QUICK START GUIDE *Revision 1.2*

SMALL SCALE SYSTEM

CONNECTING & CONFIGURING BIOMARK DEVICE MANAGER SOFTWARE

Biomark®

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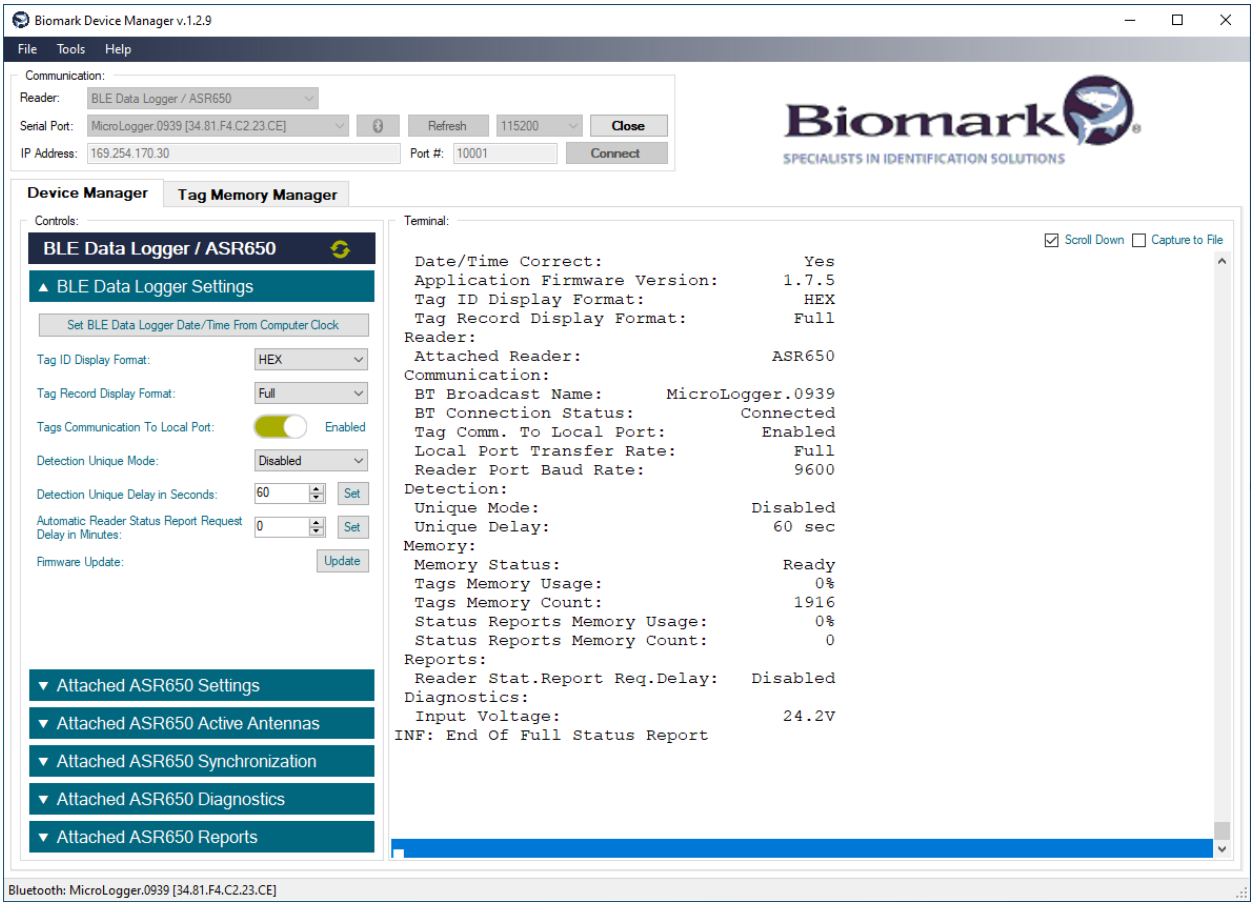
Software Overview

The Small Scale System uses Biomark's Device Manager software to configure settings on the ASR650 reader and to interface with the attached Biomark BLE Data Logger to download data collected from the reader. The primary function of Device Manager is to allow the user to access the device's memory, configure reader and data logger settings and download data to be displayed and exported.

Software features:

- Quick and easy connection to the Small Scale System
- Downloads Bluetooth Data Logger's Memory for export into Microsoft Excel, Access, or Text file
- Duplicate tag ID filtering using Tag Memory Manager
- Bluetooth compatible
- Hex/Dec tag ID converter
- Store real-time communication and tag data in a text file in a user-defined location



Step 1

1.1 Download Device Manager Software

The software is available to download from the Biomark website:

https://www.biomark.com/software-drivers

1.2 Updating Program

If the PC Device Manager is installed upon has access to the internet, the program is easily updated. The program will automatically check for updates at startup; an update check is forced manually by selecting **Help** > **Check for Updates**.

If an update is available, follow the prompts to update Device Manager. After the update has been installed, Device Manager will restart automatically.

If an update is not available, a pop-up window will indicate the Device Manager is up to date. Click the **OK** button to close the window.

Step 2

2.1 Connecting Power and Antennas to the Small Scale System

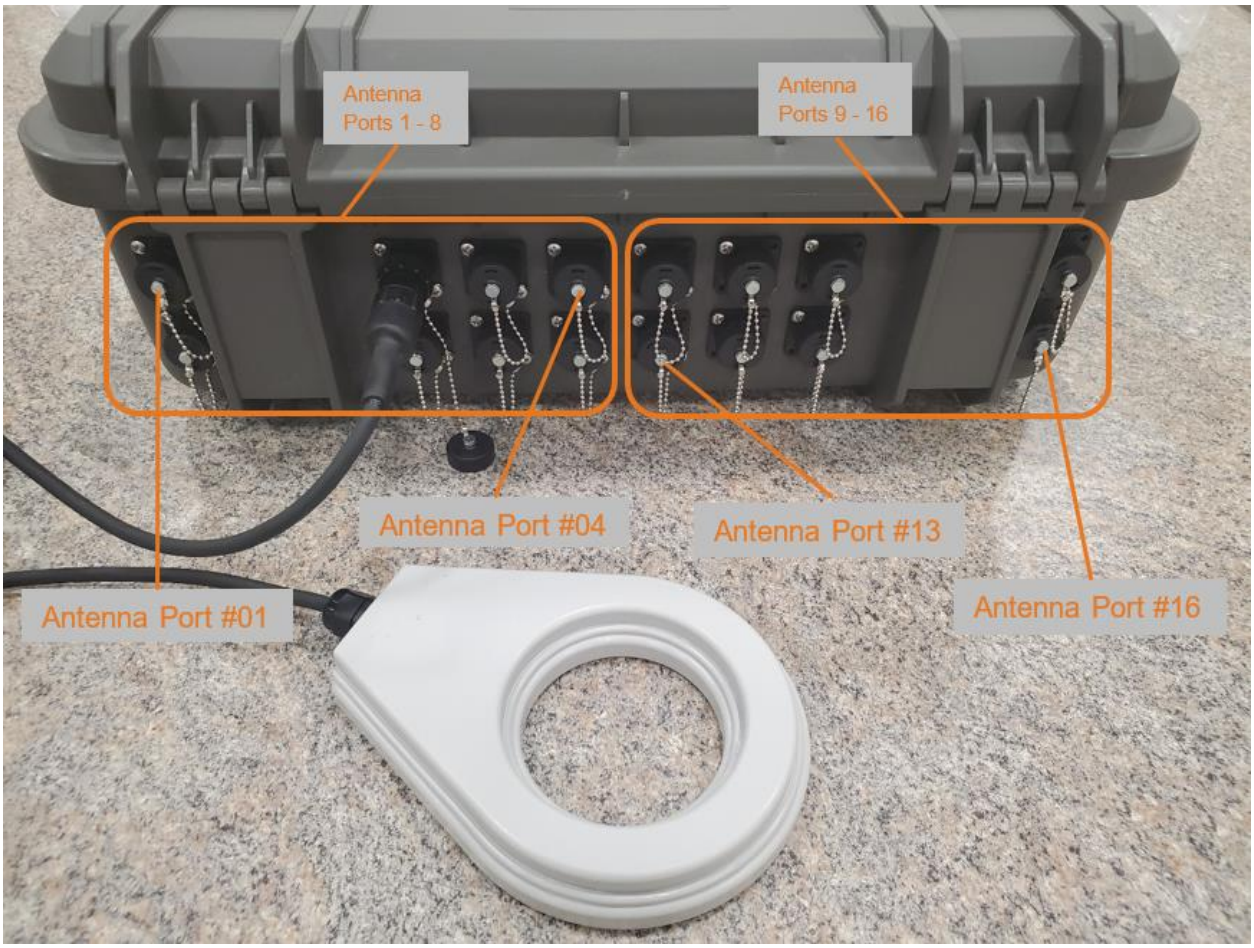
- **Connecting Power** – AC and DC ports are located on the left side of the enclosure. The Small Scale System is powered by either 12-24VDC (1.5 – 3.0amps) or 115 – 230VAC/50-60Hz (0.95 – 0.56A). To select an input power source, use the three-position rocker switch located on the inside lid of the enclosure. Before connecting or disconnecting a power source, ensure the power switch is positioned in the middle **OFF** position.

- If using a **DC** power source, connect the supplied DC battery cable to the DC port on the left side of the Small Scale System enclosure. Connect the DC power battery clamps to the DC power source within the DC power range of 12 – 24VDC. Ensure the RED (+) battery clamp is connected to the positive side and the **Black (-)** is connected to the negative side of the DC power source.

- If using an **AC** power source, connect a U.S. NEMA 5-15R receptacle to the AC bulkhead port on the left side of the Small Scale System enclosure. Connect power cable to an AC power receptacle within the AC power range of 115 – 230VAC/50-60Hz.

- **Connecting Antennas** – Secure the 4-pin connector of each antenna to the antenna ports located on the back of the Small Scale System. Antenna ports are assigned a number starting on top left, viewing from the back of enclosure. Insert the antenna connector into the antenna port until fully seated then tighten threaded collar by hand until locked.

A laminated diagram included with the system also provides a map associating the physical antenna port location to the antenna number assigned by the Small Scale System.



2.2 Power ON System

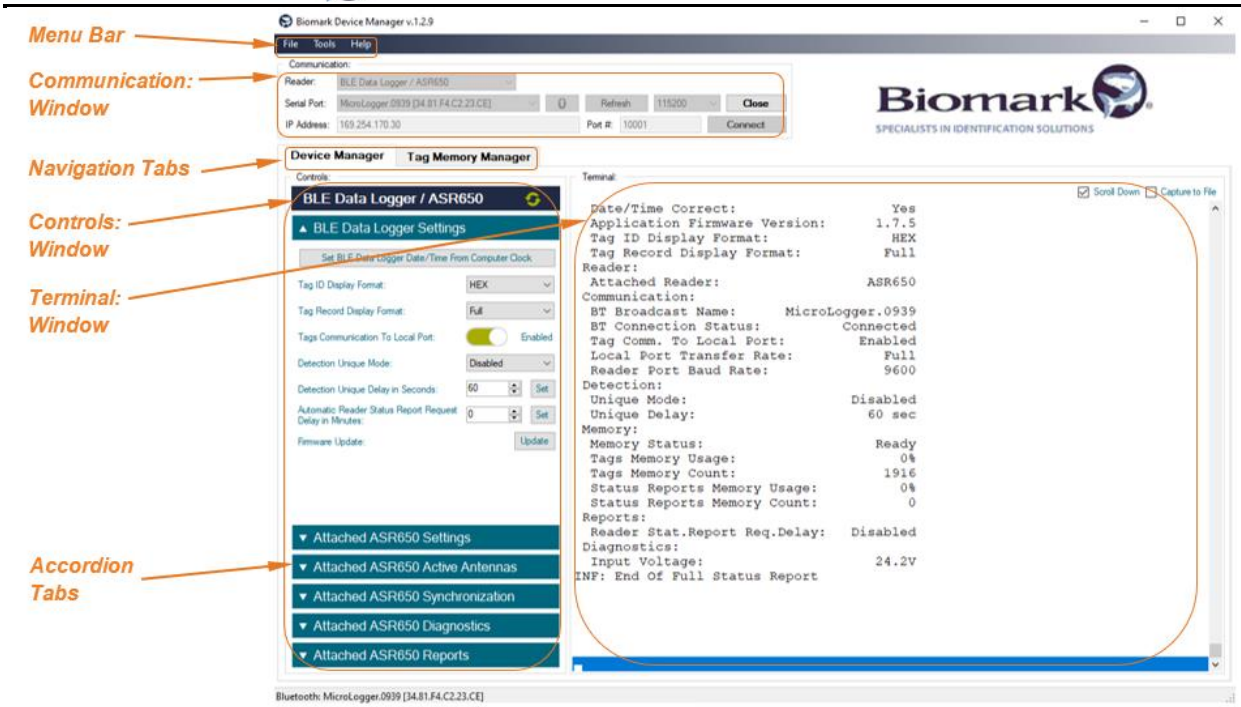
Turn ON the Small Scale System, by setting the three-way power switch to the correct power source (AC or DC). Once turned ON, the red “SERVICE” LED will flash once followed by the steady illumination of the yellow “POWER” LED. Upon power on, The Small Scale System will then begin scanning tags on the active antennas selected in the Device Manager software.

Step 3

Upon starting Device Manager, the program will default to the **Device Manager** navigation tab. There are two navigation tabs to choose from located in the middle-left of the program window. Selecting these tabs will toggle between the primary function screens of the program.

- **Device Manager** – Provides **Controls** and **Terminal** windows specific to the connected device or reader for the purpose of adjusting settings.

- **Tag Memory Manager** – Allows for downloading of the device memory. The device memory can also be cleared of all data from this screen.



3.1 Device Setup and Connection

The Small Scale System uses a Biomark BLE (Bluetooth Low Energy) Data Logger to collect and store data from the ASR650 reader. Device Manager will connect to the BLE Data Logger using the Bluetooth connection. Tag ID format displayed from the BLE Data Logger can be configured in the *BLE Data Logger Settings* accordion referenced in section 4.2. Selecting any of the **Attached ASR650** accordion bars will automatically configure the BLE Data Logger to open a direct communication channel with the ASR650 communications port. This allows Device Manager to communicate directly with the reader and configure settings and access ASR650 antenna diagnostics.

Note: While a direct communication channel to the ASR650 is open, data IS NOT being written to the BLE Data Logger's memory. A RED warning bar above the Terminal window will be displayed until the connection is closed. To prevent accidental loss, the direct communication channel will be automatically closed in 60 minutes if left open.

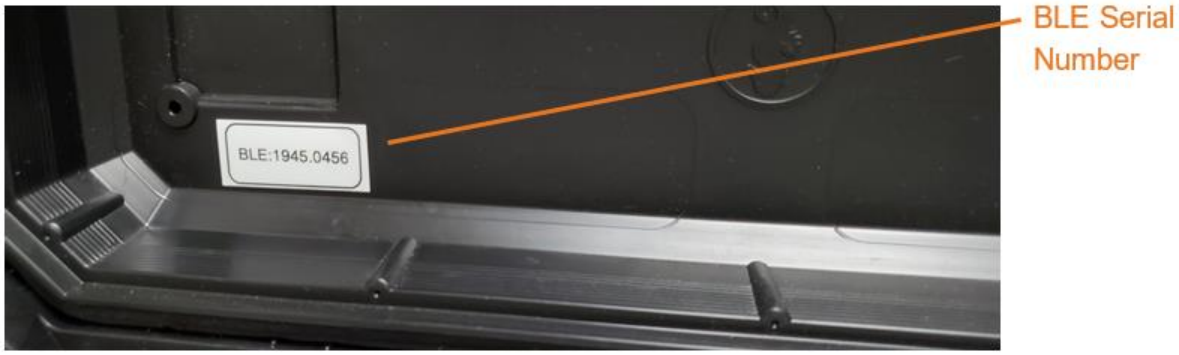
Tags detected while this connection is open are displayed in the **Terminal** window. Selecting the **Capture to File** box in upper right corner of **Terminal** window will automatically copy any information entered into the **Terminal** window to the path specified in the Menu bar **Tools > Settings > Application > Capture File Path:** as a text file name *DeviceMan.txt.* The Date/Time format of the data displayed in Device Manager is configured by selecting **Tools > Settings > Application > Date/Time Format:** drop down window. This **must** be done before making the connection to the BLE Data Logger of the Small Scale System.

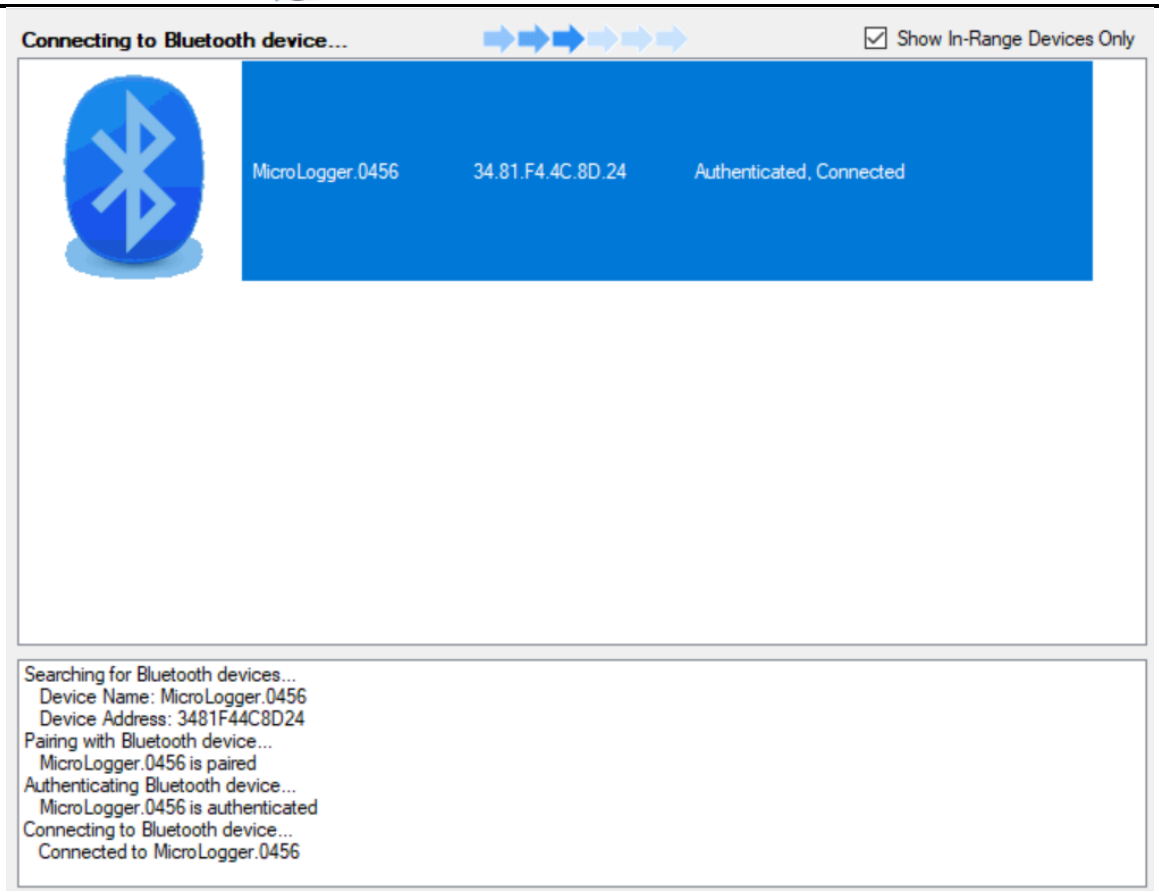
Choose one of the following to close the direct communication channel before it automatically closes after 60 minutes:

- Select the **BLE Data Logger Settings** accordion bar
- Select the **Tag Memory Manager** Tab
- Close the **Serial Port** connection with the Small Scale System
- Exit the Device Manager Software
- Cycle the power Off/On to the Small Scale System

Use the **Communications** window in Device Manager software to setup a connection with the BLE Data Logger of the Small Scale System.

- **Reader** - Select **BLE Data Logger / ASR650**.
- **Serial Port** – To achieve communication, select the **Bluetooth** icon located to the right of the Serial Port drop-down box.
  - The Bluetooth Connection Utilities box will appear and start searching for Bluetooth devices. To only show devices currently active and within range of computer, select the **Show In-Range Devices Only** box.
  - Select the Bluetooth device MicroLogger.xxxx with the same last 4 digits of the BLE Data Logger's serial number attached to the ASR650 reader. The data logger serial number is identified on the inside lid of the enclosure.





- The bottom left corner of the Biomark Device Manager software will change from **Connection Closed** to **Bluetooth MicroLogger.xxxx** when connected.

Step 4

4.1 Configure Small Scale System Using Device Manager Tab

Select the **Device Manager** tab to view the **Controls** and **Terminal** windows. The **Controls** window lists the **BLE Data Logger / ASR650** reader currently connected and available device settings. The **Terminal** window allows users to view communication traffic from the ASR650 reader and the BLE Data Logger.

4.2 Configure BLE Data Logger Settings

By selecting the arrow icon  on the **BLE Data Logger / ASR650** header, Device Manager refreshes the settings displayed in the **Controls** window and provides a full status report of the BLE Data Logger in the **Terminal** window. Review the settings of the BLE Data Logger to confirm the date/time is correct and memory status reports Ready.

- To update the data logger's date/time, select the **BLE Data Logger Settings** accordion drop-down box in the **Controls** window and click **Set BLE Data Logger Date/Time from Computer Clock**.

Configure the following settings by selecting **BLE Data Logger Settings** accordion drop-down box:

Tag ID Display Format	HEX (Hexadecimal), DEC (Decimal), or Numeric.
Tag Record Display Format	Full (Reader/Antenna ID, Date/Time, Tag) or Short (Tag).
Tag Communication to Local Port	Disable or Enabled (By enabling this function, all tag IDs will be sent to local port and displayed in **Terminal** window).
Detection Unique Mode	Last 5, Last 1, Disabled, and Delay specifies how the Tag ID is handled if it is received multiple times from the reader. If the setting is set to **Disabled**, all tag IDs received from the reader are stored in the memory and sent to the **Terminal** window (default). For all other settings, the newly received tag ID is stored in memory and sent to **Terminal** window (if enabled) only if it is different from: • **Last 5** – Last 5 dissimilar tag IDs previously received from the reader. • **Last 1** – Last tag ID previously received from the reader. • **Delay** – The last 5 dissimilar tag IDs previously received from the reader or if the specified number of seconds have passed since this tag ID was first received (based on the **Detection Unique Delay in Seconds** selected).
Detection Unique Delay in Seconds	Specifies the delay value for the **Detection Unique Mode** option. Valid values are 1 – 43200 seconds (about 12 hours).
Automatic Reader Status Report Request Delay in Minutes	Specifies how often to automatically request the Status Report from the ASR650 reader. Valid values are 0 (disabled), 1 – 1440 seconds (24 minutes).
Firmware Update	If the connected BLE Data Logger firmware is outdated or not supported by Device Manager, a pop-up window will prompt you to update the firmware. Selecting the **Update** button will open a Reader Firmware Update window indicating the present firmware version and if it is **"Outdated"** or **"Up to Date"**.

Most settings are accomplished with a single button; however, some settings will require a value entry. When changing such settings, press the **Set** button after entering the desired value. The command and the reader response appear in the **Terminal** window.

4.3 Configure ASR650 Settings

Select **Attached ASR650 Settings** from accordion drop-down box in the **Controls** window. Selecting the arrow icon  on the **BLE Data Logger / ASR650** header will refresh the setting indicated in the **Controls** window.

Configure the following settings by selecting **Attached ASR650 Settings** accordion drop-down box:

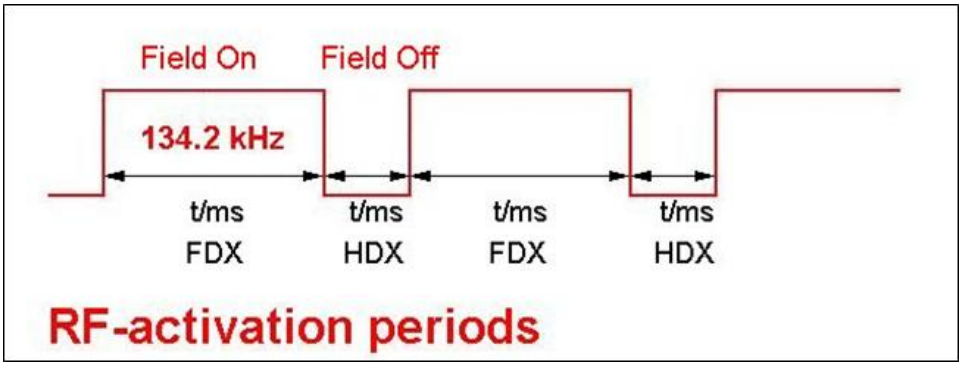
Reader ID	Identifies each reader with a unique number
Reader Operation Mode	Scan (RF Field active) or Standby (RF field inactive)
Tag Detection	FDX (Full Duplex), HDX (Half duplex), FDX + HDX (both)
Scan Time	100/20ms, 70/20ms, 50/20, or Variable (Timing)
Scans Per Antenna	1 – 10 cycles per antenna
FDX Sensitivity	Adjusts Sensitivity of FDX receiver (Max = 100%). Used to reduce read range of Full Duplex tags on all antennas
HDX Sensitivity	Adjusts Sensitivity of HDX receiver (Max = 100%). Used to reduce read range on Half Duplex tags on all antennas
RF Power	Levels 1 - 5 determines the exciter power to all antennas (Exciter voltage 3.75 - 12V)
Background Tuning	Enabled (Automatically Tune Antennas) or Disabled

- **RF Power** – Use the lowest setting possible that results in an acceptable read range. This will reduce power consumption and limit the possibility of the reader overheating.
- If **Background Tuning** is enabled, the reader will automatically adjust its tuning capacitors until an acceptable tune is achieved.
    - The auto tuning function of the reader will use the phase measurements to adjust the capacitor, keeping each antenna tuned. Even with a capacitor range of 1 – 64, it is possible an acceptable tune will be outside this range. Positioning antennas near metal can cause a loading effect forcing the antennas to go out of tune and can result in excessive amplitude voltage. If this is the case, the antenna will need to be repositioned (environmental change) until it can be tuned within the available capacitance range. The reader may shut down the antennas to protect its internal components from damage.
- **Timing** – For the reader to decode both FDX-B and HDX transponder types, the reader must switch the antenna field on and off for certain periods, referred to as "**Timing**". Per default, the reader uses "**Variable Timing**" as defined by the international standards

ISO11784/11785. In this timing, the reader adjusts the duration of the Field-On / Field-Off periods based on the presence or absence of a tag type.

- A **Field On** period followed by a **Field Off** period is referred to as a "**Cycle**". In the "**Variable Timing**", every 10th cycle is fixed at 70 milliseconds. However, there might be applications where a fixed timing may be the better choice. Therefore, the reader is capable of three different timings with a fixed length cycle: 70, 90 or 120 milliseconds. Independent of the setting, every 10th cycle will be 70 milliseconds again.

- **Scan Time**: The Variable Timing option is recommended for most installations due to its fast sequencing. The fixed timing of **50/20mS** can be used when two or more Small Scale Systems are in proximity and need to be Synchronized. It takes approximately 33mSec to detect a FDXB tag during the field On period of the cycle. The scan timing can be increased to allow multiple reads of the tag in situation of high noise spikes that interfere with a valid read. Increasing field On period of the cycle for each active antenna increases the time to sequence through all active antennas.



The following patterns are possible using the **Variable Timing**:

FDX tag present?	HDX tag present?	Field-On time	Field-Off time
No	No	50ms	4ms
Yes	No	50…100ms	4ms
No	Yes	50ms	20ms
Yes	Yes	50…100ms	20ms

4.4 Configure Attached ASR650 Active Antennas

The Antenna Multiplexers for the ASR650 allow for multiplexing up to 8 or 16 antennas with a single reader depending on installed modules. Active antennas are energized serially in this scenario, not all at the same time. Selecting the **Attached ASR650 Active Antennas** accordion drop-down box will display the type of MUX module attached and a check box is allocated for each antenna. Check the box of each antenna position to be placed in the scan sequence; the screen will refresh after each selection. Selected antennas will be added to the "Active Antennas:" list in the ASR650 Status Report.

4.5 Configure Attached ASR650 Synchronization

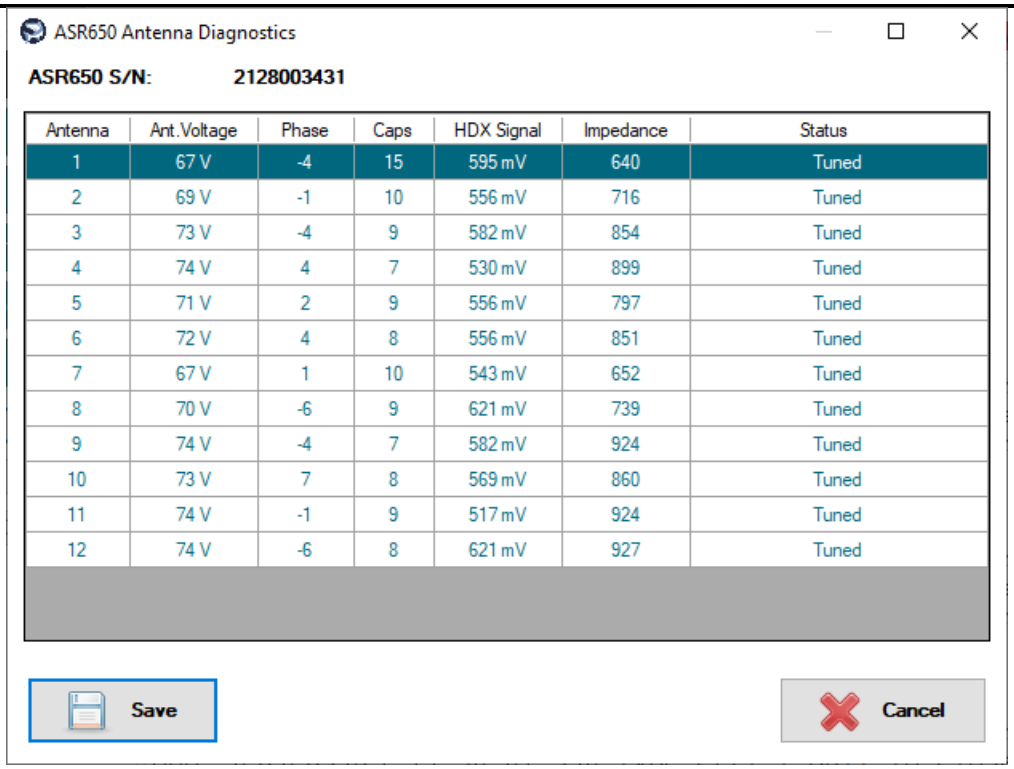
If two or more Small Scale Systems are deployed at a site and the antennas are near one another, the cycle of the system's antenna fields must be synchronized to avoid interference between antennas. Typically, synchronization will be required if systems are with 50' (and up to 150') of each other depending on the antenna's properties, orientation, and size of antenna. The antenna fields are cycled On/Off and detect distinct types of tags during separate times in the cycle. If the cycle is On for one reader while the cycle is Off for a different reader, it will interfere with tag detections. By synchronizing readers, the On/Off cycles become the same for all readers. If not synchronized, noise spikes from exciter switching On/Off at various times can interrupt FDXB tag detection on other readers. In addition, if a reader's exciter is On, it can interfere with another reader whose exciter is Off while receiving an HDX tag response. When antennas are in proximity, the respective fields can interact and cause elevated noise levels and constant tuning adjustments. This results in decreased detection distance and efficiency.

- **Sync Mode** – Select the following from the drop-down window:
  - **No Sync** – Using this setting, the ASR650 will not synchronize to any other readers and independently decide to turn On/Off the antenna field.
  - **Wireless Sync** – This synchronization mode will require the cycle timing be set to a fixed 50ms/20ms (see section 4.3). The reader can automatically synchronize to other readers nearby by monitoring the Off cycle of the antenna field for other readers fields spikes. Other noise sources can interfere with this setting. It is recommended to use the **Auto** function of the wireless setting that auto adjusts the trigger level just above the background noise.
  - **Wired Sync** – Select this mode when a physical cable links all readers to be synchronize. It is recommended to use this mode when 100% reliable synchronization is required and must be completely independent of any noise levels. Once connected to the sync cable the reader will automatically be configured as a Master or Slave. It's recommended to select 0° in the drop-down box. This will keep the antennas in both Master and Slave units in phase.
  - **Wired Sync Slave Only** – Same as **Wired Sync** but the reader will never take the role of Sync Master. If there is no sync input from another reader set as Sync Master, a reader configured in **Wired Sync Slave Only** mode will stop reading.

4.6 Attached ASR650 Diagnostics

Selecting the **Attached ASR650 Diagnostics** accordion drop-down box will access utilities used to determine the status of each active antenna connected to the reader.

- **Start Reading Antenna Diagnostics** – This function periodically updates each active antenna's diagnostics information and displays it in a chart. Chart may be saved to a user defined location.

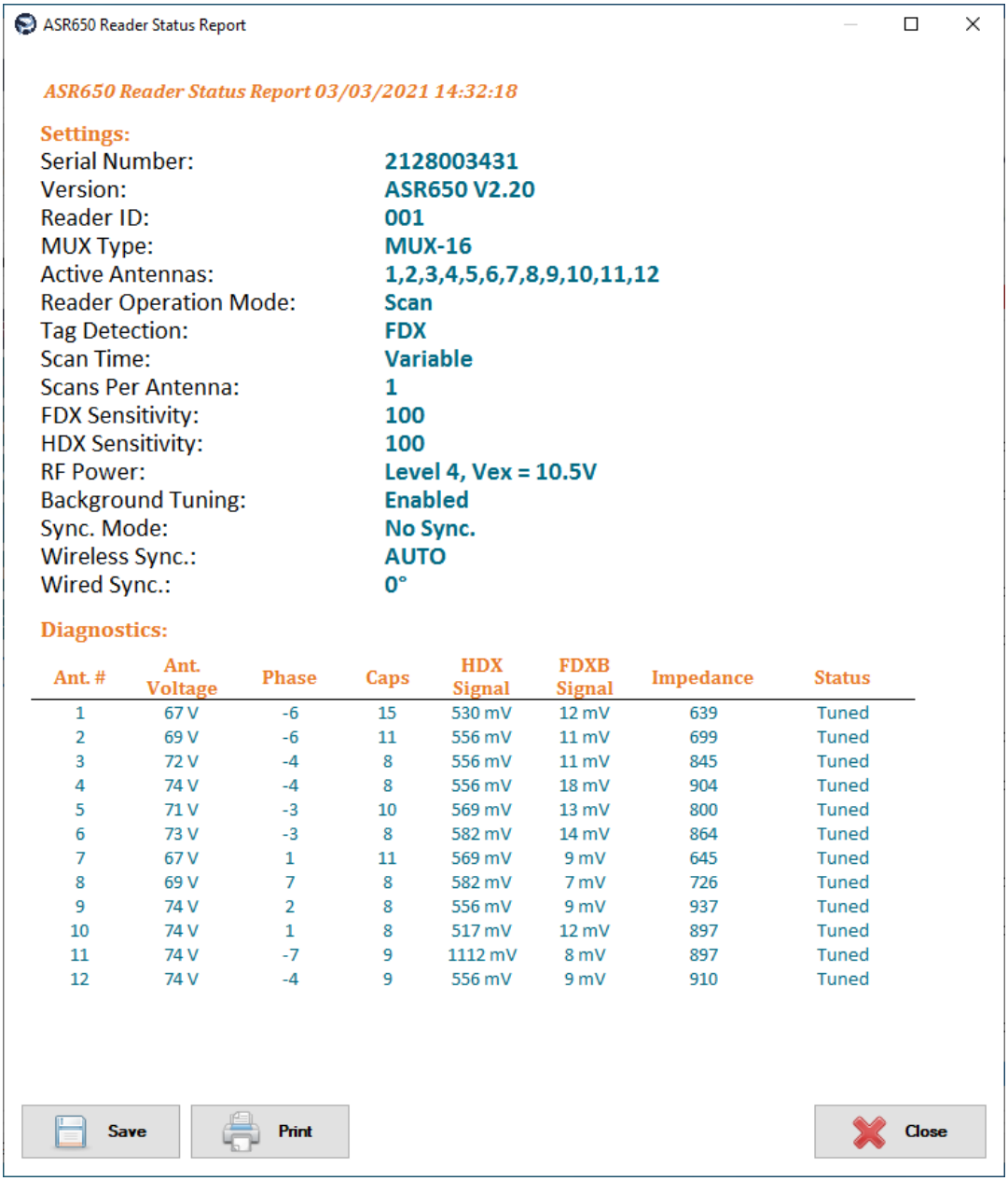


- **Start Reading FDXB Signal Level** – Select this function to activate a window showing the FDXB signal level received from a specified antenna. Select the antenna to monitor from the **Antenna Number** drop-down box. A graph will display the FDXB receiver signal level of selected antenna. This graph can be saved to a user defined location.

- **Exit and Keep Direct Connection to ASR650 Open** – Use this function to exit the Device Manager Program while maintaining the direct connection open between the BLE Data Logger and the ASR650 reader. This will allow the ASR650 firmware update software to access the reader, if needed. When this connection is open there is **no data being collected by the BLE Data Logger, including tag codes.** The BLE Data Logger will automatically close the direct connection after 60 min or when the system is reset (whichever comes first).

4.7 Attached ASR650 Reports

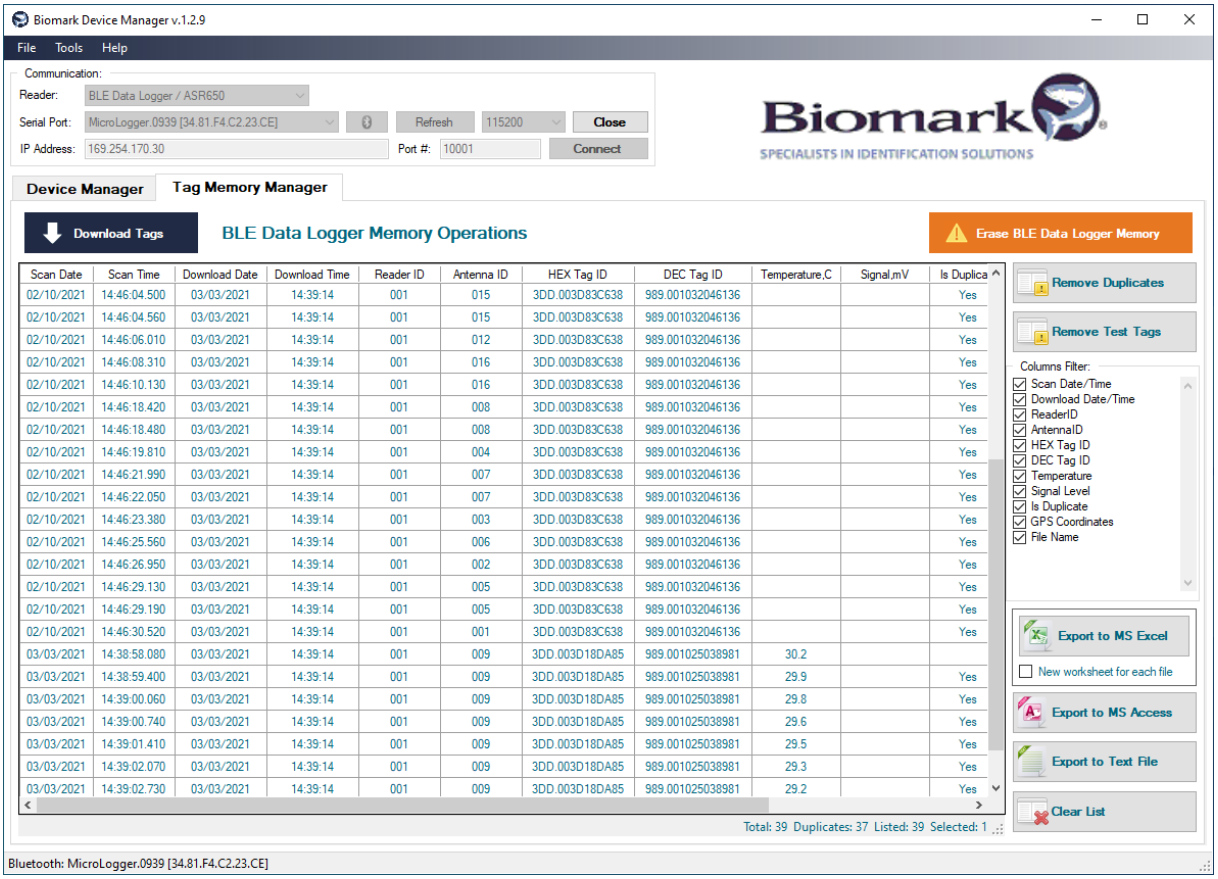
Select the ASR650 Status Report bar to have Device Manager generate a status report of the ASR650 reader settings and active antenna diagnostic data. This chart can be saved to a user specified location.



Step 5

5.1 Tag Memory Manager

The Tag Memory Manager tab is where the Small Scale System's memory can be accessed or cleared with the click of a button. Additional data can also be displayed or hidden and can then be exported to MS Excel, MS Access, or text file formats.



- **Download Tags** - Tag Memory Manager will download the BLE Data Logger's memory into the table on the screen. Please note that this can take several minutes, especially if a large quantity of tag information is downloaded.

    - A **Start Memory Download** window will allow you to select the download parameters before starting the download process. To stop the memory download process before it has been completed select **Cancel.**

5.2 Erase Memory

- **Erase Reader Memory** – Select this function to delete all memory of the connected BLE Data Logger**, <u>including all Tag ID information</u>**. Before performing the delete, Device Manger will present a confirmation window to verify execution of the operation.

5.3 Exporting Data

Downloaded data displayed in the **Tag Memory Manager** chart can be altered before being exported. Use these options to edit data as needed:

- **Remove Duplicates** – Removes any duplicate Tag ID data in the program's chart that has already been downloaded. Before performing the removal, Device Manger will present a confirmation window to verify execution of the operation.

- **Remove Test Tags** – Removes any Test Tag ID data in the program's chart that has already been downloaded. Before performing the removal, Device Manger will present a confirmation window to verify execution of the operation.

- **Column Filter** – Allow the user to hide or unhide columns from the chart. Columns hidden will not appear on an Excel sheet when the chart is exported.

- **Export to MS Excel** – Copies all data currently in the program's chart into a new MS Excel spreadsheet.

    - Newly scanned information will not be automatically included in the previously created Excel worksheet even though it appears in Device Manager's chart. To include this new information, select **Open in MS Excel** again to create an updated file.

- **Export to MS Access** – Copies all data currently in the program's chart into a new MS Access spreadsheet.

    - Newly scanned information will not be automatically be included in the previously created Access file even though it appears in the chart. To include this new information, select **Export to MS Access** again to create an updated file.

- **Export to Text File** – Copies all data to a text file saved to a location of your choosing.

    - Newly scanned information will not be automatically be included in the previously created .txt file even though it appears in the chart. To include this new information, select **Export to Text File** again to create an updated file.

- **Clear List** - Deletes all information currently in the program's chart. Before clearing the list, Device Manger will present a confirmation window to verify execution of the operation.

Small Scale System Antennas

Standard size available in 3", 6", and 10" ID. Custom sizes and cable length available.

3" (7.6 cm) ID

Tag Type	RF Power 50%	RF Power 100%
12mm APT	6.75"/8.5"	8"/10.5"
13mm BioTherm	5.5"/7"	6"/8"
10mm HPT	5.5"/7.5"	5.75"/7.75"
9mm HPT	5.75"/8"	6"/8.5"
8mm HPT	5"/6.5"	5"/6.75"
23mm HPT	8.75"/11.75"	9.75"/13"
12mm HDX	6.5"/8"	7"/9.25"
23mm HDX	11"/14.5"	11.75"/15

6" (15.2 cm) ID

Tag Type	RF Power 50%	RF Power 100%
12mm APT	9.25"/12.5"	9.5"/13"
13mm BioTherm	6.5"/8.75"	7"/9.5"
10mm HPT	6.5"/9.5"	6.5"/9.5"
9mm HPT	7"/10"	7.75"/10.25"
8mm HPT	5.75"/8"	6.25"/8.25"
23mm HPT	10.5"/14.5"	11.5"/15.25"
12mm HDX	7.5"/9.75"	8.25"/11"
23mm HDX	13.5"/17.5"	14"/18.75"
23mm HDX	11"/14.5"	11.75"/15

10" (25.4 cm) ID

Tag Type	RF Power 50%	RF Power 100%
12mm APT	12.25"/16"	12.5"/16.5"
13mm BioTherm	7.25"/10.25	8.75"/11.75"
10mm HPT	8"/11.25"	8.5"/11.5"
9mm HPT	9"/12.25"	8.75"/1.75"
8mm HPT	7"/9.75"	7.5"/10"
23mm HPT	13"/17.75"	14"/19"
12mm HDX	8.75"/11.75"	10"/13.25"
23mm HDX	16.5"/21.5"	17.5"/23"
12mm HDX	7.5"/9.75"	8.25"/11"
23mm HDX	13.5"/17.5"	14"/18.75"

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