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*HF/LF Reader System Series CPM-001*

**Simple Protocol Manual**

*Reference Guide*

***The Innovators in Radio Frequency Devices***

## Document Overview

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Preliminary

## **Section 1: Introduction**

This manual is intended as a guide to interface OEM equipment to the LADS, Inc. simple protocol readers. It serves as a test program for validating the readers comply with all of the instructions and is also a basis for any development work and gives examples of communications sessions and explains all of the standard and extended protocol instructions.

The sample program “VBTESTER.VDB” is available only as a sample of code written in Visual Basic and is not intended for use in an application other than for testing the LADS readers.

Preliminary

## Section 2: Reader protocol

All messages start with an SOH (0x01) followed by the byte count of the remainder of the message. All messages end in with an 8 bit bcc which is an XOR of all the bytes in the message.

The byte count does not include the SOH or the byte count. Since all commands require a command byte and a BCC, 0x01 is not a valid byte count.

The third byte of the message is the command byte, bytes after that depend on the command.

## Section 3: Commands:

### I. Simple Protocol Commands

Start Polling – 0x31 – This is a message that tells the LADS Microreader to start looking for a transponder. The fourth byte indicates which type of transponders are acceptable:

- Bit 0 – Read only transponders
- Bit 1 – Read write transponders
- Bit 2 – Multi-page transponders
- Bit 3 – DST transponders
- Bit 4 – ISO 15693 transponders
- Bit 5 – ISO 14443A transponders
- Bit 6 – ISO 14443B transponders

Example: 0x01, 0x02, 0x31, 0x32

This example turns on all reads that were previously active.

Example: 0x01, 0x03, 0x31, 0x09, 0x3A

This example turns on R/O and DST

Example: 0x01, 0x03, 0x31, 0x14, 0x27

This example turns on Multipage and ISO 15693

Example: 0x01, 0x03, 0x31, 0x0F, 0x0C

This example turns on all transponder reads.

Stop Polling – 0x32 – This is a message that tells the LADS Microreader to stop looking for a transponder.

Example: 0x01, 0x02, 0x32, 0x31

Light Command – 0x33 – This is a message the tell the LADS Microreader how to handle the light signal. The fourth byte of this message uses bits for the following:

Bit 0 – If set to a 1 indicates the light should be on, other wise the light should be off.

Bit 1 – If set to a 1 indicates the Microreader has control of the light otherwise the host has control of the light.

Example: 0x01, 0x03, 0x33, 0x02, 0x33      This indicates that the MR has control of the light.

Software Version command – 0x34 – This message indicates the LADS Microreader should respond with its version.

Example: 0x01, 0x02, 0x34, 0x37

## II. Extended Protocol Commands:

Download Parameter command – 0x35 – This message will send the Reader the parameters to operate with. The following items are configurable:

Field 1: Come up polling	0 or 1	(factory setting = 1 ON)
Field 2: Come up reader in control of light	0 or 1	(factory setting = 1 ON)
Field 3: Stop polling after valid read	0 or 1	(factory setting = 1 ON)
Field 4: Number of consecutive bad reads required for a transponder to be gone	1 – 9	(factory setting = 3)
Field 5: Number of consecutive valid reads required for transponder to be present	1 – 9	(factory setting = 1)
Field 6: Time in 10s of milliseconds the enunciator stays on after valid read	1 – 255	(factory setting = 20)
Field7: Time in 10s of milliseconds the light stays on after valid read	1 – 255	(factory setting =30)
Field8: Light stays on after read until host turns it off	0 or 1	(factory setting = 0 OFF)
Field9:		
Field10:		
Field11:		
Field12:		
Field13:		
Field14:		
Field15: Set the "" register with the contents of this Command.	0 - 255	(no factory setting)

In order to enable changing single or less than all of the parameters each parameter will be preceded with a designator.

Example: 0x01,0x12,0x35,0x01,0x01,0x02,0x01,0x03,0x03,0x04,0x03,0x05,0x09,  
0x06,0x0A,0x07,0x00,0x08,0x00,0x2D

Or

Example: 0x01,0x06,0x35,0x04,0x03,0x06,0x06,0x35

This command will instruct the reader that there has been n number of bad reads so the tag is not in the field any longer and set the time for the enunciator to 60 milliseconds.

Firmware Load command – 0x36 – This message will prepare the reader for a new version of firmware to be loaded.

Example: 0x01, 0x2, 0x36, 0x35

Firmware Data command – 0x37 – This message sends the data to the reader and prepares it for loading into the program area. Each packet contains a line from in Intel Hex file provided by LADS

Example: (hex) 1,2D,37,3A,31,30,34,32,30,30,30,30,35,36,30,30,36,35,30,30,  
37,32,30,30,37,33,30,30,36, 39,30,30,36,46,30,30,36,45,30,30,32,30,30,30,41,38,52

Command is comprised of the following: (taken from example above)  
Explained in Section II.

Position 1: 01 STX

Position 2: 2D Length of record

Position 3: Command byte (0x37)

Position 4 – 2D hex record read from source file with bcc at end..

NOTE: Upon completion of the successful download of the firmware file, the Reader will automatically reset itself and begin running the new firmware. The reader will NOT respond to the last record of the transmission since it has given the reader the instruction to reset.

## **Section 4:**

### **Responses:**

Normally responses will be returned immediately after command, however transponder data has priority over command responses. It is possible to receive transponder data followed by a command response.

Start Polling – 0x31 – This message is an acknowledgement for the start polling command.

Example: 0x01, 0x02, 0x31, 0x32

Stop Polling – 0x32 – This message is an acknowledgement for the stop polling command.

Example: 0x01, 0x02, 0x32, 0x31

Light Command – 0x33 – This message is an acknowledgement for the light command.

Example: 0x01, 0x03, 0x33, 0x31

Software Version – 0x34 – This message will contain 3 bytes of ASCII data containing the LADS Microreader software version.

Example: 0x01, 0x05, 0x34, 0x31, 0x31, 0x30, 0x00  
This would be software version 1.10.

Download parameter command – 0x35 – This message is an acknowledgement of the parameter download command.

Example: 0x01, 0x02, 0x35, 0x36

*Firmware Load command – 0x36* – This message is an acknowledgement of the firmware load command and prepares the reader to receive new firmware file. No other transactions can occur during the download sequence.

Example: 0x01, 0x02, 0x36, 0x35

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*Transponder Read – 0x39* – This message contains transponder data that has been read by the Microreader. The byte after the command indicates the transponder type that was read: \*\*\*\*\*(Additional types of tags will be assigned a code when they become available and are added to the simple protocol.)

0x31 – Read only transponders  
0x32 – Read write transponders  
0x33 – Multipage transponders  
0x34 – DST transponders

0x41 – ISO 15693 transponders  
 0x42 – ISO 14443A transponders  
 0x43 – ISO 14443B transponders  
 0x44 – ISO Mifare transponders  
 0x45 – SPC DST in Track format  
 0x50 – ISO American Express CC  
 0x51 – ISO Master Card CC  
 0x52 – ISO Visa CC

Following a 0x31 - 0x32 transponder type will be a transponder ID 8 bytes in length (LSB first).

Following a 0x34 transponder type will be an IDT byte, a manufacturers code, 3 bytes of ID (LSB first) 5 bytes of challenge code (LSB first) and 3 bytes of challenge response (LSB first).

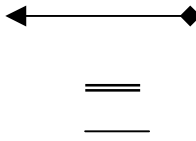
Following a 0x41 transponder type will be a transponder ID 6 bytes in length (LSB first) followed by a manufacturers code, and the byte 0xE0 (ISO standard definition.)

\*\*\*\*Following a 0x42 & 0x43 transponder type will be a transponder ID 6 bytes in length \*\*\*\*(LSB first) followed by a manufacturers code, and the byte 0xE0 (ISO standard \*\*\*\*definition.)

Transponder types 50, 51, 52 are protected by copyright laws and will not be discussed in this manual

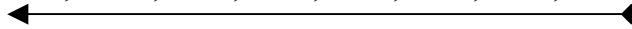
This data will be transmitted once until either a blank read occurs or a different transponder is read.

Legend for examples:


 Transponder ID or other data as described above, LSB first to end of pointer.  
 Transponder Type  
 Manufacturer code

Read only example:

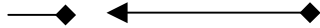
0x01, 0x0B, 0x39, 0x31, 0xFE, 0xEB, 0x01, 0x00, 0x00, 0x00, 0x60, 0x00, 0x76



DST example:

0x01, 0x10, 0x39, 0x34, 0x00, 0x06, 0xFE, 0xEB, 0x01, 0x01, 0x02, 0x03, 0x04, 0x05, 0x01, 0x02, 0x03, 0x0F





ISO 15693 example:

0x01, 0x0B, 0x39, 0x41, 0xC3, 0x59, 0x9F, 0x04, 0x00, 0x00, 0x06, 0xE0, 0x95

Parameter Download command – 0x35 – This message is an acknowledgement for the parameter download command.

Example: 0x01, 0x02, 0x35, 0x36

Firmware Initialization command – 0x36 – This message is an acknowledgement for the firmware initialization command.

Example: 0x01, 0x02, 0x36, 0x35

Firmware Data command – 0x37 – This message will acknowledge the download of the data associated with the firmware data file. It will signal a good or bad reception.

Nn = 0x00 acknowledge data  
0x01 non-acknowledge data (bad reception)

Example: 0x01, 0x03, 0x37, 0xNn, 0xLRC

Note: Upon complete download of the data contained in the hex file, the reader will re-boot itself and re-initialize the reader.

## Section 5: Communications Protocol:

Standard serial port is used and the settings are:

	134KHz Microreader	13.56MHz Microreader
Baud rate:	9600	9600
Parity:	None	None
Data bits:	8	8
Stop bits:	1	1