USER'S GUIDE

MPT SOFTWARE USERS GUIDE

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CONTENTS

Chapter 1

INTRODUCTION

The MPT User Interface suite of software contains three software programs designed for the Doppler DDF7001 direction finder. MPT UI is the main program used to operate and configure the direction finder. Doppler DF Discover is used to discover the network parameters of an MPT connected to a DHCP enabled network and MPT Flash is used to reprogram the direction finder firmware in the event that changes to the firmware are required in the future.

IN THIS CHAPTER

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.
Emphasis	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.

Chapter 2

INSTALLATION

To install the software insert the CD into your computer and wait for the computer to launch the setup program. If the computer fails to do this after a reasonable length of time locate setup.exe on the CD and double click on it. Follow the instructions given by the installer program.

Chapter 3

GETTING STARTED

Communication with the MPT is accomplished via the Ethernet connection on the unit. There are two ways to connect to the MPT Ethernet port: network and direct connection. Use the network connection if you have access to a local area network that supports DHCP. Use the direct connection for all other cases.

IN THIS CHAPTER

NETWORK CONNECTION

Figure 1 illustrates the connection of the MPT to a local area network that supports DHCP. Once the connections have been made, apply power to the unit. The first time the unit is powered on the network it can take up to 10 seconds it to acquire an IP address from the DHCP server.

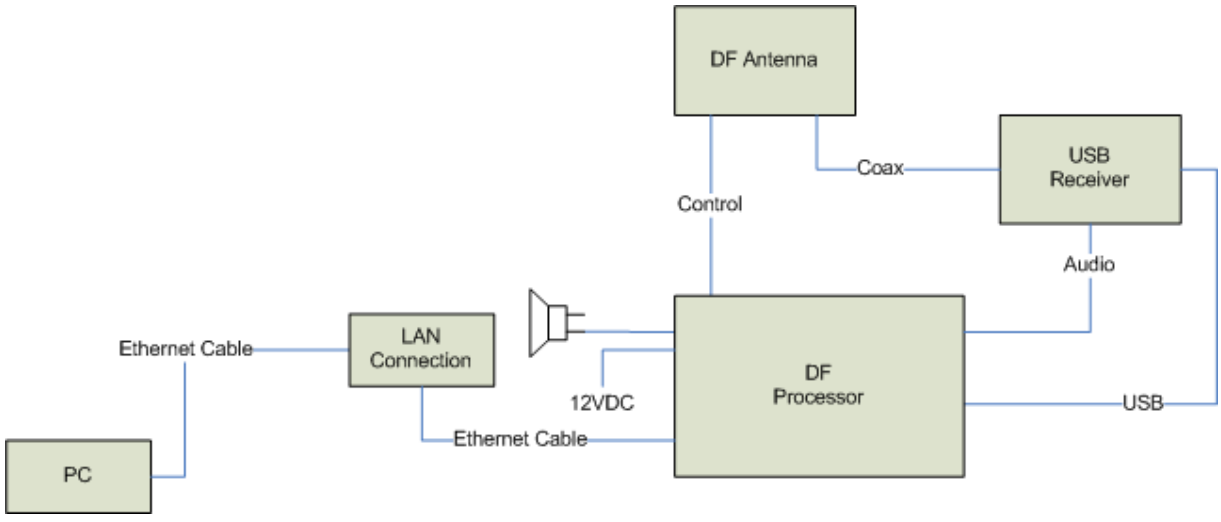


Figure 1: DDF7001 Direction Finder Connected to Local Area Network

You are now ready to use the MPT User Interface.

DIRECT CONNECTION

Use the direct connection to set initially set up the MPT for a network that does not support DHCP, or in cases where no network is available or to use the MP where no network is available such as a mobile installation. To accomplish the direct connection use a Ethernet cross over cable to connect the direction finder to the computer's network interface connection as shown in Figure 4 below.

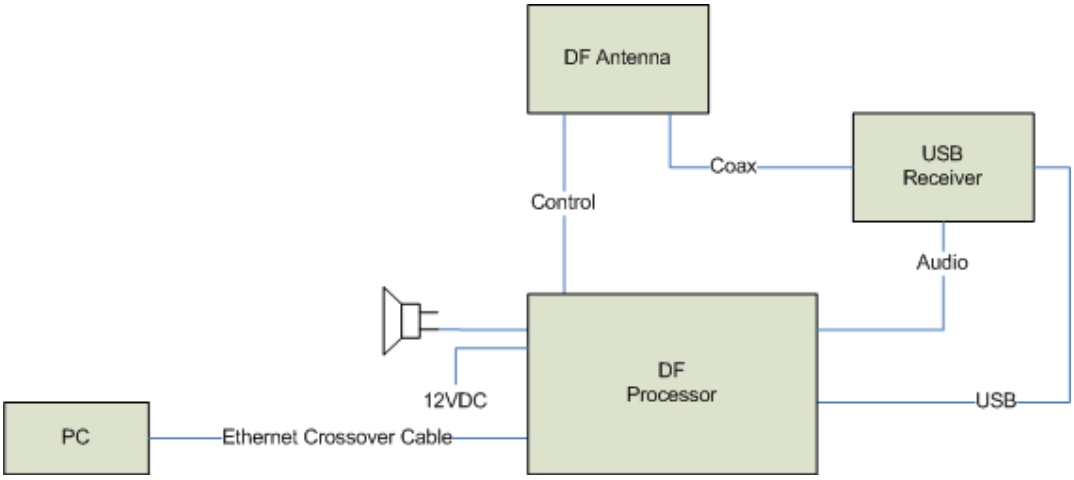
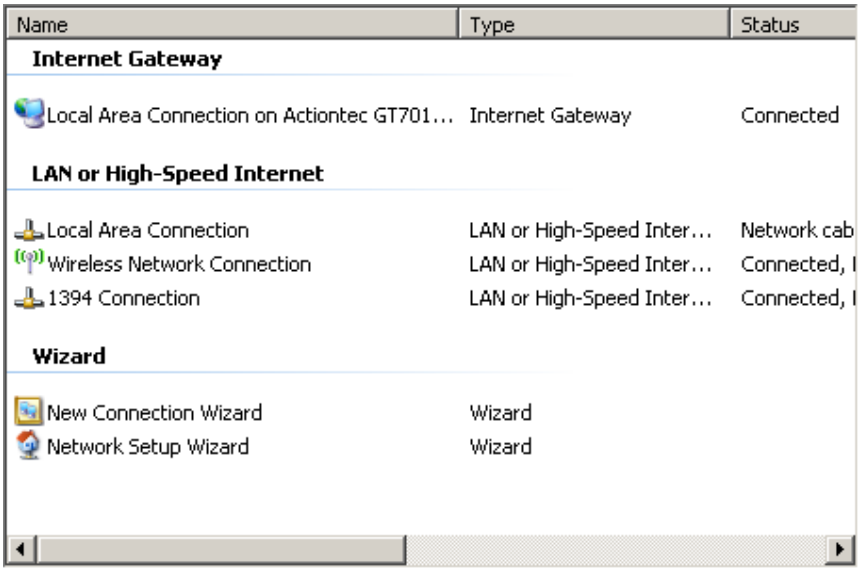


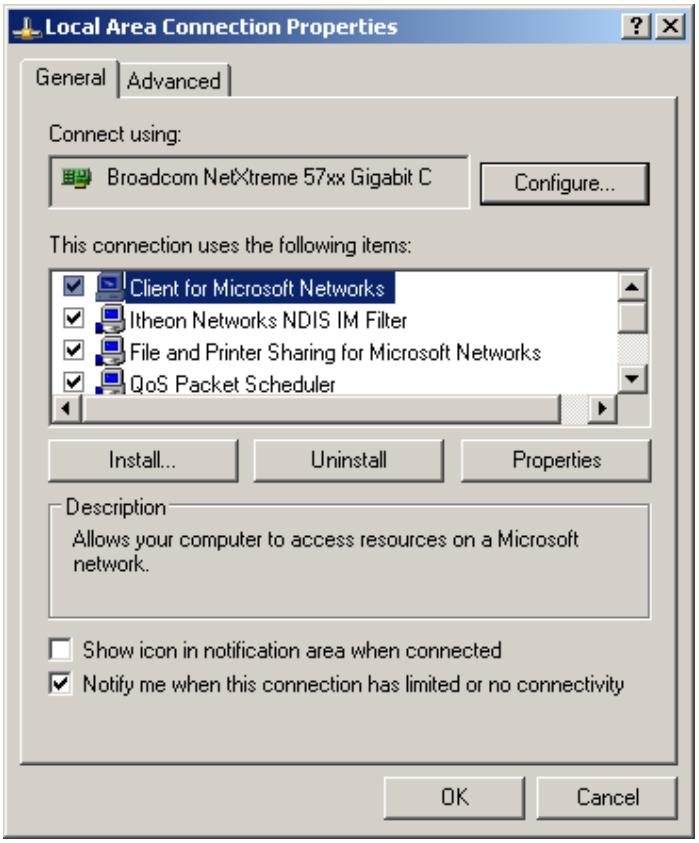
Figure 2: DDF7001 Directly Connected the Computerwith crossover cable

The default IP address of the MPT is 10.0.0.100 so in order to connect to it you must configure you computer's network connection as shown in the following steps.

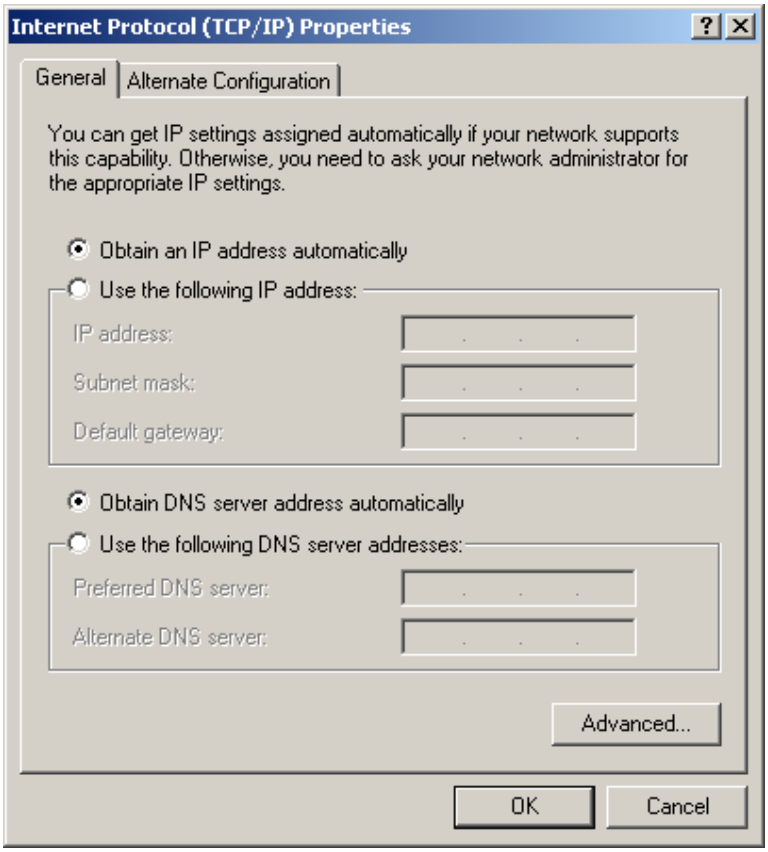
- *Use the Control Panel to navigate to the Network Connections Folder. It will look similar to the screen shot below*



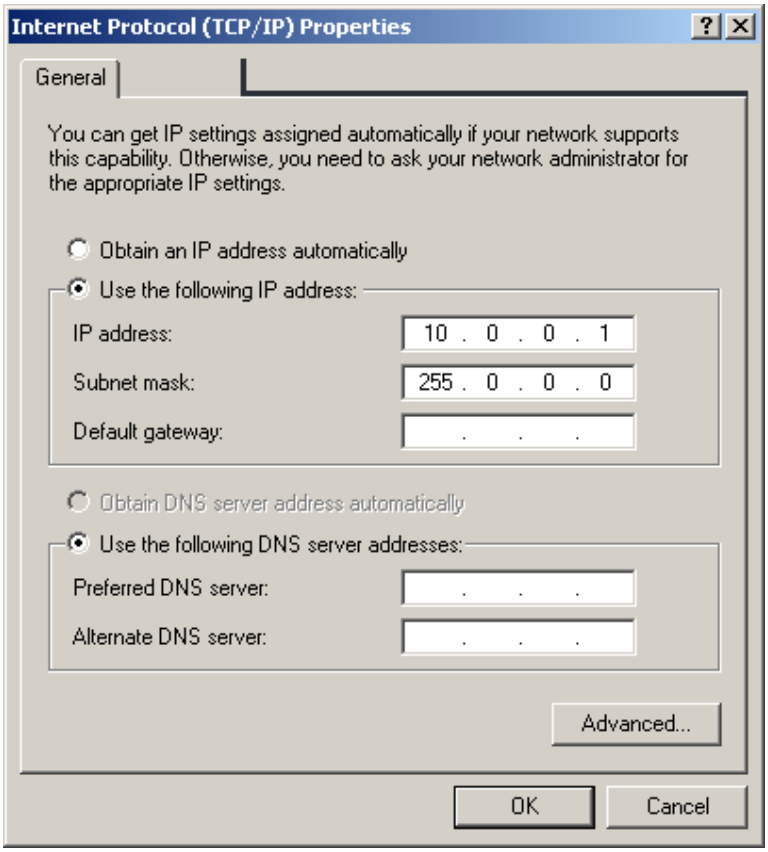
- *Right click on the Local Area Connection and select Properties to display the following dialog.*



- ***Scroll down the list, select** Internet Protocol (TCP/IP), **and press to Properties button to display the dialog box shown below. Typically the settings will appear as shown below***



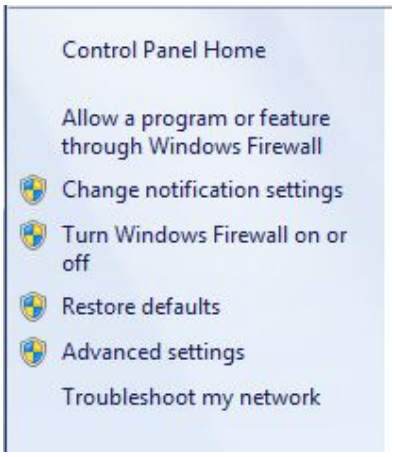
- *Click on the Use the following IP address radio button and then enter 10.0.0.1 as the IP address and 255.0.0.0 as the Subnet mask.*



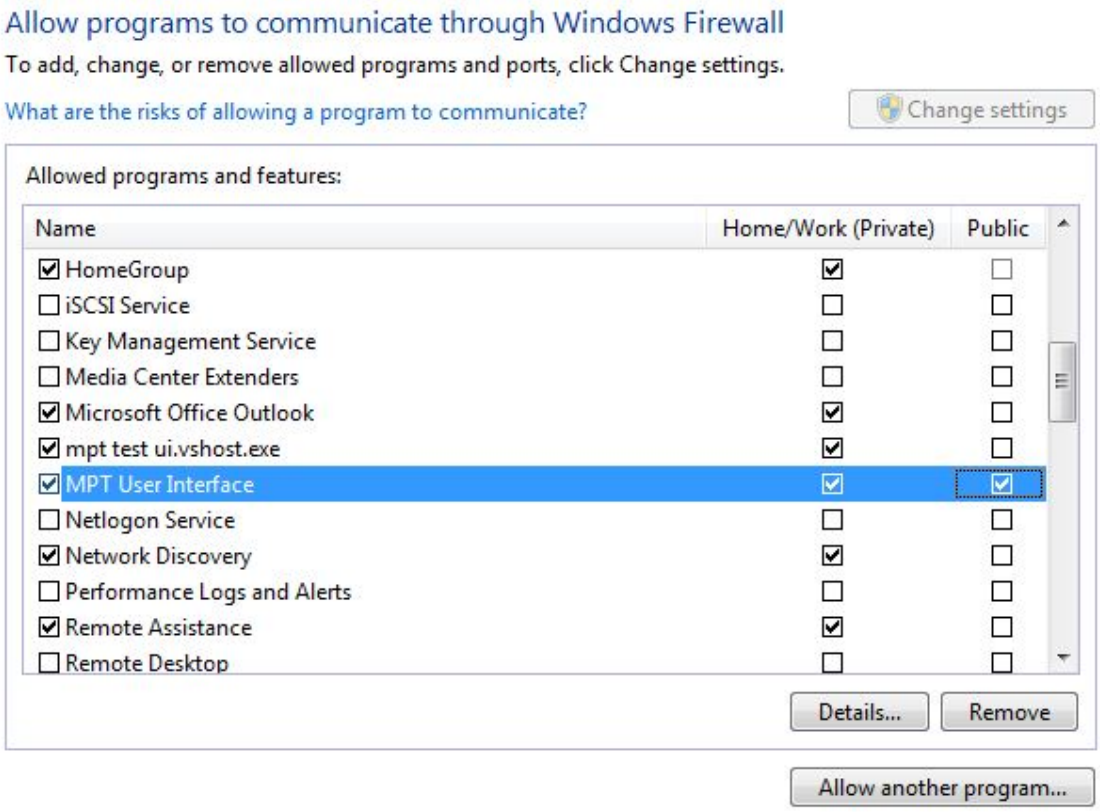
- *Press OK in both dialogs.*
- *Power the MPT and wait 15 seconds.*
- *You are now ready to use the MPT User Interface.*

WINDOWS 7

When using a direct connection with Windows 7 it is necessary to configure the Windows Firewall to allow the MPT UI and Doppler DF Discover programs to find the MPT on the network. Since the MPT IP parameters are know in this situation it is not necessary for the computer to discover the parameters; however, in the case of the MPT user interface it saves the user from making the connection manually. To configure the firewall select **Windows Firewall** from the **Control Panel.** Click on **Allow a program or feature through Windows Firewall** as shown below.



The following dialog will appear.



Select MPT User Interface and the click on Change Settings. Then click the Public check box. Repeat the process for Doppler DF Discover if desired. Click OK to close the dialog.

Chapter 4

MPT USER INTERFACE

The MPT User Interface software is used to configure and operate the Doppler MPT direction finder. After performing the steps in the ***Getting Started*** chapter make sure the MPT is powered and then launch the MPT User Interface software.

IN THIS CHAPTER

CONNECTING TO THE MPT

If there are no other connections to the MPT, the MPT User Interface will attempt to find the MPT on the network or on the direct connection and automatically connect to it. A successful connection will result in a window similar to the one below being displayed on the computer screen. A bearing may or may not be displayed depending on the receiver settings.

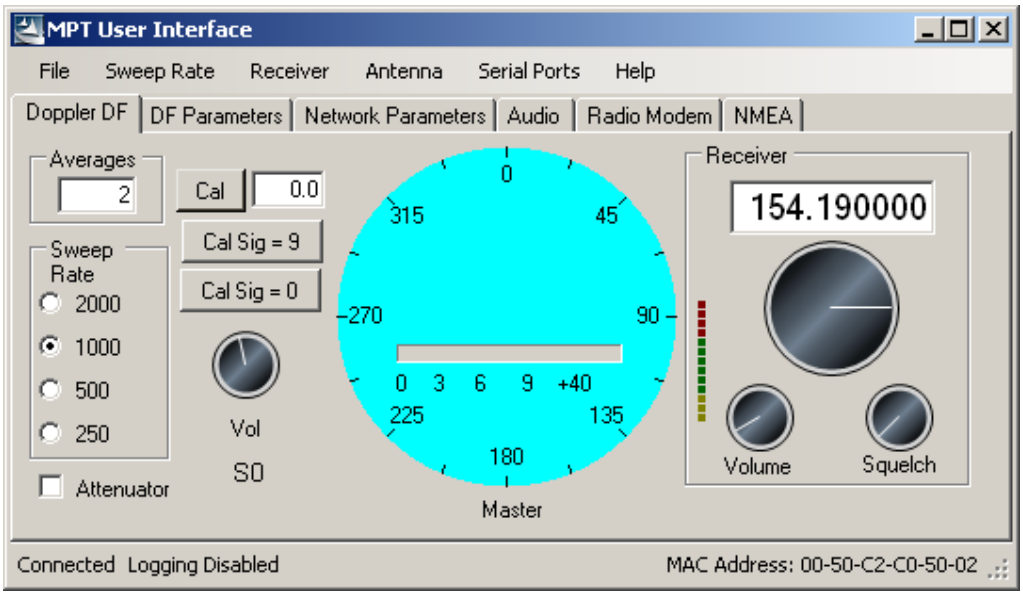


Figure 3: MPT Startup Screen

If the program is unsuccessful in making the connection or if for some reason the connection is lost you can manually connect by selecting **New Connection** from the **File** menu. The following dialog box will be displayed.

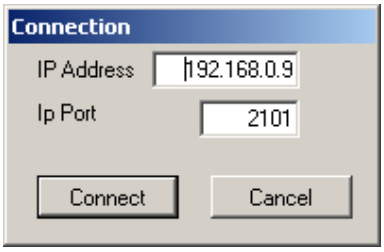


Figure 4: Direct Connection Dialog

If you are using a direct connection make sure the IP address is set to 10.0.0.100. If you are connected to a network enter the IP address and IP port that was obtained by ***Doppler DF Discover***. The program will then attempt to connect to the MPT direction finder. If the connection fails select Try Again and make sure the IP parameters have been entered correctly.

MENUS

The MPT User Interface menus are used to establish a new connection with the direction finder and to change the MPT direction finder settings.

- **File**

Figure 5: File Menu

If any changes are made to the IP Parameters then it will be necessary to reestablish a connection with the direction finder. To establish a new connection select **New Connection** from the **File** menu and enter the new parameters.

The MPT User Interface contains a logging feature that allows the user to record bearing readings to a file To enable logging select **Logging Setup** from the **File** menu. The following dialog will be displayed.

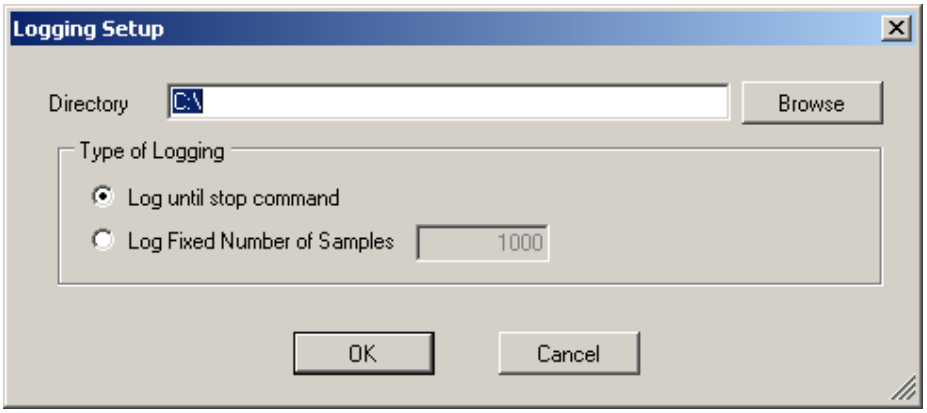


Figure 6: Logging Setup Dialog

Enter the required information and press OK. Then select **Start Logging** and the next series of bearing measurements will be logged.

- **Sweep Rate**

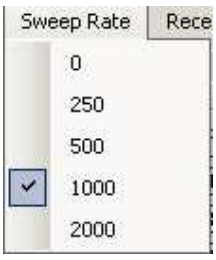


Figure 7: Sweep Rate Menu

The **Sweep Rate** menu can be used to change the sweep rate. Typically a 1000 Hz sweep rate will give best results when direction finding; however, in some cases a different sweep rate may work better.

- **Receiver**

Figure 8: Receiver Menu

The **Receiver** menu is used to select the receiver being used. Any narrow band FM receiver can be used with the MPT; however, the DF has been factory calibrated for the receivers listed in the menu. In addition the ICOM R1500, R2500, and AOR SR2200 support a USB interface allowing the frequency, squelch, and volume to be set using the MPT User interface software. If the ICOM R8500, AOR AR8600, or AOR AR5000 are used a USB-to-serial converter is required. The MPT supports USB-to-serial converters based on the Prolific or FTDI chip sets.

- **Antenna**

The MPT supports three bands; VHF (125 - 250 MHz), UHF (250 - 500 MHz), and THF (500 - 1000 MHz). In a system monitoring of all three bands is required the antennas that cover these bands can be stacked. In the case of a stacked array the **Antenna** menu can be used to switch antennas.

- **Serial Ports**
- If a USB-to-serial converter is connected to the MPT this menu allows the user to set the serial port parameters. The MPT supports up to a four port usb-to-serial converter. Each port can be set up independently as shown in the menu below.

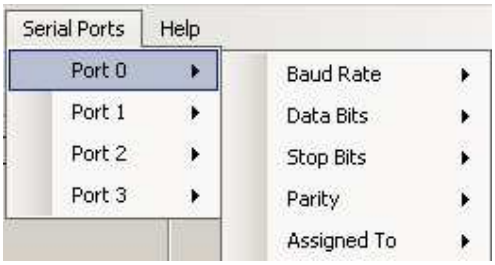


Figure 9: Serial Port Setup Menu

Additionally the serial port can be assigned to different devices depending on what is required.

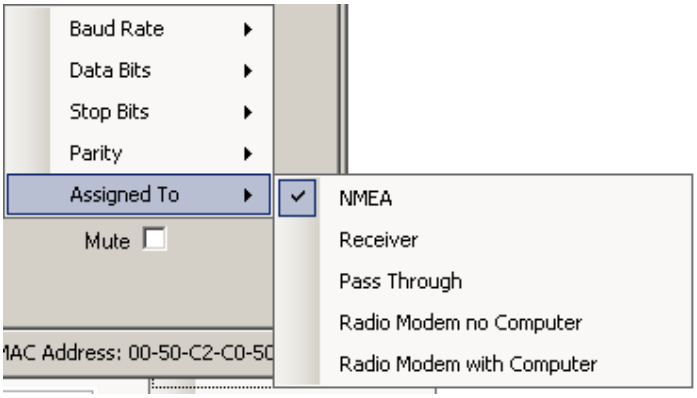


Figure 10: Assign the Serial Port to the Device using it

- **NMEA** is selected when the serial port is to be connected to a NMEA device such as a GPS receiver or compass

- **Receiver** is selected when the serial port is connected to a serial command based receiver

- **Pass Through** allows serial commands to pass through the MPT and for data coming from the device to pass through the MPT. For details on how the data is sent and received see the Communications Interface section of the MPT manual.

- Select **Radio Modem no Computer** when the MPT is to be remotely monitored by a radio modem connection and the port selected is connected to the radio modem.

- **Radio Modem with Computer** is used when the MPT is networked using a radio modem and a computer is being used at the site to display the network data.

DOPPLER DF

The Doppler DF tab provides the user with access to the most used direction finder settings and data. A screen shot of the user interface is shown below with the Doppler DF tab selected.

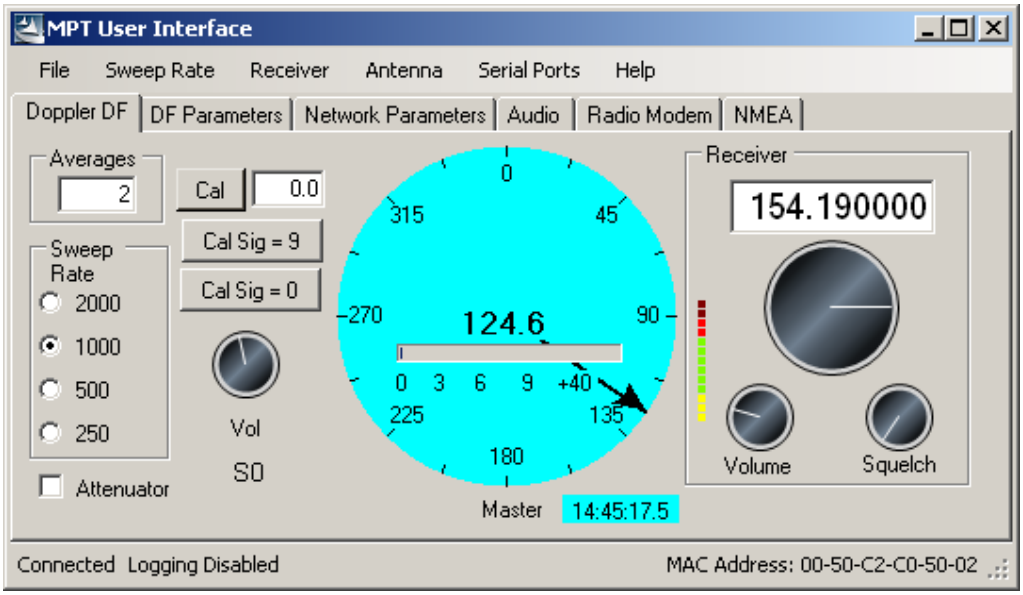


Figure 11: Main Screen

- **Averages**

The averages setting is used to set the number of averages the direction finder will use to calculate the measured bearing. If it is set to 2 the last CW and CCW sweep are averaged. This is the recommended setting. If it is set to 1 you will see the results of the CW and CCW sweeps separately. In some cases this setting can be used to determine if the received signal is being corrupted by multi path. If multipath is present large variations of the bearing will occur between the CW and CCW readings. Higher averages (maximum 20) can be used to smooth out the bearing readings; however, the smooth readings come at the expense of slow variation, so a large number of averages is not recommended for signals that are moving or if multiple signals on the same frequency are being measures.

- **Sweep Rate**

The **Sweep Rate** radio buttons can be used to change the sweep rate. Typically a 1000 Hz sweep rate will give best results when direction finding; however, in some cases a different sweep rate may work better.

- **Cal**

The **Cal** button is used to calibrate the direction finder to a known signal. If you know the location of the signal relative to the direction finder antenna enter the angle into the text box, tune the receiver to the frequency of the signal, and then press the **Cal** button. In about 1 second the direction finder will perform the calibration and the measured bearing will point at the source of the calibration signal.

- **Attenuator**

The MPT antenna electronics contain preamplifiers that are used to amplify small signals and provide good sensitivity during direction finding. If an extremely strong signal is received it could overload these preamps and corrupt the bearing measurement. Checking the **Attenuator** check box will disable the preamplifiers. Use this feature only with strong signals.

- **Volume**

The receiver audio is fed into the direction finder, processed to measure the bearing angle, filtered to remove the tone produced by the pseudo Doppler rotation, and then output through the speaker output. The **Volume** knob controls the amplitude of the volume coming out of the speaker. Left click on the knob to decrease the volume, right click to increase the volume. When the knob is selected you can also use the up arrow key to increase the volume and the down arrow key to decrease the volume.

- **Receiver Settings**

If any supported receiver is connected to the MPT direction finder via the USB port, the MPT user interface can be used to adjust the volume, the squelch, and the frequency of the receiver. With a signal tuned in adjust the receiver volume so the VU meter to the left of the volume knob consistently is in the green or slightly in the red range. If the VU meter shows a large number of red bars then decrease the volume. To set the squelch tune the receiver to a frequency without a signal and adjust the squelch so that the noise from the speaker is muted.

- **Frequency**

The frequency can be set in two ways: by typing the frequency into the frequency display and pressing the Enter key or by rotating the frequency adjustment knob. The increment for the knob adjustment can be set by right clicking on the display and selecting the desired increment as shown below. If the knob is selected the up arrow and down arrow keys can be used to increment or decrement the frequency.

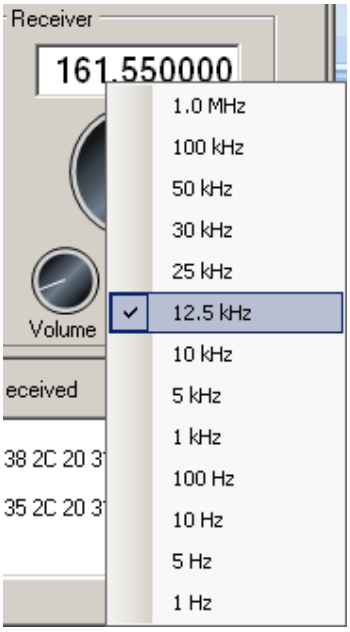


Figure 12: Right Click on Frequency Display to Set the Frequency Increment

Reading the Bearing

The bearing is displayed in the center of the compass rose and the compass rose display provides and bearing display. The S-meter reading is scaled from 0-255. The calibration is as shown in the table below.

Table 1: S Meter Scaling

Reading	S Meter Value
0	S0
48	S3
80	S5
112	S7
144	S9
176	S9 + 20
208	S9 + 40
240	S9 + 60

DF PARAMETERS

The DF parameters tab is used to access more advances settings of the direction finder.

- **Averages**

In the continuous mode the direction finder takes bearing readings at the Sample Time rate which is nominally 500 ms. The averages parameter sets the number of readings that will be included in a running average of the bearings. The default value is 2 which causes the CW and CCW bearings to be averaged.

- **Sample Time**

Typically the MPT rotates the antenna 0.5 seconds CW followed by a 0.5 second CCW rotation. This sample time can be increased to as much as 1500 ms (1.5 second).

- **Threshold**

When the receiver breaks squelch, the direction finder begins processing the audio in an attempt to process a bearing. If there is no signal and the squelch was broke on noise it may not be desirable for the direction finder to display a bearing. The threshold setting is used to set a correlation factor that effectively filters out noisy or nonexistent signals. Setting the value low will result in fewer "false alarms" but may result in missing bearings of noisy signals. Setting the value to a large value may result in a greater number of false alarms but increases the chance of obtaining a bearing on a weak signal. The range is 0 -9999. A setting of 0 will result in no bearings being taken. A setting of 9999 will result in bearings whenever the squelch threshold is exceeded. The default value is 2000.

- **Hold**

The hold time adjusts the time that the bearing will be held in the direction finder memory after the signal disappears. The direction finder will send a bearing of 360 degrees at the end of the timeout period.

- **Volume**

The volume control on the right adjusts the volume of the audio.

- **Bearing**

If the receiver is receiving a signal then the bearing will automatically update the bearing reading. If the receiver is not receiving a signal then the last bearing taken by the MPT will be displayed.

- **Version**

Displays the current version numbers of the hardware and the firmware.

- **Cal Brg To**

The direction finder can be calibrated to a given bearing by tuning in a signal, entering the desired bearing and then pressing the **Cal Brg To** button.

- **Cal Sig = 0 and Cal Sig = 9**

When using a receiver with an analog RSSI output, the RSSI signal can be connected to the direction finder allowing it to read the RSSI value and output it with the bearing. Default calibration constants are provided for the ICOM R8500, the AOR AR8600, and the AOR AR5000. To calibrate another receiver connect the RSSI signal to the RSSI input and disconnect the receive antenna. Press the Cal Sig = 0 button. Next connect the antenna and tune in a signal that registers S9 on your S meter and then press Cal Sig = 9.

Note: The ICOM R1500 and R2500 do not have analog RSSI outputs so the RSSI readings will be obtained via the USB connection to the receiver.

- **Defaults**

Pressing the Defaults button will cause the direction finder to reset all its parameters except the IP parameters to their default values.

- **Reset**

Pressing the Reset button will cause the direction finder to reboot. When this occurs the TCP/IP connection with the MPT User Interface will be dropped and a new connection will need to be established.

- **Attenuator**

The attenuator check box turns on and off the attenuator

- **Auto Output**

When the auto output is checked the direction finder outputs a bearing when it receives a signal. If the auto output is not checked then the user software must poll the DF to obtain the bearing.

- **Filter**

The MPT uses the audio from the receiver to determine the bearing of the RF emitter. In doing so it superimposes a tone on the received signal at the sweep frequency. This tone is annoying for operators to listen to, so a notch filter is built into the MPT to remove the tone from the audio. Unchecking the filter check box will remove the filter and allow the user to hear the tone.

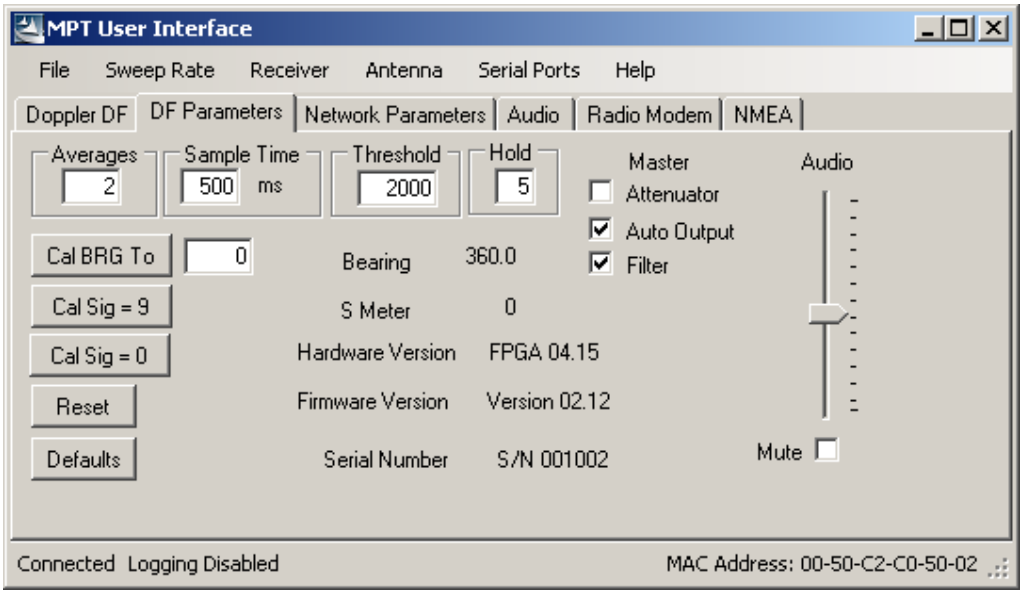


Figure 13: DF Parameters Page

All controls that are disabled are currently not being used and are included for future features.

NETWORK PARAMETERS

The MPT allows the user to set the network parameters if it is going to be connected to a network that does not support DHCP or directly to the computer. To change these parameters select the Network Parameters tab to show the following dialog.

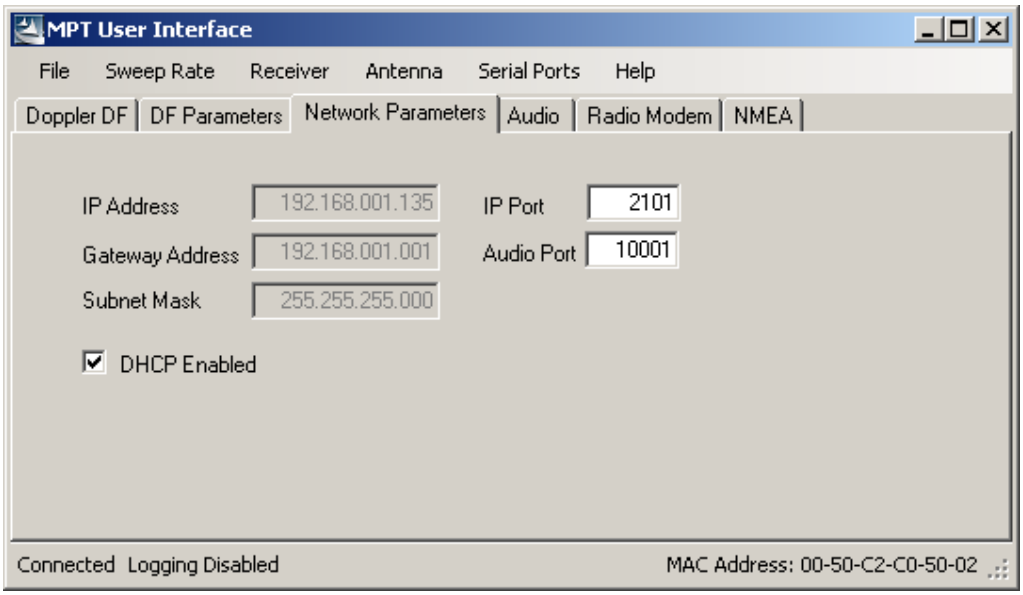


Figure 14: Network Parameters Page

If the MPT will not be used on a network that supports DHCP, uncheck the **DHCP Enabled** check box. Then enter the **IP Address**, the **Gateway Address** and the **Subnet Mask**. If the IP port is changed it may be necessary to start a ***new connection.*** If the DHCP Enabled check box was unchecked and it is then checked it will be necessary to power down the unit, connect the unit to the DHCP enabled network, and then power the unit back up. The user interface will require a ***new connection*** after this is completed. See the ***Network Connection*** paragraph in Getting Started.

The IP port may need to be changed if the IP port interferes with another device on the network.

AUDIO

The MPT digitizes the receiver audio and it can send this audio over a LAN IP connection or the crossover connection. The tab page for configuring the audio is shown below.

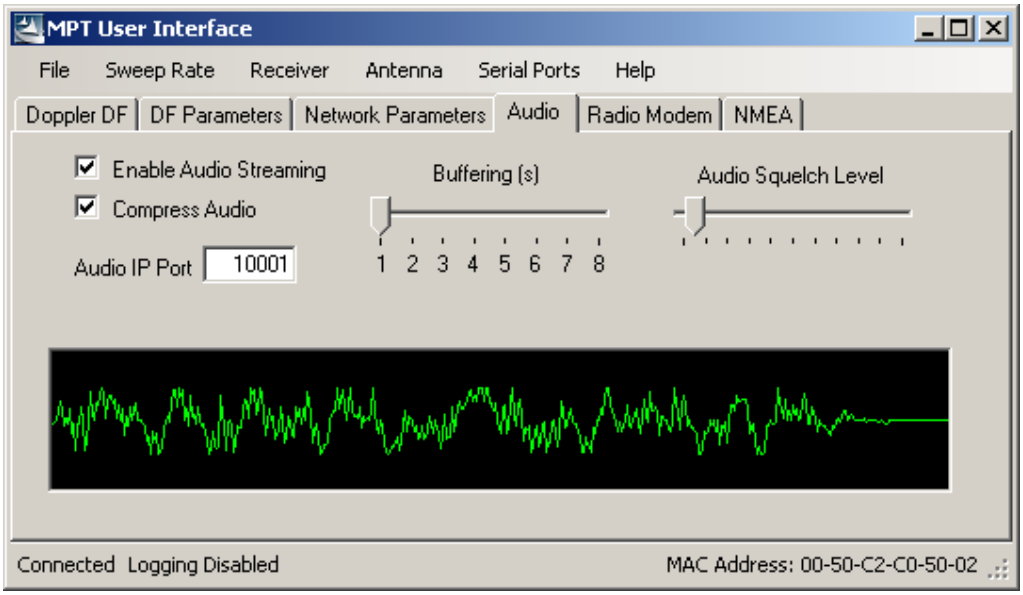


Figure 15: To Listen to Audio Enable Audio Streaming

- **Enable Audio**

To enable audio streaming check the Enable Audio Streaming check box

- **Compress Audio**

To compress the audio using A-Law compression, check the compress audio check box. To send the audio uncompressed uncheck this check box.

- **Buffering**

The PC buffers the audio prior to playing it. Typically 1 second of buffering is sufficient; however, if your network is slow or has significant delays then the audio may be choppy. If this occurs increase the buffering.

- **Audio Squelch Level**

The MPT only streams audio when the audio level is above the squelch level. Typically any value of audio that breaks the receiver squelch will also break this squelch

- **Audio IP Port**

This number sets the IP port number that the audio will be streamed on.

RADIO MODEM

The radio modem page is used to configure the MPT for remote use with a radio modem.

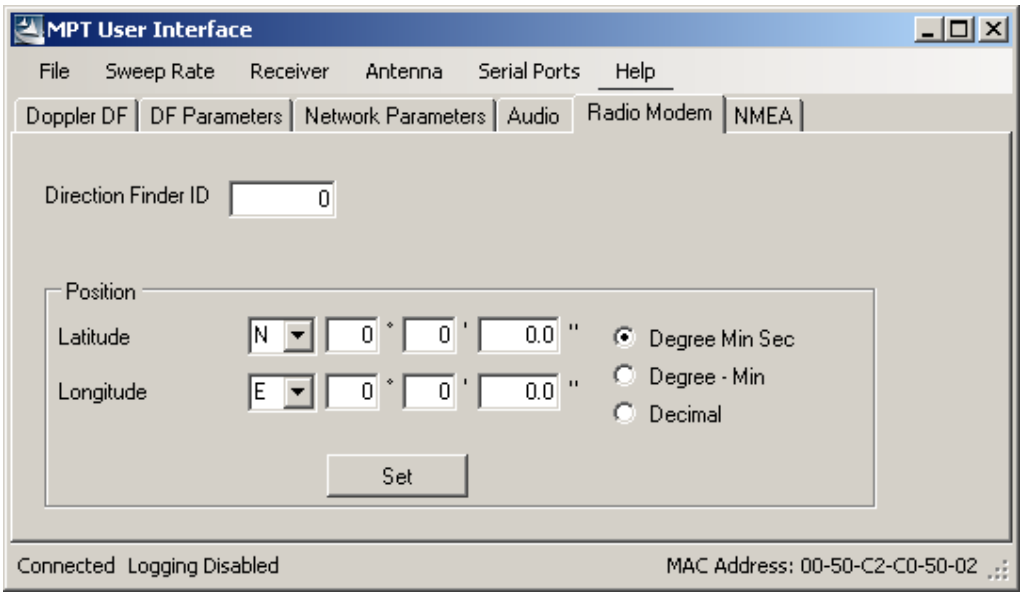


Figure 16: Enter the ID and the Site Position

- **Direction Finder ID**

Each direction finder on a radio modem based networked must have a unique identification number. Enter this unique ID in the text box and press enter.

- **Position**

The MPT sends its position to the control site each time the bearings are transmitted via the radio modem. I there is a GPS device connected to the MPT then the position obtained by the GPS will be used. If a GPS is not used, the user must enter the geographical location of the direction finding site.

NMEA

The NMEA page is used to display the GPS and compass data.

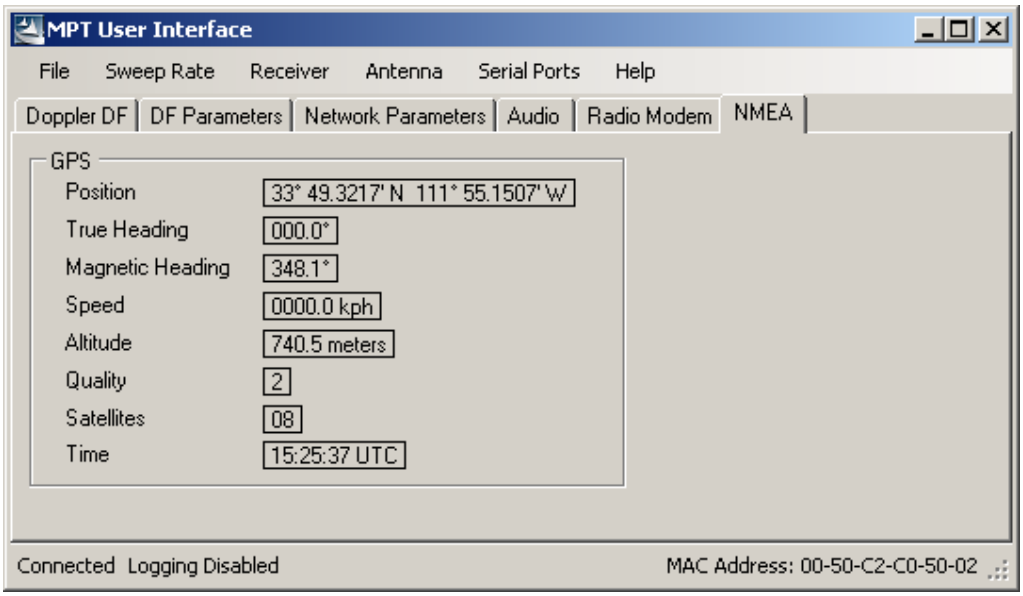


Figure 17: Displays GPS and Compass Data

Chapter 5

DOPPLER DF DISCOVER

Doppler DF Discover is used to retrieve the IP Address, IP Port, and MAC address of a MPT direction finder. To use it connect the direction finder to a network or directly connect it as discussed in the ***Getting Started*** chapter.

Next power up the direction finder, wait 10 seconds, and then launch Doppler DF Discover. The following dialog will appear on the computer screen.

Figure 18: Initial Dialog

Within 5 seconds the information in the dialog box will be update to something similar to what is shown below

Figure 19: Dialog Contents after MPT DF is Found on the Network

Make a note of the IP Address and IP Port for future reference.

Chapter 6

WEB BASED INTERFACE

The MPT also provides a web based interface that allows the user to make many of the same adjustments to the MPT parameters. To access the web based interface launch a web browser (Internet Explorer, Google Chrome, etc.) and type in the IP address of the direction finder. The following page will be displayed.

Figure 20: Home Page for the Web Based Interface

Use the navigation tabs on the left to select the particular settings to be changed. The settings are password protected. The default user name is **doppler** and the default password is **admin**. These can be changed using the **Change Password** tab.

Chapter 7

MPT FLASH

From time to time it may be necessary for Doppler Systems to make firmware changes to the MPT to add new features or to make minor bug fixes. These firmware changes will be available on our web site www.dopsys.com for downloading and installation into the MPT. The MPT flash utility is used to upload the new firmware into the MPT.

To use MPT flash connect the direction finder to the network or directly to the computer as described in the ***Getting Started*** chapter. Power the MPT and wait for 15 seconds. Launch the MPT Flash application and wait for it to discover the direction finder. When it does an **Open File** dialog will be displayed. Select the new file that was downloaded and open it. The flash programming should begin immediately and the progress shown on the screen.

Warning. Do not exit MPT Flash, power down the unit during the flash programming, or interrupt the flash programming sequence. Doing so may result in an unusable direction finder.

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