

USER GUIDE

UBS-200L LF BASE STATION



UNIFIED INFORMATION DEVICES

Preface

Revision History

This is the 1st edition of this document.

Rev	Date	Description of Change	Originator
1.0	3-24-16	Original Document	Jason D. Warschauer
1.1	12-20-16	1 st Revision	Jason D. Warschauer
1.2	11-14-17	2 nd Revision	Jason D. Warschauer
1.3	4-4-19	3 rd Revision	Jason D. Warschauer

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About This Document

Purpose

The purpose of this document is to describe in detail the procedures for operating the UI Devices UBS-200L LF Base Station.

Audience

This document is designed for use by anyone responsible for installing, operating, and maintaining the UI Devices UBS-200L LF Base Station.

Product Line

Descriptions and references to the following products are included in this document.

Part Number	Product Description
UBS-200L	Low-Frequency Base Station

Assistance

For more information, or for assistance, please contact UI Devices directly.

UI Devices Contact Information	
Address:	Unified Information Devices 500 Park Ave Suite 109 Lake Villa, IL 60046
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e-mail:	info@uiddevices.com
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References

The following documents are referenced herein.

Document	Description
USB HID Usage Tables	Universal Serial Bus (USB) HID Usage Tables, v1.11 Table 12 – Keyboard/Keypad Page

Conventions

The following pictograms and representations are used throughout this document.

WARNING:



A WARNING IS USED WHERE CARE MUST BE TAKEN, OR A CERTAIN PROCEDURE MUST BE FOLLOWED IN ORDER TO PREVENT INJURY OR HARM TO YOUR HEALTH.



Caution:

A caution indicates information on conditions which must be met, or a procedure which must be followed, which if not heeded could cause permanent damage to the system.



Note:

A note indicates conditions which must be met, or a procedure which must be followed to ensure proper functioning.



Information:

Indicates information which makes usage of the equipment or software easier.

Safety Notice

UI Devices shall not be held liable for damages caused by improper use, abuse, or manipulations outside of those recommended in this manual.

The UBS-200L should only be opened by qualified UI Devices personnel. Any attempt by untrained personnel to open the housing may result in personal injury and/or damage to the unit, and will void the warranty.



WARNING:

NEVER OPEN THE UBS-200L! THE UBS-200L CONTAINS HIGH-VOLTAGE AREAS, AND SERIOUS INJURY COULD OCCUR IF OPENED BY UN-TRAINED PERSONNEL!

Regulatory Compliance and Certifications

FCC COMPLIANCE STATEMENT



Caution:

Changes or modifications not expressly approved could void your authority to use this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may result in undesired operation.

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Chapter 1 – Introduction to the UBS-200L LF Base Station

The UBS-200L is a versatile Low-Frequency Base Station designed to read and encode the UI Devices Series of transponders for use within animal identification, logistics, and asset tracking applications.

The UBS-200L operates as a USB appliance, tethered to a host PC.

Elements of the UBS-200L Base Station



Figure 1. UBS-200L Front View.



Figure 2. UBS-200L Rear View.

UBS-200L Modes of Operation

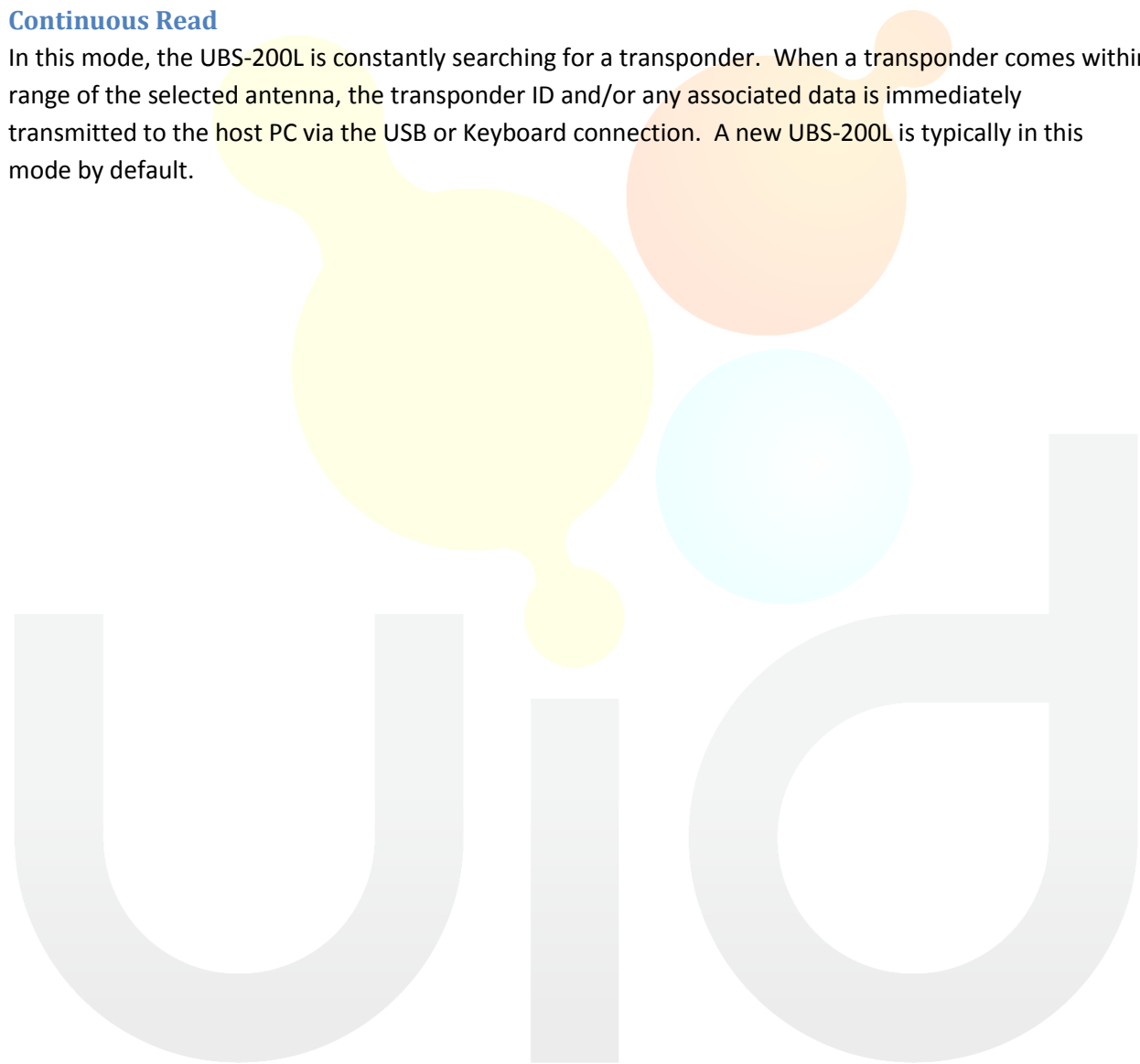
The UBS-200L supports two basic modes of operation; Standby and Continuous Read.

Standby

In this mode, the UBS-200L awaits a command from the host PC. Only when a command is received does the UBS-200L perform an action.

Continuous Read

In this mode, the UBS-200L is constantly searching for a transponder. When a transponder comes within range of the selected antenna, the transponder ID and/or any associated data is immediately transmitted to the host PC via the USB or Keyboard connection. A new UBS-200L is typically in this mode by default.



Chapter 2 – Getting Started with the UBS-200L

Installing USB Drivers

It is strongly recommend that the drivers be installed BEFORE plugging the unit into the USB port for the first time.

Contact UI Devices for access to the appropriate drivers and for assistance with driver installation.



Note:

Install the appropriate USB drivers BEFORE plugging the UBS-200L into the USB port of the PC or handheld device.

Connecting Power

Plug the power supply provided with the UBS-200L into the power port on the back of the UBS-200L. Connect the power “brick” to a 110-240 VAC power source, using the appropriate adapter cable.



Figure 3. Plug power supply connector into power port.

Caution:



Use only the power supply included with the UBS-200L. Using a power supply other than that specified may cause undesirable operation and/or damage the unit.

Connecting an External LF Antenna

Connect an external antenna or “wand” to antenna port 1 on the UBS-200L. If the UBS-200L has more than one antenna port, port 1 is that closest to the edge of the unit.

1. Line up the pins of the antenna connector with those of the antenna port.
2. Rotate the entire antenna connector until it seats itself in the antenna port.
3. Gently tighten the outer ring to hold antenna cable securely in place.

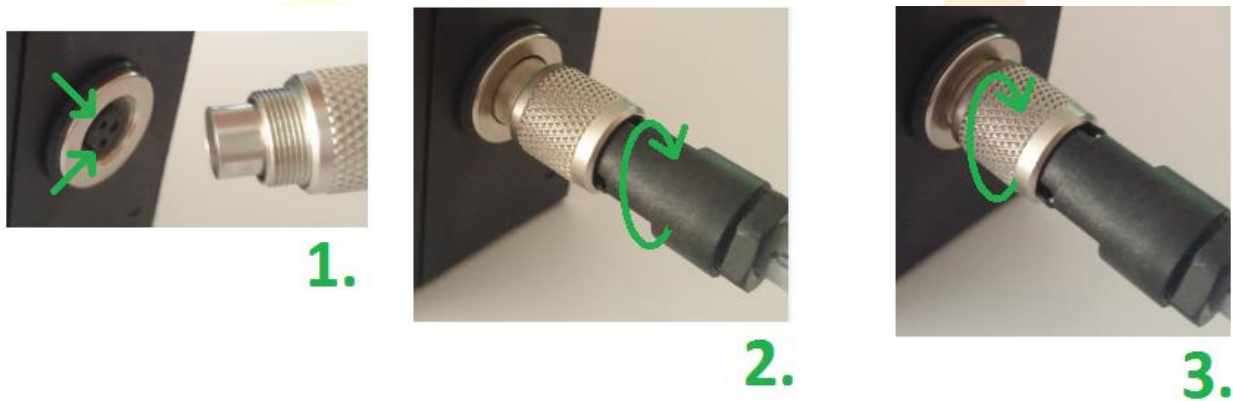


Figure 4. Plug antenna connector into lower antenna port.



Caution:

The outer ring of the antenna connector should thread very easily. If resistance is encountered, ensure connector is properly aligned with antenna port. Do not force, as the threads may be damaged!

Powering the Unit

Power-up the UBS-200L by pressing the power button. The power LED will illuminate, indicating power has been correctly applied.



Figure 5. Power switch – Power is applied.

Reading a Transponder

Present a UI Devices transponder to the antenna, following best practices described in Setting “CCB” to 1 causes the UBS-200L to automatically select the beginning block of the user-data based on the transponder type. This overrides the “SDB” setting, and may be useful where UI Devices TTF and “Classic” transponders are intermixed.



Information:

Setting “CCB” to 1 overrides the “SDB” setting. If user data begins at a block other than 3 or 7, set “CCB” to 0 and specify the beginning data block using the “SDB” command.





Chapter 4 – Tips and Tricks for Optimum Performance. The unit beeps once, and the transponder ID appears on the LCD display.

Congratulations! A transponder has been read!

Information:

If the ID does not appear when a UI Devices transponder is presented to the antenna, it is likely that the UBS-200L has been pre-configured in “Standby” mode. Continue with [“Connecting to Host PC”](#) to complete set-up and begin reading transponders.

Connecting to Host PC

Plug the “A” end of the USB cable into an available port on the host PC.

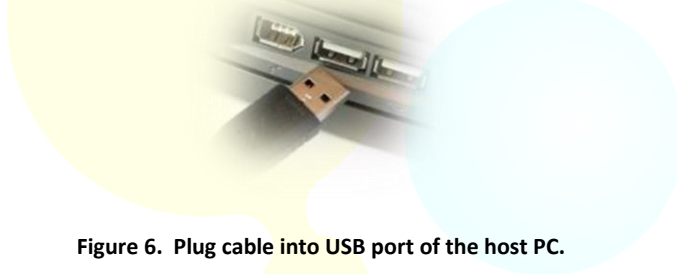


Figure 6. Plug cable into USB port of the host PC.

Plug the “B” end of the USB cable into the port labeled “USB” on the back of the UBS-200L.

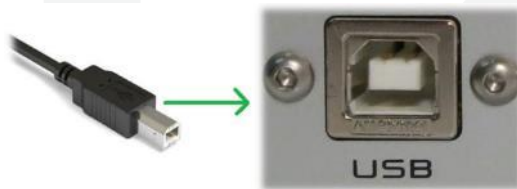


Figure 7. Plug cable into USB port of UBS-200L.

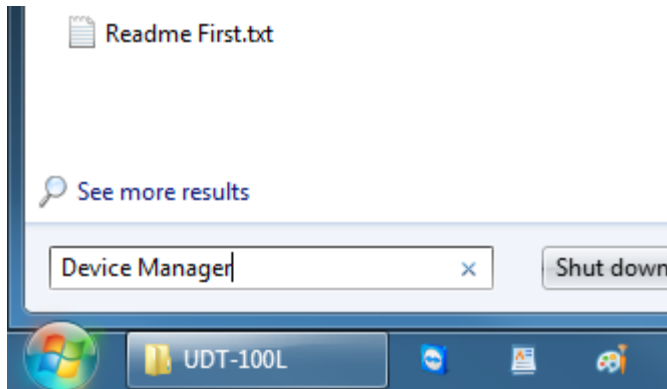
Note:

If Keyboard Wedge functionality is required, and the UBS-200L has been pre-configured to operate in Keyboard Wedge mode, then plug the “B” end of the USB cable into the Keyboard Wedge or “KW” port. Proceed to [Reading a Transponder in “Keyboard Wedge” Mode](#).

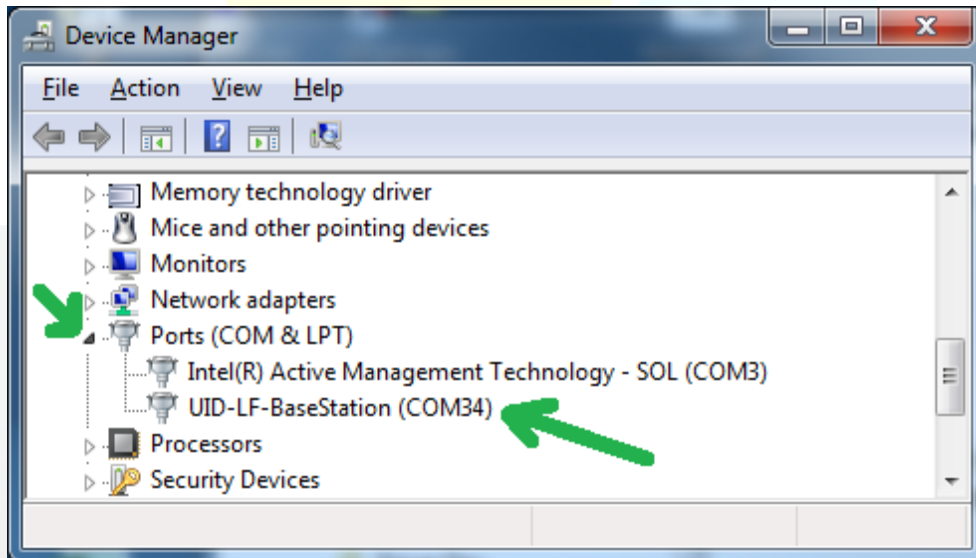
Determining COM Port number using “Device Manager” (Host Mode)

Use the procedure below to determine the COM port number assigned to the UBS-200L if operating in Host mode:

1. Open “Device Manager.” One method is to click the “Start” button, and type “Device Manager” into the Search box.



2. Click the triangle next to “Ports (COM & LPT)” to expand this section.



3. Find the most recently added “UID-LF-BaseStation” and note the COM number. This is the assigned COM port. (COM34 in the above example.)

Testing Communications using Terminal Software

Communications with the UBS-200L can be confirmed using any standard TTY terminal software. “PuTTY”, a free terminal program which can be downloaded from the internet, is used in the examples below.

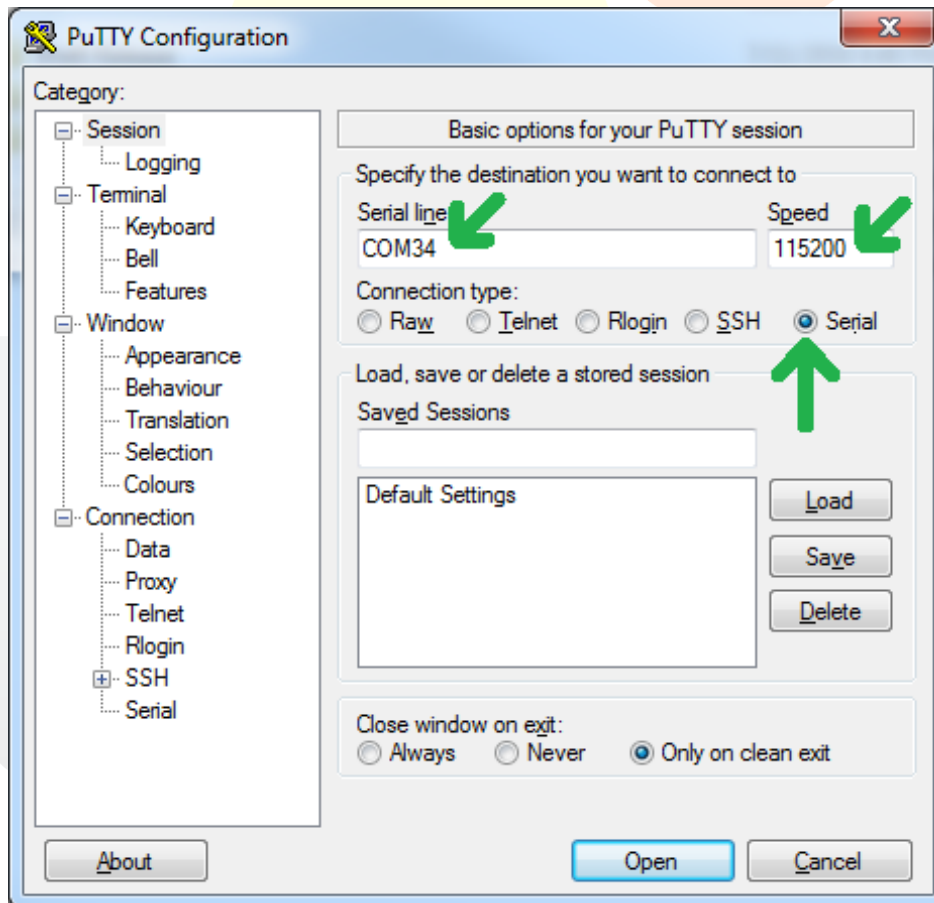
See [Appendix 4 - Test Virtual COM Port using Tera Term](#) for a similar example using Tera Term, another popular terminal program available for free download.

Establishing a Connection to the UBS-200L

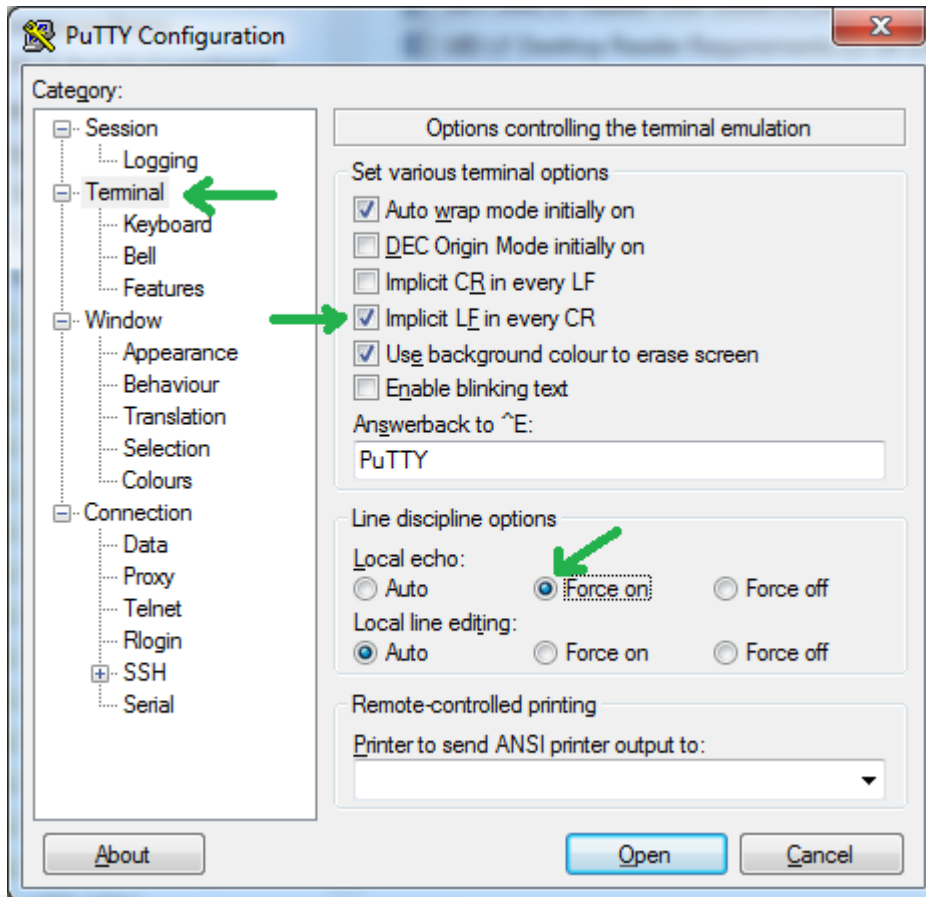
1. Start terminal software by double-clicking the appropriate icon.



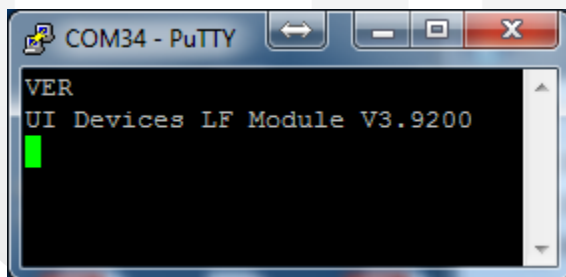
2. Set the appropriate COM port values for communications with the UBS-200L.



- It may be useful to enable “Echo” and “Line Feed” in the terminal software.



- Click “Open” to open the terminal window.
- Type “VER” and press <ENTER> when the terminal window appears, to verify communications with the UBS-200L. The LF Module firmware version will appear, and may be different from that shown below.



- Congratulations! The UBS-200L is successfully communicating over the COM port!

Reading a Transponder in “Continuous Read” Mode

Present a transponder to the UBS-200L antenna. The transponder ID and any pre-programmed data displayed on the LCD should also appear over the VCOM port.

Reading a Transponder in “Standby” Mode

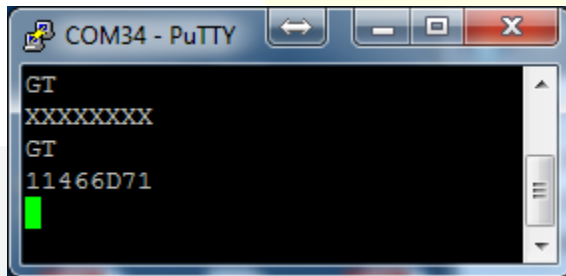
1. Type “MD 2” to ensure the unit is operating in “standby” mode.
2. Type “GT” into the terminal window and press <ENTER>. If no transponder is present at the reader antenna, “XXXXXXXX” may appear after a short delay, indicating that no transponder was found.



Information:

If the “CN” parameter is set to 1, the “XXXXXXXX” indicator will be suppressed, and **NOTHING** will be returned to the host. Proceed to the next step to ensure proper functionality.

3. Now place a transponder on the reader antenna and type “GT” followed by <ENTER> again. If the transponder is properly positioned above the reader antenna, the transponder ID will be immediately displayed.



4. Congratulations! The reader is successfully reading the transponder!

Information:

The read distance varies depending upon the size and type of transponder being read. See [Setting “CCB” to 1 causes the UBS-200L to](#) automatically select the beginning block of the user-data based on the transponder type. This overrides the “SDB” setting, and may be used where UI Devices TTF and “Classic” transponders are intermixed.

**Information:**

Setting “CCB” to 1 overrides the “SDB” setting. If user data begins at a block other than 3 or 7, set “CCB” to 0 and specify the beginning data block using the “SDB” command.

Chapter 4 – Tips and Tricks for Optimum Performance **for information about optimum position of the transponder with respect to the reader.**

Reading a Transponder in “Keyboard Wedge” Mode

If the UBS-200L has been pre-configured to operate in “Keyboard Wedge” mode, ensure the USB cable is connected to the Keyboard Wedge (inner-most) port, and follow the instructions below to read the transponder information.

1. Place the screen cursor at the location where transponder data is to be typed. (For testing purposes, it may be useful to place the cursor at the top of a blank “Notepad” page, or into the first cell of a blank “Excel” file.
2. Present a UI Devices transponder to the active UBS-200L antenna. The transponder data appears on the LCD display, and is also “typed” at the cursor location.

Information:

By default, an <ENTER> keystroke is automatically sent at the end of the transponder data. This keystroke delimiter is configurable should a different keystroke or no keystroke be desired. See [Change Keyboard Wedge Delimiters “UID KWDLM”](#).



Chapter 3 – Operating and Configuring the UBS-200L

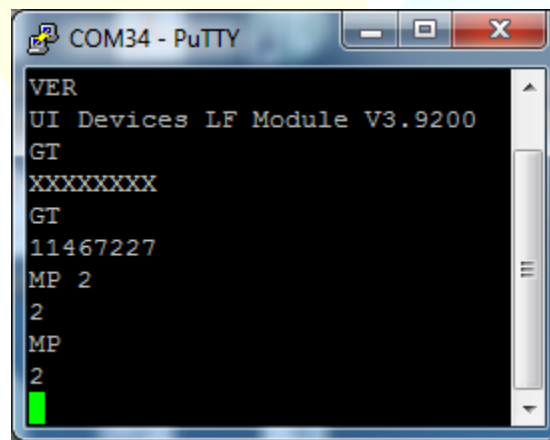
This chapter describes the protocol for communicating with and operating the UBS-200L over the virtual serial port. These commands can easily be issued using properly configured terminal software, as described in [Chapter 2 – Getting Started with the UBS-200L](#). These commands can also be automatically issued, and the responses interpreted by software, such as UI Devices pi Suite, or third-party software as described in [Appendix 3 – Connecting to Third-Party Systems](#).

Sending Commands

General UBS-200L commands consist of two or three characters, and may be followed by a parameter value. The command is then terminated by a <CR>. (Carriage Return) Although upper-case letters are used in all examples herein, the commands are NOT case sensitive.

To issue a command without a parameter value, type the command into a terminal window, and then press <ENTER>.

To issue a command with a parameter value, type the command followed by a space, followed by the parameter value. Then press <ENTER>.



```
COM34 - PuTTY
VER
UI Devices LF Module V3.9200
GT
XXXXXXXXXX
GT
11467227
MP 2
2
MP
2
```

Figure 8. Some UBS-200L Commands and Responses.

UBS-200L Response

The UBS-200L responds to commands by performing the desired action, and sending any associated data back to the host over the serial port. If a parameter is changed, the UBS-200L responds with the new parameter. By default, the response is terminated with a <CR> character.

Get Module Firmware Version “VER”

In the above example, the “VER” command requests the firmware version from the LF Module, and the Module responds with its current firmware version.

Checking a Parameter Value

If a command that typically includes a parameter is sent WITHOUT the accompanying parameter, the UBS-200L returns the current status of that parameter.

Reading/Writing Transponders

Get Transponder “GT”

The “GT” (Get Transponder) command causes the UBS-200L to return the ID of a transponder that is in range. In the above example, the UBS-200L returns “XXXXXXXX” when no transponder is present, and “11467227” (the transponder ID) when a transponder is present.

The “GT” command is used when the UBS-200L is in “Standby” mode. Once issued, the UBS-200L searches for a transponder until the time-out (TOR) value is reached. If a transponder enters the UBS-200L’s antenna field during this time, the transponder data is returned. If no transponder is read prior to the time-out, “XXXXXXXX” is returned, and the reading cycle ends.



Information:

If the “CN” parameter is set to 1 and no transponder is presented, the “XXXXXXXX” indicator will be suppressed, and **NOTHING** will be returned to the host.

Get Transponder Custom “GTC”

The “GTC” (Get Transponder Custom) command can be used to customize the data being returned from the queried transponder. The command is followed by two parameters. The first parameter (0 or 1) determines whether or not the transponder ID is included in the response. The second parameter (1-7, or 1-10 for older “Classic” transponders) determines how many memory blocks are returned. See the examples in **Figure 9**.

```
COM34 - PuTTY
GT
11467227
GTC 1 4
11467227,Blk1Blk2Blk3Blk4
GTC 1 7
11467227,Blk1Blk2Blk3Blk4Blk5Blk6Blk7
GTC 0 4
Blk1Blk2Blk3Blk4
```

Figure 9. GTC Command Examples.

Continuous ID Read Mode “MD 0”, “MD 2”

It may be desirable read the ID from multiple transponders in succession. Entering “MD 0” puts the UBS-200L into “Continuous Read” mode. In this mode, the UBS-200L enters a new read cycle at the completion of the previous one. If no transponder is read during a read cycle, “XXXXXXXX” is returned, and a new read cycle begins. If a transponder is read, the transponder ID is returned, and a new read cycle begins.

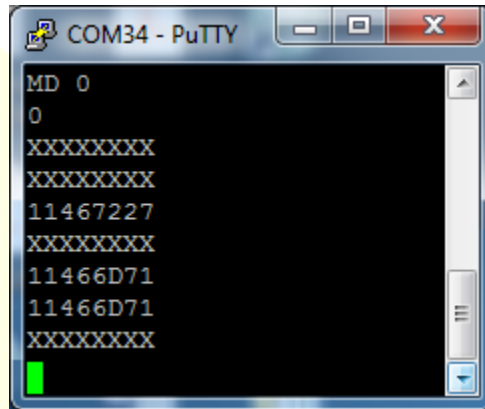


Figure 10. Continuous ID Read Mode.

Command “MD 2” returns the UBS-200L to “Standby” mode.

Information:



In “Continuous Read” mode, a new read cycle begins immediately once a transponder is read and its ID returned. As such, a transponder remaining in the UBS-200L’s field will cause the ID to be returned several times in succession, until the transponder leaves the read field. This behavior can be prevented by using the CID command.

Information:



If the “CN” parameter is set to 1 and no transponder is presented, the “XXXXXXXX” indicator will be suppressed, and NOTHING will be returned to the host.

Continuous Custom Read Mode “MD 4”

It may be desirable to get custom data from multiple transponders in succession. The “MD 4” command puts the UBS-200L into “Continuous Read” mode, using two additional parameters similar to those of the “GTC” command. In this mode, the UBS-200L enters a new read cycle at the completion of the previous one. If no transponder is read during a read cycle, “XXXXXXXX” is returned, and a new read cycle begins. If a transponder is read, the transponder data is returned according to the parameters, and a new read cycle begins.

Information:



In “Continuous Read” mode, a new read cycle begins immediately once a transponder is read and its data returned. As such, a transponder remaining in the UBS-200L’s field will cause the data to be returned several times in succession, until the transponder leaves the read field. This behavior can be prevented by using the CID command.

Information:



If the “CN” parameter is set to 1 and no transponder is presented, the “XXXXXXXX” indicator will be suppressed, and NOTHING will be returned to the host.

Select/Change Active Antenna Port “MP”

Issue the “MP” command, followed by the desired antenna port number to switch active antenna ports.

Advanced Data-Manipulation Commands

Reading Transponder Data “RD”

Transponder data blocks can only be read in Standby mode. Issue the “MD 2” command to ensure the LF Module is in Standby mode.

User data is stored in blocks 7-13. Each block contains 4 bytes of data. (8 hexadecimal characters.)

To read data from a data block, issue the “RD” command followed by a space, followed by the number of the data block to be read. See examples in Figure 11.



Information:

In older “Classic” tags, blocks 3, 5, and 6 can also contain user data.

Writing Transponder Data “WD”

Transponder data blocks can only be written in Standby mode. Issue the “MD 2” command to ensure the LF Module is in Standby mode.

Data can be written to blocks 7-13. Each block contains 4 bytes of data. (8 hexadecimal characters.)

To write data to a data block, issue the “WD” command followed by a <space>, followed by the number of the data block to be written, followed by a <space>, followed by the hexadecimal data to be written to that block. See examples **Figure 11**.

```
COM7 - PuTTY
WD 3 01234567
ACK
WD 5 89ABCDEF
ACK
WD 6 54455854
ACK

RD 3
01234567
RD 5
89ABCDEF
RD 6
54455854
```

Figure 11. Reading and Writing transponder data blocks.

**Information:**

In older “Classic” tags, blocks 3, 5, and 6 can also contain user data.

**Information:**

By converting ASCII text to hexadecimal data, 28 ASCII characters can be stored in the transponder memory. (40 ASCII characters for older “Classic” tags. “54455854” in the example above translates to “TEXT” when converted to ASCII text.



User-Level Configuration Commands

View Settings “VS”

Issuing the “VS” command causes the UBS-200L to display all current parameter values.



Caution:

Some Module parameter values are factory set, and changing them may result in undesired behavior.



Symptom	Possible Cause	Remedy
Transponder Communications		
Unit returns “#10” during attempted transponder communications	Antenna is improperly connected.	Ensure antenna is properly connected. See Connecting an External LF Antenna .
	Antenna positioned too close to metal.	Re-position antenna away from metal. See Metal vs. Non-Metal .
Unit returns “XXXXXXXX” while searching for a transponder	Transponder too far away	Move transponder closer to antenna.
	Transponder incorrectly oriented	Ensure transponder is properly oriented relative to antenna. See Transponder Orientation .
	Transponder communications blocked by metal.	Minimize interference by metal. See Metal vs. Non-Metal .
Cannot read data blocks	Incorrect data block read attempted.	Ensure correct data block is requested. See Reading Transponder Data “RD” .
	Incorrect transponder type. Data password protected.	Ensure transponder is UI Devices type.
Cannot write data blocks	Incorrect data block write attempted.	Ensure correct data block is requested. See Writing Transponder Data “WD” .
	Incorrect transponder type. Data password protected.	Ensure transponder is UI Devices type.
	Transponder too far away	Move transponder closer to antenna.
	Transponder incorrectly oriented	Ensure transponder is properly oriented relative to antenna. See Transponder Orientation .
	Transponder communications blocked by metal.	Minimize interference by metal. See Metal vs. Non-Metal .

Appendix 1 – Default Settings and Response/Error Codes **summarizes which Module parameters are safe to change and which should be left unchanged.**

Advanced Configuration Commands

Commands and parameters listed in this section are only adjustable after a successful log-in using the “UID USRLOG” command.

Advanced Log-in “UID USRLOG”

Issue the “UID USRLOG” command followed by the User Log-in Password to enter the UBS-200L Advanced Configuration mode. Contact UI Devices for additional information regarding the User Log-in Password.

Change Advanced User Password “UID CHGPW”

Contact UI Devices for assistance with changing the Advanced User Log-in Password.

Reset Advanced User Password “UID RSTPW”

Contact UI Devices for assistance with resetting the Advanced User Log-in Password.

Sound On/Off “UID SND”

Issue “UID SND 0” to turn off all sounds emitted by the unit, including transponder read confirmation tone, antenna change chirp, and start-up fanfare.

Issue “UID SND 1” to turn sounds back on.

Change Sound Pitch “UID PTCH”

With multiple units operating within a confined space, it may be desirable to adjust the pitch of each unit’s sound emission in order to more easily discern from which unit a sound is emitted. Issuing the “UID PTCH” command, followed by a number between 31 and 9999 sets the frequency or “pitch” at which the transponder confirmation tone sounds. The default value is 4096.

Information:



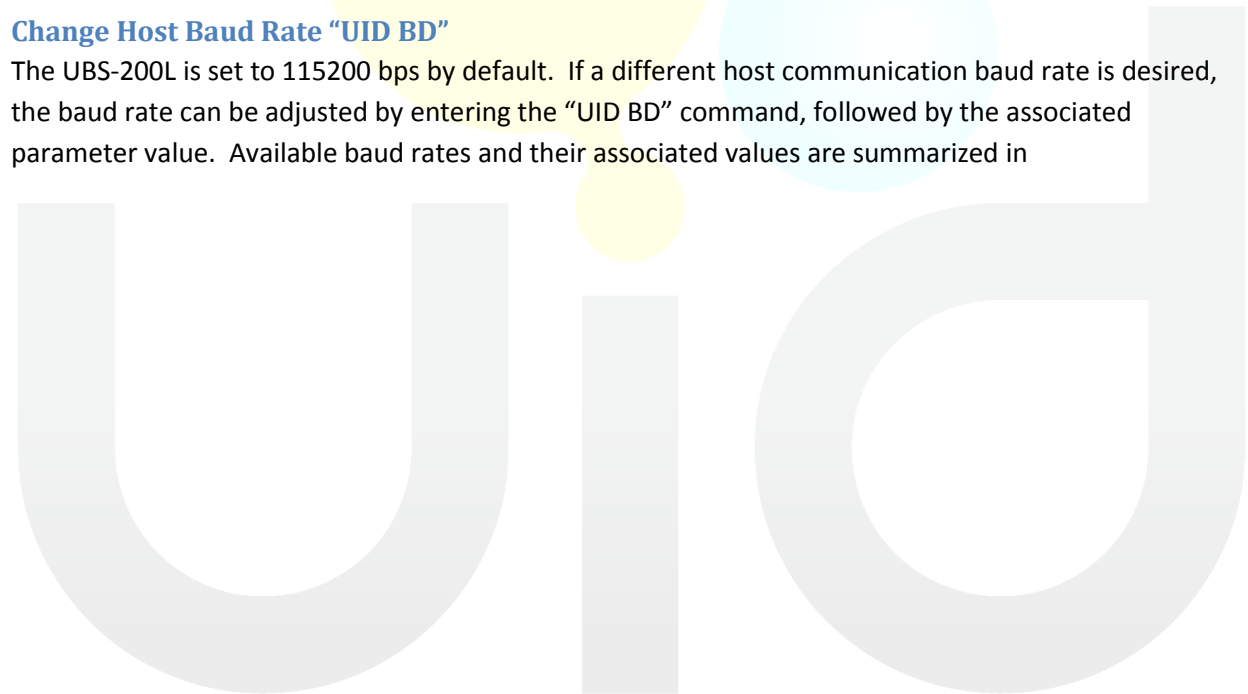
The optimum frequency for the UBS-200L speaker is around 4096 Hz. Setting the tone frequency higher or lower than this value will also reduce the volume of the transponder read confirmation tone. The volume is otherwise un-adjustable.

Set Default Power-up Antenna “UID DEFANT”

Use the “UID DEFANT” command followed by the desired antenna port number to change which antenna port is defaulted to after power-up.

Change Host Baud Rate “UID BD”

The UBS-200L is set to 115200 bps by default. If a different host communication baud rate is desired, the baud rate can be adjusted by entering the “UID BD” command, followed by the associated parameter value. Available baud rates and their associated values are summarized in



Symptom	Possible Cause	Remedy
Transponder Communications		
Unit returns “#10” during attempted transponder communications	Antenna is improperly connected.	Ensure antenna is properly connected. See Connecting an External LF Antenna .
	Antenna positioned too close to metal.	Re-position antenna away from metal. See Metal vs. Non-Metal .
Unit returns “XXXXXXXX” while searching for a transponder	Transponder too far away	Move transponder closer to antenna.
	Transponder incorrectly oriented	Ensure transponder is properly oriented relative to antenna. See Transponder Orientation .
	Transponder communications blocked by metal.	Minimize interference by metal. See Metal vs. Non-Metal .
Cannot read data blocks	Incorrect data block read attempted.	Ensure correct data block is requested. See Reading Transponder Data “RD” .
	Incorrect transponder type. Data password protected.	Ensure transponder is UI Devices type.
Cannot write data blocks	Incorrect data block write attempted.	Ensure correct data block is requested. See Writing Transponder Data “WD” .
	Incorrect transponder type. Data password protected.	Ensure transponder is UI Devices type.
	Transponder too far away	Move transponder closer to antenna.
	Transponder incorrectly oriented	Ensure transponder is properly oriented relative to antenna. See Transponder Orientation .
	Transponder communications blocked by metal.	Minimize interference by metal. See Metal vs. Non-Metal .

Appendix 1 – Default Settings and Response/Error Codes.

Change LF Module Baud Rate “UID LFBD”

The “UID LFBD” command sets the internal baud rate at which the UBS-200L communicates with the internal LF module. This command should only be adjusted if the internal LF Module has been set below its maximum baud rate for timing purposes.



Note:

Changing the LFBD value can disconnect communications between the UBS-200L and the internal LF Module. Only make adjustments to this parameter if instructed to do so by UI Devices.



LCD On/Off “UID LCD”

The “UID LCD” command can be used to toggle the LCD display on or off. If the LCD display is not required, turning it off can improve overall system read performance. Issue “UID LCD 0” to turn off the LCD display, and “UID LCD 1” to turn it back on.



Information:

Turning the LCD Display function OFF when not being used can enhance system read performance.



Information:

Turning the LCD display OFF prevents new data from being relayed to the display. Even with the display turned OFF, the backlight and power-up splash screen will still function, and the model number will still be displayed.

Keyboard Wedge On/Off “UID KW”

The “UID KW” command can be used to toggle the Keyboard Wedge function on or off. If the Keyboard Wedge function is not required, it is strongly recommended that it be turned off, as it can induce read delays. Issue “UID KW 1” to turn on the Keyboard Wedge function, and “UID KW 0” to turn it off.



Information:

Turning the Keyboard Wedge function OFF when not needed significantly enhances system read performance.



Information:

Even with the Keyboard Wedge function turned off, the host will still recognize a connected keyboard as long as the USB KW port is connected. While no keystrokes are sent with Keyboard Wedge function turned off, it is recommend that the port also be unplugged.

UID ECHO

The “UID Echo” command offers an easy way to test output to the LCD, Keyboard Wedge, and VCOM port. Issue “UID Echo” followed by a space. The first 20 characters of text following the space will be echoed to the top line of the LCD, and the entire text will be echoed to the Keyboard Wedge and the VCOM ports.



Information:

The Keyboard Wedge function and LCD Display must be set to ON in order for the text following the ECHO command to appear.

Change Input Delimiters “UID IDLM”

The UID IDLM command is used to change the UBS-200L input delimiters. This is only necessary if a legacy host program requires it. If custom input delimiters to the UBS-200L are needed, please contact UI Devices for proper use of the UID IDLM command.

Note:



Improperly setting the input delimiters through the “UID IDLM” command can cause the UBS-200L to become unresponsive to host commands. Only make adjustments to this parameter if instructed to do so by UI Devices.

Change Output Delimiters “UID ODLM”

The UID ODLM command is used to change the UBS-200L output delimiters. This is only necessary if a legacy host program requires it. If custom output delimiters from the UBS-200L are needed, please contact UI Devices for assistance in using the UID ODLM command.

Change Keyboard Wedge Delimiters “UID KWDLM”

The UID KWDLM command is used to change the UBS-200L output delimiter keystrokes. This is only necessary if a legacy host program requires it. If custom output delimiter keystrokes from the UBS-200L are needed, please contact UI Devices for assistance in using the UID KWDLM command. Available keystrokes are summarized in Table 12 of the “Universal Serial Bus (USB) HID Usage Tables.”

Change Keyboard Wedge Separator Keystroke “UID KWSPR”

The UID KWSPR command is used to change the UBS-200L keystrokes that separate the transponder ID from the accompanying transponder data. This is only necessary if a legacy host program requires it. If custom data separator keystrokes from the UBS-200L are needed, please contact UI Devices for

assistance in using the UID KWSPR command. Available keystrokes are summarized in Table 12 of the “Universal Serial Bus (USB) HID Usage Tables.”

LF Module Configuration Commands

Suppress Multiple Reads “CID”

To suppress multiple reads of the same transponder from being transmitted to the host, send the “CID 1” command. With CID set to 1, a transponder ID will only be transmitted to the host one time until another transponder is presented or the “Misread Failure Protection “NID”

While corrupted data reads are rare, they are possible under specific circumstances. As such, it may be desirable to validate the transponder ID through two consecutive reads. Sending the command “NID 1” forces the UBS-200L to compare two consecutive reads of the same transponder. The transponder ID will NOT be returned unless two consecutive reads are validated to be identical by the UBS-200L. This may slow down the ID process, and is recommended only for circumstances requiring such redundancy. It is NOT recommended for situations in which the transponder is difficult to read, or passes by the antenna quickly.

Sending the command “NID 0” turns this functionality off, so that a transponder ID is returned with a single valid read.

Note:



The NID redundancy check only works when reading IDs in MD 0 mode, or with the “GT” command. Setting NID parameter to 1 while in MD 4 mode or with the “GTC” will result in NO data being returned.

Time-Show Code “TSC” value expires.

Sending the command “CID 0” returns the UBS-200L to its default setting, where the transponder ID is sent every time it is read.

Suppress “XXXXXXXX” No-Read Message “CN”

To prevent the “XXXXXXXX” message from being sent to the host, send the “CN 1” command. While this prevents the “XXXXXXXX” from being misinterpreted as data, it also means that there will be no indication of the end of a read cycle in which no transponder is read.

Sending the command “CN 0” returns the UBS-200L to its default setting, where “XXXXXXXX” is sent to the host at the end of a read cycle in which no transponder is read.

Misread Failure Protection “NID”

While corrupted data reads are rare, they are possible under specific circumstances. As such, it may be desirable to validate the transponder ID through two consecutive reads. Sending the command “NID 1” forces the UBS-200L to compare two consecutive reads of the same transponder. The transponder ID will NOT be returned unless two consecutive reads are validated to be identical by the UBS-200L. This may slow down the ID process, and is recommended only for circumstances requiring such redundancy. It is NOT recommended for situations in which the transponder is difficult to read, or passes by the antenna quickly.

Sending the command “NID 0” turns this functionality off, so that a transponder ID is returned with a single valid read.

Note:



The NID redundancy check only works when reading IDs in MD 0 mode, or with the “GT” command. Setting NID parameter to 1 while in MD 4 mode or with the “GTC” will result in NO data being returned.

Time-Show Code “TSC”

With both “CID” and “CN” set to 1 in “MD0” continuous read mode, it may be desirable to allow a transponder to be re-read after a certain amount of time, in case the transponder data was missed by the host. The “TSC” command allows the re-transmission of the same transponder ID if the transponder remains in the field or re-enters the field after a given delay. Send the “TSC” command, followed by a parameter value to set this time delay. The parameter value can be any value from 0 to 63, and is multiplied by 100 ms to determine the actual duration of the delay. i.e. “TSC 50” sets the time-out to 5,000 ms, or 5 seconds.

Sending the command “TSC 0” will completely prevent the transponder ID from being sent again, until another transponder is presented.

Baud Rate “BD X”

The BD command sets the baud rate at which the internal LF Module communicates with the UBS-200L. Changing this baud rate requires that the “UID LFB” also be set to match. By default, the LF Module is set to communicate at the highest speed possible. Reducing this baud rate is useful only if data is coming in too quickly from the LF module. Available baud rates and their associated values are summarized in



Symptom	Possible Cause	Remedy
Transponder Communications		
Unit returns “#10” during attempted transponder communications	Antenna is improperly connected.	Ensure antenna is properly connected. See Connecting an External LF Antenna .
	Antenna positioned too close to metal.	Re-position antenna away from metal. See Metal vs. Non-Metal .
Unit returns “XXXXXXXX” while searching for a transponder	Transponder too far away	Move transponder closer to antenna.
	Transponder incorrectly oriented	Ensure transponder is properly oriented relative to antenna. See Transponder Orientation .
	Transponder communications blocked by metal.	Minimize interference by metal. See Metal vs. Non-Metal .
Cannot read data blocks	Incorrect data block read attempted.	Ensure correct data block is requested. See Reading Transponder Data “RD” .
	Incorrect transponder type. Data password protected.	Ensure transponder is UI Devices type.
Cannot write data blocks	Incorrect data block write attempted.	Ensure correct data block is requested. See Writing Transponder Data “WD” .
	Incorrect transponder type. Data password protected.	Ensure transponder is UI Devices type.
	Transponder too far away	Move transponder closer to antenna.
	Transponder incorrectly oriented	Ensure transponder is properly oriented relative to antenna. See Transponder Orientation .
	Transponder communications blocked by metal.	Minimize interference by metal. See Metal vs. Non-Metal .

Appendix 1 – Default Settings and Response/Error Codes.

Note:

The “BD” command does NOT affect the baud rate between the UBS-200L and the Host PC. If it is desired to change the baud rate between the UBS-200L and the Host PC, please use the [Change Host Baud Rate “UID BD”](#) command.

Note:

Changing the BD value can disconnect communications between the UBS-200L and the internal LF Module. Only make adjustments to this parameter if instructed to do so by UI Devices.



Echo “EC X”

The “EC” command causes the LF Module to echo received commands back to the host, prior to executing them. This can occasionally be useful, if the terminal software does not support a “Local Echo” function. Sending the command “EC 1” will turn on this feature. Sending the command “EC 0” will turn off the Echo feature. The feature is off by default.

Information:



Even with the Echo feature turned ON, the UBS-200L will NOT send a <LF> character. Further, this feature may adversely affect communications with software packages that do not expect commands to be echoed back. Therefore, best practice is to keep this feature turned OFF, and use the “Local Echo” and “Line Feed” features in the terminal software.

Get Transponder Time-Out “TOR X”

The “GT” command has a 1.5 second time-out by default. The length of this time-out can be adjusted using the “TOR” command. The parameter value can be any value from 0 to 255, and is multiplied by 100 ms to determine the actual duration of the time-out. i.e. “TOR 100” sets the time-out to 10,000 ms, or 10 seconds.

This parameter also determines the speed at which transponder data is repeated in MD2 and MD 4 modes, provided CID is set to 0.

Save to Module EEPROM “VSAVE”

Changes to parameters within the LF Module are valid only until the unit is powered down or reset. The “VSAVE” command can be issued to store the new parameter values in EEPROM, so that they remain permanent even after the unit powers down or is reset.

Reset “RST”

Issuing the “RST” command causes the LF Module to perform a soft reset. Changes to any Module parameters that were not saved using the “VSAVE” command will be lost, and the previous settings will be restored.

“INIT”

Issuing the “INIT” command causes the LF Module to perform a soft reset with default parameters. This is useful to restore the Module to its default state. To permanently restore default settings, issue the “INIT” command followed by the “VSAVE” command.

Get Device S/N “DSN”

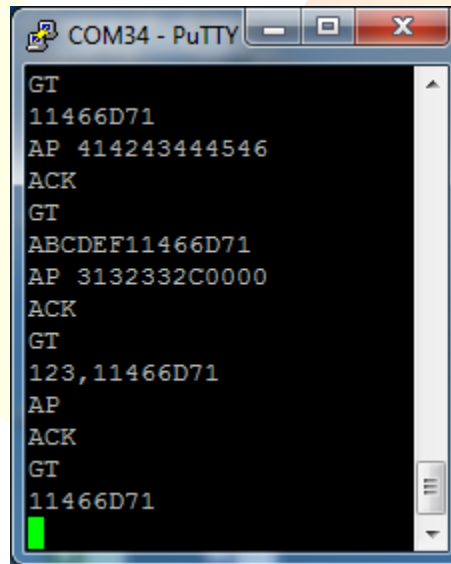
Issuing the “DSN” command returns the LF Module serial-number. Typically, this matches the last 6 digits of the UBS-200L Serial Number.

Append Prefix “AP”

Up to 6 ASCII Characters can be prepended to the UBS-200L output data stream. Issuing “AP” followed by the hexadecimal values of the 6 ASCII characters causes the characters to be pre-pended to the data stream. There is no delimiter between the prefix and the remaining data stream. If a delimiter is required, it must be specified as one of the 6 ASCII characters. All 6 characters must be specified. Use “00” <NULL> characters if a prefix of fewer than 6 characters is required. See examples in **Figure 12**.

For reference, an ASCII table is included in [Appendix 5 – ASCII Table](#).

Issuing “AP” with no parameter turns the feature off.



```
COM34 - PuTTY
GT
11466D71
AP 414243444546
ACK
GT
ABCDEF11466D71
AP 3132332C0000
ACK
GT
123,11466D71
AP
ACK
GT
11466D71
```

Figure 12. “AP” Prefix Examples.



Information:

There is no included delimiter with the “AP” prefix. If a delimiter is required, it must be specified as one of the 6 ASCII characters.



Information:

All 6 ASCII characters must be specified with the “AP” command. Use “00” <NULL> characters if a prefix of fewer than 6 characters is required.

Transmit Device Serial Number “TDSN”

Setting the TDSN to 1 causes the UBS 200L to prepend the output data stream with the last 6 digits of the device serial number, along with a delimiting comma. This can be useful when data is coming in from multiple readers over a single port, or if data is being aggregated into a single file. Sending the command “TDSN 1” will turn on this feature. Sending the command “TDSN 0” will turn off the feature off. The feature is off by default. See example in **Figure 13**.

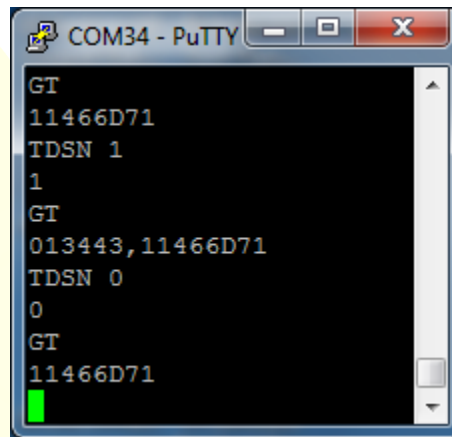


Figure 13. “TDSN” Prepend Serial Number Example.

Start Data Block “SDB”

Issue the “SDB” command followed by the beginning block number to specify where the user-data begins in the transponder memory structure. By default, this value is 7 for UI Devices TTF transponders. Some older “Classic” transponders start at block 3.

Check Config Block “CCB”

Setting “CCB” to 1 causes the UBS-200L to automatically select the beginning block of the user-data based on the transponder type. This overrides the “SDB” setting, and may be useful where UI Devices TTF and “Classic” transponders are intermixed.

Information:



Setting “CCB” to 1 overrides the “SDB” setting. If user data begins at a block other than 3 or 7, set “CCB” to 0 and specify the beginning data block using the “SDB” command.



Chapter 4 – Tips and Tricks for Optimum Performance

Read Range and Read Field

Metal vs. Non-Metal

Metal interferes with the transmission and receiving of RF signals. As such, the UBS-200L performs best when operated with the antenna away from metal objects. Placing the antenna on a metal surface may reduce the read distance. Placing a metal object between the antenna and transponder may interfere with or block communications completely. As such, best practice is to keep antenna as far from metal objects as possible. When in doubt, as a general rule, if the UBS-200L seems to be performing well with the antenna in the presence of metal, then there is no issue. If the UBS-200L is underperforming with the antenna in the presence of metal, increase the distance from the antenna to the metal to improve performance.

Neighboring Readers

RFID readers are radio transmitter/receivers, and like radios, they can interfere with each other. A sudden drop in performance may be due to another reader antenna being operated in close proximity. Best practice is to maintain a distance of at least 18 inches between readers and antennas operating at the same frequency. e.g. a handheld reader and a desktop reader. If interference between two readers is suspected, increase distance between the readers to mitigate the interference.

Transponder Orientation

The area in which a transponder can be read depends greatly on the transponder type, size, and orientation to the UBS-200L antenna. The following diagrams show the typical area where glass and disc transponder can be read reliably.

Glass transponders can best be read standing up at the center of the antenna, or sideways pointing to the center at the edge of the antenna, as shown in **Figure 14**. Glass transponders inside needles must be carefully positioned over the antenna, as the metal interferes greatly with RF communications.



Note:

Glass transponders inside needles must be carefully positioned over the reader antenna, as the metal interferes greatly with RF communications.



Figure 14. Optimum Read Positions for a Glass Transponder.

Disc transponders can best be read flat in the center of the antenna, or on edge at the edge of the antenna, as shown in **Figure 15**.



Figure 15. Optimum Read Positions for a Disc Transponder.

Maintenance

Follow these simple maintenance procedures to maximize the lifespan of the UBS-200L.

Cables

Keep the USB and antenna cables free of tension and kinks, and inspect periodically for damage. Should a cable become damaged, contact UI Devices for a replacement.

Cleaning

Periodically clean the housing of the UBS-200L using a moist cloth. Never use harsh chemicals or solvents, as they may damage the housing. Do not submerge the unit in water.



Caution:

Never use harsh chemicals or solvents when cleaning the UBS-200L, as they may damage the housing!





Caution:

Never submerge the UBS-200L in water!

Unified

Troubleshooting

Use the following table as a guide to remedy issues encountered when using the UBS-200L.

Symptom	Possible Cause	Remedy
Power		
Unit does not power up, Power LED does not illuminate.	Power supply disconnected	Ensure power supply is properly connected, both at the “DC in” connector and at the source. See Connecting Power .
	No power at source	Ensure there is power at source. Try another source, or test with another appliance.
	Power switch not fully depressed.	Ensure power switch is fully depressed. See Figure 5 .
Host Communications		
Unit does not communicate with host PC.	USB cable Disconnected	Ensure USB cable is properly connected at unit, and at host PC. See Reading a Transponder Present a UI Devices transponder to the antenna, following best practices described in Setting “CCB” to 1 causes the UBS-200L to automatically select the beginning block of the user-data based on the transponder type. This overrides the “SDB” setting, and may be useful where UI Devices TTF and “Classic” transponders are intermixed.
		<p>Information:</p>  <p>Setting “CCB” to 1 overrides the “SDB” setting at a block other than 3 or 7, set “CCB” to 0 and beginning data block using the “SDB” command.</p>
		Chapter 4 – Tips and Tricks for Optimum Performance. The unit beeps once, and the transponder ID appears on the LCD display. Congratulations! A transponder has been read!
		<p>Information:</p>  <p>If the ID does not appear when a UI Devices transponder is presented to the antenna, it is likely that the unit is pre-configured in “Standby” mode. Continue with Connecting to Host PC to complete set-up and begin reading.</p>

	COM Port Incorrect	Ensure correct COM port is selected. See Determining COM Port number using “Device Manager” .
	Incorrect Baud Rate	<ol style="list-style-type: none"> 1. Ensure correct Baud Rate is selected. 2. Test all Baud Rates. See Advanced-Level Adjustable Settings for available Baud Rates.
	Other COM Settings Incorrect	Ensure all remaining serial port settings are correct. See Default Host Serial Port Settings .
	COM Port not open, or improperly closed during previous session.	<ol style="list-style-type: none"> 1. Close any open connections to COM port. 2. Unplug and re-plug USB Cable. 3. Double-check assigned COM port. See Determining COM Port number using “Device Manager”. 4. Re-attempt communications.
Double-Characters returned over COM port.	Echo is on	Turn Echo parameter off. See Echo “EC X” .

Symptom	Possible Cause	Remedy
Transponder Communications		
Unit returns “#10” during attempted transponder communications	Antenna is improperly connected.	Ensure antenna is properly connected. See Connecting an External LF Antenna .
	Antenna positioned too close to metal.	Re-position antenna away from metal. See Metal vs. Non-Metal .
Unit returns “XXXXXXXX” while searching for a transponder	Transponder too far away	Move transponder closer to antenna.
	Transponder incorrectly oriented	Ensure transponder is properly oriented relative to antenna. See Transponder Orientation .
	Transponder communications blocked by metal.	Minimize interference by metal. See Metal vs. Non-Metal .
Cannot read data blocks	Incorrect data block read attempted.	Ensure correct data block is requested. See Reading Transponder Data “RD” .
	Incorrect transponder type. Data password protected.	Ensure transponder is UI Devices type.
Cannot write data blocks	Incorrect data block write attempted.	Ensure correct data block is requested. See Writing Transponder Data “WD” .
	Incorrect transponder type. Data password protected.	Ensure transponder is UI Devices type.
	Transponder too far away	Move transponder closer to antenna.
	Transponder incorrectly oriented	Ensure transponder is properly oriented relative to antenna. See Transponder Orientation .
	Transponder communications blocked by metal.	Minimize interference by metal. See Metal vs. Non-Metal .

Appendix 1 – Default Settings and Response/Error Codes

LF Module Adjustable Settings

The following settings are available for adjustment by the user to improve compatibility, performance, and desirable operation. Default values are in **BOLD**.

Parameter	Description	Default Value	Possible Values	Meaning
TOR	Single Read Timeout	15	0-255	Timeout value between GT command and No Transponder “XXXXXXXX” response. Value is multiplied x 100 ms. i.e. 15 = 1.5 s.
MD	Read Mode	4 1 4	0 2 4 X X	Continuous ID Read Mode Standby Mode Continuous Custom Read Mode
CID	Repeat ID Suppression	0	0 1	No Suppression of repeat Transponder IDs Repeat Transponder IDs are Suppressed
CN	No-Read Suppression	1	0 1	No Suppression of “XXXXXXXX” Response “XXXXXXXX” Response is Suppressed
NID	Redundant Validation of Transponder ID	0	0 1	One ID read is considered valid Two consecutive ID reads required for validation
MP	Antenna Port Selection	1	1 2	Antenna Port 1 Antenna Port 2
AP	Append Prefix	<NULL>	ASCII	Specify serial prefix – up to 6 ASCII characters
SDB	Start Data Block	7	3, 5-13	Data block from which to start reading user data
TDSN	Transmit S/N	0	0 1	Do not pre-pend serial number Prepend serial number
CCB	Check Config Block	1	0 1	Do not check config block Check config block – Automatically overrides SDB

Advanced-Level Adjustable Settings

The following settings are available for adjustment after the Advanced User Log-in Password has been entered. Default values are in **BOLD**.

Parameter	Description	Default Value	Possible Values	Meaning
UID BD	Host Baud Rate	5	0	4800
			1	9600
			2	19200
			3	38400
			4	57600
			5	115200
UID SND	Sound On/Off	1	0	Sound OFF
			1	Sound ON
UID PTCH	Sound Pitch	4096	31-9999	Pitch of transponder read confirmation tone
UID LCD	LCD On/Off	1	0	LCD OFF
			1	LCD ON
UID KW	Keyboard Wedge On/Off	1	0	Keyboard Wedge OFF
			1	Keyboard Wedge ON
UID DEFANT	Default Power-up Antenna	1	1	Antenna Port 1
			2	Antenna Port 2
UID LFBD	LF Module Baud Rate	3	0	4800
			1	9600
			2	19200
			3	38400

Reserved LF Module Settings

The following settings are programmed at the factory to ensure proper operation, and should not be changed by the user. The factory default settings are listed below. In case a parameter is inadvertently changed, it can be restored using the values in the table. Contact UI Devices for assistance in restoring default settings.

Parameter	Default Value
BD	3
EC	0
HF	1
FD	2
SA	0
TI	225
TO	130
TP	172
TS	1
TT	0
TZ	110
DSN	xxxxxx
PWC	1

Default Host Serial Port Settings

Bits per second:

Data bits:

Parity:

Stop bits:

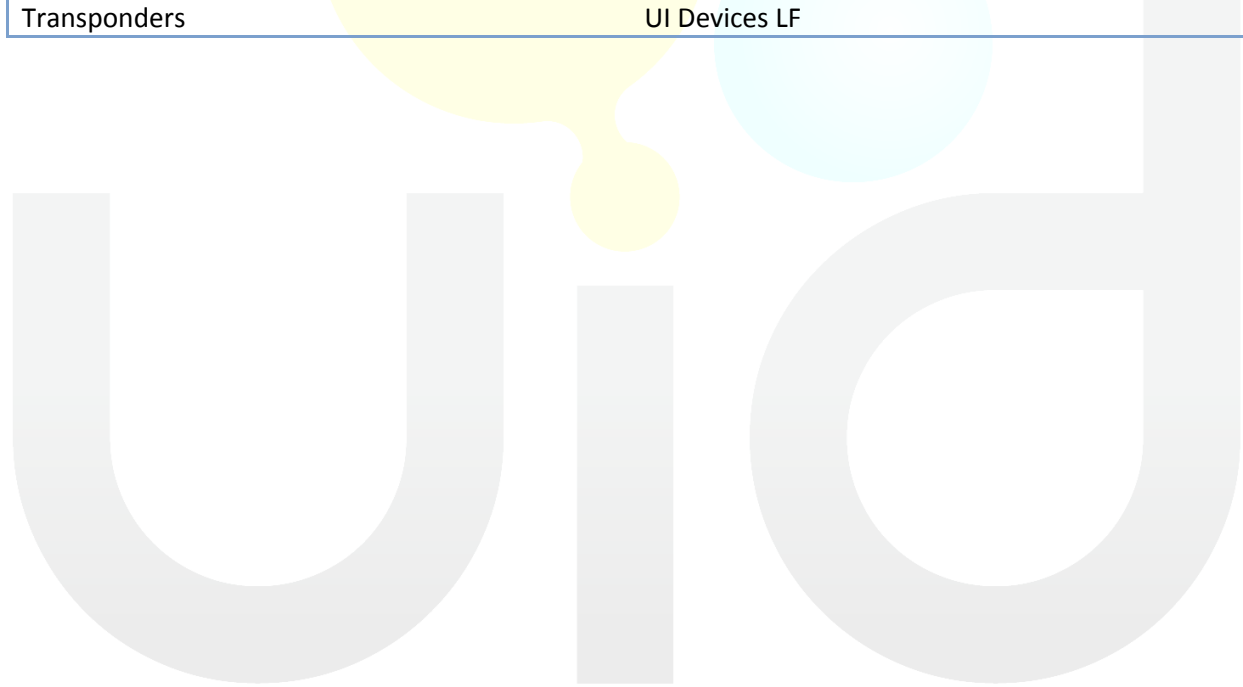
Flow control:

Common Response/Error Codes

Response/Error Code	Meaning
<NAK>#00<CR>	Unknown Command
<NAK>#02<CR>	Incorrect Parameter
<NAK>#09<CR>	Read Error
<NAK>#10<CR>	Antenna Failure
XXXXXXXX<CR>	No Transponder

Appendix 2 – Technical Specifications

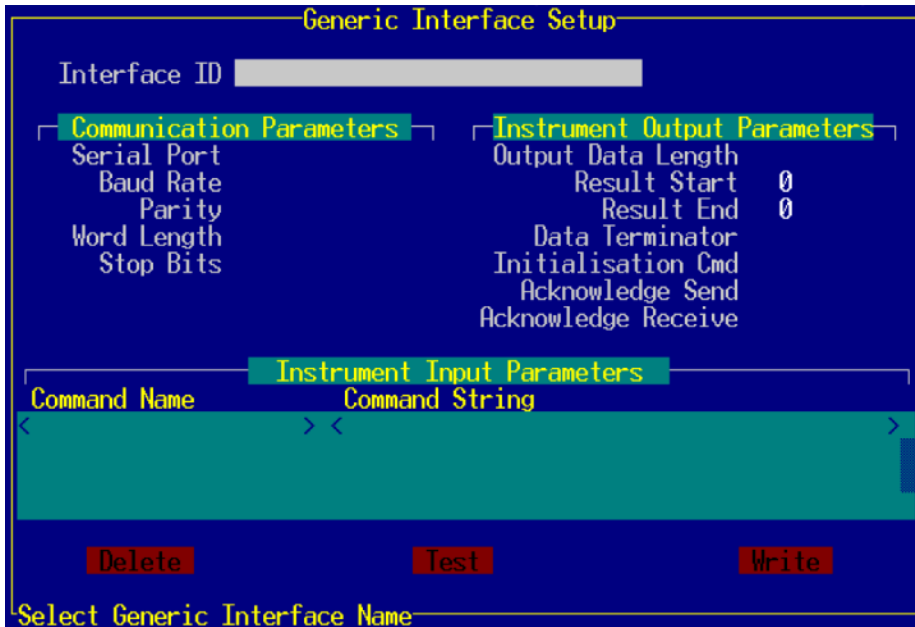
Parameter	Value
Electrical Characteristics	
Input Voltage	12V DC
Power Supply	12V, 1A (Switching)
Interface	USB
RF Frequency	134.2 KHz
Physical Characteristics	
Dimensions L x W x H	5.5 in x 5.5 in x 4.0 in
Housing Material	Aluminum, ABS
Environmental	
Operating Temperature	-20°C to +70°C
Storage Temperature	-20°C to +70°C
Compatibility	
Transponders	UI Devices LF



Appendix 3 – Connecting to Third-Party Systems

Configuring Instem Provantis COM Port Settings

1. From the “Start” menu on the PC, navigate to and select the “Instrument Comms Interface”:
Start -> Programs -> Provantis -> Administration -> Instrument Comms Interface
2. The “Generic Interface Setup” Screen appears.



3. Populate the fields according to the values the table below.

Interface ID:	<i>(Use Something recognizable, such as UI Devices UBS-200L)</i>
Communication Parameters	
Serial Port:	COMX <i>(Where X is the COM port value determined in Chapter 2 – Getting Started with the UBS-200L)</i>
Baud Rate:	38400
Parity:	None
Word Length:	8
Stop Bits:	1
Instrument Output Parameters	
Output Data Length:	9
Result Start:	1
Result End:	8
Data Terminator:	<CR>
Initialisation Cmd:	GT<CR>
Acknowledge Send:	None
Acknowledge Receive:	None

4. Select “Test” at the bottom of the Setup screen.
5. Select “Implant Reader” from the “Interface Type” box.

6. Present a UI Devices transponder to the UBS-200L antenna within 5 seconds. The 8-character Transponder ID should display perfectly just below the text “Last string received from the instrument” and should be formatted correctly in the “Result Value” box. If the read-cycle times-out prior to the transponder being presented, “XXXXXXXX” will be displayed.
7. Set-up is complete! Scanned Transponder IDs will now appear in the “Implant Number” field of the “Select Subject” window.

Configuring the UBS-200L for Continuous Read Mode

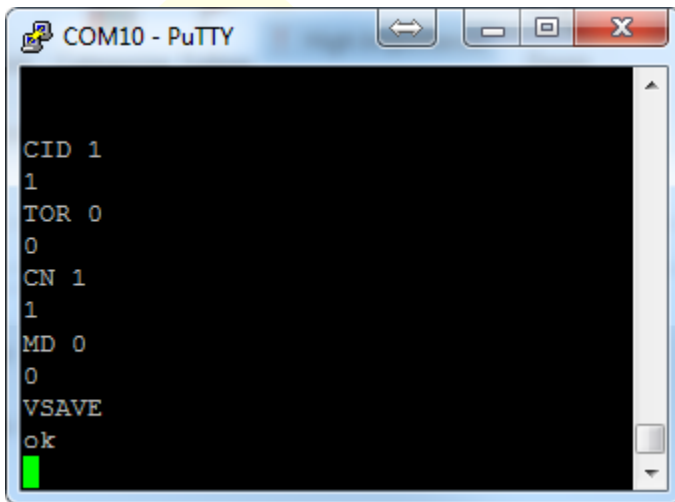
Open a terminal session as described in



1. Testing Communications using Terminal Software.
2. Send the following commands to configure the UBS-200L for “Continuous Read Mode.”

CID 1
TOR 0
CN 1
MD 0
VSAVE

The terminal session should appear as below:



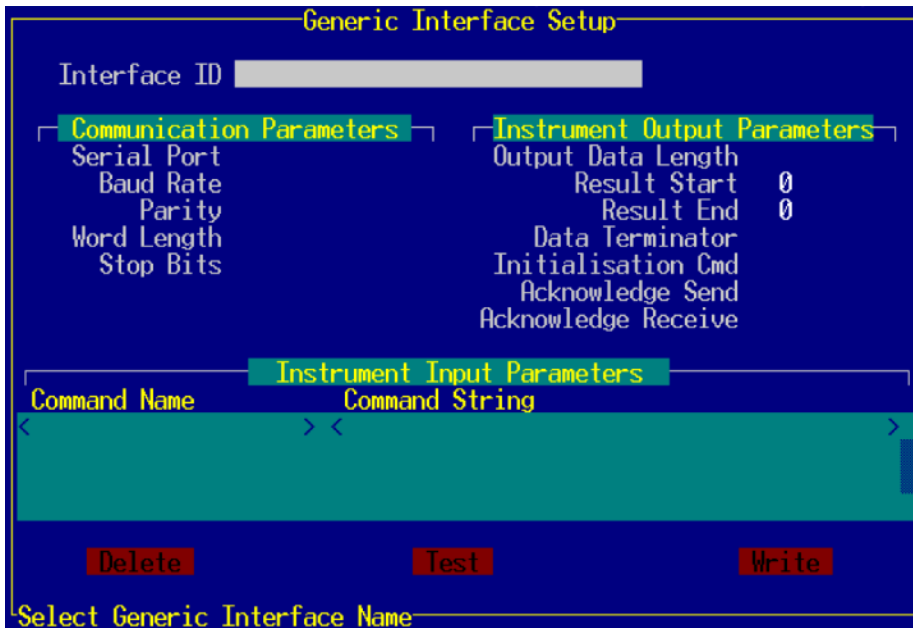
```
COM10 - PuTTY
CID 1
1
TOR 0
0
CN 1
1
MD 0
0
VSAVE
ok
```

3. Set-up is complete! The UBS-200L is now in Continuous Read mode!

Configuring Instem Provantis for Continuous Read Mode

1. From the “Start” menu on the PC, navigate to and select the “Instrument Comms Interface”:
Start -> Programs -> Provantis -> Administration -> Instrument Comms Interface

- The “Generic Interface Setup” Screen appears.



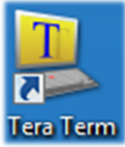
- Populate the fields according to the values the table below.

Interface ID:	<i>(Use Something recognizable, such as UI Devices UBS-200L)</i>
Communication Parameters	
Serial Port:	COMX <i>(Where X is the COM port value determined in Chapter 2 – Getting Started with the UBS-200L)</i>
Baud Rate:	38400
Parity:	None
Word Length:	8
Stop Bits:	1
Instrument Output Parameters	
Output Data Length:	9
Result Start:	1
Result End:	8
Data Terminator:	<CR>
Initialisation Cmd:	None
Acknowledge Send:	None
Acknowledge Receive:	None

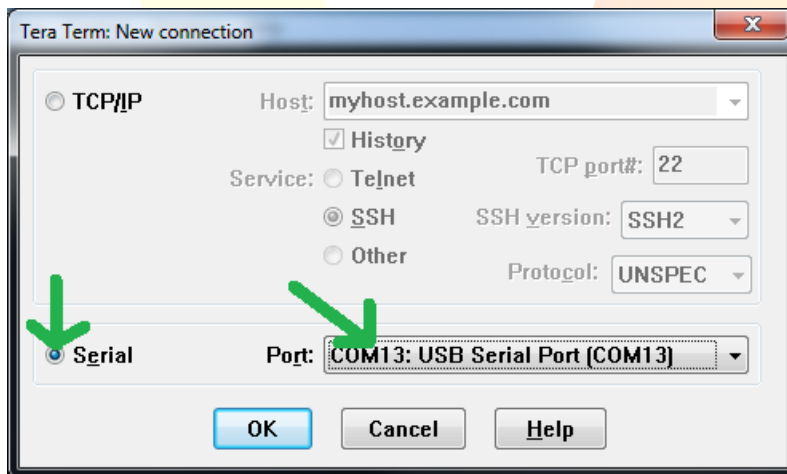
- Select “Test” at the bottom of the Setup screen.
- Select “Implant Reader” from the “Interface Type” box.
- Present a UI Devices transponder to the UBS-200L antenna within 5 seconds. The 8-character Transponder ID should display perfectly just below the text “Last string received from the instrument” and should be formatted correctly in the “Result Value” box.
- Set-up is complete! Scanned Transponder IDs will now appear in the “Implant Number” field of the “Select Subject” window.

Appendix 4 - Test Virtual COM Port using Tera Term

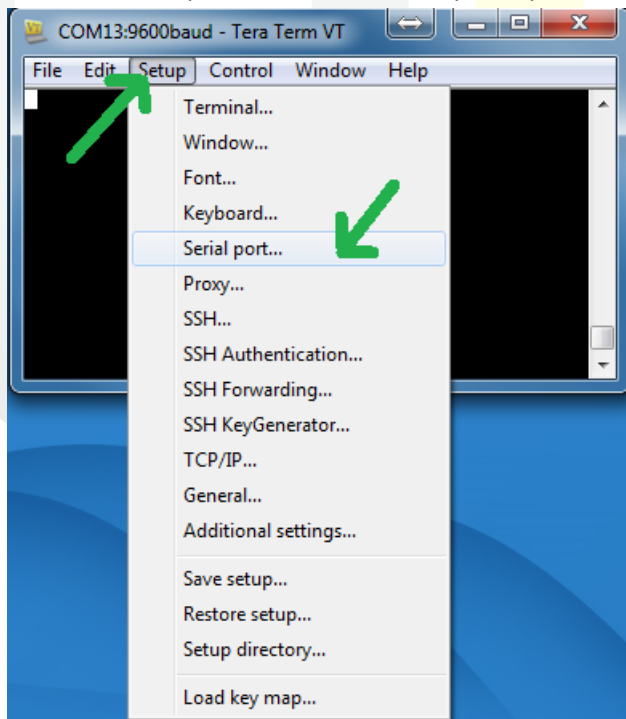
1. Download and install “Tera Term” terminal software.
2. Launch the application by double-clicking the “Tera Term” icon.



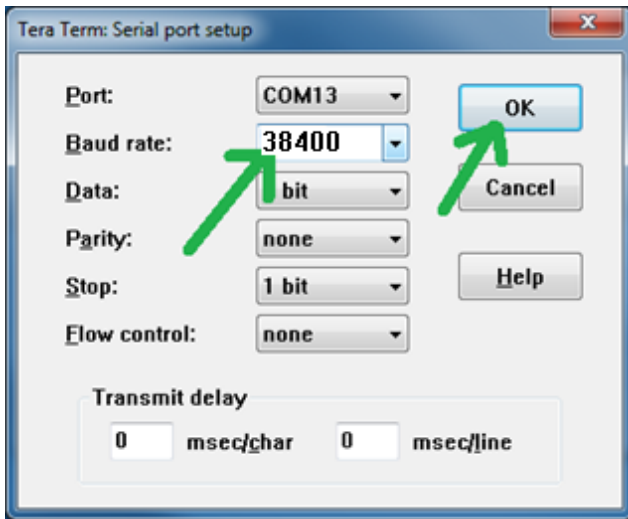
3. Click the “Serial” Radio button, and then change to the correct assigned COM port number as determined in the Device Manager. (See Chapter 2 – Getting Started with the UBS-200L) Click “OK.”



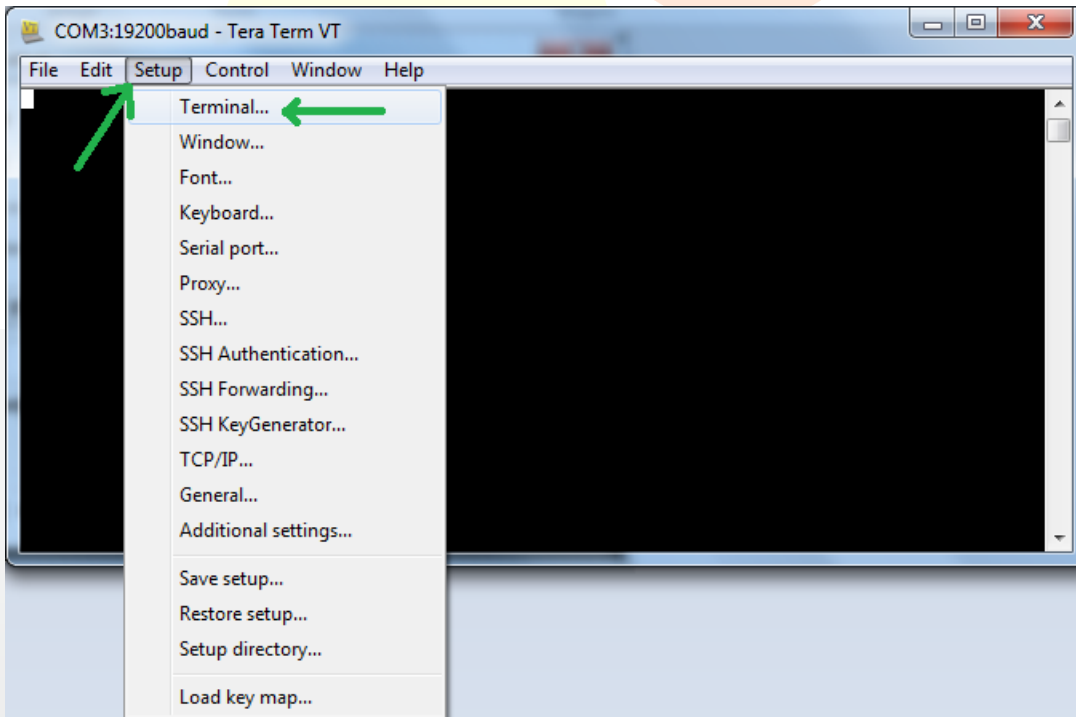
4. Choose “Serial port...” from the “Setup” drop-down menu.



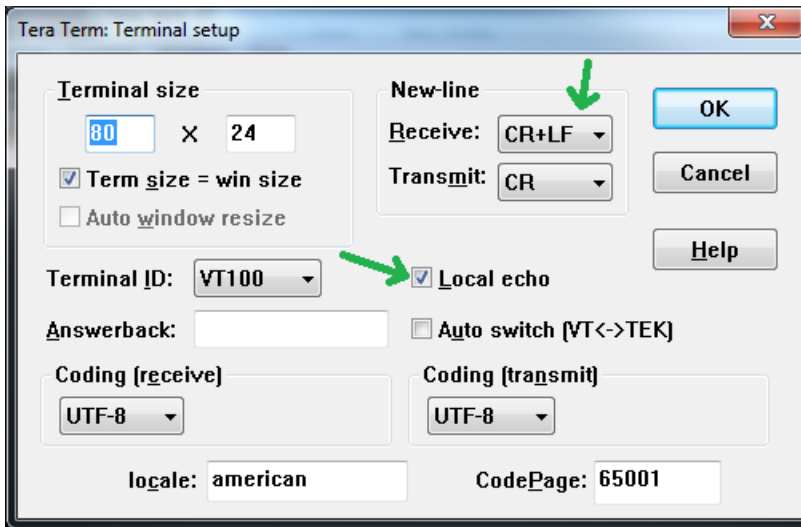
- Set the “Baud rate” to 38400, and click “OK.”



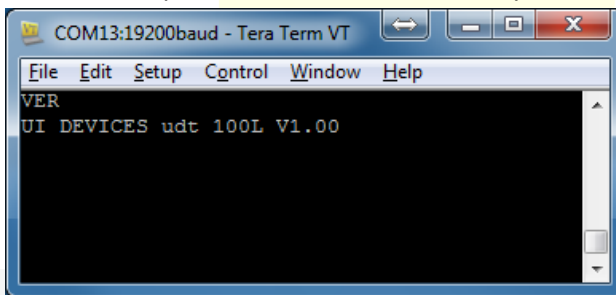
- Choose “Terminal...” from the “Setup” drop-down menu.



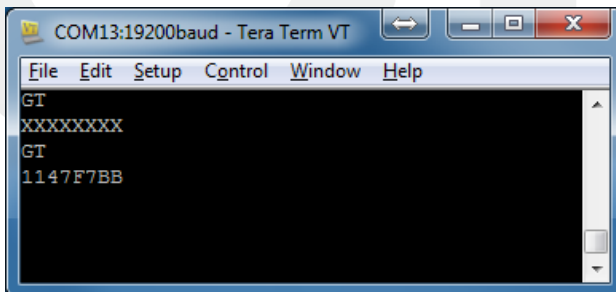
8. Enable “Receive: CR+LF” and “Local echo” in the terminal software.



6. Type “VER” and press <ENTER> to request the firmware version number from the UBS-200L. The exact response from the UBS-200L may be different from that in the below example.



7. Congratulations! COM port communications have been verified!
8. Now type “GT” into the terminal window and press <ENTER>. If no transponder is present at the UBS-200L antenna, “XXXXXXXX” will appear after a short delay, indicating that no transponder was found.
9. Now place a transponder on the UBS-200L antenna and type “GT” followed by <ENTER> again. If the transponder is properly positioned above the UBS-200L antenna, the ID of the transponder will be immediately displayed.



10. Congratulations! The UBS-200L is successfully reading the transponder!

Appendix 5 – ASCII Table

ASCII TABLE

Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char
0	0	[NULL]	32	20	[SPACE]	64	40	@	96	60	`
1	1	[START OF HEADING]	33	21	!	65	41	A	97	61	a
2	2	[START OF TEXT]	34	22	"	66	42	B	98	62	b
3	3	[END OF TEXT]	35	23	#	67	43	C	99	63	c
4	4	[END OF TRANSMISSION]	36	24	\$	68	44	D	100	64	d
5	5	[ENQUIRY]	37	25	%	69	45	E	101	65	e
6	6	[ACKNOWLEDGE]	38	26	&	70	46	F	102	66	f
7	7	[BELL]	39	27	'	71	47	G	103	67	g
8	8	[BACKSPACE]	40	28	(	72	48	H	104	68	h
9	9	[HORIZONTAL TAB]	41	29	)	73	49	I	105	69	i
10	A	[LINE FEED]	42	2A	*	74	4A	J	106	6A	j
11	B	[VERTICAL TAB]	43	2B	+	75	4B	K	107	6B	k
12	C	[FORM FEED]	44	2C	,	76	4C	L	108	6C	l
13	D	[CARRIAGE RETURN]	45	2D	-	77	4D	M	109	6D	m
14	E	[SHIFT OUT]	46	2E	.	78	4E	N	110	6E	n
15	F	[SHIFT IN]	47	2F	/	79	4F	O	111	6F	o
16	10	[DATA LINK ESCAPE]	48	30	0	80	50	P	112	70	p
17	11	[DEVICE CONTROL 1]	49	31	1	81	51	Q	113	71	q
18	12	[DEVICE CONTROL 2]	50	32	2	82	52	R	114	72	r
19	13	[DEVICE CONTROL 3]	51	33	3	83	53	S	115	73	s
20	14	[DEVICE CONTROL 4]	52	34	4	84	54	T	116	74	t
21	15	[NEGATIVE ACKNOWLEDGE]	53	35	5	85	55	U	117	75	u
22	16	[SYNCHRONOUS IDLE]	54	36	6	86	56	V	118	76	v
23	17	[ENG OF TRANS. BLOCK]	55	37	7	87	57	W	119	77	w
24	18	[CANCEL]	56	38	8	88	58	X	120	78	x
25	19	[END OF MEDIUM]	57	39	9	89	59	Y	121	79	y
26	1A	[SUBSTITUTE]	58	3A	:	90	5A	Z	122	7A	z
27	1B	[ESCAPE]	59	3B	;	91	5B	[	123	7B	{
28	1C	[FILE SEPARATOR]	60	3C	<	92	5C	\	124	7C	|
29	1D	[GROUP SEPARATOR]	61	3D	=	93	5D	]	125	7D	}
30	1E	[RECORD SEPARATOR]	62	3E	>	94	5E	^	126	7E	~
31	1F	[UNIT SEPARATOR]	63	3F	?	95	5F	_	127	7F	[DEL]

