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<u>In the event of a failure:</u>

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.

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Channel Inputs	512 Maximum
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Power Requirements	±15 Vdc and +5 Vdc
Communications Protocol	Ethernet 10Base-2 or 10Base-T (user selectable) - TCP/IP
Typical Data Acquisition Rate	200 samples/channel/sec
Typical Communications Rate	
Ethernet	10 Mbits/sec
RS232	115200 BAUD (2400, 4800, 9600, 19200, 38400, 57600 or 115200)
Dimensions (LxWxH)	9.00in x 6.25in x 3.00in (228.6mm x 158.75mm x 76.2mm)
Weight	
Operating Temperature	0°C to 55°C
Storage Temperature	-20°C to 75°C
Operating and Storage Humidity	0 to 90% (noncondensing)

General Description

The DSM3001 is a stand alone Interface Module designed to permit non DSA Electronic Pressure Scanners to be utilized in an Ethernet system. Each DSM can accept up to 8 ZOC Electric Pressure Scanners, each with up to 64 inputs. The ZOC modules must have an RTD installed in order to achieve the benefits of the Digital Sensor Array Technology.

The DSM contains 9 A/D's, 8 to measure pressure inputs and one to measure temperature inputs. It also contains an imbedded computer, RAM memory, and a hard disk drive. The DSM uses Windows 95® as an operating system. Connections for a floppy drive, monitor and keyboard and mouse are available inside the DSM. A user may connect to these inputs and operate the DSM as a stand alone computer.

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

The DSM has two outputs, Ethernet(10Base-2 or 10Base-T) and RS232.

Installation

This section will contain any special installation drawings.

Getting Started

The DSM3001 is a stand alone pressure scanning system. It incorporates a microprocessor, RAM, a Hard Disk, and other interface boards to scan pressures in non DSA Electronic Pressure Scanners. These pressures are converted to Engineering Units using the same methods as the Digital Sensor Array. A user should be familiar with Windows 95 to best understand the operation of the DSM 3001.

Power Requirements

The DSM 3001 requires three external power supplies: ±12.00 Vdc, +5.00 Vdc, and +28 Vdc. The ±12 Vdc and +5 Vdc supplies should be "Instrumentation Grade" power supplies. The +28 Vdc power is required for Digital I/O and could have a tolerance of ±4 Vdc. Power connections are made through the PT02A-12-8P input. A mating connector, PT06A-12-8S-SR, is furnished with the DSM3001. The wiring of the power inputs is shown in Figure 1.

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

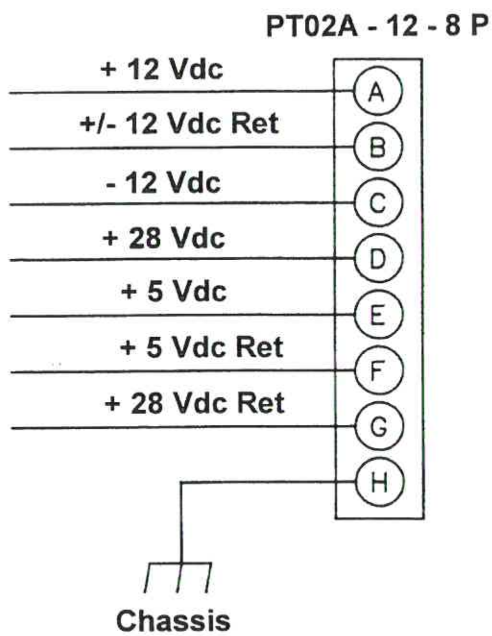


Figure 1 - Power Input Wiring

Hardware

The DSM3001 is furnished with a set of mounting ears so the unit may be mounted in a convenient location. It is important to note that the DSM3001 has a hard disk drive built into the module. Although this hard drive is designed for rough service and does have shock mounting, it cannot be subjected to severe shock or vibration. If the DSM3001 could be subjected to shock and vibration levels above 5 g's, shock mounts MUST be used. Figure 2 shows the mounting dimensions and details. Dimensions in parentheses are centimeters.

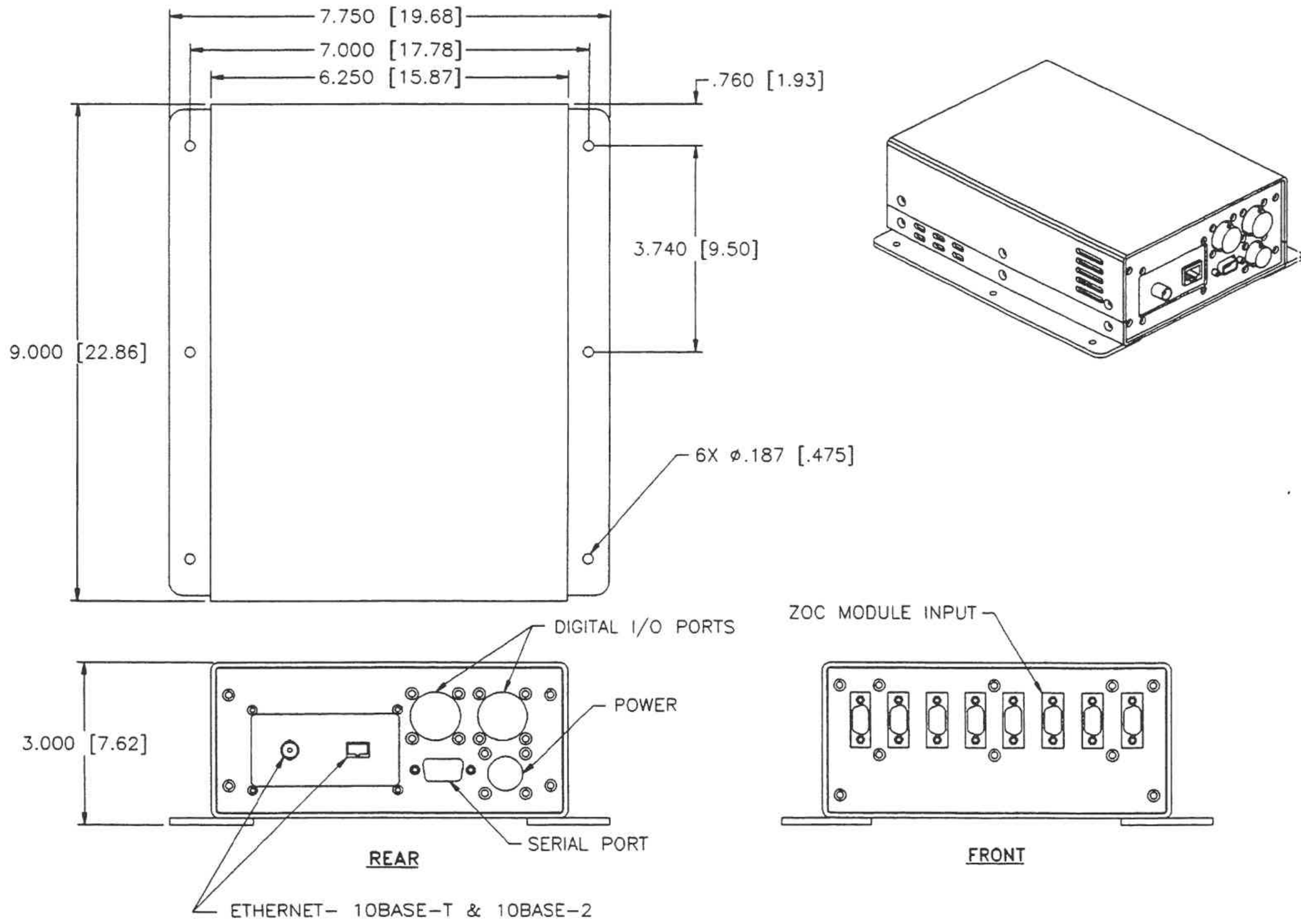


Figure 2 - DSM3001 Physical Measurements and Mounting Dimensions

Ethernet Connections

The Ethernet Adapter Module is a PCM-3660 PC 104 Module. It provides two Ethernet connections: [redacted] the active connection and disable the other. All connections must conform to IEEE802.3. The DSM Ethernet is 100% Novell NE2000 compatible.

For more information refer to the DSM Software Requirements Specification.

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

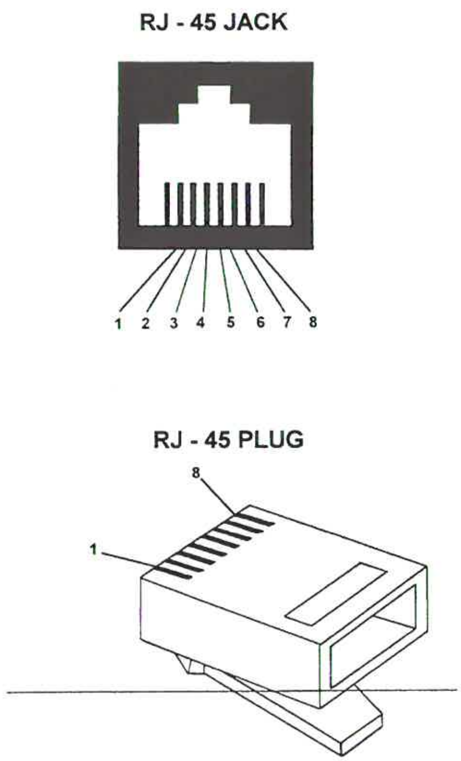
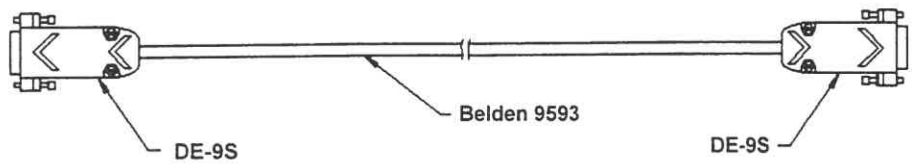


Figure 3 - RJ - 45 Plug and Jack

Serial Connection

Each DSM 3001 has one Serial connection. This connection conforms to the RS232C standard. The connector wiring is shown in Figure 4 below.



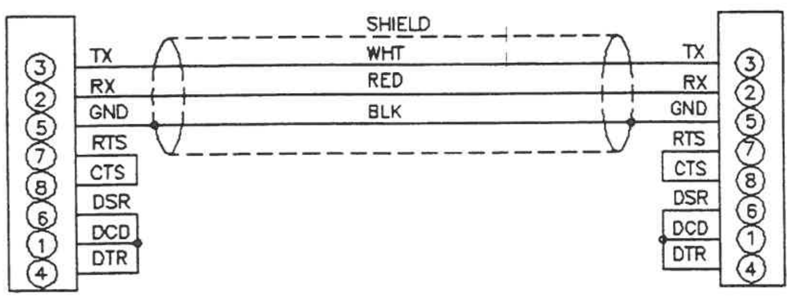


Figure 4 - RS232C Wiring

Digital I/O Connections

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

Digital Inputs are edge triggered. The input pulse should have a minimum voltage of 5 Vdc and a maximum voltage of 15 Vdc.

Digital Outputs are 28 Vdc @ 500 mA maximum.

Figure 5 shows the wiring of the Digital Inputs, Figure 6 shows the wiring of the Digital Outputs.

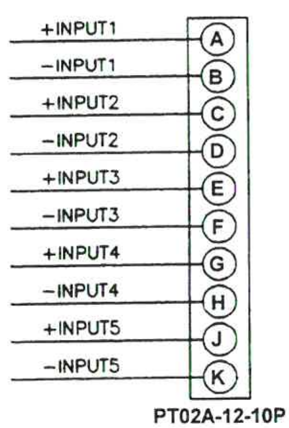


Figure 5 - Digital Input Wiring

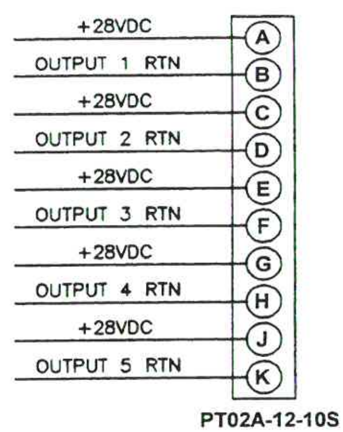


Figure 6 - Digital Output Wiring

ZOC Input Connections

Each DSM is designed to accept inputs from up to 8 ZOC 14, 17, 22, or 33 modules or any combination. Each ZOC module may have up to 64 Pressure inputs. The DSM can scan each module at different rates and does not have to scan all channels in each module. The ZOC modules must have an RTD installed so the DSM can measure the temperature of the module. The input connectors are Cannon MDM-15SH003K. Figure 7 shows the typical input wiring for a ZOC module. Figure 8 shows the typical wiring for a ZOC module installed in a Thermal Control Unit.

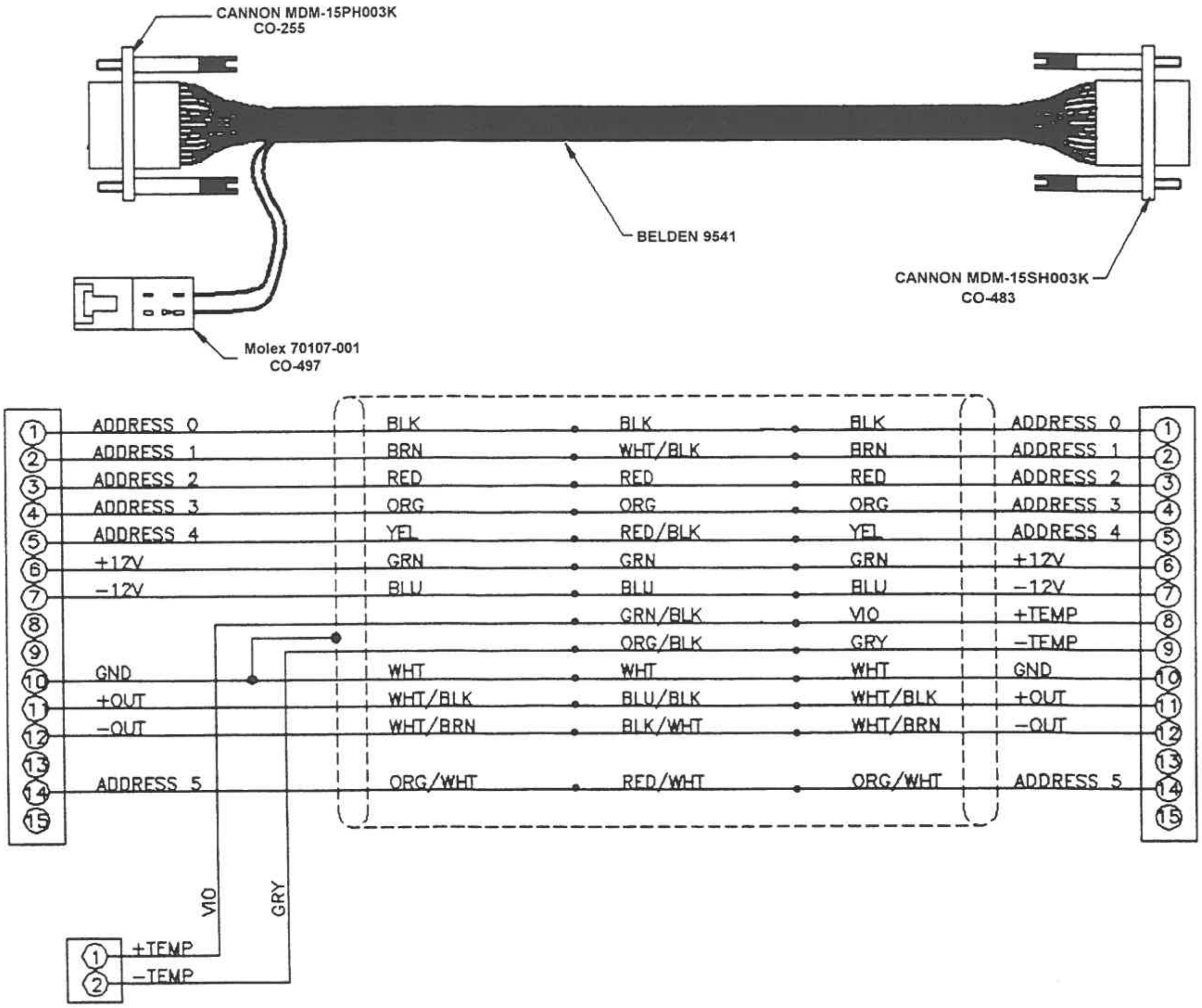


Figure 7 - Typical Input Wiring - ZOC module to DSM

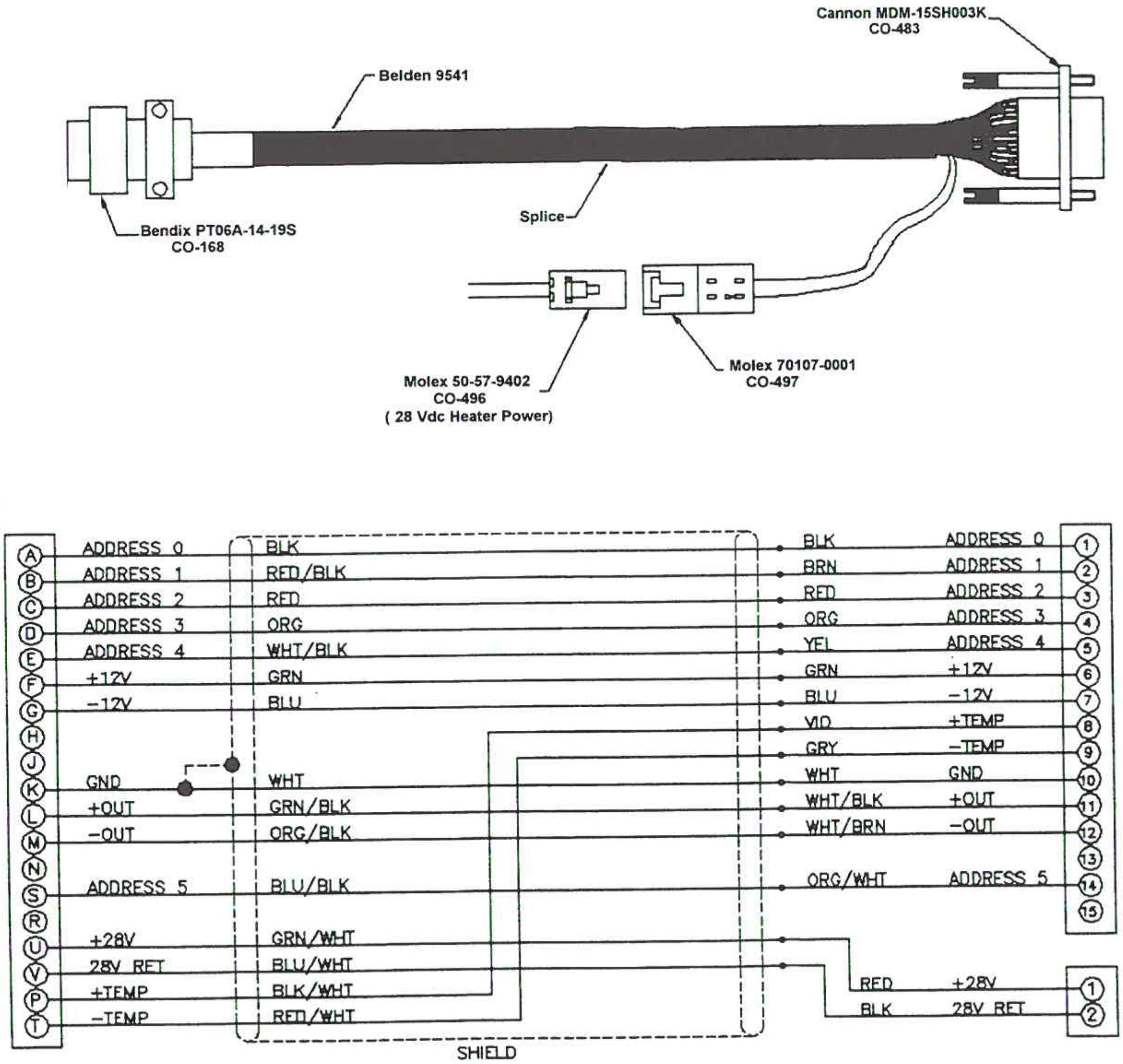


Figure 8 - Typical Wiring - ZOC module in a TCU to a DSM

Software

When the DSM is mounted and the power requirements are met, the unit is ready to be configured for use. All configuration variables must be set using a communications program or by using the DSM3001 as a stand alone computer. A user may remove the top cover and connect a keyboard, a floppy disk drive, and a monitor to the DSM3001 and use it as a computer. The DSM uses Windows 95 as an operating system.

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

RS232

HyperTerminal - A serial terminal program furnished with Windows 95.
Other commercially available programs such as LapLink may be used to load configuration files to the DSM.

Ethernet

TelNet - A program furnished with Windows 95. This permits a network connection to the DSM. A TelNet session is described later in this manual

DSMLINK - A program written by Scanivalve Corp. This program allows a user to communicate with a DSM. It operates in Windows 95 or Windows NT.

DSM LabView VI - A driver written by Scanivalve Corp for use with LabView versions 4.0.1 and higher.

Operation

This section contains information and procedures required for the proper operation of the DSM 3000 series modules.

The DSM 3000 series modules are a stand alone data system. They use Windows 95 as an operating system. When power is first applied, a DSM will self boot and execute a program named: **DSM.EXE**. The entire boot up process requires approximately 2-3 minutes. When the DSM is ready to accept commands a prompt symbol will be transmitted to the host computer.

Operation of the DSM may be monitored or controlled by connecting a computer to the Ethernet connection, the RS232 port or by removing the top cover and connecting a monitor and keyboard to the processor board.

Modules

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

RS232 Communications

Any RS232 Communications program such as: Windows Terminal, HyperTerminal, or Procomm may be used to communicate with the DSM. The host computer should be set up for 9600 BAUD, 8 data bits, 1 stop bit, and no parity. A wiring diagram is shown in figure 3.

Local Connections

The DSM may be operated in the local mode by removing the top cover(or access plate in models equipped with that feature) and connecting a monitor, keyboard, and mouse(COM1) to the connection points provided on the processor board. Refer to figure 13 for more information.

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

Ethernet Connections

Some DSM's are equipped with Ethernet cards. These modules have both 10Base-2 and 10Base-T connections. The modules auto detect the connection. No variables need to be modified to use either connection.

TelNet Host Operation

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

Open a **TelNet** session.
Select: Terminal
Select: Preferences
Enable Local Echo
Set the Emulation to VT100/ANSI
Select: Connect
Select: Remote System
Host Name: Enter: 200.30.5.xxx
Port: Select: Telnet
TermType: Select: vt100
If the computer opens a Dial Up Box,
Click on Cancel

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

Configuration Variables

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

The DSM Configuration Variables are set up to default settings that will generally permit the user to communicate using RS232. 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 figure 13 for more information on connecting these devices.

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

Identification Variables - List I

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

```
List I
SET NL 0
SET DISPIN 0
SET HAVESER 2 9600
SET HAVENET 0
SET HAVEARINC 0
SET CONOUT 2
SET SEROUT 2
SET NETOUT 2
SET ARINC1OUT 0
SET ARINC2OUT 0
SET FORMAT 0
SET SERIN 1
SET NETIN 0
SET DSA1 0 115200
SET DSA2 0 115200
SET IFUSER 1
SET ECHO 1
SET ARINC1SCALE 20
SET ARINC2SCALE 20
```

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

Each module connected to a DSM must be defined and enabled. Definition of the module includes setting the number of ports, the full scale values and the number of negative points in the module calibration. A multi range module must have each group of ports defined. The high and low pressure units should be set no more than 20% over the actual range to permit some overpressure indication. A list MI command must be entered for each module. For example, two 32 channel modules, one with a full scale of 15 psi and the other with a full scale of 5 psi, connected to positions 1 and 2, should look as follows:

```
LIST mi 1
SET TYPE1 0
SET ENABLE1 1
SET SN1 0000
SET NUMPORTS1 32
SET LPRESS1 1..32 -18.0
SET HPRESS1 1..32 18.0
SET NEGPTS1 1..32 4
```

```
LIST mi 2
SET TYPE2 0
SET ENABLE2 1
SET SN2 0000
SET NUMPORTS2 32
SET LPRESS2 1..32 -6.0
SET HPRESS2 1..32 6.0
SET NEGPTS2 1..32 4
```

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

```
LIST mi 3
SET TYPE3 0
SET ENABLE3 1
SET SN3 0000
SET NUMPORTS3 64
SET LPRESS3 1..32 -18.0
SET LPRESS3 33..64 -60
SET HPRESS3 1..32 18.0
SET HPRESS3 33..64 60
SET NEGPTS3 1..64 4
```

Conversion Variables - List c

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

```
List c
SET ZC 0
SET UNITSCAN PSI
SET CVTUNIT 1.000000
SET BIN 0
SET EU 0
SET CALZDLY 15
```

General Scan Variables - List s

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

```
List s
SET PERIOD 500
SET ADTRIG 0
SET SCANTRIG 0
SET PAGE 0
SET QPKTS 0
SET SIMMODE 0
```

Digital I/O Variables - List d

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

```
List d
SET DOUTPU 0
SET DOUTCALZ 0
SET DOUTPGSEQ 0
SET DOUTPG 0
SET DINCALZ 0
SET DINSCAN 0
SET DINPG 0
SET DLYPGSEQ 1
SET DLYPG 10
```

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

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

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

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

```
List sg 1
SET AVG1 16
SET FPS1 0
SET CHAN1 1-1..1-32

List sg 2
SET AVG2 32
SET FPS2 0
SET CHAN2 2-1..2-32

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

Temperature Offset Variables - List o

These are factory set based on the RTD's used to measure the ZOC module temperature. The settings should not be modified by an end user. The following examples show the offset settings for a Nickel-Iron RTD(604Ω at 0°C).

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

Temperature Gain Variables - List g

These are factory set based on the RTD's used to measure the ZOC module temperature. The settings should not be modified by an end user. The following examples show the gain settings for a Nickel-Iron RTD(604Ω at 0°C).

```
List g
SET TEMPM1 0.0730
SET TEMPM2 0.0730
SET TEMPM3 0.0730
SET TEMPM4 0.0730
SET TEMPM5 0.0730
SET TEMPM6 0.0730
SET TEMPM7 0.0730
SET TEMPM8 0.0730
```

The gain and offset settings will be modified for other RTD values. For a 1000 Ω Platinum RTD the gain setting will be 0.0586 and the offset will be -136.452. For other RTD values, please contact Scanivalve Corp, Product Support Department or refer to the DSM 3000 Series Software Requirements Specification.

Interface Programs

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

DSM Profile File

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

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

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

Module Profile File

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

The information contained in the Module Profile File is:

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

Program Start Up Sequence

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

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

In this case, DSM serial number 351 has modules connected to seven of the eight inputs. The serial number of the module is noted for each position, 0000 indicates no module is connected.

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

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

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

Next, the DSM reads the **CV.GPF** file. This file contains all of the remaining configuration variables. A typical **CV.GPF** file would appear as follows:

```
SET DOUTPU 0
SET DOUTCALZ 7
SET DOUTPGSEQ 0
SET DOUTPG ff
SET DOUTSCAN 0
SET DINCALZ 0
SET DINSCAN 0
SET DINPG 0
SET DINSTRIG 0
SET DINADTRIG 0
SET DLYPGSEQ 1
SET DLYPG 10
SET AVG1 16
SET FPS1 0
SET SGENABLE1 1
SET CHAN1 1-1..1-16
SET AVG2 16
SET FPS2 0
SET SGENABLE2 1
SET CHAN2 1-1..1-16
SET AVG3 16
SET FPS30
SET SGENABLE3 1
SET CHAN3 1-1..1-16
SET AVG4 16
SET FPS4 0
SET SGENABLE4 1
SET CHAN4 1-1..1-16
SET AVG5 16
SET FPS5 0
SET SGENABLE5 1
SET CHAN5 1-1..1-16
SET AVG6 16
SET FPS6 0
SET SGENABLE6 1
SET CHAN6 1-1..1-16
SET AVG7 16
SET FPS7 0
SET SGENABLE7 1
SET CHAN7 1-1..1-16
SET AVG8 16
SET FPS8 0
SET SGENABLE8 0
SET CHAN8 1-1..1-16
SET PERIOD 500
SET ADTRIG 0
SET SCANTRIG 0
SET PAGE 0
```

```
SET QPKTS 1
SET SIMMODE 0
SET 2AD 1
SET BINADDR 0 0.0.0.0
SET ZC 1
SET UNITSCAN PSI
SET CVTUNIT 1.000000
SET BIN 0
SET EU 1
SET CALZDLY 15
SET MPBS 20
SET CALPER 500
SET CALAVG 256
SET NL 0
SET DISPIN 0
SET HAVESER 2 19200
SET HAVENET 0
SET HAVEARINC 0
SET CONOUT 2
SET SEROUT 2
SET NETOUT 2
SET ARINC1OUT 0
SET ARINC2OUT 0
SET FORMAT 1
SET SERIN 0
SET NETIN 0
SET DSA1 0 115200
SET DSA2 0 115200
SET IFUSER 1
SET ECHO 0
SET ARINC1SCALE 20.0000
SET ARINC2SCALE 20.0000
SET CAL 0 9600
SET CALSCHED 0 rp
SET AUX 0 9600
SET AUXSCHED 0 rp
```

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

```
DELTA: 1-1 0
ZERO: 1-1 0
DELTA: 1-2 0
ZERO: 1-2 0
DELTA: 1-3 0
ZERO: 1-3 0
  :::      ::  :
DELTA 8-16 0
ZERO: 8-16 0
```

Finally, the DSM creates DSM Profile File: **DSMx.DPF** where x is the serial number, that identifies the modules installed by position and serial number. This file could be output to a host computer. The DSM Profile File for DSM serial number 351 could appear as follows:

DSM Serial Number: 351
Module Serial Number in Position 1: 0121
Module Serial Number in Position 2: 0233
Module Serial Number in Position 3: 0134
Module Serial Number in Position 4:1223
Module Serial Number in Position 5: 0210
Module Serial Number in Position 6: 0201
Module Serial Number in Position 7: 0154
Module Serial Number in Position 8: 0000

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

Module Replacement

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

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

Type: List p<CR>

The DSM will return a list of the module configuration

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

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

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

Type: SET SN4 0135<CR>
Type: SAVE<CR>
Type: RELOAD<CR>

This will modify the **SN.GPF** file and restart the program.

Digital I/O Control

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

Initiate CALZ

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

Three possible actions may occur.

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

SCAN Start/Stop

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

Three possible actions may occur.

1. If the DSM is in the **READY** mode:	A **SCAN** will be initiated.
2. If the DSM is in the **SCAN** mode:	The **SCAN** will be terminated.
3. If the DSM is in any other mode:	Nothing will occur.

Purge Sequence Control

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

The Purge Sequence may be initiated in two ways:

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

Purge Command

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

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

Purge Digital I/O

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

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

Calibration

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

Each module modified and calibrated at the Scanivalve Factory will be returned with a diskette containing calibration coefficients and a copy of the MRU.EXE utility. The coefficients will be in a format that will permit an easy download to a DSM. The disk will contain the following files:

MRU.EXE	The Coefficient Utility Program
MIF.DAT	An information file to support MRU.EXE
CALP.DAT	The calibration data

Two procedures are contained in this section. The first procedure explains the method for installing new coefficients to a DSM. The second procedure explains the methods for recalibrating a module and generating coefficients.

DSM Coefficient Installation Procedure

1. Connect a host computer to the RS232 port.

2. Install the floppy disk with the ZOC Module coefficients into a floppy drive. Open a DOS window, switch to the drive, and:

   Type: MRU <x> Where x is the module input position in the DSM
   The program will create a data file named yyyy.dat, where yyyy is the serial number of the module.

3. Use the DELETE Command to insure that no old Master Planes are stored in the DSM. Refer to the DSM Software Requirements Specification for more information.

4. Upload the file created in step 2 to the DSM using PROCOMM, Windows Terminal, Telnet, HyperTerminal, or any communications program that will support an ASCII upload.

5. When the upload is complete, use the **FILL** Command to complete the calibration coefficient tables. Refer to the DSM Software Requirements Specification for more information.

NOTE: This procedure must be repeated whenever the ZOC module is moved to a different DSM input or to a different DSM.

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

DSM Coefficient Generation Procedure

Required Materials
- Calibrator
- One Floppy Disk for each Module
- Module Serial Number and Calibration Position Number

1. Connect the host computer to the DSM RS232 port.

2. Open a communications program such as PROCOMM, Windows Terminal, or HyperTerminal. Set the program up for file capture.

3. Apply the calibration pressures. The number of negative pressures must be equal to the NEGPTSx variable defined for the module. The pressures must be evenly divided throughout the range of the module. Refer to the DSM Software Requirements Specification for more information on the calibrate Command.

4. When the calibration is complete, edit the Calibration File

   This file can only contain the INSERT Commands. When editing is complete, save the file as:

   CALP.DAT

5. Copy the file to a floppy disk.

6. Create a text file on the floppy named: MIF.DAT. It must contain the following:

   Module SN
   The original calibration position
   Calp.dat
   Temp.dat
   The output file name

   For example, the mif.dat file for module 209, calibrated in position 2, with the calibration data contained in a file named calp.dat.

   209
   2
   Calp.dat
   Temp.dat
   209.dat

4. Copy MRU.EXE to the floppy disk

   At this time, The example calibration disk would contain the following files:

   MRU.EXE
   MIF.DAT
   CALP.DAT

   Label the disk with the date and the module serial number.

5. Use the Calibration Coefficient Installation Procedure from this section to create and upload the coefficient files to the DSM.

Maintenance

The DSM3001 is built from subassemblies. Many of these subassemblies are shared with other variations of the DSM family. All of the subassemblies are field replaceable. This section will describe each of the subassemblies.

The major subassemblies are:

DSM Processor Board
A/D Boards
ZOC Module Interface Board
DSM ZOC Connector Board
Digital I/O Board
Power Distribution Board
Hard Disk Drive
Cooling Fan
Auxiliary Interface Board

Figure 7 is an exploded view of the DSM3001. Each of the major subassemblies is identified

Figure 8 shows the Internal Cable Connections of the DSM 3001.

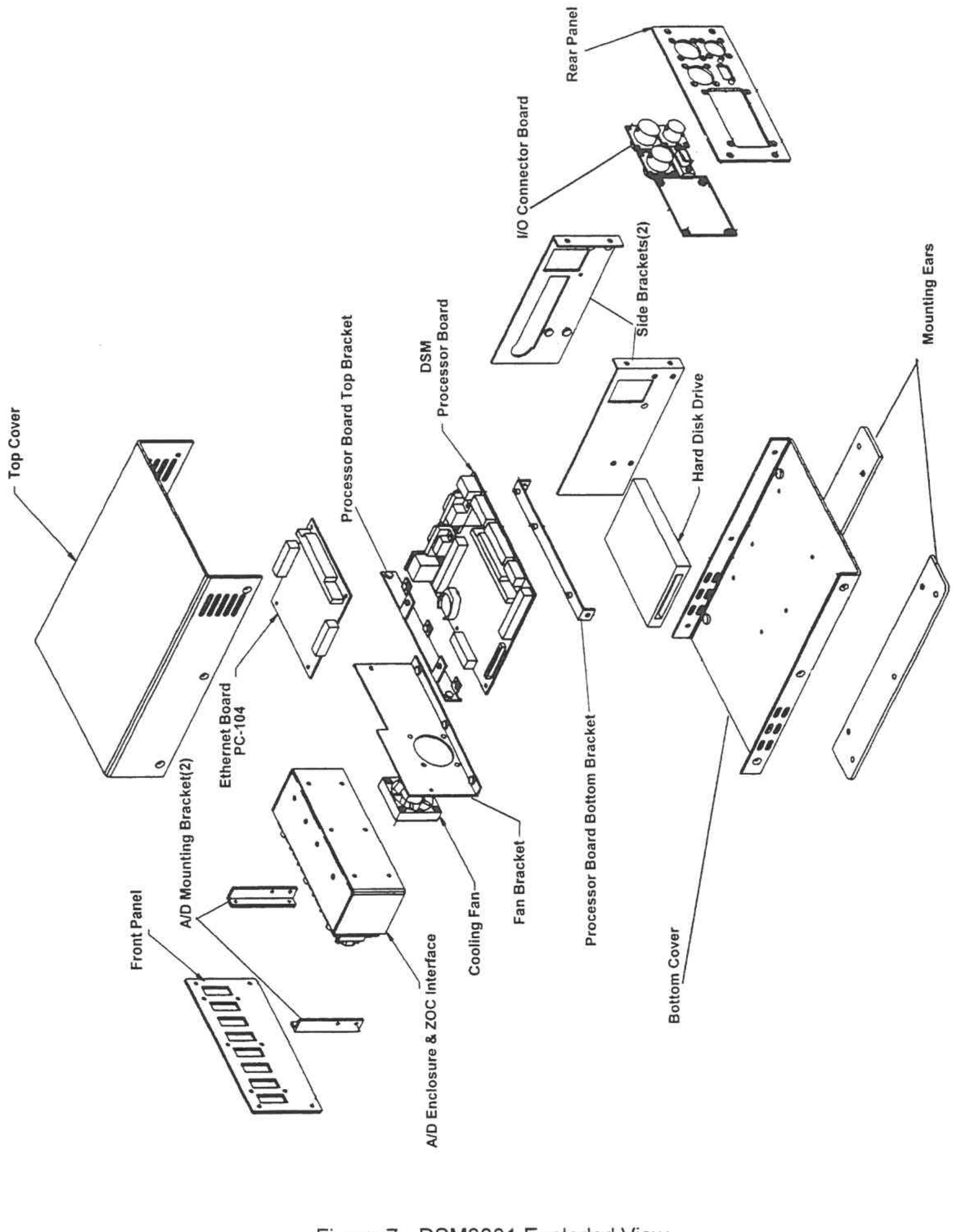


Figure 7 - DSM3001 Exploded View

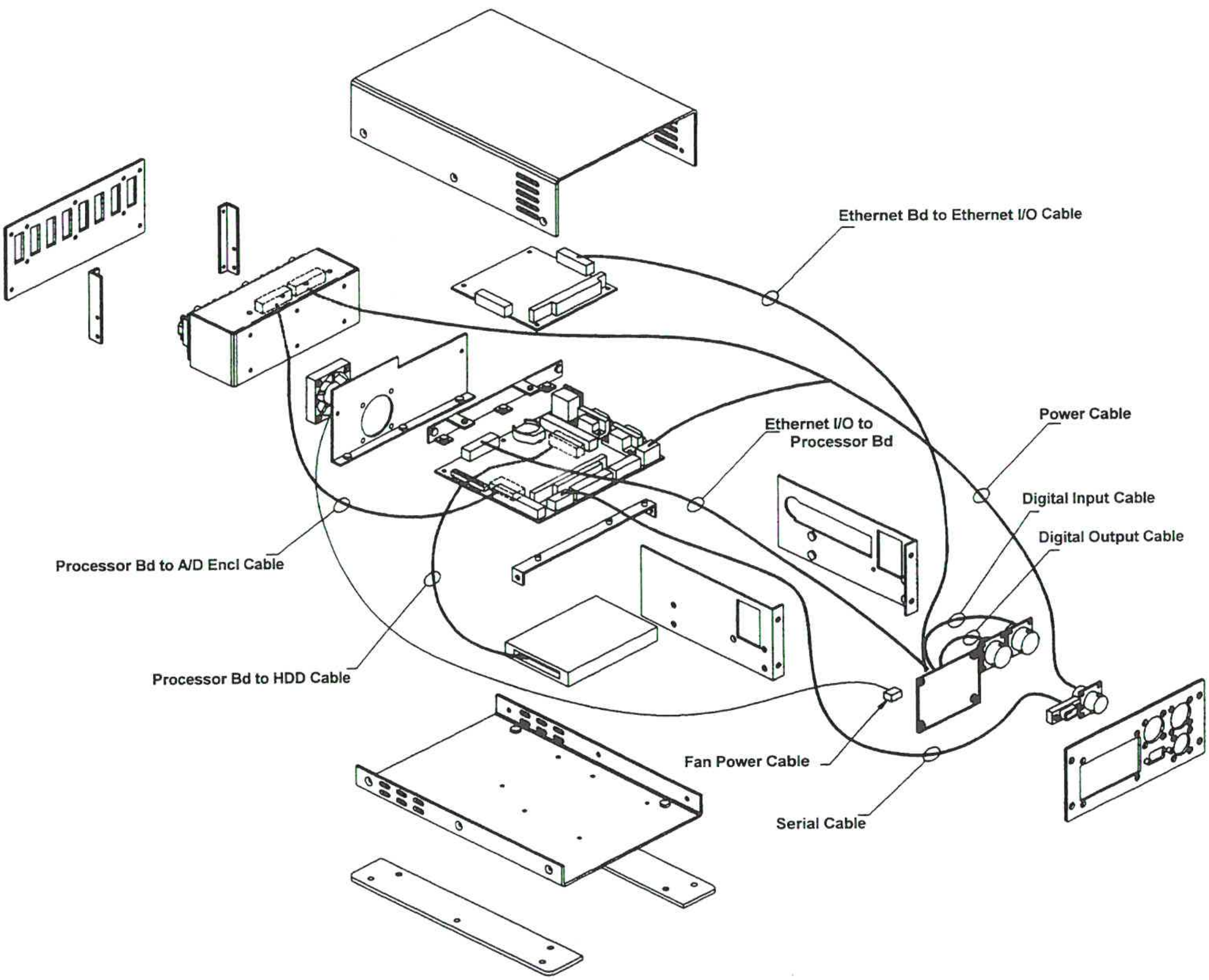


Figure 8 - DSM 3001 Internal Cable Connections

DSM Processor Board

All variations of the DSAENCL 3000 enclosures are stand alone computers. The heart of the system is a Cardio microprocessor. The supporting chip set is a Falconer chip set designed for mobile computing and compatible with both the Intel486™ and AMD Am486DX5 for embedded applications. The processor board contains all of the connections required for the DSAENCL 3000 to operate in a stand alone mode.

The processor board contains the following blocks:

- CPU
  - Intel 486DX4-75MHz (All units shipped prior to August 15, 1999)
  - Am486DX5-133MHz (All units shipped after August 15, 1999)
- I/O Block
  - Interrupt Controller
  - DMA Controller
  - Parallel I/O port
  - Serial I/O ports
  - Real Time Clock
  - IDE Interface - Support for large capacity IDE HDD(up to 8.4 gB)
  - FDD Interface (up to 2 drives)
- Memory Block
  - DRAM (8MB)
  - Flash ROM (256kB) - for BIOS
- Keyboard Interface
  - PS2 style keyboard
  - PS2 Mouse
- Video Block
  - CRT (800 x 600)
  - STN mono/color (640 x 480)
  - TFT color (640 x 480)

A block diagram of the processor board is shown in Figure 8.

Figure 9 shows the Installation and Replacement of the Cardio Processor.

Figures 10 and 11 show the layout of the processor board with all of the major blocks and connection points identified,

Figures 13 through 21 show the schematic diagram of the processor board.

The processor board has two switches.

S1 is the processor reset switch. Refer to figure 11 for the location of this switch.

S2 is an eight position DIP switch. It is used to set the IRQ and the base address of the A/D Interface. Refer to figure 11 for the location of this switch. Tables 1, 2, and 3 document the switch settings.

DSM Processor Board DIP Switch(S2) Settings

0 = Closed (on) 1 = Open (Off) **Default Settings in Bold**

Table 1 - A/D IRQ Selection

IRQ	SW2-1	SW2-2	SW2-3
15	0	0	0
12	0	0	1
11	0	1	0
10	0	1	1
9	1	0	0
7	**1**	**0**	**1**
5	1	1	0
3	1	1	1

Table 2 - A/D Base Address Selection (Port I/O)

Base Address	SW2-4	SW2-5	SW2-6	SW2-7	SW2-8
200	**0**	**0**	**0**	**0**	**0**
220	0	0	0	1	0
240	0	0	1	0	0
260	0	0	1	1	0
280	0	1	0	0	0
2A0	0	1	0	1	0
2C0	0	1	1	0	0
2E0	0	0	1	1	0
300	1	0	0	0	0
320	1	0	0	1	0
340	1	0	1	0	0
360	1	0	1	1	0
380	1	1	0	0	0
3A0	1	1	0	1	0
3C0	1	1	1	0	0
3E0	1	1	1	1	0

Table 3 - A/D Base Address Selection (Memory Mapped)

Base Address	SW2-4	SW2-5	SW2-6	SW2-7	SW2-8
C000	0	0	0	0	1
D000	0	1	0	0	1
E000	1	0	0	0	1
F000	1	1	0	0	1

Cardio Processor Replacement Procedure

Although the Cardio Processor should not require replacement during normal use, It is possible that the processor could be upgraded as faster and more powerful processors are available in this package.

NOTE: It is important that anyone changing a Cardio Processor carefully observe proper ESD practices. Failure to do this may result in damage to the Processor and/or the DSM.

Procedure

Reference Figures 7 and 9

1. Remove power from the DSM.
2. Disconnect all ZOC module inputs.
3. Place the DSM on a solid surface with the Front Panel to the left.
4. Remove the Top Cover.
5. Disconnect all cables from the Processor Board
6. Remove the three leftmost screws that secure the Fan Bracket.
7. Remove the screws that secure the Lower Processor Bracket to the Side Brackets.
8. Lift the Fan Bracket and Processor Board from the DSM.
9. Disconnect the Upper Processor Board Bracket from the Fan Bracket.
10. The Cardio is installed on the bottom side of the Processor Board. Remove the 2mm nuts that secure the retainer and lift the retainer off. Be careful to not lose the rubber pieces that secure the Cardio.
11. Remove the Cardio by pulling it straight out..
12. Install the replacement by inserting it straight into the power connector.
13. Replace the rubber bumpers, the retainers and the 2mm nuts.
14. Reconnect the Upper Bracket to the Fan Bracket and reinstall it into the DSM.
15. Reinstall the Lower Bracket to the Side Brackets.
16. Reconnect all cables to the Processor Board.
17. Replace the Top Cover.
18. Reconnect the ZOC Modules and the Power inputs.
19. Restart the DSM. The new processor will have to have its CMOS set up.

For more information or assistance, Contact:

Scanivalve Corp
Product Support Department
1722 Madson Street
Liberty Lake, Washington 99019
(800) 935-5151 or (509) 891-9970
FAX (509) 891-9481

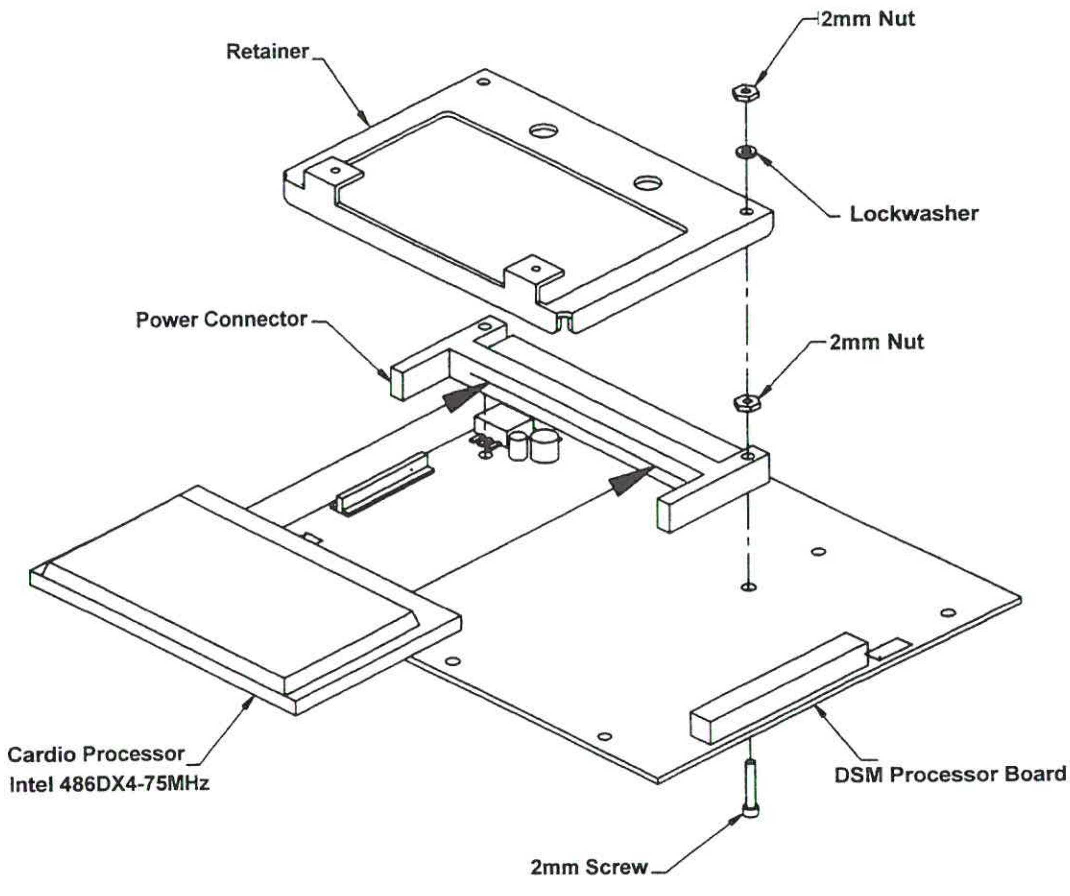


Figure 9 - Cardio Processor Replacement

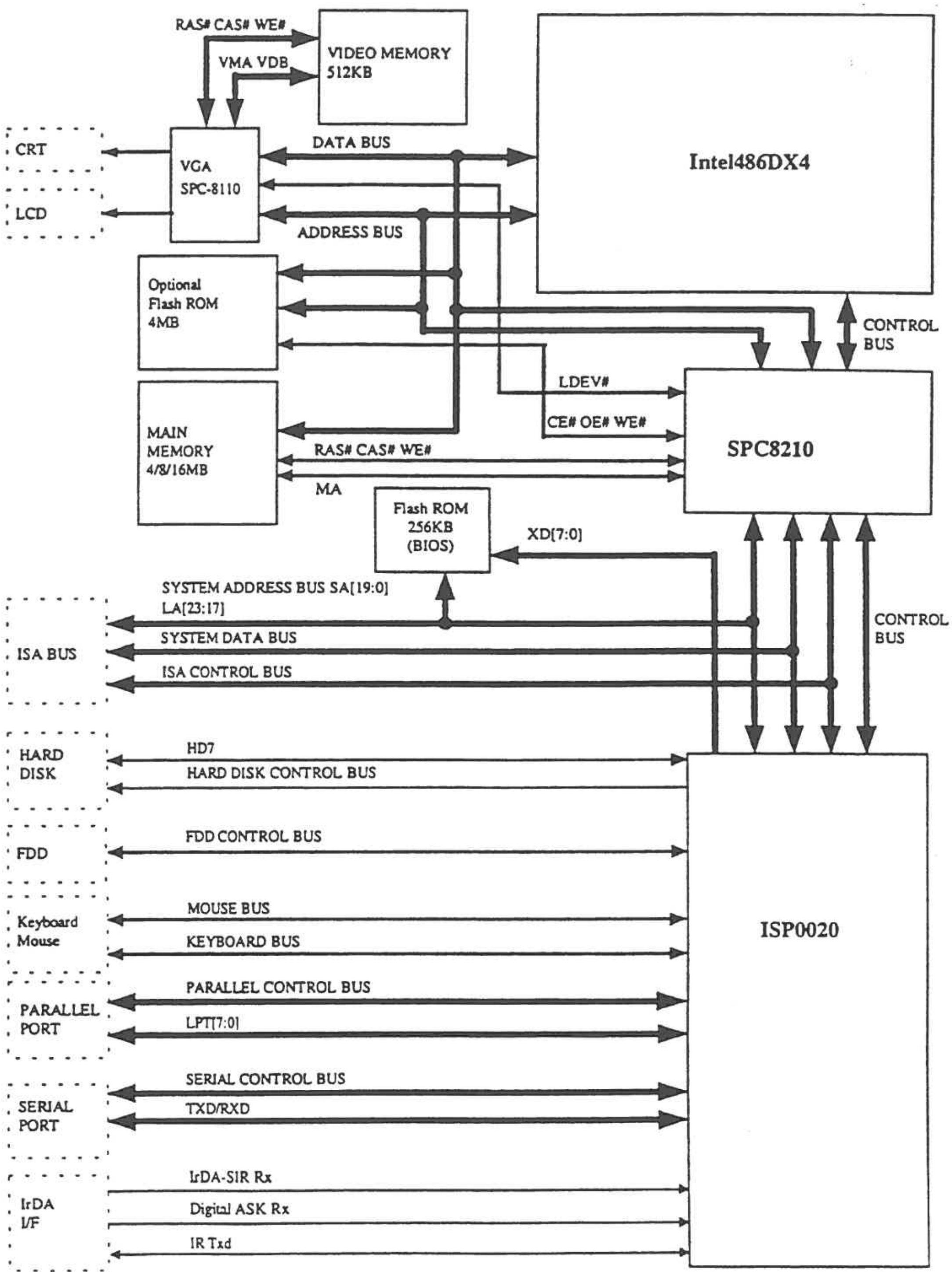


Figure 10 - DSM Processor Board Block Diagram

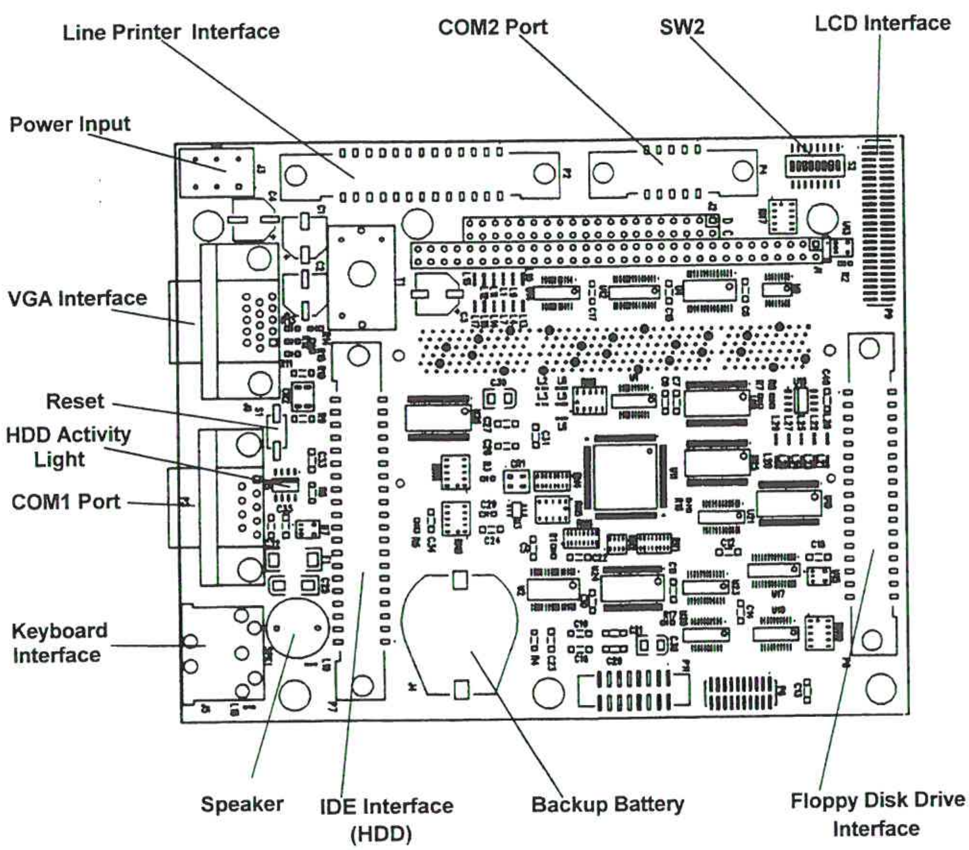


Figure 11 - DSM Processor Board Top View

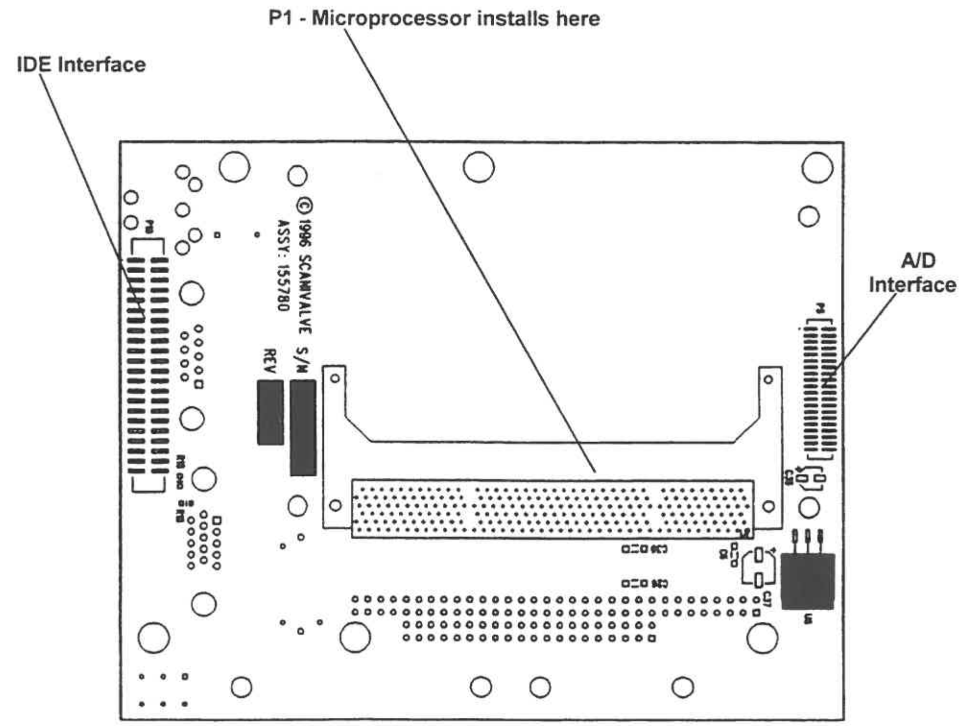


Figure 12 - DSM Processor Board Bottom View

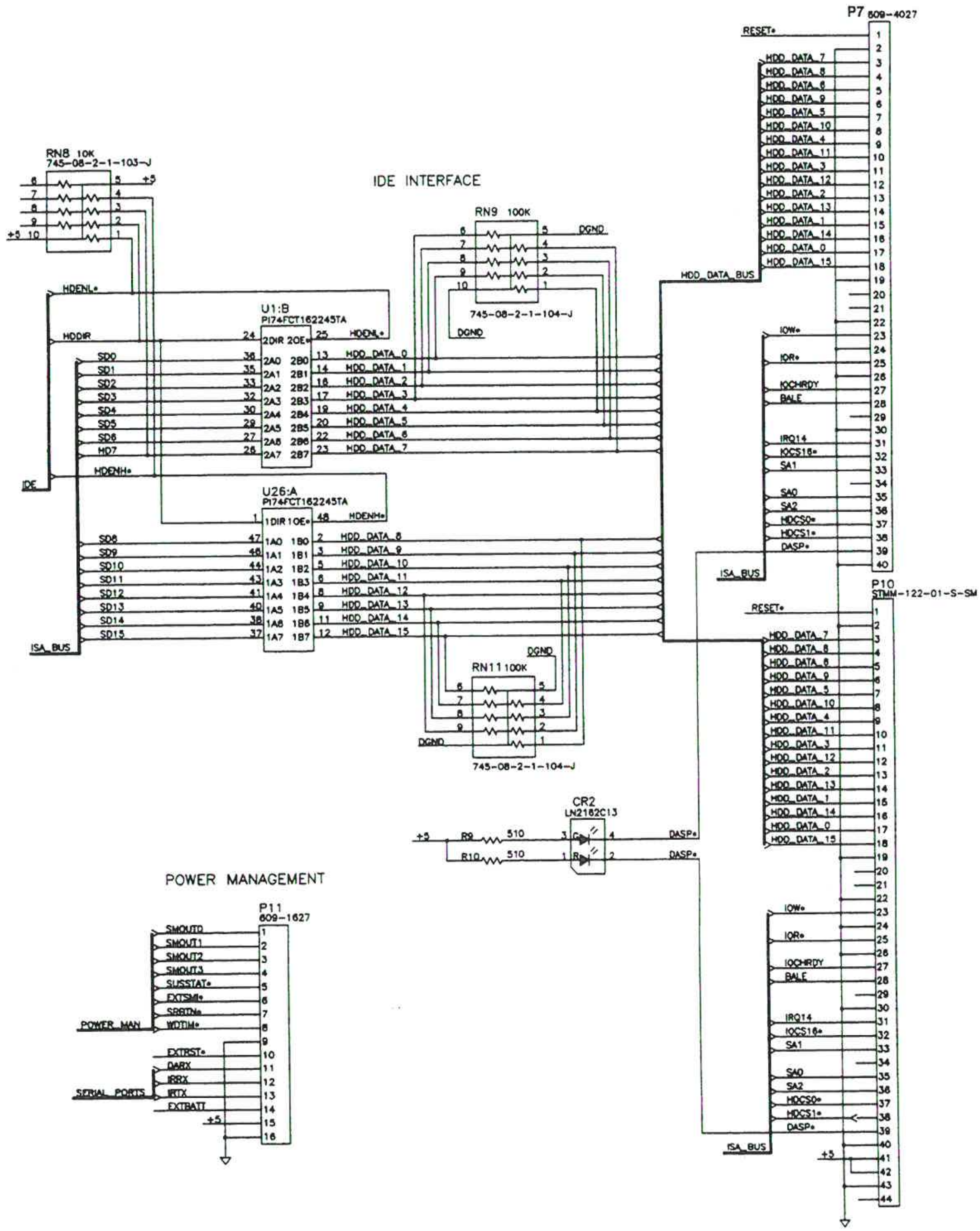


Figure 13 - DSM Processor Board - IDE Controller

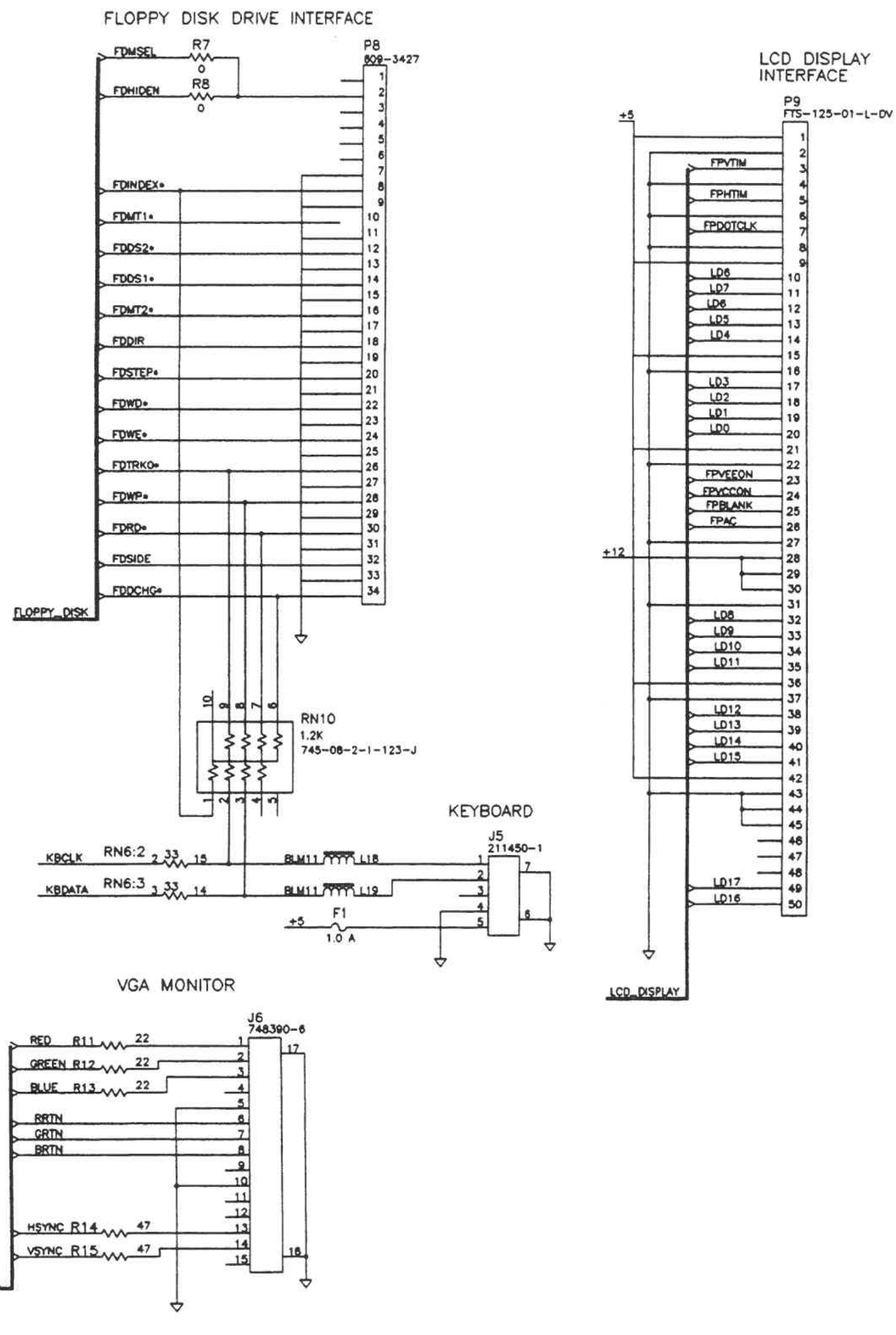


Figure 14 - DSM Processor Board - Floppy Disk IF, LCD IF, VGA Output

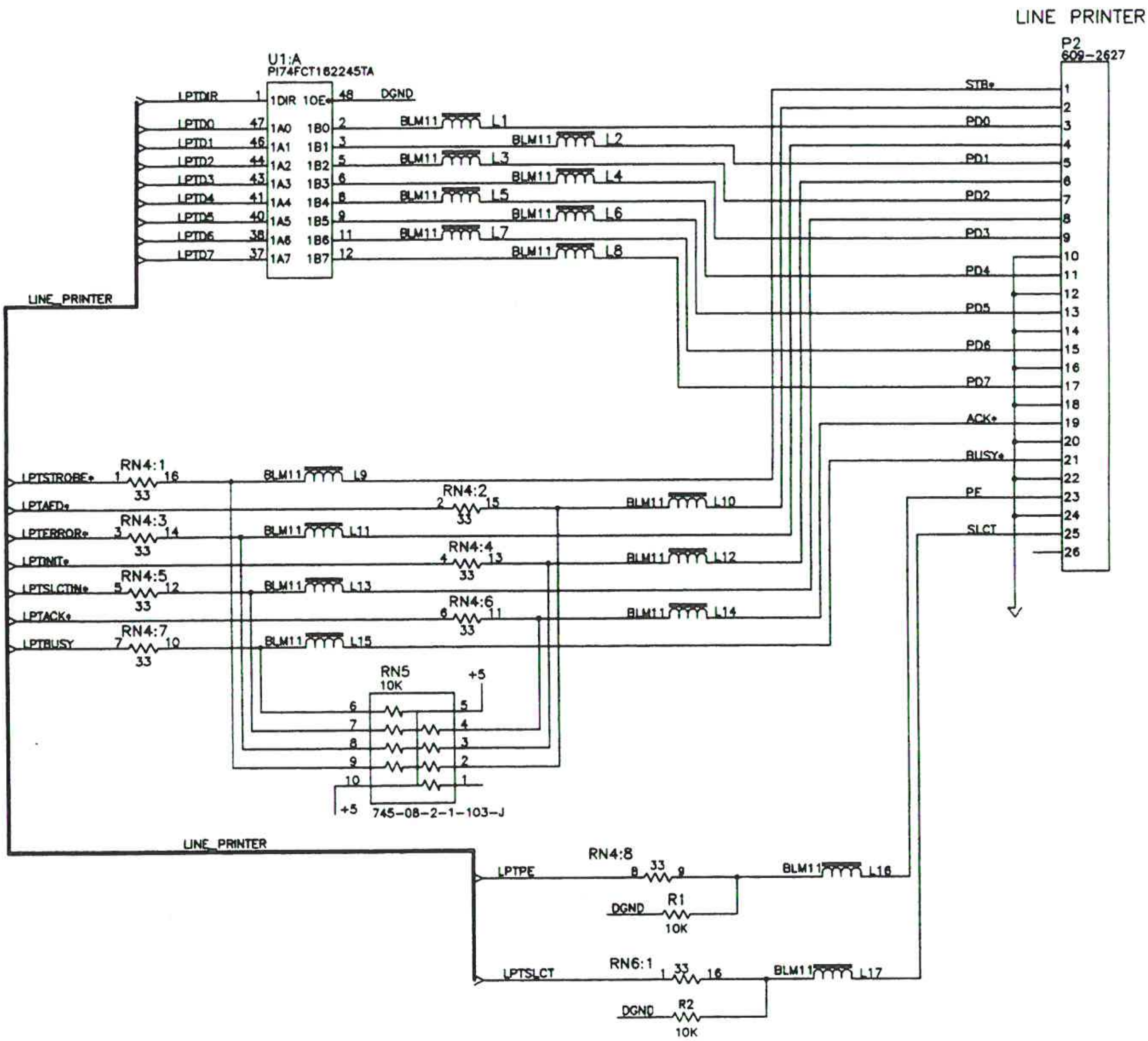


Figure 15 - DSM Processor Board - Line Printer Port

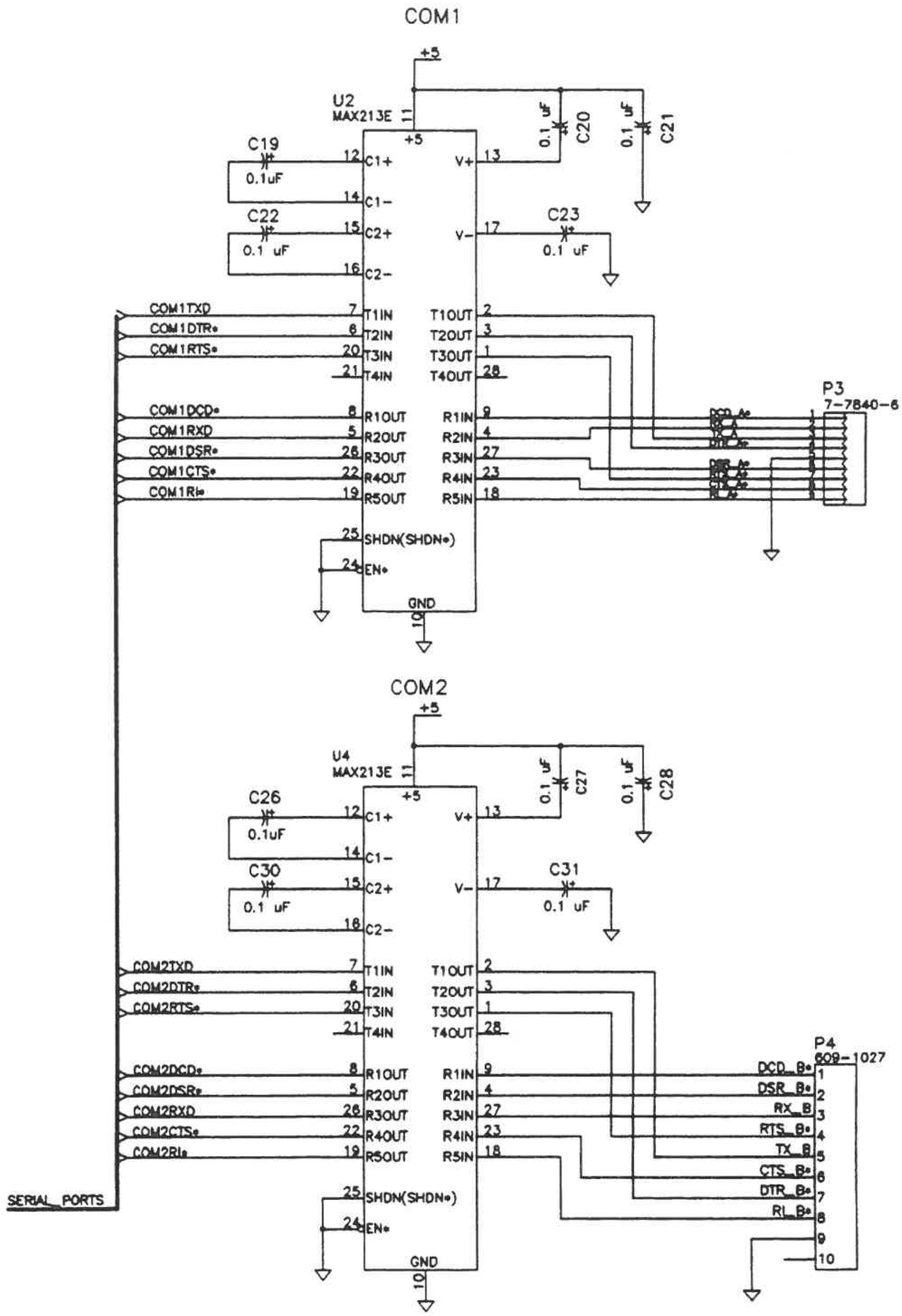


Figure 16 - DSM Processor Board - COM Ports

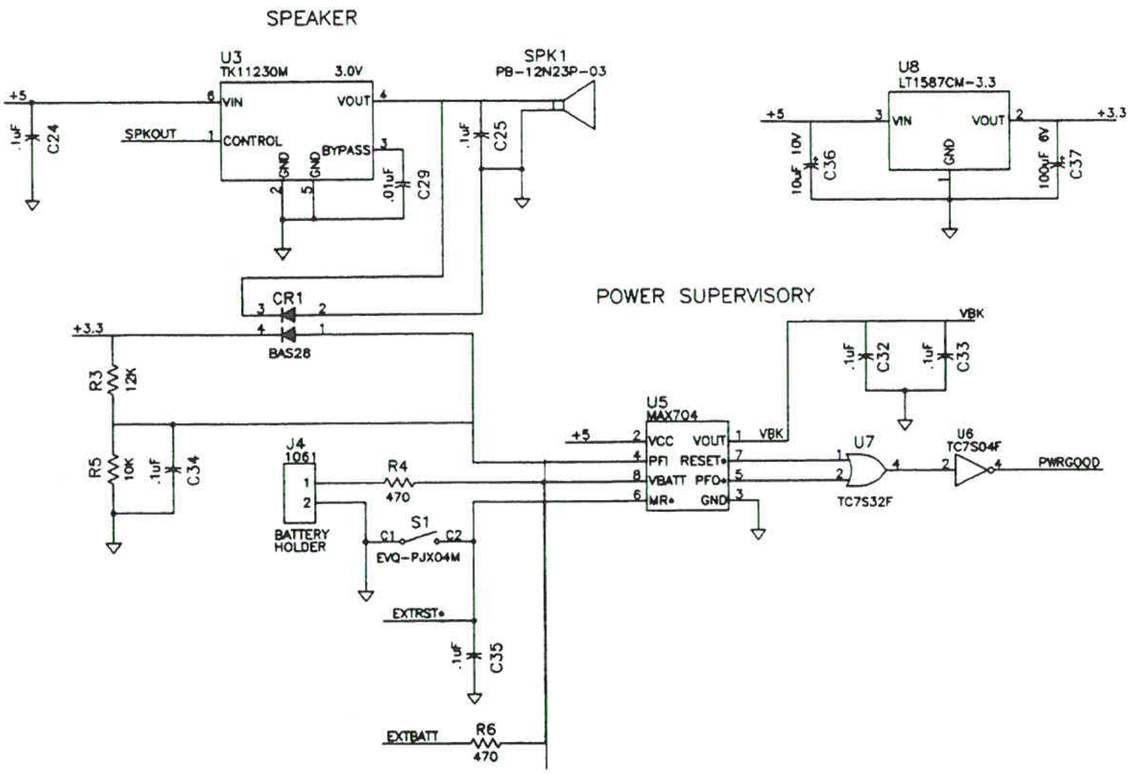


Figure 17 - DSM Processor Board - Speaker, Backup Battery, and Reset Switch

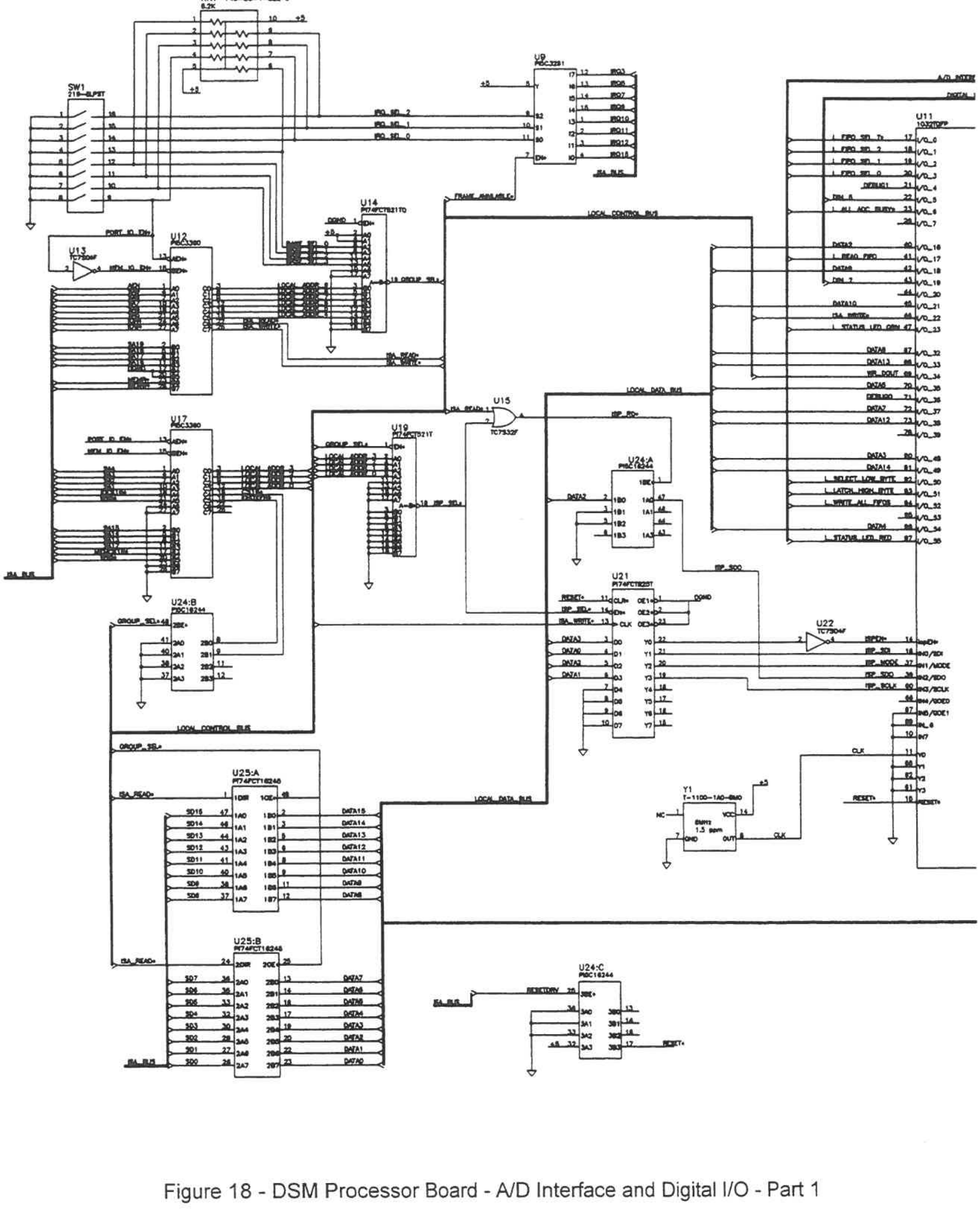


Figure 18 - DSM Processor Board - A/D Interface and Digital I/O - Part 1

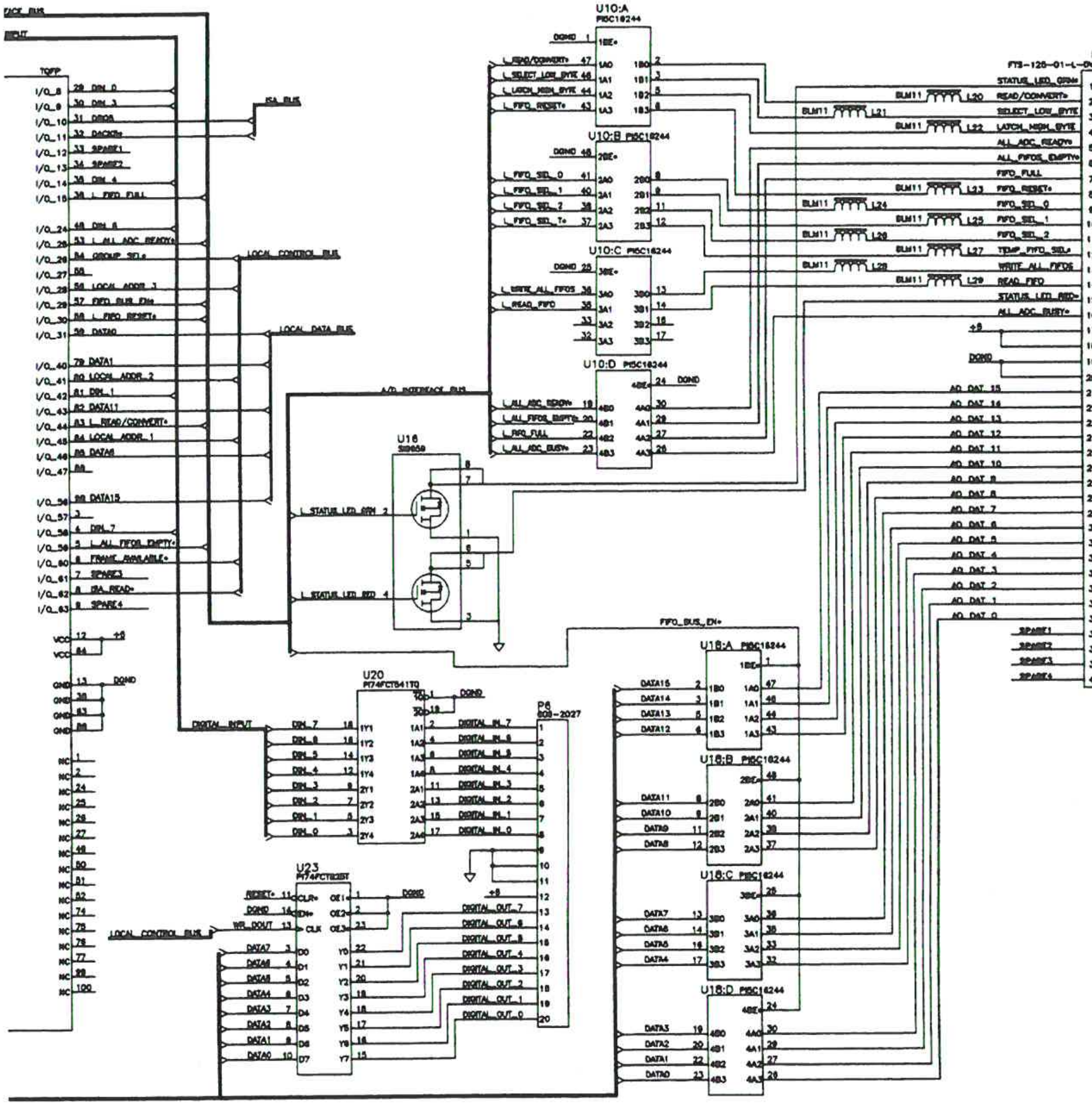


Figure 19 - DSM Processor Board - A/D Interface and Digital I/O - Part 2

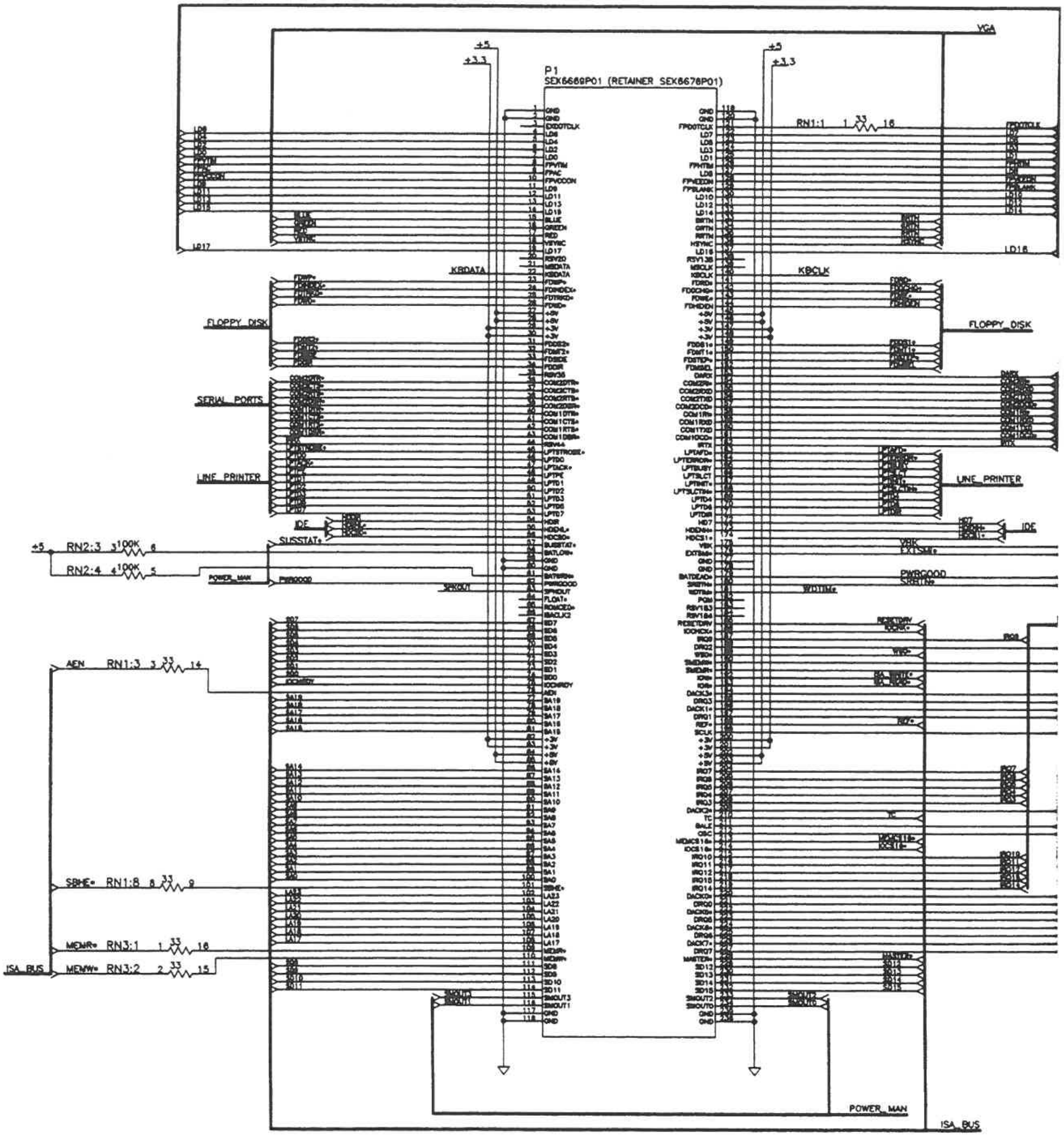


Figure 20 - DSM Processor Board - Microprocessor Section Part 1

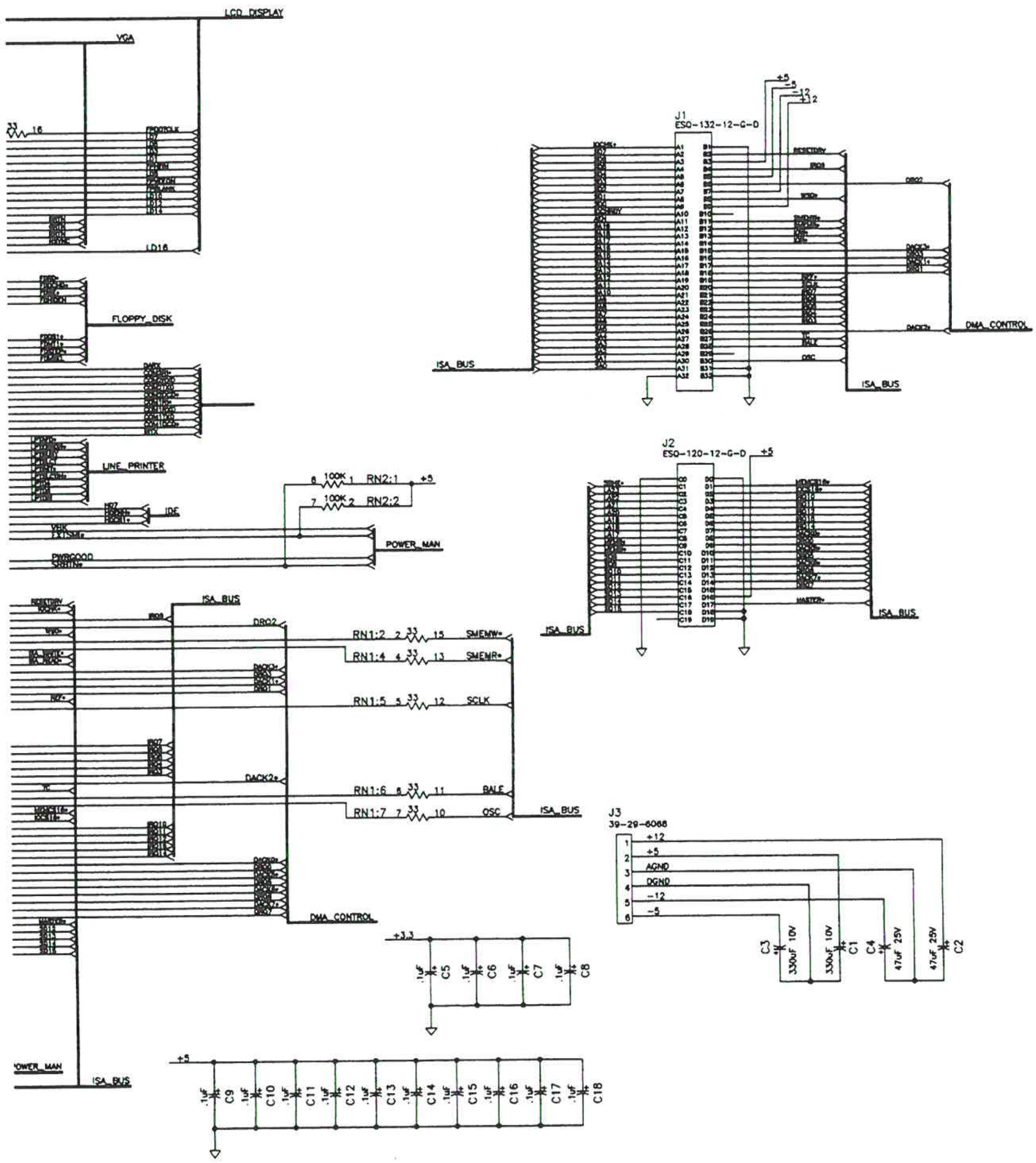


Figure 21 - DSM Processor Board - Microprocessor Section Part 2

A/D Boards

Each DSM contains 9 A/D boards. Eight are used to convert the analog pressure signals from the ZOC modules to digital signals. The ninth A/D is used to convert the analog temperature inputs to a digital signal. Only one A/D is required for the temperature measurement because the modules, and hence the sensors change temperature very slowly.

The A/D boards are installed in the A/D board enclosure The temperature and pressure A/D's are **NOT** interchangeable.

The temperature A/D is has a gain of 2.916. It is identified as Scanco PN 155781-1.

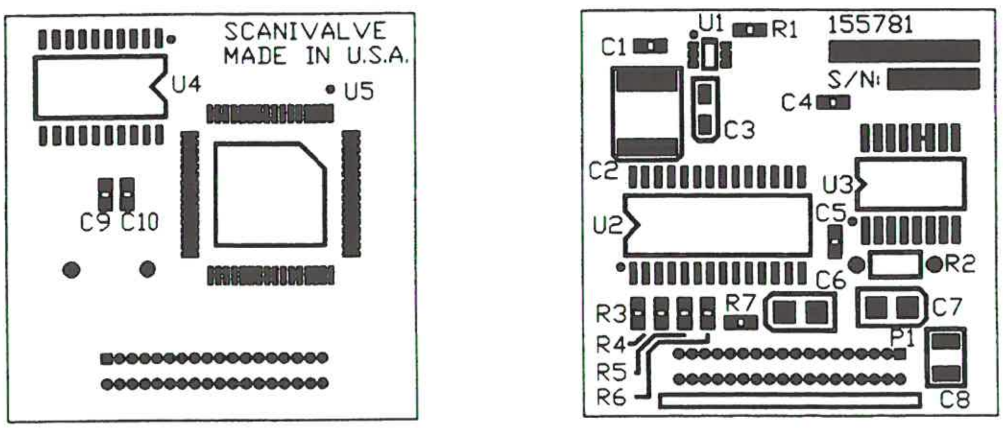
The pressure A/D could be one of three variations depending upon the output voltage of the ZOC module being scanned. Selection and use should be made by the following table:

ZOC output voltage	Gain	Scanco PN
±2.5 Vdc	3.33	155781-2
±5.0 Vdc	2.00	155781-3
±10.0 Vdc	1.00	155781-4

Table 4 - Pressure A/D Board Selection

Figure 22 shows the layout of the DSM A/D Boards.

Figure 23 shows the electrical schematic of the DSM A/D Boards.



Bottom View **Top View**

Figure 22 - DSM A/D Board Layout

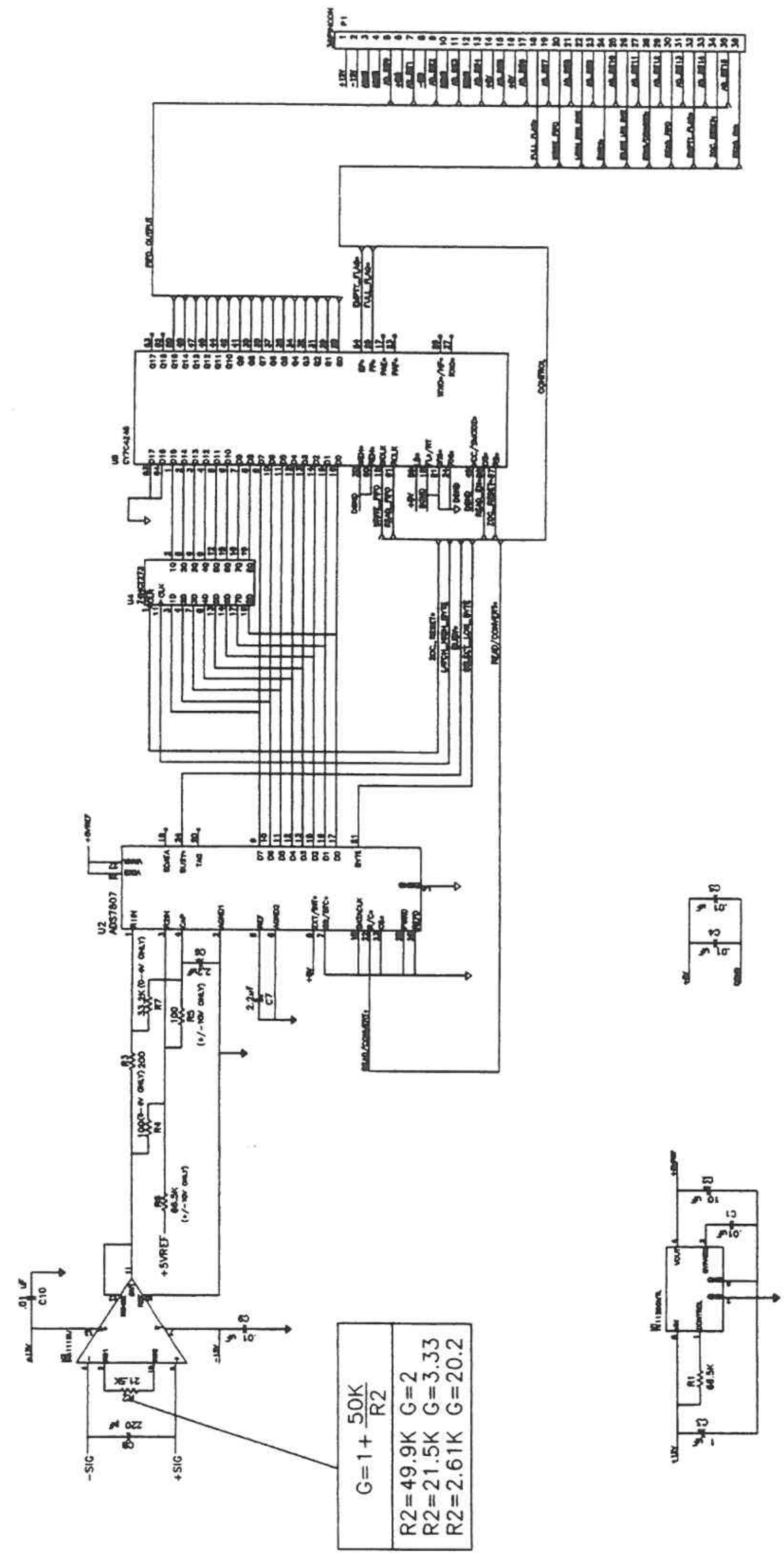


Figure 23 - DSM A/D Board Electrical Schematic

A/D Board Replacement

It may be necessary for a user to change an A/D board. This could be caused by one of several reasons, but mainly it would be necessary because a ZOC Module with an output greater than ±2.5 Vdc will be connected to the DSM. The procedure to change an A/D Board is very easy to follow.

NOTE: It is important that anyone changing an A/D carefully observe proper ESD practices. Failure to do this may result in damage to the A/D Boards and/or the DSM.

Procedure

Reference Figures 7, 8, 22, 23, and 24.

1. Remove power from the DSM.
2. Disconnect all ZOC module inputs.
3. Place the DSM on a solid surface with the Front Panel to the left.
4. Remove the Top Cover.
5. Remove the four screws that secure the A/D Mounting Brackets.
6. Rotate the Front Panel and A/D Enclosure so the six cover screws are accessible.
7. Remove the six cover screws.
8. Lift off the A/D Enclosure Cover.
9. Remove the A/D(s) by pulling straight up from the enclosure. The Pressure A/D's are numbered one through eight from the left side of the DSM. The Temperature A/D is installed in the slot at the far right of the enclosure.
10. Install the replacement A/D. Be very certain to insure that the edge connector is lined up correctly. There is sufficient clearance in the card guides to permit misalignment of the A/D. Misalignment will result in damage to the A/D.
11. Replace the Enclosure Cover and Cover Screws. Realign the Front Panel and replace the screws in the A/D Mounting Brackets.
12. Replace the Top Cover. Reinstall all cables.
13. Verify that all modules are connected in the proper order and that the correct coefficients are loaded in memory.

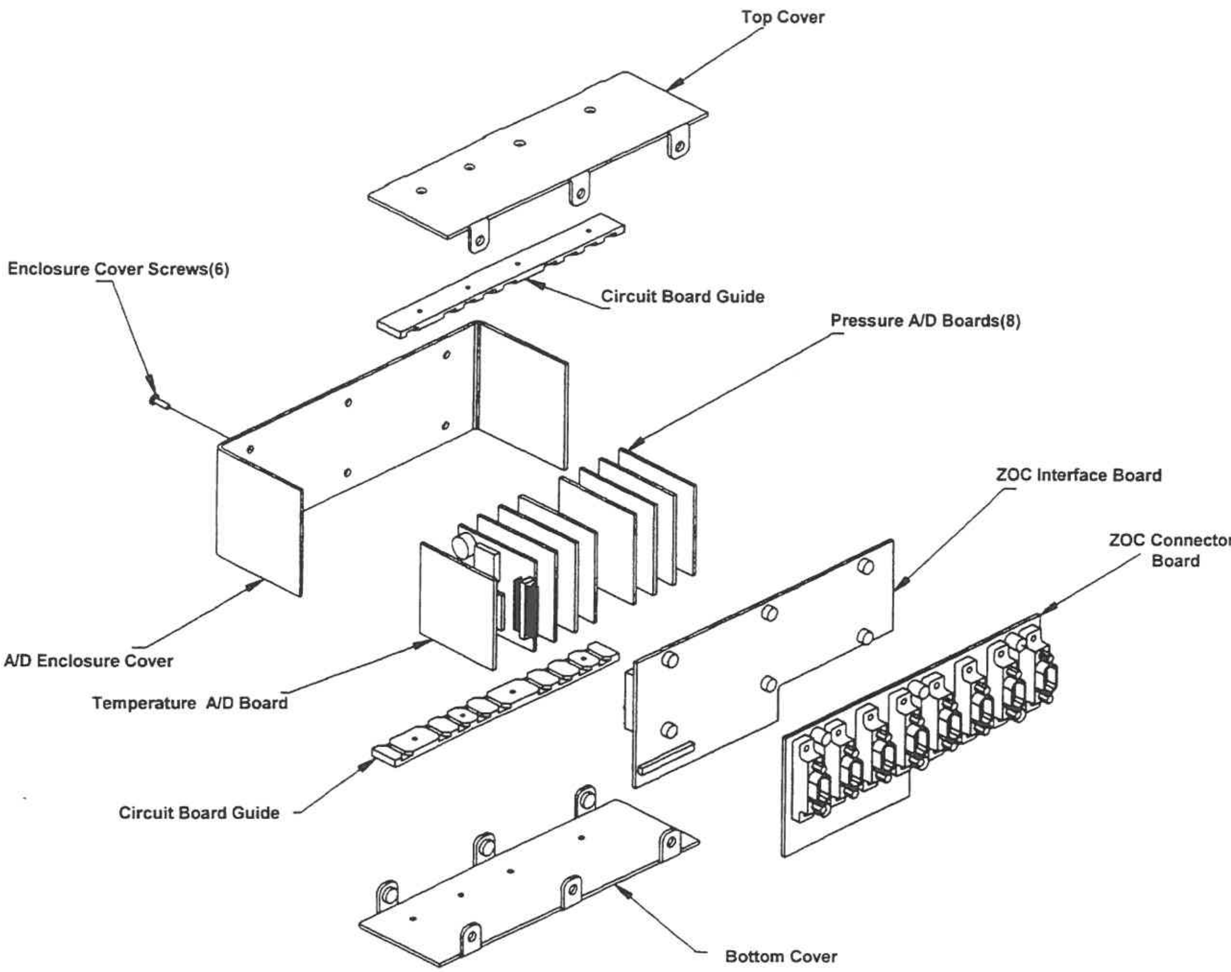


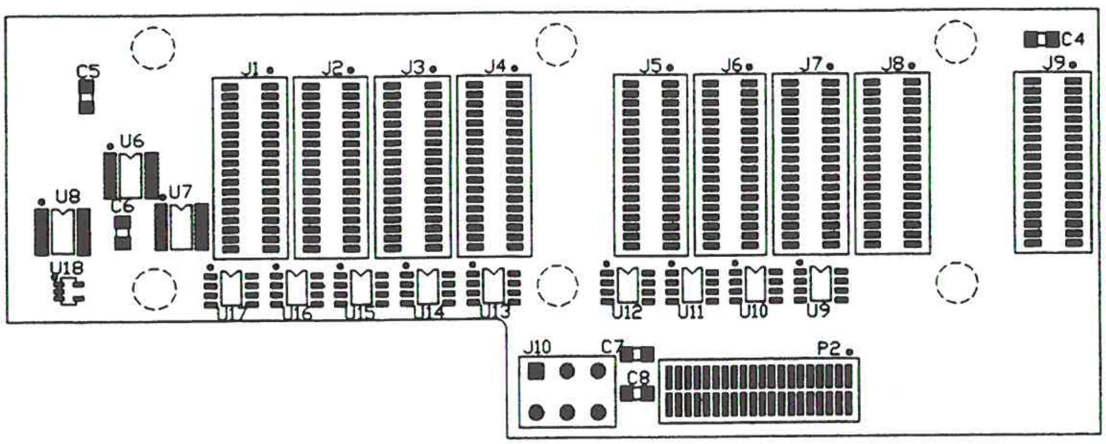
Figure 24 - A/D Enclosure Exploded Diagram

ZOC Module Interface Board

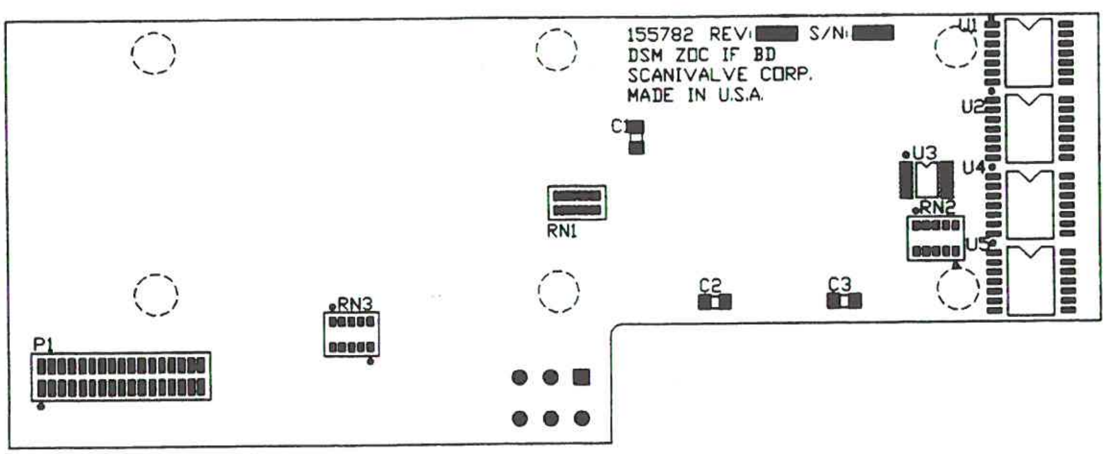
The ZOC Module Interface Board is the main interface between the ZOC modules and the DSM. It connects the A/D and Processor Boards to the ZOC Modules. This board contains the line drivers for the address outputs.

Figure 25 shows the layout of the ZOC Module Interface Board.

Figures 26, 27, and 28 contain the electrical schematic of the ZOC Module Interface Board.



BOTTOM SIDE



TOP SIDE

Figure 25 - ZOC Module Interface Board Layout

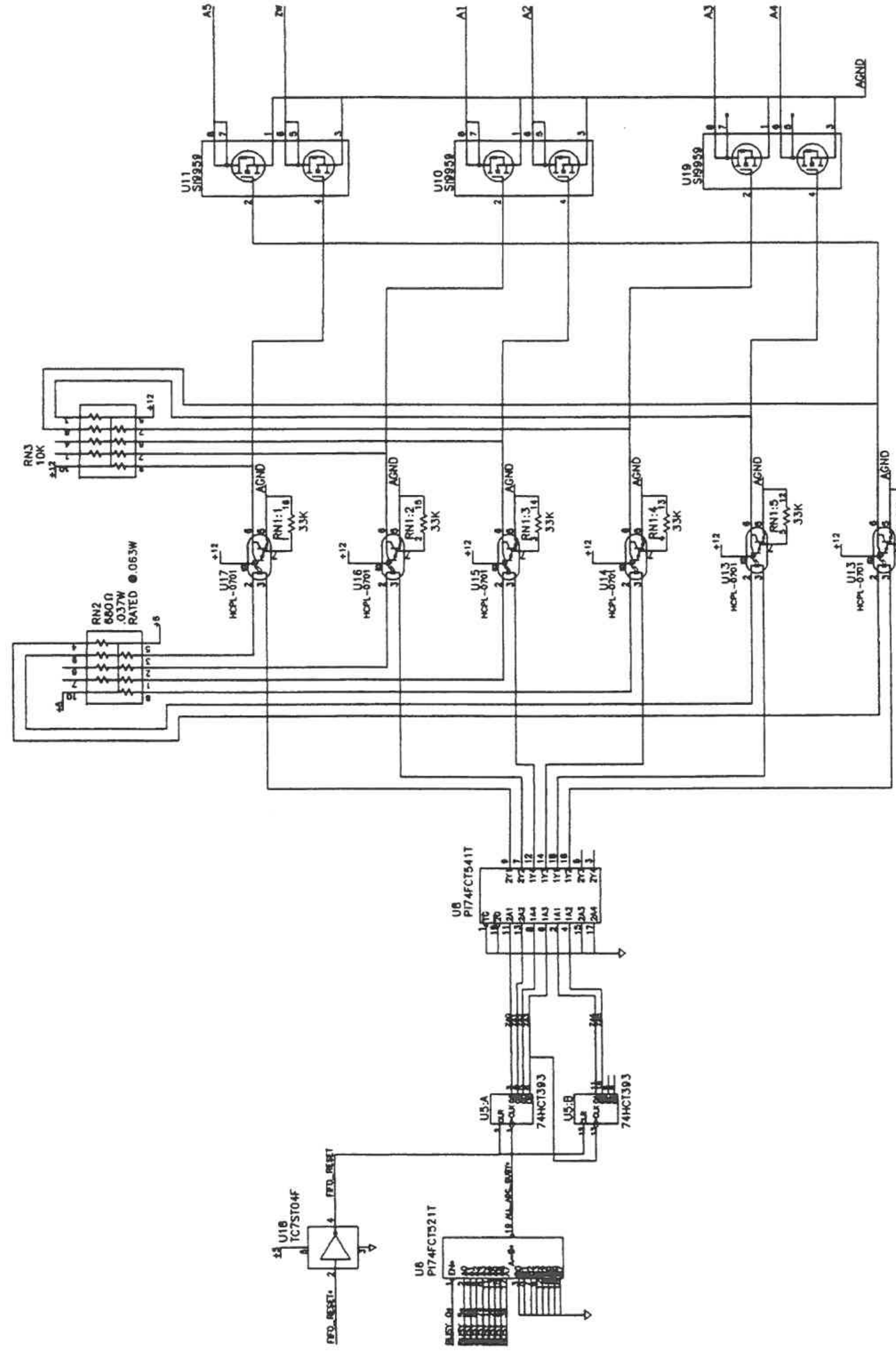


Figure 26 - ZOC Module Interface Board Electrical Schematic - Address Outputs

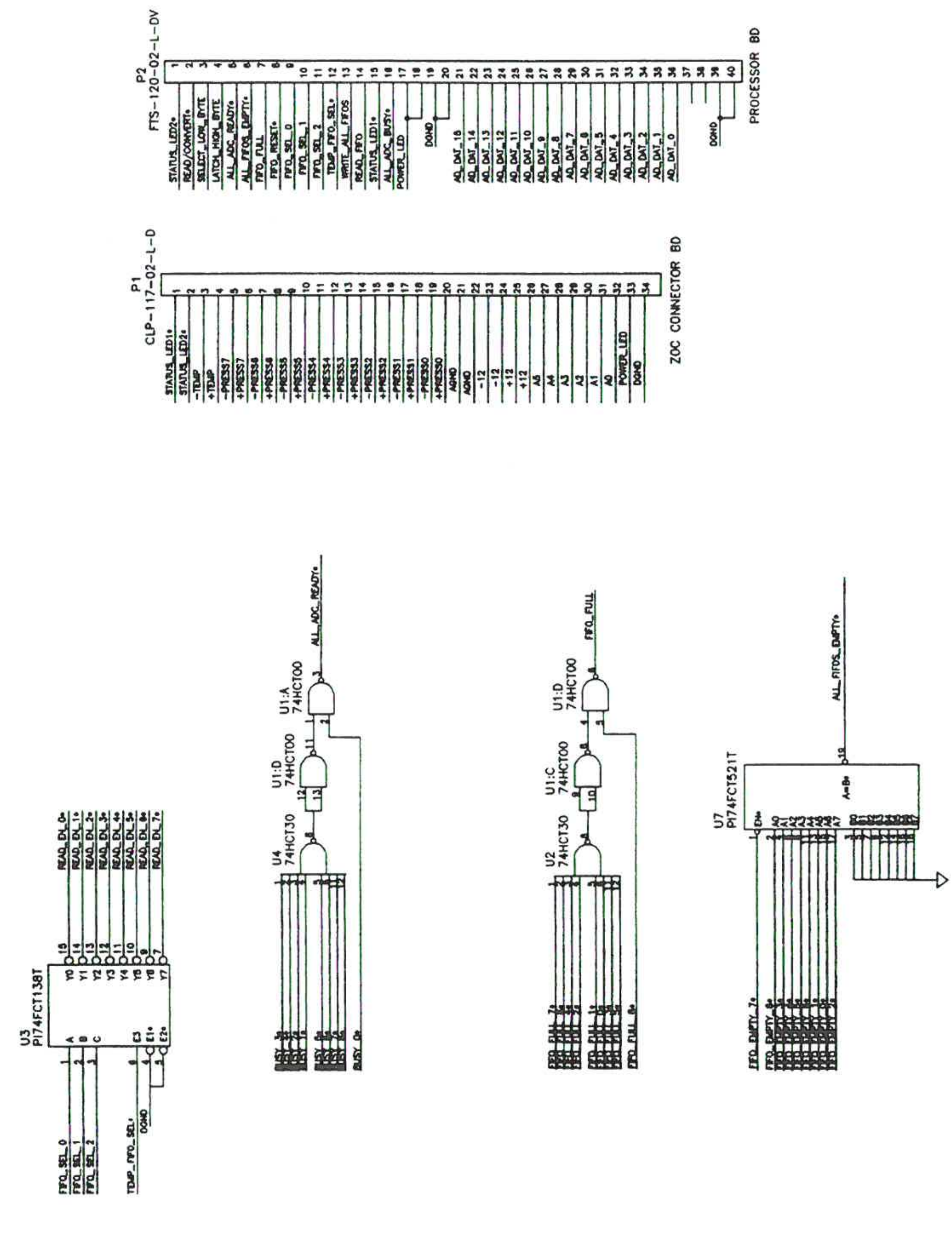


Figure 27 - ZOC Module Interface Board Electrical Schematic

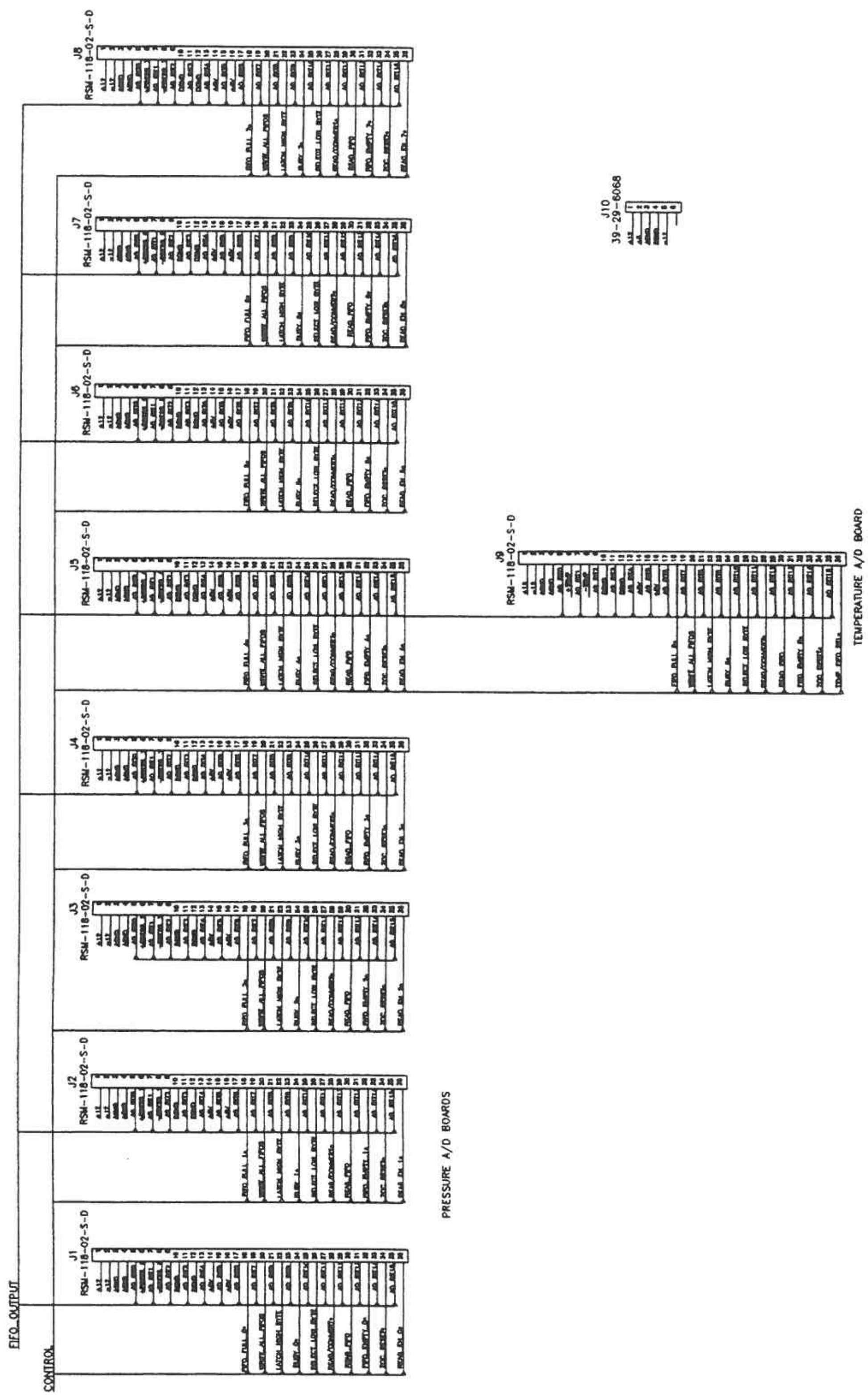


Figure 28 - ZOC Module Interface Board Electrical Schematic

DSM ZOC Connector Board

This board is the direct connection between the DSM and the ZOC Modules. It contains the interface connectors and the RTD conditioning circuits. The ZOC Module RTD's are scanned from this board and the outputs routed to the Temperature A/D Board.

Figure 29 shows the layout of the DSM ZOC Connector Board

Figures 30 and 31 contains the electrical schematic

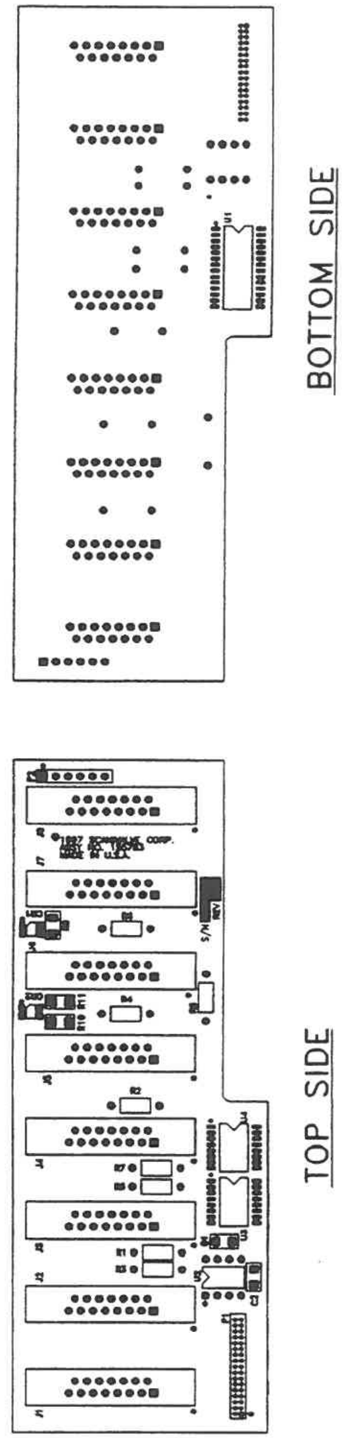


Figure 29 - DSM ZOC Connector Board Layout

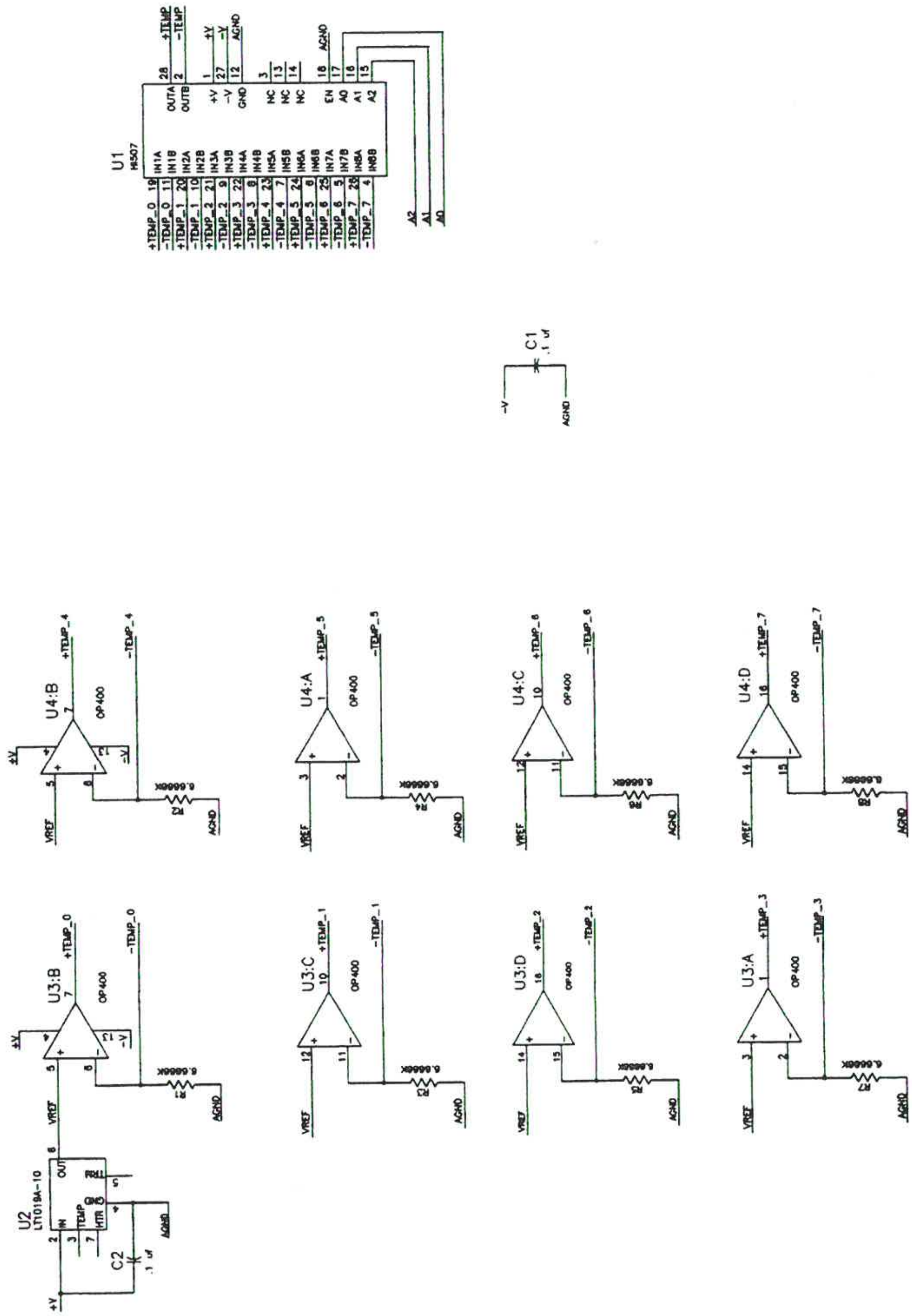


Figure 30 - DSM ZOC Connector Board Electrical Schematic Part 1

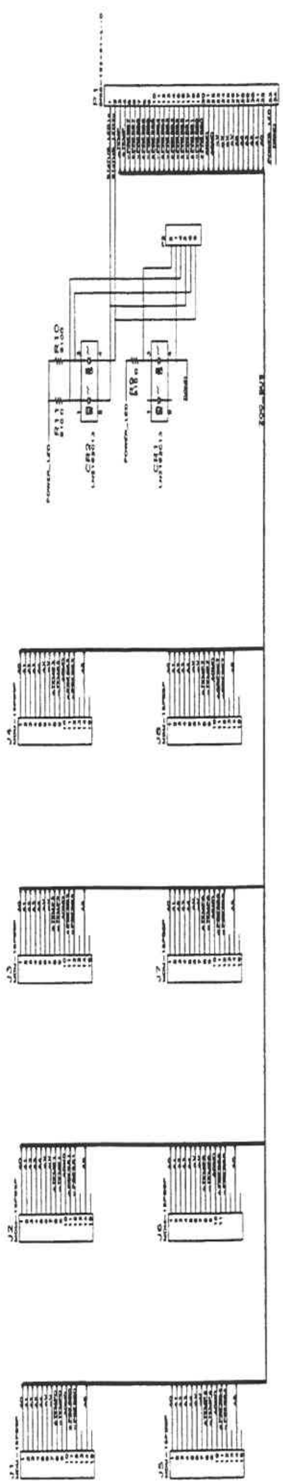


Figure 31 - DSM ZOC Connector Board Electrical Schematic Part 2

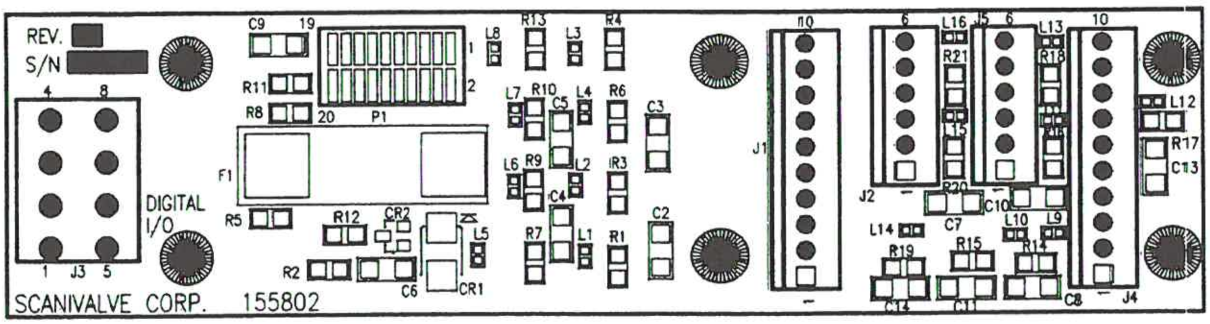
Digital I/O Board

The Digital I/O Board provides the necessary interfacing between the DSM and a Digital Input or Output. The DSM may be configured for as many as 5 Digital Inputs and/or 5 Digital Outputs.

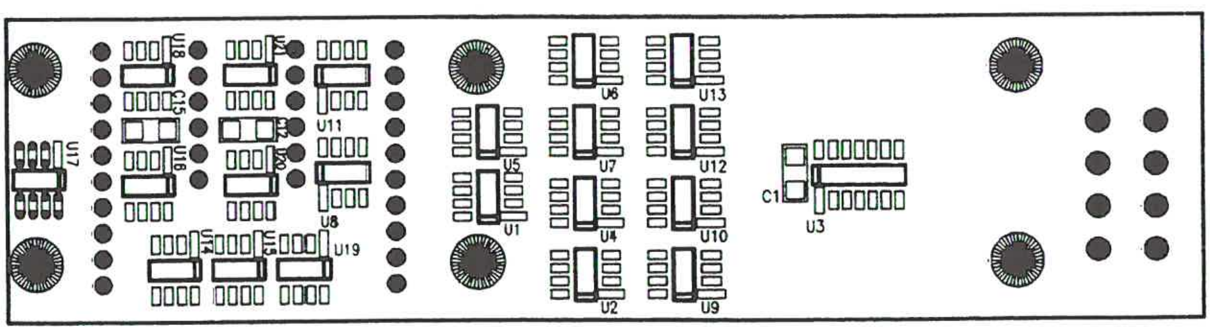
Digital Inputs are edge triggered. A minimum signal of 5 Vdc is required. The maximum input is 15 Vdc.

Digital Outputs are 28 Vdc @ 500 mA maximum. They are supplied by the unfused 28 Vdc power input.

Figure 32 shows the layout of the Digital I/O Board. Figures 33 and 34 show the schematic.



Top Side



Bottom Side

Figure 32 - Digital I/O Board Layout

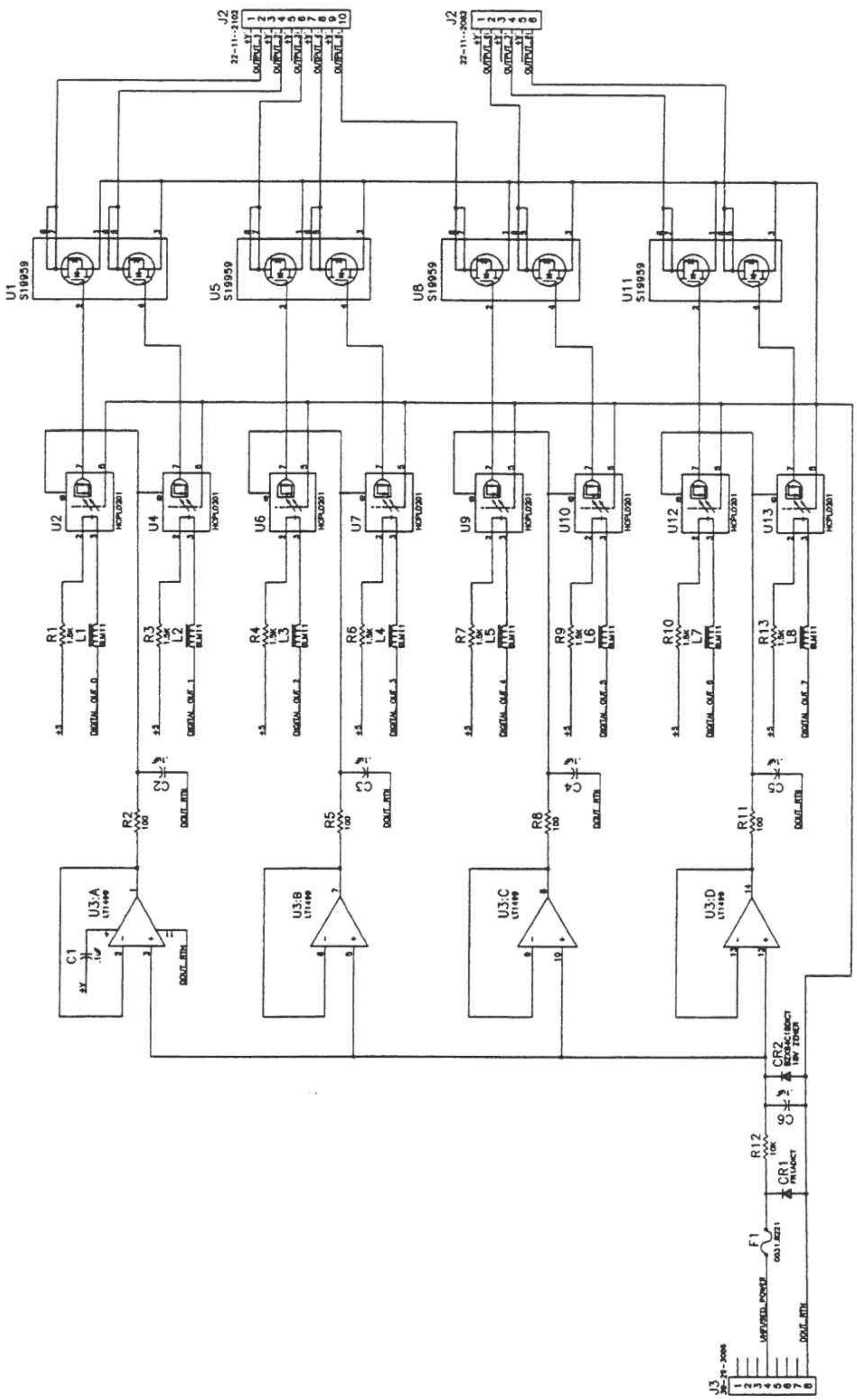


Figure 33 - Digital I/O Board Schematic - Part 1

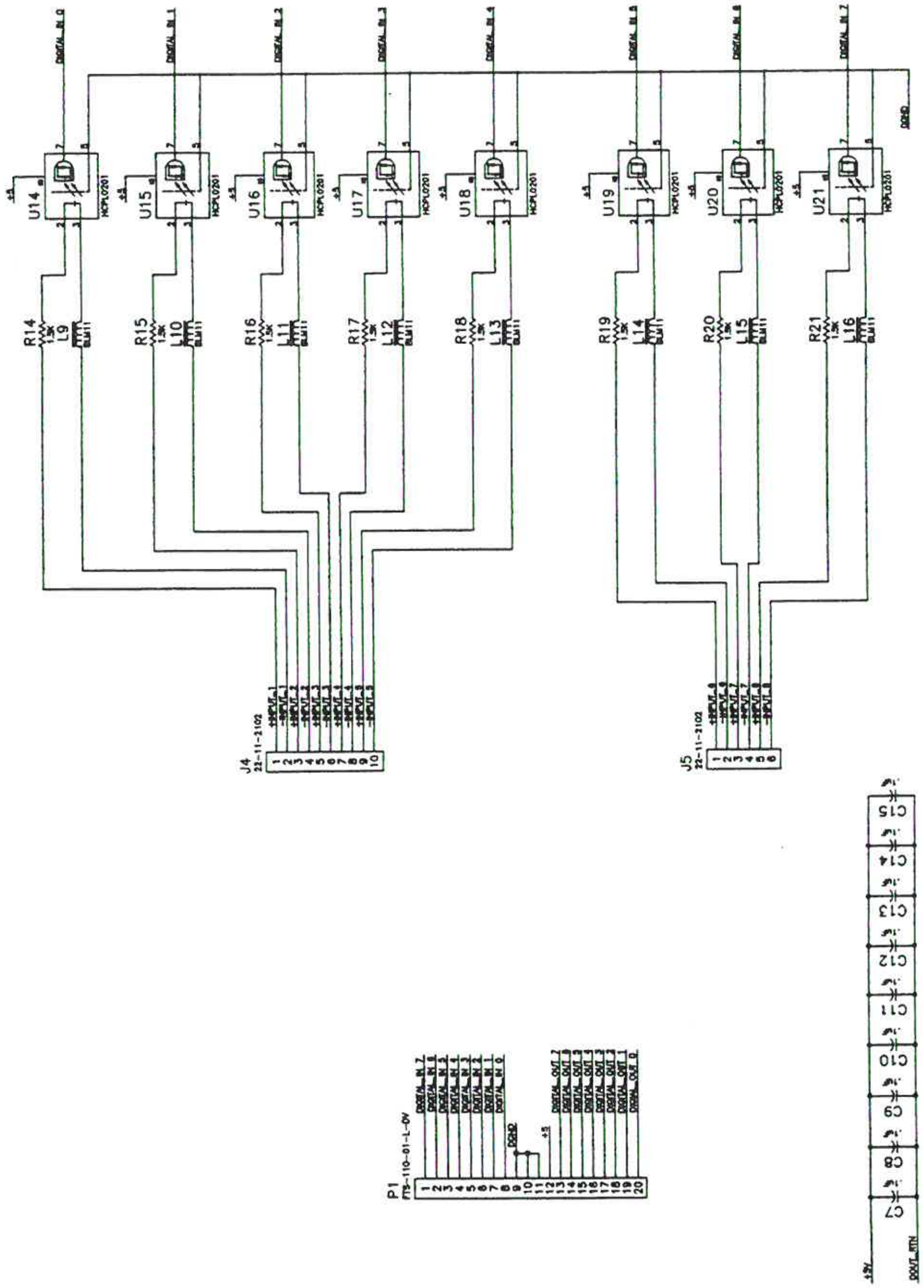


Figure 34 - Digital I/O Board Schematic - Part 2

Power Distribution Board

The Power Distribution Board receives the ±12 Vdc, + 5Vdc, and +28 Vdc and distributes the voltages to the various circuit boards. In addition, the Power Distribution Board also provides EMI filtering for the ±12 Vdc and uses the +5 Vdc to create a -5 Vdc supply. The Layout of this board is shown in figure 35. The Schematic is shown in figure 36.

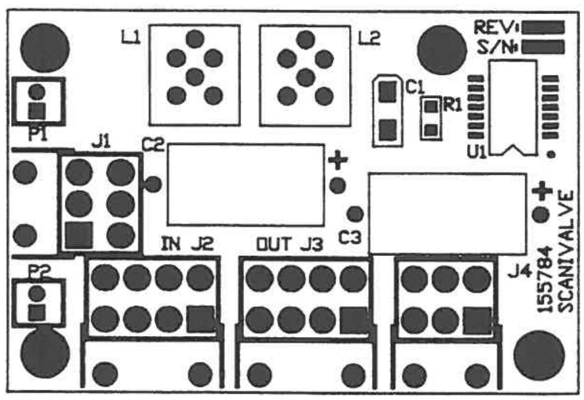


Figure 35 - Power Distribution Board Layout

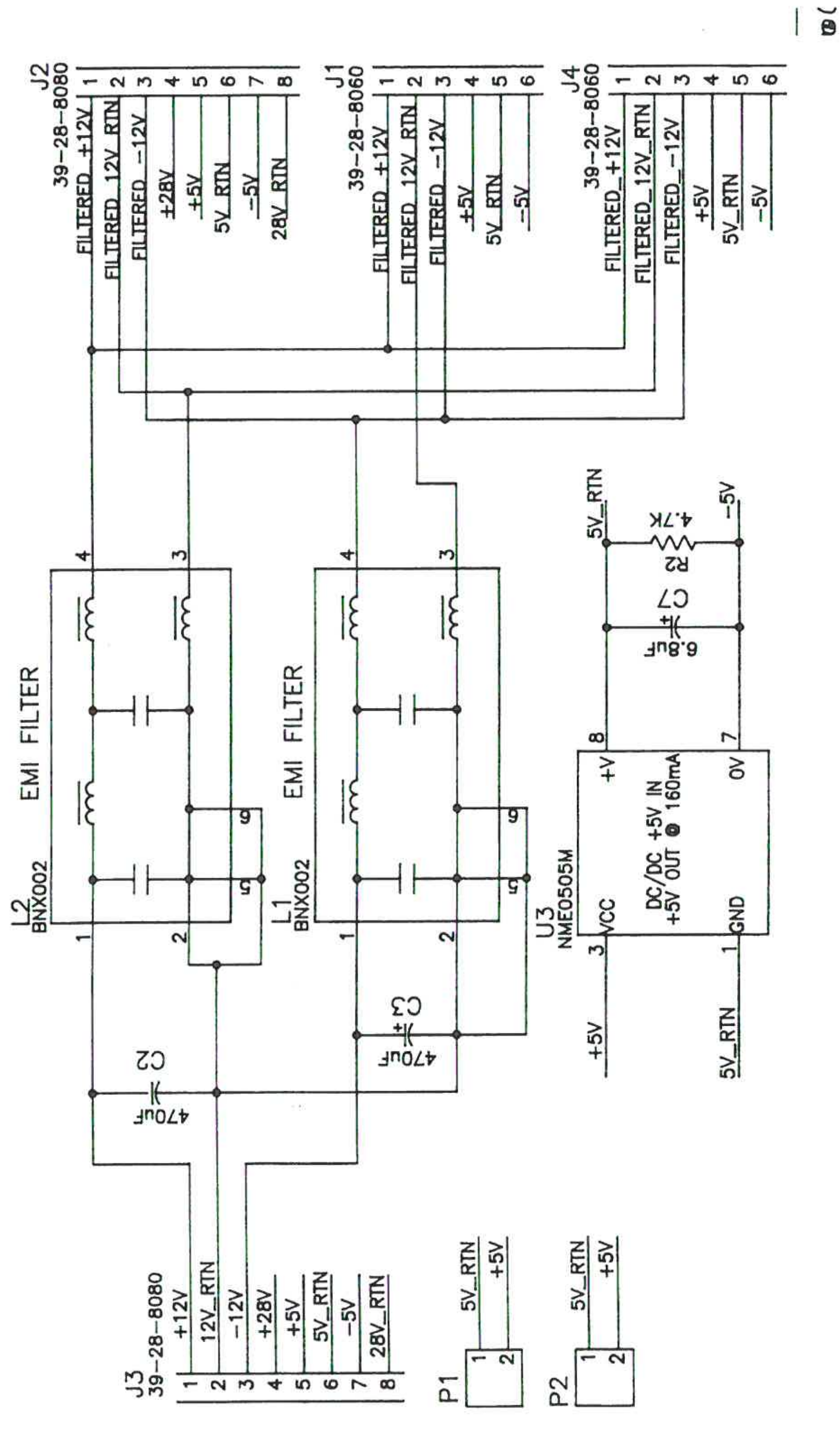


Figure 36 - Power Distribution Board Schematic

Special Hardware

Hard Disk Drive

The Hard Disk Drive used in the DSM 3001 is one of the Seagate Marathon SL family. It is a high capacity, slim line design. It can withstand up to 125 g's of shock while operating and 350 g's during non-operation. The formatted capacity is 1.35 gigabytes. They have an average MTBF greater than 300,000 power on hours.

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

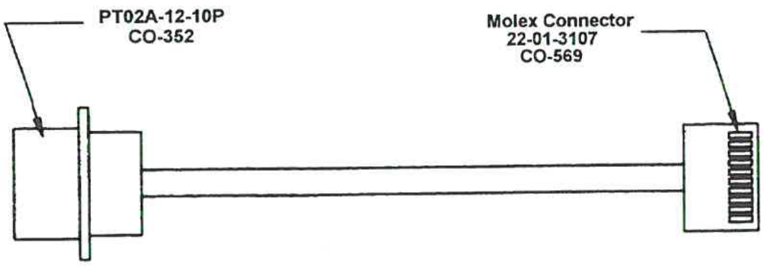
Interconnecting Cables

This section contains drawings and schematics of the various interconnecting cables. All of these cables are internal. It is not expected that a user would have to service these cables unless a problem is induced during a normal maintenance of the DSM.

The following cables are shown in this section:

Digital Input Cable
Digital Output Cable

Digital Input Cable



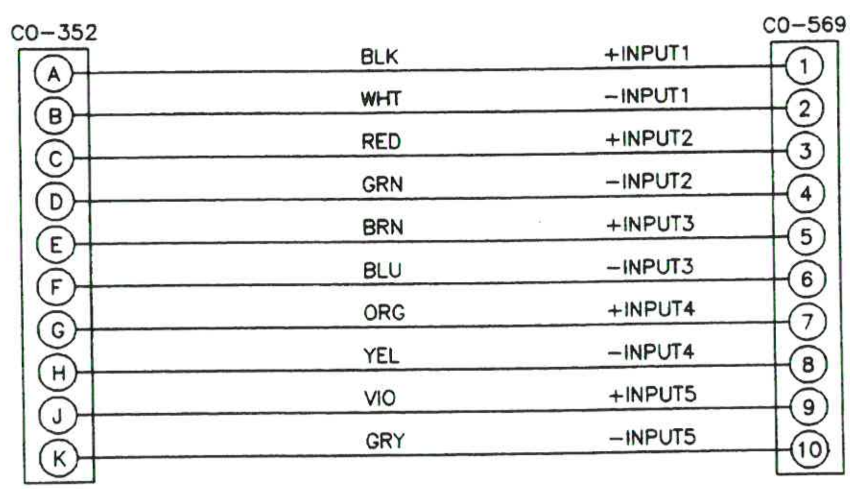
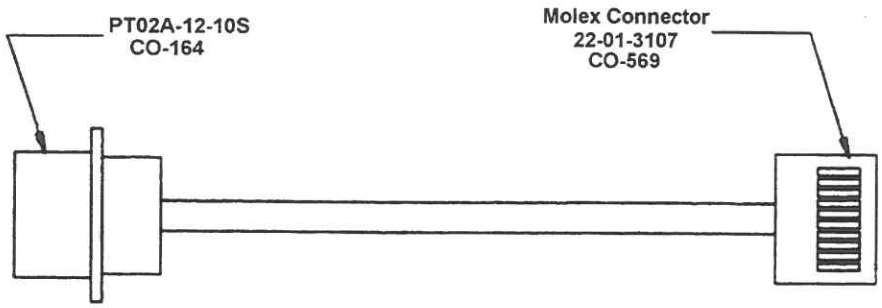


Figure 37 - Digital Input Cable(Internal)

Digital Output Cable



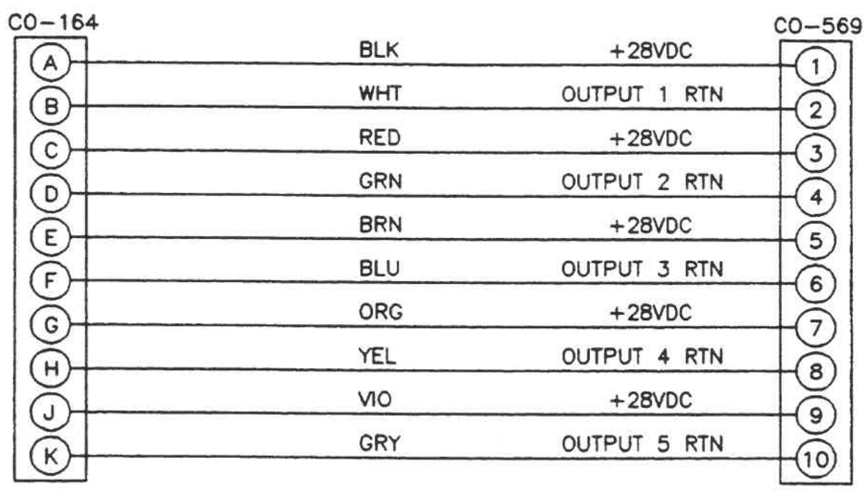


Figure 38 - Digital Output Cable(Internal)