BTD

Control Software

USER MANUAL

PROPRIETARY NOTICE

The information contained in this manual (including all illustrations, drawings, schematics and parts lists) is proprietary to BIRAL. It is provided for the sole purpose of aiding the buyer or user in operating and maintaining the instrument. This information is not to be used for the manufacture or sale of similar items without written permission.

COPYRIGHT NOTICE

This document has been prepared by Bristol Industrial and Research Associates Limited and contains copyright material belonging to the company.

The contents may not be copied or disclosed to a 3rd party without the express written permission of Biral.

© Bristol Industrial and Research Associates Limited (Biral) 2022

LIABILITY AND WARRANTY

BTD Control Software remains the property of Biral and is protected by appropriate copyright law and international treaty provisions. The Licensee is granted the right to use the software, but not to de-compile or to in anyway alter the composition of the software. The software contains information of commercial value and worth to BIRAL. The licensee may not transfer the software to any third party and should hold it in confidence and protect it from disclosure to third parties.

No other warranties except those expressly set out above are implied or should be inferred. Biral makes no warranty concerning the fitness of the BTD Thunderstorm Detector or its software for a particular purpose or use. BIRAL does not warrant, guarantee or make any representations regarding the use or the results of the use of the BTD Thunderstorm Detector or the software.

In no event will Biral, its Directors or employees be liable for direct, indirect, incidental, exemplary or consequential damages, expenses, or losses arising out of the use or inability to use the instrument or software.

FURTHER INFORMATION

You can get more information by contacting BIRAL at info@Biral.com.
For service or repair consult contact BIRAL at service@Biral.com.

Biral, PO Box 2, Portishead, Bristol, BS20 7JB, UK
Telephone: +44 (0) 1275 847787
Facsimile: +44(0) 1275 847303

Manual Number: 106546
Revision: 04E

CONTENTS

1 INTRODUCTION

This manual applies to both the **BTD-300** and **BTD-350** Thunderstorm Detector models. It covers the use of the BTD Control Software connected to a BTD Thunderstorm Detector.

The software runs on a standard PC running the Windows 7™ or later operating system. The Professional version of Windows is required. The software will run on either 32-bit or 64-bit versions of Windows. Make sure that your computer has the latest Windows service pack and critical updates.

The BTD Control software communicates with the BTD Thunderstorm Detector either via an RS422 serial or Ethernet data link. (The link is dependent on the BTD configuration, which is selected at the time of order)

Before operating the BTD the user should have read the BTD User Manual which describes the operation of the detector.

1.1 Minimum System Requirements

The requirements apply to situations where the software is installed as a single application on a computer. Where the application is to be run in conjunction with other applications it is the responsibility of the user to ensure the system requirements are adequate.

The compatibility with operating systems not listed in this document is not currently known. If operation with alternative operating systems is required, please contact Biral for further advice.

System Component	Minimum Requirement
Processor	**Pentium 1 GHz** Pentium 2GHz or higher is recommended.
RAM Memory	**1 G Bytes** 2 G Bytes is recommended.
Available Hard Disk Space	**32-Bit - 1 G Bytes for Program Installation** **64-Bit - 2 G Bytes for Program Installation** Additional space is required for the storage of logged data. The BTD Control Software generates approximately 200 M Bytes per day of logged data. It is the responsibility of the user to manage the long-term archiving of data and housekeeping of the data storage area.
Video Adaptor	**DirectX 9 graphics device**
Monitor	**800 x 600 Minimum Pixel Resolution**
Communication Ports	**Either** **RS422 Serial communications port** Capable of supporting the following: Baud Rate 115,200

	Parity	No Parity
	Data Bits	8 Data Bits
	Stop Bits	1 Stop Bit
	Or	
	USB 1.0 or USB 2.0 Port	
	Capable of connection to a USB to Serial Port adaptor with the capabilities listed above.	
	Or	
	Ethernet Port	

Table 1.1: System Requirements

2 INSTALLATION

If you have the BTD Control Software already installed on your system, please refer to section 2.2 for upgrade instructions.

2.1 New Installation

To install the software run the program BTD Installer.exe from the installation media.

As the software requires administrator access, the windows User Access Control dialog will be displayed prompting the user to allow the program to have administrator access. Click the Yes button to allow this.

A series of screens will be displayed during the installation process:

Figure 2-1: Licence Agreement

Click on the "I agree to the license terms and conditions" box to enable the Install button. Clicking on the Install button will start the installation process.
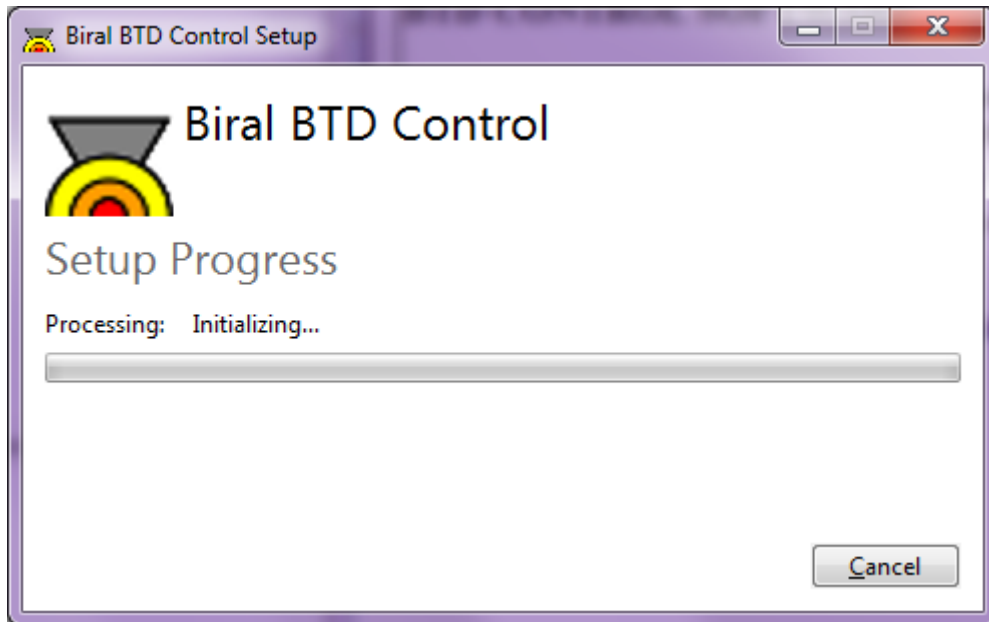
Figure 2-2: Initialisation

The installation process checks for and installs any prerequisite Windows components that are not already installed (for example the .NET framework). If these are required the installation process may take a long time and you may be prompted to reboot the computer during the installation, if this happens the installation will continue automatically on restart.

Once the Installation has finished the Following screen will be displayed.
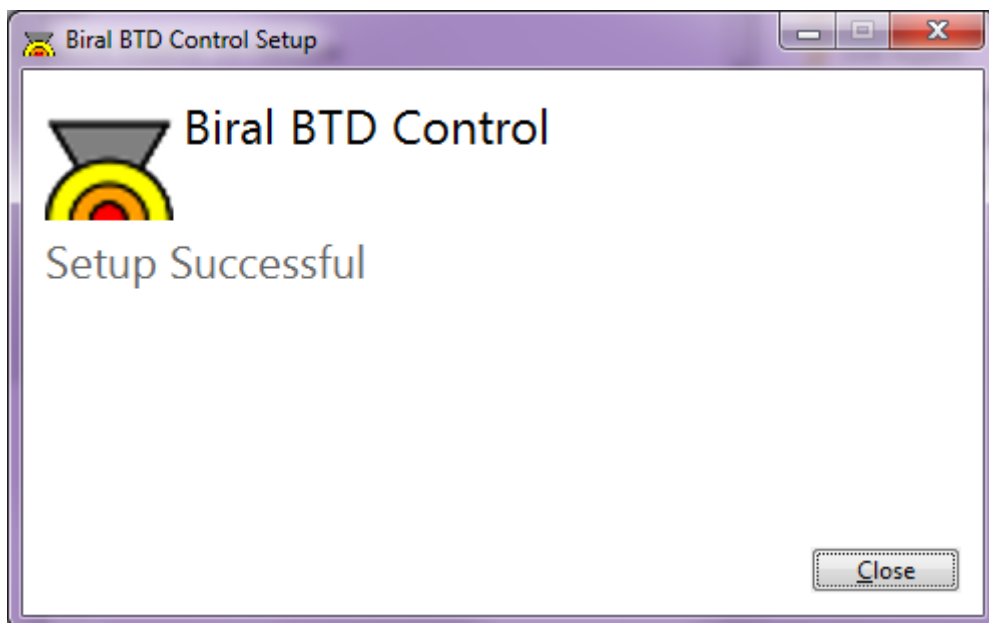

Figure 2-3: Successful Setup

If an error is displayed, please contact Biral for assistance.

Once the installation is complete an icon will be placed on the Windows Desktop.

Note: If a USB to RS422 converter is being used for the serial data connection the drivers will need to be installed – refer to the converter manufacturer for details and make sure that the appropriate drivers are installed **BEFORE** starting the software.

2.2 Update to an Existing Installation

If a previous version of the BTD Control Software is installed on the PC, then this will need to be removed before proceeding with the new installation.

To remove an existing installation:

- Open the Windows Control Panel - located on the Start Menu.

- Select Programs and Features.

- Wait for the list of installed programs to be updated.

- Locate the Biral BTD Control Software in the list and click on it.

- Right Click on the file and select Uninstall. This will run the uninstaller and remove the software from the system. Once it has been removed the BTD Control Software will not be displayed in the list of currently installed programs.

- Close the Programs and Features window and the Control Panel.

- Now follow the instructions in section 2.1 to install the new software.

3   ETHERNET CONNECTIVITY

The BTD sensor is set up to automatically assign an IP address to the sensor on start-up. This assumes that the sensor will either be connected to a network or that the PC it is connected to is set up to have an automatic private IP Address.
If in doubt of the set-up of your computer, please contact your IT administrator.
The BTD Control Software uses a Virtual Communication Port to communicate with the sensor. This port needs to be assigned on initial start-up.

3.1   Assigning the Virtual Com Port

To assign the Virtual Com Port start the BTD Control Software.
On start-up the BTD Control software will try and find the BTD sensor and connect automatically. The initial display will be:
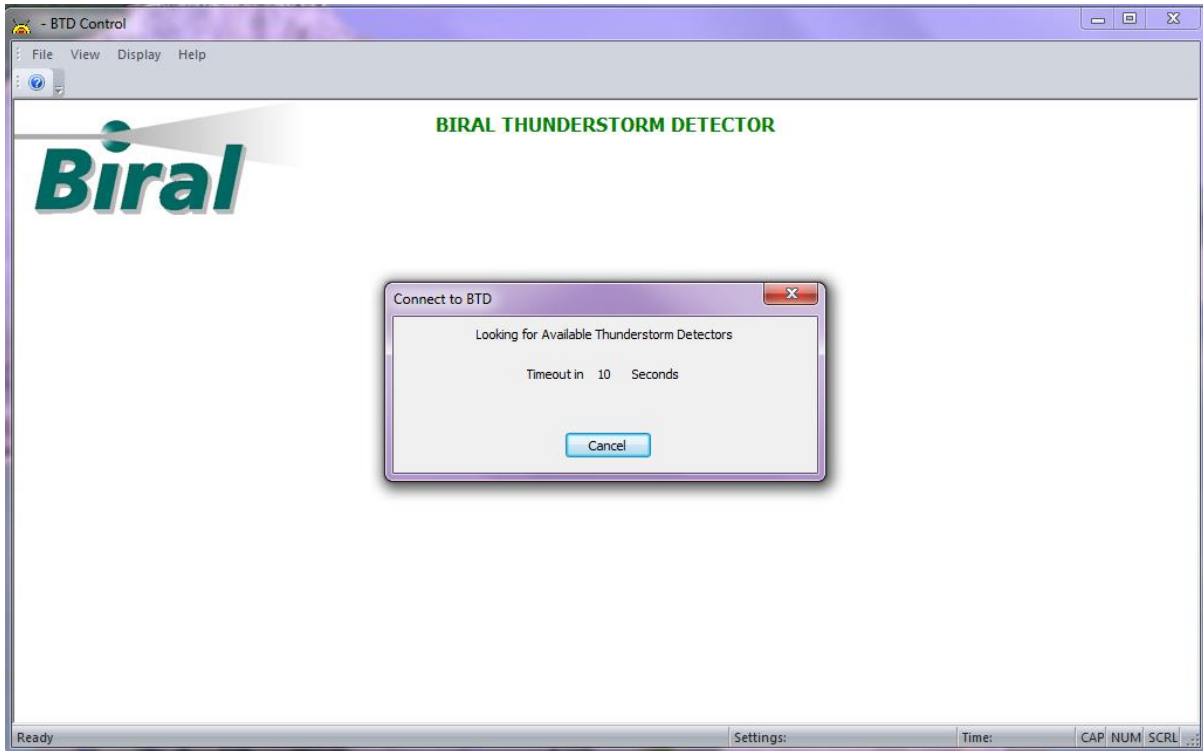
Figure 3-1: Searching For BTD Sensor

As the port has not been allocated, the software will not find the BTD Sensor, so the display will change to:
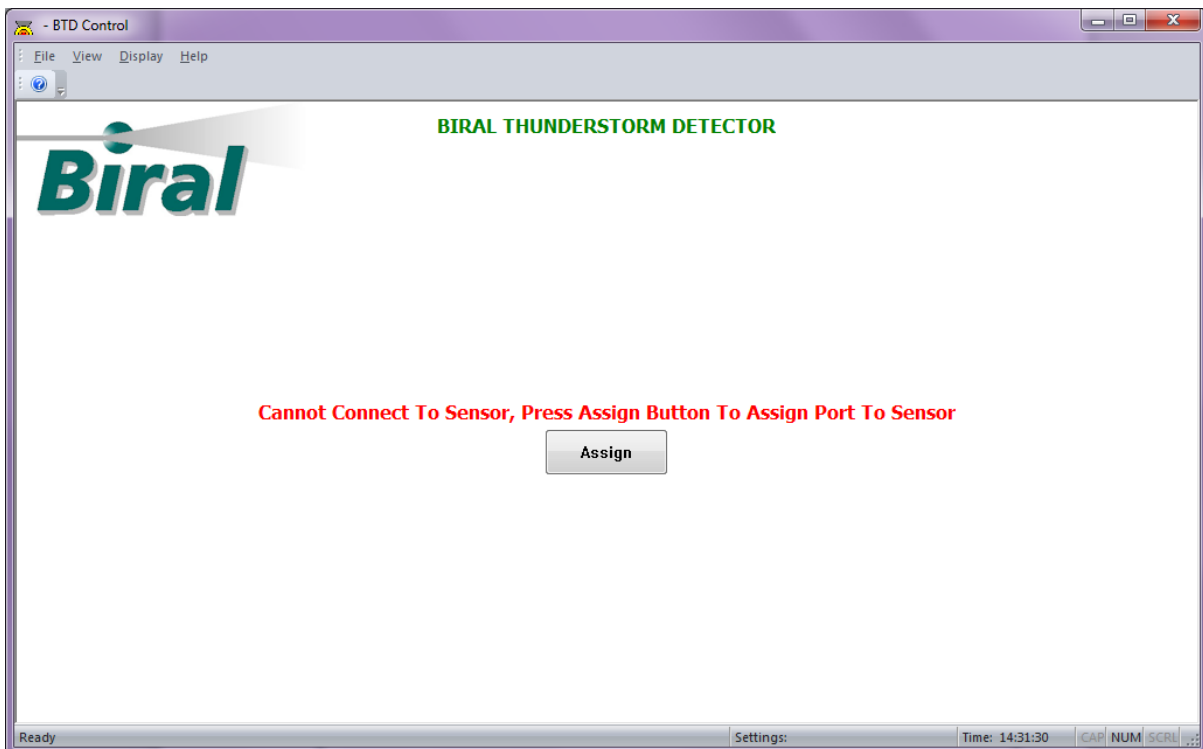

Figure 3-2: No Sensor Found

Pressing the Assign button will start the program that assigns the Com port to the sensor. Assigning a Com Port needs to have Administrator privileges so the User Account Control dialog will be displayed:

Figure 3-3: User Account Control

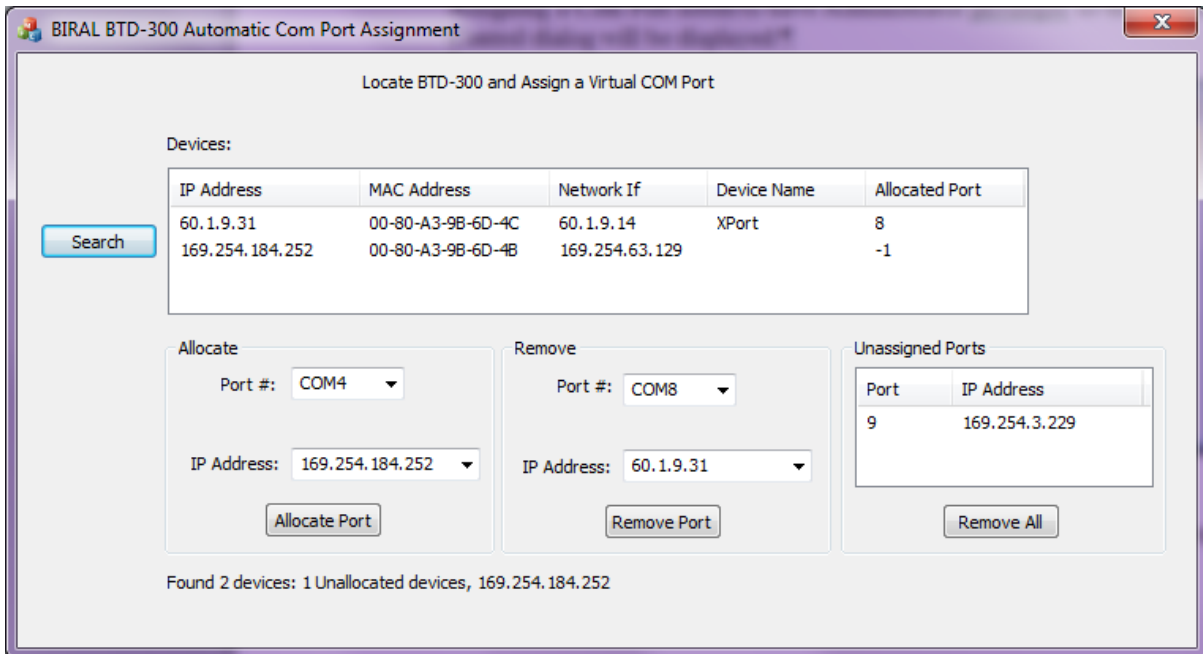Pressing the Yes button will start the Automatic Com Port Assignment program.

Figure 3-4: Automatic Com Port Assignment Display

When this program starts it searches for any BTD sensors and displays the information about them in the Device box.

In the above example there are two BTD sensors found – One is on a network (IP address 60.1.9.31) and that has a port assigned – in this instance the software cannot connect to this sensor as it is already in use.

The second sensor is connected locally to the PC with a private IP address (169.254.184.252) and does not have a port allocated to it. (Signified by the -1 in the allocated port field)

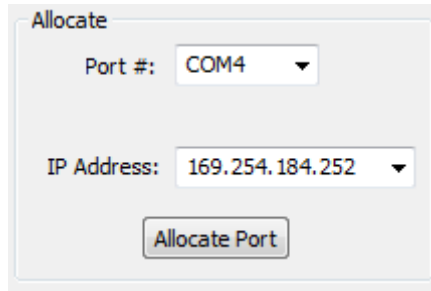To allocate a port to the second sensor use the Allocate options:

Figure 3-5: Allocate Options

The Port # drop down box lists all the free ports on the system. The first available port is displayed in the field.

The IP Address drop down box lists those devices found with no ports allocated.

To allocate a port, press the Allocate Port button, the status at the foot of the display will change to: "Allocating Port 4 to IP: 169.254.184.252, please wait.

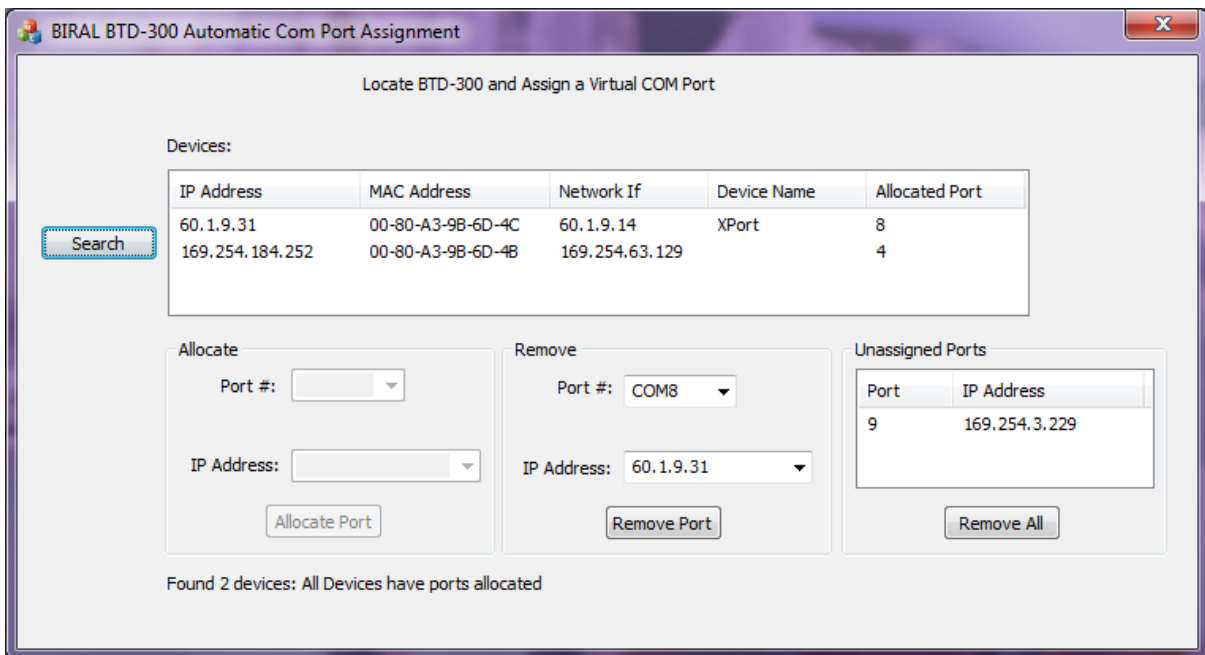On successful allocation, the display will change to:

Figure 3-6: Successful Port Allocation

Once all the ports have been allocated, close the allocation program.

Once the program is closed, the BTD Control software will automatically try and connect to the sensor.

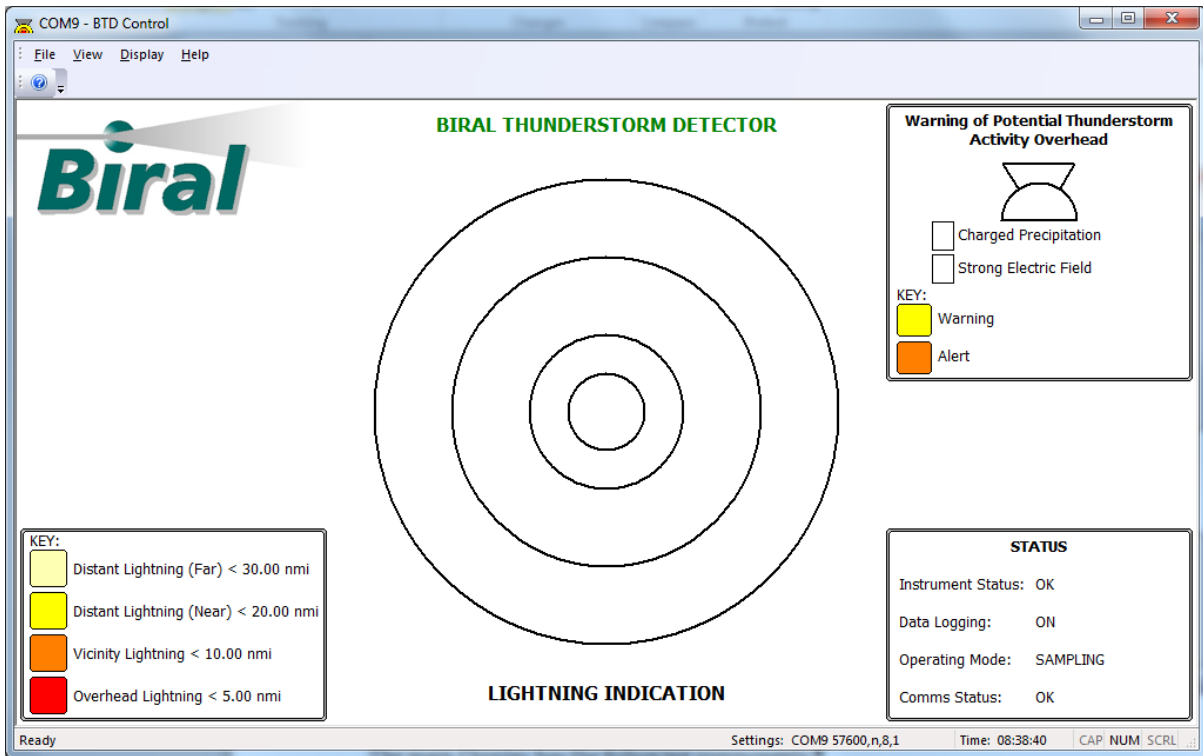On successful connection the display will change to:

Figure 3-7: Main Display

3.2   Private IP Addresses

If the BTD is connected to a PC that has an automatic private IP address, then whenever either the BTD sensor or the PC is restarted the automatic IP address will change and the BTD Control will not be able to automatically connect to the sensor. In this case the process described in section 3.1 will need to be repeated.

3.3   Removal of Old Port Assignments.

If the Private IP Address process as described in section 3.2 above has produced numerous assigned ports to old IP addresses, the Assignment program can be used to remove old assignments and free the com ports associated with them.

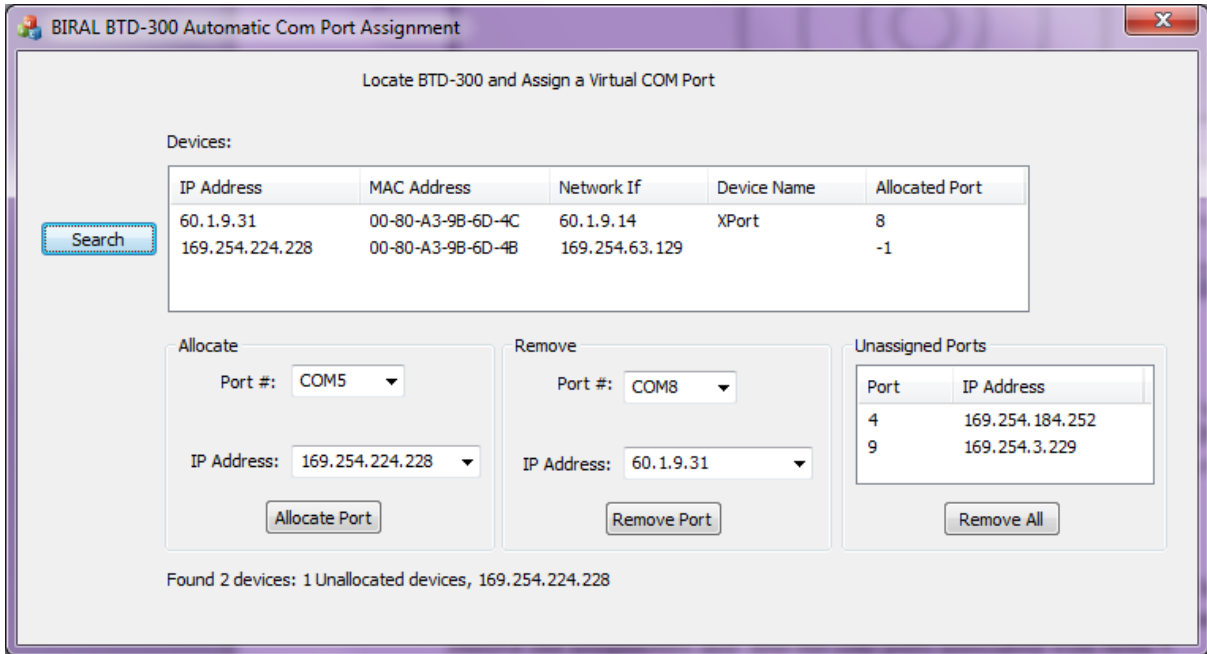In this example there are two old assignments listed in the Unassigned Ports box.
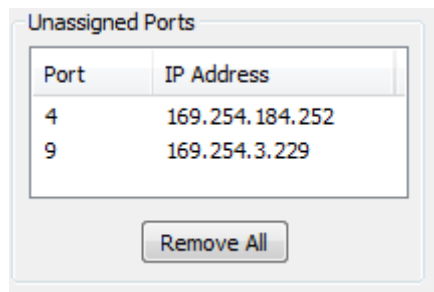
Figure 3-8: Example 2

Figure 3-9: Unassigned Ports

Pressing the Remove All button will remove ports 4 and 9 and free them for future use.

3.4   Network IP Addresses

If the BTD is connected to a PC via a network, then the network server will assign the IP address. Restarting the PC or the BTD sensor will not change the assigned IP address, so the control software should be able to connect without having to reassign a com port.

3.5   Static IP Addresses

If the BTD sensor is to be connected to a standalone PC it may be more convenient to assign a static IP address to both the PC and the sensor.

In this case restarting the PC or the BTD sensor will not change the assigned IP address.

It is possible to connect the BTD to the Control Software using static IP Addresses, but this requires that changes are made to the BTD sensor setup.

The BTD-300 uses a Lantronix® XPort® Serial to Ethernet embedded device server. This device has been set up to have an automatic IP address.

In order to change the IP address to a static address, some proprietary Lantronix® software must be installed on the PC.

3.5.1   Installing the Device Installer

When the Biral BTD Control is installed, the Lantronix® software installers are also installed with the Biral program.

These programs are located in the following folder:

C:\Program Files\BIRAL\BTDControl\Lantronix

Run the program "setup_di_x86x64cd_4.4.0.0.exe" as administrator to install the Lantronix software.

Follow the on-screen instructions to install the software.

3.5.2   Running the Device Installer

Run the Device Installer via the Start Menu.

Start – All Programs- Lantronix – DeviceInstaller 4.4 – Device Installer

This will bring up the Device Installer main screen.

The first thing the device installer does is to search for any Lantronix devices and will display any it finds. See Figure 3-10 below.
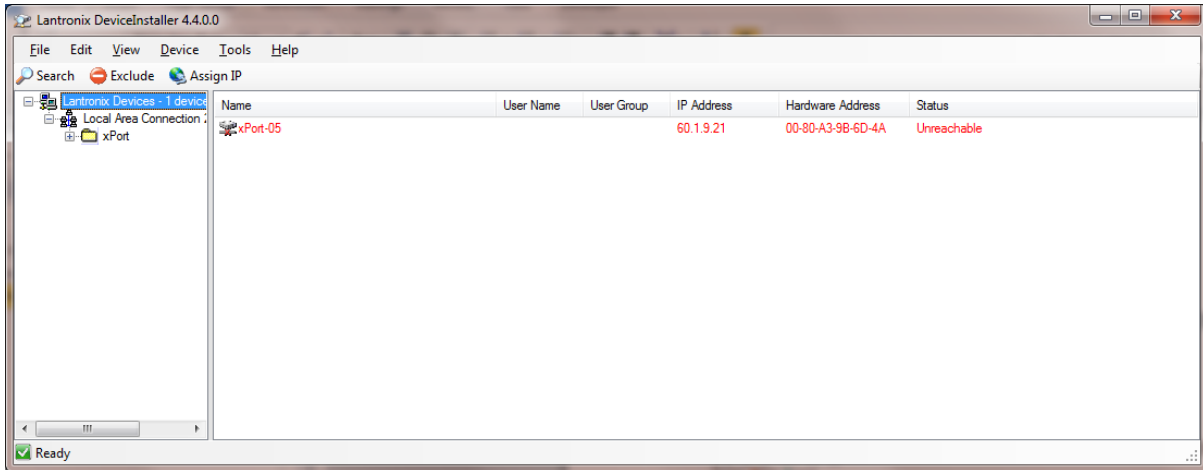
Figure 3-10: Device Installer Screen

Before making any changes to the IP addresses it is recommended that you read the TCP/IP tutorial in the Device Installer Help files.

NOTE:

Changing the IP address of the sensor may make the sensor unreachable – in the example shown in Figure 3-10 above the xPort device is unreachable and displayed in red. If the sensor is shown as unreachable an IP address can still be assigned and will **have** to be assigned before the BTD Software can connect to the sensor.

3.5.3   Assigning an IP address

Select the xPort device in the right-hand window and press the Assign IP button in the toolbar
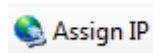
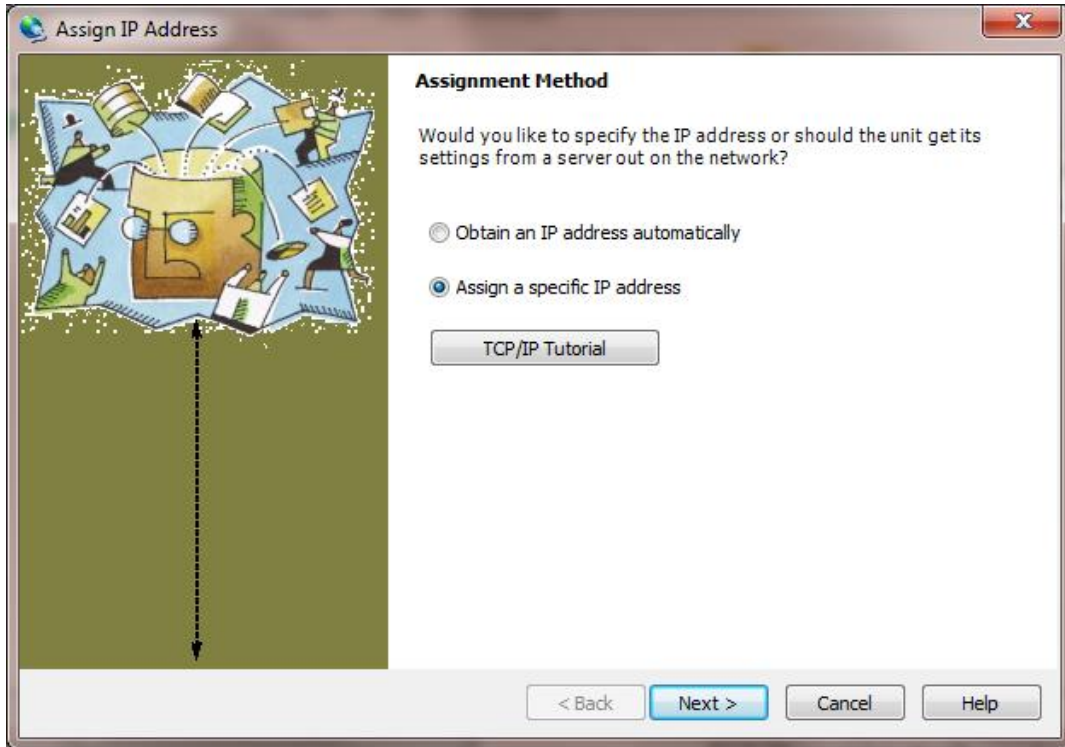The dialog as shown in Figure 3-11 will be displayed

Figure 3-11: Assign IP Address Dialog

We recommend that you read the TCP/IP Tutorial before changing any IP Addresses

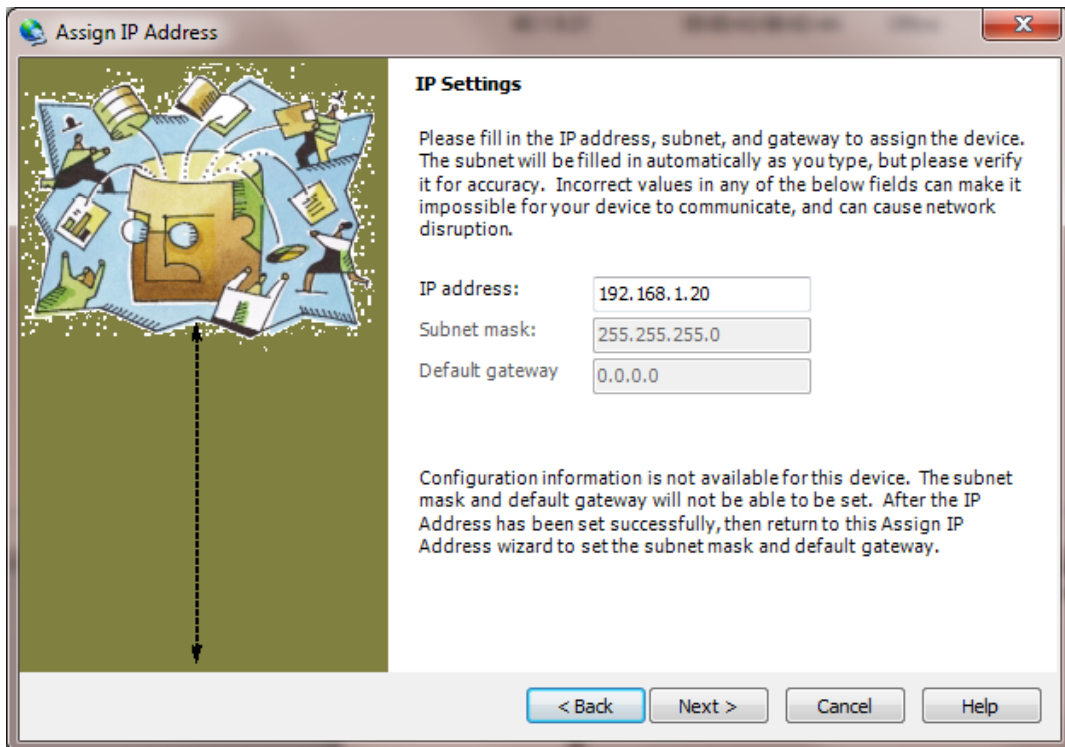Select Assign a specific IP address and press Next >

Figure 3-12: IP Settings

Enter the IP Address, following the instructions on the screen. Then press Next>
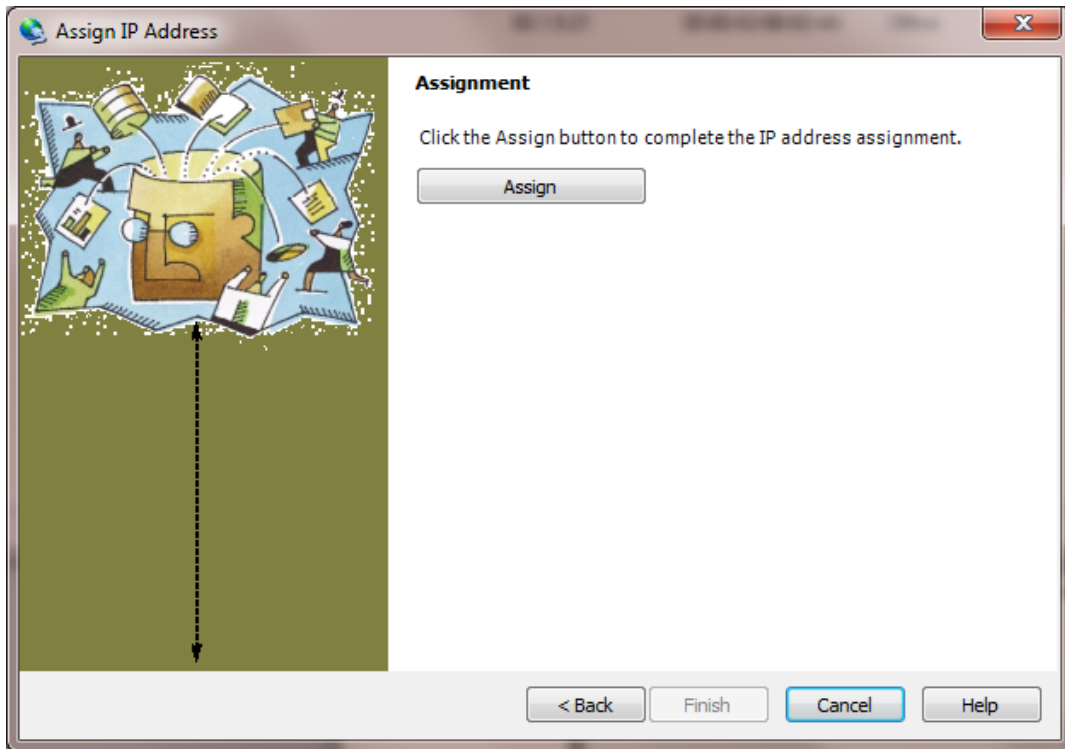

Figure 3-13: Static IP Assignment

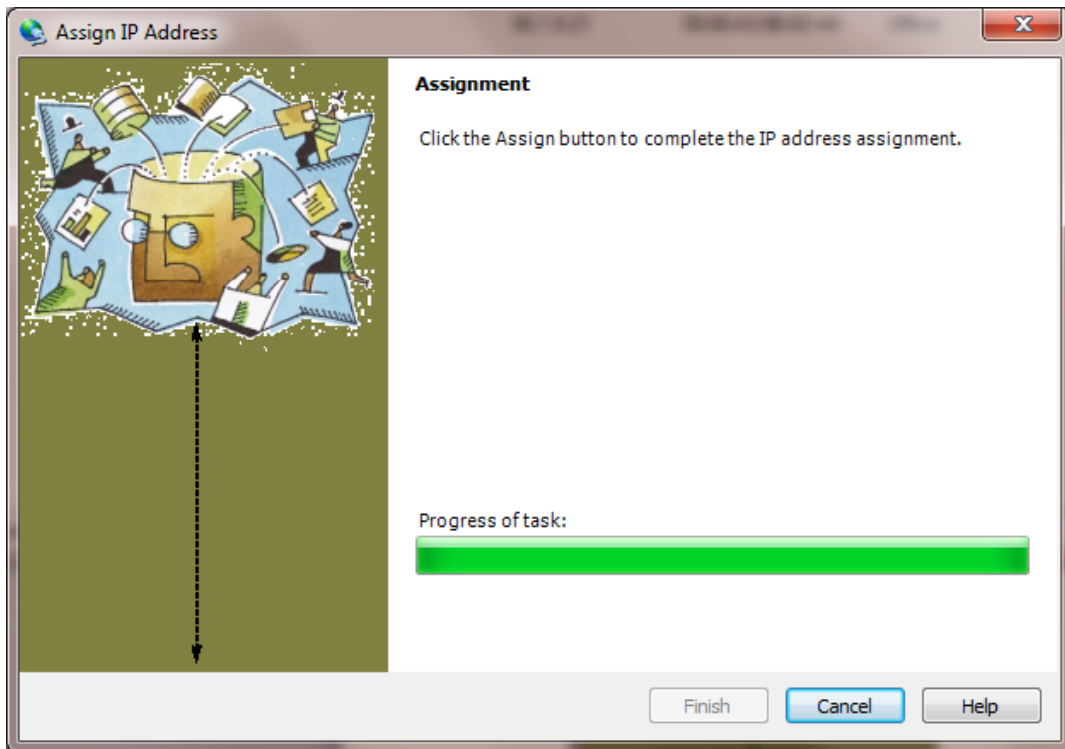Press Assign to complete the assignment.

Figure 3-14:Progress

The progress bar will update until the assignment is complete then the completion screen will be displayed as shown in Figure 3-15.
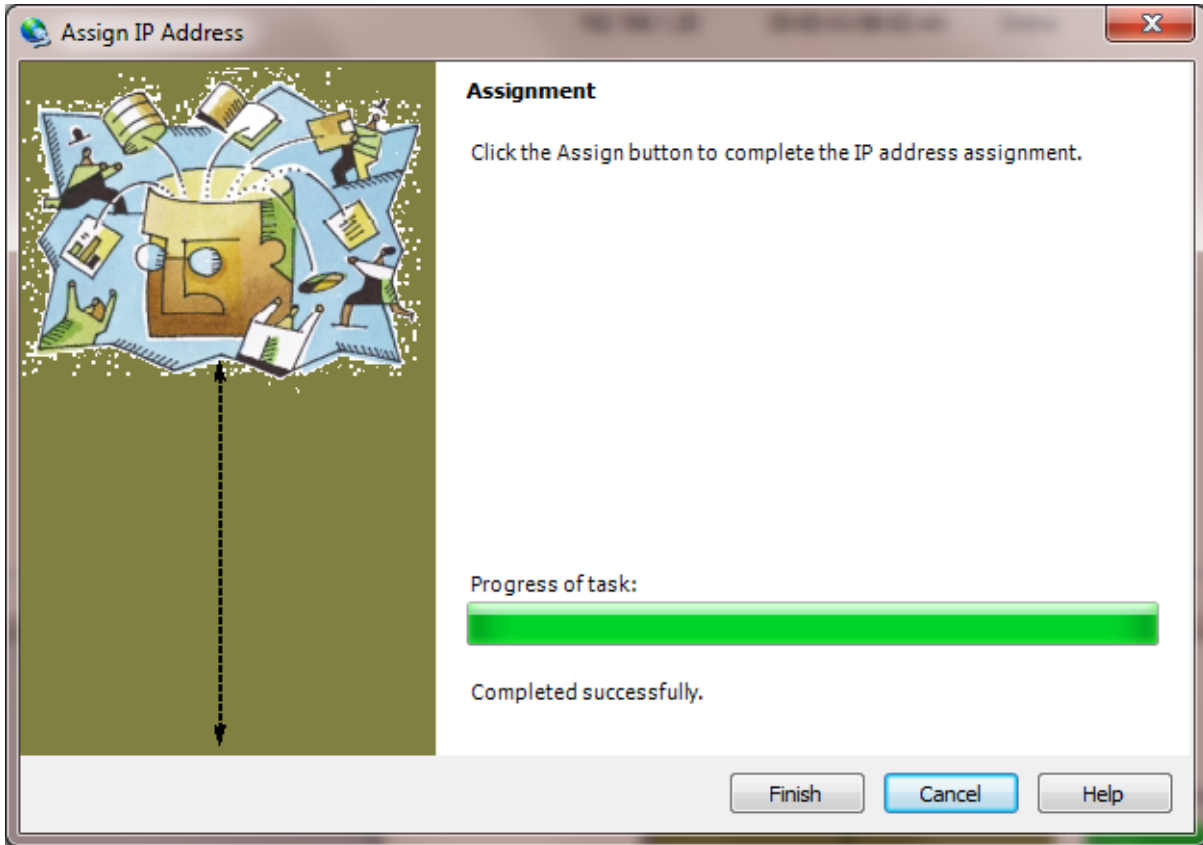
Figure 3-15: Completed

Press the Finish button.

The screen display will change to show the new IP address as shown in Figure 3-16 below.
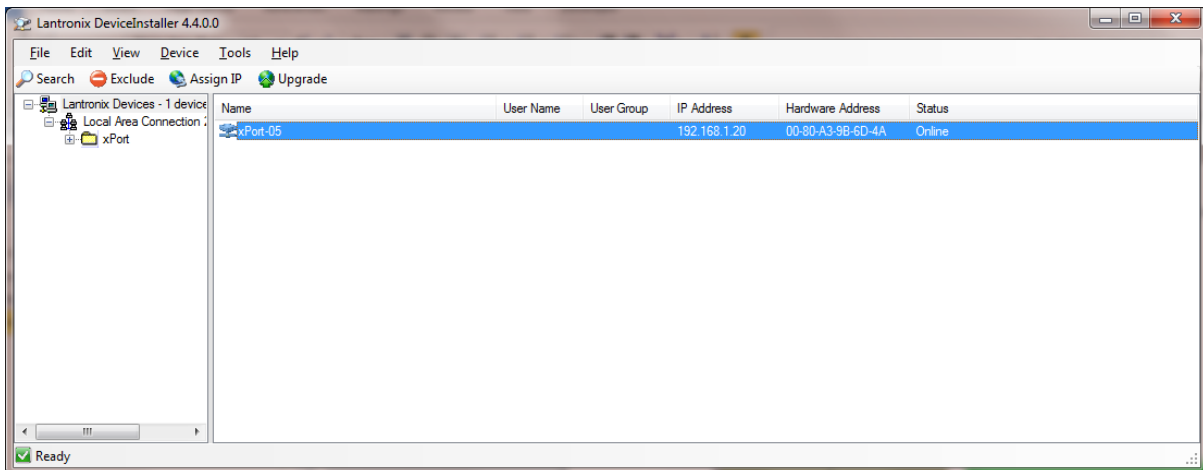

Figure 3-16: Completed Assignment

Close the device installer.

3.5.4   Assigning Com Port

To assign the Virtual Com Port start the BTD Control Software and follow the instructions in section 3.1.

4   RS422 CONNECTION

If Serial communications have been installed on the BTD, The BTD will use a 4-wire RS422 interface. See the BTD User manual for details on the connection.

As most PCs don't have RS422 ports a RS422 to RS232 or RS422 to USB converter may be required. This converter is not provided with the Software or the BTD and it is the responsibility of the user to provide this.

If the converter has been properly connected and installed, then the BTD Control software will automatically detect the BTD on the serial port on start-up.

5   USER INTERFACE

All of the functionality of the BTD is controlled via the BTD Control Software.

The BTD Control Software is designed to be flexible and easy to use. The software is started via the icon on the Windows Desktop.

On start-up the BTD Control software will try and find the BTD sensor and connect automatically. The initial display will be as shown in Figure 3-1 above.

If the connection cannot be found the No Sensor Found display as shown in Figure 3-2 above will be displayed. If this happens, for Ethernet connections follow the instructions in section 3.1 above. For serial connections, check that the RS422 connections are correct and, if using a USB converter, check that the drivers are installed, and a virtual COM Port is available.

On successful connection the main display will be shown.

When the software is closed, the BTD instrument will still be running but all data logging will stop, and no warnings will be displayed. The user will be asked to confirm the closure via the message as shown in Figure 5-1 below:
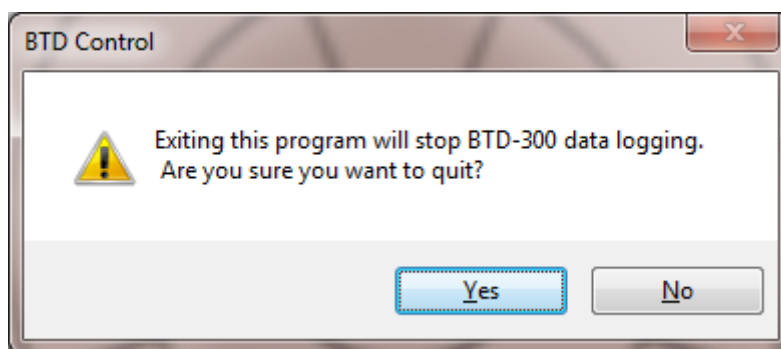

Figure 5-1: Close Confirmation

5.1 Main Display
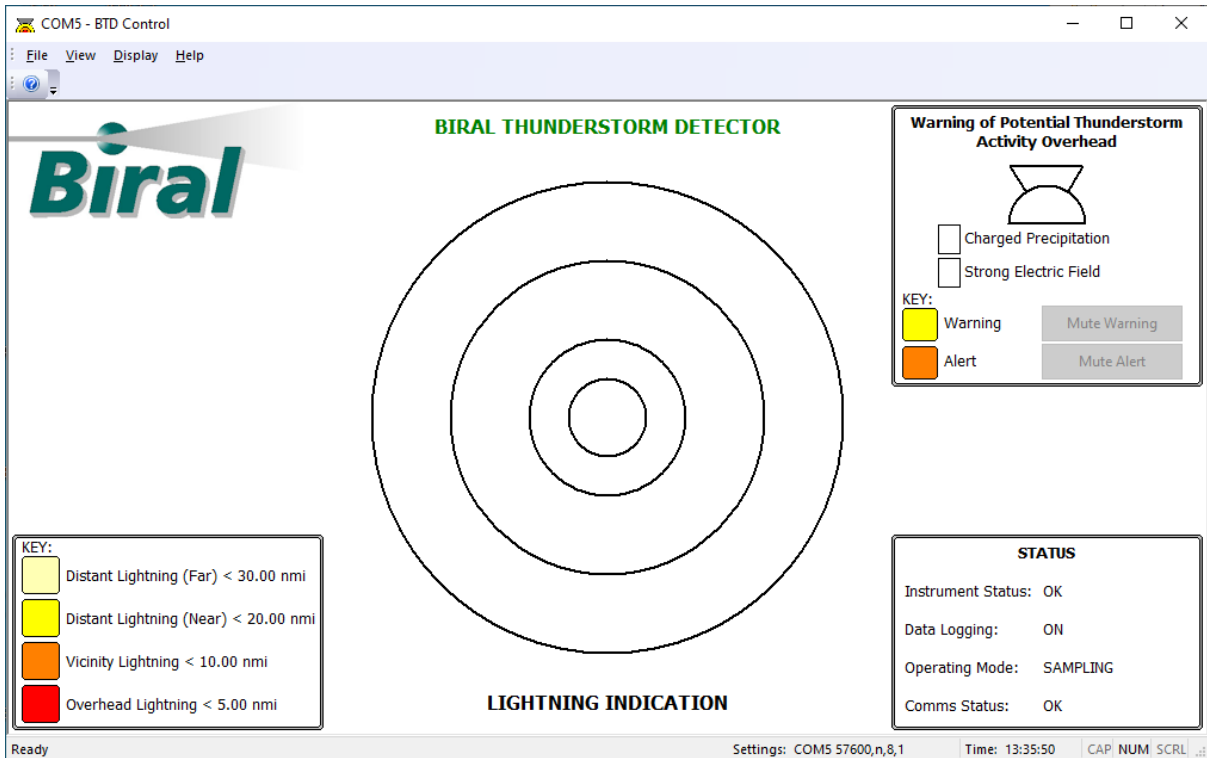
The Main Display is as shown in Figure 5-2 below:

Figure 5-2: Main Display – No Direction Finding

The main Display has the following components:

- Lightning Indication Plot.
- Lightning Key.
- Warning of Potential Thunderstorm Activity Overhead.
- Status Indication.

5.1.1 Lightning Indication Plot

This displays an indication of the lightning activity. The sector containing lightning activity is filled with the appropriate colour according to the key (bottom left). The number of flashes in the last user-defined warning period (default 15 minutes) is indicated in the sector's centre. The number representing the most recent flash is displayed in bold.

The display in Figure 5-3 below shows the indication of lightning activity during a thunderstorm.
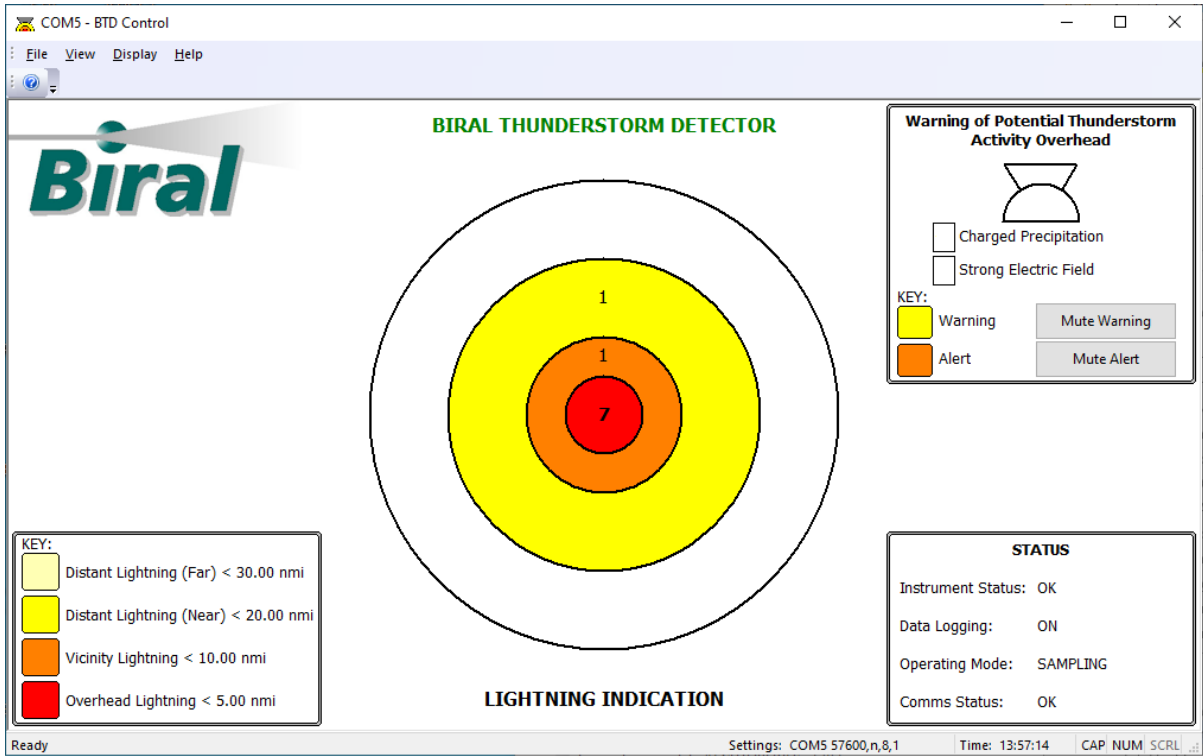
Figure 5-3: Indication Of lightning activity

If the BTD has been purchased with optional Direction Finder Module (standard equipment on the BTD-350), then the software will detect its presence on start-up and the main display will be as shown in Figure 5-4 below. In this case, the number of flashes will be located in the appropriate sector, showing both the range and the direction of the flashes. Only the appropriate sector will be coloured with the key colour.

More than one sector will normally be illuminated and will contain the number of flashes occurring in that sector, as the storm moves through the sensor's measurement area.

NOTE: the data string from the BTD will always provide a direction reading if the Direction Finder Module is fitted. If no clear direction is discernible, the data location will read '999'. If the flash is 'vicinity' or 'overhead' the direction obtained from the direction finder will NOT be used in the display of Figure 5-4. The central 'overhead' area and the first ring, 'vicinity lightning' only indicate the number of flashes, not the direction. This is in accordance with the FAA requirements, and reflects the fact that, for such close flashes, the actual flash direction may not represent the true storm position.
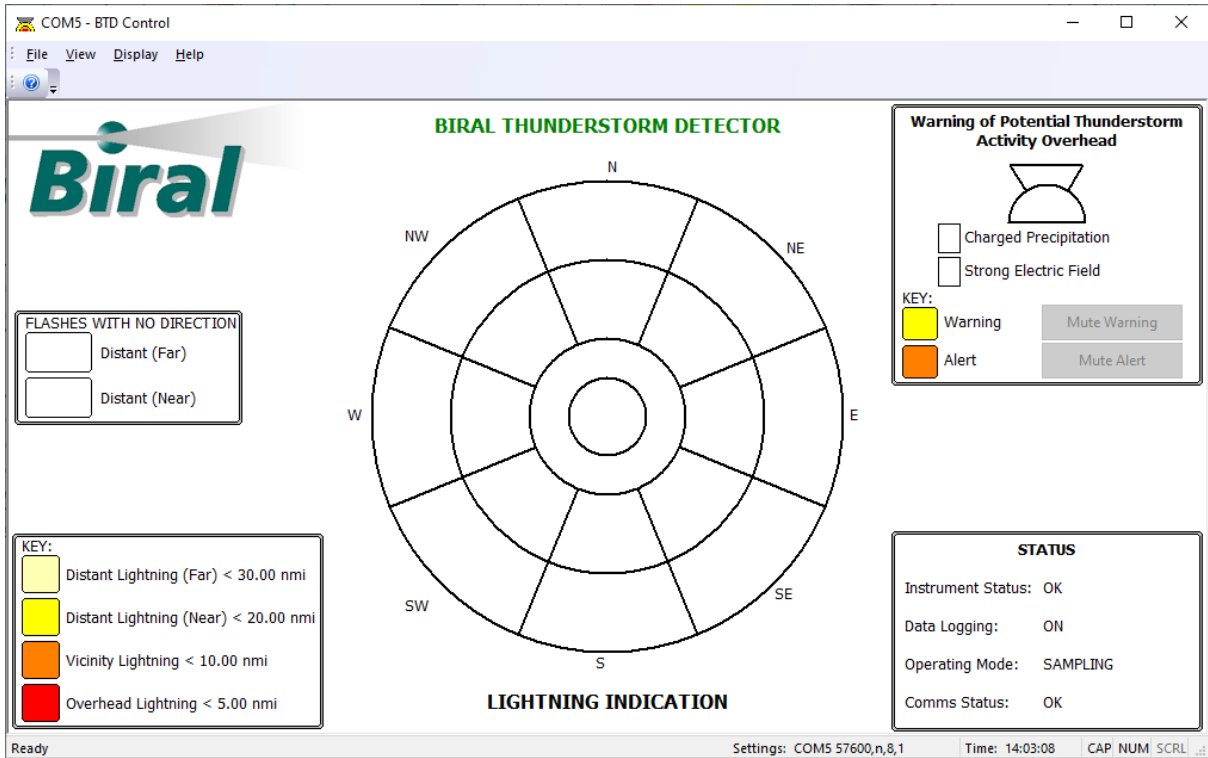
Figure 5-4: Main Display with Direction Finding Module

5.1.2 Lightning Key

The Lightning Key is displayed on the bottom-left of the screen. This is the colour key for the Lightning Indication Plot, with selected distances displayed in either Km or Nautical Miles. See Service Display (section 5.3.4) for details on how to change the ranges and units.

The two Distant Lightning events are coloured Yellow to indicate that a warning state has occurred.

The Vicinity Lightning event is coloured Orange to indicate that an alert state has occurred.

The Overhead Lightning event is coloured Red to indicate that a severe alert state has occurred.

5.1.3 Warning of Potential Thunderstorm Activity Overhead

This is displayed on the top-right of the screen. The thunderstorm icon is unfilled if no warning or alert is present. The icon is filled yellow if there is warning of charged precipitation falling at the site and orange if an alert for the presence of a strong overhead electric field activated. The warning or alert indication in the icon will remain present for a user-defined warning period (default 15 minutes). A tick in the appropriate box indicates that the charged precipitation or the strong electric field is still present.

The example in Figure 5-5 below shows a charged precipitation warning where the charged precipitation is still present. While the example in Figure 5-6 shows that a strong electric field alert occurred in the last pre-defined warning period (default 15 minutes).
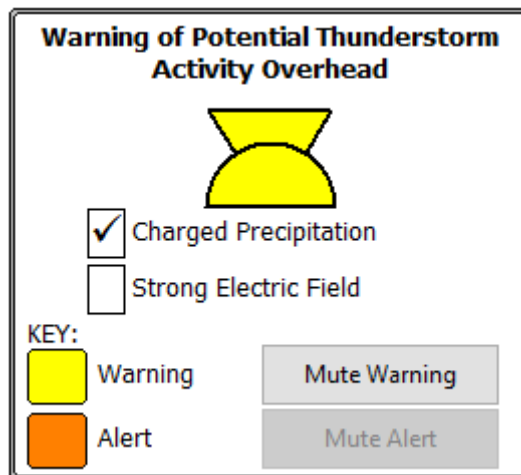

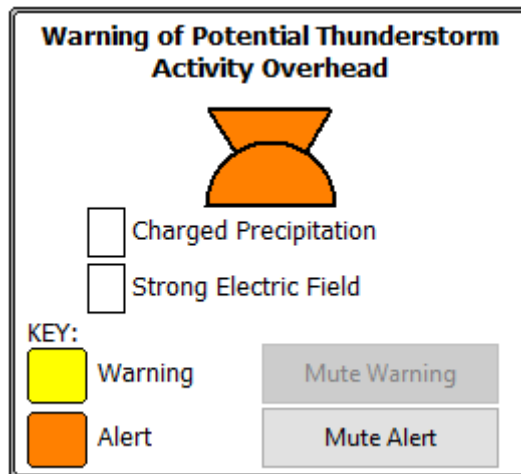Figure 5-5: Indication of current charged precipitation warning

Figure 5-6: Indication of Strong Electric Field Alert in Last Warning Period

5.1.4 Status Indication

This is displayed on the bottom-right of the screen. This shows the current status of the instrument (OK or FAULT), whether data logging is taking place (ON or OFF), the current operational mode (IDLE or SAMPLING) and the status of the communication interface (OK or display the number of errors found). More detailed instrument status can be found on the Configuration screen.

If the status is OK the text will be in black but any faults or if the system isn't logging will be shown in red. See Figure 5-7 for an example showing that the logging of data has stopped.
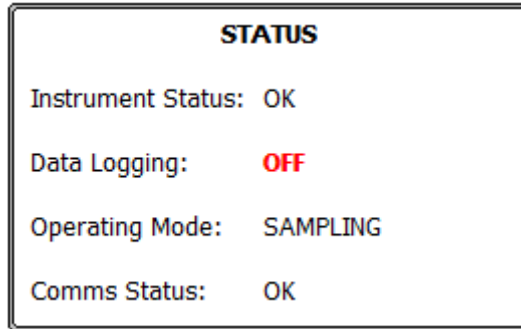
Figure 5-7: Example of non-standard status display

5.1.5   Flashes with No Direction

When the Direction Finder Module is fitted, there may be occasions when a distant flash occurs that does not have suitable quality of direction data associated with it. In this case the flash is recorded, not in the Lightning Indication plot but in the Flashes with No Direction section of the display.

The number of flashes in the last 15 minutes (default) is indicated in the centre of the box. The number displayed in bold represents the most recent flash.

The display in Figure 5-8 below shows the indication of lightning activity during a thunderstorm.
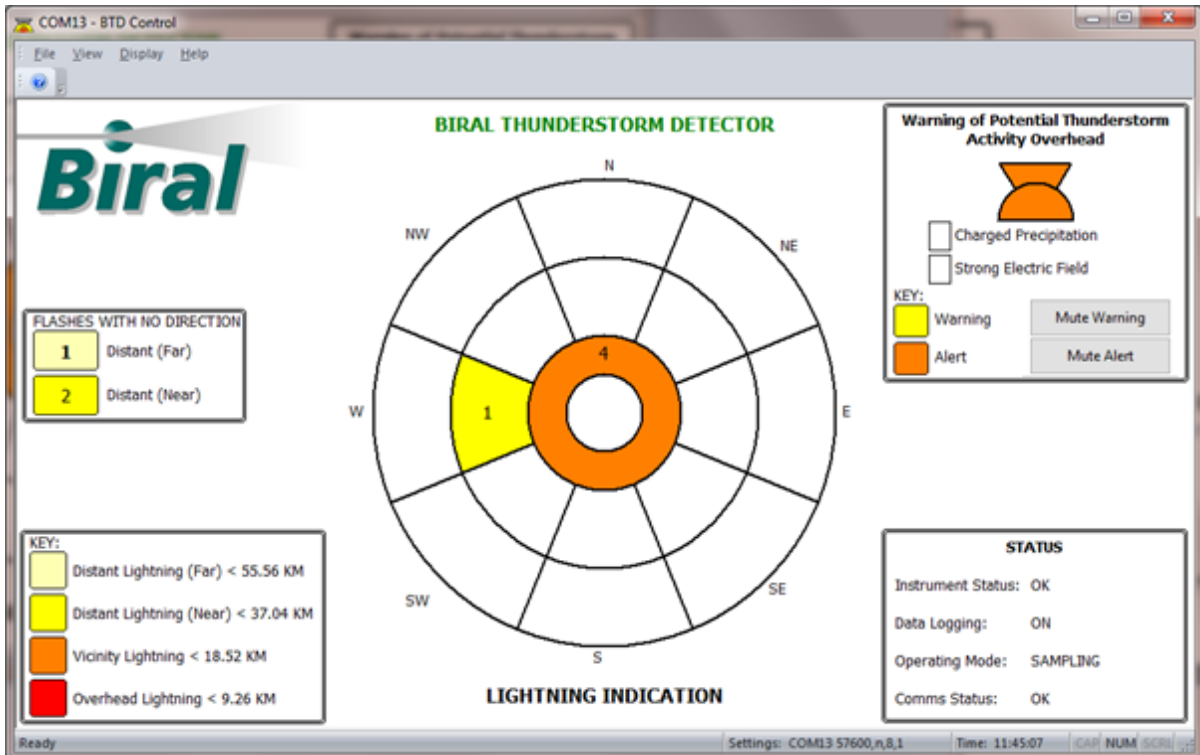

Figure 5-8: Flashes with No Direction

The BTD is designed to start sampling automatically on startup, so the Operating Mode should normally show Sampling.

5.1.6 Warning And Alert Sounds

The software can be configured to play sounds when a Warning or Alert has been detected (See Section 5.2.7 for details of sound configuration).

If the sounds have been activated, then when a warning or Alert occurs the selected sound will play every 30 seconds for a user-defined warning period (default 15 minutes).

When a Warning or Alert occurs the corresponding "Mute" button will be enabled. See Figure 5-5 and Figure 5-6 for examples.

The user can mute the sound of the warning or Alert by pressing the corresponding Mute button. If the sound has been muted the corresponding button will be disabled and the sound will not play for the rest of the warning period.

5.1.7 Idle Mode

If the user has stopped sampling the main display will change to that as shown in Figure 5-9 below.

The lightning indication plot is removed to reinforce the fact that the BTD is not sampling.
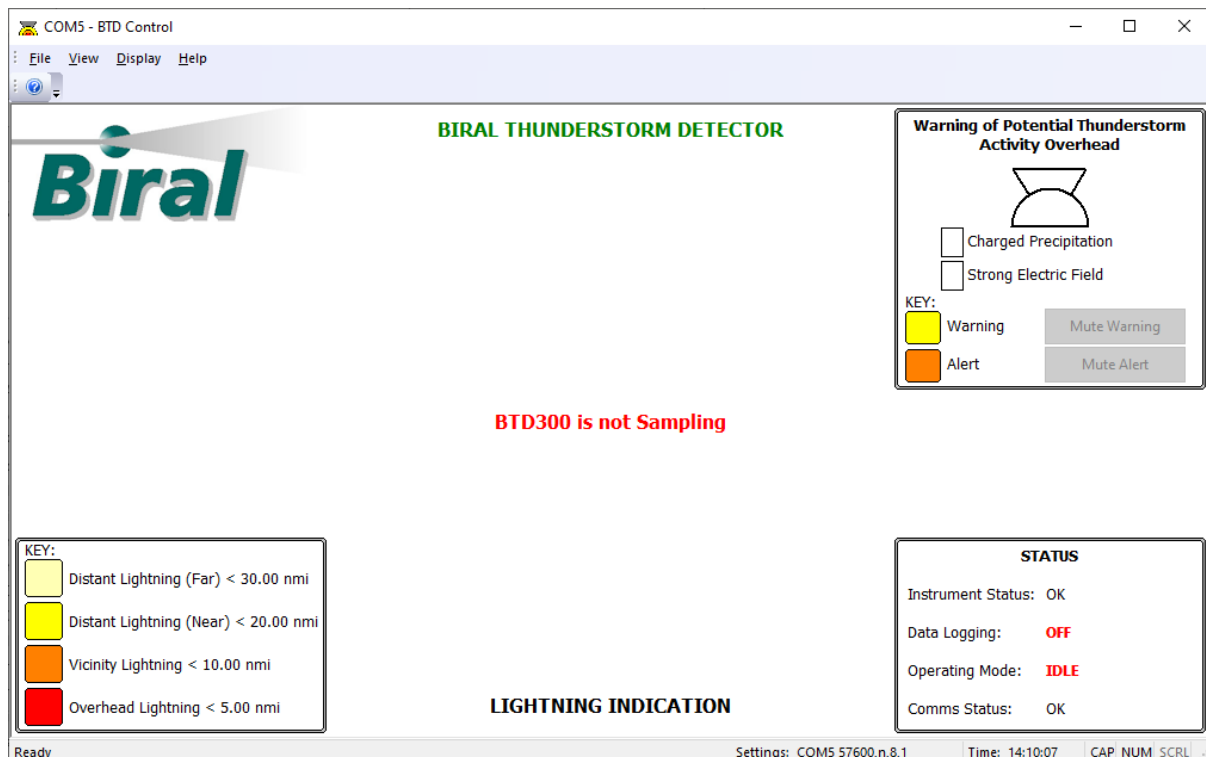

Figure 5-9: Idle Mode Display

5.2 Configuration Screen

The Configuration screen is accessed via the Display Menu as shown in Figure 5-10 below.
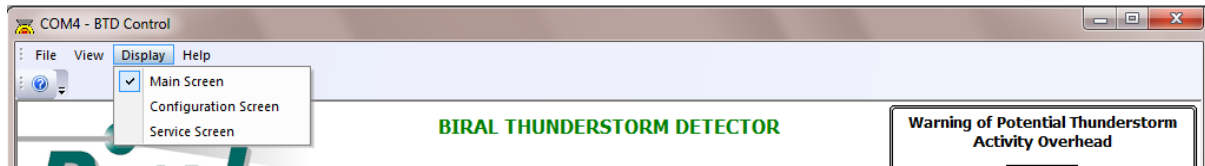

Figure 5-10: Menu Options

The Configuration Screen allows the user to view the status of the BTD and to customise certain aspects of the software.
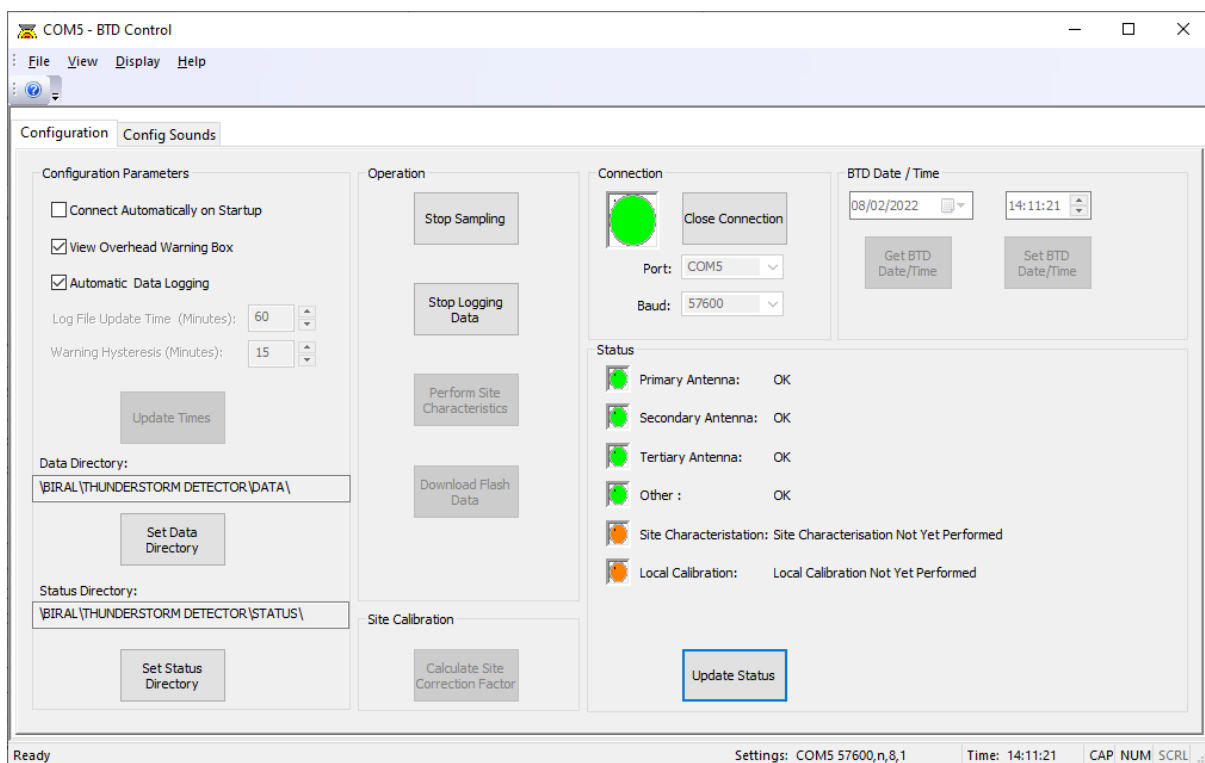

Figure 5-11: Configuration Screen

The Configuration screen has 2 tabs – Configuration and Config Sounds

The Configuration tab is divided into 6 areas:

- Configuration Parameters
- Operation
- Site Calibration
- Connection
- BTD Date/Time
- Status

5.2.1 Configuration Parameters

The configuration parameters allow the user to customise certain aspects of the software.

Figure 5-12: Configuration Parameters

- Connect Automatically on Startup – This checkbox allows the user to enable or disable the automatic connection to the BTD when the software starts. It is advisable not to disable this feature of the software. A tick in the box indicates that the feature is enabled.
- View Overhead Warning Box – This checkbox hides or displays the warning of Potential Thunderstorm Activity Overhead display. A tick in the box indicates that the Warning box is displayed. Figure 5-13 below shows the display when the warning box is hidden.
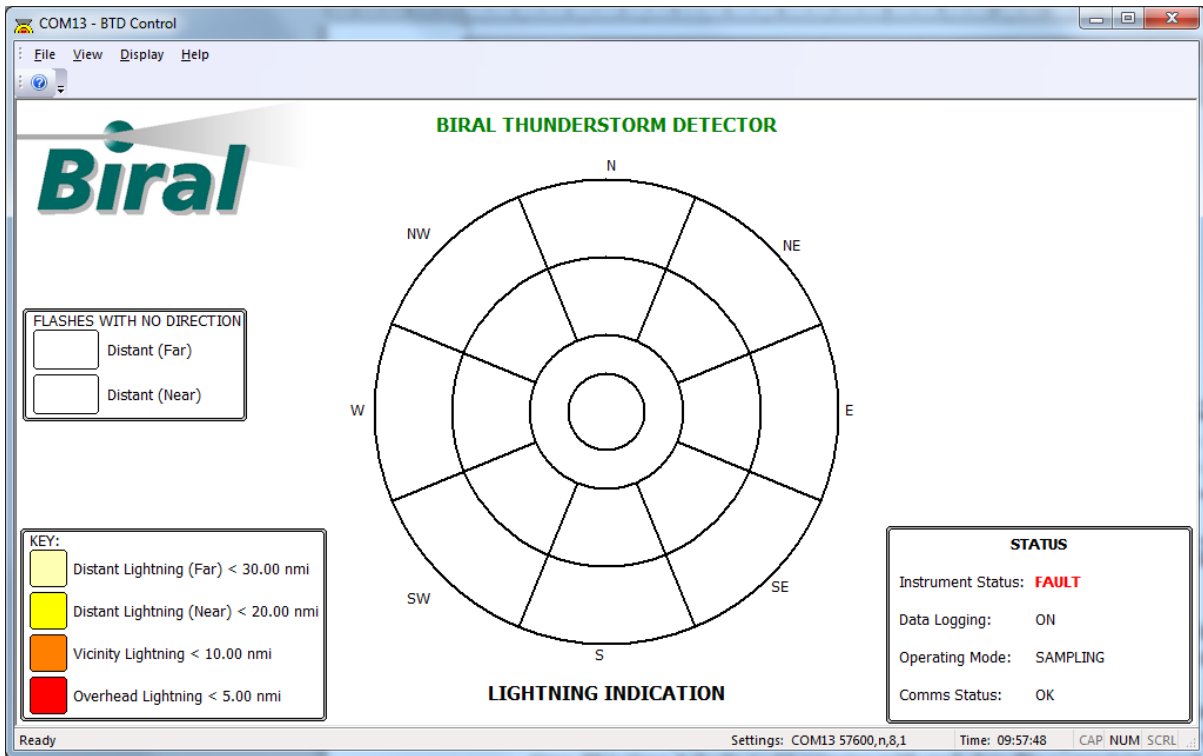
Figure 5-13: Overhead Warning hidden

- Automatic Data Logging – The software will automatically log the data whenever sampling is started. If this checkbox is disabled, then data logging will be disabled. It is advisable not to disable this feature of the software.
- Log File Update Time – When the system is sampling and logging the data, files will be automatically generated, and a new file created according to the log file update time. This time defaults to 60 minutes with each data file comprising one hour's worth of data. The update time can be changed to any value between 60 minutes and 1440 minutes (one hour to one day). This parameter can only be changed when the BTD is in idle mode. The parameter will be greyed out if the BTD is in sampling mode. To confirm and save the change in update time, press the 'Update times' button.
- Warning Hysteresis – This is the warning period in minutes that a warning or alert will be displayed on the main screen. This time defaults to 15 minutes, it can be set to any time between 5 and 60 minutes. This parameter can only be changed when the BTD is in idle mode. The parameter will be greyed out if the BTD is in sampling mode. To confirm and save the change in warning hysteresis time, press the 'Update times' button. – this will also update the BTD warning and relay hysteresis times.
- Data Directory – by default the data files will be stored in the directory C:\BIRAL\THUNDERSTORM DETECTOR\DATA. The user can change this default directory using the 'Set Data Directory' button.
- Status Directory– by default any generated status files will be stored in the directory C:\BIRAL\THUNDERSTORM DETECTOR\STATUS. The user can change this default directory using the 'Set Status Directory' button.

The settings defined here will be saved by the software and any changes made by the user will be retained.

5.2.1.1 **Data Files**

When the software initially starts the default data directory C:\BIRAL\THUNDERSTORM DETECTOR\DATA will be created. Any user-defined directories will also be created by the software.

Recorded files are automatically generated by the software and are saved using the file format "BTD_DATA_DDMMYY_HHMMSS" and end in the file format designation ".CSV", where the date is given in days, months and years and the time is in 24-hour format.

For example, a data file generated on 04 July 2014 at 09:14:50 sampling would be named "BTD_DATA_040714_091450.CSV".

The data files are text files stored in the comma separated variable format and are compatible with Microsoft Excel™.

Data files are automatically saved in the Data Directory\YYYY\Month folder, where YYYY is the year and Month is the month. When sampling continues from one month to the next a new folder and data file is generated for the new month.

For example, the data file mentioned above would be saved in the folder C:\BIRAL\ THUNDERSTORM DETECTOR \DATA\2014\JULY.

5.2.1.1.1 Example Data file.

This is an example of a generated data file.
```
BIRAL Thunderstorm Detector Log File: \BIRAL\THUNDERSTORM
DETECTOR\DATA\2014\July\BTD_DATA_040714_091450.CSV
Date: 04\07\14 09:14:50
PCDate, PCTime, Header, ID, Date, Time, No.Flashes, Warning Indicator, Warning
Flags,Self Test, Flash1 Date, Flash1 Time, Flash1 cs,Flash1 Distance, Flash1
Direction, Flash2 Date, Flash2 Time, Flash2 cs,Flash2 Distance, Flash2 Direction,
Flash3 Date, Flash3 Time, Flash3 cs,Flash3 Distance, Flash3 Direction, Flash4 Date,
Flash4 Time, Flash4 cs,Flash4 Distance, Flash4 Direction
04\07\14,09:14:50,DATA:,01,040714,090421,00,0,00,XOLOX,000000,000000,000,00000,000,
000000,000000,000,00000,000,000000,000000,000,00000,000,000000,000000,000,00000,000
04\07\14,09:14:52,DATA:,01,040714,090423,00,0,00,OOLOX,000000,000000,000,00000,000,
000000,000000,000,00000,000,000000,000000,000,00000,000,000000,000000,000,00000,000
04\07\14,09:14:54,DATA:,01,040714,090425,00,0,00,OOLOX,000000,000000,000,00000,000,
000000,000000,000,00000,000,000000,000000,000,00000,000,000000,000000,000,00000,000
04\07\14,09:14:56,DATA:,01,040714,090427,00,0,00,OLLOX,000000,000000,000,00000,000,
000000,000000,000,00000,000,000000,000000,000,00000,000,000000,000000,000,00000,000
000,000000,000,00000,000,000000,000000,000,00000,000,000000,000000,000,00000,000
```

5.2.1.2 **Status Files**

When the software initially starts the default data directory C:\BIRAL\THUNDERSTORM DETECTOR\Status will be created. Any user-defined directories will also be created by the software.

A status file named BTDSTATUS.TXT is automatically generated by the software. This is a text file and contains details of site characterisation and local calibration events that have occurred.

This is a single file which is updated whenever a site calibration or a local characterisation occurs.   If the status file is renamed for archiving, a new file is initiated with the same name.

5.2.1.2.1   Example Status File

This is an example of a generated status file.
```
SITE:,030714,114157,000011,-000005,000017,00000,00000,00000,0000000017
LOCAL:,030714,103127,00121,00163,00231,00315
```

5.2.2   Operation

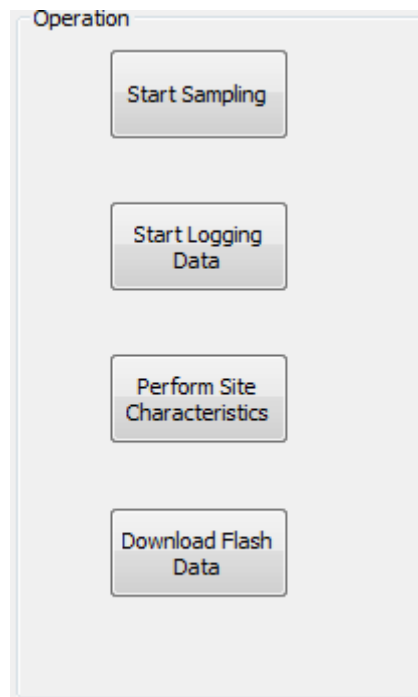The Operation options allow the user to perform certain actions:

Figure 5-14: Operation Actions

- Start/Stop sampling – Pressing this button starts and/or stops the BTD sampling mode. The text in the button will change from "Start Sampling" to "Stop Sampling" according to the current operating mode.
- Start /Stop Logging Data - Pressing this button starts and/or stops the logging of the BTD data. The text in the button will change from "Start Logging Data" to "Stop Logging Data" according to the logging status. This button is required to start the logging of the data if the automatic logging has been disabled.
- Perform Site Characteristics – This button is used by the user to perform the site characterisation process. This button can only be pressed when the BTD is in idle mode. The button will be greyed out if the BTD is in sampling mode.
- Download Flash Data – This button is used by the user to download the stored flash data from the BTD. This button can only be pressed when the BTD is in idle mode. The button will be greyed out if the BTD is in sampling mode.

5.2.2.1 **Site Characterisation**

When the BTD is installed at a site it is necessary for it to determine the background variability of electric field changes present at the site in order to identify anomalies associated with thunderstorm activity. Additionally, antenna offsets are measured during the site characterisation so they can be removed by the detector in data processing.

Before performing the Site Characterisation make sure that the sensor is not sampling. If the sensor is sampling, then the "Perform Site Characteristics" button will be greyed out.

Pressing the "Perform Site Characteristics" button will cause the Site Characterisation message (see Figure 5-15) to be displayed:
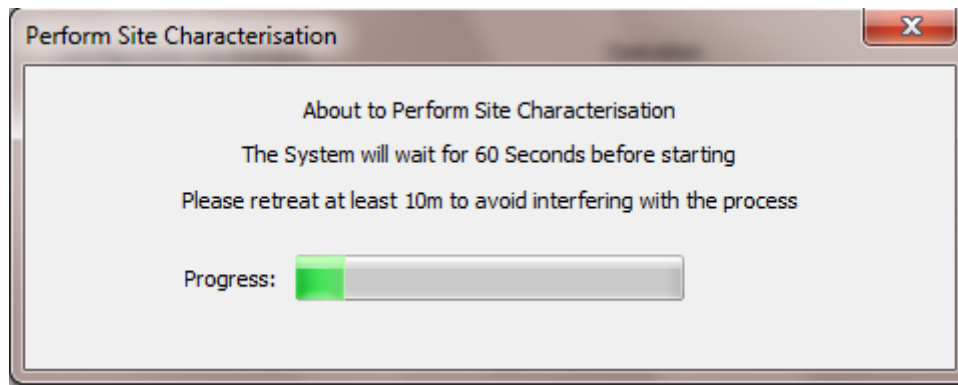

Figure 5-15: Site Characterisation Message

Once the button is pressed there is a 60 second delay before the calibration is performed to allow all persons to retreat by least 10 m away from the detector to avoid contamination by nearby movement. The progress bar will update during the Process and on completion the message box will close.

The characterisation takes approximately 32 seconds, where antenna offsets and ambient variability are measured. At the end of the Site Characterisation process, the BTD will transmit the Site Characteristic message, which will automatically be saved in the status file.

The sensor will begin sampling again automatically 10 seconds after characterisation is complete.

5.2.2.2 **Download Flash Data**

The last 128 flash times and distances detected by the BTD are stored by the BTD and can be downloaded in CSV format by pressing the "Download Flash Data" button.

Pressing this button will cause the Save As message (See Figure 5-16) to be displayed which allows the user to change the file name of the downloaded data file.

By default the file will be saved in the status directory and will have the name FLASH_DATA_DDMMYY_HHMMSS.CSV
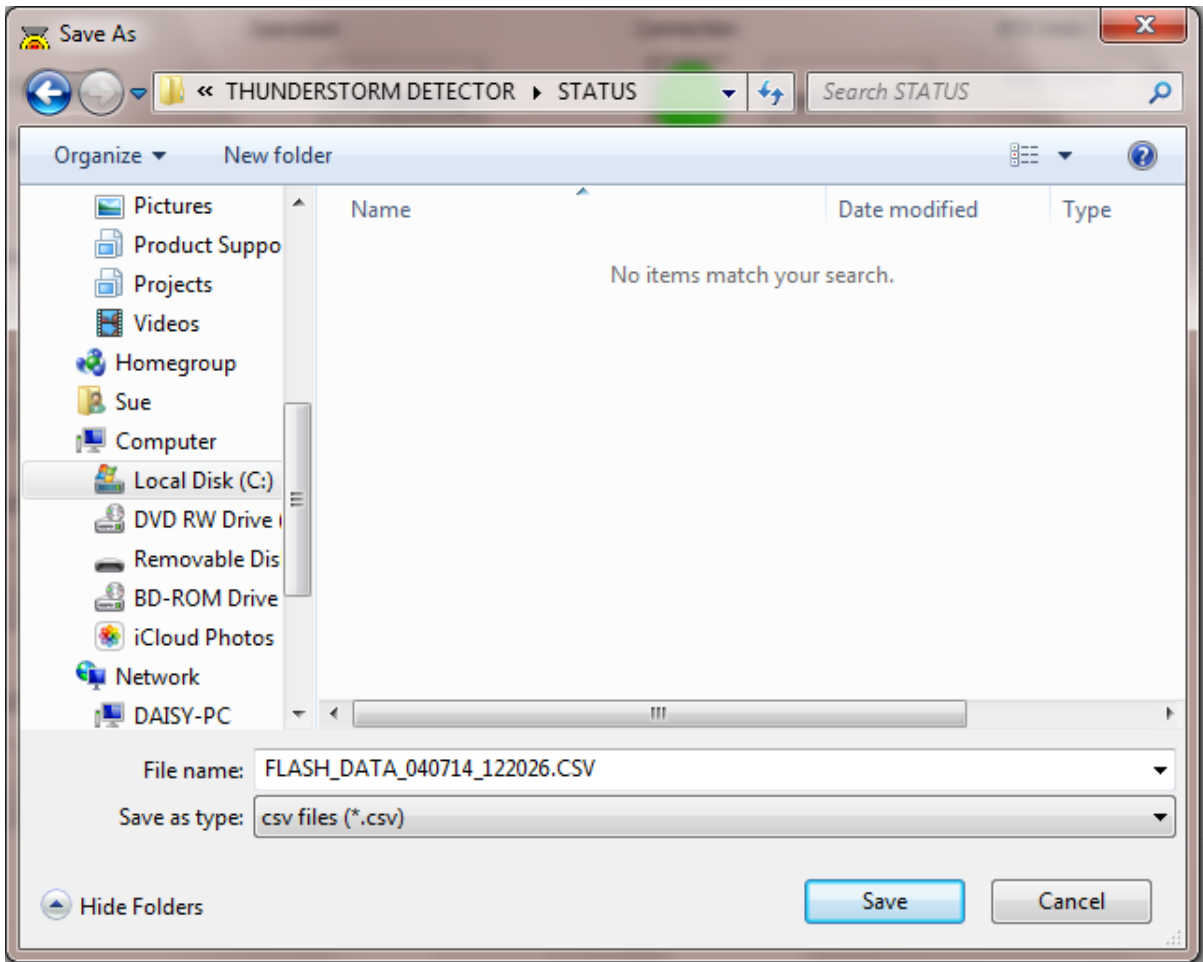
Figure 5-16: Save Flash Data File

Pressing Save will cause the Download Flash Data message (see Figure 5-17) to be displayed.
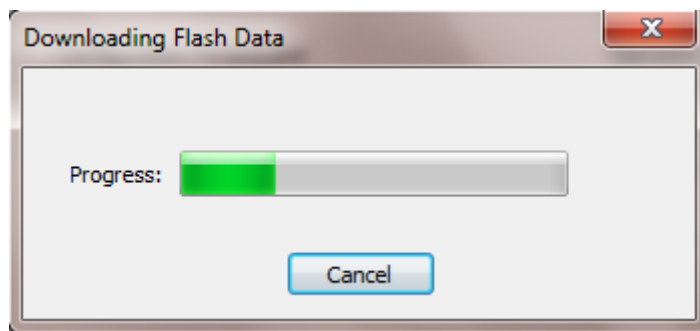

Figure 5-17: Download Flash Data Message

The progress bar will update during the download and on completion the message box will close.

5.2.2.2.1   Example Flash data file.

This is an example of a generated flash data file.

```
Flash Download :,04\07\14,12:20:26
```

```
Number of Flashes:, 128

Flash,Header,Index,Date,Time,cs,Distance,Direction,Duration,
1,FLASH:,109,030714,105805,066,02813,999,049,
2,FLASH:,110,030714,105831,096,01798,999,053,
3,FLASH:,111,030714,105848,096,03012,999,053,
4,FLASH:,112,030714,105906,003,02560,999,028,
5,FLASH:,113,030714,105923,073,02953,999,037,
6,FLASH:,114,030714,105936,076,02983,999,024,
7,FLASH:,115,030714,110006,041,02547,999,035,
```

NOTE: In this example, all the direction readings are '999', indicating that this system was not fitted with the optional direction finder.

5.2.3 Site Calibration

The range calibration cannot be automatically configured so needs to be checked by the user. The default calibration should be correct for installation at an ideal site but is likely to require modification if installed where tall objects are nearby. Once the BTD first reports the range of lightning after installation, the user should compare this range with that determined from other means (e.g. accurate lightning location network data, thunderstorm location on rainfall radar or satellite imagery). By using the Flash data downloaded from the BTD (See section 5.2.2.2) the user can calculate a site correction factor.

If a systematic bias is evident, the user should press the "Calculate Site Correction Factor" button and input the range estimated by the BTD ("Reported Distance") and that from other means ("Actual Distance") into the pop-up box. This information will be used by the software to set the range calibration factor for the installation site.

The distance units can be anything, as long as the same units are used for both readings.

Pressing the "Calculate Site Correction Factor" causes the following dialog to be displayed.
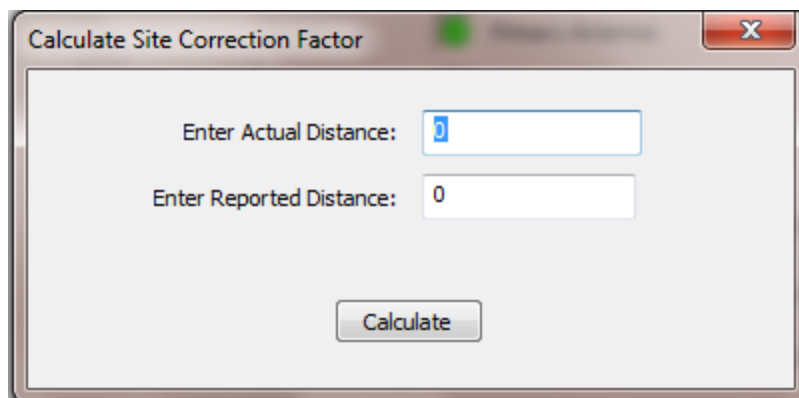

Figure 5-18: Site Correction

Once the values have been entered, pressing the Calculate button will calculate the Site Correction factor and transmit this value to the BTD.

5.2.4 Connection

The Connection Part of the Configuration Screen contains a visual indication of the communications link status and allows the user to open and close the connection to the BTD.
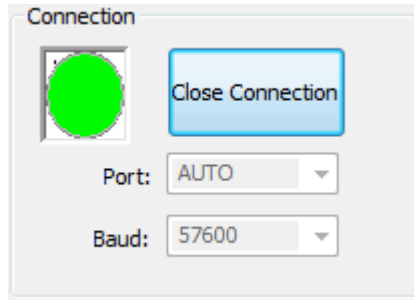
Figure 5-19: Connection Display

The connection indicator is either a Red or Green circle depending on the connection status.

The text in the button changes between "Close Connection" and "Connect". Pressing the button when the connection is active, closes the communications link and changes the display to the one in Figure 5-20.
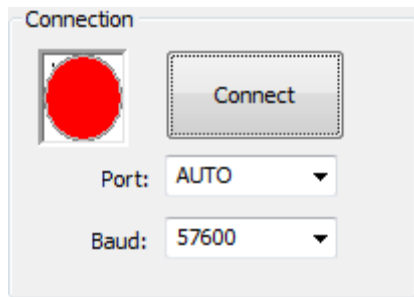

Figure 5-20: Closed Connection

The Port and Baud drop down boxes allow the user to specify the port and baud rate to use.

NOTE: The default baud rate of the system is 57600 baud. Selecting a different baud rate could cause the system to lose communications. This should only be used by service personnel.
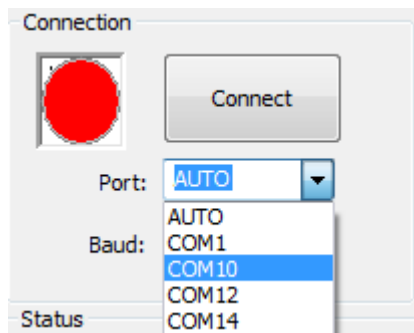

Figure 5-21: Port Selection

Setting the Port selection to AUTO (See Figure 5-22) and pressing the connect button will perform the automatic search and connect procedure with the connection message displayed (See Figure 5-22).
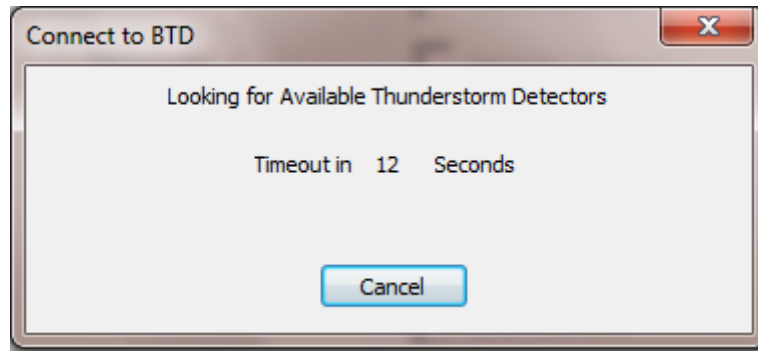
Figure 5-22: Connection Message

If a connection is found the visual indicator will turn green and the text in the button will change to "Close Connection". If the connection cannot be made the visual indicator and text will remain unchanged.

If the communications port number is known then the port number can be selected (see Figure 5-22) and the software will attempt to connect to that port, bypassing the automatic search process.

5.2.5   BTD Date and Time

This area of the configuration screen shows the current PC date and time as shown in Figure 5-23.
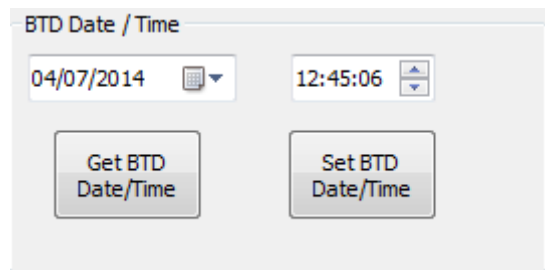

Figure 5-23: BTD Date/Time

The buttons are only active when the BTD is in idle mode, otherwise they are greyed out.

Pressing the "Get BTD Date/Time" button will request the current date and time stored in the BTD. – The Display will update momentarily showing the date and time as stored by the BTD.

Pressing the "Set BTD Date/Time" button will transmit the current PC date and time to the BTD and update the internal time in the BTD.

Note: If the BTD is fitted with the 'relay' option, and these are set to be disabled overnight to prevent un-necessary alarms, the BTD time MUST be set as detailed above to ensure correct alarm operation at the required times of day.

5.2.6 Status

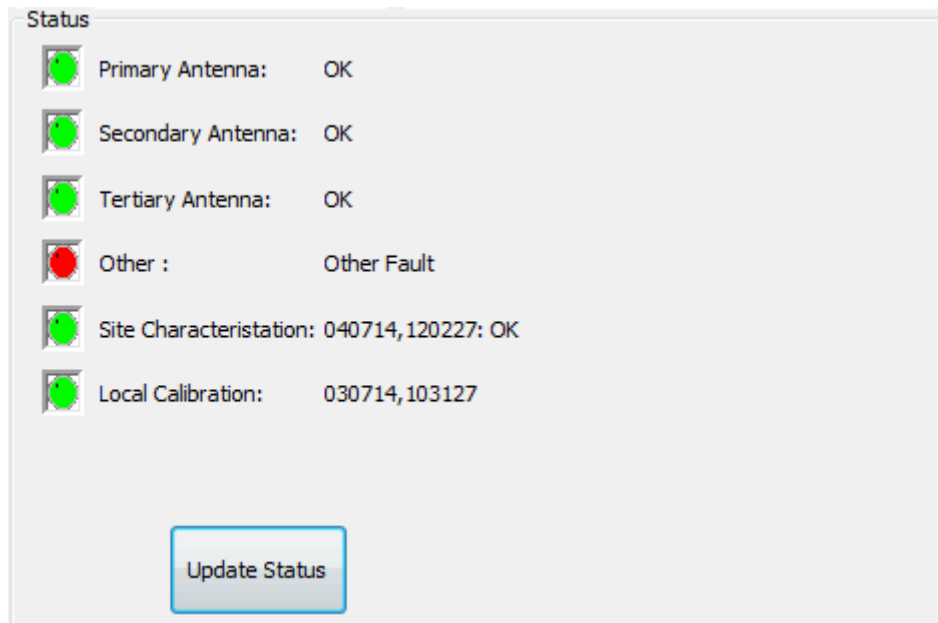The status display shows a visual and textual indication of the current state of the Detector.

Figure 5-24: Status Display

5.2.6.1 Antenna Status

The 3 antennae are monitored during operation for signs of leakage and saturation.

The display for the antenna is either a green circle with the text "OK" or a red circle with the text "Antenna Leakage" or "Antenna Saturation"

See the BTD User Manual for descriptions of Antenna leakage and saturation and troubleshooting advice.

5.2.6.2 Other

The BTD monitors the internal voltages and other health states. If an error occurs in one of these the error will be displayed.

The display for the antenna is either a green circle with the text "OK" or a red circle with the text explaining the fault. During sampling the sampling will say "Other Fault". If this occurs pressing the Update Status button will request the detailed status and the detailed fault message will be displayed.
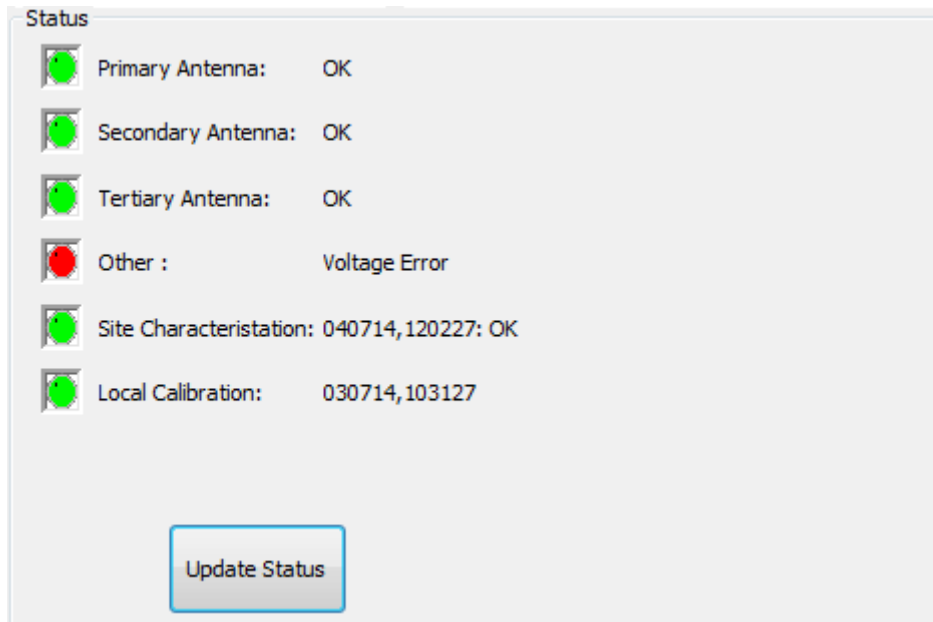
Figure 5-25: Detailed Status Display

In the example screens in Figure 5-24 and Figure 5-25 there is Voltage Error displayed.

5.2.6.3 **Site Characterisation**

The Site Characterisation status displays the date and time of last site characterisation and an indication of the validity of the characterization.

The display will be one of:

- Green circle with date and time and text "OK"
- Orange Circle and text "Site Characterisation Not Yet Performed"
- Orange Circle with date and time and text
  "Warning BTD-300: 0xXX, Direction Finder: 0xYY"
  where 0xXX is the BTD warning indicator in hex and where 0xYY is the Direction Finder warning indicator in hex

The BTD and Direction Finder Warning Flag Values will be calculated from the following table (Table 5.1: Site Characterisation Warnings) The warnings could be added together if all three BTD antenna offsets were out of range the BTD warning would be 0x07. If the Direction Finder background noise was too high on both antennae, then the Direction Finder Warning would be 0x18.

The example in Figure 5-26 shows that the Direction Finder site characterisation has passed (0x00) but the BTD has Primary and Tertiary antenna offsets out of range (0x05).

Value	BTD Warning	Direction Finder Warning
0x00	Site Characterisation passed	Site Characterisation passed
0x01	Primary Offset out of range	NS Offset out of range
0x02	Secondary Offset out of range	EW Offset out of range
0x04	Tertiary Offset out of range	E-field Offset out of range
0x08	Primary Leakage threshold out of range	NS Background noise too high
0x10	Secondary Leakage threshold out of range	EW Background noise too high
0x20	Tertiary Leakage threshold out of range	Flash occurred during calibration
0x30	Corona threshold out of range	Not used

Table 5.1: Site Characterisation Warnings
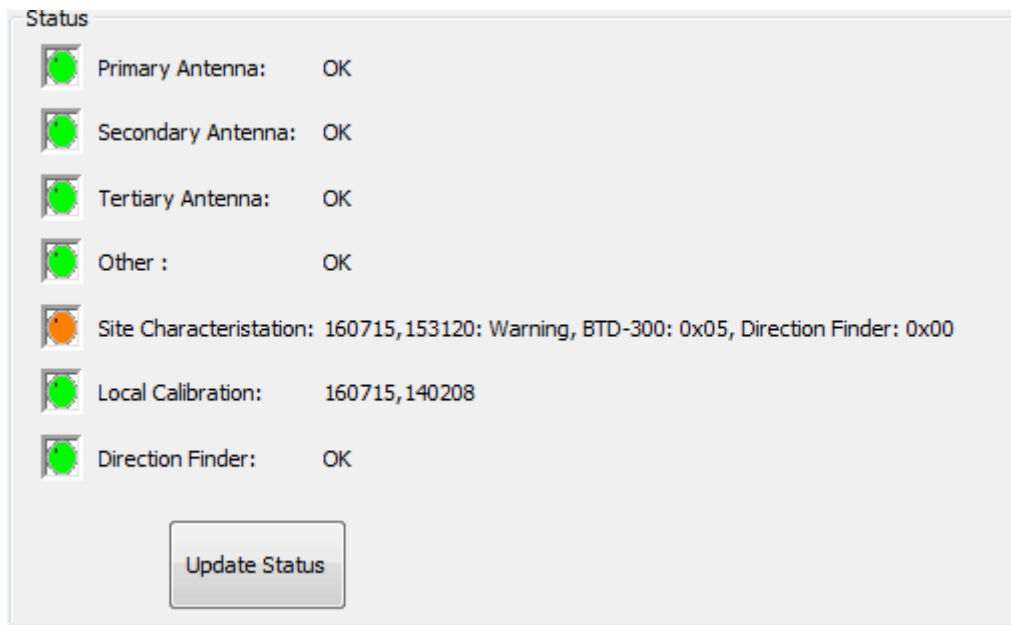
Figure 5-26: Site Characterisation Warning Display

5.2.6.4 **Local Calibration**

The local calibration is performed automatically by the BTD. See the BTD User Manual for details of the local calibration process.

The local calibration status displays the date and time of last local calibration.

The display will be one of:
- Green circle with date and time of last local calibration
- Orange Circle and text "Local Calibration Not Yet Performed"

5.2.6.5 **Direction Finder Status**

If the Direction finder Module is fitted, the status display will have the direction finder status displayed (see Figure 5-27).
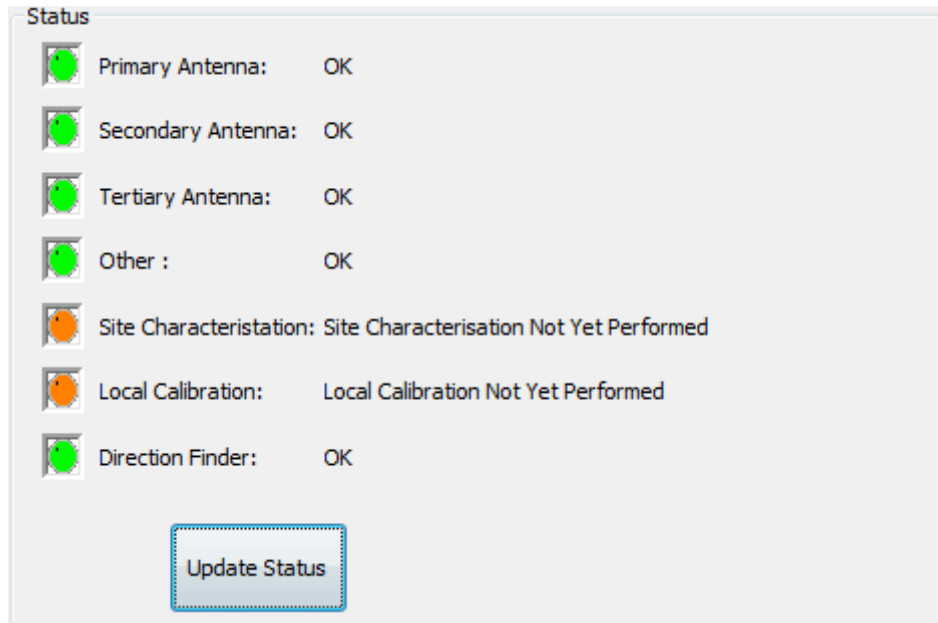

Figure 5-27: Direction Finder Status

The display will be one of:

- White Circle – no status received from direction finder
- Green circle with date and time and text "OK"
- Red Circle and text "Direction Finder Error"
- Red Circle and text "Direction Finder: Noisy Calibration" – this will be displayed during sampling if the direction finder calibration has failed.

5.2.7 Config Sounds Tab

When a Warning or Alert is issued by the BTD-300 the user's computer can be set to play a sound through the PC's speaker. For this function to work the PC speaker must be enabled and turned on. The sound will be played every 30 seconds until the Warning or Alert state clears.

You can control if Warnings and Alerts play a sound by ticking the Enabled box in the Local Sounder Settings area of the Config Sounds tab.

You can change the sound played by selecting from the list in the selection box under Sound. When you select a new sound, the sound will be played for you as a preview.

Click the Update Settings button at the bottom of the Local Sounder Settings area to save your changes.
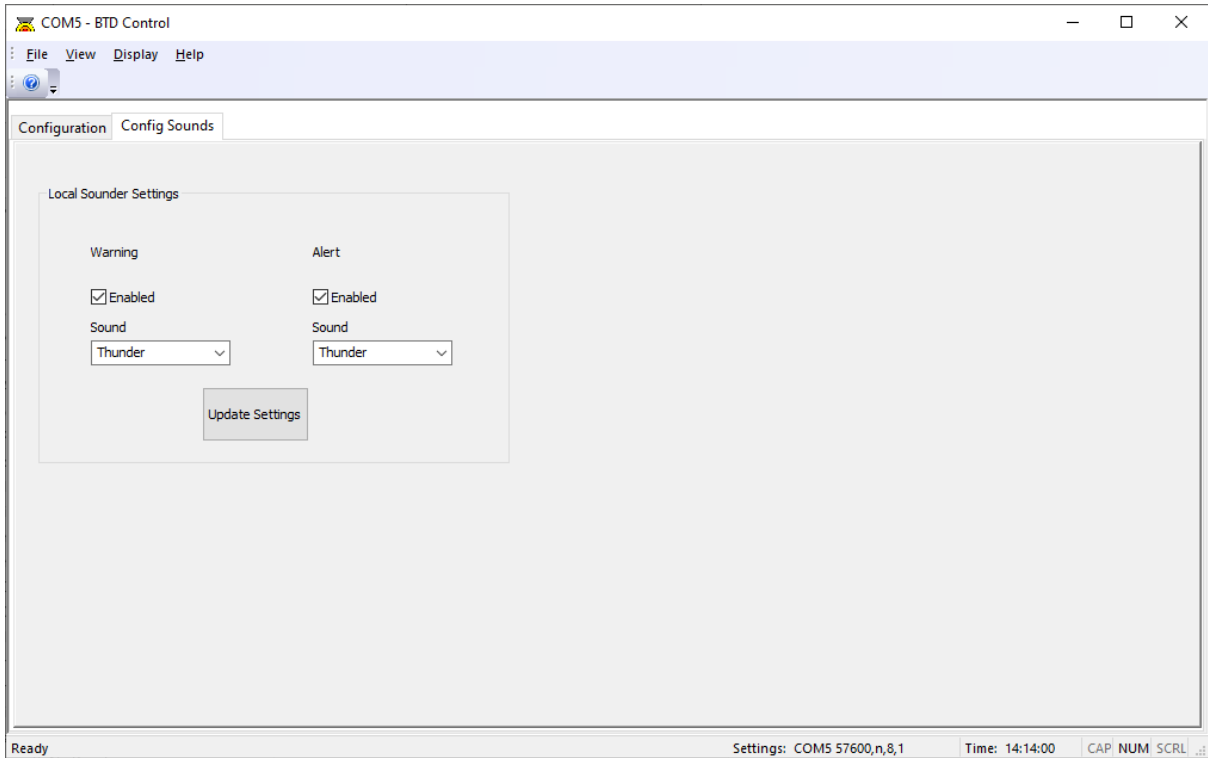
Figure 5-28: Config Sounds Tab

5.3 Service Screen

The Service screen is intended for service personnel only and as such is password protected. When the service menu Item is selected the Password dialog is displayed as shown in Figure 5-29 below.
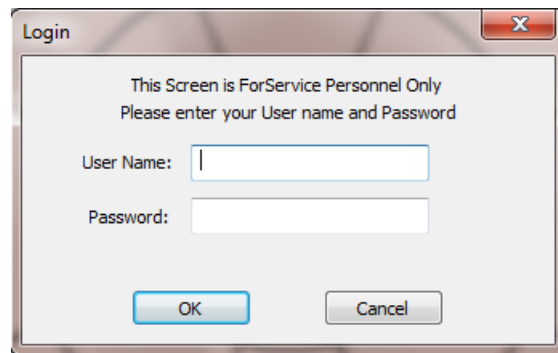

Figure 5-29: Password Dialog

If no details are entered the screen will close after 20 seconds and the screen will not change.

The user name and password are:
User Name: **Service**
Password**: BiralBTD**

Note: User name and Password are case sensitive.

Warning: The commands and options available on the service page can alter the operation of the Thunderstorm Detector and as such any changes made are at the users own risk.

If the correct username and password are entered, then the service screen will be displayed as shown in Figure 5-30 below.
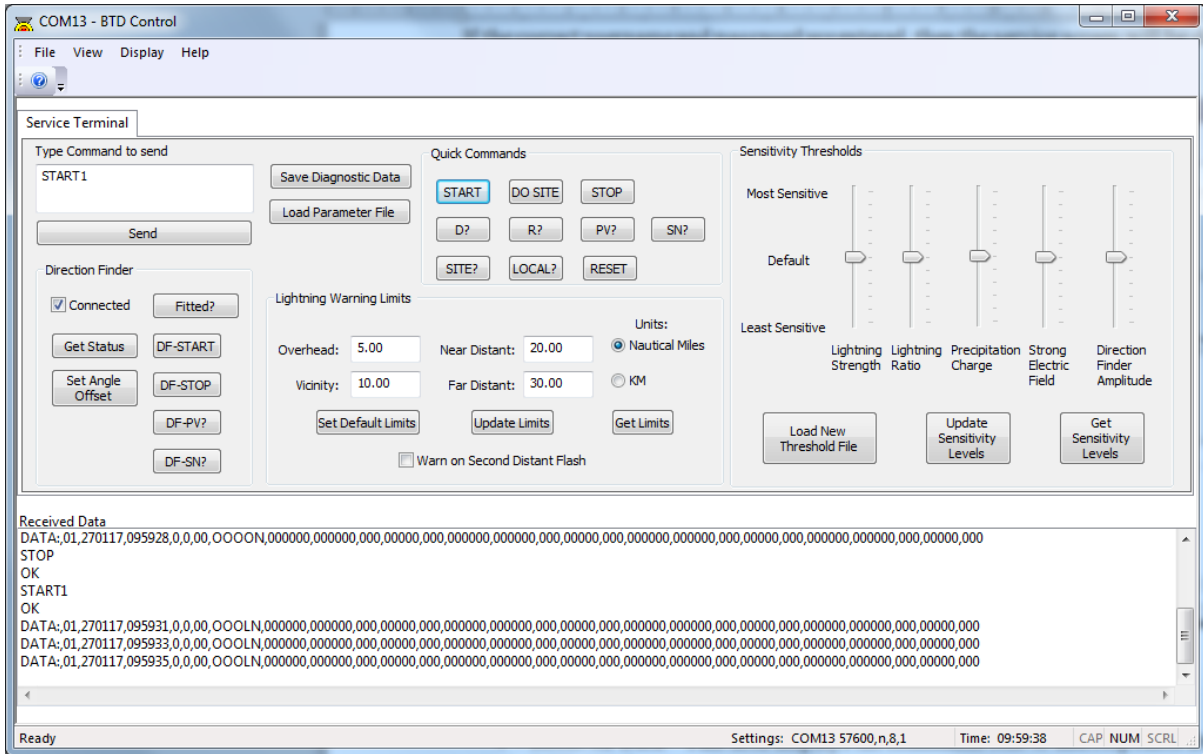

Figure 5-30: Service Screen

The Service screen is divided into 6 areas:

- Received Data – This area displays the commands sent to and responses from the BTD.
- Commands – A text box enabling the user to enter and transmit commands to the BTD and buttons for saving diagnostic data and transmission of new parameter files.
- Direction Finder – Direction Finder specific commands.
- Quick Commands – buttons with a subset of frequently used commands.
- Lightning Warning Limits – allows the warning limits and units to be changed.
- Sensitivity Thresholds – allows the sensitivity levels to be changed.

5.3.1   Command Area

The left-hand side of the screen as shown in Figure 5-31 allows the user to enter specific commands to transmit to the BTD.
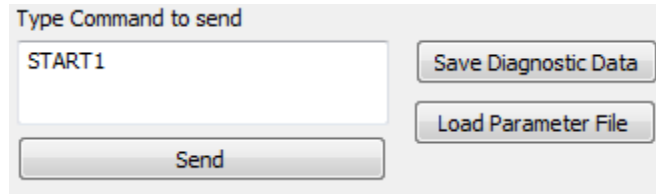
Figure 5-31: Command Area

To transmit a command, enter the text in the box and press the send button. The command and any response will be displayed in the Received Data area.

For a list of commands and responses see the BTD User manual.

5.3.1.1   **Save Diagnostic Data**

The Save Diagnostic Data button will transmit a series of commands to the BTD and save the responses in a file saved in the Status directory.

This function is for Service Personnel only and would normally only be used on request from Biral.

Pressing the button will display the Save As Dialog (See Figure 5-32), by default the file name will be BTD_DIAG_DDMMYY_HHMMSS.TXT
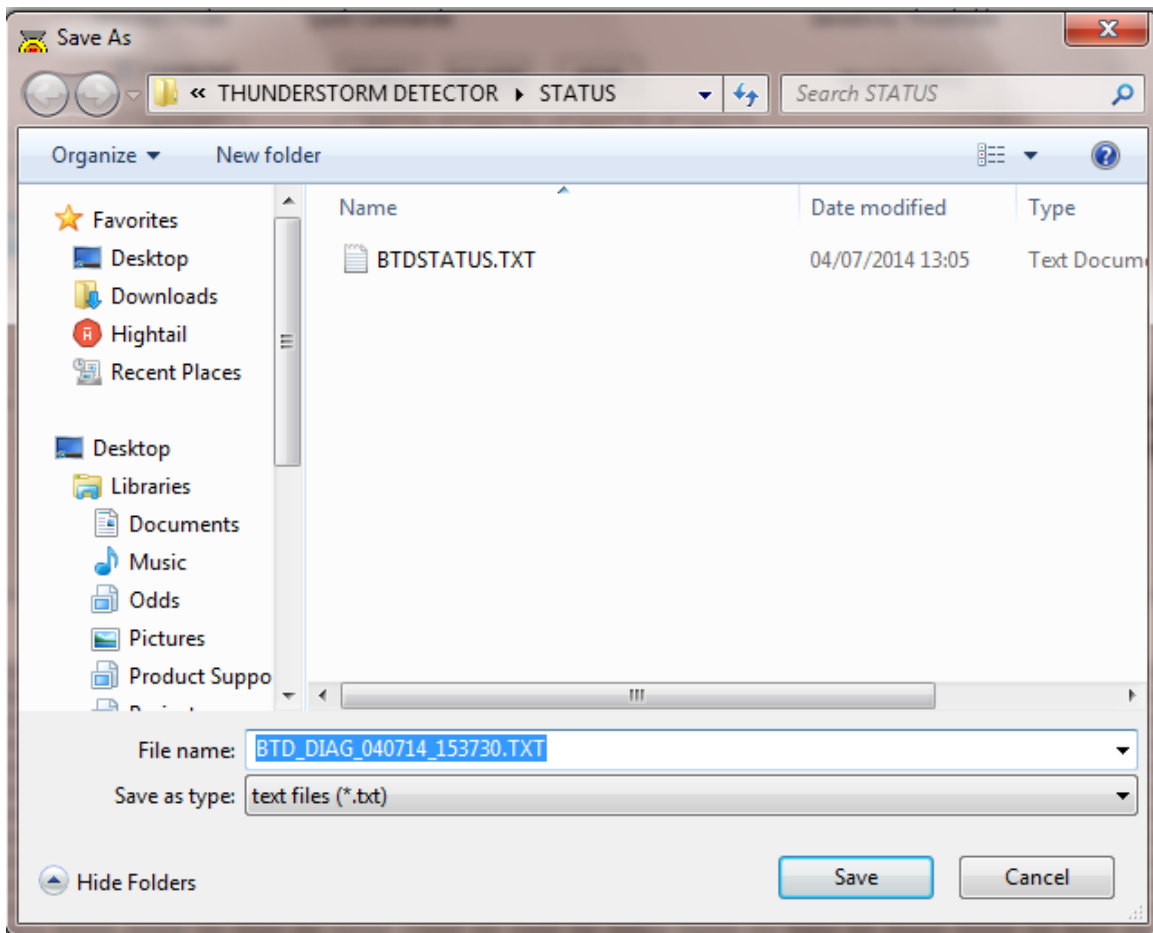
Figure 5-32: Diagnostic Save

Pressing the Save button will stop sampling and perform the Diagnostic Save function. A Progress dialog will be displayed showing the progress of the function.
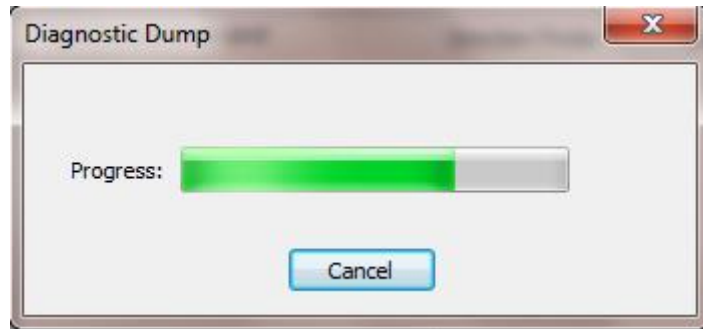

Figure 5-33: Diagnostic Progress

On Completion the Progress dialog will be closed.

If the BTD was in sampling mode before this button was pressed, then sampling will be stopped during the function and **NOT** started again when it is completed.

See paragraph 5.3.3 for instructions to restart sampling.

5.3.1.2 **Load Parameter File**

On occasion, Biral may send an updated Parameter file to user's service Personnel to be loaded onto the BTD. The file type is .TXT.

Pressing the Load Parameter File button will display the Confirmation dialog as shown in Figure 5-34 below.
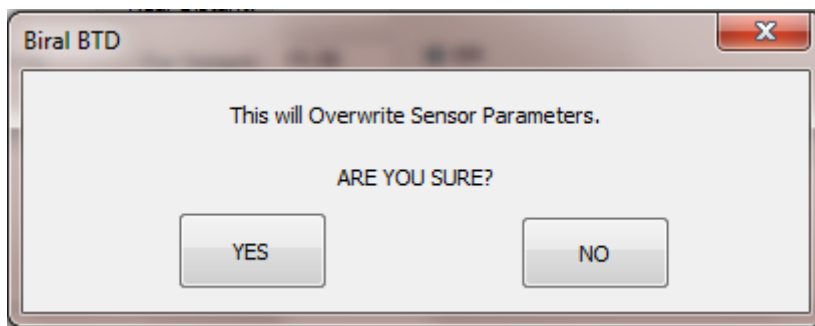

Figure 5-34: Confirmation Dialog

Pressing YES will cause the Open Dialog to be displayed as shown in Figure 5-35 below.
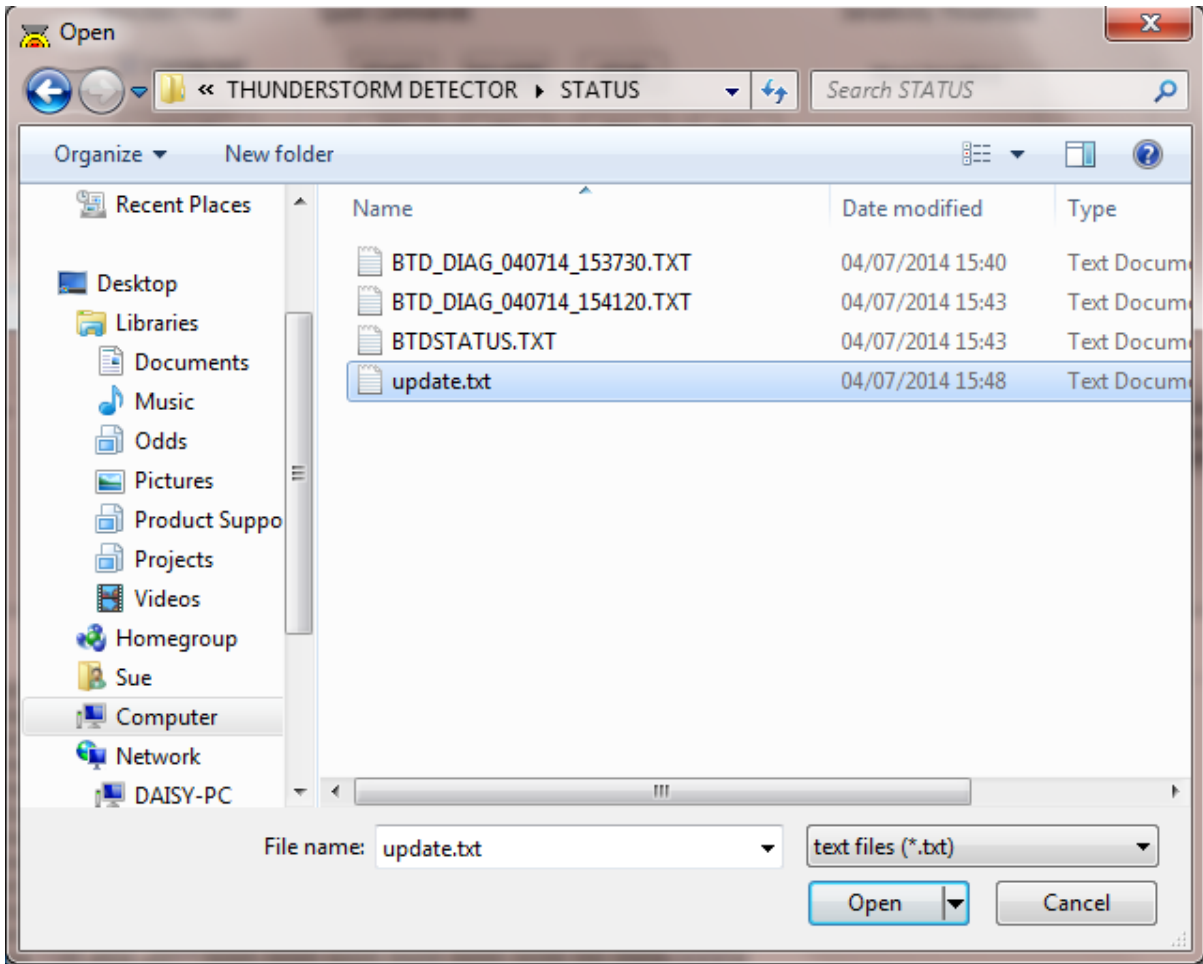
Figure 5-35: Load new Parameter File

Select the file and press Open

The new parameters will be loaded from the file and a progress dialog will be displayed (See Figure 5-36) during the operation and then the progress dialog will close.
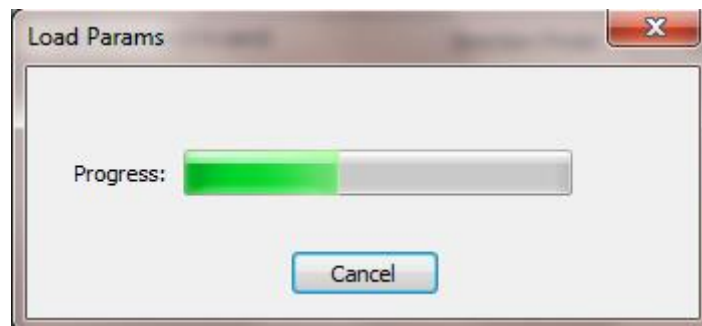

Figure 5-36: Load Parameter progress

If the BTD was in sampling mode before this button was pressed, then sampling will be stopped during the function and **NOT** started again when it is completed.

5.3.1.3 Baud Rate

The default and minimum baud rate for the Connection to the BTD is 57600 Baud. If the user changes the Baud rate using the BAUD command (See BTD User Manual for details of this

command) then the drop down box must be used to select the new baud rate for the automatic connection. The only allowable Baud rates are 57600 and 115200 baud.

5.3.2   Direction Finder Commands

This region allows the service personnel to interrogate the Direction Finder.
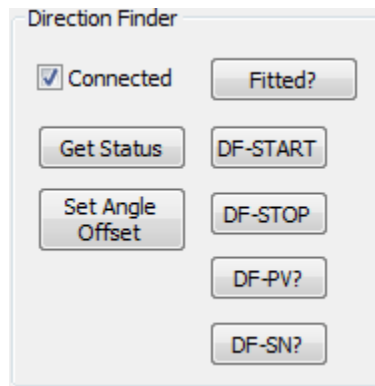

Figure 5-37: Direction Finder Commands

The Connected Checkbox shows whether a Direction Finder is connected to the BTD. A Tick shows that the Direction Finder is connected.

The Direction Finder connection state can only be changed in Idle mode. If the Connected button is checked or unchecked when the system is sampling the following message will be displayed:
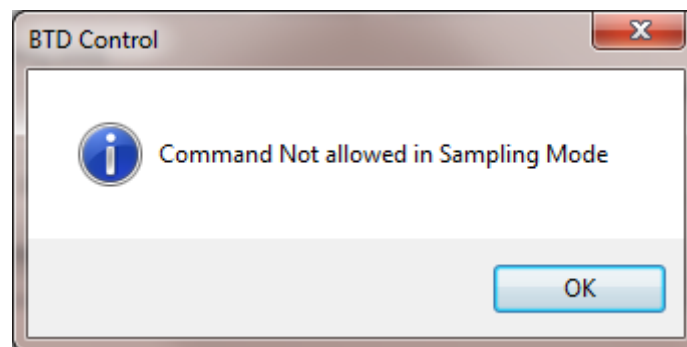

Figure 5-38: Command Not Allowed Message

If the connection state can be changed then when the Connected checkbox is checked or unchecked by the user then the program will send a series of commands to the BTD to enable / disable the Direction Finder. During this process a Progress dialog will be displayed:
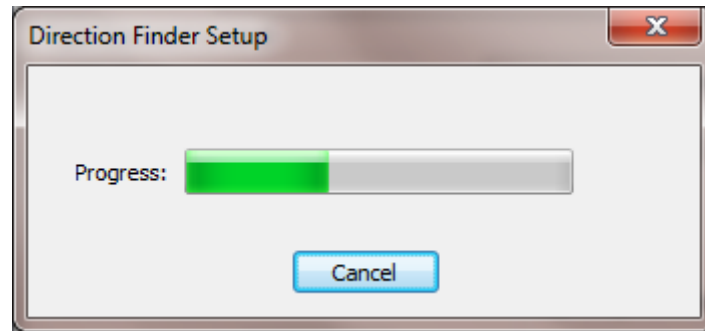
Figure 5-39: Direction Finder Connection progress

On completion the sensor will start sampling.

NOTE: THIS IS FOR SEVICE PERSONNEL ONLY. IF THE DIRECTION FINDER MODULE IS DEACTIVATED WHEN IT HAS BEEN FITTED THEN NO DIRECTION INFORMATION WILL BE AVAILABLE. LIKEWISE IF THE DIRECTION FINDER IS NOT FITTED AND IT IS ACTIVATED ANY LIGHTNING DATA WILL HAVE UNDEFINED DIRECTION DATA.

Pressing the "Fitted?" Button will interrogate the BTD to see if the Direction Finder Module is fitted. When the response is received by the software the Connected checkbox will be updated to reflect the status.

Pressing the "Get Status" button will request the Direction Finder status from the BTD.

A few quick commands are available here. The commands are:

- DF-START – Start the Direction Finder Sampling
- DF-STOP – Stop the Direction Finder Sampling
- DF-PV? – Display the Direction Finder program version and date
- DF-SN? – Display the Direction Finder Serial Number

5.3.2.1   **Set Angle Offset**

The Direction finder should be installed facing North (See BTD User Manual for installation details). If the direction finder is not able to be positioned directly north as instructed, or the installation site produces a systematic bias in magnetic direction finding, a fixed offset can be added or subtracted to the derived flash angles. The offset can only be set when the sensor is in idle mode.

To set the offset press the Set Angle Offset button. The dialog as shown in below will be displayed.
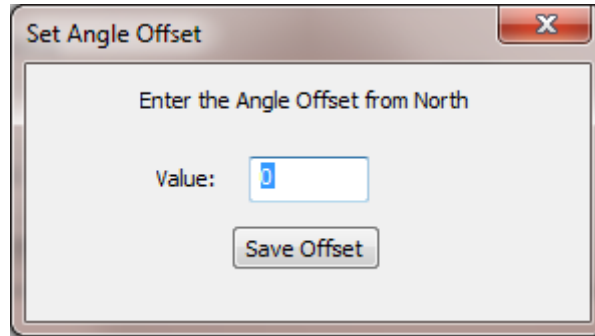
Figure 5-40: Set Angle Offset Dialog

Enter the desired offset angle in the range ±180 degrees (positive clockwise, negative anticlockwise). Pressing the save offset button will close the dialog and update the offset.

The dialog has a timeout so that if the Save offset button is not pressed within 30 seconds the dialog will close with the offset remaining unchanged.

5.3.3 Quick Commands

This region has a subset of the command set enabled as buttons to allow for ease of use.

Figure 5-41: Quick Commands

The commands are:

- Start – Start Sampling
- Do Site – Perform Site Characterisation
- Stop – Stop Sampling
- D? – Request last data string
- R? – Request Status
- PV? – Display BTD program version and date
- SN? – Display BTD Serial Number
- SITE? – Request Site Characterisation parameters
- LOCAL? – Request Local calibration Parameters
- RESET – Reset the BTD

For details of the commands and responses see the BTD User Manual

5.3.4 Lightning Warning Limits

The Warning Key on the Main screen corresponds to the limits set here. These limits are stored in the BTD. The limits are stored in the BTD in decameters (1 km = 100 decametres).

The range limits can be set to any values as long as they are in the range 2-45 nautical miles (3.70-83.34 km).

Figure 5-42: Lightning Warning Limits

5.3.4.1 **Units**

Clicking on the Nautical Miles Radio button will change the values from KM to Nautical Miles and update the main display.

Figure 5-43: Nautical Miles Display

Clicking on the KM Radio button will change the values from Nautical Miles to KM and update the main display.

The range thresholds can be stated to the nearest decametre (10 metres, i.e. two decimal places) and must be within 2-45 nautical miles (3.70-83.34 km).

5.3.4.2 **Warn on Second Distant Flash**

By default, the BTD will warn when the first lightning flash is detected within range. For distant thunderstorms it is possible to alter this function so that a caution is only issued if two flashes occur within the warning hysteresis (persistence) time, which is shown in the configuration screen of the BTD control software and has a default 15 minutes. This feature allows distant thunderstorms producing isolated or low lightning activity to be ignored (although their flashes will still be logged). The BTD will however always warn on the first flash detected in the vicinity or overhead range sectors, due to the more immediate risk they present to the site.

To set the system to warn on two flashes check the "Warn on Second Distant Flash" box,

This can only be performed when the system is not sampling. If the system is sampling a warning will be displayed and the value will remain unchanged.

5.3.4.3   Set Default Limits

Pressing the Set default Limits button will set the limits to the default lightning proximity levels. These levels are those required by the US Federal Aviation Authority (FAA). These limits are:

- Overhead – 5 Nautical Miles (9.62 Km)
- Vicinity – 10 Nautical Miles (18.52 Km)
- Near Distant – 20 Nautical Miles (37.04 Km)
- Far Distant – 30 Nautical Miles (55.56 Km)

This command is only available when not in sampling mode.

5.3.4.4   Update Limits

Pressing the Update Limits will convert the limits in the text boxes to decameters and transmit them to the BTD. Pressing this button also causes the key in the main display to update.

This command is only available when not in sampling mode.

5.3.4.5   Get Limits

Pressing this button will request the current warning limits from the BTD. Once these limits have been received the Limit boxes will update with the new values as well as the key on the main display.

5.3.5 Sensitivity Thresholds

For a description of the lightning sensitivity see the BTD User Manual.
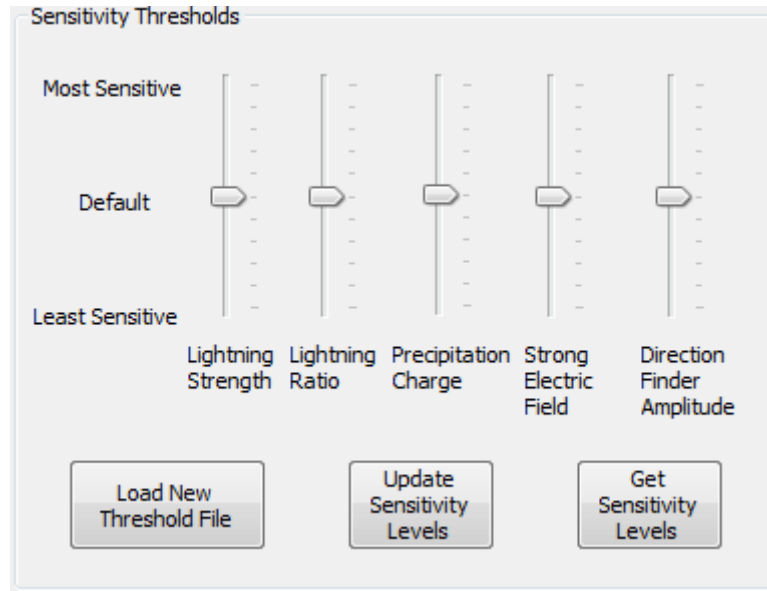
Figure 5-44: Sensitivity Thresholds

The sensitivity thresholds and levels are stored in the BTD, the display in the Service Software is initially set to the default settings. The mid-point on the slide control (level5) is the default setting.

5.3.5.1 Get Sensitivity Levels

Press the Get Sensitivity Levels button to retrieve the current settings used by the BTD. The software will request the current levels and update the slide controls to reflect the current levels.

5.3.5.2 Update Sensitivity Levels

To change the sensitivity level, adjust the relevant slide control to the new level and then press the Update sensitivity levels button. This will cause the new levels to be transmitted to the BTD.

This command is only available when not in sampling mode.

5.3.5.3 Load New Threshold File

On occasion, Biral may need to send a new Threshold file. This file will need to be loaded into the BTD. The file type is .DAT.

To load the new file, Press the Load new Threshold File button. Pressing this button will cause the Open Dialog to be displayed as shown in Figure 5-45: Load Threshold File, below.
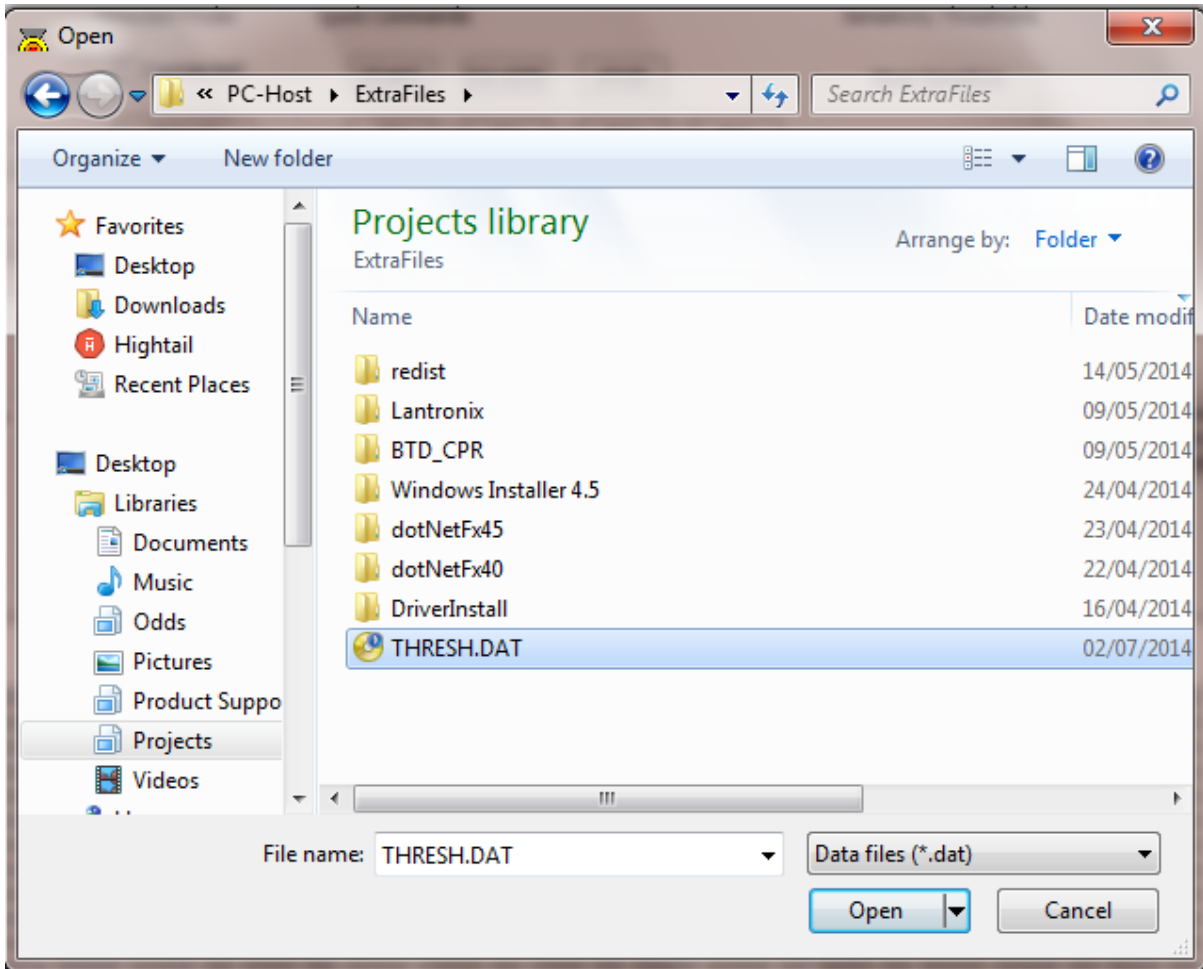
Figure 5-45: Load Threshold File

Select the file and press Open

The new thresholds will be loaded from the file and a progress dialog will be displayed (See Figure 5-46: Update Threshold Progress) during the operation and then the progress dialog will close.
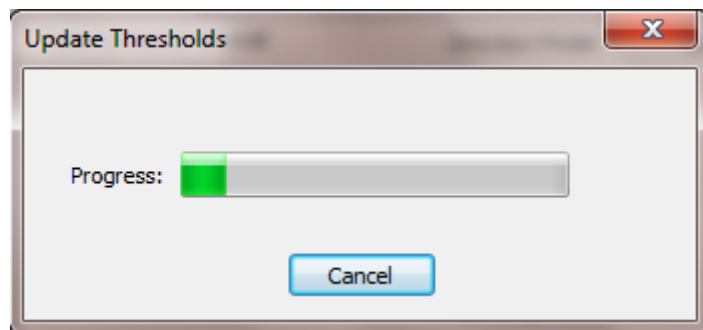

Figure 5-46: Update Threshold Progress

This command is only available when not in sampling mode.

6 APPENDIX A: TROUBLESHOOTING

6.1 Communication Problems

Once connected, if the BTD Control software receives no data from the BTD for 30 seconds then the connection will be closed and the sensor not connected screen will be displayed (see Figure 6-1)
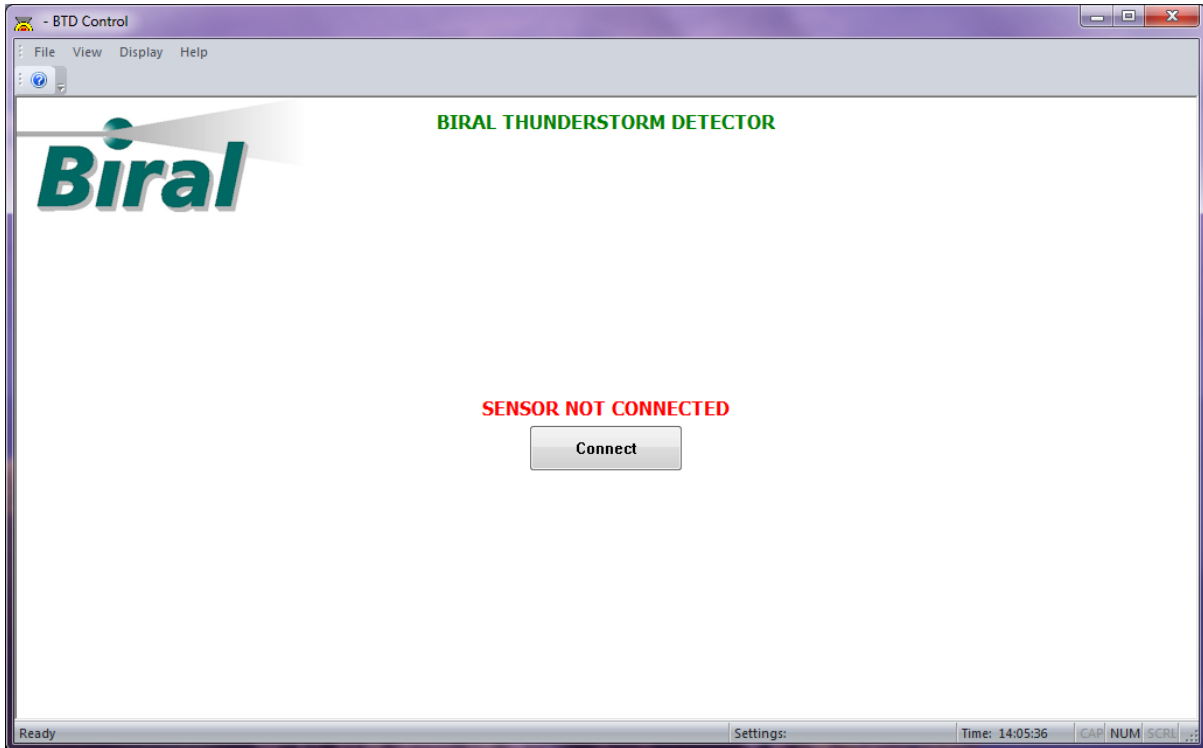

Figure 6-1: No Connection

If this occurs, check the physical connections between the BTD and the PC running the software and press the Connect button to retry the automatic connection process.

Noisy communications may result in communication errors or in corruption of the data being sent to and from the BTD. If this happens the Status Indication on the Main Display will show errors.

If this occurs, check the physical connections between the BTD and the PC running the software and look for anything that may interfere with the communications, e.g. non-shielded cables, location of the cables to sources of interference.