TAG-T3
Wombat
User Guide
Version 1.0.7

by

Geonautics International Pty Ltd

Copyright & Information

Acknowledgement

Geonautics International and its partner organizations wish to acknowledge Australia's Law Enforcement groups for their support and ongoing commitment to the development of the *TAG-T3 Wombat* product.

Condition of Use

The user undertakes that,

- They are a bona fide law enforcement agency with technical capabilities.
- The *TAG-T3 Wombat* is being used to fulfill official requirements.
- The *TAG-T3 Wombat* will be used with discretion.
- Precautions will be undertaken to keep details restricted to members of their organization requiring such information.

The user acknowledges that,

- The *TAG-T3 Wombat* is for use by law enforcement agencies.
- The *TAG-T3 Wombat* may not comply with government type approval.
- The users will be responsible for satisfying themselves that the *TAG-T3 Wombat* may be legally operated in the district where the user intends to deploy it.

Disclaimer

Care has been taken in assuring the quality of the *TAG-T3 Wombat* but the developers, Geonautics International Pty Ltd and any associated company, distributor or reseller do not accept responsibility for errors. In no event shall the aforementioned parties be liable for any loss of profit or any other commercial damage including, but not limited to, special, incidental, consequential or other damages arising from the provision of the *TAG-T3 Wombat* or associated software or peripherals to the user.

Version	By	Description	Date
1.0.0	SDE	Initial Draft	September 04
1.0.1	SDE	Rewrote command sections	January 05
1.0.2	SDE	Added TAG Comms and USB Sections	January 05
1.0.3	SDE	Changed structure…	May 05
1.0.4	BL	Rewritten and reformatted some of the structure	October 05
1.0.5	BL	Added Remote Downloader guide and removed other references.	January 06
1.0.6	BL	Changes made to the downloader guide and external wiring chart	March 06
1.0.7	SDE	Reformatting and Content changes	May 06

TABLE OF CONTENTS

Table of Tables

Table of Figures

1. INTRODUCTION

Geonautics International's **TAG-T3 WOMBAT** has been developed as a GPS logger with law enforcement tracking requirements in mind. The **TAG-T3 WOMBAT** functions as a self contained unit with Local RF communications and downloading capabilities.

Being designed to operate from a single internal 9v (PP3) battery, the unit can log positions for up to a month without user intervention. Coupling this with the water and dust resistant seals the unit is perfectly suited to *"slap on"* applications.

The device can also be used with external power, allowing the user the flexibility of operating from an external power source, be it multiple battery packs or vehicular power. This feature makes the unit suitable for longer term deployments.

Figure 1, TAG-T3

While remaining compatible with SNETLiteM3 and GeoPoint the **TAG-T3 WOMBAT** with low power consumption, compact size and rugged design has it all covered for your tracking needs.

1.1 Features

Features of the **TAG-T3 WOMBAT** include;

- 50,000 logged positions
- Up to 200' Local RF Communications Link
- Internal RF Link Antenna
- RF Frequency - 916 or 868 MHz
- Case meets the IP67 standard
- Can be configured to trigger an external relay
- 5 to 24v DC Operating Voltage
- Less than 700µA sleep current
- High-speed USB interface for faster data transfers via "Direct Connect"
- Compatible with SNETLiteM3 and GeoPoint software packages

2. THE TAG-T3 WOMBAT KIT

2.1 TAG-T3 Wombat

The **TAG-T3 WOMBAT** is designed to be used in a stand alone configuration, and should be configured to the users particular operational parameters before deployment.

Installation and operational procedures are beyond the scope of this manual. However a few things to consider include:

2.1.1 Box

The **TAG-T3** is an environmentally sealed unit which meets the IP67 specification.

The device is protected from dust and temporary water immersion for up to 30 minutes at a depth of 15cm. IP67 indicates the seals will not protect against water jets that are higher in pressure than a running kitchen faucet.

It is recommended to apply a small amount of Silicon Grease to the seals (both battery and top covers) each time it is opened.

2.1.2 Vehicle Mounting

Always avoid mounting the **TAG-T3** near surfaces that may become hot, either because of the engine or through sunlight heating the vehicle.

If using a magnetic plate to mount the unit ensure the mounting surface is clean and free from grease and dirt. 75% of the magnets should be in direct contact to ensure an adequate hold.

The magnetic plate is built into the lid of the **TAG-T3**. It is affixed to the unit via the mounting holes and M2.5 screws provided. The magnets are extremely strong and should not be placed near electrical equipment – particularly computer monitors.

The magnetic plate is shipped with a keeper plate covering the magnets. This reduces the effects to the outside surroundings and to help protect the plate.

Figure 2, Magnetic plate

2.1.3 GPS Antenna

The GPS antenna connector is located on the end of the **TAG-T3** unit. GPS signals require "line of sight", thus the GPS antenna (see 2.3.1) should be installed in a place where it has the best view of the sky available. As a rule of thumb, materials that are not electrically conductive, glass, cardboard, plastic, rubber etc, will not affect the GPS signals. Materials that are conductive will totally block the signals.

Remember that metallic paints, window tinting, demister elements and "in glass" antennas may all have an effect.

2.1.4 TRX Antenna

The TRX antenna used to communicate with the unit is located next to the GPS antenna connector. It should be positioned with as little metal around it as possible. Placement of the **TAG-T3** should allow the TRX antenna to be in as good a position as achievable, allowing as near to line of sight as possible. Also keep in mind that metallic paints and metal vehicle components can all affect the TRX signal.

Figure 3, TRX Antenna

2.2 DL1 REMOTE DOWNLOADER

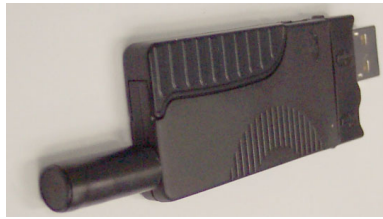
The Geonautics DL1 Remote Downloader allows for easy deployments with its inbuilt storage, external antenna connector and battery holders. It allows for the user to load "scripts" to configure and interrogate their **TAG-T3** while being used in a stand alone mode. The DL1 can also be used while connected directly to a PC.

2.2.1 Getting Started

Before the unit can be used for remote downloading, it must be configured with the commands that are to be sent to the target unit. The *TAG Comms* software package is used to perform this "scripting" configuration. In this mode, the DL1 Remote Downloader must be connected to a PC via the USB plug. No batteries are required at this stage. Please consult your *TAG Comms* user guide for more information.

In stand alone Remote mode, the device is powered by three, v389 or similar, Silver Oxide batteries. These batteries will enable the device to perform field communications for approximately 7 hrs.

Open the battery door and insert 3 batteries in the DL1 Remote Downloader's battery holders. The orientation for the batteries is shown on the device housing.



An antenna connector is located on the rear of the device, opposite the USB connector. An antenna must be connected to communicate via the RF link.

Once the unit is configured, batteries have been inserted and an antenna has been connected, the device is then ready to begin communicating.

2.2.2 Initiating the DL1 Downloader

Slide the switch found on the side of the device towards the USB connector. This will commence the command sequence (e.g. Download, reconfigure, etc).

2.2.3 Monitoring Progress

The DL1 Remote Downloader will give an initial 'triple buzz' from its internal vibration motor. This indicates that it is ON and ready to find its programmed target.

Once the unit is ready, it will indicate one of three states:

- If DL1 has nothing to do (e.g. not programmed with a script), then it will give a triple 'buzz', pause for 2 seconds, then give a final triple 'buzz'.
- If the DL1 Remote Downloader is not within range of its target, it will give a single 'buzz' once every ten (10) seconds.
- If the Remote Downloader is within range and communicating with its programmed target, it will give a single 'buzz' once every two (2) seconds.

Once the Remote Downloader has received all necessary information, it gives a 'triple buzz', and then will cease any further indications.

Slide the switch found on the side of the device away from the USB connector. This will turn the device OFF.

Each time power is applied to the DL1 Remote Downloader, it will run through its programmed "script", storing any and all responses it receives from its target.

Please consult your *TAG Comms* user guide on retrieving the responses from the **TAG-T3**, which were stored on the DL1 Remote Downloader during its operation.

2.2.4 External Power Connector

External power can be fed to the Remote Downloader via the three pin connector located at the front of the device. This allows the unit to be powered externally to enable longer download times. A spare three pin Datamate connector and pins are provided for this connector. 4V to 10V can be fed through this connector. Pin out configuration is described in the following picture.

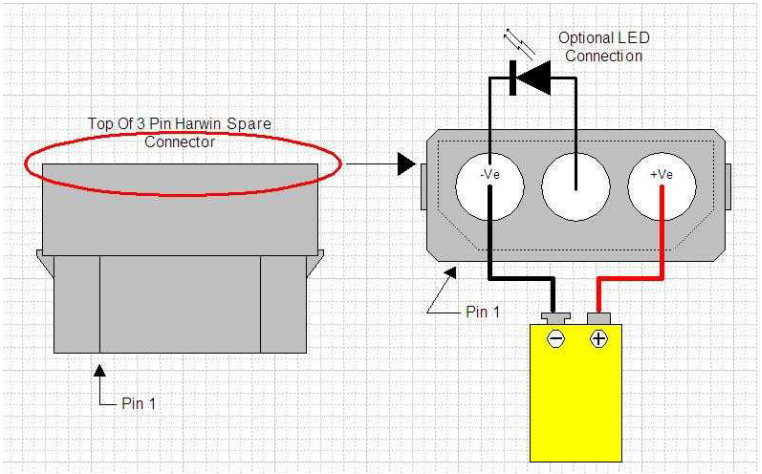


Figure 4, DL1 – External Power Configuration

2.2.5 External LED Indicator

An LED connected to the external Datamate connector (as shown in Figure 4 above) enables the visual indication of:

- The start (triple flash) and end (on constantly) of the remote download process.
- Each time the packet receive process has been started, whereby a single flash will occur at a rapid rate during normal RF communications.

2.3 Accessories

2.3.1 GPS Antenna

The TAG-T3 is fitted with a SMA Connector for connection to the External GPS antenna.

Figure 5, External GPS Antenna

SMA GPS Connector	
Pin	**Connection**
Centre Pin	Antenna Active (3v3)
Outside	Antenna Ground

Table 1, GPS Connector

2.3.2 External Power Cable

The TAG-T3 can also be powered using the external power cable attached instead of the 9V battery cover.

Figure 6, Externally Powered TAG-T3

External Power Cable	
Cable	**Connection**
Red Striped	V+ (5v to 24v DC)
Plain Black	GND

Table 2, External Power Cable

2.4 TAG Comms Software

TAG Comms provides a zero-cost, basic command and display system for Geonautics' range of positioning products.

Features of *TAG Comms* include;

- Communications via standard modems
- Accept SMSs from cell phones
- Provides control of Geonautics' tracking devices
- Live updates of positions for real-time tracking
- Ability to accept incoming calls for automatic downloads
- Simple interface to minimize training requirements

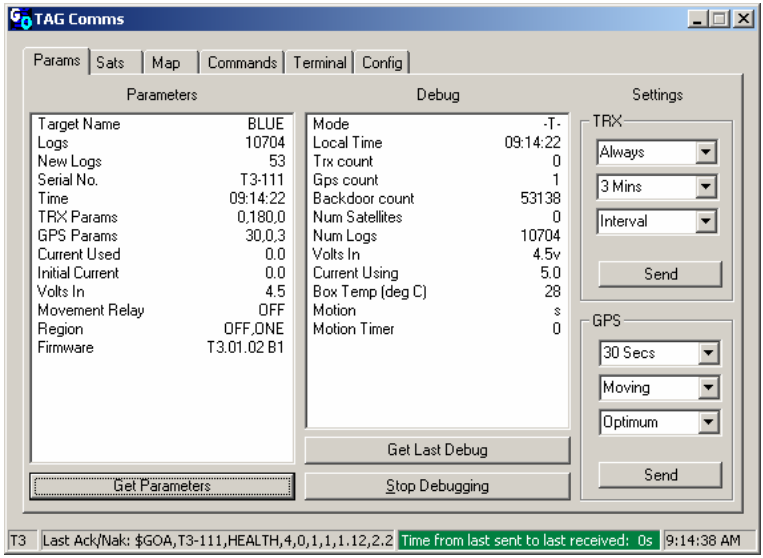


Figure 7, TAG Comms Main Window

Please consult your *TAG Comms* user guide for more information.

3. GETTING STARTED

The **TAG-T3** can be controlled using commands sent via an RF Data connection. Through the RF connection and a PC using the supplied *TAG Comms* software, the **TAG-T3** can be fully configured and interrogated. Please consult your *TAG Comms* user guide for more information on setting up your DL1 Remote Downloader.

3.1 First Time

Before deploying a **TAG-T3**, or if problems are encountered in using the device, it is recommended that the following steps be taken.

1. Ensure the 9V battery is correctly installed within the **TAG-T3**.

2. Reset the **TAG-T3** by ,

   sending **$GO0,,RST** to the unit via Direct Connect Mode

   This ensures you have a known starting point, the unit will respond with a **$GOA,<Unit_Id>,RST**.

3. Make sure the DL1 Remote Downloader is plugged into the USB port and the appropriate drivers are installed correctly.

4. Configure the DL1 to communicate with your **TAG-T3**, see *TAG Comms* User Guide for more detailed information on configuring and controlling your DL1 Remote Downloader.

3.2 Communicating with your TAG-T3

3.2.1 RF Communication

Once configured, the **TAG-T3** will remember and use that configuration each and every time power is applied to the unit. The unit can be interrogated as well as configured using the DL1 Remote Downloader.

Figure 8, DL1 Remote Downloader

3.2.2 Direct Connect Mode

Using the supplied USB Direct Connect Cable, the **TAG-T3 WOMBAT** can be configured to the desired operational parameters.

Figure 9, USB Direct Connect Cable

The cable can do the same interrogation and configuration functions as the DL1 Remote Downloader. The connector that the USB Direct Connect Cable plugs into is contained within the **TAG-T3**.

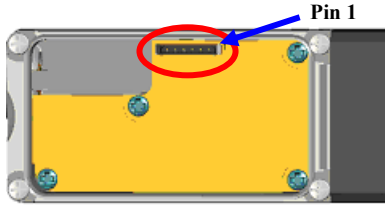


Figure 10, Direct Connect Cable Connector location

Take care when removing the top cover so as not to damage the seals. Antistatic precautions should be observed when the cover is not on the unit.

3.3 Concealment and Tactical Issues

Concealment and tactical issues surrounding the use of the **TAG-T3** units are beyond the scope of this guide.

4. COMMANDS

4.1 Command Set Notation

The following pages give a complete list of the **TAG-T3**'s command set. Commands may be transmitted to the unit directly using the Remote Downloader or via the "Direct Connect" cable. All commands must be terminated with a carriage return / linefeed pair <CR><LF>.

Commands are sent to and received from the **TAG-T3** unit in a comma separated ASCII format. With respect to the command set, the following notation is used

$GO0	Command identifier
[<Unit_Id >]	Optional device serial number
<parameter>	Indicates a parameter is required
[,<parameter>]	Optional parameter
<parameter|parameter>	Choice of parameters i.e. ON|OFF

Sending an appropriately filled out command message to the **TAG-T3** can change the appropriate parameters for that command. It should be noted that not all values need to be supplied in order to change a single value of a multiple parameter command. All that is required is to ensure that there are the correct number of commas so that the value being set is in the right location.

Any commands sent to the unit with "blank" values will result in that parameter being queried and the result returned as part of the reply. e.g. sending a

$GO0,,CLK,,,,
or **$GO0,,CLK**
or **$GO0,Unit_Id,CLK**

to the **TAG-T3** will return an acknowledgment containing the current parameters, for example **$GOA,T3-001,CLK,0000,36000,60,180**

The **TAG-T3** will acknowledge all commands sent to it with either an acknowledgment, or an error message. Command ACKnowledgments and NACKnowledgments that are returned by a device, have the following notation

$GOA	Command ACKnowledgment identifier
$GON	Command Not ACKnowledge identifier
$GOM	Unsolicited message identifier

4.2 Standard Position String

$GO0,<Target>,<Operation>,<Unit Id.>,<Date>,<UTC>,
<Lat>,<Long>,<Height>,<Speed>,<Heading>,<Accuracy>,
<No. Of Satellites>,<Quality>,<Log Type>,<Movement Type>

String Parameters	Description
Target	The target name of the unit
Operation	The operation name of the unit
Unit Id.	Unique serial number of the unit
Date	UTC date according to the GPS
UTC	UTC time according to the GPS. A UTC offset must be added to determine the local time of the point
Lat	Latitude of the position, in degrees
Long	Longitude of the position, in degrees
Height	Height of the position in meters
Speed	Speed of the position in km/h
Heading	Heading of the position, in degrees
Accuracy	Position Dilution Of Precision, PDOP
No. of satellites	Number of space vehicles used to calculate position
Quality	Status of position, 0 Position old 1 Position current
Log Type	Type of log for position, L Logged position R Real time position
Movement Type	Type of log for position, K Speed greater than 10kph M Unit *is* being shocked/moved s Unit *has* been shocked/moved S Unit is stationary v Unit has under voltage V Unit has over voltage 1 Unit has been shocked by trigger 1

Table 3, Standard Position String

Example:

```
$GO0,T3-999,EXTERNAL,T3999,08012004,064336,-27.490401,153.037357,50,0,0,3.8,4,1,R,S
$GO0,T3-999,EXTERNAL,T3999,08012004,064337,-27.490401,153.037357,50,0,0,3.8,4,1,R,S
$GO0,T3-999,EXTERNAL,T3999,08012004,064338,-27.490401,153.037357,50,0,0,3.8,4,1,R,S
$GO0,T3-999,EXTERNAL,T3999,08012004,064339,-27.490401,153.037357,50,0,0,3.8,4,1,R,S
```

4.3 System Configuration
4.3.1 Vehicle (Identification)

Sets / queries a vehicle name and operation name for the **TAG-T3** unit.

$GO0,,VEH[,<Target Name>][,<Operation Name>]

$GOA,<Unit_Id>,VEH,<Target Name>,<Operation Name>

Vehicle (Identification) Command	Description
Target Name	Identifies the Vehicle/Target
Operation Name	Identifies the Operation

Table 4, Vehicle (Identification) Command

*The target and operation names are used to identify the vehicle and are limited to 8 characters. Spaces or characters that are illegal in Windows™ file names **may not** be used.*

Default: $GO0,,VEH,T3-xxx,INTERNAL
Where xxx is the **TAG-T3** serial number.

Example: **$GO0,,VEH,FRED,TEST**

Returns: **$GOA,<Unit_Id>,VEH,FRED,TEST**

TAG Comms uses the target name for creating the storage files for real-time and logged positions.

Real-time positions are stored in <Target Name>.REL
Logged positions are stored in <Target Name>.MEM

4.3.2 Clock

Sets the **TAG-T3**'s clock parameters.

$GO0,,CLK[,<hhmm>][,<UTC offset>][,<First Sat>][,<Fix>]

$GOA,<Unit_Id>,CLK,<hhmm>,<UTC offset>,<First Sat>,<Fix>

Clock Command	Description
hhmm	Start time used to commence TRX intervals
UTC Offset	Seconds from UTC (Greenwich Mean Time) to local time
First Sat	Period in seconds in which the GPS tries to find a satellite
Fix	Period in seconds in which the GPS tries to obtain a position fix

Table 5, Clock parameters

Default: $GO0,,CLK,0000,36000,60,180

Example: **$GO0,,CLK,0930,-18000,60,180**

Returns: **$GOA,<Unit_Id>,CLK,0930,-18000,60,180**

*In the example shown the **TAG-T3** would start its first TRX interval at the local time of half past nine in the morning and the UTC offset has been set to -5hrs, US Eastern Time. Subsequent times would be determined by the values of the TRX (Configuration) command on page 35.*

*The UTC Offset is **not** reset during a RST command.*

4.3.3 Motion

Sets the motion sensitivity of the movement sensor and the interval that any single movement is valid.

$GO0,,SHK[,<shock>][,<duration>]

$GOA,<Unit_Id>,SHK,<shock>,<duration>

Motion Command	Description
shock	Strength of movement to register motion, 1 to 255 where, 1 being most sensitive 255 being the least sensitive
duration	Number of seconds the motion is valid for from the last movement

Table 6, Motion Command

Default: $GO0,,SHK,30,90

Example: **$GO0,,SHK,20,120**

Returns: **$GOA,<Unit_Id>,SHK,20,120**

The shock duration should be set longer than the least time we would expect to see a motion trigger. The duration should be large enough to allow for stationary times at traffic lights and other periods of inactivity.

If shock is set to zero (0), the motion sensor will be disabled. Only experienced users should consider using this option.

4.3.4 Voltage

Set the trigger levels for voltage rises and voltage drops. The duration of the trigger is set by the duration time of the Motion (Configuration) command. See page 22.

$GO0,,VLT[,<low>][,<high>]

$GOA,<Unit_Id>,VLT,<low>,<high>

Voltage Command	Description
low	Lower voltage trigger level expressed as volts*10
high	Upper voltage trigger level expressed as volts*10

Table 7, Voltage Command

Default: $GO0,,VLT,0,135

Example: **$GO0,,VLT,20,120**

Returns: **$GOA,<Unit_Id>,VLT,20,120**

A voltage setting of 135 is interpreted as 13.5 volts.

When setting the high limit to sense the alternator induced voltage rise, use the Parameter, page 42, or Debug (Last), page 44, command to establish the voltage when the engine is running and then set the high value to a voltage slightly under that voltage (0.3 volts lower is normally sufficient).

4.3.5 Power (Configuration)

Sets or resets the monitoring of the power available to run the unit. For battery powered units it should be used to count down the available power of the battery.

$GO0,,POW,<amps>

$GOA,<Unit_Id>,POW,<amps>

Power (Configuration) Command	Description
amps	Initial amount of power available in amp hours

Table 8, Power (Configuration) Command

Default: $GO0,,POW,0

Example: **$GO0,,POW,10.0**

Returns: **$GOA,<Unit_Id>,POW,10.0**

If the available power is set to zero the power used will count up from zero. If available power is set to a number then the power used will count down.

4.3.6 Backdoor

Turns on or off the TRX midnight backdoor. Backdoor is referenced to local time.

Note: The midnight backdoor is provided to ensure there is one period each day that the device can be contacted by TRX even if parameters are set to values which would prohibit the TRX coming on. Only experienced users should disable the backdoor.

$GO0,,BDR[,ON|OFF]

$GOA,<Unit_Id>,BDR,ON|OFF

Backdoor Command	Description
ON|OFF	Turns Backdoor setting ON or OFF

Table 9, Backdoor Command

Default: $GO0,,BDR,ON

Example: **$GO0,,BDR,OFF**

Returns: **$GOA,<Unit_Id>,BDR,OFF**

4.4 Positions

4.4.1 Position (Live Track)

Turns on or off real-time tracking.

$GO0,,POS[,ON|OFF]

$GOA,<Unit_Id>,POS,ON|OFF

Position (Live Track) Command	Description
ON|OFF	Turns real-time tracking ON or OFF

Table 10, Position (Live Track) Command

Default: $GO0,,POS,OFF

Example: **$GO0,,POS,ON**

Returns: **$GOA,<Unit_Id>,POS,ON**

Followed by position strings every 1 second.

$GO0,..... (Standard position string) (see page 19)
.....
$GO0,..... (Standard position string) (see page 19)

Real-time positions are updated every second and are turned OFF automatically, if the TRX connection is lost.

TAG Comms updates the file <Target Name>.REL to store the positions returned.

4.4.2 Position (Last)

Returns the last stored position of the **TAG-T3**.

$GO0,,POS

$GO0,..... (Standard position string) (see page 19)

Default: Not Applicable

Example: **$GO0,,POS**

Returns: **$GO0,..... (Standard position string)** (see page 19)

The Position (Last) command does not force a new position to be acquired and hence depending on the GPS power management mode may not be up to date.

TAG Comms updates the file <Target Name>.REL to store the positions.

4.5 Memory

4.5.1 Memory (New)

Downloads any positions stored in memory that have not previously been downloaded.

$GO0,,MEM,NEW
……
Memory not previously downloaded
……
$GOA,<Unit_Id>,MEM,NEW

Default: Not Applicable

Example: **$GO0,,MEM,NEW**
(Assume 500 positions stored with 100 new)

Returns: **401:500**
$GO0,..... (Standard position string) (see page 19)
.....
.....

499:500
$GO0,..... (Standard position string) (see page 19)
500:500
$GO0,..... (Standard position string) (see page 19)
$GOA,<Unit_Id>,MEM,NEW

TAG Comms updates the file <Target Name>.MEM to store the positions.

Using $GO0,,MEM,NEW prevents duplicates of the positions when multiple downloads are made.

4.5.2 Memory (All)

Downloads all positions stored in memory.

$GO0,,MEM,ALL
……
Downloads all logged points in memory
……
$GOA,<Unit_Id>,MEM,ALL

Default: Not Applicable

Example: **$GO0,,MEM,ALL**
(Assume 500 positions logged with 100 new)

Returns: **1:500**
$GO0,..... (Standard position string) (see page 19)
.....
.....
499:500
$GO0,..... (Standard position string) (see page 19)
500:500
$GO0,..... (Standard position string) (see page 19)
$GOA,<Unit_Id>,MEM,ALL

TAG Comms updates the file <Target Name>.MEM to store the positions.

4.5.3 Memory (Delete)

Deletes all positions stored in memory.

$GO0,,MEM,DEL

$GOA,<Unit_Id>,MEM,DEL

Default: Not Applicable

Example: **$GO0,,MEM,DEL**

Returns: **$GOA,<Unit_Id>,MEM,DEL**
Memory which has been deleted may be able to be recovered by using the Memory (Raw) command of page 31.

4.5.4 Memory (Fix)

Downloads positions in memory, starting at the specified fix number and continuing until either the end fix number or until last memory point has been reached.

$GO0,,MEM,FIX[,<Start Fix Number>][,<End Fix Number>]
……
Downloads memory between and including the specified fix numbers
……
$GOA,<Unit_Id>,MEM,FIX,<Start Fix Number>,<End Fix Number>

Memory Fix	Description
Start Fix Number	First fix to download
End Fix Number	Last fix to download

Table 11, Memory Fix Command

Default: Not Applicable

Example: **$GO0,,MEM,FIX,201,300**
(Assume 500 positions logged with 100 new)

Returns: **201:500**
$GO0,..... (Standard position string) (see page 19)
.....
.....

299:500
$GO0,..... (Standard position string) (see page 19)
300:500
$GO0,..... (Standard position string) (see page 19)
$GOA,<Unit_Id>,MEM,FIX

The start and end fix numbers must be in the range of zero to the current number of logs.

TAG Comms updates the file <Target Name>.MEM to store the positions.

4.5.5 Memory (Format)

Overwrites the memory, to disable recovery of points with the Memory (Raw) command of *page 31*.

$GO0,,MEM,FMT
……
$GOA,<Unit_Id>,MEM,FMT

Default: Not Applicable

Example: **$GO0,,MEM,FMT**

Returns: **Format: 0%**

Format: 8%
…
Format: 90%

Format: 98%

$GOA,<Unit_Id>,MEM,FMT

Points must firstly be deleted via the Memory (Delete) command, see page 28, before this command can be used.

4.5.6 Memory (Raw)

Downloads all 50,000 positions stored in memory regardless of whether they are valid.

$GO0,,MEM,RAW
……
Downloads entire memory for 1 to 50,000 regardless of their validity
……
$GOA,<Unit_Id>,MEM,RAW

Default: Not Applicable

Example: **$GO0,,MEM,RAW**
(Assume 500 positions logged with 100 new)

Returns: **1:500**
$GO0,..... (Standard position string) (see page 19)
.....
49999:500
$GO0,..... (Standard position string) (see page 19)
50000:500
$GO0,..... (Standard position string) (see page 19)
$GOA,<Unit_Id>,MEM,RAW

This command should only be used if memory previously deleted needs to be recovered. Any points overwritten will not be recovered.

TAG Comms updates the file <Target Name>.MEM to store the positions.

4.6 Alarms

4.6.1 Movement

For the duration of any series of movements of the **TAG-T3**, the unit can fire the External Relay Trigger.

$GO0,,MOV[,<Relay ON|OFF>]

$GOA,<Unit_Id>,MOV,<Relay ON|OFF>

Movement (Alarm)		Description
Movement Alarm	Relay Number	Fire relay while motion detected, see 4.9.1, otherwise OFF

Table 12, Movement (Alarm) Command

Default: $GO0,,MOV,OFF

Example: **$GO0,,MOV,ON**

Returns: **$GOA,<Unit_Id>,MOV,ON**

4.6.2 Region (GeoFence)

As the **TAG-T3** moves in or out of the area, the unit will fire the External Trigger Relay.

$GO0,,RG1[,<North>][,<South>][,<East>][,<West>]
[,<Relay ON|OFF,][,<Name>]

$GOA,<Unit_Id>,RG1,<North>,<South>,<East>,<West>,
<Relay ON|OFF>,<Name>

Region (Alarm)	Description
North	The northern limit of the region (latitude in degrees)
South	The southern limit of the region (latitude in degrees)
East	The eastern limit of the region (longitude in degrees)
West	The western limit of the region (longitude in degrees)
Relay	Fire relay when inside region, OFF to disable, see 4.9.1
Name	Name of Region Alarm

Table 13, Region (Alarm) Command

Default: $GO0,,RG1,0.0,0.0,0.0,0.0,OFF,ONE

Example: **$GO0,,RG1,-27.5,-27.6,153.2,153.1,ON,BOX_1**

Returns:

$GOA,<Unit_Id>,RG1,27.5,27.6,153.2,153.1,ON,BOX_1

Note: When the alarm is triggered and relay is set, the unit will fire the external Relay Trigger.

4.6.3 Input Triggering

Turn ON and OFF the acknowledgement of input triggering. With the command enabled the motion sensing will display a "1" for any external triggers that cause motion. See page 22.

$GO0,,TRG[,<Motion ON|OFF>]

$GOA,<Unit_Id>,TRG,<Motion ON|OFF>,<State HI|LO>

Input Trigger Command	Description
Motion	When set to ON, trigger is enabled, OFF to disable
State	When command is acknowledged it will return the current state of the input trigger, HI or LO

Table 14, Input Trigger Command

Default: $GO0,,TRG,OFF,

Example: **$GO0,,TRG,ON**

Returns: **$GOA,<Unit_Id>,TRG,ON,HI**

From the example above, the input triggering acknowledgment is turned ON. The state of the trigger at the time of the command is also returned as HI.

4.7 TRX

4.7.1 TRX (Configuration)

Specifies the TRX operational parameters.

$GO0,,TRX[,<Interval>][,<Period>][,<Power Management>]

$GOA,<Unit_Id>,TRX,<Interval>,<Period>,<Power Management>

GSM Command		Description
Interval		Number of seconds between the TRX turning on
Period		Number of seconds for the TRX to stay ON, minimum 60 secs
Power Management	0	TRX ON according to Interval and Period timers
	1	TRX ON during each Interval and when movement sensed

Table 15, TRX Command

Default: $GO0,,TRX,1800,180,0

Example: **$GO0,,TRX,0,180,0**

Returns: **$GOA,<Unit_Id>,TRX,0,180,0**

Setting the TRX interval to zero forces the TRX to be permanently on.

The interval is aligned to the start time and local time parameters of the Clock command of page 21.

4.7.2 TRX (Echo)

Implements a pass through mode where all communications via the "Direct Connect" port are echoed directly to the TRX, likewise all communications from the TRX are sent to the "Direct Connect" port.

Note: This command is for debugging purposes and should only be used by experienced users.

$GO0,,ECO,TRX[,ON|OFF]

$GOA,<Unit_Id>,ECO,TRX,ON|OFF

TRX (Echo)	Description
ON|OFF	Turns TRX Echo ON or OFF

Table 16, TRX (Echo) Command

Default: $GO0,,ECO,TRX,OFF

Example: **$GO0,,ECO,TRX,ON**

Returns: **$GOA,<Unit_Id>,ECO,TRX,ON**

While this command is on all TRX communications will be echoed to the "Direct Connect" port.

This command is reset to OFF whenever power is removed from the unit.

4.8 GPS
4.8.1 GPS (Configuration)

Specifies the GPS operational parameters.

$GO0,,GPS[,<Interval>][,<Force Logs>][,<Power Management>]

$GOA,<Unit_Id>,GPS,<Interval>,<Force Logs>,<Power Management>

GPS Command		Description
Interval		Number of seconds between commencing a GPS log
Force Logs	0	Positions only logged while moving
	1	Force positions to be logged
Power Management	0	GPS ON always
	1	GPS turns off between logs or when timeouts occur, see page 21 for information on timeouts
	2	GPS ON when movement sensed
	3	GPS turns off between logs but ignores timeouts if motion is detected

Table 17, GPS (Configuration) Command

Default: $GO0,,GPS,30,0,3

Example: **$GO0,,GPS,60,1,3**

Returns: **$GOA,<Unit_Id>,GPS,60,1,3**

Setting the GPS interval to zero, forces the GPS to be permanently off.

The GPS will also come on as required to perform real-time tracking.

*If Interval is set to zero (0), GPS is turned OFF and **will not** turn on when movement is sensed. Only experienced users should consider using this option.*

4.8.2 GPS (Reset)

Forces the GPS to reset and begin a sky search, whilst ignoring previous almanac, ephemeris and stored position data.

$GO0,,GPS,RST

$GOA,<Unit_Id>,GPS,RST

Example: **$GO0,,GPS,RST**

Returns: **$GOA,<Unit_Id>,GPS,RST**

Note: The GPS unit must be ON when command is sent to unit, see page 37.

4.8.3 GPS (Echo)

Implements a pass through mode where all communications from the GPS are passed back through the current connection.

Note: This command is for debugging purposes and should only be used by experienced users.

$GO0,,ECO,GPS[,ON|OFF]

$GOA,<Unit_Id>,ECO,GPS,ON|OFF

GPS (Echo)	Description
ON|OFF	Turns GPS Echo ON or OFF

Table 18, GPS (Echo) Command

Default: $GO0,,ECO,GPS,OFF

Example: **$GO0,,ECO,GPS,ON**

Returns: **$GOA,<Unit_Id>,ECO,GPS,ON**

While this command is on, all communications from the GPS will be echoed to the current connection.

This command is reset to OFF whenever power is removed from the unit.

4.8.4 GPS (Sats)

Returns the Satellite constellation and signal strengths currently seen by the GPS module.

$GO0,,SATS

$GOA,<Unit_Id>,SATS
,<Sv1ID>,<Sv1 Sig>,<Sv1 Elev>,<Sv1 Azimuth>
,<Sv2ID>,<Sv2 Sig>,<Sv2 Elev>,<Sv2 Azimuth>
…
,<SvNID>,<SvN Sig>,<SvN Elev>,<SvN Azimuth>

Default: Not Applicable

Example: **$GO0,,SATS**

Return: **$GOA,<Unit_ID>,SATS,2,5.00,18,128,5,**
9.20,49,353,6,8.20,46,213,10,12.40,52,122,30,8.80,6
5,288,21,0.00,-90,0,23,0.00,-90,0,24,0.00,-90,0

Note: The Signal strength ranges from 0 to 25, with the higher the number the better the signal strength. If the signal level is negative then that satellite is not yet locked in.

Both the Elevation and Azimuth are in degrees

Using this command within Geonautics' range of tracking programs will allow the user to see the constellation visually.

GPS Command		Description
Satellite N	SvN ID	Space Vehicle N ID
	SvN Sig	Space Vehicle N Signal Strength
	SvN Elev	Space Vehicle N Elevation
	SvN Azimuth	Space Vehicle N Azimuth

Table 19, SATS Command

Above table shows the responses that will be returned for each space vehicle, up to N space vehicles.

4.8.5 GPS (Health)

Returns the current "health" of the GPS module.

$GO0,,HEALTH

$GOA,<Unit_Id>,HEALTH,<nSVS>,<almanac>,<antenna>
,<backup>,<nav fware>,<dsp fware>,<date>,<time>

GPS Health Command	Description
nSVS	Number of Space Vehicles currently locked onto
almanac	Indicates whether the Almanac is complete, 0 No 1 Yes
antenna	Indicates whether the receiver is receiving RF, 0 No 1 Yes
backup	Indicates whether battery backup is present, 0 No 1 Yes
nav fware	Navigation firmware revision
dsp fware	DSP firmware revision
date	GPS date of the last calculated fix, ddmmyyyy
time	GPS time of the last calculated fix, hhmmss

Table 20, GPS Health Command

Default: Not Applicable

Example: **$GO0,,HEALTH**

Returns: **$GOA,<Unit_Id>,HEALTH,7,0,1,1,1.04,2.12, 27102004,052342**

4.9 Miscellaneous

4.9.1 Relay Triggering

Turn ON or OFF an internal short to power ground so that an externally wired relay can be triggered.

$GO0,,RLY[,ON|OFF|<time>]

***$GOA,<Unit_Id>,RLY*,ON|OFF**

Relay Triggering Command	Description
ON|OFF	Turns Relay Trigger ON or OFF
time	Turns ON the short to power ground for <time> tenths, then turns the short OFF.

Table 21, Relay Command

Default: $GO0,,RLY,OFF

Example: **$GO0,,RLY,50**

Returns: **$GOA,<Unit_Id>,RLY,OFF**

In the example shown the **TAG-T3** *would turn the trigger output, ON for 5 seconds, then turn the output OFF, resulting in the OFF message.*

Sending $GO0,,RLY queries the current state of the relay trigger
e.g. $GOA,<Unit_Id>,RLY,ON.

Note: This output can be used to fire an external relay (up to 250mA), see page 48.

4.9.2 Parameters

Returns the current operating parameters of the **TAG-T3**.

$GO0,,PAR

"Target Name" Logs:50000 NewLogs SerialNo.
Time
Trx=Interval,Period,PowerManagement
GPS=Interval,Force,PowerManagement
Current=Used:Size Voltage
Movement=Relay
Region1=Relay,Name
Firmware

Parameters		Description
Target Name		Identifies the vehicle
Logs		Total number of logged positions
New Logs		Logged positions that haven't been previously downloaded
Serial No.		Serial number of the unit
Time		Current local time of unit
Trx		TRX settings
GPS		GPS settings
Current	Used	Current consumed since last reset
	Size	Current figure set
	Voltage	Current Input Voltage on the unit
Movement	Relay	Turns Relay Trigger ON or OFF
Region1	Relay	Turns Relay Trigger ON or OFF
	Name	Name of Region
Firmware		Unit firmware version

Table 22, Parameters

Default: Not Applicable

Example: **$GO0,,PAR**

Returns:
FRED 500:50000 100 T3-099
11:47:11
Trx=1800,180,0
G=30,0,3
C=0.1:0.0 11.9v
R1=ON,ONE
T3.1.0.13

Alarms and Functions set to OFF are removed from the listing.

4.9.3 Debug (Live)

Turn on and off the debugging information.

$GO0,,DBG[,ON|OFF]

$GOA,<Unit_Id>,DBG,ON|OFF

When ON, the following debug information is output every second.

$GOM,<Unit_Id>,DBG,<ModulesStatus>,<LocalTime>,,<TRXTimer>
,<GPSTimer>,<BackdoorTimer>,<SpaceVehicles>,<Logs>,<Voltage>
,<Current>,<Temperature>,<MotionStatus>,<MotionTimer>

Debug String		Description
Module Status	-|B	if TRX is currently ON due to the backdoor interval, otherwise -
	-|T	if TRX is currently ON, otherwise -
	-|G	if GPS is currently ON, otherwise -
Local Time		Local Time of unit, represented as hh:mm:ss
TRX Timer		Counts down to zero when TRX ready to turn ON, otherwise up 'til the TRX has completed its interval
GPS Timer		Counts down to zero when GPS ready to turn ON, otherwise up 'til the GPS has completed its interval
Backdoor Timer		Up to 120 when backdoor ON, otherwise shows the time 'til midnight
Space Vehicles		Satellites used in the current GPS solution fix
Logs		Number of logged positions currently stored on device
Voltage		Input Voltage on device
Current		Current being used by device, expressed as mA
Temperature		Temperature of device in degrees C, low accuracy
Motion Status		Status of the motion sensing *S: Stationary* *s: Stationary but yet to complete final log* *M: Movement sensor* *T: External trigger* *v: Under voltage* *V: Over voltage*
Motion Timer		Counts down to the completion of the motion

Table 23, Debug String

Default: $GO0,,DBG,OFF

Example: **$GO0,,DBG,ON**

Returns: **$GOA,<Unit_Id>,DBG,ON**

Followed by a series of strings,

```
$GOM,T3e-003,DBG,--G,06:11:18,6522,1,64122,5,1054,12.4v,33,27,M,85
$GOM,T3e-003,DBG,--G,06:11:19,6521,0,64121,5,1054,12.4v,32,27,M,84
$GOM,T3e-003,DBG,--G,06:11:20,6520,0,64120,5,1054,12.5v,32,27,M,89
$GOM,T3e-003,DBG,--G,06:11:21,6519,30,64119,5,1055,12.5v,33,27,M,89
$GOM,T3e-003,DBG,--G,06:11:22,6518,29,64118,5,1055,12.5v,33,27,M,89
……
……
$GOM,T3e-003,DBG,--G,06:11:32,6508,19,64128,5,1055,12.5v,32,27,M,89
```

4.9.4 Debug (Last)

Displays the most recent debug information.

$GO0,,DBG

$GOM,<Unit_Id>,DBG,<ModulesStatus>,<LocalTime>,,<TRXTimer>
,<GPSTimer>,<BackdoorTimer>,<SpaceVehicles>,<Logs>,<Voltage>
,<Current>,<Temperature>,<MotionStatus>,<MotionTimer>

See Debug (Live) for parameter descriptions, page 43.

Default: Not Applicable

Example: **$GO0,,DBG**

Returns: **$GOM,T3e-003,DBG,--G,06:11:32,6508,19,64128,5,1055,12.5v,32,27,M,89**

4.9.5 Power (Query)

Queries how much power has been used by the **TAG-T3**.

$GO0,,POW

$GOA,<Unit_Id>,POW,<amps>:<amps available>

Power (Query) Command	Description
amps	Power measured in amps, remaining if <amps available> is non zero otherwise power used.
amps available	Power as set by the Power (Configuration) command, see page 24

Table 24, Power (Configuration) Command

Default: Not Applicable

Example: **$GO0,,POW**

Returns: **$GOA,<Unit_Id>,POW,0.348:1.000**

$GO0,,PAR also displays the power used/remaining, see page 42.

4.9.6 Shutdown

Shuts the **TAG-T3** down by disabling everything and placing the unit into sleep mode. The unit will wake up again at midnight and operate according to current parameter settings thereafter.

Note: This command makes the device unreachable until the next local midnight occurs. This command should only be used by experienced users.

$GO0,,SHT

$GOA,<Unit_Id>,SHT

Default: Not Applicable

Example: **$GO0,,SHT**

Returns: **$GOA,<Unit_Id>,SHT**

4.9.7 Shutdown (Reset)

If a unit is inadvertently sent the Shutdown command, 4.9.6, then the unit can be "reset" to operate again as per user settings.

Note: This command can only be sent via Direct Connect. This command should only be used by experienced users.

$GO0,,SHT,RST

$GOA,<Unit_Id>,SHT

Default: Not Applicable

Example: **$GO0,,SHT,RST**

Returns: **$GOA,<Unit_Id>,SHT,RST**

4.9.8 SuperReset

Resets all parameters to their factory default values and forces a restart of the system.

$GO0,,RST

$GOA,<Unit_Id>,RST
$GOM,<Unit_Id>,RST

Example: **$GO0,,RST**

Returns: **$GOA,<Unit_Id>,RST**

The reset command terminates any connections and turns off the TRX. After reset the TRX will be turned back on for the backdoor period of 120 seconds.

By default the TRX will be set to come on for three minutes every half hour and the GPS will revert to thirty second logging on movement with the GPS turned on when motion is detected (power management 3).

For default TRX (Configuration) see page 35.
For default GPS (Configuration) see page 37.

5. TROUBLESHOOTING AND FAQ

If you are having trouble connecting to your **TAG-T3** unit, some tips are below on how to re-establish contact.

- If the problem is occurring during RF Communications, ensure that the communications settings are correct, refer to the *TAG Comms* user guide for further information.

- When a device is not powered for long periods or moves a great distance while turned OFF, the GPS can take longer than normal to calculate its first new position. When trying to force the GPS into calculating a position, set the GPS power management to always ON (0), then give the unit a GPS, RST, ensuring the antenna can see sky. Having the unit stationary may help fast track this operation.

- Default TRX interval is ON for 3 mins each half hour, on the half hour, referenced to local time. When device is first powered, local time could be incorrect until the GPS can see the sky and update its internal clocks.

- Consult your *TAG Comms* user guide on updating drivers for DL1 Remote Downloader

- Contact your local Geonautics representative.

APPENDIX A EXTERNAL RELAY TRIGGERING

An internal short to power ground can be utilized, so that an external relay can be triggered to ENABLE / DISABLE 3rd party devices. The internal 6 Pin Datamate Connector, page 49, is used to connect the external relay to the **TAG-T3**. This output is protected internally by a 0.25A fuse. To trigger the external relay when connected, the command $GO0,,RLY (page 41), is used. Wiring examples can be found below.

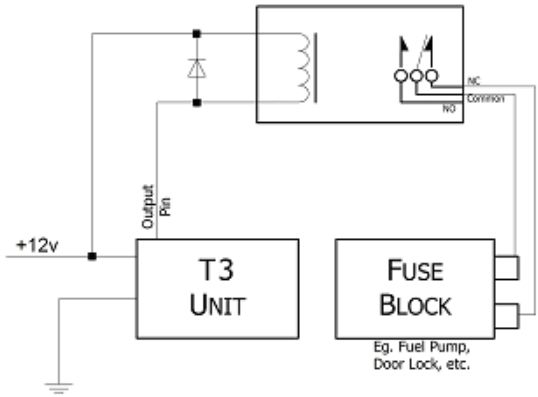


Figure 11, To DISABLE External Devices using the TAG-T3

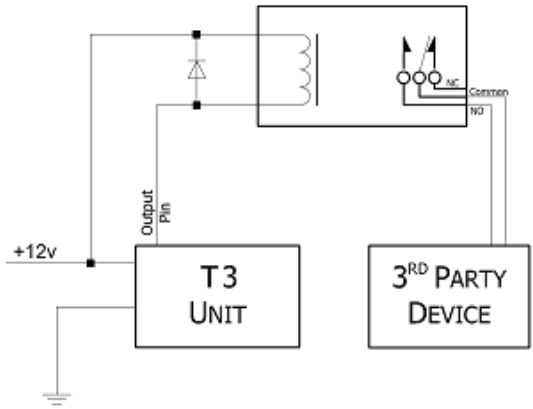


Figure 12, To ENABLE External Devices using the TAG-T3

A 6 pin connector is located, see Figure 10, under the top cover of the TAG-T3. This connector is used to connect to the USB Direct Connect cable or an external device to trigger.

6 Pin Data Connector	
Pin	**Connection**
1	GND
2	Sense
3	Data Out
4	Data In
5	I/O (External Trigger)
6	V+ (USB 5V)

Table 25, 6 Pin Data Connector

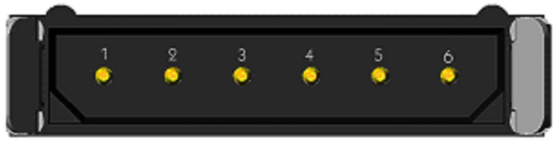


Figure 13, 6 Pin I/O Connector

APPENDIX B SPECIFICATIONS

B.1 TAG-T3 Specification

Property		Specification
Size	mm	120 mm x 40 mm x 24 mm
	inches	$4^{3/4}$" x $1^{1/2}$" x 15/16"
Weight		approx. 100g
Housing		ABS/PC, IP67
Storage Temperature	°C	-20 to 70
	°F	-5 to 160
Operating Temperature	°C	-20 to 55
	°F	-5 to 130
Operating Voltage		5 to 24v DC
Operating Current (typical)	GPS Only	30 mA
	TRX – RX Mode	10 mA
	TRX – TX Mode	15 mA
	Maximum	35 mA
Sleep Current		< 700 µA (typical)
GPS Engine		Trimble Lassen iQ
RF Frequency		916.5 or 868.35 MHz (Factory Set)
Logged Storage		50,000 Points

Table 26, TAG-T3 Specifications

B.2 TAG-T3 Kit

Property	Description
TAG-T3 Kit	TAG-T3 Tracker Core Remote Downloader External GPS Antenna 9V Battery Cover 9V Battery External Power connector with cover Magnetic Plate and Keeper USB "Direct Connect" Cable Software for downloading User Guide Plastic Case

Table 27, TAG-T3 Kit

APPENDIX C COMMAND REFERENCE

Command	Page	Description
System Configuration		
Vehicle (Identification)	20	$GO0,,VEH,<Target>,<Operation>
Clock	21	$GO0,,<hhmm>,<UTC Offset>,<First Sat>,<Fix>
Motion	22	$GO0,,SHK,<Sensitivity>,<Duration>
Voltage	23	$GO0,,VLT,<Low>,<High>
Power	24	$GO0,,POW,<Capacity>
Backdoor	24	$GO0,,BDR,<ON|OFF>
Positioning		
Position (Live Track)	25	$GO0,,POS,<ON|OFF>
Position (Last)	26	$GO0,,POS
Memory		
Memory (New)	27	$GO0,,MEM,NEW
Memory (All)	28	$GO0,,MEM,ALL
Memory (Delete)	28	$GO0,,MEM,DEL
Memory (Fix)	29	$GO0,,MEM,FIX,<Start Point>,<End Point>
Memory (Format)	30	$GO0,,MEM,FMT
Memory (Raw)	31	$GO0,,MEM,RAW
Alarms		
Movement	32	$GO0,,MOV[,<Relay ON|OFF>]
Regions (GeoFences)	33	$GO0,,RG1[,<North>][,<South>][,<East>][,<West>][,<Relay ON|OFF,][,<Name>]
Input Triggering	34	$GO0,,TRG[,<Motion ON|OFF>]
TRX		
TRX (Configuration)	35	$GO0,,TRX,<Interval>,<Period>,<Power Mgmt>
TRX (Echo)	36	$GO0,,ECO,TRX,<ON|OFF>
GPS		
GPS (Configuration)	37	$GO0,,GPS,<Interval>,<Force>,<Power Mgmt>
GPS (Reset)	38	$GO0,,GPS,RST
GPS (Echo)	38	$GO0,,ECO,GPS,<ON|OFF>
GPS (Sats)	39	$GO0,,SATS
GPS (Health)	40	$GO0,,HEALTH
Miscellaneous		
Relay Triggering	41	$GO0,,RLY[,ON|OFF|<time>]
Parameters	42	$GO0,,PAR
Debug (Live)	43	$GO0,,DBG,<ON|OFF>
Debug (Last)	44	$GO0,,DBG
Power (Query)	45	$GO0,,POW
Shutdown	45	$GO0,,SHT
Shutdown (Reset)	46	$GO0,,SHT,RST
Super Reset	46	$GO0,,RST

Table 28, Commands

APPENDIX D GEONAUTICS' PLAIN ENGLISH WARRANTY

We aren't lawyers but our lawyers thought it would be a good idea to explain how we stand behind our products. This is a simple explanation of how our warranty works.

What is covered by our Warranty?

All products manufactured by Geonautics are covered by a warranty.

What Items are not covered by Warranty?

Geonautics does not cover batteries and disposable accessories that are related to the products you bought. We do not cover microphones and equipment that are normally damaged in field use.

We do not cover acts of God or circumstances outside our control such as lightning strikes, accident or mistreatment damage; or

Independently warranted items that are bought through Geonautics but are not manufactured by Geonautics, such as the TTI RF range. If, for example you buy a receiver or a computer through us and it breaks down you will have to talk to the manufacturer.

How long is the Warranty good for?

Our warranty is the standard one year warranty from the date we shipped the goods from our office. Our solid state items such as A1, A2 and A3 digital recorders receive an additional warranty from us and are covered for a total of 3 years.

What do I have to do to claim my Warranty?

You will need to do the following:

Notify us within 14 days of becoming aware that there is a problem with your product;

Return the products to Geonautics or their representative in your area at your cost (we do not accept COD deliveries); and

Be patient while we check the equipment to make sure that the problem is a genuine problem and hasn't arisen because of any misuse, neglect, improper installation, storage, accident or other damage that really shouldn't be our problem.

How does our Warranty protect you?

Once we have satisfied ourselves that there is a problem with the product we will either repair it, replace it or issue you with a credit or refund for the products. Any replacement provided to you will continue to carry the remainder of your existing warranty. We try to use new parts wherever possible when making warranty repairs but sometimes it is not possible to source replacement parts for older products and a refurbished part may be used in repairing your product.

Lawyer Stuff

Our lawyers need us to put in another bit here with lots of legal jargon.

Geonautics does not provide any other express warranties for its products or imply further terms in its warranty which are not printed here. This includes warranties relating to the product being fit for any particular purpose or being of a certain merchantable quality.

Geonautics will not be liable for any damage caused by the failure of any product or associated software. In particular, neither Geonautics nor any associated company, distributor, re seller, agent or employee shall be liable to any party for any loss of profit or any other commercial damage including, but not limited to special, incidental, consequential, collateral or other damages arising from the provision of our products, associated software or accessories as a consequence of any cause or event whatsoever.

If any provision of this warranty or its application to any party, person or circumstances is invalid or unenforceable, for any reason then the remainder of this warranty shall not be effected because of it and shall remain.

This warranty extends only to the original purchaser or registered user. The warranty may be transferred to other users with the written approval of Geonautics.