

YOU'RE HEARD, LOUD AND CLEAR.

**Installation and Operation Manual for
the SBIII Digital Signal Booster
Model 613-8**

**Manual Part Number
7-9485**



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Symbols Commonly Used



WARNING



ESD Electrostatic Discharge



CAUTION or ATTENTION



Hot Surface



High Voltage



Electrical Shock Hazard



Heavy Lifting



Important Information



Changes to this Manual

We have made every effort to ensure this manual is accurate. If you discover any errors, or if you have suggestions for improving this manual, please send your comments to our Angola, New York facility to the attention of the Technical Publications Department. This manual may be periodically updated. When inquiring about updates to this manual refer to the manual part number and revision number on the revision page following the front cover.

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Table of Contents

- Overview**..... 1
 - Down / Up Conversion..... 2
- Unpacking** 3
- Installation**..... 3
 - Location 3
 - Mounting..... 3
 - Connections..... 3
 - Antenna Isolation 4
 - Required Equipment 5
 - Measurement Procedure 5
- RF Exposure (Exposition RF)** 6
- Signal Flow Block Diagram** 6
 - Uplink and Downlink Input Signals 6
 - Channel Module 8
 - Uplink and Downlink Output Signals 9
- Operation**..... 9
 - Subassembly LED's 9
 - Configuring the Channel Module 9
 - Filters Tab 11
 - Command Buttons 11
 - Filter Area 12
 - Status Area 12
 - Link Tab 12
 - Command Buttons 12
 - Link and Settings Area..... 13
 - Status Area 13
 - Admin Tab..... 13
 - System Tab..... 13

Figures and Tables

- Figure 1:** The Down / Up Converter Process 3
- Figure 2:** Cabinet Mounting 4
- Figure 3:** Measuring Antenna Isolation 5
- Figure 4:** Signal Flow Block Diagram 6
- Figure 5:** Booster Cabinet Front View 7
- Figure 6:** Enet Connector 9
- Figure 7:** Enter Your Password 9
- Figure 8:** Web-Page Interface Filters Tab 10
- Figure 9:** Design Filter Interactive Display 10
- Figure 10:** Web-Page Interface Link Tab 11
- Figure 11:** Web-Page Interface Admin Tab..... 12
- Figure 12:** Web-Page Interface System Tab 13

- Table 1:** Model number nomenclature..... 1
- Table 2:** Specifications 2
- Table 3:** Subassembly LED Descriptions..... 8

Appendixes

Appendix A: Front Panel Ethernet Connectivity	14
Ethernet Connectivity	14
Direct Connection	14
Required Equipment	14
Procedure	14
Networked Connection	15
Required Equipment	15
Procedure	17
Appendix B: Changing Your Service Computers IP Address	18

For Class A Unintentional Radiators

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which the user will be required to correct the interference at his own expense.

Pour Classe-A Radiateurs Involontaires

Cet équipement a été testé et jugé conforme avec les limites de la Classe-A des appareils numériques, suivants à la Partie 15 des règlements de la FCC. Ces limites sont conçues pour fournir une protection raisonnable contre les interférences dangereuses lorsque l'équipement est utilisé dans un environnement commercial. Cet équipement génère, utilise et peut émettre des fréquences radio et, s'il n'est pas installé et utilisé conformément aux instructions du manuel, ceci peut causer des interférences dangereuses aux communications radio. Le fonctionnement de cet équipement dans une zone résidentielle est susceptible de causer des interférences mauvaises dans lequel l'utilisateur sera tenu pour responsable de corriger l'interférence à sa propre discrétion.

WARNING: Changes or modifications which are not expressly approved by TXRX Systems Inc. could void the user's authority to operate the equipment.

AVERTISSEMENT: Les changements ou modifications qui ne sont pas approuvés par TXRX Systems Inc. pourrait annuler l'autorité de l'utilisateur de faire fonctionner l'équipement.

ATTENTION: This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

ATTENTION : Cet appareil est conforme à la Partie 15 des règlements de la FCC. L'opération doit se conformer aux deux conditions suivantes: (1) cet appareil ne peut causer d'interférences nuisibles et (2) cet appareil doit accepter toute interférence reçue, y compris les interférences qui peuvent provoquer un fonctionnement indésirable.

OVERVIEW

Signal boosters extend radio coverage into areas where abrupt propagation losses prevent reliable communication. The system receives an RF signal, raises its power level, and couples it to an antenna so that it can be re-radiated. The TXRX model 613-8 family of channelized signal boosters is designed to operate in either the 700 or 800 MHz range. Dual band models are available that include both 700 and 800 MHz systems in the same enclosure box. The system is based on a module design with each module capable of handling 14 or 30 carriers in the uplink and downlink direction. The signal

booster is available in a variety of configurations as shown in **Table 1**. The product model number is used to describe each configuration available. Model number nomenclature is described in table 1.

The size of the system can be tailored to the customers needs by increasing or decreasing the number of carriers used. Each module is bi-directional with one downlink and one uplink signal branch. Each of the two branches in a module are independently tunable to their required pass frequencies via software interface. System specifica-

613-8XX-YYUD-Z-Options (nomenclature breakdown)	
613-8	Designates product as 700 - 800 MHz channelized signal booster
XX	Designates operating frequency band 9A = 806 - 869 MHz 3B = 763 - 805 MHz 3G = 763 - 869 MHz
YY	Designates how many modules used and number of filters available A = 1 module with 14 filters B = 1 module with 30 filters AA = 2 modules with 14 filters each BB = 2 modules with 30 filters each AB = 1 module (700 MHz) with 14 filters and 1 module (800 MHz) with 30 filters BA = 1 module (700 MHz) with 30 filters and 1 module (800 MHz) with 14 filters
UD	Designates the type of output for the uplink and downlink HH = high power uplink and downlink HL = high power uplink and low power downlink LH = low power uplink and high power downlink LL = low power for both uplink and downlink FH = fiber output uplink and high power downlink FL = fiber output uplink and low power downlink HF = high power uplink and fiber output downlink LF = low power uplink and fiber output downlink FF = fiber uplink and fiber downlink
Z	Designates mounting style RM = 19" rack mount G1 = Painted enclosure G2 = Stainless steel enclosure
Options	Designates the options that have been added Blank = no options added N = NFPA compliant (National Fire Protection Association) P = 10 MHz high precision reference D = -48 VDC Q = Fiber input downlink only R = Fiber input uplink only S = Fiber input downlink and uplink
Table 1: Model number nomenclature.	

Frequency Range (MHz)	763 - 775 and 793 - 805 (units sold in USA) 806 - 824 and 851 - 869 (units sold in USA) 764 - 776 and 794 - 806 (units sold in Canada) 806 - 824 and 851 - 869 (units sold in Canada)
Number of Carriers per Module Low Density Model High Density Model	14 uplink and downlink 30 uplink and downlink
Gain Low Power Version High Power Version	80 dB (min) 95 dB (min)
Maximum RF Bandwidth 700 MHz module 800 MHz module	12 MHz 15 MHz
Output Level Low Power High Power	-30 to 10 dBm composite -15 to 25 dBm composite
Maximum Continuous Input Level	Operational: -20 dBm Static w/o damage: -10dBm
RF In/Out Impedance	50 Ohms
Alarms	Form-C Contacts
Power	90 - 250 VAC, 50/60 Hz or - 48 VDC
Operating Temperature Range	-30 °C to +60 °C 95% RH (non-condensing)
Table 2: Specifications.	

tions for the 613-8 family of channelized signal boosters are listed in **Table 2**.

Down / Up Conversion

A channelized signal booster has much in common with a superheterodyne (superhet) receiver. The incoming signal is converted to a lower frequency so that single channel selectivity can be obtained. It is then filtered. Unlike the superhet receiver however, the signal is not demodulated. Instead, it is up-converted back to its original frequency where it is further amplified to reach a useful power level.

Figure 1 shows a simplified block diagram that illustrates the down/up conversion principle. An incoming signal at (Freq IN) is amplified and applied to the first mixer along with a signal from a local oscillator (Freq LO). A third signal at an intermediate frequency (Freq IF) is produced as a result of the mixing. The intermediate frequency is given by the following relationship:

$$(1) \text{ Freq IF} = \text{Freq IN} - \text{Freq LO}$$

The IF signal from the mixer then passes through digital filtering with single channel bandwidth before being amplified and passed on to the second mixer. The second mixer also receives the same local oscillator signal (Freq LO). The result is a mixing product frequency at the output of mixer 2. The output frequency (Freq OUT) is given by the following relationship:

$$(2) \text{ Freq OUT} = \text{Freq IF} + \text{Freq LO}$$

Substituting equation (1) for the “Freq IF” term in equation (2) allows the “Freq LO” terms to be canceled yielding:

$$(3) \text{ Freq Out} = \text{Freq IN}$$

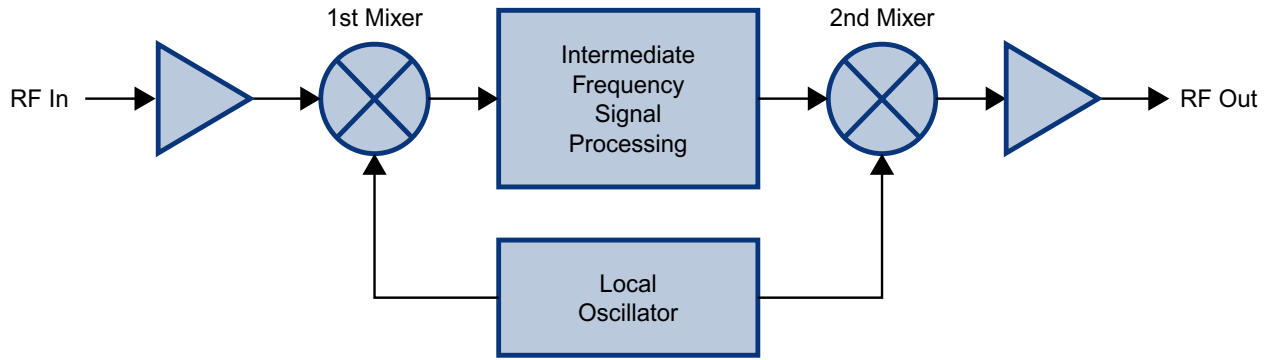


Figure 1: The down converter / up converter process.

The implication of equation (3) is that the frequency stability of the signal that is processed by this type of signal booster is not affected by the frequency stability of the signal booster itself. Frequency stability depends only on the stability of the signal source producing the signal to be boosted. A shift in the LO frequency will cause the center of the filter bandwidth to move with respect to the signal. For very narrow filter widths, the channel modules LO may be locked to a high stability 10 MHz reference.

UNPACKING

It is important to report any visible damage to the shipping company immediately. It is the customer's responsibility to file damage claims with the shipping company within a short period of time (1 to 5 days). Care should be taken when removing the unit from the packing box to avoid damage to the unit.

INSTALLATION

The following sub-sections of the manual discuss general considerations for installing the booster. All work should be performed by qualified personnel and in accordance with local codes.

Location

The layout of the signal distribution system will be the prime factor in determining the mounting location of this unit. However, safety and serviceability are also key considerations. The unit should be located where it can not be tampered with by the general public, yet is easily accessible to service personnel. Also, consider the weight of the unit and the possibility for injury if it should become detached from its mounting for any reason.

The booster needs to be installed such that there can be unobstructed air flow around the equipment. Insure that the heat sink fins are unobstructed. The various subassemblies within the equipment cabinet will stay warm during normal operation so in the interest of equipment longevity, avoid installation locations that carry hot exhaust air or are continually hot.

Mounting

Figure 2 shows the mounting hole dimensions and layout for the cabinet. Mount the cabinet using 3/8" (10 MM) diameter steel bolts (not supplied). We recommend flat washers on both ends and a lock washer under the nut. Nut and bolt mounting is preferred to the use of lag bolts. Use backer blocks where necessary to spread the force over a larger area. In areas of known seismic activity, additional devices such as tether lines may be necessary.

Because Bird Technologies cannot anticipate all of the possible mounting locations and the structure types where these devices will be located, we recommend consulting local building inspectors, engineering consultants or architects for advice on how to properly mount objects of this type, size and weight in your particular situation. It is the customer's responsibility to make sure that these devices are mounted safely and in compliance with building codes.

Connections

All RF cabling connections to the booster should be made and checked for correctness prior to powering up the system. N(f) bulkhead connectors are available at the top of the booster enclosure box for connection to the system antennas. Make sure the

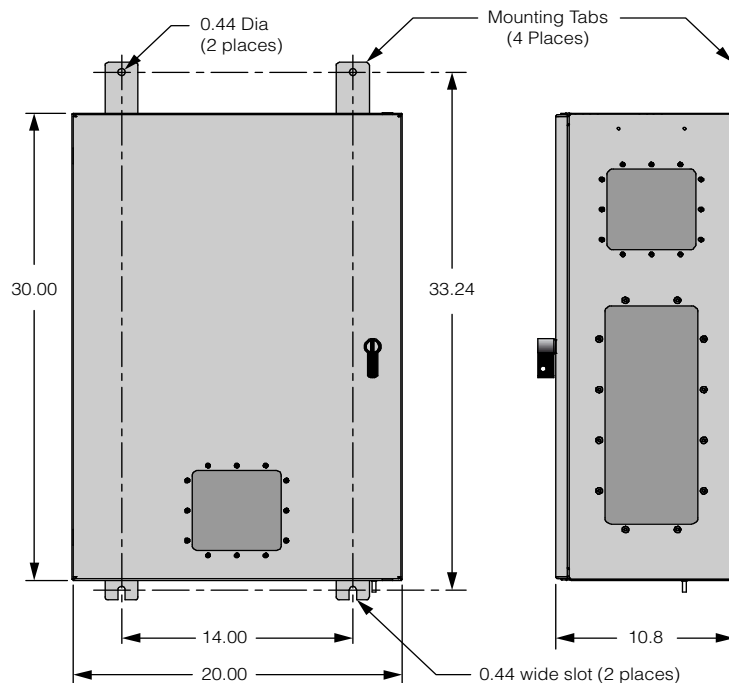


Figure 2: Cabinet mounting hole layout.

correct branch of the antenna system is connected to its corresponding uplink/downlink connector or the system will not work properly. Using high quality connectors with gold center pins is advised. Flexible jumper cables made of high quality coax are also acceptable for connecting to rigid cable sections.



Caution: The ERP (effective radiated power) from the booster system must not exceed +37 dBm (5 Watts) in order to remain compliant with FCC regulations. The maximum power output from the booster is approximately +40 dBm. Depending on cable loss and antenna gain, the output power of the booster may need to be reduced accordingly.



Caution: The maximum continuous input power level for this booster is -20 dBm. Stronger input signals will cause the unit to exceed its IM specifications. Static input signals greater than -10 dBm may damage the unit.

Models of the booster are available for either AC or DC operation. Based on the model number (see

table 1) the booster is designed to be plugged into either a single phase AC line (110 VAC at 50/60 Hz) or a - 48 Volt DC source. A connector is available at the top of the equipment box for connecting the AC or DC source voltage.

Antenna Isolation

Antenna isolation between uplink and downlink should be measured before connecting the signal booster to the antenna system. This step is necessary to insure that no conditions exist that could possibly damage the signal booster and should not be skipped for even the most thoroughly designed system.

Just like the feedback squeal that can occur when the microphone and speaker get too close together in a public address system, a signal booster can start to self oscillate. This can occur when the isolation between the Uplink and Downlink antennas does not exceed the signal boosters gain by at least 15 dB. Oscillation will reduce the effectiveness of the system and may possibly damage amplifier stages. Isolation values are relatively easy to measure with a spectrum analyzer and signal generator.

REQUIRED EQUIPMENT

The following equipment is required in order to perform the antenna isolation measurements.

- 1) Signal generator for the frequencies of interest capable of a 0 dBm output level. Modulation is not necessary.
- 2) Bird Technologies "Signal Hawk" spectrum analyzer which will cover the frequencies of interest and is capable of observing signal levels down to -100 dBm or better.
- 3) Double shielded coaxial test cables made from RG142, RG55 or RG223 coaxial cable.

MEASUREMENT PROCEDURE

To measure the antenna isolation perform the following in a step-by-step fashion.

- 1) Set the signal generator for a 0 dBm output level at the center frequency of the boosters passband.

- 2) Set the spectrum analyzer for the same center frequency and a sweep width equal to or just slightly greater than the passband chosen earlier in step 1.
- 3) Temporarily connect the test leads of the signal generator and spectrum analyzer together using a female barrel connector, see **Figure 3**. Observe the signal on the analyzer and adjust the input attenuator of the spectrum analyzer for a signal level that just reaches the 0 dBm level at the top of the graticule.
- 4) Referring to figure 3, connect the generator test lead to one side of the antenna system and the spectrum analyzer to the other then observe the signal level. The difference between the observed level and 0 dBm is the isolation between the sections. If the signal is too weak to observe, the spectrum analyzer's bandwidth may have to be narrowed and its input attenuation reduced. The isolation value measured

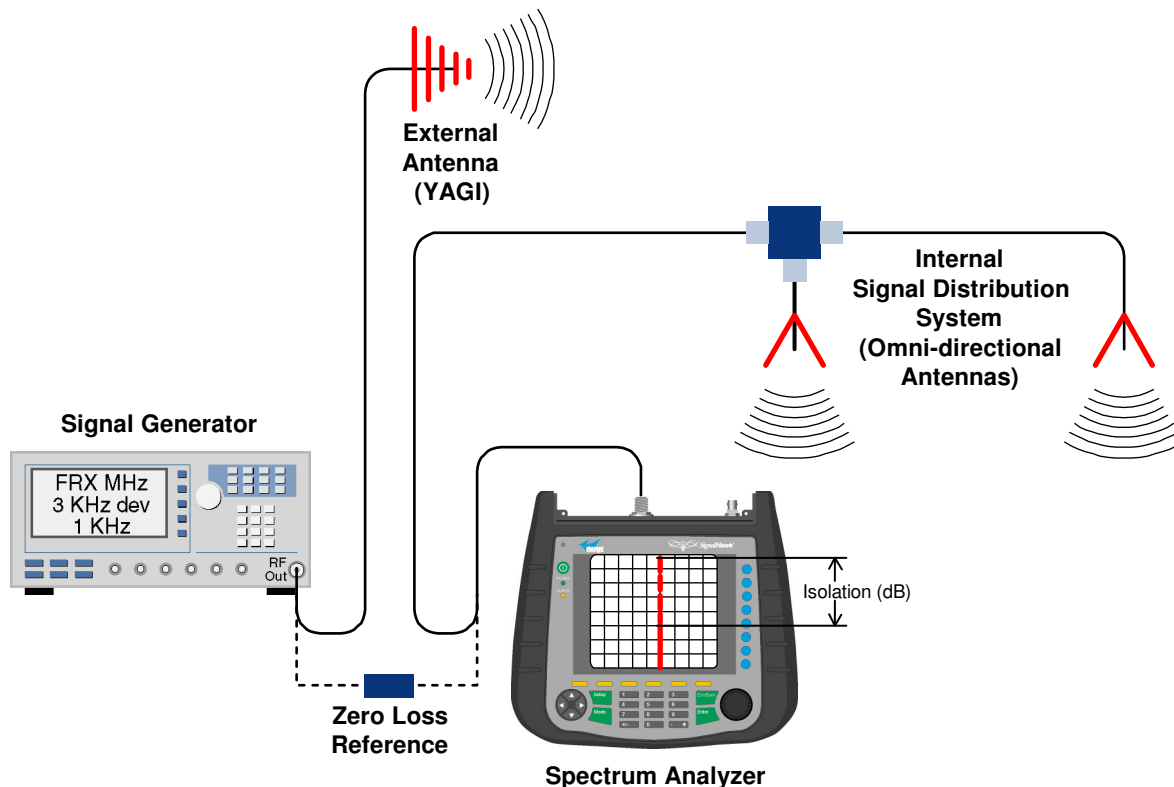


Figure 3: Typical test equipment interconnection for measuring antenna isolation.

should exceed the signal booster's gain figure by at least 15 dB.

- 5) Repeat step 4 again with the signal generator set at the passband edges in order to see if the isolation is remaining relatively constant over the complete width of the passband.
- 6) Repeat the isolation measurements if necessary at other system passbands to determine the overall minimum isolation value for the system. Physical modification of the antenna system maybe required in order to reach an acceptable minimum value.

RF EXPOSURE

To comply with FCC RF exposure compliance requirements, a separation distance of at least 100 cm must be maintained between the antennas of this device and all persons. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

EXPOSITION RF

Pour conformer aux exigences d'exposition de FCC RF, une distance de séparation d'au moins 100 cm doit être maintenue entre les antennes de cet appareil et toutes les personnes. Cet appareil ne doit pas être co-localisé ou exploités en conjonction avec toute autre antenne ou transmetteur.

SIGNAL FLOW BLOCK DIAGRAM

Figure 4 is the signal flow block diagram of the standard channelized signal booster model 613-8. **Figure 5** shows the front view of the booster cabinet. The channel modules are bi-directional with each module containing one downlink branch and one uplink branch. The branches are functionally identical because the same circuit board designs are used in each branch. The uplink and downlink branches may be programmed to any frequency in the appropriate band.

Uplink and Downlink Input Signals

Uplink input signals (794 - 806 and 806 - 824) are picked up by the DAS antenna and applied to the triplexer. The uplink input signals pass through the triplexer and are fed into a directional coupler where they are distributed to the uplink input port of both the 700 and 800 MHz channel modules.

Downlink input signals (764 - 776 and 851 - 869) are picked up by the Donor antenna and applied to the triplexer. The downlink input signals pass through the triplexer and exit at either the 700 or 800 MHz output port. The 700 and 800 MHz downlink inputs signals are then applied to the downlink inputs of the respective 700 and 800 MHz channel modules.

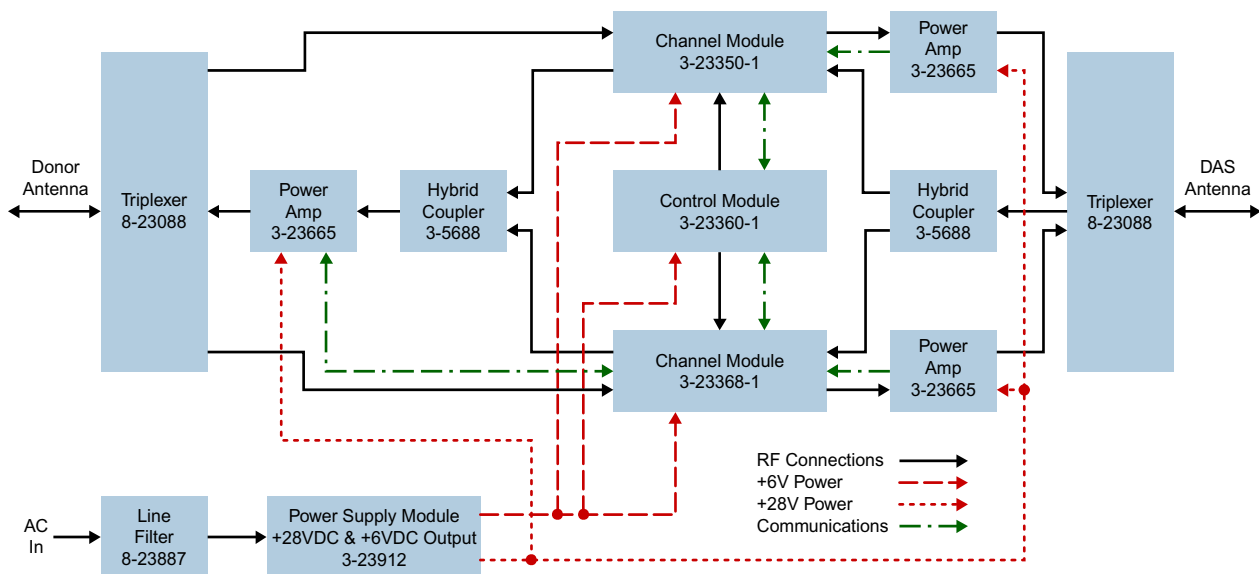


Figure 4: Signal flow block diagram of the channelized signal booster. Dual band high power model shown as an example.

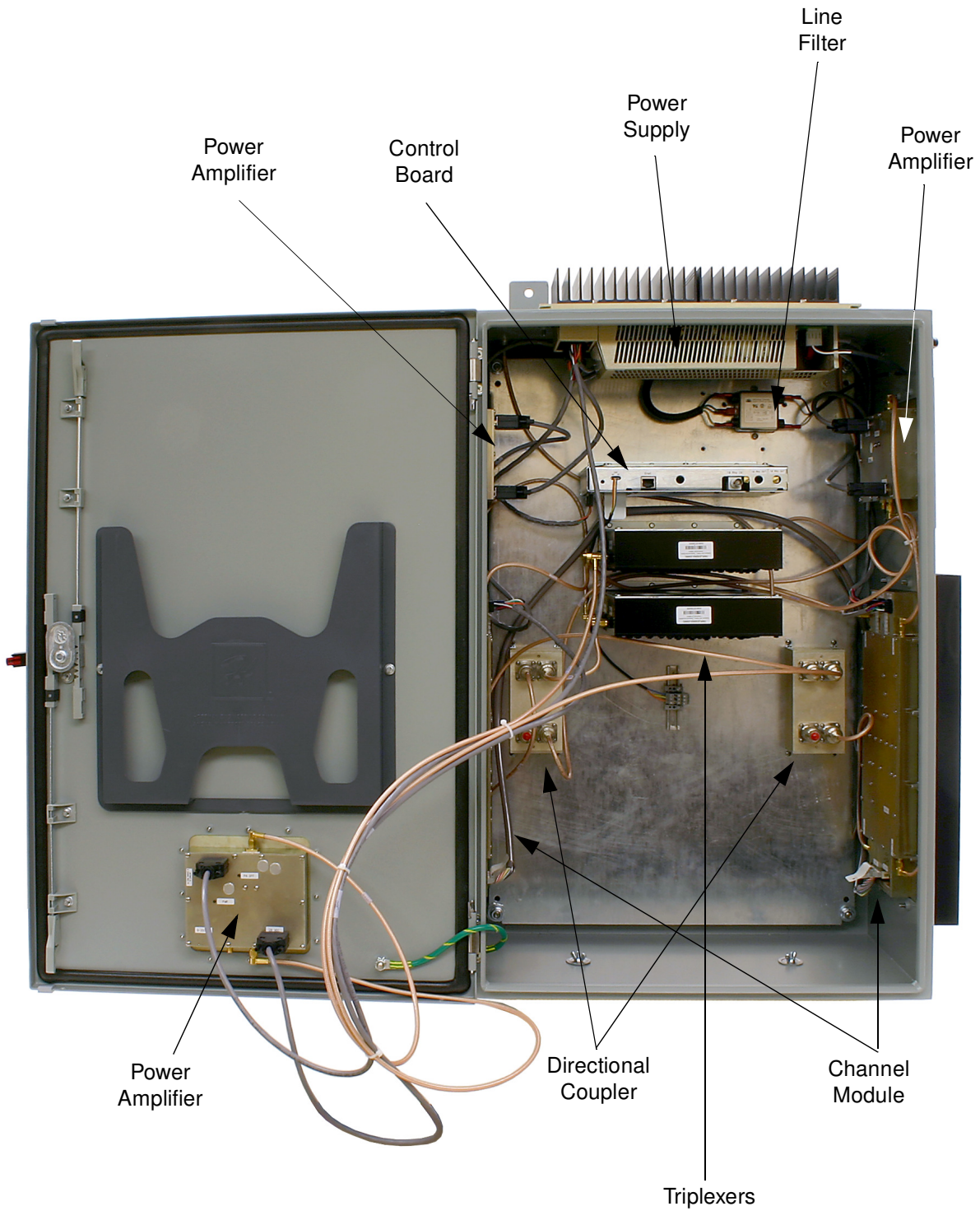


Figure 5: Front view of the booster.

Channel Module

The uplink input signals and the downlink input signals are applied to a down-converter board when they enter the channel module. Within the channel module input signals are down converted, digitized, and DSP filtering is performed. There are two styles of Channel modules available, a 14 channel version and a 30 channel version. After DSP filtering the analog signal is recreated and up converted

with an up-converter board to the original frequency before being output from the channel module at the downlink and uplink output ports.

Up converter boards are available in two different styles including low level and high level. If the signal booster is a high-power model then a low level up converter board is used in the channel module. If the booster is a low power model then high level

Location	Label	Possible States	Causes	Action to take
Bottom of channel module	DL/UL PWR	Green solid	FPGA successfully loaded	None
Bottom of channel module	DL/UL PWR	Off	Issue with board	Return to factory
Bottom of channel module	DL/UL COM	Red flashes	Exchanging data with control board	None
Bottom of channel module	DL/UL COM	Red solid	Exchanging data with control board	None
Bottom of channel module	DL/UL COM	Off	No data exchanging	None
Bottom of channel module	DL/UL COM	Always Off and it is expected to flash	No data exchanging	Check cabling; return control board to factory
Bottom of channel module	DL/UL DAC	Red solid	DAC overflow	Lower output power setting
Bottom of channel module	DL/UL DAC	Off	DAC normal operation	None
Bottom of channel module	DL/UL ADC	Red solid	ADC overflow	Increase down converter attenuation
Bottom of channel module	DL/UL ADC	Off	ADC normal operation	None
Control board	Ctrl LED	Off	no power, no bootloader, no program	Return to factory
Control board	Ctrl LED	Orange	bootloader installed, no program	return to factory or perform field update
Control board	Ctrl LED	Red	Control board detected a fault	Address fault condition. Contact factory
Control board	Ctrl LED	Green solid	Control board normal operation	None
Power Amplifier	PWR	Green solid	6 VDC supply to Amplifier is OK	None
Power Amplifier	PWR	Off	No supply voltage	check power supply and cabling
Power Amplifier	PA OFF	Off	Power Amp normal operation	None
Power Amplifier	PA OFF	Red solid	Over current, over temp	Amp shut down, contact factory

Table 3: Subassembly LED descriptions.

up converter boards are used. Signal booster models that have the fiber-optic option installed in them have enhanced down-converter boards that are capable of dealing with the low level signals from the optical conversion.

Uplink and Downlink Output Signals

Uplink and Downlink output signals leave the channel module at the UL OUT and DL OUT connectors respectively. The 700 and 800 MHz uplink output signals are combined with a directional coupler then passed on to a power amplifier stage. The output of the power amplifier is passed through a triplexer then radiated from the donor antenna. Downlink output signals leave the channel module and are applied to a power amplifier stage. The output of the power amplifier is passed through a triplexer then radiated from the service antenna.

OPERATION

Power is applied to the channelized booster by plugging in the AC or DC power cord (depending on how the system was configured for input power).

Subassembly LED's

LED's are located on several of the subassemblies within the Booster cabinet. The function of each of these indicator LED's are listed in **Table 3**.

Configuring the Channel Module

The digital signal booster provides Ethernet connectivity that allows access to a web-based interface for programming the individual channels. Programming will require connecting your laptop

computer to the Enet connector on the control board. **Figure 6** shows the connector. A standard Ethernet crossover cable is used to make the connection between your laptop and the booster cabinet. Refer to **Appendix A** at the back of this manual for detailed instructions on how to properly connect your computer to the Enet port of the booster.

Once your laptop is properly connected to the signal booster, if password protection is enabled, the password request box will appear in your web browser as shown in **Figure 7**. Type in your password and press the OK button. The password box will disappear and the web-based interface screen, at the filters tab, will appear as shown in **Figure 8**. The web based interface is divided into four pages including FILTERS, LINK, ADMIN, and SYSTEM. Each page contains a group of related functions.

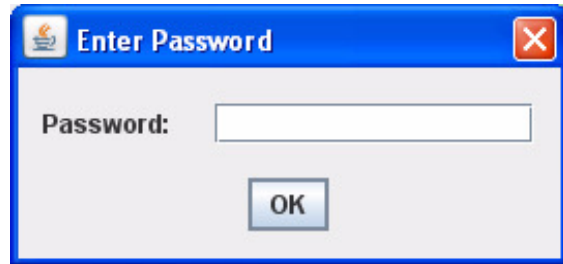


Figure 7: Enter your password.

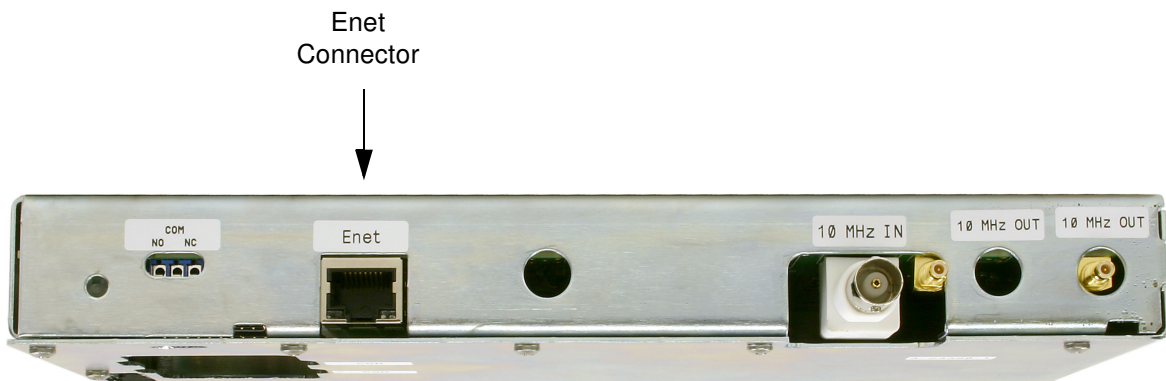


Figure 6: Enet connector on the control board.

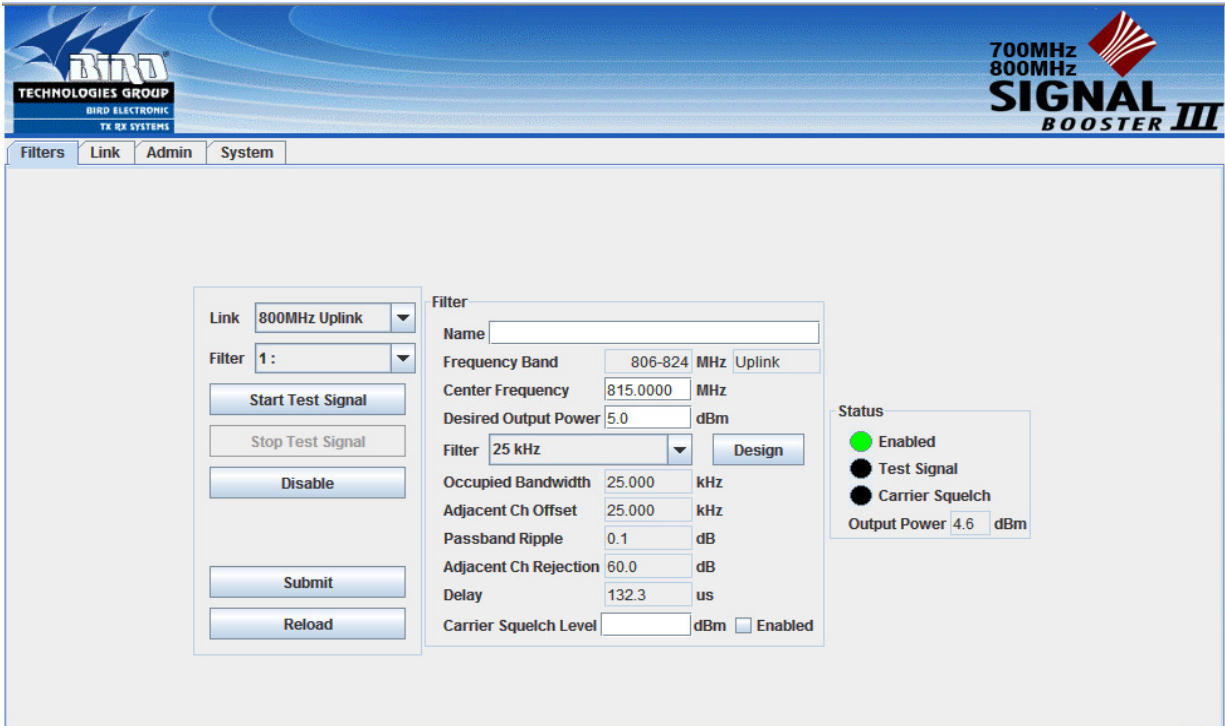


Figure 8: The Web-Page Interface screen, filters tab.

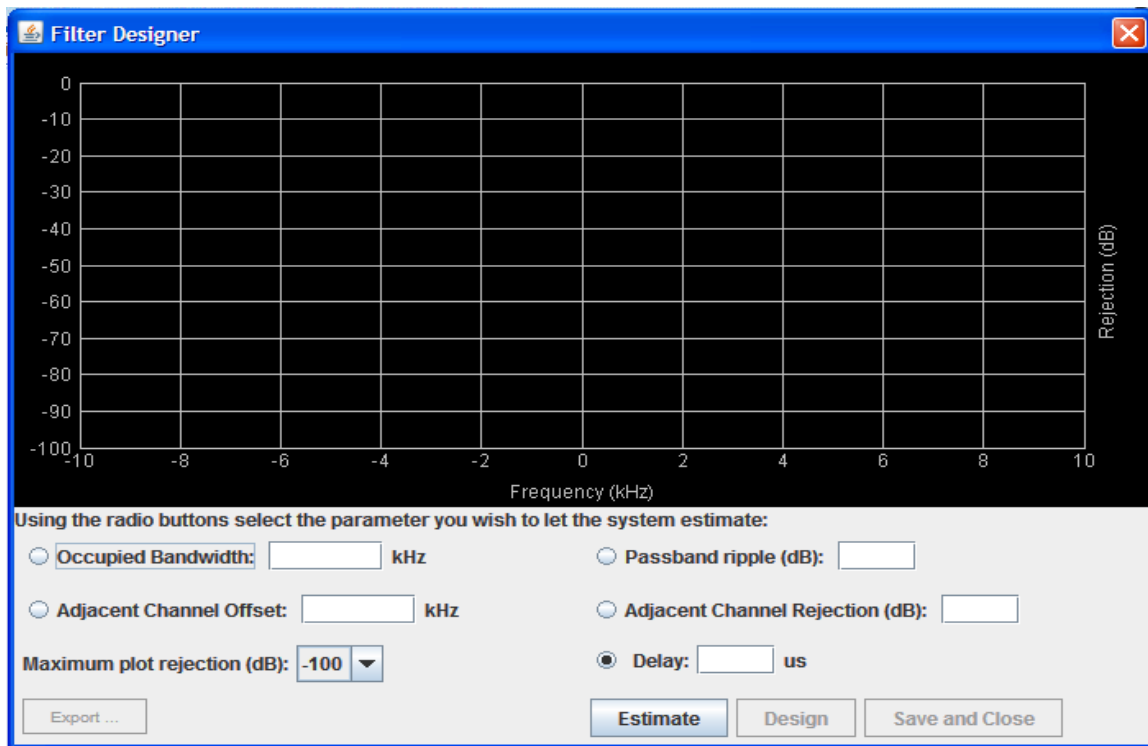


Figure 9: The design filter interactive display screen.



Once your password has been entered and validated a 15 minute inactivity timer is started. If the user does not make any changes to the web page interface the system will re-arm security once the inactivity timer expires. The user will then need to re-enter the password.

Password protection is disabled by default when your system leaves the factory. To enable password protection for your system perform the following steps;

- 1) Launch the web page interface in your web browser.
- 2) Click the "Admin" tab at the top of the interface screen.
- 3) Click on the "Enable Password protection" box.
- 4) Enter your password. Write your password down somewhere for safe keeping in case you forget it. If you do forget your password you will need to contact Bird Technologies Group to obtain a default password.

5) Click the submit button to apply the changes.

Filters Tab

The filters tab is divided into three functional areas which include a row of command buttons running down the left side of the screen, a filter area in the middle of the screen, and a status area on the right side of the screen as shown in **Figure 8**. The filter tab is designed to interact with one channel at a time. The channel that is selected for interaction is determined by the LINK and FILTER boxes on the upper left of the screen. To change the filter channel that you are going to interact with click on the arrow to display the full drop down box. Scroll down the list until the desired channel is highlighted and click on it. The data displayed in the filter area of the display screen will now be for the selected channel.

COMMAND BUTTONS

Clicking on a command button (located on the extreme left hand side of the filters tab) performs the associated task immediately. The submit and reload buttons in the bottom left corner allow any changes you make to the display/interface boxes to be downloaded to the booster. The submit and reload buttons act like a trigger sending any changes you made in the interface boxes to the

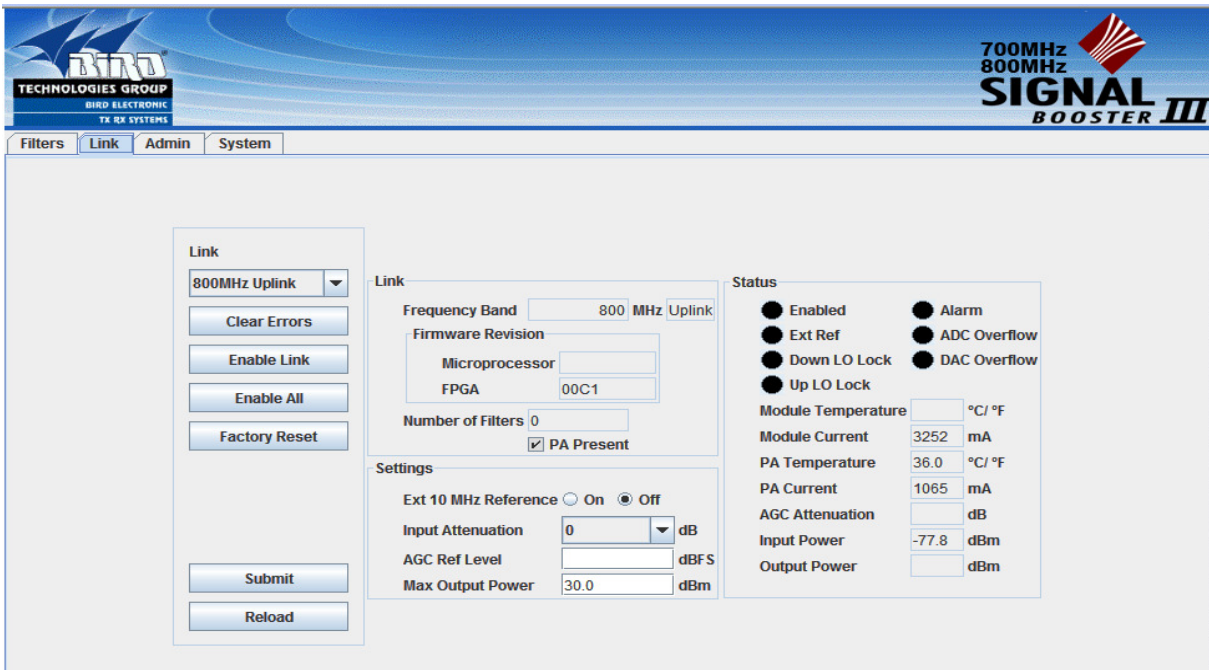


Figure 10: The Web-Page interface screen, link tab.

channel module as well as updating any displayed data from the module, but only after the button is pressed.

FILTER AREA

This is a user interactive area where the field engineer can program the operating characteristics of the selected channel filter. Each parameter in the settings area can be changed by clicking in the box and typing in the new values or by pointing at an arrow to display a drop down box. Most of the adjustable parameters have adjustment limitations as applicable. The parameters are self-explanatory. The changes you make are only applicable to the selected channel filter. After you have made changes to the various parameters press the “submit” command interface button (lower left corner of the screen) in order to copy the changes into the module itself.

When the “Design Filter” button is pressed a custom design template will be displayed as shown in **Figure 9**. Remember the changes you make are only applicable to the selected channel filter. After you have made changes to the various parameters press the “submit” command interface button (lower left corner of the screen) in order to copy the changes into the module itself.

STATUS AREA

The status area of the filters tab lets the user know whether the channel is enabled, if the test signal is on, if the carrier squelch is on, and what the output power level is for that channel. A green bubble indicates the parameter is on and a black bubble indicates the parameter is off.

Link Tab

The link tab is divided into four functional areas which include a row of command buttons running down the left side of the screen, a link and settings area in the middle of the screen, and a status area on the right side of the screen as shown in **Figure 10**. The link tab is designed to interact with one branch of a module at a time. The branch that is selected for interaction is determined by the LINK box on the upper left of the screen. To change the branch that you are going to interact with click on the arrow to display the full drop down box. Scroll down the list until the desired branch is highlighted and click on it. The data displayed in the link area of the display screen will now be for the selected branch.

COMMAND BUTTONS

Clicking on a command button (located on the extreme left hand side of the filters tab) performs

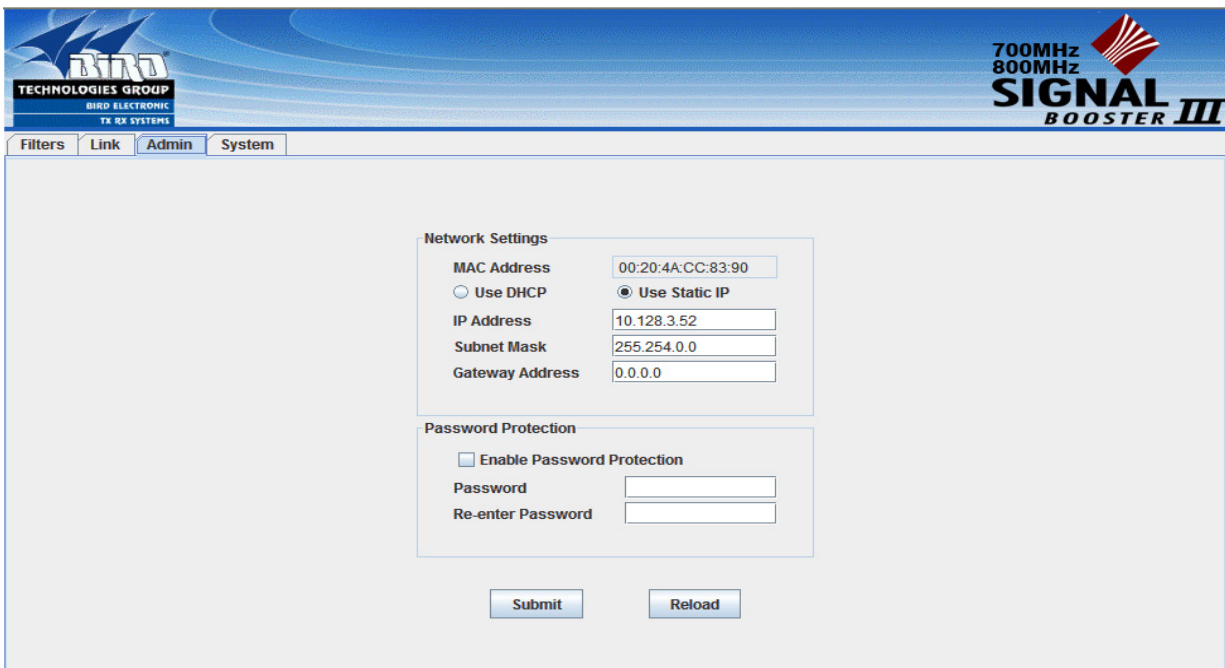


Figure 11: The Web-Page Interface screen, admin tab.

the associated task immediately. The submit and reload buttons in the bottom left corner allow any changes you make to the display/interface boxes to be downloaded to the booster. The submit and reload buttons act like a trigger sending any changes you made in the interface boxes to the channel module as well as updating any displayed data from the module, but only after the button is pressed.

LINK AND SETTINGS AREA

This is a user interactive area where the field engineer can program the operating characteristics of the selected branch as shown in the settings area. Each parameter in the settings area can be changed by clicking in the box and typing in the new values or by pointing at an arrow to display a drop down box. Most of the adjustable parameters have adjustment limitations as applicable. The parameters are self-explanatory. The changes you make are only applicable to the selected channel filter. After you have made changes to the various parameters press the “submit” command interface button (lower left corner of the screen) in order to copy the changes into the module itself. The link portion of the area displays status information for the branch.

STATUS AREA

The status area of the link tab lets the user know the status of the module and power amplifier if applicable. Parameters that can be turned on or off have a bubble next to the parameter name. A green bubble indicates the parameter is on and a black bubble indicates the parameter is off.

Admin Tab

The admin tab allows the user to change the boosters network settings and enable password protection for the web-based interface program. The boxes on this page are interactive. To make changes click inside the box and a cursor will appear. Refer to **Figure 11**.

System Tab

The system tab lists the control board software versions. A customer designated location name can be recorded. There is also a system logbook available on this page. Refer to **Figure 12**.

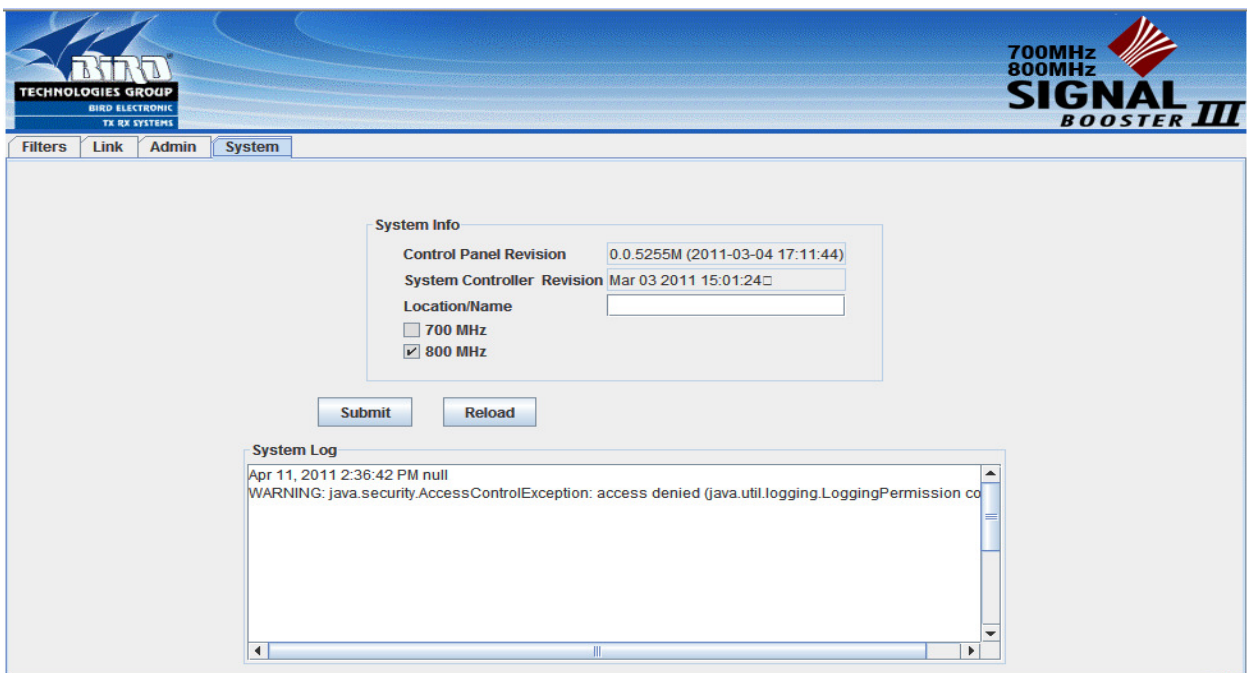


Figure 12: The Web-Page Interface screen, system tab.

APPENDIX A

Front Panel Ethernet Connectivity

ETHERNET CONNECTIVITY

The front panel User Interface connector on the booster provides for 10/100 BASE-T Ethernet connection using the TCP-IP protocol. This product feature allows access to a web-based interface for programming the individual modules within the booster. The web based interface requires a JAVA runtime environment (version 1.6.0 or later) to be installed on your laptop. The JAVA software can be downloaded free of charge from the Sun Microsystems website found at “<http://java.com/en/download/index.jsp>”. The channelized booster is shipped from the factory with a default IP address of “**192.168.1.1**”.

Two connection schemes are discussed including a direct connection from your laptop computer to the booster front panel as well as connecting the booster to a networked environment. A direct connection (at the installation site) should be established the first time you interface to the booster using the fixed IP mentioned above. Once the initial communications are established the IP address in the booster can be changed to permit a networked connection (from a remote site such as your office).

Direct Connection

Your initial connection to the booster system should be a direct connection to the front panel using an Ethernet crossover cable. **Figure A1** shows the proper way to interconnect the equipment as well as the pinout for a CAT-5 crossover cable.

REQUIRED EQUIPMENT

Cat-5 Crossover Cable

Laptop Computer with a network interface card installed. In addition, the JAVA run-time environment version 1.6.0 or later, and a web browser such as Internet Explorer must also be installed on the laptop.

PROCEDURE

To connect your laptop computer to the front panel LAN port and access the web page interface, perform the following steps;

- 1) Insure the JAVA runtime environment software is installed on your laptop.
- 2) Connect your laptop network port to the LAN connector on the booster front panel using a standard CAT-5 Crossover cable.



The front panel LAN connector has two built-in bi-color status LED's which will aid you in establishing communications. The meaning of each LED is shown in **Table A1**.

LINK LED (left side)		ACTIVITY LED (right side)	
Color	Meaning	Color	Meaning
Off	No Link	Off	No Activity
Amber	10 Mbps	Amber	Half-Duplex
Green	100 Mbps	Green	Full-Duplex

Table A1: LAN port status LED's

- 3) The left-most (LINK) status LED built-in to the LAN port connector should illuminate amber or green indicating that a good physical connection is established between your computer and the booster.
- 4) Insure that your laptop's IP address is compatible with the default address of the signal booster system. This may require changes be made to the Ethernet adaptor address on your laptop (refer to **Appendix B**). Your laptop's IP address will need to be set to “**192.168.1.2**” along with a subnet mask of “**255.255.255.0**”. The right-most (ACTIVITY) status LED built-in to the LAN port connector will turn amber or green indicating good TCP-IP communications are established between the laptop and the booster.

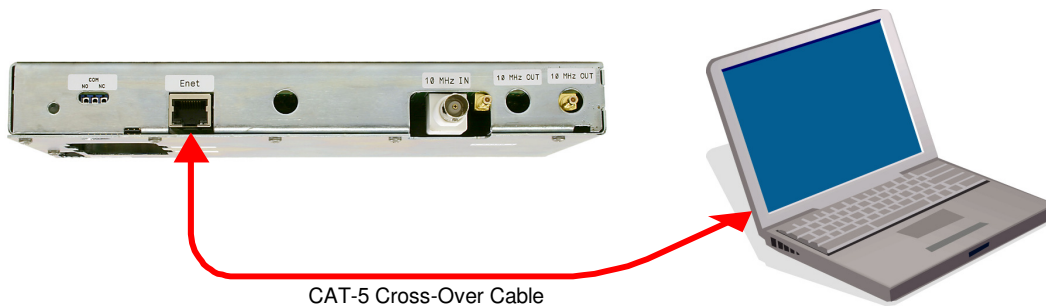
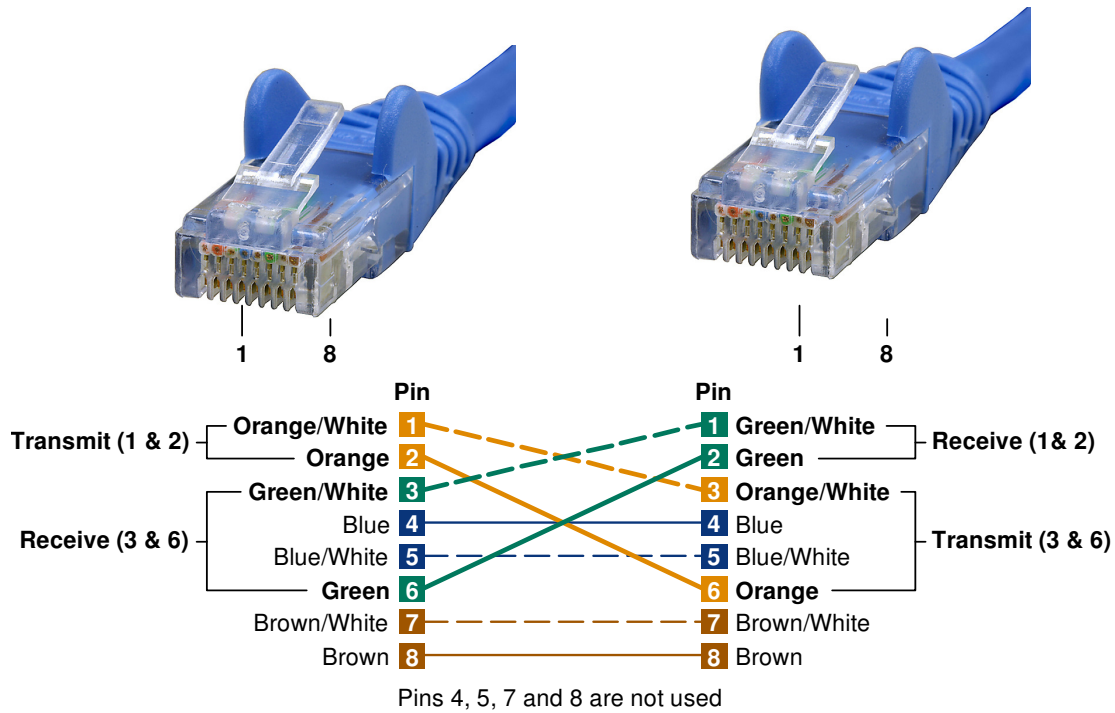


Figure A1: Direct connection to the booster using crossover cable.

- 5) Launch your web browser software on the laptop.
- 6) In your web browser's address box type-in the address of the booster "http://192.168.1.1" and press the ENTER key. The web page interface to the booster should appear in your laptop's browser window. When you launch the web page you may notice that the JAVA applet will load first.

Networked Connection

Before attempting a networked connection to the signal booster system consult with your IT support personnel for information concerning the correct IP address to use and any additional connectivity

issues such as firewalls. Once you have the correct IP address you will need to direct connect to the booster system as discussed in the earlier section of this appendix and reconfigure the booster LAN port with this new address. You can then connect the signal booster system using a straight-through CAT-5 cable to the networked environment and interface to it from a remote computer. **Figure A2** shows the proper way to interconnect the equipment for a networked connection as well as the pinout for a straight-thru CAT-5 cable.

REQUIRED EQUIPMENT

Cat-5 Straight-thru Cable
Laptop Computer with a network interface card installed. In addition, the JAVA run-time environ-

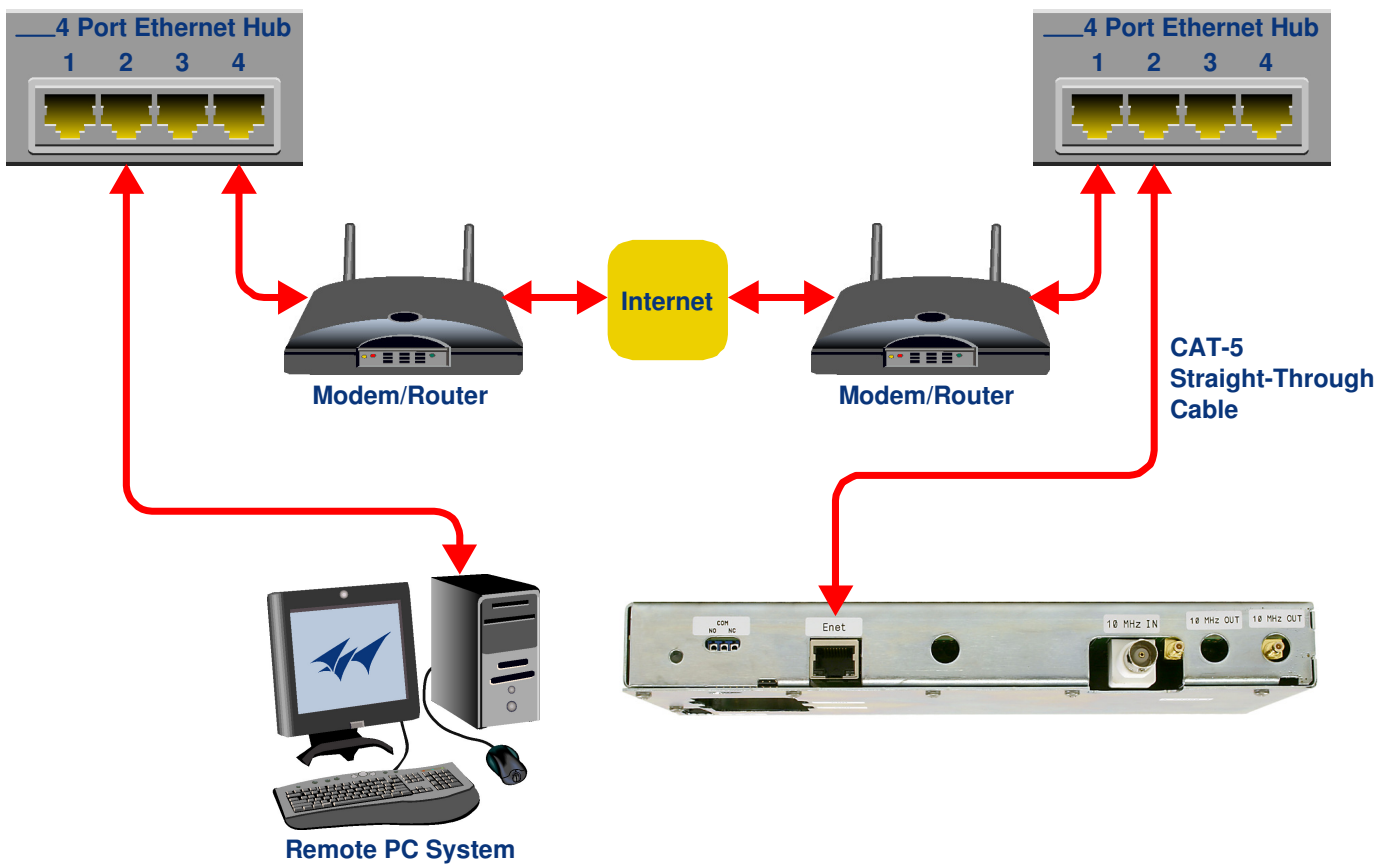
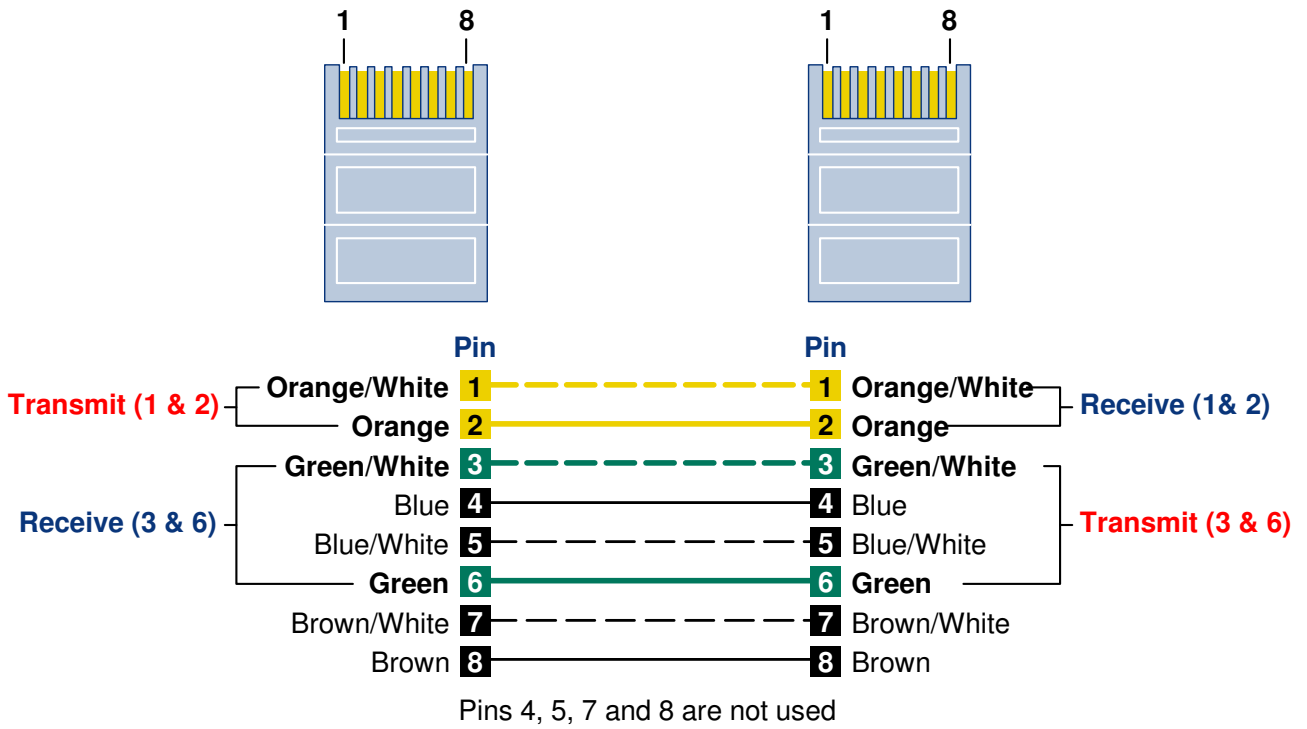


Figure A2: WAN connection to the booster using straight-through cable.

ment version 1.6.0 or later, and a web browser such as Internet Explorer must also be installed on the laptop.

PROCEDURE

Before a networked connection can be established, the booster LAN Port must be changed to an IP address that's compatible with your network. If you are unsure how to determine this address check with your IT support personnel. To connect the booster LAN port to a networked environment and access the web page interface, perform the following steps;

- 1) Change the boosters LAN port IP address. To do this, direct connect your laptop to the booster as discussed in the earlier section of this appendix titled "Direct Connection" and follow steps 1 through 4.
- 2) Launch the configuration Applet in your web browser.
- 3) Click the "Admin" tab at the top of the interface display screen.
- 4) To be safe, take note of the settings currently displayed.
- 5) Select the "User Static IP" radio button.
- 6) Enter the following settings provided by your network administrator;
 - A) IP Address
 - B) Subnet Mask
 - C) Gateway Address
- 7) Click the "Submit" button to apply the changes.
- 8) Once the changes have been successfully applied close your web browser.
- 9) Launch the configuration Applet in your web browser using the newly entered IP address.

APPENDIX B

Changing Your Service Computers IP Address

When you initially direct connect your laptop service computer to the booster it will be necessary to change the computers IP address. The procedure for doing this varies depending upon your operating system. As an example, this appendix illustrates how to make the change using the Microsoft XP operating system. The procedure for other operating systems will vary slightly from this example. Consult with your IT support personnel if needed. To change the IP address (assuming the Microsoft XP operating system is being used) perform the following in a step-by-step fashion;

- 1) Select "Start" from the status menu.
- 2) Single click the "Control Panel" choice from the "Start" pop-up menu as shown in **Figure B1**.
- 3) From the "Control Panel" icon selections double click on the "Network Connections" icon. Refer to **Figure B2**.
- 4) When the "Network Connections" folder opens double click on the "Local Area Connection" icon. See **Figure B3**.
- 5) The "Local Area Connection Status" box will open. Single click the "Properties" tab as shown in **Figure B4**. **Note:** If you do not have the cable connected between the service computer and the booster front panel the "Local Area Connection Status" box will not open. Instead proceed to step 6.
- 6) The "Local Area Connection Properties" box will open. Use the arrow buttons to scroll down the list until the "Internet Protocol (TCP/IP)" choice is highlighted as shown in **Figure B5**. Click the "Properties" tab at the right-center of the box.
- 7) Select the "Use the following IP address" bubble. Make sure the circle is filled-in. Refer to **Figure B6**.
- 8) Enter the new IP address and subnet mask values as shown in **Figure B7**. To interface your computer to the signal booster use an IP address of "192.168.1.2" and a subnet mask of "255.255.255.0".
- 9) Click on the "OK" tab to initiate the changes. This completes the procedure. Close any open boxes.

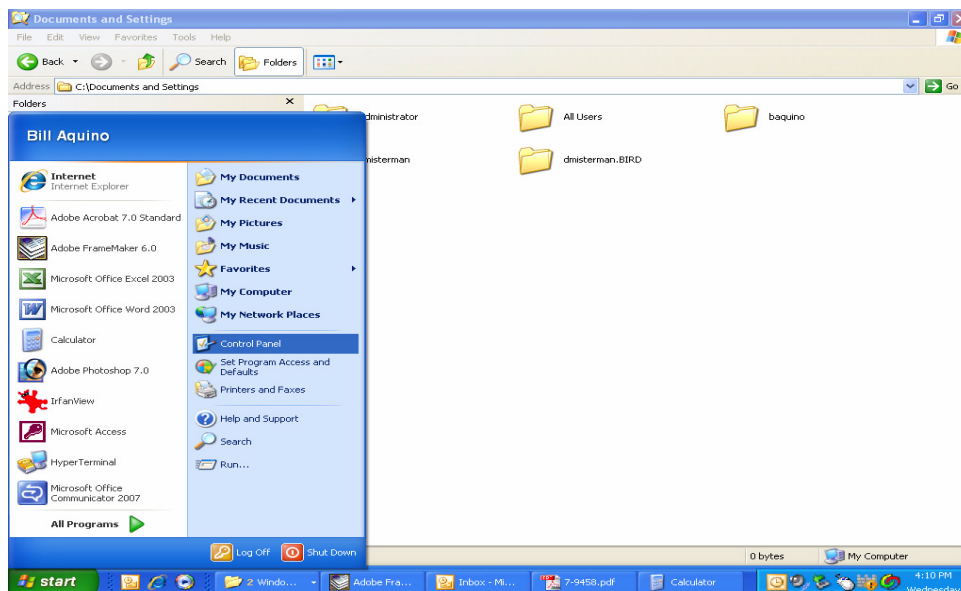


Figure B1: Choose the "Control panel" icon.

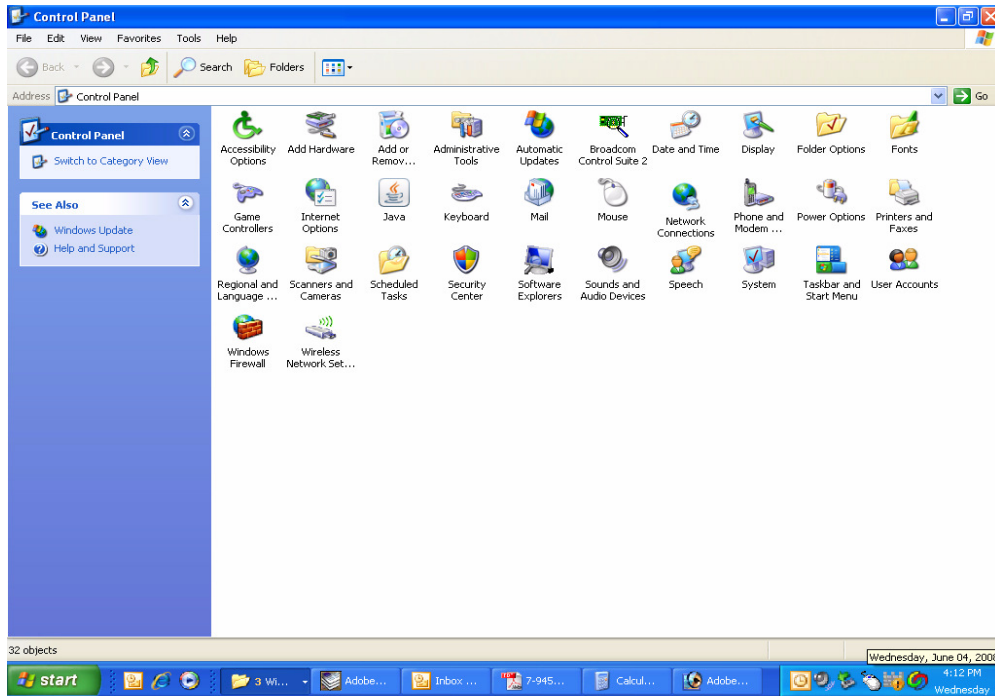


Figure B2: Select the "Network Connections" icon.

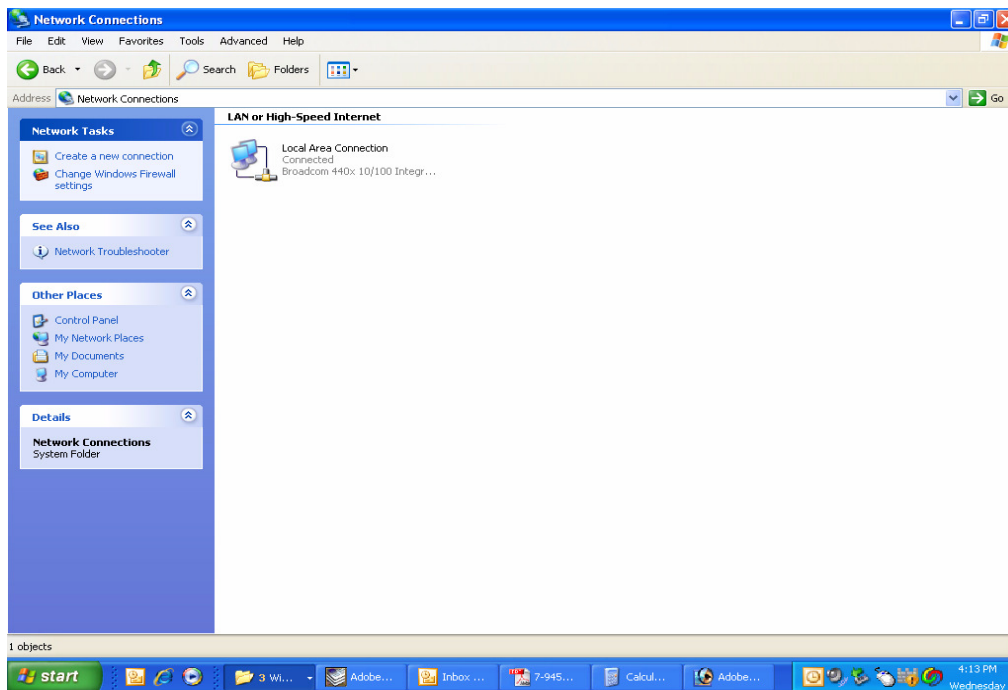


Figure B3: Select the "Local Area Connection" icon.

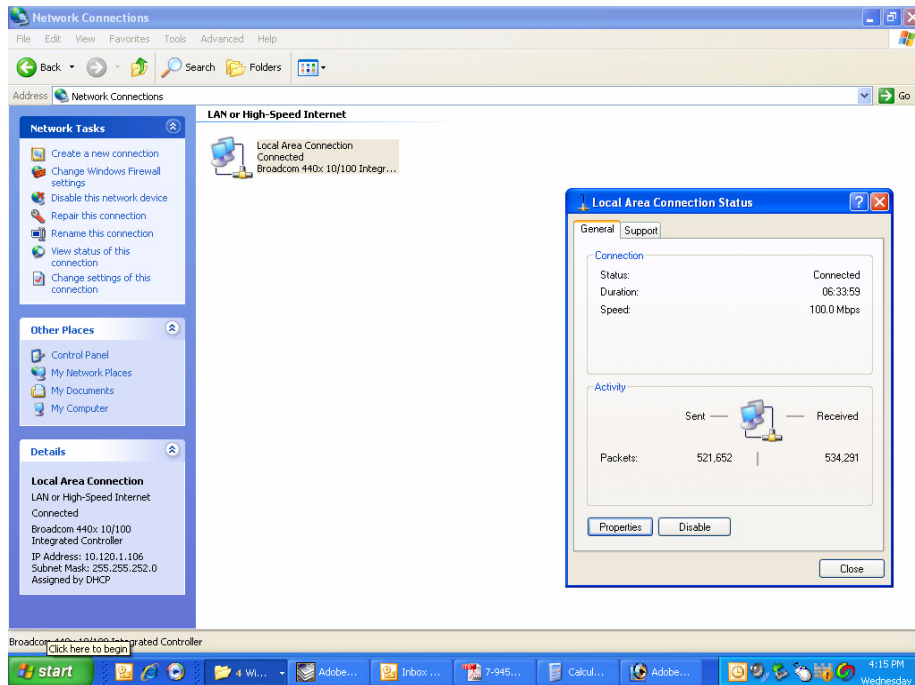


Figure B4: Select the “Properties” tab.

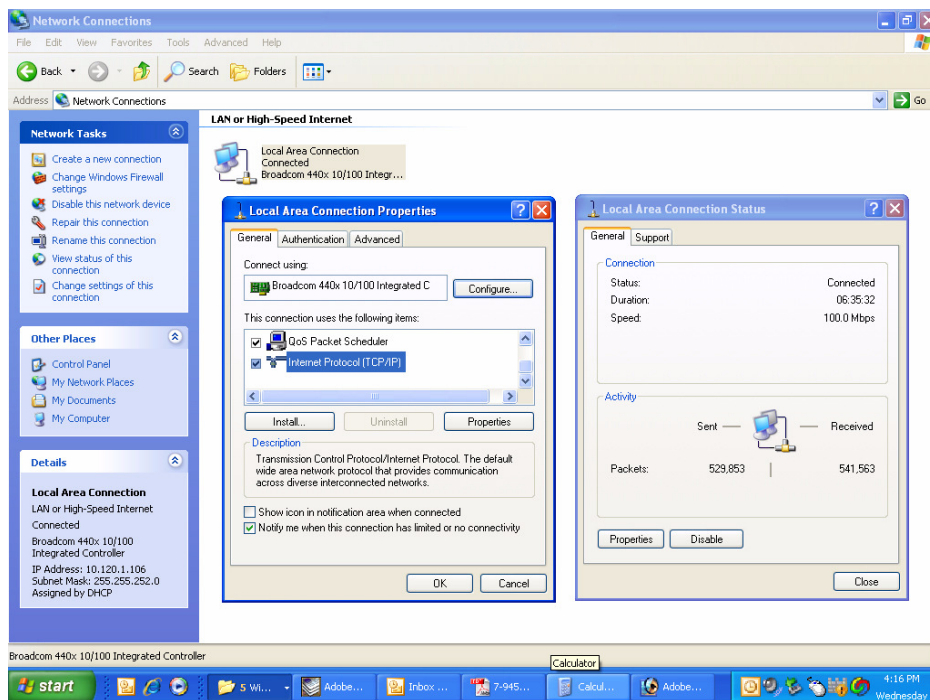


Figure B5: Make sure the “Internet Protocol (TCP/IP)” choice is highlighted. Then select “OK”.

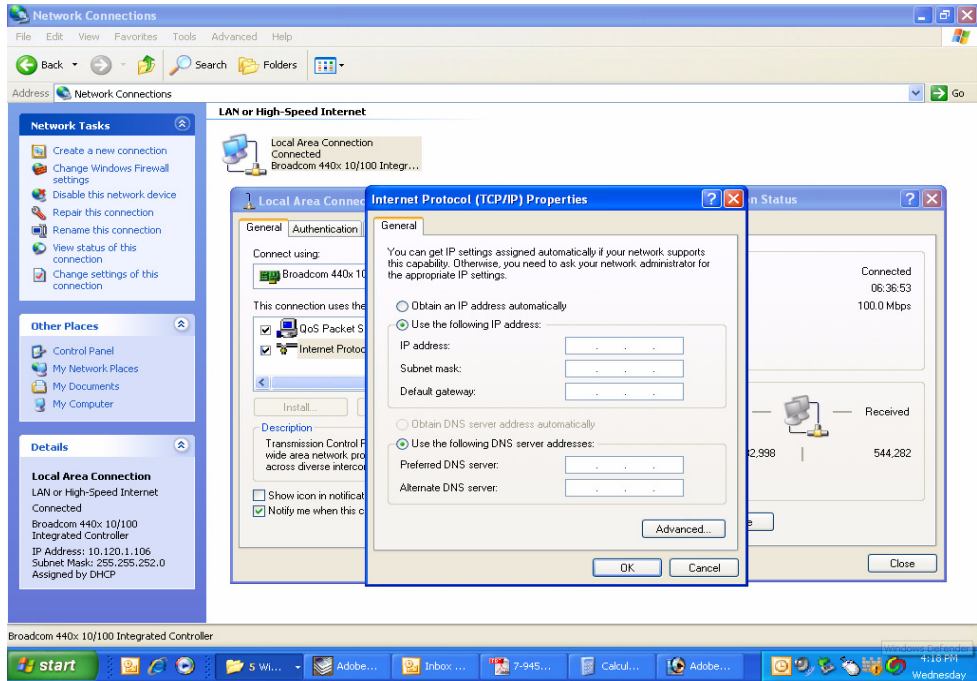


Figure B6: Select “Use the Following IP Address”.

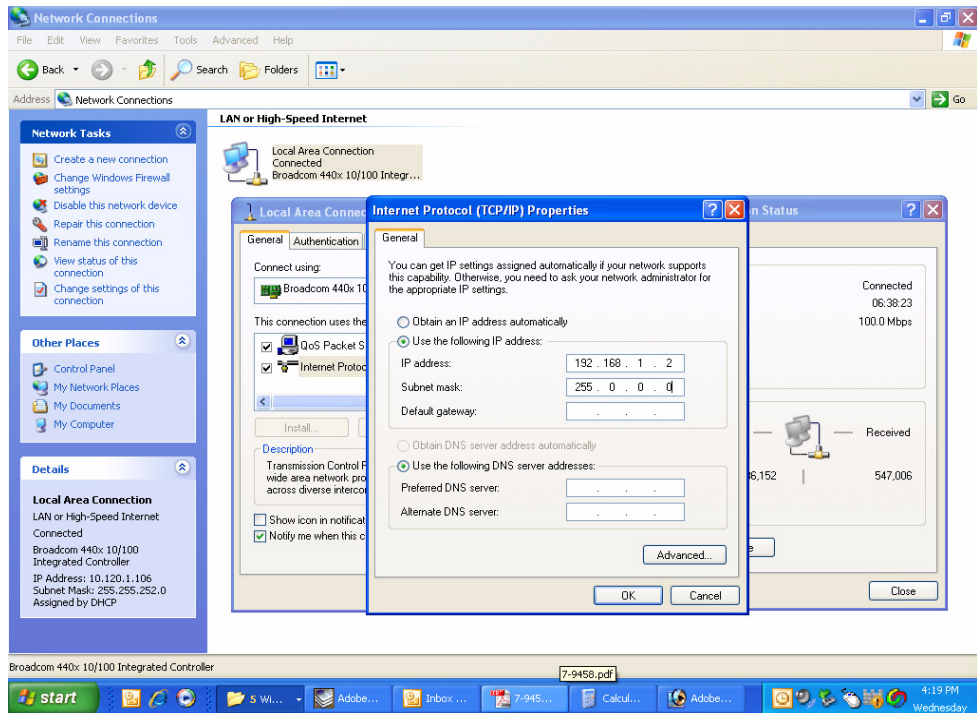


Figure B7: Enter the new IP Address and Subnet mask Values.

