

# ROBOTIC SYSTEMS

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## L2 RINEX LOGGING SYSTEM

Model: RS-L2LOGGER-V1

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# Technical Specifications

<b>MODEL DETAILS</b>	Model Number	Standard Unit; RS-L2LOGGER-V1 Full System Kit; RS-L2LOGGER-V1-KIT
	Version	1.0
<b>GNSS</b>	Supported Signals	GPS L1 C/A, GPS L2 CL, GPS L2 CM, Galileo E1 C, Galileo E1 B, Galileo E5 bl, Galileo E5 bQ, BeiDou B1I D1, BeiDou B1I D2, BeiDou B2I D1, BeiDou B2I D2, QZSS L1C/A QZSS L2 CM, QZSS L2 CL, GLONASS L1 OF, GLONASS L2 OF
	Positioning Modes	Survey-In: Converge on antenna location to configured accuracy Fixed Position: Start from stored or user input antenna location
	Position Acquisition Times	Fixed Position: ~30s Survey-In: Dependent on satellite coverage and user set accuracy (e.g. ~5min with 1m accuracy and 20 satellites)
	Log Output	GNSS Data Log (*.gdl)
<b>RINEX</b>	Converter Software	GNSS Logger Interface (Windows XP, Vista, 7, 8, 8.1, 10)
	RINEX Version	3.02
	RINEX Output	Observation (*.**o)
	Data Storage	Removable Full-size SD Card (included)
<b>POWER</b>	Input	7-16V (1.25W) Reverse Polarity Protected
	Antenna Power	3.3V, 100ma Output
<b>PHYSICAL</b>	Size	16.5 x 12.5 x 9cm
	Weight	440g
	Ingress Protection	IP67

# Overview

## Introduction

The L2 RINEX Logger from Robotic Systems is a robust and simplified approach to logging localised GNSS corrections for use in Post Processed Kinematic (PPK) systems. Tracking L1/L2 GPS/Galileo/BeiDou/QZSS/GLONASS satellite constellations, the L2 RINEX Logger can calculate its own location over time with the press of a single button or have it entered manually for an instantaneous 3D Fix.

Colour-coded LEDs display the logger status from a distance with data being stored on an easy to access full size SD card. All contained within an IP67 housing for complete dust and water protection.

Use the included, single-step conversion software to translate the L2 RINEX Logger's \*.GDL file to a RINEX observation file, ready to upload to any compatible PPK system.

Available in two variants. See product codes and contents below.

## Features

- L1/L2 GPS, L1/L2 Galileo, L1/L2 BeiDou, L1/L2 QZSS & L1/L2 GLONASS logging
- Survey-In or start from stored location
- Low power consumption
- Complete water and dust protection
- Easy to use conversion software

## What's Included

Your package should include the following items:

### ***RS-L2LOGGER-V1:***

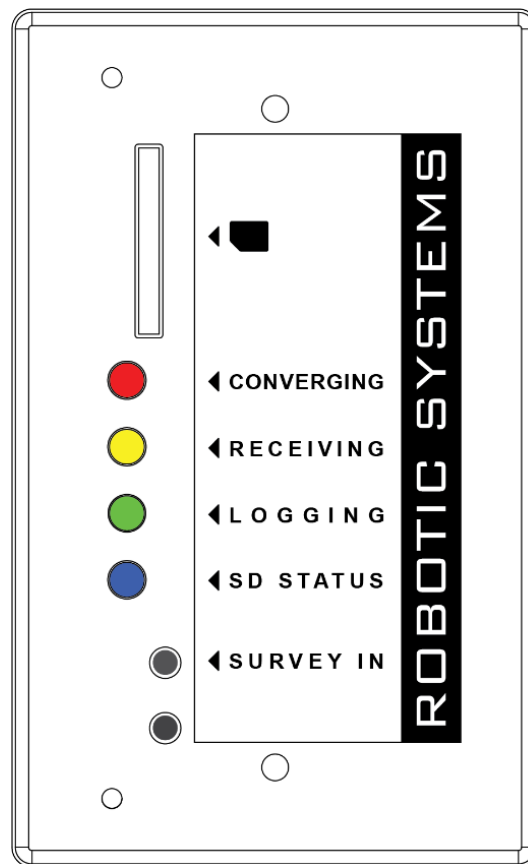
- L2 RINEX Logger Unit
- SanDisc Ultra 16GB SD card
- Universal plug pack power supply with compatible plug (AU, EU, UK, US compatible)

### ***RS-L2LOGGER-V1-KIT:***

- L2 RINEX Logger Unit
- 1GB SD card
- Universal plug pack power supply with compatible plug (AU, EU, UK, US compatible)
- Un-terminated power cable with compatible plug
- Survey-grade tripod
- Tribrach levelling/plumb adjustment system
- High performance L1/L2 active antenna

# Hardware Description

## Front Panel



### **SD Card Slot**

The RS-L2LOGGER-V1 supports both SD and SDHC cards formatted with either FAT16 or FAT32 file systems. MicroSD variants supported via an SD to microSD adapter.

### **Converging LED (Red)**

Indicates system Survey-In status.

- Flashing indicates the Survey-In process is being undertaken.
- Off indicates Survey-In process has not been initiated or has been completed.

### **Receiving LED (Yellow)**

Flashing indicates data is being received from GPS receiver.

### **Logging LED (Green)**

Indicates file writing status.

- Flashing indicates waiting for 20 seconds of continuous successful FIXED BASE STATION position mode operation.
- Solid-on indicates satellite data is being logged.

**SD Status LED (Blue).**

Indicates presence and Write-Protect status of SD card.

- Solid-on indicates SD card is detected and SD card Write-Protect is off.
- Double-flash indicates system is waiting for SD card or Write-Protect is on.

**Survey-In Button**

The Survey-In button is used to initiate the “Survey-In” process using the parameters stored in the config file on the SD card.

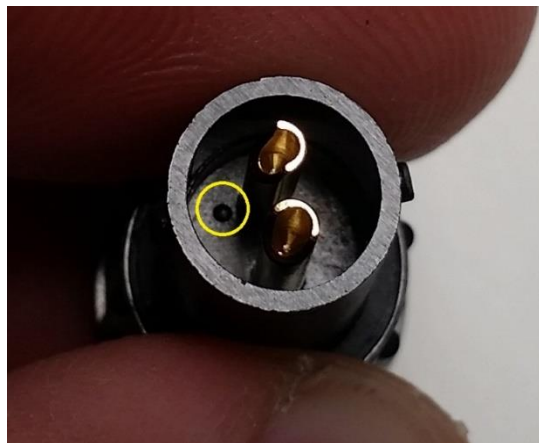
**Button 2**

This button is not currently used and is reserved for future expansion.

**Power Connection**

The RS-L2LOGGER-V1 requires a power supply between 7 and 16VDC at 1.25W typical. The power input is reverse-polarity, over-current and over-voltage protected. If the over-voltage or over-current protection activates, it may take a brief period for the PTC protection device to cool and return to a normal state. If the protection is tripped, power the RS-L2LOGGER-V1 down and power it up again after 1-2 minutes.

The IP67 rated panel mount power connector is manufactured by Conxall, model number 17282-2PG-300. Suitable mating connectors are model numbers 16282-2SG-311, 16282-2SG-315 and 16282-2SG-318. If terminating an additional power cable, note the positive pin is marked with a dot as shown below.

**Antenna Connection**

The antenna connection is via an IP67 rated standard polarity SMA female connector to mate with the widest range of active antennas which typically come pre-terminated with standard polarity SMA male connectors. Power is also supplied to the active antenna via this connector.

# Modes of Operation

The RS-L2LOGGER-V1 is designed to be operated in two different scenarios:

## Operation from a Surveyed Point

When operating from a known point such as a State Survey Marker (SSM) or similar surveyed point, the position can be entered in Earth Centred Earth Fixed (ECEF) format, **in centimetres**, in the config file on the SD card. Alternatively, a position found during a previous “Survey-In” procedure and saved to the config file can be used. This is the default mode of operation and will start automatically on power up unless the user presses the “Survey-In” button as detailed below. This mode is typically used when recording more than one log file from the same location or for fixed base station installations.

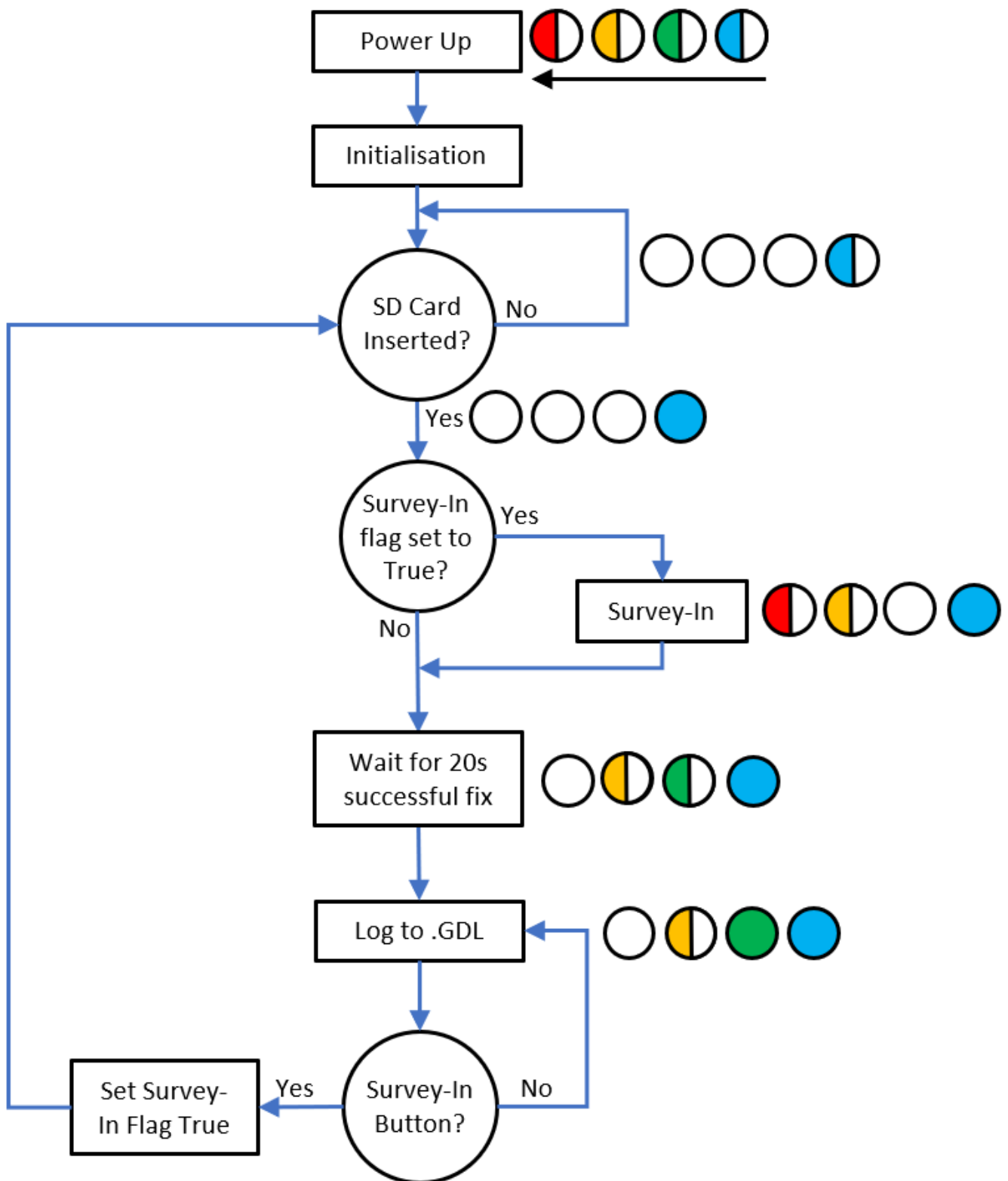
## Operation from an Unknown Point

When operating from an unknown point, the system can be set to “Survey-In” or converge its position to an accuracy specified in the config file. This point is stored in the config file on the SD card for future use. **Any previously save position will be overwritten.** This is the typical mode of operation when the system is used as a mobile base station.



## State Diagram

The State Diagram shows the different operational states of the RS-L2LOGGER-V1. It also shows the expected LED indicator states for clarity.



## **Power-Up and Initialisation**

Power-Up and Initialisation are the initial states for the RS-L2LOGGER-V1 where the software starts and configures the hardware. It is only very brief and should not concern the user.

## **Survey-In**

If the user initiates the “Survey-In” procedure by pressing the Survey-In button the RS-L2LOGGER-V1 will commence the Survey-In process. The RS-L2LOGGER-V1 will take subsequent measurements of position until the accuracy specified by the user in the config file has been met **and** the minimum observation time of 60 seconds has elapsed.

Increased accuracy requires a longer convergence time. Some levels of accuracy may not be attainable dependant on the availability of satellites, antenna performance and local RF conditions among other factors. If this is the case, the survey in process will not complete even after many hours. The best course of action in this case is to reduce the accuracy requirement (by increasing the value in the config file) and try again.

After this process is completed, the point found during “Survey-In” is written over any existing point specified in the config file on the SD card, allowing it to be used in future surveys as a known point as detailed above. Only a single point is held at any one time in the config file.

## **Logging**

On starting logging, the RS-L2LOGGER-V1 creates a new log file with the name format X.GDL where X starts at 0 and increments with each new log file created. The RS-L2LOGGER-V1 records GPS satellite data on the SD card in a proprietary format (\*.GDL) which can be converted to RINEX (e.g. \*.19O) using the supplied software. This RINEX file can be used to improve accuracies in Post Processed Kinematic (PPK) systems.

## **Completion of Logging**

On completion of logging, the RS-L2LOGGER-V1 can be powered down or the SD card can be removed. There is no requirement to stop logging prior to power down or SD card removal.

# Electrical Description

Input/Output signal directions are given with respect to the RS-L2LOGGER-V1 unit.

## Power Connection

Pin	Description	Cable Colour
1	Vin 7-16V 1.25W	Red
2	0V	Black

## RF Connection

Pin	Description
Pin	RF Input/Antenna Power Output 3.3V 100mA
Shield	RF Ground

# Desktop RINEX Conversion Software

The RS-L2LOGGER-V1 package includes Windows software to convert the native logger \*.GDL file into RINEX 3.02 format. To begin conversion, browse to the file location and select the \*.GDL file. Click the start button and the .YYO file will be saved in with the same output file name and location, where YY is the last two digits of the year. The output RINEX file is ready to upload to a PPK system.

## Antenna Selection

The conversion software allows the user to select an antenna from a dropdown box that will be populated in the RINEX file. In the case that your antenna is not within the list the method to add it, is as follows:

1. Navigate to the folder "C:\ProgramData\GNSS LOGGER INTERFACE"
2. Open the file "antenna types.txt"
3. Add a line containing the antenna type. The line must be 20 characters long. The last 4 characters are for the antenna radome. For example:

```
example:          3S-02-TSADM  NONE
character numbers: 1           20
```

4. Save the file and open the conversion software.
5. The antenna you added will be in the dropdown box.

# Configuration File

The configuration file has five fields that are required:

- The first field specifies the accuracy to Survey-In to **in centimetres**. The number specified must be strictly non-negative, numeric, integer and greater than or equal to 10.
- The second field specifies the X ECEF coordinate **in centimetres**. This value can be positive or negative decimal numbers, but the field must be strictly numeric.
- The third field specifies the Y ECEF coordinate **in centimetres**. The format requirements are as for the X ECEF coordinate above.
- The fourth field specifies the Z ECEF coordinate **in centimetres**. The format requirements are as for the X ECEF coordinate above.
- The last field is a logic flag to force logging independent of GPS Fix and start-up timer. Value is strictly either a 0 (false) or a 1 (true).

Configuration files can be generated manually in a text editor such as notepad however the format of the config file is extremely specific, and it must be correct for the system to correctly interpret the file. The only allowed file name is CONFIG.TXT.

Example CONFIG.TXT

```
100,-472186907,254014209,-344279343,0
```

If the RS-L2LOGGER-V1 cannot locate a CONFIG.TXT file on the SD card, it will create one with the following contents:

```
100,0,0,0,0
```

# Troubleshooting

Symptom	Possible Cause	Check
No LEDs on	No power	Check power supply voltage is between 7 and 16VDC and supply can deliver 180mA to 80mA respectively
Blue SD Card Light is blinking	No SD Card inserted	Insert SD card
	SD card write-protect is on	Eject SD card and confirm write-protect switch is off before re-inserting
	SD card format is not compatible	Confirm SD card is formatted with either FAT16 or FAT32 file systems.
	SD card capacity too large	Ensure SD card capacity is 32GB or below. SD or SDHC cards are suitable
Survey-In does not complete	Antenna unplugged	Confirm antenna is plugged in
	Antenna cable/connectors damaged	Confirm coaxial cable and connectors are clean, dry and in good condition. Check cable for crushing or abrasion
	Poor RF environment	Confirm antenna has a clear, unobstructed view of the sky. Avoid positioning antenna near RF sources, buildings or trees
	Survey-In accuracy is set too high	<b>Decrease</b> the Approximate Position Accuracy by <b>increasing</b> the acceptable position error in the config file on the SD card. As a rough guide, accuracies of better than 1m will typically take 2 minutes to converge. Exact convergence time will depend on the number of satellites available and local RF conditions
	Antenna used is passive	Confirm antenna is active ie it contains an RF amplifier and RF filter
	Active Antenna is not compatible with power supply	Confirm active antenna is compatible with 3.3V 100mA power provided by system

# **Resources**

## **Company Details**

Robotic Systems Pty Ltd

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## **Support Process**

Technical support can be obtained by emailing

[support@roboticsystems.com.au](mailto:support@roboticsystems.com.au)

You will receive a reply email with a support ticket tracking number and Robotic Systems engineers will respond to your support request.

## **Downloads**

Supporting documents and software associated with the RS-L2LOGGER-V1 can be found by navigating to the Robotic Systems website and navigating to the RS-L2LOGGER-V1 product page.

<https://www.roboticsystems.com.au>

Browse our growing range of specialised GPS products here:

<https://www.roboticsystems.com.au>