

**DSM3400 Series  
DIGITAL SERVICE MODULE**

**INSTRUCTION and SERVICE MANUAL**

04/2011

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## Specifications

Module Inputs	8
Channel Inputs	512 Maximum
Interface Connectors	
ZOC Interface	Cannon MDM-15SH003K
Digital Input	PT06A-12-10S
Digital Output	PT06A-12-10P
Digital Power	PT06A-8-3S-SR
Power Requirements	
12 Vdc Version	9 to 18 Vdc
24 Vdc Version	18 to 36 Vdc
Power Consumption	35 Watts
Communications Protocol	Ethernet 10/100Base-T and RS232
Typical Data Acquisition Rate	625 samples/channel/sec, depending on configuration
Communications Configuration	
Ethernet	TCP/IP - Input and Output
RS232	115200 BAUD (100, 300, 1200, 2400, 4800, 9600, 19200, 38400, or 57600) 8 data bits, 1 stop bit, no parity. Used for communication with auxiliary devices only
ARINC 429	Output only
Dimensions (LxWxH)	9.00 in x 8.00 in x 6.00 in (228.6 mm x 203.2 mm x 152.4 mm)
Weight	6.5 lbs (2.95 kg)
Operating Temperature	0°C to 60°C
Storage Temperature	-40°C to 85°C
Operating and Storage Humidity	0 to 95% (non-condensing)

## General Description

The DSM3400 Series modules are designed to permit non DSA Electronic Pressure Scanners to be utilized in an Ethernet system. Each DSM can accept up to 8 ZOC Electronic Pressure Scanners, each with up to 64 inputs. The ZOC modules must have an RTD installed in order to achieve the benefits of the Digital Sensor Array Technology.

The DSM contains 9 A/D's, 8 to measure pressure inputs and one to measure temperature inputs. It also contains an imbedded computer, RAM memory, and a hard disk drive. The DSM uses Windows Embedded XP® as an operating system. Connections for a monitor, keyboard, mouse, and USB port are available inside the DSM. A user may connect to these inputs and operate the DSM as a stand alone computer.

When a ZOC module is to be used with a DSM, it first must have an RTD installed so a three dimensional Pressure/Temperature characterization table can be generated. These coefficients can then be downloaded into the DSM and used to generate Engineering Unit data.

The DSM3400 is available in two configurations. Ethernet only and ARINC 429. The ARINC 429 version has both connections. For more information, please contact Scanivalve Corp, Product Support Department.



Figure 1 - DSM3400/Ethernet



Figure 2 - DSM 3400 ARINC 429



# Getting Started

The DSM3400 is a stand alone pressure scanning system. It incorporates a microprocessor, RAM, a Compact Flash Hard Disk, and other interface boards to scan pressures in ZOC Electronic Pressure Scanners. These pressures are converted to Engineering Units using the same methods as the Digital Sensor Array. A user should be familiar with Windows XP to best understand the operation of the DSM3400.

## Hardware

The DSM3400 is furnished with a set of mounting ears so the unit may be mounted in a convenient location. It is important to note that although the DSM3400 has a ruggedized hard disk drive built into the module, the DSM3400 must be protected if shock and vibration levels will exceed 3 g's. It is recommended that the DSM be shock mounted whenever possible. Figure 3 shows the mounting dimensions and details. Dimensions in parentheses are centimeters.

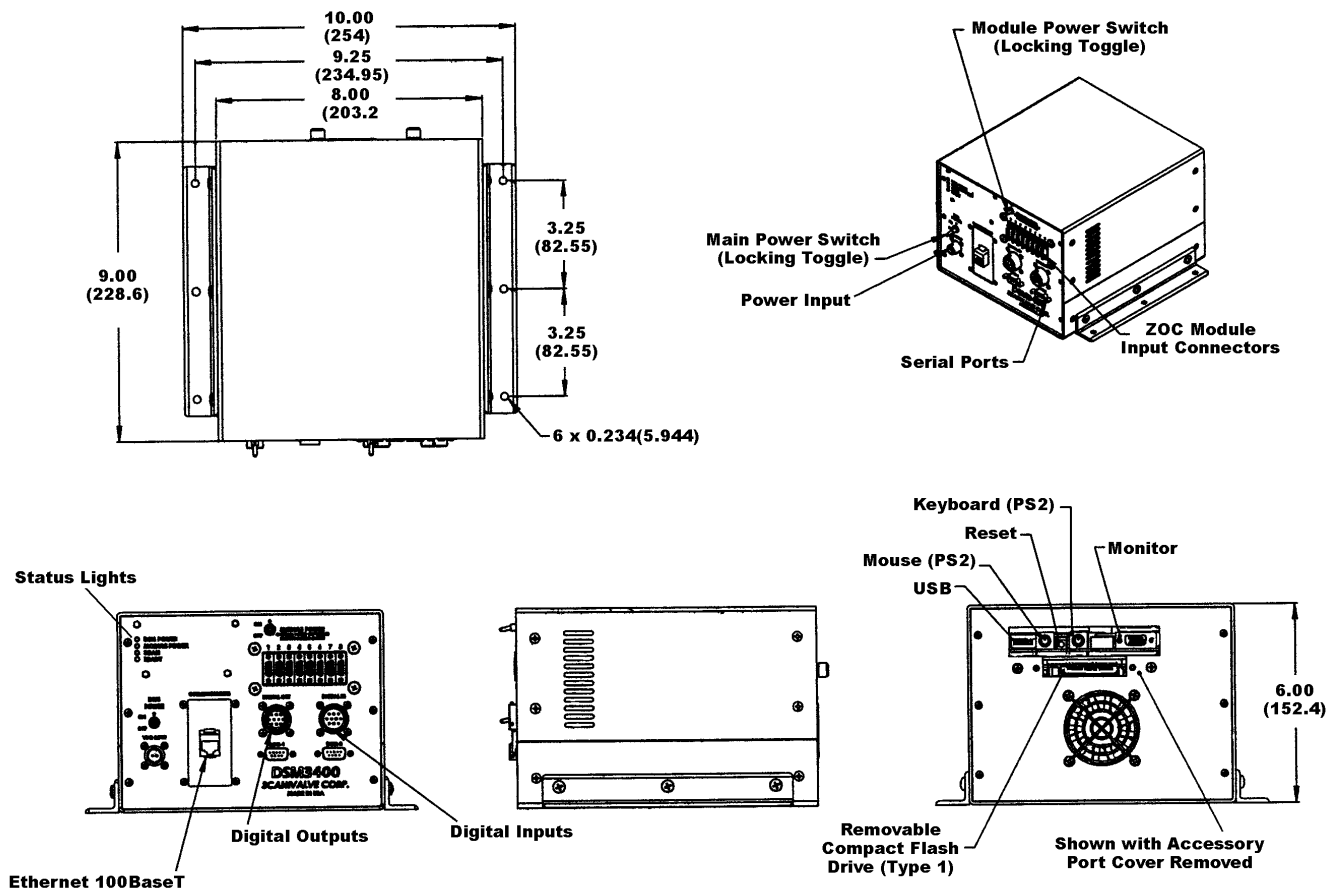


Figure 3 - DSM3400 Physical Measurements and Mounting Dimensions

## DSM Front Panel Controls and Indicators

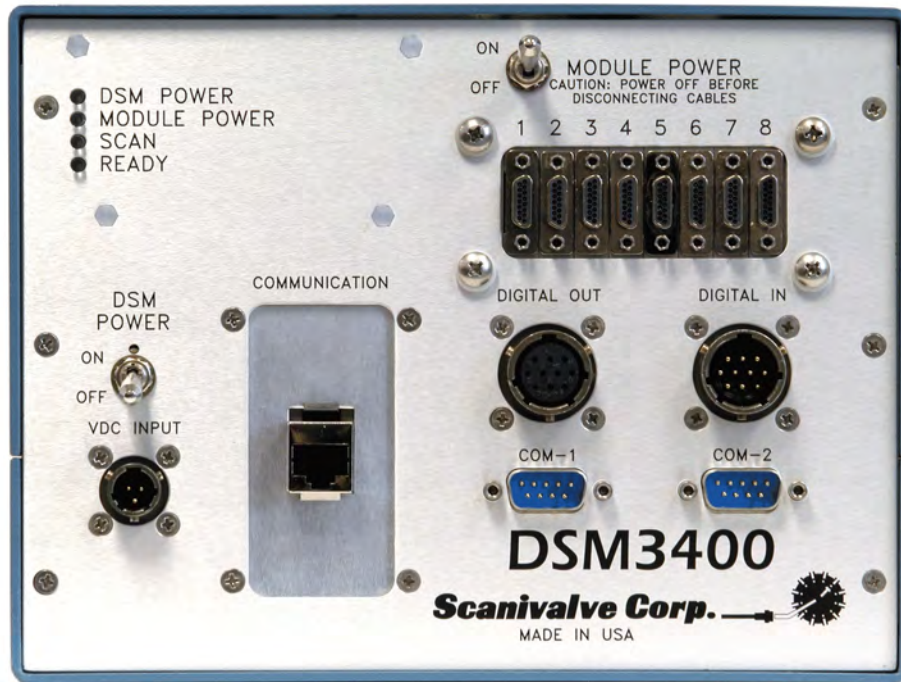


Figure 4 - DSM3400 Front Panel

### **DSM Power Input**

This is the main power input. All DSM3400 Series modules operate from +9 to 36 Vdc. Refer to Figure 4 on page 6 for more information.

### **DSM Power Switch**

This switch controls the power to the entire DSM module.

### **DSM Power Indicator**

A green led that will be illuminated when power is applied to the DSM.

### **Module Power Switch**

This switch removes DC power from the modules. This allows a “hot swap” of module configurations without having to reboot the DSM.

### **Module Power Indicator**

This yellow led will be illuminated when power is applied to the ZOC modules.

### **Ready Indicator**

This green led will be illuminated when the DSM is in the READY mode.

### **Scan Indicator**

This red led will be illuminated when the DSM is in the SCAN mode.

**Digital Input**

This connector is used to input up to five(5) digital inputs tot he DSM. Refer to Figure 9 on page 9 for more information.

**Digital Output**

This connector is used to output up to five(5) digital outputs. Refer to Figure 10 on page 9 for more information.

**Ethernet Connection**

This is a RJ45 connection for a 10/100 Base-T Ethernet connection. The DSM will auto select the speed based on the network. Refer to Figure 5 on page 7 for more information.

**Com1, Com2 Ports**

The DSM has two(2) RS232 ports. They may be configured for serial communications with SPC3000 Calibrator Modules or other serial auxiliary devices. Refer to Figure 6 on page 8 for more information.

**Accessory Port Cover**

This cover, on the rear panel, is used to mask the local connections for a Keyboard, Monitor and Mouse.



Figure 5 - DSM3400/ARINC Front Panel

## Accessory Ports



Figure 6 - DSM3400 Rear Panel / Accessory Port Location

**WARNING:** DO NOT connect or disconnect equipment to the Keyboard, Monitor, or Mouse ports while power is applied to the DSM.

**Monitor** This connector will accept a standard VGA monitor.

**Mouse** This port will support a standard PS2 mouse. The connector is colored green for easier identification.

**Keyboard** This port will support a standard PS2 keyboard. The connector is colored violet for easier identification.

**USB Ports** The DSM3400 has one(1) USB port. It supports any standard USB V1.1 or 2.0 device.

**Reset Switch** This is a hardware reset switch.

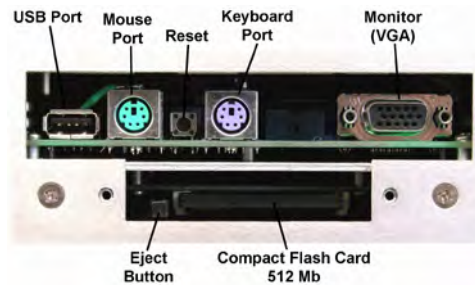


Figure 7 - Accessory Port Detail

## Power Requirements

The DSM3400 has two options for power input: A 12 Vdc version that operates from 9 to 18 Vdc, and a 24 Vdc version that operates from 18 to 36 Vdc. It is very important that the power input does not exceed the limits listed. The wiring of the power input is shown in Figure 8.

It is very important to insure that the cooling fan is operating whenever power is applied to the DSM. If the cooling fan is not functioning, the DSM **MUST** be shut down as soon as possible. The processor will overheat and could be damaged if cooling air flow is lost.

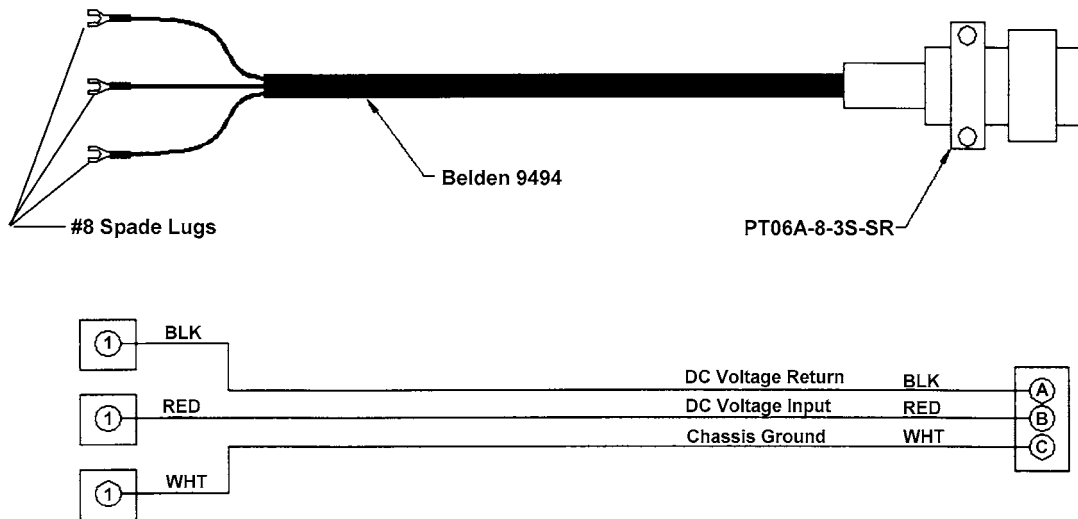


Figure 8 - Power Input Wiring

## Ethernet Connections

A DSM3400 has one Ethernet connection, 10/100Base-T. The Ethernet subsystem supports IEEE 802.3 Ethernet standards for 10BaseT and 100BaseT. The subsystem will auto-negotiate the data rate. The Ethernet connection is a RJ45 jack. This subsystem also supports PC97, PC98, and Net PC standards.

For more information refer to the DSM 3000 Software Requirements Specification.

The RJ-45 jack is shown below for customer reference.

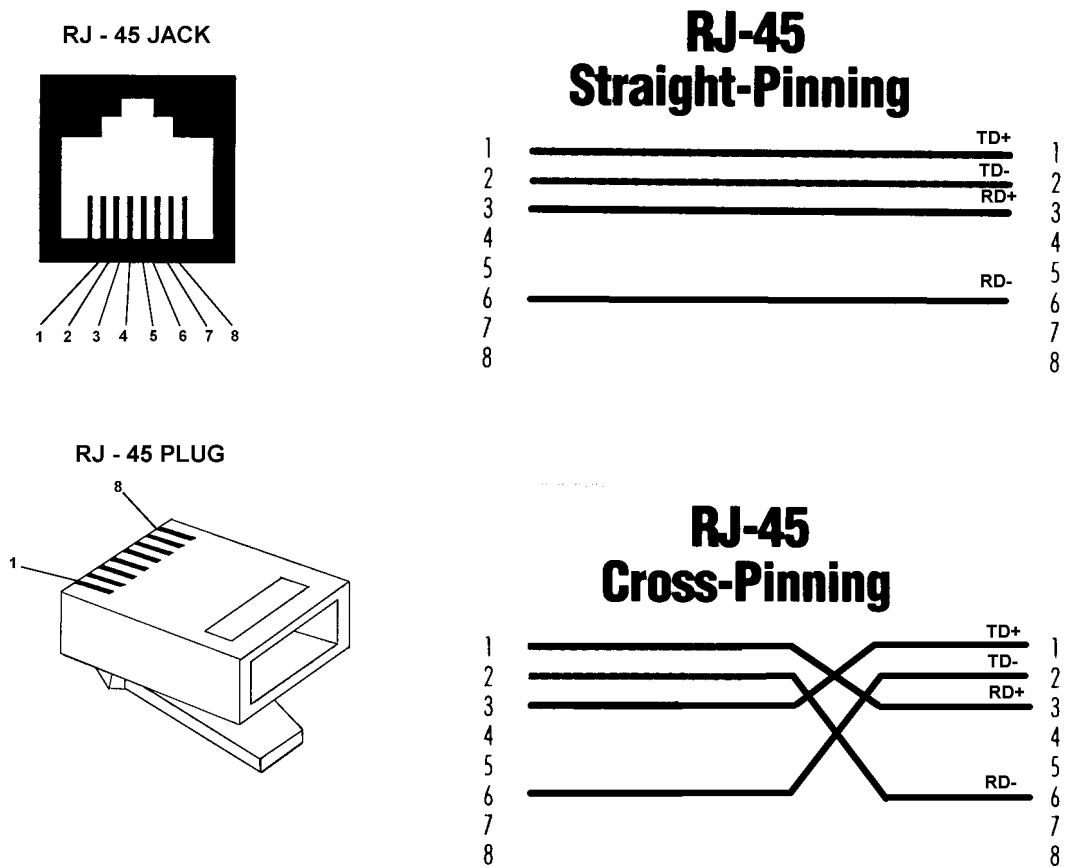


Figure 9 - RJ 45 Plug and Jack

## Serial Connection

Each DSM3400 has two Serial connections. The connections conform to the RS232C standard. The connector wiring is shown in Figure 10 below.

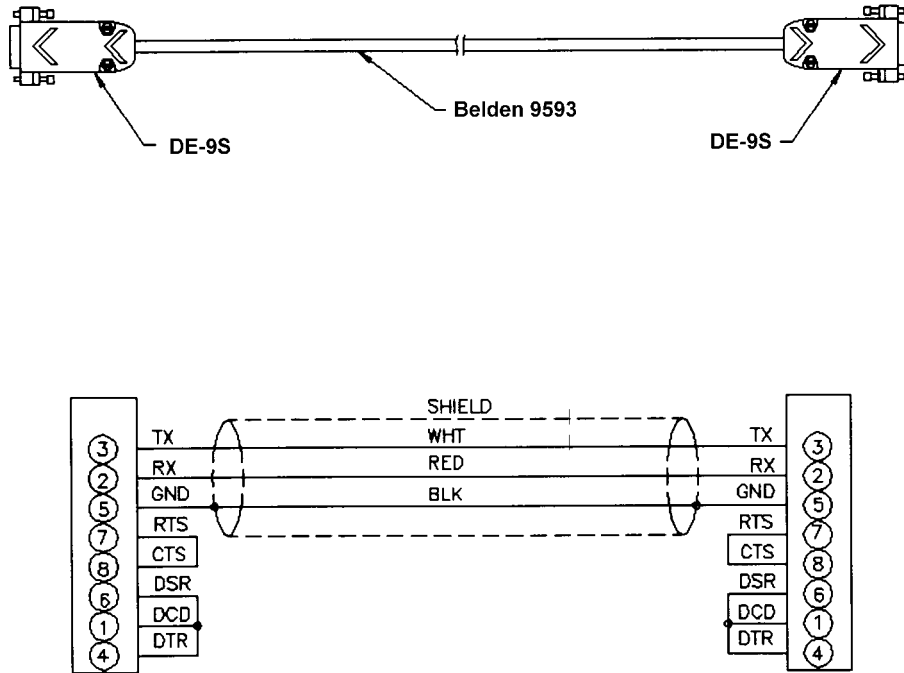


Figure 10 - RS232C Wiring

## Digital I/O Connections

Each DSM has a Digital Input and a Digital Output connector. A maximum of Five(5) Digital Inputs and Five(5) Digital Outputs may be configured. Configuration information may be found in the Software Specification

Digital Inputs are edge triggered. The input pulse should have a minimum voltage of 9 Vdc and a maximum voltage of 15 Vdc.

The Digital Outputs are powered directly by the DC input voltage input. It is recommended that the user supply be capable of providing sufficient current drive for the DSM and the Digital Outputs. Each Digital Output requires approximately 500 mA @ 24 Vdc.

Figure 11 shows the wiring of the Digital Inputs, Figure 12 shows the wiring of the Digital Outputs.

**NOTE:** Digital Input 1 is reserved for the Hardware Trigger Input for Frame or Scan Triggers..

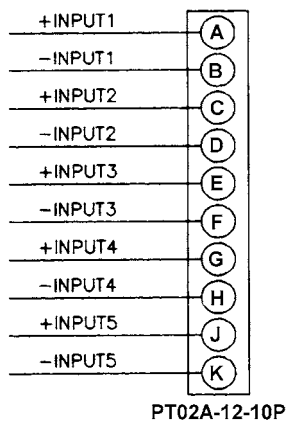


Figure 11 - Digital Input Wiring

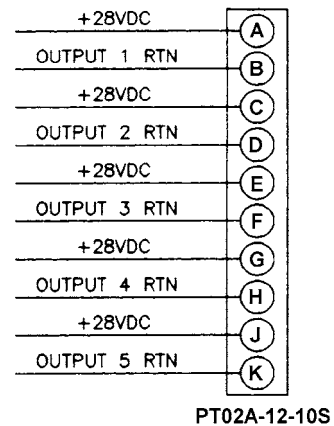


Figure 12 - Digital Output Wiring



## ZOC Input Connections

Each DSM is designed to accept inputs from up to 8 ZOC 14, 17, 22, or 33 modules or any combination. Each ZOC module may have up to 64 Pressure inputs. The DSM can scan each module at different rates. The ZOC modules must have an RTD installed so the DSM can measure the temperature of the module. The input connectors are Cannon MDM-15SH003K. Figure 13 shows the typical input wiring for a ZOC module. Figure 14 shows the typical wiring for a ZOC module installed in a Thermal Control Unit.

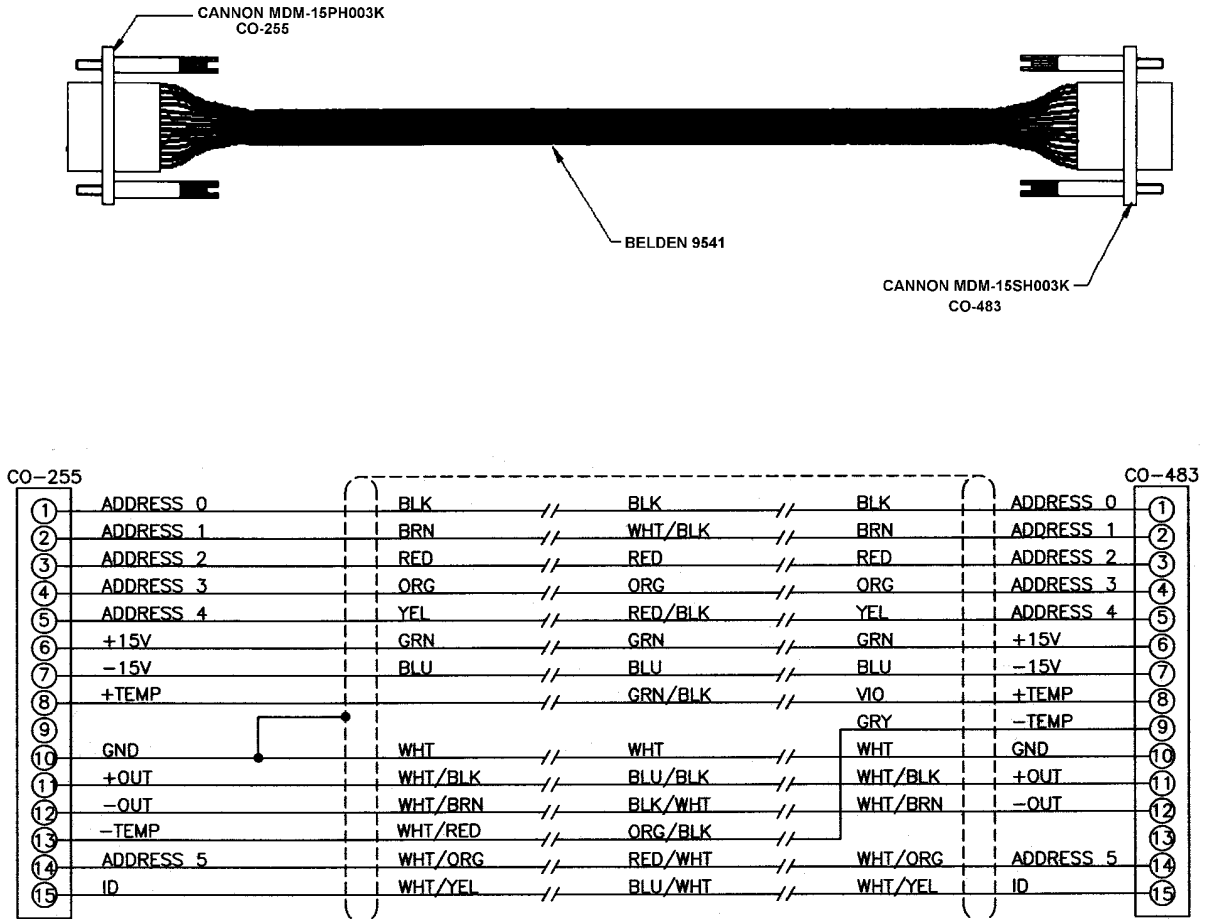


Figure 13 - Typical Input Wiring - ZOC module to DSM

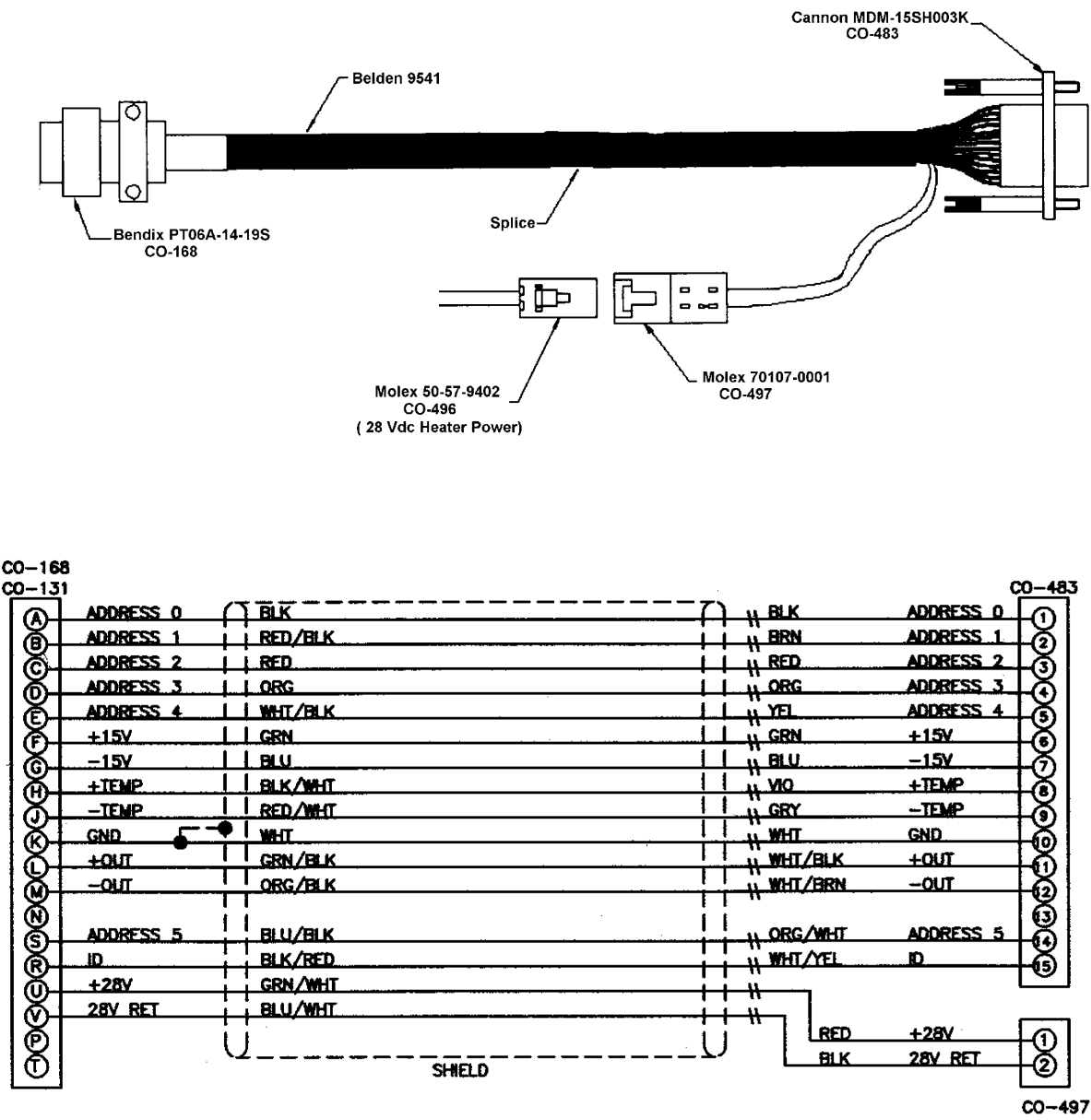


Figure 14 - Typical Wiring - ZOC module in a TCU to a DSM

## ARINC 429 Connections

DSM3400 modules configured for ARINC429 may have an 8 channel ARINC card installed. The 8 channel card is a Condor Engineering part number CEI-420A-88

A DSM 3400/ARINC with the CEI-420A-88 ARINC card has one ARINC 429 connection. It has eight channels each of which can be programmed to output different scan groups. ARINC data can only be output in Engineering Units. The ARINC card will not output Raw A/D counts. The wiring is shown in Figure 15.

### DB-25P

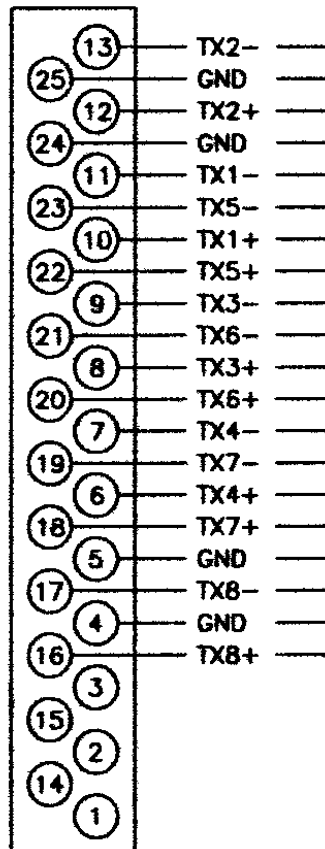


Figure 15 - 8 Channel ARINC output pinouts

## Software

When the DSM is mounted and the power requirements are met, the unit is ready to be configured for use. All configuration variables must be set using a communications program or by using the DSM3400 as a stand alone computer. A user may remove the top cover and connect a keyboard, a mouse, and a monitor to the DSM3400 and use it as a computer. The DSM uses Windows Embedded XP an operating system.

A user may connect another computer to the DSM and communicate by one of the following protocols and associated programs:

### Ethernet

TelNet	A program furnished with Windows 95 and 98. This permits a network connection to the DSAENCL 3400. A TelNet session is described later in this manual
HyperTerminal	A terminal program furnished with Windows NT, 2000 and XP. This program may be configured for Ethernet or Serial Communications.
DSMLinkC	A program written by Scanivalve Corp. This program allows a user to communicate with a DSAENCL 3400. It operates in Windows 9x, NT, 2000, and XP.
DSM LabView VI	Drivers written by Scanivalve Corp are available for use with LabView versions 5.0 and higher.
Network Neighborhood	Windows Peer to Peer Networking

### RS232

The RS232 ports on a DSM3400 are for output only.

## Operation

This section contains information and procedures required for the proper operation of the DSM3400 series modules.

The DSM3400 series is a stand alone data system. Windows Embedded XP is used as the operating system. When power is first applied, a DSM will self boot and execute a program named: **DSM3400.EXE**. The entire boot up process requires approximately 2-3 minutes. When the DSM is ready to accept commands a prompt symbol will be transmitted to the host computer.

Operation of the DSM may be monitored or controlled by connecting a computer to the Ethernet connection or by removing the top cover and connecting a monitor, mouse, and keyboard to the processor board.

## Modules

The DSM will support any existing ZOC Module. The ZOC modules must have an added RTD so the DSM can properly determine the temperature plane to be used. The modified modules use a slightly different input cable. This cable has wiring for the RTD. Modules should only be connected and disconnected with power removed from the DSM. After the modules are connected, power may be applied. Configuration of the DSM may be checked during warm up. At this time, if calibration coefficients have been installed, it is very important to verify that the modules are connected to the proper inputs. Otherwise, data may be invalid.

## RS232 Communications

A DSM may be configured to output commands and receive data from external Serial devices. A wiring diagram is shown in figure10.

## Local Connections

The DSM may be operated in the local mode by removing the top cover(or access plate in models equipped with that feature) and connecting a monitor, keyboard, and mouse(COM1) to the connection points provided on the processor board. Refer to figures 5, 6, and 7 for more information.

In the Local Mode, the DSM operates as a stand alone computer.

## Ethernet Connections

All DSM's are equipped with an Ethernet interface. These modules have a 100/10 BaseT connection. The modules auto detect the connection. No variables need to be modified to use either connection.

## IP Address

All DSM3400 Modules have a preset IP address that can be modified by a user, if desired. The preset IP address is 191.30.36.xxx where xxx is the serial number of the unit.

## Multiple Ethernet Connections

The DSM3400 Modules not support multiple Ethernet connections. However, if a second Ethernet connection is made to a DSM3400, the current connection will be dropped for the new connection. The DSM3400 will output the following message when a command is entered from the new connection:

RCV Error Code 10053

## Changing the IP Address

The IP Address can be modified by changing the settings of the TCP/IP Properties associated with the Local Area Connection. The IP Address can only be modified by changing the settings of the Windows IP address assignments. These assignments can only be modified when the DSM3400 is in Local Mode with a Keyboard, Monitor and Mouse connected.

To change the IP Address:

Select Start  
Select Control Panel

From the Control Panel Window:

Select Network Connections

From the Network Connections Window:

Select Local Area Connection

The Local Area Connection Status window will open,

Click on Properties

The Local Area Connection Properties Window will open,

Left Click once on Internet Protocol (TCP/IP) to highlight the line

Click on Properties

Click the appropriate Radio Button for the IP Address assignment

Click on: Obtain an IP address automatically if the LAN is controlled by a server

Click on: Use the following IP address if the LAN is a dedicated LAN.

Enter the IP address and Subnet Mask.

The DNS settings should be set to suit the Local Area requirements.

Click OK to save the changes.

Click OK to exit the Local Area Network Properties Window

Close the Local Area Status Window

Close the Network Connections Window.

**NOTE:** At this point, the new IP address can be used. However, these changes will be lost if the configuration changes are not saved. Please refer to the section on saving configuration changes for a procedure.

## Saving Configuration Changes

Changes to the C: Drive in the DSM3400 Modules require the execution of a configuration manager program. The DSM3400 Hard Disk Drive is labeled as Drive C and Drive D. However, Drive D is actually a folder on Drive C. Drive D changes do not require execution of the configuration manager program.

### Storing Data on Drive D

Data files and program files may be written to Drive D as needed. The memory allotted to this drive is limited. No special procedures are required to make changes to Drive D permanent.

### RAD Configuration Variables

Changes to RAD software Configuration Variables are permanent as soon as a SAVE command is issued.

### Operating System Changes

Changes to the operating system require a special procedure. This includes changes to any software or driver installed on the C Drive, IP Address changes, Clock and Date Settings, or any write to Drive C.

Select: Start

Select: Run

The Run Window will open.

In the window labeled: Open:, Enter the following command:

ewfmgr -commit c:

Click OK to execute the program

Execute a "clean" shutdown of Windows

Select: Start

Select: Turn off Computer

Select: Restart

When the DSAENCL3200 has completed the restart, verify the IP Address setting.

## TelNet Host Operation

A host computer may be used to control the DSM without special software. The host must be operating in Windows 95/98/ME/NT/2000/XP. The host to DSM connection should be made using an Ethernet connection.

Open a **TelNet** session.

Select: Terminal

Select: Preferences

Enable Local Echo

Set the Emulation to VT100/ANSI

Select: Connect

Select: Remote System

Host Name: Enter: 191.30.34.xxx

Port: Select: Telnet

TermType: Select: vt100

If the computer opens a Dial Up Box,

Click on Cancel

When the TelNet session is open, any command listed in the Software Requirements Specification may be entered. Responses will be displayed in the TelNet Window. Please refer to the Software Requirements Specification furnished with the DSM.

Newer versions of Windows may not include TelNet. These versions do include a version of HyperTerminal that may be configured to operate as a Serial or Ethernet Interface program.

## HyperTerminal Ethernet Operation

Open the HyperTerminal program

Select: Start  
Select: Programs  
Select: Accessories  
Click on Hyperterminal

A HyperTerminal Window will open

Double Click: Hyperterminal.exe

A New Connection Window will open

Enter a name for the session and Click OK

A Connect to Window will open

Click on the down arrow by the Connect Using Box and click on TCP/IP(Winsock)

Enter the address of the DSM in the Host Address Box

The HyperTerminal window will indicate that a connection has been made.

Check the setup

Select: File  
Select: Properties

A Properties Window will open.

Click on the Settings Tab  
Emulation Mode should be Auto Detect  
Terminal should be ANSI

Click on the ASCII Setup Button

For best operation, The check boxes for:

Send line ends with line feeds, and Echo typed characters locally  
May have to be checked



## Configuration Variables

The DSM contains many configuration variables which must be set up properly in order for the DSM to function correctly. These variables are arranged in groups to aid the user in the setup of the DSM. This section contains recommended setup information. It is expected that the information in this section will permit a user to set up and check out a DSM. The user must be aware that the setup may need to be modified depending upon test requirements. It is recommended that a user read, and be completely familiar with, the DSM Software Requirements Specification before attempting to set up a DSM.

Please refer to the DSM Software Requirements Specification for more information on the proper syntax and methods for verifying and/or modifying Configuration Variables.

### Identification Variables - List I

The first variables to set are the Identification variables. The Identification variables set the Input and Output Interfacing. A List I command to the DSM will result in the following:

```
List I
      SET NL 0
      SET DISPIN 0
      SET HAVENET 1
      SET HAVEARINC 0
      SET CONOUT 2
      SET NETOUT 2
      SET FORMAT 0
      SET NETIN 1
      SET IFUSER 1
      SET ECHO 0
      SET CAL 0 9600
      SET CALSCHED 0 rp 0
      SET AUX 0 9600 1
      SET AUXSCHED 0 rp 0
      SET RESCAN 1 2500
      SET TWOAD 0
```

## Module Profile Variables - List P

The first variables to set are the Module Profile Variables. These variables identify the modules connected to the DSM and their locations. The DSM software uses this information to map the correct coefficient file to the module input. A List P command to the DSM will result in the following:

```
List P
SET RADSN 18
SET SN1 232
SET SN2 235
SET SN3 0
SET SN4 0
SET SN5 0
SET SN6 0
SET SN7 0
SET SN8 0
```

## Module Variables - List MI x Where x = the module position number

At bootup, the DSM reads the Module Profile List and maps module coefficients and configuration variables into memory. The module configuration variables include setting the number of ports, the full scale values and the number of negative points in the module calibration. A multi range module must have each group of ports defined. The high and low pressure units should be set no more than 20% over the actual range to permit some overpressure indication. In addition, a user may enter up to 4 comment lines. The Module Information may be read by entering a List MI command. The Module Information data may be modified by a user, but the changes will not be permanent until a SAVE command is issued. For example, two 32 channel modules, one with a full scale of 15 psi and the other with a full scale of 5 psi, connected to positions 1 and 2, should look as follows:

```
LIST mi 1
REM1 1 Comment line 1
REM1 2 Comment line 2
REM1 3 Comment line 3
REM1 4 Comment line 4
SET TYPE1 0
SET ENABLE1 1
SET SN1 0232
SET NUMPORTS1 32
SET NPR1 15
SET LPRESS1 1..32 -18.0
SET HPRESS1 1..32 18.0
SET NEGPTS1 1..32 4
SET MODTEMP1 0 1.000000
```

```
LIST mi 2
REM2 1 Comment line 1
REM2 2 Comment line 2
REM2 3 Comment line 3
REM2 4 Comment line 4
SET TYPE2 0
SET ENABLE2 1
SET SN2 0235
SET NUMPORTS2 32
SET NPR2 5
SET LPRESS2 1..32 -6.0
SET HPRESS2 1..32 6.0
SET NEGPTS2 1..32 4
SET MODTEMP2 0 1.000000
```

A 64 channel module with ranges of 15 and 50 psi connected to position 3 would be set up as follows:

```
LIST mi 3
REM3 1 Comment line 1
REM3 2 Comment line 2
REM3 3 Comment line 3
REM3 4 Comment line 4
SET TYPE3 0
SET ENABLE3 1
SET SN3 0111
SET NUMPORTS3 64
SET NPR3 15
SET LPRESS3 1..32 -18.0
SET LPRESS3 33..64 -60
SET HPRESS3 1..32 18.0
SET HPRESS3 33..64 60
SET NEGPTS3 1..64 4
SET MODTEMP1 0 1.000000
```

### Conversion Variables - List c

Once the modules have been defined and enabled, the conversion variables should be set to the units desired. . The following are the default settings:

List c

```
SET ZC 1
SET UNITSCAN psi
SET CVTUNIT 1.000000
SET BIN 0
SET EU 1
SET CALZDLY 5
SET MPBS 0
SET CALPER 500
SET CALAVG 32
SET MAXEU 9999.00
SET MINEU -9999.00
SET STARTCALZ 0
SET FILLONE 0
SET A2DCOR 1
```

### General Scan Variables - List s

This group sets up the scan function. This is the group to define the scan rate, trigger and some output functions. The default settings follow:

List s

```
SET PERIOD 500
SET ADTRIG 0
SET SCANTRIG 0
SET PAGE 0
SET QPKTS 0
SET SIMMODE 0
SET BINADDR 0 0.0.0.0
SET IFC 62 0
SET TIMESTAMP 0
SET FM 1
SET TEMPPOLL 1
```

## Digital I/O Variables - List d

This group sets up the Digital Inputs and Outputs. If functions such as Scan, Purge and Calibrate Zero are to be controlled externally, the applicable variable must be set correctly. The defaults follow:

List d

```
SET DOUTPU 0
SET DOUTCALZ 60
SET DOUTPGSEQ 0
SET DOUTPG 0
SET DOUTSCAN 8
SET DLYPGSEQ 1
SET DLYPG 10
SET DOUTREADY 4
SET BANKA 0
SET BANKB 0
SET BANKUSR 0
```

## Scan Group Variables - List sg x      Where x = the Scan Group Number

Each DSM can have as many as 8 different scan groups set up. A scan group is enabled by entering a channel or range of channels in the chanx variable. A scan group must be cleared by first setting CHANx to 0 before entering a new range of channels to be scanned. Refer to the DSM Software Requirements Specification for more information on Scan Groups. A user must be aware that a maximum of 128 channels may be displayed in a HyperTerminal or Telnet application. The following example will scan the modules enabled in the MI examples with an average of 16 samples:

List sg 1

```
SET AVG1 16
SET FPS1 0
SET SGENABLE1 1
SET CHAN1 1-1..3-64
```

If a user wished to scan each enabled module at different averages, then 3 scan groups could be set up. Examples follow:

List sg 1

```
SET AVG1 16
SET FPS1 0
SET SGENABLE1 1
SET CHAN1 1-1..1-32
```

List sg 2

```
SET AVG2 32
SET FPS2 0
SET SGENABLE2 1
SET CHAN2 2-1..2-32
```

List sg 3

```
SET AVG3 8
SET FPS3 0
SET SGENABLE3 1
SET CHAN3 3-1..3-64
```

### Temperature Offset Variables - List o

These are factory set based on the RTD's used to measure the ZOC module temperature. The settings should not be modified by an end user.

List o

```
SET TEMPB1 -192.9757
SET TEMPB2 -192.9757
SET TEMPB3 -192.9757
SET TEMPB4 -192.9757
SET TEMPB5 -192.9757
SET TEMPB6 -192.9757
SET TEMPB7 -192.9757
SET TEMPB8 -192.9757
```

### Temperature Gain Variables - List g

These are factory set based on the RTD's used to measure the ZOC module temperature. The settings should not be modified by an end user.

List g

```
SET TEMPM1 0.0228
SET TEMPM2 0.0228
SET TEMPM3 0.0228
SET TEMPM4 0.0228
SET TEMPM5 0.0228
SET TEMPM6 0.0228
SET TEMPM7 0.0228
SET TEMPM8 0.0228
```

## Calibration

All modules that will be used with a DSM must be fitted with an RTD so the DSM can determine the temperature of the module. This is critical to allow a user to achieve the best possible accuracy in a system. A module, once calibrated, may be used in any position in a DSM. It may even be moved to a different DSM with no loss in accuracy.

The key to this capability is the module profile (coefficient) files and the module list. The module profile files (mpf files) contain module setup information and calibration coefficients. Each module should have its own unique MPF file, identified as xxxx.mpf: where xxxx is the serial number of the module. The module list contains a listing of module serial numbers vs the input position.

At boot up, the DSM software looks for the file: **sn.gpf**. This file contains the module profile list. The software reads the file. If a input position has a number greater than 0 assigned to it, the software looks for the corresponding MPF file in the DSM folder on the Hard Disk and maps the setup and coefficients into the DSM RAM memory. If an MPF file cannot be found, default configuration information is entered into memory.

## DSM Coefficient Installation

When a DSM and modules are purchased as a system, the module coefficients are installed on the DSM hard disk drive at the factory. The coefficients may be found in the C:\DSM folder and also in a folder named: \MPF. The MPF folder is for backup only. The coefficients are also provided on a floppy disk as an additional backup.

MPF files may be transferred to a DSM by Serial or Ethernet connections. The best method is to use Network Neighborhood where the files may be "dragged and dropped" from a host computer to a DSM.

## Interface Programs

Scanivalve Corp has written two programs to assist a user with DSM-Host communication. One, **DSMLINK**, has been written in Visual Basic for operation in a Windows 95/98//NT/2000/XP environment. The other, **DSM LabView VI**, is a driver for LabView. It also is written for operation in a Windows 95/98//NT/2000/XP environment. For more information contact Scanivalve Corp, Sales and Marketing.

## Digital I/O Control

A DSM has five(5) Digital Inputs and five(5) Digital Outputs that may be configured to operate, control, or monitor certain external functions. Some of the more common uses are documented in this section.

### Initiate CALZ

A Digital Input may be configured to initiate a **CALZ**. The input must transition from a logic zero to a logic one to be valid.

Three possible actions may occur.

- |  |  |
|--|--|
| 1. If the DSM is in the <b>READY</b> mode: | A <b>CALZ</b> will be initiated.   |
| 2. If the DSM is in the <b>SCAN</b> mode:  | The <b>SCAN</b> will be suspended. A <b>CALZ</b> will be initiated, <b>SCAN</b> will continue when the <b>CALZ</b> is complete |
| 3. If the DSM is in any other mode:        | Nothing will occur.  |

### SCAN Start/Stop

A Digital Input may be configured to initiate or terminate a **SCAN**. The input must transition from a logic zero to a logic one to be valid.

Three possible actions may occur.

- |  |                                     |
|--|-------------------------------------|
| 1. If the DSM is in the <b>READY</b> mode: | A <b>SCAN</b> will be initiated.    |
| 2. If the DSM is in the <b>SCAN</b> mode:  | The <b>SCAN</b> will be terminated. |
| 3. If the DSM is in any other mode:        | Nothing will occur.                 |

## Purge Sequence Control

A Digital Input may be configured to initiate a Purge Sequence. The input must transition from a logic zero to a logic one to be valid.

The Purge Sequence may be initiated in two ways:

1. Issue the **PURGE** command when the DSM is in **READY** mode
2. Apply a signal, to the digital input assigned to purge, when the DSM is in **READY** or **SCAN** mode.

### Purge Command

The following is the sequence for a purge operation when **PURGE** is initiated by the Purge command:

1. The DSM receives the Purge command and is in the **READY** mode.
2. The digital output are set according to the **DOUTPGSEQ** configuration variable.
3. These output remain set until **DLYPGSEQ**, configurable from 0 to 5 seconds, times out. If 0 is set, No Delay occurs. Default is 1 second.
4. The digital output are set according to **DOUTPG** configuration variable.
5. These output remain set until **DLYPG**, configurable from from 0 to 3600 seconds, times out or a **STOP** command is issued. When 0 is set, the delay is infinite. A **STOP** command must be used to terminate the Purge Sequence when delay is set to 0. Default is 10 seconds.
6. When the Purge Sequence is complete, the digital output are set according to the **DOUTPGSEQ** configuraton variable.
7. These output remain set for the delay set in **DLYPGSEQ**.
8. When **DLYPGSEQ** times out the DSM returns to the **READY** mode.

### Purge Digital I/O

The following is the sequence for a Purge operation when initiated by the purge digital input, as assigned by the **DINPG** configuration variable:

1. The purge signal is received by the DSM. If the DSM is in the **READY** mode, the Purge Sequence will be initiated. If the DSM is in the **SCAN** mode, the SCAN function is suspended for the duration of the purge sequence.
2. The digital output are set according to the **DOUTPGSEQ** configuration variable.
3. These output remain set until **DLYPGSEQ**, configurable from 0 to 5 seconds, times out. If 0 is set, no delay occurs. Default is 1 second.
4. The digital output are set according to **DOUTPG** configuration variable.
5. These output remain set until **DLYPG**, configurable from from 0 to 3600 seconds, times out or a **STOP** command is issued. When 0 is set, the Delay is infinite. A **STOP** command must be used to terminate the Purge Sequence when delay is set to 0. Default is 10 seconds.
6. When the Purge Sequence is complete, the digital output are set according to the **DOUTPGSEQ** configuraton variable.
7. These output remain set for the delay set in **DLYPGSEQ**.
8. When **DLYPGSEQ** times out, the DSM returns to the mode it was in when the digital signal was received. If the DSM initiated the Purge Sequence from the **READY** mode, it will return to the **READY** mode. If the DSM initiated the Purge Sequence from the **SCAN** mode, the **SCAN** function will be resumed.



## Maintenance

The DSM3400 is built from subassemblies. Many of these subassemblies are shared with other variations of the DSM family. All of the subassemblies are field replaceable. This section will describe each of the subassemblies.

The major subassemblies are:

- DSM Processor Board
- RADBASE3200
- RADA/D3200
- Digital I/O Board
- Power Supply
- Hard Disk Drive
- Cooling Fan

Figures 16 and 17 are exploded views of the DSM3400. Each of the major subassemblies is identified

Figure 18 shows the Internal Cable Connections of the DSM3400.

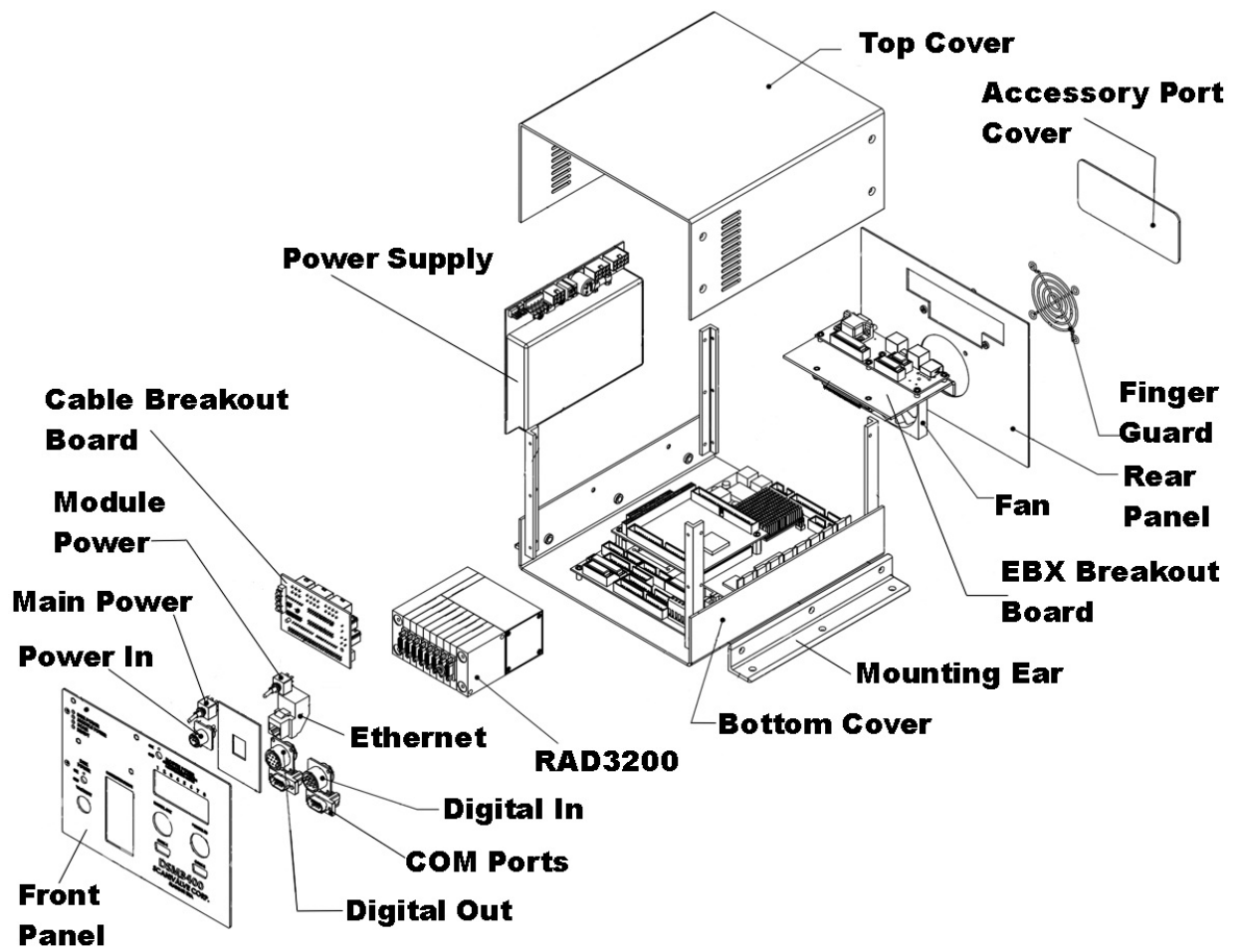


Figure 16 - DSM3400 Exploded View

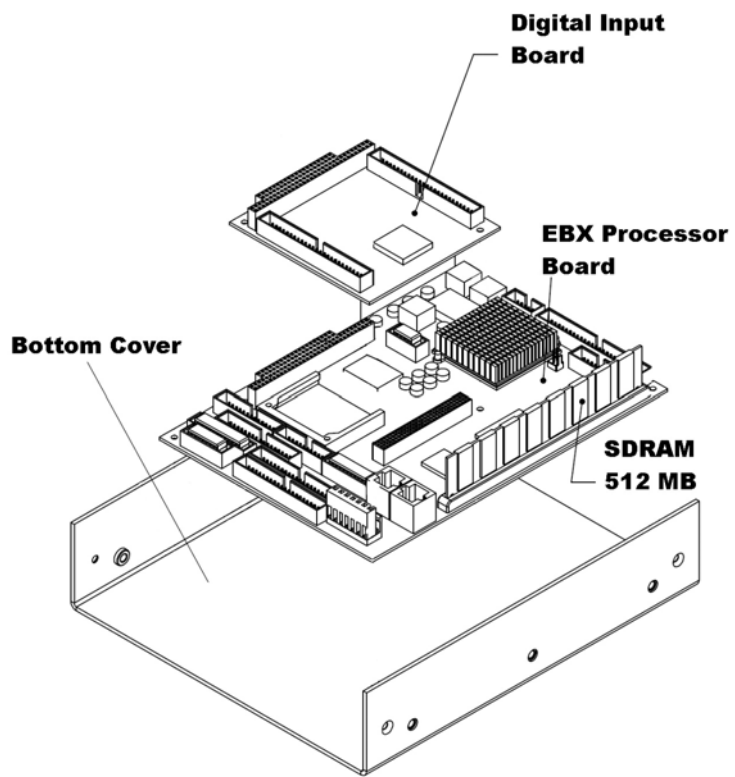


Figure 17 - DSM3400 Exploded View 2

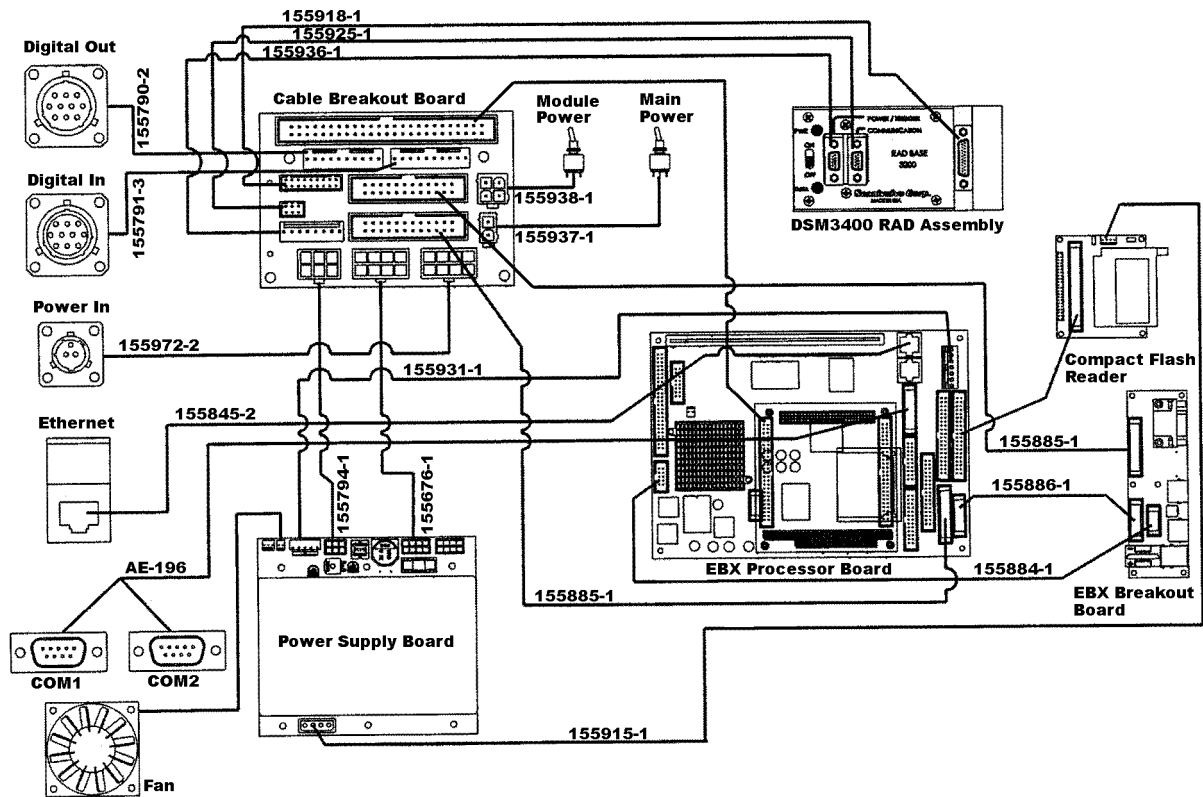


Figure 18 - DSM3400 Internal Cable Connections

## DSM Processor Board

All variations of the DSM3400 Modules are stand alone computers. The processor is a applications. The processor board contains all of the connections required for a DSM3400 to operate in a stand alone mode.

The processor board has five(5) jumpers. W6, W7, W8, W10, and W11. The jumpers are configured at the Scanivalve Factory and should not be changed.

## Thermal Cutback

A temperature sensor is installed on the processor board. When the processor board exceeds 70°C, the BIOS will reduce the CPU clock speed until the processor has cooled.

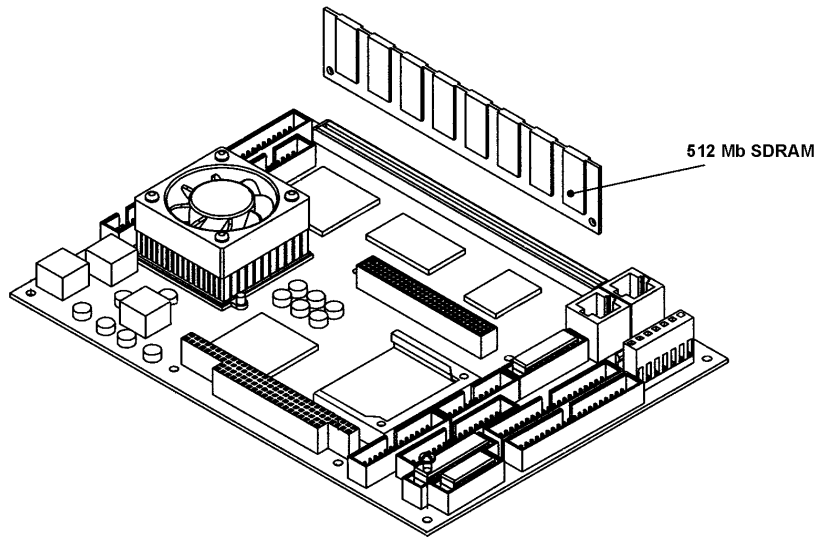


Figure 19 - Ampro EBX Board Layout

## RAD3200 Subassembly

The DSM3400 uses a RAD3200 to scan the modules and convert the input pressures to A/D counts. An exploded view of the RAD Subassembly is shown in Figures 20 and 21.

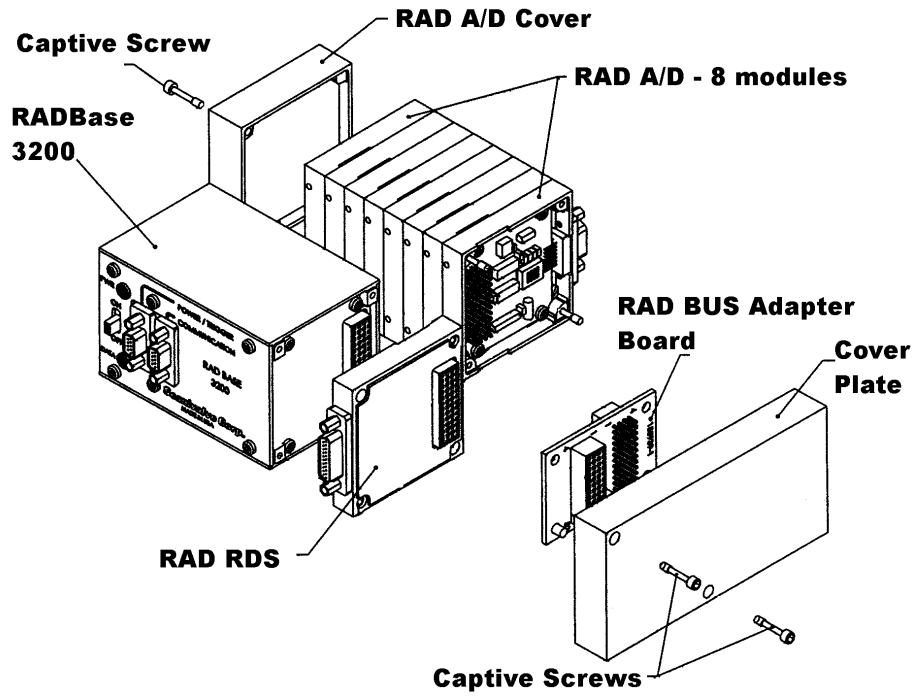


Figure 20 - RAD3200 Subassembly

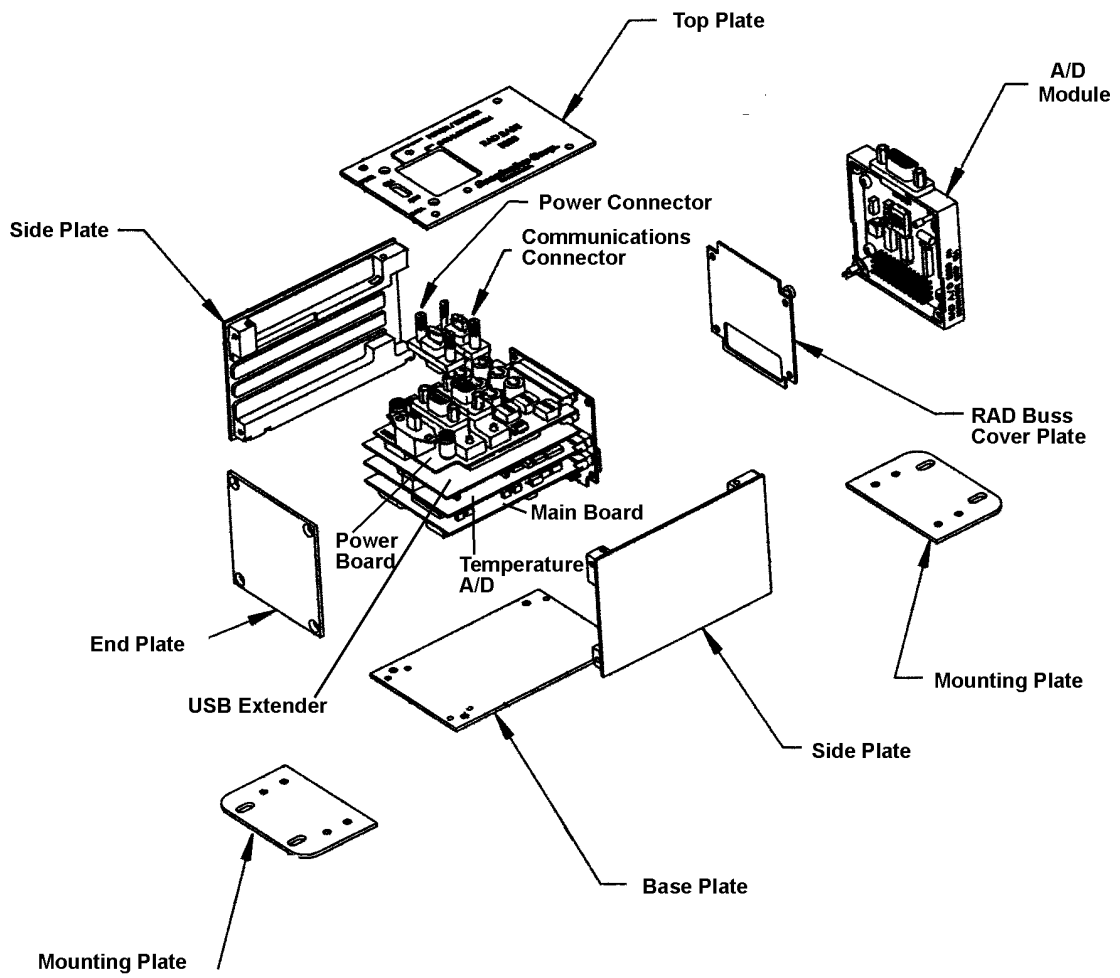


Figure 21 - RAD3200 Exploded View

## RAD A/D 3200 - Remote A/D Modules

Each RAD3200 may have up to 9 A/D modules connected. One for Temperature and eight for Modules. The Temperature A/D is installed in the RADBASE. The other 8 pressure A/D modules may be connected and disconnected as needed for a given test requirement. The temperature and pressure A/D's are **NOT** interchangeable.

Each A/D module has an ID chip installed. The ID chip identifies the module by type, location and serial number. Each module can be characterized to correct for zero and gain errors, thus minimizing system errors. This information is contained in the ID chip. When the DSM3400.exe program is started, the software identifies each A/D and maps the correction coefficients into memory. These data are used during the conversion of the analog inputs to an engineering unit to minimize errors from the A/D's.

The A/D modules have a DIP switch used to identify the position of the A/D. This switch must be set by the user when the A/D is installed. The A/D modules DIP switches must be set for a position between 1 and 8 (binary 0 - 7). The actual physical position of the modules is not important.

A truth table showing the DIP switch settings is shown in Table 1.

The temperature A/D has a gain of 2.916. The pressure A/D has a gain of 2.854.

**NOTE:** This information is provided for reference only. A user will not have to set up the A/D modules unless the A/D is being replaced in the field. Scanivalve Corp recommends that a user not attempt to replace the A/D module if the user has not received training at the Scanivalve Corp factory.

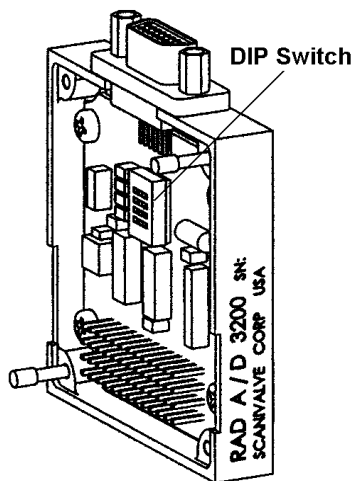


Figure 22 - RAD3200 Pressure A/D Module



Position	SW1	SW2	SW3	SW4
1	ON	ON	ON	ON
2	OFF	ON	ON	ON
3	ON	OFF	ON	ON
4	OFF	OFF	ON	ON
5	ON	ON	OFF	ON
6	OFF	ON	OFF	ON
7	ON	OFF	OFF	ON
8	OFF	OFF	OFF	ON

Table 1 - RAD3200 A/D Module DIP Switch Settings

## RDS 3200 - Remote Digital Switch

The RDS, Remote Digital Switch, contains eight(8), software controlled and optically isolated, switches. The switches are controlled by the Digital Output Configuration Variables or the DOUT Commands in the RAD software. For more information on the Digital Outputs, please refer to the RAD3200 Software Requirements Specification.

Each switch is rated for 1 A at 60 V. The Voltage may be AC or DC. If the switches will be used to switch power, the power must be supplied by the user.

The RDS has a four position DIP switch that is used to set the address, or position in the RAD3200. The RDS must always be the last unit in the system. The A/D modules may be installed in positions 1 through 8 (binary 0 - 7). An RDS is always position 9 (binary 8) or higher. The RAD may accept up to 8 RDS Modules which must be programmed as positions 9 through 16 (binary 8 to 15) respectively. A truth table for the RDS DIP switch setting is shown in Table 2.

The first RDS must be installed in location 9. The DOUT commands will not function unless the first RDS is in that location. If an RDS is not installed correctly, an error will be reported at boot up.

The pinout of the RDS is shown in Figure 25.

**NOTE:** This information is provided for reference only. A user will not have to set up the RDSA/D module unless the module is being replaced in the field. Scanivalve Corp recommends that a user not attempt to replace the RDS module if the user has not received training at the Scanivalve Corp factory.

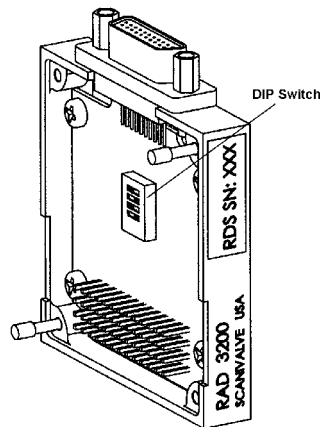


Figure 23 - RDS 3200 - Remote Digital Switch

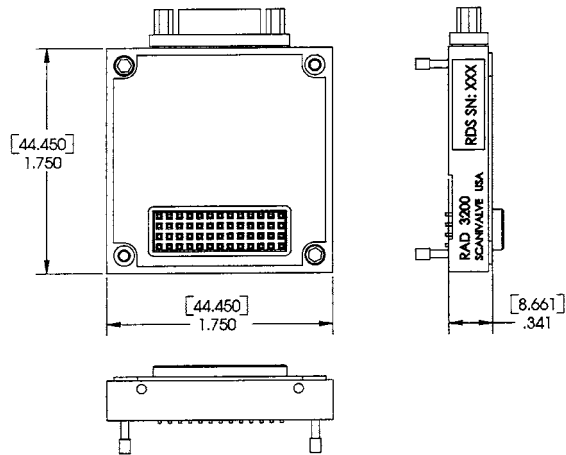


Figure 24 - RDS3200 Dimensions

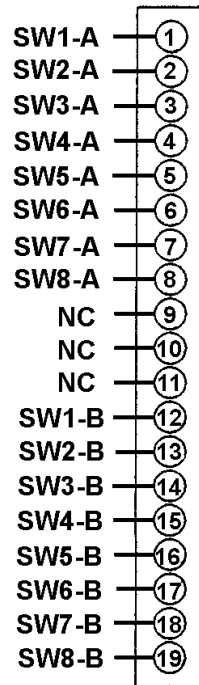


Figure 25 - RDS3200 Pinouts

Position	Channels	SW 1	SW 2	SW 3	SW 4
9	1 - 8	ON	ON	ON	OFF
10	9 - 16	OFF	ON	ON	OFF
11	17 - 24	ON	OFF	ON	OFF
12	25 - 32	OFF	OFF	ON	OFF
13	33 - 40	ON	ON	OFF	OFF
14	41 - 48	OFF	ON	OFF	OFF
15	49 - 56	ON	OFF	OFF	OFF
16	57 - 64	OFF	OFF	OFF	OFF

Table 2 - RDS 3200 DIP Switch Settings

## Breakout Board

All variations of the DSM3400 enclosures use an EBX Processor Board. The processor board contains all of the connections required for the DSM3400 to operate in a stand alone mode.

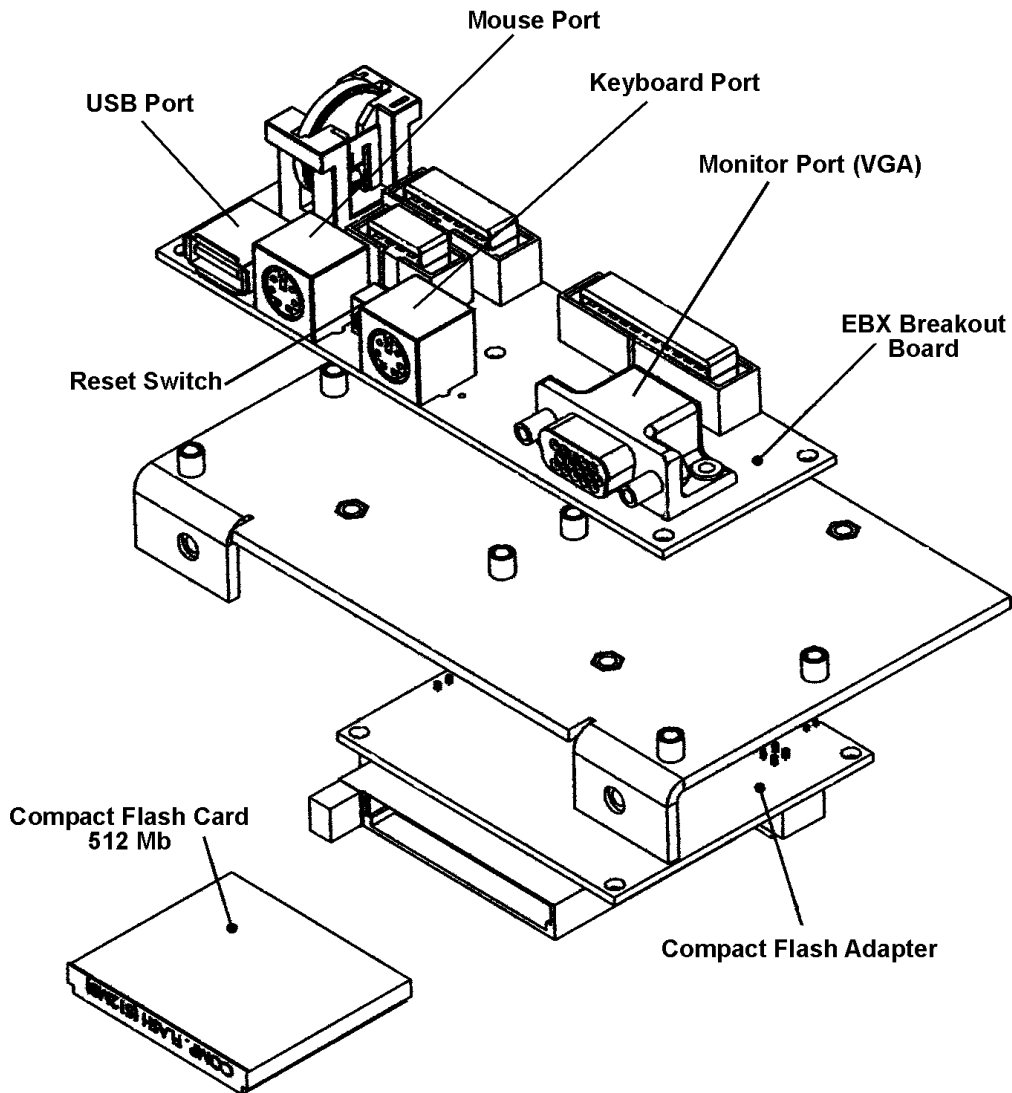


Figure 26 - DSM3400 EBX Breakout Board and Compact Flash Installation

## Power Supply

The DSM3400 Power Supply is a DC/DC power converter that converts a DC Voltage input to +24 Vdc,  $\pm 15$  Vdc and + 5 Vdc. The DSM3400 will accept DC input voltages from 9 to 36 Vdc. This unit is not user serviceable.

### PDM 1000 Power Input Module

A PDM1000 is included with all DSM3400 modules for DC power input. This is a single output 24 Vdc power supply. This power supply will drive one DSM3400. The Scanivalve part number is 145065-1. The unit will operate from 100 to 240 Vac at 47 to 63 Hz. The output is 24 Vdc at 2.5 A. A 10 foot (3 meter) interconnecting cable, Scanivalve part number 155819-1, is included. Longer cables are available. For more information on the power supply and cables, contact Scanivalve Corp, Customer Service Department.

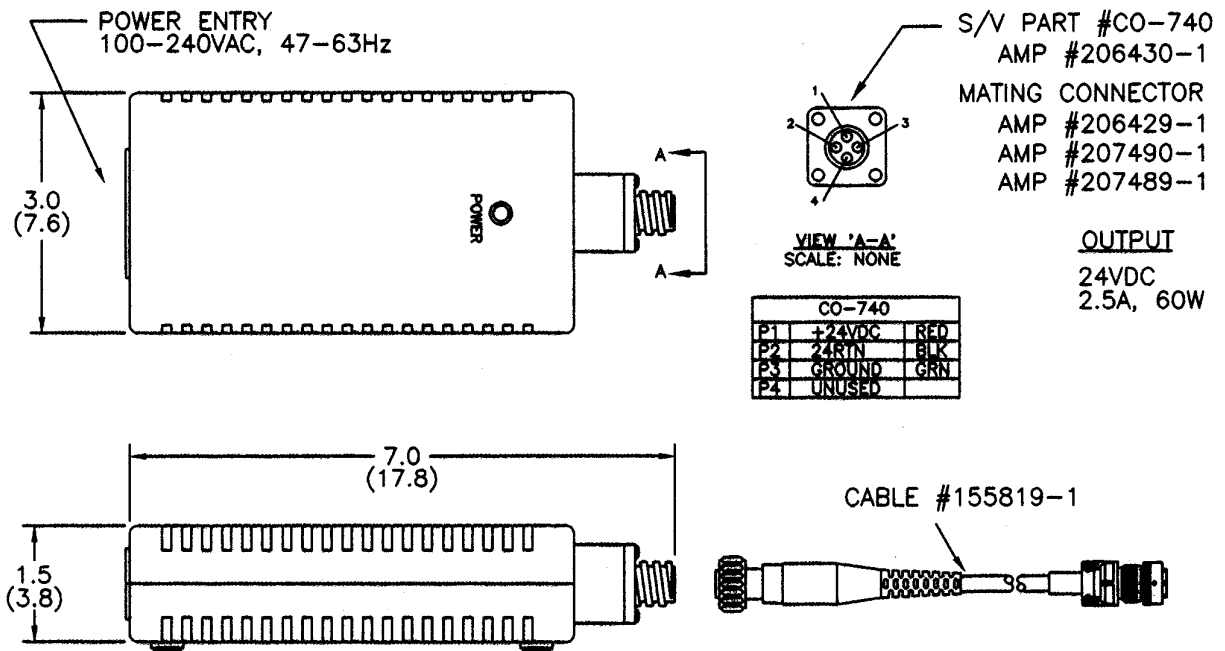


Figure 27 - PDM1000 Power Supply and Cable

## Special Hardware

### Hard Disk Drive

The Hard Disk Drive used in the DSM3400 is a Compact Flash Memory Card. Most units will have a card manufactured by Simple Technology. It can withstand up to 2000g's of shock during both operating and non-operation modes. The unformatted capacity is 512 Megabytes. Read and write speeds are 1.5MB per second. The Simple Technology part number is STI-CF/512T2

### RAM Memory

The DSM3400 has a single 256 MB DRAM DIMM installed. It has a 133 MHz bus speed. Most units will use RAM manufactured by Kingston Technology. The part number is KVR133X64C3/256.

### Cooling Fan

The cooling fan is a Mechatronics F4010H05. The power requirements are 5 Vdc @ 100ma. It rotates at 4200 rpm and provides an air flow of 4.6 scfm. The fan must not be obstructed.

**NOTE:** The DSM **MUST** be shut down as soon as possible if the cooling fan is not operating. Continued operation of the DSM without sufficient cooling air will result in damage to the microprocessor.