

UM Receiver BLE External Logger API

Underground Magnetics (UM) Locating Receivers are equipped with BLE 5.1 radios to facilitate communication with various devices. The Receiver BLE connection is configured for a peripheral role, meaning the remote device is required to initiate the connection. A GATT server is configured as a serial connection with write and notify characteristics. This document describes how to interface with a UM Receiver and the data available from the receiver.

1 Connecting to the Receiver

1.1 Turn on the Bluetooth radio in the receiver's settings

1.2 Scan for BLE devices to find the receiver's Bluetooth Device Name.

The name format differs by brand.

The name format is DEVICE_SERIAL where DEVICE is the device name and SERIAL is the receiver serial number. The serial number can be found in the receiver's System Info screen.

For Leica branded receivers the device name is DT100 as of receiver software v1.15

For all other receivers the device name is UMRX

1.3 Connect to the receiver using it's MAC address

1.4 Connect to ACL/GATT. Bonding is not required.

1.5 Accept the request for MTU size of 247

1.6 Discover services and characteristics

The base UUID for the Serial port service is 554d0000-261f-677e-a6f1-54c57aa996d4. For the rest of this document, UUIDs will be abbreviated to the first 8 characters. The remaining characters of the UUID will match the base.

Device Information Service (0x180A)

Manufacturer, Model number, and Serial number are available

Serial port service: UUID 554d0000

Notification: UUID 554d0001 – Receive data

Write no response: UUID 554d0002 – Transmit data

1.7 Enable notifications on 554d0001

2 Communication

Send data to the Receiver by writing to 554d0002

Receive data as notification on 554d0001

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3 Data Format

All data is formatted as comma delimited ASCII text strings. When sent over BLE as a notification, the packets are sent and received as a byte array. For example, the string “hello” will be sent as “68656C6C6F”. This will have to be converted back to ASCII when received.

4 Logger Commands

Once connected, the following commands are supported:

Command	Description	Response
\$UMPBDL,1	Enable push-button data logging	OK or ERROR
\$UMPBDL,0	Disable push-button data logging	OK or ERROR
>> TEST STUFF <<		
\$UMTDL,<logPeriod>	Enable Timed data logging Argument: logPeriod = log period x 100mS logPeriod = 0 to disable timed logging Legal values: 0, 10 - 100	OK or ERROR
\$UMDLRA,1	Require Acknowledge to flash Log icon confirming receipt of data. Recommended for Pushbutton logging	OK or ERROR
\$UMDLACK	Acknowledge receipt of log data	OK or ERROR

5 Info String

The first time a command to start logging is received (\$UMPBDL,1 or \$UMTDL,t where t != 0), the receiver will respond with a comma delimited info string. Following is the info string format:

Parameter	Format
Manufacturer	String
Model Name	String
Serial Number	9 digits
Bootloader Version	String
Software Version	String
Manufacture Date	MM/DD/YYYY
Calibration Date	MM/DD/YYYY

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Hour Count	Decimal hours
UMDL Schema	integer
Response	"OK"

6 Data Logger Packet Format

The Data Logger output is a comma delimited ASCII text string (sent as a byte array).

The following tables describe the parameters:

UMDL Schema 1:

Index	Parameter	Type	Description
1	Mode	enum	0 Single 1 Twin 2 Null 3 Sweep 4 Twin Sweep 5 Omni 6 Twin Omni
2	Frequency	integer	Frequency in Hz
3	Freq type	enum	0 Active 1 LD Active 2 Power 3 Grouped Power 4 Cathodic 5 Sonde 6 Radio 7 Fault Find
4	Signal	integer	0 - 99
5	Gain	integer	0 - 145dB
6	Depth	string	Imperial X' Y' Metric X.Yym No Depth "- - -"
7	Current	string	0 - 999mA
8	Compass Angle	integer	Degrees (bearing) Range is 0 to 180* since direction cannot be

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			determined
9	Guidance Arrows	integer	-300 to 300 Neg = arrows point left
10	LD Phase	enum	Not implemented, always 0
11	Clipping	bool	0 No Clipping 1 Clipping
12	Depth & Current Setting	enum	0 ON 1 AUTO
13	LR Arrow Style	enum	0 OFF 1 Style 1 2 Style 2
14	Audio Volume	integer	0 - 3
15	Audio Modulation	enum	0 AM 1 FM
16	Audio Sound	enum	0 Smooth 1 Rough
17	Battery Voltage	float	2 decimal places
18	Battery Type	enum	0 Not measured 1 Alkaline 2 Alkaline + error 3 Lithium
19	Backlight	enum	0 Low 1 Medium 2 High
20	Utility	enum	0 None 1 Gas 2 Power 3 Communications 4 Water 5 Sewer 6 Fiber 7 Other
21	Menu in use	bool	0 Not in use 1 In use

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UMDL Schema 2:

Index	Parameter	Type	Description
0	Log Type	enum	0 Pushbutton Log 1 Time-based Log
1	Mode	enum	0 Single 1 Twin 2 Null 3 Sweep 4 Twin Sweep 5 Omni 6 Twin Omni
2	Frequency	integer	Frequency in Hz
3	Freq type	enum	0 Active 1 LD Active 2 Power 3 Grouped Power 4 Cathodic 5 Sonde 6 Radio 7 Fault Find
4	Signal	integer	0 - 99
5	Gain	integer	0 - 145dB
6	Depth	string	Imperial X' Y' Metric X.Yym No Depth "- - -"
7	Current	string	0 - 999mA
8	Compass Angle	integer	Degrees (bearing) Range is 0 to 180* since direction cannot be determined
9	Guidance Arrows	integer	-300 to 300 Neg = arrows point left
10	LD Phase	enum	Not implemented, always 0
11	Clipping	bool	0 No Clipping 1 Clipping
12	Depth & Current Setting	enum	0 ON 1 AUTO
13	LR Arrow Style	enum	0 OFF 1 Style 1 2 Style 2
14	Audio Volume	integer	0 - 3
15	Audio Modulation	enum	0 AM 1 FM

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16	Audio Sound	enum	0 Smooth 1 Rough
17	Battery Voltage	float	2 decimal places
18	Battery Type	enum	0 Not measured 1 Alkaline 2 Alkaline + error 3 Lithium
19	Backlight	enum	0 Low 1 Medium 2 High
20	Utility	enum	0 None 1 Gas 2 Power 3 Communications 4 Water 5 Sewer 6 Fiber 7 Other
21	Menu in use	bool	0 Not in use 1 In use

Change Log

V1.1

- Added DE100 device name for Leica branded receivers

V1.2

- Updated Leica device name prefix to DT100
- Added clarification for compass angle. Range is 0 to 180*. Since direction cannot be determined. It may be more intuitive to add 180* to any angle > 90*. That would make the range 0 to 90 and 270 to 359.
- Added Omni and Twin Omni antennas – Use only in Sonde frequencies

V1.3

- Added support for flashing receiver log icon log acknowledge
- Added support for Time-based data logging
- Added Log Schema 2
 - Index 0 is Log Type