

In order to derive the maximum benefit of the telematics solution and allow for cost effective deployment, a direct connection to the vehicle communication infrastructure (CAN bus system) must be made. This direct connection is standard in North America and has contributed to the above mentioned wide adoption and success of telematics systems.

Direct connection as a method for installing telematics devices is also a universally accepted practice in Europe when it comes to passenger cars and light commercial vehicles. In fact, these vehicle groups are the main target of the push by insurance companies to greater adoption of telematics systems. Allianz, one of the largest insurance companies in the world, has recently launched its own telematics solution, called Allie (www.allie.it), specifically targeted at consumer and passenger cars. Several other aftermarket products, such as radio systems, reverse cameras, and anti-theft devices also use a direct connection to vehicles.

1 | Zurich Fleet Intelligence. (2010). Enabling safer, more efficient and environmentally friendly fleets. Retrieved from Zurichna.com: http://www.zurichna.com/internet/zna/sitecollectiondocuments/en/corporatebusiness/fleet%20intelligence/10-2115%20zfi%20brochure%20%202010_10_18.pdf

The following is a detailed analysis that explains how the use of Geotab's direct access telematics device meets safety standards and enhances safety in virtually every vehicle when installed and handled properly. Before diving into the details it should be noted that at the most basic level, the Geotab device connects through in-vehicle communications interfaces. The interfaces are designed and made for such communication by the car manufacturer and are governed by international standards that dictate how to do so safely.

Detailed Review of Direct Access Safety

Legal and contractual considerations supporting safety

Geotab is not aware of any legislation worldwide that would prohibit the installation of aftermarket, direct access devices for safety reasons. While Geotab has not conducted a detailed jurisdiction by jurisdiction safety review, Geotab has engaged the services of competent legal counsel in North America, Europe and the Far East. Geotab also has not received any feedback to the contrary from its global user base, many of whom are large and sophisticated corporations with extensive legal compliance programs.

The same can be said of contractual restrictions to use direct access devices - Geotab is not aware of any such contractual limitation.

Large fleet acceptance

Direct access devices have been deployed by large fleet customers who have the means, capability, and declared policy to ensure the safety of their drivers and vehicle loss avoidance.

Geotab's direct access devices (hardware) are certified and comply with international standards

The CAN transceivers and CAN controllers embedded in the Geotab GO device support the full industrial temperature range and incorporate advanced security features such as short circuit protection, thermal shutdown, ESD protection, high impedance status and power up in recessive condition.

The design of the Geotab device incorporates hardware protection: the device is protected from high voltage, electrostatic discharge (ESD) and adheres to the Automotive E-Mark specification and is currently undergoing SAE J1455 certification ensuring the device does not affect or interfere with other devices/components.

The Geotab GO device is compliant with all the North American, European, and Australian mandatory certifications, in particular:

- PTCRB: Compliance with 3GPP network standards within the PTCRB Operators' networks.
- FCC/IC: Generally exempt from FCC/IC testing requirements except FCC Part 15 Subpart B (ICES003 for Canada) for conducted and radiated emissions. Geotab devices display the FCC/IC numbers of the integrated modules (where relevant).
- CE Mark: Radio & Telecommunications Terminal Equipment (R&TTE) Directive - certified by TÜV SÜD and CETECOM.
- CE Mark: Restriction of Hazardous Substances (RoHS) Directive - certified by Etratech
- E Mark: Automotive EMC Directive - certified by TÜV SÜD - including Immunity Related Functions related to vehicle data bus functionality
- A-tick/Australian RCM: Compliance with applicable ACMA technical standards—that is, for telecommunications, radio communications, EMC and EME.

Further, the Geotab GO device conforms to international standards when communicating with the vehicle infrastructure. It can be argued that the very existence of a standard for communication between a telematics device and vehicle communication infrastructure supposes that such communication is an acceptable practice:

- SAE J1708: Serial Data Communications Between Microcomputer Systems in Heavy-Duty Vehicle Application
- SAE J1850: Class B Data Communications Network Interface
- SAE J1939 / ISO 11898: Recommended Practice for a Serial Control and Communications Vehicle Network
- ISO 9141: Road vehicles - Diagnostic systems - Requirements for interchange of digital information
- ISO 11898: Road vehicles — Controller area network (CAN)
- ISO 14230: Road vehicles — Diagnostic systems — Keyword Protocol 2000
- ISO 15765: Road vehicles — Diagnostics on Controller Area Networks (CAN)
- SAE J1962 / ISO 15031-3 - Diagnostic Connector

In addition to compliance with noted standards, the Geotab GO device includes sophisticated proprietary systems and features to further enhance safety and the robustness of the device.

[Geotab's components and manufacturing processes for devices adhere to high quality standards and incorporate advanced safety features](#)

In manufacturing its devices Geotab uses experienced, expert partners for critical direct access related components, such as CAN transceivers and CAN controllers. Geotab's partners in the manufacturing process have long-term experience in the production of automotive products and are qualified according to ISO/TS16949 quality standards. This is a stringent technical specification first published by the International Automotive Task Force, a group comprised of representatives from the automotive manufacturers, and the "Technical Committee" of the ISO.

To limit power consumption and prevent any undue drain of the vehicle's battery the device will go into a "sleep" mode when the vehicle is not in use.

Geotab's device firmware undergoes rigorous automated test procedures

Geotab firmware development is based on Agile methodologies and uses a series of automated test protocols: every build is checked first against software based unit tests. As part of the release process, a custom developed vehicle simulator allows integration testing of all facets of the firmware and its interactions with different vehicle types. Once a new firmware release is published, this will be first tested on a limited set of vehicles and then, over a controlled release cycle, rolled out over-the-air to the entire customer base, ensuring that all the units run the latest version of the firmware.

Geotab adopts industry standard behaviour when communicating on the vehicle data bus and additionally the firmware logic monitors for insurgence of issues on the bus and removes itself from transmission when one is detected.

The software adheres to the following standards when communicating with the vehicle:

- SAE J1939: Recommended Practice for a Serial Control and Communications Vehicle Network
- SAE J1587: Electronic Data Interchange Between Microcomputer Systems in Heavy-Duty Vehicle Applications
- ISO 15765: Road vehicles — Diagnostics on Controller Area Networks (CAN)
- ISO 9141: Road vehicles — Diagnostic systems - Requirements for interchange of digital information
- ISO 14230: Road vehicles — Diagnostic systems — Keyword Protocol 2000
- SAE J1979 and SAE J2012 / ISO 15031: Communication between vehicle and external equipment for emissions-related diagnostic

Proactive Monitoring and Data Mining of the Installed Base enhance safety

The Geotab hardware and firmware is continually monitored by data mining techniques: automated auditing is constantly running on over 200,000 vehicles to capture/log hardware or software errors or predefined exceptions. Non-typical behaviour is logged and addressed. Geotab proactively examines vast amounts of data to look for anomalies that could indicate problems with the device. The risk of problems going undetected for any length of time is thus very low.

Units can be analysed and upgraded over-the-air without any need for any end user intervention, allowing a seamless deployment of both bug fixes and new functionalities.

Geotab devices have a proven safety record

Geotab has well over 300,000 devices installed and has been providing telematics based fleet management solutions for over a decade. During this time, Geotab is not aware that any of the supported vehicles using its devices was ever involved in an accident that was caused by a malfunctioning device. This is in contrast to the large number of accidents that were prevented by installing the fleet management solution as cited by insurance companies and our customers.

Known cases of device malfunction have included the following issues:

- The engine light coming on without any other adverse effect on the vehicle.
- The vehicle experiencing difficulty shifting gears.
- The vehicle going into “limp” mode (i.e. reduced top speed).
- The vehicle stalling.
- The vehicle failing to start.

In all of the above cases the driver was able to safely bring the vehicle to a stop and remove the device. The problem was later resolved by securing the device pin connectors to the vehicle and/or firmware updates.

Safety: A Shared Responsibility

Safety remains a shared responsibility - automotive safety cannot make up for reckless driving. Based on experience, proper installation is the most critical safety procedure as reported serious incidents involving telematics devices, in their majority, could be traced back to installation errors. Geotab has a rigorous safety program that is designed to anticipate and mitigate safety risks by adhering to high standards, built-in redundancies and fail safe features, as prescribed in cited in safety and design standards.

The following lists the key safety practices for users:

1. Check for known compatibility / install related issues based on make, model, year in the Geotab Product Guide.
2. When self installing the Geotab device follow the instructions. If the instructions cannot be followed discontinue self-installation and have the installation performed by a certified installer or reseller.
3. Do not tamper with the device and before each use check for loose cables and other items that could interfere with the proper operation of the device
4. If any safety issue arises, safely remove the device and contact your fleet manager.

Geotab is continuously striving to improve safety features and practices of their telematics device and welcomes feedback and suggestions from all users around the world. To learn more or to offer comments, you can contact Geotab by visiting www.geotab.com or emailing testdrive@geotab.com.

To read about the practical use of telematics in a safety program to save lives and reduce costs, visit: <http://www.geotab.com/geodownloads/resources/Telematics-in-Safety-Program-2014.pdf>