

USER'S GUIDE

TARGETTRACK

Revision A

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INTRODUCTION

This document describes the setup and operation of Doppler Systems' TargetTrack software. TargetTrack is designed to provide a user interface the Doppler radio direction finders or a network of Doppler radio direction finders. Updates and upgrades to this software are available on our website <http://www.dopsys.com/software/downloads.html>.

TYPOGRAPHICAL CONVENTIONS

Before you start using this guide, it is important to understand the terms and typographical conventions used in the documentation.

For more information on specialized terms used in the documentation, see the Glossary at the end of this document.

The following kinds of formatting in the text identify special information.

FORMATTING CONVENTION	TYPE OF INFORMATION
Triangular Bullet(➤)	Step-by-step procedures. You can follow these instructions to complete a specific task.
Special Bold	Items you must select, such as menu options, command buttons, or items in a list.
<i>Emphasis</i>	Use to emphasize the importance of a point or for variable expressions such as parameters.
CAPITALS	Names of keys on the keyboard. for example, SHIFT, CTRL, or ALT.
KEY+KEY	Key combinations for which the user must press and hold down one key and then press another, for example, CTRL+P, or ALT+F4.

GLOSSARY OF TERMS

B

BEACON

A transmitter at a known location on a known frequency that can be used for calibration

C

CEP

CEP stands for Circular Error Probability. It is defined as the radius of a circle, centered about the target, whose area is equivalent to the area of the EEP ellipse.

CEP THRESHOLD

When the CEP threshold is met the color of the EEP ellipse on the map changes color and the target text in the target display changes color.

D

DIRECTION FINDING NETWORK

A Direction Finding (DF) Network consists of two or more direction finders located at distinct locations that are interconnected via a local area network (LAN), a wide area network (WAN), the Internet, or via radio modems.

DIRECTION FINDING SITE

A location where a direction finder, receiver, and a means of communicating with a computer running the TargetTrack software are located.

E

EEP

EEP stands for Elliptical Error Probability. TargetTrack estimates the location of the target and draws it on the map. Additionally it draws an ellipse around the target. EEP represents that under ideal direction finding conditions, there is a 95% probability that the target is somewhere within this ellipse.

I

INTERCEPT

Reception of a signal by the direction finder that causes TargetTrack to record audio and bearings. The duration of the intercept will be the time the signal is on the air.

P

PRIMARY SITE

Site that serves as the primary location and is where the direction finder audio source originates.

S

SITE QUALITY

The site quality refers to the expected magnitude of the bearing error. Direction finding bearing error is affected by the environment in which the direction finding site is installed in. In a fixed site, the ideal location is where the antenna is mounted at a high point on top of a pole or tower and there are no other metallic objects around it. This type of environment gives the antenna a clear line-of-sight to the target and minimizes the possibility of reflections. In a mobile site a good location consists of a high point clear of metallic objects such as power lines and clear of large objects such as hills. Unfortunately, it is not always possible to locate the direction finding site at a good location. As a result the bearing error can increase. Adjusting the site quality instructs the targeting algorithm to assume the bearing has a certain standard deviation depending on the setting. This affects the size of the EEP ellipse.

T

TARGET

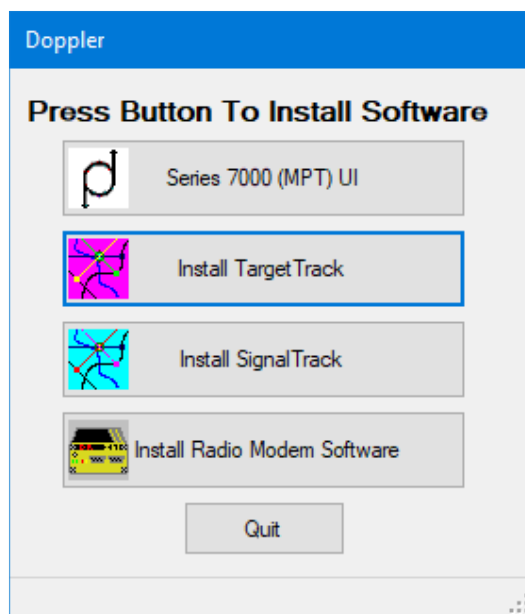
The estimated location of a radio frequency source.

TRANSCRIPT

User entered textual data that provides descriptive information on an intercept

INSTALLATION

To install TargetTrack insert the installation USB thumb drive into your computer or download and unzip the installation software from our website. Double click on Doppler.exe. If downloading from the web site, unzip the downloaded file and launch the Doppler.exe application. A screen shot of the installer is shown below. Press the Install TargetTrack button. TargetTrack requires SQL Server Compact Edition. If this software is not installed on your computer then the installer will automatically install it. After TargetTrack is installed press the Quit button.



MAPS

TargetTrack offers three mapping options

- Great Maps
- User generated maps
- ESRI ArcGIS mapping engine

This section will describe the mapping options in detail

IN THIS CHAPTER

Using Great Maps 9

Creating Maps Using MapFix..... 15

Using the ESRI ArcGIS Mapping Engine.....21

USING GREAT MAPS

Great Maps is an open source mapping utility that uses online map data from various providers to generate and display maps for use in TargetTrack. More information on Great Maps can be found on the GMap.Net web site <https://greatmaps.codeplex.com/>. The map data is immediately displayed and is then downloaded in the background into a local map database so that the downloaded maps can be used when TargetTrack is disconnected from the Internet. To build a local map database the user simply needs to select the area of interest and wait for the software to download and save the map data. Once the map data is downloaded the user can disconnect the computer from the Internet and continue to use the downloaded maps. This allows the user to use TargetTrack in a mobile application where a connection to the Internet may not be available.

The figure below shows the GMap.Net utility installed in TargetTrack. The utility consists of a display pane and a tool bar that can be used to manipulate the maps.

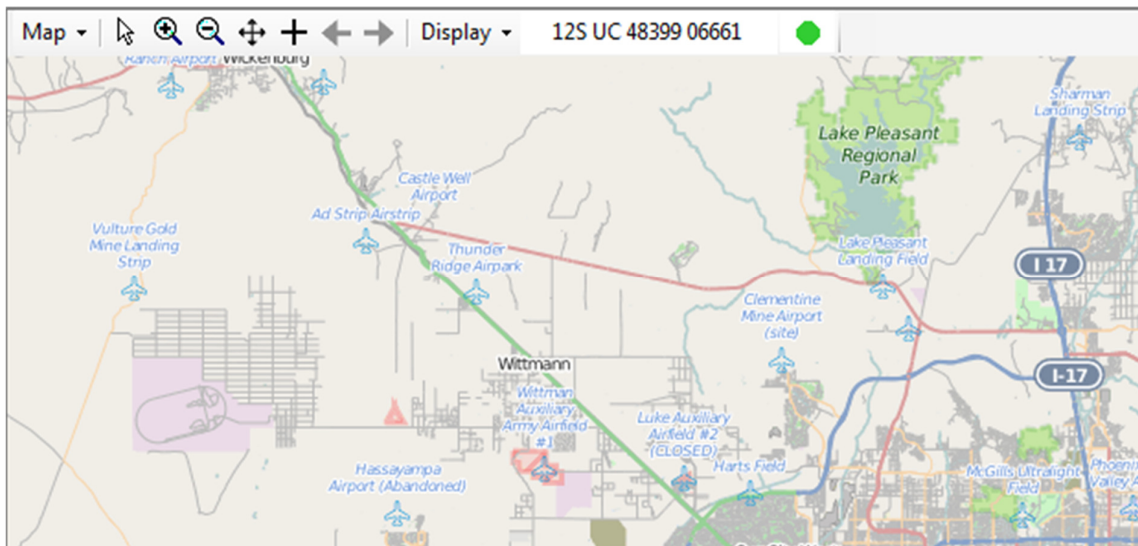


Figure 1: Typical Great Maps Display

Note: Great Maps uses various providers to supply mapping data. These providers may have terms of use provisions. The user is responsible for conforming to the provider's terms of use.

MAP MENU

The Map menu is used to select the mapping provider and to export and import map data from the local map database. The figure below illustrates the Map menu selections.

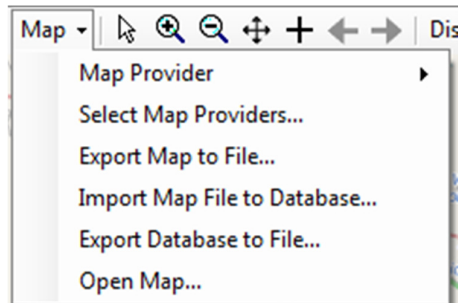


Figure 2: Great Maps Menu

MAP PROVIDERS

The map providers menu allows the user to select which map provider will be used to display the map. The figure below shows the menu with three providers installed and OpenStreetMap selected. Changing the map provider will download data for the region of interest from the map provider selected.

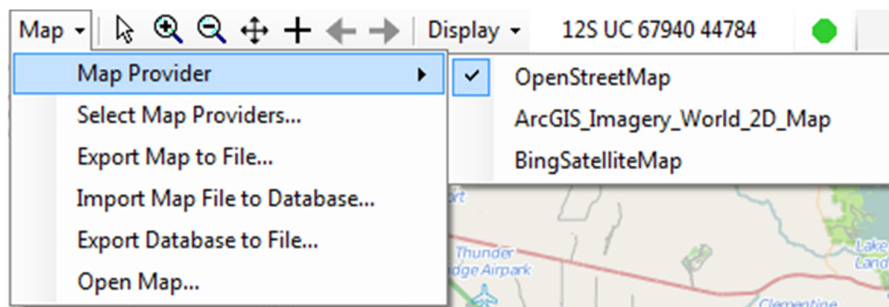


Figure 3: Use Map Provider to Select the Mapping Data Provider

SELECT MAP PROVIDERS

Select Map Providers allows the user to pick which map providers will appear in the Map Providers menu. There are a large number of map data providers and the user will probably use a limited number. For example in an urban area when operating mobile the user may want a street map and a map displaying imagery. Choosing Select Map Providers displays the following dialog

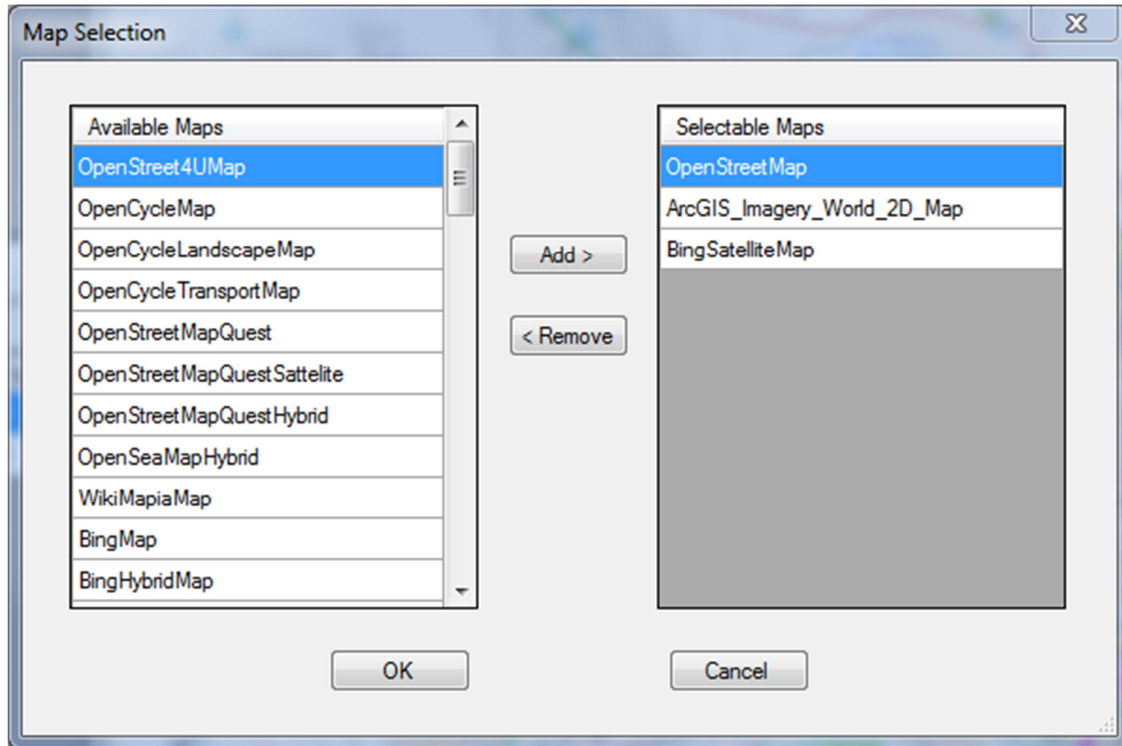


Figure 4: Build the Map Provider Menu by Selecting the Map Providers You Want to Use

To add a map provider to the Map Provider menu select the desired map provider from the Available Maps list and press **Add**. To remove a provider select the map provider from the selectable maps list and press **Remove**.

EXPORT MAP TO FILE

Export Map to File allows the user to save the currently displayed map to a file and then import the map data into a database on a different computer running TargetTrack. Selecting **Export Map to File** displays a standard Windows save file dialog.

IMPORT MAP FILE TO DATABASE

Import Map File to Database allows a user to import a previously saved map (.gmdb) file into the mapping database. This feature allows map data from one computer to be easily added to the database on another computer.

EXPORT DATABASE TO FILE

Export Database to File allows the user to export the entire mapping database into a file. This file can then be imported on another computer running TargetTrack.

OPEN MAP

Open Map opens a saved ESRI or bitmap image based map.

TOOLS

A variety of tools are provided to manipulate the map and objects on the map. The figure below defines the tools.

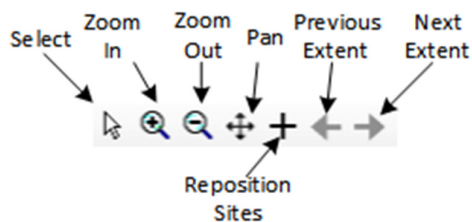


Figure 5: Great Maps Tool Bar

- ▶ **Select** - Pressing select makes it possible for the user to select sites and to right click on the map to add or delete sites.
- ▶ **Zoom In** - Zoom In activates the zoom in tool allowing the user to select an area and zoom in on that area
- ▶ **Zoom Out** - Zoom Out activates the zoom out tool allowing the user to select an area and zoom out with that area in the center of the zoom. A smaller zoom out area will result in the largest area covered
- ▶ **Pan** - Pan activates the pan tool allow the user to scroll the map.
- ▶ **Reposition Sites** - This tool allows the user to click on and drag sites to another location on the map. Sites with GPS receiver installed cannot be repositioned.
- ▶ **Previous Extent** - Previous Extent allows the user to undo a previous map manipulation (e.g. zoom or pan)
- ▶ **Next Extent** - Next Extent allows the user to redo a previous map manipulation (e.g. zoom or pan).

DISPLAY MENU

The display menu allows the user to set the format of display for latitude and longitude. The options are shown in the figure below.

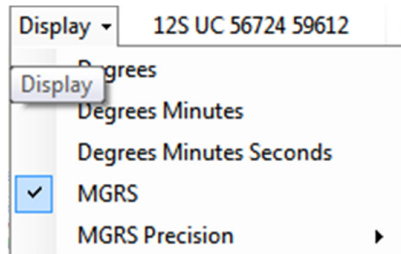


Figure 6: Choose the Format of the Geographic Location Display

**DOWNLOAD
INDICATOR**

The download indicator alerts the user to the status of the map database. If the indicator is green then the map data displayed on the screen has been saved to the database. If the indicator is fuchsia then the data is in the process of being downloaded.

CREATING MAPS USING MAPFIX

Maps are required to display the bearing data and the estimated location of the radio frequency emitter. To create a TargetTrack bitmap based map use the MapFix program, which is installed on your hard disk in the same directory as TargetTrack. An icon for MapFix is placed in your Doppler program group. With MapFix you can import an image and assign latitude and longitude coordinates to it. Then save the file and you are ready to use the map in TargetTrack.

Technically, a TargetTrack map is a pixel-based image (a bitmap) that is stored in a file together with coordinate information. To make a map, you must first create a map image and store it in a graphics file. You can create a map image by using a commercially available map program or by using a scanner. When you have such a file, you import it to Map Fix. The next step is to assign coordinates to the image. When you have assigned coordinates, you can check the coordinates of any location by moving the mouse. The latitude and longitude of the cursor location are displayed at the top of the screen. Finally, you save the image with coordinates as a map file.

There are some things you should consider when making a TargetTrack map. If the map has many details and/or is very dark, you might find it hard to see bearings on the screen. It is advisable to use a map with fairly pale colors or with limited detail.

CREATING A MAP IMAGE

To make a map you first need a graphics file containing a map image. You cannot use MapFix to create this file. A convenient way of making a graphics file is to use a **map program** (see "**Using Microsoft MapPoint**" on page 18). Alternatively, you could scan in an image from a hard copy map or obtain one from a web site such as Google Earth or Google Map. You can even use a photograph of a map if you would like. Since graphics files consume space on your hard disk, you might want to delete them after you have used them to make TargetTrack maps.

GRAPHICS FILE FORMATS

There are a great number of file formats for storing images. Almost all of these are pixel based. A given format can usually store several kinds of images (different numbers of colors per pixel and different compression schemes). It is also possible to store an image as graphics drawing commands (the Windows Metafile Format is of this type). Map Fix only handles can open JPEG (.jpg), bit map (.bmp), or GIF (.gif) files. Common programs such as Microsoft Paint or Microsoft Imager can easily convert any standard graphics file into a suitable image.

SCANNING IN AN IMAGE

If you create a map image by scanning it in from an image on paper, make sure that you orient the paper image with north in the upward direction, so that latitudes become horizontal and longitudes vertical. If the latitude and longitude lines on your map are not clearly visible make sure to mark the latitude and longitude of two points on your map (preferably near diagonal corners). You then use your scanning software to save the image as a graphics file.

USING GOOGLE EARTH

Google Earth provides an excellent interface for making map images for TargetTrack. Use the following guidelines to create a map. See the Google Earth help file for more information on using Google Earth.

- ▶ *Install Google Earth per instructions found at www.earth.google.com (see Google Earth - <http://www.earth.google.com>)*
- ▶ *Run Google Earth and use the controls to select the area of interest*
- ▶ *Make sure the Sidebar is showing. If it is not showing then select it in the View menu*
- ▶ *In the Sidebar click on the features you want to show on your map. Typically you would select roads as a minimum*
- ▶ *In the View menu uncheck all items except Status Bar*
- ▶ *Press the F11 key to expand the view to full screen*
- ▶ *Use the Placemark selection in the Tools menu to add two placemarks to the map. Note the longitude and latitude of each placemark. It is best to select placemarks near diagonally opposite corners of the map*
- ▶ *Press Ctrl+Alt+C to copy the map image to the clipboard*
- ▶ *Launch a graphics program such as Microsoft Paint and paste the image on the clipboard into the program.*
- ▶ *Save the image as a bitmap*

USING MICROSOFT MAPPOINT

Microsoft MapPoint or other similar mapping software applications can also be used to create maps. To use Microsoft MapPoint follow the instructions below.

- ▶ *Launch Microsoft MapPoint and select the area of interest*
- ▶ *Use the Options menu (MapPoint 2006 or later) to display the longitude and latitude in degrees minutes seconds*
- ▶ *Select Location Sensor from the Tools menu*
- ▶ *Use pushpins from the toolbar at the bottom of the display to mark two locations on the map. Note the longitude and latitude of each location. It is best to select locations near diagonally opposite corners of the map.*
- ▶ *Press Ctrl+Shift+C to copy the map onto the clipboard*
- ▶ *Open a graphics program such as Microsoft Paint and paste the map image into the program.*
- ▶ *Save the image as a bitmap*

USING MAPFIX

MapFix is a utility program supplied with TargetTrack used to convert the bitmap files of the maps you've saved into map files that can be used with TargetTrack.

IMPORTING THE IMAGE

To import a graphics file containing a map image to Map Fix, select the **Import** option from the **File** menu or click the **Import** button on the tool bar. A file open dialog appears. Then go to the directory where the graphics file is located, select the file and click OK. The map image then appears on the screen

ENTER CALIBRATION POINTS

Using commands in the **Enter Points** menu or on the tool bar, you assign coordinates to your pixel image by specifying the latitude and longitude or MGRS coordinates of two locations on the image. Thus, you need to know the location of two points that you can identify and select with the mouse. You are free to choose any two points, except that they must define a rectangle (they cannot line up). To achieve maximum precision, you should see to it that the two points are fairly far apart, preferably along a diagonal of the image. The following commands appear in the **Enter Points** menu:

Fix Point 1: Determine the location and coordinates of the first point. When you select this option, the cursor changes to a cross. Move the cross to the first location and click the mouse. Enter the latitude and longitude or MGRS coordinates of the location in the dialog box that pops up. The location you have chosen is marked in red on the screen. If you are not satisfied, select **Clear Point 1** from the **Enter Points** menu and repeat the process.

Fix Point 2: Determine the location and coordinates of the second point. When you select this option, the cursor changes to a cross. Move the cross to the second location and click the mouse. Enter the latitude and longitude or MGRS coordinates of the location in the dialog box that pops up. The location you have chosen is marked in blue on the screen. If you are not satisfied, select **Clear Point 2** from the **Enter Points** menu and repeat the process.

Clear point 1 and Clear point 2: Use these options if you want to start over fixing points.

The screenshot shows a 'Fix Point' dialog box. It has a title bar with the text 'Fix Point' and a close button. The main area is divided into a 'Position' section and a coordinate type selection section. The 'Position' section contains three input fields: 'Latitude' with a dropdown set to 'N' and three text boxes containing '33', '50', and '57.84'; 'Longitude' with a dropdown set to 'W' and three text boxes containing '111', '58', and '6.67'; and 'MGRS' with a single text box containing '12S VC 10572 45878'. To the right of these fields are three radio buttons: 'Deg Min Sec' (which is selected), 'Deg Min', and 'MGRS'. At the bottom of the dialog are two buttons: 'Fix' and 'Cancel'.

Figure 7: Enter Position of the Point Where You Clicked

After you have entered both points the map is now calibrated. As a test of the calibration you may move the mouse to other known locations and read the position from the tool bar. If there is a discrepancy then you may have made a coordinate entry mistake. To correct the mistake simple clear the fixed points and start over.

SAVING THE MAP FILE

Use the **Save Map As** option in the **File** menu to open a dialog where you can save the map image with coordinates to file. The file name extension for a TargetTrack map file is .MAP. Type in the map name you wish to use in TargetTrack. If you save the map to the Map subdirectory, TargetTrack will automatically load these maps when the program is first started. However, you may save the maps anywhere on your hard disk. Saving a map is available only after you have imported a graphics file and fixed the coordinates of two points on the map

USING THE ESRI ARCGIS MAPPING ENGINE

This section provides instruction on how to use ESRI maps in TargetTrack.

INSTALLING AND LICENSING THE ESRI ARCGIS MAPPING ENGINE

Prior to using the ArcGIS Mapping Engine, you must obtain a license to use the engine on your computer. This license may be obtained from Doppler Systems LLC or it can be obtained directly from ESRI (www.esri.com <http://www.esri.com>). We do not recommend installing the Mapping Engine until you acquire the license.

► *Installing the mapping engine*

To install the ArcGIS Mapping Engine, insert the installer CD and wait for the Doppler installer program to launch. If it does not launch, use Windows Explorer to navigate to the CD and double click on Doppler.exe. Push the **Install ESRI ArcGIS Mapping Engine** button and follow the instructions on the screen.

► *Obtaining the License File*

To install the license you must use the license number you were provided to get a license file from ESRI. Go to the **Start** menu and select **ArcGIS->Software Authorization** to display the following dialog:

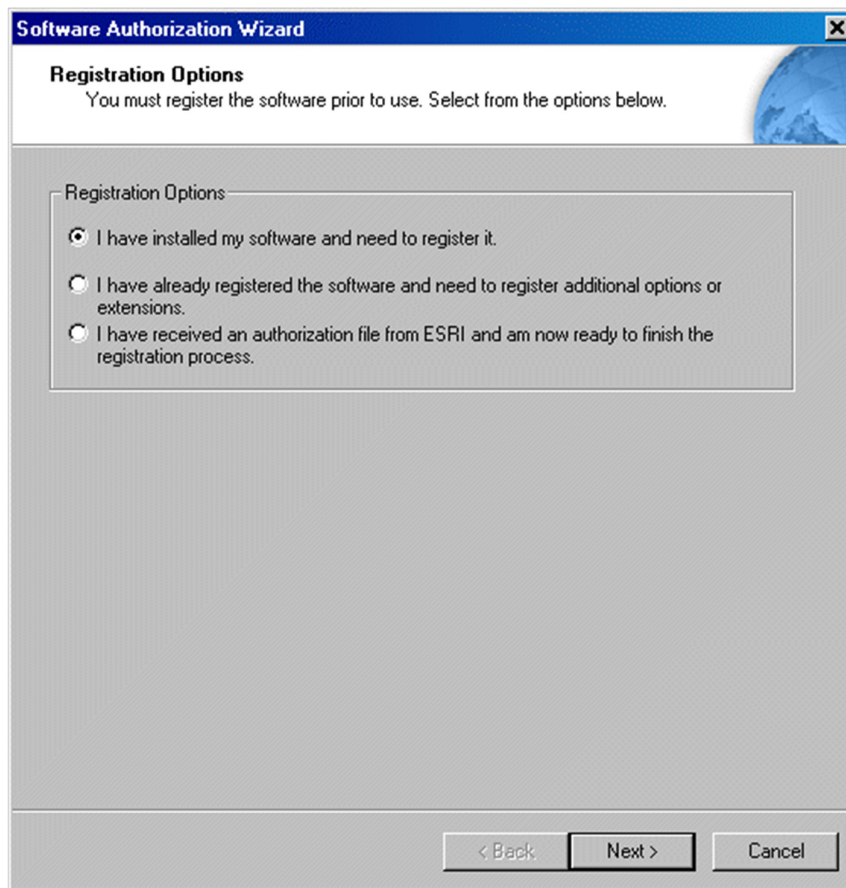
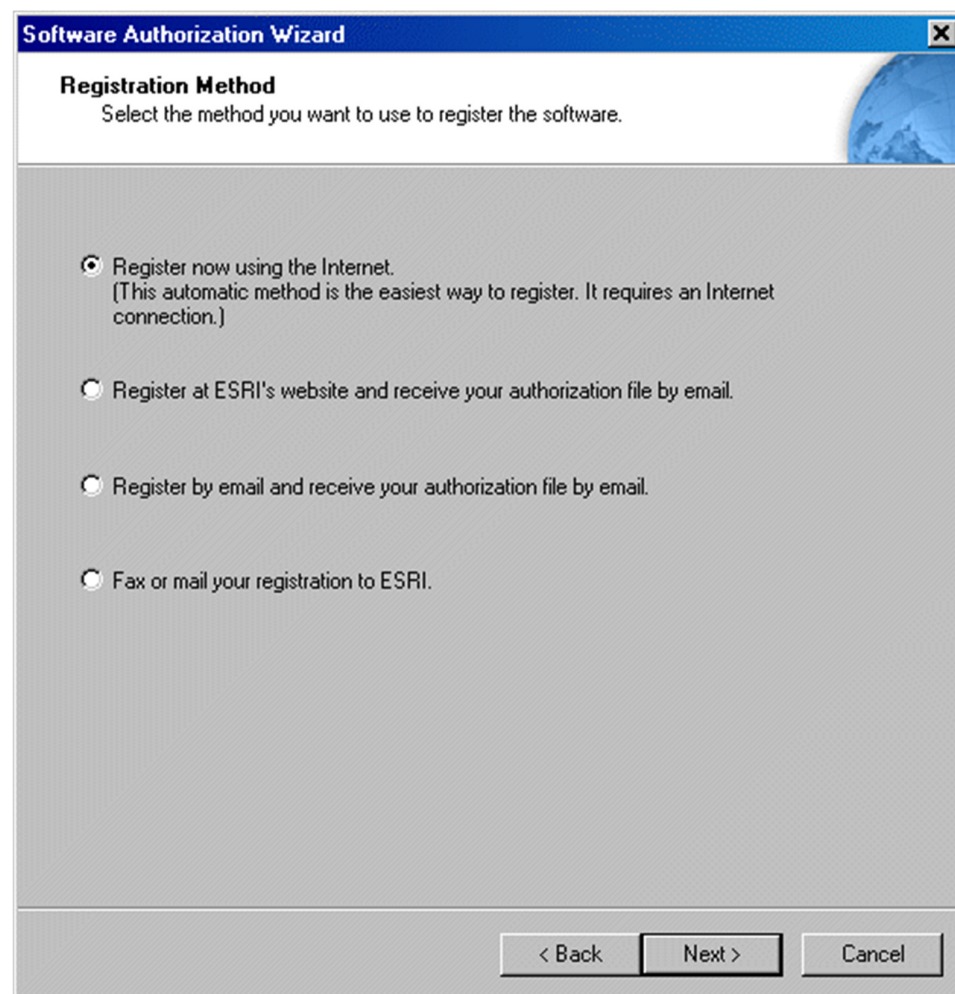


Figure 8: Dialog Used to Register Your ArcGIS Engine License and Obtain a License File

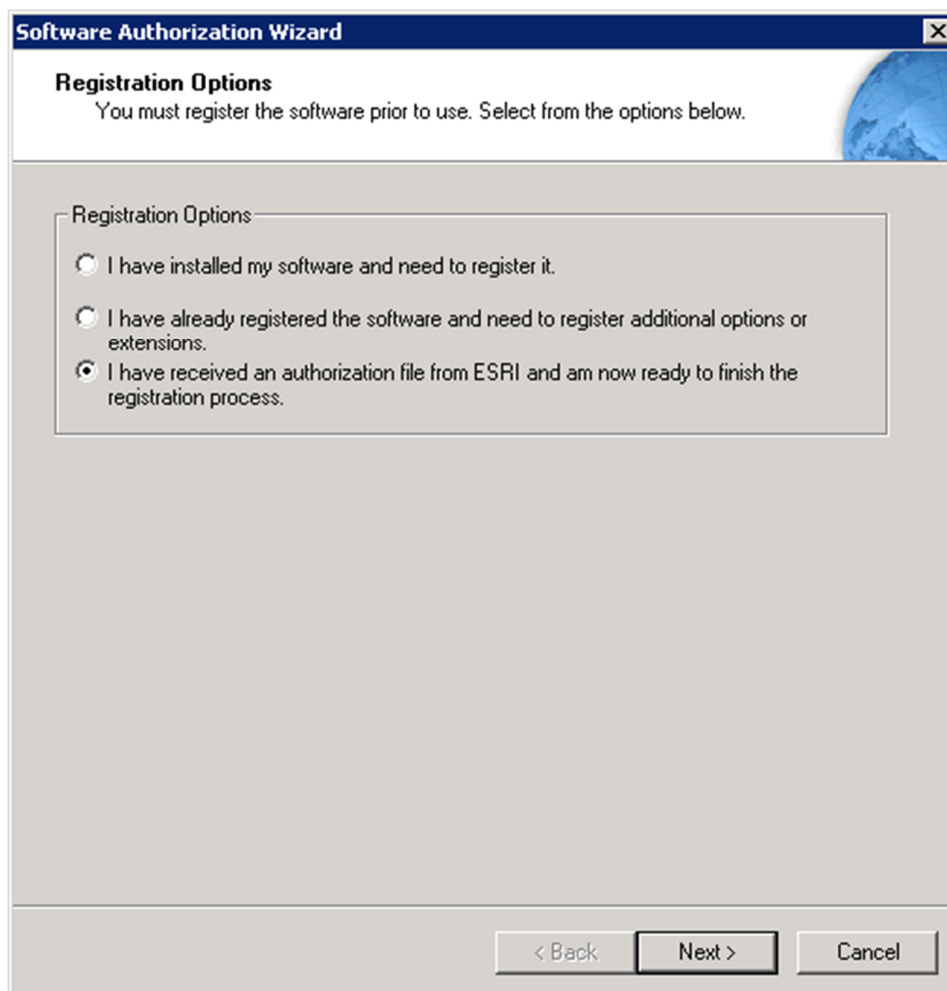
Select the first option and the following screen will be displayed



Select the option you would like to use and then press the **Next** button. After pressing the **Next** button follow the instructions for the option you've selected.

► *Installing the License File*

After obtaining the license file you must then install it into the ArcGIS mapping software. To install it go to the **Start** menu and select **ArcGIS->Software Authorization** to display the following dialog:



Select the third option and press **Next**.

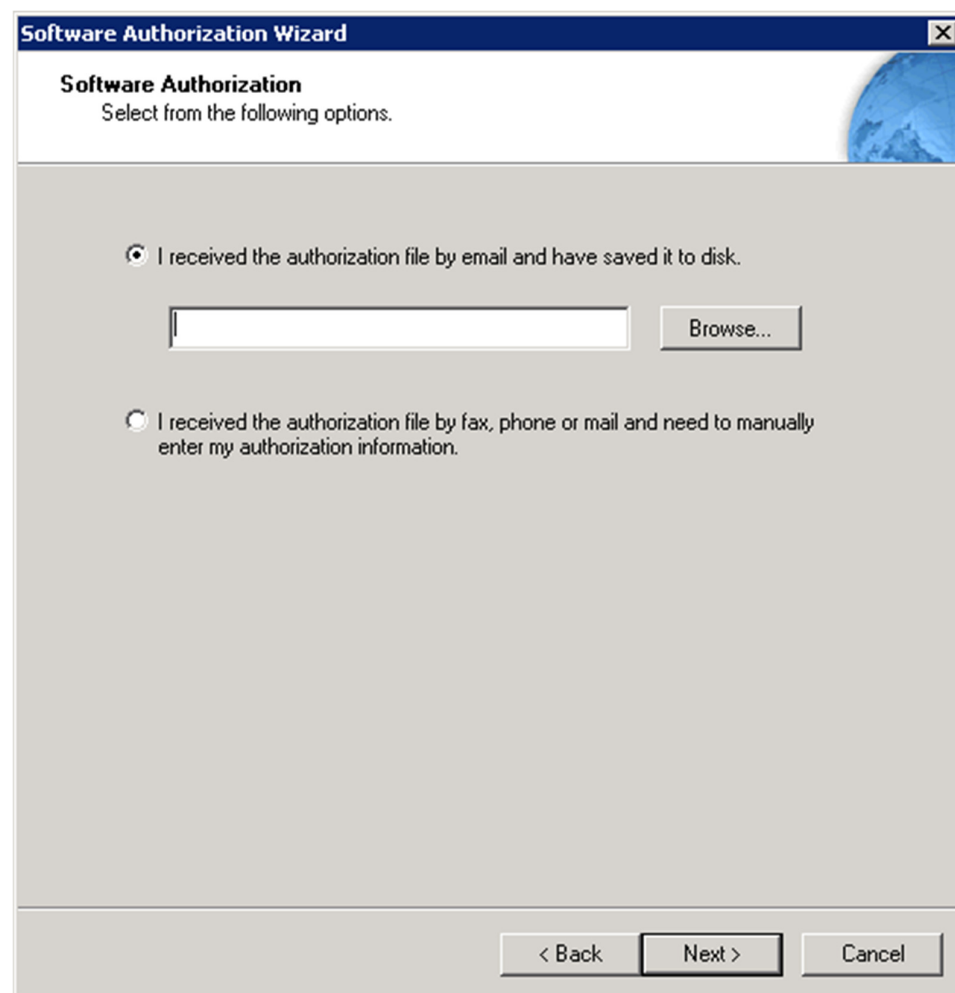


Figure 9: Authorizing a File Obtained by e-mail

Press **Browse** and navigate to the license file and press **Next**.

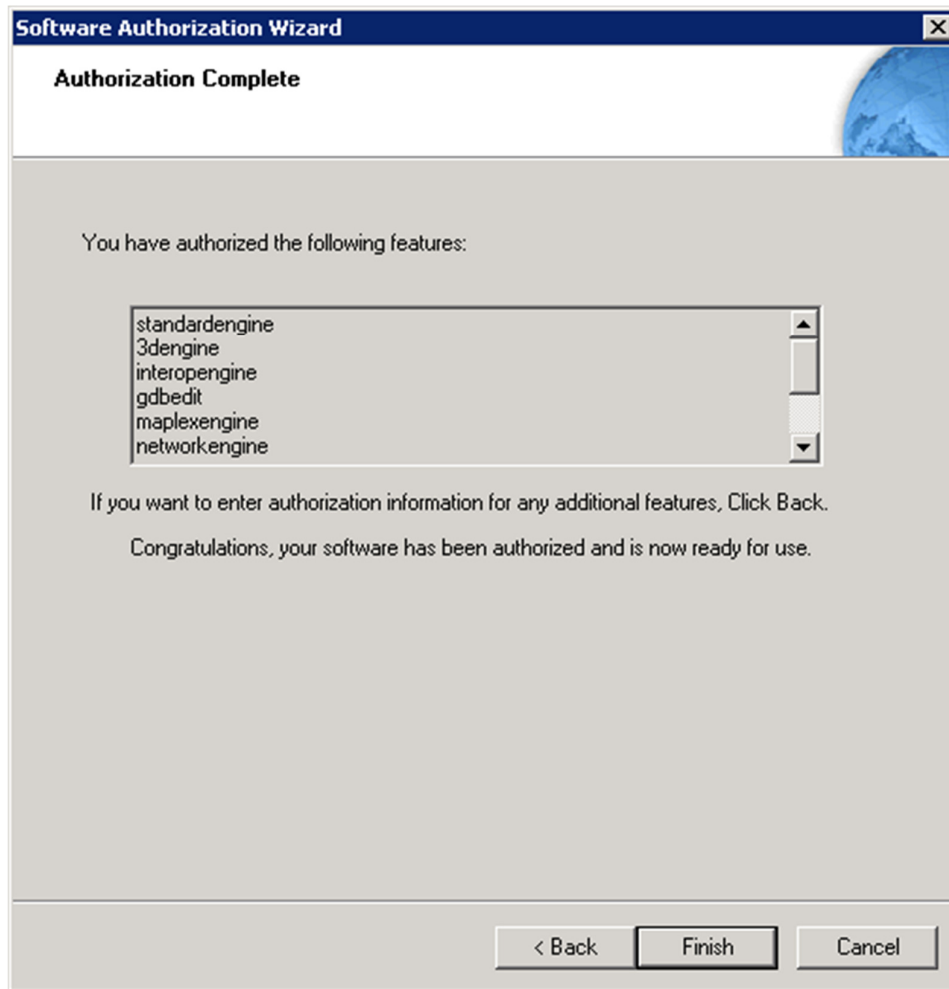


Figure 10: Authorization Complete Will Display Dialog Above

The Authorization Complete dialog signifies the license was properly installed and now the ArcGIS Mapping Engine can be used in TargetTrack.

ESRI ARCGIS MAPPING DISPLAY

The figure below shows the ESRI mapping tool installed in TargetTrack. The tool consists of a display pane and a tool bar containing a number of tools that can be used to open, save, build, and manipulate the maps.

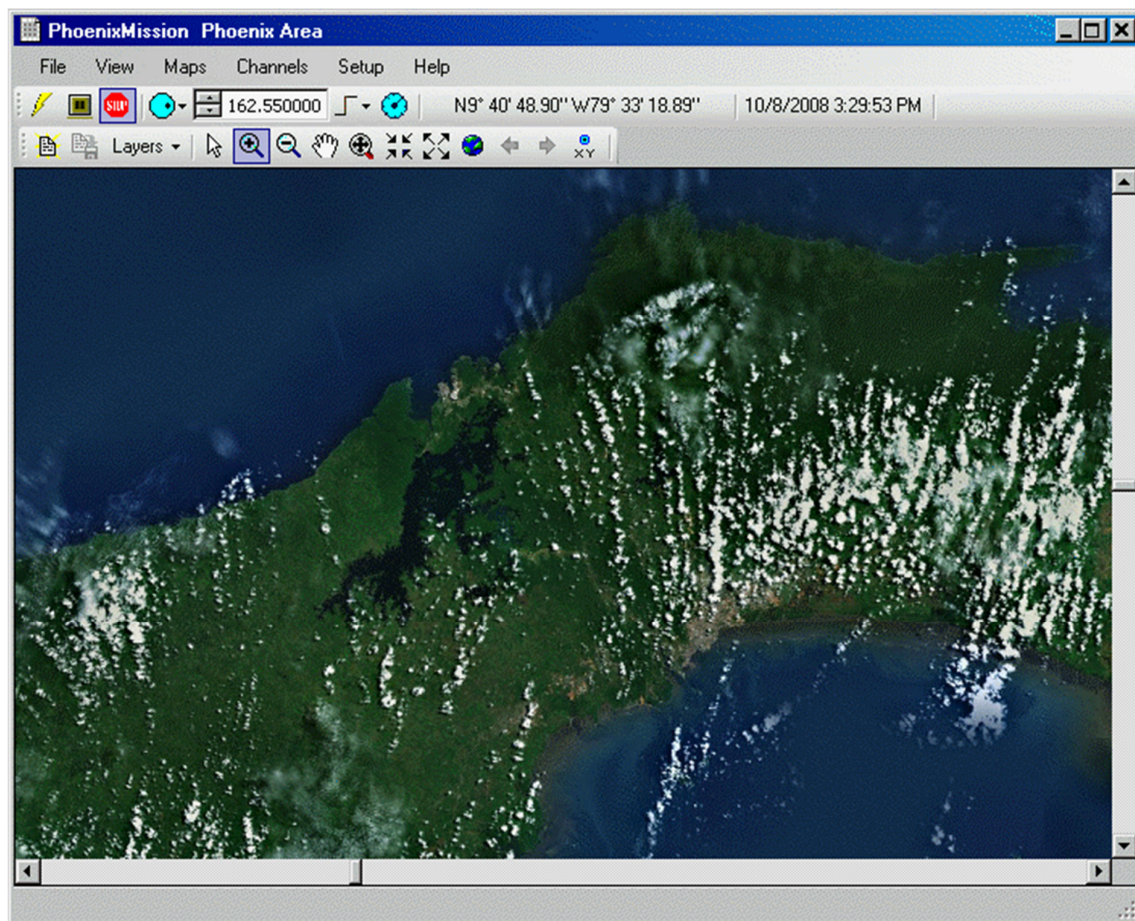


Figure 11: ESRI Mapping Tool Installed in SignalTrack

MAPPING TOOL BAR

The graphic below illustrates the mapping tool bar.

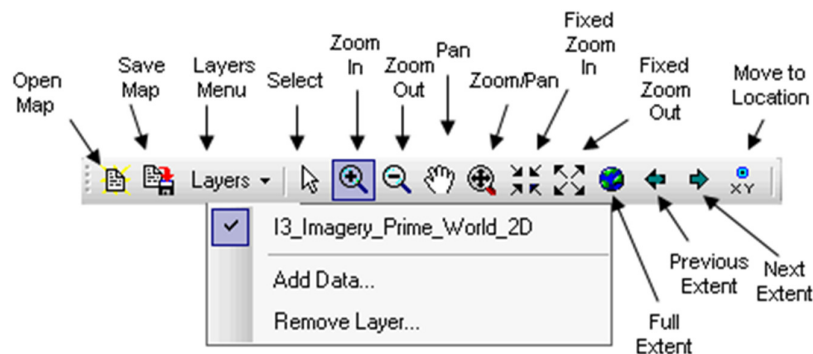


Figure 12: ESRI Mapping Tool Bar

- ▶ The **Open Map** tool displays a standard open file dialog that displays ESRI mapping files that can be opened into the display.
- ▶ The **Save Map** tool allows the user to save any changes that have been made to the map
- ▶ The **Layers** drop down menu allows a user to enable and disable layers, add data (layers), and remove layers
- ▶ The **Select** tool allows the user to manipulate standard elements such as sites.
- ▶ The **Zoom In** tool allows the user to select a rectangle on the screen and the map will be zoomed to fit into the rectangle
- ▶ The **Zoom Out** tool allows the user to zoom the map to a greater extent depending on the size of the rectangle selected
- ▶ The **Pan** tool allows the user to pan the map display
- ▶ The **Zoom/Pan** tool allows the user to zoom while panning (you have to try it to see how it works)
- ▶ The **Fixed Zoom In** tool zooms the map a fixed amount
- ▶ The **Fixed Zoom Out** tool zooms the map out a fixed amount
- ▶ The **Previous Extent** tool allows the user to undo a map manipulation (e.g. zoom)
- ▶ The **Next Extent** tool allows the user to redo a map manipulation (e.g. zoom)
- ▶ **Move to Location** allows the user to input coordinates and the map will then automatically pan to these coordinates. The coordinates can be entered in a number of formats including degrees-minutes-seconds, decimal degrees, and MGRS

BUILDING MAP FILES

TargetTrack uses ESRI map files (*.mxd) as the base map. Data to make the map files is available from a variety of sources and TargetTrack can use this data to build ESRI map files.

ESRI maps are built in layers. Each layer of the map is built from standard map data files that use one of the following formats:

- ▶ Shapefile data (*.shp)
- ▶ Geodatabase data (feature classes, geometric networks, topologies, network datasets).
- ▶ Raster data (Imagine Image (.img), Bitmap (.bmp), JPEG (.jpg, .jpeg), Portable Network Graphics (.png), Graphics Interchange Format(.gif), Tagged Image File Format (.tif, .tiff), Arc/Info & Space Imaging BIL (.bil), Arc/Info & Space Imaging BIP (.bip), Arc/Info & Space Imaging BSQ (.bsq), DTED Level 0-2 (.dted), ERDAS 7.5 LAN (.lan), ERDAS 7.5 GIS (.gis), JP2 (.jp2), MrSID (.sid), RAW (.raw), NTIF (.ntf), USGS Ascii DEM (.dem), X11 Pixmap (.xpm), PC Raster (.map), PCI Geomatics Database File (.pix), JPC (.jpc), J2C (.j2c), J2K (.j2k), HDF (.hdf), BSB (.kap), ER Mapper ECW (.ecw)).
- ▶ Server data (ArcGIS Server, ArcIMS, WMS (Web Mapping Service) services)
- ▶ Layer files (*.lyr)

After the map layers are added TargetTrack can save the map as an ESRI map file (*.mxd). TargetTrack can then be used to open and manipulate (zoom, pan, etc.) the map files.

To build map files from data, select **Open Map** from the TargetTrack **File** menu and navigate to the file Blank.mxd. Next select **Add Layers** from the **Layers** menu. The following dialog will be displayed.

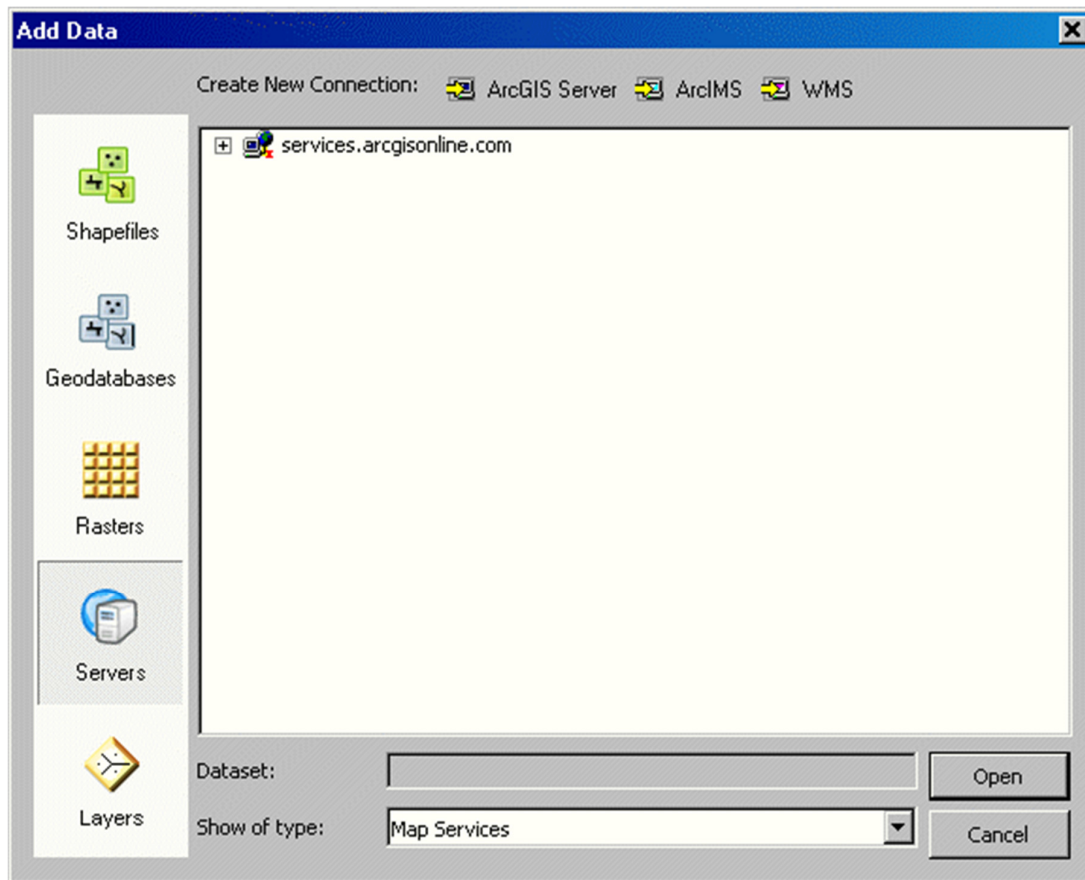


Figure 13: Select the type of Data to Add

Use this dialog to select the data you want to use to build the layers of your map. Select the type of data you wish to add from the left window and then select the data in the main window.

After you have built up the layers press the **Save Map** button on the mapping tool bar.

MANIPULATING LAYERS

Once you've loaded a map, individual layers can be disabled and enabled. The **Layers** drop down menu lists all the layers in the order in which they are displayed. The topmost layer is the first layer in the list; the next layer is listed second, etc. A check box next to the layer name indicates that the layer is enabled and being displayed. Many times layers above other layers obscure layers below them. So, to see the lower layers you must disable the layers above the lower layers. Merely enabling (checking) a layer may not display that layer if the layer above it obscures it.

Layer can be removed by selecting the **Remove Layer** menu item from the **Layers** drop down menu. When the dialog is displayed, check the layers you wish to remove and press **OK**.

RUNNING TARGETTRACK

TargetTrack is designed to interface the DDF6000 and DDF7000 series Doppler Systems' radio direction finders. Interface to the DDF6000 series is via the computer serial port or via a serial to Ethernet converter. Interface to the DDF7000 series direction finders is via an Ethernet connection. Direct connection to the Ethernet port from the computer requires a crossover cable. See the MPT (DDF7000) User's manual for further details.

SETUP

The following paragraphs describe the setup steps needed to operate TargetTrack.

AUDIO

TargetTrack requires an audio connection from the local direction finder to the computer. For the 6000 series direction finders this connection needs to be from the external speaker output of the direction finder to the left channel audio input of the computer. This requires the computer have an audio line input and a cable that provides a 3.5 mm stereo plug connected to two 3.5 mm monaural inputs. Adapters can be obtained from a variety of sources. For the 7000 series audio can be connected either via the sound card similar to the 6000 series or via the Ethernet using the UDP audio streaming provided by the DDF7000.

NETWORK NAME

The first time you run TargetTrack you will be asked to enter a network name. The network name is used by the database to keep track of the intercepts, intercept data, and recorded audio files. The default name is the network name of the computer; however, you can select a different name if you would like to. You can change this name later using **Network Name** in the **File** menu.

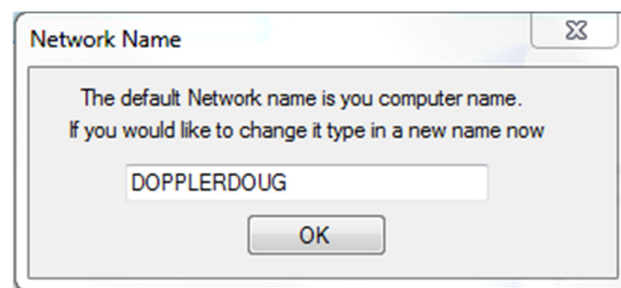


Figure 14: Enter the Direction Finding Network Name

LOADING MAP FILE

After entering the network name the screen will look similar to the one below.

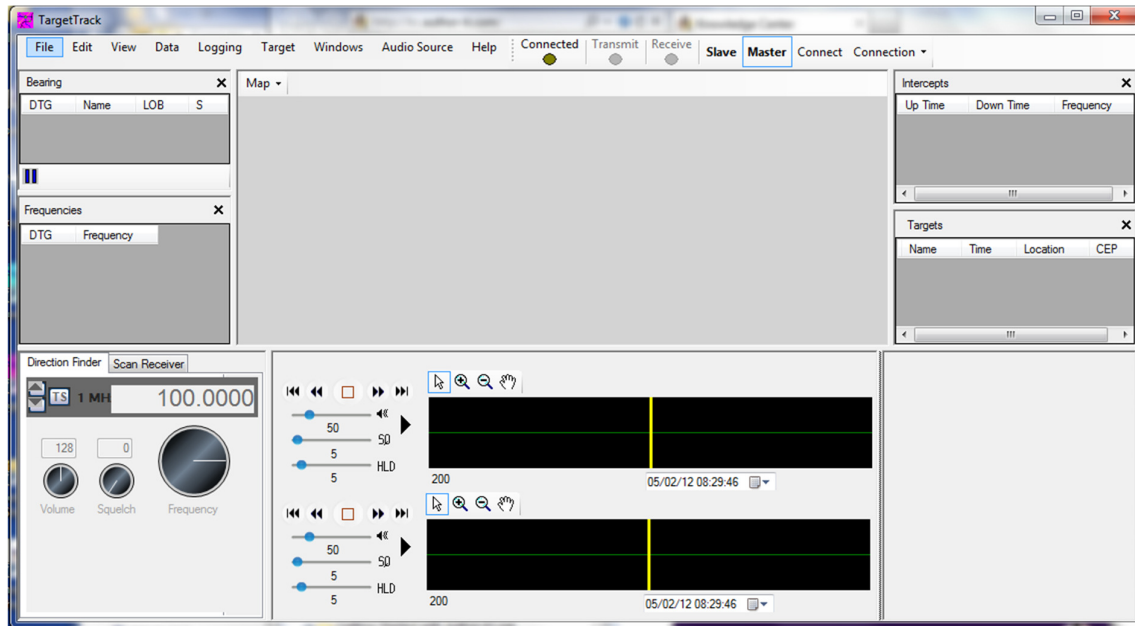


Figure 15: Appearance of the Display at Startup

If it does not adjust the window splitters so you can view all the panes. If you do not have a scan receiver connected close the scan receiver audio control by clicking the on the close button at the right of the control.

If you are using maps generated by MapFix then from the **Map** menu select **Open Map File...** In the resulting dialog select the map file you wish to use. If you are connected to the Internet and wish to use **Great Maps** select **New Great Map** from the **Map** menu.

The screen will then look similar to the one below.

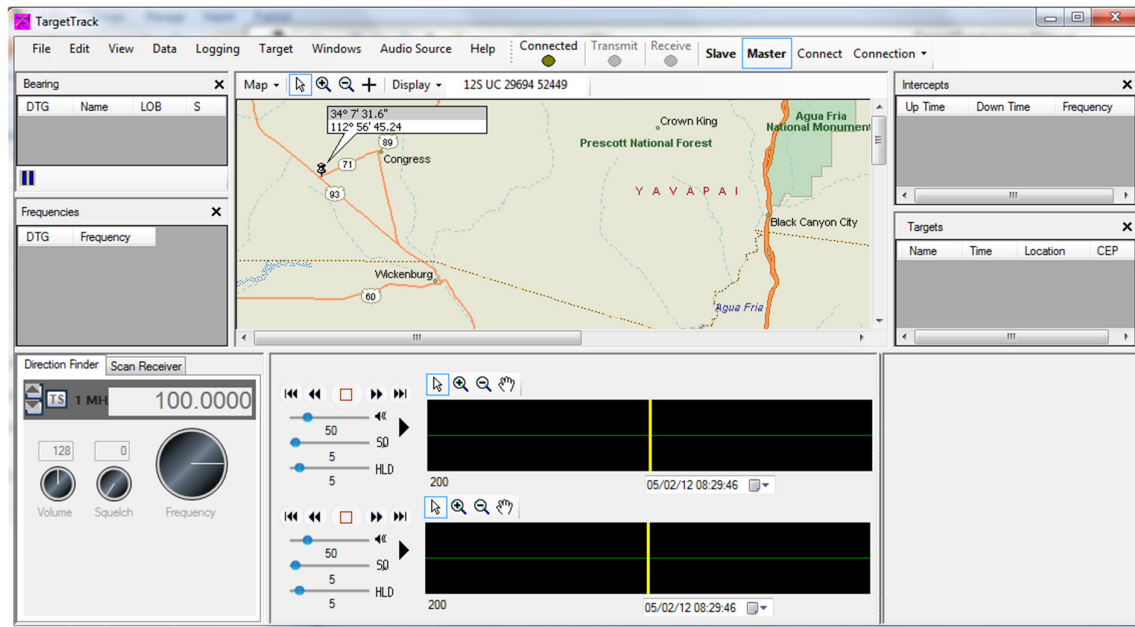


Figure 16: Display with a Map File Selected

AUTOMATIC IDENTIFICATION OF A DIRECTION FINDING SITE

When MPT (DDF7000 series) direction finders are used in the system and all the direction finders are connected either by a crossover cable or to a local area network (LAN) TargetTrack will display the network parameters and location of the direction finder sites. If the MPT's firmware version is 2.13 or earlier then only the IP address and IP port of the direction finder will be display. If the version is greater than 2.13 and a either the location has been entered into the MPT or the DF location has a GPS connected then the location of the site will be displayed.

The display for the network data is in the lower right hand corner of the TargetTrack window as shown below.

IPAddress	Connections	IPPort	Location
192.168.1.148	0	2101	12S VC 14933 42805
192.168.1.135		2101	

Figure 17: Direction Finders Installed on a LAN will be Displayed on this List

In the above example both direction finders are connected to a LAN. The DF at 192.168.1.148 is running version 2.14 and the DF at 192.168.1.135 is running version 2.13.

When the user moves the mouse over an unconnected DF site TargetTrack will display the location on the screen as shown in the example below.

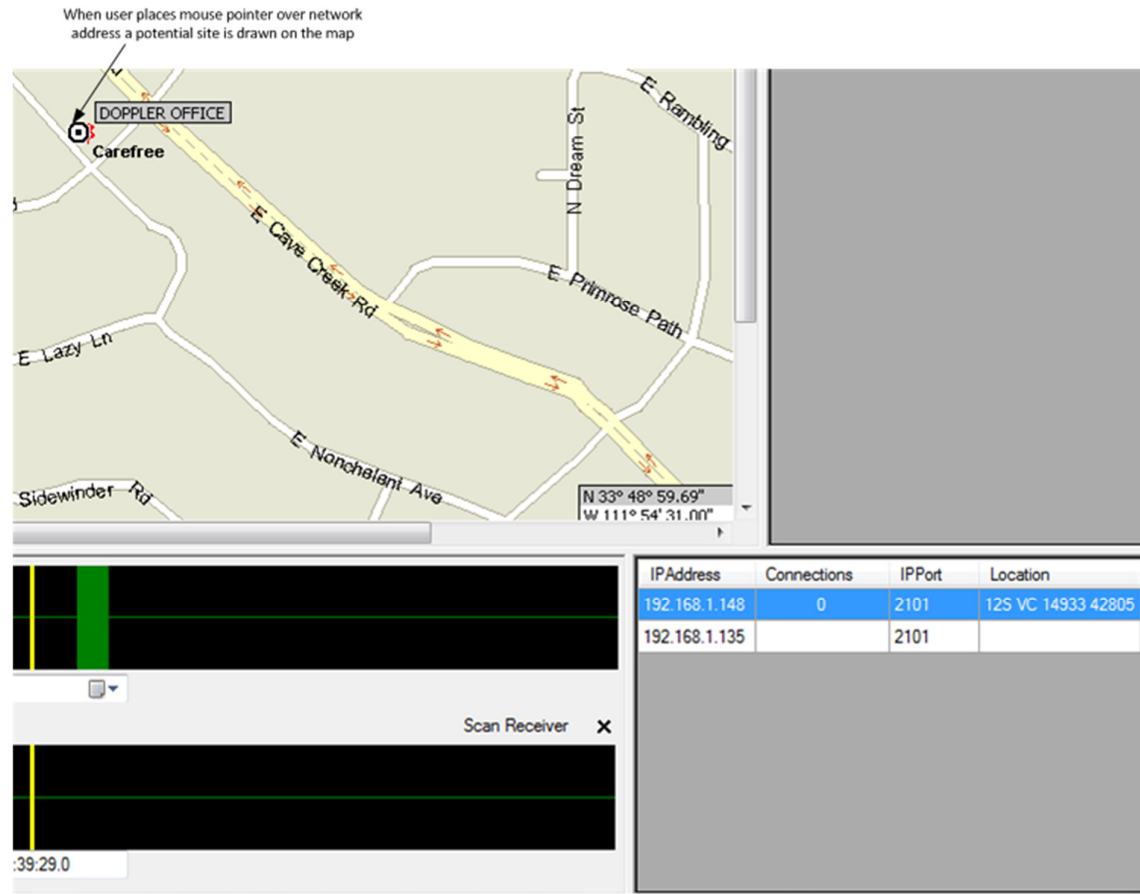


Figure 18: Placing the Mouse Over the Site Listed will Show the Location of the Site on the Map

If the user wishes to connect to the site he simply right clicks on the network address of the site he wishes to connect and selects **Connect as Fixed Site** or **Connect as Mobile Site** as shown below.

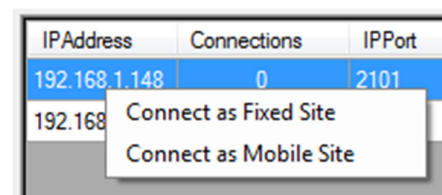


Figure 19: Establish a Connection by Right Clicking on the List Item

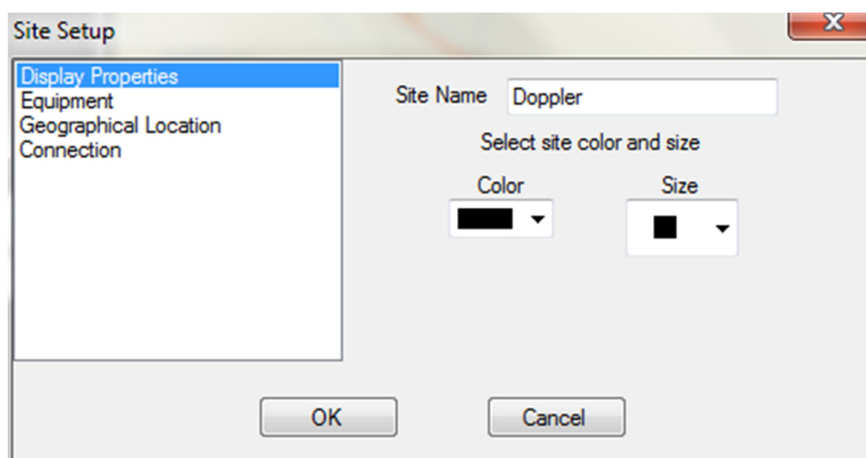
Once the connection is made the network display will be updated to show the total number of connections to the direction finder. If this instance of TargetTrack has made the connection then the number of connections will be displayed in bold as shown below.

IPAddress	Connections	IPPort	Location
192.168.1.148	1	2101	12S VC 14934 42805
192.168.1.135		2101	

Figure 20: Connections to Each DF will be Displayed

SETTING UP A DIRECTION FINDING SITE

To setup a site, right click the mouse on the map near geographical location of the site. Select the type of site you wish to set up either a fixed or mobile site. The dialog box shown below will be displayed.



The 'Site Setup' dialog box is shown with a close button (X) in the top right corner. On the left is a list of options: 'Display Properties' (highlighted), 'Equipment', 'Geographical Location', and 'Connection'. The main area contains a 'Site Name' text field with 'Doppler' entered. Below this is the text 'Select site color and size'. There are two dropdown menus: 'Color' (showing a black square) and 'Size' (showing a small black square). At the bottom are 'OK' and 'Cancel' buttons.

Figure 21: Enter the Site Name

Enter a site name and the color and size you would like to use for the site. Then use the mouse and left click on the Direction Finder and Receiver topic to select the following dialog.

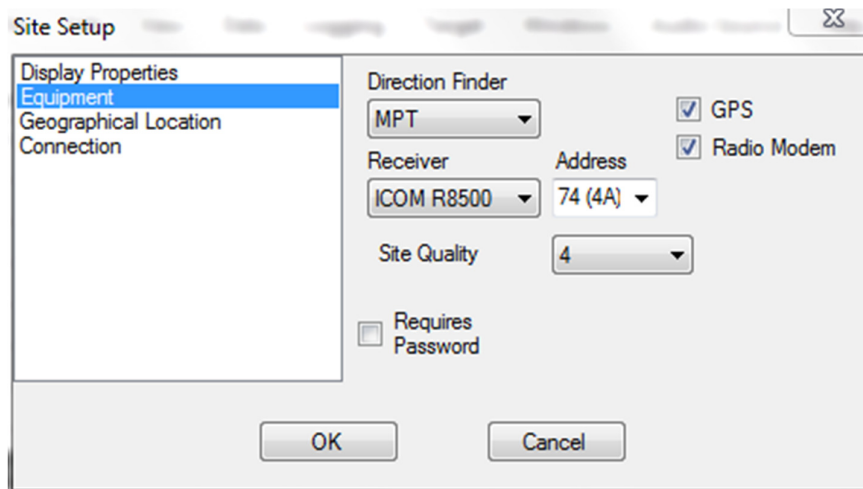


Figure 22: Site Equipment Dialog

Using the drop down combo boxes select the direction finder and the receiver you are using. Set the site quality (Site quality is defined in the glossary). Check GPS if a GPS receiver is connected and Radio Modem if you are using a radio modem to connect to other sites. If the direction finder at the site requires a password check the Requires Password check box and enter a user id and password (see the MPT Software Users Guide) on how to set the direction finder to require a password).

Next you can select the Geographical Location text to display the following dialog.

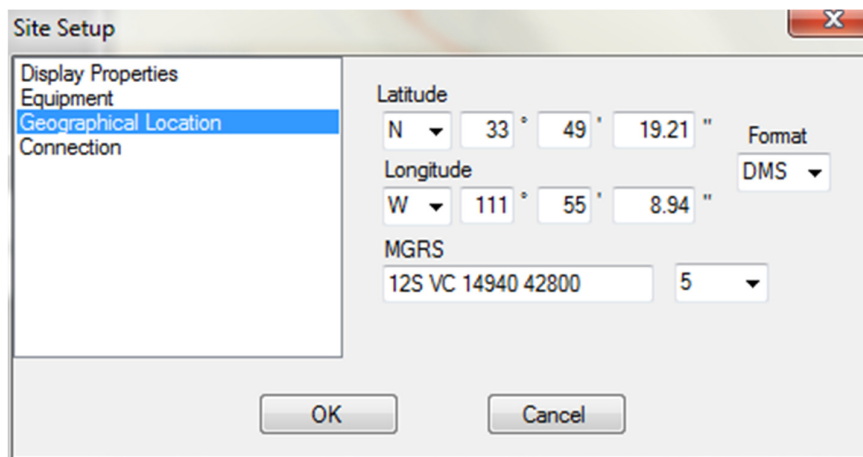


Figure 23: Location Dialog

This dialog allows you to manually adjust the geographical location of the site. If a GPS receiver is connected to the site then the location settings will be disabled because the position is determined by the GPS.

Next press Connection to display the following dialog.

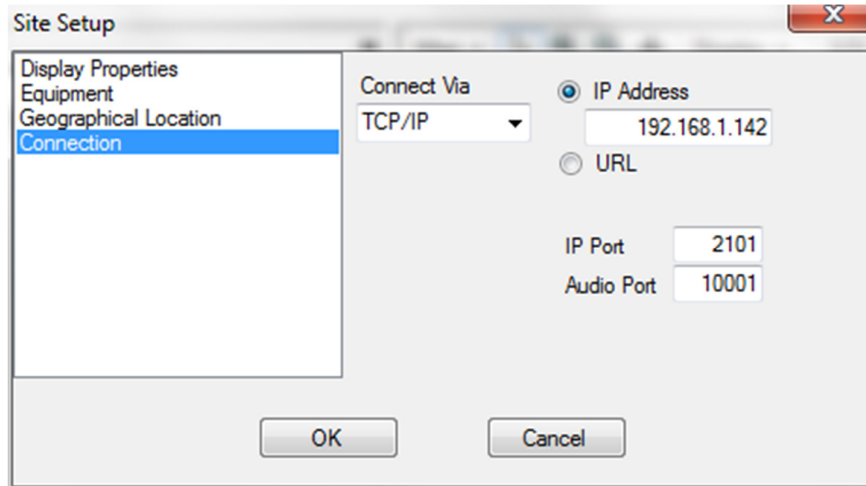


Figure 24: Connection Dialog

Select
the
type of

connect in the Connect Via drop down and set the connection parameters using the other drop downs.

Press OK and a site will be displayed on the screen as shown below.



Figure 25: Appearance of a Fixed Site on the Map

If the site has an X through it then a connection to the site has not been made. Check the physical cable connections to the direction finder and the connection settings. You can edit the settings by right clicking on the site and selecting Edit Site from the pop up menu. Holding the mouse over the site will display the status of the site.

USING TARGETTRACK WITH A NAT ENABLED ROUTER

TargetTrack requires audio from the primary site in order to operate properly. If you are using a DDF7000 series direction finder, the direction finder streams UDP audio from the Ethernet connection. If your computer is connected to a NAT enabled router and the direction finder is outside of your local area network (LAN) then you must configure your router and TargetTrack to receive the audio. An example of this would be a DDF7001 direction finder that is connected to the Internet and a computer running TargetTrack that is connected to a modem/router.

Note: Some Internet providers block access to certain ports. If this is the case try using IP port 80 for audio streaming. If this does not work contact your provider to determine what port to use.

CONFIGURING YOUR ROUTER FOR AUDIO STREAMING

To configure your router you must port forward the audio port that you will receive the audio UDP stream to the local IP address of your computer. To determine your computer's IP address open a command prompt and type **ipconfig**. A display similar to the one below will appear

```

C:\Windows\system32\cmd.exe

Wireless LAN adapter Wireless Network Connection 2:
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :

Wireless LAN adapter Wireless Network Connection:
    Connection-specific DNS Suffix . :
    Link-local IPv6 Address . . . . . : fe80::b4a6:19d0:d310:6ae7%13
    IPv4 Address. . . . . : 192.168.1.134
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

Ethernet adapter Local Area Connection:
    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix . :

Tunnel adapter isatap.{F65E2E02-A877-4D1C-B896-50EF5112E2A8}:
    Media State . . . . . : Media disconnected
  
```

Figure 26: Determining the IP Address of the Host Computer

The IPv4 address of the adapter is the IP address that you want to port forward the UDP audio to. Typically this address will be 192.16x.xxx.xxx.

Once you've determined this address then you need to set up the port forwarding in your router, forwarding the audio IP port (default value is 10001) to the IP address you obtained above. A typical entry in a port forwarding table is shown below.

10001	10001	UDP ▾	192.168.1.134	☒
-------	-------	-------	---------------	-------------------------------------

Figure 27: Typical Port Forwarding Router Entry

CONFIGURING TARGETTRACK TO STREAM AUDIO FROM AND EXTERNAL IP CONNECTION

When using a DDF7000 series direction finder outside of a local area network (LAN) streaming audio to TargetTrack requires that the direction finder must know your external IP address. The external address is the address that external IP connections such as web sites use to send information to your router. Your router then translates the external IP address into an internal IP address using the NAT in the router and sends the information to your computer.

When setting up a site TargetTrack will attempt to determine the external IP address. This address will be displayed in the communications dialog box similar to the one shown below.

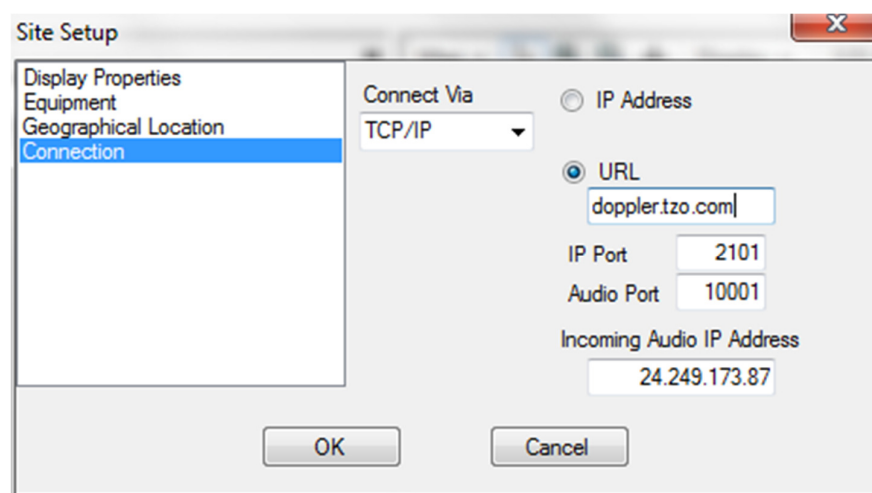


Figure 28: Incoming Audio IP Address

If the Incoming Audio IP Address is blank or if you know this address is not your external IP address then you must enter the external IP address in the test box. In most cases, if an address is displayed it will be the one to use.

If there is no address displayed then you will need to determine it. Contact your network administrator or log on to your router to find this address.

AUDIO SOURCE

If you are using a MPT (DDF7000) direction finder then you next select the audio source from the Audio Source menu. If the audio is connected via the sound card select sound card. If you are streaming audio from the direction finder then select the site name from the Audio Source menu. Once selected, audio received by the direction finder will be streamed to TargetTrack.

SCAN RECEIVER

TargetTrack has provisions to control and monitor a second receiver. The scan receiver can be an ICOM R8500, ICOM R2500, AOR AR8600, AOR AR5000, or an AOR AR5001D receiver. To control the receiver the receiver must be connected to the PC using a USB or serial connection. The audio from the receiver must be connected to the right channel of the line input to the PC. If you are not using a scan receiver close the scan receiver audio control by clicking the close box located on the right side of the control.

SUMMARY

At this point you are now ready to operate the site. If you have additional sites that are connected via an Ethernet connection you can add them at this time using the procedure outlined above.

SCREEN LAYOUT

The figure below shows the major areas of the screen

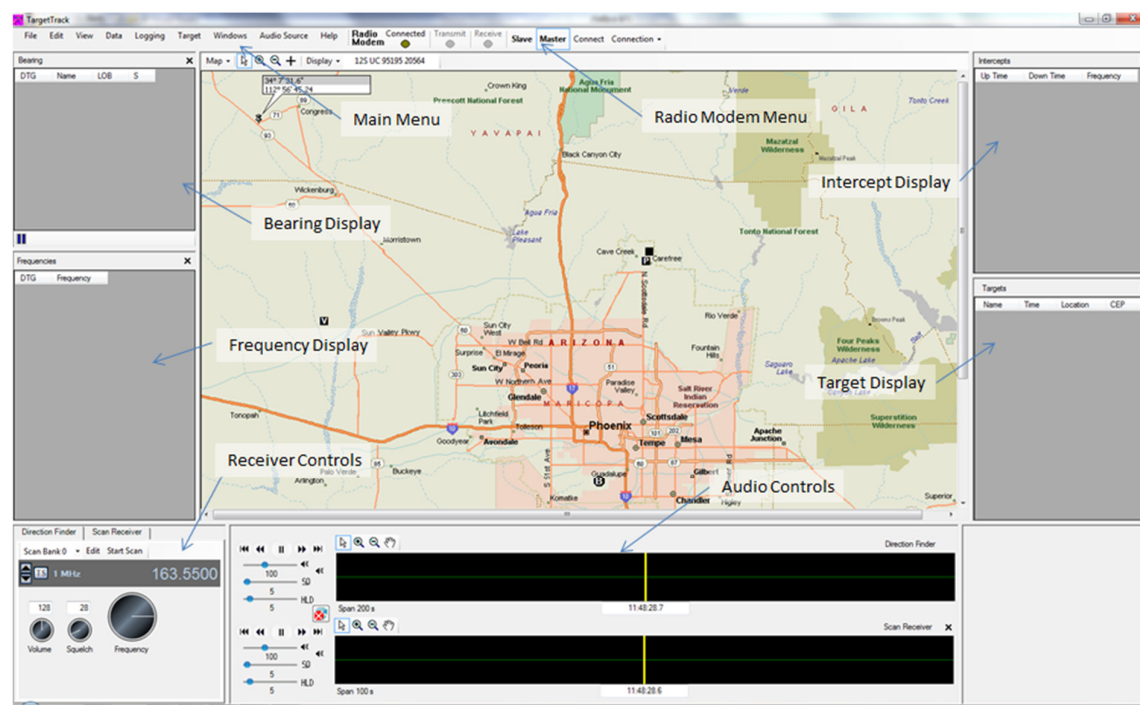


Figure 29: Target Track Display

Map

The Map displays the location of the sites and the bearings as they are received. Placing the mouse over a site will display the status of the site. A site with an X through it indicates that it is not operational.

Audio Controls

The Audio Controls display and control the incoming audio. The operation of the audio controls is explained in the **Audio Controls** section.

Receiver Controls

The receiver controls are used to set the frequency, volume, and squelch of the DF receiver and the scan receiver. It is also used to set up the scan banks for the receiver if scanning is desired.

Bearing Display

The bearing display shows the bearings that are measured during the intercept. The highlighted bearings indicate the bearings being displayed on the screen. Right clicking in the header of this display will allow you to select which columns you want to display.

Frequency Display

The frequency display shows the frequencies on which signals have been received. Double clicking on one of these frequencies will tune the active receiver to that frequency. Right clicking in the header of this display will allow you to select which columns you want to display.

Intercept Display

The intercept display shows the intercepts that have been received. Each intercept has an up time, a down time, and a frequency. Double clicking on the intercept will cause it to playback. Right clicking on it will allow you to select the Edit Transcript function which is discussed in the Data section of this document or to delete the intercept. Right clicking in the header of this display will allow you to select which columns you want to display.

Target Display

A list of targets for the currently displayed intercept. Right clicking in the header of this display will allow you to select which columns you want to display.

Radio Modem Menu

Menu to setup and operate a radio modem connection.

AUDIO CONTROLS

The audio controls are very important in monitoring and operating TargetTrack. This section will discuss the operation of the audio controls. The Audio Control consists of a number of sub controls. The function of each of these controls is explained below. There are one set of controls for the left channel and one set of controls for the right channel. The figure below shows these controls and their function is explained in the following paragraphs.



Figure 30: TargetTrack Audio Control

AUDIO FILE CONTROL

The Audio File Control ¹ and its operation are explained in this section.

A screen shot of the control is shown below. There are identical controls for the direction finder and the scan receiver.

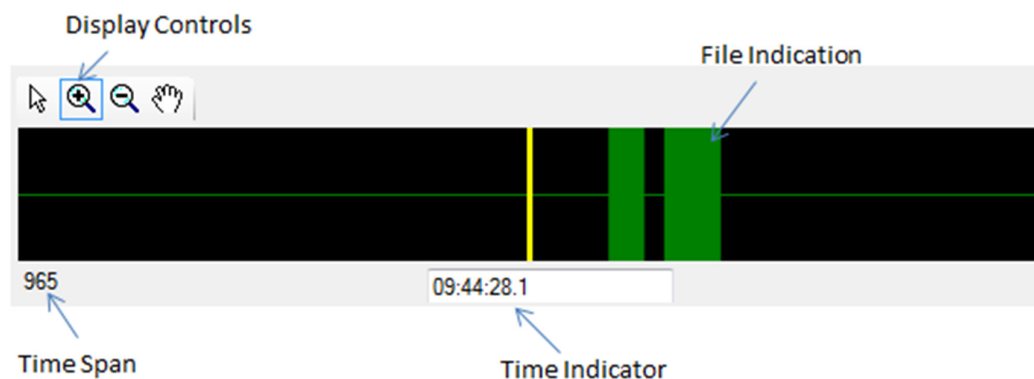


Figure 31: Audio File Control

Green rectangles indicate previously recorded files. Blue rectangles indicate a file that is currently being recorded.

OPERATION

The Figure below illustrates the Audio File Control. The control consists of a Tool strip with buttons, two labels, and a display panel. The width of the panel represents a time span. The middle of the panel represents the Set Time that is marked by a yellow line.

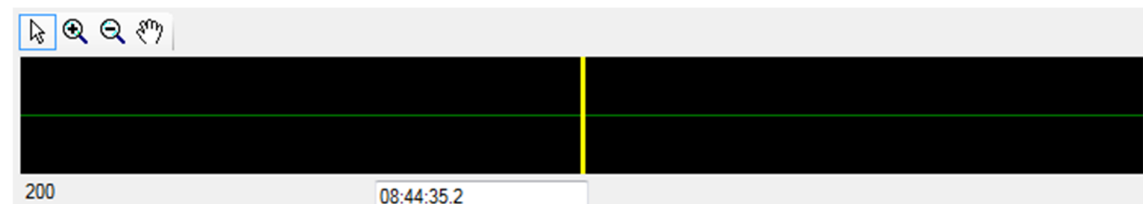


Figure 32: Set Time Indicator

The Set Time can be increased or decreased at any time. If the set time is decreased the displayed files will move to the left. If the set time is incrementally increased, the displayed files will move the right and any new files that come into the time span will be shown to the far left of the control. When the set time is incremented and a file's start time is less than or equal to the set time the control will start playing and the associated bearings will be displayed. If after incrementing the set time, the time at the end of the file is less than the set time then the control will stop playing.

SELECTION MODES

The Audio File Control has four selection modes: Normal, Zoom In, Zoom Out, and Pan. The selection mode determines the interaction of the control with the mouse. The following paragraphs explain the way the control will work in the various modes. Mode selection is done using the controls on the tool strip at the top of the panel display.

NORMAL MODE

In the normal mode  the cursor is the default cursor.

No Mouse Button Pressed

When moving the cursor across the panel with no mouse button pressed, a tool tip appears at the cursor location when the cursor points to a file. The tool tip displays the file's name.

Left Mouse Button

When the left mouse button is pressed and the mouse is dragged a selection rectangle appears and increases or decreases in dimension with the mouse motion. When the left button is released the selection rectangle remains.

Right Mouse Button

When the right mouse button is pressed and the mouse is over a region that represents a file, the Normal context menu appears.

When the right mouse button is pressed and the mouse is within a previously drawn selection rectangle, the Selection context menu shall be displayed.

Left Mouse Button Double Click

If the user double clicks the left mouse button and the mouse position is greater than 5 pixels from the center line, the set time will be changed to the time represented by the point where the mouse was positioned.

ZOOM IN MODE

When in the zoom in mode  the cursor changes to the zoom in cursor when the mouse is positioned over the display panel.

Left Mouse Button Down

When the left mouse button is pressed a selection rectangle is displayed and expands and contracts with the motion of the mouse. When the left mouse button is released the time span of the control is changed to the time span represented by the selection rectangle and the set time is changed to the value represented by the center of the selection rectangle.

Double Click

When the left mouse button is double clicked on the control, the time span is changed to half of the current time span.

ZOOM OUT MODE

When in the zoom out mode  the cursor changes to the zoom out cursor when the mouse is positioned over the display panel.

Left Mouse Button Down

When the left mouse button is pressed a selection rectangle is displayed and expands and contracts with the motion of the mouse. When the left mouse button is released the set time is changed to the value represented by the center of the selection rectangle and the time span is changed by a factor of T_{span}/T_{sr} where T_{span} is the current time span and T_{sr} is the time represented by the width of the selection rectangle.

Double Click

When the left mouse button is double clicked on the control, the time span is changed to twice the current time span.

PAN

When in the Pan mode  the cursor changes to the Pan cursor.

Left Mouse Button Down

Pressing the left mouse and dragging the mouse causes the set time to change to scroll the file display to follow the mouse.

CONTROLS

The Audio File Control contains a number of .Net controls. The figure below illustrates the controls and the following paragraphs describe the operation of these controls.

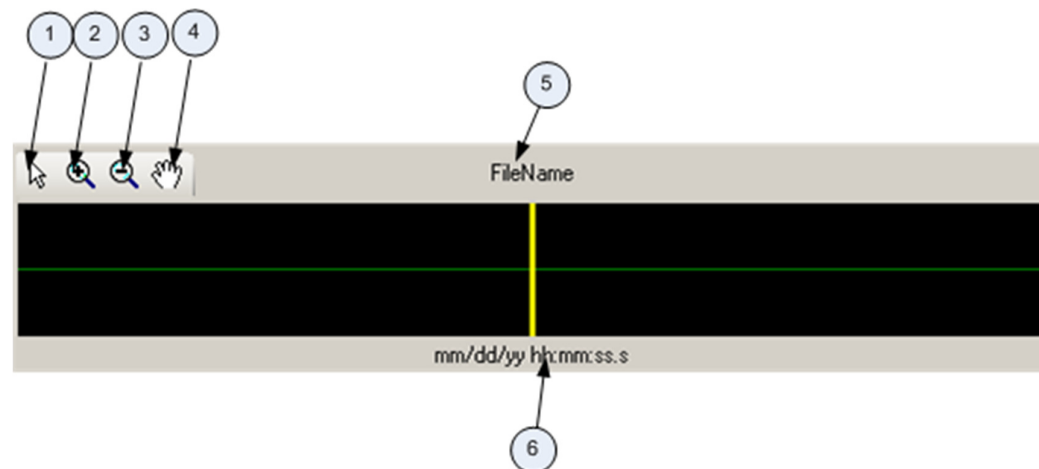


Figure 33: Audio File Control Tools

NORMAL CURSOR BUTTON

- 1 When the Normal Cursor Button is pressed the audio file control is put into the normal selection mode.

ZOOMIN BUTTON

- 2 When the Zoom In button is pressed the audio file control will be placed in the Zoom In selection mode.

ZOOM OUT BUTTON

- 3 When the Zoom Out button is pressed the audio file control will be placed in the Zoom Out selection mode.

PAN BUTTON

- 4 When the pan button is pressed the audio file control is placed in the Pan selection mode.

FILE NAME LABEL

- 5 The filename label displays the name of the file that is currently playing. If there is no file playing then the file name will be blank.

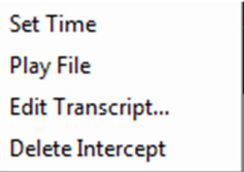
SET TIME TEXTBOX

- 6 The Set Time Textbox will display the Set Time of the audio file control and allow the user to enter the set date and time. If the date of the Set Time is the same as the current date then the date field (dd/mm/yy) will not be displayed. Right clicking on the Set Time Textbox will cause a calendar popup menu to be displayed allowing the user to easily set the date. When the Audio Control is in the play mode the Set Time Textbox will display the time of play and therefore, will be incrementing in 0.5 second increments.

CONTEXT MENUS

The audio file control will have two context (pop up) menus: the normal context menu and the selection context menu.

NORMAL CONTEXT MENU



- Set Time
- Play File
- Edit Transcript...
- Delete Intercept

The normal context menu has four items in it. When the user right clicks in the control this menu appears. If the user clicks on a file representing, the **Play File**, **Edit Transcript**, and **Delete Intercept** items are shown. If the user right clicks on a point where there is no file represented, only the **Set Time** item will be shown.

Set Time

If the user selects **Set Time**, the time represented by the location where the user clicked will be the new set time.

Play File

If the user selects **Play File** then the file that was clicked on will begin to play from the beginning.

Edit Transcript

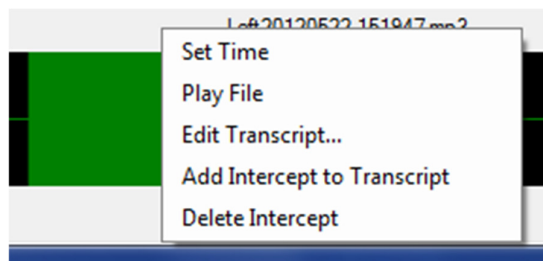
If the user selects **Edit Transcript** then the database transcript will be displayed for editing.

Delete Intercept

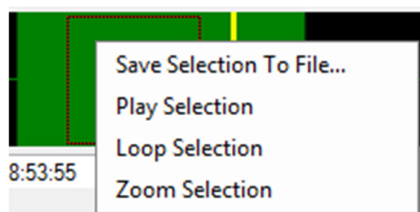
If the user selects **Delete Intercept** then the intercept will be deleted and its representation on the audio display removed.

Add Intercept to Transcript

If the transcript editor is displayed and it is displaying a transcript of an intercept or intercepts that is different than the intercept that was right clicked on then the **Add Intercept to Transcript** menu item is displayed. Selecting this item will add the intercept to the displayed transcript. See **Grouping Intercepts** for more information on assigning a single transcript to multiple intercepts.



SELECTION CONTEXT MENU



The Selection context menu will be displayed when the user right clicks on a selection.

Save Selection

If the user selects **Save Selection**, the software will determine if a one or more files or portions of one or more files have been selected. If a valid selection has been made a Save File dialog will be displayed allowing the user to enter a file name for the file. Once a file name is selected the software saves the selected portions of files to the filename entered by the user.

Play Selection

If the user selects **Play Selection**, the software will set the Set Time to the right side of the selection box and play the file until the time exceeds the left side of the selection box.

Loop Selection

If the user selects **Loop Selection**, the software loop the audio from the beginning of the selection to the end of the selection. Looping can be halted by right clicking anywhere on the audio file control and selecting **Stop Looping**.

Zoom Selection

If the user selects Zoom Selection the Time Span of the control is expanded to be the same width as the selection box. The Set Time shall be adjusted so that it is in the middle of the zoomed selection.

FULL REWIND BUTTON

- ② When this button is pushed the Set Time of the Audio File Control is changed to the current time - 60 minutes.

REWIND BUTTON

- ③ When this button is pushed the Set Time of the Audio File Control is decremented by 500 ms. Holding down on this button will cause the time to be continuously decremented in 500 ms increments.

HOLD/PLAY BUTTON

- ④ If the control is in the hold mode pressing this button transitions the control to the play mode. If in the play mode pressing this button transitions the control to the hold mode. The icon on the button will change between the pause and play icon.

FAST FORWARD BUTTON

- ⑤ Pressing this button increments the Set Time of the Audio File Control by 500 ms. Holding down this button will continuously increment the Set Time in 500 ms increments.

FULL FORWARD

- 6 Pressing this button changes the Set Time of the Audio File Control to the current time.

RECORD HOLD TIME

- 7 This slider controls the time that the channel keeps recording after the volume is lower than the squelch level. The time delay is adjustable from 2 to 40 seconds. The audio level must be below the squelch level for the entire record hold time. If the audio level exceeds the squelch level at any time during the record hold time then the hold time period is reset.

SQUELCH CONTROL

- 8 This slider is used to set the level of audio that will trigger recording to start in a given channel.

VOLUME CONTROL

- 9 This slider is used to control the volume in the left or right channel.

MUTE/UNMUTE

- 10 This button is used to mute or listen the channel it is assigned to. When muted the control shall display as shown below. When unmuted the control shall display as shown below.

 Muted

 Listen

SYNCHRONIZE

- 11 This button is used to synchronize the direction finder audio file control with the receiver audio file control. When the button is pressed the set time and time span of the controls will be identical. When panning or zooming whichever control is panned or zoom the other control will follow.

 Synchronized

 Not Synchronized

VU METER

- 12 The VU meter displays the level of the audio that is playing.

START/STOP RECORDING

13 The Start/Stop Recording button enables or disables audio and bearing recording. When Start Recording is pressed, the audio is recorded on the direction finder and scan receiver channels. The bearing data is also recorded and at the end of the intercept the audio and bearing data are stored in the database. When the Stop Recorder is pressed all recording of audio and bearing data is disabled.

HIDING THE SCAN RECEIVER AUDIO CONTROL

Pressing the **x** in the upper right hand corner of the Scan Receiver Audio Control (bottom audio control) will hide the control and disable the Scan Receiver function. The scan receiver function can be re-enabled by selecting **Show Scan Receiver** from the **View** menu.

RECEIVER CONTROLS

A screen shot of the receiver controls is shown below. The Direction Finder tab controls the primary site direction finder receiver and the Scan Receiver tab controls the scan receiver.

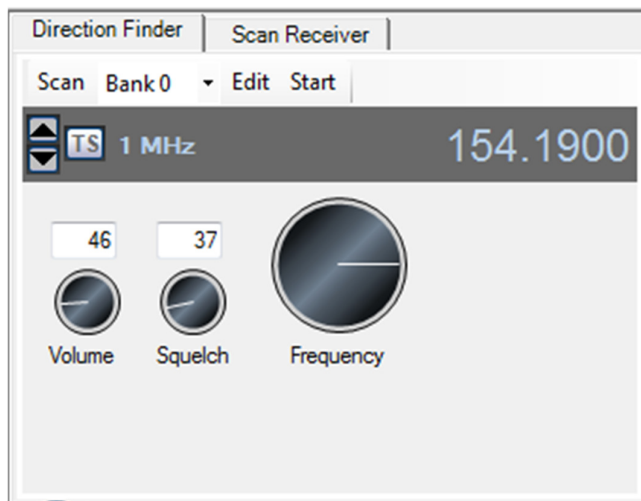


Figure 34: Receiver Control

The volume, squelch and frequency knobs can be controlled by clicking on them or using the up and down arrow keys. Right clicking on the knobs causes the setting to increase and left clicking causes the value to decrease. Similarly selecting the control and then pressing the up arrow key increases the setting and pressing the down arrow key decreases the setting.

Pressing the Scan button in the menu bar toggles the menu bar between Scan and Search

When the scan receiver is selected an additional menu item, **Setup**, is displayed allowing the user to select the type of receiver to be used and the port the receiver is connected to. The figures below illustrate the scan receiver display.

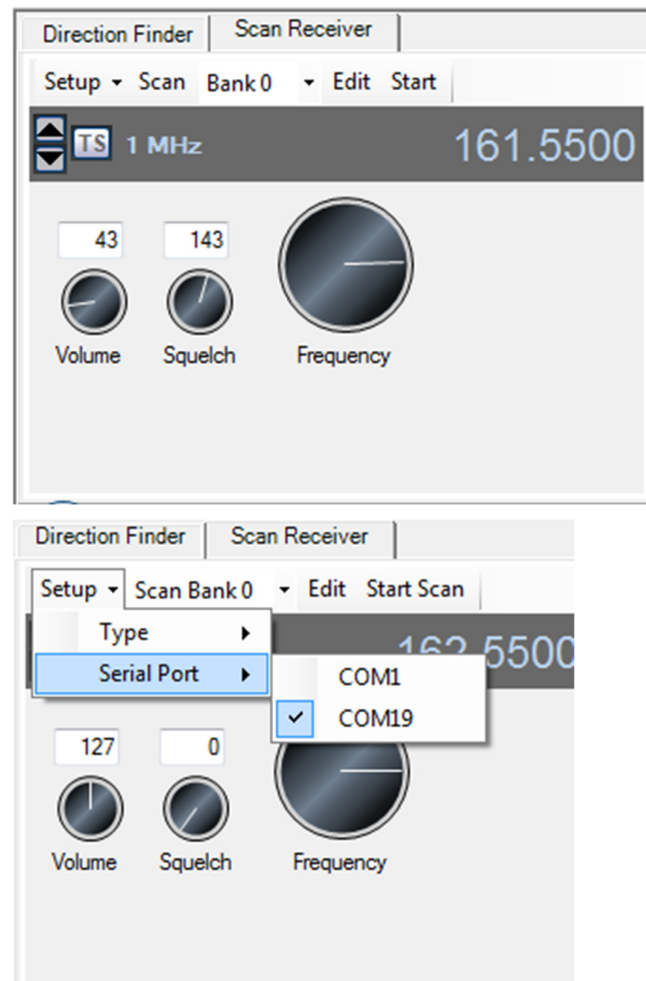


Figure 35: Scan Receiver Connection

Once the scan receiver is properly setup and connected it can be tuned and scan bank frequencies can be entered in the same fashion as the direction finder receiver. The audio files for the scan receiver will be shown on the lower audio control.

SCANNING

If the Scan/Search button in the menu is set the Search press it to toggle it to Scan. Then to start a scan select the Scan Bank from the drop down and press Start.

To edit the scan bank memories press Edit and the following dialog box will be displayed. Pressing the upload button will upload frequencies already loaded into the receiver memory. If the user changes a memory it will be highlighted in fuchsia. Pressing the Download button will download it into the receiver memory. Each bank is treated separately and can be selected using the Bank drop down. The frequencies to program into the memory can be read from a .csv formatted file.

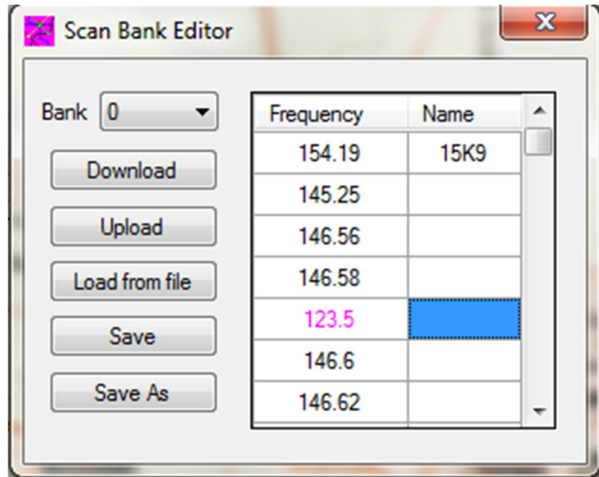


Figure 36: Scanning Dialog

The file needs to have the following format.

Receiver Memory Frequencies										
	Bank0	Name	Bank1	Name	Bank2	Name	Bank3	Name	Bank4	Name
Channel 0	154.19	15K9	0		0		0		0	
Channel 1	145.25		0		0		0		0	
Channel 2	146.56		0		0		0		0	
Channel 3	146.58		0		0		0		0	
Channel 4	123.5		0		0		0		0	
Channel 5	146.6		0		0		0		0	
Channel 6	146.62		0		0		0		0	
Channel 7	146.64		0		0		0		0	
Channel 8	146.66		0		0		0		0	
Channel 9	146.68		0		0		0		0	
Channel 10	146.7		0		0		0		0	
Channel 11	146.72		0		0		0		0	
Channel 12	146.74		0		0		0		0	

SEARCHING

If the Scan/Search button in the menu is set the Scan press it to toggle it to Search. Then to start a search select the search Bank from the drop down and press Start.

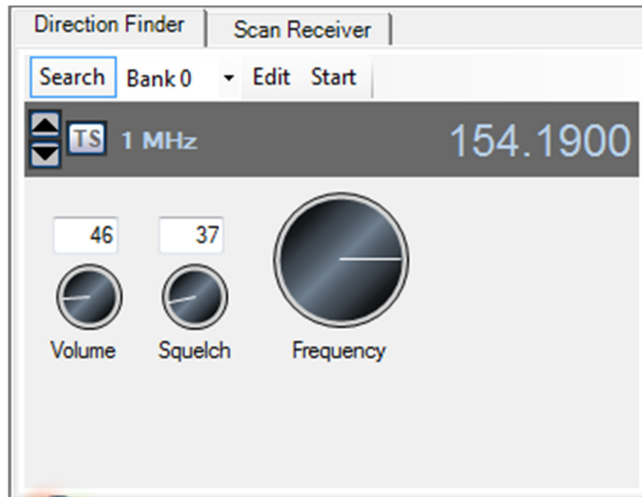


Figure 37: Selecting the Search Function

To edit the search bank memories press Edit and the following dialog box will be displayed.

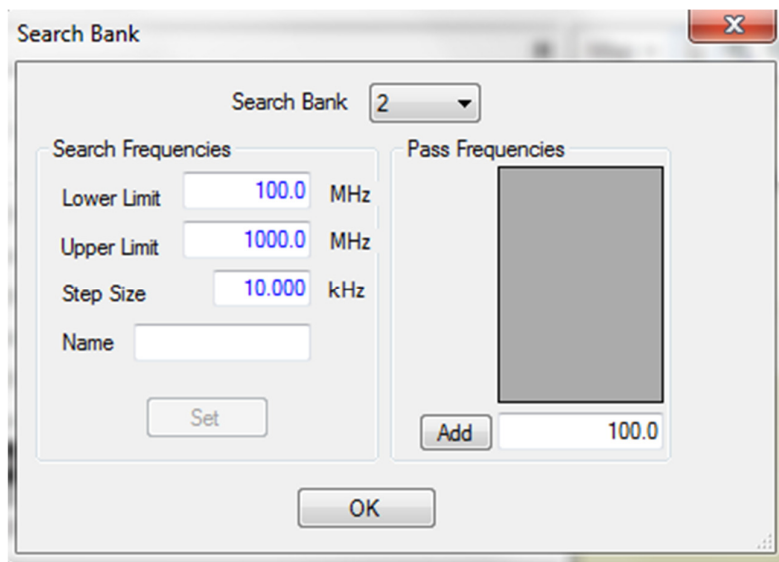
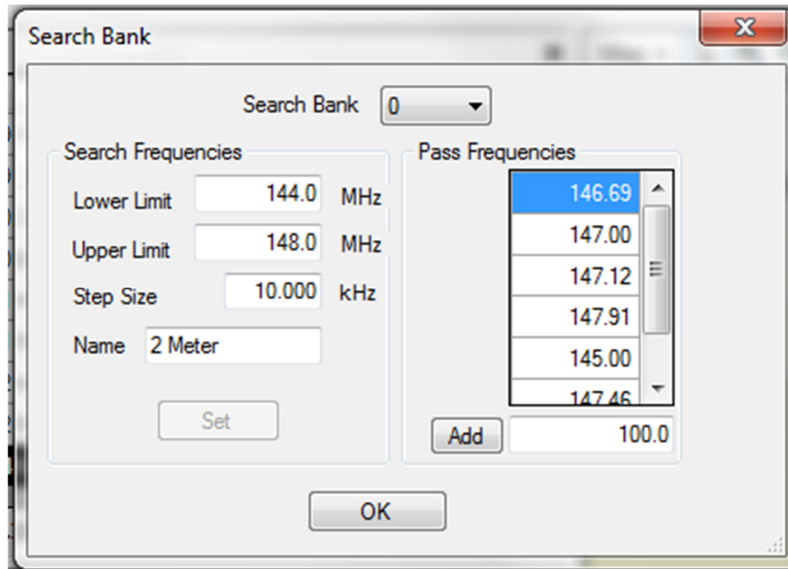


Figure 38: Search Function Dialog

If the text is in blue then this search bank has not been entered as a search bank in the receiver. To download the search bank frequencies simply enter the lower and upper limits, the step size and a name of the search bank and press set. If the text is black then the search bank frequencies are valid as shown below. You can change them by typing in new values and pressing set.



On
the

Figure 39: Pass Frequencies

right of the display are pass frequencies.

Pass frequencies may be entered by typing in the frequency and pressing the Add button. They can be removed by right clicking on the pass frequency list and selecting **Remove** or **Remove All**. **Remove** will remove the selected items, **Remove All** will delete all the pass frequencies.

During a search, a pass frequency can be added by pressing the pass button in the receiver control as shown below.

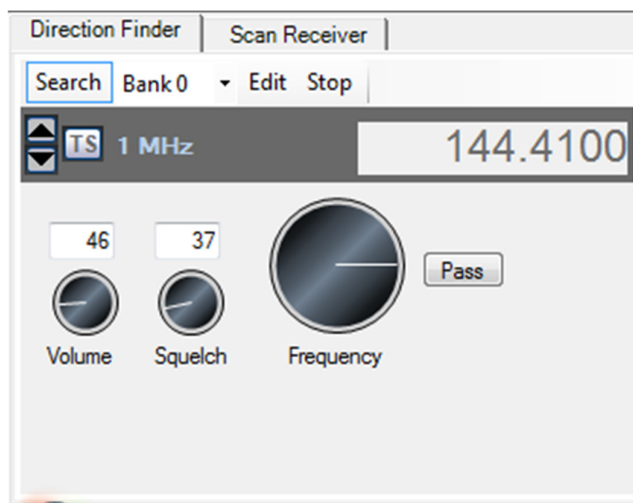


Figure 40: Pass Frequency Button for Search

SHUTTLEXPRESS TO TUNE THE RECEIVER

The Contour ShuttleXpress is a device that can be used in TargetTrack to control the direction finder receiver and the scan receiver. This section will explain the use of this control to control the receivers.

A photo of the ShuttleXpress is shown below. The controls' operation is described below.

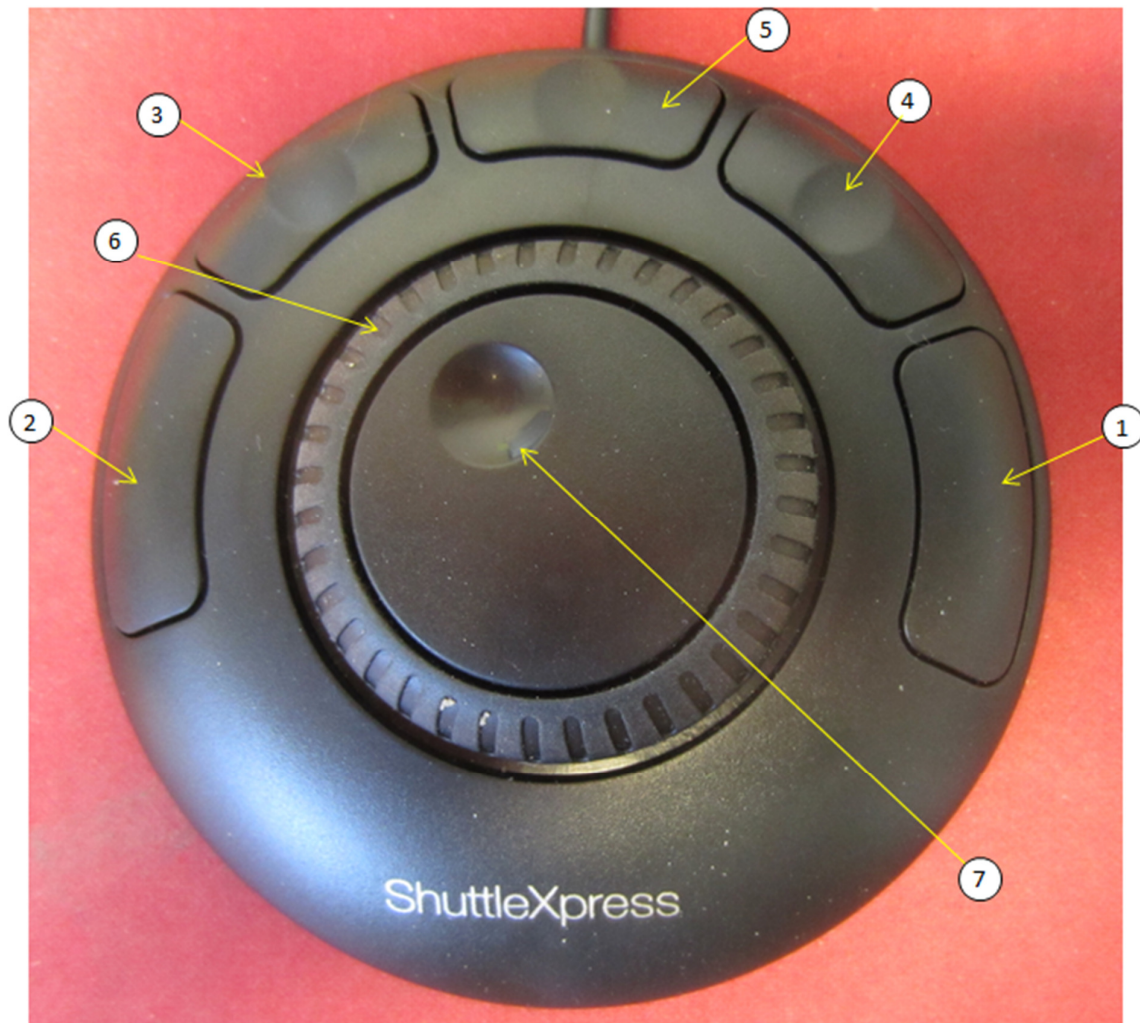
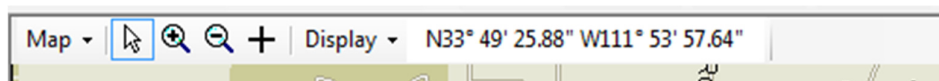


Figure 41: Contour Shuttle Express

- 1 Start Recording. This button will cause TargetTrack to start recording the audio and bearing data.
- 2 Stop Recording. This button will cause TargetTrack to stop recording the audio and bearing data.
- 3 Decrement Frequency. Pressing this button will cause the displayed receiver frequency to decrease by one tuning step.
- 4 Increment Frequency. Pressing this button will cause the displayed receiver frequency to increase by one tuning step.
- 5 Synchronize Frequencies. If the DF receiver tab is active pressing this button will cause the scan receiver to be tuned to the DF receiver frequency. If the scan receiver is active pressing this button will cause the DF receiver to be tuned to the scan receiver frequency.
- 6 Jog Frequency. Rotating this control one step clockwise and holding it in this position will cause the frequency to increase slowly. Rotating further clockwise will cause the frequency to increase more rapidly. Rotating the control counter clockwise decreases the frequency in the same way.
- 7 Tune Frequency. Rotating this control clockwise will increase the frequency and rotating it counter clockwise will decrease the frequency. This control operates similarly to the dial on the front of many general purpose communications receivers.

MAP CONTROLS

The map contains various controls to manipulate the map and the set the type of location display desired by the user. A screen shot of the map controls is shown below.



The zoom controls allow the user to zoom in and zoom out.

Click on the move tool to enable repositioning of fixed, virtual, and beacon sites on the screen.

The display tool will show a drop down menu allowing the user to select the format to use to display locations on the map.

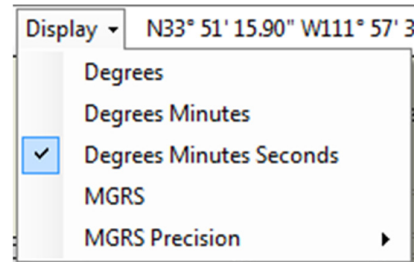


Figure 42: Map Display Menu

FREQUENCY DISPLAY

The frequency display shows all the frequencies that have been received by the scan and direction finding receivers. These frequencies persist from session to session so that the frequencies are readily available to allow the user to easily tune to these saved frequencies. The Frequency Display works in conjunction with the Receiver controls. When a receiver is activated (tab selected) then double clicking on an entry in the Frequency display will tune the receiver to that frequency. Additionally there is a pop up menu that allows the user to tune either receiver to the selected frequency, to delete the frequency from the list or to add the frequency to a scan bank.

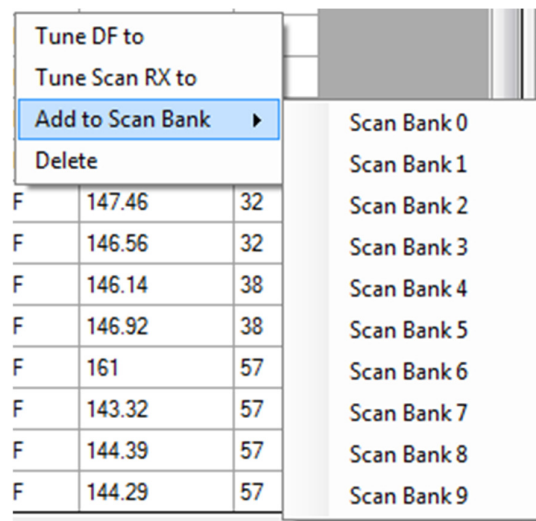


Figure 43: Adding a Frequency to a Scan Bank

TARGET DISPLAY

The Target display shows information about the targets that TargetTrack has identified or have been identified by the user using the manual target feature. A sample display is shown below along with the corresponding map display. As shown in the figure there are four targets displayed on the map. The location column shows the predicted location of the target. This can be in MGRS or latitude and longitude depending on the **map settings**. The CEP displays the circular ellipse probability. This is the diameter of an equivalent circle that around the target. Under ideal conditions that target will have a 95% probability of being within the CEP. The time column displays the last time the target was updated. The most current target is designated as the active target and the active check box is checked for this target. If the user clicks on a target the average bearings that are being used to calculate the target location are displayed in the Average Bearings table at the bottom of the target display.

The user can delete a single target by right clicking on the target and selecting delete. All targets can be deleted by pressing the Delete All button.

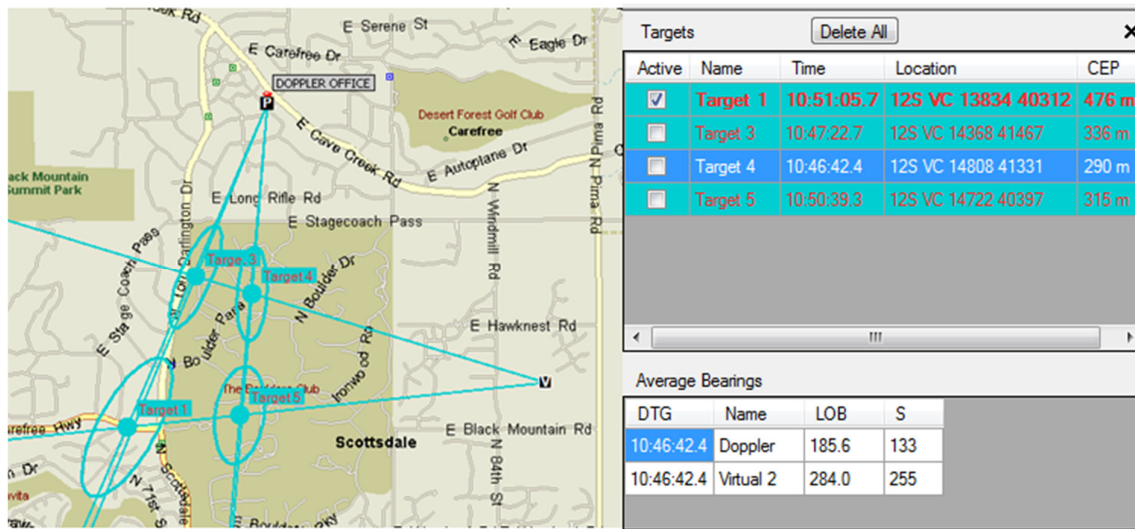


Figure 44: Typical Target Display

OPERATION WITH A RADIO MODEM

TargetTrack is designed to connect with remote sites and mobile sites using a radio modem. The radio modem we recommend is the Cal Amp DataRadio Integra-TR. The radio modem can be connected to the system via a serial port on the computer or if you are using a MPT (Series 7000) direction finder you can connected to a USB-to-serial converter that is connected to the MPT processor.

When networking using radio modems a site can be either a master or a slave. The master is typically a control site and controls the frequency of the direction finding network. It polls for slave connections and relays the collected data to all slaves. This site should have clear line-of-site communications with all the slaves if possible.

A slave site responds to commands and polling by the master. Typically a slave will be a mobile site or a remote fixed site with or without a computer.

OPERATION AS A MASTER

To operate the site as a master you must first press the Master button in the Radio Modem menu bar, select the serial port that the radio modem is connected to. The menu for this selection is shown below

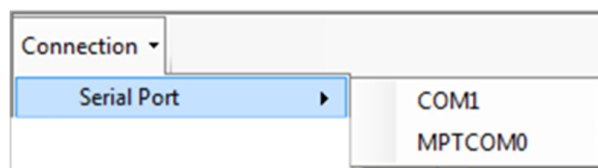


Figure 45: Radio Modem Serial Port Selection

If you
are
using
an MPT

direction finder the MPT user interface software is used to configure the serial ports to use the radio modem and the MPT port available for the radio modem will be displayed. If the radio modem is connected to the computer's serial port then you would select that port.

To start the connection press the Connect button in the radio modem menu strip and the software will start to poll looking for slave connections.

OPERATION AS A SLAVE

To setup TargetTrack as a slave, first press the Slave button in the radio modem menu strip. Next select the type of connection and enter a network ID. The menu items are shown below

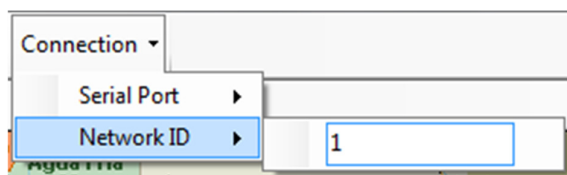


Figure 46: Network ID Setting

After making these settings press the Connect button and TargetTrack will begin monitoring for a poll from the master site.

RADIO MODEM INDICATORS

The radio modem indicators are shown below. When the Connected indicator is amber it indicates that a serial port connection has been opened to the radio modem serial port. When TargetTrack is in the master mode and the Connected indicator is green it indicates that a connection has been made with a remote (mobile) site. When TargetTrack is in the slave mode a green Connected indicator indicates that the remote has is receiving poll messages from the master. When the Connected indicator is red it indicates that an error has been detected. Double clicking on the Connected indicator will display the error message.

The Transmit and Receive indicators are amber when in the radio modem is waiting to transmit or receive. The Transmit indicator flashes green when TargetTrack sends a message and the Receive indicator flashes green when TargetTrack receives a message from the radio modem.

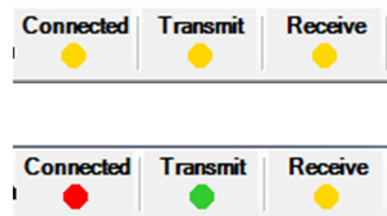


Figure 47: Radio Modem Indicators

MENU FUNCTIONS

The following paragraphs discuss the function of the menus in the main menu bar.

FILE

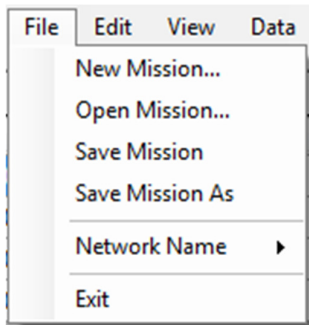


Figure 48: File Menu

The **File** menu allows the user to define missions. Missions are simply saved files that define the location and connection of sites. In most cases users will not need to save missions because TargetTrack always saves the current mission and restores it upon restart. However, it may be advantageous to save a mission in case of a computer malfunction or an operator error that would affect the operation of the software.

The **Network Name** item allow the user to change the network name which is used by the database to organize the data by the particular computer it is recorded on. If it is desired that data be moved from one computer to another it is best to have each computer have a unique network name.

VIEW

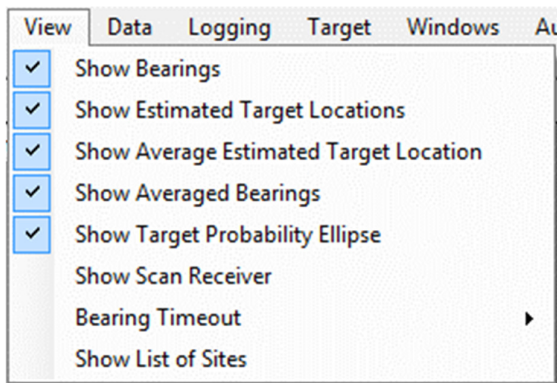


Figure 49: View Menu

The **View** menu determines what is displayed on the map.

Unchecking the **Show Bearings** item will cause software to not display the lines of bearing from the sites.

Unchecking the **Show Estimated Target Location** item will cause the software to not display the instantaneous target estimates

Unchecking the **Show Average Estimated Target Location** will cause the software not to display the average estimated location on the Map

Unchecking the **Show Target Probability Ellipse** will cause the software to not display the 95% probability ellipse.

Unchecking the Show Scan Receiver item will cause the Scan Receiver audio control to be hidden and the scan receiver function to be disabled. Checking it will re-enable the scan receiver function.

Bearing Timeout allows the user to enter a timeout period so that if a site does not receive a bearing in this timeout period the bearing is not displayed.

Show List of Sites will display a list of the active sites and their status. A sample is shown below

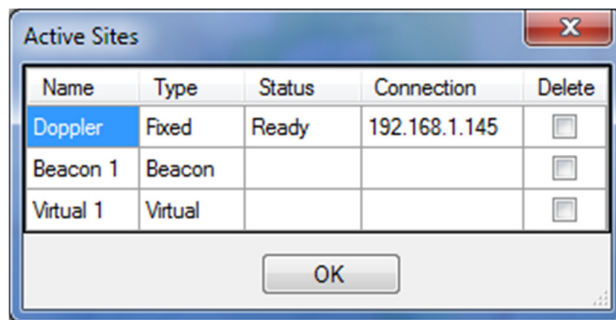


Figure 50: Active Sites Dialog

Checking the Delete box and pressing OK will delete the sites.



Figure 51: Data Menu

Selecting **Search** causes the Search dialog to be displayed as discussed earlier.

Selecting **Import** allows a user to import data that was recorded by TargetTrack on a different computer.

Selecting **Repair Database** will rebuild the database using the data in the MP3 headers of the audio file.

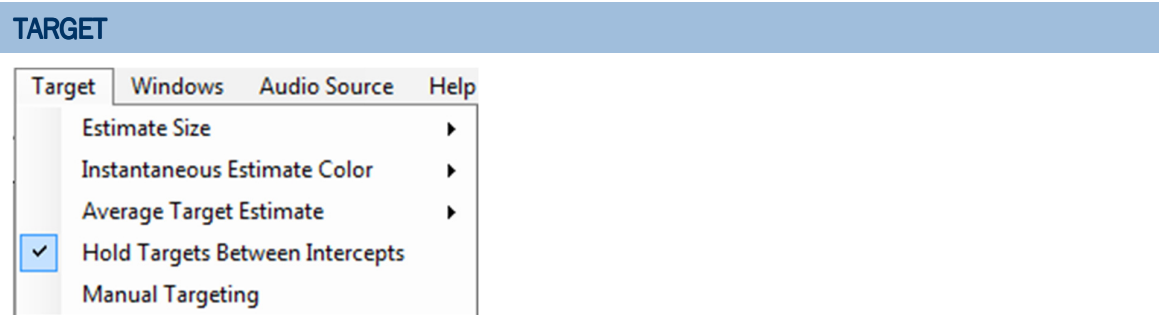


Figure 52: Target Menu

The **Target** menu allows the user to set parameters for display of the target.

Estimate Size determines the size of the estimates displayed on the map.

Estimate Color determines the color of the instantaneous estimates

Average Target Estimate allows the user to set the display properties of the averaged bearings and target estimates.

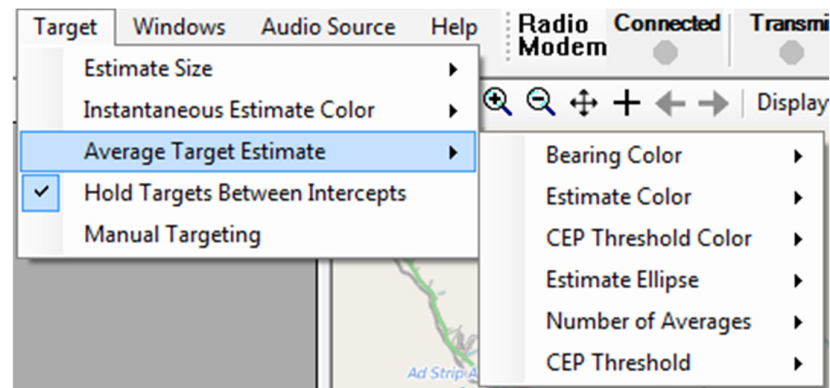


Figure 53: Average Target Estimate Menu

Bearing Color sets the color of the averaged bearing

Estimate Color sets the color of the average estimate.

CEP Threshold Color sets the color of the average estimate and the average estimate ellipse when the CEP is less than a set value. When the CEP is less than the CEP Threshold the color of the average estimate and the ellipse change and the target is highlighted in the target display.

Estimate Ellipse determines how the estimate ellipse is displayed. It can be displayed as an ellipse or as a heat map.

Number of Averages determines the number of averages used to determine the average estimated position of the target.

CEP Threshold allows that user to set a value for the CEP threshold. If this threshold is crossed TargetTrack indicates this by displaying the average estimate and the estimate ellipse in a different color and highlighting the target in the Target Display window.

Hold Targets Between Intercepts. Select this option if you want TargetTrack to keep the calculated targets on the screen when a new intercept starts. If this option is unchecked all old targets will be deleted when a new intercept begins.

Manual Targeting enables the manual targeting option. If Manual Targeting is unchecked then TargetTrack will automatically identify targets. See the targeting topic for more information.

WINDOWS

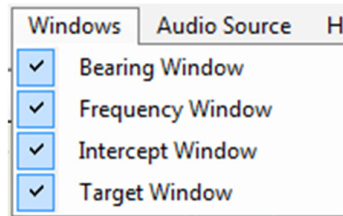


Figure 54: Windows menu

The **Windows** menu allows the user to hide and show any of the displays on the desktop. The displays can also be hidden by pressing the close box in the upper right hand corner of the displays.

AUDIO SOURCE

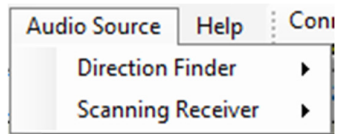


Figure 55: Audio Source Menu

The **Audio Source** menu allows the user to select where the audio comes from. This is only applicable to the Direction Finder if the Direction finder is a MPT (DDF7000 series). The scanning receiver will always be set to the sound card.

SITE CONTEXT MENUS

Right clicking on a site will display a menu that allows you to change the site display, disable the site, change the site quality, change the DF settings of the site, edit site, or delete the site. A screen shot of the site context menu for a fixed or mobile site is shown below.

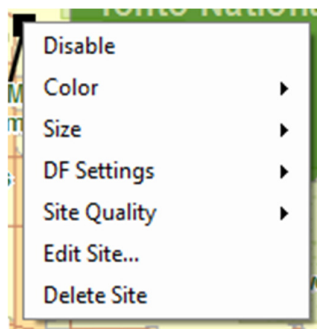


Figure 56: Site Context Menu

Disable

Selecting **Disable** will cause TargetTrack to ignore the bearings from this site. The bearings will not be displayed and will not be used in the target estimation.

Color

Selecting **Color** will display a color menu allowing the user to select the color of the site and its bearing lines

Size

Selecting **Size** will display a drop down menu allowing the user to select the size of the site on the map.

DF Settings

Selecting **DF Settings** will display a drop down menu that allows the user to change the settings of the direction finder. This is discussed more fully in the direction finder settings section.

Edit Site

Selecting **Edit Site** will display the *same dialog used to set up the site originally*.

Delete Site

Selecting **Delete Site** will prompt the user to confirm the deletion of a site.

DIRECTION FINDER SETTINGS

Typically the default settings of the direction finder are adequate under most conditions. However, in some instances it is necessary to change the settings. TargetTrack allows the user to change the settings as needed. The change the settings right click on the direction finding site and select DF Settings. The pop up menu shown below will be displayed.

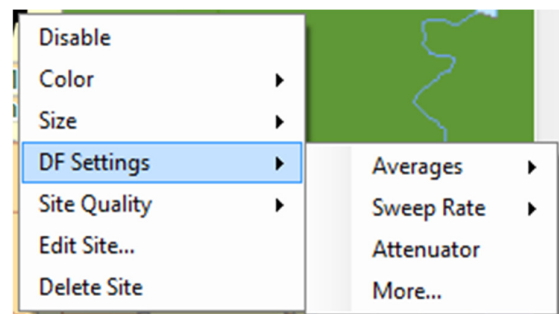


Figure 57: DF Settings Menu

Averages

Selecting **Averages** will allow the user to select the number of averages used by the direction finder to calculate the bearing. Typically a setting of 2 is best.

Sweep Rate

Selecting **Sweep Rate** allows the user to select the speed of synthetic rotation of the antenna. The default value of this is 1000 Hz, and this value works well. However, if you are direction finding on a digital signal with significant 1000 Hz content it may be necessary to set the sweep rate to a different value to obtain a stable bearing.

Attenuator

Selecting **Attenuator** will turn on or turn off the attenuator in the antenna. This is sometimes useful in mobile applications when strong signals can saturate the front end of the receiver.

More

Selecting **More** will display a dialog similar to the one below.

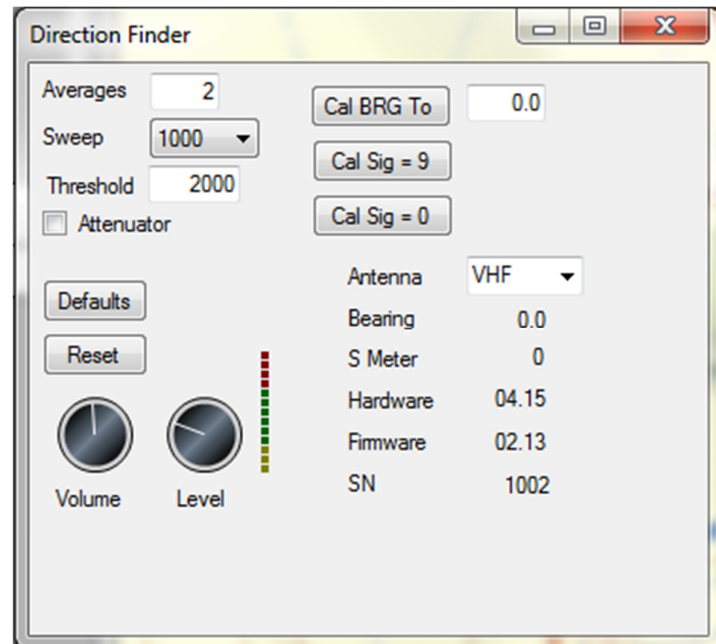


Figure 58: DF Settings Dialog

Averages, **Sweep**, and **Attenuator** are all as discussed above.

Threshold

The direction finder has an algorithm that requires consecutive bearing samples to be within a certain window. The width of this window is defined by the threshold setting. The function of this setting is to prevent the direction finder from calculating a bearing on noise when the squelch breaks and there is no signal. Increasing this setting will cause the direction finder to calculate more bearings on false signals. Decreasing the setting will require a stronger signal in order to calculate the bearing. A more detailed discussion of this topic can be found in the **Application Notes** [http://www.dopsys.com/appnotes/RF%20Sensitivity%20of%20Series%207000%20\(MPT\)%20DF.pdf](http://www.dopsys.com/appnotes/RF%20Sensitivity%20of%20Series%207000%20(MPT)%20DF.pdf) section of our website.

Defaults

Pressing the **Defaults** button will reset the direction finder settings to their default values. If the user presses this recalibration of the sites may be required.

Reset

Pressing **Reset** resets the processor. During the reset the communications with the processor will be lost. The software will attempt to reestablish communications.

Volume

Volume sets the speaker/headphone volume of the direction finder.

Level

Level sets the audio level of the receiver. To set this level tune the receiver to a frequency with a signal and adjust this level until the VU meter displays slightly in the red.

Cal Bearing

The **Cal Bearing** button allows the user to calibrate the bearing to some value. **Calibration using the beacon method** is preferable.

Cal Sig = 9 and Cal Sig = 0

These buttons are used to calibrate the s meter settings for receivers that have an analog RSSI output. To set these first disconnect the antenna from the direction finder and open the receiver squelch. Press **Cal Sig = 0**. Next connect the antenna and tune in a signal that has an S9 level and press **Cal Sig = 9**. This signal is best supplied by a signal generator.

Antenna

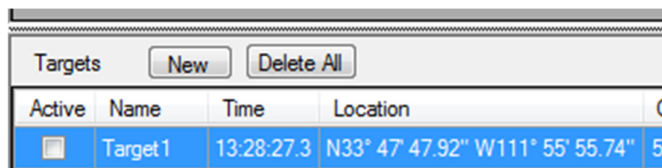
Selecting **Antenna** allows the user to switch antennas. In the fixed site antenna the antenna is automatically switched when the frequency is changed so no adjustment of this setting is normally required.

TARGET LOCATION ESTIMATION

By using multiple networked locations TargetTrack can estimate the location of the radio frequency emitter (target). A location estimate algorithm is used that provides a least squares estimate of the location of the target and a calculation of the 95% ellipse. The 95% ellipse indicates that under ideal conditions the target has a 95% chance of being within that ellipse. The algorithm uses all sites that are collecting data to provide the estimate.

Manual Target Estimation

Under the **Target** menu the user may select the **Manual** option. When this option is selected the user determines which bearings to use to estimate the target. At the top of the Target display a **New** button will appear when a signal is present. Upon examining the bearings the user can press the **New** button to enable a new target. TargetTrack will take the currently displayed bearings and estimate the target location. To add to the estimate the user then must click **Active** the check box.



Active	Name	Time	Location	CEP
☐	Target1	13:28:27.3	N33° 47' 47.92" W111° 55' 55.74"	589 m

Figure 59: Manual Target Display

The display below shows two targets. If upon observing the display the user thinks that the bearings currently being measured would enhance the estimate of either target then he would check the active check box next to that target. If the currently measured bearings would result in an entirely new target he would press the **New** button to establish a new target on the screen on in the **Target** display.

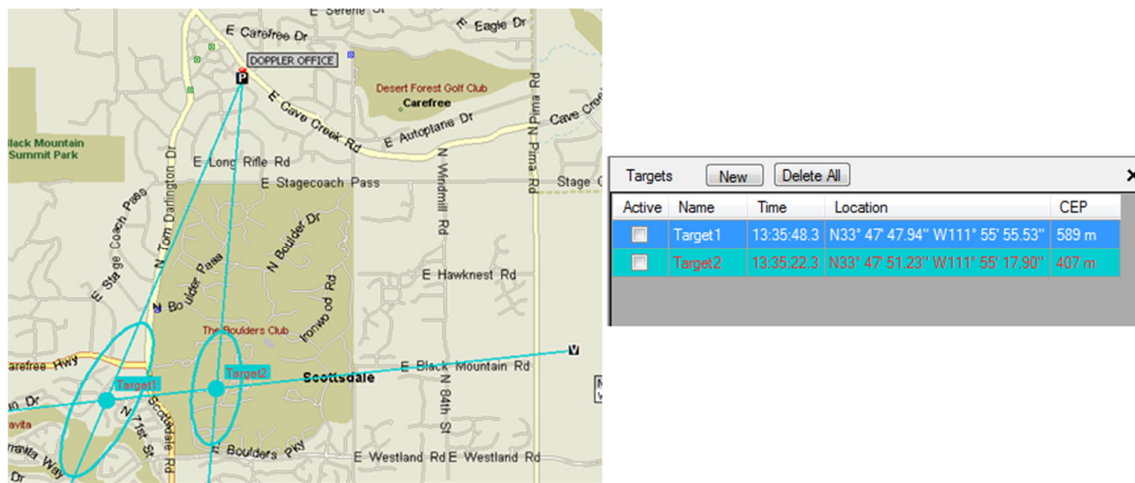


Figure 60: Selection of Manual Target

Automatic Estimation

If **Manual Targeting** in the **Targeting** menu is unchecked the software will attempt to identify targets based on the measured bearings. After a target is first established based on measured bearings the software compares the next set of measured bearings to determine if the estimated target is within the target ellipse. If it is outside of the ellipse then the target estimator identifies it as a different target.

INTERCEPT DATABASE

The intercept database is a searchable database that contains links to each recorded audio file and its associated data. This data is stored on the computer in a user directory known by the database. In addition to the data collected by the software the user can also enter descriptive data on the intercept to help identify the target. This user entered data is referred to as the transcript. A transcript can be related to several intercepts by using the grouping function.

SEARCHING THE DATABASE

Selecting **Search** from the **Data** menu will display the following dialog.

Search

Intercepts

Site Name:

☐ DTG Range: From:

To:

Transcripts

Serial Number:

Site Location:

Classification:

Target Office:

Priority:

Frequency:

Language:

Speakers:

Keywords:

Subject:

Summary:

DTMF:

Figure 6 I: Intercept Database Search Dialog

The user can enter in any of the fields and the data base will be searched to match these fields. The search is performed as an and function so in order to elicit a match all the search criteria must be met. If you select no criteria and press search a list of all intercepts in the data base will be shown as illustrated below.

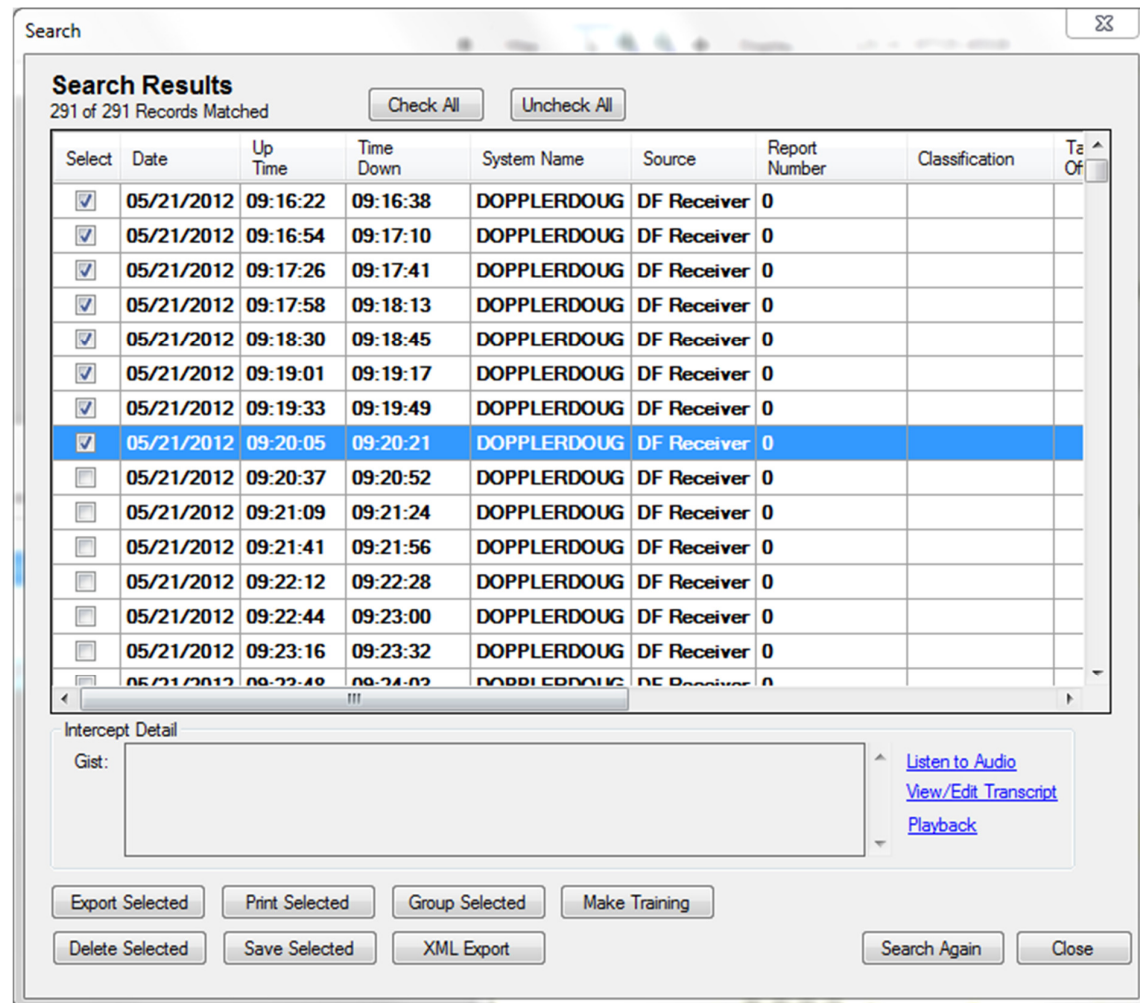


Figure 62: Search Results Dialog

The user can select a particular record and then press Listen to Audio, View/Edit Transcript, or Playback. Listen to audio will launch the default mp3 player and play the audio. View/Edit the transcript will display the transcript editor as discussed previously. The Playback link will cause the time setting of the audio file control to be set to the starting time of the intercept and the audio control will play the audio and display the recorded data.

The user can also use this screen to delete records and data from the database and to export the records for import onto another computer running TargetTrack. The user can also save or print the selected records. The file is saved in .csv format.

Pressing the Group Selected will group all the intercepts under one transcript as described in **Grouping Intercepts**

Pressing the XML Export button will export the selected records into an XML formatted file as described in **Exporting to an XML File**.

ACCESSING THE TRANSCRIPT

A transcript can be accessed in two ways. The user can enter the approximate date and time of the transcript into the audio control time setting. The audio file will then be displayed in the audio file control and the user can then right click on the file and choose edit transcript. The second way to access the transcript is by searching the database.

A typical blank transcript is shown below.

The screenshot shows the 'Transcript Editor' window with the following fields and sections:

- Up Time:** 02/02/2013 16:56:12
- Down Time:** 02/02/2013 16:56:27
- Target Office:** [Empty field]
- Language:** [Empty field]
- Classification:** [Empty field]
- Report Number:** 0
- Priority:** [Empty field]
- Speakers:** A table with columns 'Speaker' and 'Location'.

Speaker	Location
- Subject:** [Empty field]
- Keywords:** [Empty text area]
- Gist:** [Empty text area]
- Intercepts:** A table with columns 'Date' and 'Time'.

Date	Time
02/02/2013	16:56:12
- System Name:** DOPPLERDOUG
- Location:** 12S VC 15596 42384
- Up Time:** 16:56:12
- Down Time:** 16:56:27
- Frequency:** 144.04 MHz
- Source:** DF Receiver
- DTMF:** 1

At the bottom are three buttons: Close, Save, and Revert.

Figure 63: Transcript

Once displayed the fields can be filled out and saved to the data base.

ADDING SPEAKERS

The speakers in the transcript consist of a list of the speakers' names and their locations. The locations can be blank. To add a speaker type in the speaker's name and location. Another way to add a speaker is by using the context menu on the map. The figure below illustrates this procedure. With the Transcript Editor displayed, right click on the map at the location you want to add the speaker. Select **Add New Speaker at this location** and a new speaker will be added to the speaker list.

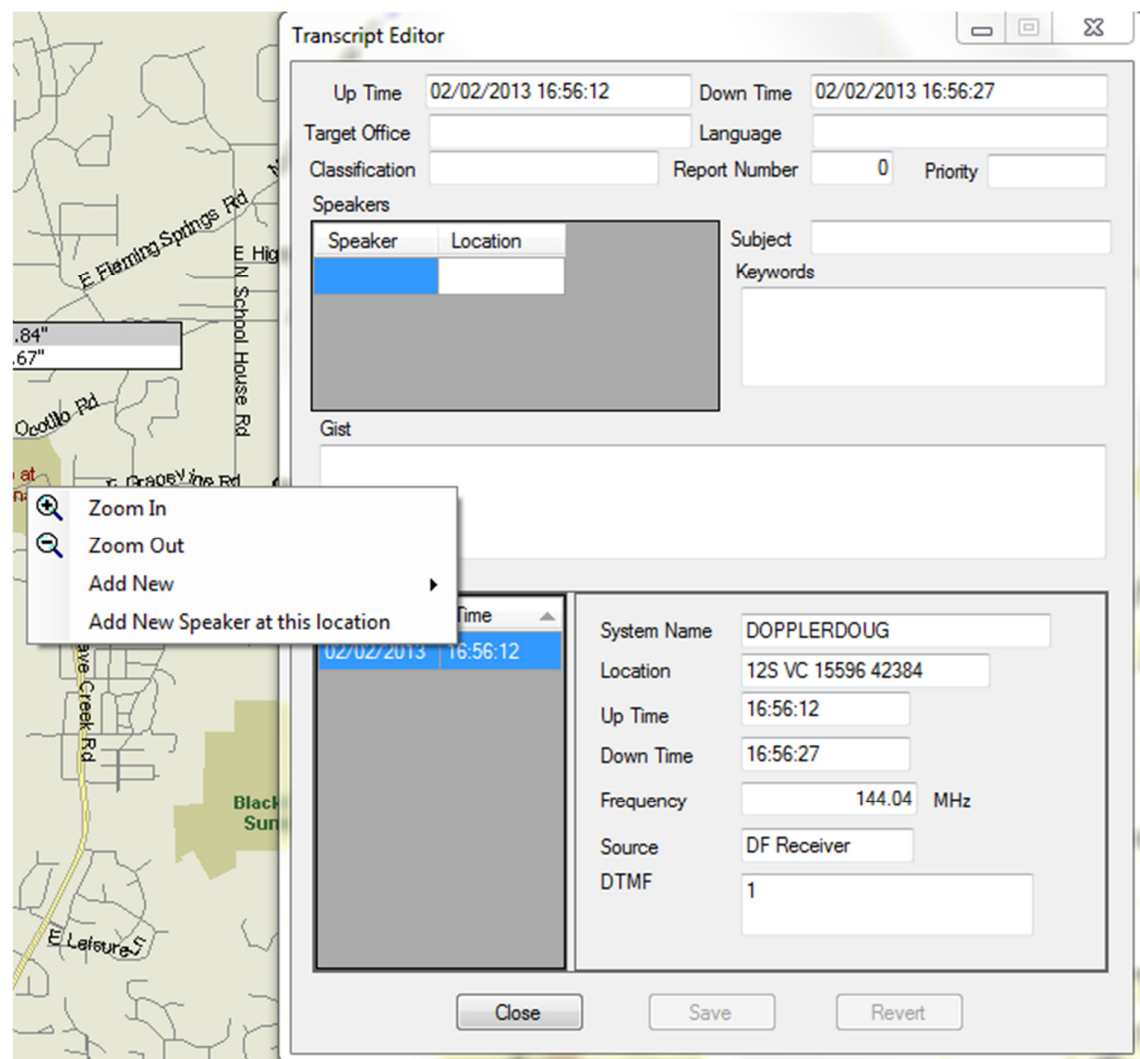


Figure 64: Adding Speakers to a Transcript

The figure below shows the result. Click on the word speaker and you can edit the speaker's name.

The screenshot shows the 'Transcript Editor' window with the following fields and sections:

- Up Time:** 02/02/2013 16:56:12
- Down Time:** 02/02/2013 16:56:27
- Target Office:** [Empty]
- Language:** [Empty]
- Classification:** [Empty]
- Report Number:** 0
- Priority:** [Empty]
- Speakers:** A table with two columns: Speaker and Location.

Speaker	Location
Speaker	12S VC 11921 44751
- Subject:** [Empty]
- Keywords:** [Empty]
- Gist:** [Empty]
- Intercepts:** A table with two columns: Date and Time.

Date	Time
02/02/2013	16:56:12
- System Name:** DOPPLERDOUG
- Location:** 12S VC 15596 42384
- Up Time:** 16:56:12
- Down Time:** 16:56:27
- Frequency:** 144.04 MHz
- Source:** DF Receiver
- DTMF:** 1

At the bottom of the window are three buttons: Close, Save, and Revert.

Figure 65: Entering the Speaker's Name

You can also set the speaker's location using the map as shown below. With the Transcript Editor showing select the speaker you want to set the location of. Right click on the map and select **Set Speaker Location**. The speaker location will be set to the location of the mouse click.

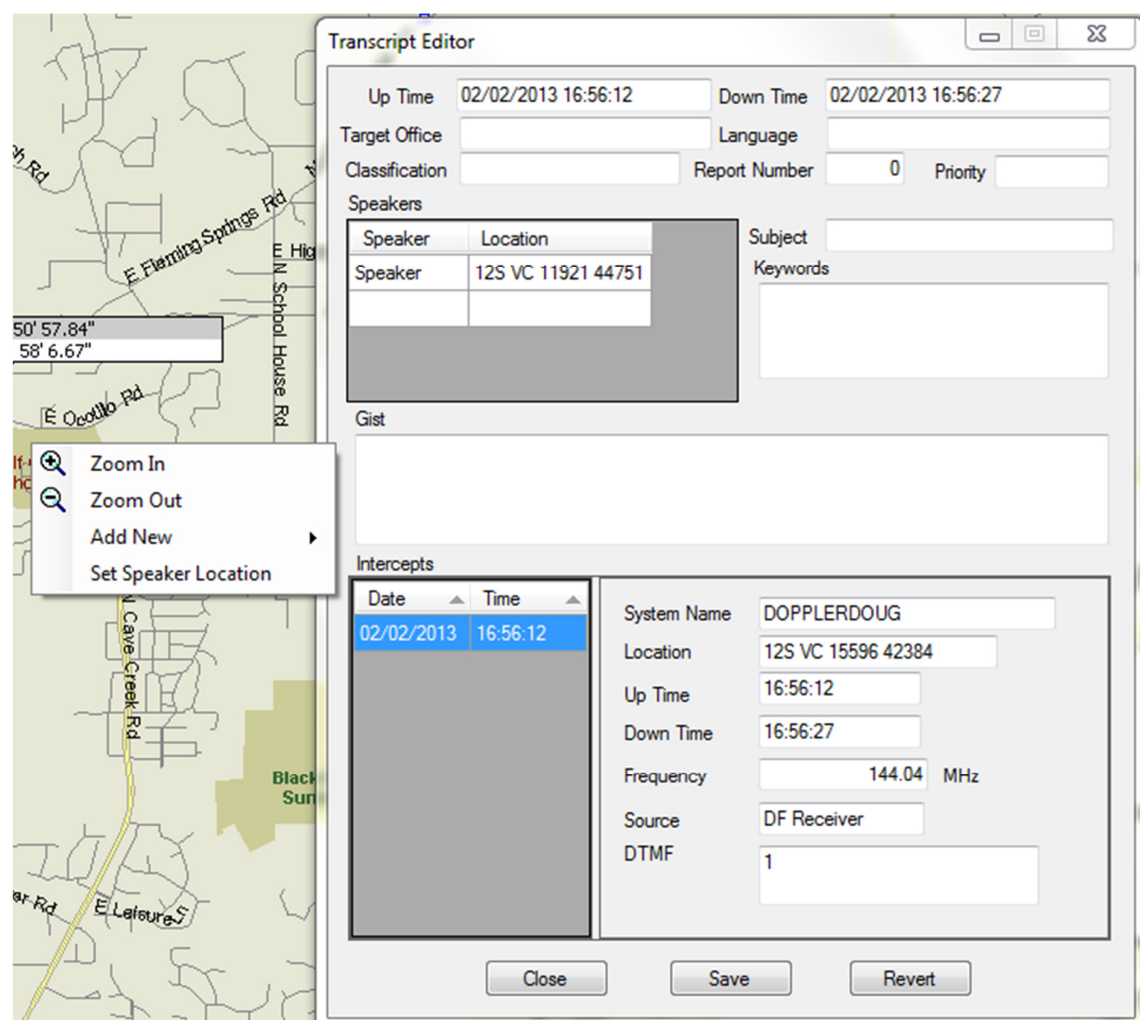


Figure 66: Setting the Speaker's Location

GROUPING INTERCEPTS

After receiving a number of related intercepts it is possible to assign all related intercepts to one transcript. To form a group perform a search on the database to display the intercepts you wish to group. The figure below shows the results of a search. Check the intercepts you want to group and press **Group Selected**

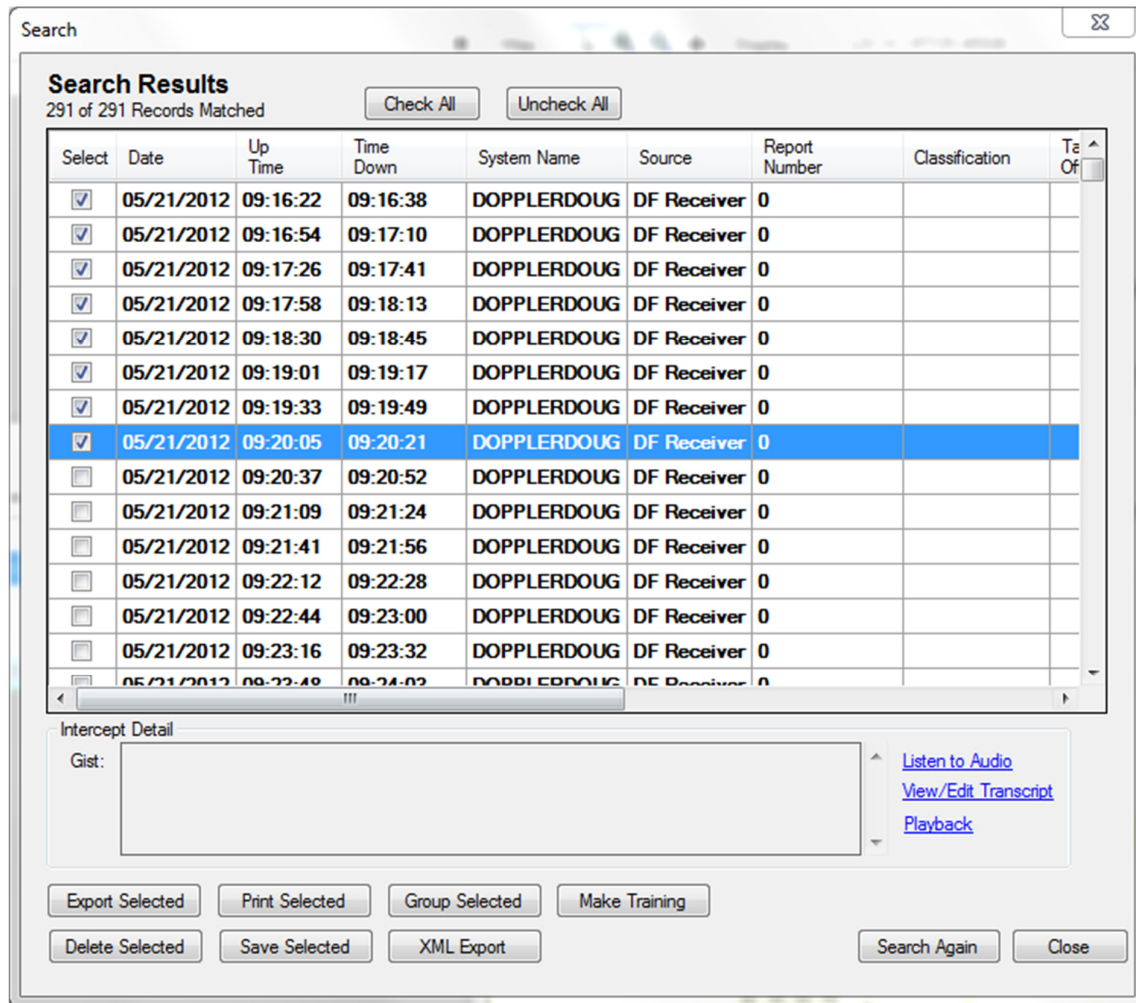


Figure 67: Grouping Intercepts

The software forms a group and assigns a new transcript to the group. The search display will display all the grouped transcripts in bold and Transcript Editor window will be displayed as depicted in the figure below.

Search Results
324 of 324 Records Matched

Check All Uncheck All

Select	Date	Up Time	Time Down	System Name	Source	Report Number	Classification	Tag
☒	05/21/2012	09:16:22	09:16:38	DOPPLERDOUG	DF Receiver	1	One Mobile	Do
☐	05/21/2012	09:16:54	09:17:10	DOPPLERDOUG	DF Receiver	1	One Mobile	Do
☐	05/21/2012	09:17:26	09:17:41	DOPPLERDOUG	DF Receiver	1	One Mobile	Do
☐	05/21/2012	09:17:58	09:18:13	DOPPLERDOUG	DF Receiver	1	One Mobile	Do
☐	05/21/2012	09:18:30	09:18:45	DOPPLERDOUG	DF Receiver	1	One Mobile	Do
☐	05/21/2012	09:19:01	09:19:17	DOPPLERDOUG	DF Receiver	1	One Mobile	Do
☐	05/21/2012	09:19:33	09:19:49	DOPPLERDOUG	DF Receiver	1	One Mobile	Do
☐	05/21/2012	09:20:05	09:20:21	DOPPLERDOUG	DF Receiver	1	One Mobile	Do
☐	05/21/2012	09:20:37	09:20:52	DOPPLERDOUG	DF Receiver	1	One Mobile	Do
☐	05/21/2012	09:21:09	09:21:24	DOPPLERDOUG	DF Receiver	1	One Mobile	Do
☐	05/21/2012	09:21:41	09:21:56	DOPPLERDOUG	DF Receiver	1	One Mobile	Do
☐	05/21/2012	09:22:12	09:22:28	DOPPLERDOUG	DF Receiver	1	One Mobile	Do
☐	05/21/2012	09:22:44	09:23:00	DOPPLERDOUG	DF Receiver	1	One Mobile	Do
☐	05/21/2012	09:23:16	09:23:32	DOPPLERDOUG	DF Receiver	1	One Mobile	Do
☐	05/21/2012	09:23:48	09:24:02	DOPPLERDOUG	DF Receiver	1	One Mobile	Do

Intercept Detail

Gist: Transmitter at Dave's house

[Listen to Audio](#)
[View/Edit Transcript](#)
[Playback](#)

Export Selected Print Selected Group Selected

Delete Selected Save Selected

Search Again Close

Figure 68: Grouped Intercept Display

Transcript Editor

Up Time: 05/21/2012 09:16:22 Down Time: 05/21/2012 09:35:12

Target Office: Doppler One Language:

Classification: One Mobile

Speakers: None Keywords: Report Number: 1

Priority:

Subject:

Gist: Transmitter at Dave's house

Intercepts

Date	Time
05/21/2012	09:16:22
05/21/2012	09:16:54
05/21/2012	09:17:26
05/21/2012	09:17:58
05/21/2012	09:18:30
05/21/2012	09:19:01
05/21/2012	09:19:33
05/21/2012	09:20:05

System Name: DOPPLERDOUG

Location: 12S VC 1419 4358

Up Time: 09:16:22

Down Time: 09:16:38

Frequency: 144.04 MHz

Source: DF Receiver

DTMF:

Close Save Revert

Figure 69: Transcript Editor View of Grouped Intercepts

The Transcript Editor displays the transcript information and a list of all the intercepts included in the transcript. Clicking on any one of the intercepts will display the data associated with the intercept.

An intercept can be removed by right clicking on it and selecting Remove Intercept. The audio file can be played or the intercept played back in TargetTrack by selecting Listen To Audio or Playback respectively.

An intercept can be added by pressing down and holding the mouse button over an intercept in the Search Results and then dragging and dropping the intercept onto the Intercept list in the Transcript Editor.

EXPORTING TO AN XML FILE

To export the records to an XML file select the files you want to export in the **Search Results** window and press the **XML Export** button. The following dialog box will be displayed.

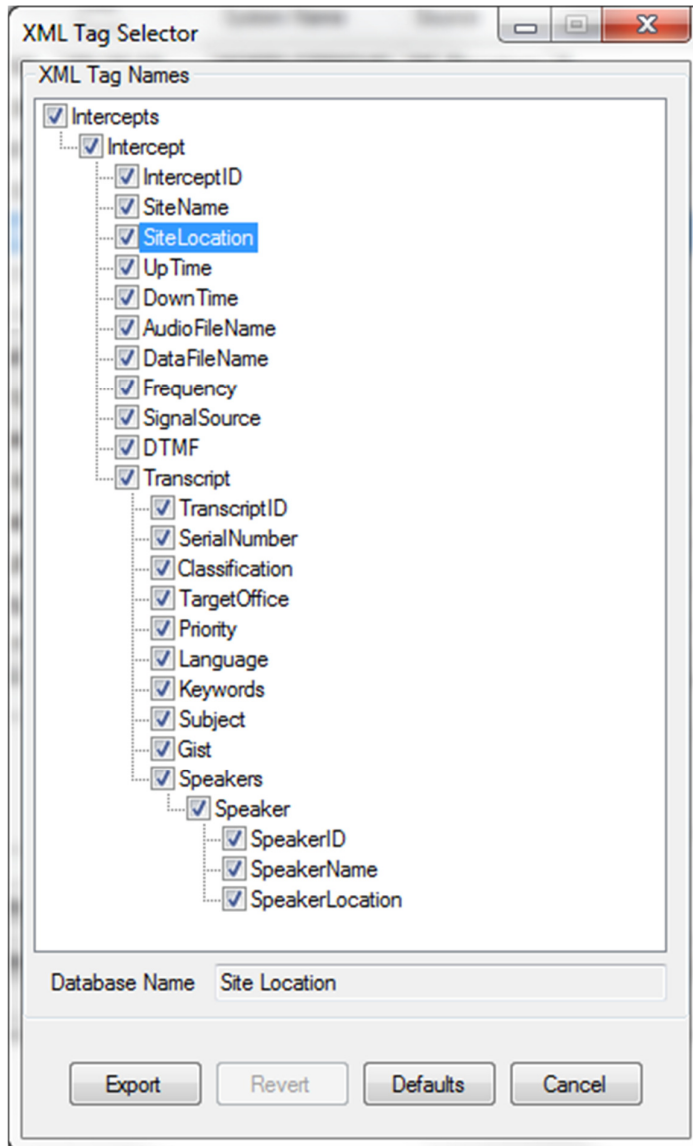
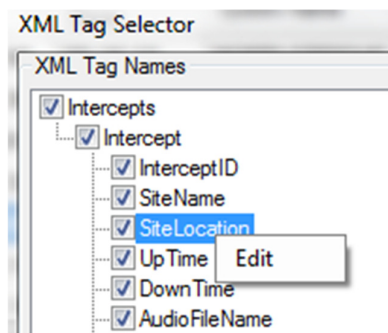


Figure 70: XML Export of Intercepts

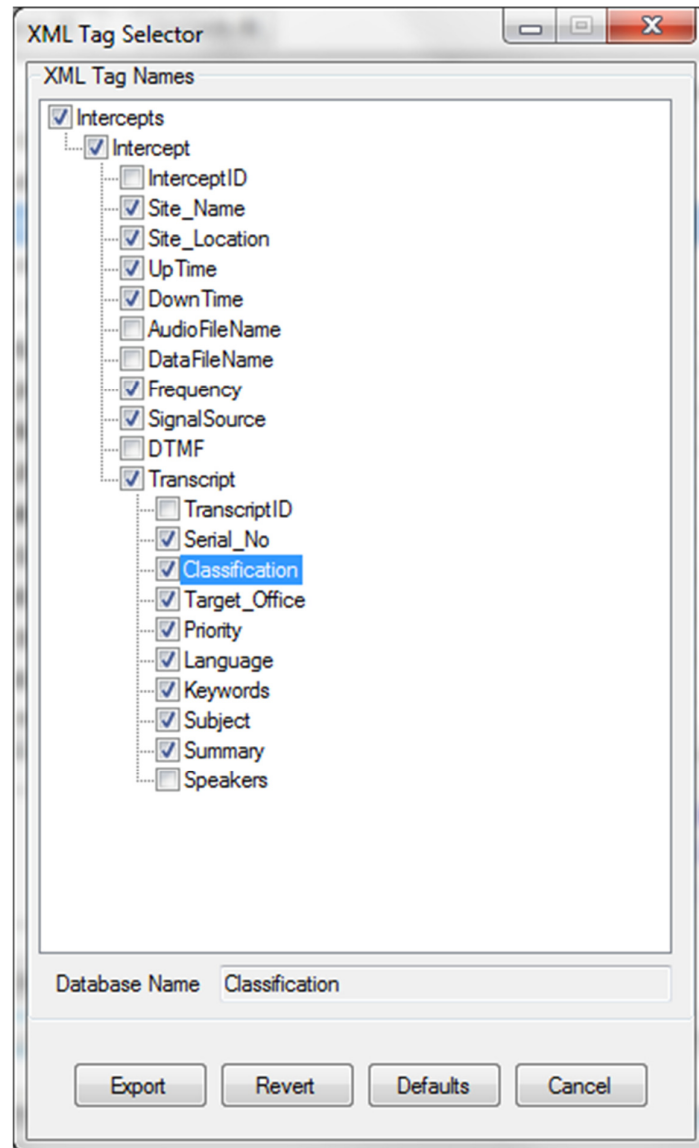
At this point you can select which fields of the database you wish to export and change the names of the fields if you would like.

Clicking on one of the nodes of the tree will display the database field name at the bottom of the tree view as shown above. To change the XML tag value simply click on the node and edit the name or right click on the node and select Edit as shown below.



To exclude the field from the export remove the check mark from the field.

The figure below shows an edited list.



Press the Export button and a save file dialog will be displayed allowing you to enter the name and directory of the file.

The listing below shows the a single record export using the structure above

```
<?xml version="1.0" encoding="utf-16" standalone="yes"?>
<Intercepts>
  <Intercept>
    <Site_Name>DOPPLERDOUG</Site_Name>
    <Site_Location>125 VC 14076 44353</Site_Location>
    <UpTime>2012-05-21T09:17:58</UpTime>
    <DownTime>2012-05-21T09:18:13</DownTime>
    <Frequency>144.04</Frequency>
    <SignalSource>DF Receiver</SignalSource>
    <Transcript>
      <Serial_No>0</Serial_No>
      <Classification></Classification>
      <Target_Office></Target_Office>
      <Priority></Priority>
      <Language></Language>
      <Keywords></Keywords>
      <Subject></Subject>
      <Summary></Summary>
    </Transcript>
  </Intercept>
</Intercepts>
```

After the first use of XML Tag Selector dialog subsequent uses will use the structure of the previous export. During editing the user can revert to the last saved structure by pressing the **Revert** button. To revert to the default values press the **Default** button.

IMPORTING RECORDS

Records can be imported from databases on other computers that are running TargetTrack. The import files are created on another computer by using the search facility and exporting records to a file. To import these files onto your computer, copy the file onto your computer and then select **Import** from the **Data** menu. Open the file you want to import and these files will be imported into your database.

REPAIRING THE DATABASE

Redundancy of data is built into TargetTrack in that the MP3 header file contains the same information as the database itself. If the database gets corrupted the database can easily be rebuilt using the MP3 header file information. Select **Repair Database** from the Data menu and TargetTrack will rebuild the database using the mp3 files stored in the Data directory.

This feature can also be used in case one of the mp3 files or intercept data files gets deleted or corrupted.

PURGING THE DATABASE

The database can be purged of all records and files or you can purge records imported from other networks or training packages. To purge all records select **Data->Purge Database->Purge All Records**. To purge records imported from other networks or records from a training package select **Data->Purge Database->Network Name**.

Warning! Purging the database deletes all records and files. These records and files are not recoverable. Use caution when using this command.

MAKING TRAINING PACKAGES

TargetTrack make training packages using either previously collected data or the program can generate simulated data.

MAKING A TRAINING PACKAGE FROM PREVIOUSLY RECORDED INTERCEPTS

You can use previously recorded data to make a set of intercepts to be used for training purposes. To generate a training package you first select the intercepts you want to use and then you can edit the start time and frequency of each intercept. In this way you can take intercepts collected over a long time period and compress them into a shorter time period.

To make a training package select Search from the Data menu and use the search criteria to display the data you want to use to make the training package. In the search results window check the intercepts that you want to include in the training package as shown below.

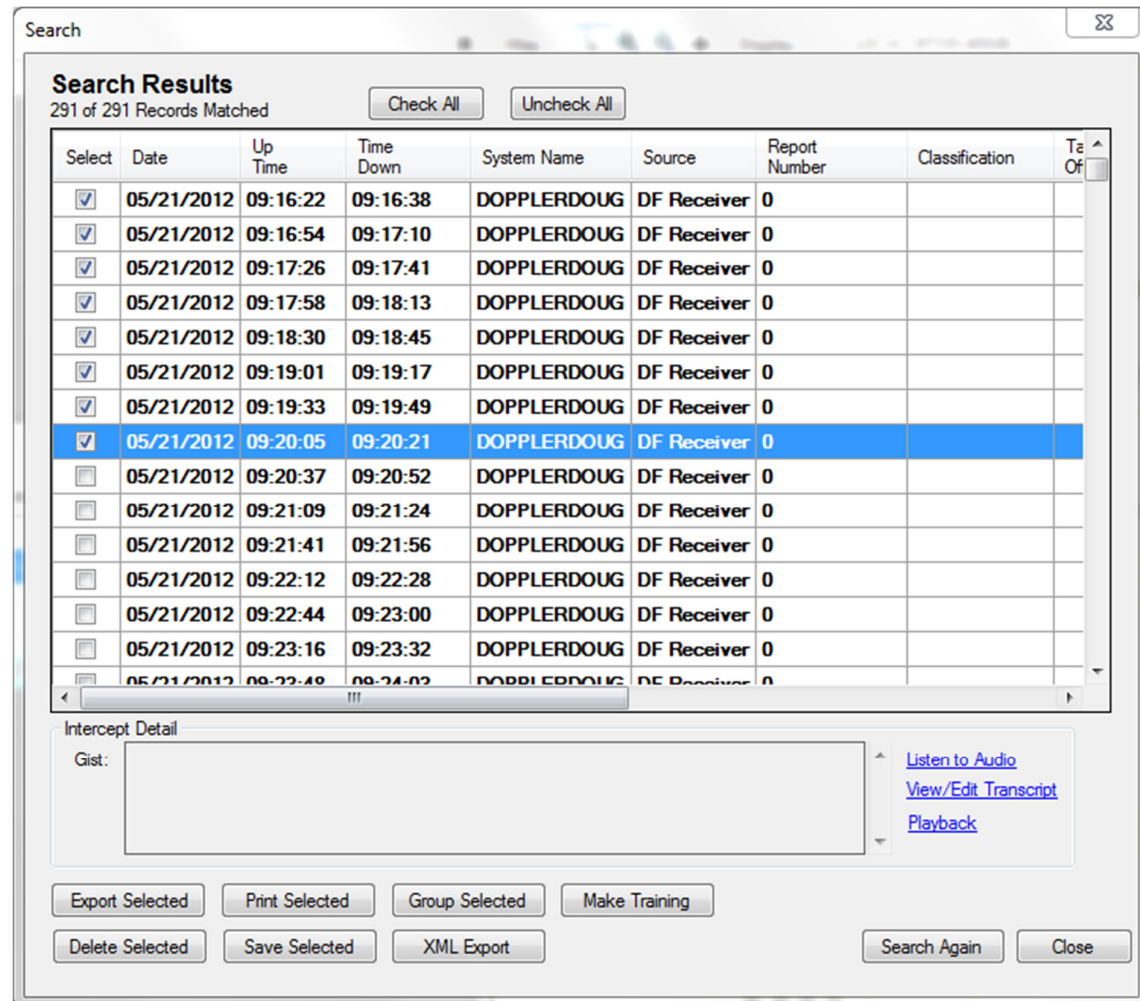
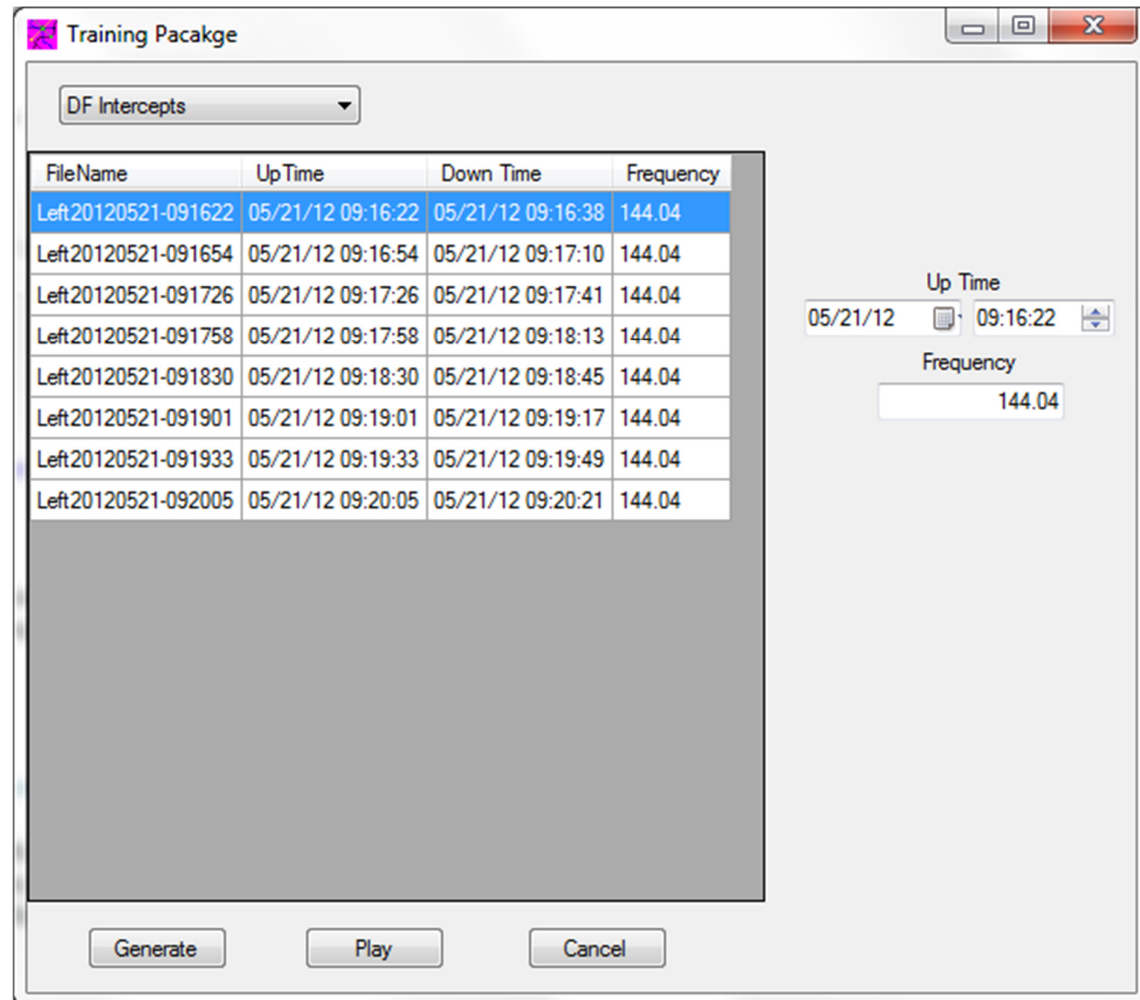


Figure 71: Selecting Intercepts for a Training Package

Press **Make Training** and you will be asked to enter the name of the training package. Once a name is entered the following dialog box will be displayed.



The dialog box titled "Training Package" contains a dropdown menu set to "DF Intercepts". Below it is a table with four columns: FileName, Up Time, Down Time, and Frequency. The first row is highlighted in blue. To the right of the table are input fields for "Up Time" (showing 05/21/12 09:16:22) and "Frequency" (showing 144.04). At the bottom are three buttons: "Generate", "Play", and "Cancel".

FileName	Up Time	Down Time	Frequency
Left20120521-091622	05/21/12 09:16:22	05/21/12 09:16:38	144.04
Left20120521-091654	05/21/12 09:16:54	05/21/12 09:17:10	144.04
Left20120521-091726	05/21/12 09:17:26	05/21/12 09:17:41	144.04
Left20120521-091758	05/21/12 09:17:58	05/21/12 09:18:13	144.04
Left20120521-091830	05/21/12 09:18:30	05/21/12 09:18:45	144.04
Left20120521-091901	05/21/12 09:19:01	05/21/12 09:19:17	144.04
Left20120521-091933	05/21/12 09:19:33	05/21/12 09:19:49	144.04
Left20120521-092005	05/21/12 09:20:05	05/21/12 09:20:21	144.04

Figure 72: Generating a Training Package from Actual Data

Now use the controls on the right to set the **Up Time** for each intercept. Once you've arranged the files the way you want them press the **Generate** button and intercepts will be created and entered into the database. After the intercepts have been generated the Generate button turns into an **Accept** button. If you are happy with the package press the Accept button and the Search results dialog will again be displayed with the training package intercepts shown. The figure below illustrates this

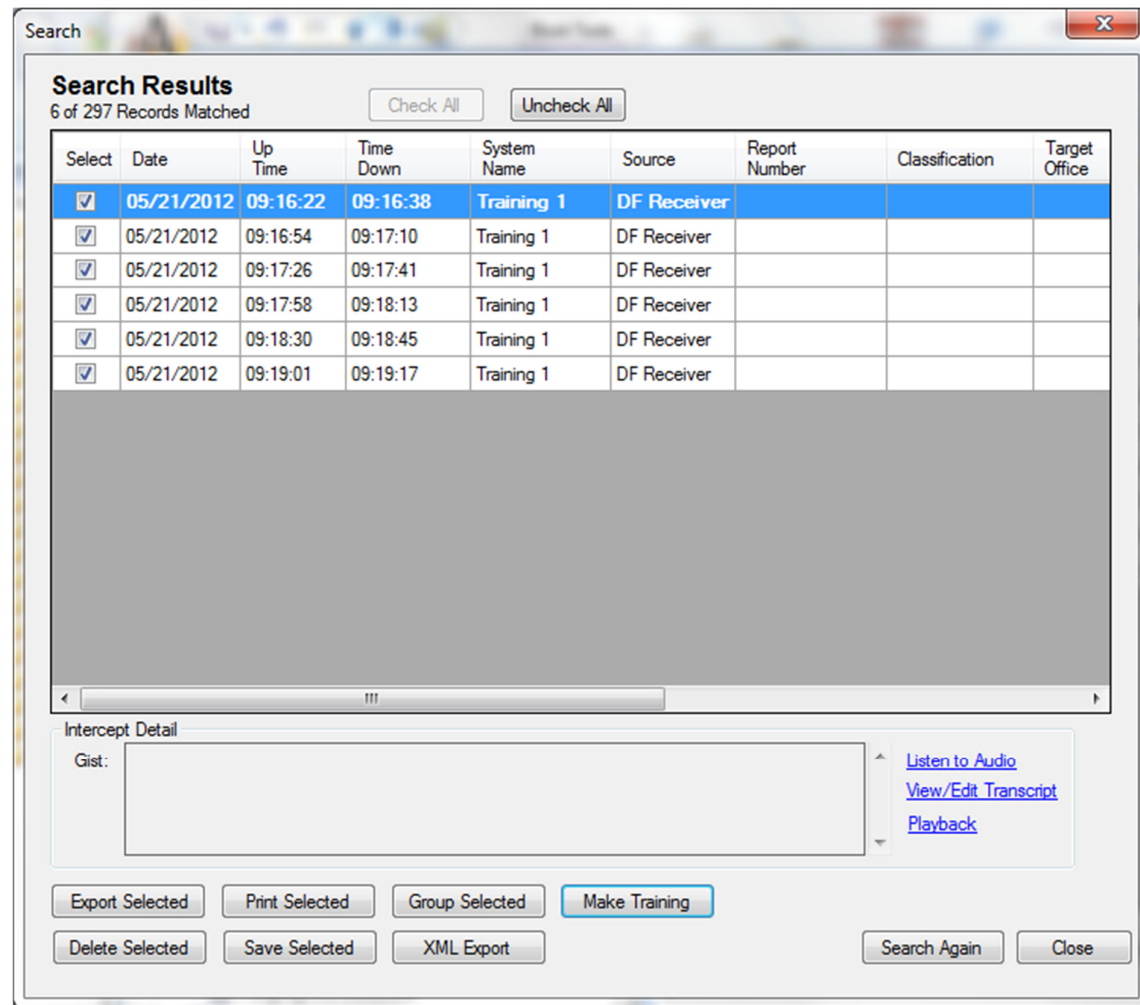


Figure 73: Setting the Up Time and Down Time of Actual Data

At this point the training package is in the data base and ready for use on the computer that it was generated on. If you want to use it on other computers simply press the **Export Selected** button and create an export package that can be imported on other computers. After exporting the package it can be removed by pressing the **Delete Selected** button.

MAKING A TRAINING PACKAGE FROM SIMULATED DATA

To make a training package from simulated data you must first obtain some audio files. The audio files can be prerecorded audio or you can use an application such as **Audacity** <http://audacity.sourceforge.net/> to record audio files and save them as mp3 files. For the most realistic scenarios using multiple targets, use recording software and note the length of time each speaker (target) is present. For convenience it is best to store all the recorded audio files in one folder (directory).

Once you have audio files launch TargetTrack and select **Design a Training Package** from the **File** menu. The following dialog will be displayed

Training Package Creator

Package Name Training Package 1

Add Audio Files Start Date 01/01/13 00:00:00 Frequency 100.0 MHz

Intercepts

	File Name	Frequency	Gap	Date	Up Time	Duration	Down Time
*							

Sites

	Name	Location
*		

Targets

	Name	Location	Power	Duration (s)	Gap (s)	Up Time	Down Time
*							

Add Targets to All Intercepts

Generate Package

Cancel

Figure 74: Simulated Data Training Package

Select a name for the training package by typing in a **Package Name**. Press the **Add Audio Files** button and go to the directory where you saved the audio files you wish to use. Select the files as shown below and press **OK**.

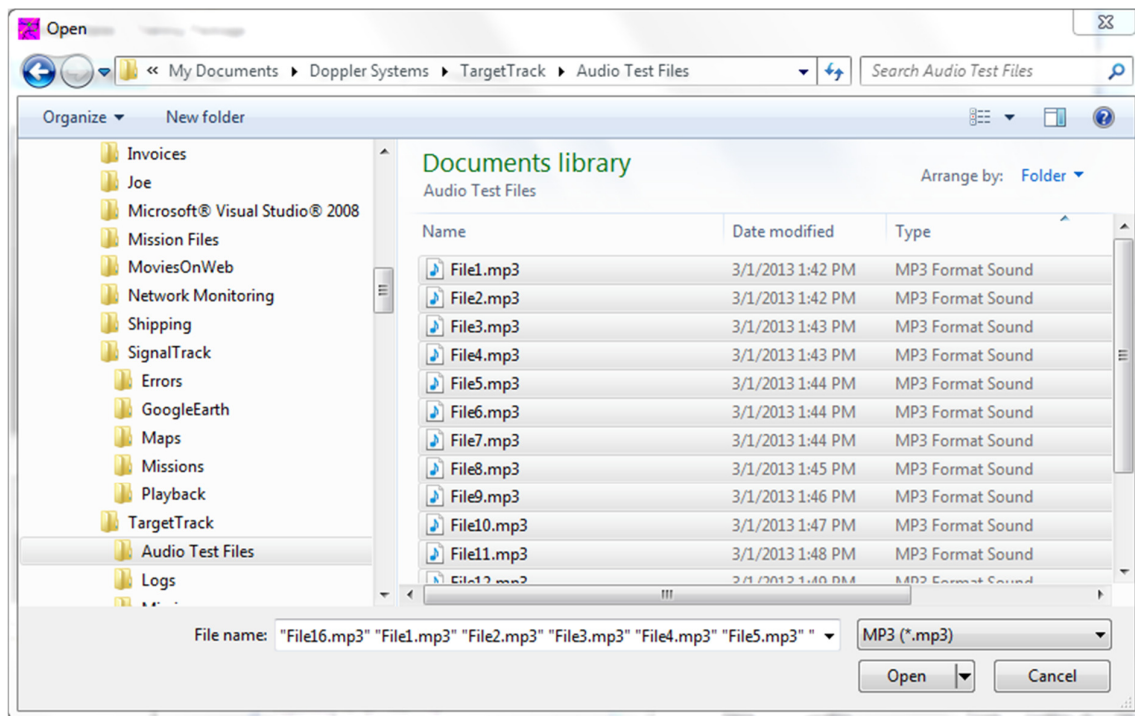


Figure 75: Selecting the Audio Files for the Simulated Training Package

The dialog window will appear as shown below. Notice that the file names are changed to reflect the naming convention used by TargetTrack.

Training Package Creator

Package Name: Training Package 1

Add Audio Files Start Date: 01/01/13 00:00:00 Frequency: 100.0 MHz

Intercepts

	File Name	Frequency	Gap	Date	Up Time	Duration	Down Time
▶	Left20130101-000000	100	00:00:20	01/01/13	00:00:00	19	00:00:18
	Left20130101-000038	100	00:00:20	01/01/13	00:00:38	9	00:00:48
	Left20130101-000108	100	00:00:20	01/01/13	00:01:08	21	00:01:29
	Left20130101-000149	100	00:00:20	01/01/13	00:01:49	26	00:02:15
	Left20130101-000235	100	00:00:20	01/01/13	00:02:35	20	00:02:55
	Left20130101-000315	100	00:00:20	01/01/13	00:03:15	18	00:03:34
	Left20130101-000354	100	00:00:20	01/01/13	00:03:54	7	00:04:01
	Left20130101-000421	100	00:00:20	01/01/13	00:04:21	23	00:04:45
	Left20130101-000505	100	00:00:20	01/01/13	00:05:05	50	00:05:55

Sites

	Name	Location
*		

Targets

	Name	Location	Power	Duration (s)	Gap (s)	Up Time	Down Time
*							

Add Targets to All Intercepts

Generate

Cancel

Figure 76: Simulated Training Data Dialog after Importing Audio Files

Each audio file represents an intercept. The start date and time of the group of intercepts represented by the file list can be changed by entering the desired start date in the **Start Date** field above the table. The frequency of all the intercepts can also be changed. The gap between intercepts is set to a default value of 20 seconds; however you can change this to be whatever you want.

Next enter the site names and locations you wish to use. Click in the name field and enter a name. To enter a location you can type in the location or place your mouse on the map, right click, and select **Copy Location**. Click in the location field in the table and right click and select **Paste** or type **Ctrl-V**. An example with three sites is shown below.

The screenshot shows the 'Training Package Creator' window. At the top, the 'Package Name' is 'Training Package 1'. Below this, there are fields for 'Add Audio Files', 'Start Date' (01/01/13 00:00:00), and 'Frequency' (100.0 MHz). The main section is titled 'Intercepts' and contains a table with the following data:

	File Name	Frequency	Gap	Date	Up Time	Duration	Down Time
▶	Left20130101-000000	100	00:00:20	01/01/13	00:00:00	19	00:00:18
	Left20130101-000038	100	00:00:20	01/01/13	00:00:38	9	00:00:48
	Left20130101-000108	100	00:00:20	01/01/13	00:01:08	21	00:01:29
	Left20130101-000149	100	00:00:20	01/01/13	00:01:49	26	00:02:15
	Left20130101-000235	100	00:00:20	01/01/13	00:02:35	20	00:02:55
	Left20130101-000315	100	00:00:20	01/01/13	00:03:15	18	00:03:34
	Left20130101-000354	100	00:00:20	01/01/13	00:03:54	7	00:04:01
	Left20130101-000421	100	00:00:20	01/01/13	00:04:21	23	00:04:45
	Left20130101-000505	100	00:00:20	01/01/13	00:05:05	50	00:05:55

Below the intercepts table is a 'Targets' section with a table that has columns for Name, Location, Power, Duration (s), Gap (s), Up Time, and Down Time. The first row contains an asterisk (*). To the right of the intercepts table is a 'Sites' section with a table that has columns for Name and Location. It contains three entries: Site 1 (12S VC 16574 47174), Site 2 (12S VC 17577 42377), and Site 3 (12S VC 11411 46000). Below the sites table is a large greyed-out area. At the bottom right of the window are three buttons: 'Add Targets to All Intercepts', 'Generate', and 'Cancel'.

Figure 77: Entering Site Data for Simulated Data Training Package

Next select the intercept that you would like to enter a target for and select the **Name** field in the **Targets** table. Enter a target name (default would be Target x) and enter the location, transmission power, duration, and gap time for the target. When you first enter a target the power, duration, and gap time will default to fill the duration of the intercept. The gap time is the time between when the first target stops transmitting and the second target begins transmitting. Repeat this process for all other targets you want to enter. An example of two targets is shown below.

The screenshot shows the 'Training Package Creator' window. At the top, the 'Package Name' is 'Training Package 1'. Below it, there are fields for 'Add Audio Files', 'Start Date' (01/01/13 00:00:00), and 'Frequency' (100.0 MHz). The main area is divided into three sections: 'Intercepts', 'Targets', and 'Sites'.

Intercepts Table:

	File Name	Frequency	Gap	Date	Up Time	Duration	Down Time
▶	Left20130101-000000	100	00:00:20	01/01/13	00:00:00	19	00:00:18
	Left20130101-000038	100	00:00:20	01/01/13	00:00:38	9	00:00:48
	Left20130101-000108	100	00:00:20	01/01/13	00:01:08	21	00:01:29
	Left20130101-000149	100	00:00:20	01/01/13	00:01:49	26	00:02:15
	Left20130101-000235	100	00:00:20	01/01/13	00:02:35	20	00:02:55
	Left20130101-000315	100	00:00:20	01/01/13	00:03:15	18	00:03:34
	Left20130101-000354	100	00:00:20	01/01/13	00:03:54	7	00:04:01
	Left20130101-000421	100	00:00:20	01/01/13	00:04:21	23	00:04:45
	Left20130101-000505	100	00:00:20	01/01/13	00:05:05	50	00:05:55

Targets Table:

	Name	Location	Power	Duration (s)	Gap (s)	Up Time	Down Time
▶	Target 1	12S VC 15927 43811	10	8	1	00:00:00	00:00:08
	Target 2	12S VC 12095 41733	10	10	1	00:00:09	00:00:18
*							

Sites Table:

	Name	Location
	Site 1	12S VC 16574 47174
	Site 2	12S VC 17577 42377
▶	Site 3	12S VC 11411 46000
*		

Buttons on the right: 'Add Targets to All Intercepts', 'Generate', 'Cancel'.

Figure 78: Entering Target Data for Simulated Data Training Package

If you would like to use these same targets for all intercepts press the **Add Targets to All Intercepts** button. If not move to the next intercept and enter the target information. After entering the target information you can edit the values to whatever you want. You can delete intercepts, targets, or sites by clicking on the left side of the row to select the entire row and then pressing the **Delete** key.

When you've entered all the necessary data press the **Generate** button. If the generation is successful the **Generate** button will change to **Play**. If you want to view the generated training package press the **Play** button and TargetTrack will playback the training package. You can modify the training package at any time and generate a new one with the same name or a different one.

To export the training package for use on a different computer use the **Export** feature of the database.

VIRTUAL SITES

Virtual sites allow the user to manually create a site and enter a bearing for that site. This would be used if a mobile or remote site did not have data communications with the site where TargetTrack is being run. In this case an operator could verbally convey his location and the bearing to the target and the TargetTrack operator could enter the data into a Virtual site.

To construct a Virtual Site, right click on the map and select **Add New -> Virtual Site**. A site with a V displayed on it will be shown at the location where the user clicked. To enter a bearing for the site right click on the site and enter the bearing followed by the Enter key as shown below

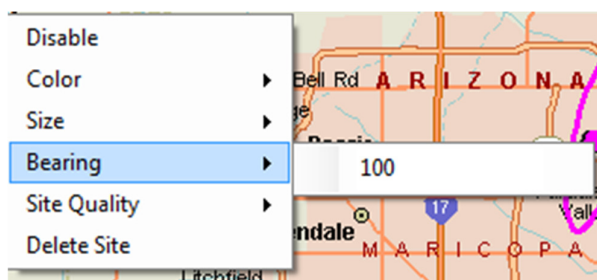


Figure 79: Virtual Site Bearing Entry

The site quality can be set also if desired to reflect the accuracy of the bearing measurement.

The virtual site can be moved by selecting the **Site Move** tool in the map tool bar and dragging the site to a location.

CALIBRATION

Sites can be calibrated to a radio frequency source at a known locations. These sources are referred to as beacons. To set up a beacon in TargetTrack right click on the map and select Add New -> Beacon from the pop up menu. A round site with a B on it will be displayed. The frequency of the beacon is set by right clicking on the beacon site and entering the frequency as shown below.

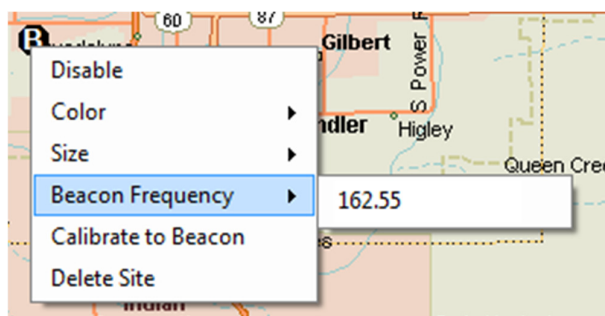


Figure 80: Calibration Menu

To calibrate sites to a Beacon first select the sites using the left mouse button. Hold down the shift key to select multiple sites. Next right click on the beacon site and select Calibrate to Beacon. The system will tune the site to the calibration frequency perform the calibration and then return the site to its previous frequency.

MOBILE OPERATION

TargetTrack can be used as a standalone direction finder in a mobile environment. By using saved sites a user can triangulate on a target. To do this the mobile must first receive a signal from the target. When the operator determines that the bearing is good he presses the **Insert** key and the source is saved to the screen as a different color. The vehicle is then driven to a different location and the process is repeated. Once two bearings are obtained, TargetTrack can estimate the location of the target. The operator can obtain more bearings from other locations to further narrow down the target location. If the operator determines that a bad bearing was entered the bearing can be deleted by selecting the saved site with the mouse and pressing the **Delete** key.

When a mobile site is the primary site the follow display is shown in the lower right hand corner of the screen. The display shows the bearing relative to the vehicle. This display is useful when you are close to the target and are trying to drive up on the target. The **Insert** button functions the same way the **Insert** key functions and the **Clear** button functions the same way the **Delete** key functions.

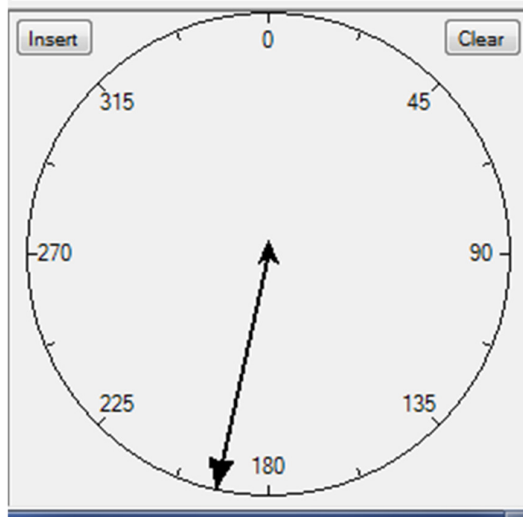


Figure 81: Mobile Compass Rose Display

REMOTE OPERATION BY ANOTHER PROGRAM

TargetTrack allows another program to have limited control over the operation of TargetTrack. A TCP/IP server furnishes the interface. The TCP/IP server is on port 10100 and can be used

- 1) As a local connection if the software is installed on the same computer as TargetTrack
- 2) As a remote connection on a LAN allowing software on another computer to control TargetTrack
- 3) As a remote connection on a WAN (e.g. Internet) by configuring an open port on any firewalls.

Commands and data are exchanged in XML format. The message will consist of a 16 byte header followed by an XML message. The first two bytes of the header are the length of the message in bytes (including the header). The remaining 14 bytes of the header are for future use.

The entire interface with the XSD Schema is described in the TargetTrack Remote Control Interface Document available on the installation CD and on the [Doppler](#) web site.

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