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9602-LP Quick Start Guide

Version A

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11100 Endeavor Ct., Suite 300
Manassas, Virginia 20109 USA
Phone: 703-392-1136
Email: contact@nalresearch.com

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REVISION HISTORY

Revision	Date	Description
1.4.5	05/30/2014	Initial version
1.5	07/30/2021	Updated to new template
A	04/20/2022	Formal release

REFERENCE DOCUMENTS

The latest revisions of the NAL documents are available from the NAL Research website at https://www.nalresearch.com/support/documentation-downloads/.

Reference	**Title**	**Revision/Date**
[1]	9602-LP User Guide	Version A, 03/28/2022
[2]	SatTerm User Guide (supports v8.9.7)	Version A, 03/28/2022
[3]	AT Commands for 9602-LP	Version A, 03/31/2022

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ACRONYM LIST

AC .....alternating current

AT .....Two-letter sequence starting a string of terminal commands. The AT is intended to get the terminal's attention prior to executing a command.

dB .....decibel

DC.....direct current

DoD .....Department of Defense

EMSS .....Enhanced Mobile Satellite Services

GPS .....Global Positioning System

kbps.....kilobits per second

LED .....light-emitting diode

SatTerm.....satellite terminal emulator software

SBD .....short burst data

SIM .....subscriber identification module

1 INTRODUCTION

The 9602-LP is a pocket-size, low-cost, satellite tracker designed to operate with the Iridium low-Earth orbit satellite network (see **Figure 1**).

Note: For immediate information on how to configure the 9602-LP device, refer to section **4.**

Figure 1: 9602-LP Mountable Tracker

The 9602-LP comprises an Iridium 9602 transceiver module; a built-in, 50-channel Global Positioning System (GPS) receiver; and low-power microcontrollers. The 9602-LP allows only Short Burst Data (SBD) connectivity to the Iridium satellite network. It does not support voice, circuit switched data, or Short Message Service (SMS). It can transmit messages in NAL Research's defined formats compatible with models 9601-DGS and 9601-DGS-LP. The 9602-LP can also transmit in PECOS Message Structure (PMS). The 9602-LP supports 256-bit AES encryption algorithm. NAL Research can enable the 9602-LP to utilize the Department of Defense (DoD) Enhanced Mobile Satellite Services (EMSS) gateway when requested by an authorized user. When a Data Terminal Equipment (DTE) is connected to the 9602-LP with SatTerm software installed (or any terminal emulator software), the DTE can be used to set up the operating parameters of the 9602-LP via a serial connection. A DTE can be a desktop computer, a laptop computer, or a tablet.

2 DEVICE DESCRIPTION

2.1 MULTI-INTERFACE CONNECTOR

The multi-interface connector on model 9602-LP is a standard male 15-pin miniature D-Sub type (DB-15) connector, as shown in **Figure 1**.

Figure 2: Multi-Interface Connector

The connector comprises four interfaces with the pin assignments shown in **Table 1**. These interfaces include:

- External DC power input
- 3-wire RS232 serial data interface
- TTL/CMOS I/Os
- Reserved RS232 serial data interface

Table 1: Pin Assignments for the 9602-LP Multi-Interface Connector

Pin #	Signal	Description	Interface
1	EXT_PWR	External power input (+3.6 VDC to +5.3 VDC)	DC Power (+)
2	EXT_GND	External power input (GND)	DC Power (GND)
3	Tx1	RS232 Input	RS232 Data

Table 1: Pin Assignments for the 9602-LP Multi-Interface Connector

Pin #	Signal	Description	Interface
4	Rx1	RS232 Output	RS232 Data
5	Signal_GND	Signal Ground, 0 V signal reference and return	RS232 GND
6	EMERGENCY	External TTL/CMOS Input S0	0–5 V TTL
7	TTL	TTL/CMOS Output 0	0–5 V TTL
8	TTL	TTL/CMOS Output 1	0–5 V TTL
9	EXT_PWR	External power input (+6.0 VDC to +32.0 VDC)	DC Power (+)
10	Rx2	Reserved	RS232 Data
11	Tx2	Reserved	RS232 Data
12	TEST	External TTL/CMOS Input S1	0–5 V TTL
13	TTL	External TTL/CMOS Input S3	0–5 V TTL
14	TTL	External TTL/CMOS Input S2	0–5 V TTL
15	TTL	TTL/CMOS Output 2	0–5 V TTL

Model HRC-24-12 is a data/power cable assembly (see **Figure 3**) designed to work with the 9602-LP tracker. The HRC-24-12 has a three-foot RS-232 cable for connection onto a computer and three wires for DC power inputs to a 9602-LP. Model HRC-24-12 is available on the NAL website (www.nalresearch.com).

Figure 3: Model HRC-24-12 Data/Power Cable Assembly

2.2 EMERGENCY BUTTON

Under the default configuration, you can trigger Emergency Tracking at any time with a quick press and release of the Emergency button (momentary switch). See **Figure 4**. Once enabled, holding the Emergency button longer than three seconds takes the 9602-LP out of Emergency Tracking. When Emergency Tracking is active, the Emergency LED illuminates. Refer to section **2.3** for information on LEDs status.

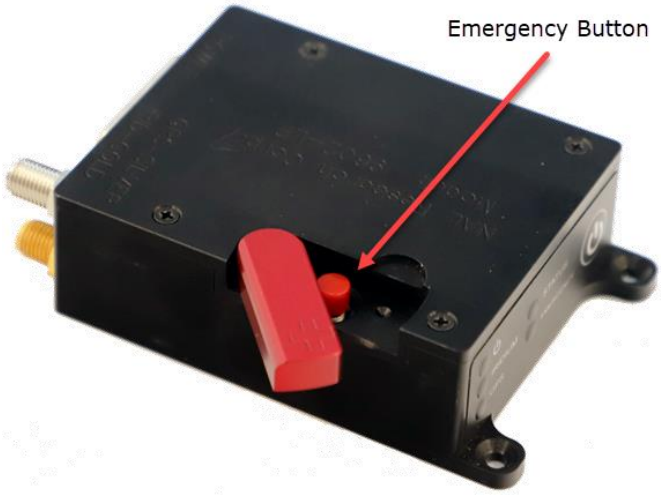

Figure 4: Emergency Button

2.3 LED SETTINGS

The 9602-LP has five status LEDs. These include Power indicator, Iridium signal strength, GPS availability, SBD transmission status, and Emergency mode alert (see **Figure 5**).

Figure 5: LED Status

They provide a quick visual check to ensure proper operations. These LEDs provide the following information during Normal Tracking mode shown in **Table 2**:

Table 2: Description of LED States

Label	Name	LED Off	LED Blinking	LED Solid
⏻	Power	Device is off	N/A	Device is on
IRIDIUM	Iridium	Off or has no signal	Has 1–2 bars of signal	Has 3–5 bars of signal
GPS[1]	GPS	GPS off or time only	2-D fix or dead reckoning	3-D fix
STATUS	Message Status	No SBD transmission with a valid GPS fix was sent to the gateway	Last SBD transmission was not successfully sent or did not have a valid GPS fix, but one was sent since the unit was turned on	Last SBD transmission had a valid GPS fix and successfully received it by the gateway
EMERGENCY	Emergency	Emergency mode not activated	N/A	Emergency button is pressed or the S0 Input is activated

[1] Watch closely for the LED because it can briefly stay on.

The 9602-LP is shipped with all LEDs set to ACTIVE. The LEDs can be disabled to reduce power consumption.

3 ANTENNAS

3.1 IRIDIUM ANTENNA CONNECTOR

The 9602-LP uses a single SMA female 50-ohm antenna connector for both transmission and reception of the Iridium signal, as shown in **Figure 6**. NAL Research offers several types of antennas for use with the 9602-LP. For low-cost and applications where small form-factor and light weight are required, NAL Research highly recommends model SYN7391-C, as shown in **Figure 7**.

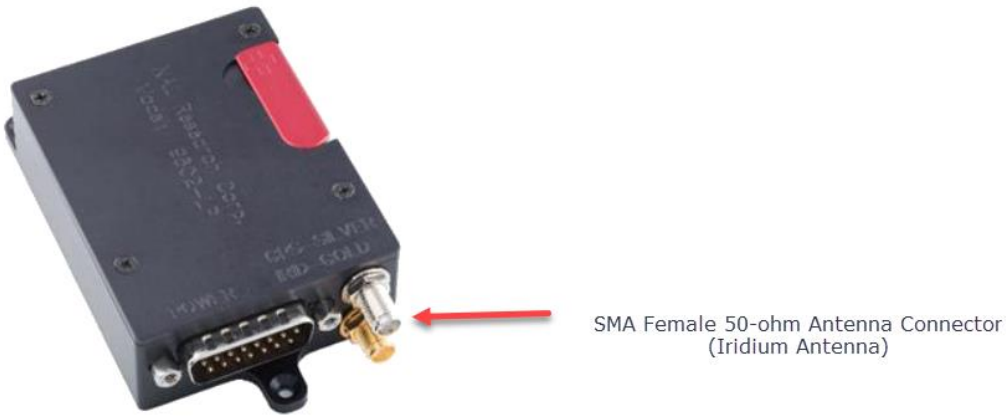

Figure 6: SMA Female 50-ohm Antenna Connector (Iridium)

Figure 7: Model SYN7391-C Antenna

3.2 GPS ANTENNA CONNECTOR

The 9602-LP tracker uses a SubMiniature Version A (SMA) female connector for the GPS antenna, as shown in **Figure 8**. For low-cost and applications where small form-factor and light-weight are required, NAL Research highly recommends model SAF7352-IG, as shown in **Figure 9**.

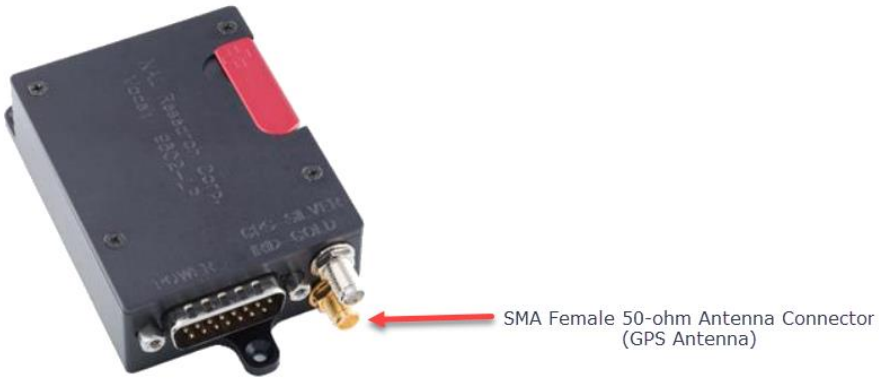

Figure 8: SMA Female 50-ohm Antenna Connector (GPS)

Figure 9: Model SAF7352-IG Antenna

IMPORTANT: DO NOT CONNECT OR DISCONNECT THE GPS ANTENNA WHEN THE 9602-LP IS TURNED ON.

4 CONFIGURING THE 9602-LP

The 9602-LP supports a 3-wire serial data interface to a computer, allowing the computer running SatTerm software (or any terminal emulator software) to configure its operating profile using NAL Research's defined AT commands. These AT commands can be found in the manual "AT Commands for 9602-LP" [3]. The 9602-LP does not support auto-baud, and the default baud is factory-set at 19.2 kbps but can be changed to other bauds with the +IPR command.

Required hardware and software for the configuration of the 9602-LP include:

- A desktop or laptop computer (not provided).
- A 3-wire RS232 cable (not provided).
- A DC power source (not provided).
- SatTerm software or any terminal emulator software (SatTerm is available on the NAL Research web site).

To configure and initialize the 9602-LP:

1. . Connect the power/RS232 cable to the computer and to the 9602-LP.
2. Install the SatTerm software to computer. See the NAL document "SatTerm User Guide" [2] for details.
3. Apply the appropriate DC power to the 9602-LP.
   The 9602-LP defaults to power on when DC power is first applied. It is not necessary to push the ON/OFF button. An NAL Research message appears along with the firmware version to indicate proper serial communications and power input.
4. Use the SatTerm software (or any terminal emulator) installed on the computer to set the 9602-LP's operating parameters.
5. With the unit turned off, connect an Iridium antenna and a GPS antenna to the 9602-LP antenna ports.
6. Ensure the antennas have a full view of the sky and the cable loss between the tracker and antenna is less than 2 dB.

7. Supply appropriate DC power to the 9602-LP.

   The 9602-LP defaults to “Tracking” mode, and begins tracking.

IMPORTANT: EMSS-enabled 9602-LP must first be provisioned (signed up for airtime) with EMSS SBD service before testing or field use. Accessing the DoD EMSS Gateway is not authorized until the 9602-LP is provisioned. Unauthorized attempts to access the DoD EMSS Gateway will result in immediate disabling of the offending device, which must then be returned to NAL Research for repair. See https://sbd.pac.disa.mil for more information regarding EMSS service provisioning.

IMPORTANT: For detailed information on how to configure the 9602-LP device, refer to the 9602-LP User Guide **[1]**.

5 TECHNICAL SUPPORT

For technical support, please contact us at:

Phone: 703-392-1136, x203

Fax: 703-392-6795

Email: support@nalresearch.com

Technical documents are also available to download on NAL Research's website www.nalresearch.com in the Support > Documentation & Downloads section.