Hydrophone Option Bird Dog 3-3 System

Hydrophone Tester

User's Manual

Bird Dog 3-3 System User's Manual

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1 Introduction

1.1 HydroTest System description

The Bird Dog 3-3 Hydrophone Option allows testing of both acoustical properties and electrical properties of the Hydrophone unit. For acoustical testing, a sound tube is used to produce an acoustical signal. The Hydrophone element is placed under the sound tube and receives the selected acoustical signal. The HydroTest software has two modes for analysis. In the first mode the program compares the acoustic response of the Hydrophone to a stored "good" response. In the second mode the program compares the response to a "standard" Hydrophone connected to a second channel on the Hydrophone tester. The user selects either a sweep frequency or a fixed frequency for use in the acoustical test. The standard sound tube has been designed to output a useable signal from 100 to 500 Hz. The unique design of the sound tube allows the Hydrophone unit or Hydrophone streamer section to be placed underneath the sound tube. Placement of the Hydrophone is very critical for accurate comparison tests, each hydrophone must be placed in identical position and orientation under the sound tube for accurate comparison tests.

The Hydrophone tester also performs electrical impedance and impulse response tests of the Hydrophone Unit. The user selects the frequency to be used for the impedance test, and the tolerance setting for the test. The HydroTest software has two modes for analysis of the Impulse response. In the first mode the program compares the Impulse response of the Hydrophone to a stored "good" response. In the second mode the program compares the Impulse response to a "standard" Hydrophone connected to a second channel on the Hydrophone tester. The phase and amplitude of the impulse response is compared against the standard response and the error is shown on the screen.

Tolerance settings are used to allow simple PASS/FAIL results for each of the critical tests.

All tests results can be saved to a database for statistical results and documentation of tests. Failed tests are easily seen in the database.

1.1.1 Hydrophone Option System Description

Basic Bird Dog 3-3 system is an independent analog to digital acquisition system, especially designed for quality control testing and repair of seismic geophone units and geophone strings. The Hydrophone Test Options is used with the Bird Dog 3-3 unit to test Hydrophones, and the Vibrator QC option is available for testing servo hydraulic vibrators.

The Bird Dog 3-3 System with the Hydrophone Test Option consists of the following:

- Bird Dog 3-3 – Digital to Analog converter unit with Ethernet interface. Bird Dog 3-3 is a 24 bit acquisition unit. The Bird Dog 3-3 also has a 16 bit D/A output..
- Computer – The Bird Dog 3-3 unit connects to a computer with Windows 98, Windows XP, Windows NT, Windows 7, or Windows 8 operating system and an Ethernet Network Interface Card (NIC).
- Bird Dog 3-3 software operates on the computer and communicates to the Bird Dog 3-3 unit. The Software package allows viewing, analysis, and storage of the acquired signals.
- Audio Amplifier
- Hydrophone Sound Tube
- Connection cables are included to connect:
    - Power (11-18 VDC)
    - Hydrophone being tested
    - Leakage cable to test leakage of geophone string
    - Ethernet cable to connect Bird Dog 3-3 to computer
    - Hydrophone Test Cable

1.2 Bird Dog Software Installation and Setup

Create a new directory on the hard drive and copy all files from installation CD to that directory. For Windows Vista computers, the *.exe file cannot be in the “program files” directory.

Program updates are available on at www.seismicsource.com

- GeoTest.exe – Geophone Test program used to analyze and store the geophone test signals and results.
- HydroTest.exe – Hydrophone Test program
- VScope and Source Signature Programs– allow many options for the advance user. Export to SEG-Y files, FFT analysis, and detailed troubleshooting are just a few of options available with the Vscope and Source Signature programs.

2 Ethernet Setup

2.1 TCP/IPv4 Settings

Before the Computer can be connected to the Bird Dog 3-3 unit, it is necessary to setup the Ethernet port. Normally, it is necessary to set up a fixed TCP/IPv4 address for the computer to communicate with the Bird Dog 3-3 unit.

IPv4 Address SET to FIXED IP ADDRESS – 10.0.0.101

Subnet mask set to 255.0.0.0

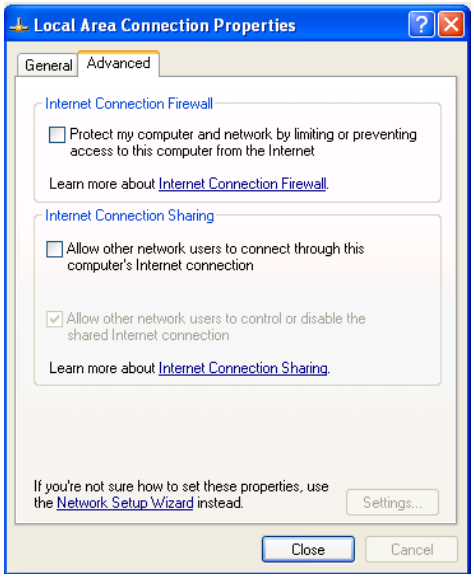
All Firewalls Disabled

2.2 Firewall

It is important to disable all Firewalls on the computer. Third party firewall from Norton, McAfee or other companies can completely disable communications between the computer and the Bird Dog 3-3 unit. Typically the Firewall will allow the "ping" command to operate, but will block all other commands and messages.

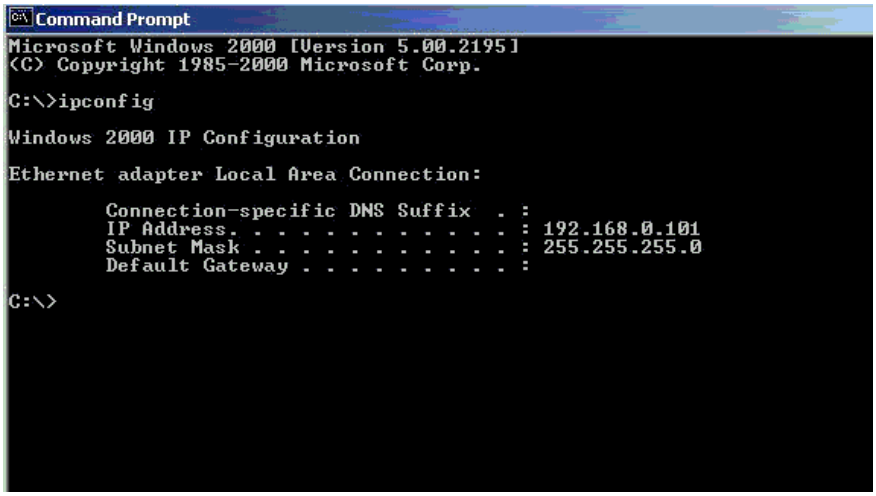
There is a built in Firewall with some Windows operating systems. This should be disabled.

Typical Firewalls will ask if the program should be "blocked". If it is desired to have a firewall enabled when using VScope, always select "Unblock this program" if asked.



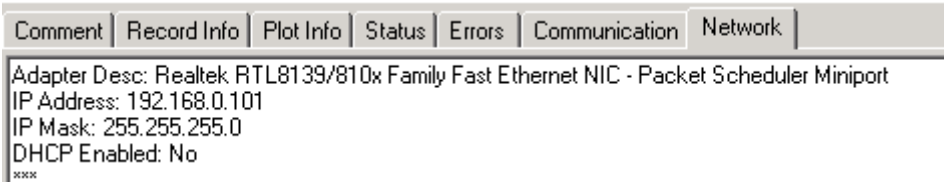
2.3 TCP/IP Verification

To verify that the IP address is correct, select “Start”, then “Run”, then type in “CMD”. This starts the command prompt in Windows (This is similar to the old DOS command prompt). Type the command “ipconfig”. The current ip address 10.0.0.101 should be shown.



Viewing the Network Tab at the bottom of the VScope program can also check the IP address.

The Network Tab shows the current IP address detected by the VScope program.



2.4 Changing To A Different Computer

If the Bird Dog 3-3 unit was previously communicating with a computer with a different address, then the Bird Dog 3-3 unit must be reset (power off then on) for the unit to communicate to the computer with the new address.

2.5 Authentication

With some of the Windows versions there is an additional Authentication Tab. The Authentication must be disabled to operate with the Bird Dog 3-3 unit.

2.6 Additional Ethernet Setup Information

See Section 7 for more information about setting up the Ethernet connection.

3 Cable Connections

3.1 Bird Dog Cable Connections – Hydrophone Test

- Connect Bird Dog 3-3 to computer with patch cable provided
- Connect 11-18 VDC supply to Bird Dog 3-3 power cable. The power connects to the 2 pin connector on the Bird Dog 3-3 unit. Make sure voltage to box is at least 11 volts. The power LED will operate with lower voltage but the unit will not perform properly.
- Connect 12 volt power to Audio Amplifier
- Connect Hydrophone Test Cable to Amplifier and Hydrophone to be tested
- Insert Hydrophone to be tested in the Sound Tube

4 Configuring The HydroTest Program

4.1 Hardware Configuration - HydroTest

Connect and power up Bird Dog 3-3 unit. Start the HydroTest program by double clicking on HydroTest.exe file in Windows Explorer. Verify the correct Bird Dog unit is enabled by selecting menu **Settings->Device**.

If no unit serial numbers are displayed in the window click Auto Detect. It should find all units connected to computer.

Make sure the unit is enabled. A check mark by the serial number shows that the unit is enabled. Just left click the small box next to the serial number to enable it. This feature allows multiple units to be connected through the Ethernet link. All that is needed is an Ethernet hub.

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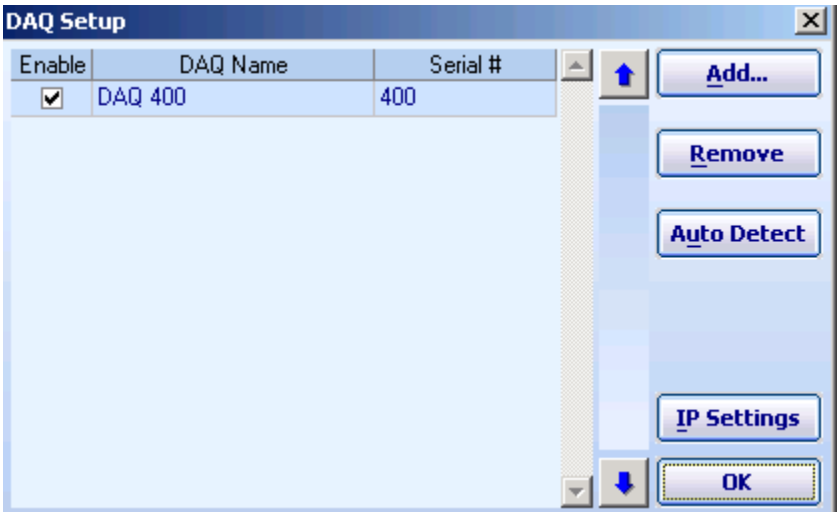


Figure 4.1 Device Configuration

To check that communication with the unit is working properly click the menu **Settings->Device**, then IP Settings button. The device information should appear. If the configuration window does not appear, it means that the unit selected is not responding.

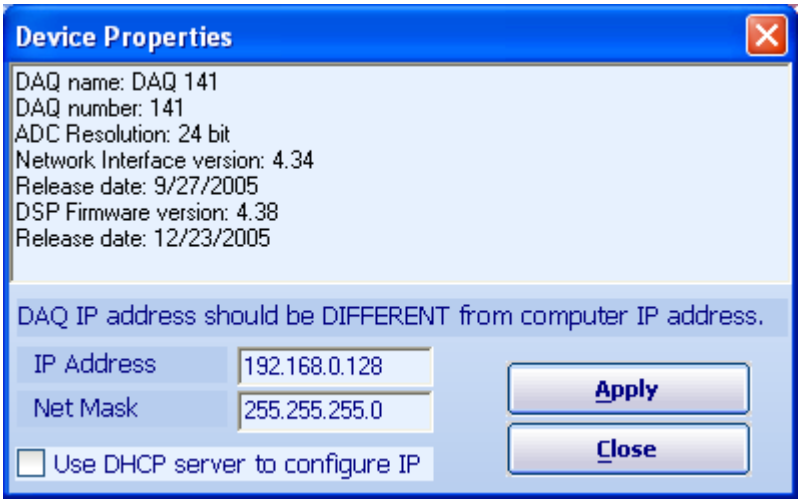


Figure 4.2 Device IP Settings

This is usually caused by improper TCP/IP settings, or Ethernet cable not plugged in properly. The computer or Bird Dog unit may need to be reset if the TCP/IP configuration has changed.

The first three numbers in IP Address of BDII unit should match your computer IP Address (10.0.0.). The last number must be different. It should be in the range from 1 to 253. If your computer uses 101 as the last number in its IP Address then you CANNOT use 101 for the Bird Dog.

Do not change Bird Dog's IP Address unless you have some other device connected to network with the same address. Programming wrong IP Address to the Bird Dog may cause it to stop communicating with computer.

An additional check of communication can be performed by first removing all Bird Dog units from the table. Highlight the unit to be removed then press the Remove button. After all units have been removed, press the Auto Detect button and all units connected to the computer will be added.

Once the unit is setup, there is no reason to return to this menu unless you need to change Bird Dog unit or test the communication link.

5 Program Operation

The main menu of the program is located at the left side of the program window. It allows you to navigate between various modes. They are Test Menu, Database Menu, and Settings Menu.

Test Menu – Is selected for performing Hydrophone Tests

Database Menu – Is selected to view stored data, or to load or create a new database

Settings Menu – Is used to select the basic tests options for the system.

5.1 Database Menu

The **Database** menu allows the user to Create, Rename, Empty, or Delete the database. HydroTest can use different databases to store acquired data. The projects are like folders used to sort and store different data. The program remembers last project and loads it automatically on startup.

After first installing new "HydroTest" program create "New project" to store the data

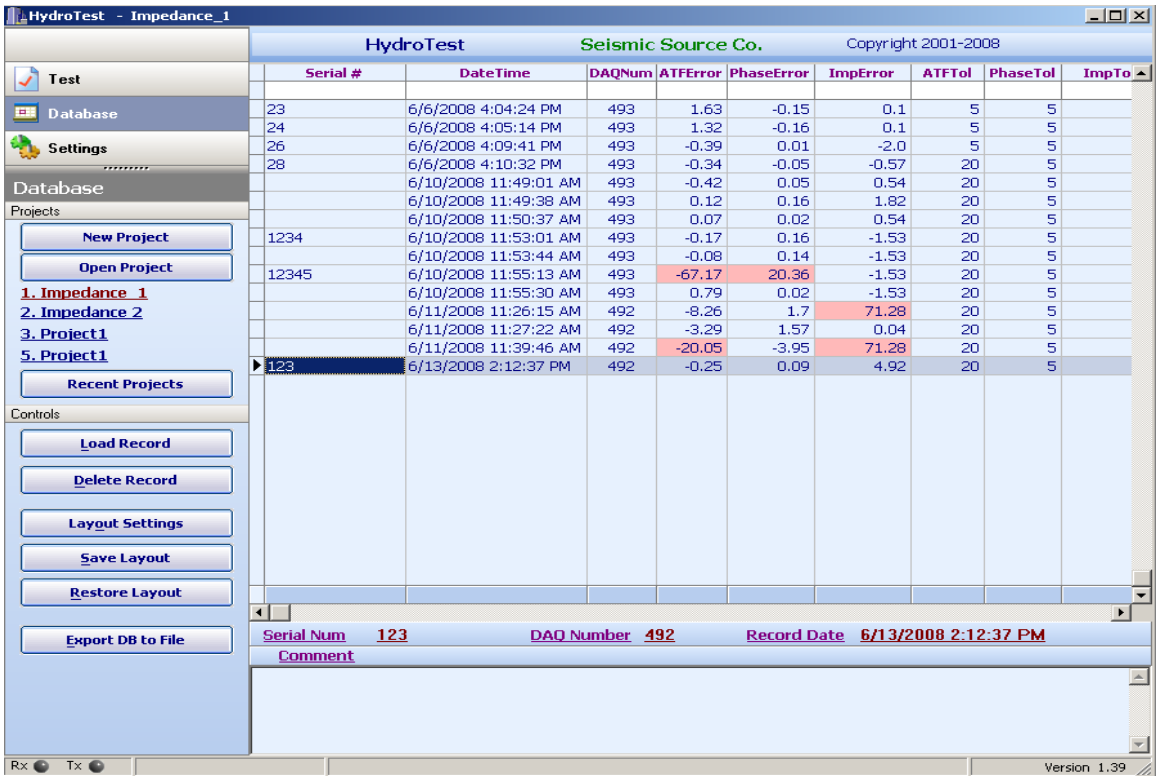


Figure 5.1 File Menu

5.2 Settings Menu

The Settings Menu allows user selectable entries for the HydroTest.

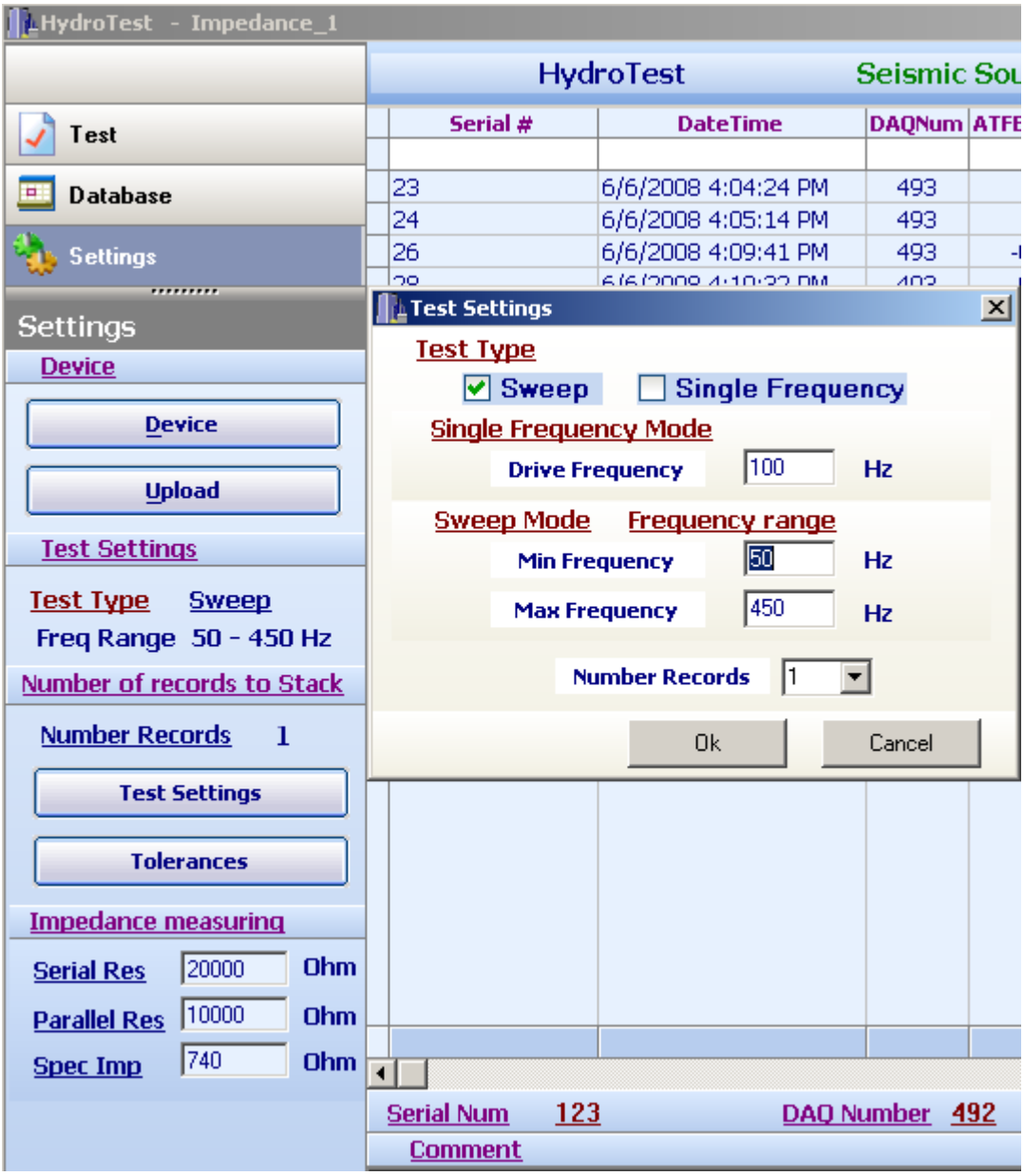


Figure 5.2 Hardware Setup

5.2.1 Test Settings

The Test Type allows two types of acoustical signals to be generated

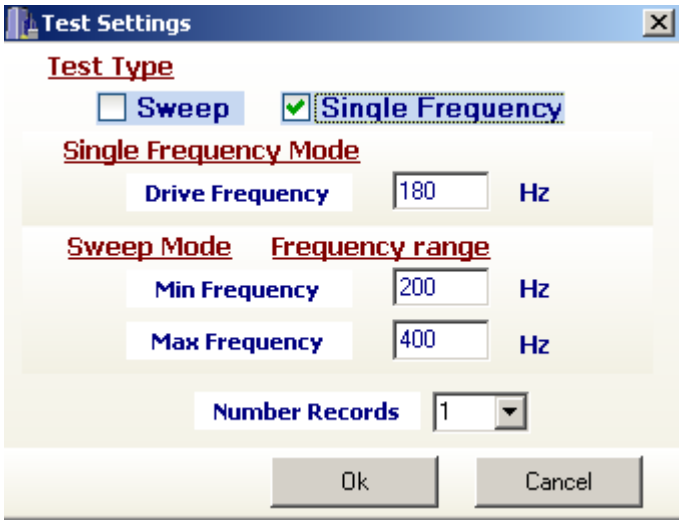
Sweep Mode – the Sound Tube will produce a Sweep frequency from 5 to 500 Hz in 2 seconds. The Frequency Range of analysis should normally be limited to 100 to 400 Hz.

Single Frequency – The sound Tube will output a steady "single frequency " tone for 2 seconds. The frequency is normally set from 200 to 400 Hz.

Single Frequency Mode Drive Frequency – The entry is used when Single Frequency Test Type is selected. The frequency is also used for the impedance test.

Sweep Mode Frequency Range – These entries are used when Sweep Mode Test type is selected. The Minimum Frequency and Maximum Frequency entries are used to set the limits for analysis of the Hydrophone Acoustical signal. Normal entries are 200 to 400 Hz

Number of Records – The Acoustical tests can be averaged over multiple records. For an entry of 1 only one test will be used. An entry of 2 will cause the system to output two acoustical records and average the results. Normal setting is 1



5.2.2 Tolerances

Tolerance Settings for

- Amplitude Error (Acoustic and Pulse Response)
- Phase Error (Acoustic and Pulse Response)
- Impedance Error

Are entered in the Tolerance Settings

The program uses these entered limits to determine if the test PASS or FAIL.

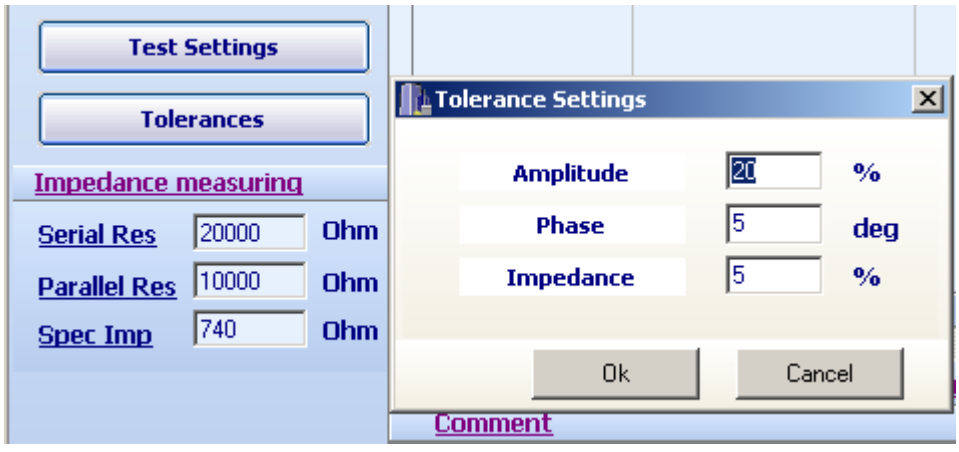
5.2.3 Impedance Measuring

For the impedance test the following entries are available

Serial Resistance – 8,000 ohms - This is the value of the resistance used in the test cable. Normal entry is 8,000 ohms. This value can be adjusted to fine-tune the results. With Test selection set on "Electrical Test" measure the resistance from the RED + Hydrophone 1 and pin CC on the 55 pin BDII connector. (Most Switch boxes will have label with series resistance)

Parallel Resistance – 10,000 ohms – This is the value of the input impedance of the Bird Dog II unit. Normal entry is 10,000 ohms. This value should only be adjusted to fine-tune results.

Spec Imp- Specified Impedance – This is the value of the "target" impedance of the Hydrophone. Some Hydrophones have specified impedance at a given frequency; most hydrophones do not. This entry is normally set to the average impedance value of the "good" hydrophones.



5.3 Test Menu

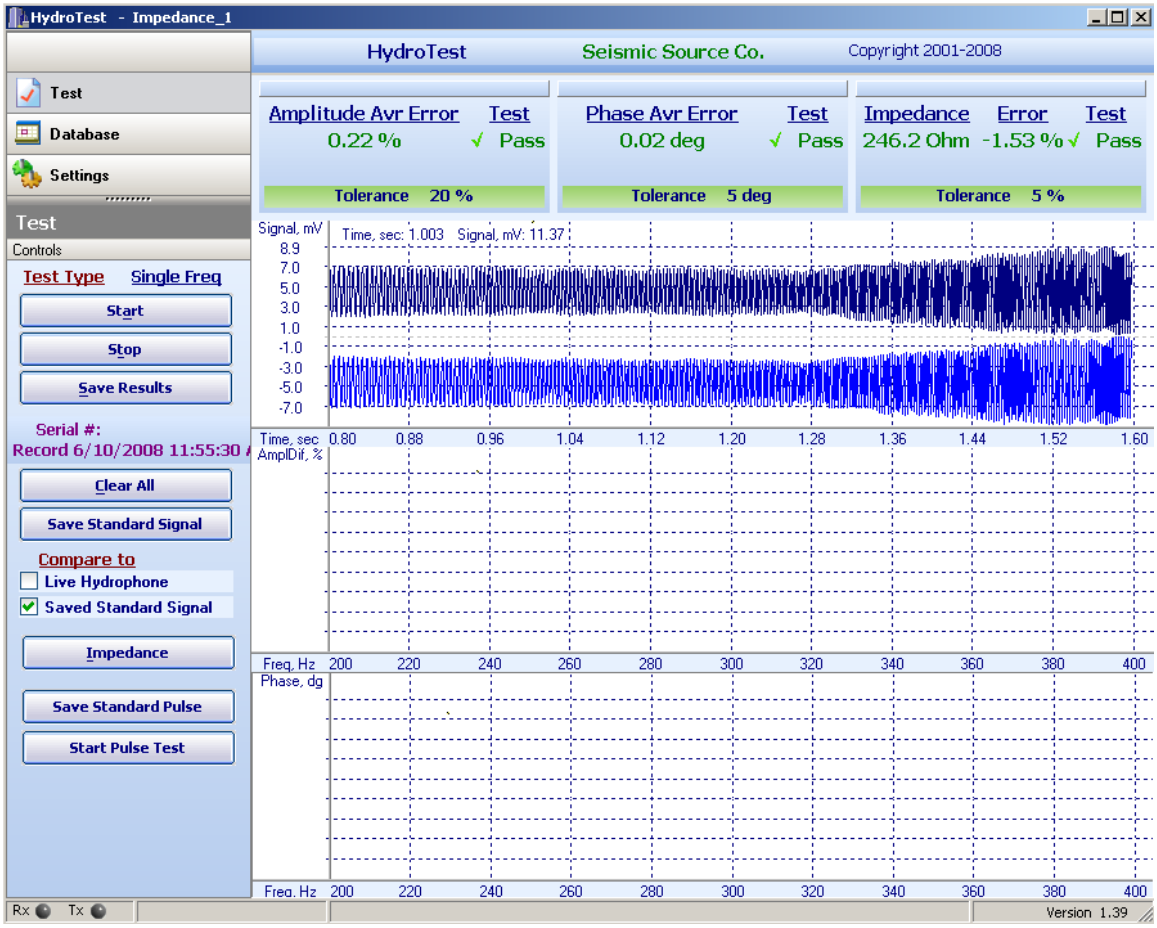


Figure 5.8 Test Mode Window

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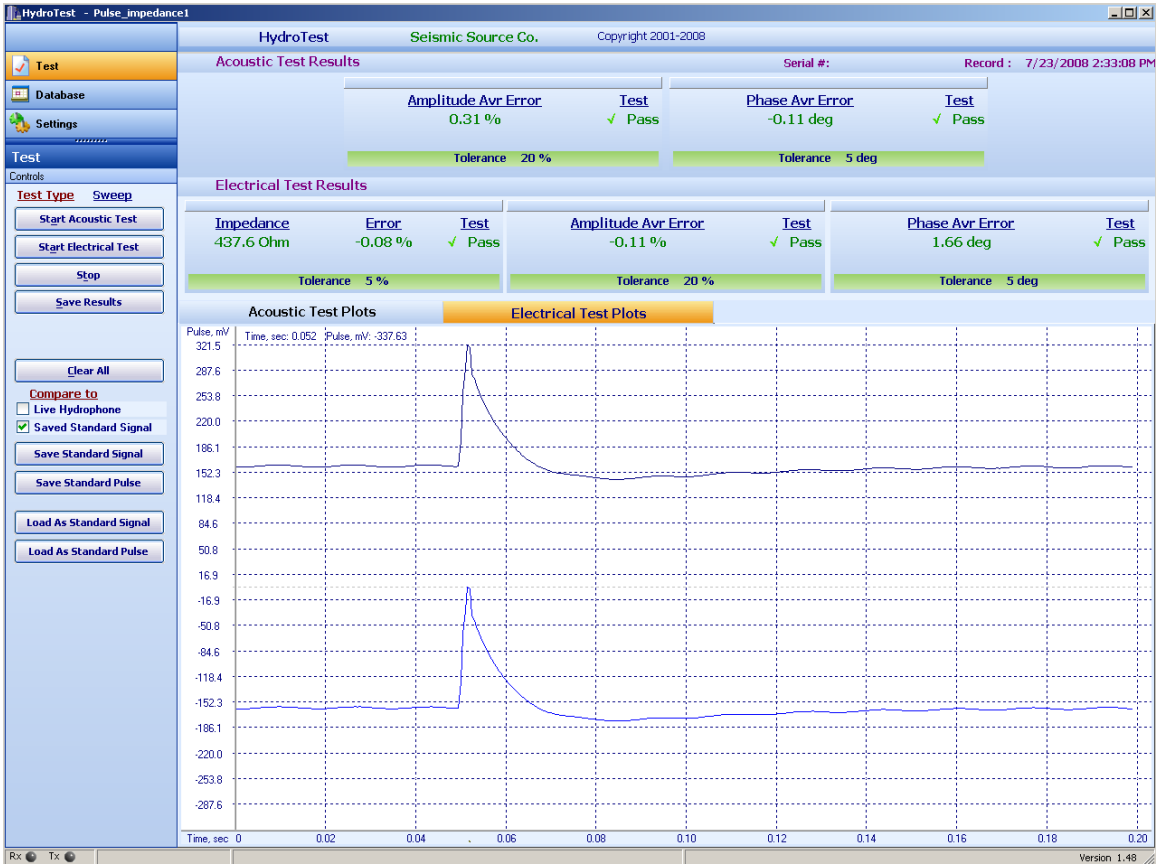
Compare to: selects two types of operation

- **Live Hydrophone Mode**- In this mode, Two Hydrophones are inserted into the Sound Tube. The Test is run and the amplitude and phase response of each Hydrophone is compared.
- **Saved Standard Signal Mode** – In this mode, One Hydrophone is inserted into the Sound Tube. The response of this hydrophone is saved to memory. Press "Save Standard Signal" button in the main Test screen window to save this response. New Hydrophones will be inserted into the tube one at a time and a comparison is computed against the stored response.

5.3.1 Save Standard



The Standard Signal must be stored before test can be performed in “Saved Standard Signal” mode.

The standard signal can be saved for both “Acoustic” and “Electrical Pulse” test

“Save Standard Signal” button – When this button is pushed the acoustic/electrical switch must be in acoustic position, the acoustic tube will generate a tone and the Hydrophone response will be used as the standard

“Save Standard Pulse” button - When this button is pushed the acoustic/electrical switch must be in electrical position, the BDII will generate an electrical pulse and the Hydrophone response will be used as the standard Pulse response

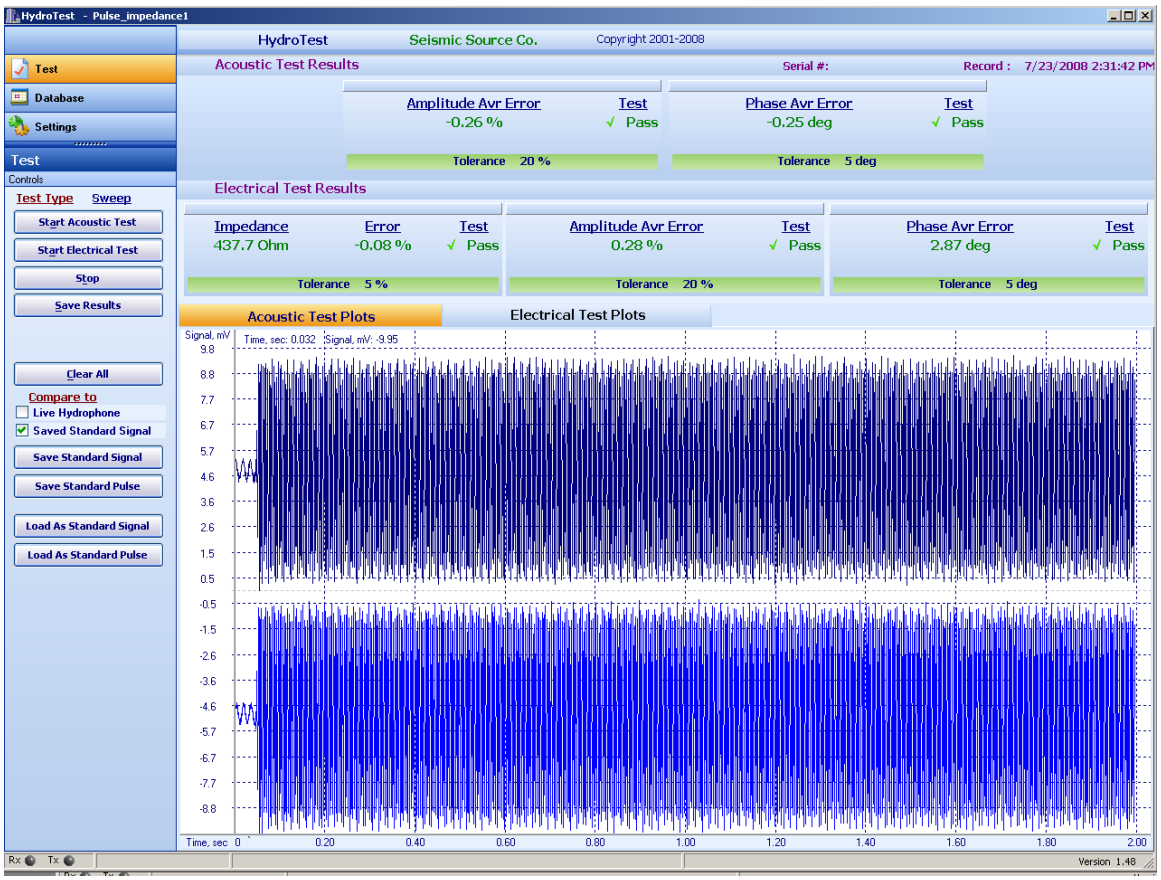
“Load as Standard Signal” button – When this button is pushed the current acoustic response will be used as the standard.

“Load as Standard Pulse” button – When this button is pushed the current electrical pulse response will be used as the standard pulse response.

It is easy, to change the “standard” signals. For this reason, it is important to store the standard signals. The Standard signal should be stored to the database. Find a Hydrophone with a standard response. Perform the acoustic and electrical tests and store them to the database and mark them as the “Standard”.

This “Standard” can then be reloaded into the HydroTest program. After reloading the data, the “load Standard Signal” and “load standard Pulse” buttons can be used to reload the known “good” standard response.

5.3.2 Acoustic Tests



Press “Clear All” button to clear the results stored in memory and shown on the screen.

Make sure the Acoustic/Impedance Switch is set to Acoustic Mode.

Make sure Hydrophone to be tested is placed in exact position under sound tube. Placement error of a few centimeters can cause large amplitude errors.

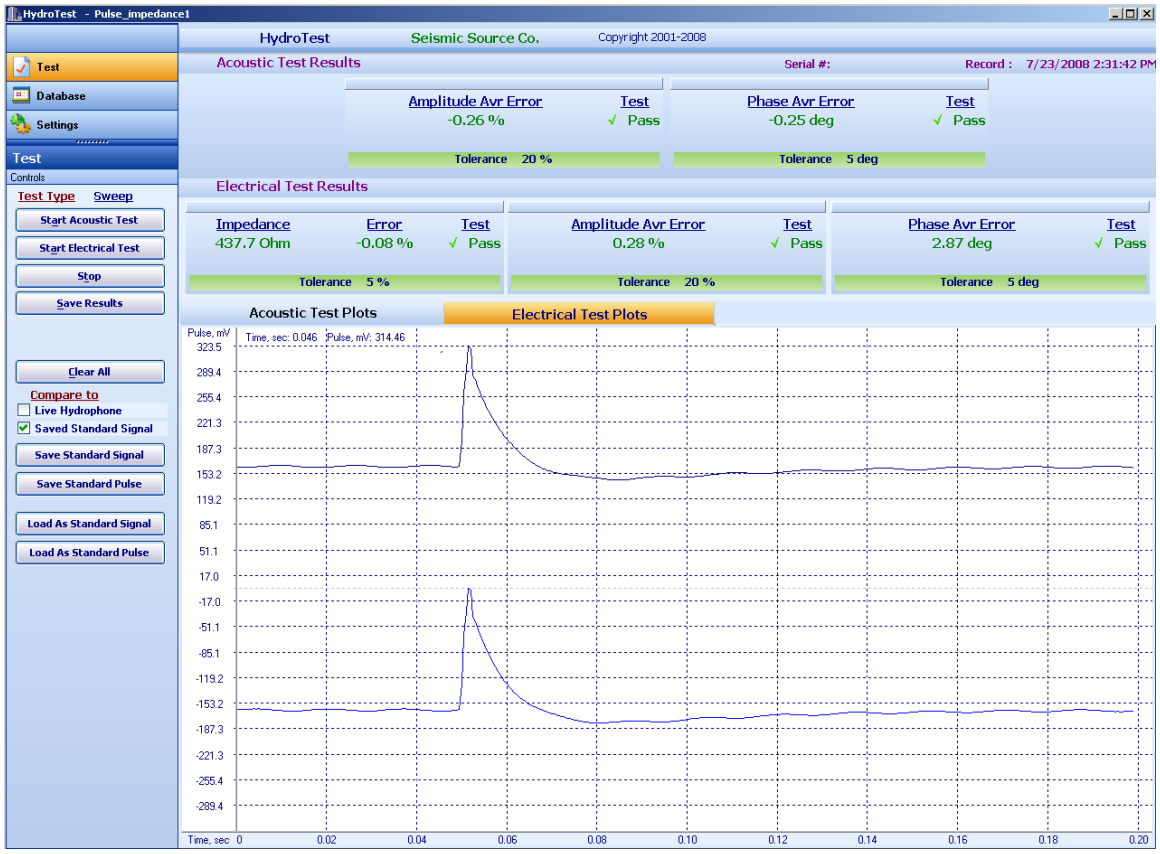
Press Start Acoustic Test button to acquire new test data.

After recording new data the results of the test will be shown on the screen. Depending on the result and tolerance settings the program will mark the results with Pass or Fail. If the tests results are within the user specified limits the tolerance box will be green, if the test result is outside the limits the tolerance box will be red.

The traces show the result of Hydrophone test in the Time Domain, one trace is the “standard signal” and the other trace is the Test signal

Right Click on the Graph to change axis settings or to change plots..

5.3.2 Electrical Tests



Switch the Acoustic/Electrical Switch to Electrical mode

Press “Start Electrical Test” Button

The Impedance test shows the PASS/FAIL results of the Impedance test

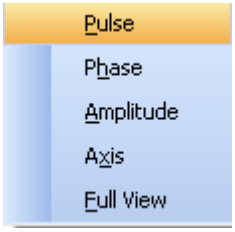
The trace shows the result of Hydrophone Pulse test in the Time Domain.

The Pulse Tests amplitude difference and the phase difference are shown. PASS or Fail results are computed.

Pulse test can operate in Stored Mode or Live Hydrophone Mode.

The traces shows the result of Hydrophone test in the Time Domain, one trace is the “standard signal” and the other trace is the Test signal

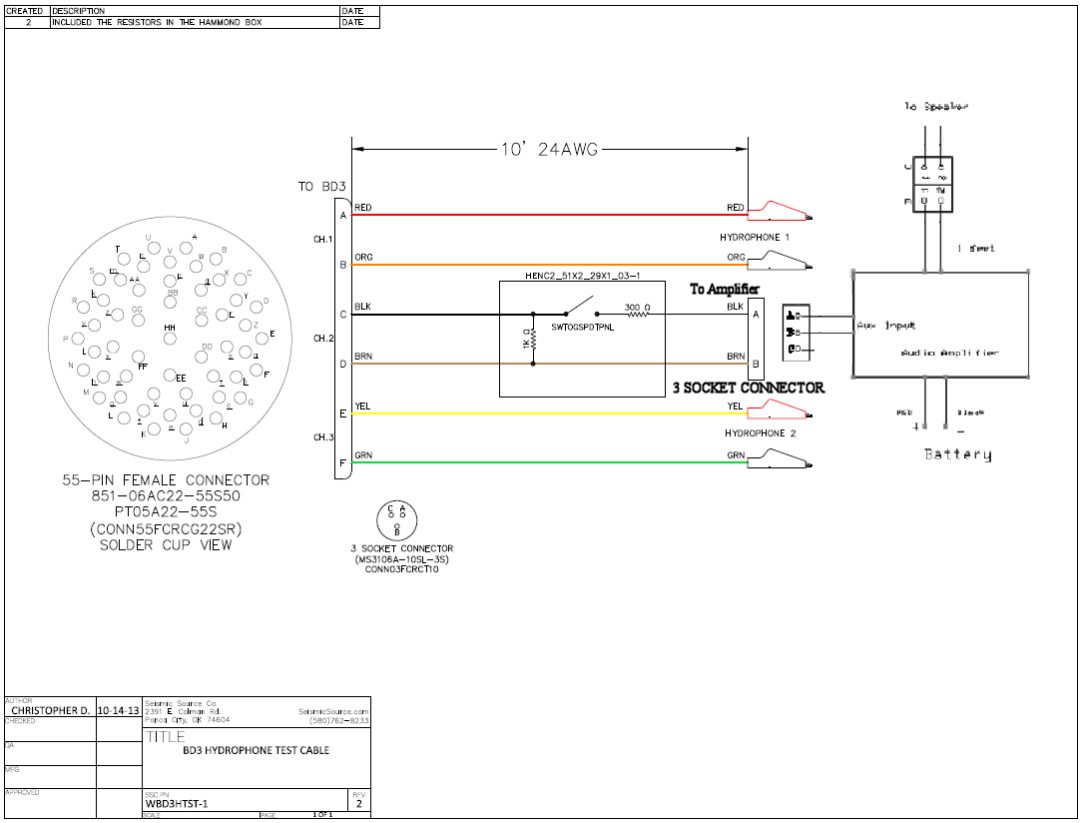
Right Click on the Graph to change axis settings or to change plots..



5.3.2 Storing Data to Database

After acquisition is finished you can save new data to database. To do that click the Save button at the bottom of the main Screen or press “S” key. A window will appear where you can enter a **Serial Number** and a **Comment** for current record. By default this window displays a comment from the previous record.

6.0 Schematics



7 Windows Ethernet Setup

7.1 Windows VISTA Operation

When using Windows Vista Operating System the program cannot be installed in the Program Files subdirectory.

A new subdirectory on the C drive should be made and the program should be copied to this subdirectory.

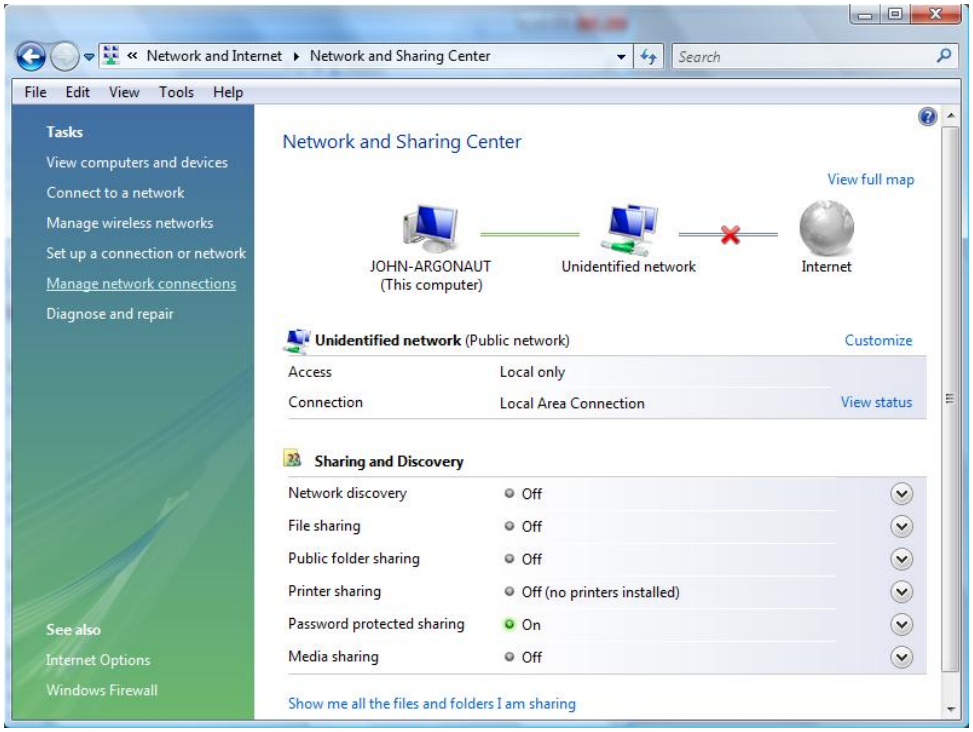
IP address setup must be set to a fixed IP address and all firewalls must be disabled.

Disable the Windows Firewall by selecting the Firewall selection in the "Network and Internet" selection in the Control Panel

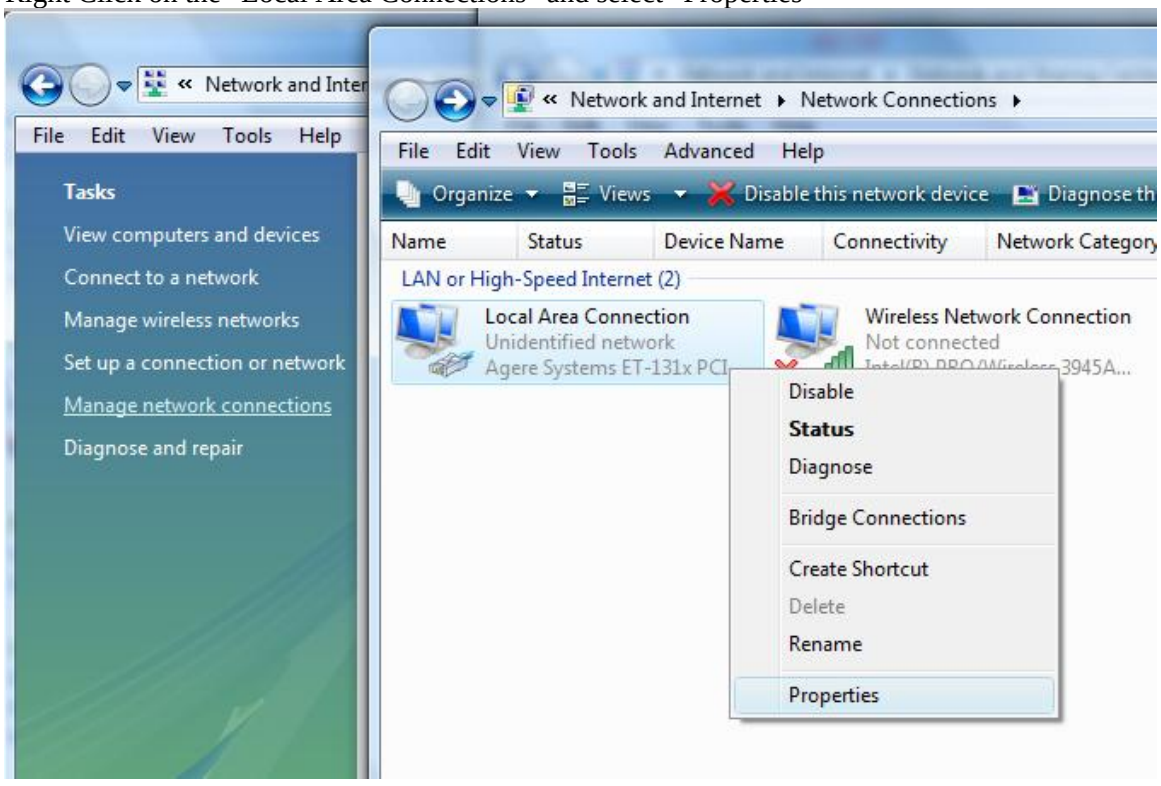
With Windows Vista computer, the Ethernet setup is done by the following procedure:

Go to the Control Panel and select "View network status and tasks".

Select “Manage network connections”



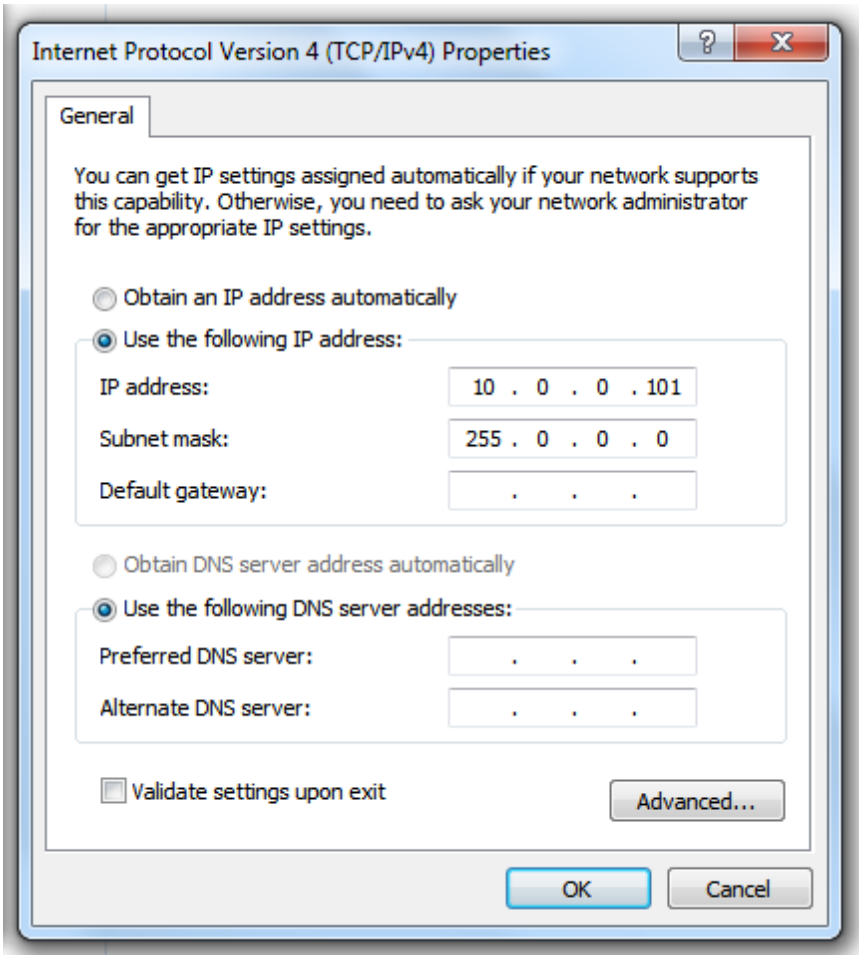
Right Click on the “Local Area Connections” and select “Properties”



It is also recommended to disable all other Network connections. Highlight the other Network Connections (like Wireless) select “Connectivity” and Disable.

Highlight the “Internet Protocol Version 4 (TCP/IP)” and Click on Properties button.

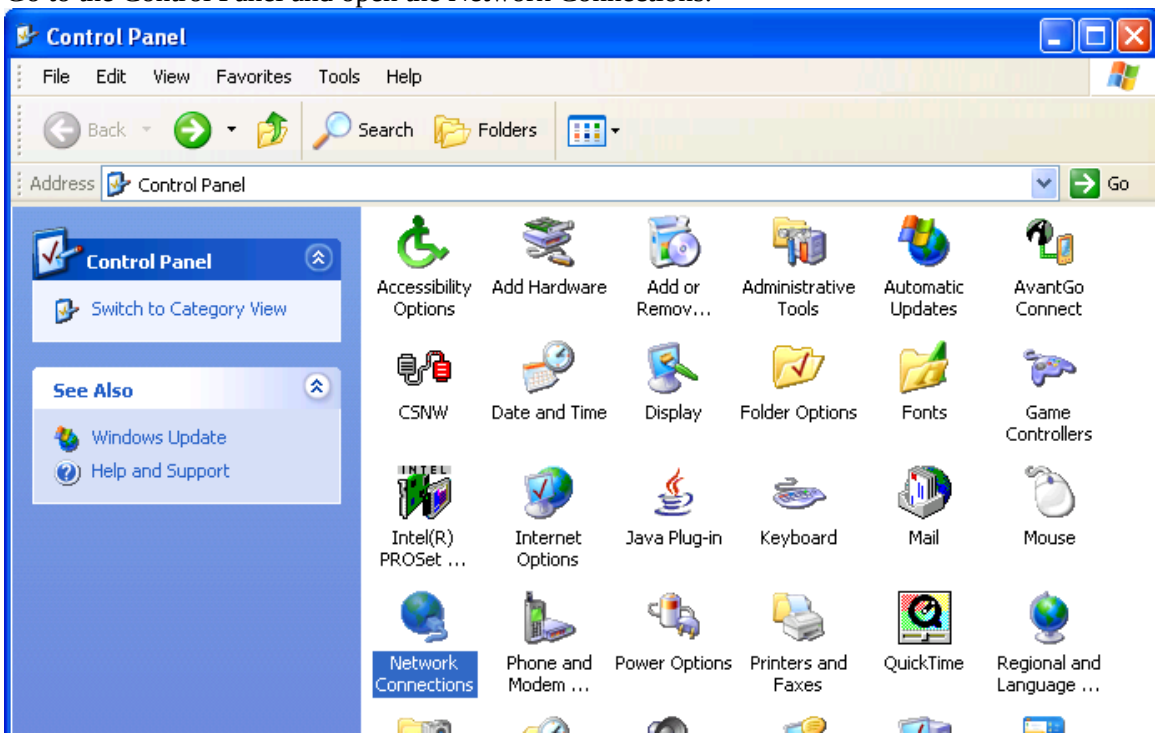
Use following IP address:
IP address 10.0.0.101
Subnet Mask 255.0.0.0
Press OK to accept entries.



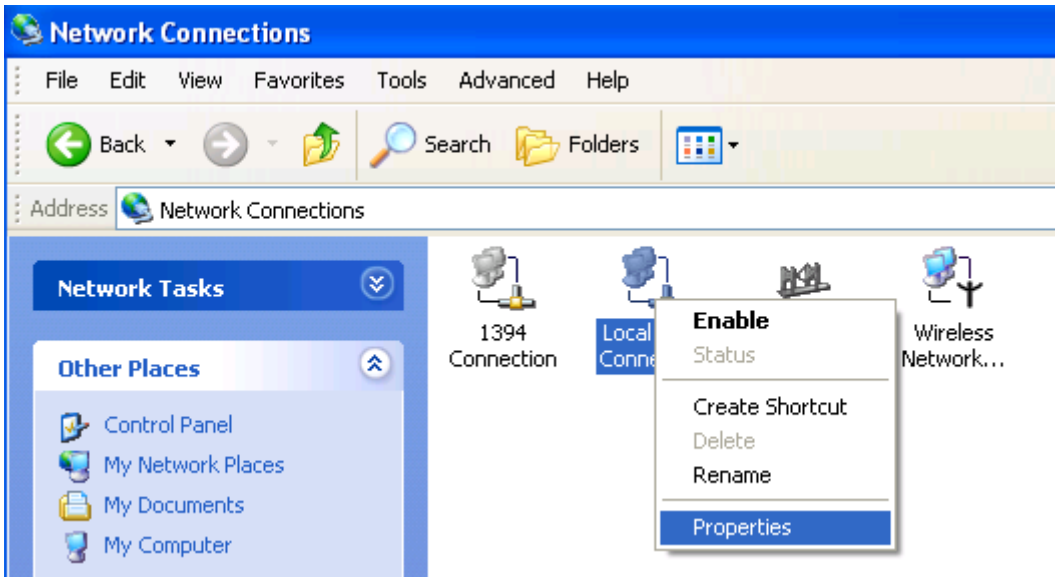
7.2 Windows XP Ethernet setup

With Windows XP computer setup in classic mode, the Ethernet setup is done by the following procedure:

Go to the Control Panel and open the Network Connections.

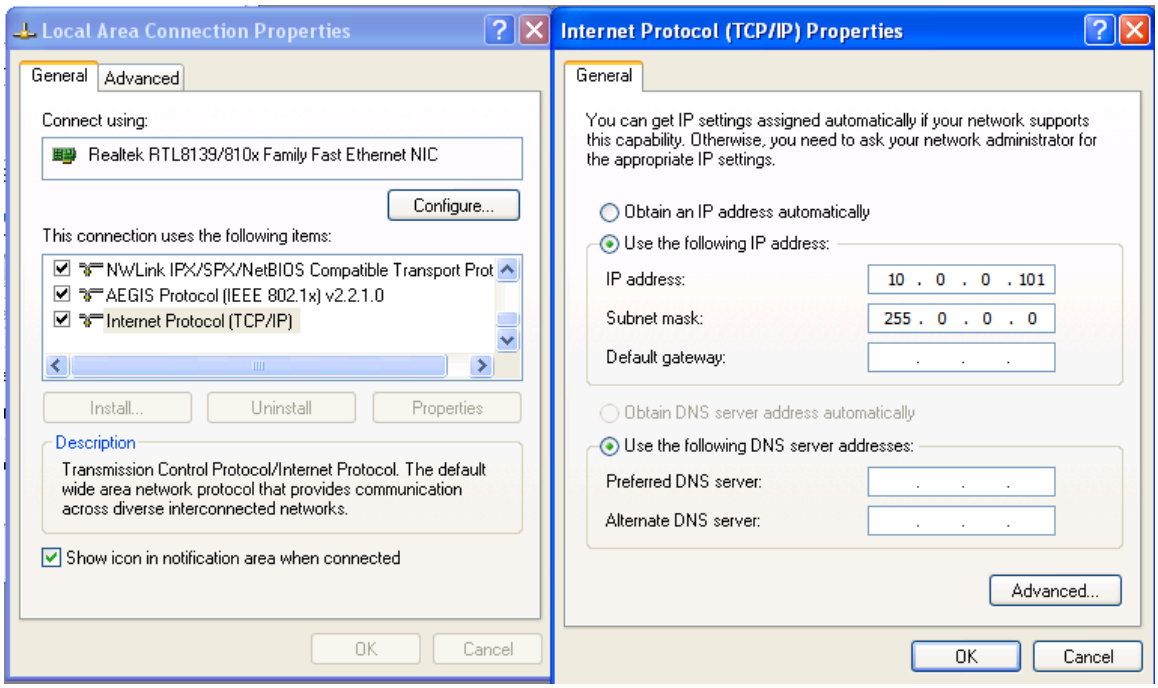


Right Click on the Local Area Connection Icon and select properties.



Scroll Down to the Internet Protocol TCP/IP selection and click on this icon.

Click on Properties button.
Use following IP address:
IP address 10.0.0.101
Subnet Mask 255.0.0.0
Press OK to accept entries.



It is sometimes necessary to reboot the computer to have the new address take affect.

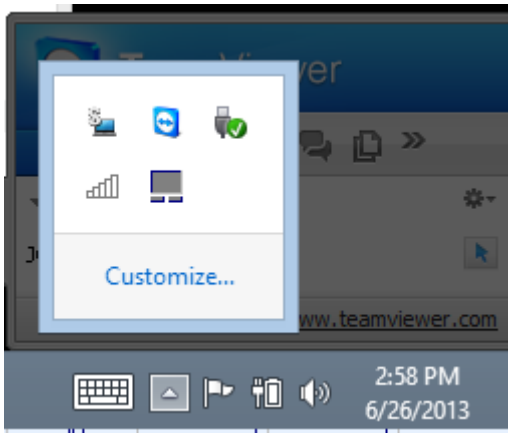
If the Bird Dog 3-3 unit was previously communicating with a computer with a different address, then the Bird Dog 3-3I unit must be reset (power off then on) for the unit to communicate to the new address.

With Windows XP there is an additional Authentication Tab. The Authentication must be disabled to operate with the Bird Dog 3-3 unit.

7.3 Windows 7 and Windows 8

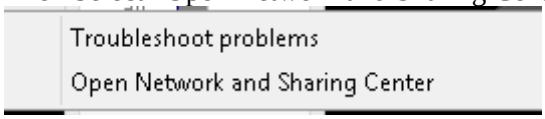
With Windows 7 and Windows 8 there is normally a quick access to the IP settings

In the lower left hand corner, there are multiple icons.

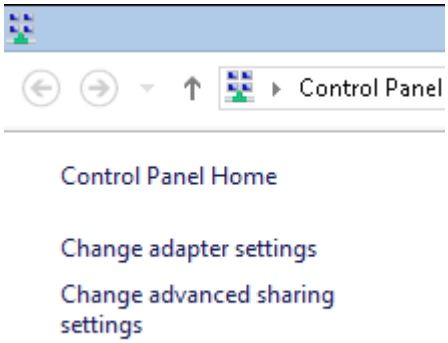


Right Click on the WiFi Icon

Then Select “Open Network and Sharing Center”



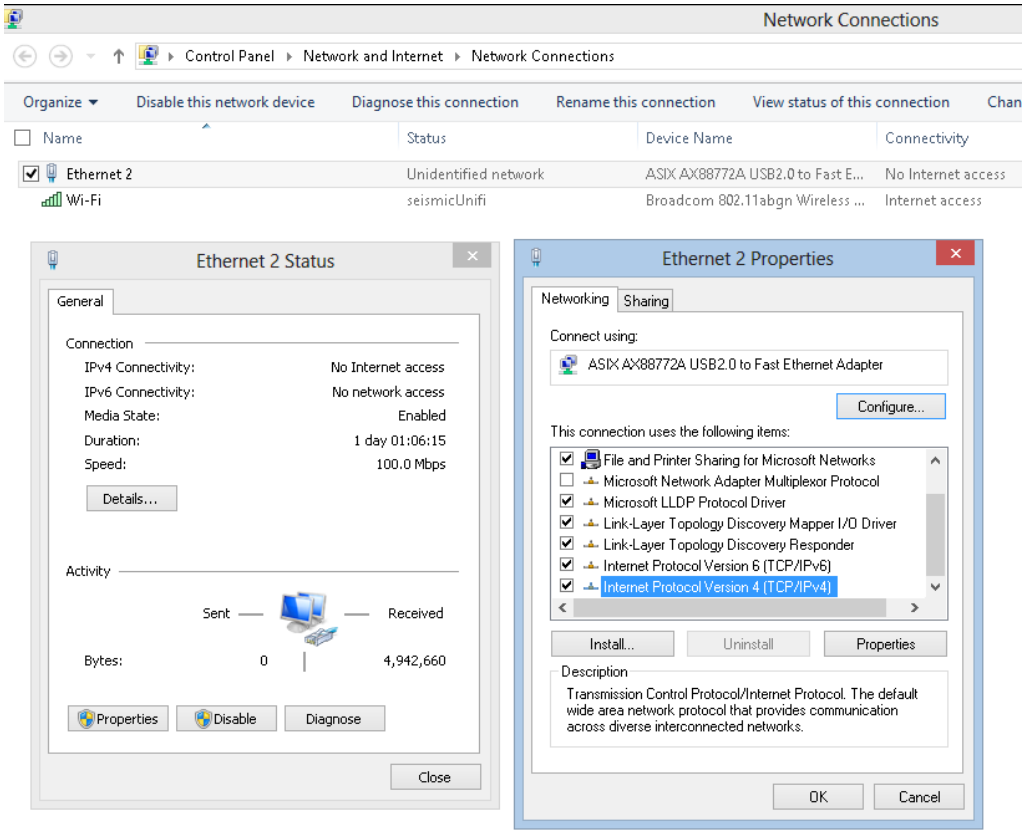
Then select “Change adapter Settings”



Double Click the Wired Ethernet used by the Bird Dog 3-3 unit

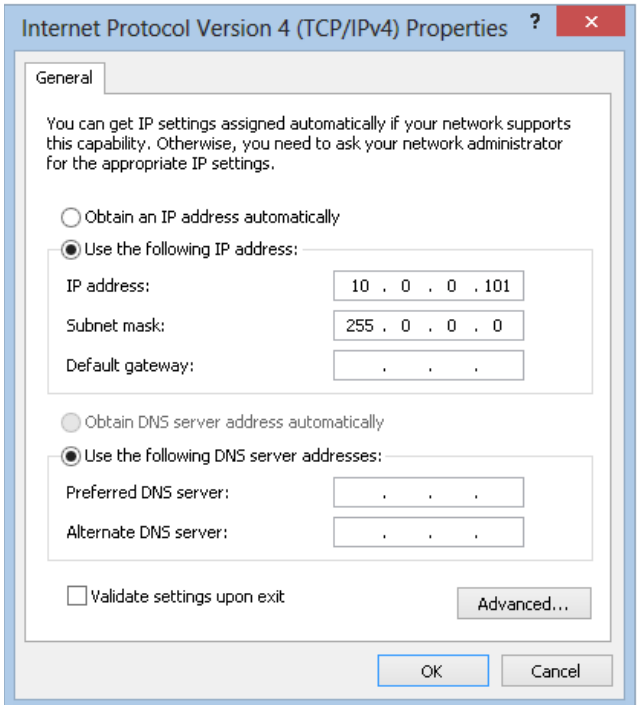
On the Ethernet status screen – click the “Properties” button at the bottom.

On the Ethernet Properties screen select the “Internet Protocol Version 4 (TCP/IPv4)

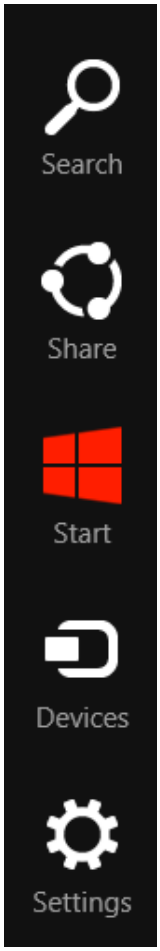


Then set the IP address to a fixed IP

We suggest using 10.0.0.101 for the computer, with the 255.0.0.0 Subnet mask

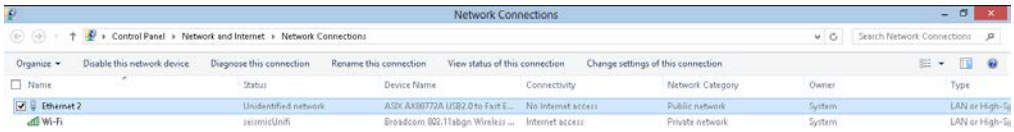


The Network selections can also be access via the windows 8 start menu.



Search for the “network” software

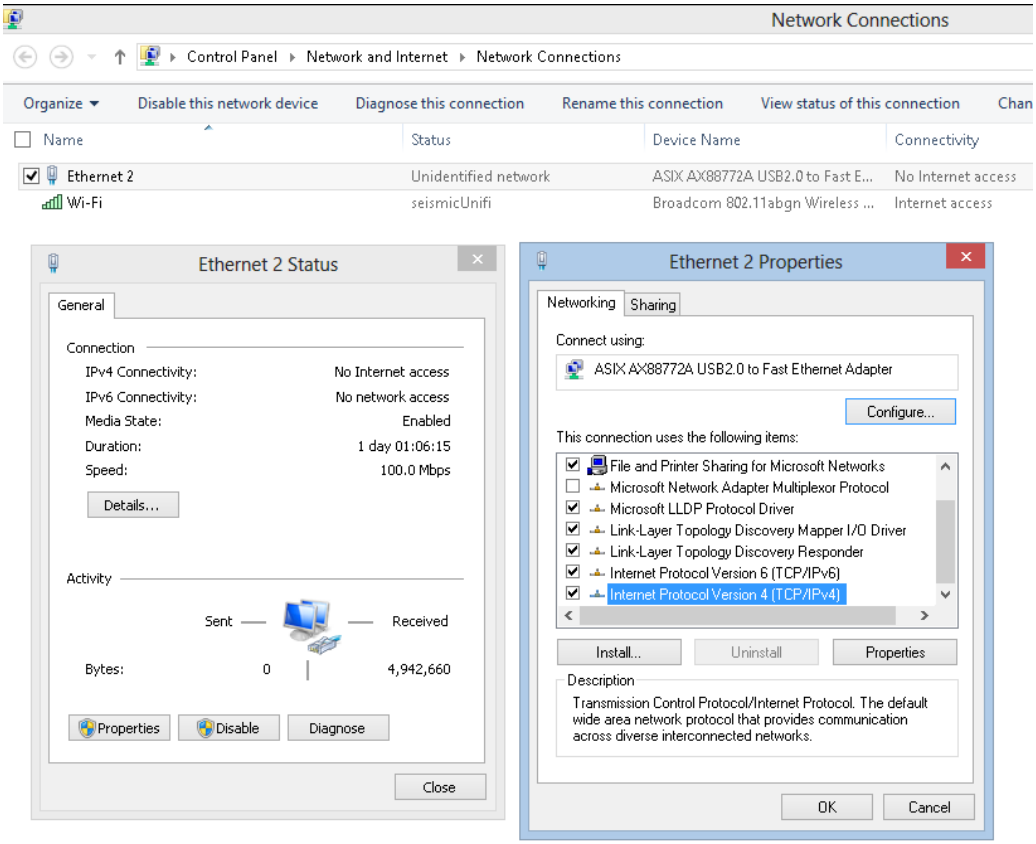
Click on the Network application



Double Click the Wired Ethernet used by the Bird Dog 3-3 unit

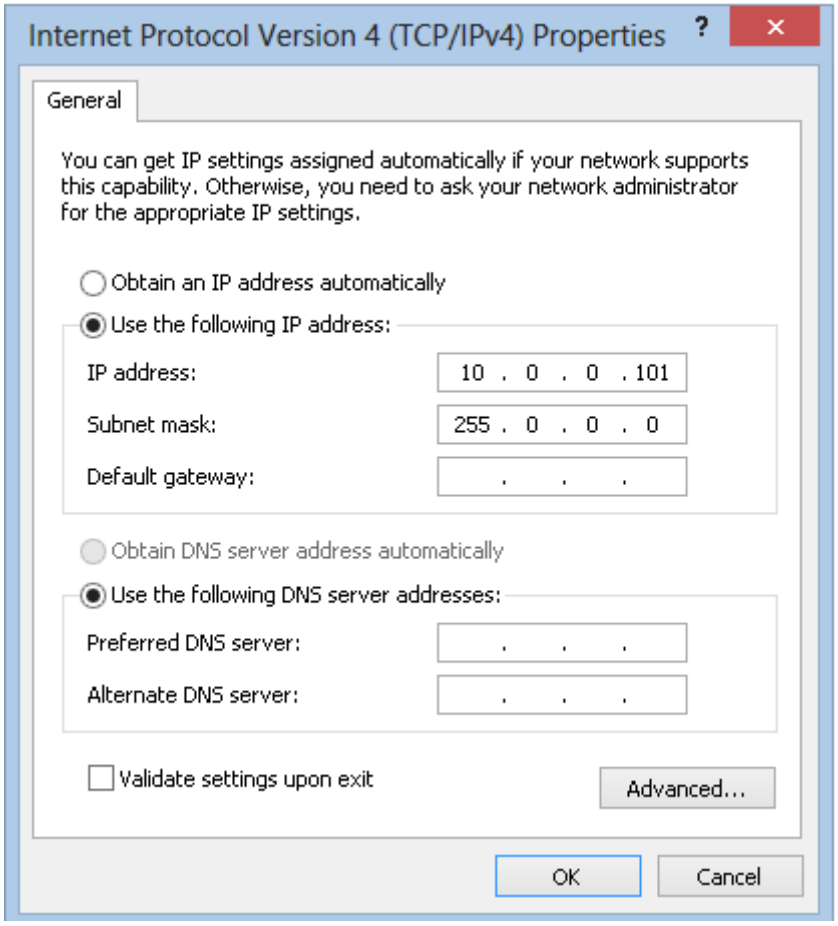
On the Ethernet status screen – click the “Properties” button at the bottom.

On the Ethernet Properties screen select the “Internet Protocol Version 4 (TCP/IPv4)



Then set the IP address to a fixed IP

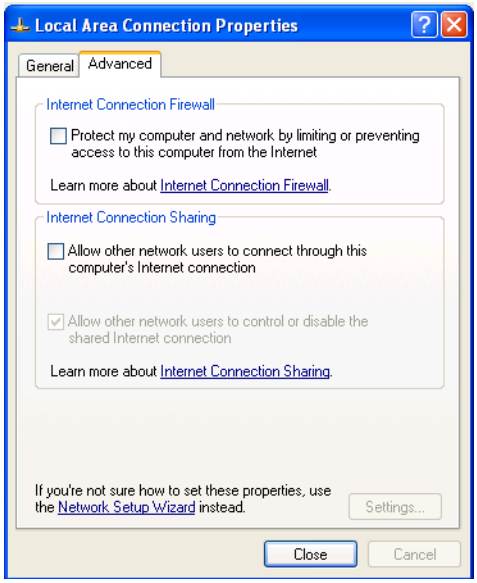
We suggest using 10.0.0.101 for the computer, with the 255.0.0.0 Subnet mask



7.4 Firewall

It is important to disable all Firewalls on the computer. Third party firewall from Norton, McAfee or other companies can completely disable the operation of the BD3 Recording system unit. Typically the Firewall will allow the "ping" command to operate, but will block all other commands and messages.

There is a built in Firewall with Windows XP. This should be disabled. Go to the Advanced Menu of the Local Area Properties and disable the Firewall.



Typical Firewalls will ask if the program should be "blocked", always select "Unblock this program" if asked.

7.5 TCP/IP Verification

To verify that the IP address is correct, select “Start”, then “Run”, then type in “CMD”. This starts the command prompt in Windows (This is similar to the old DOS command prompt). Type the command “ipconfig”. The current ip address 192.168.0.101 should be shown.

Viewing the Network Tab at the bottom of the program can also check the IP address.

The Network Tab shows the current IP address detected by the program.

Also if the Bird Dog 3-3 unit was previously communicating with a computer with a different address, then the Bird Dog 3-3 unit must be reset (power off then on) for the unit to communicate to the new address.

With some of the Windows versions there is an additional Authentication Tab. The Authentication must be disabled to operate with the Bird Dog 3-3 unit.