

# USER MANUAL

for TracPlus 9601 –DGS-LP  
Revision 1  
19 January 2010



**TracPlus**<sup>™</sup>  
PREMIUM TRACKING SERVICE

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## INTRODUCTION

Thank you for purchasing a TracPlus Iridium GPS Tracking Kit (p/n 9601-KIT-LPo).

## SUPPORT RESOURCES

If you have any questions about your 9601-DGS-LP that are not answered by this document, please contact Customer Support at any time by the following means:

By Telephone:	United States of America	888 632 777
	New Zealand	0800 872275
	Rest of World	+64 3 477 8656

By Email: [support@tracplus.com](mailto:support@tracplus.com)

On the Web: [www.tracplus.com](http://www.tracplus.com)

## WARRANTY INFORMATION

TracPlus USA provides a standard one-year warranty on the contents of this kit. This standard warranty guarantees our equipment to be free of defects in material and workmanship from the date of purchase. If a component fails within the standard warranty period, TracPlus USA will fix or replace the unit at no charge to the customer.

## WARRANTY PROCEDURE






If TracPlus USA Technical Support deems the unit to have failed they will provide you with a Return Materials Authorization Number (RMA#).

You will then ship the failed component back to TracPlus USA using the RMA# provided by Technical Support. The cost of shipping the component back to TracPlus USA is your responsibility.

TracPlus USA will fix the component and ship it back to you, or send you a replacement unit if the unit is unable to be fixed. TracPlus USA will pay the cost to ship the fixed or replacement unit back to you.

## SAFETY INFORMATION

### **WARNING: FAILURE TO ADHERE TO THESE WARNINGS MAY RESULT IN INJURY OR PHYSICAL DAMAGE TO YOUR EQUIPMENT AND VOID YOUR WARRANTY.**

-  Do not disassemble the 9601-DGS-LP for repair or services. The warranty is voided if the 9601-DGS-LP is disassembled. If repair or services are required, please contact Customer Services.
-  Never feed supply voltage into the active GPS antenna. Always use the bias voltage supplied by the 9601-DGS-LP SMA antenna connector to power an active GPS antenna. Feeding voltage to the GPS antenna other than the provided bias voltage will damage the 9601-DGS-LP.
-  Do not submerge the 9601-DGS-LP in water, or expose to high humidity environments. The 9601-DGS-LP is not waterproof.
-  Do not subject the 9601-DGS-LP to excessive shock, or vibration. This can physically damage the unit.
-  If connecting the 9601-DGS-LP to external switches or sensors, such switches and sensors must be between signal ground and open circuit only. Do not apply any voltage to 9601-DGS-LP input pins at any time, either directly or via the Wire Harness Data (p/n 2982-2397-701-102).

## INSTALLATION GUIDELINES

### INSTALLATION GUIDELINES

Before installation, be sure to consider the suitability of the install location of the antenna. All GPS and Iridium devices require an unobstructed view of the sky, and can only reliably communicate with the necessary satellites if they are within in line of sight of the antenna.

Due to the nature of satellite data communications, position reports will occasionally be dropped due to factors other than the antenna location. However, if the rate of dropped reports is greater than 5%, it is likely that the installation position is less than optimal.

The antenna must be mounted level or as flat as possible.

Ensure the antenna has a clear line of sight to the sky; the 9601-DGS-LP cannot communicate reliably under cover, indoors or in other seriously obscured locations.

Tall structures can cast a shadow, or 'dead zone' in reporting. The 9601-DGS-LP may fail to communicate if operated next to a large building or other structure.

Other radio transmitters (GPS equipment, communications equipment, aerials, etc) may interfere with the transmission of messages from and to the NAL device.

Please ensure all equipment is securely and appropriately mounted with the antenna at least 30cm from any person.

### CONNECTION TO AIRCRAFT POWER

The 9601-DGS-LP should be installed in such a way as to ensure that it is powered whenever the Aircraft Master Switch is on. A 2A circuit breaker should be used between the main bus and the DC Voltage Converter (p/n SYN-DC-936-UK)



To ensure correct and intended operation, do not connect via the Avionics Master Switch.

A separate switch may also be installed so that tracking can be disabled when the Aircraft Master Switch is turned on for prolonged periods of time, but tracking is not considered desirable. This can include extended periods of ground based avionics or engine testing.



To ensure correct and intended operation, the COI switch on the 9601-DGS-LP must be switched permanently in the ON position ('I'). The TNE switch on the 9601-DGS-LP must be switched permanently in the NORMAL position ('N') as shown in Figure 1.

## INSTALLATION GUIDELINES (CONTINUED)

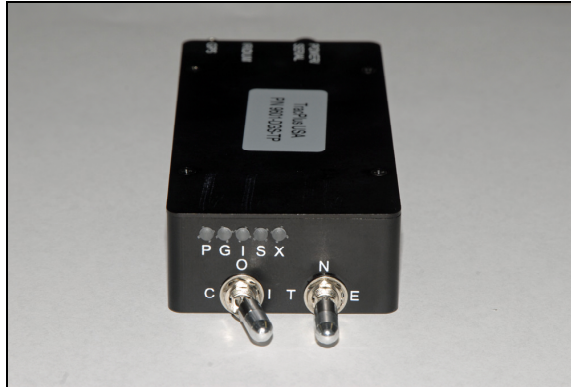


Figure 1: Correct and permanent positions of the COI and TNE switches in a permanent aircraft installation.

### SENSORS AND SWITCHES

The 9601-DGS-LP can be connected to sensors to detect and transmit engine start, takeoff, landing and engine stop events. These are used to automatically create Flight and Engine Time reports based on aircraft activity. For more information, contact Customer Support.

The 9601-DGS-LP can also be connected to a pilot activated distress switch in the cockpit. When activated, the 9601-DGS-LP will send out distress messages at regular intervals, which are then forwarded to your nominated cell phones and pagers. For more information, contact Customer Support.

If the 9601-DGS-LP is not connected to a remote distress switch, the TNE switch on the device will transmit distress messages when moved to the 'E' position.



The 9601-DGS-LP will continuously broadcast distress messages while in distress mode. Forwarding each distress message to all cell phones and pagers attracts a per message surcharge.

### ENGINE RUN AND AIRBORNE SENSORS

The 9601-DGS-LP has two discrete inputs, for engine run and airborne status, respectively. These are connected to airframe appropriate sensors, which should switch between Signal Ground and open circuit.

Activation of either sensor will cause the relevant input line to change state, in turn causing the relevant event message (engine start, engine stop, takeoff or landing) to be transmitted.



Both input lines must be held at the intended state at all times. Mechanical switches or relay outputs should be selected and installed in such a way as to prevent unwanted changes of state being detected (e.g. debounced).

If an event message is being transmitted when a change of state occurs, the change of state will not be acted on until the first message transmission is complete.

## INSTALLATION GUIDELINES (CONTINUED)

If the 9601-DGS-LP fails to send an event message, it will reattempt to send the message as soon as possible. In this instance, the timestamp of the message (and the time used in Flight and Engine Time Reporting) will show the time the message was sent.

### ENGINE RUN SENSOR INPUT LINE

The Engine Run input line is pin 6 on the DB15 IO connector of the Wire Harness Data (p/n 2982-2397-701-102).

Open circuit the input line when the engine is running. Close to Signal Ground when engine is not running.



While oil pressure switches can be used as engine run sensors, the responsibility for the correct choice of an engine run sensor appropriate to the application, airframe, regulatory and operational requirements of the aircraft operator must remain with the installer.

### AIRBORNE SENSOR INPUT LINE

The Airborne input line is pin 7 on the DB15 IO connector of the Wire Harness Data (p/n 2982-2397-701-102).

Open circuit the input line when the aircraft is on the ground. Close to Signal Ground when the aircraft is airborne.



While strain gauge switches can be used as airborne sensors, the responsibility for the correct choice of an airborne sensor appropriate to the application, airframe, regulatory and operational requirements of the aircraft operator must remain with the installer.

### DISTRESS SWITCH INPUT LINE

The Distress Switch input line is pin 8 on the DB15 IO connector of the Wire Harness Data (p/n 2982-2397-701-102).

Close to Signal Ground to activate distress mode, otherwise leave open circuit.



While a standard dipole switch can be used as a distress switch, the responsibility for the correct choice of a switch appropriate to the application, airframe, regulatory and operational requirements of the aircraft operator must remain with the installer.

### PRODUCT SPECIFICATIONS

Please refer to Appendix A on page 11.

### WIRING DIAGRAM

Please refer to Appendix B on page 14.

## OPERATION AND TESTING

### TURNING ON AND OFF

If the 9601-DGS-LP has been installed in accordance with instructions, the 9601-DGS-LP will be powered on and off with the Aircraft Masters.

At power on, the 9601-DGS-LP will attempt to first establish a GPS fix and then transmit regular standard position reports. Under nominal operating conditions, it can take up to 40 seconds to obtain a GPS fix.



The 9601-DGS-LP will attempt to transmit standard position reports whenever powered, regardless of the state of the airborne or engine run sensors.

At power off, the 9601-DGS-LP will no longer transmit any reports.



Transmission of a report may take up to ten seconds under normal operating conditions. To avoid unintentional loss of data, wait for at least ten seconds after discrete events (e.g. engine shutdown) before turning off Aircraft Masters.

### STATUS INDICATOR LEDS

The NAL 9601-DGS-LP has five status indicators LEDs to provide a quick visual check to ensure proper operation as well as a way to optimize antenna locations during installation. Non power LEDs may turn off between reports to conserve power.

LABEL	NAME	COLOR	STATE	MEANING
P	Power	Red	On	9601-DGS-LP is powered ON.
			Off	9601-DGS-LP is powered OFF.
G	GPS Fix	Green	On	Valid GPS 3D fix.
			Blink	2D fix or Dead Reckoning.
			Off	No GPS fix.
I	Iridium	Green	On	Message is being transmitted or Iridium signal strength is between 40-100%.
			Blink	Iridium signal strength is between 10-40%.
			Off	Iridium signal strength is less than 10%.
S	Status	Green	On	Last message had valid GPS fix and was sent successfully to Iridium.
			Blink	Last message was not sent successfully, or last message sent did not have a valid GPS fix and at least one previous message was sent successfully since startup.
			Off	No message has been sent.
X	Unused	Unused	Off	Not used.

Table 1: Status Indicator LEDs and their Meanings.

## OPERATION AND TESTING (CONTINUED)

### TURNING ON AND OFF IN PORTABLE FORM

To power on and operate the NAL 9601 with its internal battery, connect the battery pack power cable like so:



Line up the connectors and press towards the device. A faint series of clicks should be heard.

### TESTING THE 9601-DGS-LP

While all devices are tested prior to shipping, it is recommended the device is checked immediately after installation and before being used operationally.

Move the aircraft to a position where the antenna has a clear and uninterrupted view of the sky.

Power on the Aircraft Master and inspect the Power (P), GPS (G), Iridium (I) and Status (S) indicator LEDs. Under normal operating conditions, the P should light immediately, followed by the G, I and S indicator LEDs within 1-2 minutes.

If these four LEDs take longer than 2 minutes to illuminate or do not remain illuminated, the antenna may be in a poor satellite coverage reception area. Operating environments such as a valley or in the shadow of tall buildings can cause a loss of signal strength and affect operation. Move the antenna to a less obscured location, or provide it with a less obstructed view of the sky.

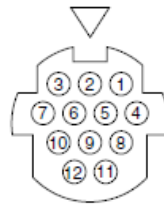


As the Iridium satellite network uses a “tumbling” constellation of polar orbit satellites, the degree of coverage in a particular location can vary from minute to minute as different satellites move in and out of range.

**APPENDIX A:  
EQUIPMENT  
SPECIFICATIONS**

**IRIDIUM GPS TERMINAL (p/n 9601-DGS-LP)**

Dimensions : (metric)	112 mm x 53 mm x 25.4 mm
(imperial)	4.40" x 2.10" x 1.00"
Weight: (metric)	180 grams
(imperial)	0.40 pound
Input Voltage:	2.7VDC to 5.5VDC
Avg. Current (Report):	90mA @ 5.0VDC Input
Avg. Current (Sleep):	20µA @ 5.0VDC Input
I/O Interface:	12-Pin Hirose Circular Connector
Antenna Interface:	SMA Female
Software Interface:	AT Commands through Serial
Operating Temp:	-30°C to +60°C (-22°F to +140°F)
Operating Humidity:	< 75% RH
Iridium Frequency:	1616 to 1626.5 MHz
GPS Frequency:	1575.42 MHz (L1 carrier)



**HR30-7P-12SC(71)**

Figure A1: Pinout Configuration on 12 Pin Hirose Circular Connector.



The pinouts shown below apply to the female 12 pin Hirose Circular Connector on the 9601-DGS-LP, not to the male 12 pin Hirose Circular Connector on the Wire Harness Data (p/n 2982-2397-701-102)

PIN #	SIGNAL	DESCRIPTION	INTERFACE
1	EXT_PWR	External power input (+2.7VDC to +5.5VDC)	DC Power (+)
2	EXT_GND	External power input (GND)	DC Power (GND)
3	Tx	RS232 Tx	RS232 Data
4	Rx	RS232 Rx	RS232 Data
5	Signal_GND	Signal Ground, 0V signal reference and return	RS232 GND
6	EMERGENCY	Operates under Emergency mode when pulled to GND	DC Power
7	RS232	External RS232 level input or battery charger input	RS232 Level
8	TTL	External TTL/CMOS level input	0 - 5V TTL
9	TTL	External TTL/CMOS level input	0 - 5V TTL
10	RS232	RS232 level output	RS232 Level
11	TTL	TTL/CMOS level output	0 - 5V TTL
12	TTL	TTL/CMOS level output	0 - 5V TTL

Table A1: Pinouts for 12 Pin Hirose Circular Connector on 9601-DGS-LP.

**APPENDIX A:  
EQUIPMENT  
SPECIFICATIONS  
(CONTINUED)**

**DC VOLTAGE POWER CONVERTER (p/n SYN-DC-936-LP)**

Dimensions : (metric)	80 mm x 60 mm x 21 mm
(imperial)	3.13" x 2.37" x 0.84"
Weight: (metric)	145 grams
(imperial)	0.32 pound
Input Voltage:	9.0VDC to 36.0VDC
Output Voltage:	5.0VDC, 3.0A Max.
Connector Interface:	6-Pin Hirose DB-9 Serial
Operating Temperature:	-30°C to +60°C (-22°F to +140°F)
Operating Humidity:	< 75% RH

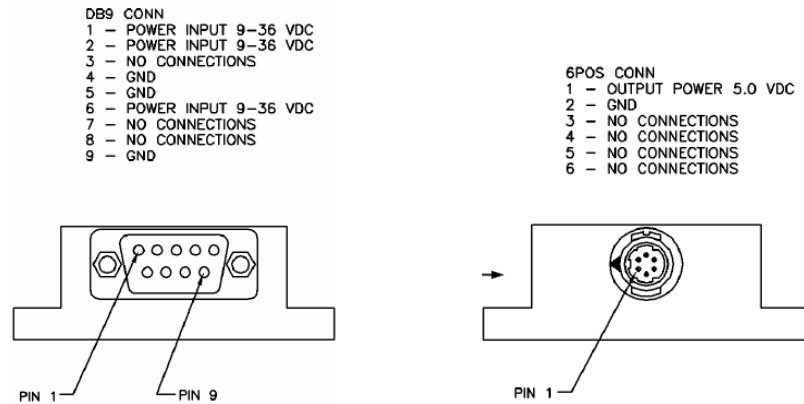


Figure A2: Pinout Configuration on SYN-DC-936-LP.

**APPENDIX A:  
EQUIPMENT  
SPECIFICATIONS  
(CONTINUED)**

**WIRE HARNESS DATA (p/n 2982-2397-701-102)**

Connector Interfaces:                   6-Pin Hirose (to DC Voltage Converter)  
                                                   12-Pin Hirose (to Iridium GPS Terminal)  
                                                   DB-9 Serial PC Interface (optional)  
                                                   DB-15 I/O Sensor Interface (optional)

PIN	SIGNAL/DESCRIPTION
1	Output Power 5.0 VDC
2	GND
3	Not connected
4	Not connected
5	Not connected
6	Not connected

Table A2: Pinout Configuration for 6-pin Hirose DC Voltage Converter Interface

PIN	SIGNAL/DESCRIPTION
1	EXT_PWR
2	EXT_GND
3	RS232 TX
4	RS232 RX
5	Signal Ground
6	EMERGENCY
7	RS232 Level discrete input
8	TTL/CMOS discrete input
9	TTL/CMOS discrete input
10	RS232 Level discrete input
11	TTL/CMOS level
12	TTL/CMOS level

Table A3: Pinout Configuration for 12-pin Hirose Iridium GPS Terminal Interface

PIN	SIGNAL/DESCRIPTION
2	Serial Rx Data
3	Serial Tx Data
5	Serial Ground

Table A4: Pinout Configuration for DB9 Serial PC Interface

PIN	SIGNAL/DESCRIPTION
1	TracWatch switch input
2	Serial Rx Data
3	Serial Tx Data
4	Not connected
5	Signal Ground
6	Engine Run sensor input
7	Airborne sensor input
8	Emergency switch input
9	+5V

Table A5: Pinout Configuration for DB15 I/O Sensor Interface

**APPENDIX B  
WIRING DIAGRAM**

