DFRobot
SEN0366 Laser Rangefinder

User's Manual

DFRobot Community Property

This document contains material that is supplied by DFRobot and its user community. This information is intended for general public use.

INITIAL RELEASE

This work has been perfected enough to warrant its initial release. A few issues remain to be resolved, and a new release would occur. The DFRobot community members are invited to submit corrections or additional information.

Version 1.02

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1 Introduction

1.1 Purpose of this document

This document serves as a User's Manual for the SEN0366 Laser Rangefinder, which is a product of DFRobot. This material is intended to guide the technical user during the design of application hardware and software components related to using this device.

1.2 Purpose of the SEN0366 Laser Rangefinder

The Infrared Laser Distance Sensor, SKU SEN0366, measures the distance between the device and most any object in the range of up to 50 to 80 meters. The distance limit is determined by the current precision setting of the instrument, ambient conditions, and reflectivity characteristics of the designated target object. This instrument connects with the user's equipment via a TTL/CMOS level serial connection that is suitable for a UART/USART operating at 9600 baud.

This product has proven to be reliable and accurate. It performs extremely well in its role.

1.3 Document Authority

This document was compiled from publicly available online documentation and information derived through experimentation. Existing documentation is not thorough or exhaustive, leaving the user with extensive guesswork and experimentation in order to make full use of this device. This document is an effort to ease the technical discovery burden of potential and existing users. The instrument is a worthy addition to the toolset available to hobbyists and engineers alike. Good documentation should help with widespread use of this device.

Given the point or origin, this document does not have any authority on its own. Empirical discoveries and source document guesswork is never as good as information provided directly from the engineers who created the device. The author hopes that this initial effort will be favorably regarded at DFRobot, enough that the engineering staff will open up to providing concrete answers to unresolved technical questions.

The user community is invited to help in the collection of this device's functional characteristics. An email address for submitting edits, suggestions, corrections, and new additions with be provided in the near future.

The author has worked in the embedded community since 1972. He authored a number of monitor/control systems, where it was often necessary to implement custom communications protocols. Numerous sensors and controls were designed by the author, each with connectivity requirements. It was necessary to fully document those works since they were utilized by large companies and government entities. The younger generations do not seem to be required to learn documentation skills. Maybe I can have some positive affect in that regard.

1.4 External References

Several external documents affect the conduct of this project or the compilation of this document. The following material provides references to substantiative material:

1.4.1 DFRobot Website Documentation

There is a substantial amount of material regarding the SEN0366 device on the seller's website. Rather than reproduce all of that here, links are provided so that readers may access that information directly. The

reason this new document exists, however, is because the available documentation is not technically complete in the vein of industry grade datasheets or documentation.

https://www.dfrobot.com/product-2108.html

https://wiki.dfrobot.com/Infrared_Laser_Distance_Sensor_50m_80m_SKU_SEN0366

https://dfimg.dfrobot.com/nobody/wiki/068db268ba37a41067c1b17607932139.pdf

1.4.2 Useful Reference Material

A number of computer related topics must be mastered in order have a complete understanding of the information in the current document. The following links have been provided to benefit the novice reader:

https://www.geeksforgeeks.org/binary-number-system/

https://www.geeksforgeeks.org/hexadecimal-number-system/

https://www.geeksforgeeks.org/what-is-ascii-a-complete-guide-to-generating-ascii-code/

1.5 Document Status

This document is in a preliminary condition. It is currently undergoing proof-reading and editing. Community comments, suggestions, corrections, and additional information are strongly solicited.

There are a few missing details that need to be resolved by the engineering staff at DFRobot. That information will be incorporated when it becomes available.

The communications protocol will be the only topic initially described in this manual.

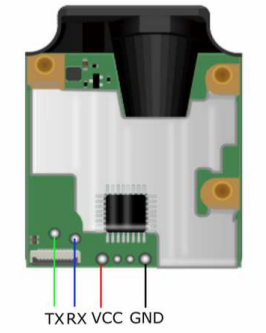
2 Introduction to the SEN0366 Communications Protocol

The SEN0366 Laser Rangefinder is a remarkably good instrument. It should enjoy extensive use throughout the user community. This device integrates with user equipment through the use of a TTL/CMOS level UART/USART serial connection. The communications protocol is a collection of rules and procedures which govern the format, content, and sequence of messages that are exchanged between the instrument and the user's system. Users must either master this protocol or obtain some externally written functional library in order to make use of this instrument.

This chapter establishes an initial understanding of the physical connection and message content. The external documents cover this material; however, some salient facts are omitted or blurred.

2.1 UART/USART Electrical Connection

The following connectivity issues augment the seller's information:



1. The units are delivered with different wire colors than shown on the WIKI pages. Use the pictorial that shows the wires connected to the rangefinder's circuit board in order to verify/determine proper connections.
2. The rangefinder's TX wire connects to your UART's RX pin. Of course, the rangefinder's RX wire must connect to your TX pin.
3. Even though the communications facility is based upon multi-drop, or multi-point connectivity, fan out specifications were not provided. This specification must be supplied so that users know how many rangefinders can be connected in a single circuit.

4. Multiple rangefinder devices can be controlled and read over a single serial connection. The wires of each device are connected to the same point on the user's system, in parallel. There are electrical rules which govern this sort of connection; however, these are not provided in the supplier's documentation. Keep the length of connection "Tees" to a minimum, and use an oscilloscope to determine if termination resistors should be used to eliminate reflections in the signal.
5. The rangefinder draws 113 mA at 5V when the laser is not active. Current rises to about 130 mA while the laser is on.

2.2 Message Components

Messages to and from the laser rangefinder each consist of a series of bytes. Of course, UART/USARTs generally work with binary bytes; however, novice users tend to think only in terms of ASCII character content. It is necessary for the user to understand that these messages consist of binary 8-bit bytes that are strictly numeric in nature. Well, in the case of messages which transport distance measurements, those messages include ASCII strings of numeric characters as message components. Since message content is a sequence of arbitrary binary values, it is useful to represent them in documentation or variable initializations using the two character hexadecimal format. Please consult the external references for those foundational topics.

Material that follows later in this text will describe the form and structure of the messages exchanged between the laser rangefinder and the applications computer. The contents of some bytes within messages are situational, known only when the immediate needs of the message are known. Such bytes appear in descriptive text as a <*symbol*>. The value associated with each *symbol* is explained in the detailed descriptions of individual commands. The following symbols will be used in those descriptions:

- **< > - A symbolic representation of a byte**. The space between the "<" and the ">" contain an abbreviation or name of the message field. Fields are shown in the sequence in which they appear in a message. Regardless of the field name, the contents of a field are always an 8-bit byte.
- **Two digit hexadecimal value.** These two digits represent the actual binary numeric value of the byte.
- **<ADDR> - Device address.** This byte selects the particular rangefinder device that is to be the recipient of the message. Each device in a parallel wiring plan must be assigned a unique address. Perhaps an address must be in the range of 0x01 through 0xF9. Address 0xFA is a broadcast address to which all connected devices respond.
- **<GRP> - Command group.** This byte immediately follows the device address. It seems to designate a command class, or category.
- **<CMD> - Command function.** This byte follows the <GRP> byte. It designates the function or operation to be performed by the rangefinder.
- **<CS> - Message checksum.** This byte terminates the message and provides a means to validate the entire message. Assuming that SUM is the numeric sum of all of the preceding bytes in the message, CS = ~SUM + 1. (~ being the binary inversion operator)
- **<ERR> - Error indication.** This byte seems to provide indication of a specific error condition discovered while attempting to perform a command.
- **<ADJ> - Distance Adjustment.** This byte applies an adjustment to the measurement value. This adjustment ranges from 0 to 255.
- **<INT> - Sample Interval**. This byte is used to set the sample rate of a rangefinder for when it is operated in continuous mode. It specifies a time interval in seconds.

- **<POS> - Select Zero Reference.** This byte is used to select either the front or rear face of the physical device to serve as the reference for the measurement.
- **<RNG> - Maximum range.** Specifies the maximum range of the device, in meters.
- **<FRQ> - Frequency**. This byte is included in the "Set Frequency" command without explanation. No observable operational change has been observed when changed.
- **<RES> - Measurement Resolution.** This byte specifies the resolution setting for measurements. Resolution is either 1.0 or 0.1 millimeters.
- **<AUTO> - Measurements upon power-up**. The byte specifies whether or not measurements are started automatically when power is applied to the device.
- **<onOFF> - Laser State.** This byte specifies if the laser should be turned ON or OFF.
- **{x|y|z} – Select one.** Only one of the items enclosed within the braces is included in the message.

2.3 Command Messages

The rangefinder is made to do things by sending it a short stream of binary 8-bit values in a specific sequence. There are two general forms of commands:

<ADDR> <GRP> <CMD> <CS>

This byte sequence carries no user specified content, and can actually be encoded is user software as a fixed array of bytes. Several of these are specified in DFRobot documents with the <ADDR> byte set to 0xFA, the broadcast address. All commands can be used with a specific <ADDR> designation; however, this isn't always useful.

<ADDR> <GRP> <CMD> <user option> <CS>

This command format includes a byte that specifies a user-defined option. Messages of this type are used to change settings within the rangefinder device. The actual numeric value of this byte depends on the specific command being send and the setting to be enforced. Issues with the <ADDR> field are the same as those previously raised.

2.4 Reply Messages

With the exception of the "Single Measurement" command, all commands respond to the control host with a reply message which provides execution status and sometimes data. There are two general formats for reply messages and additional formats for supplying distance readings. The two general reply formats are briefly described here while the data carriers are described in the chapter for message descriptions.

<ADDR> <GRP> (<CMD> | 0x80) <CS>

A message in this form acknowledges the command message it just received. It is almost an echo of the original command; however, 0x80 is OR'd into the original <CMD> byte. Of course, the <CS> is also computed specific to the reply. It remains a four byte message. Some commands break this pattern.

Replies to messages bearing a <user option> field are usually in this format since the data field is not included in the reply.

A specific example of such a message for consideration is a "Control Laser On/Off" command directed to device 0x82:

Hex: 82 06 05 01 72
Bin: 10000010 00000110 00000101 00000001 01110010

The reply to this message showing success would be:

Hex: 82 86 85 01 F3
Bin: 10000010 1000110 10000101 00000001 11110011

<ADDR> [<GRP> | 0x80] (<CMD> | 0x80) <ERR> <CS>

A message in this form acknowledges the receipt of a command; however, it also signals that the command was rejected due to some error related to the command. Both the <GRP> and <CMD> bytes are OR'd with 0x80 when returned in this reply. It is a five byte message.

NOTE: *There are irregularities between commands. The command bytes are not always OR'd with 0x80 and sometimes a different <CMD> byte is returned.*

2.5 Ambiguities of <ADDR> and 0xFA Broadcast

Several commands in DFRobot documentation are shown with the broadcast address 0xFA in the <ADDR> field. All commands will respond to a specific address.

Broadcast messages should not respond to the host processor lest numerous simultaneous replies become electrically mixed on a parallel circuit. All such reply messages will be lost and TX hardware will physically suffer from the collision. Replies are indeed made to broadcast commands. Refrain from sending a broadcast message to which a reply is returned when operating multiple rangefinders on a single circuit.

3 Detailed Message Descriptions

This chapter contains detailed descriptions of each command/reply message pair. These descriptions may yet require revision as times passes.

The bytes in each message are shown either as a <symbol> or as a two character hexadecimal number. Each byte is separated in the manuscript by a single space. That space is NOT included in the binary message. Each message is the indicated sequence of bytes with no other formatting or padding in the actual message.

When textual information is included in a reply, be advised that those bytes are included without special handling. There is no intrinsic difference between an ASCII byte and any other byte, other than international agreement regarding the printable glyph associated with its numeric value.

3.1 Read Parameter

This command may be issued in order to retrieve mostly unspecified values from a rangefinder. Effort will be expended to discover and publish the nature and format of the information contained in the reply.

CMD: <ADDR> 06 01 <CS> DFRobot Sample: FA 06 01 FF

REPLY: FA 06 81 <ADDR> xx xx <CS>
The device's assigned address is provided as shown. Each 'xx' field is one byte of the information provided in the reply. The meaning of those two bytes is unknown.

ERROR: No error is detected.

NOTES:
1. A specific address can be used with this command.
2. The broadcast address always appears in the reply, regardless of command message content.
3. Do not use the broadcast address when multiple rangefinders are wired into a single circuit.

3.2 Read Machine Number

This command provides the serial number of the rangefinder device. According to online documentation, the value in the reply message is a 16 byte ASCII string. Such is not the case.

CMD: <ADDR> 06 04 <CS> DFRobot Sample: FA 06 04 FC

REPLY: FA 06 84 xx <CS>
The 'xx' characters above each represent one byte of information supplied by the reply. In spite of DFRobot documentation, this reply contains only one byte. The meaning of this byte is unknown.

ERROR: No error is detected.

NOTES:
1. A specific address can be used with this command.
2. The broadcast address always appears in the reply, regardless of command message content.
3. Do not use the broadcast address when multiple rangefinders are wired into a single circuit.
4. The reply content is significantly different than described in available documentation. This may be an issue with the firmware version of the tested device.

3.3 Set Address

Use this command to set the individual address of a rangefinder. The value delivered by this command becomes the <ADDR> byte of subsequent commands directed to that specific device. Be sure that only one rangefinder is connected to the host when the command is issued with the broadcast address. It is cumbersome to have all of the connected devices respond to commands intended for a single unit.

CMD: <ADDR> 04 01 <newADDR> <CS> DFRobot Sample: FA 04 01 ADDR CS
Set <newADDR> to the desired address for the selected device.

REPLY: FA 04 81 81
The command succeeded by assigning <newADDR> to the device.

ERROR: FA 84 81 02 FF
The 02 byte is probably an error code meaning "invalid address". The range of a valid address is unspecified; however, all tested values were accepted.

NOTES:
1. A specific address can be used with this command.
2. The broadcast address always appears in the reply, regardless of command message content.
3. Do not use the broadcast address when multiple rangefinders are wired into a single circuit.

3.4 Revise Distance

This command is used to set an adjustment that is subsequently applied to the distance measurement. Each use of this command replaces the previous value. The adjustment is added or subtracted from the instrument's actual reading whenever the distance is reported. The numeric value of the adjustment is in the currently selected precision.

CMD: <ADDR> 04 06 {+|-} <ADJ> <CS> DFRobot Sample: FA 04 06 {2B|2D} XX <CS>

Use byte 0x2B ('+') or 0x2D ('-') in this command to indicate adjustment polarity. The valid numeric range and magnitude of the <ADJ> is 0 to 255 as is fitting for a single byte.

REPLY: FA 04 8B 77
This reply breaks pattern. Other replies would make one expect the reply to be FA 04 86 7C.

ERROR: FA 84 8B 01 F6
This reply breaks pattern. Other replies make one expect FA 84 86 01 FB; however, such is not the case.

NOTES:
1. A specific address can be used with this command.
2. The broadcast address always appears in the reply, regardless of command message content.
3. Do not use the broadcast address when multiple rangefinders are wired into a single circuit.

3.5 Set Data Return Interval

This command sets the time interval between continuous readings, in seconds.

CMD: <ADDR> 04 05 <INT> <CS>
The <INT> byte specifies the time interval, in seconds, between successive readings while the unit is in continuous mode. All values of this byte appear to be acceptable in the range 0 to 255. Set the interval to zero in order to take measurements at the maximum rate, where the interval is about 235ms.

REPLY: FA 04 85 7D

ERROR: FA 84 85 01 FC

NOTES:
1. A specific address can be used with this command.
2. The broadcast address always appears in the reply, regardless of command message content.
3. Do not use the broadcast address when multiple rangefinders are wired into a single circuit.

3.6 Select Measurement Starting Point

The physical position on the rangefinder that is used as the starting "zero" reference can be either the face of the device where the laser beam exits or the face on the opposite side. Use this command to select the desired reference point.

CMD: <ADDR> 04 08 <POS> <CS>
When the <POS> byte is 01 the zero point is to the front (top), 00 sets the rear (tail). Front/top and rear/tail may not be properly interpreted.

REPLY: FA 04 88 7A

ERROR: FA 84 88 01 F9
An error is reported if the <POS> value is not either 00 or 01.

NOTES:
1. A specific address can be used with this command.
2. The broadcast address always appears in the reply, regardless of command message content.
3. Do not use the broadcast address when multiple rangefinders are wired into a single circuit.

3.7 Set Measurement Range

Use this command to set the maximum measurement range, in meters. The advantages for doing this are not described in the external references. Efforts will be made to discover why this feature might be used.

CMD: <ADDR> 04 09 <RNG> <CS>
The range byte must contain 5, 10, 30, 50, or 80. It specifies the maximum range of the device, in meters.

REPLY: FA 04 89 79

ERROR: FA 84 89 01 F8

NOTES:
1. A specific address can be used with this command.
2. The broadcast address always appears in the reply, regardless of command message content.
3. Do not use the broadcast address when multiple rangefinders are wired into a single circuit.

3.8 Set Frequency

This command sets the frequency of something. This command does not affect the sample rate as does the command described in 3.5, above. The author observed no change in behavior as a result of using this command.

CMD: <ADDR> 04 0A <FRQ> <CS>
Valid settings for <FRQ> seem to be 0, 5, 10, and 20 decimal. (00, 05, 0A, and 14) No explanation of these values has been provided.

REPLY: FA 04 8A 78

ERROR: FA 84 8A 01 F7
This indicates that the specified <FRQ> was not one of the listed values.

NOTES:
1. A specific address can be used with this command.
2. The broadcast address always appears in the reply, regardless of command message content.
3. Do not use the broadcast address when multiple rangefinders are wired into a single circuit.
4. Don't use this command until its purpose and affect can be determined.

3.9 Set Resolution

Use this command to set the resolution of each reading. The unit can deliver readings with either 1.0 or 0.1 millimeter resolution.

CMD: <ADDR> 04 0C <RES> <CS>
A <RES> value of 01 sets 1mm resolution, 02 sets 0.1mm resolution.

REPLY: FA 04 8C 76

ERROR: FA 84 8C 01 F5
The command was rejected because the <RES> value was not either 01 or 02.

NOTES:
1. A specific address can be used with this command.
2. The broadcast address always appears in the reply, regardless of command message content.
3. Do not use the broadcast address when multiple rangefinders are wired into a single circuit.

3.10 Set Measurement Auto-Start

It may be desirable for the rangefinder to automatically start sending continuous readings when power is applied. Use this command to enable and disable automatic startup of streaming measurements. When enabled, a rangefinder device will begin outputting measurement reading messages following the application of power.

Do not use this command with a broadcast address when multiple devices are connected.

CMD: <ADDR> 04 0D <AUTO> <CS>
The <AUTO> field is 00 to disable auto-start, 01 to enable.

REPLY: FA 04 8D 75

ERROR: FA 84 8D 01 F4
The <AUTO> field is not as expected, either 00 or 01.

NOTES:
1. A specific address can be used with this command.
2. The broadcast address always appears in the reply, regardless of command message content.
3. Do not use the broadcast address when multiple rangefinders are wired into a single circuit.

3.11 Take Single Measurement

Issue this command to cause all connected devices to make a single measurement, storing it internally. The idea is to take readings with all sensors at the same time. Always use the broadcast address because it makes no sense to use this command when only one rangefinder is connected in the circuit.

Readings taken as a result of this command are retrieved from individual rangefinders through the use of the "Read Cache" command.

CMD: FA 06 06 FA

REPLY: This command does not reply. That really aught to be the policy for all commands to a broadcast address.

NOTES:
1. Do not use a specific address with this command since only that unit will place a reading into its cache.
2. This command is best used when multiple devices are wired into a single circuit.

3.12 Read Cache

Use this command to retrieve the measurements that were taken following a "Take Single Measurement" command (06 06). Issue this command to each rangefinder connected to the system, each with its own assigned address. The reply from each rangefinder is just like a reply to the "Single Measurement" command, except for the byte in the <CMD> position.

CMD: <ADDR> 06 07 <CS>

REPLY: When the device is set to 1.0mm resolution:
<ADDR> 06 82 ddd.ddd <CS>
When the device is set for 0.1mm resolution:
<ADDR> 06 82 ddd.dddd <CS>

The 'd' characters represent a single numeric digit, expressed as a single ASCII byte. The numeric string including the decimal point is a printable string. These bytes are embedded in the message in the same manner as all other bytes.

An 87 byte would be the expected <CMD> byte when patterned after other replies. This byte is actually 82, as would be the case for a reply to a "Single Measurement" command.

ERROR: <ADDR> 06 82 ERR---dd <CS>
The 'd' characters represent bytes containing numeric ASCII digits. There is no explanation regarding the content or meaning of these digits. The composite string consists of a sequence of bytes containing the characters shown above, in ASCII. These characters are included in the message with no other formatting, taking their own place like the rest of the bytes.

Unless an oversight in the DFRobot documentation, the 06 byte is not set to 86 when an error is reported. This is a break from pattern. Perhaps the command is not in error but the measurement wasn't performed. Additionally, the 87 byte would be 82 in the reply to a single measurement command. The actual form of this reply needs to be discovered.

The author was unable to precipitate an error reply, so all of this is speculation based upon external documentation.

3.13 Single Measurement

This command solicits a single reading from the designated rangefinder. Do not use the broadcast address with this command when operating multiple devices in the circuit. The designated rangefinder takes one reading and sends that value in a reply.

CMD: <ADDR> 06 02 <CS>

REPLY: When the device is set to 1.0mm resolution:
<ADDR> 06 82 ddd.ddd <CS>
When the device is set for 0.1mm resolution:
<ADDR> 06 82 ddd.dddd <CS>

The 'd' characters represent a single numeric digit, expressed as a single ASCII byte. The numeric string including the decimal point is a printable string. These bytes are embedded in the message in the same manner as all other bytes.

ERROR: <ADDR> 06 82 ERR---dd <CS>

The 'd' characters represent bytes containing numeric ASCII digits. There is no explanation regarding the content or meaning of these digits. The composite string consists of a sequence of bytes including the ASCII characters shown above. These characters are included in the message with no other formatting, taking their own place like the rest of the bytes.

3.14 Continuous Measurement

Issue this command to cause the rangefinder to send reading messages continuously without the need for intervening commands. Do not use the broadcast address with this command when operating multiple devices in the circuit. The measurement is performed at the currently set resolution.

This time interval between measurements is set by using the "Set data return interval" command.

Issue any other command in order to exit continuous mode.

CMD: <ADDR> 06 03 <CS>

REPLY: When the device is set to 1.0mm resolution:
<ADDR> 06 83 ddd.ddd <CS>
When the device is set for 0.1mm resolution:
<ADDR> 06 83 ddd.dddd <CS>

The 'd' characters represent a single numeric digit, expressed as a single ASCII byte. The numeric string including the decimal point is a printable string. These bytes are embedded in the message in the same manner as all other bytes.

ERROR: <ADDR> 06 83 ERR---dd <CS>

The 'd' characters represent bytes containing numeric ASCII digits. There is no explanation regarding the content or meaning of these digits. The composite string consists of a sequence of bytes containing the ASCII characters shown above. These characters are included in the message with no other formatting, taking their own place like the rest of the bytes.

The 06 byte is returned as 86 in the error reports of other commands. If this is not a documentation error then this reply breaks pattern.

The author was unable to precipitate an error reply. This description is speculative, taken from available external documentation.

3.15 Control Laser On/Off

The normal state of the laser is off. Turing the laser on is very useful while attempting to aim the rangefinder at the object whose distance is being determined. This command is used to turn the laser on or off.

CMD: <ADDR> 06 05 <onOFF> <CS>
The <onOFF> byte 00 turns the laser off, 01 turns it on.

REPLY: <ADDR> 06 85 01 <CS>

The 01 byte breaks the reply pattern. The documentation does not indicate what this value means; however, the reply does contain 01 in that position.

ERROR: <ADDR> 06 85 00 <CS>

This reply breaks pattern in two ways. First, the 06 is usually returned as 86. Second, the 00 byte is usually 01 to indicate an error.

NOTES:
1. A broadcast address can be used with this command; however, this should not be done when multiple devices are wired into the circuit.
2. The device's address is always returned in the reply, even if the broadcast address is used in the command.
3. The laser is always automatically turned off following a distance measurement.

3.16 Shut Down

Use this command to shut the rangefinder down. Although not explained in any external documentation, use of this command probably relates to reducing power consumption. Wake the device from this command merely by sending any command.

CMD: <ADDR> 04 02 <CS>

REPLY: <ADDR> 04 82 <CS>

ERROR: It seems that no error is detected.

NOTES:
1. A broadcast address can be used with this command; however, this should not be done when multiple devices are wired into the circuit.
2. The device's address is always returned in the reply, even if the broadcast address is used in the command.

Revision Control

This section contains information that controls the revision status of the document. Revisions in whole number form, such as 1.00, are approved documents. Numbers to the right of the decimal point indicate that the document is undergoing revision.

Revision History

Revision	Date	Description
0.01		Initial document creation.
0.02	11/19/2024	Various corrections and changes, some to correct technical errors.
0.03	11/22/2024	Numerous changes made to command descriptions following device testing.
1.00	11/22/2024	Additional corrections applied, unnecessary commentary removed, ready for initial distribution.
1.01	11/27/2024	Show hyperlinks as clear text since they did not remain hyperlinks in PDF printout. Insert picture of wire connections to rangefinder board. Provide data streaming rate when interval is set to zero.
1.02	12/20/2024	Corrected function codes for two commands, added parameter explanations.