



**Broadcast Devices, Inc.**

**Technical Reference Manual**

***SWP-206 Digi-Monitor 8 Channel RF Power Monitor System  
For Use with the BDI DPS-100D Power Meter System***

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## **I. Introduction**

The SWP-206 Digi Monitor was developed by BDI to display data from up to 8 DPS-100D Digital Power Sensors in a single rack unit display. 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 displays forward/reflected power, temperature and line pressure measurements can be performed by the addition of optional BDI TMP-100 temperature sensors and PSW-100 pressure sensors connected to accompanying DPS-100D Power sensor systems. Simple RS-485 serial connection via standard Category 5/6 cabling is used to connect the various DPS-100D power sensors to the SWP-206 chassis.

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**

The SWP-206 Digi Monitor series protection system has been upgraded to communicate with the DPS-100D RF Power sensor. A single Ethernet cable interface to up to eight DPS-100D sensors can be supported. RS485 communication protocol allows for addressing of each sensor. Each DPS-100D sensor

## **III. Installation Considerations**

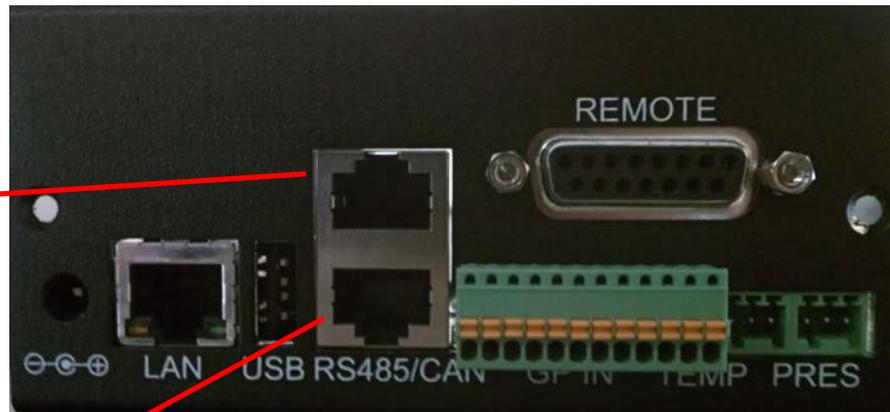
Each DPS-100D directional coupler/sensor should be placed in the desired location for measurement. Each supplied directional coupler has a set of measurement ports, one for forward power and the other for reflected power. There is also provision for external temperature and line pressure sensors. Each DPS-100D has an internal temperature sensor for measurement of internal electronics temperature.

1. Install the coupler making sure that the flow of RF follows the arrow direction marked on the coupler. Failure to do this will provide erroneous power indications as they will be reversed.
2. Using standard Ethernet cable attach a cable from the rear panel of the SWP-206 chassis using the supplied DB9 to RJ45 adapter. This adapter should be plugged in to the DB9 connector marked RS485. Connect the other end of this cable to the first DPS-100D RJ45 receptacle marked RS485. Note that each DPS-100D sensor has two RJ45 receptacles marked RS485. The second connector is used to connect to the next DPS-100D sensor or in the case of the last sensor a supplied RS485 terminator is connected to properly terminate the RS485 bus.

#### IV. Rack Equipment Location and Connection

1. In a suitable EIA 19" rack enclosure mount the SWP-206 chassis. ***It is strongly recommended that the SWP-206 be plugged into a personal computer style UPS system if the system is to be used where interlock control of broadcast transmitters is contemplated.***
2. Attach the supplied DB9 to RJ45 adapter to the rear panel DB9 connector marked RS-485.
3. Using the supplied Ethernet cables attach one Ethernet cable to the RJ45 receptacle of the adapter installed in step 2 to the first sensor in the system. Using supplied cable daisy chain attach from one sensor to the next until all sensors supplied have been connected. Each DPS-100D sensor has been supplied with its own RS485 address 1 through 8. The data for each sensor will appear on the respective SWP-206 channel. Note that when the DPS-100D sensors are used in conjunction with the SWP-206 chassis they are powered through the RS-485 connection. Make sure all connections are complete and all DPS-100D sensors show an active display. Each DPS-100D sensor has an RS-485 address. This address is programmed at the factory but it is possible to change this address if desired. To perform this change consult the DPS-100D Technical Reference Manual supplied with the DPS-100D sensor. NOTE: No two DPS-100D sensors can have the same RS-485 address or the system will fail to operate properly. See Fig. 1 below

Connect Provided  
Category 6 Cable from  
SWP-206 Chassis to first  
DPS-100D sensor



Connect Provided Category 6  
Cable To next DPS-100D  
Sensor or for the last DPS-100D  
Sensor install provided  
RS-485 terminating adapter

**Fig. 1 Shows connection from SWP-206 Chassis and to succeeding DPS-100D Sensors**

4. Once all DPS-100D sensors have been connected their local displays should be lit and should display the normal operating screen which shows Forward/Reflected Power,

Temperature, Pressure and other data. Note that when properly connected and addressed the SWP-206 channels will show power indication. For channels where no sensor is associated the power indication will be a series of dotted lines indicating no data available. If for some reason a desired channel is not showing data when connected to a DPS-100D sensor, check the cabling to make sure it is seated properly and check the display ICON under COMMS. Review Fig.2 below

Communications Icon  
Indicating RS-485  
Communications established with  
SWP-206 Chassis

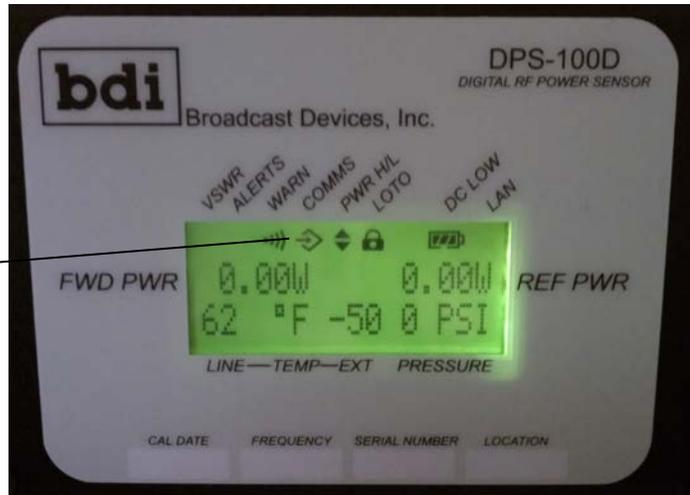


Fig. 2

### **Optional Connections:**

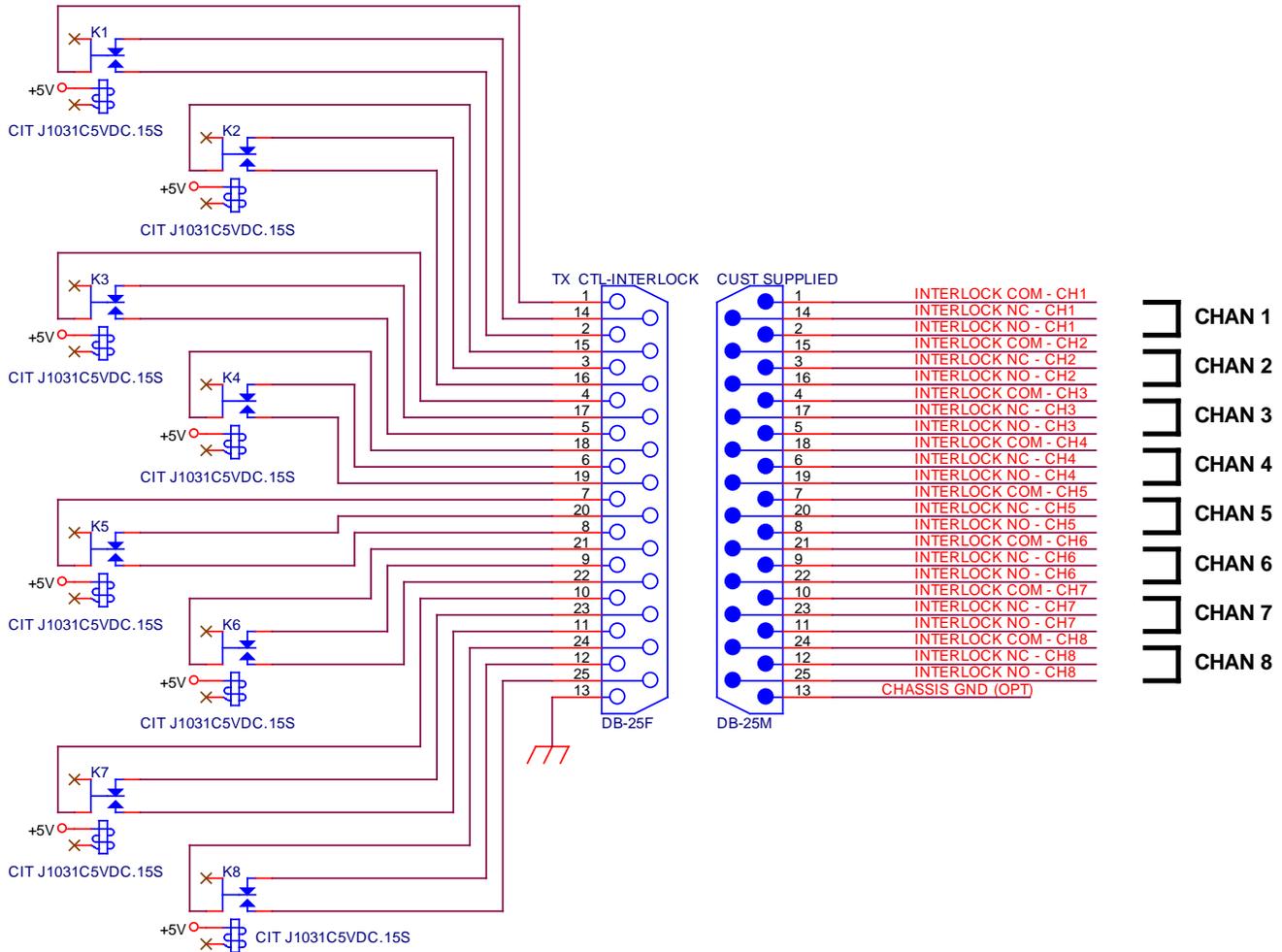
When optional BDI temperature and pressure sensors are attached to the DPS-100D RF sensor a complete set of data including forward/reflected power, temperature and pressure can be displayed on the SWP-206 chassis for the respective DPS-100D channel. Normal operation of the SWP-206 chassis displays forward/reflected power. To access the temperature and pressure readings use the left/right arrow keys on the respective channel to access the second screen indicating temperature and pressure.

**BDI TMP-100** can be attached to any DPS-100D. The DPS-100D provides power for the sensor. A three position plug is supplied with each TMP-100 for direct plug in to the DPS-100D sensor

**BDI PSW-100** Pressure sensors can be connected in a similar fashion to the temperature sensor described above.

## 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.



**Fig. 3 Rear Panel J8 Interlock 1 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.

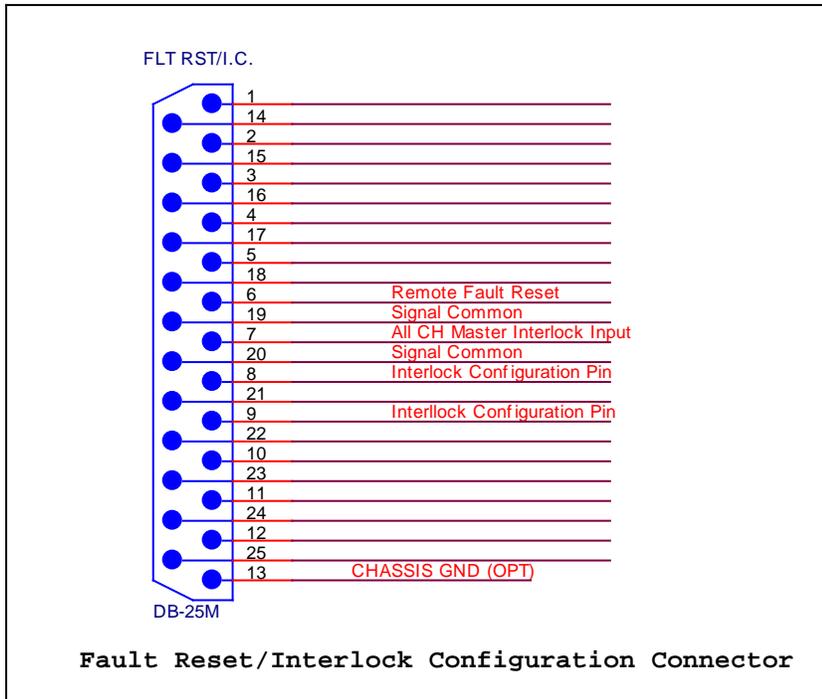
### J3 FLT RST/ I.C. Rear Panel DB-25 INPUT CONNECTIONS

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

**Fig. 4**

**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)

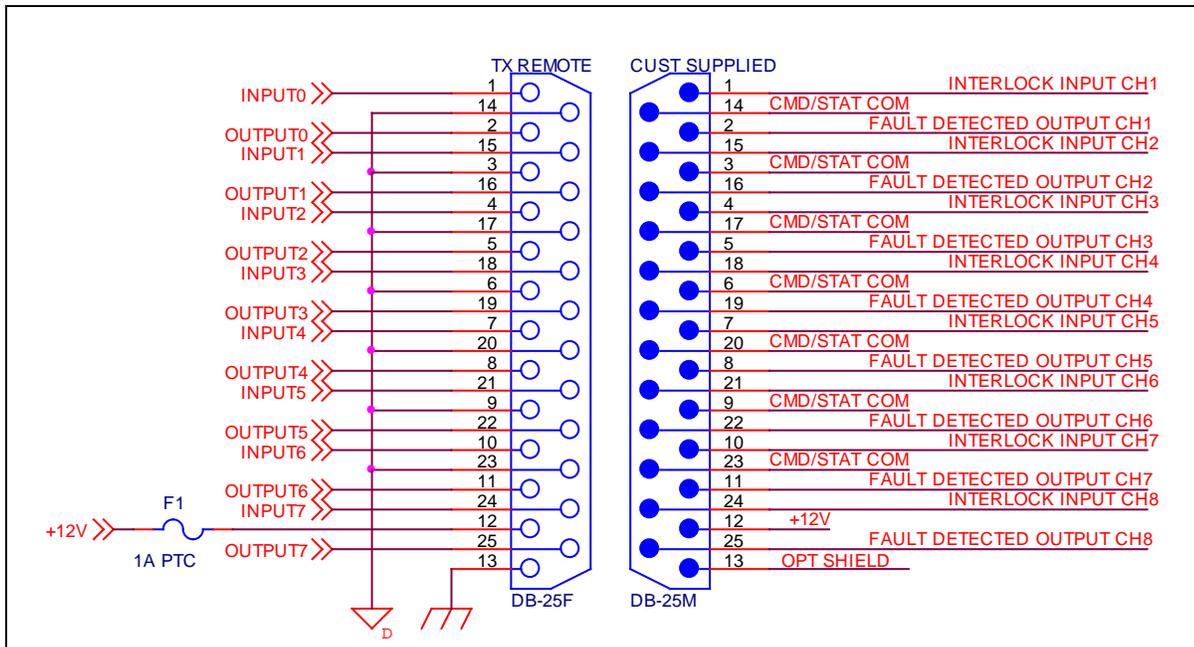


**Fig. 5 SWP-206 Rear Panel J3 IL/CFG connector**

## VI. Remote Control/External Interlock Connection

The SWP-206 chassis provides transmitter interlock control based upon information from the DPS-100D sensors connected. In addition there is an external interlock string connection for each SWP-206 channel which is provided on the SWP-206 rear panel DB25 connector marked “ **J1 Remote Control**”. External interlock inputs can be used to interface to patch panels or lock out tag out devices or any interlock related connection where transmitter operation should be interrupted due to a switch closure. A DB25 connector and hood are provided marked JI R/C/S for installation to this connector. Each of the eight external interlock inputs is jumped out on this connector. To interrupt these connections to add external interlock devices pertaining to a particular channel make connections as shown.

There is also provision for reflected power fault status for each channel. There is also provision for fault reset. See Fig. 6 for connection information. Note that status is active low. Remote fault reset is accomplished by momentary connection from pin 24 to any CMD/STATUS COM pin.



**Fig. 6 SWP-206 Rear Panel J1 R/C/S Connector**

### Optional RF Status Panel Connection Information

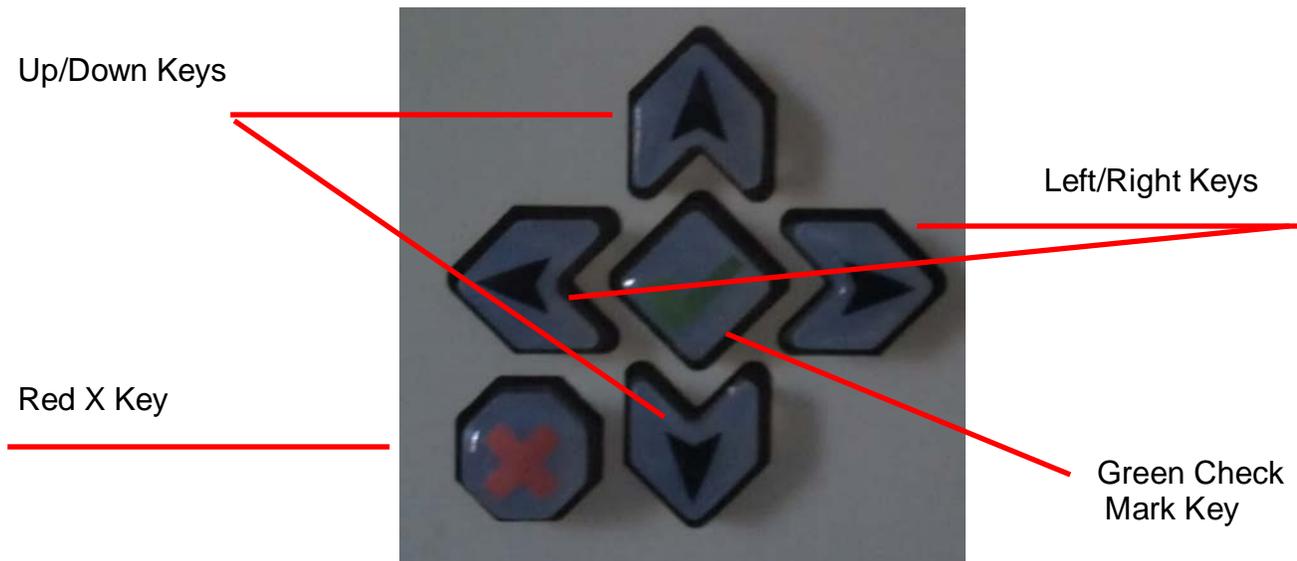
The SWP-206 can be ordered with the RFS-100 RF status LED indicator panel. If this option is ordered make connection between the SWP-206 rear panel connector J9 Interlock 2 and the DB25 connector marked "Relay" on the RFS-100 RF Status Panel with the provided 6 foot DB25 M/F cable. This panel shows active display of DPS-100D sensors connected as to whether RF is present or not. Note that on unused channels the default is "RF ON"

## 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 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 RED "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. To deactivate unused channels from the scan group follow these instructions:

1. Enter the manual operation mode by pressing the RED "X" key on the front panel of the SWP-206 until the \* is extinguished.
2. Select the channel to be deactivated by using the up/down arrows to navigate to that channel.
3. Press and hold the GREEN Check mark key for 5 seconds. The unit will enter the programming mode.
4. Using the left/right arrow keys select to enter the channel enable mode

5. Using the up/down arrow keys select "Deactivate"
6. Press and hold the RED X key for five seconds to store the information.



**Fig. 7 SWP-206 Front Panel Button Cluster**

Fault Reset: If the SWP-206 detects a fault condition it will alternate between the normal display and a **"FAULT DETECTED"** warning message. Pressing the RED "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 IL/CFG** connector for fault reset and interlock configuration.

## 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 Login Screen will look like this:**



Default Username: username

Default Password: password

Once logged in the IP configuration 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 screenshot shows a configuration interface with the following fields and controls:

IP Address 192.168.1.107	IP Mask 255.255.255.0	MAC ADDRESS 54:10:EC:51:BE:80
Primary DNS Server 192.168.1.1	Gateway 192.168.1.1	Serial Data Port 10001
Username username	Password password	Refresh (circular arrow icon)
Back (left arrow icon)	<b>bdi</b> FW REV LAN 1.6.3	UPDATE FIRMWARE (right arrow icon)

**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.**

It is a good idea to record your settings here for future reference:

IP Address: \_\_\_\_\_

Sub net mask: \_\_\_\_\_

Primary DNS Server: \_\_\_\_\_

Default Gateway: \_\_\_\_\_

Serial Data Port: \_\_\_\_\_

Username: \_\_\_\_\_

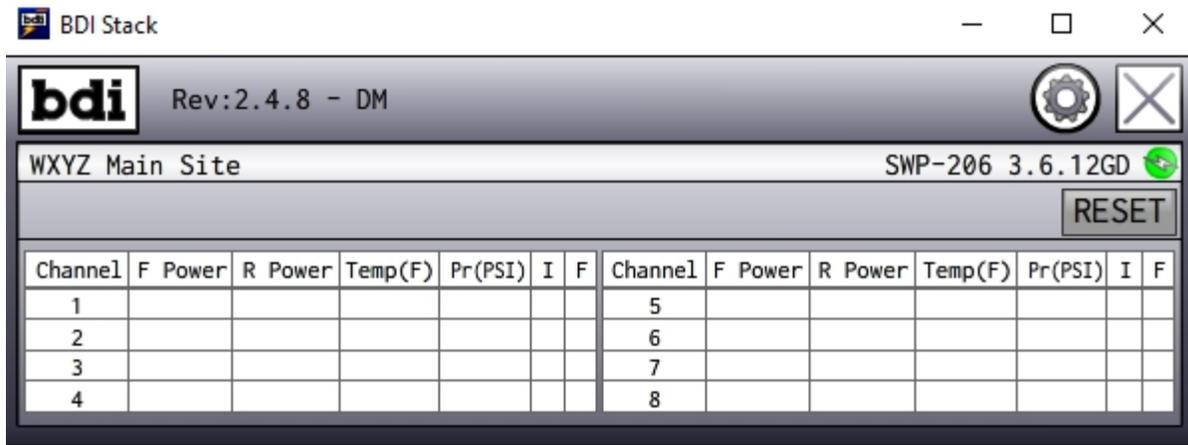
Password: \_\_\_\_\_

**When all data has been entered and recorded here click on the checkmark key to save your settings. YOU MUST POWER CYCLE THE UNIT FOR THESE CHANGES TO TAKE EFFECT OR THE UNIT WILL STILL BE SET TO FACTORY DEFAULTS.**

## VIII. BDI Stack Graphical User Interface

BDI provides a graphical user interface software package which is designed to operate in a Windows XP/7/8/10 operating system environments and Android devices. The Stack program is contained on the CD supplied with your unit. It can also be downloaded from the downloads page on our website: [www.broadcast-devices.com](http://www.broadcast-devices.com)

### Typical GUI Screen shot

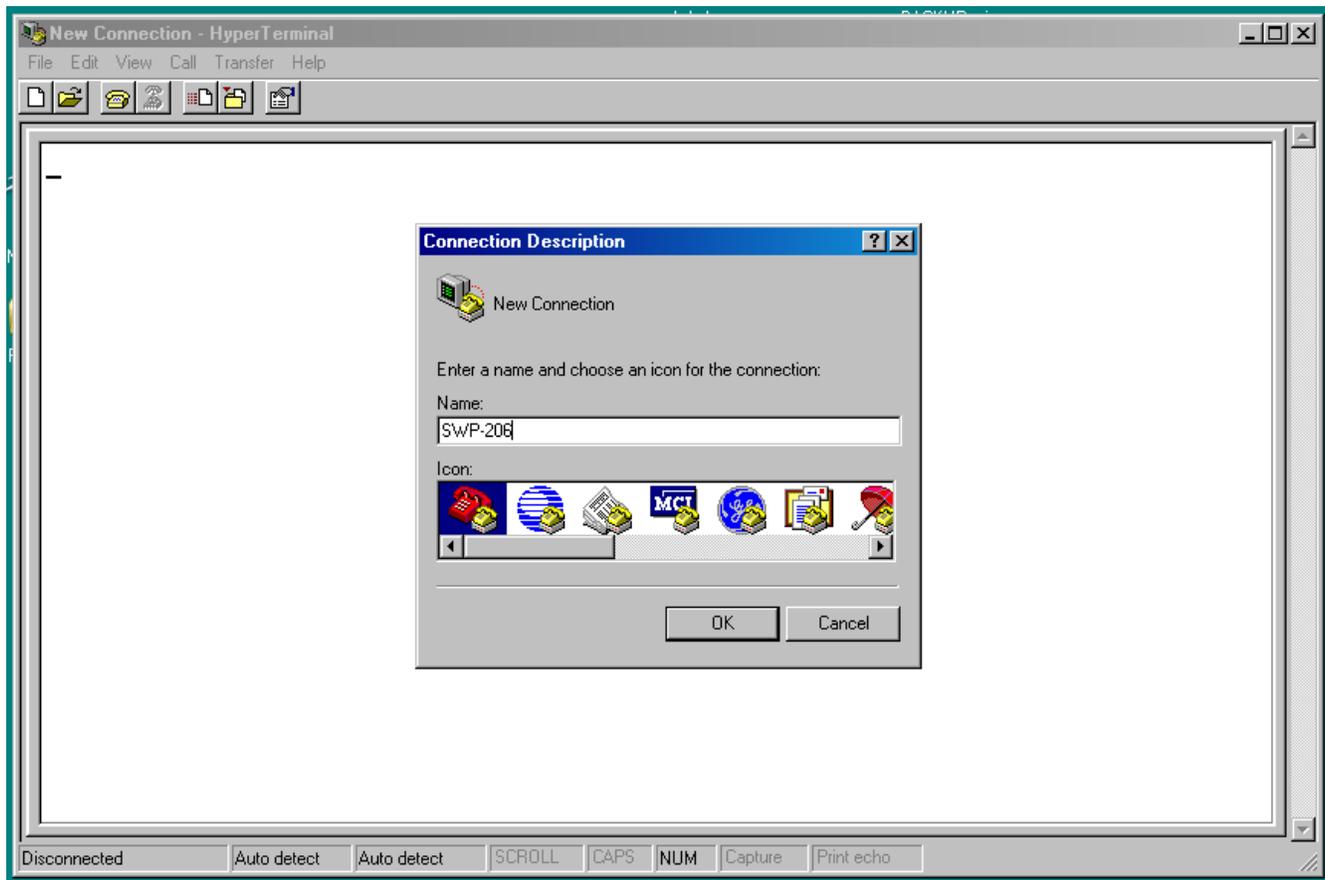


The BDI Stack GUI can be used with up to 6 different BDI products simultaneously from collocated or non-collocated equipment.

### SWP-206 Remote Access – Without the BDI Stack GUI

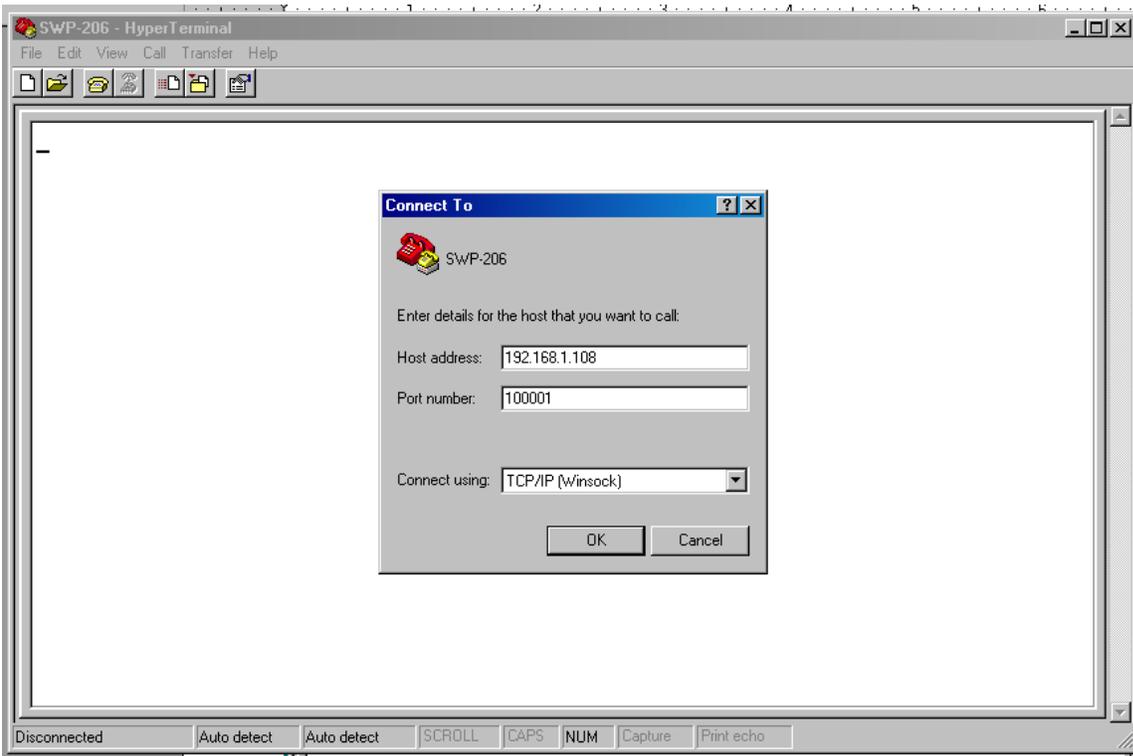
To access the SWP-206 remotely without use of the BDI Stack can be done by use of a terminal emulator capable of TCP/IP operation is required. Hyper Terminal (provided with Win XP) is one such program however many free and commercial programs are capable of accessing the SWP-206. The example below uses 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.

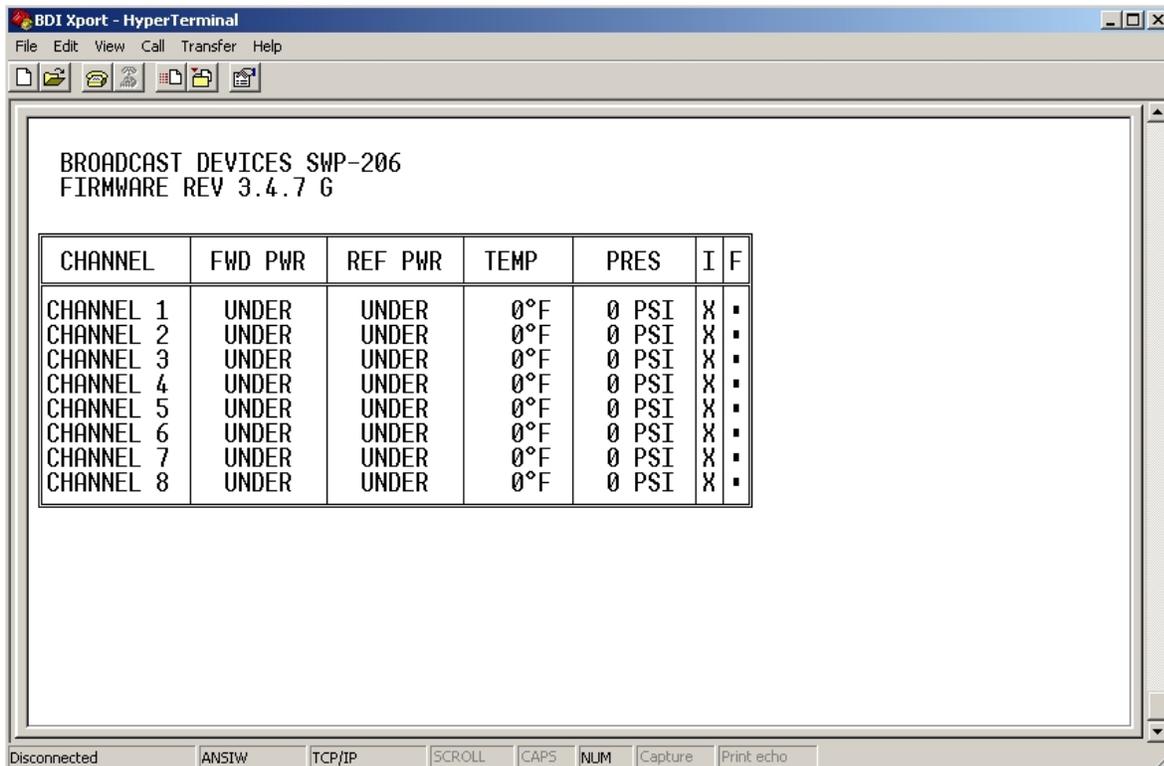


Hyper Terminal will prompt for a Connection Name. Enter a name for this connection such as "SWP-206"

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 (Winsoc) 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:



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>

## IX. 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. Check our web site for current ship to address: [www.broadcast-devices.com](http://www.broadcast-devices.com) . 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 parts, 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.

**X. 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:	+/- 5% of reading
Number of channels:	8 forward, 8 reflected



