DSAENCL 3200 SERIES
SOFTWARE REQUIREMENTS SPECIFICATION

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Table of Contents

Command List

Configuration Variables

DSAENCL CONTROL AND CONFIGURATION

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

DSAENCL COMMANDS

This section describes the commands used to control the DSAENCL. The DSAENCL 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 or Local.
4) Output converted data, status, setup and calibration data over the Ethernet or Local outputs.

When a DSAENCL 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 unit returns to the host.
A **PROMPT (>)** will be output when the DSAENCL is ready to accept a command.

TCP/IP does not guarantee that packet boundaries will be maintained between a Host and a DSAENCL. Therefore, **ALL** commands from a Host **MUST** be terminated properly with one of two options using the NL configuration variable. The two options are:

CR-LF (ASCII 13 - ASCII 10) or CR (ASCII 13)

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

DSAENCL COMMAND LIST

COMMAND **A/D CALIBRATION (NON-TEMPERATURE COMPENSATED)**

SYNTAX **A2DCAL <*module*> <*index*> <*voltage*> <CR>**

ARGUMENTS

module	-	The A/D module being calibrated. 0 is the RADBASE, 1 to 8 indicate pressure A/D's.
index	-	the Calibration point, 0 through 15
voltage	-	the applied calibration voltage

DESCRIPTION This command is used to produce the voltage correction table for a non-temperature compensated A/D. Although 16 points may be applied, a user may use as few as three points.

RETURNS <*nl*>

nl	-	end of line

EXAMPLE To calibrate a non-temperature compensated A/D module installed in position 1, apply a series of voltages. The entries may be as follows:

```
A2DCAL 1 0 0.0000
A2DCAL 1 1 0.5000
A2DCAL 1 2 1.0000
A2DCAL 1 3 1.5000
A2DCAL 1 4 2.0000
A2DCAL 1 5 2.5000
```

NOTE This command will only generate the correction table. It does not convert the table to a set of coefficients. Coefficients are generated by the A2DCALC command and written to the A/D module using the IDPWRITE command.

COMMAND **A/D CALIBRATION (TEMPERATURE COMPENSATED)**

SYNTAX **A2DTCAL <*module*> <*t index*> <*point index*> <*voltage*> <CR>**

ARGUMENTS

module -	The A/D module being calibrated. 0 is the RADBASE, 1 to 8 indicate pressure A/D's.
t index -	The temperature index, 0 through 7
point index -	the Calibration point, 0 through 15, for a t index
voltage -	the applied calibration voltage

DESCRIPTION This command is used to produce the voltage correction table for a temperature compensated A/D. Although 16 points may be applied at each temperature index, a user may use as few as three points.

RETURNS <*nl*>

nl	-	end of line

EXAMPLE To calibrate a temperature compensated A/D module installed in position 1, apply a series of voltages. The entries may be as follows:

```
A2DTCAL 1 1 0 0.0000
A2DTCAL 1 1 1 0.5000
A2DTCAL 1 1 2 1.0000
A2DTCAL 1 1 3 1.5000
A2DTCAL 1 1 4 2.0000
A2DTCAL 1 1 5 2.5000
```

NOTE This command will only generate the correction table. It does not convert the table to a set of coefficients. Coefficients are generated by the A2DTCALC command and written to the A/D module using the IDPWRITE command.

COMMAND SYNTAX

A/D COEFFICIENT CALCULATION (NON-TEMPERATURE COMPENSATED)
A2DCALC <*module*> <*number of points*> <CR>

ARGUMENTS

module	-	The A/D module being calibrated. 0 is the RADBASE, 1 to 8 indicate pressure A/D's.
number of points	-	the number of points in the coefficient table

DESCRIPTION

This command is used to calculate the voltage correction coefficients for a non-temperature compensated A/D. Three coefficients are generated: ADCC, ADCB, and ADCA. They will only be calculated by this command. IDPWRITE and IDPCONFIRM are used to write these coefficients to the ID chip.

RETURNS

<mod> <ac> <bc> <cc><*nl*>

mod	-	The A/D module, 0 to 8, where 0 is the RADBASE and 1 to 8 corresponds to the A/D modules
ac	-	The A coefficient in the polynomial
bc	-	The B coefficient in the polynomial
cc	-	The C coefficient in the polynomial
nl	-	end of line

EXAMPLE

A series of voltages have been applied using the A2DCAL command. To generate the third order polynomial for the A/D correction for module 1,

Type: A2DCALC 1 6

The DSAENCL software will calculate the polynomial coefficients and return them. They will not be written to the ID chip until IDPWRITE and IDPCONFIRM commands have been executed.

NOTE

This command will only generate the correction coefficients. Coefficients are written to the A/D module ID chip using the IDPWRITE command.

COMMAND SYNTAX

A/D COEFFICIENT CALCULATION (TEMPERATURE COMPENSATED)
A2DTCALC <*module*> <*number of temp planes*> <*number of points* <CR>

ARGUMENTS

module - The A/D module being calibrated. 0 is the RADBASE, 1 to 8 indicate pressure A/D's.
index - the Calibration point, 0 through 15
voltage - the applied calibration voltage

DESCRIPTION

This command is used to produce the voltage correction coefficients for a temperature compensated A/D. Although 16 points may be applied, a user may use as few as three points.

RETURNS

<mod> <ac> <bc> <cc><*nl*>

mod - The A/D module, 0 to 8, where 0 is the RADBase and 1 to 8 corresponds to the A/D modules
ac - The A coefficient in the polynomial
bc - The B coefficient in the polynomial
cc - The C coefficient in the polynomial
nl - end of line

EXAMPLE

A series of voltages have been applied using the A2DCAL command. To generate the third order polynomial for the A/D correction for module 1,

Type: A2DTCALC 1 6

The DSAENCL software will calculate the polynomial coefficients and return them. They will not be written to the ID chip until IDPWRITE and IDPCONFIRM commands have been executed.

NOTE

This command will only generate the correction coefficients. Coefficients are written to the A/D module ID chip using the IDPWRITE command.

COMMAND **AUXILIARY COMMAND**

SYNTAX **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 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 **BANK A MODE**
SYNTAX **BANKA <CR>**

ARGUMENTS None

DESCRIPTION Commands the DSAENCL to switch the DOUTS set in the configuration variable: BANKA. This command is intended for use in any situation where DOUT settings must be changed quickly.

RETURNS <*nl*>
nl - end of line

EXAMPLE To switch the DOUTS to the condition set in the Digital Variable BANKA:
Enter the command:

BANKA

The DSAENCL will switch the outputs based on the setting of the configuration variable: BANKA. This command assumes that the configuration variable is set correctly.

COMMAND	**BANK B MODE**
SYNTAX	**BANKB <CR>**
ARGUMENTS	None
DESCRIPTION	Commands the DSAENCL to switch the DOUTS set in the configuration variable: BANKB. This command is intended for use in any situation where DOUT settings must be changed quickly.
RETURNS	<*nl*> nl - end of line
EXAMPLE	To switch the DOUTS to the condition set in the Digital Variable BANKB: Enter the command: BANKB The DSAENCL will switch the outputs based on the setting of the configuration variable: BANKB. This command assumes that the configuration variable is set correctly

COMMAND **BANK USER MODE**
SYNTAX **BANKUSR <CR>**

ARGUMENTS None

DESCRIPTION Commands the DSAENCL to switch the DOUTS set in the configuration variable: BANKUSR. This command is intended for use in any situation where DOUT settings must be changed quickly.

RETURNS <*nl*>
nl - end of line

EXAMPLE To switch the DOUTS to the condition set in the Digital Variable BANKUSR:
Enter the command:

BANKUSR

The DSAENCL will switch the outputs based on the setting of the configuration variable: BANKUSR. This command assumes that the configuration variable is set correctly

COMMAND **CALIBRATE**

SYNTAX **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. The data returned from this command will be lost if it is not captured in a log file or by the Host computer. **NOTE:** The DSAENCL 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 installed in position 3 at 15 psi:

Apply the appropriate Control pressures for the module
Connect a pressure standard to the CAL input.
Enter the command:

CAL 15 3-1..3-16<CR>

The DSAENCL 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 DSAENCL 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 DSAENCL software will insert the stored data in the Module Profile Files.

EXAMPLE
If a user wanted to calibrate a module installed in position 3 at 15 psi:
Apply CTL1 and CTL2 Control pressures
Connect a pressure standard to the CAL input.
Enter the command:

CALINS 15 3-1..3-16<CR>

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

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

ARGUMENTS None

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

NOTES General rules for use of a CALZ command

1. Power Up — A CALZ should be executed after the DSAENCL and DSA3016 modules have stabilized.
2. Power Cycle — A CALZ should be executed if power is cycled, or if a RESTART or RELOAD command is executed.
3. RESTART — A CALZ should be executed after a RESTART command.
4. RELOAD — A CALZ should be executed after a RELOAD command.
5. Module Swap — A CALZ should be executed after a module position swap. If the module has reached stability before the swap, the CALZ may be executed immediately after a LIST SYS U command.
6. Module Change — A CALZ should be executed after a module change. The module should be allowed to stabilize before executing the CALZ command, but after a LIST SYS U command.

The Zero and Delta Arrays are cleared when the DSAENCL is powered down or when a RESTART or RELOAD 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, or changed without a power cycle.

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 to a 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 DSA3016 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 number, 1 to 8, 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, 1 to 8
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 scan group
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>

If 2 modules are configured in the scan group, The DSAENCL will return:

```
CHAN: 1 1 1 1 -15.000000 15.000000 32 1
CHAN: 1 2 1 2 -15.000000 15.000000 32 1
CHAN: 1 3 1 3 -15.000000 15.000000 32 1
CHAN: 1 4 1 4 -15.000000 15.000000 32 1
CHAN: 1 5 1 5 -15.000000 15.000000 32 1
CHAN: 1 6 1 6 -15.000000 15.000000 32 1
CHAN: 1 7 1 7 -15.000000 15.000000 32 1
CHAN: 1 8 1 8 -15.000000 15.000000 32 1
CHAN: 1 9 1 9 -15.000000 15.000000 32 1
CHAN: 1 10 1 10 -15.000000 15.000000 32 1
 :: ::  : : : : : :: ::  :: ::  : :
CHAN: 1 31 2 15 -15.000000 15.000000 32 1
CHAN: 1 32 2 16 -15.000000 15.000000 32 1
>
```

This shows that all 16 ports of two 16 channel modules have been assigned in sequence to Scan Group 1 for a total of 32 channels in the scan group. The modules are installed in positions 1 and 2. The minimum full scale pressure value for both modules is -15.0 engineering units. The maximum pressure value is 15.0 engineering units. The output data will be in engineering units

COMMAND **CLEAR**

SYNTAX **CLEAR**<CR>

ARGUMENTS None

DESCRIPTION Commands the DSAENCL 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 **CLOSE SCAN FILE**

SYNTAX **CLOSE**<CR>

ARGUMENTS None

DESCRIPTION Commands the DSAENCL to close the current open scan file created when CONOUT is set to 3 and a SCAN command is issued. The CLOSE command will close the file and set file counter so the next SCAN command will open a new scan file. The scan files are automatically named scanxxx.dat. The scan file counter is reset when the program is exited.

NOTE: If a CLOSE command is not issued to close an open scan file, the data collected from the next SCAN command will be appended to the open file. If a CLOSE command is not issued before the DSAENCL.exe program is shut down, all data from the open file will be lost.

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

EXAMPLE Data collection has commenced. CONOUT is set to 3 and a SCAN command has been issued. A scan file named: scan000.dat is opened. When the SCAN function is complete,

Type: CLOSE

This will close the file: scan000.dat.

When the next SCAN command is issued, a new file named: scandat001 is opened. When this scan is complete,

Type: CLOSE

This will close the file: scan001.dat

When the DSAENCL.exe program is exited, the counter used to increment the file name is reset. When the DSAENCL.exe program is re-started, the first file name will be scan000.dat

COMMAND SYNTAX **CONTROL PRESSURE RESET**
DOUTPU<CR>

ARGUMENTS *none*.

DESCRIPTION Resets the control pressures to the power up condition. This will reset control pressures if the BANKA, BANKB, and BANKUSR commands are used to modify control pressure settings from the power up condition. This also will reset DOUTS that have manually set.

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

EXAMPLE To reset the control pressures to the power up mode after several operations of the BANK(x) commands, Type:

DOUTPU<Enter>

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 DSAENCL 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 DSAENCL must be in the READY mode to accept the command.
This command **DOES NOT** modify the tables in the DSAENCL system computer memory.
The Sensor Profile File will be stored in the DSAENCL Folder. The file may be transferred 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 DSAENCL 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 DSAENCL :
Type: CREATESPF t355 3-8<CR>

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

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

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

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 16 channel modules, the following command would be issued:

DELETE 0 69 1-1..8-16<CR>

To delete the master points for channels 49 through 56 in a DSA3016 installed in position 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 DSA3016 installed in position 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 ENCL folder on the DSAENCL 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 SYNTAX **DELETE ERROR LOG FILE**
DELETELOGFILE <CR>

ARGUMENTS *None*

DESCRIPTION Deletes the Error Log file from the DSAENCL hard disk drive. The error log file in the ENCL folder is a log of major activity in the DSAENCL. All major activity will be appended to this file from the time it is created until the file is deleted. This file can aid a user in troubleshooting a problem. The file is created during the initial installation of the DSAENCL software. The DSAENCL software will re-create the file after it has been deleted.

NOTE: The DSAENCL has limited disk storage space. It is recommended that this file not be allowed to exceed 5 megabytes. When the file size reaches 5242880 Bytes, an error will be logged.

If IFUSER is set to 1, the error will be displayed immediately and logged in the Error log file.

If IFUSER is set to 0, the error will only be logged in the Error log file and in the error buffer.

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

EXAMPLE To delete the file, ERROR.TXT from the ENCL folder on the DSAENCL hard drive:

Type: DELETELOGFILE

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 installed in position one:
Type: DELTA 1<CR>
The DSAENCL 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: 1-15 30
DELTA: 1-16 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 DSAENCL and DSA3016 modules have been allowed to stabilize after power up. Also a CALZ should be executed if power is cycled, or if a RESTARTor RELOAD command is executed.

The Zero and Delta Arrays are cleared when the DSAENCL is powered down or when a RESTART or RELOAD 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 DSAENCL.

Type: DIN<CR>

The DSAENCL 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.

COMMAND **DISCONNECT FROM HOST**

SYNTAX **DISCONNECT**<CR>

ARGUMENTS *none*.

DESCRIPTION Disconnects the DSAENCL from the Host computer. Once this command is issued the Ethernet connection between the Host and the DSAENCL will be cleanly disconnected. The Host may re-connect to the DSAENCL by a normal TCP/IP connection method.

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

EXAMPLE To disconnect a DSAENCL from a Host ,Type:

DISCONNECT <Enter>

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 4 will be de-energized. DOUT 4 0 <CR>

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 DSAENCL 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 DSAENCL 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 they occur.

COMMAND **FILE**

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

ARGUMENTS *<filename>* - The file to be opened. If the file is not in the ENCL 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 DSAENCL. A file: scan.cmd may contain the commands:

```
SET FPS1 1
SCAN
```

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

Example 1

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

Example 2

The file: scan.cmd is located in the DSAENCLCMD folder. To execute the file,
Type: FILE C:\DSAENCLCMD\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 (M) calibrated points as guides. These "filled" points are marked as CALCULATED(C).
The FILL command **NEVER** overwrites MASTER(M) points. It does overwrite old points marked as CALCULATED(C) or INVALID(I).
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 9 of the module installed in position 3. The applied pressure is 10.9998 psi, the measured counts are 20254.

```
INSERT 48.75  3-9    10.9998   20254 M
```

The following command will insert a master point at 43.75°C for channel 16 of module serial number 209. The applied pressure is -2.4864 psi, the measured counts are -6651.

```
INSERT 43.75 209-16    -2.4864   -6651 M
```

COMMAND **LIST ALL CONVERSION COEFFICIENTS**

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 DSAENCL 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
M	- a Master Plane generated from a calibration
C	- a Calculated Plane generated during a FILL
I	- an Invalid Plane, the value cannot be accurately calculated
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 DSAENCL 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 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 SYNTAX **LIST A/D CORRECTION TABLE (NON-TEMPERATURE COMPENSATED)**
LIST A2DCOR <*module*> <CR>

ARGUMENTS <module> - The A/D location, 0 to 8. Where 0 is the temperature A/D and 1 to 8 are the module locations.

DESCRIPTION Lists the correction coefficients for the A/D in the specified location.

RETURNS A2DCOR <module> <index> <applied voltage> <counts>

module	-	0 to 8, Where 0 is the temperature A/D in the RADBASE and 1 to 8 are the module A/D's.
index	-	the calibration point, up to 16 points may be entered, numbered 0 to 15.
applied voltage	-	the voltage applied at the calibration point.
counts	-	the A/D counts measured at the calibration point

EXAMPLE To list the coefficients for the A/D converter in A/D module 1:

Type: LIST A2DCOR 1<CR>

The DSAENCL will return:

```
A2DCOR 1 0 0.00000 0
A2DCOR 1 1 0.00000 0
A2DCOR 1 2 0.00000 0
A2DCOR 1 3 0.00000 0
A2DCOR 1 4 0.00000 0
A2DCOR 1 5 0.00000 0
A2DCOR 1 6 0.00000 0
A2DCOR 1 7 0.00000 0
A2DCOR 1 8 0.00000 0
A2DCOR 1 9 0.00000 0
A2DCOR 1 10 0.00000 0
A2DCOR 1 11 0.00000 0
A2DCOR 1 12 0.00000 0
A2DCOR 1 13 0.00000 0
A2DCOR 1 14 0.00000 0
A2DCOR 1 15 0.00000 0
```

COMMAND **LIST A/D CORRECTION TABLE (TEMPERATURE COMPENSATED)**

SYNTAX **LIST A2DTCOR *<module>* *<temp>*** <CR>

ARGUMENTS
- <module> - The A/D location, 0 to 8. Where 0 is the temperature A/D and 1 to 8 are the module locations.
- <t index> - The temperature index, 0 to 7

DESCRIPTION Lists the correction coefficients for the A/D in the specified location.

RETURNS A2DTCOR <module> <t index> <temp><p index> <voltage> <counts><ideal counts>

- module - 0 to 8, Where 0 is the temperature A/D in the RADBASE and 1 to 8 are the module A/D's.
- t index - the calibration point, each module may have up to 8 points. Each of these points may have up to 16 correction points.
- temp - The actual temperature of the index point, read from the ID chip.
- p index - Index point, 0 through 16 where the applied voltage, measured counts and ideal counts are read.
- voltage - the voltage applied at the p index calibration point.
- counts - the A/D counts measured at the p index calibration point
- ideal counts - the ideal counts at the p index point at the applied voltage, based on the formula:

$$\frac{AppliedVolts \times 2.852}{10} \times 32767$$

EXAMPLE To list the coefficients for the A/D converter in A/D module 1:

Type: LIST A2DTCOR 1 1<CR>

The DSAENCL will return:

```
A2DTCOR 1 25 0.000000 0 0.000000 0 0
A2DTCOR 1 25 0.000000 1 0.000000 0 0
A2DTCOR 1 25 0.000000 2 0.000000 0 0
A2DTCOR 1 25 0.000000 3 0.000000 0 0
A2DTCOR 1 25 0.000000 4 0.000000 0 0
A2DTCOR 1 25 0.000000 5 0.000000 0 0
A2DTCOR 1 25 0.000000 6 0.000000 0 0
A2DTCOR 1 25 0.000000 7 0.000000 0 0
A2DTCOR 1 25 0.000000 8 0.000000 0 0
A2DTCOR 1 25 0.000000 9 0.000000 0 0
A2DTCOR 1 25 0.000000 10 0.000000 0 0
A2DTCOR 1 25 0.000000 11 0.000000 0 0
A2DTCOR 1 25 0.000000 12 0.000000 0 0
A2DTCOR 1 25 0.000000 13 0.000000 0 0
A2DTCOR 1 25 0.000000 14 0.000000 0 0
A2DTCOR 1 25 0.000000 15 0.000000 0 0
```

COMMAND **LIST CALIBRATION VARIABLES**
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 DSAENCL 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 5
SET MPBS 0
SET CALPER 500
SET CALAVG 32
SET MAXEU 9999.00
SET MINEU -9999.00
SET STARTCALZ 0
SET FILLONE 0
SET A2DCOR 1
>
```

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

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

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

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

COMMAND **LIST FILES**
SYNTAX **DIRFILE** <CR>

ARGUMENTS None

DESCRIPTION Lists the data files stored In the ENCL folder on the DSAENCL 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>

filename - The data file name
nl - end of line.

EXAMPLE To list all data files stored In the ENCL folder on the DSAENCL hard disk drive:

Type: DIRFILE<CR>

The DSAENCL will return a file list

FILE: SCAN000.DAT
FILE: SCAN001.DAT
FILE: SCAN002.DAT
FILE: SCAN003.DAT
FILE: End of Files

COMMAND **LIST GAIN VARIABLES**

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. The value of this term will vary based on the module type. Refer to the section on Temperature Gain Values in the Configuration Variable Section of this manual for more information on the values for the “M” terms.

RETURNS SET TEMPMn <*value*><*nl*>

n	-	The module position or the serial number
value	-	The temperature gain value for module n
nl	-	end of line.

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

Type: LIST g 253<CR>

The DSAENCL will return:

SET TEMPM253 0.0228

The gain settings may also be verified by module location. To verify the temperature gain setting of the module installed in position 6,

Type: LIST g 6<CR>

The DSAENCL will return:

SET TEMPM6 0.0228

The temperature gain settings may be verified for all modules installed in the DSAENCL.

Type: LIST g<CR>

The DSAENCL may return:

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

COMMAND **LIST ID CHIP IDENTIFICATION**

SYNTAX **LIST ID [<loc> <site> <device>]** <CR>

ARGUMENTS

<loc> - the ID chip location, 0 to 16

<site> - the location type, Where: A = A/D module
M = ZOC module
D = Digital Module (RDS)

<device> - must be E for EPROM

DESCRIPTION Lists the ID chip identification information. DSA3016 modules may only be site 1 through 8. A/D modules may be sites 0 through 8 where the Temperature A/D module can only be site 0. Digital modules are site 9.

RETURNS <index> <loc> <site> <device> <ID> <error>

index - Line number, used for reference only

loc - the ID chip location, 0 to 16

site - the location type, Where: A = A/D module
M = ZOC module
D = Digital Module (RDS)

device - E = EPROM
T = Temp
S = Switch

ID - the chip ID number - This number is unique for each ID chip.

error - any error that may have occurred

EXAMPLE 1 To view all of the ID information of a DSAENCL with 2 A/D modules, an RDS, and a DSA3016 installed in position 1:

Type: LIST ID<CR>

The DSAENCL may return:

0 1 A T 28644c340000008f None
1 0 A T 286e4c3400000040 None
2 0 A T 28cddb460000000c None
3 1 A E 14ca251e010000f3 None
4 0 A E 142e8e1e01000045 None
5 1 M E 147524ef00000048 None
6 2 A T 28b1de460000003b None
7 2 A E 14e9251e0100001c None
8 9 D E 14ee241e01000054 None

EXAMPLE 2 To view the ID information of the DSA3016 module in location 1

Type: LIST ID 1 M E

The DSAENCL may return:

5 1 M E 147524ef00000048 None

EXAMPLE 3 To view the ID information of the A/D module in location 2

Type: LIST ID 2 A E

The DSAENCL may return:

7 2 A E 14e9251e0100001c None

EXAMPLE 4 To View the ID information of a typical DSAENCL

Type: LIST ID

The Enclosure may return:

```
0 1 A T 28644c340000008f None
1 0 A T 286e4c3400000040 None
2 0 A T 28cddb460000000c None
3 1 A E 14ca251e010000f3 None
4 0 A E 142e8e1e01000045 None
5 2 A T 28b1de460000003b None
6 2 A E 14e9251e0100001c None
7 9 D E 14ee241e01000054 None
```

COMMAND **LIST ID CHIP SETTINGS**

SYNTAX **LIST IDP [<loc> <site> <device> <mem>]** <CR>

ARGUMENTS

<loc>	-	the ID chip location, 0 to 16	
<site>	-	the location type, Where:	A = A/D module
			M = ZOC module
			D = Digital Module (RDS)
<device>	-	the device type, always E for EPROM	
<mem>	-	the memory type, Where	E = EPROM
			P = PROM

DESCRIPTION Lists the ID chip settings. ZOC modules may only be site 1 through 8. A/D modules may be sites 0 through 8 where the Temperature A/D module can only be site 0. If the location, site, and device are not specified, the settings for all chips will be returned.

RETURNS SET IDP <loc> <site> <device> <mem> <name> <value>

loc	-	the ID chip location, 0 to 16	
site	-	the location type, Where:	A = A/D module
			M = ZOC module
			D = Digital Module (RDS)
device	-	the device type, always E for EPROM	
mem	-	the memory type, Where:	P = PROM
			E = EPROM
name	-	the parameter name	
value	-	the parameter value	

EXAMPLE 1 To view all of the ID chip information of the chip in A/D module in position 1:

Type: LIST IDP 1 A<CR>

The DSAENCL may return:

```
SET IDP 1 A E P DFC 1
SET IDP 1 A E P DMC 0
SET IDP 1 A E P SN 111
SET IDP 1 A E P REV A
SET IDP 1 A E P MDATE 7/1/2002
SET IDP 1 A E E ADCA 0.000000
SET IDP 1 A E E ADCB 0.996481
SET IDP 1 A E E ADCC 2.070793
SET IDP 1 A E E ECC 0.001499
SET IDP 1 A E E GAIN 0
SET IDP 1 A E E ACDATE 7/1/2002
SET IDP 1 A E E ADCD 6.50000
```

EXAMPLE 2 To view all of the ID chip information of the chip in the DSA3016 module in position 1:

Type: LIST IDP 1 M<CR>

The DSAENCL may return:

```
SET IDP 1 M E P DFC 2
SET IDP 1 M E P DMC 4
SET IDP 1 M E P SN 301
SET IDP 1 M E P REV A
SET IDP 1 M E P MDATE 1/27/2000
SET IDP 1 M E E RTYPE 0
SET IDP 1 M E E RVALUE 1
SET IDP 1 M E E RCORA 0.000000
SET IDP 1 M E E RCORB 0.000000
SET IDP 1 M E E RCDATE 1/27/2000
SET IDP 1 M E E PCDATE 8/16/2002
SET IDP 1 M E E NPR1 15.000000
SET IDP 1 M E E NPR2 15.000000
SET IDP 1 M E E VALVE 1
SET IDP 1 M E E XDUCER 0
```

EXAMPLE 2 To view all of the ID chip information of the chip in the RADBASE A/D module(position 0):

Type: LIST IDP 0 A<CR>

The DSAENCL may return:

```
SET IDP 0 A E P DFC 0
SET IDP 0 A E P DMC 0
SET IDP 0 A E P SN 25
SET IDP 0 A E P REV A
SET IDP 0 A E P MDATE 10/24/2003
SET IDP 0 A E E ADCA 0.000000
SET IDP 0 A E E ADCB 1.002526
SET IDP 0 A E E ADCC 14.007034
SET IDP 0 A E E RV 5.002700
SET IDP 0 A E E ACDATE 10/24/2003
SET IDP 0 A E E SN 126
SET IDP 0 A E E APPTYPE 0
>
```

COMMAND **LIST IDENTIFICATION VARIABLES**
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 DSAENCL may return:

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

COMMAND **LIST MASTER CONVERSION COEFFICIENTS**

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 DSAENCL 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
M	- indicates this is a Master Plane
nl	- end of line

EXAMPLE To view the Master Points between 10°C and 40°C for channel 1 of the module installed in position 1:

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

The DSAENCL may 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 VARIABLES**

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 1 To view the configuration of the DSA3016 module installed in position 1,
Type: LIST mi 1<CR>
The DSAENCL may 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 16
SET NPR1 5
SET LPRESS1 1..16 -6.100000
SET HPRESS1 1..16 6.100000
SET NEGPTS1 1..16 4
SET MODTEMP1 0 1.000000
>

EXAMPLE 1 To view the configuration of the module installed in position 7,
Type: LIST mi 1<CR>
The DSAENCL may return:
REM7 1 Comment line 1
REM7 2 Comment line 2
REM7 3 Comment line 3
REM7 4 Comment line 4
SET TYPE7 0
SET ENABLE7 1
SET NUMPORTS7 16
SET NPR7 5
SET LPRESS7 1..16 -5.5500000
SET HPRESS7 1..16 5.5500000
SET NEGPTS7 1..16 4
SET MODTEMP7 0 1.000000
>

COMMAND **LIST OFFSET VARIABLES**
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. The value of this term will vary based on the module type. Refer to the section on Temperature Gain Values in the Configuration Variable Section of this manual for more information on the values for the “B” terms.

RETURNS SET TEMPBn <*value*> <*nl*>

n - the module position or 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 DSAENCL will return:

SET TEMPB253 -192.9757

The offset settings may also be verified by module location. To verify the temperature offset setting of the module installed in position 6,

Type: LIST o 6<CR>

The DSAENCL will return:

SET TEMPB6 -192.9757

The temperature offset settings may be verified for all modules installed in the DSAENCL.

Type: LIST o<CR>

The DSAENCL may return:

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

COMMAND **LIST PROFILE LIST SETTINGS**
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. When the DSAENCL is first booted up, or when a RESTART, or REBOOT command is entered, The software reads the values set in this list and maps the coefficients in the respective MPF files into memory. If a MPF file is not found, default values for the module information data are used. After the initialization is complete, the software searches for ID chip information. If the ID chip information matches the Profile List, no changes are made. If the ID chip information is different from the Profile list, the Profile List is updated. ID chip information will also override Module Information.

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

RETURNS SET DSAENCLSN <*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 DSAENCL may return:

SET DSAENCLSN 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 VARIABLES**
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 DSAENCL

Type: LIST s<CR>

The DSAENCL will return:

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

COMMAND **LIST SCAN GROUP VARIABLES**

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 in the SG Group

EXAMPLE To verify or modify the configuration settings of Scan Group 1,
Type: LIST SG 1<CR>
A typical DSAENCL with a 16 channel module enabled will return:
SET AVG1 100
SET FPS1 0
SET SGENABLE1 1
SET CHAN1 1-1..1-16
>

NOTE When the SET CHANn parameter is modified, it must be set to 0 before the new channel configuration is entered. If not, the new configuration will be appended to the existing configuration.
For example: if three 16 channel modules are assigned to Scan Group 1, the SET CHAN variable will be:1-1..3-16. If the module assignment is changed to 2 16 channel modules and the channel assignment is not set to 0 before the new assignment: 1-1..2-16 is added, the channel assignment will appear as follows:
SET CHAN1 1-1..3-16
SET CHAN1 1-1..2.-16
This also applies in cases where a user has software to configure the scan groups prior to a test. If a scan group has channels defined and the channels are defined again without setting the channels to 0 first, the channel assignment will appear twice. If Scan Group 1 has a 32 channel module assigned and it is re-assigned by an initialization program, the channel assignments will appear as follows:
SET CHAN1 1-1..1-16
SET CHAN1 1-1..1-16

COMMAND **LIST SYSTEM COMPONENTS**
SYNTAX **LIST SYS [<U> or <S>]** <CR>

ARGUMENTS
- blank - the existing system information, as determined at power up, will be displayed. No data will be updated.
- <U> - the system information will be updated and displayed.
- <S> - system information will be displayed using simulated ID chips.

DESCRIPTION Lists the system information. This is the same information displayed at power up. This command must be run when system changes are made after power up.

RETURNS
```
DSAENCL Serial Number N
LOC  A2DSN  -MODEL-   -SN-  CHAN VALVE  -NPR1-  -NPR2- XDUCER -CAL-DATE-
  1
  2
  3
  4
  5
  6
  7
  8
LOC    -MODEL-  -SN-   CHAN   DESCRIPTION
  9
  10
  11
  12
  13
  14
  15
  16
```

NOTES Positions 1 through 8 are reserved for A/D modules. Positions 9 is reserved for RDS modules. All positions do not have to be filled. The positions are identified by the setting of the dip switches on the A/D and RDS modules. A standard DSAENCL will only have 2 A/D modules installed. A/D 1 will scan modules installed in positions 1 through 4. A/D 2 will scan module installed in positions 5 through 8. A special order version of the DSAENCL is available with 8 A/D modules. The RDS module is always identified as position 9.

A List Sys U command will not update the module profile file, nor the module information read from the mpf files during a boot up or restart. If a module is swapped out, or if a module position is changed after the program has started, the program **MUST** be restarted for the module information to be updated.

EXAMPLE 1 To view the current System Information as determined at power up:

Type: LIST SYS<CR>

The DSAENCL will return:

DSAENCL Serial Number 103

LOC	A2DSN	-MODEL-	-SN-	CHAN	VALVE	-NPR1-	-NPR2-	XDUCER	-CAL-DATE-
1	111	DSA3016	300	16	IP	15.00	15.00	DIF	3/16/2005
2	110	DSA3016	311	16	IP	30.00	50.00	DIF	3/18/2005
3		DSA3016	325	16	IP	100.00	100.00	DIF	3/18/2005
4		DSA3016	326	16	IP	100.00	100.00	DIF	3/18/2005
5		DSA3016	341	16	IP	100.00	100.00	DIF	3/19/2005
6		DSA3016	344	16	IP	300.00	300.00	DIF	3/19/2005
7		DSA3016	345	16	IP	300.00	300.00	DIF	3/19/2005
8		DSA3016	361	16	IP	750.00	750.00	DIF	3/20/2005

LOC	-MODEL-	-SN-	CHAN	DESCRIPTION
9	RDS	103	8	REMOTE DIGITAL SWITCH [DOUT 1-8]
10				
11				
12				
13				
14				
15				
16				

The RADBASE 3200 is Serial number 103. It has two A/D 3200 modules connected.

A/D 3200 Sn 111 is installed in Location 1, DSA3016 modules 300, 311, 325, and 326 will be scanned by this A/D module.
A/D 3200 Sn 110 is installed in location 2. DSA3016 modules 341, 344, 345, and 361 will be scanned by this A/D module.

RDS3200 Sn 103 is installed in location 9.

DSA3016 SN300 has 16 channels The Full Scale pressure range of the module is 15 psi. The module is set up as a normal Differential Pressure Module. It was last calibrated March 16, 2005.
DSA3016 SN311 has 16 channels. It is a Dual Range module with full scale ranges of 30 and 50 psi. The module is set up as a normal Differential Pressure Module. It was last calibrated March 18, 2005.
DSA3016 SN325 has 16 channels The Full Scale pressure range of the module is 100 psi. The module is set up as a normal Differential Pressure Module. It was last calibrated March 18, 2005.
DSA3016 SN326 has 16 channels The Full Scale pressure range of the module is 100 psi. The module is set up as a normal Differential Pressure Module. It was last calibrated March 18, 2005.
DSA3016 SN341 has 16 channels The Full Scale pressure range of the module is 100 psi. The module is set up as a normal Differential Pressure Module. It was last calibrated March 19, 2005.
DSA3016 SN344 has 16 channels The Full Scale pressure range of the module is 300 psi. The module is set up as a normal Differential Pressure Module. It was last calibrated March 19, 2005.
DSA3016 SN345 has 16 channels The Full Scale pressure range of the module is 300 psi. The module is set up as a normal Differential Pressure Module. It was last calibrated March 19, 2005.

DSA3016 SN361has 16 channels The Full Scale pressure range of the module is 750 psi. The module is set up as a normal Differential Pressure Module. It was last calibrated March 20, 2005.

EXAMPLE 2 If the enclosure has the modules installed in random positions, the data returned could appear as follows:

DSAENCL Serial Number 103

LOC	A2DSN	-MODEL-	-SN-	CHAN	VALVE	-NPR1-	-NPR2-	XDUCER	-CAL-DATE-
1	111	DSA3016	300	16	IP	15.00	15.00	DIF	3/16/2005
2	110	DSA3016	311	16	IP	30.00	50.00	DIF	3/18/2005
3									
4									
5									
6		DSA3016	344	16	IP	300.00	300.00	DIF	3/19/2005
7		DSA3016	345	16	IP	300.00	300.00	DIF	3/19/2005
8		DSA3016	361	16	IP	750.00	750.00	DIF	3/20/2005

LOC	-MODEL-	-SN-	CHAN	DESCRIPTION
9	RDS	103	8	REMOTE DIGITAL SWITCH [DOUT 9-16
10				
11				
12				
13				
14				
15				
16				

This example shows that modules are installed in positions 1, 2, 6. 7, and 8. A/D1 will scan the modules in positions 1 and 2. A/D 2 will scan the modules in positions 6, 7, and 8.

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 DSAENCL 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 DSAENCL, this will be the ENCL Folder. For more information on file transfers, please refer to the file transfer procedures in this manual.
The command may be entered from the system computer or a host computer. The DSAENCL must be in the READY mode to accept the command.
This command **DOES NOT** modify the tables in the DSAENCL system computer memory. The new coefficients will not be effective until the program is restarted.

RETURNS

<*nl*>
nl - End of line.

EXAMPLE

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 DSAENCL, 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>

NOTE

The DSAENCL 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 DSAENCL to initiate a purge sequence. This command may be initiated by entering the command from the local system computer or a host computer. The DSAENCL 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 DSAENCL returns to the READY mode.

When a purge is initiated by a digital input, the DSAENCL may be in the READY mode or in the SCAN mode. The purge sequence is the same as above unless the DSAENCL is in the SCAN mode. If the DSAENCL 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 DSAENCL software to quit the execution of the DSAENCL.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 ETHERNET interface.
EXAMPLE	To quit the program, Type: QUIT<CR>

COMMAND	**RELOAD**
SYNTAX	**RELOAD** <CR>
ARGUMENTS	None
DESCRIPTION	Commands the DSAENCL software to reload the DSAENCL 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 DSAENCL software to restart the DSAENCL.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 DSAENCL to restore all configuration variables to their **default** values.

NOTE: This will erase all conversion coefficient tables. And set all mpf files to default values. All calibration coefficients in the mpf files will be erased. The **RELOAD** command should be used if it is necessary to reload a configuration.

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

EXAMPLE To Restore the DSAENCL to the default configuration, with no conversion coefficient tables,
Type: RESTORE<CR>

WARNING

This command should not be used unless a DSAENCL configuration is completely unknown and unusable. This command will reset all configuration variables to their default values, which includes setting all MPF files to zero. This could result in the loss of all coefficients for any modules listed in the Profile List.

For best results when a configuration must be reset, it is recommended that the **RESTART** or **RELOAD** commands be used rather than the **RESTORE** command.

COMMAND **SAVE**

SYNTAX **SAVE [*modules*]**<CR>

ARGUMENTS [*Modules*] Syntax is:

module	for one module
module,module,module	for several modules
module..module	for a range of modules

Module is the physical location of the module in the DSAENCL3200.

DESCRIPTION Commands the DSAENCL to save the configuration variables, and correction tables to disk. Correction tables are saved as **.MPF** files for all modules specified in the command.
If a module, several modules, or a range of modules is not specified, the correction tables for all enabled modules will be saved.
All configuration variables will be saved by any variation of this command.

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

EXAMPLES To save the current configuration variable settings and conversion coefficients for all enabled modules

Type: SAVE<CR>

To save the current configuration variable settings and conversion coefficients for module 4 only.

Type: SAVE 4<CR>

To save the current configuration variable settings and conversion coefficients for modules 1, 3, and 7 only.

Type: SAVE 1,3,7<CR>

To save the current configuration variable settings and conversion coefficients for modules 3, 4, 5, 6 and 7 only.

Type: SAVE 3..7<CR>

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

ARGUMENTS None

DESCRIPTION Commands the DSAENCL to scan the pressure sensors and output scan data. The SCAN function operation depends on the setting of ADTRIG and SCANTRIG.

ADTRIG = 0
SCANTRIG = 0

The SCAN function will be initiated immediately when the SCAN command is received. Data will be acquired at the rate determined by the settings of PERIOD, AVGn and the Number of Channels. In a DSAENCL Number of Channels is always 64. Data will be output in Averaged Frames as the Frames are ready until FPS is satisfied or a STOP Command is received.

ADTRIG = 0
SCANTRIG = 1

In this case, a hardware trigger will initiate the SCAN function. The Software trigger will not initiate the SCAN function. Data will be acquired at the rate determined by the settings of PERIOD, AVGn and the Number of Channels. In a DSAENCL, Number of Channels is always 64. Scanning will continue until FPS is satisfied or a STOP command is received. Multiple trigger pulses received during a scan will be ignored.

ADTRIG = 1
SCANTRIG = 0

In this case, the SCAN command only enables the scan function. The DSAENCL will enter the WTRIG mode and wait for a hardware or software trigger. When a trigger is received, the DSAENCL will acquire and output one averaged frame of data and re-enter the WTRIG mode. Data will be acquired at the rate determined by the settings of PERIOD, AVGn and the Number of Channels. In a DSAENCL Number of Channels is always 64. Multiple trigger pulses received during a scan will be ignored. When a Frame has been output, the next trigger will repeat the process. This will continue until the Frames per Scan Variable has been satisfied or a STOP command is received.

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 is set to 0, the scan packets are returned in ASCII Format 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.

EXAMPLE A scan group is set up to display 16 channels of module 1 with fps set to 1

Type: SCAN<CR>

The DSAENCL 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

1. 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.
2. All frames are separate parsable frames.
3. The DSAENCL.exe console window will display up to 128 channels from a Scan Group.
4. If ADTRIG is set to 1, SCANTRIG must be set to 0. If SCANTRIG is set to 1, ADTRIG must be set to 0.

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 DSAENCL to set one of the Configuration Variables.

When Configuration Variables are listed with the LIST command, the variables are output 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 16, 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 DSAENCL.exe console program and then exits Windows. The AC power may be turned off after approximately 45 seconds. The use of this command will shorten the boot up time of the DSAENCL by about one-half. This command can be issued from DSMLink or TelNet while a Host computer is connected to the DSAENCL.
RETURNS	nothing
NOTES	The program: shutdown.exe, must be in the ENCL folder for this command to function correctly. This command is designed for use when the DSAENCL does not have a local keyboard, monitor and mouse connected. If the DSAENCL has a keyboard, monitor and mouse connected, normal Windows shutdown procedures should be followed 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 DSAENCL 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 DSAENCL.

COMMAND **SLOTS**

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

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

DESCRIPTION Queries the DSAENCL 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 DSAENCL 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 DSAENCL 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 DSAENCL 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 DSAENCL is not READY.

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

STATUS: READY

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

STATUS: CALZ

COMMAND	**STOP**
SYNTAX	**STOP** <CR>
ARGUMENTS	None
DESCRIPTION	Commands the DSAENCL 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 DSAENCL

Type: TEMP EU<CR>

The DSAENCL will return:

TEMP: 1 28.75
TEMP: 2 29.25
TEMP: 3 30.00
TEMP: 4 29.50
TEMP: 5 28.25
TEMP: 6 29.50
TEMP: 7 28.50
TEMP: 8 27.50

To view the A/D counts of the temperature inputs

Type: TEMP RAW<CR>

The DSAENCL will return:

TEMP: 1 9731
TEMP: 2 9748
TEMP: 3 9783
TEMP: 4 9767
TEMP: 5 9708
TEMP: 6 9759
TEMP: 7 9723
TEMP: 8 9693

NOTE A counts reading of 32767 indicates an open input. A counts reading of 0 with an engineering unit reading of 0 indicates that the module is not enabled.

COMMAND SYNTAX **TEMPERATURE GRADIENT COMPENSATION**
TGRAD<CR>

ARGUMENTS none

DESCRIPTION This command reads the temperature of the A/D modules and stores this information in a table. This table is then used to estimate the A/D module temperatures during a scan based on the temperature of the RADBASE.

RETURNS <Location> <RADBase Temp> <A/D Temp> <Delta Temp> <*nl*>

Location	- A/D Location, 1 through 8
RADBase Temp	- Measured Temperature of the RADBase in degrees C
A/D Temp	- Measured Temperature of the RAD A/D Module in this location.
Delta Temp	- The calculated Temperature differential for the A/D Module in this location.
nl	- End of line.

NOTE The DSAENCL software can only read the temperature of the RADBASE when in the scan mode. The temperature of the A/D modules connected to the RADBASE can be estimated based on the gradient calculation derived from the table generated by this command.

EXAMPLE A DSAENC has two A/D modules installed To calculate and store the temperature differential for these modules, Type:

TGRAD<enter>

The DSAENCL software will calculate the differential temperatures and return:

Loc 1 Base 33.187500 Temp 28.562500 Delta -4.625000
Loc 2 Base 33.187500 Temp 27.750000 Delta -5.437500
Loc 3 Base 33.187500 Temp 0.000000 Delta -33.187500
Loc 4 Base 33.187500 Temp 0.000000 Delta -33.187500
Loc 5 Base 33.187500 Temp 0.000000 Delta -33.187500
Loc 6 Base 33.187500 Temp 0.000000 Delta -33.187500
Loc 7 Base 33.187500 Temp 0.000000 Delta -33.187500
Loc 8 Base 33.187500 Temp 0.000000 Delta -33.187500

COMMAND	**VERSION**
SYNTAX	**VER** <CR>
ARGUMENTS	none
DESCRIPTION	Requests the version number of the DSAENCL.EXE file.
RETURNS	VERSION: <*version string*> <*nl*>
EXAMPLE	To determine the version of DSAENCL.exe software in use: Type: VER<CR> The DSAENCL will return: VERSION: 3.12

COMMAND **WRITE ID CHIP VARIABLES**

SYNTAX **IDPWRITE <*location*> <*site*> <*device*> <*memory*>** <CR>

ARGUMENTS

location - The location of the device. Valid values are 0 through 8, Where 0 can only be the Temperature A/D.

site - A for an A/D, or M for a Module

device - The memory device in the A/D or module. This must always be E for EPROM. The software will select the Device family based on the Name to be modified.

memory- E for EPROM, or P for PROM. Data stored in PROM may only be set once. If PROM data are set at the Scanivalve Factory, they may not be modified in the field. Data stored in EPROM may be modified by a user.

DESCRIPTION

The ID Chip write process requires two commands to complete. The IDPWRITE command stages the ID chip identification variables and prepares the software to write to the ID Chip PROM or EPROM. This command does not actually perform the write. The write process does not occur until a IDPCONFIRM command is issued. The IDPCONFIRM command is considered to be part of the IDPWRITE command

RETURNS

SET IDP <*location*> <*site*> <*device*> <*memory*> <*name*> <*value*>

location - The location of the device. Valid values are 0 through 8, Where 0 can only be the RADBASE Temperature A/D.

site - A for an A/D, or M for a Module

device - The memory device in the A/D or module. This must always be E for EPROM. The software will select the Device family based on the Name to be modified.

memory - E for EPROM, or P for PROM. Data stored in PROM may only be set once. If PROM data are set at the Scanivalve Factory, they may not be modified in the field. Data stored in EPROM may be modified by a user.

name - The name of the variable

value - The value of the variable

EXAMPLE

The IDP variables for the EPROM in a ZOC module have been programmed using the SET IDP Variable commands. When all of the variables have been set, the DSAENCL software must be set up to write to the EPROM. The following command is entered:

```
IDPWRITE 1 M E E
```

The DSAENCL returns the following:

```
SET IDP 1 M E E RTYPE 0
SET IDP 1 M E E RVALUE 1
SET IDP 1 M E E RCORA 0.000000
SET IDP 1 M E E RCORB 0.000000
SET IDP 1 M E E RCDATE 1/26/2004
SET IDP 1 M E E PCDATE 1/1/2000
SET IDP 1 M E E NPR1 1.000000
SET IDP 1 M E E NPR2 1.000000
SET IDP 1 M E E VALVE 2
SET IDP 1 M E E XDUCER 0
Type IDPCONFIRM to confirm IDP write or STOP to escape
```

If the data is correct, issue the IDPCONFIRM command to write the variables to the EEPROM. If the data are not correct, type STOP and repeat the process to correct the errors.

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 DSAENCL 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.

DSAENCL CONFIGURATION VARIABLES

GENERAL SCAN VARIABLES (Group S)

VARIABLE	**ADTRIG <*code*>**
VALID VALUES	0, 1, or 2
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 PERIOD. 1 - Frame timing is controlled by an external hardware or a software trigger. When ADTRIG is enabled, a frame will be triggered whenever a hardware or software trigger input is received. The hardware trigger is a hard wired input to the power input connector. The Software trigger is a TAB, or Ctrl I, character. When a SCAN command is received, the DSAENCL enters a WAIT state until a trigger pulse is received. At that time, the DSAENCL 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. Multiple trigger pulses received during a scan will be ignored. 2 - Sets the Tag Bit Function. This function is only available if SCANTRIG is set to 0. This function allows a user to apply a voltage to the Trigger Input and have that digital state recorded in the data stream. The status of the Tag Bit is placed in bit 7 of the enabled Scan Group(s) in the Binary Packet. Scan Groups are identified in byte 1 of the Scan Packets. The status of the Tag Bit is also shown on the formatted screen of the Console.
NOTE	If ADTRIG is set to 1, SCANTRIG must be set to 0. If ADTRIG is set to 2, SCANTRIG must be set to 0.

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 in a UDP format.

VARIABLE	**FM <*code*>**
VALID VALUES	1 to 20
DEFAULT VALUE	1
DATA TYPE	integer
DESCRIPTION	The DSAENCL Frame Multiplier. This variable determines the number of averaged frames sampled before they are sent to the host. The Frame Multiplier concept is explained in the DSAENCL Frame Multiplier section of this manual.

VARIABLE	**IFC *<char 1> <char 2>***
VALID VALUES	char 1 - Any valid ASCII character char 2 - Any valid ASCII character
DEFAULT VALUE	char 1 - 62 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	**PERIOD *<period>***
VALID VALUES	25 to 65535
DEFAULT VALUE	500
DATA TYPE	integer
DESCRIPTION	This master period variable sets the sample rate, in microseconds, of the pressure A/D converters and the one temperature A/D converter. Period is the dwell time between channels. All Scan Groups use the this variable. Period is only one of the terms required to determine data rate. Data rate is determined by the equation:

$$DataRate = \frac{1}{PeriodXNumberofChannelsXAVG)}$$

Data Rate is expressed in Hertz per channel
Period is in microseconds
Channels is always 64 in a standard DSAENCL
AVG is the average term for that scan group

NOTE: Channels will always equal 64 in a DSAENCL with 2 A/D modules. Channels will always equal 16 in a DSAENCL with 8 A/D modules.

VARIABLE	**QPKTS *<enable>***
VALID VALUES	0, 1, or 2
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Sets the action the DSAENCL will take when the output data buffer is full. 0 - Frames are discarded and the DSAENCL will continue scanning. 1 - No frames are lost, the DSAENCL stops scanning, and an error is logged. 2 - The output data buffer is not used.

VARIABLE	**SCANTRIG <*code*>**
VALID VALUES	0, or 1
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Controls scan initiation. 0 - Scanning is initiated by the SCAN command. 1 - Scanning is initiated by an external hardware trigger. When SCANTRIG is enabled, a scan will be initiated whenever a hardware trigger input is received. The hardware trigger is a hard wired input to the power cable. The scan function will continue until the Frames per Scan variable is satisfied or a STOP command is received. Multiple trigger pulses received during a scan will be ignored.
NOTES	If SCANTRIG is set to 1, ADTRIG must be set to 0. A Software Trigger will not initiate the SCAN function.

VARIABLE	**TEMPPOLL <*code*>**
VALID VALUES	0 or 1
DEFAULT VALUE	1
DATA TYPE	integer
DESCRIPTION	This variable controls the Temperature Polling function. When this variable is enabled, the temperature of the A/D modules are read at a 5 second period.. 0 - Temperature polling is disabled. 1 - Temperature polling is enabled.

VARIABLE	**TIMESTAMP <*code*>**
VALID VALUES	0 or 1
DEFAULT VALUE	1
DATA TYPE	integer
DESCRIPTION	This variable sets the time stamp units. The Time Stamp is the elapsed time from the start of the scan function. The first time stamp will always be zero. 0 - Time is in microseconds 1 - Time is in milliseconds

CONVERSION VARIABLES (Group C)

VARIABLE	**A2DCOR <*code*>**
VALID VALUES	0 or 1
DEFAULT VALUE	1
DATA TYPE	Integer
DESCRIPTION	Sets the A/D Correction ON or OFF. 0 - Sets A/D Correction OFF 1 - Sets A/D Correction ON

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 256
DEFAULT VALUE	64
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	50 to 5000
DEFAULT VALUE	500
DATA TYPE	integer
DESCRIPTION	Sets the period, in microseconds, of the DSAENCL 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 DSAENCL 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 1
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, and EU is set to 1, the DSAENCL will output the values set in **MAXEU** and **MINEU** to indicate that a conversion error may exist. The DSAENCL 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.

NOTE 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. If a user is not able to maintain the temperature of his modules to ±0.25°C, large errors may result.

If FILLONE is set to 1 when a full set of coefficients are available, and a **FILL** command is issued, the coefficients will all be set to the value of the first Master Plane in the coefficient file.

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, and EU is set to 1, the DSAENCL will output 9999 or whatever has been entered as the MAXEU value to indicate that a conversion error may exist. The DSAENCL 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, and EU is set to 1, the DSAENCL will output -9999 or whatever has been entered as the MINEU value to indicate that a conversion error may exist. The DSAENCL 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 DSAENCL to execute a CALZ at startup. The DSAENCL does not save zeros at power down. If the DSAENCL is set to start scanning immediately or if it is difficult to input commands to the DSAENCL once it is powered up, then this variable should be set to 1. The DSAENCL will then execute a CALZ at the end of the initialization sequence.

VARIABLE **UNITSCAN <*units*>**
VALID VALUES see list below
DEFAULT VALUE PSI
DATA TYPE string
DESCRIPTION This sets the output engineering units for the DSAENCL. 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 DSAENCL will default to PSI.

VARIABLE **ZC <*code*>**
VALID VALUES 0, 1
DEFAULT VALUE 1
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 OUTPUT CONFIGURATION VARIABLES (Group D)

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	60
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	4
DATA TYPE	integer
DESCRIPTION	Enables the digital outputs to indicate that the DSAENCL 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	3
DATA TYPE	integer
DESCRIPTION	Enables the digital outputs to indicate that the DSAENCL 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.

VARIABLE	**BANKA <*value*>**
VALID VALUES	0 to FF Hexadecimal
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Enables the digital outputs to be set to mode other than defined in one of the standard DOUT variables. 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	**BANKB <*value*>**
VALID VALUES	0 to FF Hexadecimal
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Enables the digital outputs to be set to mode other than defined in one of the standard DOUT variables 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	**BANKUSR <*value*>**
VALID VALUES	0 to FF Hexadecimal
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Enables the digital outputs to be set to mode other than defined in one of the standard DOUT variables. 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 - 256
DEFAULT VALUE	16
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. DSAENCL scan groups always scan 64 channels in a 2 A/D version and 16 channels in a 8 A/D version. 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 Frames per Scan. Sets the number of averaged frames for Scan Group n to be output after a SCAN command is issued. Data will be output at a rate set by the formula below. Averaged frames will be output until the setting of FPS is met. Each Scan group may have a different value of FPS. When set to 0, the scan will continue until a stop command is received.

$$DataRate = \frac{1}{PeriodXChannelsXAVG)}$$

Data Rate is expressed in Hertz per channel
Period is in microseconds
Channels is the number of channels
AVG is the average term for that scan group

NOTE: Channels will always equal 64 in a DSAENCL with 2 A/D modules. Channels will always equal 16 in a DSAENCL with 8 A/D modules.

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..16 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..16 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*> - *may be defined as:*	*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..16 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	16	
DATA TYPE	integer	
DESCRIPTION	Defines the number of ports for the module n.	
NOTE	NUMPORTSn must be set to 16 in a DSAENCL.	

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

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.

IDENTIFICATION CONFIGURATION VARIABLES (Group I)

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 DSAENCL 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 DSAENCL 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 - CALSCHED is not enabled. 1 - CALSCHED 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
NOTES	If CONOUT is set to 3, the following rules apply. – The first SCAN command will open the file: scan000.dat. This file will remain open until a CLOSE command is issued. If the file is not closed, subsequent SCAN commands will append data to that file. – When the first file is closed, the next SCAN command will open a new file: scan001.dat. The file name will increment each time a file is closed and a new SCAN command issued. – The counter used to increment the file name is reset when the DSAENCL.exe program is exited. When the DSAENCL.exe program is re-started, the first file name will be scan000.dat. – Data are written to the file in the format defined by the variable BIN. If BIN is 0, data are written in ASCII format. If BIN is 1 or 2, data are written in Binary format. – If the DSAENCL.exe program is quit before a CLOSE command is received the data buffered for the current open file will be lost.

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	**HAVENET <*code*>**
VALID VALUES	0 or 1
DEFAULT VALUE	1
DATA TYPE	Integer
DESCRIPTION	Determines if a network is configured. 0 - No network is configured 1 - Network is configured

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	**RESCAN <*code*>**
VALID VALUES	0, 1, or 2
DEFAULT VALUE	1
DATA TYPE	integer
DESCRIPTION	Determines the action the DSAENCL will take to recover from a USB disconnect during a SCAN. 0 - No restart of SCAN. 1 - SCAN will restart with the last good frame number. 2 - SCAN will restart with the frame number reset to zero.

VARIABLE	**TWOAD <*code*>**
VALID VALUES	0 or 1
DEFAULT VALUE	01
DATA TYPE	integer
DESCRIPTION	Determines mode of operation for the software. 0 - Special DSAENCL operation, 8 A/D's may be installed. 1 - Enclosure Mode, Two A/D's installed only. A/D #1 scans modules 1 through 4 and A/D # 2 scans modules 5 through 8.
NOTES	1. When TWOAD is set to 1, All modules must have NUMPORTS set to 16. 2. If TWOAD is changed, the DSAENCL must be rebooted for the change to take effect. If the system is not rebooted, proper operation of the DSAENCL cannot be guaranteed.

ID CHIP CONFIGURATION VARIABLES (Group ID)

VARIABLE	**IDP** ***<loc> <site> <device> <mem> <name> <value>***
VALID VALUES	See Below
DEFAULT VALUE	Varies
DATA TYPE	Integer
DESCRIPTION	Sets the values in an ID Chip. This variable will be used rarely by a user. The ID chips are pre-programmed at the time of manufacture. It is recommended that a customer understand the information in the Section defining the RAD ID Chip Data Format before attempting to modify a setting using this configuration variable.

- Loc - The location of the device. Valid values are 0 through 8, Where 0 can only be the Temperature A/D.
- Site - A for an A/D, M for a Module, or D for a Digital Module.
- Device - The memory device in the A/D or module. This must always be E for EPROM. The software will select the Device family based on the Name to be modified.
- Mem - The memory device type. P for PROM or E for EPROM. The Identification data stored in PROM cannot be modified by a user.
- Name - The name of the EEPROM data to be modified. Refer to the following lists of parameter names that may be modified.
- Value - The new value.

Memory Device Type P (PROM) - All Family Codes - Values may not be modified by a user

DFC	Device Family Code	0 = RAD Temperature A/D Board 1 = RAD Pressure A/D Board 2 = Pressure Scanner Module 3 = RAD Digital I/O Device 4 = Test Fixture (BASM3200) 5 = Voltage Scanner Module (EIM)
DMC	Device Model Code	Family Code = 0 0 = 16 Bit 100 KHz, 5V Ref. Family Code = 1 0 = 16 Bit 100 KHz Family Code = 2 0 = ZOC 3016 1 = ZOC 17 2 = ZOC 22 3 = ZOC 23 4 = ZOC 33 Family Code = 3 0 = Remote Digital Switch, 8 channels Family Code = 4 0 = BASM3200 Family Code = 5 0 = ZOC16EIM 1 = ZOCEIM16 2 = ZOCEIM32
SN	Serial Number	Number 0 – 4096
REV	Revision	Letter Code A – P
MDATE	Manufacture Date	MM/DD/YYYY

Memory Device Type E (EEPROM) - Family Code 0

ADCA	A/D Correction Coefficient A	The A coefficient of A x^2 + Bx + C.
ADCB	A/D Correction Coefficient B	The B coefficient of A x^2 + Bx + C.
ADCC	A/D Correction Coefficient C	The C coefficient of A x^2 + Bx + C.
ADCD	A/D Correction Coefficient D	The D coefficient used in the Temperature correction algorithm.
RV	Reference Voltage	The measured voltage reference value used in the temperature calibration.
ACDATE	A/D Calibration Date	MM/DD/YYYY
SN	RAD Serial Number	Number 0 – 4096
APPTYPE	RAD Application Type	0 = Standalone 1 = Enclosure

Memory Device Type E (EEPROM) - Family Code 1

ADCA	A/D Correction Coefficient A	The A coefficient of A x^2 + Bx + C.
ADCB	A/D Correction Coefficient B	The B coefficient of A x^2 + Bx + C.
ADCC	A/D Correction Coefficient C	The C coefficient of A x^2 + Bx + C.
ECC	Excitation Current Correction	Actual measured excitation current (1.5 mA ideal with exact 5 V reference).
GAIN	Gain Code	0 = 2.852 Gain (Standard)
ACDATE	A/D Calibration Date	MM/DD/YYYY

Memory Device Type E (EEPROM) - Family Code 2

RTYPE	RTD Type Code	0 = Platinum 385 1= Nickel-Iron
RVALUE	RTD Value Code	RTD Type Code = 0 0 = 100 Ohm 1 = 500 Ohm 2 = 1000 Ohm RTD Type Code = 1 0 = 604 Ohm
RCORA	RTD Correction A	A term for Callendar-Van Dusen equation.
RCORB	RTD Correction B	B term for Callendar-Van Dusen equation.
RCDATE	RTD Calibration Date	MM/DD/YYYY
PCDATE	Pressure Sensor Calibration Date	MM/DD/YYYY
NPR1	Nominal Pressure Range 1	Value must be in PSI
NPR2	Nominal Pressure Range 2	Value must be in PSI
VALVE	Pressure Valve Arrangement	0 – No Valve 1 – X1 2 – X2 3 – NPx (Normal Px Mode) 4 – NO (Normal Open) 5 – IP
XDUCER	Transducer Type	0 – Differential 1 – Delta 2 – Absolute

Memory Device Type E (EEPROM) - Family Codes 3, 4, and 5

No programmable Values

TEMPERATURE OFFSET VARIABLES (Group O)

VARIABLE **TEMPBn <*value*>** Where n = the module position number
VALID VALUES any real number
DEFAULT VALUE -192.9757
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 0.0228

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 may 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	MODULES
Nickel- Iron 604 Ω at 0°C	-192.9757	0.0228	ZOC16TC (Std.) ZOC22B (Standard) ZOC23B (Standard) DSA3016 (Std.) DSA3216 (Std.)
Platinum 100 Ω at 0°C	-259.7403	0.1853	ZOC22B (Special) ZOC23B (Special) ZOC33 (Special)
Platinum 500 Ω at 0°C	-259.7403	0.0371	ZOC33 (Standard)
Platinum 1000 Ω at 0°C	-259.7403	0.0185	ZOC22B (Special) ZOC23B (Special) ZOC33 (Special)

Error and Event Log File (ERRLOG.TXT)

An Error and Event Log File was added to Version 2..00 of the DSAENCL Software. All events and errors are logged to this file. The file will be created by the software if it does not exist. All events and errors are appended to the file as they occur. The file will be opened each time the DSAENCL software is started and closed when the DSAENCL software is shutdown. This file will not be automatically erased, but the file may be deleted manually. Old errors and events may be deleted from the file using a text editor. The file is in the ENCL Folder. An example of entries showing the startup of the DSAENCL software with some errors and events concluded by a normal shutdown is shown below.

---------- ERRLOG Opened at Date:3/15/2005 Time:0:2:40.766
DSAENCL Ver 3.03 Copyright (c) Scanivalve Corp. 2002 - 2005 at Date:3/15/2005 Time:0:2:40.766
WARNING: No RDS present at location 9 at Date:3/15/2005 Time:0:3:42.284
EVENT: Scan started at Date:3/15/2005 Time:1:21:6.292
EVENT: Scan stopped, stop received Scangroup 0 Frame 16 at Date:3/15/2005 Time:1:21:11.449
EVENT: Calz started at Date:3/15/2005 Time:1:21:15.966
ERROR: CalZ temp or module out of range at Date:3/15/2005 Time:1:21:23.667
EVENT: Calz finished at Date:3/15/2005 Time:1:21:23.687
EVENT: Scan started at Date:3/15/2005 Time:1:21:50.405
ERROR: Invalid command at Date:3/15/2005 Time:1:23:27.875
EVENT: Scan stopped, stop received Scangroup 0 Frame 7 at Date:3/15/2005 Time:1:21:53.99
EVENT: Scan started at Date:3/15/2005 Time:4:54:54.798
EVENT: Scan stopped, stop received Scangroup 0 Frame 15 at Date:3/15/2005 Time:4:54:59.535
EVENT: Scan started at Date:3/15/2005 Time:4:55:14.787
EVENT: Scan stopped, stop received Scangroup 0 Frame 107 at Date:3/15/2005 Time:4:55:43.258
EVENT: Scan started at Date:3/15/2005 Time:4:55:58.750
EVENT: Scan stopped, stop received Scangroup 0 Frame 49 at Date:3/15/2005 Time:4:56:12.149
---------- ERRLOG Closed at Date:3/15/2005 Time:7:46:0 145

DSAENCL ID Chip Data Format

The RAD system uses the Dallas DS2430A EEPROM chip for storing information about various system components. The information travels with the hardware, allowing the system to configure itself after power-up. The DS2430A has two memory areas; a 64 bit permanent memory that is written once during the manufacturing, and a 256 bit area that can be written multiple times.

The permanent memory area will contain information necessary to identify the device in a format that is consistent over all of our device types. The 256 bit memory area will have a device dependent format.

Permanent Memory Data Format

The permanent memory area contains a Device Family Code, a Device Model Code, a Serial Number, a Revision Code, and a Manufacture Date.

Permanent Memory 64 Bits			
Bits	Name	Description	Assigned Values
4	DFC	Device Family Code	0 = RAD Temperature A/D Board 1 = RAD Pressure A/D Board 2 = Pressure Scanner Module 3 = RAD Digital I/O Device 4 = Test Fixture 5 = Voltage Scanner Module
4	DMC	Device Model Code	Family Code = 0 0 = 16 Bit 100 KHz, 5V Ref., Gain = 2.852 Family Code = 1 0 = 16 Bit 100 KHz Family Code = 2 0 = ZOC 3016 1 = ZOC 17 2 = ZOC 22 3 = ZOC 23 4 = ZOC 33 Family Code = 3 0 = RDS Remote Digital Switch, 8 Channels Family Code = 4 0 = BASM3200 Family Code = 5 0 = ZOC16EIM 1 = ZOCEIM16 2 = ZOCEIM32
12	SN	Serial Number	Binary Number 0 – 4096
4	REV	Revision	Letter Code A – P
16	MDATE	Manufacture Date	DDDDDMMMMYYYYYYY DDDDD = Day (1 – 31) MMMM = Month (1 – 12) YYYYYYY = Years Past 2000 (0 – 128)
24		Spare	

EEPROM Memory Data Format

The EEPROM data format is device dependent. The five device families are listed in the following tables.

RAD Temperature A/D Board (Device Family = 0) EEPROM Memory 256 Bits			
Bits	Name	Description	Assigned Values
32	ADCA	A/D Correction Coefficient A	The A coefficient of $Ax^2 + Bx + C$. 32 bit floating point coefficients.
32	ADCB	A/D Correction Coefficient B	The B coefficient of $Ax^2 + Bx + C$. 32 bit floating point coefficients.
32	ADCC	A/D Correction Coefficient C	The C coefficient of $Ax^2 + Bx + C$. 32 bit floating point coefficients.
32	RV	Reference Voltage	32 bit floating point number equals measured output of voltage reference.
16	ACDATE	A/D Calibration Date	DDDDDMMMMYYYYYYY DDDDD = Day (1 – 31) MMMM = Month (1 – 12) YYYYYYY = Years Past 2000 (0 – 128)
12	SN	RAD Serial Number	Binary Number 0 – 4096
8	APPTYPE	RAD Application	Integer, Binary Number 0 - 255 0 = Standalone, (Default) 1 = Enclosure ENCL3200
92		Spare	

RAD Pressure A/D Board (Device Family = 1) EEPROM Memory 256 Bits			
Bits	Name	Description	Assigned Values
32	ADCA	A/D Correction Coefficient A	The A coefficient of $Ax^2 + Bx + C$. 32 bit floating point coefficients.
32	ADCB	A/D Correction Coefficient B	The B coefficient of $Ax^2 + Bx + C$. 32 bit floating point coefficients.
32	ADCC	A/D Correction Coefficient C	The C coefficient of $Ax^2 + Bx + C$. 32 bit floating point coefficients.
32	ECC	Excitation Current Correction	32 bit floating point number equals deviation from 1.5 mA ideal with exact 5 V reference.
16	ACDATE	A/D Calibration Date	DDDDDMMMMYYYYYYY DDDDD = Day (1 – 31) MMMM = Month (1 – 12) YYYYYYY = Years Past 2000 (0 – 128)
8	GAIN	Gain Code	0 = 2.852 Gain
104		Spare	

Pressure Scanner Module (Device Family = 2) EEPROM Memory 256 Bits			
Bits	Name	Description	Assigned Values
8	RTYPE	RTD Type Code	0 = Platinum 385 1= Nickel-Iron
8	RVALUE	RTD Value Code	RTD Type Code = 0 0 = 100 Ohm 1 = 500 Ohm 2 = 1000 Ohm RTD Type Code = 1 0 = 604 Ohm
32	RCORA	RTD Correction A	A term for Callendar-Van Dusen equation. Two 32 bit floating point numbers.
32	RCORB	RTD Correction B	A and B terms for Callendar-Van Dusen equation. Two 32 bit floating point numbers.
16	RCDATE	RTD Calibration Date	DDDDDMMMMYYYYYYY DDDDD = Day (1 – 31) MMMM = Month (1 – 12) YYYYYYY = Years Past 2000 (0 – 128)
16	PCDATE	Pressure Sensor Calibration Date	DDDDDMMMMYYYYYYY DDDDD = Day (1 – 31) MMMM = Month (1 – 12) YYYYYYY = Years Past 2000 (0 – 128)
32	NPR1	Nominal Pressure Range 1	32 Bit Floating Point Number, units of PSI
32	NPR2	Nominal Pressure Range 2	32 Bit Floating Point Number, units of PSI
8	VALVE	Pressure Valve Arrangement	0 = None 1 = X1 2 = X2 3 = NPX 4 = NO 5 = IP
8	XDUCER	Transducer Type	0 = Differential 1 = Delta 2 = Absolute 3 = True Delta P 4 = EIM
64		Spare	
RAD Digital I/O Device (Device Family = 3) EEPROM Memory 256 Bits			
Bits	Name	Description	Assigned Values
256		Not Used	
Test Fixture (Device Family = 4) EEPROM Memory 256 Bits			
Bits	Name	Description	Assigned Values
256		Not Used	
Voltage Scanner (Device Family = 5) EEPROM Memory 256 Bits			
Bits	Name	Description	Assigned Values
256		Not Used	

DSAENCL Scan Function

When a SCAN function is initiated, the DSAENCL will scan all of the channels in the modules enabled in the software. A/D1 scans modules 1 to 4, and A/D2 scans modules 5 - 8. Each channel in a module will be accessed at the rate set in the configuration variable, PERIOD. Data from each channel are accumulated in a buffer until the AVG term is met. The data from each channel are averaged and then output as a FRAME. This process will continue until the number of frames set in the variable, FPS, have been output, or a STOP command is received.. When FPS has been met, or a STOP command received, the Scan function will stop and the DSAENCL will return to the READY mode. If FPS is set to 0(zero), the SCAN function will continue indefinitely until a STOP command is received. A STOP Command may be entered by typing STOP from the Local or remote keyboard, or by pressing the Escape Key on either input.

Two configuration variables, ADTRIG and SCANTRIG, determine how the SCAN function will be implemented.

Internal Trigger

When these variables are set to 0 (disabled), the SCAN function will be controlled by an internal clock trigger. The SCAN function will be initiated by a SCAN command issued from the DSAENCL computer or an external Host computer. Scanning will commence approximately 5 milliseconds after the SCAN command is received. Each Frame will be acquired as soon as the previous Frame acquisition is complete. The SCAN function will remain active until FPS is met or a STOP Command is received.

External Trigger

The DSAENCL SCAN function may be controlled with external triggers. The settings of SCANTRIG and ADTRIG determine how the SCAN function will be initiated and how each Frame will be acquired. ADTRIG and SCANTRIG cannot be enabled at the same time.

When SCANTRIG is set to 1(enabled), the SCAN function will be initiated by an external hardware trigger. Frame triggering will be controlled by an internal clock trigger. Scanning will commence approximately 5 milliseconds after the hardware trigger is received. Each Frame will be acquired as soon as the previous Frame acquisition is complete. The SCAN function will remain active until FPS is met or a STOP Command is received. Multiple trigger pulses received while the SCAN function is active will be ignored. When the SCAN function is complete, another trigger will repeat the process.

When ADTRIG is set to 1(enabled), the SCAN function will be initiated by the SCAN command. The DSAENCL will enter the WTRIG mode and wait for a hardware or software trigger. When a trigger is received, the DSAENCL will acquire and output one averaged Frame of data and re-enter the WTRIG mode. Multiple trigger pulses received during a Frame Scan will be ignored. When a frame has been output, the next trigger will repeat the process. This will continue until the Frames per Scan Variable has been satisfied or a STOP command is received.

Hardware Trigger

The Hardware Trigger input is optically isolated to prevent grounding problems. It is a TTL level, edge sensing device. It requires a minimum signal of 9 Vdc @ 6.5 mA. It may accept voltages as high as 15 Vdc. The external trigger input is on pins A and B of the DSAENCL Trigger Input connector.

Software Trigger

The Software Trigger is a <TAB> character, or Ctrl I.

DSAENCL Frame Multiplier

The RADBASE must transfer large blocks of data on the USB link to the DSAENCL processor in order to support high speed operation. For this section, a large block of data is defined as a data block greater than one averaged frame. In this case, problems may occur when scanning at slow speeds, scanning with an external trigger, or when minimum data latencies are required.

The FM configuration variable is used to prevent the problems that might occur in the conditions described in the paragraph above. The FM variable has an influence on the number of averaged frames sampled before they are sent to the Host Computer. The software calculates a term called FMmax. FMmax may be equal to 1 or could be some number greater than one depending on the setting of FM, ADTRIG, and FPS. FMmax is calculated by the formula:

$$FM\max = \frac{32768}{(ModulePorts*9*AVGn)}$$

FMmax will be an integer value, truncated to the closest whole number. This will be the number of averaged frames transmitted in each block. The block sizes may become very large as FMmax increases. A user must insure that the Host Computer has sufficient RAM to accept very large blocks of data.

When FM is set to 1, no latencies occur because only one averaged frame of data will be transferred in each block. Tests have proved this to be a slow method of data transfer.

When FM is set to a number greater than 1, to the maximum allowable, data transfer speeds will be much faster. With this method, data latencies will occur because data are accumulated before they are made available to the Host Computer.

Mode	FM	ADTRIG	FPS	Actual FM	Notes
Minimum Latency	1	1	X	1	Assumes Minimum Latency
Minimum Latency	1	0	X	1	Provides Minimum Latency
Manual	>1	0	X	FM to FMmax	May Oversample at end
Manual	>1	1	0	FM to FMmax	FPS must be set to a multiple of FM for all data to be flushed.
Maximum Speed	1	0	0	FMmax	Maximum Speed - Will oversample at end
Maximum Speed	1	0	>1	FPS to FMmax	May oversample at end if FPS is greater than FM Max

FM Notes

Generally, if an external trigger is used. FM should be set to 1. If FM is set to numbers greater than one when external triggers are used, multiple triggers will have to be issued for each data block output.

When slow internal triggers are used, FM should be set to 1.

FM should only be set to values greater than one when fast throughput is required. The setting of FM should then be as small as possible to get the required speed.

Maximum Value of FM

The maximum setting of FM is 20. The setting of FM must be selected by determining the speed requirements and comparing this to the available memory in the host computer. The amount of input buffer memory required is determined by the formula:

Memory = ModulePorts*9*AVGn*FM Where: ModulePorts is the number of channels in the largest module.
AVGn is average setting for the largest scan group.
FM is the setting of FM.

For example: If FM is set to 2, the largest module is a ZOC33, and the scan group average is 8, the memory required will be:

Memory = 64*9*8*2 = 9216 bytes

If FM is set to 5, the memory required will be:

Memory = 64*9*8*5 = 23040 bytes

If the software cannot allocate sufficient memory, an error will be generated:

ERROR: Cannot allocate <n> bytes of memory for input buffer

Ethernet Connections

All DSAENCL3200's are equipped with an Ethernet port. The Ethernet speed is 100Base-T connections. No variables need to be modified to use this connection.

IP Address

All DSAENCL3200 Enclosures have a preset IP address that can be modified by a user, if desired. The preset IP address is 191.30.36.xxx where xxx is the serial number of the unit.

Multiple Ethernet Connections

The DSAENCL3200 Enclosures will not support multiple Ethernet connections. However, if a second Ethernet connection is made to a DSAENCL 3200, the current connection will be dropped for the new connection. The DSAENCL 3200 will output the following message when a command is entered from the new connection:

RCV Error Code 10053

DSAENCL Profile File

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

DSAENCL 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 DSAENCLnnn.DPF file exists when the DSAENCL.EXE program starts up, it will be overwritten by the information obtained from the polling of the ID chips.

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 DSAENCL. These files are read when the DSAENCL.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 NPRn <Nominal Full Scale Pressure Value><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>

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 If Tag Bit is set, 80 Hex will be merged with the Scan Group Number. (81 to 88)
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 If Tag Bit is set, 80 Hex will be merged with the Scan Group Number. (81 to 88)
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)

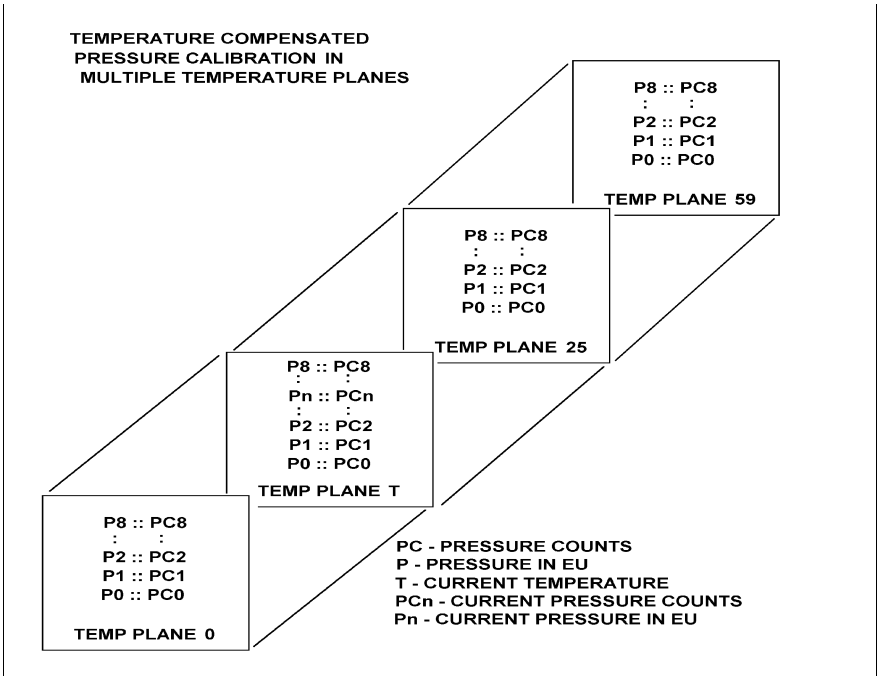
* Optional based on Number of Channels setting.

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

APPENDIX A - 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 B - 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 C - CHANGE LIST

General Information

This section contains change information to assist a user in determining the differences between different versions of RAD.exe software. All versions through version 3.02 were designed to operate all RAD variations. In April 2005, the RAD software was divided into four (4) versions.

RAD.exe	Version 2.10 designed to operate a stand alone RAD system with a dedicated system computer.
DSAENCL.exe	Version 3.10 designed to operate a Two or Eight A/D DSA3200 Enclosure only.
DSMRAD.exe	Version 1.00 designed to operate a eight channel DSM3400 only
SPCENCL.exe	Version 1.00 designed to operate a SPCENCL only.

The current released version of any of the software versions will be the last one listed in each version list.

DSAENCL.exe Versions

Version 3.10 - Released May 2005
RAD.exe Version 3.02 with defaults set for Two A/D operation

Version 3.11 - Released June 2005
Corrected a “memory leak” problem
Documented the DISCONNECT command

Version 3.12 - Released August 2005
Added support for a “second” Ethernet connection
Added a “module” term to the SAVE command to permit a save of less than 8 modules.

Version 3.13 - Not Released

Version 3.14 - Released January 2007
Added Broadcast capability to the UDP Binary socket
Corrected a bug in the IDPWRITE function