SPCENCL 3200
CALIBRATOR ENCLOSURE

INSTRUCTION and SERVICE MANUAL

06/2005

1722 North Madson Street
Liberty Lake, WA 99019
Tel: (800) 935-5151
(509) 891-9970
Fax: (509) 891-9481
web site: www.scanivalve.com
e-mail: scanco@scanivalve.com

Scanivalve Corp.

WARRANTY

Scanivalve Corporation, Liberty Lake, Washington, hereafter referred to as Seller, warrants to the Buyer and the first end user that its products will be free from defects in workmanship and material for a period of twelve (12) months from date of delivery. Written notice of any claimed defect must be received by Seller within thirty (30) days after such defect is first discovered. The claimed defective product must be returned by prepaid transportation to Seller within ninety (90) days after the defect is first discovered. Seller's obligations under this Warranty are limited to repairing or replacing, at its option, any product or component part thereof that is proven to be other than as herein warranted.

Surface transportation charges covering any repaired or replacement product or component part shall be at Seller's expense; however, inspection, testing and return transportation charges covering any product or component part returned and redelivered, which proves not to be defective, shall be at the expense of Buyer or the end user, whichever has returned such product or component part.

This Warranty does not extend to any Seller product or component part thereof which has been subjected to misuse, accident or improper installation, maintenance or application; or to any product or component part thereof which has been repaired or altered outside of Seller's facilities unless authorized in writing by Seller, or unless such installation, repair or alteration is performed by Seller; or to any labor charges whatsoever, whether for removal and/or reinstallation of the defective product or component part or otherwise, except for Seller's labor charges for repair or replacement in accordance with the Warranty. Any repaired or replacement product or component part thereof provided by Seller under this Warranty shall, upon redelivery to Buyer, be warranted for the unexpired portion of the original product warranty.

THIS WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND IN NO EVENT SHALL SELLER BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

In the event of a failure:

1) Notify Scanivalve Corporation, Technical Service Department. Include model number and serial number. On receipt of this information, service data or shipping instructions will be forwarded. This may be transacted by telephone: (800)935-5151 or (509)891-9970
2) On receipt of shipping instructions, forward the product, transportation prepaid. Repairs will be made and the product returned.
3) All shipments should be made via "Best Way". The product should be shipped in the original packing container or wrapped in protective material and surrounded by a minimum of four (4) inches of a shock absorbing material.

Scanivalve Corp.
1722 N. Madson Street
Liberty Lake, WA 99019
Telephone: (800)935-5151 (509)891-9970
Fax: (509)891-9481

Table of Contents

Figures and Illustrations

Specifications

Modules	4
Power Requirements	115 or 230 Vac 50 or 60 Hz
Communications Protocol	
To Host	Ethernet 100Base-T TCP/IP or UDP
To Calibrators	RS232
Typical Communications Rate	
Ethernet	100 Mbits/sec
RS232 to Calibrators	9600 BAUD
Dimensions (LxWxH)	19.0in x 8.75in x 15.0in (48.26 cm x 22.23 cm x 38.1 cm)
Weight	
Enclosure only	20 lbs (9.07 kg)
SPC3000 and back blocks (each)	8.5 lbs (3.86 kg)(up to four (4) per enclosure)
Operating Temperature	0°C to 50°C
Storage Temperature	-20°C to 75°C
Operating and Storage Humidity	0 to 90% (noncondensing)

General Description

The SPCENCL3200 is designed to permit SPC3000 Calibrators to be utilized in an Ethernet system. Each SPCENCL3200 can accept up to four (4) SPC3000 Calibrators.

The SPCENCL3200 contains an imbedded computer, RAM memory, and a hard disk drive. The SPCENCL3200 uses Windows XP®Embedded as an operating system. Connections for a monitor, keyboard and mouse are available at the rear of the SPCENCL3200. A USB connection is also available in the SPCENCL3200. A user may connect to these inputs and operate the SPCENCL3200 as a stand alone computer.

Getting Started

The SPCENCL3200 is a stand alone calibrator control system. It incorporates a microprocessor, RAM, a Hard Disk, and other interface boards to control SPC3000 Pressure Calibrators in Scanivalve Corp Electronic Pressure Scanning Systems. A user should be familiar with Windows XP to best understand the operation of the SPCENCL3200.

Hardware

The SPCENCL3200 is furnished with a set of mounting ears so the unit may be mounted in a standard 19 inch rack. Support rails are also furnished to help support the enclosure. It is important to note that the SPCENCL3200 uses a Compact Flash Card as a hard disk drive. Although a Compact Flash is designed for rough service, it cannot be subjected to severe shock or vibration. If the SPCENCL3200 could be subjected to shock and vibration levels above 5 g's, shock mounts MUST be used. Figure 1 shows the mounting dimensions and details. Dimensions in parentheses are millimeters. Figure 2 on the next page is a close up of the rear panel. Figure 3 is a more detailed view of the local connections. It also shows the access to the Compact Flash Disk Drive.

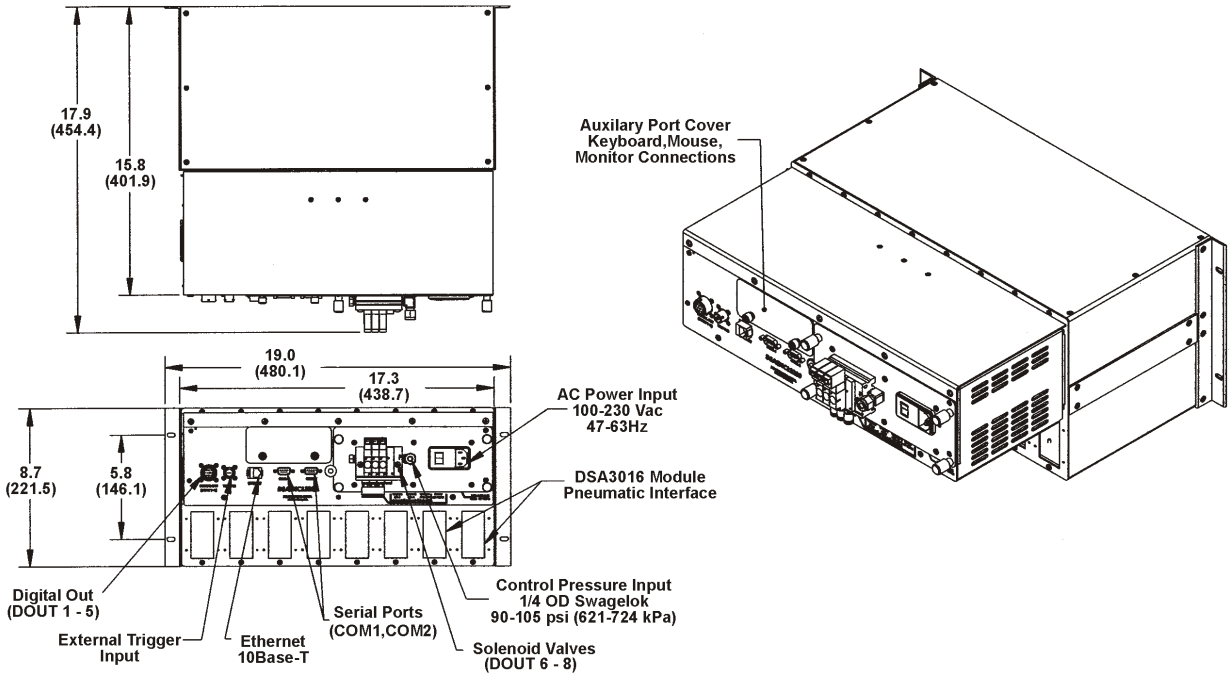


Figure 1 - SPCENCL3200 Physical Measurements and Mounting Dimensions

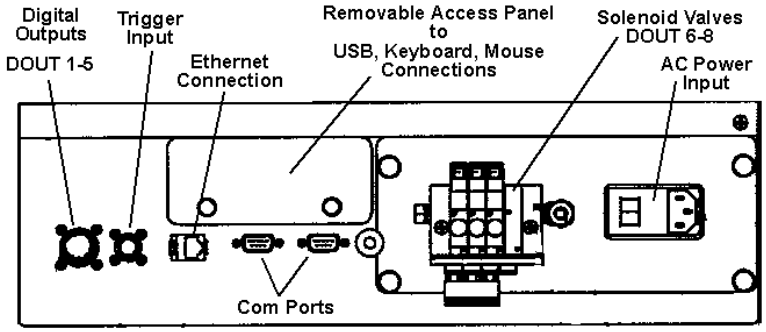


Figure 2 - SPCENCL3200 Rear panel

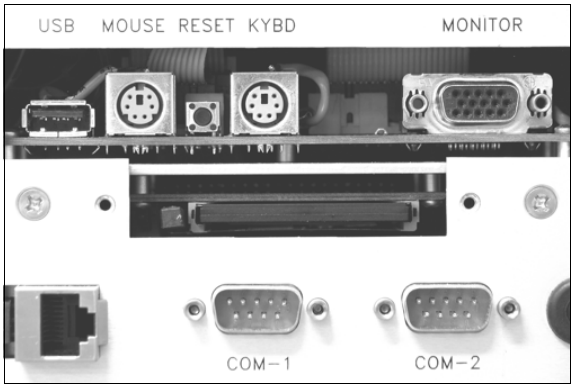


Figure 3 - Local Connection and Hard Disk Drive details

Power Requirements

The SPCENCL3200 operates from 115 Vac 60 Hz or 230 Vac 50 Hz. It generates ±15.00 Vdc, +5.00 Vdc, and +24 Vdc internally. Power connections are made through a Power Entry Module.

It is very important to insure that the cooling fan is operating whenever power is applied to the SPCENCL3200. If the cooling fan is not functioning, the SPCENCL3200 **MUST** be shut down as soon as possible. The processor will overheat and could be damaged if cooling air flow is lost.

Ethernet Connections

The Ethernet Adapter is built into the EBX Computer Board. An RJ45 connector is available on the rear panel. The Ethernet speed is 100Base-T. All connections must conform to IEEE802.3. The SPCENCL3200 Ethernet is 100% Novell NE2000 compatible.

For more information refer to the SPCENCL3200 Software Requirements Specification.

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

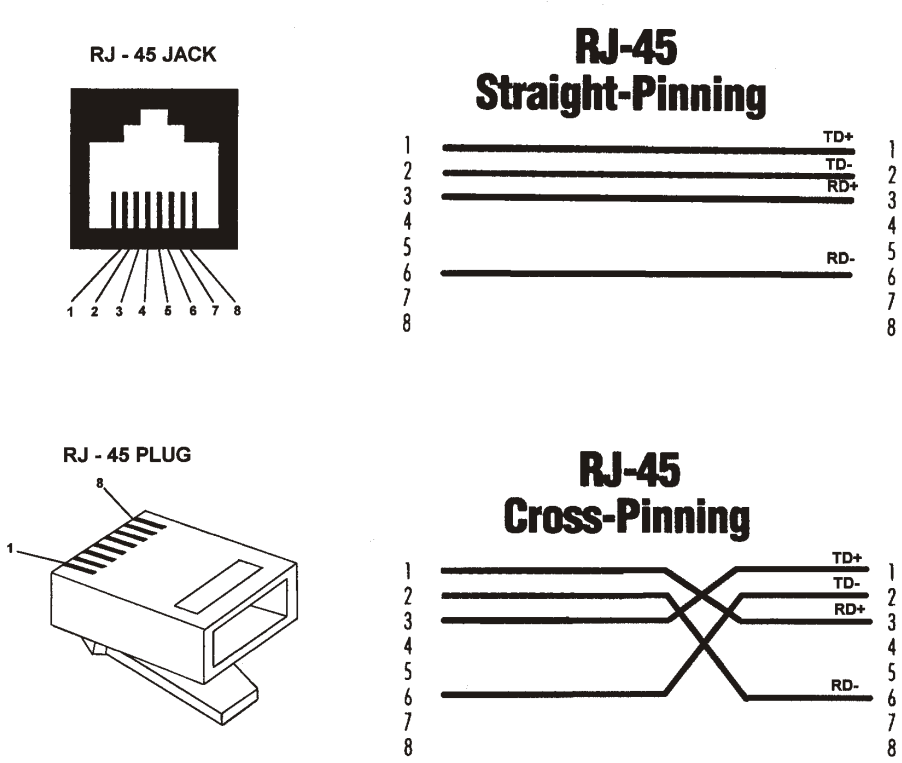


Figure 4 - RJ - 45 Plug and Jack

Serial Connection

Each SPCENCL3200 has two Serial connections. The Serial connections are only used for communication with a SPC3000 Calibrator or another Auxiliary Serial Device. COM1 connects to Callibrator number one (1). The serial connection to other SPC3000 modules in the SPCENCL3200 are “daisy chained from one calibrator to the next. Each calibrator has a unique address. The connections conform to the RS232C standard. The connector wiring is shown in Figure 5 below.

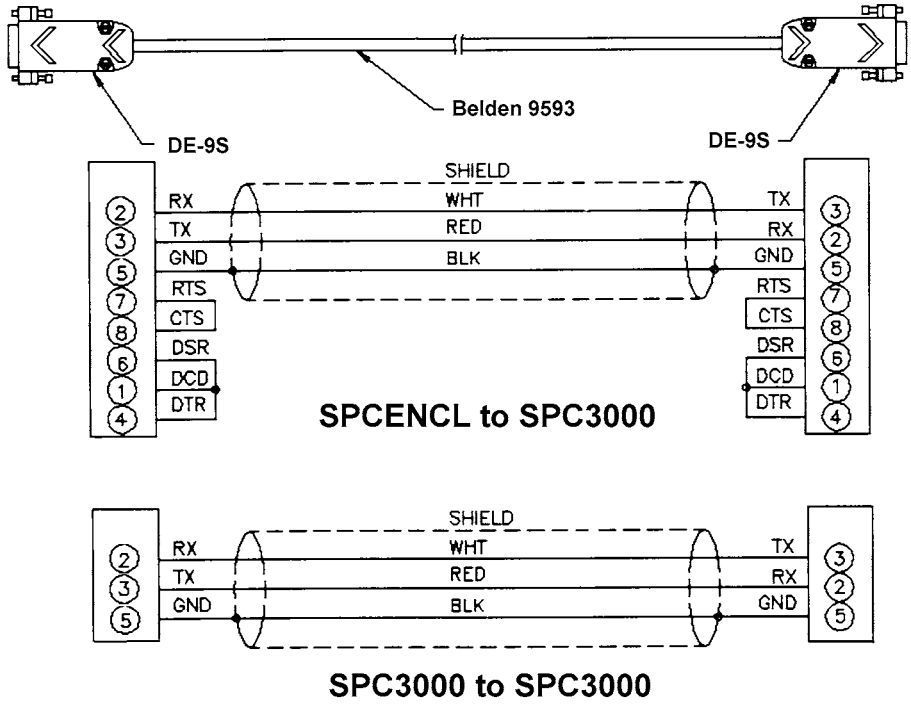


Figure 5 - RS232C Wiring

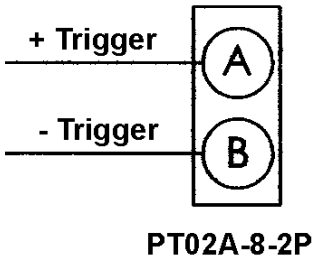
Digital I/O Connections

Each SPCENCL3200 has a Digital Output and a Trigger Input Connector. A maximum of Five(5) Digital Outputs may be configured. Configuration information may be found in the Software Specification

The Trigger Input is edge triggered. The input pulse should have a minimum voltage of 9 Vdc at 6.5 ma. The maximum trigger voltage is15 Vdc. The Trigger Input mating connector is a PT06A-8-2S

Digital Outputs are 24 Vdc @ 500 mA maximum. The Digital Output mating connector is a PT06A-12-10P

Figure 6 shows the wiring of the Trigger Input, Figure 7 shows the wiring of the Digital Outputs.



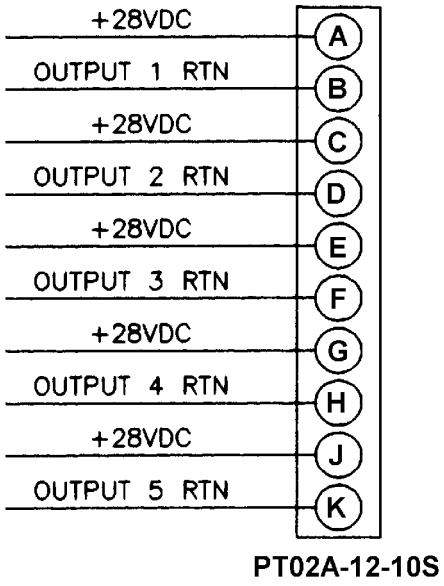


Figure 6 - Trigger Input Wiring

Figure 7 - Digital Output Wiring

Software

When the SPCENCL3200 is mounted and the power requirements are met, the unit is ready to be configured for use. All configuration variables must be set using a communications program or by using the SPCENCL3200 as a stand alone computer. A user may remove the access cover and connect a keyboard, mouse, and a monitor to the SPCENCL3200 and use it as a computer. The SPCENCL3200 uses Embedded Windows XP Embedded as an operating system.

A user may connect another computer to the SPCENCL3200 and communicate by one of the following protocols and associated programs:

Ethernet

TelNet - A program furnished with Windows 98. This permits a network connection to the SPCENCL3200. A TelNet session is described later in this manual.

HyperTerminal - HyperTerminal may be configured for a winsock terminal program in Windows NT, 2000, and XP.

Other commercially available programs such as LapLink, PROCOMM, or any communications program may be used to load configuration files to the SPCENCL3200. A HyperTerminal Winsock session is described later in this manual.

Operation

This section contains information and procedures required for the proper operation of the SPCENCL3200 .

The SPCENCL3200 series enclosures are a stand alone data system. They use Windows XP Embedded as an operating system. When power is first applied, a SPCENCL3200 will self boot and execute a program named: **SPCENCL.EXE**. The entire boot up process requires approximately 2-3 minutes. When the SPCENCL3200 is ready to accept commands a prompt symbol will be transmitted to the host computer.

Operation of the SPCENCL3200 may be monitored or controlled by connecting a computer to the Ethernet connection, or by removing the rear access cover and connecting a monitor, keyboard, and mouse to the processor board.

Local Connections

The SPCENCL3200 may be operated in the local mode by removing the rear access cover and connecting a monitor, keyboard, and mouse to the connection points provided on the processor board. Refer to figures 1, 2, 3, and 18 for more information.

In the Local Mode, the SPCENCL3200 operates as a stand alone computer.

Ethernet Connections

All SPCENCL3200'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 SPCENCL3200 Enclosures have a preset IP address that can be modified by a user, if desired. The preset IP address is 191.30.45.xxx where xxx is the serial number of the unit.

Changing the IP Address

The IP Address can be modified by changing the settings of the TCP/IP Properties associated with the Local Area Connection. The IP Address can only be modified by changing the settings of the Windows IP address assignments. These assignments can only be modified when the SPCENCL3200 is in Local Mode with a Keyboard, Monitor and Mouse connected.

To change the IP Address:
- Select Start
- Select Control Panel

From the Control Panel Window:
- Select Network Connections

From the Network Connections Window:
- Select Local Area Connection

The Local Area Connection Status window will open,
- Click on Properties

The Local Area Connection Properties Window will open,
- Left Click once on Internet Protocol (TCP/IP) to highlight the line
- Click on Properties

Click the appropriate Radio Button for the IP Address assignment
- Click on: Obtain an IP address automatically if the LAN is controlled by a server
- Click on: Use the following IP address if the LAN is a dedicated LAN.

Enter the IP address and Subnet Mask.

The DNS settings should be set to suit the Local Area requirements.
- Click OK to save the changes.
- Click OK to exit the Local Area Network Properties Window
- Close the Local Area Status Window

Close the Network Connections Window.

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

Saving Configuration Changes

Changes to the C: Drive in the SPCENCL3200 require the execution of a configuration manager program. The SPCENCL3200 Hard Disk Drive is labeled as Drive C and Drive D. However, Drive D is actually a folder on Drive C. Drive D changes do not require execution of the configuration manager program.

Storing Data on Drive D

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

SPCENCL Configuration Variables

Changes to SPCENCL3200 software Configuration Variables are permanent as soon as a SAVE command is issued.

Operating System Changes

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

Select: Start
Select: Run

The Run Window will open.
In the window labeled: Open:, Enter the following command:

ewfmgr -commit c:
Click OK to execute the program

Execute a “clean” shutdown of Windows

Select: Start
Select: Turn off Computer
Select: Restart

When the SPCENCL3200 has completed the restart, the changes will be permanent.

TelNet Host Operation - Windows 95 and 98

A host computer may be used to control the SPCENCL3200 without special software. The host to SPCENCL3200 connection should be made using an Ethernet connection.

Open a **TelNet** session.
Select: Terminal
Select: Preferences
Enable Local Echo
Set the Emulation to VT100/ANSI
Select: Connect
Select: Remote System
Host Name: Enter: 191.30.45.xxx Where: xxx is the serial number
Port: Select: Telnet
TermType: Select: vt100
If the computer opens a Dial Up Box,
Click on Cancel

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

HyperTerminal Ethernet Operation - Windows NT, 2000, and XP

Open the HyperTerminal program
- Select: Start
- Select: Programs
- Select: Accessories
- Click on Hyperterminal

A HyperTerminal Window will open
- Double Click: Hyperterminal.exe

A New Connection Window will open
- Enter a name for the session and Click OK

A Connect to Window will open
- Click on the down arrow by the Connect Using Box and click on TCP/IP(Winsock)
- Enter the IP address of the SPCENCL3200 in the Host Address Box
- The HyperTerminal window will indicate that a connection has been made.

Check the setup
- Select: File
- Select: Properties

A Properties Window will open.
- Click on the Settings Tab
- Emulation Mode should be Auto Detect
- Terminal should be ANSI

Click on the ASCII Setup Button
- For best operation, The check boxes for:
- Send line ends with line feeds, and Echo typed characters locally may have to be checked

Configuration Variables

The SPCENCL3200 contains many configuration variables which must be set up properly in order for the SPCENCL3200 to function correctly. These variables are arranged in groups to aid the user in the setup of the SPCENCL3200. This section contains recommended setup information. It is expected that the information in this section will permit a user to set up and check out a SPCENCL3200. The user must be aware that the setup may need to be modified depending upon test requirements. It is recommended that a user read, and be completely familiar with, the RAD 3200 Series Software Requirements Specification before attempting to set up a SPCENCL3200.

The SPCENCL3200 Configuration Variables are set up to default settings that will generally permit the user to communicate using Ethernet TCP/IP. If communications cannot be established, then the setup will have to be started in the local mode. This requires a keyboard, monitor(VGA or better), and a mouse. Refer to figures1, 2, and 3 for more information on connecting these devices.

Please refer to the RAD 3200 Series Software Requirements Specification in this manual for more information on the proper syntax and methods for verifying and/or modifying Configuration Variables.

Identification Variables - List I

The first variables to set are the Identification variables. A List I command to the SPCENCL3200 will result in the following:

```
List I
SET NL 0
SET HAVENET 1
SET CONOUT 2
SET NETOUT 2
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 BINADDR 0 0.0.0.0
SET BIN 0
```

Digital I/O Variables - List D

This group sets up the Digital Inputs and Outputs. The defaults follow:

```
List D
SET DOUTPU 0
SET DOUTREADY 40
```

Calibrator Commands

Commands to SPC3000 calibrators installed in a SPCENCL3200 must conform to the following syntax::

CALCMD <calibrator address> <calibrator command><Enter>

Calibrator address - any valid calibrator address, 0 to 9, or U to Y

Calibrator command - any valid calibrator command

Note: The SPCENCL3200 will not support continuous readings. A TUNE command may be initiated through the Ethernet connection, but the TUNE progress may not be monitored.

The following lists show the most commonly used SPC3000 commands. For more information on these commands, please refer to the SPC3000 manual.

Control Command Group

Command Function	Command
Read Pressure	RP
Go Positive	GP
Go Negative	GN
Positive High	PH
Positive Medium	PM
Positive Low	PL
Negative High	NH
Negative Medium	NM
Negative Low	NL
Initialize Calibrator	IC
Zero Pressure	ZO
Energize Closure	EC
Set Closure	SC

Configure Command Group

Command Function	Command
New Configuration Variable	NC
New Ranges	NR
Set Mode	SM
Set Points Positive	SPP
Set Points Negative	SPN
Transmit Configuration Variable	TC
Status Inquiry	SI
Display Configuration Variable	DC
Display Pressure Points	DPP
Burn Prom	BP

Diagnostic Command Group

Command Function	Command
Erase Faults	EFLT
Display Faults	DFLT
Read Voltage	RV
Display Period	DP
Tune Servo	TUNE

Auxiliary Device Commands

Commands to Auxiliary Devices connected to a SPCENCL3200 must conform to the following syntax::

AUXCMD <calibrator address> <calibrator command><Enter>

Device address - any valid device address, 0 to 9

Device command - any valid device command

Note: The SPCENCL3200 will not support continuous readings.

Pneumatics

The SPCENCL3200 has built in pneumatic solenoids that may be used for control of CALZ, RUN, and PURGE in ZOC modules. These solenoids are configured to operate from Digital Outputs 6, 7, and 8. These were selected because they do not interfere with the possible use of Digital Outputs 1-5. Figure shows the solenoids, pneumatic fittings, and the Control Pressure Input on the Rear Panel of a typical SPCENCL3200. Figure 9 is a close up of the silk screen legend documenting the valves, their function and the DOUT command that controls each one.

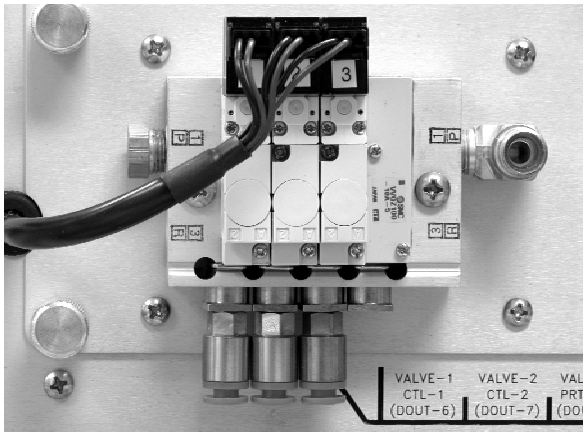


Figure 8 - SPCENCL Control Pressure Pneumatic Block

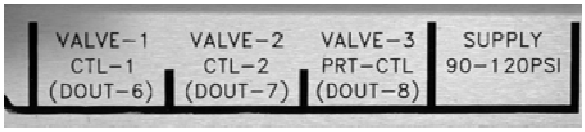


Figure 9 - SPCENCL Control Pressure Pneumatics Legend

Control Pressure Pneumatic Block Details

A user does not need to make any electrical connections to the Solenoid Valves. All electrical connection are made and tested at the Scanivalve Factory.

If the SPCENCL 3200 is purchased as part of a system, the unit will be shipped with all tubing connection made and tested at the factory. In this case, a user must only connect is a Control Pressure Supply Pressure to the Control Pressure Input fitting.

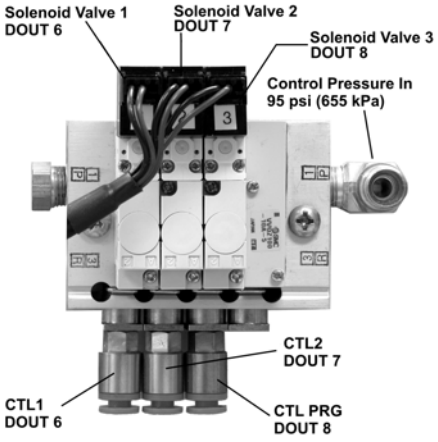


Figure 10 - SPCENCL Control Pressure Pneumatic Block Details

If the SPCENCL3200 has been purchased as a spare or without modules, a user will have to connect the Solenoid control pressure, Servo pressure, and the CAL, REF and Static connections to the module back blocks. Figure 11 shows the three connection points on a typical rear access back block.

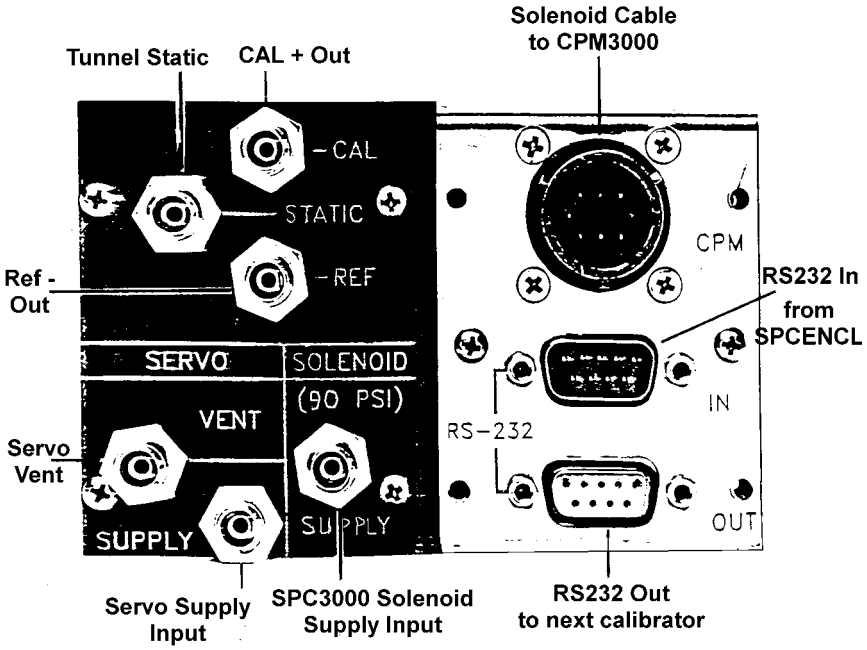


Figure 11 - Typical SPC3000 Rear Access Back Blocks

The methods required to connect the control pressure tubing to the rear back blocks will depend on the type of back block. For information on connections to the back blocks, please contact Scanivalve Corp, Product Support Department for more information.

Solenoid Valve Tube Connections

The SPCENCL3200 Solenoid valves use a SMC IQH3-M5 fitting for the tubing connection. This fitting has an internal compression o-ring that “captures” the tube and forms a leak tight seal. It is designed to accept a 0.187 inch (4.75 mm) OD plastic tube. Figure 12 shows the fitting and the tube connection.

To connect a tube:

1. Cut the tube end square. The cut must not be angled. Angled ends may result in leaks. The fitting has an internal compression o-ring that “captures” the tube forming a leak tight seal.
2. Insert the tube into the fitting. The tube will meet resistance from the compression o-ring after approximate 0.375 inches(9.5 mm) has been inserted.
3. Force the tube into the compression fitting. The tube will encounter a stop after another 0.25 inches(6.35 mm) has been inserted.

To Disconnect a tube, Press the release ring (Figure 12, view 3)toward the body of the fitting while pulling on the tube. The tube will slide out of the fitting. The release ring will only move about 1 mm.

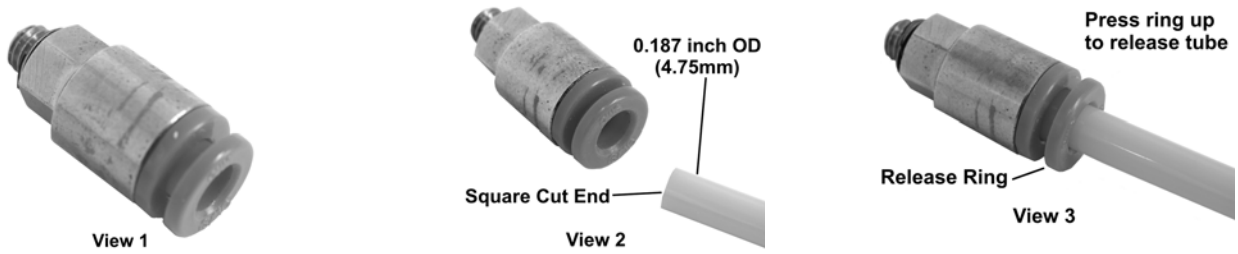


Figure 12 - Control Pressure tubing connection

Maintenance

The SPCENCL3200 is built from subassemblies. Many of these subassemblies are shared with other variations of the SPCENCL3200 family. All of the subassemblies are field replaceable. This section shows the major subassemblies. The major subassemblies are:

EBX Processor Board
EBX Breakout Board
Compact Flash Solid State HDD
Power Supply
Cooling Fan

Figure 13 is a Block Diagram of the SPCENCL3200. Figure 14 is an exploded view of the SPCENCL3200. Each of the major subassemblies is identified. Figures 15 and 16 show the Internal Cable Connections. Figures 17 and 18 show the EBX Processor Board and the EBX Breakout Board. Figure 19 shows the SPCENCL3200 Power Supply and the Power Distribution Cable.

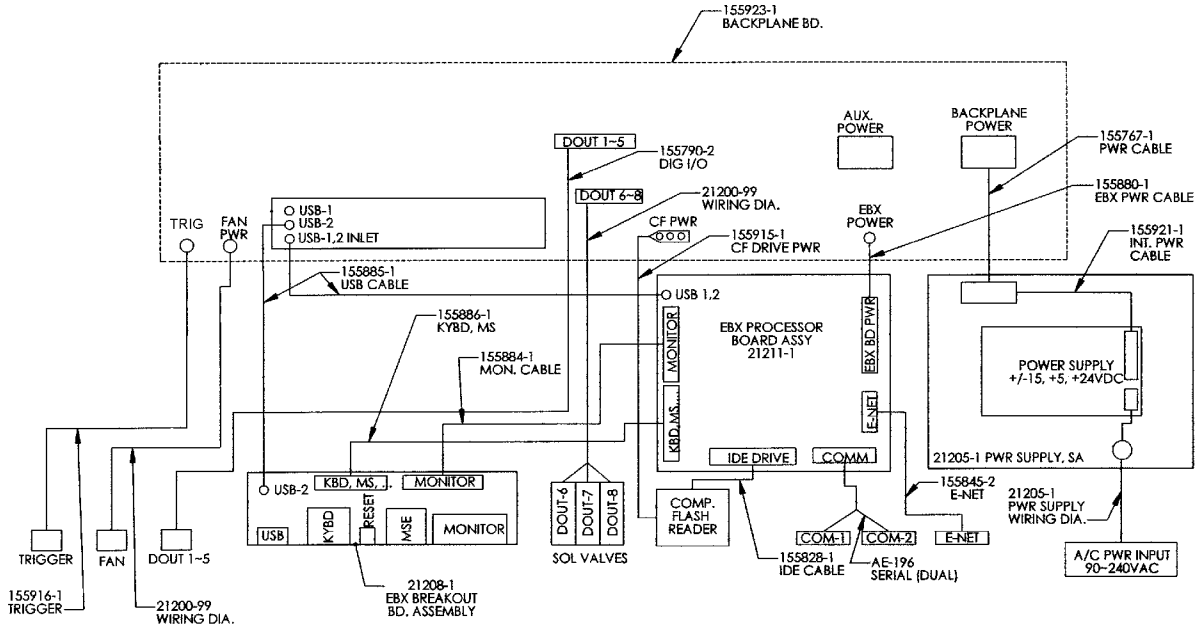


Figure 13 - SPCENCL Block Diagram

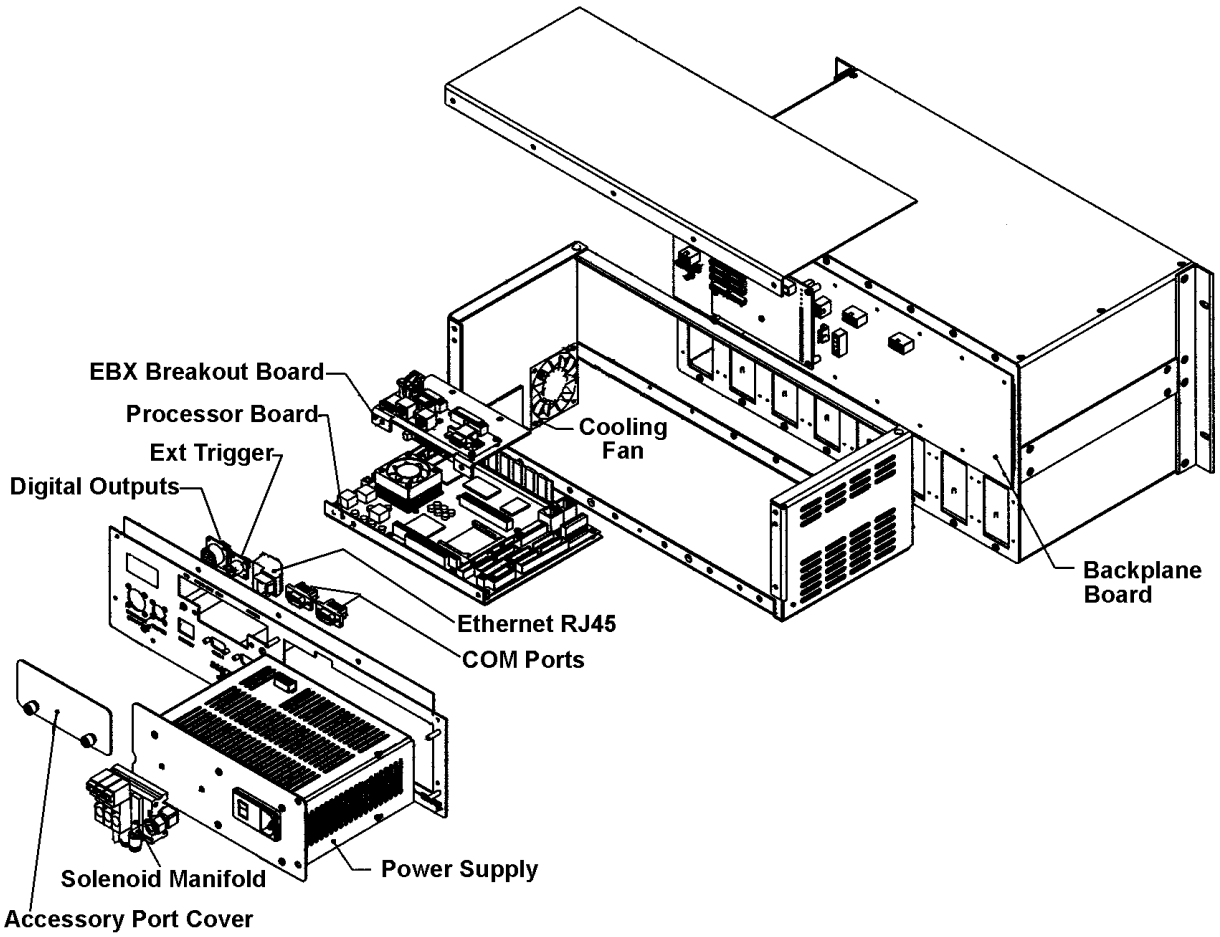


Figure 14 - SPCENCL3200 Exploded View

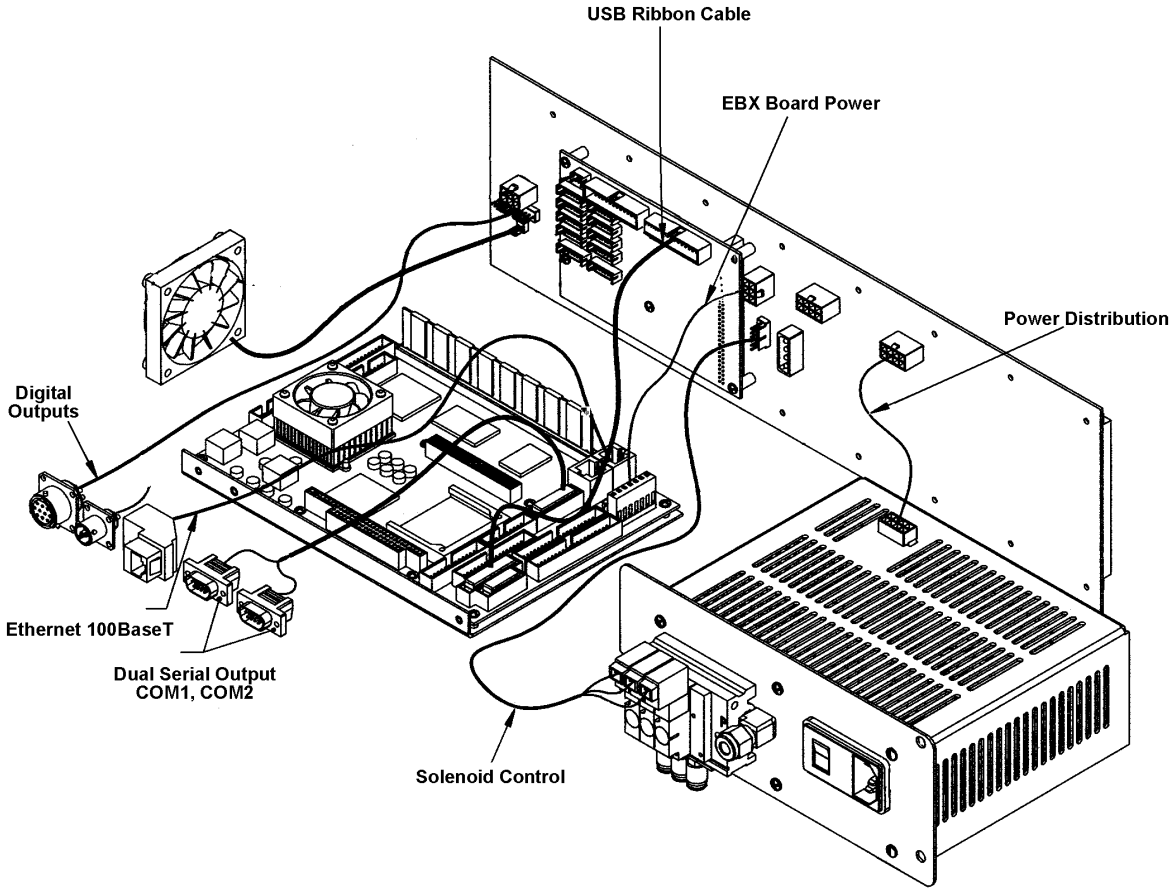


Figure 15 - SPCENCL3200 Internal Cable Connections, Part 1

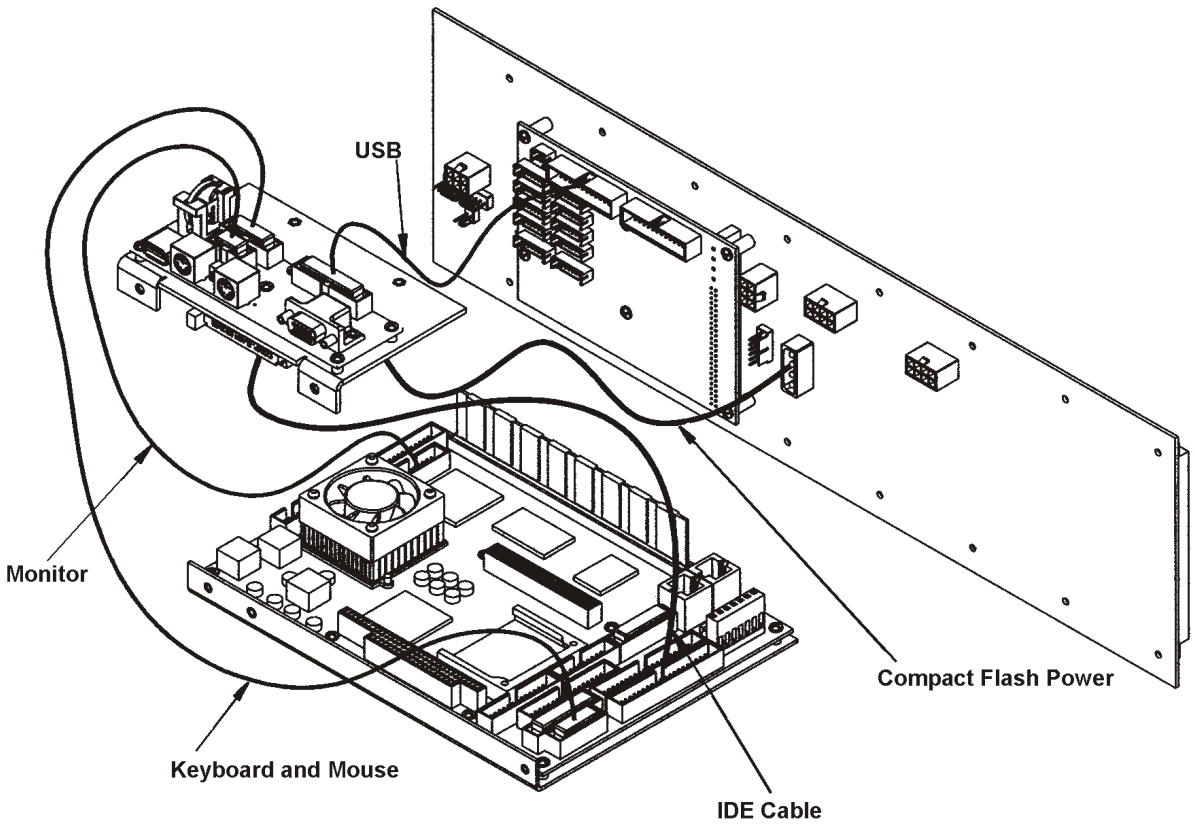


Figure 16 - SPCENCL3200 Internal Cable Connections, Part 2

Processor Board

All variations of the SPCENCL3200 enclosures use an EBX Processor Board. The processor board contains all of the connections required for the SPCENCL3200 to operate in a stand alone mode.

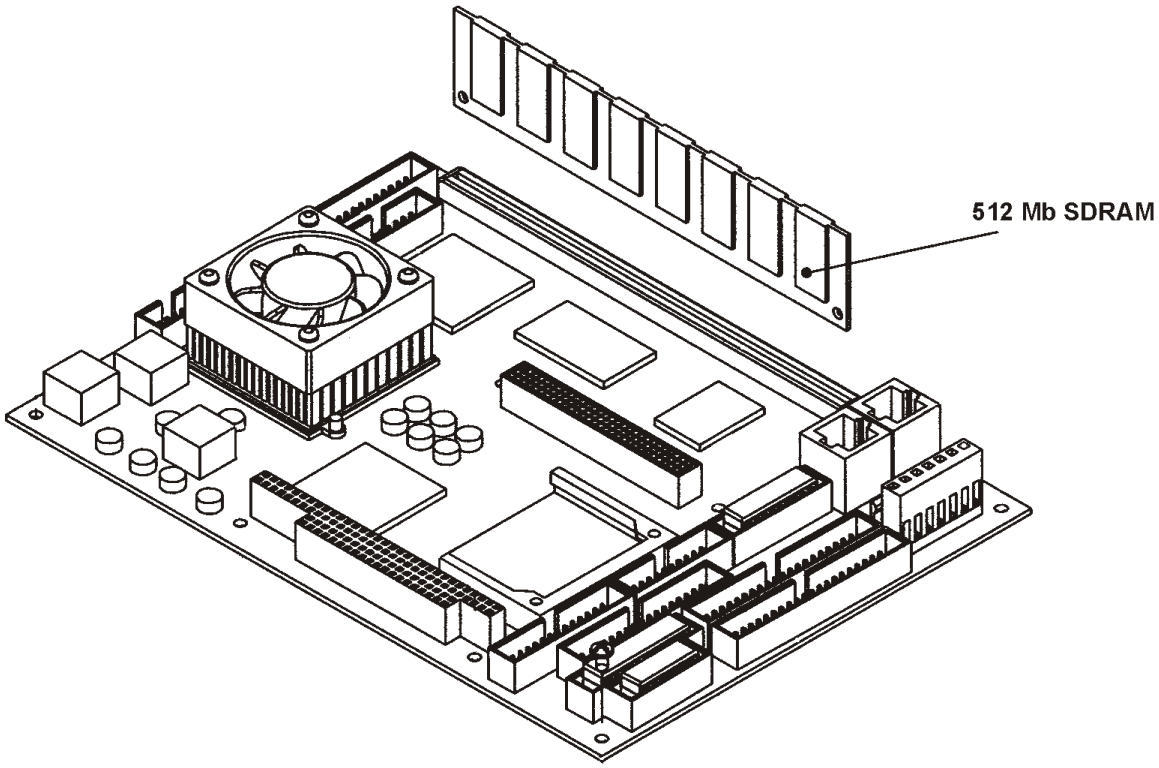


Figure 17 - SPCENCL3200 EBX Processor Board

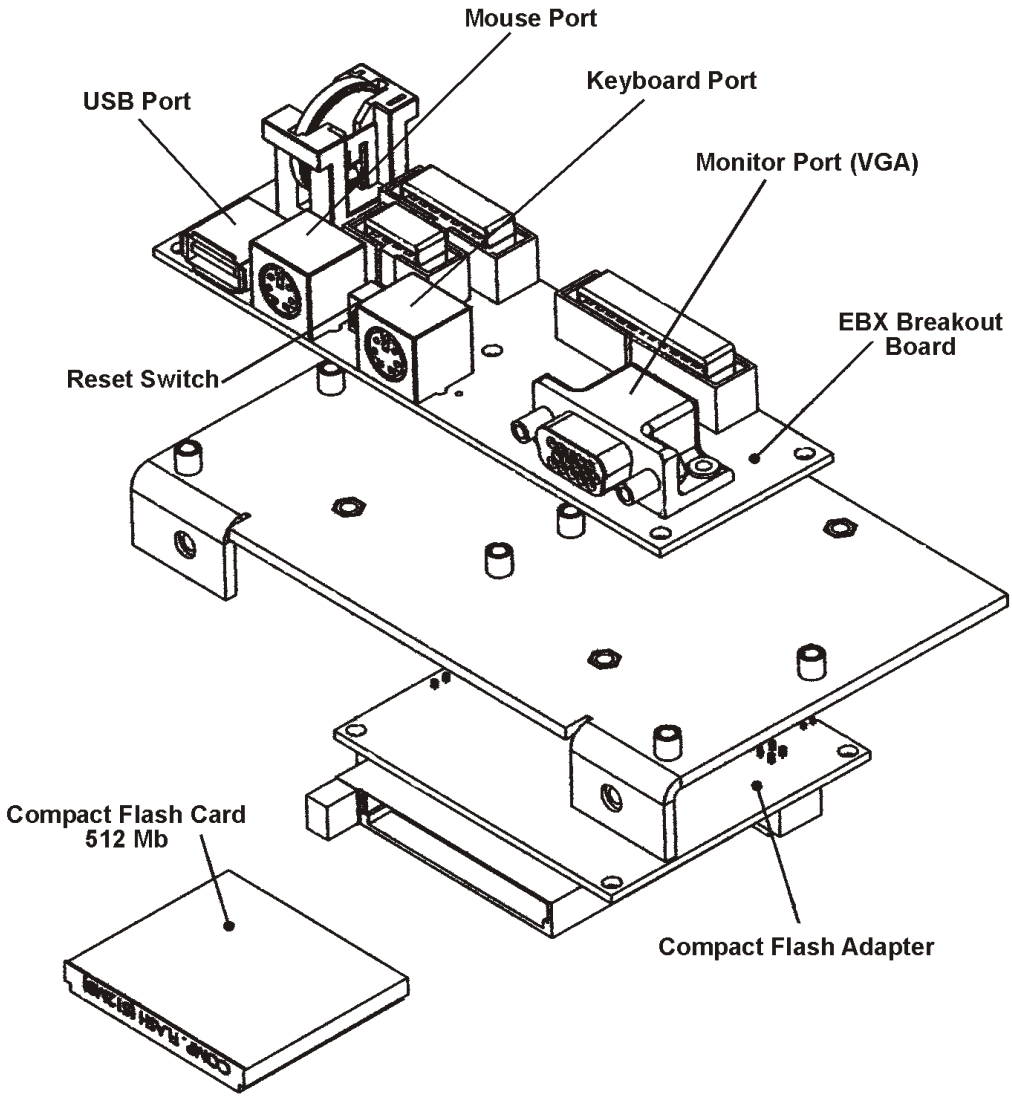


Figure 18 - SPCENCL3200 EBX Breakout Board and Compact Flash Installation

Power Supply

The SPCENCL3200 Power Supply converts the AC Input voltage to:±15 Vdc, + 5Vdc, and +24 Vdc , and outputs and distributes the voltages to the various circuit boards and RAD3200. An exploded view of this power supply is shown in figure 19.

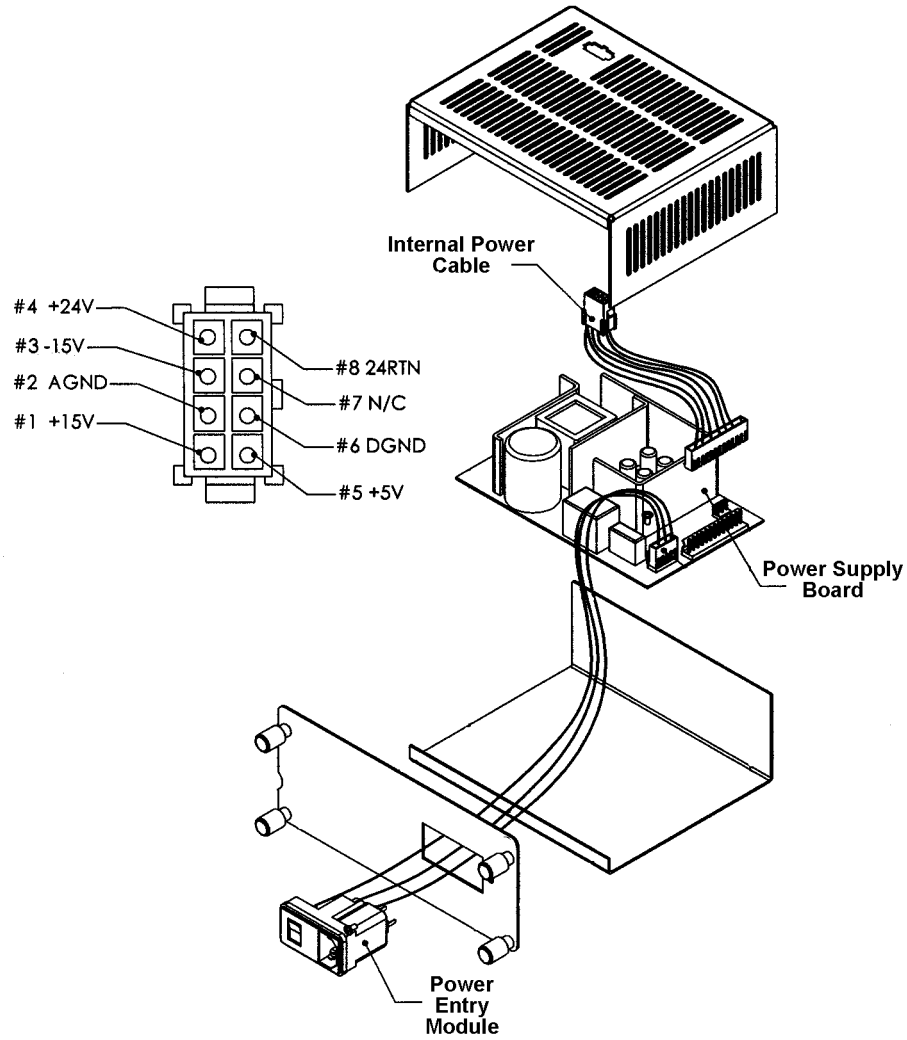


Figure 19 - SPCENCL3200 Power Supply and Power Distribution

Special Hardware

Hard Disk Drive

The Hard Disk Drive used in the SPCENCL3200 is a Compact Flash. It has a capacity of 512 Mbytes. It may be removed by the user for data security. Access is through the access panel on the rear of the enclosure.

Cooling Fan

The cooling fan is a Mechatronics F4010H05. The power requirements are 5 Vdc @ 100ma. It rotates at 4200 rpm and provides an air flow of 4.6 scfm.

The fan must not be obstructed. The EMI mesh should be cleaned occasionally in order to keep the cooling air flow at a maximum.

NOTE: The SPCENCL3200 **MUST** be shut down as soon as possible if the cooling fan is not operating. Continued operation of the SPCENCL3200 without sufficient cooling air will result in damage to the microprocessor.

SOFTWARE REQUIREMENTS SPECIFICATION

SPCENCL CONTROL AND CONFIGURATION

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

SPCENCL COMMANDS

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

1) Receive and execute commands via the Ethernet or Local.
2) Output converted data, status, setup and calibration data over the Ethernet or Local outputs.

When a SPCENCL3200 is in a “not ready” mode, all commands are disabled except STATUS.

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:

CALCMD	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 SPCENCL is ready to accept a command.

TCP/IP does not guarantee that packet boundaries will be maintained between a Host and a SPCENCL. 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 SPCENCL program must be restarted, preferably with the **RESTART** command, in order for the changes to take effect.

SPCENCL COMMANDS

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 SPCENCL. 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 BINADDR is set to a value other than zero, the data from the AUXSCHED or CALSCHED variables 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 **CALIBRATOR COMMAND**
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 SPCENCL. 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.

NOTES When BIN is set to 1 and BINADDR is set to a value other than zero, the data from the AUXSCHED or CALSCHED variables 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	**CLEAR**
SYNTAX	**CLEAR**<CR>
ARGUMENTS	None
DESCRIPTION	Commands the SPCENCL 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 **CONTROL PRESSURE RESET**
SYNTAX **DOUTPU**<CR>

ARGUMENTS *none*.

DESCRIPTION Resets the control pressures to the power up condition. This will reset control pressures if the DOUT commands are used to modify settings from the power up condition.

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

EXAMPLE To reset the control pressures to the power up mode after several operations of the DOUT commands, Type:

DOUTPU<Enter>

COMMAND **DELETE ERROR LOG FILE**

SYNTAX **DELETELOGFILE** <CR>

ARGUMENTS *None*

DESCRIPTION Deletes the Error Log file from the SPCENCL hard disk drive. The error log file in the ENCL folder is a log of major activity in the SPCENCL. 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 SPCENCL software. The SPCENCL software will re-create the file after it has been deleted.

NOTE: The SPCENCL 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 SPCENCL hard drive:

Type: DELETELOGFILE

COMMAND	**DIN**
SYNTAX	**DIN** <CR>
ARGUMENTS	*none*
DESCRIPTION	Reads the status word from the SeaLevel Board. This will display to the local console only. This feature is for troubleshooting only.
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 SPCENCL. 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 SPCENCL from the Host computer. Once this command is issued the Ethernet connection between the Host and the SPCENCL will be cleanly disconnected. The Host may re-connect to the SPCENCL by a normal TCP/IP connection method.

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

EXAMPLE To disconnect a SPCENCL 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 SPCENCL will return the last 30 errors in the format::
ERROR: High press from DQ
ERROR: Divide by zero
ERROR: 4.5 Volt ref low

If no errors have been logged, the SPCENCL 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 **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 SPCENCL may return:

SET NL 0
SET DISPIN 0
SET HAVENET 1
SET CONOUT 2
SET NETOUT 2
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 BINADDR 0 0.0.0.0
SET BIN 0
>

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

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

COMMAND	**SCAN TRIGGER**
SYNTAX	**TRIG**
ARGUMENTS	None
DESCRIPTION	This command acts as a software trigger to the SPCENCL. When AUXSCHED and/or CALSCHED are enabled, this command will send the command specified in the AUXSCHED or CALSCHED variable to the AUX and/or CAL port. The TRIG command may be the word TRIG or a <TAB> character code (9 HEX or Control I). This command is synthesized when a leading edge hardware trigger is received. The SPCENCL software polls the hardware trigger every 20 ms for changes in status.

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 SPCENCL 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.

COMMAND	**SHUTDOWN**
SYNTAX	**SHUTDOWN** <CR>
ARGUMENTS	none
DESCRIPTION	This command calls the program: shutdown.exe which first exits the SPCENCL.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 SPCENCL by about one-half. This command can be issued from a Host computer connected to the SPCENCL3200.
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 SPCENCL does not have a local keyboard, monitor and mouse connected. If the SPCENCL 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 SPCENCL 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 SPCENCL.

COMMAND **STATUS**

SYNTAX **STATUS** <CR>

ARGUMENTS None

DESCRIPTION Commands the SPCENCL 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.
- 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 SPCENCL is not READY.

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

STATUS: READY

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

STATUS: LIST

COMMAND	**STOP**
SYNTAX	**STOP** <CR>
ARGUMENTS	None
DESCRIPTION	Commands the SPCENCL 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	**VERSION**
SYNTAX	**VER** <CR>
ARGUMENTS	none
DESCRIPTION	Requests the version number of the SPCENCL.EXE file.
RETURNS	VERSION: <*version string*> <*nl*>
EXAMPLE	To determine the version of SPCENCL.exe software in use: Type: VER<CR> The SPCENCL will return: VERSION: 1.00

SPCENCL CONFIGURATION VARIABLES

DIGITAL OUTPUT CONFIGURATION VARIABLES (Group D)

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	**DOUTREADY *<value>***
VALID VALUES	0 to FF Hexadecimal
DEFAULT VALUE	3
DATA TYPE	integer
DESCRIPTION	Enables the digital outputs to indicate that the SPCENCL 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.

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	

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 a TRIG command or hardware trigger 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.	

NOTES When BIN is set to 1 and the BINADDR is set to a value other than zero, the data from the AUXSCHED or CALSCHED variables 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

VARIABLE	**BIN <*code*>**
VALID VALUES	0 or 1
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

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	**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	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 a TRIG command, or hardware trigger 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.

NOTES When BIN is set to 1 and BINADDR is set to a value other than zero, the data from the AUXSCHED or CALSCHED variables 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

VARIABLE **CONOUT *<code>***
VALID VALUES 1 or 2
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.

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 **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>

Error and Event Log File (ERRLOG.TXT)

An Error and Event Log File is part of the SPCENCL 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 SPCENCL software is started and closed when the SPCENCL 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 SPCENCL 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
SPCENCL 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

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.
DSMRAD.exe	Version 3.11 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.

SPCENCL.exe Versions

Version 1.00 - Released May 2005
RAD.exe Version 3.02 with defaults set for Two A/D operation