bdi

Broadcast Devices, Inc.

Technical Reference Manual

SWP-206 8 Channel Protection System

VPS-100 8 Channel Protection System – ERI Version

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Rev. C March 2010
Firmware 3.4.7G and higher

Table of Contents

I. Introduction

The SWP-206 Multi station protection system was developed by BDI to meet the needs of master antenna and multi station operations. The SWP-206 can measure up to 8 directional coupler forward/reflected outputs simultaneously providing interlock control to safeguard against damage caused by high reflected power. The SWP-206 uses a proprietary 3 strike algorithm to provide protection against high reflected power but to ignore transient events such as nearby lightning strikes. In addition temperature and line pressure measurements can be performed by the addition of optional BDI TMP-100 temperature sensors and PSW-100 pressure sensors.

We recommend that the installer read this technical reference manual in its entirety before attempting the installation. The BDI SWP series protection systems are designed to provide reliable protection to antenna systems for many years to come if installed and operated properly.

II. Description of system

Each SWP series protection system is composed of a directional coupler, power sensor, SEM-100 sensor interface panel and SWP series supervisory chassis. All sensors plug into the SEM-100 interface panel and all sensor outputs are connected to the SWP series supervisory chassis via standard DB-25 Male to female cables from the SEM-100 interface panel. An installation is composed of plugging together the provided cables as described in the installation section.

There is provision on the SWP series chassis for external transmitter interlock control, LAN connectivity, and local serial RS-232 connection. Respective connectors are labeled for this purpose on the rear of the SWP-206 controller chassis.

III. Installation Considerations

Each directional coupler/sensor should be placed in the desired location for measurement. Each supplied directional coupler has a set of measurement ports, one for forward power and the other for reflected power.

1. Install the coupler making sure that the flow of RF follows the arrow direction marked on the coupler. Next, mount the supplied **BDI DPS-100** sensor with the accompanying bracket and hose clamps to the directional coupler it will be connected to.

2. Connect the forward power from the coupler to the forward power input using the supplied external attenuator and RF cable.

3. Connect the reflected power sample to the reflected power input of the sensor using the supplied RF cable.

4. If there is a local patch panel or lock out tag out switch associated with this sensor, there is

a two conductor plug mounted on the DPS-100 sensor for adding these safety devices to the interlock string. As supplied the DPS-100 sensor has a jumper connected to this plug. If no connections are desired for interlock leave the jumper in place. Removal of the jumper will cause the interlock relay or relays associated with this sensor to open.

Note about Directional coupler ports:

The forward port of a directional coupler is denoted as being the coupler connector closest to the direction from which the forward power is coming from. The reflected power sample is the coupler connector closest to the direction of the load. See the diagram below.

FWD   **REF**

Directional Coupler

From RF Source
EX:Transmitter

To RF Load
EX:Antenna
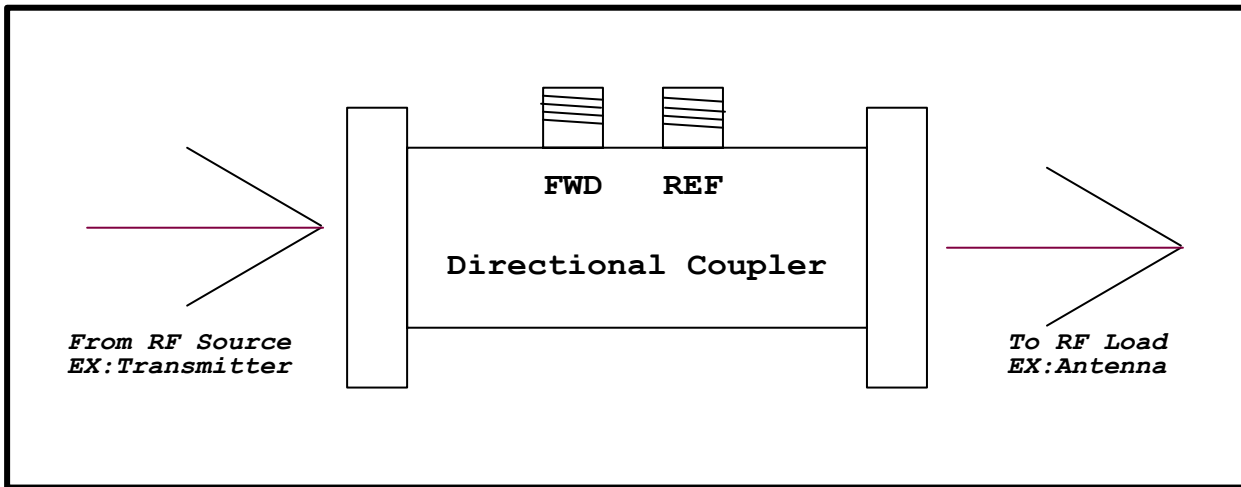
Reject Load Directional Coupler Connection Information

When connecting to a reject load such as a hybrid load in a tandem transmitter setup or a system reject load in a master antenna system to a BDI-DPS-100 sensor connect the **FORWARD** power directional coupler output to the **REFLECTED** power input of the DPS-100 sensor. Since the energy fed into a reject load is system reflected power it is treated as such by the SWP series chassis. Connect the supplied terminations to the DPS-200 forward power input connector and to the reflected power sample output of the directional coupler. See the diagram below for proper connection method.
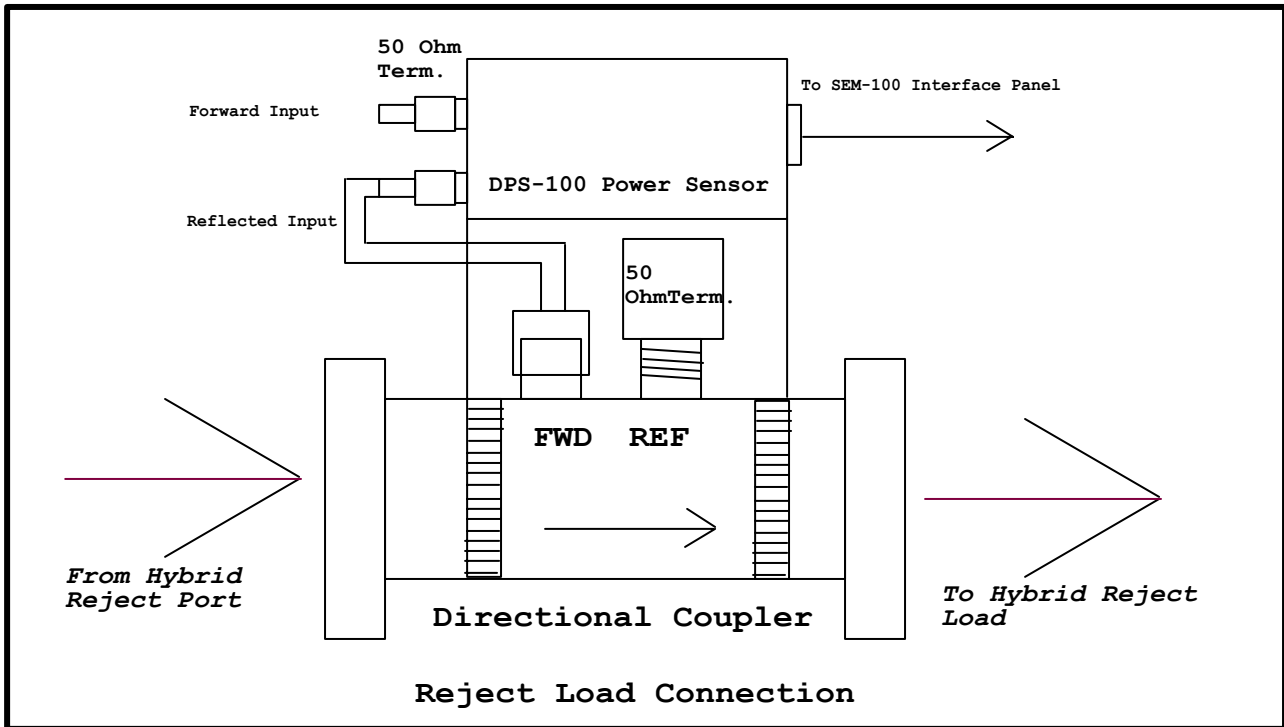

IV. Rack Equipment Location and Connection

1. In a suitable EIA 19" rack enclosure, mount the supplied SEM-100 Interface panel shown below and the SWP-206 supervisory chassis. Do not apply power to the SWP-206 until instructed later in these instructions.

2. Make the connections between the DPS-100 sensors already installed and the SEM-100 Interface panel using the supplied DB9 male to female cables as shown below.

3. Make connections between the SEM-100 panel and the SWP-206 supervisory chassis. There are three DB-25 male/female cables that need to be connected. Connect a DB25 male to female cable between the A/D-1, 2   connectors on the rear of the SWP-206 to the connectors P9B and P9C respectively shown below. Make a connection between the SWP-206 GPIO/RC connector and the connector P11 shown below.

Optional Connections:

BDI TMP-100 temperature sensors if supplied can be connected as shown in the diagram below or can be connected directly to an associated BDI DPS-100 Power sensor. There is a three position plug mounted to each DPS-100 sensor for this purpose. It is also possible to make connection for temperature measurement to the SEM-100 panel as shown below. Use one or the other connector but not both or erroneous temperature information may be displayed.

BDI PSW-100 Pressure sensors can be connected as shown in the diagram below using the supplied three position plug.
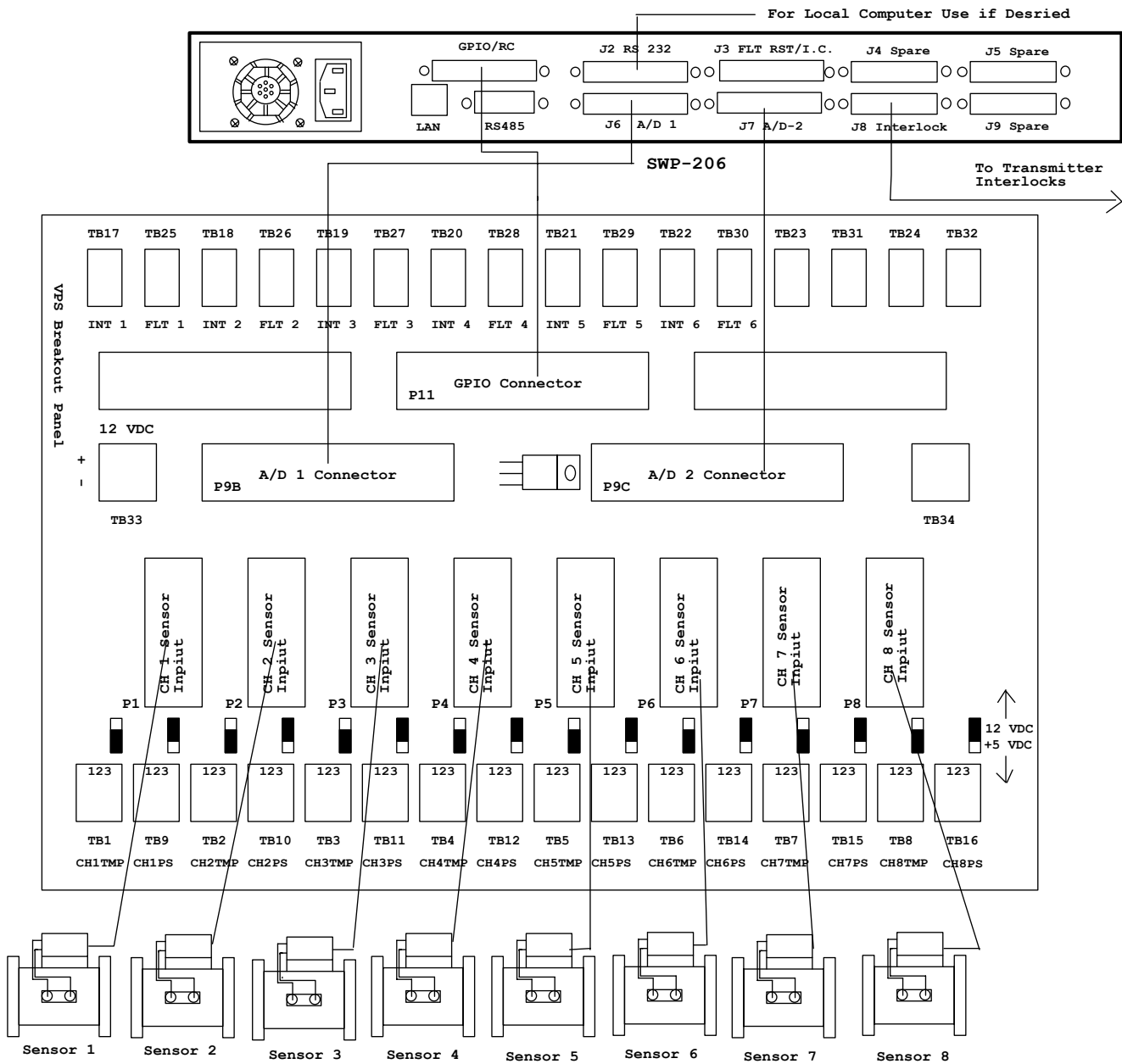
SEM-100 Interface Panel/SWP-206 Interconnection Diagram

V. Interlock Connections

Please refer to the diagram below for this discussion. A set of form C relay contacts is available to connect to the respective transmitters connected to the system. A DB-25 connector on the rear of the SWP-206 chassis is designated as "Interlocks" for this purpose. Connection information is illustrated in the diagram below.
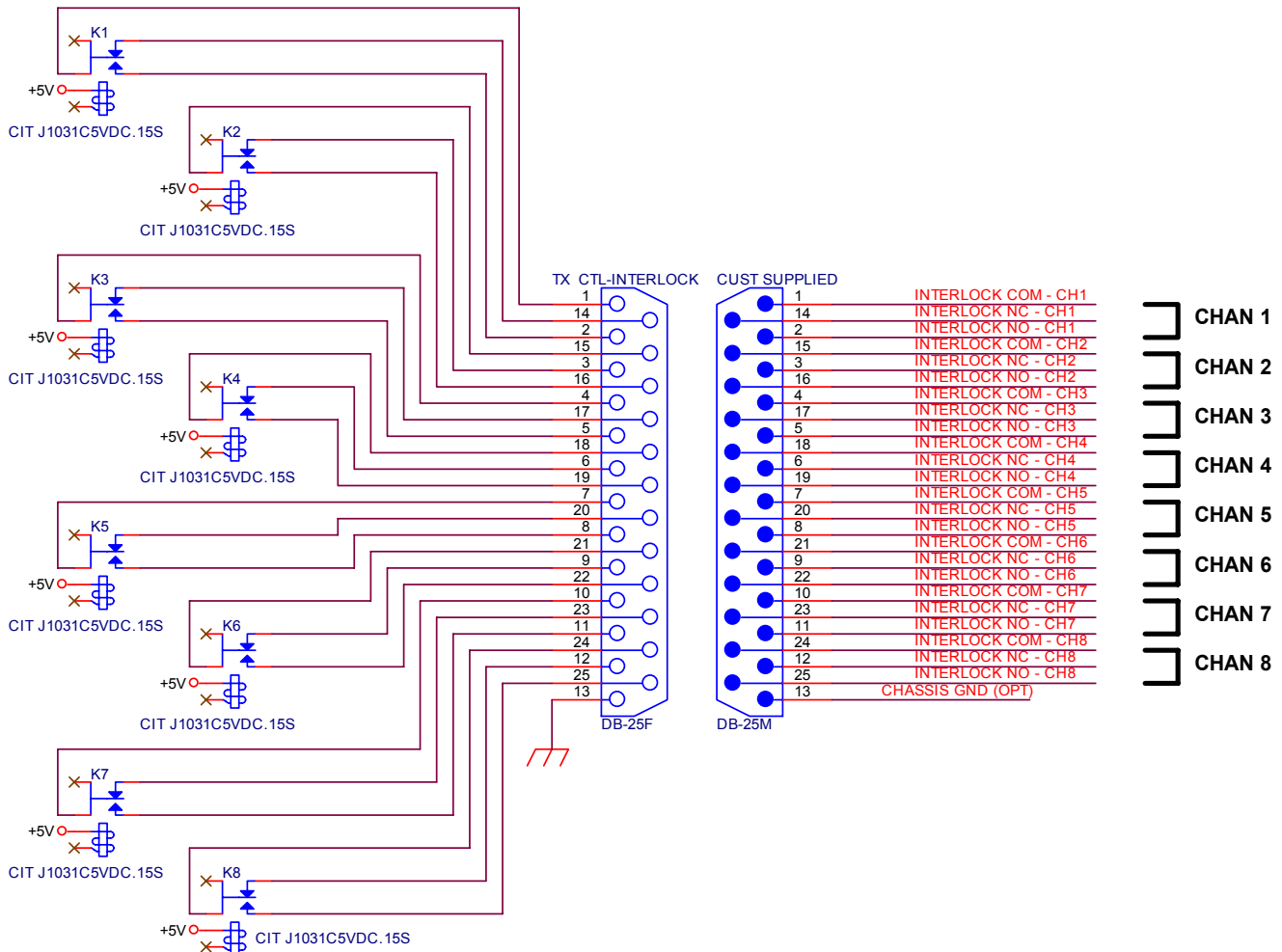
Rear Panel Interlock Connector Diagram

The above connection diagram is the suggested method of wiring interlocks to the respective transmitters connected to the system. Note that the Antenna and station specific relays for each transmitter are connected in series. This will provide interlock protection to each transmitter cabinet for both broad band and station specific reflected power events.

The SWP-206 can be used in four different interlock configurations. Refer to the chart below for configuration information. The four interlock modes are defined as follows:

8 Narrow band channels: Each channel has an independent interlock relay which opens if a reflected power fault occurs on the respective channel or if the external interlock input has been opened such as on the DPS-100 sensor itself. This jumper is provided to tie into a lock out tag out system or patch panel for safety purposes.

CH 1 Broad band, CH2-8 Narrow Band: If this mode is chosen any fault on channel 1 will cause all 8 interlock relays to open simultaneously. An example of its use is for master antenna applications where only one broad band output such as a single antenna feed is being monitored and the rest of the channels are monitoring station specific transmission lines such as each transmitter feed to a combiner. Relays 2 through 8 will open if a respective channel fault occurs.

CH1-4 Broad Band, CH5-8 Narrow Band: This mode is often used where there is an upper and lower bay of an antenna, a broad band output of a combiner and a system reject load. A reflected power fault or external interlock input fault on any of channels 1 through 4 will cause all of the interlock relays to open. If a fault occurs any of channels 5 through 8 only the respective channel numbered relay will open. These channels are often used to measure up to four narrow band inputs to a combiner system.
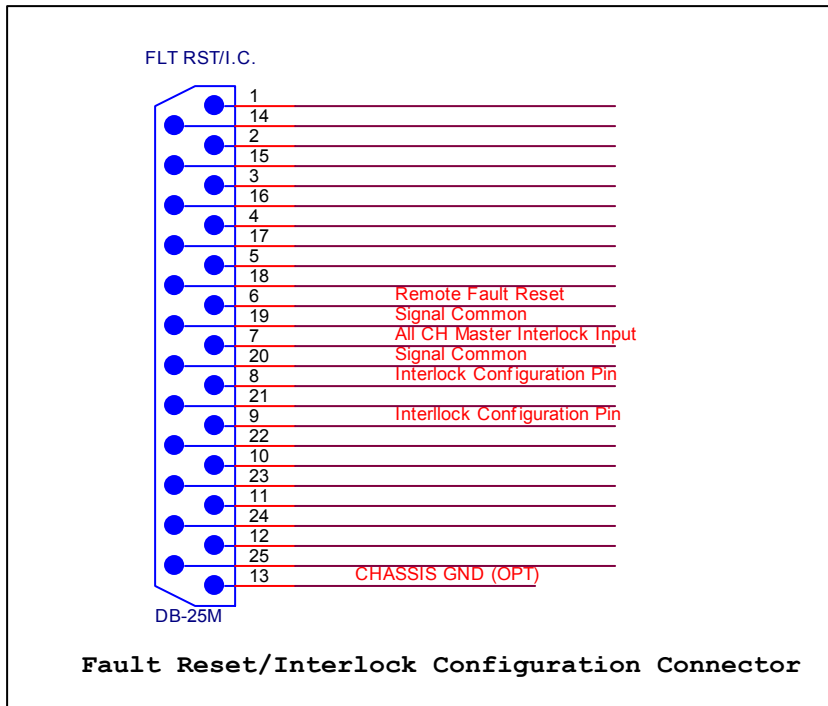
8 Broad Band Channels: When this mode is selected any reflected power fault on any channel will cause all 8 relays to open simultaneously.

J3 FLT RST/ I.C. Rear Panel DB-25 INPUT CONNECTIONS

DB-25 Pin 8	DB-25 Pin 9	Channel Configuration
OPEN	OPEN	8 NARROWBAND CHANNELS
COM	OPEN	CH1 BROADBAND, CH2-8 NARROWBAND
OPEN	COM	CH1-4 BROADBAND, CH5-8 NARROWBAND
COM	COM	8 BROAD BAND CHANNELS

DB-25 PIN 6 – Remote Fault Reset – for connection to a wired remote control. Momentary closure to pins 19 or 20 which are common pins will cause a fault reset. If the fault condition has cleared the interlock relays will re energize allowing transmitters connected to restart.

DB-25 Pin 7 – All channel master interlock input (MUST be connected to com for any interlock relay to close)

Fault Reset/Interlock Configuration Connector

In the figure:
FLT RST/I.C.

Pins left column/right column with labels:
1
14
2
15
3
16
4
17
5
18
6 — Remote Fault Reset
19 — Signal Common
7 — All CH Master Interlock Input
20 — Signal Common
8 — Interlock Configuration Pin
21
9 — Interllock Configuration Pin
22
10
23
11
24
12
25
13 — CHASSIS GND (OPT)

DB-25M

VI. Remote Control Interface

There is provision on the SEM-100 interface panel to connect fault indicators and fault reset to a conventional remote control system or a local display panel for indication and system reset. These connections are made via TB17-32 connectors on the top of the SEM-100 panel. Refer the assignment list below for connection information.

SEM-100 Tie Block	Connection Type
TB17	Sensor 1 Interlock Input
TB18	Sensor 2 Interlock Input
TB19	Sensor 3 Interlock Input
TB20	Sensor 4 Interlock Input
TB21	Sensor 5 Interlock Input
TB22	Sensor 6 Interlock Input
TB23	Sensor 7 Interlock Input
TB24	Sensor 8 Interlock Input
TB25	Sensor 1 Fault Status
TB26	Sensor 2 Fault Status
TB27	Sensor 3 Fault Status
TB28	Sensor 4 Fault Status
TB29	Sensor 5 Fault Status
TB30	Sensor 6 Fault Status
TB31	Sensor 7 Fault Status
TB32	Sensor 8 Fault Status

The above connections are TTL compatible high level output +5 VDC for normal operation. Fault indication will cause the respective status to pull low toward ground.

Once all connections have been made, apply power to the SWP-206 supervisory chassis. The unit display should light and the LED indicators on the SEM-100 interface panel should light as well. If any LED's on the SEM-100 panel fail to light there may be a short or wiring error. All inputs to the SEM-100 panel are PTC fuse protected such that each sensor connected to the system is isolated. If one were to develop a short it would only affect that particular sensor and not the whole system.

VII. Operation

Operation of the SWP-206 requires minimal user input. A channel may be manually selected using the up and down arrow keys. Pressing the "X" key momentarily will cause the SWP-206 to enter **AUTO** mode which will continuously cycle between the all channels allowing both to be viewed with no user intervention. Auto mode is denoted by an asterisk (*) appearing in the lower left hand corner of the display. Alternate presses of the X key will cause the SWP-206 to alternately be in Auto or Manual mode. In manual mode using the up/down arrow keys allows the selection of a particular channel for display.

Fault Reset: If the SWP-200 detects a fault condition it will alternate between the normal display and a **"FAULT DETECTED"** warning message. Pressing the "X" key momentarily will reset the fault condition and close the interlock relays. If the condition which precipitated the original fault is still present, the SWP-206 will return to the FAULT mode and open the interlocks after a three strike detector timeout. There is provision for remote fault reset on the rear panel of the unit for dry contact closure and through an optional LAN web interface. See section VI. Interlock connections for a pin diagram of the **J3 FLT RST/I.C**. connector for fault reset and interlock configuration.

Setup Mode Entry

Factory default setting of the reflected power interlock trip point is 500 watts. To change the reflected power interlock trip points the user must enter the system setup mode. There are two types of parameters that can be changed. One is for the reflected power trip point and the other is the forward/reflected power attenuator settings. The latter settings are factory adjusted and should not need adjustment. **It is not advisable to make any changes to these settings without factory assistance. Changes to these settings may lead to erroneous forward and reflected power measurements.**

To change the reflected power trip point and entry to setup mode:

1. Select the channel for which the parameters will be changed by pressing the up or down arrows.

2. Press the RED "X" key to enter the manual mode denoted by the disappearance of the (*) in the lower left corner of the display.

3. Press and hold the green checkmark key on the keypad cluster for five seconds until the. display changes to the setup mode.

4. Use the left/right arrow keys to select the reflected power setting.

5. Adjust the setting to the desired setting by use of the up/down arrows.

6. Once the reflected power level at which that channel has been selected press and hold the RED X key for five seconds until the display reverts to the normal operating display. The changes will then be saved.

7. To change any other channel repeat 1 - 8 of the above instruction set.

8. When all parameters have been changed as desired and saved place the unit back in the AUTO mode by pressing the RED X key momentarily.

SWP-206 LAN Access Configuration

To configure the SWP-206 for LAN operation, open a browser window and enter the default IP address for the SWP-206. **The factory default IP address is: 192.168.1.107**
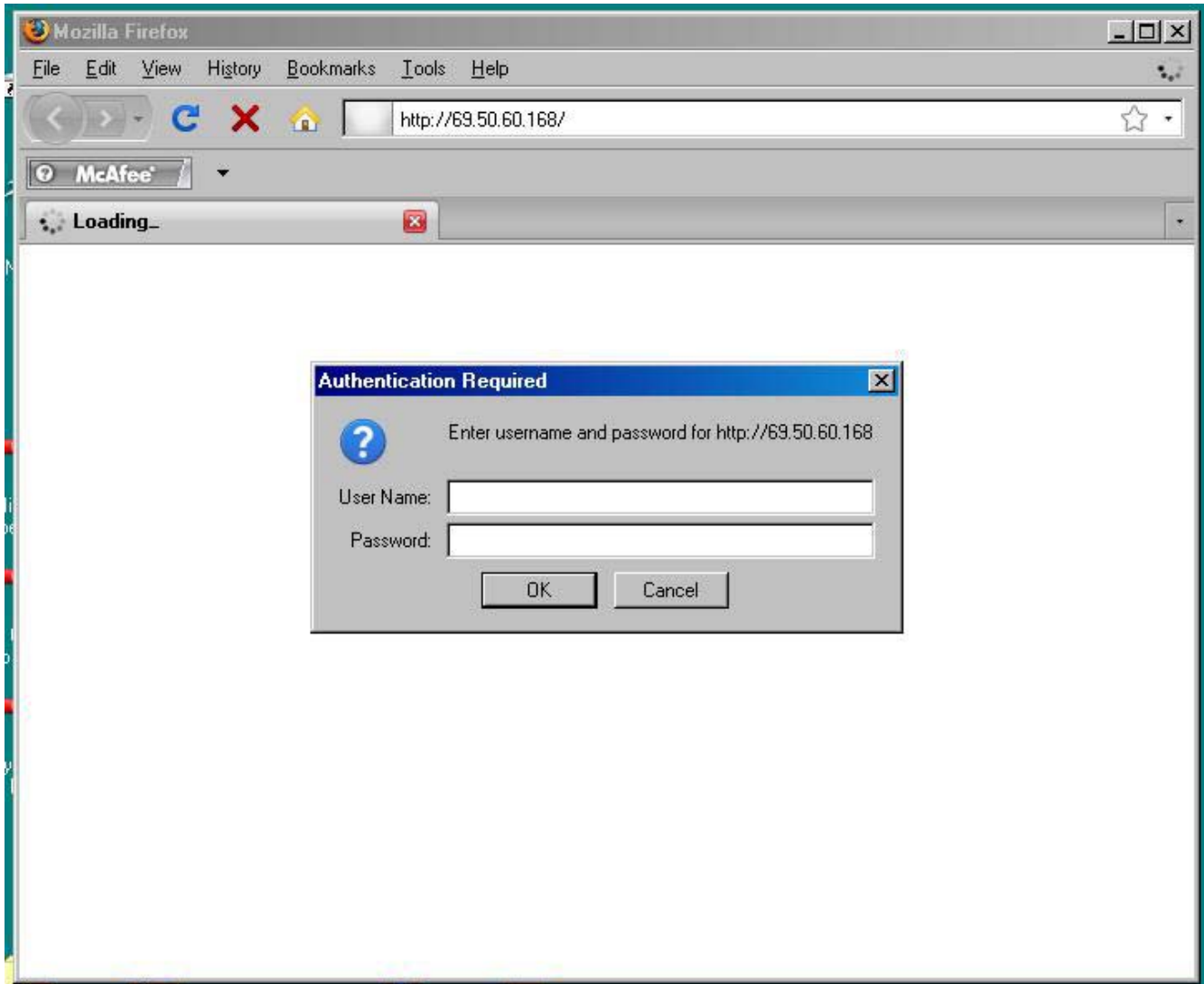
The SWP-206 factory default settings do not have a user name or password. Hit [ENTER] [ENTER] to proceed to the main configuration menu. To change the IP address of the SWP-206 click the NETWORK tab on the right side.

This screen allows the user to change the IP address, subnet mask and default gateway to match local LAN configuration. Contact your network administrator to obtain the correct settings. Click the [OK]
button after changes are made. The SWP-206 is capable of automatically obtaining its IP configuration from a DHCP server however this may result in difficulty "locating" the SWP-206 or may inhibit routing requests from outside a firewall to the SWP-206 for remote access.

NOTE: Be sure to record the new IP address before applying settings (see below). Failure to record the new settings may cause difficulties in locating the SWP-206.

The SWP-206 default password for remote access is "bdi". Please be sure that the [Caps Lock] key
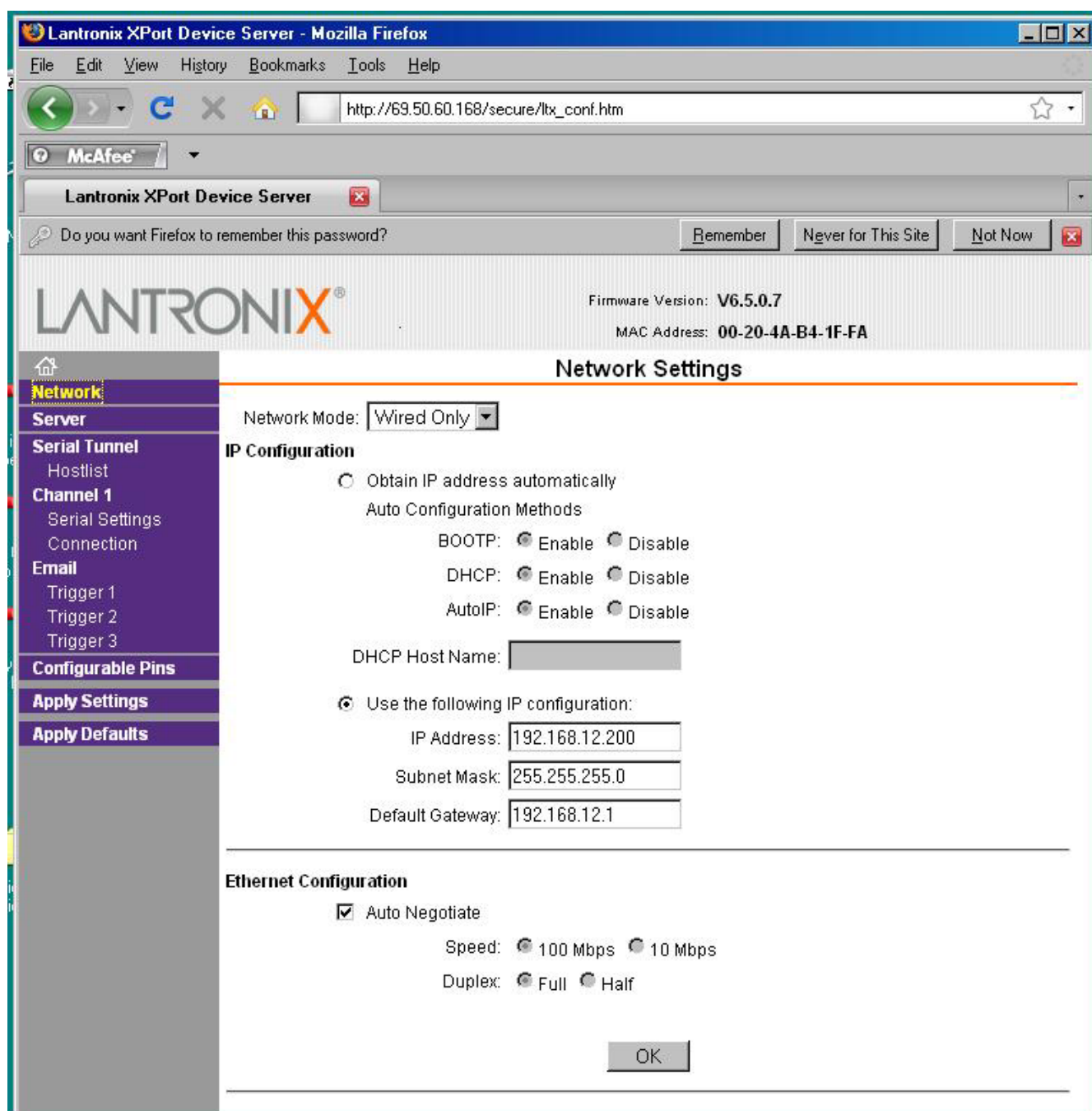
is not enabled or the password will not be accepted. The password may be changed or disabled by clicking the [Connection] tab.
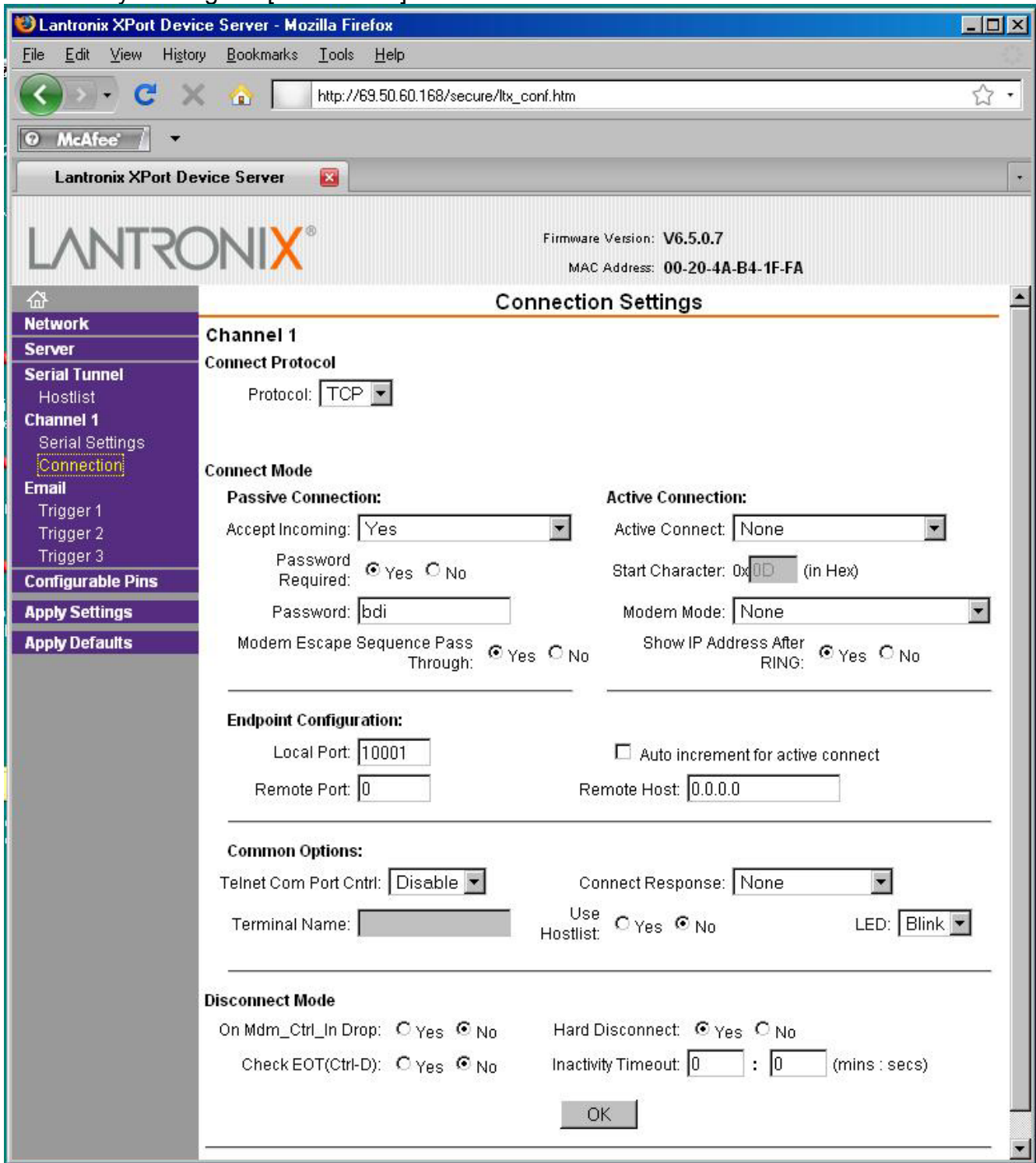
The passive connection password may be changed to the user's preferred password. The SWP-206 may also be configured to not require a password for remote monitoring by checking the "NO" option next to "Password Required".

To save your changes click the "Apply Settings" tab on the left side of the screen. **NOTE: If you exit the configuration menu without clicking the "Apply Settings" tab your changes will be lost.**

To allow remote access to the SWP-206 your router and firewall must be configured to allow requests to **PORT 10001** to pass to the IP address configured for the SWP-206. Failure to do so will prevent access to the SWP-206 from outside the local network.

SWP-206 Remote Access

To access the SWP-206 remotely a terminal emulator capable of TCP/IP operation is required. Hyper Terminal (provided with Win XP) is one such program however many free and commercial programs are capable of accessing the SWP-206. The example below uses Hyper Terminal.

Step 1:   Run Hyper Terminal. Hyper Terminal is located in PROGRAMS- ACCESSORIES- COMMUNICATIONS in Windows XP. If you do not have a copy of Hyper Terminal see the end of this section for information on how to obtain a free copy of Putty which is a share ware communications program available on the world wide web.
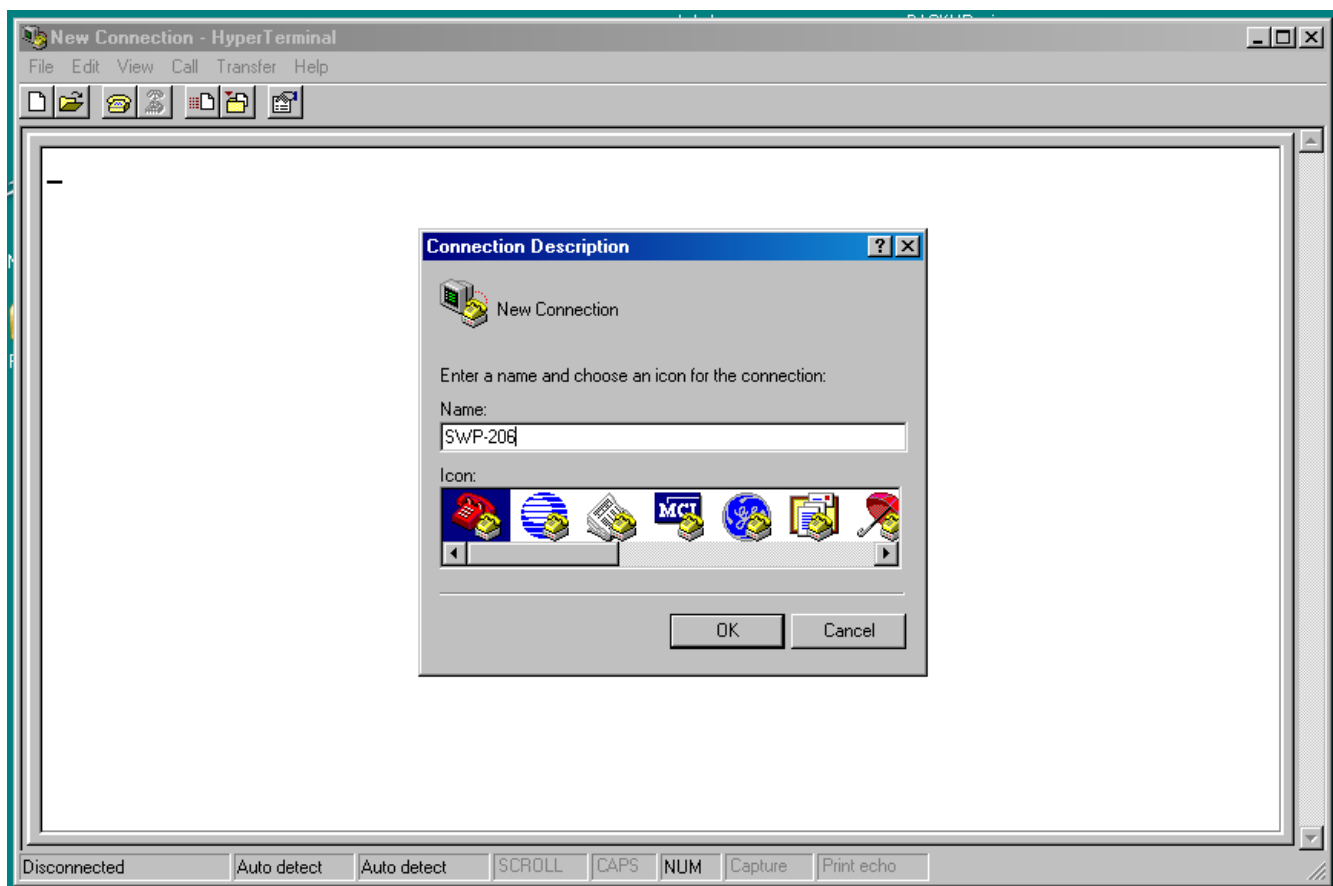
 Hyper Terminal will prompt for a Connection Name. Enter a name for this connection such as "SWP-206"
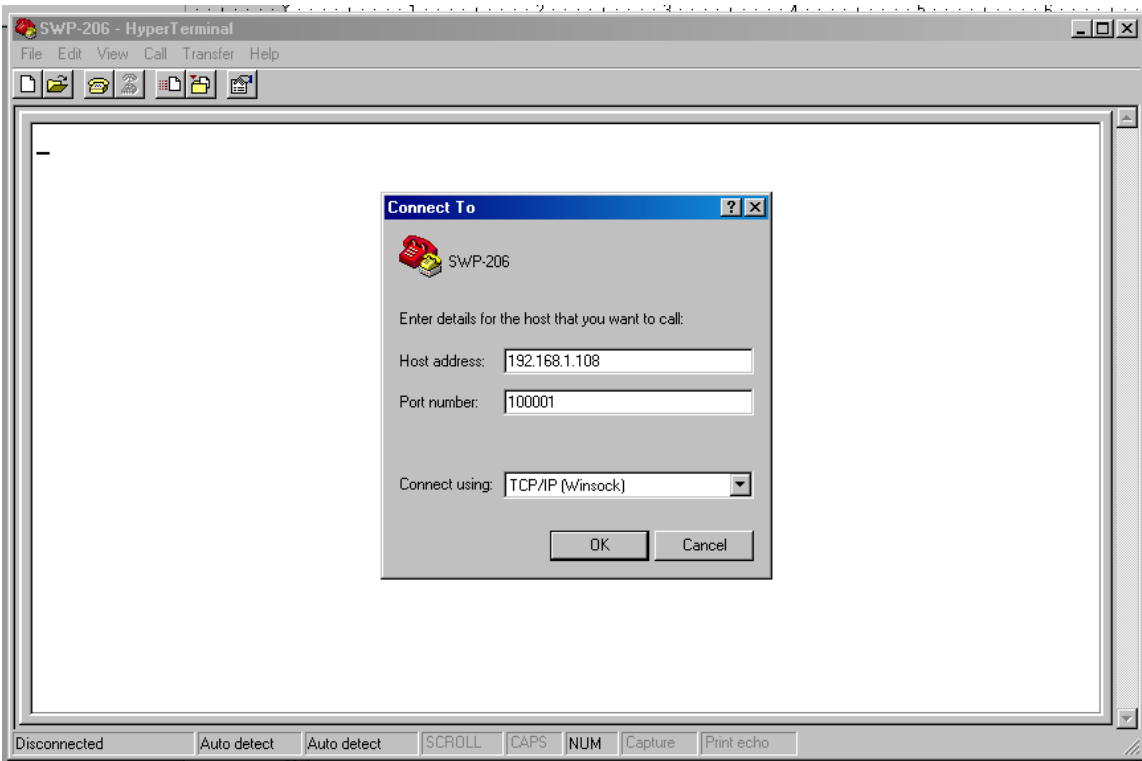
Hyper Terminal will request the configuration information necessary to connect to the SWP-206. Enter the SWP-206 IP address in the Host Address. Enter 10001 as the Port Number. Select TCP/IP (Winsock) for the Connect Using option and click "OK" as shown below.

Once Hyper Terminal connects with the SWP-206 system the screen below should appear:
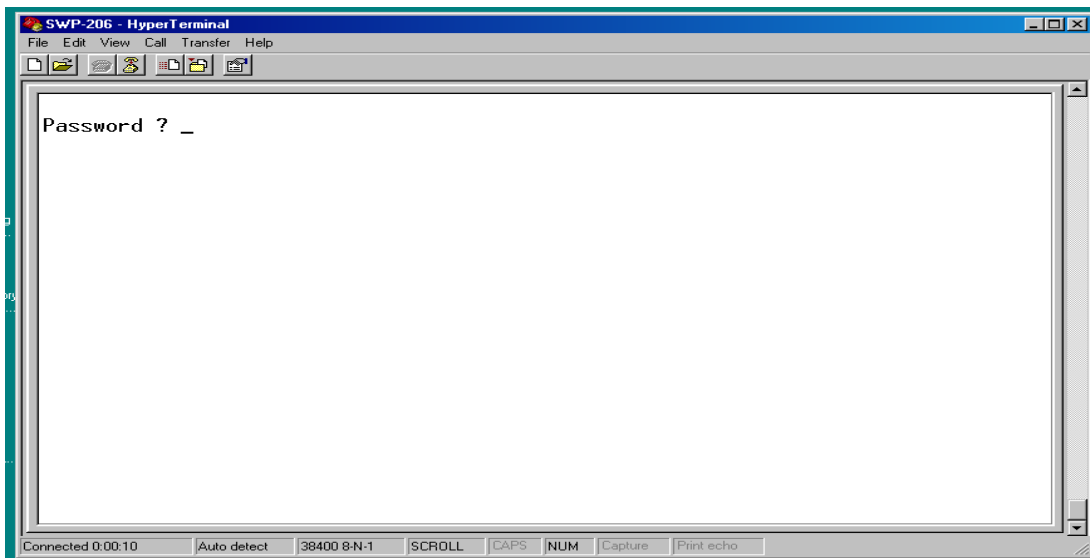
Enter the default or user configured password followed by [ENTER]. If the password is

entered correctly the VPS-206 will clear the screen and begin sending remote monitoring data which is refreshed every 4 seconds and resembles the screen below.


```
BDI Xport - HyperTerminal
File  Edit  View  Call  Transfer  Help


    BROADCAST DEVICES SWP-206
    FIRMWARE REV 3.4.7 G

    ┌──────────┬─────────┬─────────┬───────┬─────────┬───┬───┐
    │ CHANNEL  │ FWD PWR │ REF PWR │ TEMP  │  PRES   │ I │ F │
    ├──────────┼─────────┼─────────┼───────┼─────────┼───┼───┤
    │CHANNEL 1 │  UNDER  │  UNDER  │  0°F  │  0 PSI  │ X │ . │
    │CHANNEL 2 │  UNDER  │  UNDER  │  0°F  │  0 PSI  │ X │ . │
    │CHANNEL 3 │  UNDER  │  UNDER  │  0°F  │  0 PSI  │ X │ . │
    │CHANNEL 4 │  UNDER  │  UNDER  │  0°F  │  0 PSI  │ X │ . │
    │CHANNEL 5 │  UNDER  │  UNDER  │  0°F  │  0 PSI  │ X │ . │
    │CHANNEL 6 │  UNDER  │  UNDER  │  0°F  │  0 PSI  │ X │ . │
    │CHANNEL 7 │  UNDER  │  UNDER  │  0°F  │  0 PSI  │ X │ . │
    │CHANNEL 8 │  UNDER  │  UNDER  │  0°F  │  0 PSI  │ X │ . │
    └──────────┴─────────┴─────────┴───────┴─────────┴───┴───┘


Disconnected        ANSIW      TCP/IP      SCROLL   CAPS   NUM   Capture   Print echo
```

To stop monitoring the SWP-206 exit Hyper Terminal using the usual Windows FILE-EXIT commands. When exiting Hyper Terminal for the first time after configuring for an SWP-206 connection you will be prompted to save the configuration. Doing so will allow easy access in the future. In addition, the ".ht" file saved by Hyper Terminal can be dragged to the desktop or a shortcut created for instant access.

Hyper Terminal is one of many communications programs what will work with the SWP-206. You may use another program if Hyper Terminal is not readily available. There is a share ware program that Broadcast Devices, Inc. has tested and has been shown to be equivalent to Hyper Terminal. The program is called Putty and is available on the web at:

http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html

VIII. Warranty

  Broadcast Devices, Inc. products are warranted against failure due to faulty materials or workmanship for a period of one year from the date of shipment to the ultimate user. The warranty covers repair or replacement of defective parts at the factory, provided the unit has been returned prepaid by the user. All shipments to the factory shall have affixed to the outside of the container an R. A. number obtained from the factory. The above warranty is void if the unit has been modified by the user outside of any recommendations from the factory or if the unit has been abused or operated outside of its electrical or environmental specifications. If customer conducted field tests suggest that the unit may be faulty, whether or not the unit is in warranty, a full report of the difficulty should be sent to Broadcast Devices, Inc. factory at Cortlandt Manor, New York. The office may suggest further tests or authorize return for factory evaluation.

  Units sent to the factory should be well packed in the original packing if possible and shipped to Broadcast Devices, Inc. 2066 E. Main Street, Cortlandt Manor, NY 10567. Remember to affix the R.A. number to the outside of the carton. Any packages received without such R.A. number will be refused. Note: freight collect shipments will also be refused. When the unit has been received, inspected and tested, the customer will receive a report of the findings along with a quotation for recommended repairs, which are found falling outside of the standard warranty. Units returned for in-warranty repairs which are found not to be defective will be subject to an evaluation and handling charge. In-warranty units will be repaired at no charge and returned via prepaid freight.

  Out-of-warranty units needing repair require a purchase order and will be invoiced for parts, labor, and shipping charges.

  When ordering replacement part, always specify A) Part number or Description, and Quantity; B) Date of Purchase, Where Purchased; C) Any Special Shipping Instructions. Always specify a street address, as shipping companies cannot deliver to a postal box.

  Broadcast Devices, Inc. is not responsible for any other manufacturer's warranty on original equipment. Nor are we responsible for any failure, damage, or loss of property that may occur due to the installation or operation of our equipment outside of recommended specifications.

Broadcast Devices, Inc. may from time to time make changes to the materials used in the manufacture of its equipment and reserves the right to do so without further notice.

IX. Specifications

Electrical Power Requirements:	100 -240 VAC 50-60 Hertz
Physical Environment:	0 -60 C non condensing atmosphere
Physical Size:	19"W X 1.75" H X 10" D 1 - EIA Rack Unit
GPIO:	Ground Start/TTL compatible Status
Interlock Relays:	8 – Form C 30 VDC @1 Ampere Contact Rating
Communications:	Parallel R/C, RS232/485/LAN
Power Measurement Range:	0 – 100 KW – configuration dependent
Power Measurement Accuracy:	+/- 0.5 dB – typically +/-0.25 dB
Number of channels:	8 forward, 8 reflected