SOFTWARE SPECIFICATION

DSA 3200 SERIES MODULES

Version 1.11

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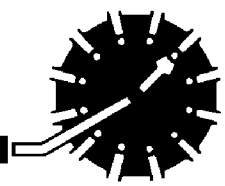

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Command List by Syntax

DSA CONTROL AND CONFIGURATION

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

The section on DSA Commands lists each command and explains its function.

DSA COMMANDS

This section describes the commands used to control the DSA.
The DSA software must run as embedded software on the DSA 3017 pressure scanner hardware. It is to perform 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 from the Ethernet Link.
4) Allow the configuration to be saved through power down.
5) Output converted data, status, setup and calibration data over the Ethernet Link.
6) Set the DSA Physical Ethernet Address(MAC Address).
7) Protocol to be TCP/IP or User Defined Protocol.
8) Support the user in troubleshooting the DSA hardware and system.

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

TCP/IP does not guarantee that packet boundaries will be maintained between a Host and a DSA module. Therefore, **ALL** commands from a Host **MUST** be terminated properly with one of four options. The DSA will detect and adjust to the termination option being used by a Host.

The four options are:

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

The current DSA RS232 interface includes error checking. A checksum byte is generated and added to the end of the serial data packet. It is assumed that data will be transmitted in ASCII format. Data may be transmitted in BINARY format. If data are to be transmitted in BINARY format, then page mode transmission must be disabled.

Prior to version 1.08, the software would not attempt to output data is the sensor temperatures were less than 0 degrees C. Version 1.08 allows data output at temperatures below 0 degrees C. In this case, the EU conversion will use the last good set of coefficients. **No errors will be logged**. If this condition might exist, a user must monitor the sensor temperatures in the data output.

COMMAND LIST

COMMAND **CALIBRATE**

COMMAND SYNTAX **CAL <*press*> *[group]***

ARGUMENTS

<*press*> - is a real number that represents the calibration pressure for this point.

[group] - is a switch that determines the number of channels to calibrate.
Group may be H, L or blank.
L - Channels 0 - 7(ports 1-8)will be calibrated.
H - Channels 8 - 15(ports 9-16) will be calibrated.
Blank - Channels 0 - 15(ports 1-16) will be calibrated.

DESCRIPTION

Commands the DSA to perform the following:

1) Read one averaged frame of pressure and temperature counts.
2) Return calibration information for all channels calibrated in the following format::
   INSERT <temp> <chan> <press> <press counts>/M

NOTE: The DSA does not control the calibration. It will only read the information when commanded. The User must:

1) Apply the control pressures to switch the calibration valves to the CAL mode.
2) Apply a known calibration pressure.
3) Issue the CAL command when the calibration pressure is stable.

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 ports 1 through 8 at 15 psi:
Connect a pressure standard to the CAL input.
Apply CTL1 and CTL2 Control pressures
Enter the command:
CAL 15 L<CR>

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

If a user wanted to calibrate all ports at 15 psi:
Connect a pressure standard to the CAL input.
Apply CTL1 and CTL2 Control pressures
Enter the command:
CAL 15<CR>

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

COMMAND	**CALIBRATE BAROMETRIC PRESSURE**
COMMAND SYNTAX	**CALB *<press>***
ARGUMENTS	*<press>* - is a real number that represents the local barometric pressure.
DESCRIPTION	Commands the DSA to perform the following: 1) Read the current counts and enter them in the zero array (list z) 2) Lookup the counts for the pressure entered at the current temperature 3) Subtract the table counts from the zero counts and enter the difference in the delta array (list d) In order for the correction to be active, ZC must be set to 1. The CalB function only uses the entered pressure for channels that are defined as absolute sensors (ABS(x) = 1). If a channel is not defined as an absolute channel, the software it will perform a CALZ on that channel. The pressure entered as the barometric pressure must be in the units defined in CVTUNIT (i.e.: PSI, kPa, etc)
RETURNS	*<nl>* - end of line
EXAMPLE	To correct all absolute sensors to read the local barometric pressure: Disconnect all inputs. Enter the command: CALB <press> Where: press is the local barometric pressure in the current engineering units. If CVTUNIT is set to psi, and the local barometric pressure is 14.696 psia,, Enter the command: CALB 14.696 If CVTUNIT is set to kPa, and the local barometric pressure is 101.3254, Enter the command: CALB 101.3254

COMMAND	**CALIBRATE ZERO**
COMMAND SYNTAX	**CALZ**
ARGUMENTS	None
DESCRIPTION	Commands the DSA to perform a quick zero calibration. This operation produces A/D count values for each pressure channel that is subtracted from the raw pressure counts before converting to the chosen pressure units. The data are stored in the ZERO(0-15) and DELTA(0-15) Configuration Variable Array. 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 DSA will measure the zero counts for each channel and update the Zero and Delta Arrays.

COMMAND	**CLEAR**
COMMAND SYNTAX	**CLEAR**
ARGUMENTS	None
DESCRIPTION	Commands the DSA to clear any errors that have occurred. The errors are sent to the client in an ASCII Packet. ASCII Packets are described in a subsequent sections.
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 **DELETE**
COMMAND SYNTAX **DELETE <*start temp*><*end temp*>[<*channel*>]**

ARGUMENTS
<*start temp*>- an integer from 0 to 79 that represents the low point of the temperature planes to be deleted.
<*end temp*> - an integer from 0 to 79 that represents the high point of the temperature planes to be deleted.
<*channel*> - optional, the channel to be deleted.

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 CAL command.
NOTE: See the description of the FILL command for more information.

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

EXAMPLE
To delete the master points for all modules in a system using eight 32 channel modules, the following command would be issued:
DELETE 0 79<CR>

To delete the master points for channel 4, the following command would be issued:
DELETE 0 79 4<CR>

To delete the master points for channel 16, the following command would be issued:
DELETE 0 79 16<CR>

COMMAND **ERROR**
COMMAND SYNTAX **ERROR**

ARGUMENTS
None

DESCRIPTION
Lists the errors that are stored and listed after a CLEAR. Only the first 15 errors will be listed. If more than 15 errors have occurred, the message: “Greater than 15 errors occurred ”will appear at the end of the list. An Error List may be found in Appendix D. The return format is:
ERROR: error

EXAMPLE
To read the contents of the Error Buffer:
Type: ERROR<Enter>

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

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

COMMAND **FILL**
COMMAND SYNTAX **FILL**

ARGUMENTS None

DESCRIPTION Fills the Conversion Table with calculated pressure points and temperature planes using the MASTER calibrated points as guides. These "filled" points are marked as CALCULATED.
The FILL command NEVER overwrites MASTER points. It does overwrite old points marked as CACULATED.
NOTE: The DELETE command must be used to change points marked as MASTER to CALCULATED before using the FILL command.

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>

COMMAND **INSERT**
COMMAND SYNTAX **INSERT <*temp*><*chan*><*press*><*press counts*>[M]**

ARGUMENTS

<*temp*> -	an integer from 0 to 79 that represents the temperature in degrees Celsius.
<*chan*> -	an integer from 0 to 15 identifying the 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.
[M] -	optional switch that designates the entry as a master conversion point.

DESCRIPTION Inserts one pressure-pressure counts entry into the Conversion Table. If the M option is used this point is entered as a MASTER point.
The LIST MASTER and LIST ALL commands download the contents of the conversion table in the format required by this INSERT command.

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°C for channel 1. The applied pressure is 11.9998 psi, the measured counts are 26376.
INSERT 30 1 11.9998 26376 M

The following command will insert a master point at 48°C for channel 16. The applied pressure is 10.9998 psi, the measured counts are 20254.
INSERT 48 16 10.9998 20254 M

COMMAND **LIST ALL**

COMMAND SYNTAX **LIST A *<Start Temp><End Temp>[Channel]***

ARGUMENTS None

DESCRIPTION Lists all of the master and calculated points in the temperature-pressure correction matrix. The return format is:
INSERT <temp><chan><press><pressure counts><M or C>

RETURNS INSERT <*temp*><*channel*><*press*><*press counts*><M,C,I><*nl*>
INSERT <*temp*><*channel*><*press*><*press counts*><M,C,I><*nl*>
: : : :
INSERT <*temp*><*channel*><*press*><*press counts*><M,C,I><*nl*>
<*temp*> - the temperature plane
<*channel*> - the channel in port notation
<*press*> - the pressure in EU
<*press counts*> - the A/D counts of pressure
<*nl*> - end of line.

EXAMPLE To list all of the coefficients from 16°C to 20°C for channel 1 in a module calibrated from 17°C to 40°C
Type: LIST a 17 20 1<CR>
The DSM will return a list of INSERT commands showing the temperature, channel, applied pressure, counts and the type of plane.

INSERT 17 1 -45.949100 -26184 M
INSERT 17 1 -31.250000 -17763 C
INSERT 17 1 -19.969601 -11302 M
INSERT 17 1 -6.250000 -3425 C
INSERT 17 1 0.000000 162 M
INSERT 17 1 19.984600 11636 M
INSERT 17 1 25.000000 14523 C
INSERT 17 1 35.000000 20281 C
INSERT 17 1 45.949100 26586 M
:: :: :: :: :: ::
INSERT 20 1 -45.949100 -26166 C
INSERT 20 1 -31.250000 -17750 C
INSERT 20 1 -19.969601 -11292 C
INSERT 20 1-1 -6.250000 -3424 C
INSERT 20 1-1 0.000000 160 C
INSERT 20 1-1 19.984600 11629 C
INSERT 20 1-1 25.000000 14514 C
INSERT 20 1-1 35.000000 20267 C
INSERT 20 1-1 45.949100 26567 C

COMMAND **LIST ALL RANGES** (Model 3207 Only)
COMMAND SYNTAX **LIST B**

ARGUMENTS None

DESCRIPTION Lists the 16 Absolute/Gauge Settings from the ABSn variable. This is active only when MODEL is set to 3207.

EXAMPLE The DSA 3207 could contain both Absolute and Gauge Transducers. The setting of ABSx defines the transducer type to the software.
To display the transducer type defined for each channel in a DSA3207 with Absolute transducers installed in channels 1 - 6 and 13 - 16, and Gauge Transducers installed in channels 7 - 12,
Type:

LIST B<CR>

The DSA module will return the following

SET ABS0 1
SET ABS1 1
SET ABS2 5
SET ABS3 1
SET ABS4 1
SET ABS5 1
SET ABS6 0
SET ABS7 0
SET ABS8 0
SET ABS9 0
SET ABS10 0
SET ABS11 0
SET ABS12 1
SET ABS13 1
SET ABS14 1
SET ABS15 1

COMMAND **LIST CALIBRATE**
COMMAND SYNTAX **LIST C**

ARGUMENTS None

DESCRIPTION Lists the CALIBRATION configuration variables.

EXAMPLE To view the current conversion variable settings:

Type: LIST C<CR>

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

SET PMAXL 18.09
SET PMAXH 18.09
SET PMINL -18.09
SET PMINH -18.09
SET NEGPTSL 4
SET NEGPTSH 4
SET ABS 0
>

COMMAND **LIST DELTA**
COMMAND SYNTAX **LIST D**

ARGUMENTS None

DESCRIPTION Lists the 16 delta zero correction values. These are used in the conversion of raw counts to Engineering Units(EU).

EXAMPLE To view the current delta zero correction values:

Type: LIST D<CR>

The DSA will return the delta zero correction values. They could appear as follows.

SET DELTA0 0
SET DELTA1 1
SET DELTA2 0
SET DELTA3 1
SET DELTA4 0
SET DELTA5 1
SET DELTA6 0
SET DELTA7 0
SET DELTA8 1
SET DELTA9 0
SET DELTA10 1
SET DELTA11 0
SET DELTA12 1
SET DELTA13 0
SET DELTA14 1
SET DELTA15 0

NOTE The delta values will vary as the module ages. These values are the difference between the current zero offset value obtained in the most recent CALZ and the zero value in the coefficient table.

COMMAND **DIGITAL OUTPUT**
COMMAND SYNTAX **DOUT *<Number><Value>***

ARGUMENTS

Number	The digital output channel 0 through 7
Value	1 = On
	0 = Off

DESCRIPTION Commands the DSA to energize or de-energize a Digital Output Channel.

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

EXAMPLE 1 To energize Digital Output 1:

Type: DOUT 1 1<CR>

EXAMPLE 2 To de-energize Digital Output 6:

Type: DOUT 6 0<CR>

COMMAND **LIST GAIN**
COMMAND SYNTAX **LIST G**

ARGUMENTS None

DESCRIPTION Lists the 16 temperature gains. These are used to convert temperature counts to degrees Celsius. This is the “M” term in the characterization equation:

$$°C = \frac{Counts - TempB}{TempM}$$

EXAMPLE To view the temperature gain settings:

Type: LIST G<CR>

The DSA will return the temperature gain settings. They could appear as follows.

SET TEMPM0 793.
SET TEMPM1 432.
SET TEMPM2 441.
SET TEMPM3 429.
SET TEMPM4 402.
SET TEMPM5 400.
SET TEMPM6 413.
SET TEMPM7 400.
SET TEMPM8 410.
SET TEMPM9 412.
SET TEMPM10 421.
SET TEMPM11 430.
SET TEMPM12 430.
SET TEMPM13 412.
SET TEMPM14 422.
SET TEMPM15 432.

NOTE The temperature gain settings are determined when the sensor is manufactured. They normally will not change after a calibration

COMMAND **LIST IDENTIFICATION**
COMMAND SYNTAX **LIST I**

ARGUMENTS None

DESCRIPTION Lists the IDENTIFICATION configuration variables.

EXAMPLE To verify the general module configuration settings:

Type: LIST i<CR>

The DSA will return:

SET ECHO 1

NOTE A user must be very careful when modifying one of these variables. An incorrect value in one of these variables could have a detrimental affect on the operation of the module.

COMMAND **LIST MASTER**

COMMAND SYNTAX **LIST M <*Start Temp*><*End Temp*>[<*channel*>]**

ARGUMENTS
<*Start Temp*> - The lowest temp plane to be returned.
<*End Temp*> - The highest temp plane to be returned.
<*channel*> - optional, may be 0 through 15.

DESCRIPTION Lists all of the MASTER POINTS in the temperature-pressure correction matrix. The return format is:

INSERT<temp><clear><pressure><pressure counts><M>

RETURNS

INSERT <*temp*><*channel*><*press*><*press counts*>M<*nl*>
: : : :
INSERT <*temp*><*channel*><*press*><*press counts*> M<*nl*>

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

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

Type: List m 10 40 1<CR>

The DSA will return:

INSERT 14 1 -5.958100 -21594 M
INSERT 14 1 -4.476100 -15127 M
INSERT 14 1 -2.994200 -8646 M
INSERT 14 1 -1.470100 -1973 M
INSERT 14 1 0.000000 4467 M
INSERT 14 1 1.470100 10917 M
INSERT 14 1 2.994200 17594 M
INSERT 14 1 4.476100 24098 M
INSERT 14 1 5.958100 30603 M
INSERT 23 1 -5.958100 -21601 M
INSERT 23 1 -4.476100 -15161 M
INSERT 23 1 -2.994300 -8714 M
INSERT 23 1 -1.470100 -2077 M
INSERT 23 1 0.000000 4332 M
INSERT 23 1 1.470100 10746 M
INSERT 23 1 2.994200 17397 M
INSERT 23 1 4.476100 23863 M
INSERT 23 1 5.958100 30333 M
INSERT 32 1 -5.958100 -21636 M
INSERT 32 1 -4.476100 -15214 M
INSERT 32 1 -2.994200 -8784 M
INSERT 32 1 -1.470100 -2162 M
INSERT 32 1 0.000000 4228 M
INSERT 32 1 1.470100 10615 M
INSERT 32 1 2.994200 17246 M
INSERT 32 1 4.476100 23691 M
INSERT 32 1 5.958100 30136 M

COMMAND	**LIST MAXn PRESSURES** (Model 3207 Only)
COMMAND SYNTAX	**LIST H**
ARGUMENTS	None
DESCRIPTION	Lists the 16 maximum pressures stored in the MAXn Variable. This is active only when MODEL is set to 3207.
EXAMPLE	To view the maximum pressure settings for the module in the example of List Ranges type: LIST H<CR> The DSA will return the maximum pressure settings. They could appear as follows. SET MAX0 6 SET MAX1 6 SET MAX2 6 SET MAX3 6 SET MAX4 18 SET MAX5 18 SET MAX6 18 SET MAX7 18 SET MAX8 18 SET MAX9 18 SET MAX10 60 SET MAX11 60 SET MAX12 60 SET MAX13 60 SET MAX14 60 SET MAX15 60
NOTE	Generally, the maximum pressure setting is 20% greater than the full scale of the sensor to allow a user some over range indication.

COMMAND	**LIST MINn PRESSURES** (Model 3207 Only)
COMMAND SYNTAX	**LIST L**
ARGUMENTS	None
DESCRIPTION	Lists the 16 maximum pressures stored in the MINn Variable. This is active only when MODEL is set to 3007.
EXAMPLE	To view the minimum pressure settings for the module in the example of List Ranges type: LIST L<CR> The DSA will return the minimum pressure settings. They could appear as follows. SET MIN0 -6 SET MIN1 -6 SET MIN2 -6 SET MIN3 -6 SET MIN4 -18 SET MIN5 -18 SET MIN6 -18 SET MIN7 -18 SET MIN8 -18 SET MIN9 -18 SET MIN10 -60 SET MIN11 -60 SET MIN12 -60 SET MIN13 -60 SET MIN14 -60 SET MIN15 -60
NOTE	Generally, the maximum pressure setting is 20% greater than the full scale of the sensor to allow a user some over range indication.

COMMAND **LIST NEGATIVE POINTS** (Model 3207 Only)
COMMAND SYNTAX **LIST N**

ARGUMENTS None

DESCRIPTION Lists the Negative Points settings for each of the 16 channels in a DSA3007. This is active only when MODEL is set to 3007.

EXAMPLE To view the negative points set for the module in the example of List Ranges type:

LIST L<CR>

The DSA will return the negative points settings. They could appear as follows.

SET NEGPTS0 4
SET NEGPTS1 4
SET NEGPTS2 4
SET NEGPTS3 4
SET NEGPTS4 4
SET NEGPTS5 4
SET NEGPTS6 4
SET NEGPTS7 4
SET NEGPTS8 4
SET NEGPTS9 4
SET NEGPTS10 4
SET NEGPTS11 4
SET NEGPTS12 4
SET NEGPTS13 4
SET NEGPTS14 4
SET NEGPTS15 4

COMMAND **LIST OFFSET**
COMMAND SYNTAX **LIST O**

ARGUMENTS None

DESCRIPTION Lists the 16 temperature offsets. These are used in the conversion of temperature counts to degrees Celsius. This is the “B” term in the correction equation:

$$°C = \frac{Counts - TempB}{TempM}$$

EXAMPLE To view the temperature offset settings:

Type: LIST O<CR>

The DSA will return the temperature offset settings. They could appear as follows.

```
SET TEMPB0 -14121.
SET TEMPB1 -10631.
SET TEMPB2 -7556.
SET TEMPB3 -10576.
SET TEMPB4 -5958.
SET TEMPB5 -5133.
SET TEMPB6 -8378.
SET TEMPB7 -6851.
SET TEMPB8 -9011.
SET TEMPB9 -10288.
SET TEMPB10 -7520.
SET TEMPB11 -7400.
SET TEMPB12 -9167.
SET TEMPB13 -7015.
SET TEMPB14 -6328.
SET TEMPB15 -6156.
```

NOTE The temperature offset settings are determined when the sensor is manufactured. They normally will not change after a calibration

COMMAND **LIST SCAN**
COMMAND SYNTAX **LIST S**

ARGUMENTS None

DESCRIPTION Lists the SCAN configuration variables

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

Type: LIST s<CR>

The DSA will return:

SET PERIOD 100
SET AVG 16
SET FPS 100
SET XSCANTRIG 0
SET FORMAT 0
SET STAMPMS 1
SET EU 1
SET ZC 1
SET BIN 1
SET SIM 0
SET QPKTS 1
SET UNITSCAN PSI
SET CVTUNIT 1.0
>

COMMAND **LIST ZERO**
COMMAND SYNTAX **LIST Z**

ARGUMENTS None

DESCRIPTION Lists the 16 zero correction values. These are used in the conversion of raw counts to zero corrected counts.

EXAMPLE To view the current zero correction values:

Type: LIST Z<CR>

The DSA will return the zero correction values. They could appear as follows.

SET ZERO0 261
SET ZERO1 -86
SET ZERO2 -49
SET ZERO3 -6
SET ZERO4 -20
SET ZERO5 47
SET ZERO6 44
SET ZERO7 23
SET ZERO8 -51
SET ZERO9 47
SET ZERO10 6
SET ZERO11 26
SET ZERO12 53
SET ZERO13 37
SET ZERO14 -57
SET ZERO15 -20

NOTE The zero values will be updated after a CALZ.

COMMAND **SAVE**
COMMAND SYNTAX **SAVE**

ARGUMENTS None

DESCRIPTION Commands the DSA to save the RAM image of NVM. Any change to a configuration variable must be followed by a SAVE command if the change is to be permanent.

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

EXAMPLE To save the current configuration variable settings and conversion coefficients,
Type: SAVE<CR>

COMMAND **SCAN**
COMMAND SYNTAX **SCAN**

ARGUMENTS None

DESCRIPTION Commands the DSA to scan the pressure sensors and send Scan packets to the client.

EXAMPLE 1 A scan command is executed with EU set to 1, BIN set to 0, and FORMAT set to 0. Data are scrolled and will be displayed as follows:

Frame # <number>
Time <time> <µs or ms>
<chan> <press eu> <temp eu>
" " "
" " "
<chan> <press eu> <temp eu>

EXAMPLE 2 A scan command is executed with EU set to 0, BIN set to 0, and FORMAT set to 0. Data are scrolled and will be displayed as follows:

Frame # <number>
Time <time> <µs or ms>
<chan> <press counts> <temp counts>
" " "
" " "
<chan> <press counts> <temp counts>

EXAMPLE 3 A scan command is executed with EU set to 1, BIN set to 0, and FORMAT set to 1. Data are scrolled and will be displayed as follows:

Frame = <number> Time = <time> <µs or ms>
<chan> <press eu> <chan><press eu> <chan> <press eu> <chan> <press eu>
<chan> <press eu> <chan><press eu> <chan> <press eu> <chan> <press eu>
<chan> <press eu> <chan><press eu> <chan> <press eu> <chan> <press eu>
<chan> <press eu> <chan><press eu> <chan> <press eu> <chan> <press eu>

EXAMPLE 4

A scan command is executed with EU set to 0, BIN set to 0, and FORMAT set to 1. Data are scrolled and will be displayed as follows:

Frame = <number> Time = <time> <µs or ms>
<chan> <press cts> <chan><press cts> <chan> <press cts> <chan> <press cts>
<chan> <press cts> <chan><press cts> <chan> <press cts> <chan> <press cts>
<chan> <press cts> <chan><press cts> <chan> <press cts> <chan> <press cts>
<chan> <press cts> <chan><press cts> <chan> <press cts> <chan> <press cts>

NOTE:

If the sensor temperatures are less than 0 degrees C, the EU conversion will use the last good set of coefficients. **No errors will be logged**. If this condition might exist, a user must monitor the sensor temperatures in the data output.

COMMAND **SCAN TRIGGER**
COMMAND SYNTAX **TRIG**

ARGUMENTS None

DESCRIPTION

This command acts as a software trigger to the DSA. When XSCANTRIG is set to 1, an averaged frame of data will be output when the DTS receives the TRIG command or a <TAB> character code (9 HEX or Control I). This will continue until a STOP command is issued or the Frames per Scan variable is met. The data format will depend upon the setting of EU, BIN and FORMAT.

EXAMPLE

A scan command is executed with EU set to 1, BIN set to 0, XSCANTRIG set to 1, and FORMAT set to 0. The DSA will wait for a Hardware trigger, the TRIG command or a <TAB> character (9 HEX or Control I). When one of the Data are scrolled and will be displayed as follows:

Frame # <number>
Time <time> <µs or ms>
<chan> <temp eu>
" "
" "
<chan> <temp eu>

For information on other formats, refer to the SCAN command .

COMMAND **SET**
COMMAND SYNTAX **SET *<name>* *<value>***

ARGUMENTS

<name> - the Configuration Variable to be set or modified.
<value> - the value of that Configuration Variable

DESCRIPTION

Commands the DSA to set one of the many Configuration Variables. Configuration Variables are described in a subsequent section.

NOTE

Listing the Configuration Variables with the LIST command outputs the data in the format required by the SET command. This enables the user to upload data from a file that has been created by a LIST download.

COMMAND	**STATUS**
COMMAND SYNTAX	**STATUS**
ARGUMENTS	None
DESCRIPTION	Commands the DSA to send a Status Packet to the client. The Status Packet is described in a subsequent section.
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 DSA is not READY. If the STATUS command is entered while the DSA is on, but inactive, the DSM will return: Status: READY If the STATUS command is entered while the DSM is executing a Calibrate Zero command, the DSM will return: Status: DSA 1CALZ

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

COMMAND	**UPLOAD**
COMMAND SYNTAX	**UPLOAD <S or C><filepath\filename>**
ARGUMENTS	S System file to be uploaded C Configuration file to be uploaded
DESCRIPTION	Uploads the specified file to the DSA module. The DSA interprets the type of file based on the file type argument.
RETURNS	<*nl*> <*nl*> - end of line.
EXAMPLE	To upload the configuration variable file cv.cfg, located in the dsafiles subdirectory on drive c: of the host computer: Type: UPLOAD C c:\dsafiles\cv.cfg
NOTE	S or C must be uppercase Refer to the DSA3200 Boot Parameter Modification and DSA Operating System Upload Procedures for more information.

COMMAND	**VERSION**
COMMAND SYNTAX	**VER**
ARGUMENTS	None
DESCRIPTION	Outputs the current software version number.
RETURNS	DSAHS Scanivalve © 2000 -2008 Ver 1.11
EXAMPLE	To read the current software version: Type: VER<CR> The DSA returns: Version: DSAHS Scanivalve © 2000 - 2008 Ver 1.11

CONFIGURATION VARIABLES

Configuration Variables control the way the DSA functions. The Variables are assigned to one of several groups: SCAN, CALIBRATION, IDENTIFICATION, PRESSURE, and DEBUG. Each variable is assigned a "data type" description.

SCAN VARIABLES

VARIABLE	**AVG**
VALID VALUES	1 to 240
DEFAULT VALUE	16
DATA TYPE	integer
DESCRIPTION	This sets the number of raw samples to acquire before producing a filtered output.

VARIABLE	**BIN**
VALID VALUES	1 or 0
DEFAULT VALUE	1
DATA TYPE	integer
DESCRIPTION	Sets the format of the data packet output. 1 = Binary 0 = ASCII

VARIABLE	**CVTUNIT**
VALID VALUES	any real number
DEFAULT VALUE	1.0
DATA TYPE	float
DESCRIPTION	Unit conversion factor. This converts the calibrated units to the requested scan units. This value can be set directly or by setting the UNITSCAN variable to the desired unit. CVTUNIT will be set whenever UNITSCAN is set. It may be set independently without setting UNITSCAN. If a user wants to have CVTUNIT set to a different variable from UNITSCAN, UNITSCAN must be set first.

VARIABLE	**EU**
VALID VALUES	0 or 1
DEFAULT VALUE	1
DATA TYPE	string
DESCRIPTION	Sets the output format for temperature and pressure units. 0 = raw units 1 = Engineering units
NOTE	The module will output 999999 when one or more of the following conditions exist: 1. The EU conversion exceeds the setting of PMAXL or PMAXH 2. The calculated temperature of any sensor is 79 degrees C or greater. The module will output -999999 when one or more of the following conditions exist: 1. The EU conversion exceeds the setting of PMINL or PMINH 2. The calculated temperature of any sensor is 79 degrees C or greater.

VARIABLE	**FORMAT <*code*>**
VALID VALUES	0, or 1
DEFAULT VALUE	0
DATA TYPE	Integer
DESCRIPTION	Determines if data are to be scrolled on the display. ASCII Output only 0 - data are scrolled 1 - data are displayed in place, formatted for a VT100 terminal.

VARIABLE	**FPS**
VALID VALUES	0 to 2147483648
DEFAULT VALUE	100
DATA TYPE	long integer
DESCRIPTION	Frames per Scan. Sets the number of averaged frames to send to the host computer when a scan command is issued. Averaged Frames will be sent to the host computer until the value of FPS is met. At that time the DSA will exit the scan mode and wait for another command. If a 0 is entered, the scan will continue until a STOP command is received.

VARIABLE	**PAGE**
VALID VALUES	0 or 1
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	When set to 1, the DSA will accumulate 10 frames of data before the data is sent over the network. If FPS is set to a number less than 10, the data will be sent over the network when FPS is completed. When a STOP command is issued, the frame acquisition will stop on a 10 frame boundary. **NOTE**: This variable is active in UDP mode only.

VARIABLE	**PERIOD**
VALID VALUES	125 to 65535 microseconds
DEFAULT VALUE	500
DATA TYPE	integer
DESCRIPTION	Sets the interval between channel samples. Period is related to the scan rate, or frequency by the formula: $DataRate = 1 \div (Period \times 16 \times Average)$

VARIABLE	**QPKTS**
VALID VALUES	0 or 1
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	This switch will control the action the DSA will take when the data buffer is full. 0 - frames will be discarded when the data buffer is full. The DSA will continue to scan. 1 - no frames will be lost. The DSA will stop scanning and log an error if the data buffer is filled.

VARIABLE	**SIM <*code*>**
VALID VALUES	0, or 1
DEFAULT VALUE	0
DATA TYPE	Integer
DESCRIPTION	Determines the source of the data samples. 0 - Data are taken from the sensors 1 - Data are generated internally

VARIABLE	**TIME <*code*>**
VALID VALUES	0, 1, or 2
DEFAULT VALUE	0
DATA TYPE	Integer
DESCRIPTION	Determines the format of the Time Stamp. 0 - No Time Stamp 1 - Time stamp data are in microseconds 2 - Time stamp data are in milliseconds

VARIABLE	**UNITSCAN**
VALID VALUES	see list below
DEFAULT VALUE	PSI
DATA TYPE	string
DESCRIPTION	Unit scan factor. This sets the scan units for the DSA. 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

If a value other than those listed is entered, PSI will be used. It is best to use uppercase when entering these units.

VARIABLE	**XSCANTRIG**
VALID VALUES	0 or 1
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Sets the External Trigger as the Frame Trigger. 0 = the internal clock is the frame trigger 1 = the external trigger is the frame trigger

VARIABLE	**ZC**
VALID VALUES	0 or 1
DEFAULT VALUE	1
DATA TYPE	integer
DESCRIPTION	Sets zero correction on or off. 0 = no correction 1 = zero correction
NOTE 1:	ZC must be set to 0 for the following conditions: 1. Model is set to 3207 2. The module has gauge transducers installed.
NOTE 2:	ZC must be set to 0 for the following conditions: 1. Model is set to 3207 2. Absolute sensors are installed and the CALB command will not be used.
NOTE 3:	ZC must be set to 1 for the following conditions: 1. Model is set to 3217 or 3218 2. Differential transducers are installed
NOTE 4:	ZC must be set to 1 for the following conditions: 1. Model is set to 3207 2. Absolute sensors are installed and the CALB command will be used.

CALIBRATION VARIABLES

VARIABLE **ABS**
VALID VALUES 0 or 1
DEFAULT VALUE determined by module type
DATA TYPE integer
DESCRIPTION Sets the mode of operation of the module for models 3217 and 3218.
0 = gauge or differential
1 = absolute.

VARIABLE **ABSn** Where n = 0 - 15 for channels 1 - 16
VALID VALUES 0 or 1
DEFAULT VALUE determined by module type
DATA TYPE integer
DESCRIPTION Sets the mode of operation of the module for model 3207 only.
0 = gauge or differential
1 = absolute.

VARIABLE **MAXn** Where n = 0 - 15 for channels 1 - 16
VALID VALUES 0 through 500
DEFAULT VALUE 15
DATA TYPE integer
DESCRIPTION Sets the maximum pressure for channel n. This variable is only used if MODEL is set to 3207. This must be set to zero or to a positive number if the module is an absolute module.

VARIABLE **MINn** Where n = 0 - 15 for channels 1 - 16
VALID VALUES 0 through 500
DEFAULT VALUE 0
DATA TYPE integer
DESCRIPTION Sets the maximum pressure for channel n. This variable is only used if MODEL is set to 3207. This must be set to zero or to a positive number if the module is an absolute module.

VARIABLE **NEGPTSn** Where n = 0 - 15 for channels 1 - 16
VALID VALUES 0 through 8
DEFAULT VALUE 4
DATA TYPE integer
DESCRIPTION Sets the number of negative calibration points for channel n. This must be set to zero or to a positive number if the module is an absolute module. This variable is only used if MODEL is set to 3207

VARIABLE	**NEGPTSL**
VALID VALUES	0 through 8
DEFAULT VALUE	4
DATA TYPE	integer
DESCRIPTION	Sets the number of negative calibration points for channels 1 - 8. This must be set to zero or to a positive number if the module is an absolute module.

VARIABLE	**NEGPTSH**
VALID VALUES	0 through 8
DEFAULT VALUE	4
DATA TYPE	integer
DESCRIPTION	Sets the number of negative calibration points for channels 9 - 16. This must be set to zero or to a positive number if the module is an absolute module.

VARIABLE	**PMAXL**
VALID VALUES	any real number
DEFAULT VALUE	determined by module type
DATA TYPE	float
DESCRIPTION	Sets the maximum pressure for channels 1 - 8.
NOTE	The module will output 999999 if the measured pressure exceeds this value.

VARIABLE	**PMAXH**
VALID VALUES	any real number
DEFAULT VALUE	determined by module type
DATA TYPE	float
DESCRIPTION	Sets the maximum pressure for channels 9 - 16.
NOTE	The module will output 999999 if the measured pressure exceeds this value.

VARIABLE	**PMINL**
VALID VALUES	any real number
DEFAULT VALUE	determined by module type
DATA TYPE	float
DESCRIPTION	Sets the minimum pressure for channels 1 - 8. This must be set to zero or to a positive number if the module is an absolute module.
NOTE	The module will output -999999 if the measured pressure exceeds this value.

VARIABLE	**PMINH**
VALID VALUES	any real number
DEFAULT VALUE	determined by module type
DATA TYPE	float
DESCRIPTION	Sets the minimum pressure for channels 9 - 16.This must be set to zero or to a positive number if the module is an absolute module.
NOTE	The module will output -999999 if the measured pressure exceeds this value.

IDENTIFICATION VARIABLES

VARIABLE	**ECHO**
VALID VALUES	0 or 1
DEFAULT VALUE	0
DATA TYPE	integer
DESCRIPTION	Determines if characters received from a serial host will be echoed back to the host. 0 - the DSA will not echo characters 1 - the DSA will echo characters back to the host. .

VARIABLE	**MODEL**
VALID VALUES	3207, 3217, or 3218
DEFAULT VALUE	3217
DATA TYPE	string
DESCRIPTION	Determines the module type. When set to 3207, special variables are enabled to permit up to eight(8) ranges in a module. The recommended setting of ZC depends on the setting of MODEL. Please refer to the description of ZC for mor einformation.

VARIABLE	**PORT xxxx**
VALID VALUES	Any valid port number other than 0
DEFAULT VALUE	23
DATA TYPE	integer
DESCRIPTION	Sets the Ethernet port. The default value is 23 which is the TelNet port. A change to this variable does not take effect until the module has been rebooted. If PORT is set to zero, communications in Ethernet will be impossible.

VARIABLE	**HOST <IP Address> <Port> <Protocol>**
VALID VALUES	IP Address - Any valid IP Address Port - Any valid port number other than 0 Protocol - U for UDP T for TCP
DEFAULT VALUE	IP Address - 0 Port - 0 Protocol - T
DATA TYPE	Varies
DESCRIPTION	Sets the parameters for binary transmission to a host computer. The default port value is 23 which is the TelNet port. For binary transmission to Scanivalve Corp BTEL program, protocol must be set to U. A change to this variable does not take effect until the module has been rebooted. If PORT is set to zero, communications in Ethernet will be impossible.

PRESSURE VARIABLES

VARIABLE	**DELTA0 - DELTA15**
VALID VALUES	-32768 to 32767
DEFAULT VALUE	none
DATA TYPE	integer
DESCRIPTION	Delta zero corrections for channels 1 - 16. These values are set when a CALZ is executed.

VARIABLE	**TEMPB0 - TEMPB15**
VALID VALUES	any real number
DEFAULT VALUE	none
DATA TYPE	float
DESCRIPTION	The “B” term in the conversion equation used to convert temperature counts to degrees Celsius. The conversion formula is:

$$°C = \frac{Counts - TempB}{TempM}$$

VARIABLE	**TEMPM0 - TEMPM15**
VALID VALUES	any real number
DEFAULT VALUE	none
DATA TYPE	float
DESCRIPTION	The “M” term in the conversion equation used to convert temperature counts to degrees Celsius. The conversion formula is:

$$°C = \frac{Counts - TempB}{TempM}$$

VARIABLE	**ZERO0 - ZERO15**
VALID VALUES	-32768 to 32767
DEFAULT VALUE	none
DATA TYPE	integer
DESCRIPTION	The zero correction for channels 0 - 15. These values are set during the original calibration and fill.

DSA PACKET DEFINITIONS

When requested the DSA sends an application packet to the client. Each packet sent to the client starts with a Packet Type Word. This word defines the packet type.

PACKET TYPE TABLE

PACKET NAME	PACKET ID	BYTES	NOTES
Scan	1Hex	304	Binary Scan Packet (NOT USED)
Status	3Hex	180	Long Status Packet
Scan Raw	4Hex	72	Transmits Pressure and Temperature data in binary, raw counts.
Scan EU	5Hex	104	Transmits Pressure and Temperature data in binary, engineering units.
Scan Raw -Time	6Hex	80	Transmits Pressure data in binary, raw counts with a time stamp.
Scan EU - Time	7Hex	112	Transmits Pressure and Temperature data in binary, engineering units with a time stamp.
ASCII	20Hex	Variable	Text Packet may be formatted or un-formatted. The format is determined by the setting of the FORMAT Configuration Variable. **NOTE:** When the first integer of the packet is 20Hex or greater, the packet is assumed to be in ASCII FORMAT.

HOST to DSA

Command Packet

FUNCTION DESCRIPTION	BYTES	DATA TYPE	VALUES
ASCII Command Data (Refer to the Command Section of this manual for more information)	1 to 512	String	Unique to Packet Each line must be terminated with a CR, LF, CR-LF or LF-CR.

DSA to HOST
Scan Packet
(Not Used)

FUNCTION DESCRIPTION	BYTES	DATA TYPE	VALUE/NOTES
Packet Type	2	Integer	1Hex
Pad bytes (Forces quad byte alignment)	2	Integer	undefined
Module Name	20	char[20]	(not used)
Channels 1 thru 8 - Minimum Pressure	4	Float	(not used)
Channels 9 thru 16 - Minimum Pressure	4	Float	(not used)
Channels 1 through 8 - Maximum Pressure	4	Float	(not used)
Channels 9 through 16 - Maximum Pressure	4	Float	(not used)
Pressure Type	12	char[12]	Type of scan
Pressure Units	12	char[12]	Scan units
Temperature Type	12	char[12]	Temperature units
Status	20	char[20]	Current DSA status
Error	60	char[60]	Current DSA errors
Period	2	Integer	
Skip Frames	2	Integer	
Average	2	Integer	
Year	2	Integer	
Month	2	Integer	
Day	2	Integer	
Hour	2	Integer	
Minute	2	Integer	
Second	2	Integer	
Millisecond	2	Integer	
Channels 1 through 16 Pressure	64	Float	4 bytes per channel
Channels 1 through 16 Temperature	64	Integer	Degrees C 4 bytes per channel

Status Packet

FUNCTION DESCRIPTION	BYTES	DATA TYPE	VALUE/NOTES
Packet Type	2	Integer	3Hex
Pad bytes (Forces quad byte alignment)	78	Integer	undefined
Status	20	char[20]	Current DSA status
Pad bytes (Forces quad byte alignment)	80	Integer	(not used)

Scan Raw Packet

FUNCTION DESCRIPTION	BYTES	DATA TYPE	VALUE/NOTES
Packet Type	2	Integer	4Hex
Pad bytes (Forces quad byte alignment)	2	Integer	undefined
Frame Number	4	Integer	Current Frame Number
Channels 1 through 16 - Pressure	32	Integer	2 bytes per channel
Channels 1 through 16 - Temperature	32	Integer	2 bytes per channel

Scan EU Packet

FUNCTION DESCRIPTION	BYTES	DATA TYPE	VALUE/NOTES
Packet Type	2	Integer	5Hex
Pad bytes (Forces quad byte alignment)	2	Integer	undefined
Frame Number	4	Integer	Current Frame Number
Channels 1 through 16 - Pressure	64	Float	4 bytes per channel
Channels 1 through 16 - Temperature	32	Integer	Degrees C 2 bytes per channel

Scan Raw with Time Packet

FUNCTION DESCRIPTION	BYTES	DATA TYPE	VALUE/NOTES
Packet Type	2	Integer	6Hex
Pad bytes (Forces quad byte alignment)	2	Integer	undefined
Frame Number	4	Integer	Current Frame Number
Channels 1 through 16 - Pressure	32	Integer	2 bytes per channel
Channels 1 through 16 - Temperature	32	Integer	2 bytes per channel
Time in millisecond or microseconds	4	Integer	2 bytes
Time Units	4	Integer	1 = microseconds 2 = milliseconds

Scan EU with Time Packet

FUNCTION DESCRIPTION	BYTES	DATA TYPE	VALUE/NOTES
Packet Type	2	Integer	7Hex
Pad bytes (Forces quad byte alignment)	2	Integer	undefined
Frame Number	4	Integer	Current Frame Number
Channels 1 through 16 - Pressure	64	Float	4 bytes per channel
Channels 1 through 16 - Temperature	32	Integer	2 bytes per channel
Time in millisecond or microseconds	4	Integer	2 bytes
Time Units	4	Integer	1 = microseconds 2 = milliseconds

ASCII Packet

This packet will be transmitted when the host issues one of the following commands:
1) SCAN with BIN set to 0
2) LIST n
3) ERROR
4) STATUS

FUNCTION DESCRIPTION	BYTES	DATA TYPE	VALUE
ASCII Data (The first two bytes must **NOT** be 1Hex through 1FHex). Refer to the Command Section of this manual for the proper Command return formats.	1 to 1492	String	Unique to Packet. Each line is terminated with a CR, LF, CR-LF, or LF-CR.

EXAMPLES:

The following shows the format of the ASCII DATA portion of the List Packet in response to a LIST MASTER:

INSERT <temp> <chan> <press> <press counts> /M
INSERT <temp> <chan> <press> <press counts> /M
: : : :
INSERT <temp> <chan> <press> <press counts> /M

When a LIST ALL is commanded, Master and Calculated planes are listed. The Master items will have a /M suffix while the Calculated items will have a /C. The following is an example of a LIST ALL command:

INSERT <temp> <chan> <press> <press counts>/M
INSERT <temp> <chan> <press> <press counts>/C
: : : :
INSERT <temp> <chan> <press> <press counts>/M

For examples of the ASCII Packets returned from a SCAN Command, refer to the SCAN Command .

Network Protocols Supported

Physical Layer :	10Base-T IEEE 802.3
Link Layer:	INTERNET Protocol (IP)
Transport Layer:	Transmission Control Protocol (TCP)
	User Datagram Protocol (UDP)

DSA3200 Boot Parameter Modification

The DSA3200 Series modules use an operating system licensed from VxWorks. The boot parameters are set at the factory, but these parameters may be modified to suit the needs of a specific installation. This section documents the modification of the boot parameters.

1. De-energize the DSA3200. Connect the DSA3200 trigger/serial test cable (Scanco part #155829) from the DSA3200 to a host PC.
2. Start HyperTerminal, or an equivalent communication program. Connect the DSA3200 to a COM port on the PC Host. Set the serial parameters to 9600 BAUD, no parity, 8 data bits and 1 stop bit.
3. Energize the DSA3200. The following sign-on information should be displayed.

```
VxWorks System Boot
Copyright 1984-1997  Wind River Systems, Inc.

CPU: HITACHI hs7709
Version: 5.3.1
BSP version: 1.1/0
Creation date: Feb  9 2000, 12:41:05

Scanivalve (c)2000, Boot loader version 1.00
Press any key to stop auto-boot...
```

4. Press any key within 3 seconds to stop the auto-boot process. If a key is not pressed within the 3 seconds time, the system will proceed to auto-boot with the existing operating system using the current setup.

   NOTE: The boot-loader will continue to reboot until stopped by pressing a key under the following conditions:
   - A. If boot-from-flash is selected, and no operating system is present in flash.
   - B. if boot-from-net is selected and the FTP server is not correctly set up.

5. When the auto-boot process is stopped, the boot-loader will prompt with:

   [VxWorks Boot]:

   To get a list of the existing boot parameters:

   Type: p <Enter>

   The following list is the default setup:

```
boot device             : cs
processor number        : 0
host name               : host
file name               : c:/dsa_hs/vxworks.st
inet on ethernet (e)    : 191.30.80.100
host inet (h)           : 191.30.101.109
user (u)                : DSA_HS
ftp password (pw)       : scanivalve
flags (f)                  : 0x0
other (o)               : flash,000.096.093.218.000.002,10baset
```

6. Modify the parameters as required by typing the change command at the [VxWorks Boot] prompt

   Type: c<Enter> The boot-loader prompts you for each parameter.

   If a particular field has the correct value and does not need to be changed,

   Press: <Enter>

   NOTE: If any other key is pressed, that will replace the existing information.

   To clear a field,

   Type: . <Enter>

   To quit before viewing all of the parameters,

   Type: CTRL+D.

7. After all changes have been made, verify the settings:

   Type: p<Enter> The settings are saved in flash at this point.

8. Restart the operating system, with the new settings,

   Type: @<Enter> This is the “Load and Go” command.

9. If the DSA3200 boots correctly, de-energize the DSA3200 and disconnect the serial test cable.

10. Re-apply power to the DSA3200.

Boot parameters and their functions:

boot device	Must not be changed from cs
processor number	Must not be changed from 0
host name	Must not be changed from host.
file name	The full pathname of the operating system file name to be booted from, when booting from the network. The default path and file in this line is the path and file used at Scanivalve.
inet on ethernet(e)	The internet address of this DSA3200. The subnet mask may be specified when entering this parameter by entering a colon followed by the subnet mask in hex notation. I.e. 191.30.85.100:FFFFFF00
inet on backplane (b)	Must be left blank
host inet (h)	The internet address of the host to boot from.
gateway inet (g)	The internet address of a gateway node if the host is not on the same network as the DSA3200.
user (u)	The user name that the DSA3200 uses to access the host. This is the name that must be set up in the FTP server on the host. The FTP server must be set up to provide that user name with the proper permission to read from the host directory and the password must be set correctly.
ftp password (pw)	The user password. This must be supplied to boot from host.
flags (f)	Must be 0x0
target name (tn)	Must be blank
startup script (s)	Must be blank
other (o)	This specifies the place to boot from, the MAC address, and the network media. The line must not contain any spaces and each parameter is separated by a comma. The syntax is: <bootloc>,<mac address>,<media type> Valid values are case sensitive and are as follows: <bootloc> net - Boot from network flash - Boot from flash. <mac address> ddd.ddd.ddd.ddd.ddd.ddd <media type> 10base2 - 10Base2 type 10baset - 10BaseT type

DSA3200 Operating System Upload

This section describes the method for upgrading and uploading a new operating system to the DSA3200. Two programs are used in the DSA3200, the boot-loader and the operating system/DSA3200 application, referred to as the operating system.

The purpose of the boot-loader is to start the operating system from local flash or from a location on the network, such as a disk file on a host PC and to allow setting of certain key operating system parameters. The boot-loader can only be installed with special flash programming equipment. However, the boot-loader, under most normal upgrade conditions, would not need to be changed.

When upgrading a new DSA3200 operating system, the following procedure should be followed:

1. Install an FTP server, on your host PC. Scanivalve Corp recommends the War Daemon FTP Server. The installation is described in the FTP Server Installation/Configuration Procedure.
2. Use the boot parameter modification procedure to modify the boot parameters:
   A Change the file name parameter to the location of the vxWorks.st file.
   B. Insure that the user parameter is set to DSA_HS. It must match the user in the FTP server.
   C. Set the password to scanivalve. It must match the password in the FTP server.
3. Connect to the DSA3200 using TelNet
4. Issue the "UPLOAD S <full file path>" command from TelNet. Only back slashes can be used in the path name and the S must be upper case.
5. Monitor the operation with the STATUS command. When it returns READY, the upload is complete.
6. When the DSA3200 returns READY, The new operating system is installed in flash memory, but not in RAM.
7. The new operating system will be effective when power is recycled.

DSA3200 Buffer Description

The DSA3200 buffer is a software buffer. It is set up as a FIFO. It is factory set to hold 10000 averaged frames of data. Each frame uses 292 bytes of memory.

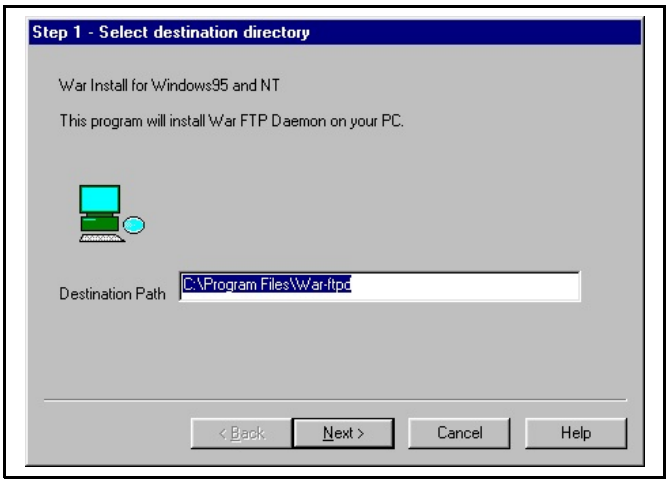
The software buffer is always in use regardless of the setting of QPKTS variable. The effect of QPKTS occurs when the buffer is filled. If QPKTS is set to 1, the scan will stop when the buffer is full. If QPKTS is set to 0, subsequent frames will be discarded when the buffer is full.

The buffer is the liaison between the scan task and the scan output task. The scan output task has a higher priority than the scan task. Under initial conditions, when the buffer is empty, the scan task places one frame of data in the buffer. It then signals the scan output task to read the buffer until it is empty. However, when multiple frames of data are in the buffer, the output task continues until the buffer is empty. Multiple frames of data will accumulate if the scan output task is blocked by the network while outputting data.

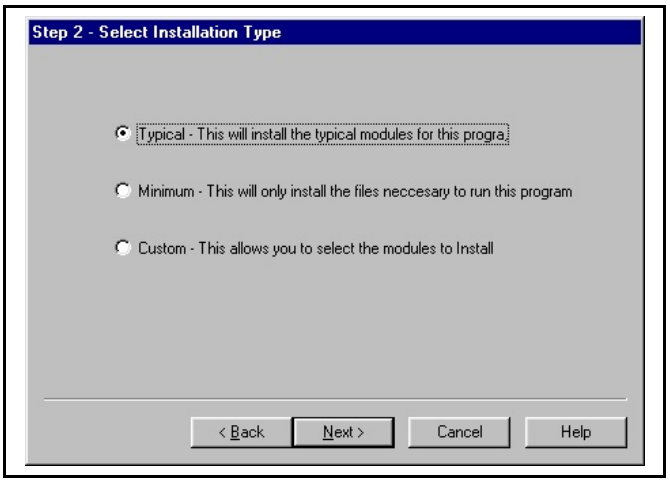
WarFTP Server

Installation

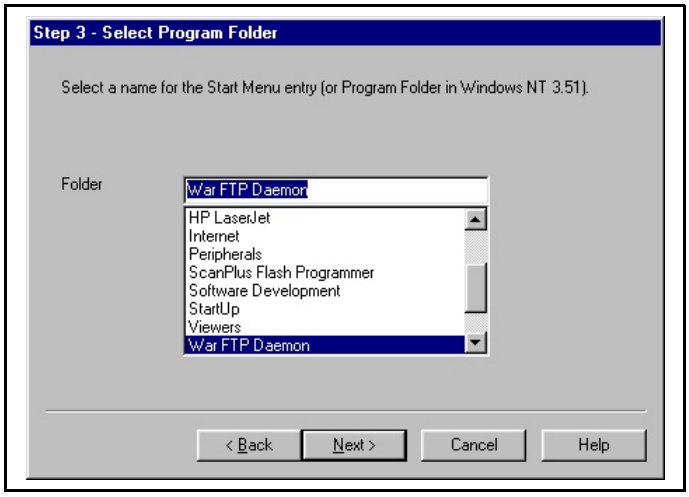
Copy the file: Warftp.exe into a temporary directory.
Double click: Warftp.exe to unzip the installation files.
Double click: Setup.exe
A window will open prompting for an installation directory. Click Next.



A window will open prompting for an installation type.
Select: Typical, and click Next.

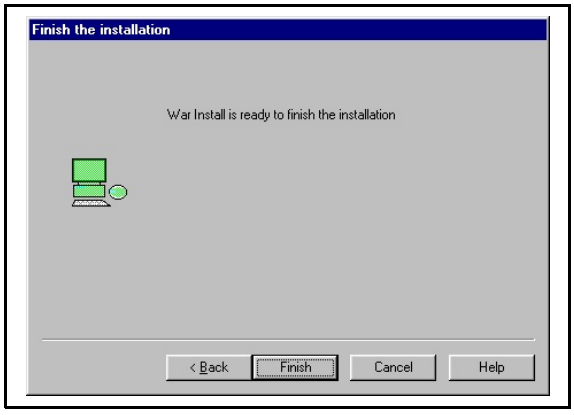


A Window will open prompting for a program folder. Use the default folder, and click Next.



A window will open prompting to finish the installation.

Click: Finish to complete the installation.



If the installation is successful, a window will open with this message. Click OK

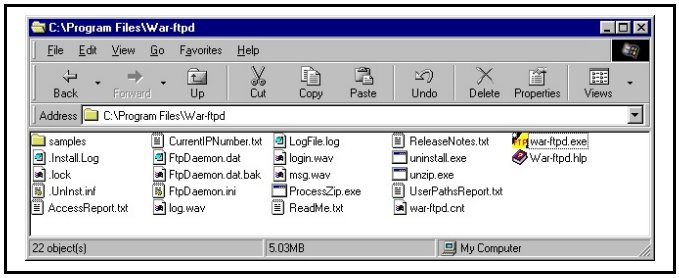
Create a folder for the DSA files.

Create the directory: C:\DSA_HS.

Copy the file: VxWorks into this directory.

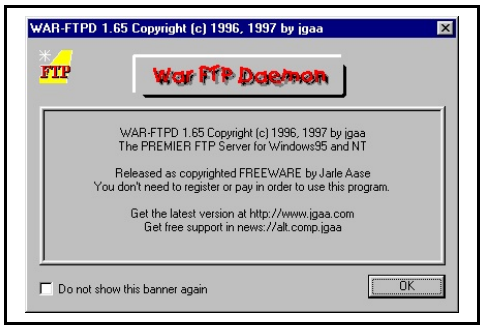
Configuration and Setup

Start the application by double clicking the war-ftpd.exe icon in the C:\Program Files\War-ftp directory.



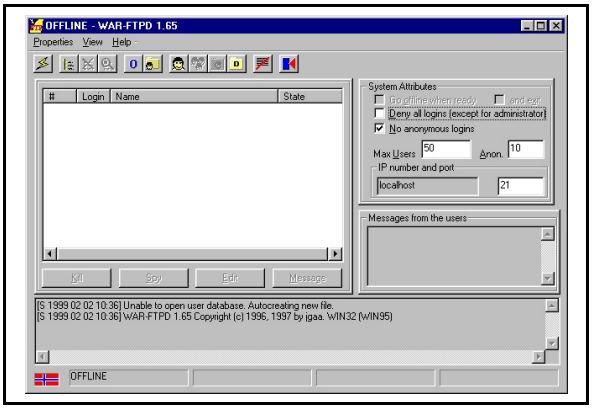
The War FTP Daemon information window will open

Enable the "Do not show this banner again" check box and click OK.

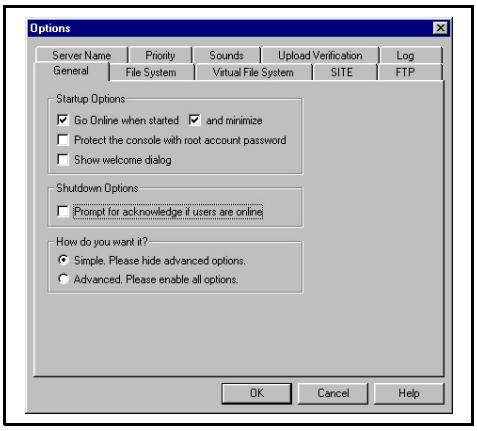


The main display window will open. It will look similar to the window below.

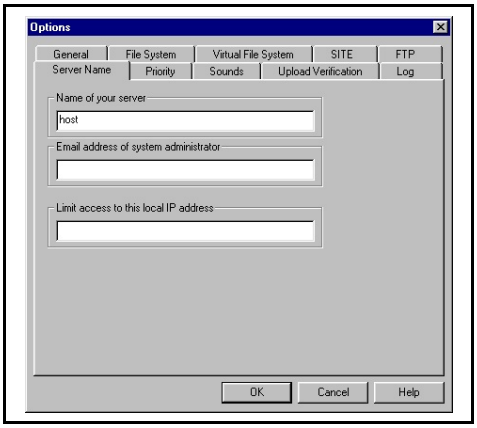
Select: Properties
Select: Options



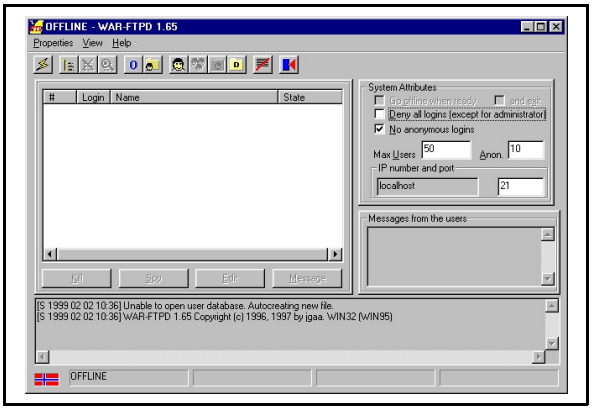
From the General Tab, Enable the "Go online when started and minimize" check boxes.
Select the Server Name Tab.



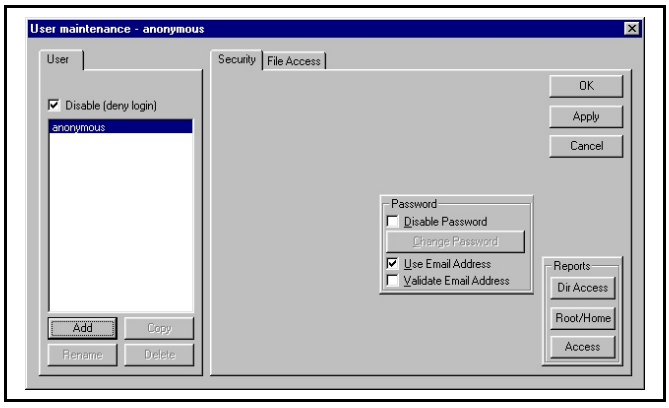
Enter a name for the FTP server.
In this example the server will be named : host.
Click OK.



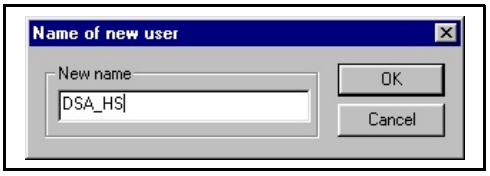
The main window will re-open
Open the User Maintenance window:
Click on the large smiling face icon



When the User Maintenance Window opens,
Click the Add button

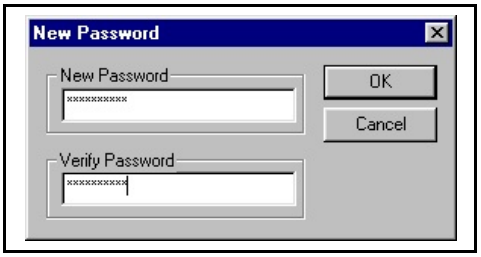


A window will open prompting a User name for the DSA
Enter a user name for the DSA.
For this example, the User Name will be: DSA_HS
Click OK.



Another window will open prompting for a password
Enter a password for the DSA.
For this example, the password will be: scanivalve.
Click OK.

.

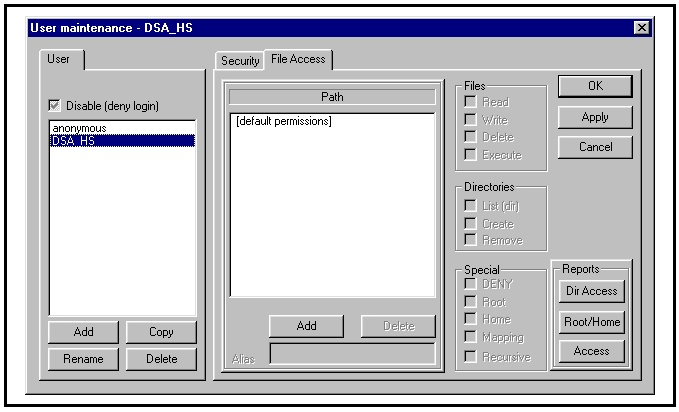


The User Maintenance window will re-open.

Highlight DSA_HS

Select the File Access Tab

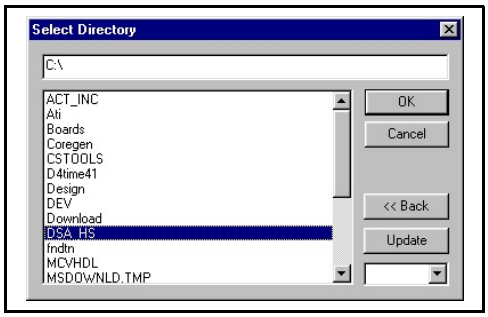
Click on the Add Button.



A Select Directory Window will open

Highlight the DSA_HS directory.

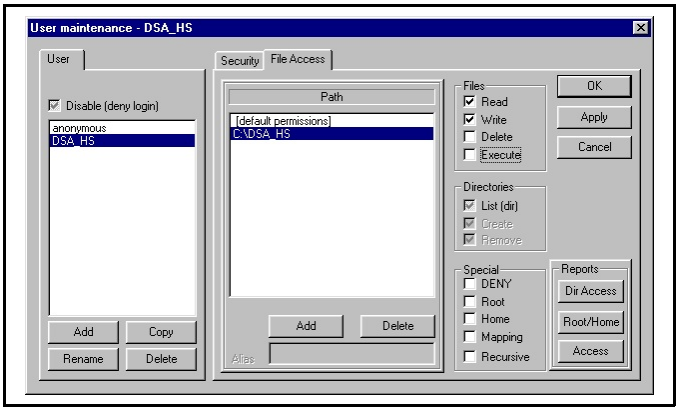
Click OK.



Enable the Read and Write checkboxes in the Files frame.

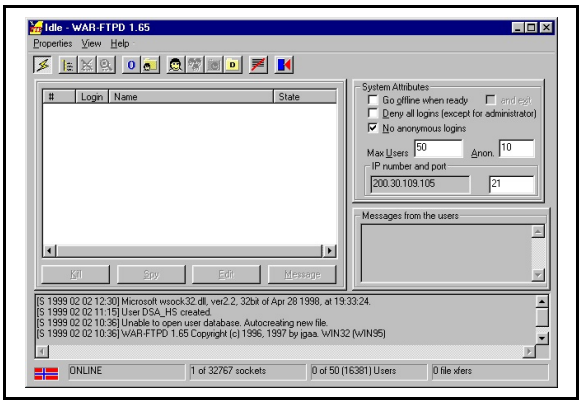
Click : Apply

Click: OK



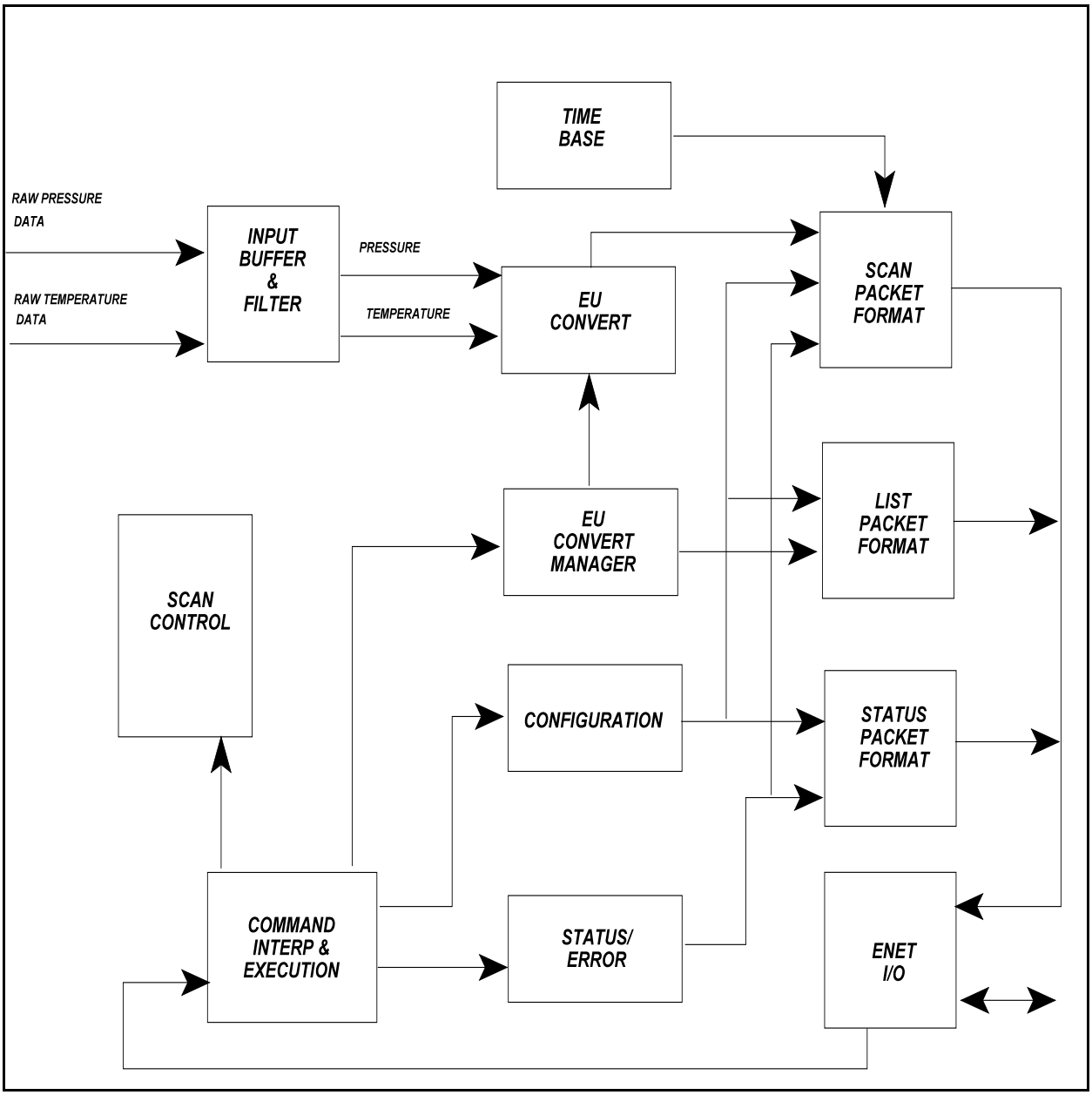
The Main Window will re-open
Put the server online:

Click on the lightning bolt..

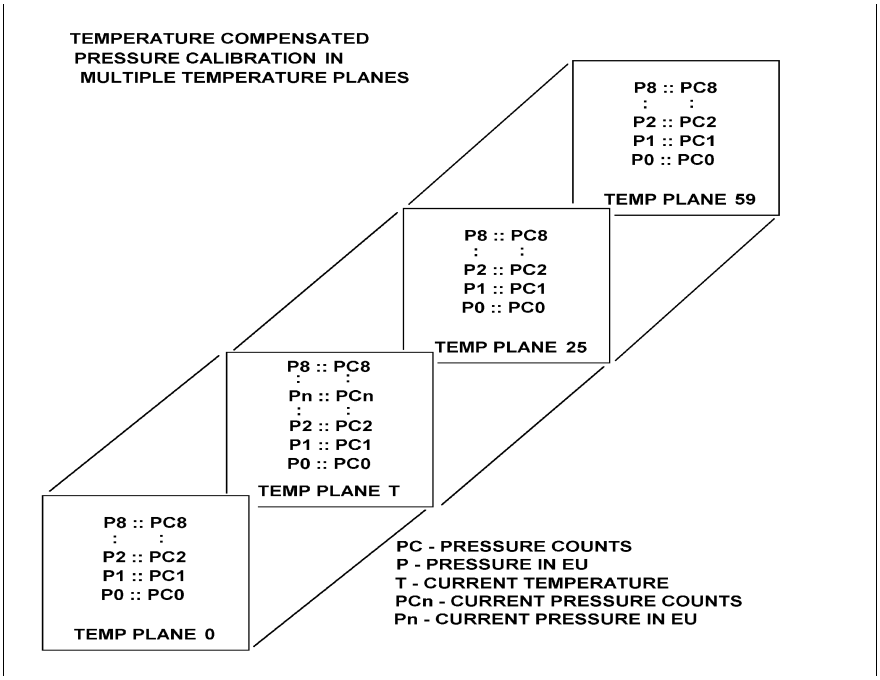


The WarFTP server is now ready
The server can be started manually as needed, or it could be configured to start automatically by placing a shortcut to War-Ftpd.exe in the Windows/Start Menu directory.

APPENDIX A - DSA Data Flow



APPENDIX B - Temperature Compensated Pressure Conversion



FORMULAS:

Pressure interpolation within current temperature plane:

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

Calculation of entries in current temperature plane:

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

Calculation of entries in current temperature plane:

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

APPENDIX C - Engineering Unit Conversion Constants

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

APPENDIX D - CHANGE LOG

Version 1.00 - Released April 2000
First Release

Version 1.01 - Released April 18, 2000
Corrected bug in the Dual Range Configuration
Added Dual Range capability

Version 1.02 - Released July 18, 2000
Added the Calibrate Command
Added Page Mode Variable to the SCAN group - this is active only when in UDP mode

Version 1.03 - Released August 23,2000
Added support for the DSA3207

Version 1.04 - Released March 2001
Added Software Trigger
TRIG command or <TAB> character

Version 1.05 - Released June 29, 2001
Increased upper temperature plane limit to 79 degrees Celsius

Version 1.06 - Released March 2002
Modified bootloader to support new or old flash chips
Added Variable PORT to the I Group to permit Ethernet ports other than 23

Version 1.07 - Released April 2003
Added HOST configuration variable for binary data transmission support.

Version 1.08 - Released June 2005
Modified the operation below 0 degrees C. If the sensor temperature is less than 0 degrees C, the EU conversion will use the last good set of coefficients. No error will be indicated.

Version 1.09 - Released January 2006
Added CALB command to permit adjustment of the ambient pressure reading of absolute sensors

Version 1.10 - Released January 2007
Disabled the Nagle Algorithm in TCP and UDP data transmission. This will guarantee one frame per packet in either data transmission.

Version 1.11 - Released June 2008
Modified the EU conversion to output 999999 if the measured pressure exceeds the maximum positive pressure setting or -999999 if the measured pressure exceeds the maximum negative pressure.
Extended the upper temperature range of the coefficient file to 79 degrees C. The software will use the last master plane coefficients for all EU conversions above 69 degrees C. The module will output 999999 when the temperature reaches 79 degrees C.