DSM 3000 SERIES
SOFTWARE REQUIREMENTS SPECIFICATION

V1.23

0902

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DSM CONTROL AND CONFIGURATION

The operation of each DSM is controlled by sending commands to selected units via the network. The DSM returns data or information over the same network to the requesting client/host.

DSM COMMANDS

This section describes the commands used to control the DSM. The DSM software performs the following general tasks:

1) Read and filter the raw A/D counts that represent pressure and temperature.
2) Convert the pressure A/D counts to user chosen pressure units.
3) Receive and execute commands via the Ethernet, Serial or Local.
4) Output converted data, status, setup and calibration data over the Ethernet, Serial, ARINC, or Local outputs.

When a DSM module is in a “not ready” mode, all commands are disabled except STATUS and STOP.

COMMAND FORMAT

Each of the commands are explained with the following sections: command, syntax, arguments, description, and returns.

COMMAND lists the name of the command.
SYNTAX lists the format of the command. The following conventions are used:

BP	Boldface letters indicate command keywords and operators. Within the discussion of syntax, bold type indicates that the text must be entered exactly as shown.
expression	Words in italics indicate place holders for information you must supply, or information returned by the calibrator, such as a coefficient name or pressure data.
[/H]	Items in square brackets are optional.
,	Commas separate options, only one of the options may be used.
<CR>	Items in angle brackets are used for names of keys on a typical keyboard. The carriage-return key, sometimes marked as a bent arrow, Enter, or Return on the key board, is called <CR>.

Spaces, as used in the syntax, are entered as spaces.
DESCRIPTION describes the function of the command.
RETURNS lists the format of the information that the calibrator returns to the host.
A **PROMPT (>)** will be output when the DSM is ready to accept a command.

TCP/IP does not guarantee that packet boundaries will be maintained between a Host and a DSA module. Therefore, **ALL** commands from a Host **MUST** be terminated properly with one of four options. The DSM must be configured for the proper termination character(s).

The four options are:
CR (ASCII 13), LF (ASCII 10), LF-CR (ASCII 10 - ASCII 13), or CR-LF (ASCII 13 - ASCII 10)

When a communications variable is modified, the DSM program must be restarted, preferably with the **RESTART** command, in order for the changes to take effect.

DSM COMMAND LIST

COMMAND SYNTAX

AUXILIARY COMMAND
AUXCMD <*command*> <CR>

ARGUMENTS

< *command*> - Any valid string to an auxiliary device connected to a serial port

DESCRIPTION

This command permits a host computer to send a command to a device connected to a DSM or DSAENCL. The variable: **AUX**, must be enabled for this command to be recognized.

RETURNS

<*nl*>
<*nl*> - end of line

EXAMPLE

If a user wanted to command a calibrator, SPC3000, connected to the serial port to apply a pressure to the DSA modules, the following command would be issued:

AUXCMD [a]GP 15 <CR> where a is the address of the calibrator

The calibrator will output 15 psi.

NOTES

When BIN is set to 1 and the BINADDR is set to a value other than zero, the data from the AUX or CAL commands are converted to a BINARY format and output over the UDP binary port specified in the BINADDR variable. The data format is:

<ID byte>	-	1 byte, the value will be 1 if the data are from a calibrator or 2 if the data are from an auxiliary unit.
<pressure>	-	4 bytes of floating point binary pressure data

COMMAND SYNTAX

CALIBRATE
CAL <*press*> <*channels*><CR>

ARGUMENTS

<press> - a real number that represents the calibration pressure for this point.
<channels> - a combination of:
module-port for one channel; or:
module-port,module-port for multiple modules; or
module-port...module-port for a range of modules.
Module is the physical location of the module in the system.
Port is a single pressure sample point within a module.

DESCRIPTION

This command reads one averaged frame of pressure and temperature counts. **NOTE:** The DSM does not control the calibration. It will only read the information when commanded.

RETURNS

INSERT *<temp><channel><press><press counts>* M*<nl>*
<temp> - the temperature plane
<channels> - the channel in module-port notation
<press> - the pressure in EU
<press counts> - the A/D pressure counts(or bits)
<nl> - end of line

EXAMPLE

If a user wanted to calibrate a module connected to input 3 at 15 psi:

Connect a pressure standard to the CAL input.
Apply CTL1 and CTL2 Control pressures
Enter the command:

CAL 15 3-1..3-32<CR>

The DSM will measure the counts for each channel and return the appropriate INSERT commands.

NOTES

When BIN is set to 1 and the BINADDR is set to a value other than zero, the data from the AUX or CAL commands are converted to a BINARY format and output over the UDP binary port specified in the BINADDR variable. The data format is:

<ID byte> - 1 byte, the value will be 1 if the data are from a calibrator or 2 if the data are from an auxiliary unit.
<pressure> - 4 bytes of floating point binary pressure data

COMMAND SYNTAX

CALIBRATE INSERT
CALINS *<press> <channels>*<CR>

ARGUMENTS

<press> - a real number that represents the calibration pressure for this point.
<channels> - a combination of:

module-port for one channel; or:
module-port,module-port for multiple modules; or
module-port...module-port for a range of modules.
Module is the physical location of the module in the system.
Port is a single pressure sample point within a module.

DESCRIPTION

This command reads one averaged frame of pressure and temperature counts and stores the information in memory in the INSERT format shown in the CALIBRATE Command. **NOTE:** The DSM does not control the calibration. It will only read the information when commanded.

RETURNS

<*nl*> - end of line

When this command returns the prompt, a SAVE command must be issued. The DSM will insert the stored data in the Module Profile Files.

EXAMPLE

If a user wanted to calibrate a module connected to input 3 at 15 psi:

Connect a pressure standard to the CAL input.
Apply CTL1 and CTL2 Control pressures
Enter the command:

CALINS 15 3-1..3-32<CR>

The DSM will measure the counts for each channel and write the new master plane information into memory.

COMMAND **CALIBRATE ZERO**
SYNTAX **CALZ <CR>**

ARGUMENTS None

DESCRIPTION Commands the DSM to perform a zero calibration. This operation produces A/D count values for each pressure channel that is subtracted from the raw pressure counts before conversion to the engineering units. The data are stored in a Zero Array and a Delta Array. These values may be read by executing a ZERO or DELTA command. This command places the DSM in the CALZ Mode until the command is completed or a STOP command is issued. CALZ requires approximately 15 seconds to complete.

RETURNS <*nl*>
<*nl*> - end of line

EXAMPLE To update the current ZERO file and correct for any zero drift of the transducers:
Enter the command:

CALZ

The DSM will measure the zero counts for each channel and update the Zero and Delta Arrays. The DSM will write the information into the file, ZERO.CFG when a SAVE Command is executed.

NOTE It is very important that a user execute a CALZ after the DSM and ZOC modules have been allowed to stabilize after power up. Also a CALZ should be executed if power is cycled, or if a RESTART, RELOAD or RESTORE command is executed.

The Zero and Delta Arrays are cleared when the DSM is powered down or when a RESTART, RELOAD, or RESTORE command is executed. The data in the ZERO.cfg file is intended to be historical data. The Zero and Delta values are not reloaded at power up or restart because it is impossible to determine how long the power has been off. This also is designed to insure that a new set of zeros is acquired if modules have been switched.

COMMAND **CALIBRATOR COMMAND**

SYNTAX **CALCMD <*calibrator command*> <CR>**

ARGUMENTS <*calibrator command*> -Any valid Calibrator Command - refer to the applicable Calibrator Software Manual for more information.

DESCRIPTION This command permits a host computer to send a command to one or more Serial Calibrators connected in a system to a DSM or DSAENCL. The variable: **CAL**, must be enabled for this command to be recognized.

RETURNS <*nl*>
<*nl*> - end of line

EXAMPLE If a user wanted to command a calibrator, SPC3000, connected to the serial port to apply a pressure to the DSA modules, the following command would be issued:

CALCMD [a]GP 15 <CR> where a is the address of the calibrator

The calibrator will output 15 psi.

COMMAND **CHANNEL**

SYNTAX **CHAN *<scan group>*** <CR>

ARGUMENTS *<scan group>* - a real number that represents the scan group number.

DESCRIPTION This command outputs the channel configuration for the scan group entered in the argument.

RETURNS CHAN: <group><sequence><mod><*port*><lpress> <hpress><numchan><eu><*nll*>

<group> - the scan group
<sequence> - the scan port number
<mod> - the module number
<*port*> - the port number in the module
<lpress> - the minimum pressure value
<hpress> - the maximum pressure value
<numchan> - the number of channels in the module
<eu> - the eu conversion setting, 0 = raw counts, 1 = EU
<*nl*> - end of line

EXAMPLE To verify the which channels have been assigned to SCAN GROUP 1:

Type:

```
CHAN 1 <CR>
```

The DSM will return:

```
CHAN: 1 1 1 1 -6.100000 6.100000 32 1
CHAN: 1 2 1 2 -6.100000 6.100000 32 1
CHAN: 1 3 1 3 -6.100000 6.100000 32 1
CHAN: 1 4 1 4 -6.100000 6.100000 32 1
CHAN: 1 5 1 5 -6.100000 6.100000 32 1
CHAN: 1 6 1 6 -6.100000 6.100000 32 1
CHAN: 1 7 1 7 -6.100000 6.100000 32 1
CHAN: 1 8 1 8 -6.100000 6.100000 32 1
CHAN: 1 9 1 9 -6.100000 6.100000 32 1
CHAN: 1 10 1 10 -6.100000 6.100000 32 1
 ::  ::   :  :  :   :  :   ::   ::    ::   ::   :   :
CHAN: 1 31 1 31 -6.100000 6.100000 32 1
CHAN: 1 32 1 32 -6.100000 6.100000 32 1
>
```

This shows that all 32 ports of a 32 channel module have been assigned in sequence to Scan Group 1. The module is connected to input one. The minimum full scale pressure value is -6.1 engineering units. The maximum pressure value is 6.1 engineering units. The output data will be in engineering units

COMMAND	**CLEAR**
SYNTAX	**CLEAR**<CR>
ARGUMENTS	None
DESCRIPTION	Commands the DSM to clear any errors that have occurred. The errors are sent to the client in response to a ERROR command.
RETURNS	<*nl*> <*nl*> - end of line.
EXAMPLE	To clear any errors listed in the ERROR Buffer, the following command would be issued: CLEAR <CR> The ERROR buffer will be cleared

.

COMMAND **CREATE SENSOR PROFILE FILE**

SYNTAX **CREATESPF *<sensor serial number> <channel number>*** <CR>

ARGUMENTS

sensor serial number - the serial number of the replacement sensor
channel number - the location of the new sensor in position-port format

DESCRIPTION

Commands the DSM to copy the coefficients from the specified channel to a Sensor Profile File so the sensor can be used as a replacement sensor. Generally this would only be used at the Scanivalve Factory, but it could be used by an end user to move a sensor from one module to another.
The command may be entered from the local input or a host computer. The DSM must be in the READY mode to accept the command.
This command **DOES NOT** modify the tables in the DSM memory.
The Sensor Profile File will be stored in the DSM Folder. The file may be transfered to a host computer using a file transfer.

RETURNS

A file named: Tnnnnnnn.spf or Snnnnnnn.spf where T or S indicates the type of sensor and nnnnnnn indicates the sensor serial number. The file contains
LPRESS <Maximum Low Pressure>
HPRESS <Maximum High Pressure>
NEGPTS <Number of Negative Points>
<temp index> <pressure> <pressure counts>
<temp index> <pressure> <pressure counts>
:: :: :: :: :: :: :: ::
<temp index> <pressure> <pressure counts>
<*nl*>

<temp index> - The temperature in °C multiplied by four.
<pressure> - The applied pressure
<pressure counts> - The measured pressure counts
<*nl*> - End of line.

EXAMPLE

Replacement sensors have been calibrated in a module. The data must be moved to Sensor Profile Files. The DSM must be powered up and the sensor data must be in memory for this command to function correctly. The file containing the data will be named Tnnnnnnn.spf or Snnnnnnn.spf, where T indicates a replacement sensor for DSA3016 and S indicates a replacement sensor for a ZOC22, ZOC23, or ZOC33. The serial number of the sensor is indicated by nnnnnnn.

To create a Sensor Profile File for sensor T355 in port 8 of a module installed in position 3 of a DSM :
Type: CREATESPF t355 3-8<CR>

The file: T355.spf will be created and written to the DSM Folder in the DSM

To create a Sensor Profile File for sensor S42778 in port 21 of a module installed in position 7 of a DSM :
Type: CREATESPF s42778 7-21<CR>

The file: S42778.spf will be created and written to the DSM Folder in the DSM

COMMAND **DELETE**

SYNTAX **DELETE *<start temp><end temp>*[*<channels>*]**<CR>

ARGUMENTS

<start temp> - an integer from 0 to 69 that represents the low point of the temperature planes to be deleted.

<end temp> - an integer from 0 to 69 that represents the high point of the temperature planes to be deleted.

[<channels>] - optional, a channel to be deleted. This may be in the format: *module-port* or *serial number-port* for a single module. *module-port..module-port* or *serial number-port..serial number-port* for a range of channels

DESCRIPTION

Converts all pressure points within temperature planes between the low and high temperature range, inclusive, to "calculated". This allows new MASTER points to be entered via the INSERT command.

NOTE: Refer to the description of the FILL command for more information.

RETURNS

<nl>

<nl> - end of line.

EXAMPLE

To delete the master points for all modules in a system using eight 32 channel modules, the following command would be issued:

DELETE 0 69 1-1..8-32<CR>

To delete the master points for channels 49 through 56 in a ZOC33 connected to input six, the following command would be issued:

DELETE 0 69 6-49..6-56<CR>

To delete the master points for channel 3 in a ZOC17 connected to input four, the following command would be issued:

DELETE 0 69 4-3<CR>

COMMAND	**DELETE FILE**
SYNTAX	**DELFILE *<filename>***<CR>
ARGUMENTS	*<filename>* - the file to be deleted in the format: scanxxx.dat
DESCRIPTION	Deletes data files from the local hard disk drive.
RETURNS	*<nl>* *<nl>* - end of line.
EXAMPLE	To delete the file, SCAN002.dat from the hard drive: Type: DELFILE SCAN002.dat To verify that the file was deleted, refer to the List Files Command.

COMMAND **DELTA**
SYNTAX **DELTA <*module*>**<CR>

ARGUMENTS <*module*> - the module position 1 through 8.

DESCRIPTION Lists the active delta zero correction values that resulted from a CALIBRATE ZERO. These values are used in the conversion of raw counts to Engineering Units (EU). These variables can only be set by executing a CALIBRATE ZERO command. If a module number is not entered, the DELTA values for all active modules are listed.

RETURNS
```
DELTA: <channel> <value> <nl>
DELTA: <channel> <value> <nl>
        :   :   :   :
DELTA: <channel> <value> <nl>
        <channel>  - the channel in module-port format
        <value>    - the zero correction values
        <nl>       - end of line.
```

EXAMPLE To view the DELTA values for the module connected to input one:
```
        Type:   DELTA 1<CR>
The DSM will return the current delta values
        DELTA: 1-1 40
        DELTA: 1-2 38
        DELTA: 1-3 29
        DELTA: 1-4 31
         ::   ::     ::  ::
        DELTA: 1-10 34
        DELTA: 1-11 35
        DELTA: 1-12 27
         ::   ::     ::   ::
        DELTA: 1-29 30
        DELTA: 1-30 29
        DELTA: 1-31 20
        DELTA: 1-32 29
        >
```

NOTES Delta values are the difference between the current CALZ zero value and the zero value stored in the calibration coefficients. The values tend to be low when a module has been recently calibrated and increase slowly over time as the sensors drift.

It is very important that a user execute a CALZ after the DSM and ZOC modules have been allowed to stabilize after power up. Also a CALZ should be executed if power is cycled, or if a RESTART, RELOAD or RESTORE command is executed.

The Zero and Delta Arrays are cleared when the DSM is powered down or when a RESTART, RELOAD, or RESTORE command is executed. The data in the ZERO.cfg file is intended to be historical data. The Zero and Delta values are not reloaded at power up or restart because it is impossible to determine how long the power has been off. This also is designed to insure that a new set of zeros is acquired if modules have been switched.

COMMAND **DIN**
SYNTAX **DIN** <CR>

ARGUMENTS *none*

DESCRIPTION Reads the status word from the lattice chip.

RETURNS A sixteen bit status word. For more information , refer to the Status Word Format Table in this document.
<*nl*>
<*nl*> - end of line.

EXAMPLE When this command is entered, the value of the status word is returned in hexadecimal notation. The value returned depends upon the status of the DSM.

Type: DIN<CR>

The DSM will return the value: 2, If no frames are available, there are no digital inputs, no A/D errors have occurred, and the FIFO's are empty.

If the DSM has Digital Inputs 1(DIN0) and 3(DIN2) set, no frames available, no A/D errors, and empty FIFO's, the DSM will return the value: 502.

COMMAND	**DOUT**
SYNTAX	**DOUT *<discrete channel><status>***<CR>
ARGUMENTS	*<discrete channel>* - a Digital Output channel 1 through 8. *<status>* - 1 = On 0 = Off
DESCRIPTION	Commands the Discrete Output channel on or off.
RETURNS	*<nl>* *<nl>* - end of line.

EXAMPLE

In this example, digital output channel 1 will be energized:

DOUT 1 1 <CR>

In this example, digital output channel 5 will be de-energized

DOUT 5 0 <CR>

COMMAND	**DSA COMMAND**
SYNTAX	**DSA*<module> <DSA command>***<CR>
ARGUMENTS	*<module>* - DSA Module 1 or 2 *<DSA Command>* - Any valid DSA Command - refer to the DSA Software Requirements Specification for more information.
DESCRIPTION	This command permits a host computer to send a command to DSA modules connected in a system with one or more DSMs.
RETURNS	*<nl>* *<nl>* - end of line.
EXAMPLE	A DSA3017 is connected to the COM2 serial output of a DSM. To update the Zero offset file on the DSA module: Type: DSA1 CALZ<CR> The DSM will return: > When the CALZ is complete To view the SCAN variables of the DSA module: Type: DSA1 LIST i<CR> The DSM will return the settings of the identification configuration variables in the DSA module.
NOTES	This command will only be active if the configuration variables, DSA1 or DSA2 , are enabled.

COMMAND **ERROR**
SYNTAX **ERROR** <CR>

ARGUMENTS None

DESCRIPTION Lists the errors that have occurred since the last CLEAR. Only the first 30 errors will be listed. If more than 30 errors have occurred, the message:
ERROR: Greater than 30 errors occurred" will appear at the end of the list.

RETURNS ERROR: <*error message*><*nl*>
ERROR: <*error message*><*nl*>
: : : :
ERROR: <*error message*><*nl*>
<*error message*> - an error message shown in the error list.
<*nl*> - end of line.

EXAMPLE To read the contents of the Error Buffer:
Type: ERROR

The DSM will return the last 30 errors in the format::
ERROR: Module or Port not found
ERROR: List MI no group number
ERROR: Group not between 1 and 8

If no errors have been logged, the DSM will return:
ERROR: No errors

NOTE The Error Buffer is only updated if the configuration variable: IFUSER , is set to 0. When IFUSER is set to 1, errors will be displayed as the occur.

COMMAND **FILE**

SYNTAX **FILE <*filename*>** <CR>

ARGUMENTS <*filename*> - The file to be opened. If the file is not in the DSM Folder, then a path must be specified.

DESCRIPTION Opens the named file. It is assumed that this file will be a command or a series of commands. If the file is a calibration file, the **INSERT** commands will be executed. It is imperative that a **DELETE** command be executed prior to opening a calibration coefficient file to prevent Master Point Overwrite Errors. This command will not support commands such as CALZ unless it is the only command in the file. The FILE command is not a Macro function, that is, it will execute each command in the file in order without waiting for each command to be completed.

RETURNS <*nl*>
<*nl*> - end of line.

EXAMPLE A startup command list may be sent to the DSM. A file: scan.cmd may contain the commands:

```
SET FPS1 1
SCAN
```

This file should be located in the DSM Folder. If not, a path must be specified.

Example 1

The file: scan.cmd is located in the DSM folder. To execute the file,
Type: FILE scan.cmd<CR>

Example 2

The file: scan.cmd is located in the DSMCMD folder. To execute the file,
Type: FILE C:\DSMCMD\scan.cmd<CR>

COMMAND **FILL**

SYNTAX **FILL** <CR>

ARGUMENTS None

DESCRIPTION Fills the Conversion Table with calculated pressure points and temperature planes using the MASTER calibrated points as guides. These "filled" points are marked as CALCULATED.
The FILL command NEVER overwrites MASTER points. It does overwrite old points marked as CALCULATED or INVALID.
The method used to FILL the conversion tables is determined by the setting of the variable: FILLONE. This variable is in the Conversion Group.

> If FILLONE is set to zero, the FILL command will fill the conversion tables by calculating the temperature planes between Master Planes.
>
> If FILLONE is set to one, the FILL command will copy the data in the first Master Plane encountered to all other planes. If a second Master Plane is encountered, the FILL will be terminated, and an error will be logged.

RETURNS <*nl*>
<*nl*> - end of line.

EXAMPLE In this example, new MASTER points have been loaded and the coefficient table must be completed.

> Type: FILL<CR>

The FILL command only needs to be used if MASTER points are added to the coefficients and the program is not restarted. When the program is started, restarted, or reloaded, The MASTER points are loaded into memory from the Module Profile Files and a FILL is executed by the program.

COMMAND	**INSERT**
SYNTAX	**INSERT *<temp><channel><press><press counts>* M**<CR>

ARGUMENTS

<temp> - an integer from 0 to 69 that represents the temperature in degrees Celsius.

<channel> - a combination of *module* and *port*. Syntax is:
module-port or *serial number-port* for one channel.

<press> - a real number that represents the calibration pressure point.

<press counts> - a signed integer from 32767 to -32768 that represents the current pressure counts from the sensor.

DESCRIPTION

Inserts one pressure-pressure counts entry into the Correction Table. Only master points are accepted.
The LIST MASTER and LIST ALL commands download the contents of the conversion table in the format required by this INSERT command.
If a MASTER plane is overwritten, an error will be generated.

RETURNS

<nl>
<nl> - End of line.

EXAMPLE

Although INSERT commands are most often entered from a Module Profile File, they may be entered from a keyboard.

The following command will insert a master point at 30.5°C for channel 1 of the module installed in position 3. The applied pressure is 11.9998 psi, the measured counts are 26376.

```
INSERT 30.50  3-1    11.9998   26376 M
```

The following command will insert a master point at 48.75°C for channel 59 of the module installed in position 3. The applied pressure is 10.9998 psi, the measured counts are 20254.

```
INSERT 48.75  3-59    10.9998   20254 M
```

The following command will insert a master point at 43.75°C for channel 26 of module serial number 209. The applied pressure is -2.4864 psi, the measured counts are -6651.

```
INSERT 43.75 209-26    -2.4864   -6651 M
```

COMMAND **LIST ALL**

SYNTAX **LIST A *<start temp><end temp> <channels>***<CR>

ARGUMENTS

<start temp> - The lowest temp plane to be returned.
<end temp> - The highest temp plane to be returned.
<channels> - a combination of *module* and a *port*. Syntax is: *module-port* or *Serial number-port* for one channel

DESCRIPTION

Lists all of the master, calculated and invalid points in the temperature-pressure correction matrix. This command places the DSM in the LIST mode until the command is completed or a STOP command is issued.

RETURNS

INSERT *<temp><channel><press><press counts>*<M, C, or I>*<nl>*
INSERT *<temp><channel><press><press counts>*<M, C, or I>*<nl>*
: : : :
INSERT *<temp><channel><press><press counts>*<M, C, or I>*<nl>*

<temp> - the temperature plane
<channel> - the channel in module-port notation
<press> - the pressure in EU
<press counts> - the A/D counts of pressure
<nl> - end of line.

EXAMPLE

To list all of the coefficients from 16°C to 20°C for channel 1 in a module calibrated from 17°C to 40°C

Type: LIST a 16 20 1-1<CR>

The DSM will return a list of INSERT commands showing the temperature, channel, applied pressure, counts and the type of plane.

```
INSERT 16.00 1-1 0.000000 0 I
INSERT 16.00 1-1 19.000000 0 I
INSERT 16.00 1-1 25.000000 0 I
::     ::    ::  ::   ::   ::   ::      : :
INSERT 16.75 1-1 35.000000 0 I
INSERT 16.75 1-1 45.000000 0 I
INSERT 17.00 1-1 -45.949100 -26184 M
INSERT 17.00 1-1 -31.250000 -17763 C
INSERT 17.00 1-1 -19.969601 -11302 M
INSERT 17.00 1-1 -6.250000 -3425 C
INSERT 17.00 1-1 0.000000 162 M
INSERT 17.00 1-1 19.984600 11636 M
INSERT 17.00 1-1 25.000000 14523 C
INSERT 17.00 1-1 35.000000 20281 C
INSERT 17.00 1-1 45.949100 26586 M
::     ::    ::  ::   ::   ::     ::       ::     ::
INSERT 20.00 1-1 -45.949100 -26166 C
INSERT 20.00 1-1 -31.250000 -17750 C
INSERT 20.00 1-1 -19.969601 -11292 C
INSERT 20.00 1-1 -6.250000 -3424 C
INSERT 20.00 1-1 0.000000 160 C
INSERT 20.00 1-1 19.984600 11629 C
INSERT 20.00 1-1 25.000000 14514 C
INSERT 20.00 1-1 35.000000 20267 C
```

COMMAND **LIST ARINC SCAN GROUP ASSIGNMENTS**

SYNTAX **LIST AR** <CR>

ARGUMENTS None

DESCRIPTION Lists the ARINC Scan Groups and their scaling.

RETURNS

SET ARINCOUT1 <*scan group*> <*scaling*> <*nl*>
SET ARINCOUT2 <*scan group*> <*scaling*> <*nl*>
SET ARINCOUT3 <*scan group*> <*scaling*> <*nl*>
SET ARINCOUT4 <*scan group*> <*scaling*> <*nl*>
SET ARINCOUT5 <*scan group*> <*scaling*> <*nl*>
SET ARINCOUT6 <*scan group*> <*scaling*> <*nl*>
SET ARINCOUT7 <*scan group*> <*scaling*> <*nl*>
SET ARINCOUT8 <*scan group*> <*scaling*> <*nl*>

<*scan group*> - the scan group assigned to this ARINC channel
<*scaling*> - the ARINC scaling factor (default is 20)
<*nl*> - end of line.

EXAMPLE To view the current ARINC Scan Group assignments:

Type: LIST AR<CR>

NOTE The variables displayed in this command are only active when a Condor Engineering CEI-420A-88 ARINC 429 card is installed and the configuration variable, HAVEARINC, is set to 2.

COMMAND **LIST CONVERSION**
SYNTAX **LIST C** <CR>

ARGUMENTS None

DESCRIPTION Lists the Conversion configuration variables from Group C.

RETURNS SET <*variable*> <*value*> <*nl*>
: : : :
SET <*variable*> <*value*> <*nl*>
<*variable*> - the configuration variable name
<*value*> - the current setting
<*nl*> - end of line.

EXAMPLE To view the current conversion variable settings:

Type: LIST C<CR>

The DSM will return the current conversion settings. They could appear as follows.

```
SET ZC 1
SET UNITSCAN psi
SET CVTUNIT 1.000000
SET BIN 0
SET EU 1
SET CALZDLY 15
SET MPBS 0
SET CALPER 500
SET CALAVG 256
>
```

For more information, refer to the Conversion Variable information in this manual.

COMMAND **LIST DIGITAL**
SYNTAX **LIST D** <CR>

ARGUMENTS None

DESCRIPTION Lists the Digital Configuration variables from Group D.

RETURNS SET <*variable*> <*value*> <*nl*>
SET <*variable*> <*value*> <*nl*>
: : : :
SET <*variable*> <*value*> <*nl*>
<*variable*> - the configuration variable name
<*value*> - the current setting
<*nl*> - end of line.

EXAMPLE To view the current digital variable settings:

Type: LIST C<CR>

The DSM will return the current digital settings. They could appear as follows.

```
SET DOUTPU 0
SET DOUTCALZ 7
SET DOUTPGSEQ 0
SET DOUTPG ff
SET DOUTSCAN 0
SET DINCALZ 0
SET DINSCAN 0
SET DINPG 0
SET DINSTRIG 0
SET DINADTRIG 0
SET DLYPGSEQ 1
SET DLYPG 10
```

COMMAND	**LIST FILES**
SYNTAX	**DIRFILE** <CR>
ARGUMENTS	None
DESCRIPTION	Lists the data files stored on the local hard disk drive. Filenames are in the format: scanxxx.dat, where xxx is automatically incremented whenever a new scan file is created.
RETURNS	*<filename>* *<nl>* : : : : *<filename>* *<nl>* *<nl>* *<nl>* - end of line.
EXAMPLE	To list all data files stored on the DSM hard drive: Type: DIRFILE<CR> The DSM will return a file list FILE: SCAN000.DAT FILE: SCAN001.DAT FILE: SCAN002.DAT FILE: SCAN003.DAT FILE: End of Files

COMMAND **LIST GAIN**
SYNTAX **LIST G <*module*>** <CR>

ARGUMENTS None

DESCRIPTION Lists the active temperature gain set for the module from the Temperature Gain Group, Group G. Module may be the position or the serial number. These data are used to convert temperature counts to degrees Celsius. This is the "M" term in the temperature characterization equation.

RETURNS SET TEMPMn <*value*> <*nl*> Where: n is the module position or the serial number.

<*nl*> - end of line.

EXAMPLE To verify the temperature gain setting for the module serial number 253,

Type: LIST g 253<CR>

The DSM will return:

SET TEMPM253 0.0730

The gain settings may also be verified by module location. To verify the temperature gain setting of the module connected to input 6,

Type: LIST g 6<CR>

The DSM will return:

SET TEMPM6 0.0730

The temperature gain settings may be verified for all modules connected to the DSM.

Type: LIST g<CR>

The DSM will return:

```
SET TEMPM1 0.0730
SET TEMPM2 0.0730
SET TEMPM3 0.0730
SET TEMPM4 0.0730
SET TEMPM5 0.0730
SET TEMPM6 0.0730
SET TEMPM7 0.0730
SET TEMPM8 0.0730
>
```

COMMAND **LIST IDENTIFICATION**

SYNTAX **LIST I** <CR>

ARGUMENTS None

DESCRIPTION Lists the Identification configuration variables from Group I.

RETURNS SET <*variable*> <*value*> <*nl*>
SET <*variable*> <*value*> <*nl*>
: : : :
SET <*variable*> <*value*> <*nl*>

<*variable*>	- the configuration variable name
<*value*>	- the current setting
<*nl*>	- end of line.

EXAMPLE To verify the general module configuration settings:

Type: LIST i<CR>

The DSM will return:

```
SET NL 0
SET DISPIN 0
SET HAVESER 2 19200
SET HAVENET 1
SET HAVEARINC 0
SET CONOUT 2
SET SEROUT 2
SET NETOUT 2
SET ARINC1OUT 0
SET ARINC2OUT 0
SET FORMAT 1
SET SERIN 1
SET NETIN 1
SET DSA1 0 115200
SET DSA2 0 115200
SET IFUSER 1
SET ECHO 1
SET ARINC1SCALE 20.0000
SET ARINC2SCALE 20.0000
SET CAL 0 9600
SET CALSCHED 0 rp
SET AUX 0 9600
SET AUXSCHED 0 rp
>
```

COMMAND **LIST MASTER**
SYNTAX **LIST M** ***<start temp><end temp> [<channels>]***<CR>

ARGUMENTS

<start temp> - The lowest temp plane to be returned.
<end temp> - The highest temp plane to be returned.
[*<channels>*] - *channels* is a the combination of *module* and a *port*. Syntax is: *module-port* or *Serial Number-port* for one channel

DESCRIPTION

Lists all of the Master Points in the temperature-pressure correction matrix. This command places the DSM in the LIST mode until the command is completed or a STOP command is issued.

RETURNS

INSERT *<temp><channel><press><press counts>*M*<nl>*
: : : :
INSERT *<temp><channel><press><press counts>* M*<nl>*
<temp> - the temperature plane
<channel> - the channel in module-port or serial number-port notation
<press> - the pressure in EU
<press counts> - the A/D counts of pressure
<nl> - end of line

EXAMPLE

To view the Master Points between 10°C and 40°C for channel 1 of the module connected to input 1:

Type: List m 10 40 1-1<CR>

The DSM will return:

```
INSERT 14.00 1-1 -5.958100 -21594 M
INSERT 14.00 1-1 -4.476100 -15127 M
INSERT 14.00 1-1 -2.994200 -8646 M
INSERT 14.00 1-1 -1.470100 -1973 M
INSERT 14.00 1-1 0.000000 4467 M
INSERT 14.00 1-1 1.470100 10917 M
INSERT 14.00 1-1 2.994200 17594 M
INSERT 14.00 1-1 4.476100 24098 M
INSERT 14.00 1-1 5.958100 30603 M
INSERT 23.25 1-1 -5.958100 -21601 M
INSERT 23.25 1-1 -4.476100 -15161 M
INSERT 23.25 1-1 -2.994300 -8714 M
INSERT 23.25 1-1 -1.470100 -2077 M
INSERT 23.25 1-1 0.000000 4332 M
INSERT 23.25 1-1 1.470100 10746 M
INSERT 23.25 1-1 2.994200 17397 M
INSERT 23.25 1-1 4.476100 23863 M
INSERT 23.25 1-1 5.958100 30333 M
INSERT 32.75 1-1 -5.958100 -21636 M
INSERT 32.75 1-1 -4.476100 -15214 M
INSERT 32.75 1-1 -2.994200 -8784 M
INSERT 32.75 1-1 -1.470100 -2162 M
INSERT 32.75 1-1 0.000000 4228 M
INSERT 32.75 1-1 1.470100 10615 M
INSERT 32.75 1-1 2.994200 17246 M
INSERT 32.75 1-1 4.476100 23691 M
INSERT 32.75 1-1 5.958100 30136 M
```

COMMAND **LIST MODULE INFORMATION**

SYNTAX **LIST MI <*module*>**<CR>

ARGUMENTS <*module*> - module group 1 through 8 or module serial number.

DESCRIPTION Lists the configuration variables from Groups M1 through M8. If the module is not identified, all modules are listed. Each Module Information Group has provisions for up to four comment lines. These lines may be used to aid in the identification of the module group.

RETURNS

REM<*module*> *1* <*comment*> <*nl*>
REM<*module*> *2* <*comment*> <*nl*>
REM<*module*> *3* <*comment*> <*nl*>
REM<*module*> *4* <*comment*> <*nl*>
SET <*variable*> <*value*> <*nl*>
SET <*variable*> <*value*> <*nl*>
: : : :
SET <*variable*> <*value*> <*nl*>

<*variable*>	- the configuration variable name
<*value*>	- the current setting
<*nl*>	- end of line.

EXAMPLE To view the configuration of the module connected to input 1,

Type: LIST mi 8<CR>

The DSM will return:

```
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 NUMPORTS1 32
SET NPR1 5
SET LPRESS1 1..32 -6.100000
SET HPRESS1 1..32 6.100000
SET NEGPTS1 1..32 4
SET MODTEMP1 0 1.000000
>
```

COMMAND **LIST OFFSET**
SYNTAX **LIST O *<module>***<CR>

ARGUMENTS None

DESCRIPTION Lists the active temperature offsets set for the module from the Temperature Offset Group, Group O. These data are used to convert temperature counts to degrees Celsius. This is the "B" term in the temperature characterization equation.

RETURNS SET TEMPBn <*value*> <*nl*> Where: n is the module position or the serial number

<*value*> - the current setting
<*nl*> - end of line.

EXAMPLE To verify the the temperature offset setting for the module serial number 253,

Type: LIST o 253<CR>

The DSM will return:

SET TEMPB253 -43.5028

The offset settings may also be verified by module location. To verify the temperature offset setting of the module connected to input 6,

Type: LIST o 6<CR>

The DSM will return:

SET TEMPB6 -43.5028

The temperature offset settings may be verified for all modules connected to the DSM.

Type: LIST o<CR>

The DSM will return:

```
SET TEMPB1 -43.5028
SET TEMPB2 -43.5028
SET TEMPB3 -43.5028
SET TEMPB4 -43.5028
SET TEMPB5 -43.5028
SET TEMPB6 -43.5028
SET TEMPB7 -43.5028
SET TEMPB8 -43.5028
>
```

COMMAND **LIST PROFILE**

SYNTAX **LIST P** <CR>

ARGUMENTS None

DESCRIPTION Lists the Installed module serial numbers from the Serial Number Profile Group, Group P. These data are used to create Module Profile Files that will hold module specific configuration variables.

NOTE: If serial numbers are not entered, the conversion coefficients will not load.

RETURNS

SET DSMSN <*value*> <*nl*>
SET SN1 <*value*> <*nl*>
SET SN2 <*value*> <*nl*>
: : : :
SET SN8 <*value*> <*nl*>

<*value*> - the serial number of the module installed at that location
<*nl*> - end of line.

EXAMPLE To Verify the module input configuration

Type: LIST p<CR>

The DSM will return:

```
SET DSMSN 18
SET SN1 253
SET SN2 0
SET SN3 0
SET SN4 0
SET SN5 0
SET SN6 0
SET SN7 0
SET SN8 0
>
```

COMMAND **LIST SCAN**
SYNTAX **LIST S** <CR>

ARGUMENTS None

DESCRIPTION Lists the General Scan configuration variables from Group S.

RETURNS SET <*variable*> <*value*> <*nl*>
SET <*variable*> <*value*> <*nl*>
: : : :
SET <*variable*> <*value*> <*nl*>

<*variable*>	- the configuration variable name
<*value*>	- the current setting
<*nl*>	- end of line.

EXAMPLE This command is used to verify the general scan settings of the DSM

Type: LIST s<CR>

The DSM will return:

```
SET PERIOD 500
SET ADTRIG 0
SET SCANTRIG 0
SET PAGE 0
SET QPKTS 1
SET SIMMODE 0
SET 2AD 0
SET BINADDR 0 0.0.0.0
SET USEVXD 0
>
```

COMMAND **LIST SCAN GROUP**
SYNTAX **LIST SG <*group*>**<CR>

ARGUMENTS <*group*> - scan group 1 through 8

DESCRIPTION Lists the Scan Group configuration variables from Groups G1 through G8.

RETURNS SET <*variable*> <*value*> <*nl*>
SET <*variable*> <*value*> <*nl*>
: : : :
SET <*variable*> <*value*> <*nl*>

<*variable*>	- the configuration variable name
<*value*>	- the current setting
<*nl*>	- end of line.

If no channels are assigned to a scan group, the following will be returned for a channel variable:

SET CHAN< *scan group* >0<*nl*>

For more information, refer to the CHAN Scan Variable.

EXAMPLE To verify or modify the configuration settings of Scan Group 1,

Type: LIST SG 1<CR>

The DSM will return:

```
SET AVG1 100
SET FPS1 2
SET SGENABLE1 1
SET CHAN1 1-1..1-32
>
```

COMMAND **MERGE SENSOR PROFILE FILE**

SYNTAX **MERGESPF *<sensor profile file> <module profile file> <port number>*** <CR>

ARGUMENTS

sensor profile file	- the file containing the replacement sensor data
module profile file	- the file where the sensor data will be added
port number	- the location of the new sensor

DESCRIPTION

Commands the DSM to merge the coefficients for a replacement sensor from a Sensor Profile File into a Module Profile File.
The Sensor Profile File must reside in the same directory as the Module Profile File. In a DSM, this will be the DSM Folder. For more information on file transfers, please refer to the file transfer procedures in this manual.
The command may be entered from the local input or a host computer. The DSM must be in the READY mode to accept the command.
This command **DOES NOT** modify the tables in the DSM memory. The new coefficients will not be effective until the program is restarted.

RETURNS

<*nl*>
<*nl*> - End of line.

EXAMPLE

To replacement sensor data will be provided on a floppy disk. The file containing the data will be named Tnnnnnnn.spf or Snnnnnnn.spf, where T indicates a replacement sensor for DSA3016 and S indicates a replacement sensor for a ZOC22, ZOC23, or ZOC33. The serial number of the sensor is indicated by nnnnnnn.

When the SPF file has been installed on the DSM, the sensor data may be added to the MPF file.

To install the coefficients from sensor T355 in port 8 of module serial number 150 :

Type: MERGESPF t355.spf m150.mpf 8<CR>

To install the coefficients from sensor S42778 in port 61 of module serial number 322

Type: MERGESPFs42778.spf m322.mpf 61<CR>

NOTE

In both examples the DSM program must be restarted for the new coefficients to be effective. The program may be restarted by the RESTART command or by cycling power.

COMMAND **PURGE**
SYNTAX **PURGE** <CR>

ARGUMENTS None

DESCRIPTION Commands the DSM to initiate a purge sequence. This command may be initiated by entering the command from the local input, a host computer or by a digital input. When the command is entered from the local input or a host computer, the DSM must be in the READY mode. The purge sequence is:

1. The digital output are set according to the DOUTPGSEQ variable.
2. The output remain set for a delay time set by the DLYPGSEQ variable.
3. When DLYPGSEQ times out, the digital output are set according to the DOUTPG variable.
4. The digital output will remain set until the DLYPG variable is met or until a STOP command is issued.
5. When DLYPG times out or when a STOP command is received the digital output are set according to the DOUTPGSEQ variable.
6. The output remain set for a delay time set by the DLYPGSEQ variable.
7. When DLYPGSEQ times out, the DSM returns to the READY mode.

When a purge is initiated by a digital input, the DSM may be in the READY mode or in the SCAN mode. The purge sequence is the same as above unless the DSM is in the SCAN mode. If the DSM is in the SCAN mode, the scanning will be suspended until the purge sequence is completed. At that time scanning will be resumed.

RETURNS <*nl*>
<*nl*> - End of line.

EXAMPLE To initiate a PURGE sequence:
Type: PURGE<CR>

COMMAND	**QUIT**
SYNTAX	**QUIT** <CR>
ARGUMENTS	None
DESCRIPTION	Commands the DSM to quit the execution of the DSM.exe program.
RETURNS	<*nl*> <*nl*> - End of line.
NOTE	This command should only be used in the local mode. Once the program is quit, it cannot be restarted from the SERIAL or ETHERNET interfaces
EXAMPLE	To quit the program, Type: QUIT<CR>

COMMAND	**RELOAD**
SYNTAX	**RELOAD** <CR>
ARGUMENTS	None
DESCRIPTION	Commands the DSM to reload the DSM configuration from the configuration files. This will overwrite the configuration stored in memory..
RETURNS	<*nl*> <*nl*> - End of line.
EXAMPLE	To initiate the Reload sequence, Type: RELOAD<CR>

COMMAND	**RESTART**
SYNTAX	**RESTART** <CR>
ARGUMENTS	None
DESCRIPTION	Commands the DSM to restart the DSM.exe program.
RETURNS	<*nl*> <*nl*> - End of line.
EXAMPLE	To initiate a Restart sequence, Type: RESTART<CR>

COMMAND	**RESTORE**
SYNTAX	**RESTORE** <CR>
ARGUMENTS	None
DESCRIPTION	Commands the DSM to restore all configuration variables to their **default** values. **NOTE:** This will erase all conversion coefficient tables. The **RELOAD** command should be used if it is necessary to reload a configuration.
RETURNS	<*nl*> <*nl*> - End of line.
EXAMPLE	To Restore the DSM to the default configuration, with no conversion coefficient tables, Type: RESTORE<CR>

COMMAND	**SAVE**
SYNTAX	**SAVE** <CR>
ARGUMENTS	None
DESCRIPTION	Commands the DSM to save the configuration variables, and correction tables to disk.
RETURNS	<*nl*> <*nl*> - End of line.
EXAMPLE	To save the current configuration variable settings and conversion coefficients, Type: SAVE<CR>

COMMAND **SCAN**
SYNTAX **SCAN** <CR>

ARGUMENTS None

DESCRIPTION Commands the DSM to scan the pressure sensors and output scan data.
If the SCANTRIG Configuration Variable is set to 1, the SCAN command only enables the scan function. The DSM will enter the WTRIG mode and wait for an external or internal software trigger. When the trigger signal is received, the DSM will commence scanning. Multiple trigger pulses received during a scan will be ignored. When a scan is complete, the next pulse will trigger another scan without re-issuing the SCAN command.

RETURNS The format of the returned data is based on the setting of the BIN configuration variable. If BIN is set to 1 the Scan Packets are returned in Binary Format(Refer to the section on Binary Data Packets for more information).

If BIN and FORMAT are set to 0, the scan packets are returned as follows:

<group> <frame> <channel> <pressure> <nl>
<group> <frame> <channel> <pressure> <nl>
:: :: :: :: ::
<group> <frame> <channel> <pressure> <nl>

<group > - the scan group number from 1 to 8
<frame > - the current frame number
<channel> - the channel in module-port format
<pressure> - the pressure in either counts or real number format based on the setting of the EU configuration variable.
<nl> - end of line.

If FORMAT is set to 1, the scan packets are returned as follows:

Group=<group> Frame=<frame>
x01= pressure x02= pressure x03= pressure x04= pressure x05= pressure x06= pressure
x07= pressure..... xnn= pressure Where: x is the scan group number .
nn is the last channel in the Scan Group

EXAMPLE 1

A scan group is set up to display 16 channels of module 1. FPS is set to 1, BIN is set to 0, EU is set to 1, and FORMAT is set to 0

Type: SCAN<CR>

The DSM returns:

```
1 1 1-1 0.0052
1 1 1-2 0.0086
1 1 1-3 0.0015
1 1 1-4 0.0017
1 1 1-5  -0.0162
1 1 1-6 0.0035
1 1 1-7 0.0036
1 1 1-8 0.0114
1 1 1-9 0.0031
1 1 1-10 0.0073
1 1 1-11 0.0111
1 1 1-12 -0.0035
1 1 1-13 0.0057
1 1 1-14 0.0097
1 1 1-15 0.0049
1 1 1-16 0.0086
```

EXAMPLE 2

A scan group is set up to display 16 channels of module 1. FPS is set to 1, BIN is set to 0, EU is set to 1, and FORMAT is set to 1

Type: SCAN<CR>

The DSM returns:

```
Group=1 Frame=0000001
101=  0.0052   102= .0086     103= -0.0015   104=  0.0017   105= -0.0162   106=  0.0035
107=  0.0036   108=  0.0114   109=  0.0031   110=  0.0073   111=  0.0111   112= -0.0035
113=  0.0057   114=  0.0097   115=  0.0049   116=  0.0086
```

NOTES

Only channels that are listed with the LIST SGn command are returned.
The field length is not fixed. Scan Groups are returned as they are ready.
All frames are separate parsable frames.
When using serial or Telnet, the maximum number of channels that can be displayed is 128.

COMMAND **SCAN TRIGGER**

SYNTAX	**TRIG**<CR>
ARGUMENTS	None
DESCRIPTION	This command acts as a software trigger to the DSM. When ADTRIG is set to 1, an averaged frame of data will be output when the DSM receives the TRIG command or a <TAB> character code (9 HEX or Control I). This will continue until a STOP command is issued or the Frames per Scan variable is met. The data format will depend upon the setting of EU, BIN and FORMAT.
RETURNS	An averaged frame of data in the format specified by the setting of FORMAT, BIN, and EU configuration variables. For more information on data formats, refer to the SCAN command, and the description of the BIN, EU and FORMAT variables

COMMAND	**SET**
SYNTAX	**SET <*name*> <*value*>**<CR>
ARGUMENTS	<*name*> - the Configuration Variable to be set or modified. <*value*> - the value to be assigned to that Configuration Variable.
DESCRIPTION	Commands the DSM to set one of the Configuration Variables. Listing the Configuration Variables with the LIST command, outputs the data in the format required by the SET command. This enables the user to upload the data from a file that has been created by a LIST download.
RETURNS	<*nl*> <*nl*> - end of line.
EXAMPLE	This command will change configuration variable settings. To set zero correction on Type: SET ZC 1<CR> To change the pressure units to Pascals Type: SET UNITSCAN PA<CR> To change the scan channels in Scan Group 2 from module 2, channels 1 through 64, to module 1, channels 1 through 16: Type: SET CHAN2 0<CR> SET CHAN2 1-1..1-16<CR>

COMMAND	**SHUTDOWN**
SYNTAX	**SHUTDOWN** <CR>
ARGUMENTS	none
DESCRIPTION	This command calls the program: shutdown.exe which first exits the DSM.exe console program and then exits Windows. The AC power may be turned off after approximately 30 seconds. The use of this command will shorten the boot up time of the DSM by about one-half. This command can be issued from DSMLink or TelNet while the Host computer is connected to the DSM.
RETURNS	nothing
NOTE	The program: shutdown,exe must be in the DSM folder for this command to function correctly. It should also be noted that this program uses a Microsoft function that is not guaranteed by Microsoft to properly close all applications. If a DSM that has been shutdown using shutdown.exe does not respond to a host computer after a reasonable length of time is used, the AC power should be cycled to cause a cold boot of the DSM.

COMMAND **SLOTS**
SYNTAX **SLOTS <channel>**<CR>

ARGUMENTS <channel> - The channel in module-port format

DESCRIPTION Queries the DSM to return the 10 boundary pressures for the 9 pressure slots defined for a given channel.

RETURNS
Press 9 <*pressure*> <*nl*>
Press 8 <*pressure*> <*nl*>
Press 7 <*pressure*> <*nl*>
Press 6 <*pressure*> <*nl*>
Press 5 <*pressure*> <*nl*>
Press 4 <*pressure*> <*nl*>
Press 3 <*pressure*> <*nl*>
Press 2 <*pressure*> <*nl*>
Press 1 <*pressure*> <*nl*>
Press 0 <*pressure*> <*nl*>

EXAMPLE To determine the boundary pressures for channel 1 of the 5 psi module s/n 253

Type: SLOTS 253-1<CR>

The DSM will return:

Press 9 6.10000
Press 8 4.88000
Press 7 3.66000
Press 6 2.44000
Press 5 1.22000
Press 4 0.00000
Press 3 -1.52500
Press 2 -3.05000
Press 1 -4.57500
Press 0 -6.10000

The pressures applied during a calibration must be selected so that there are not two or more applied pressures in any one slot. The module in the example above has been set up with 4 negative points. By default, it will have 4 positive points as a calibration must always include a zero point.

In this example, the slots for channel 1 of a 15 psi module in input 2 is configured for 2 negative points

Type SLOTS 2-1<CR>

The DSM will return:

Press 9 15.00000
Press 8 12.85714
Press 7 10.71429
Press 6 8.57143
Press 5 6.42857
Press 4 4.28572
Press 3 2.14286
Press 2 0.00000
Press 1 -7.50000
Press 0 -15.00000

COMMAND **STATUS**

SYNTAX **STATUS** <CR>

ARGUMENTS None

DESCRIPTION Commands the DSM to return the current status.

RETURNS STATUS: <*current status*><nl>

<*current status*> - one of the following:

- READY - The module is ready to accept any command.
- SCAN - The module is in the SCAN mode. The only commands that will be accepted are STATUS or STOP.
- CALZ - The module is executing a CALIBRATE ZERO command. The only commands that will be accepted are STATUS or STOP.
- LIST - The module is outputting a list. The only commands that will be accepted are STATUS or STOP.
- WTRIG - The module is waiting for an external scan trigger. The only commands that will be accepted are STATUS or STOP.

<*nl*> - end of line.

EXAMPLE The STATUS command may be entered at any time. This is one of the commands that will not generate an error if entered while the DSM is not READY.

If the STATUS command is entered while the DSM is on, but inactive, the DSM will return:

STATUS: READY

If the STATUS command is entered while the DSM is executing a Calibrate Zero command, the DSM will return:

STATUS: CALZ

COMMAND	**STOP**
SYNTAX	**STOP** <CR>
ARGUMENTS	None
DESCRIPTION	Commands the DSM to abort the current operation and return to the READY mode.
RETURNS	<*nl*> <*nl*> - end of line.
EXAMPLE	To abort any function or operation: Type: STOP<CR>

COMMAND **TEMPERATURE**

SYNTAX **TEMP <*units*>**<CR>

ARGUMENTS *units* - May be one of the following:

RAW - Returns the temperature in raw counts.

EU - Returns the temperature in Engineering Units

DESCRIPTION Lists the current temperatures of all 8 modules. If a module is not connected, the returned temperature will be 0

RETURNS TEMP: 1 <*temp*> <*nl*>

TEMP: 2 <*temp*> <*nl*>

: : :

TEMP: 8 <*temp*> <*nl*>

<*temp*> - The module temperature in raw counts or engineering units

<*nl*> - End of line.

EXAMPLE To view the current temperatures of the modules connected to the DSM

Type: TEMP EU<CR>

The DSM will return:

TEMP: 1 28.00
TEMP: 2 105.75
TEMP: 3 00.00
TEMP: 4 00.00
TEMP: 5 00.00
TEMP: 6 00.00
TEMP: 7 00.00
TEMP: 8 00.00

To view the A/D counts of the temperature inputs

Type: TEMP RAW<CR>

The DSM will return:

TEMP: 1 982
TEMP: 2 2047
TEMP: 3 0
TEMP: 4 0
TEMP: 5 0
TEMP: 6 0
TEMP: 7 0
TEMP: 8 0

NOTE A counts reading of 2047 indicates an open input. A counts reading of 0 with an engineering unit reading of 0 indicates that the module is not enabled.

COMMAND	**VERSION**
SYNTAX	**VER** <CR>
ARGUMENTS	none
DESCRIPTION	Requests the version number of the DSM.EXE file.
RETURNS	VERSION: <*version string*> <*nl*>
EXAMPLE	To determine the version of DSM.exe software in use: Type: VER<CR> The DSM will return: VERSION: 1.23

COMMAND	**WRITE FILES**
SYNTAX	**GETFILE <*filename*>** <CR>
ARGUMENTS	<*filename*> - In the format scanxxx.dat.
DESCRIPTION	Transmits an ASCII file of the format scanxxx.dat, where xxx is an integer value between 000 and 999, to the device specified as the target output device.
RETURNS	File Contents
EXAMPLE	A series of data files have been collected by setting CONOUT to 3 which writes the files to disk, incrementing the scanxxx.dat number each time. To retrieve or view the data:

Type: GETFILE scan000.dat

The DSM will return the data in the following format:

```
1 1 1 1 -0.447
1 1 1 2 0.009
1 1 1 3 -0.002
1 1 1 4 0.000
1 1 1 5 -0.016
1 1 1 6 0.002
:: :: :: :: :: ::
1 2 1 7 0.004
1 2 1 8 0.011
1 2 1 9 0.002
1 2 1 10 0.007
:: :: :: ::   :: ::
1 3 1 11 0.007
1 3 1 12 -0.005
1 3 1 13 0.004
1 3 1 14 0.010
1 3 1 15 0.005
1 3 1 16 0.009
>
```

The data format lists the group number first, followed by the frame number, then the module number, the port number and finally the data.

COMMAND **ZERO**

SYNTAX **ZERO <*module*>**<CR>

ARGUMENTS <*module*> -the module position 1 through 8 or the serial number.

DESCRIPTION Lists the active zero correction values that obtained from a CALIBRATE ZERO command. These data are used in the conversion of raw counts to Engineering Units (EU). These values may only be set by executing a CALIBRATE ZERO. If a module number is not entered, the ZERO values for all modules are listed.

RETURNS

ZERO: <*channel*> <*value*> <*nl*>
ZERO: <*channel*> <*value*> <*nl*>
: : : :
ZERO: <*channel*> <*value*> <*nl*>

<*channel*> - the channel in module-port or serial number-port format
<*value*> - the zero correction values
<*nl*> - end of line.

EXAMPLE To view the current zeros for module 1

Type: ZERO 1<CR>

The DSM will return:

```
ZERO: 1-1 160
ZERO: 1-2 165
ZERO: 1-3 68
ZERO: 1-4 131
ZERO: 1-5 41
ZERO: 1-6 162
ZERO: 1-7 145
ZERO: 1-8 233
ZERO: 1-9 158
ZERO: 1-10 150
ZERO: 1-11 156
ZERO: 1-12 96
ZERO: 1-13 19
ZERO: 1-14 134
ZERO: 1-15 132
ZERO: 1-16 238
```

NOTE If a module number is not entered, the zero values for all enabled modules will be returned.

DSM CONFIGURATION VARIABLES

GENERAL SCAN VARIABLES (Group S)

VARIABLE **ADTRIG *<code>***
VALID VALUES 0, 1
DEFAULT VALUE 0
DATA TYPE integer
DESCRIPTION This variable determines the method for a Frame Trigger.
0 - Frame timing is controlled by an internal timer set by the period
1 - Frame timing is controlled by an external hardware or software trigger. When ADTRIG is enabled, a frame will be triggered whenever a hardware or software trigger input is received. The hardware trigger is defined by the variable DINADTRIG. The software trigger is either the word: TRIG or a TAB character (ASCII 9, TAB, or ^I) . When a SCAN command is received, the DSM enters a WAIT state until a ADTRIG is received. When the ADTRIG is received, the DSM will acquire and output one averaged frame of data and re-enter the WAIT state. This will continue until a STOP command is received or the FPS variable is satisfied.

VARIABLE **BINADDR *<port> <IP address>***
VALID VALUES port - 1 to 5000
IP address - any valid IP address
DEFAULT VALUE port - 0
IP address - 0.0.0.0
DATA TYPE integer
DESCRIPTION When port is set to 0, data are NOT sent out over the binary address port, Data are sent over the standard TCP port. If port is 1 to 5000, data are sent over that port to the IP address identified.

VARIABLE **IFC *<char 1> <char 2>***
VALID VALUES char 1 - Any valid ASCII character
char 2 - Any valid ASCII character
DEFAULT VALUE char 1 - 0
char 2 - 0
DATA TYPE integer
DESCRIPTION This variable sets the interframe characters to be used when transmitting ASCII unformatted output. If only one character is desired, char 2 must be set to 0. If both characters are set to 0, no interframe characters will be transmitted.
EXAMPLE If a Carriage Return is desired between frames, the following command would be used:

SET IFC 13 0

VARIABLE **PAGE *<code>***
VALID VALUES 0, 1
DEFAULT VALUE 0
DATA TYPE integer
DESCRIPTION This function is not implemented.

VARIABLE	**PERIOD** ***<period>***
VALID VALUES	25 to 32767
DEFAULT VALUE	500
DATA TYPE	integer
DESCRIPTION	This master period variable sets the rate, in microseconds, of the eight pressure A/D converters and the one temperature A/D converter. All Scan Group periods are derived from this variable.

VARIABLE	**QPKTS** ***<enable>***
VALID VALUES	0, 1
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Sets the action the DSM will take when the output data buffer is full. When set to 1, no frames are lost, the DSM stops scanning, and an error is logged. When set to 0 frames are discarded and the DSM will continue scanning.

VARIABLE	**SIMMODE** ***<enable>***
VALID VALUES	0,1
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Sets the simulated mode 0 - uses actual A/D pressure and temperature readings 1 - uses simulated values. Default values will be used unless a simulated data file exists Simulated data files must have the name: SIMMx.CFG, Where x can be a number from 1 to 9. Numbers 1 through 8 indicate module pressure data and number 9 is reserved for temperature data.

VARIABLE	**SCANTRIG** ***<code>***
VALID VALUES	0, 1, 2
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Controls scan initiation. 0 - Scanning is initiated by the SCAN command. 1 - Scanning is enabled by the SCAN command and initiated by the external scan trigger discrete input. 2 - Scanning is initiated automatically when the DSM is powered up.

VARIABLE	**USEVXD** ***<code>***

VALID VALUES 0, 1
DEFAULT VALUE 0
DATA TYPE integer
DESCRIPTION Enables or disables the VxD interrupt scan function.

0 - VxD Scan interrupt is disabled.
1 - VxD Scan interrupt is enabled.

NOTE: This variable can only be enabled when eight A/D cards are installed in the DSM (2AD is set to one). There are major hardware differences between the eight A/D and two A/D configurations. If this variable is not set correctly, all data will be invalid. When this variable is enabled, the A/D IRQ setting must be changed. Refer to the Software Upgrade Procedure in this manual for more information.

VARIABLE **2AD <*code*>**
VALID VALUES 0, 1
DEFAULT VALUE 0
DATA TYPE integer
DESCRIPTION Sets the scan software to match the hardware configuration.

0 - Eight A/D cards are installed.
1 - Two A/D cards are installed.

NOTE: This variable **MUST NOT** be modified by a user. There are major hardware differences between the eight A/D and two A/D configurations. If this variable is not set correctly, all data will be invalid.

CONVERSION VARIABLES (Group C)

VARIABLE	**BIN *<code>***
VALID VALUES	0, 1, or 2
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Sets the format of the output data: (Refer to the packet definitions for more information) 0 - Output is in ASCII 1 - Output is in binary format 2 - Output is in binary format with module-port information

VARIABLE	**CALAVG *<sample average>***
VALID VALUES	1 to 32767
DEFAULT VALUE	256
DATA TYPE	integer
DESCRIPTION	Sets the calibration sample average. This value should be set to insure that a sufficient number of samples will be acquired to insure a stable, noise free calibration.

VARIABLE	**CALPER *<period>***
VALID VALUES	25 to 32767
DEFAULT VALUE	500
DATA TYPE	integer
DESCRIPTION	Sets the period, in microseconds, of the DSM calibration data acquisition. This is the same as PERIOD in the SCAN Group This value should be set to insure that a sufficient settling time exists so that the channel samples are stable.

VARIABLE	**CALZDLY *<delay>***
VALID VALUES	5 to 128
DEFAULT VALUE	15
DATA TYPE	integer
DESCRIPTION	Sets the delay time, in seconds, before the DSM executes a CALZ Command. This value should be set to insure that a sufficient delay exists so that the Zero Offset data are not biased by residual pressure in the module calibration valves.

VARIABLE	**CVTUNIT *<value>***
VALID VALUES	any real number
DEFAULT VALUE	1.0
DATA TYPE	float
DESCRIPTION	This is the conversion factor to convert from PSI units to the desired scanning units. This value may be set directly or by setting the UNITSCAN variable.

VARIABLE **EU *<code>***

VALID VALUES 0, 1
DEFAULT VALUE 0
DATA TYPE integer
DESCRIPTION Sets the units of the output data:

0 - Output is in raw counts
1 - Output is in selected engineering units

When the A/D counts reach 32767 or -32768, the DSM will output 9999 or -9999 to indicate that a conversion error may exist. The DSM will also output these values when the maximum or minimum master conversion planes are exceeded.

VARIABLE **FILLONE <*code*>**
VALID VALUES 0, 1
DEFAULT VALUE 0
DATA TYPE integer
DESCRIPTION Sets the type of fill that will be performed.

0 - The pressure conversion planes will be filled using several Master Planes
1 - The pressure conversion planes will be filled using a single Master Plane

If FILLONE is set to 1 during the execution of a FILL command, the software will copy the data from the first Master Plane encountered to all other temperature planes. If a second Master Plane is found, the FILL will be terminated and an error will be logged. Normally, a pressure conversion plane is filled using two to nine Master Planes. This function is designed for a who user wishes to calibrate his modules at one temperature **and** is able to maintain the temperature of the module(s) to ±0.25°C.

NOTE: If a user is not able to maintain the temperature of his modules to ±0.25°C, large errors may result. Sensor drift due to temperature can exceed 30 counts per degree C, depending upon the module type. This calculates to a 0.1% error

VARIABLE **MAXEU <*value*>**
VALID VALUES Any valid floating point number
DEFAULT VALUE 9999
DATA TYPE Floating point
DESCRIPTION Sets the maximum Engineering Unit Value. This is the number that will be displayed when an overflow condition occurs
When the A/D counts reach 32767, the DSM will output 9999 or whatever has been entered as the MAXEU value to indicate that a conversion error may exist. The DSM will also output these values when the maximum or minimum master conversion planes are exceeded.

VARIABLE **MINEU <*value*>**

VALID VALUES Any valid floating point number
DEFAULT VALUE -9999
DATA TYPE Floating point
DESCRIPTION Sets the minimum Engineering Unit Value. This is the number that will be displayed when an overflow condition occurs
When the A/D counts reach -32768, the DSM will output -9999 or whatever has been entered as the MINEU value to indicate that a conversion error may exist. The DSM will also output these values when the maximum or minimum master conversion planes are exceeded.

VARIABLE **MPBS *<number of planes>***
VALID VALUES 0 to 140
DEFAULT VALUE 0
DATA TYPE integer
DESCRIPTION When an INSERT command is issued and a master point is overwritten, a configurable number of temperature planes on either side of the new MASTER plane are converted to calculated. These points will be recalculated when a FILL command is executed. The number of planes to be entered in this variable may be calculated by the formula:

Planes = TEMP * 4 where TEMP is the number of degrees to be changed. For example, if it is desired to have points ± 4° of the new master plane modified, then MPBS would be set to 16.

VARIABLE **STARTCALZ *<code>***
VALID VALUES 0, 1
DEFAULT VALUE 0
DATA TYPE integer
DESCRIPTION When set to 1, causes the DSM to execute a CALZ at startup. The DSM does not save zeros at power down. If the DSM is set to start scanning immediately or if it is difficult to input commands to the DSM once it is powered up, then this variable should be set to 1. The DSM will then execute a CALZ at the end of the initialization sequence.
If SCANTRIG is set to 2 and STARTCALZ is set to 1, the DSM will execute a CALZ and immediately start a scan sequence.

VARIABLE **UNITSCAN *<units>***
VALID VALUES see list below

DEFAULT VALUE	PSI
DATA TYPE	string
DESCRIPTION	This sets the output engineering units for the DSM. Setting this value will also set CVTUNITS. CVTUNITS may be set to a different value, however UNITSCAN must be set first. The following are the list of units supported:

ATM	FTH2O	KGM2	MH2O	OZFT2
BAR	GCM2	KIPIN2	MMHG	OZIN2
CMHG	INHG	KNM2	MPA	PA
CMH2O	INH2O	KPA	NCM2	PSF
DECIBAR	KGCM2	MBAR	NM2	PSI
				TORR

NOTE: If a value other than those listed is entered, The DSM will default to PSI.

VARIABLE	**ZC <*code*>**
VALID VALUES	0, 1
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Enables or disables zero correction of the pressure data 0 - No zero correction is performed. 1 - Zero correction is performed.

DIGITAL I/O CONFIGURATION VARIABLES (Group D)

VARIABLE	**DINADTRIG** ***<value>***
VALID VALUES	0, 1, 2, 4, 8, 10, 20, 40, 80 Hexadecimal
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Determines which bit of the Digital Input word is used to initiate the A/D Trigger. This input will only be acknowledged if the configuration variable, **ADTRIG,** is set to 1. Input 1 may be used for Digital Inputs, but if an external pacer is used, it must be used for the pacer input. Input 8 is the most significant binary bit.

VARIABLE	**DINCALZ** ***<value>***
VALID VALUES	0, 1, 2, 4, 8, 10, 20, 40, 80 Hexadecimal
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Determines which bit of the Digital Input word is used to initiate a **CALZ.** Input 1 is the least significant binary bit. Input 1 may be used for Digital Inputs, but if an external pacer is used, it must be used for the pacer input. Input 8 is the most significant binary bit.

VARIABLE	**DINPG** ***<value>***
VALID VALUES	0, 1, 2, 4, 8, 10, 20, 40, 80 Hexadecimal
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Determines which bit of the Digital Input word is used to initiate or abort a **PURGE** sequence. Input 1 is the least significant binary bit. Input 1 may be used for Digital Inputs, but if an external pacer is used, it must be used for the pacer input. Input 8 is the most significant binary bit.

VARIABLE	**DINSCAN** ***<value>***
VALID VALUES	0, 1, 2, 4, 8, 10, 20, 40, 80 Hexadecimal
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Determines which bit of the Digital Input word is used to start or stop a **SCAN**. Input 1 is the least significant binary bit. Input 1 may be used for Digital Inputs, but if an external pacer is used, it must be used for the pacer input. Input 8 is the most significant binary bit.

VARIABLE	**DINSTRIG <*value*>**
VALID VALUES	0, 1, 2, 4, 8, 10, 20, 40, 80 Hexadecimal
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Determines which bit of the Digital Input word is used to initiate a **SCAN** when **SCANTRIG** is set to 1. Input 1 is the least significant binary bit. Input 1 may be used for Digital Inputs, but if an external pacer is used, it must be used for the pacer input. Input 8 is the most significant binary bit.

VARIABLE	**DLYPG <*value*>**
VALID VALUES	0 to 3600
DEFAULT VALUE	10
DATA TYPE	integer
DESCRIPTION	Sets the time, in seconds, that the module inputs will be purged. This is only a part of the total purge sequence time. This timer can be interrupted by a STOP command. When set to 0, the time is infinite and the PURGE sequence can only be terminated by a STOP command.

VARIABLE	**DLYPGSEQ <*value*>**
VALID VALUES	0 to 5
DEFAULT VALUE	1
DATA TYPE	integer
DESCRIPTION	Sets the time delay, in seconds, before purge air is applied to the modules. If 0 is entered, no delay will occur.

VARIABLE	**DOUTCALZ <*value*>**
VALID VALUES	0 to FF Hexadecimal
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Enables digital outputs for a **CALZ** operation. Output 1 is the least significant binary bit. Output 8 is the most significant binary bit. The command is entered as 2 hexadecimal digits.

VARIABLE	**DOUTPG <*value*>**
VALID VALUES	0 to FF Hexadecimal
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Enables digital outputs for a **PURGE** sequence. Output 1 is the least significant binary bit. Output 8 is the most significant binary bit. The command is entered as 2 hexadecimal digits.

VARIABLE	**DOUTPGSEQ** ***<value>***
VALID VALUES	0 to FF Hexadecimal
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Enables digital outputs to transition from normal operation to **PURGE** operation. Output 1 is the least significant binary bit. Output 8 is the most significant binary bit. The command is entered as 2 hexadecimal digits.

VARIABLE	**DOUTPU** ***<value>***
VALID VALUES	0 to FF Hexadecimal
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Enables the digital outputs for normal power up configuration. Output 1 is the least significant binary bit. Output 8 is the most significant binary bit. The command is entered as 2 hexadecimal digits.

VARIABLE	**DOUTSCAN** ***<value>***
VALID VALUES	0 to FF Hexadecimal
DEFAULT VALUE	7
DATA TYPE	integer
DESCRIPTION	Enables the digital outputs to indicate that the DSM is in the **SCAN** mode. This variable **ONLY** affects the **DOUT** bit that is enabled. All other outputs are masked. Output 1 is the least significant binary bit. Output 8 is the most significant binary bit. The command is entered as 2 hexadecimal digits.

VARIABLE	**DOUTREADY** ***<value>***
VALID VALUES	0 to FF Hexadecimal
DEFAULT VALUE	7
DATA TYPE	integer
DESCRIPTION	Enables the digital outputs to indicate that the DSM is in the **READY** mode. This variable **ONLY** affects the **DOUT** bit that is enabled. All other outputs are masked. Output 1 is the least significant binary bit. Output 8 is the most significant binary bit. The command is entered as 2 hexadecimal digits.

SCAN GROUP CONFIGURATION VARIABLES (Group G1 through G8)

VARIABLE **AVGn <*sample average*>** Where n = the scan group number
VALID VALUES 1 - 32767
DEFAULT VALUE 1
DATA TYPE integer
DESCRIPTION Sets the minimum number of samples to average for Scan Group n. Refer to the CHANn variable for information on averaging of modules with a dissimilar number of channels.

VARIABLE **CHANn <*channels*>** Where n = the scan group number
VALID VALUES <*channels*> - *channels* is a combination of a *module* and a *port*. Syntax is:
module-port for one channel
module-port,module-port for many channels
module-port..module-port for a range of channels
Module is the physical location of the module in the rack or the connector supporting the module.
Port is a single pressure sample point within a module.
When 0 is entered, no channels are assigned to a scan group.
DEFAULT VALUE 0
DATA TYPE string
DESCRIPTION Sets the channel assignments in scan group n. Duplicate *module-port* entries are not permitted in the same module group. For example:
the notation: CHAN 1-1,1-1 is not valid.

If a scan group contains ports from dissimilar modules, for example: a 64 port module and a 16 port module, the smaller module will be sampled more often in order to keep the larger module synchronized with the smaller module. The additional samples from the smaller module are averaged. In the previous example the 16 port module will be sampled 4 times for every one sample of the 64 port module.

The order of the channels in the output frame is determined by the order of entry. Use the LIST SGn command to verify the output frame order.

Setting the channel variable does not automatically erase old channels. The user is responsible to insure that unwanted channels are cleared before new channels are set. The command :
SET CHAN<scan group>0<enter> will clear a scan group

VARIABLE **FPSn <*frames*>** Where n = the scan group number

VALID VALUES	0 - 2147483648
DEFAULT VALUE	0
DATA TYPE	long integer
DESCRIPTION	Sets the number of output-averaged frames for Scan Group n to be output after starting a scan. When set to 0, the scan will continue until a stop command is received.

VARIABLE	**SGENABLEn <*code*>** Where n = the scan group number
VALID VALUES	0, 1
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Defines if the scan group n is enabled: 0 - Disabled 1 - Enabled

MODULEn CONFIGURATION VARIABLES (M1 through M8)

VARIABLE **ENABLEn *<enable>*** Where n = the module position number
VALID VALUES 0, 1
DEFAULT VALUE 0
DATA TYPE integer
DESCRIPTION Defines if the module n is enabled:
0 - Disabled
1 - Enabled

VARIABLE **HPRESSn *<ports> <pressure>*** Where n = the module position number
VALID VALUES *<port> <pressure>* - *port* - one port
port,port - many ports
port..port - a range of ports
pressure - a real number representing the pressure.
DEFAULT VALUE 1..64 15.0
DATA TYPE string
DESCRIPTION Defines the maximum pressure for port or ports of the module n.

VARIABLE **LPRESSn *<ports> <pressure>*** Where n = the module position number
VALID VALUES *<port> <pressure>* - *port* - one port
port,port - many ports
port..port - a range of ports
pressure - a real number representing the pressure..
DEFAULT VALUE 1..64 15.0
DATA TYPE string
DESCRIPTION Defines the minimum pressure for port or ports for the module n.

VARIABLE **MODTEMPn *<port number> <scale factor>*** Where n = the module position
VALID VALUES *<port number>* - *port number*- the port position to display the module temperature.
<scale factor> *scale factor* - the temperature scaling factor
DEFAULT VALUE 0 1.0
DATA TYPE string
DESCRIPTION Defines the module port number to display the module temperature and the temperature scaling factor. If EU is set to 1, the temperature output will be °C times the scale factor. If EU is set to 0, the temperature will be the displayed value divided by 4.

VARIABLE **NEGPTSn *<ports> <negpts>*** Where n = the module position number

VALID VALUES	*<port> <negpts>* -	*port*	- one port
		port,port	- many ports
		port..port	- a range of ports
		negpts	- an integer that defines the number of master negative points. The maximum number of master negative points is 8.
DEFAULT VALUE	1..64 4		
DATA TYPE	string		
DESCRIPTION	Defines the number of master negative points for port or ports of the module n.		

VARIABLE	**NPRn *<pressure>***	Where n = the module position number
VALID VALUES	any valid integer up to 4 digits	
DEFAULT VALUE	15	
DATA TYPE	integer	
DESCRIPTION	Defines the nominal pressure range for the module installed in position n.	

VARIABLE	**NUMPORTSn *<ports>***	Where n = the module position number
VALID VALUES	16,32, or 64	
DEFAULT VALUE	64	
DATA TYPE	integer	
DESCRIPTION	Defines the number of ports for the module n.	

VARIABLE	**TYPEn *<code>***	Where n = the module position number
VALID VALUES	0, 1, 2, 3, or 4	
DEFAULT VALUE	0	
DATA TYPE	integer	
DESCRIPTION	This variable defines the module n type: 0 - Standard 1 - Absolute 2 - Gauge 3 - True Differential 4 - Electrical Input Module	

MODULE PROFILE VARIABLES (Group P)

VARIABLE	**DSMSN** ***<serial number>***
VALID VALUES	Any valid integer up to 4 digits
DEFAULT VALUE	0000
DATA TYPE	Integer
DESCRIPTION	The serial number of the DSM.

VARIABLE	**SNn** ***<serial number>***	Where n = the module position number
VALID VALUES	Any valid integer up to 4 digits	
DEFAULT VALUE	0000	
DATA TYPE	Integer	
DESCRIPTION	The serial number of the module installed in slot n.	

ARINC SCAN GROUP VARIABLES (Group AR)

VARIABLE	**ARINCOUTn** ***<scan group> <scaling>***	
VALID VALUES	n	- the ARINC Output channel, may be 1 through 8.
	scan group	- the scan group assigned to this output channel, may be 1 through 8.
	scaling	- any valid number, default is 20.
DEFAULT VALUE	n	- 1
	scan group	- 1
	scaling	- 20
DATA TYPE	varies	
DESCRIPTION	This group of variables assigns scan groups and scaling for each of the eight ARINC outputs for the Condor Engineering CEI-420A-88 ARINC card.	
NOTE	These variables are only active when HAVEARINC is set to 2.	

IDENTIFICATION CONFIGURATION VARIABLES (Group I)

VARIABLE	**ARINC1OUT *<code>***
VALID VALUES	0 through 10
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Determines if data will be output to the Condor Engineering CEI-400-44 ARINC card, channel 1. 0 - No ARINC Output from transmit channel 1 1 - 8 - Scan Group 1 - 8 are assigned to ARINC1 Output. 9 - DSA1 data are assigned to ARINC1 Output 10 - DSA2 data are assigned to ARINC1 Output
NOTES	When ARINC1OUT or ARINC2OUT is set to 9 or 10, DSA Outputs cannot be routed to other outputs. In order for properly scanned data from the DSA module to be sent to the ARINC Output, The ARINC variable in the DSA Module setup must be set to 1. Refer to the DSA Software Requirements Specification for more information. This variable is only active when HAVEARINC is set to 1.

VARIABLE	**ARINC2OUT *<code>***
VALID VALUES	0 through 10
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Determines if data will be output to the Condor Engineering CEI-400-44 ARINC card, channel 2. 0 - No ARINC Output from transmit channel 2 1 - 8 - Scan Group 1 - 8 are assigned to ARINC2 Output. 9 - DSA1 data are assigned to ARINC2 Output 10 - DSA2 data are assigned to ARINC2 Output
NOTES	When ARINC1OUT or ARINC2OUT is set to 9 or 10, DSA Outputs cannot be routed to other outputs. In order for properly scanned data from the DSA module to be sent to the ARINC Output, The ARINC variable in the DSA Module setup must be set to 1. Refer to the DSA Software Requirements Specification for more information. This variable is only active when HAVEARINC is set to 1.

VARIABLE	**ARINC1SCALE *<value>***
VALID VALUES	1 through 100000
DEFAULT VALUE	20
DATA TYPE	integer
DESCRIPTION	ARINC scale factor for the ARINC1 output. Equal to the full scale value of the highest range module to be scanned. This number is based on the UNITS selected. The default number represents a module with a 20 units full scale.
NOTE	This variable is only active when HAVEARINC is set to 1.

VARIABLE	**ARINC2SCALE *<value>***
VALID VALUES	1 through 100000
DEFAULT VALUE	20
DATA TYPE	integer
DESCRIPTION	ARINC scale factor for the ARINC2 output. Equal to the full scale value of the highest range module to be scanned. This number is based on the UNITS selected. The default number represents a module with a 20 units full scale.
NOTE	This variable is only active when HAVEARINC is set to 1.

VARIABLE	**AUX *<comport> <BAUD><terminator code>***
VALID VALUES	See Below
DEFAULT VALUE	comport - 0 BAUD - 9600 Terminator code -
DATA TYPE	integer
DESCRIPTION	Determines and identifies communications to External Serial Devices Comport 0 - No external device connected. 1 - An external device is connected to COM1 2 - An external device is connected to COM2 3 - An external device is connected to COM3 4 - An external device is connected to COM4 BAUD This sets the BAUD rate of the serial communications channel. Valid values are: 110, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200. Terminator code 0 - null terminator 1 - CR 2 - CR LF 3 - LF CR 4 - LF
NOTE	A DSM can only communicate with an Auxiliary device if a Comport is initialized for an auxiliary device and SEROUT is set to 0 and HAVESER is set to 0.

VARIABLE	**AUXSCHED *<enabled> <command> <internal interval time>***
VALID VALUES	See Below
DEFAULT VALUE	enabled - 0 command - RP Internal interval time - 0
DATA TYPE	integer, string
DESCRIPTION	When enabled, identifies the command to be sent to the external serial device when an ADTrig is received. The internal interval time is in milliseconds. enabled 0 - AUXSCHED is not enabled. 1 - AUXSCHED is enabled command Any valid command. Internal interval time The valid range is 500 to 100,000 milliseconds, 0 disables this function.

VARIABLE	**CAL *<comport> <BAUD>***
VALID VALUES	See Below
DEFAULT VALUE	comport - 0 BAUD - 9600
DATA TYPE	integer
DESCRIPTION	Determines and identifies communications to Serial Calibrators Comport 0 - No Calibrator is connected. 1 - A Calibrator is connected to COM1 2 - A Calibrator is connected to COM2 3 - A Calibrator is connected to COM3 4 - A Calibrator is connected to COM4 BAUD This sets the BAUD rate of the serial communications channel. Valid values are: 110, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200.
NOTE	A DSM can only communicate with a Calibrator if a Comport is initialized for a calibrator and SEROUT is set to 0 and HAVESER is set to 0. The only valid BAUD rate for a calibrator manufactured by Scanivalve Corp is 9600.

VARIABLE	**CALSCHED *<enabled> <command> <internal interval time>***
VALID VALUES	See Below
DEFAULT VALUE	enabled - 0 command - RP internal interval time - 0
DATA TYPE	integer, string
DESCRIPTION	When enabled, identifies the command to be sent to the serial calibrator(s) when an ADTrig is received. The internal interval time is in milliseconds enabled 0 - AUXSCHED is not enabled. 1 - AUXSCHED is enabled command Any valid command. Internal interval time The valid range is 500 to 100,000 milliseconds, 0 disables this function.

VARIABLE	**CONOUT *<code>***
VALID VALUES	1, 2, or 3
DEFAULT VALUE	2
DATA TYPE	integer
DESCRIPTION	Determines if output data are to be sent to the console. 1 - Output to the Console 2 - Output data to the Console if comment was input from the keyboard. 3 - Output data to disk file: scanxxx.dat, no display of data

VARIABLE	**DISPIN *<code>***
VALID VALUES	0 or 1
DEFAULT VALUE	0
DATA TYPE	Integer
DESCRIPTION	Determines if data from other host s are to be displayed. 0 - No data from other hosts are to be displayed 1 - Display data from other hosts

VARIABLE	**DSA1 *<comport> <BAUD>***.
VALID VALUES	See Below
DEFAULT VALUE	com port - 0 BAUD - 115200
DATA TYPE	Integer
DESCRIPTION	Determines and identifies a DSA connection to a COM port and the BAUD rate. Com port 0 - No DSA module is connected 1 - A DSA module is connected to COM1 2 - A DSA module is connected to COM2 3 - A DSA module is connected to COM3 4 - A DSA module is connected to COM4 BAUD - This sets the BAUD rate of the serial communication channel (if present). Valid Values are: 110, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200.

VARIABLE	**DSA2 *<comport> <BAUD>.***
VALID VALUES	See Below
DEFAULT VALUE	comport - 0 BAUD - 115200
DATA TYPE	Integer
DESCRIPTION	Determines and identifies a DSA connection to a COM port and the BAUD rate. Comport 0 - No DSA module is connected 1 - A DSA module is connected to COM1 2 - A DSA module is connected to COM2 3 - A DSA module is connected to COM3 4 - A DSA module is connected to COM4 BAUD - This sets the BAUD rate of the serial communication channel (if present). Valid Values are: 110, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200.

VARIABLE	**ECHO *<enable>***
VALID VALUES	0 or 1
DEFAULT VALUE	0
DATA TYPE	Integer
DESCRIPTION	Determines if characters received from the network or the serial host will be echoed back to the host. 0 - Echo is disabled 1 - Echo is enabled

VARIABLE **FORMAT <*code*>**
VALID VALUES 0, 1, or 2
DEFAULT VALUE 0
DATA TYPE Integer
DESCRIPTION Determines if data are to be scrolled on the display.

0 - data are scrolled
1 - data are displayed in place, formatted for a VT100 terminal.
2 - data are scrolled with a prompt between frames

VARIABLE **HAVEARINC <*code*>**
VALID VALUES 0, 1, or 2
DEFAULT VALUE 0
DATA TYPE Integer
DESCRIPTION Determines if ARINC is configured.

0 - No ARINC is configured
1 - ARINC is configured with the two channel ARINC card, Condor Engineering CEI 400-44
2 - ARINC is configured with the eight channel ARINC card, Condor Engineering CEI 420A-88

NOTES When HAVEARINC is set to 1, the variables ARINC1OUT, ARINC2OUT, ARINC1SCALE, and ARINC2SCALE are active.
When HAVEARINC is set to 2, the variable ARINCOUTn is active.

VARIABLE **HAVENET <*code*>**
VALID VALUES 0 or 1
DEFAULT VALUE 0
DATA TYPE Integer
DESCRIPTION Determines if a network is configured.

0 - No network is configured
1 - Network is configured

VARIABLE **HAVESER <*comport*> <*BAUD*>**
VALID VALUES See Below
DEFAULT VALUE comport - 2
BAUD - 9600
DATA TYPE Integer
DESCRIPTION Determines if a serial interface is configured and the BAUD rate.

Comport - 0 - No serial interface is configured
1 - Comport 1 is configured
2 - Comport 2 is configured
3 - Comport 3 is configured
4 - Comport 4 is configured

BAUD - This sets the BAUD rate of the serial communication channel (if present). Valid Values are: 110, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200.

VARIABLE	**IFUSER <*code*>**
VALID VALUES	0 or 1
DEFAULT VALUE	1
DATA TYPE	Integer
DESCRIPTION	Determines the method of logging errors and if a sign on message will be issued to the serial host. 0 - All errors will be logged. Errors may only be accessed by issuing an ERROR command and cleared by issuing a CLEAR command. A sign on message will not be issued to the serial host. 1 - All errors will be displayed as they occur. A sign on message will be issued to the serial host.

VARIABLE	**NETIN <*code*>**
VALID VALUES	0 or 1
DEFAULT VALUE	1
DATA TYPE	Integer
DESCRIPTION	Determines if network inputs are to be acknowledged. 0 - ignore network input 1 - acknowledge network input

VARIABLE	**NETOUT <*code*>**
VALID VALUES	0, 1, or 2
DEFAULT VALUE	2
DATA TYPE	Integer
DESCRIPTION	Determines if data are to be output to a network . 0 - never output data to the network 1 - always output data to the network 2 - output data to the network if command is initiated from the network

VARIABLE	**NL <*code*>**
VALID VALUES	0 or 1
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Determines the new line character(s) for all output. 0 - <CR><LF> 1 - <CR>

VARIABLE	**SERIN *<code>***
VALID VALUES	0 or 1
DEFAULT VALUE	1
DATA TYPE	integer
DESCRIPTION	Determines if data will be input from the serial interface 0 - No input from the serial input. 1 - Acknowledge the serial input.

VARIABLE	**SEROUT *<code>***
VALID VALUES	0, 1, or 2
DEFAULT VALUE	2
DATA TYPE	Integer
DESCRIPTION	Determines if data are to be output to a serial interface . 0 - never output data to the serial interface 1 - always output data to the serial interface 2 - output data to the serial interface if command initiated from the serial interface

TEMPERATURE OFFSET VARIABLES (Group O)

VARIABLE	**TEMPBn <*value*>** Where n = the module position number
VALID VALUES	any real number
DEFAULT VALUE	-43.5028
DATA TYPE	float
DESCRIPTION	The "B" term in the conversion equation used to convert temperature counts to degrees Celsius. If a module number is not specified, all modules will be displayed. This value is for a Nickel-Iron RTD(604Ω at 0°). The conversion formula is:

$$°C = TempM \times (Counts) - TempB$$

TEMPERATURE GAIN VARIABLES (Group G)

VARIABLE	**TEMPMn <*value*>** Where n = the module position number
VALID VALUES	any real number
DEFAULT VALUE	0.0730
DATA TYPE	float
DESCRIPTION	The "M" term in the conversion equation used to convert temperature counts to degrees Celsius. If a module number is not specified, all modules will be displayed. This value is for a Nickel-Iron RTD(604Ω at 0°). The conversion formula is:

$$°C = TempM \times (Counts) - TempB$$

Some ZOC modules use different RTD's for temperature measurement. The values of TEMPBx and TEMPMx will have to be modified by the user when a different RTD is used. The following table lists the other RTD's that could be installed and the values of TEMPB and TEMPM for each one.

RTD	TEMPB	TEMPM
Platinum 500 Ω at 0°C	-16.665	0.1184
Platinum 1000 Ω at 0°C	-83.7374	0.0844

DSM Profile File

When the DSM.EXE program is started, including a RELOAD or RESTART, a DSM Profile file will be generated. This file is named DSMnnn.DPF, where nnn is the serial number of the DSM. This file is an ASCII text file and contains the following information:

DSM Serial Number: <serial number><CR><LF>
Module Serial Number in Position 1: <module serial number><CR><LF>
Module Serial Number in Position 2 <module serial number><CR><LF>
Module Serial Number in Position 3: <module serial number><CR><LF>
Module Serial Number in Position 4: <module serial number><CR><LF>
Module Serial Number in Position 5: <module serial number><CR><LF>
Module Serial Number in Position 6: <module serial number><CR><LF>
Module Serial Number in Position 7: <module serial number><CR><LF>
Module Serial Number in Position 8: <module serial number><CR><LF>

If a DSMnnn.DPF file exists when the DSM.EXE program starts up, it will be overwritten.

Module Profile File

Each module has a unique Module Profile File which is created during the initial calibration of the module. This file is updated each time a SAVE command is executed by the DSM. These files are read when the DSM.EXE program is started, including RELOAD and RESTART.

The information contained in the Module Profile File is:

```
REMn 1 <comment><CR><LF>
REMn 2 <comment><CR><LF>
REMn 3 <comment><CR><LF>
REMn 4 <comment><CR><LF>
SET TYPEn <module type><CR><LF>
SET NUMPORTSn <number of ports><CR><LF>
SET TEMPMn <temperature gain factor><CR><LF>
SET TEMPBn <temperature offset factor><CR><LF>
SET LPRESSn <channels> <pressure><CR><LF>
SET HPRESSn <channels> <pressure><CR><LF>
SET NEGPTSn <channels> <number of negative points><CR><LF>
INSERT <temperature> <channels> <pressure> <pressure counts> M<CR><LF>
INSERT <temperature> <channels> <pressure> <pressure counts> M<CR><LF>
  : :        : : : :        : :        : :        : : : :        :  : :    : :
INSERT <temperature> <channels> <pressure> <pressure counts> M<CR><LF>
```

Program Start Up Sequence

The **DSM.EXE** program reads several configuration files when it is first started. These files are found in the DSM folder. The files are read in a sequence that allows the DSM to configure itself for operation in the system. The first file read is: **SN.GPF**. This file contains the serial number and positions of the modules connected to the DSM.

When the module configuration is read, the DSM then looks for a Module Profile File for each of the modules listed in the **SN.GPF** file. The Module Profile Files are named: **Mxxxx.MPF** where xxxx is the serial number of the module. For example, the Module Profile File for module serial number 0121 might be:

```
REM0121 1 Comment line 1
REM0121 2 Comment line 2
REM0121 3 Comment line 3
REM0121 4 Comment line 4
SET TYPE0121 0
SET ENABLE0121 1
SET NUMPORTS0121 16
SET NPR0121 15
SET LPRESS0121 1..16 -18.000000
SET HPRESS0121 1..16 18.000000
SET NEGPTS0121 1..16 4
SET TEMPM0121 0.0730
SET TEMPB0121 -43.5028
INSERT 0 1-1 -15.0 -26400 M<CR><LF>
INSERT 0 1-1 -12.0 -26400 M<CR><LF>
   ::     :    ::     ::      ::      :    :      :
INSERT 0 1-16 15.0 26400 M<CR><LF>
```

When all of the Module Profile Files have been read, the DSM issues a **FILL** command to fill in the calibration tables.

Next, the DSM reads the **CV.GPF** file. This file contains all of the remaining configuration variables.

The last file to be read is the **ZERO.CFG** file. This file contains the current zero offset for each position. The file may appear as follows:

Finally, the DSM creates DSM Profile File: **DSMx.DPF** where x is the serial number, that identifies the modules installed by position and serial number. This file could be output to a host computer.

CAUTION: It is very important that the serial numbers entered in the Profile Group, Group P, be correct. This list is used to set up the Calibration Coefficient Tables in the DSM memory. If the modules are moved or replaced, the Group P list **MUST** be updated immediately.

Module Replacement

A DSM determines the system configuration during start up by reading the **SN.GPF** file. If this file does not contain the correct and current module information, data collected during subsequent tests will be invalid. The module configuration **MUST** be verified as a first step prior to any other operation of the DSM. The module configuration may be verified by the following:

From a Telnet or Host connection, Issue a **List P** command ,

Type: List p<CR>

The DSM will return a list of the module configuration

```
SET DSMSN 351
SET SN1 0121
SET SN2 0233
SET SN3 0134
SET SN4 1223
SET SN5 0210
SET SN6 0201
SET SN7 0154
SET SN8 0000
```

Verify that the actual system configuration matches the configuration listed.
If the configuration is correct, it is safe to continue.

If the configuration is **NOT** correct, enter the changes to Group P and reload the program.
For example, if module serial number 0135 were actually installed in position 4 instead of serial number 1223.

Type:	SET SN4 0135<CR>	The DSM will look on the hard drive for a Module Profile File for this serial number module. If one exists, the DSM will delete the stored calibration tables and replace them with tables from M0135.MPF. If a Module Profile File for the module specified cannot be found, an error will be generated and the current tables will not be deleted.
Type:	SAVE<CR>	This will save the configuration.
Type:	RELOAD<CR>	This will restart the program. Calibration data will be loaded and a Fill command will be executed.

.

Coefficient Installation Procedure

This procedure assumes that the DSM has DSM.EXE Version 1.10 or greater installed. If an older version of DSM.EXE is installed, contact Scanivalve Corp., Product Support Department for upgrade information.

1. Connect a Monitor, Mouse and Keyboard to the Auxiliary connections of the DSM.

2. Connect a host computer to the RS232(COM2) port. Power up the DSM.

3. Enter the serial number of the new module in Group P. Refer to the DSM Software Requirements Specification for more information.

4. Use the **DELETE** Command to delete old Master Planes stored in the DSM. Save the new configuration. Refer to the DSM Software Requirements Specification for more information.

5. Quit the DSM program and open a HyperTerminal session.

6. Install the floppy disk with the ZOC Module Profile File into a floppy drive and upload the Module Profile File to the DSM Folder in the DSM using PROCOMM, Windows Terminal, Telnet, HyperTerminal, or any communications program that will support an ASCII upload.

7. When the upload is complete, close the HyperTerminal session and start the DSM program. Refer to the DSM Software Requirements Specification for more information.

CAUTION: It is very important that the Zero Offset files be updated prior to collecting data. It is recommended that a **CALZ** be performed as soon as the modules have stabilized. After the first **CALZ**, the **ZC** variable should be set to 1.

DSM File Transfer

Files may be transferred to and from the DSM by RS232 or FTP. The files that may be transferred are: Module Profile Files, Sensor Profile Files, Configuration Files, and even DSM.exe upgrades. This section assumes that the files to be transferred are being stored on the DSM hard disk drive. Module Profile Files may be loaded into memory. This is explained in the Install Coefficients Section.

File Transfers using RS232

1. Connect a Monitor, Mouse and Keyboard to the Auxiliary connections of the DSM.

2. Connect a host computer to the RS232(COM2) port. Power up the DSM.

3. When the program has started, quit the DSM program and open a HyperTerminal session.

4. Open a HyperTerminal session or any serial communications program on the Host Computer. Connect the Host Computer Serial port to COM2 of the DSM. Establish a connection.

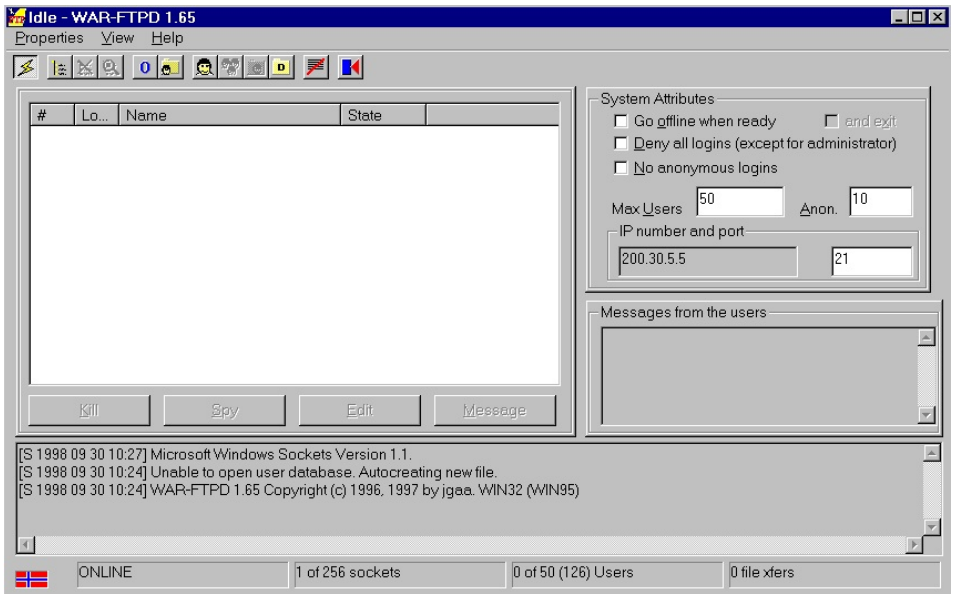
5. Install the floppy disk with the file(s) to be transferred into a floppy drive and upload them to the DSM Folder in the DSM using any communications program that will support an ASCII upload.

6. When the upload is complete, close the HyperTerminal session and start the DSM program. Refer to the DSM Software Requirements Specification for more information.

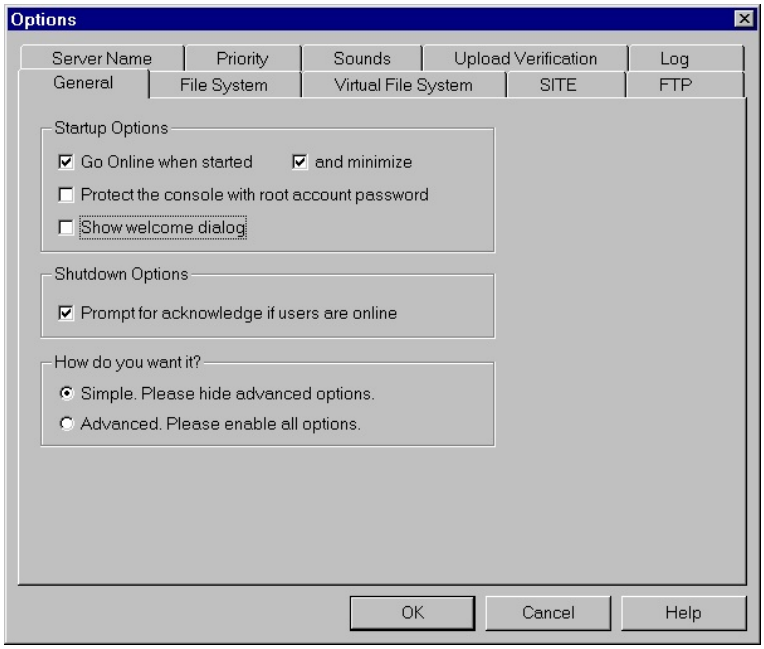
File Transfers using FTP

Scanivalve Corp has chosen War FTP Daemon v1.65 as the FTP server on the DSM. All DSM3000 series modules now have this software installed and configured when they are shipped. This software may be added to existing DSM modules. This software may be downloaded from the Internet either from the War FTP Daemon site(www.home.sol.no~jarlaase/tftpd.htm) or a linkk on the Scanivalve Web site(www.scanivalve.com).

Once the software is downloaded and installed on the DSM, it must be configured for proper operation. When the program is started a screen similar to the one below will open. Remove the check at the box marked: No anonymous logins.

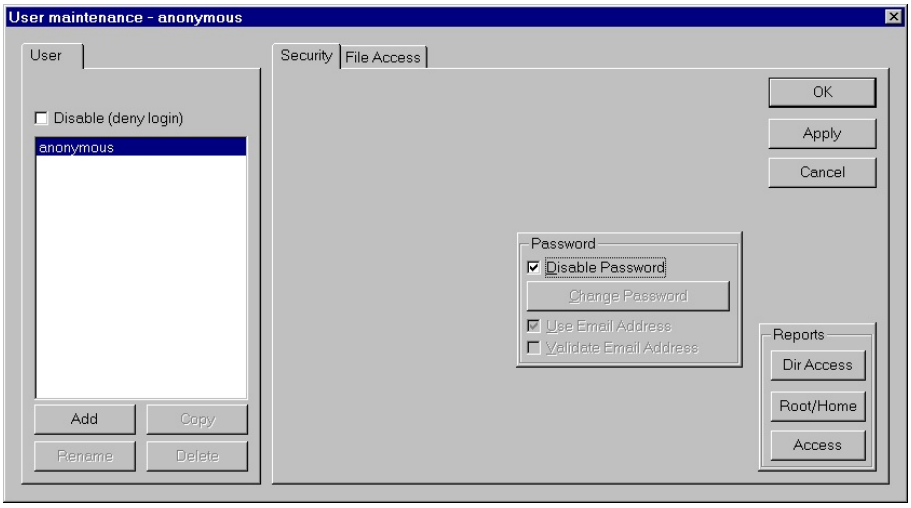


Next, click the Options Button(marked with the blue O). This will open the Options window. Select General settings and Check the boxes marked : Go Online when started and minimize. Un-check the box marked: Show welcome dialog.



Return to the first screen and click the icon marked: User Security Properties. The screen below will be displayed.

Clear the check from the box marked: Disable (deny login).
Check the box marked: Disable Password
Click Apply



Click the

File Access Tab

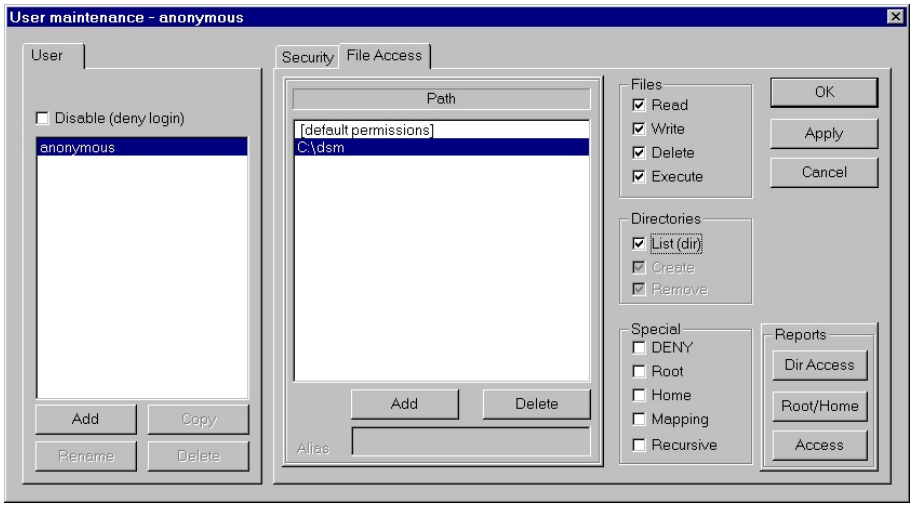
The window below will be displayed.

Click Add, and select the directories that a user will be allowed to access. It is recommended that access be permitted to the DSM Directory only.

Double click all of the boxes under Files and Directories.

Click Apply

Click OK



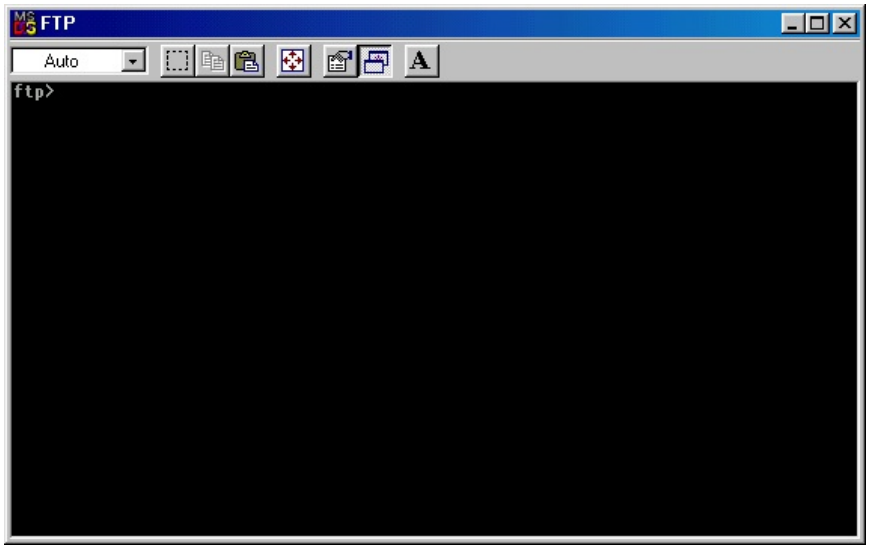
Finally, add the War FTP Daemon program to the Start Menu in the DSM. The DSM must be re-booted or have power cycled for this program to be effective.

Once the FTP software is installed and configured in the DSM, there must be a way to communicate

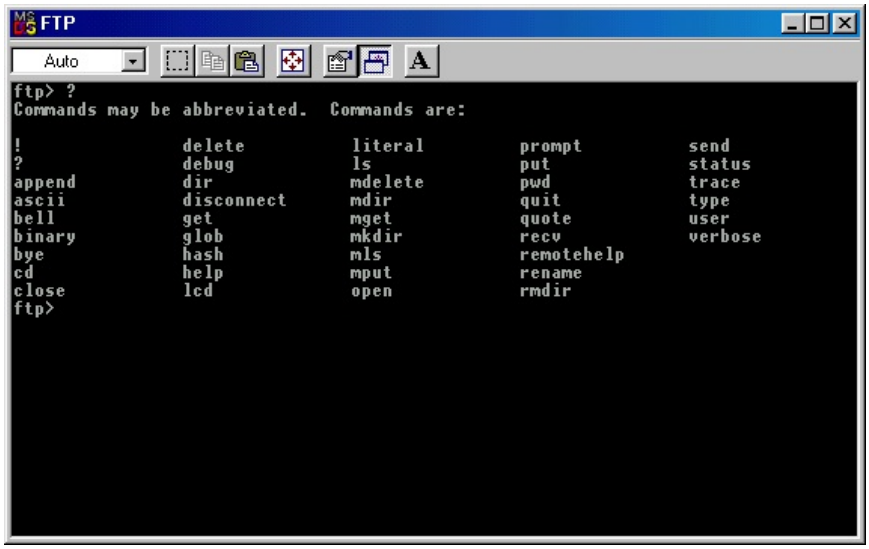
from an external computer. Windows 95 and Windows 98 have a very good method, but almost any ftp software will be sufficient..

In Windows 95 or 98, find the program: ftp.exe. It may be helpful to add a shortcut to this program on the desktop.

When this program is started, a window will open with a ftp prompt.



To view the command list, Type: **?**
Users familiar with UNIX may see some similarities.



Open the session by entering the command: **Op**

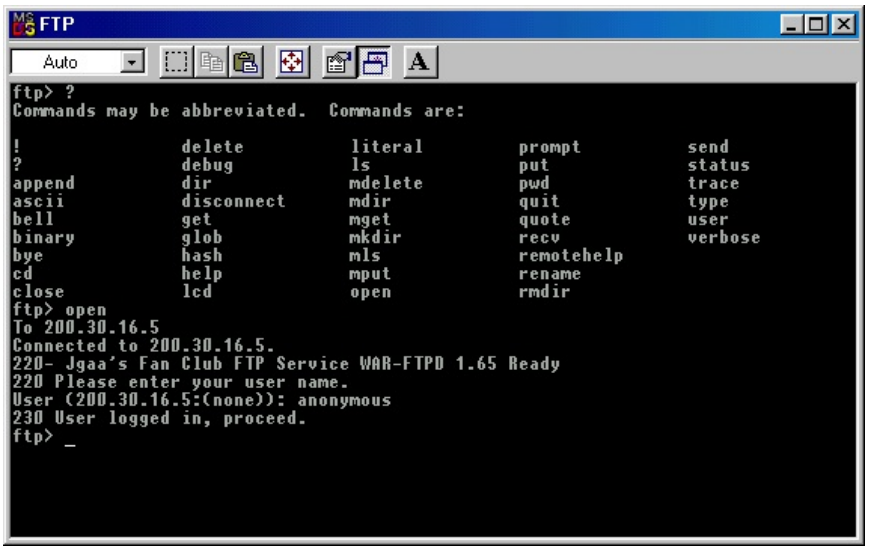
en

The program will return: **To**

Enter the IP address of the DSM

The program will ask for a password if the connection is successful.

Enter: **anonymous**



Most file transfers must be completed in the binary mode. To switch to this mode:

Enter: binary

When this mode is active, send the file:

Enter: send

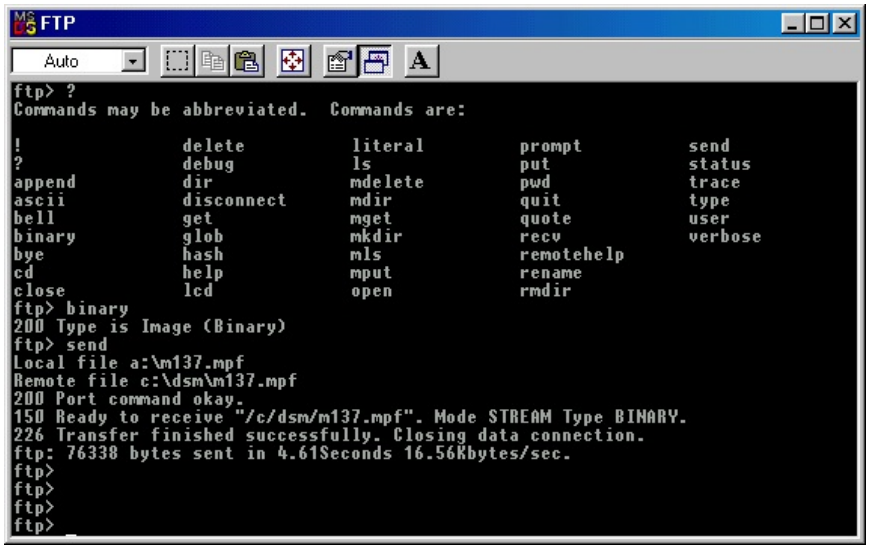
At the local file prompt:

Enter: The path and name of the file to be transferred.

At the remote file prompt:

Enter: The destination, path, and name of the file being transferred.

The program will report the bytes transferred.

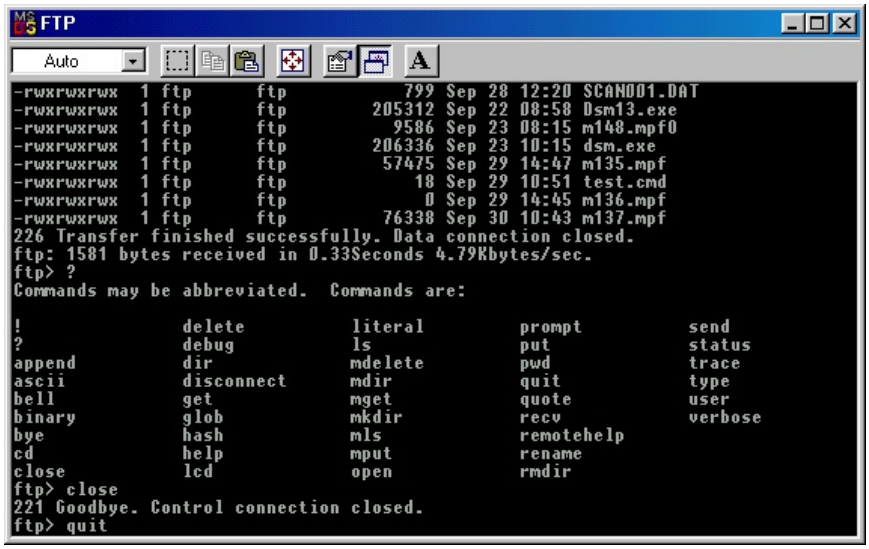


When the transfer is

complete, the contents of the DSM hard drive may be viewed by entering directory commands.

When the session is complete, close the connection to the DSM by entering: **close**.

Exit the program by entering: **quit** at the ftp prompt.



ARINC Data Word Format

Bit Number	Function	Number of Bits	Value	Notes
31	Parity	1	0	Required by ARINC
29, 30	SSM	2	00	
28	Sign	1	0 or 1	0 = pos 1 = neg
10 - 27	Scaled Pressure	18	Varies	See Note 1
8,9	Mode	2	00 - 11	00 = STOP 01 = CALZ 10 = SCAN 11 = PURGE
0 - 7	Label	8	Varies	When Mode = 10, the Channel sequence number (max 256) will be output. For all other conditions of Mode, the output will be 0000 0000

Note 1: When the Mode bits are set to 10(SCAN), scaled data are output. To determine pressure in PSI, isolate bits 10 through 28, shift right 10 bit positions and sign extended value. Conversion to pressure in psi for a 20 psi full scale module is calculated as follows:

$$EUPressure = \frac{Scaledpressure * 20}{262144}$$

When the Mode bits are set to 00, 01, OR 11(PURGE, CALZ, or STOP), a single ARINC word will be output to indicate that scanning and, consequently data transmission, has stopped. Bits 28 through 10 will be set to 1. The data will be:

111 1111 1111 1111 1111

ARINC Channel Assignment

A DSM with the Condor Engineering CEI-400-44 ARINC card has 2 ARINC Channels. Either one of the two DSM ARINC Channels can be user configured to output ONE of the following:

DSA #1
DSA #2
Scan Group #1
Scan Group #2
Scan Group #3
Scan Group #4
Scan Group #5
Scan Group #6
Scan Group #7
Scan Group #8

The ARINC label will be the sequence number of the module-port list generated by the CHANNELS command.

A DSM with the Condor Engineering CEI-420A-88 ARINC card has 8 ARINC Channels. Each of these ARINC Channels can be user configured to output ONE of the following:

Scan Group #1
Scan Group #2
Scan Group #3
Scan Group #4
Scan Group #5
Scan Group #6
Scan Group #7
Scan Group #8

The ARINC label will be the sequence number of the module-port list generated by the CHANNELS command.

ARINC Throughput

Throughput rate for one ARINC transmit line is calculated given as follows. Note that each DSM will have two transmit lines. There are two transmit lines for the entire system.

ARINC limit = 100K BITS / sec
ARINC word size = 36 bits (32 data bits plus 4 spacing bits)
One channel = one ARINC word (formatted as above)
Max channels = 256 channels

$$Rate = \frac{100000 bits/\sec}{36 bits/channel * (256 channels/frame)} = 10.8 Hz$$

The calculation is based on a worst case of 256 channels, which is the maximum for one ARINC channel. Faster throughputs could be obtained with fewer pressure channels per ARINC channel. The number of pressure channels per ARINC channel is user configurable within the constraints listed under ARINC Options.

NOTE: It should not be assumed that ARINC transmissions can be achieved at the same speeds as are available in Ethernet. ARINC transmissions are serial and limited to 100,000 bits per second which is approximately equal to an RS232 transmission at 11100 BAUD. The actual throughput will be determined by the number of channels being scanned, the scan period, the scan average, and the number of ARINC output channels being used. A user should test a setup configuration to determine the actual throughput available prior to attempting to collect critical data.

ARINC Options

1. Setting of spacing bits depends upon the ARINC board supplier. Some ARINC Boards do not permit modification of the spacing bits.

2. Configuration of the ARINC word format is fixed.

3. When a Condor Engineering CEI-400-44 ARINC card is installed, the ARINC Channels are configured by the ARINC1OUT, ARINC2OUT, ARINC1SCALE, and ARINC2SCALE Configuration Variables.

4. When a Condor Engineering CEI-420a-88 ARINC card is installed, the ARINC Channels are configured by the ARINCOUTn configuration variables.

Refer to the DSM Software Command and Configuration Variable Documents for more information on Scan Groups.

Binary Scan Packets

Packets without Module-Port Information

Byte	Name	Value
0	Binary ID	1 = EU (EU =1) 2 = Raw (EU = 0)
1	Group ID	1 to 8
2 and 3	Number of Channels	0 to 512
4 through7	Frame Number	1 to 2^{32}
8 through 11	Time in milliseconds	0 to 2^{32}
12 through 15	Channel 1 Data	4 bytes per channel
16 through19	Channel 2 Data *	4 bytes per channel
: : : : : :	: : : :	: : : :
(4n + 8) through (4n + 11)	Channel n Data *	4 bytes per channel

* Optional based on Number of Channels setting.

Packets with Module-Port Information

Byte	Name	Value
0	Binary ID	3 = EU with channels (EU =1) 4 = Raw with channels (EU = 0)
1	Group ID	1 to 8
2 and 3	Number of Channels	0 to 512 (Byte 2 is LSB)
4 through7	Frame Number	1 to 2^{32}
8 through 11	Time in milliseconds	0 to 2^{32}
12 through 19	Channel 1 Data	Data (4 bytes), Module (2 bytes), Port (2 bytes)
20 through 27	Channel 2 Data *	Data (4 bytes), Module (2 bytes), Port (2 bytes)
: : : : : :	: : : :	: : : :
(8n + 4) through (8n + 11)	Channel n Data *	Data (4 bytes), Module (2 bytes), Port (2 bytes)

* Optional based on Number of Channels setting.

When BIN is set to 1 and the BINADDR is set to a value other than zero, the data from the AUX or CAL commands are converted to a BINARY format and output over the UDP binary port specified in the BINADDR variable. The data format is:

<ID byte> - 1 byte, the value will be 1 if the data are from a calibrator or 2 if the data are from an auxiliary unit.
<pressure> - 4 bytes of floating point binary pressure data

Hardware Interface

Address Map

Function	Tag	R/W	Offset from Base (hex)	Offset from Base (dec)	Description
Lattice ISP	----	----	00	00	Reserved for in system programming of the Lattice.
Status	STAT_RD	R	02	02	Status word. See format below.
Control	CON_WR	W	02	02	Control word. See format below.
FIFO Read	FIFO_RD	R	04	04	Provides read pulse for reading data from FIFO's
FIFO Select	FIFOSEL_WR	W	04	04	Allows selection of one of the 9 FIFOs to be read. See format below.
Clear Frame Available	CLEAR_FA_WR	W	06	06	Provides a pulse for clearing the frame available. Only the address pulse from an IOR is used.
FIFO Reset	FIFO_RESET_WR	W	08	08	Provides a pulse for resetting the FIFOs. Also the channel read sequencer is reset. Only the address pulse from an IOR is used.
Set Pacer	PAC_WR	W	0A	10	Writes the pacer divisor word. Value written is the desired channel interval in microseconds minus 3. For example if the desired period is 25 usec, write 22.
Digital Out	DOUT_WR	W	0C	12	Provides the digital out pulse for writing to the digital out port.

Status Word Format

Bit Positions	Function	Description
15 through 8	DIN7 to DIN0	Digital Inputs
3	A/D Error occurred.	0 - No Error 1 - Error. Cleared with FIFO Reset.
2	FIFO's Full	0 - FIFO's are not full 1 - FIFO's are full. Cleared with FIFO Reset.
1	FIFO's Empty	0 - FIFO's are not empty 1 - FIFO's are empty.
0	Frame Available	0 - No Frame Available 1 - Frame Available Indicates that the threshold level has been reached. If interrupt jumper is on, an interrupt is generated. If no interrupt jumper, only this bit is set. Cleared by Clear Frame Available.

Control Word Format

Bit Positions	Function	Description
15 through 4	Not Used	
3	Red Led	0 - Red off 1 - Red on
2	Green Led	0 - Green off 1 - Green on
1	Scan	0 - NoScan 1 - Scan Controls scanning. When scan is stopped the current channel is finished.
0	External Pacer Clock	0 - Internal pacer clock 1 - Exrternal pacer clock. Selects internal or external pacer clock. The divisor word is used in both cases.

FIFO Select Format

Bit Position	Function	Description
15 through 4	Not Used	
3	FIFO Select Temp Not	0 - Temp selected 1 - Pressure Selected
2 through 0	FIFO Select Pressure	0 through 7 - Pressure FIFO select

Suggested Software Procedure for Hardware Interface

At Power Up Initialization:

1) Issue "Scan Off"
2) Issue "FIFO Reset"
3) Issue "Clear Frame Available"
4) Set pacer clock to either internal or external according to the configuration value
5) Set pacer divisor word according to configuration value.

When Setting ADTRIG:

1) Set pacer clock to either internal or external.

When Setting PERIOD:

1) Set pacer divisor word.

To Start Scan:

1) Issue "FIFO Reset"
2) Issue "Clear Frame Available"
3) Issue "Scan On"

During Scan: (Either polled or in ISR):

```
If Frame Available
    Loop through the following 8 times
        Select Pressure FIFO
        Read 1024 pressure data items for the selected FIFO
    End loop
    Select Temp FIFO
    Read 1024 temp data items
    Clear Frame Available
End if frame available
```

To Stop Scan:

1) Issue "Scan Off".
2) Issue "FIFO Reset"
3) Issue "Clear Frame Available"

Recommendations for use of an external ADTRIG

When using an external frame trigger, it is critical that the DSM be set up correctly so it can scan and output the data correctly. The setup requirements are determined by the number of installed A/D cards, the number of channels in the modules being scanned, and the averaging requirements.

A DSM will not output a Frame of data until the Frame Available Flag is set. This flag is set when the FIFO buffer is filled. The Frame Available flag will be set when 1024 unaveraged channel samples have been read into the FIFO. All subsequent data must be in blocks of 1024.

Table 1 below shows the relationship between channel interval and the maximum frames per second using an external frame trigger.

Channel Interval	Time to Frame Available	Maximum Frames/Second
200 µs	204.8 ms	4.8
100 µs	102.4 ms	9.7
50µs	51.2 ms	19.5

Table 2 shows the maximum setting of channel average that will not affect the Frames per second output.

Module Channels	Max Average
64	16
32	32
16	64

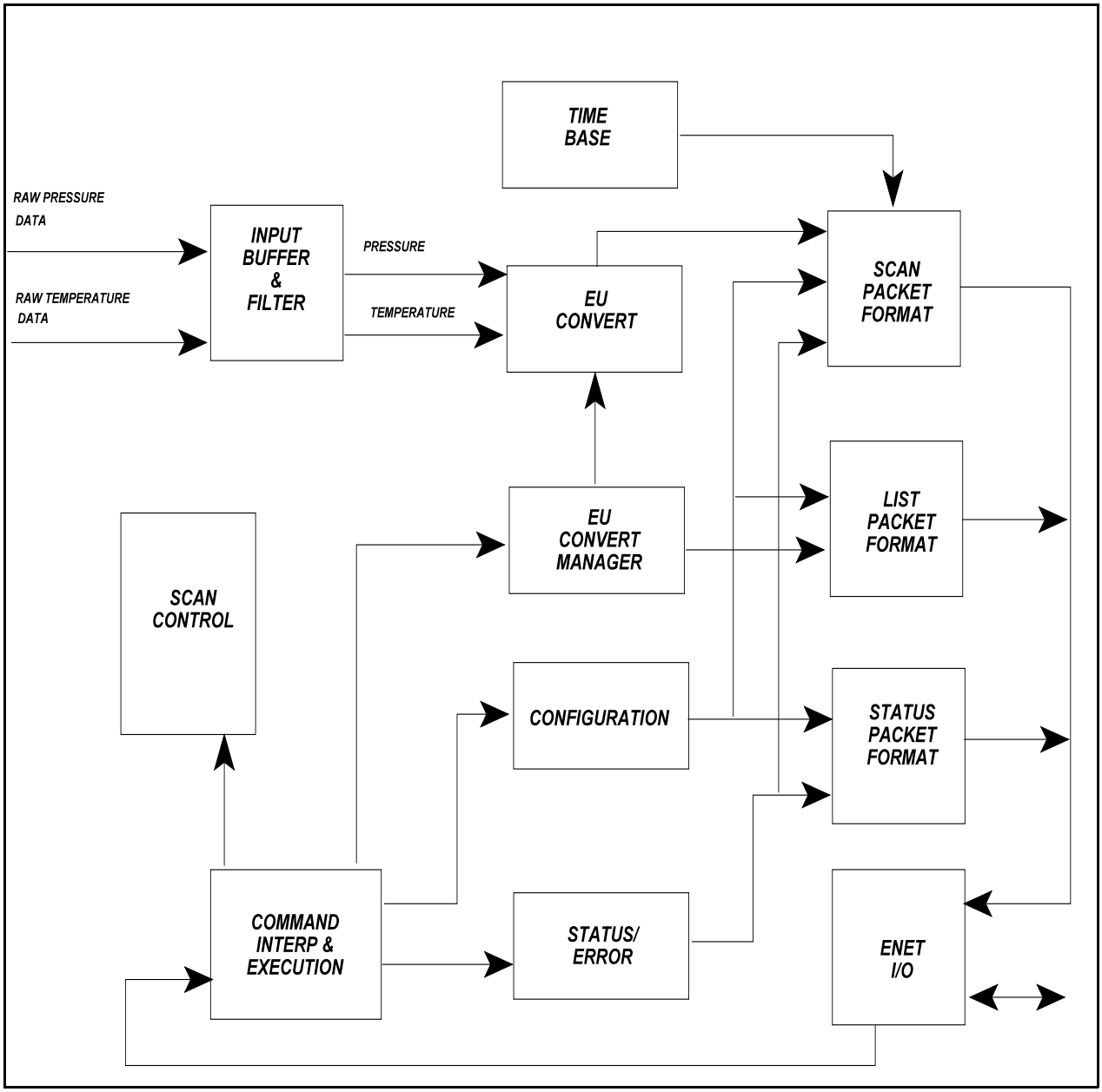
NOTE: The A/D boards in a DSAENCL with 2 A/D boards installed each scan four modules. For these systems, the maximum average will be 16.

Example 1 A DSAENCL with 2 A/D modules scanning DSA3016 modules must be triggered for an output of 10 FPS.
The channel interval must be set faster than 100 µs so the FIFO can fill in less than 100 ms.
Maximum average = 16 (1024 samples / 64 channels)
Maximum Frame Period(Channel Interval X Channels X Average) must be less than 100 ms.

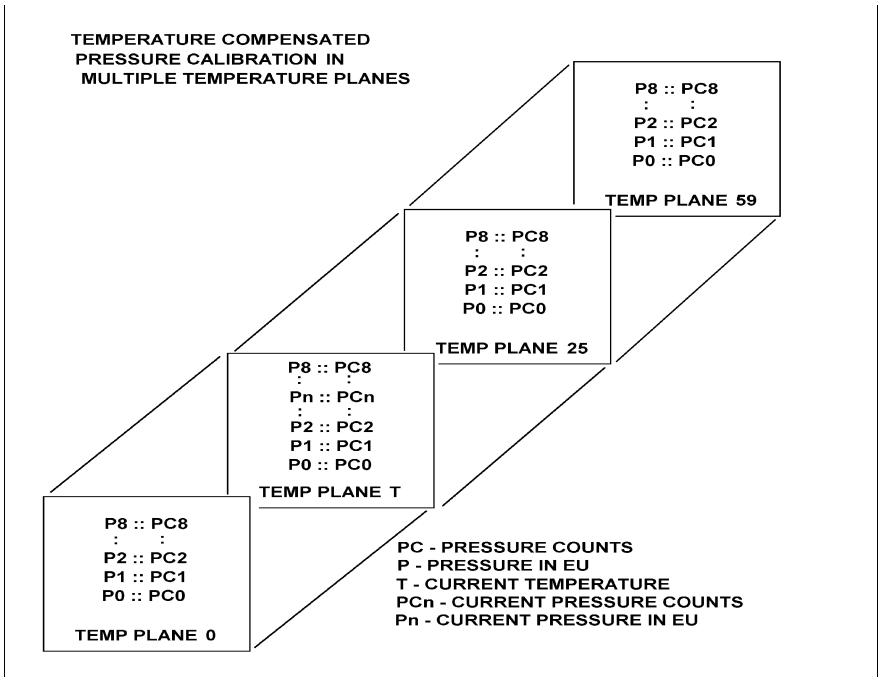
Example 2 A DSM with 8 A/D modules scanning ZOC 22 modules must be triggered for an output of 10 FPS.
The channel interval must be set faster than 100 µs so the FIFO can fill in less than 100 ms.
Maximum average = 32(1024 samples / 32 channels)
Maximum Frame Period(Channel Interval X Channels X Average) must be less than 100 ms.

Tests at the Scanivalve factory have shown that a DSAENCL with 2 A/D boards can operate at a 10 Hz AD trigger rate if the Maximum Frame Period is less than 92 ms. A DSM or DSAENCL with 8 A/D boards can operate at a 10 Hz AD trigger rate if the Maximum Frame Period is less than 75 ms.

APPENDIX A - DSA DATA FLOW



APPENDIX B - TEMPERATURE COMPENSATED PRESSURE CONVERSION



FORMULAS:

Pressure interpolation within current temperature plane:

$$P_{n_t} = \frac{1}{PC_{1_t} - PC_{0_t}}((PC_{1_t} - PC_{n_t})P_{0_t} - (PC_{0_t} - PC_{n_t})P_{1_t})$$

Calculation of entries in current temperature plane:

$$P_{n_t} = \frac{1}{PC_{1_t} - PC_{0_t}}((PC_{1_t} - PC_{n_t})P_{0_t} - (PC_{0_t} - PC_{n_t})P_{1_t})$$

Calculation of entries in current temperature plane:

$$P_t = \frac{1}{T_{25} - T_0}((T_{25} - T)P_{0_0} - (T_0 - T)P_{0_{25}})$$

APPENDIX C - ENGINEERING UNIT CONVERSION CONSTANTS

UNITSCAN Setting	Engineering Unit	PSI to EU 1 psi =	EU to PSI 1 EU =
ATM	Atmospheres	0.068046 A	14.6960 psi
BAR	Bars	0.068947 b	14.5039 psi
CMHG	Centimeter of Mercury	5.17149 cmHg	0.193368 psi
CMH2O	Centimeter of Water	70.308 cmH_2O	0.014223 psi
DECIBAR	Decibar	0.68947 db	1.4504 psi
FTH2O	Foot of Water	2.3067 ftH_2O	0.43352 psi
GCM2	Gram per square Centimeter	70.306 g/cm^2	0.014224 psi
INHG	Inch of Mercury @ 0°C	2.0360 inHg	0.491159 psi
INH2O	Inch of Water @ 4°C	27.680 inH_2O	0.036127 psi
KGCM2	Kilogram per square Centimeter	0.0703070 kg/cm^2	14.2235 psi
KGM2	Kilogram per square Meter	703.069 kg/m^2	0.0014223 psi
KIPIN2	kips per square inch(ksi)	0.001 kip/in^2	1000.0 psi
KNM2	Kilonewton per square Meter	6.89476 kN/m^2	0.145038 psi
KPA	Kilopascal	6.89476 kPa	0.145038 psi
MBAR	Millibar	68.947 mb	0.014504 psi
MH2O	Meter of Water	0.70309 mH_2O	1.42229 psi
MMHG	Millimeter of Mercury	51.7149 mmHg	0.0193368 psi
MPA	Megapascal	0.00689476 Mpa	145.038 psi
NCM2	Newton per square Centimeter	0.689476 N/cm^2	1.45038 psi
NM2	Newton per square Meter	6894.76 N/m^2	0.000145038 psi
OZFT2	Ounce per square Foot	2304.00 oz/ft^2	0.000434028 psi
OZIN2	Ounce per square Inch	16.00 in/ft^2	0.062500 psi
PA	Pascal	6894.76 Pa	0.000145038 psi
PSF	Pound per square Foot	144.00 lb/ft^2	0.00694444 psi
TORR	Torr	51.7149 T	0.0193368 psi

APPENDIX D - CHANGE LIST

This section contains change information to assist a user in determining the differences between different versions of software.

Version 1.00

First release. This version not shipped to customers

Version 1.01

This version added ARINC 429 commands. This version was also not shipped to customers.

Version 1.02 - Released December 2, 1997

This was the first version shipped to customers.

The following commands were added:

Delete Files	DELFILE
List Files	DIRFILE
Slots	SLOTS
Write Files	GETFILE

Version 1.03 - Released January 7, 1998

The following Commands were added:

Channel	CHAN

The following Variables were

Scan Group Enable	SGENABLEn

Version 1.06 - Released February 25, 1998

The following Commands were added:

Calibrator Command	CALCMD

The following Variables were

Scan Trigger Enable	DINSTRIG
Scan Mode Indication	DOUTSCAN
Calibrator Configuration	CAL

This version also increased the resolution of the FILL command. Temperature planes are set at 0.25°C intervals instead of 1.0°C intervals.

Version 1.07 - Released March 2, 1998

This version is the same as version 1.06. A bug in the implementation of the DOUTSCAN variable was corrected.

Version 1.08 - Released April 1, 1998

This version added the variable: 2AD, which sets the scan software to match the hardware configuration when two or eight A/D cards are installed.

This version also moved the module serial number from the Module Information Group to a new group: Module Profile Group(Group P). The command: List P, was also added to allow a user to list the module serial numbers.

Version 1.09 - Released June 1, 1998

This version is a major revision of DSM.EXE. Binary data output was added along with a revision in the way coefficients are handled. Calibration Coefficients will remain in a Module Profile File. The DSM will find the correct Module Profile File and load the coefficients into memory at startup. A new Group, Group P was added to act as a module list.

Version 1.10 - Released June 16, 1998

This version repaired several minor bugs found in Version 1.09. It also added a range of channels to the DELETE Command.

Version 1.11 - Released July 31, 1998

This version repaired a bug in the MPBS Configuration Variable. MPBS was modified to a default of 0 from 20. If the default is set to 20, Master Temperature planes closer than 5°C will be deleted when the program loads.

Added the ability to configure the line terminator using the AUX configuration variable.

Added binary output of data from AUX or CAL commands

Version 1.12 - Released August 26, 1998

This version added a Virtual Device Driver to permit channel intervals as fast as 25 microseconds.

The variable USEVXD was added to the SCAN group.

The variable MODTEMPn was added to the MI groups. When this is enabled, the DSM will output the module temperature in the channel specified.

Repaired a bug in the ARINC mode bits when the scan function is active.

Version 1.13 - Released September 2, 1998

This version repaired a bug in the Binary UDP output

No other changes

Version 1.14

Added the ability to replace an individual sensor and update the MPF files.

Commands added: CREATESPF and MERGESPF

Added MAXEU and MINEU to set maximum and minimum EU values when overflow occurs.

Version 1.15 - Released November 1998

Added the variable STARTCALZ to permit an automatic CALZ at startup.

Version 1.16 - Released August 5, 1999

Added the command Shutdown to properly exit windows and shut down the DSM.

Only one TCP/IP connection permitted to the DSM.

Added an Interval time base to the CALSCHED and AUXSCHED commands

Corrected a bug in the ADTRIG section of the 8 A/D version

Version 1.17 - Released September 14, 1999

Removed the multiple TCP/IP connection block because of connection problems to certain mainframe computers.

Version 1.18 - Released November 19, 1999

Added the Digital Output: DOUTREADY which can be configured to indicate that the DSM is in the

READY mode.
Corrected a minor bug in the UDP data output.

Version 1.19 - Released August 2, 2000
Corrected a bug in the Binary data transmission
Corrected a bug in the DOUTSCAN and DOUTREADY outputs that caused them to flicker during SCAN and READY modes.

Version 1.20 - Released May 31, 2001
Increased Output Data Buffer to 6 Mb from 1 Mb
Added display of Adfifo.vxd to VER command
Changed copyright from 2000 to 2001
Added a Confirm statement to the RESTORE command
Added configuration variable IFC (Interframe Characters) to S Group
Added two new scan packets with module-port information
Added another code to the BIN configuration variable to enable module-port data in binary packets
Added “Clean Disconnect” to Ethernet
Added configuration variable FILLONE to C Group

Version 1.21 - Released September, 2001
Corrected a bug in the Digital Outputs

Version 1.22 - Released September 26, 2001
Corrected a byte alignment problem in Binary Scan Packets Types 3 and 4.

Version 1.23 - Released July 31, 2002
Added a Software Trigger function to ADTRIG
Added support for Condor Engineering 8 channel ARINC429 card, CEI-420A-88.
Added option 2 to the HAVEARINC configuration variable
Added ARINCOUTn configuration variables
Added LIST AR command to display ARINCOUTn variables