DAPlog Plus for Windows

A Data Acquisition Processor board from Microstar Laboratories is a data acquisition system that occupies one expansion slot in a personal computer. This document introduces the Data Acquisition Processor by showing how to set up a wide variety of applications in DAPlog Plus for Windows (DAPlog) software.

DAPlog provides immediate and easy access to one or more DAP boards. From DAPlog, communication with a DAP board is initiated automatically and requires no programming. DAPlog provides a graphical interface to:

- Save and load Input configurations
- Select system options
- Display data in a graph and/or table
- Disk log data to a text or binary file
- Disk log data to a binary file at high speed by the server

This user manual contains two sections: Sample Applications and Hardware Configurations. Together, these sections serve as a good starting point for building complete data acquisition systems, including software and hardware.

This version of DAPlog supports the DAPL 2000 operating system. DAPlog is compatible with the Windows 9x/ME/NT/2000 operating systems.

Sample Applications

Sample applications serve as a good starting point to build a new application. You easily can modify them to meet your specific requirements. Each sample application consists of the following sections.

Create the Application

This section shows step-by-step instructions on how to build the application in DAPlog.

Sample Hardware Configuration

This section provides a hardware configuration to meet the requirements of the given example. It consists of a list of hardware, step-by-step instructions on how to connect the hardware, and a 3-D line drawing illustrating the channel architecture and overall signal configuration.

The chosen hardware provides quick and secure connections of discrete wires to a DAP board and better signal quality due to the shielding. Contact Microstar Laboratories for more information about available options.

Illustration

This section captures screen shots of DAPlog at various steps.

Download the Application

This section provides a downloadable configuration file for DAPlog.

Before running the sample applications, make sure that you have installed the Accel32/DAPcell server and verify that the DAP board and DAP board software are properly installed by following the Detect DAP board sample application.

List of Sample Application

Sample and Graph One Channel

Sample, Graph and Log Two Channels to a Disk File

Select a Sample Rate

Sample and Graph Eight Differential Channels

Sample 128 Channels with Input Expansion

Select a Continuous Range of Input Channel Pipes

Select an Even\Odd Range of Input Channel Pipes

Select a Rectangular Range of Input Channel Pipes

Configure All Input Channel Pipes to Sample the Same Pin

Configure All Input Channel Pipes to Sample an Incremented Pin

Configure All Input Channel Pipes to Sample at the Same Gain

Sample and Graph One Channel

This application shows a basic input configuration. It provides access to the DAP configuration options and the resulting data. The DAP board samples one input signal and sends the digitized values directly to the host PC. The host PC then displays the data in a graph.

Create the application

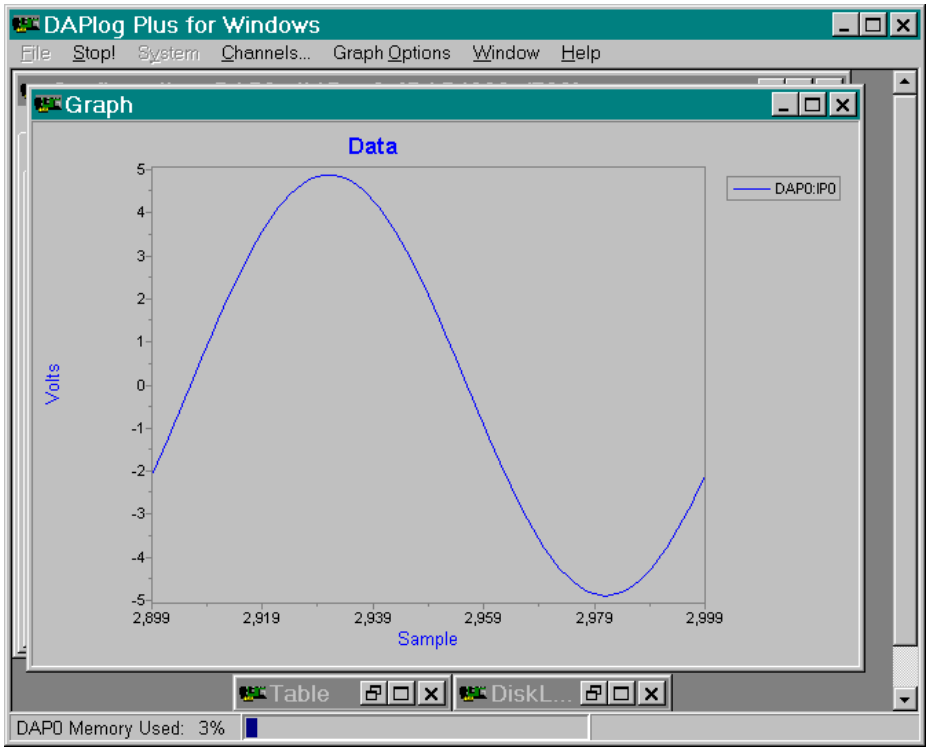
1. Select `File|New`.
2. Select the `Input|Pipes` tab and type "`1`" in the `Channels` edit box.
3. Open `Window|Graph`.
4. Select `Start!`.

Sample Hardware Configuration

Basic Hardware Configuration

Illustration

The following figure shows what DAPlog looks like after starting acquisition.



Download the Application

(Coming soon!)

Sample, Graph, and Log Two Channels to a Disk File

This application shows a basic input configuration with logging capability. It provides access to the DAP configuration options, the resulting data, and logging options. The DAP board samples two input signals and sends the digitized values directly to the host PC. The host PC then displays the data in a graph while logging to a disk file. Select the disk file before starting the DAP board. After stopping the DAP board, close the disk log file before accessing it through other applications. Only data from the selected channels are logged.

Create the application

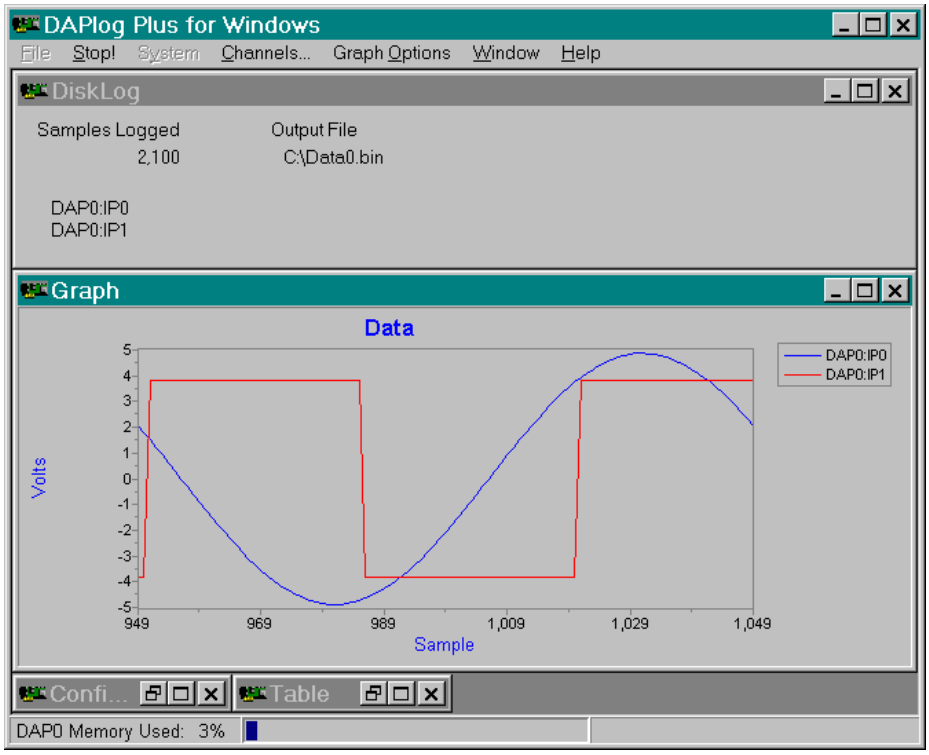
1. Select `File|New`.
2. Select the `Input|Pipes` tab and type "2" in the `Channels` edit box.
3. Open `Window|DiskLog`.
4. Select `Disk Log Options|Open File`, type a file name `Data0.bin`, and click `Open`.
5. Open `Window|Graph`.
6. Select `Start!`, followed by `Stop!` when the experiment is complete.
7. Open `Window|DiskLog` and select `Disk Log Options|Close File`.

Sample Hardware Configuration

Basic Hardware Configuration

Illustration

The following figure shows the `DiskLog` and the `Graph` window with two input channels.



Download the Application

(Coming soon!)

Select a Sample Rate

This application shows how to select a sample rate for a DAP board. The DAP board samples two input signals and sends the digitized values directly to the host PC. The host PC then displays the data in a graph. The DAP board samples `S0` and `S1` at an aggregated rate of 4K samples per second. Each channel is sampling at 2K samples per second.

Create the application

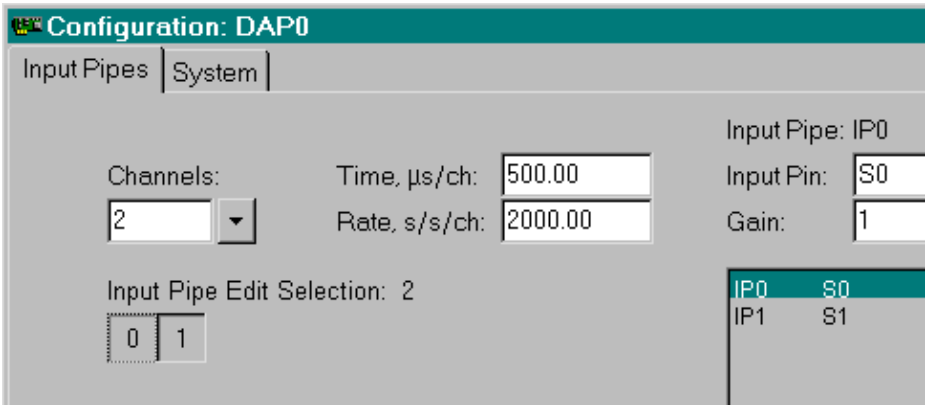
1. Select `File|New`.
2. Select the `Input|Pipes` tab, type "`2`" in the `Channels` edit box, and type "`2000`" in the `Rate, s/s/ch` edit box.
3. Open `Window|Graph`.
4. Select `Start!`.

Sample Hardware Configuration

Basic Hardware Configuration

Illustration

The following figure shows the sample rate edit box.



Download the Application

(Coming soon!)

Sample and Graph Eight Differential Channels

This application shows a basic input configuration for differential input signals. It provides access to the DAP configuration options and the resulting data. The DAP board samples eight differential input signals and sends the digitized values directly to the host PC. The host PC then displays the data in a graph.

Create the application

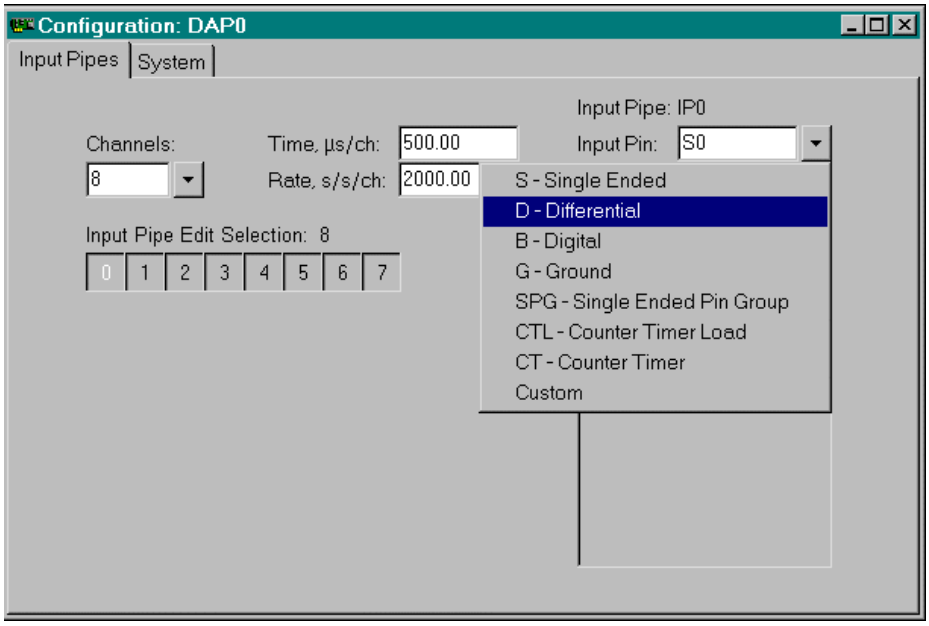
1. Select `File|New`.
2. Select the `Input|Pipes` tab and type "`8`" in the `Channels` edit box.
3. Press the down-arrow button next to the `Pin` edit box and select `Differential` from the list. `D0` will be displayed in the `Pin` edit box.
4. Move the mouse cursor over the `Pipe Edit Selection` grid, press the right mouse button to bring up a pop-up menu, and select `All Channels -> Pin Increment From First`.
5. Open `Window|Graph`.
6. Select `Start!`.

Sample Hardware Configuration

Basic Hardware Configuration

Illustration

The following figure shows selecting a differential input.



Download the Application

(Coming soon!)

Sample 128 Channels with Input Expansion

This application utilizes the input capability. The DAP board samples 128 input signals by using Analog Input Expansion boards and sends the digitized values directly to the host PC. The host PC then displays the data in a graph.

Create the application

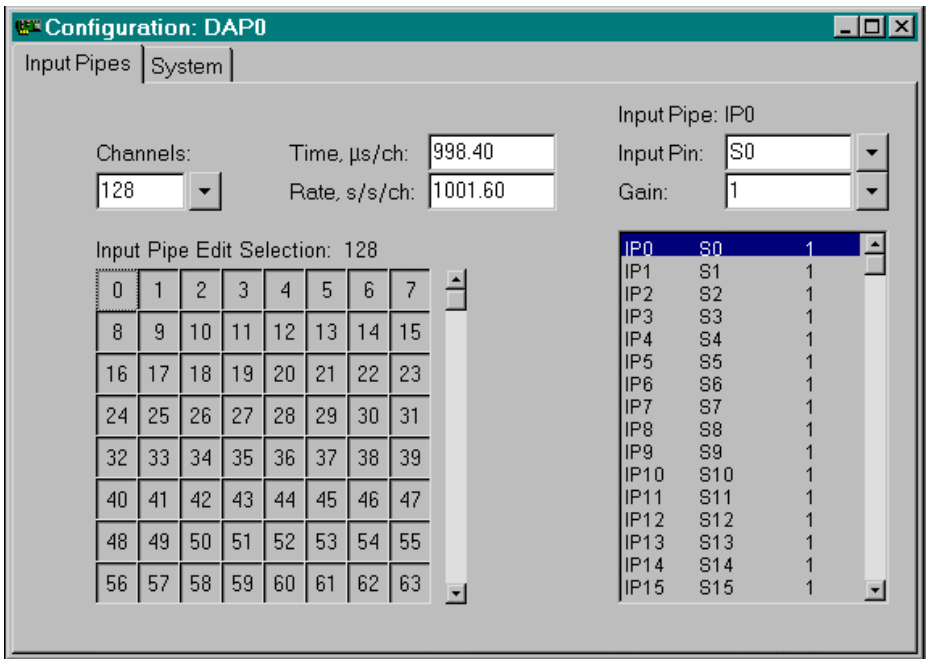
1. Select `File|New`.
2. Select the `Input|Pipes` tab and type "`128`" in the `Channels` edit box.
3. Select the `Processing|Send To PC` tab and press the `Select All` button.
4. Open `Window|Graph`.
5. Select `Channels`, click the first unselected button `DAP0:IP1`, and drag the mouse to select all items through to the `DAP0:IP127` button. Then click the `OK` button to select all channels for graphing.
6. Select `Start!`.

Sample Hardware Configuration

Hardware Configuration with Analog Expansion

Illustration

The following figure shows a configuration for 128 channels.



Download the Application

(Coming soon!)

Select a Continuous Range of Input Channel Pipes

DAPlog makes working with a group of input channel pipes easy. This application shows how to select a continuous range of input channel pipes.

By default, DAPlog configures 16 continuous input channel pipes to sample 16 continuous input pins. Specifically, the input channel pipe `IP0` samples from `S0`, `IP1` samples from `S1`, etc. To provide interesting results, this application configures a group of eight input channel pipes, namely `IP0` through `IP7`, to sample the same input pin `S2`. The digitized values in all 16 channels are sent to the host PC. The host PC then displays the data in a graph.

Create the application

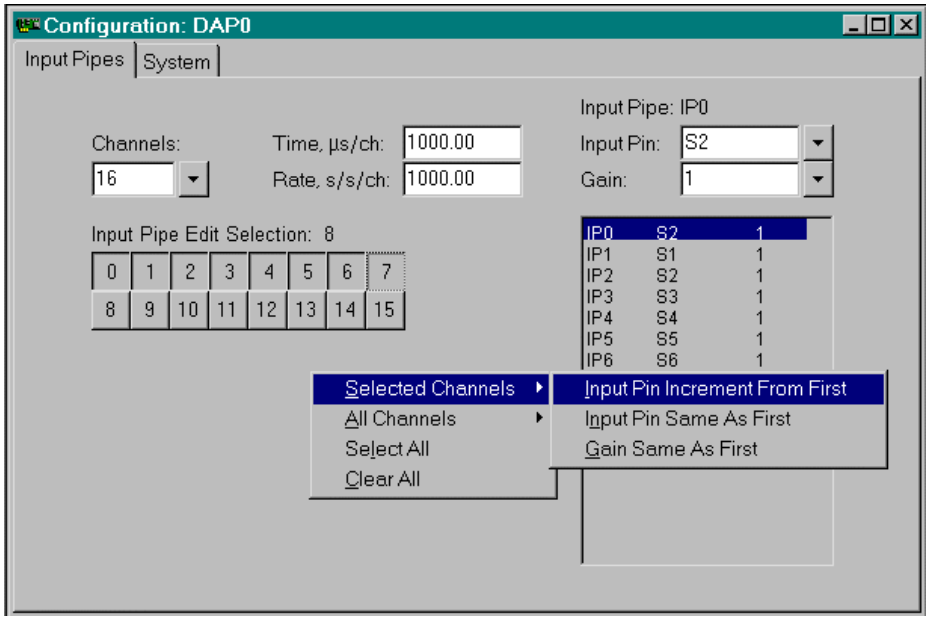
1. Select `File|New`.
2. Select the `Input|Pipes` tab, move the mouse cursor to the `Pipe Edit Selection` grid, and press the right mouse button to bring up a pop-up menu. Select `Clear All`.
3. Click the `0` button and drag the mouse to select all items through to the `7` button.
4. Type "`S2`" in the `Pin` edit box.
5. Move the mouse cursor over the `Pipe Edit Selection` grid, press the right mouse button to bring up a pop-up menu, and select `Selected Channels|Pin Same As First`.
6. Open `Window|Graph`.
7. Select `Start!`.

Sample Hardware Configuration

Basic Hardware Configuration

Illustration

The following shows step 5 as described in the Create the Application section.



Download the Application

(Coming soon!)

Select an Even/Odd Range of Input Channel Pipes

DAPlog makes working with a group of input channel pipes easy. This application shows how to select an even/odd range of input channel pipes.

By default, DAPlog configures 16 continuous input channel pipes to sample 16 continuous input pins. Specifically, the input channel pipe `IP0` samples from `S0`, `IP1` samples from `S1`, etc. To provide interesting results, this application configures all even input channel pipes, namely `IP0`, `IP2`, `IP4`, `IP6`, `IP8`, `IP10`, `IP12`, and `IP14` to sample the same input pin, `S2`. The digitized values in all 16 channels are sent to the host PC. The host PC then displays the data in a graph.

Apply the same terminology to select an odd range of input pipes.

Create the application

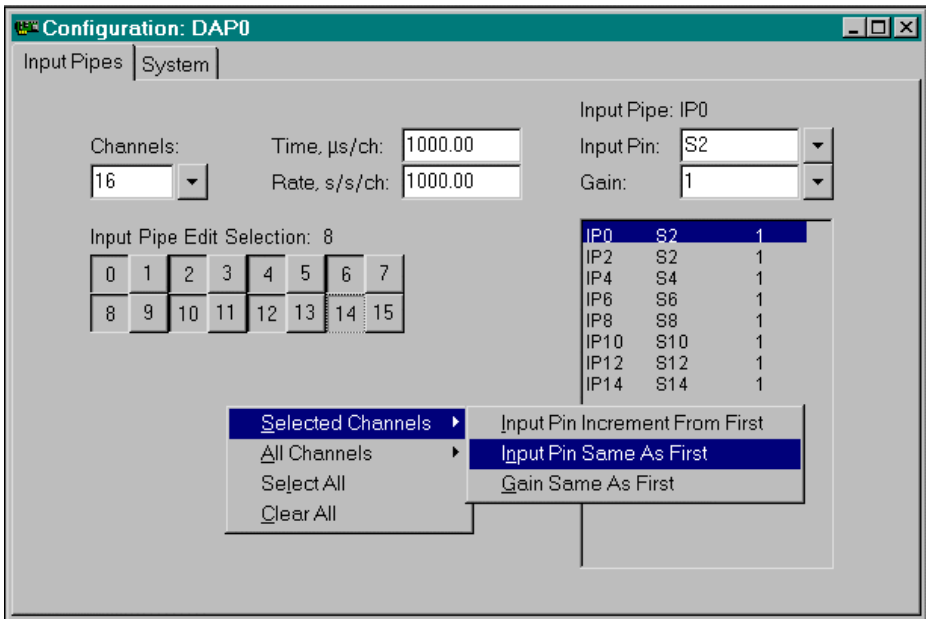
1. Select `File|New`.
2. Select the `Input|Pipes` tab, move the mouse cursor to the `Pipe Edit Selection` grid, and press the right mouse button to bring up a pop-up menu. Select `Clear All`.
3. Press and hold the `Alt` key on the keyboard.
4. Click the `0` button and drag the mouse vertically to select both the `0` and `8` buttons.
5. Click the `2` button and drag the mouse vertically to select both the `2` and `10` buttons.
6. Click the `4` button and drag the mouse vertically to select both the `4` and `12` buttons.
7. Click the `6` button and drag the mouse vertically to select both the `6` and `14` buttons.
8. Release the `Alt` key.
9. Type "`S2`" in the `Pin` edit box.
10. Move the mouse cursor over the `Pipe Edit Selection` grid, press the right mouse button to bring up a pop-up menu, and select `Selected Channels|Pin Same As First`.
11. Open `Window|Graph`.
12. Select `Start!`.

Sample Hardware Configuration

Basic Hardware Configuration

Illustration

The following shows step 10 as described in the Create the Application section.



Download the Application

(Coming soon!)

Select a Rectangular Range of Input Channel Pipes

DAPlog makes working with a group of input channel pipes easy. This application shows how to select a rectangular range of input channel pipes.

By default, DAPlog configures 16 continuous input channel pipes to sample 16 continuous input pins. Specifically, the input channel pipe `IP0` samples from `S0`, `IP1` samples from `S1`, etc. To provide interesting results, this application configures a rectangular range of input channel pipes to sample an incremented pin. That means the input channel pipes `IP0`, `IP1`, `IP8`, `IP9` sample from the input pins `S2`, `S3`, `S4`, `S5` respectively. The digitized values in all 16 channels are sent to the host PC. The host PC then displays the data in a graph.

Create the application

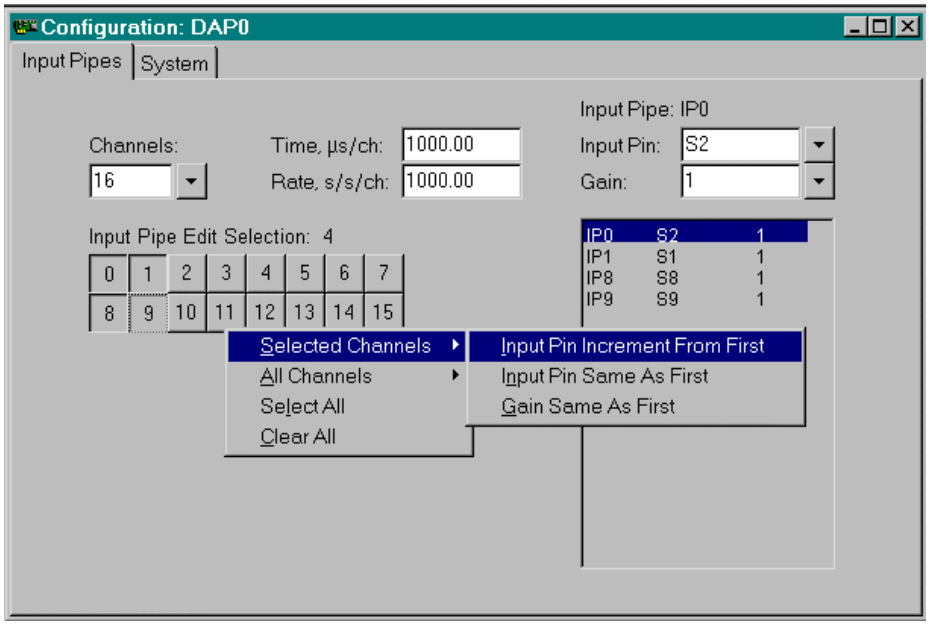
1. Select `File|New`.
2. Select the `Input|Pipes` tab, move the mouse cursor over the `Pipe Edit Selection` grid, and press the right mouse button to bring up a pop-up menu. Select `Clear All`.
3. Press and hold the `Alt` key on the keyboard.
4. Click the `0` button and drag the mouse to select the `0`, `1`, `8`, and `9` buttons.
5. Release the `Alt` key.
6. Type "`S2`" in the `Pin` edit box.
7. Move the mouse cursor over the `Pipe Edit Selection` grid, press the right mouse button to bring up a pop-up menu, and select `Selected Channels|Pin Increment From First`.
8. Open `Window|Graph`.
9. Select `Start!`.

Sample Hardware Configuration

Basic Hardware Configuration

Illustration

The following shows step 7 as described in the Create the Application section.



Download the Application

(Coming soon!)

Configure All Input Channel Pipes to Sample the Same Pin

DAPlog makes working with all input channel pipes easy. This application shows how to configure all input channel pipes to sample the same input pin `S0` in one easy step.

By default, DAPlog configures 16 continuous input channel pipes to sample 16 continuous input pins. Specifically, the input channel pipe `IP0` samples from `S0`, `IP1` samples from `S1`, etc. To provide interesting results, this application configures all 16 input channel pipes to sample input pin `S0`. The digitized values in all 16 channels are sent to the host PC. The host PC then displays the data in a graph.

Create the application

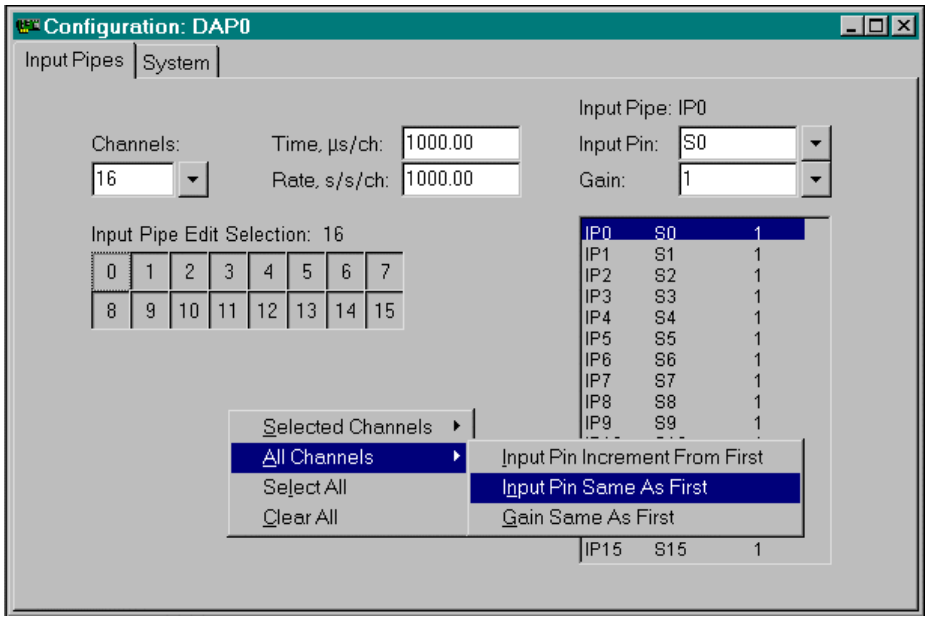
1. Select `File|New`.
2. Select the `Input|Pipes` tab.
3. Move the mouse cursor over the `Pipe Edit Selection` grid, press the right mouse button to bring up a pop-up menu, and select `All Channels|Pin Same As First`.
4. Open `Window|Graph`.
5. Select `Start!`.

Sample Hardware Configuration

Basic Hardware Configuration

Illustration

The following shows step 3 as described in the Create the Application section.



Download the Application

(Coming soon!)

Configure All Input Channel Pipes to Sample an Incremented Pin

DAPlog makes working with all input channel pipes easy. This application shows how to configure all input channel pipes to sample an incremented pin in one easy step.

This application configures 16 continuous input channel pipes to sample 16 continuous input pins. Specifically, the input channel pipe `IP0` samples from `S0`, `IP1` samples from `S1`, etc. The digitized values in all 16 channels are sent to the host PC. The host PC then displays the data in a graph.

Create the application

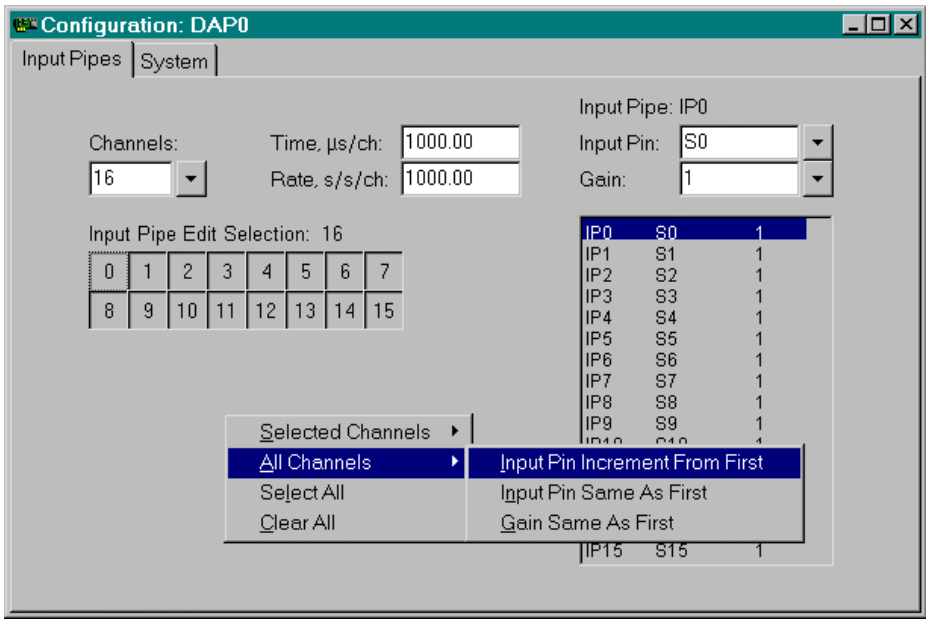
1. Select `File|New`.
2. Select the `Input|Pipes` tab.
3. Move the mouse cursor over the `Pipe Edit Selection` grid, press the right mouse button to bring up a pop-up menu, and select `All Channels|Pin Increment From First`.
4. Open `Window|Graph`.
5. Select `Start!`.

Sample Hardware Configuration

Basic Hardware Configuration

Illustration

The following shows step 3 as described in the Create the Application section.



Download the Application

(Coming soon!)

Configure All Input Channel Pipes to Sample at the Same Gain

DAPlog makes working with all input channel pipes easy. This application shows how to configure all input channel pipes to sample at the same gain one easy step.

By default, DAPlog configures 16 continuous input channel pipes to sample 16 continuous input pins at the gain of 1. Specifically, the input channel pipe `IP0` samples from `S0`, `IP1` samples from `S1`, etc. To provide interesting results, this application configures all 16 input channel pipes to sample at the same gain of 10. The digitized values in all 16 channels are sent to the host PC. The host PC then displays the data in a graph.

Create the application

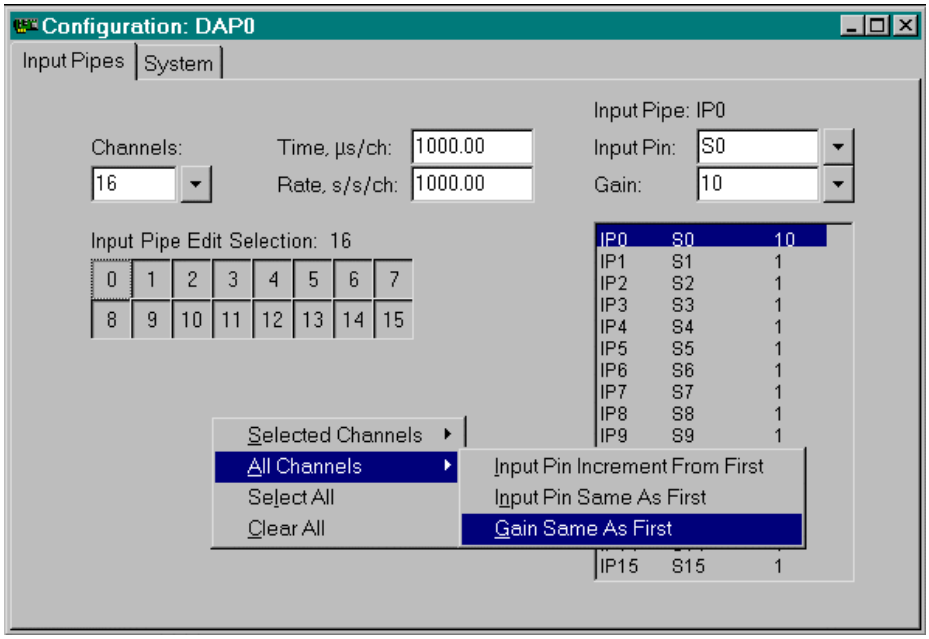
1. Select `File|New`.
2. Select the `Input|Pipes` tab and type "`10`" in the `Gain` edit box.
3. Move the mouse cursor over the `Pipe Edit Selection` grid, press the right mouse button to bring up a pop-up menu, and select `All Channels|Gain Same As First`.
4. Open `Window|Graph`.
5. Select `Start!`.

Sample Hardware Configuration

Basic Hardware Configuration

Illustration

The following shows step 3 as described in the Create the Application section.



Download the Application

Coming soon!)

Hardware Configurations

These hardware configurations serve as a good starting point to build a new application. You easily can modify them to meet your specific requirements. Each hardware configuration consists of the following sections.

Parts List

List all components required to build the application.

Connections

This section shows step-by-step instructions on how to connect the hardware listed in the Parts List section.

Line Drawing

This section provides a line drawing of the hardware configuration described in the Connections section to help visualization.

List of hardware configurations

Basic Hardware Configuration

Hardware Configuration with Input Expansion

Two DAP Boards

Basic Hardware Configuration

This hardware configuration shows a basic option for up to 16 single-ended analog inputs, or eight differential analog inputs, and two analog outputs. It provides quick connections for analog signals by means of an Analog Termination Board, part number MSTB009. An Analog Termination board provides 16 single-ended or eight differential analog inputs, and two analog outputs with onboard termination points. Most hardware has more than one model available. The following models are chosen to provide a better signal quality because of shielding.

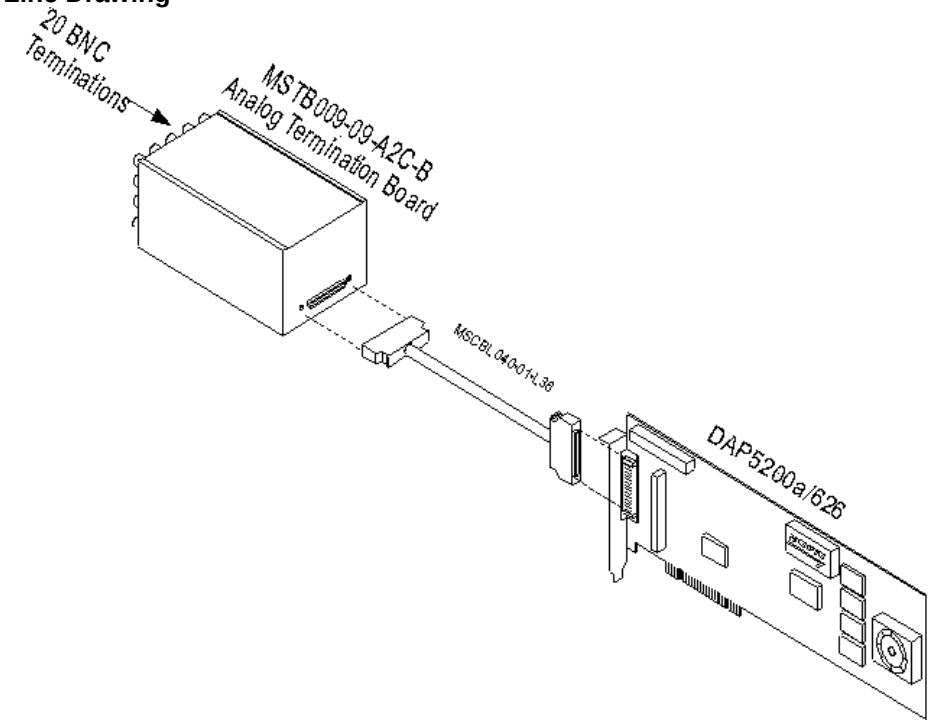
Parts List

Part Number	Description	Quantity
DAP 5200a	Data Acquisition Processor	1
MSTB009-09-A2C-B	Analog Termination Board in an Single Board Enclosure	1
MSCBL040-01-L36	68-line round, shielded cable	1

Connections

1. Install the DAP 5200a board as described in the DAP 5200a manual.
2. Connect the MSTB009-09-A2C-B enclosure to the DAP5200a with the MSCBL040-01-L36 cable.
3. Connect signals to BNC connectors labeled with `S0` through `S15` on the MSTB009-09-A2C-B enclosure. For differential inputs, refer to the MSTB 009 manual for the input mapping.
4. Analog signals output from `DAC0` and `DAC1` of the MSTB009-09-A2C-B enclosure.

Line Drawing



Hardware Configuration with Input Expansion

This section shows two input configurations for up to 128 single-ended inputs or 64 differential inputs with two standard end panels: BNC and DB37 connectors. Both configurations provide quick connections for analog signals by means of an Analog Input Expansion Board, part number MSXB037. Each Analog Input Expansion board provides 16 single-ended or eight differential analog inputs with onboard termination points. Most hardware has more than one model available. The following models are chosen to provide a better signal quality because of shielding.

Configuration A

The DB37 end panel provides a DB-37 connector for mass input termination. Input signals are connected to the header by means of a DB-37 connector on the front panel. For more information, please see MSXB 037 hardware manual.

Parts List

Part Number	Description	Quantity
DAP 5200a	Data Acquisition Processor	1
MSIE001-01-E	Industrial Enclosure	1
MSXB037-02-E2K	Analog Input Expansion Board, 1 slot	8
MSCBL040-01-L36	68-line round, shielded cable	1

Connections

1. Install the DAP 5200a and its driver as shown in the DAP 5200a manual.
2. Set up the MSIE001-01-E enclosure as shown below.
    i. Install jumpers on Pin 1, 2, 3, 4, and 5 on connector J5 of the first MSXB037-02-E2K board and install the board next to the MSXB 029 board.
    ii. Install jumpers on Pin 1, 2, 3, and 4 on connector J5 of the second MSXB037-02-E2K board and install the board next to the first MSXB037-02-E2K board.
    iii. Install jumpers on Pin 1, 2, 3, and 5 on connector J5 of the third MSXB037-02-E2K board and install the board next to the second MSXB037-02-E2K board.

iv. Install jumpers on Pin 1, 2, and 3 on connector J5 of the fourth MSXB037-02-E2K board and install the board next to the third MSXB037-02-E2K board.

v. Install jumpers on Pin 1, 2, 4, and 5 on connector J5 of the fifth MSXB037-02-E2K board and install the board next to the fourth MSXB037-02-E2K board.

vi. Install jumpers on Pin 1, 2, and 4 on connector J5 of the sixth MSXB037-02-E2K board and install the board next to the fifth MSXB037-02-E2K board.

vii. Install jumpers on Pin 1, 2, and 5 on connector J5 of the seventh MSXB037-02-E2K board and install the board next to the sixth MSXB037-02-E2K board.

viii. Install jumpers on Pin 1 and 2 on connector J5 of the eighth MSXB037-02-E2K board and install the board next to the seventh MSXB037-02-E2K board.

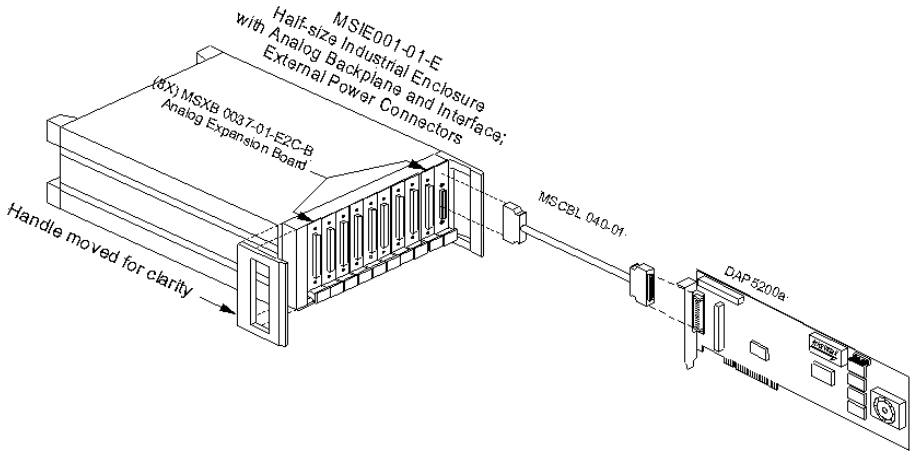
3. Connect the MSXB 029 board in the first MSIE002-06-E enclosure to the MSCBL063 cable in the second MSIE002-06-E enclosure with the MSCBL040-01-L18 cable.

4. Connect the DAP 5200a board to the MSXB 029 board in the second MSIE002-06-E enclosure with the MSCBL040-01-L36 cable.

5. Connect signals to MSXB037 boards.

Note: When installing the MSXB037-02 board, push it firmly into the slot and make sure it is connected securely to the Analog Backplane.

Line Drawing



Configuration B

A BNC end panel provides individual signal connections. Each signal is connected to the MSXB 037 through a BNC connector on the end panel. When MSXB037-01-E2C-B is shipped, its input signal terminals are not connected to the BNC connectors on the BNC panel. Please see the BNC End-panel Connections section below for the standard configuration.

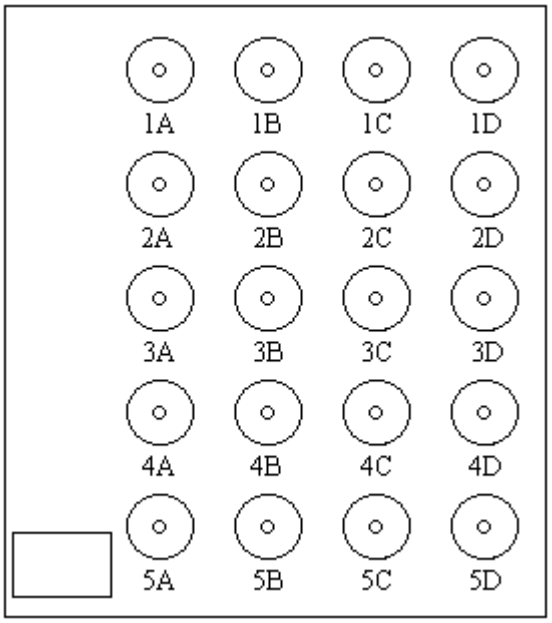
Parts List

Part Number	Descriptions	Quantity
DAP 5200a	Data Acquisition Processor	1
MSIE002-06-E	Industrial Enclosure	2
MSXB037-01-E2C-B	Analog Input Expansion Board, 5 slots	7
MSXB037-01-E2Y	Analog Input Expansion Board, 1 slot	1
FPANEL004-02	Front Panel with 4 Isolated BNC, 1 slot	4
MSCBL040-01-L36	68-line round, shielded cable, 36”	1
MSCBL040-01-L18	68-line round, shielded cable, 18”	1
MSCBL063-01-L4.5	68-line ribbon cable, 4.5”	1

Note: One MSXB037-01-E2Y and four FPANEL004-02 are used instead of the eighth MSXB037-01-E2C-B because the second MSIE has 19 available slots only.

BNC End-Panel Connections

The following figure shows a BNC panel with labels, and the table shows the mapping between BNC connectors and input signal termination on the MSXB 037 board.



BNC panel	*Input Signal Termination*
1A	S0
1B	S1
1C	S2
1D	S3
2A	S4
2B	S5
2C	S6
2D	S7
3A	S8
3B	S9
3C	S10
3D	S11
4A	S12
4B	S13
4C	S14
4D	S15
5A	Not Connected
5B	Not Connected
5C	-
5D	-

All BNC connectors are isolated BNC connectors. Each BNC input connector has a black and a red wire. The red wire is connected to Sx, where x represents the input signal termination, whereas the black wire is connected to Gx. For example, the red and black wires of 1A should connect to S0 and G0 on the MSXB 037 board.

All input signals should be within ±10 volts of this reference ground.

Connections

1. Install the DAP 5200a board as described in the DAP 5200a manual.
2. Connect four BNC panels to four MSXB037-01-E2C-B boards.
3. Set up the first MSIE002-06-E enclosure as shown below.

i. Install jumpers on Pin 1, 2, 3, 4, and 5 on connector J5 of the first MSXB037-01-E2C-B board and install the board next to the MSXB 029 board, Analog Backplane Interface board.

ii. Install jumpers on Pin 1, 2, 3, and 4 on connector J5 of the second MSXB037-01-E2C-B board and install the board next to the first MSXB037-01-E2C-B board.

iii. Install jumpers on Pin 1, 2, 3, and 5 on connector J5 of the third MSXB037-01-E2C-B board and install the board next to the second MSXB037-01-E2C-B board.

iv. Install jumpers on Pin 1, 2, and 3 on connector J5 of the fourth MSXB037-01-E2C-B board and install the board next to the third MSXB037-01-E2C-B board.

4. Connect the remaining three BNC panels to three remaining MSXB037-01-E2C-B boards.

5. Replace the front panel on the MSXB037-01-E2Y board with FPANEL004-02 and connect the BNC wires on the remaining three FPANEL004-02 to the MSXB037-01-E2Y.

6. Set up the second MSIE002-06-E enclosure as shown below.

   i. Connect the short ribbon cable MSCBL063 to connector J3 of the MSXB 029 board.

   ii. Install jumpers on Pin 1, 2, 4, and 5 on connector J5 of the fifth MSXB037-01-E2C-B board and install the board next to the MSCBL063 cable.

   iii. Install jumpers on Pin 1, 2, and 4 on connector J5 of the sixth MSXB037-01-E2C-B board and install the board next to the fifth MSXB037-01-E2C-B board.

   iv. Install jumpers on Pin 1, 2, and 5 on connector J5 of the seventh MSXB037-01-E2C-B board and install the board next to the sixth MSXB037-01-E2C-B board.

   v. Install jumpers on Pin 1 and 2 on connector J5 of the MSXB037-01-E2Y board with FPANEL004-02 and install the board next to the seventh MSXB037-01-E2C-B board.

   vi. Install three FPANEL004-02 to cover the remaining open slots on the MSIE 002.

7. Connect the MSXB 029 board in the first MSIE002-06-E enclosure to the MSCBL063 cable in the second MSIE002-06-E enclosure with the MSCBL040-01-L18 cable.

8. Connect the DAP5200a board to the MSXB 029 board in the second MSIE002-06-E enclosure with the MSCBL040-01-L36 cable.
9. Connect signals to the corresponding BNC connectors.

Note: When installing the MSXB037-01 board, push it firmly into the slot and make sure it is connected securely to the Analog Backplane.

Line Drawing