

# **BC2 Tools Manual**

SunovaWorX Inc.

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# Chapter 1

## BC1Emulator

### 1.1 Operating Broadcaster 1 using BC1Emulator tool<sup>1</sup>

#### 1.1.1 Summary

This procedure describes how to use the BC1Emulator tool to operate a Broadcaster 1 device, without the need for a physical BC1 remote controller. BC1Emulator is provided by SunovaWorX as part of an upgrade pathway for migrating from Broadcaster 1 to Broadcaster 2.

#### 1.1.2 Requirements

- Tegar tablet, powered on
- serial power module, powered on
- Broadcaster 1 radio connected to the radio Chogori port of the serial power module
- serial cable connecting the radio port on the tablet with the radio port on the serial power module

#### 1.1.3 Initializing BC1Emulator

1. On the Windows desktop, locate the **Broadcaster Tools** folder. Tap it to open the folder.
2. Locate the BC1Emulator  icon. Tap it to launch the program.
3. If prompted, choose the correct COM port: **COM4**. (This is the same radio COM port used in BC2 Tablet Interface.)

#### 1.1.4 Operating BC1Emulator

BC1Emulator operates nearly identically to physical BC1 remotes: the F1-F8 buttons act as soft keys just as on a BC1 engine controllers and remotes. The **STOP**, **UP** and **DOWN** buttons also behave similarly.

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<sup>1</sup>Procedure: 190141 Version: v1-2-g954d2f9 Date: 2019-07-10

One minor difference exists with the **BACK/CONNECT** button. In Broadcaster 1, this button had no text and only had a radio tower image next to an on/off symbol. With BC1Emulator the button text changes depending on the screen being displayed. As such, it will either show **CONNECT** or **BACK**.

Refer to the Broadcaster 1 Operators Manual & Installation Guide for specific details of BC1 remote operation.

### 1.1.5 About

To view the About screen, containing program version and date information,

1. Tap the menu button at the top-right of the screen.
2. Tap the **About** button.
3. Tap **OK** when finished.

### 1.1.6 Exiting

To finish using BC1Emulator,

1. Tap the menu button at the top-right of the screen.
2. Tap the **Exit** button.
3. You will be prompted to confirm that you wish to exit: tap **Yes**.

### 1.1.7 Results

BC1Emulator is designed to work much the same as a physical BC1 remote, so for operators familiar with Broadcaster 1, there should be very little difference in operation, once the program is running.

# Chapter 2

## RadioCheck

### 2.1 Troubleshoot Radio with RadioCheck Tool<sup>1</sup>

#### 2.1.1 Summary

This procedure describes how to use the RadioCheck tool to check the basic health status of a Broadcaster radio physically connected to the tablet, and allows for testing signal strength between pairs of radios.

#### 2.1.2 Requirements

- Rugged tablet remote, powered on
- serial power module, powered on
- Broadcaster radio connected to the radio Chogori port of the serial power module
- serial cable connecting the radio port on the tablet with the radio port on the serial power module

#### 2.1.3 Running RadioCheck and connecting to local radio

RadioCheck and this document use the term *local* to refer to the radio module connected to the tablet. This term is used to differentiate between the radio module being tested and all the other radios in the network.

1. On the Windows desktop, locate the **Broadcaster Tools** folder. Tap it to open the folder.
2. Locate the RadioCheck  icon. Tap it to launch the program.
3. Verify that **Comm Port** is set to COM4.
4. Tap the **Channel** textbox to enter the desired radio channel. (For testing connections with Broadcaster 1 systems, this number must match the **Sys. ID** value.)
5. Tap **Connect to Radio**.

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<sup>1</sup>Procedure: 190142 Version: v1-8-g32a0644 Date: 2020-10-26

### 2.1.4 Verifying radio health

Several indicators indicate a radio's health and connectivity with the tablet:

- A large green box with dark-green text indicating the local (connected) radio's address (a 6-digit hexadecimal number).
  - If this box is red, and reads Local: <not connected>, this indicates no wired connection to the radio, and typically indicates a wiring, power or connector issue. Typically this does not indicate a wireless or antenna problem.
  - In the event of a hardware error reported by the radio this box will be yellow if *some* communication has occurred between RadioCheck and the radio. It will be red if the only data received from the radio is an error message.
- The voltage seen by the radio, typically around 12V. In damaged radios, this value has been observed to fluctuate randomly above and below zero, indicating a problem with the radio's internal circuitry.
- The temperature of the radio, measured in degrees celsius.
- The version number of the software running on the radio. Currently, this is version 1.11.1.

If these values are not present, this indicates a problem with the radio or the cable. Figure 2.2 on page 6 shows a healthy radio.

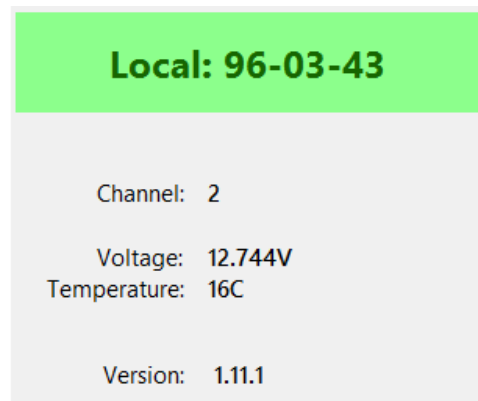


Figure 2.1: RadioCheck indicates a healthy radio.

### Hardware Error

The Broadcaster radios are capable of indicating when they are unable to function properly, depending on the nature of the malfunction.

- Voltage error: indicates the radio is either not being supplied with a sufficient 12V supply, or, there is a problem with the radio's internal circuitry. See Figure 2.2 on page 6.

- General/Unknown error: for some reason, the radio is not able to successfully power up. Generally this is a permanent problem requiring the radio to be replaced. See Figure 2.3 on page 6.

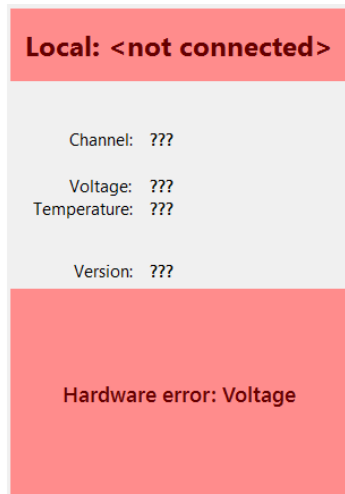


Figure 2.2: RadioCheck indicates a radio with a voltage problem.

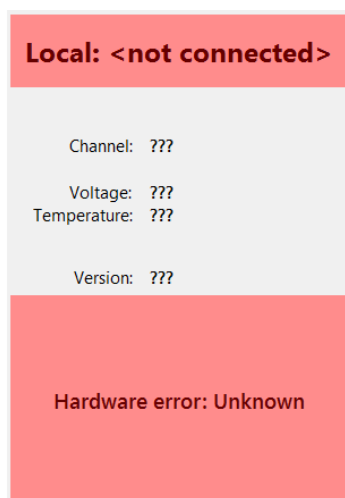


Figure 2.3: RadioCheck indicates a radio with general hardware failure.

### 2.1.5 Testing connections with other radios

When available, the local radio's list of other known radios is shown automatically, but you can force the radio to begin refreshing its list by pressing the Refresh Radio List button. The radio

constantly attempts to discover new radios, so radios that become known will be added to the list automatically.

RadioCheck allows for sending a request to another radio for a response - we call this a *ping*.

To begin pinging another radio, select it from the list of known radios and do one of the following:

- Tap the **Ping Once** button: this sends a single request to the radio for a response.
- Toggle the **Ping Repeat** button to ON: repeatedly sends a ping request until toggled off, or a different radio is selected.

The results of a ping test are displayed in two time-series graphs, indicating the signal strength as seen by the pinged radio, as well as the signal strength seen by your local radio. In other words: how well the other radio “hears” you, and how well you “hear” it. A strong radio connection will be more than 70%. Below 30%, communication is not possible, and failed ping tests appear as gaps in the graph. Intermittent gaps may not indicate a serious problem, but wide gaps or frequent gaps could indicate that the radios are having trouble communicating consistently. Figures 2.4 and 2.5 show examples of radios successfully pinging one another, with Figure 2.5 showing an intermittent connection. Figure 2.6 illustrates what an intermittent *wired* connection looks like when pinging: the red and black diagonal stripes indicate that the local radio is not informing whether a ping was successful or not. This indicates a possible cabling or wired connection problem.

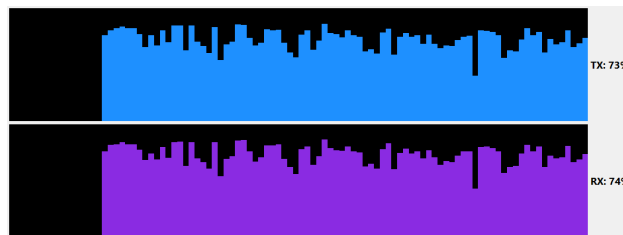


Figure 2.4: RadioCheck indicates a fairly strong and consistent connection with another radio.

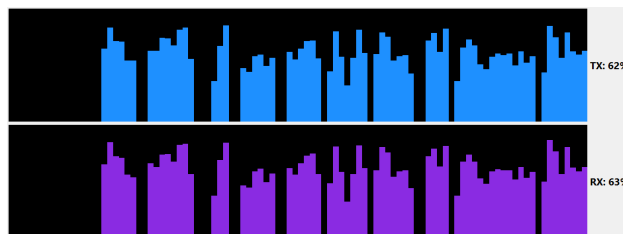


Figure 2.5: RadioCheck indicates an intermittent wireless connection with another radio.

Not being able to ping another radio does not always indicate a problem:

- Other radios in the list of known radios may not be on the same radio channel; even though a radio is in the list, it may not be possible to ping it due to it being on a different channel.



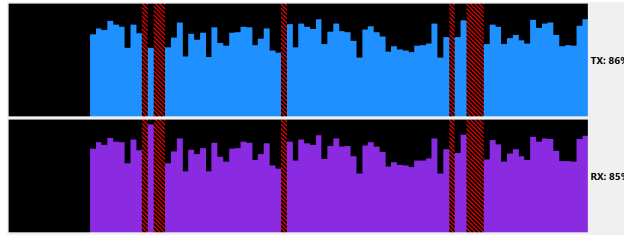


Figure 2.6: The red and black diagonal stripes indicate an intermittent *wired* connection to the local radio while pinging another radio.

- Radios share their list of known radios with each other. Therefore it is common for a radio to know of another radio's existence, even though they cannot communicate directly.
- Radios can simply be out-of-range.

**Warning:** Radios **must** be on the same channel for both pings and engine data to be transmitted and received. Pinging works independently of the DES key setting: seeing successful pings but not engine data *could* indicate a mismatch in DES keys.

### 2.1.6 About

To view the About screen, containing program version and date information,

1. Tap the **About** button.
2. Tap **OK** when finished.

### 2.1.7 Results

RadioCheck shows the basic health status a Broadcaster radio, and tests the point-to-point connections with other radios on the same radio channel.

## Chapter 3

# CellSatCheck

### 3.1 Troubleshoot CellSat Module Using CellSatCheck<sup>1</sup>

#### 3.1.1 Summary

This procedure describes how to use the CellSatCheck tool to check the health and connectivity of an IDP-782 HSPA cell/sat module.

#### 3.1.2 Requirements

- Teguar tablet, powered on
- serial power module, powered on
- cell/sat module connected to the cell/sat Chogori port of the serial power module
- serial cable connecting the cell/sat port on the tablet with the cell/sat serial port on the serial power module
- *(optional)* Cell and satellite antennas plugged into cell/sat module, and positioned to maximize reception

#### 3.1.3 Running CellSatCheck and Connecting to Cell/Sat module

1. On the Windows desktop, locate the **Broadcaster Tools** folder. Tap it to open the folder.
2. Locate the CellSatCheck  icon. Tap it to launch the program.
3. The button at the top-left of the screen indicates which COM port is being used for cell/sat connections: if it is something other than COM5, tap the button, select COM5, and tap OK.

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<sup>1</sup>Procedure: 190146 Version: v1-1-gedfa2ae Date: 2019-07-10

### 3.1.4 Verifying Basic Connection to Cell/Sat module

CellSatCheck is able to know when it has a consistent, wired connection to the cell/sat module. If there *is* a connection, CellSatCheck will say Cable: OK at the top of the screen.

The **Module** tab lists some basic properties that, when present, indicate that the module has a wired connection to the tablet and is communicating with the tablet.

- Basic Connection: this is the same value to the right of the Cable: text at the top of the screen, indicating whether the module is physically connected and communicating with the tablet.
- ID: the 15-character serial number of the module, used in wireless communication to uniquely identify this module. It should match the number printed on the rear of module on the side opposite of the Light Emitting Diode (LED) indicators.
- Last Acknowledgement: The Coordinated Universal Time (UTC) time that the module last communicated with the tablet. If the module is properly connected and working, this time will count up each second or two.
- Time Since Last Acknowledgement: the number of seconds since the tablet last received communication from the module. When properly working, this value should not exceed 2 seconds.

### 3.1.5 Troubleshooting Basic Connection to Cell/Sat module

If there is a problem that prevents the program from determining if the module is plugged in, the text will instead say Cable: none.

If no connection to the module is detected, there are some basic troubleshooting steps:

- Verify that the serial power module has three green LEDs visible and solid (not fluctuating.) Fluctuating or unlit LEDs indicate a probable power issue.
- Verify that the red power indicator LED on the cell/sat module is lit.
- Ensure that the cell/sat serial cable is properly seated with screw terminals tightened on both the tablet and power serial module.
- Ensure that the cell/sat Chogori connector is seated with the ring screw tightened.
- Check that the rectangular green connector plugged into the cell/sat module (inside the weatherproof membrane) is properly seated.

In some cases, an intermittent connection is possible, which indicates a loose connector or damaged cable. There is a short delay of up to about 3 seconds between when the connection is broken and when CellSatCheck will *know* that it is broken. This delay can make it slightly harder to diagnose loose connections, compared to no delay.

Additionally: there is an approximate 15 second delay between powering the cell/sat module and when CellSatCheck will report that it is connected. Take this delay into account when troubleshooting power issues with the cell/sat module.

### 3.1.6 Troubleshooting satellite wireless issues

The **Satellite** tab lists properties for the satellite communication aspect of the cell/sat module. The two properties of interest are:

- Signal Strength: indicate the current detected signal strength. This number should be at least **39**. If less than 39, this indicates a problem with the satellite antenna or reception.
- Connection State: this should be **Active**.

If either of these two properties are not the expected values, verify that the antenna is undamaged and properly connected and positioned to maximize reception.

### 3.1.7 Troubleshooting Cellular Wireless Issues

The **Cellular** tab lists properties for the cellular communication aspect of the cell/sat module.

- Signal Strength: Is a value from 0-31, where higher is better. A value of 99 indicates that the signal strength is unknown or not available, and indicates a problem with the cell antenna or cell reception. When plugging in the cell antenna, it can take upwards of 60 seconds before the cell modem reacts.
- Status: the current state of the connection, ideally **Home** or **Roaming**. A value of **NotRegistered** indicates a cell antenna connection problem or insufficient reception.
- Access Point Connected: when **True**, this indicates that the cell modem has successfully connected to the Internet.
- Cell Server Connected: when **True**, this indicates that the cell modem has successfully connected to the data server on the Internet through which communication occurs. This cannot be true prior to Access Point Connected being true.

Summarized: cell communication requires sufficient signal strength, Home or Roaming status, and Cell Server Connected to be **True** (which in turn requires Access Point Connected to be **True**.)

While cell communication is possible with very low signal strength (1-4 or so) this may increase the time it takes for messages to be sent, or incur delays when receiving messages. Low signal strength may also be an early warning sign that reception may disappear entirely, depending on your location and terrain.

Common causes of poor or absent cell communication are:

- Cell antenna not plugged in.
- Cell antenna not mounted properly, or mounted too low to the ground.
- Cell reception poor - you may simply be in an area with little or no cell reception.

### 3.1.8 About

To view the About screen, containing program version and date information,

1. Tap the **About** button.
2. Tap **OK** when finished.

### 3.1.9 Results

The CellSatCheck tool provides diagnostic information about the cell/sat module health and connectivity, useful for troubleshooting connection or signal strength issues.

# Chapter 4

## Update

### 4.1 Update BC2 Tablet Software Suite using Update Tool<sup>1</sup>

#### 4.1.1 Summary

This procedure describes how to use the Update tool to retrieve and install updates for the BC2 Tablet software suite, which includes programs for interfacing with Broadcaster 2, diagnostic tools and documentation.

#### 4.1.2 Requirements

- Teguar tablet, powered on with a working Internet connection (WiFi, Ethernet, or SIM card)

#### 4.1.3 Procedure

1. On the Windows desktop, locate the Broadcaster Tools folder. Tap it to open the folder.
2. Locate the Update icon and tap it to launch the Update tool.
3. The tool will start by checking for available information from the Internet, with text **Checking for updates**.
4. If there is a newer version available, the tool will say **New Version Available** and will provide an **Install** button and a **Cancel** button. To install the update, press **Install**.
5. While downloading, the tool will provide a progress bar and information about how long it will take before the download is complete.
6. Once the download is complete, the software will be installed, accompanied by a progress bar.
7. Once the software update has completed, a green box with text **Update Complete!** confirms completion. Press **OK** to exit the Update tool.

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<sup>1</sup>Procedure: 190145 Version: v1 Date: 2019-03-27

#### 4.1.4 Troubleshooting

In the event of an error, the Update tool will display `Error running update...` and will attempt to display helpful text indicating the nature of the error. Possible errors are:

- BC2 Tablet Interface is still running: if BC2 Tablet Interface is not visible, try restarting the tablet computer before running the update again.
- The *current* version of the software is not found. This could happen if the BC2 Tablet Interface program is deleted or damaged. A manual uninstall and re-install is recommended.
- The *available* version of the software is not found: typically, this indicates a problem with the Internet connection.
- The latest installer is not found. If persistent, this could indicate a problem with the SunovaWorX server.
- Download error: indicates a disruption in Internet communication. Check Internet connection and re-try.
- Error retrieving remote file hash: typically indicates a disruption in Internet communication, but also could indicate a problem with the SunovaWorX server.
- Verification failed: indicates that the downloaded installer is corrupt or incomplete. Check Internet connection and re-try.
- Error starting install: something went wrong installing the update. Could indicate a problem with the file system on the tablet.
- Error resuming: when the Update tool is run from within BC2 Tablet Interface, indicates that BC2 Tablet Interface could not be restarted.
- Error creating update folder: indicates a problem with the file system on the tablet, as the tool is unable to create the folder to which the installer will be saved.
- Error writing <FILENAME> to disk: indicates a problem with the file system on the tablet, as the tool is unable to write the downloaded installer to disk.

If errors are persistent when retrieving updates and your Internet connection is known to be working, contact SunovaWorX for assistance.

#### 4.1.5 Results

The Update tool, when run, automatically performs a software update if there is one available and it is newer than what is currently installed.

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<sup>2</sup>Procedure: 190141 Version: v1-2-g954d2f9 Date: 2019-07-10

<sup>3</sup>Procedure: 190142 Version: v1-8-g32a0644 Date: 2020-10-26

<sup>4</sup>Procedure: 190146 Version: v1-1-gedfa2ae Date: 2019-07-10



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<sup>5</sup>Procedure: 190145 Version: v1 Date: 2019-03-27

# Version History

|    |            |   |                                                                          |
|----|------------|---|--------------------------------------------------------------------------|
|    | 2020-10-30 | * | Updated prodecure 190142<br>  (RadioCheck usage procedure).              |
|    | 2020-03-18 | * | Updated glossary.                                                        |
|    | 2020-03-11 | * | Fixed an issue with duplicate index entries.                             |
|    | 2020-03-11 | * | Minor text changes to procedure 190142.                                  |
|    | 2019-07-25 | * | Updated template.                                                        |
|    | 2019-07-22 | * | Updated template.                                                        |
|    | 2019-07-10 | * | Added glossary items, improved formatting.                               |
|    | 2019-04-26 | * | Updated template.                                                        |
|    | 2019-04-25 | * | Updated RadioCheck procedure 190142 with support for cable interruption. |
|    | 2019-04-17 | * | Updated RadioCheck procedure 190142.                                     |
|    | 2019-03-29 | * | Included 190146 in main document.                                        |
| v1 | 2019-03-29 | * | Added CellSatCheck procedure 190146.                                     |
|    | 2019-03-27 | * | Added 190145.                                                            |
|    | 2019-03-26 | * | Added RadioCheck procedure 190142.                                       |
| v0 | 2019-03-26 | * | Initial document setup.                                                  |

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# Acronyms

LED    Light Emitting Diode 10

UTC    Coordinated Universal Time 10

# Glossary

|                      |                                                                                                                                                                                                                                                                                                             |             |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| BC1Emulator          | A software tool that runs on the tablet computer that mimics the behaviour of, and is designed as a backup or replacement for, a BC1 hardware remote.                                                                                                                                                       | 2, 3        |
| BC2 Tablet Interface | Previously called 'BC2Gui'. The software program designed for tablet computers, providing command and control of Broadcaster 2 remote engine controllers.                                                                                                                                                   | 2           |
| cell/sat module      | An Orbcomm IDP-782 satellite transceiver with cellular capability that connects BC2 engine controllers and remote via cellular and satellite communication.                                                                                                                                                 | 9–12        |
| CellSatCheck         | A software diagnostic tool for verifying that a cell/sat module is functioning properly and has adequate reception.                                                                                                                                                                                         | 9, 10, 12   |
| Chogori              | In this documentation, 'Chogori' refers to a 10-pin weatherproof screw connector or cable, named for the company that manufactures it.                                                                                                                                                                      | 2, 4, 9, 10 |
| hexadecimal          | Refers to a positional number system of base 16 that uses the digits 0-9 to represent values from zero to nine, and letters A-F to represent values from ten to fifteen. Hexadecimal numbers are useful for representing binary numbers, where each hexadecimal number represents four bits or half a byte. | 5           |
| LED                  | Light Emitting Diode (LED). A lower power light used in circuits.                                                                                                                                                                                                                                           | 10          |
| radio channel        | For radio communication, this number corresponds to the common radio wave frequency on which a group of devices communicate. For cell/sat communication, the effect is the same: only devices sharing this number can communicate with each other.                                                          | 4, 7, 8     |

|                     |                                                                                                                                                               |             |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| RadioCheck          | A software diagnostic tool for verifying that a radio is functioning properly and for testing its signal strength when communicating with other radios.       | 4, 5, 7, 8  |
| serial power module | A device manufactured by SunovaWorX that provides power as well as radio and cellular/satellite connectivity to the tablet computer via serial communication. | 2, 4, 9, 10 |
| SunovaWorX          | The manufacturer of Broadcaster 2.                                                                                                                            | 2, 14       |
| UTC                 | Coordinated Universal Time (UTC). Is the primary time standard used for synchronizing clocks around the world. Time zones are defined as offsets from UTC.    | 10          |

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