

## Using Bluetooth Data Links with the CEESCOPE and CEE ECHO

*The CEE HydroSystems CEESCOPE™ and CEE ECHO™ can output real time survey data and receive incoming position data from a separate GNSS receiver over a Bluetooth radio link. This can provide a convenient cable-free option for position input and allow the echo sounders to be used in a simplified acquisition mode, for example with a GNSS data collector. However careful setup is needed to achieve consistent connectivity, with strict adherence to the procedures outlined here.*

The CEESCOPE™ and CEE ECHO™ echo sounders have a Bluetooth radio that may be used to transmit and receive survey data. This document describes the setup and operation of this data link; here the name CEE ECHO will be used but all described operations apply equally to the CEESCOPE. Bluetooth may be used to send position data from a GNSS receiver to the echo sounder, or to send selected output data from the CEE ECHO to an acquisition PC or data collector. These two operations cannot be performed simultaneously as the echo sounder supports only one connected device.

The CEE ECHO Bluetooth operating mode may be either MASTER (for incoming GNSS data) or SLAVE (for outgoing survey data), as selected in the **System (1/8)** menu. With the correct Bluetooth mode set, the target device is scanned and located, and a connection is established. Then, the data output / input must be properly configured and activated for data to flow.

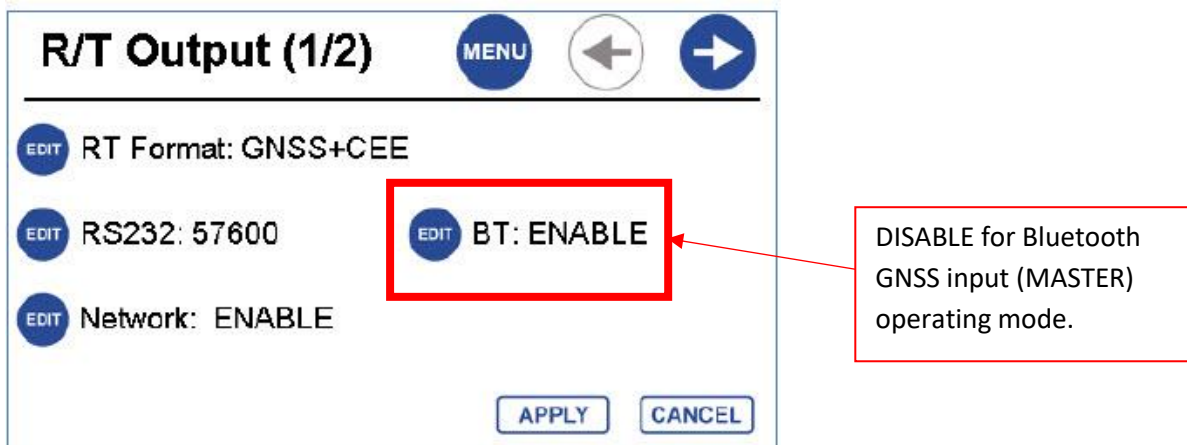
### Case 1: Incoming GNSS Data

In order to provide a redundant mode of connection to an external third-party GNSS receiver in addition to the RS232 cable input, the CEE ECHO can receive GNSS data over Bluetooth. Sometimes, this connection method is preferred as it is very convenient once configured. The main drawback of Bluetooth is the potential for inconsistency in connection usually caused by the GNSS receiver being incorrectly configured. Unless an exact, well-documented procedure is used to configure the connected GNSS receiver each time there may be challenges. The Bluetooth link also introduces potential for variable latency, should the linking radio signal be weak or intermittent. From a data consistency standpoint CEE usually recommends using the RS232 cable over Bluetooth.

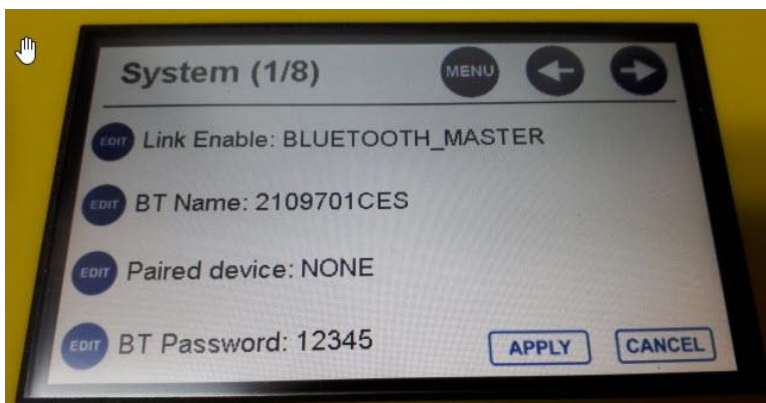
To receive GNSS data over Bluetooth, the input mode selection on the CEE ECHO **GNSS (1/3)** menu must be set to BLUETOOTH (or BTSerial on older units). The other options are EXTERNAL (for the RS232 cable) or INTERNAL (for CEESCOPE built-in internal GNSS).



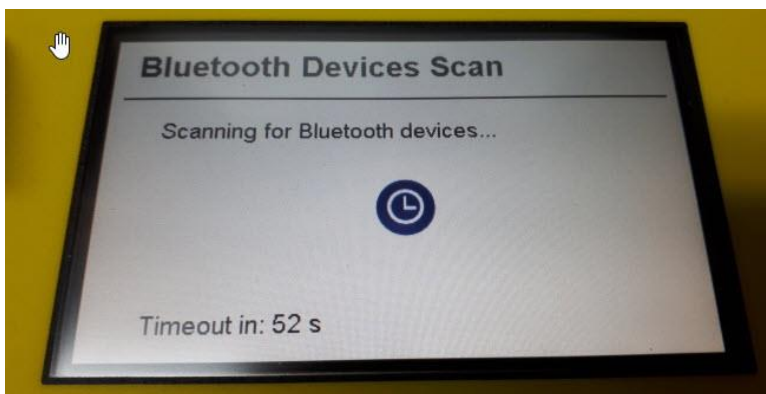
NOTE: Some CEE ECHO firmware versions will NOT display the BLUETOOTH source option on the **GNSS (1/3)** menu unless the **Real Time (R/T) Output (1/2)** menu shows Bluetooth output is **DISABLED**.



To establish an incoming Bluetooth data connection, first select **BLUETOOTH\_MASTER** on **System (1/8)** menu. The “BT Password” is the password needed to access the connected GNSS device so this must match what is required by the GNSS receiver. The password is set by pressing **EDIT** for the “BT Password”.



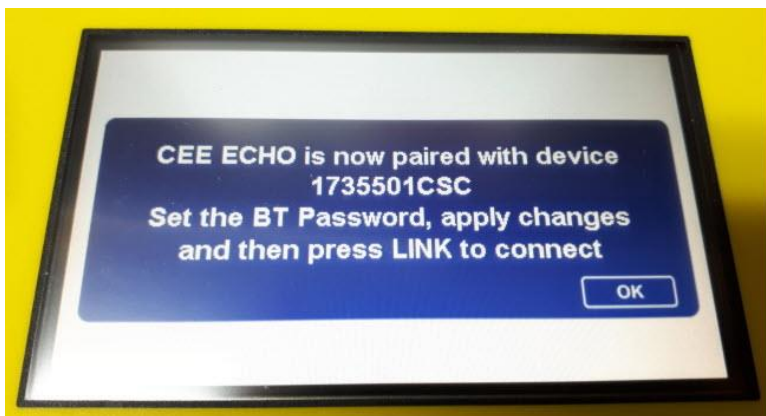
Press **EDIT** for “Paired Device” to commence a scan of available active Bluetooth devices.



Upon completion of the scan the available devices will appear.



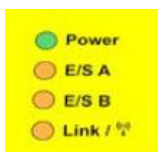
Select the desired device by pressing EDIT then OK at the next screen.



At this point the selected device is active in the CEE ECHO and as soon as the LINK button is pressed a connection will establish.



LINK button located on main panel below ON/OFF button.



When the CEE ECHO has been properly connected to the GNSS receiver, the LINK indicator LED will glow solid. The LINK LED behaves as follows:

- Off** Link disabled. No data transfer.
- Flashing** Bluetooth is ready and trying to connect.
- Solid** Bluetooth is connected and data can now transfer.

Note that if the link LED is flashing there will be NO DATA TRANSFER. The link LED MUST be solid; ensure this is the case before proceeding further.

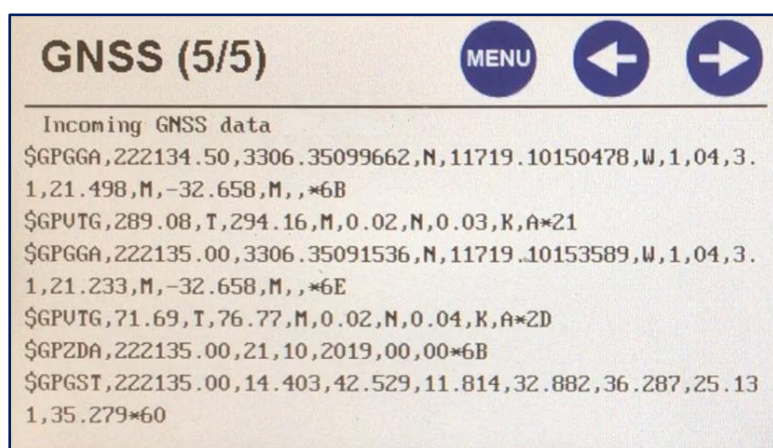
Note that an INCORRECT PASSWORD is the most common cause of failure to establish a connection. Default password may be 12345, 0000 (Trimble). If the password is not known, check the GNSS receiver setup.

Before a valid GNSS position is received through the Bluetooth link, the GNSS receiver must be configured to output NMEA0183 messages on the appropriate (connected) Bluetooth port. Output messages that are often selected are:

GGA: Position                      VTG: Course                      ZDA: Time

***The GNSS receiver WILL NOT “automatically” provide GNSS position data to the CEE ECHO unless properly configured with NMEA output messages.***

If the correct messages are selected, a valid position will appear on the CEE ECHO home screen. The **GNSS (5/5)** menu terminal viewer may be used to check the incoming data. If this page is blank, the GNSS output has not been configured correctly. If messages are streaming but no position is shown on the CEE ECHO home screen, then incorrect messages have been selected.



Note that there is no BAUD rate setting for a Bluetooth connection.

#### ***Troubleshooting:***

Incoming GNSS data are usually not received because of an incorrect setup in the GNSS receiver. Modern GNSS receivers have multiple Bluetooth ports and the NMEA output messages must be activated on the correct port. Often, a hand-held data collector is also connected to the GNSS receiver for configuration, and this will also occupy a Bluetooth port. The data collector may override any other device connected to a certain Bluetooth port (typically Port #1), so should the CEE ECHO be paired with Port 1 and then the data collector is activated, no Bluetooth link will be possible. Setting NMEA output messages on Port 2 with the data collector also connected, and then pairing the CEE ECHO with the GNSS receiver (Port 2) would ensure that the Bluetooth data output was not interrupted by subsequent data collector connection.

***In summary – do not assume that the Bluetooth data input will happen by magic! All these steps need to be properly and exactly completed or else no data will be received. Still, it is not guaranteed that the CEE ECHO will be able to establish a working connection. Connectivity depends on the GNSS firmware, receiver age and Bluetooth operation design.***

## Case 2 – Outgoing Survey Data

The CEE ECHO has three data outputs: Ethernet LAN (default, recommended), RS232 serial, and Bluetooth. The RS232 and Bluetooth outputs are not recommended with standard data acquisition software where a LAN cable may be used. This is because the water column echogram data cannot be transmitted using these modes owing to data (baud) rate limitations. However, Bluetooth may be useful when operating in a stripped-down acquisition mode – principally when acquiring data using GNSS acquisition software such as Leica Captivate, Topcon Magnet or Trimble Access.

When using the RS232 cable or Bluetooth the CEE ECHO **Real Time (R/T) Output (1/2)** menu selection must be changed away from the default “GNSS + CEE” (CEE = Binary echogram data) to one of the text-only output message options such as DBT, DBS, GNSS + DESO25 (see CEE ECHO manual for all available output message descriptions). The Bluetooth R/T Output option must be ENABLED on the same menu screen.

**R/T Output (1/2)** MENU ← →

EDIT RT Format: DBT

EDIT RS232: DISABLE EDIT BT: ENABLE

EDIT Ethernet: ENABLE

APPLY CANCEL

For typical applications using GNSS software, it is appropriate to select DBT (depth below transducer). This will report the depth with no draft included, allowing the transducer to GNSS antenna offset to be entered into the GNSS software as with a normal rod height. Alternatively, DBS (depth below surface) can be used which will incorporate the echo sounder draft offset (**ES 1/6** menu). Most other output formats will not be recognized by GNSS software.

Data output using Bluetooth requires the Bluetooth Link Enable (**System (1/8)** menu) to be set as BLUETOOTH\_SLAVE. The password shown on this screen will need to be entered into the connecting device if / when prompted.

**System (1/8)** MENU ← →

EDIT Link Enable: BLUETOOTH\_SLAVE

EDIT BT Name: 2306801CSL

EDIT BT Password: 12345

APPLY CANCEL

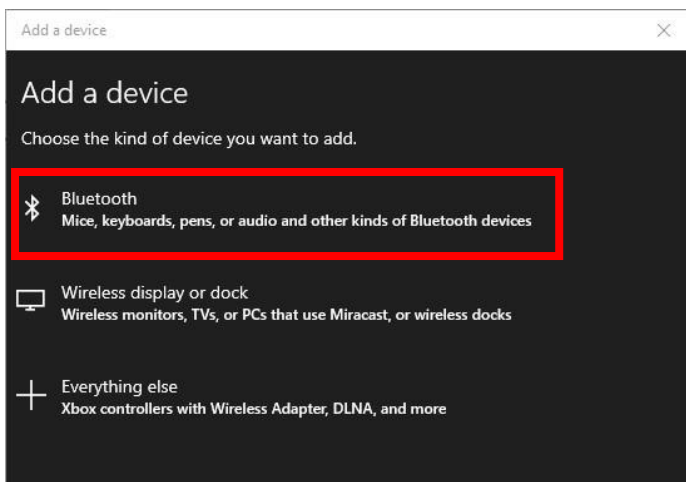




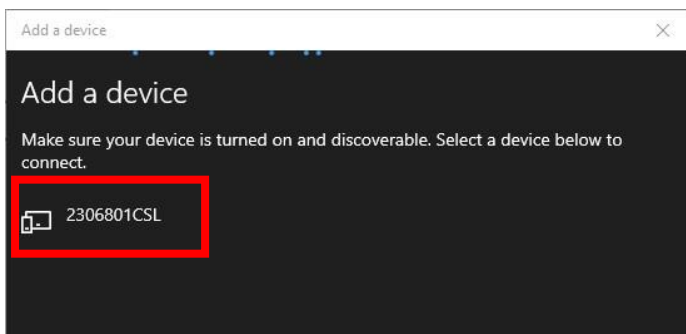
Press the LINK button on the panel below the on/off button. This will activate the Bluetooth module to be discoverable by other devices.

The LINK LED will now start flashing and the target device should be used to scan for the CEE ECHO signal. Once detected, enter the CEE ECHO password on the target device if prompted. The CEE ECHO will be displayed as the “BT Name” field entry on **System (1/8)** menu – by default this is the unit’s serial number.

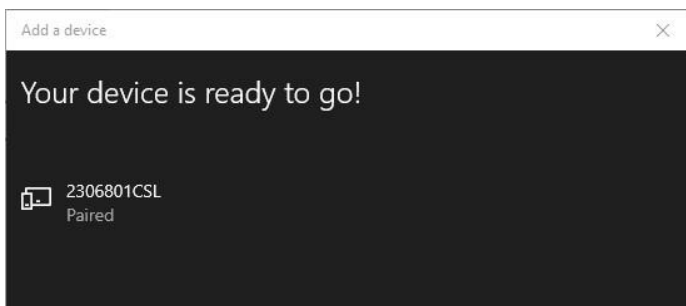
As an example, to connect to a PC using a built-in Bluetooth radio, first go to the Bluetooth icon in the lower right corner of the screen (next to clock) and right click and “Add a Device”



The PC will start scanning for available Bluetooth devices. Make sure the LINK light is flashing on the CEE ECHO indicating the Bluetooth is active and discoverable.



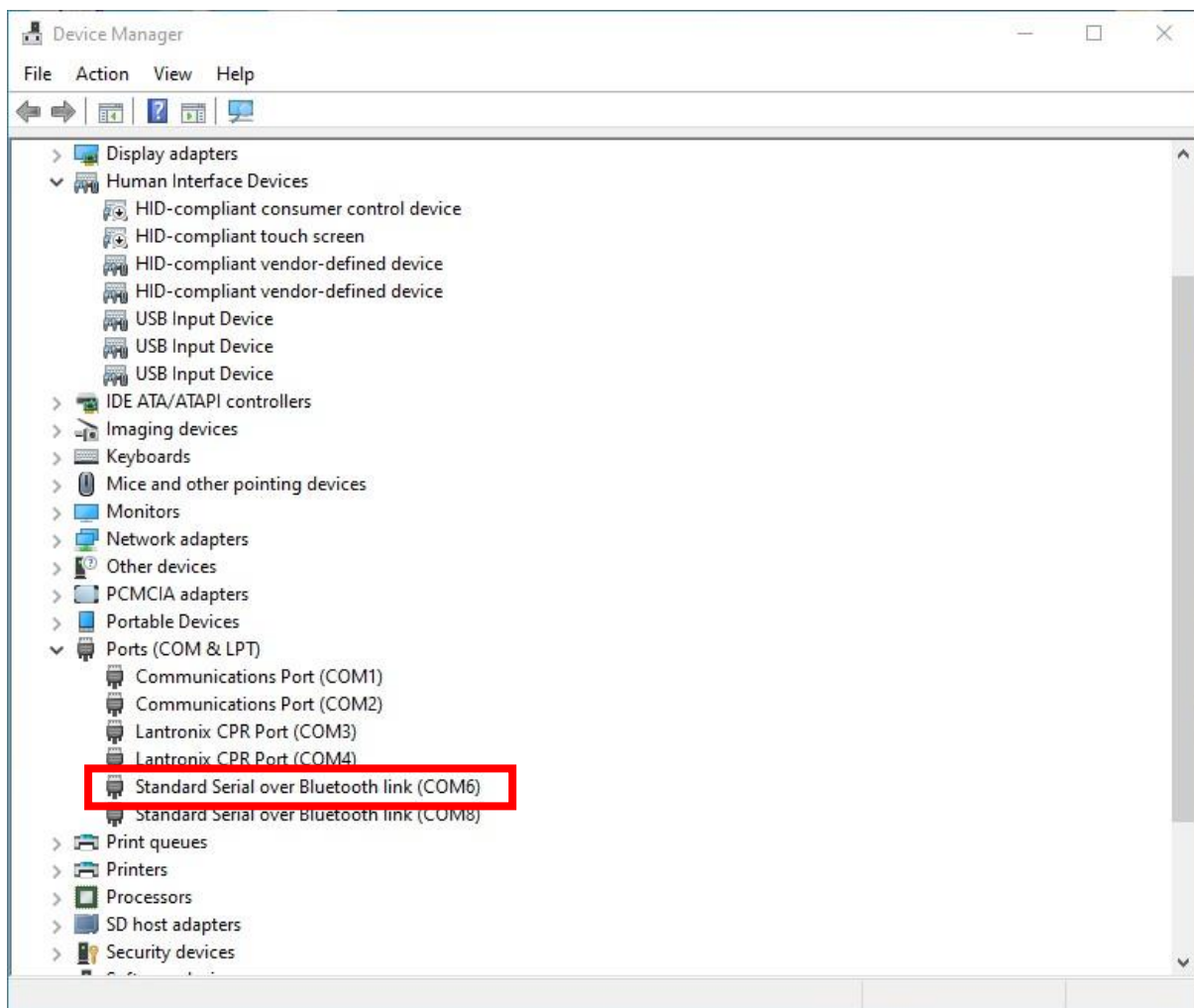
Select the CEE ECHO device.



Pairing is complete and the CEE ECHO device ID will now be permanently stored in the PC memory for future connections.

***NOTE: The LINK LED will still be flashing even though the CEE ECHO and the PC are paired. This is because there is no active data link between the two devices. Once a program initiates data transfer, the LINK LED will become solid.***

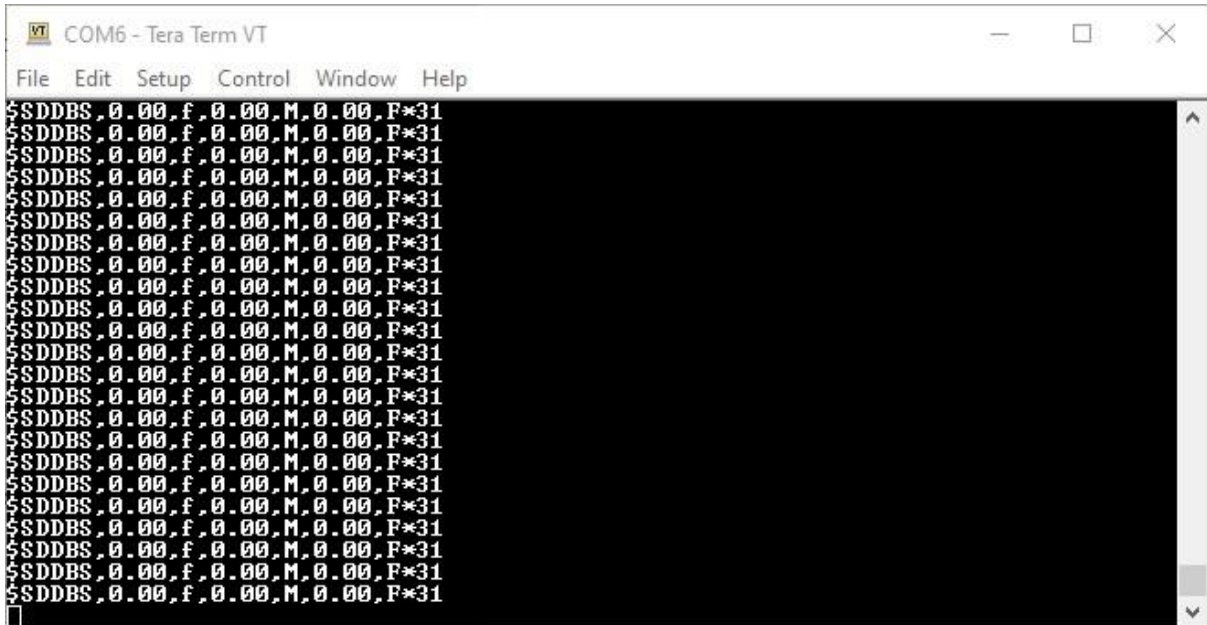
The Bluetooth link generates a Bluetooth COM port which should be used to access the data from the CEE ECHO – for instance in Hydromagic or HYPACK software. The COM ports can be viewed on the Control Panel / Device Manager. In this case COM6 is the port for the CEE ECHO connection. If the device is uninstalled from the Bluetooth menu, this COM port will disappear.



In order to test the Bluetooth data link, TeraTerm may be used to display the data available on COM6.

Note that the Bluetooth COM port does not require a baud rate setting, and data will flow independent of the baud rate set in the acquisition software. In this example the CEE ECHO was set to output the DBS NMEA message.

As soon as the COM6 serial port is opened in a software utility, the LINK light will become solid indicating data transfer.



### Bluetooth Facts and Terminology

Bluetooth, curiously named after 10<sup>th</sup> century Danish king Harald Bluetooth is a low power short range radio system. The frequency range is 2.4-2.48GHz. Typical Bluetooth systems used on GNSS receivers are very low power so the distance between the connected devices should be minimized to ensure uninterrupted connectivity.

**Pairing:** Bluetooth relies on devices being actively joined together in a permanent bond. The reason for this is to facilitate an automatic connection when the target device comes within range without the need to reconfigure and set up the radio link at each time of use. After pairing, the user simply has to select the device from a list of available devices and a link will be established.

**Connection:** Just because a device is paired does not mean there is a connection with a data flow. The relevant program / app must be running to initiate the required data transfer through the Bluetooth link. For a GNSS receiver that is turned on, as long as the data export is configured for the Bluetooth port this data will automatically be received by a properly configured and paired Bluetooth device.