Model 556B Acquisition Interface Module

7067481C

User's Manual

ISO 9001 SYSTEM CERTIFIED

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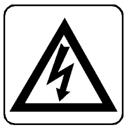
Important Safety Considerations
Read Carefully



Indicates warning of mains or high voltage present at output labeled HV.
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Caution – risk of danger. Refer to documentation for detailed explanation of caution symbol wherever marked.

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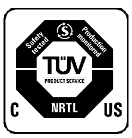


Example of "Cue" mark. Product complies with appropriate current FCC (UL)/CSA 61010-1 directives.

Manufacturer's Address

Canberra Industries, Inc
800 Research Parkway
Meriden, CT. 06450

1. Introduction

The CANBERRA Model 556B Acquisition Interface Module (AIM), serves as a link between a host computer and signal processing NIM. This NIM can be configured with manual and/or programmable versions of CANBERRA's ADC, AMP, DSP, HVPS, AMX, RPI building blocks to tailor the system to the needs of any application. A single AIM, in conjunction with a Genie family workstation, can control a whole bin of programmable NIM for total computer front-end configuration and control.

The 556B AIM, a single-width NIM, has a 10/100 fast Ethernet interface with 10 Base-T and 100 Base-TX transceivers conforming to IEEE 802.2/802.3 communication standards. The module has been designed with two high-speed ADC ports and an Instrument Control Bus (ICB) for programmable front-end NIM units. Connected to an Ethernet network, the 556B allows data acquisition from any computer on the network.

The 556B AIM can acquire data in PHA or Loss-Free PHA mode from either ADC port independently. The AIM contains 64K, 32-bit channels of local acquisition memory and can acquire data from both ADCs at a maximum aggregate rate of 1 MHz (500 kHz for a single input). Preset and elapsed times are maintained within the module with centisecond resolution. The AIM will automatically terminate acquisition upon reaching the preset live or real time or a preset total counts in a region. If module power is lost, the spectral memory will be retained for up to 20 years.

An optional sample changer interface is available for ADC 1. External start/stop control can be provided for both ADCs with an optional cable.

2. Controls and Connectors

Front Panel

This is a brief description of the 556B's front panel indicators. For more detailed information, refer to the appendix *Specifications* on page 48.

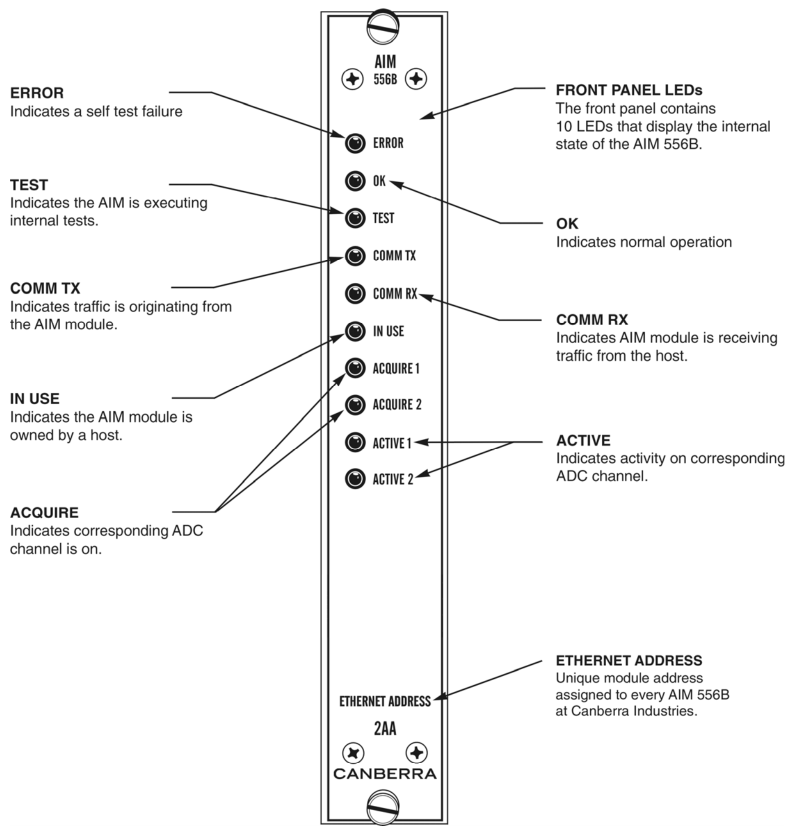


Figure 1 Front Panel Indicators

Rear Panel

This is a brief description of the 556B's rear panel connectors. For more detailed information, refer to the appendix *Specifications* on page 48.

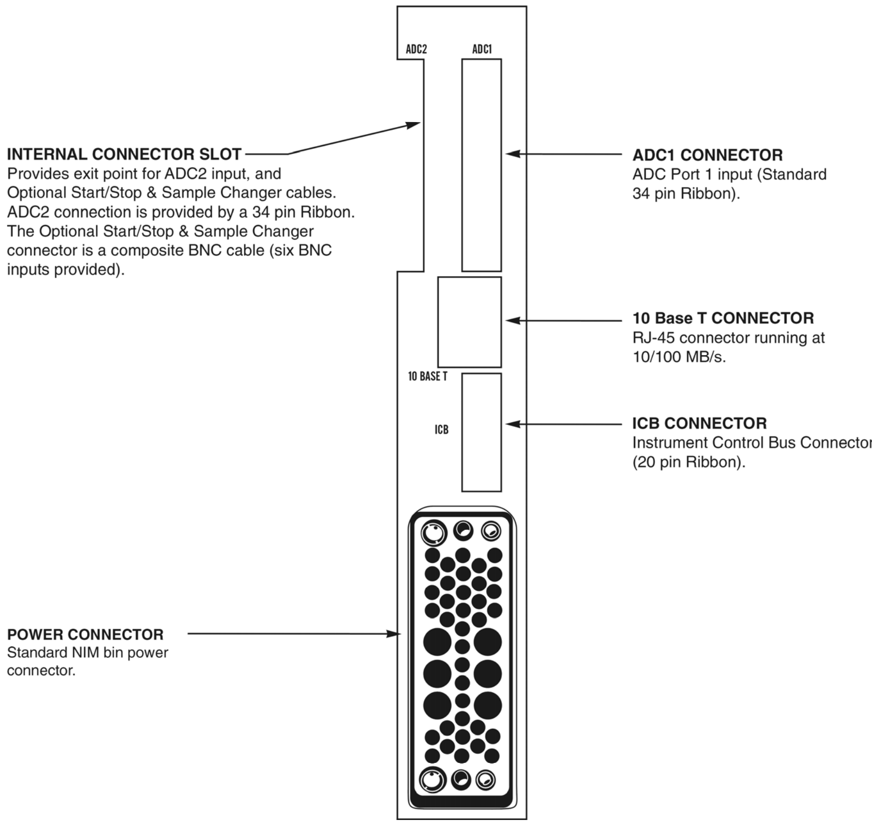


Figure 2 Rear Panel Connectors

Internal Controls

This is a brief description of the jumper controls on the 556B board; the jumpers are shown in their factory default positions.

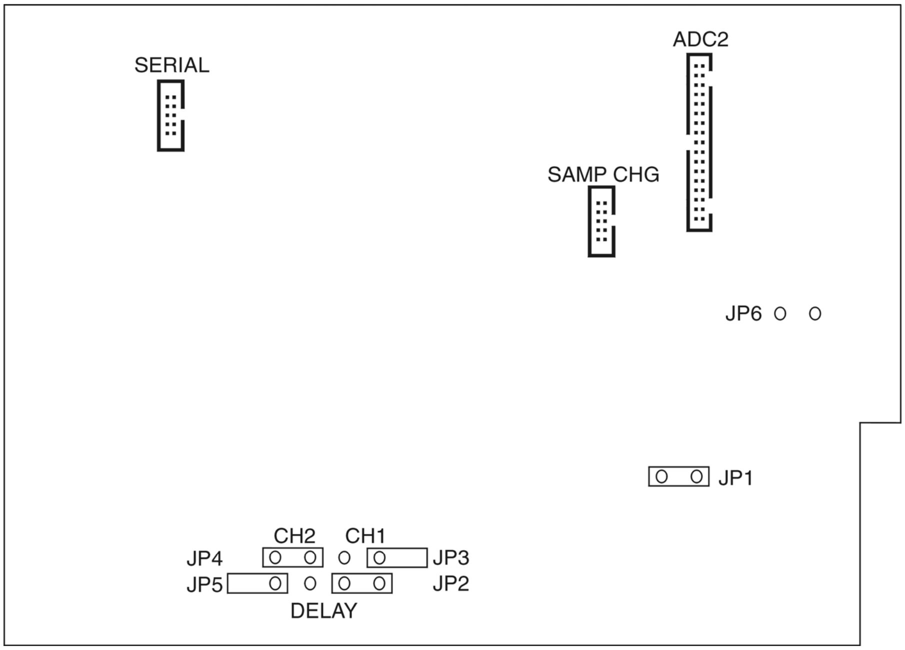


Figure 3 Internal Controls and Connectors

Delay Settings

0.75 µs Delay …… Both sets of jumpers in (JP2/JP4 and JP3/JP5).

1.0 µs Delay …… JP2 and JP4 in, JP3 and JP5 out (factory setting).

1.5 µs Delay …… JP2 and JP4 out, JP3 and JP5 in.

2.0 µs Delay …… Both sets of jumpers out (JP2/JP4 and JP3/JP5).

Note: Only jumpers JP2 through JP5 should be changed. Moving any other jumpers will affect the operation of the module.

3. System Setup

Refer to the AIM/ICB System Installation Manual for typical ICB installation and technical information.

System Requirements

This procedure assumes that the following equipment is available:

- **Host**
(OpenVMS®) VAX® or AXP® Server or Workstation

or

- Any computer capable of running the Microsoft® Windows® Operating System.

- **System Software**
OpenVMS Version 5.5-2, AXP Version 1.5, or later, 480198 Genie-VMS® Spectroscopy Applications Software.

or

- Windows® and S500 or S502 Genie-2000 Basic Spectroscopy Software.

or

- OS/2® Version 2.0 or later, S400 or S402 Genie-PC Basic Spectroscopy Software and S410 Genie-PC AIM SFT Driver.

- Communications: Fully IEEE 802.3 and IEEE 802.2 compliant Ethernet interface.

- A NIM Bin which can supply sufficient power (see *Power Requirements* on page 50).

- An optional VT100 or compatible terminal set for 9600 baud, 8 data bits, no parity and 1 stop bit (required only for diagnostics).

- One 556B AIM module and serial diagnostics cable.

Installation

The following procedure describes how to install a Model 556B AIM module for remote acquisition in an existing system.

Carefully unpack the unit, verifying that you have received the Model 556B AIM module and all accessories (refer to *Accessories* on page 51). Thoroughly inspect all equipment for damage that may have occurred during transit. If there are no problems with the equipment, proceed with the following steps:

1. When the AIM is shipped from the factory, the transfer times for both ADCs are set at 1 µs. This will allow a maximum cable length of 4.5 m (15 ft). If these are the desired settings, go to step two. If you'd like to change the transfer time settings, remove the 556B's right side-panel. Referring to the figure in *Internal Controls* on page 4, change jumpers JP2-JP5 then replace the right side-panel.

   Use the following guidelines to select the transfer rate: If the cables between the AIM and the ADCs are short, (i.e., less than 2 m (6 ft)), the fastest transfer rate can be selected. If the cables are long (i.e., more than 4.5 m (15 ft)), the slowest rate should be selected.

2. Always turn off the power to a NIM bin which contains an AIM module before inserting or removing any modules or connecting an Ethernet transceiver cable.

3. For 10 Base-T and 100 Base-TX networks, connect a patch cable to the RJ-45 jack on the rear panel of the 556B (See the figure in *Rear Panel* on page 3).

   Each AIM has a unique network address in the form 00-00-AF-00-nn-nn. The last four digits are assigned to the AIM at the factory and are printed on a label on the module's front panel. You will need this address to specify which AIM you want to access. The AIM will operate in any legal Ethernet configuration. However, use caution if you run the AIM through an Ethernet bridge due to the large amount of traffic generated by the AIM. Bridges can be set up to ignore any message with the AIM address prefix “00-00-AF”.

4. Orient the cable from the ADC or AMX so that its pin one indicator (an arrow on the connector itself or a highlighted colored cable) is up and connect it to the keyed 34-pin ADC connectors on the AIM's rear panel. A connection for a second ADC is provided through an internal connector. The AIM is shipped with a ribbon cable attached to this connector and secured to the AIM's wrap enclosure. See the figures in *Hardware Setup Diagrams* on page 57 and the figure in *Rear Panel* on page 3 for location of the connectors.

Host System Notes

The host system updates the status of the AIMs on the network every 20 seconds; therefore you may have to wait a few seconds for the host to recognize a new AIM.

If an AIM is reset (via power up or local terminal command), the host system reconfigures the AIM automatically.

Settling Up the Hardware

For your convenience, the diagrams in the appendix *Hardware Setup Diagrams* on page 57 show the interconnections for several of the more common systems. They are provided to help you set up a system using the 556B AIM.

Setting Up the Software

Before you can use your Model 556B Acquisition Interface Module with one of Canberra's Genie systems, you'll have to create an MCA Input Definition file so the Genie software can work with it.

Genie-VMS

For a Genie-VMS system, refer to *Genie-VMS Setup* on page 9.

Genie-2000 or Genie-PC

For a Genie-2000 or Genie-PC system, refer *Genie-2000/PC Setup* on page 12.

Installing the Option Cables

The cables for either the Start/Stop Option or the Sample Changer Option are not normally installed at the factory. If you need to install either of these cables in the field, follow the steps in the appendix *Field Installing the Option Cables* on page 60.

Startup Sequence

When the 556B's power is first turned on, the Test and Ok LEDs will turn on and within 10 seconds, the In Use LED will begin flashing. The Test and Ok LEDs will stay on and the In Use LED will continue to flash for approximately 10 seconds.

During this initialization period, the 556B will wait for a Bootstrap Enter command. If this command is not received within 10 seconds the 556B will exit to the Main

Application. This is indicated by all of the front panel LEDs flashing and then turning off.

Within 30 seconds of power on, the Test LED will turn on, indicating that the 556B has entered the Main Application and is conducting its power on test sequence. If no errors are encountered within 30 seconds, the Ok LED will turn on, indicating that the 556B is ready to honor Host Commands.

If any other LED turns on, this indicates an error condition and the Module may or may not be ready to honor host commands. In the case of an error condition being encountered on start up the failure(s) will be displayed on the local terminal (if connected). If no errors are encountered, the 556B Main Menu will be displayed on the local terminal, if connected, after the power on sequence is complete.

4. Genie-VMS Setup

This chapter tells you how to install and verify the operation of the 556B AIM on a Genie-VMS system with Model 480258 Integrated MCA Control Software.

Getting Started with a Genie-VMS System

For a host OpenVMS system, refer to the *Model 480198 Genie-VMS Spectroscopy System Manual*. A few commands are given below to get you started with a host OpenVMS system.

To view the status of all the networked modules, type the following command:

```
CONFIGURATION/DEVICE NI
```

A report will be generated which shows the addresses of all the AIMs on the network.

The CREATE command creates an MCA configuration. The format is:

```
MCA CREATE [configuration name] [ADC input device]
```

The following example causes the MCA configuration TEMP to be set up for the first ADC connected to the AIM module (2B1). Note that dashes and leading zeroes in the AIM's address were omitted in the command.

```
MCA CREATE TEMP NI2B1:1/CHANNELS=2K
```

Where:

MCA	Utility which allows access to the facilities of the Integrated MCA control system, which controls all 9900 acquisition and display resources.
CREATE	Creates an MCA configuration.
TEMP	Name of the new configuration being created.
NI	Prefix identifies the ADC as networked.
2B1	AIM network address.
:1	Indicates data is to be acquired from the first ADC port.

The following qualifiers were used in this command:

/CHANNELS	Specifies the number of channels per group for the new MCA configuration. In this case, the number of channels is 2048 (2K).

The “MCA Commands” chapter in the *Model 480198 Genie-VMS Command Descriptions Manual* has more information on this command and its qualifiers.

Next, to begin collecting data, you must turn on acquisition with the following command:

```
MCA ON TEMP
```

If you have display capability, you should see a spectrum.

When you are finished acquiring data, turn acquisition off with the following command:

```
MCA OFF TEMP
```

Analyze the data by performing the following command:

```
PEAK
```

After analysis is complete, a report of the peaks which were found will be printed on the screen. (You can specify a listing file name using the /LIST qualifier, as follows: PEAK/LIST=[filename]).

Now you can save the data on disk by performing the MOVE command. For example

```
MOVE TEMP SAVE
```

Where TEMP is the name of the source MCA configuration and SAVE is the name of the destination file. If the destination file already exists, a new version is created. Now that the data is saved to disk under the file name SAVE, you can release the AIM by deleting the MCA configuration TEMP.

```
MCA DEL TEMP
```

Verifying the Genie-VMS Setup

Use the steps below to verify Genie-VMS has been setup correctly.

1. Log on to a host OpenVMS system. Enter the following command:

   ```
   CONFIGURATION/DEVICES NI
   ```

A report which shows the status of all AIMs on the network is generated. The new AIM should be included in the report, as shown in the following example. (The report is updated every 20 seconds.)

		Memory Allocation	Input Usage				Owned by Node
Address	Status		1	2	3	4	
NI19B	Reachable						FLAME
NI58B	Reachable	80000000	Free	Free	N/A	N/A	
NI7A3	Reachable	80000000	Free	Free	N/A	N/A	
NI622	Reachable	80000000	Free	Free	N/A	N/A	

2. Set up acquisition for the first ADC connected to the AIM with the command:

   MCA CREATE TEMP NInnnn:1/CHANNELS=2K

   Where *nnnn* are the least significant digits of the AIM's address. Omit the leading zeros. For example, module address 2B1 would be written as “NI2B1”.

   After you enter this command, the AIM's “In-Use” LED will turn on.

3. Turn on acquisition with the command:

   MCA ON TEMP

   The ACQUIRE LED for the first ADC should turn on. If you have display capability, you will see a spectrum acquiring.

4. Release the AIM with the command:

   MCA DEL TEMP

5. Genie-2000/PC Setup

This chapter tells you how to install and verify the operation of the 556B AIM on a Genie-2000 or Genie-PC system.

Before you can use your Model 556B Acquisition Interface Module with the system, you'll have to create an MCA Input Definition (MID) for it.

In addition to the input definition, you should be aware of the MCA Adjust screens, which are described in detail in the "Gamma Acquisition and Analysis" chapter of the *Genie-2000 Operations Manual* or *Genie-PC Basic Operations Manual*.

MID Wizard or MID Editor?

For a simple configuration, such as a single-input system, you can use the MID Wizard to help you set up your MCA Input Definition quickly and easily. Refer to the *MID Wizard* on page 36 for information on using the MID Wizard.

Most AIM configurations, however, are more complex than the MID Wizard was designed to handle, so you'll need to use the MID Editor to create or edit your definition. The *MCA Input Definition (MID) Editor* on page 12 explains how to use the MID Editor to create an AIM Input Definition.

MCA Input Definition (MID) Editor

The following sections tells you how to use the MCA Input Definition (MID) Editor.

Note: When you open the MID Editor on a remote VDM (Virtual Data Manager) server while it's in use, Genie 2000 will prevent certain operations with the VDM.

The MID Editor is used to set the parameters of your MCA as desired and then save those settings as a MID file. In addition to using the MID Editor to create a new input definition, it may be used to edit an existing MID file.

Basic Concepts

We'll review some basic concepts that are important to understand before actually getting into the details of how you define your system's MCAs.

Multiple MCA Configurations

Since MCA definitions are saved in individual files called MID files, you can have as many definitions as you like. For example, you might have one MCA defined as a *1K*

Sodium Iodide Spectroscopy MCA in one file and another as a *2K Sodium Iodide Spectroscopy MCA* in another file.

Before you start an experiment you simply pick the configuration you want to use by selecting the appropriate MID file and loading it.

Because an MCA definition file can include any or all of the MCAs that are available to your system, you can use more than one MCA at a time. However, each MCA can be included only once in a given definition file and each MCA in that file must have a unique name and/or IP address.

Building an MCA Definition

Building an MCA Definition means:

- Selecting the MCA to be used for each input through the Device Menu. To do so, you ADD the MCA to the MID Editor.
- Defining the operating characteristics and modes for each MCA through the Settings Menu.
- After your desired settings for this MCA Definition have been achieved, Saving the MCA Input Definition as a MID file.

We'll discuss how to add (and delete) the MID editor's MCA entries and will explain what the definition entry consists of, and how to build an MCA Definition list.

Using the MCA Definition Files

To use an MCA Definition, first load that MID file into the VDM's internal MCA Runtime Configuration Database. From that point on, all MCA operations will use the configuration information that was stored in the Definition File. To change to a new configuration, all you have to do is replace the database's contents with a new file.

Starting the MID Editor

You will use the MID Editor to work with at least one definition file for your device.

Start the MID Editor by double clicking on its icon (

) in the Genie-2000 Program Group (or by selecting the desktop icon, if provided) or from the Start menu select **Programs | GENIE-2000 | MCA Input Definition Editor**.

The result will be the application window shown in Figure 4.

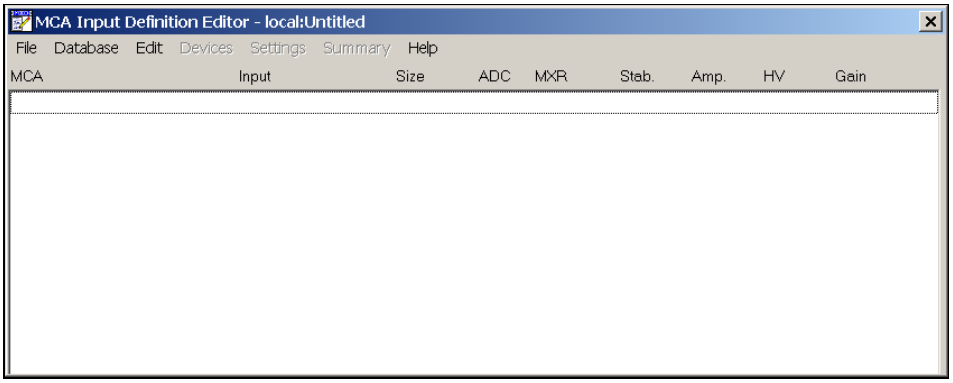


Figure 4 The MID Editor Window

To use the MID Editor, you build the MCA Definition list and you may then add to or delete the desired MID files from the list.

Note: The phrase “local:Untitled” in the title bar, means that the MID Editor is connected to the local VDM and that no file is currently open; this is the default condition in a non-networked environment.

Adding an MCA

The **Edit** menu, at the top of the MCA Input Definition Editor's main window, is used to add MCA hardware to or delete MCA hardware from an MCA Input Definition.

To add an MCA:

1. From the **Edit** menu, select **Add MCA**.
2. The “Add MCAs to Definition Table” dialog box opens. This dialog contains all available MCAs.
3. Select **AIM** from the list of available MCAs by clicking on the ‘+’ symbol next to Network MCAs (Figure 5).

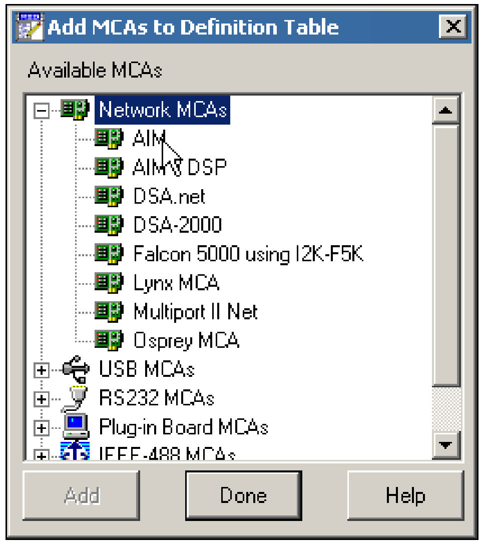


Figure 5 The Add MCA Dialog

4. Click on **Add** to add an AIM MCA to the MCA Input Definition Editor list.

   You can add as many MCAs to the definition as are necessary for your system, highlight each MCA and then click the Add button to add them to the MCA Input Definition Editor list.

When you've finished adding MCAs, click on the **Done** button.

Deleting an MCA

If you want to remove an MCA that you have added to the definition, you can do it easily by:

1. Selecting the table entry you want to delete.
2. Select **Edit | Delete MCA** to open the Delete MCA dialog box (Figure 6). Click on **OK** or click twice on the entry in the table to remove the entry.

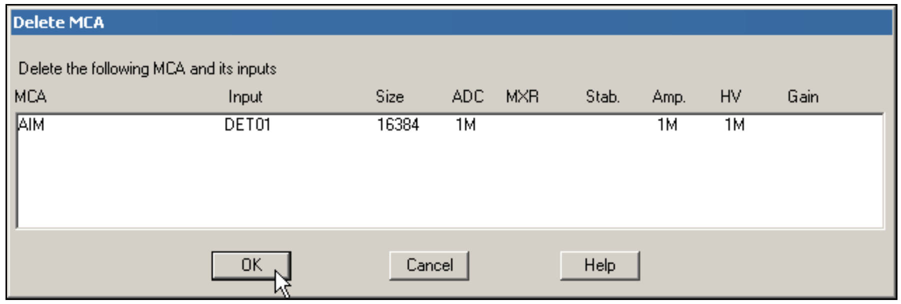


Figure 6 The Delete MCA Dialog

Defining an MCA

To define the MCA, click on the definition table entry (Figure 7) for the AIM module. That selects it as the MCA to be operated upon.

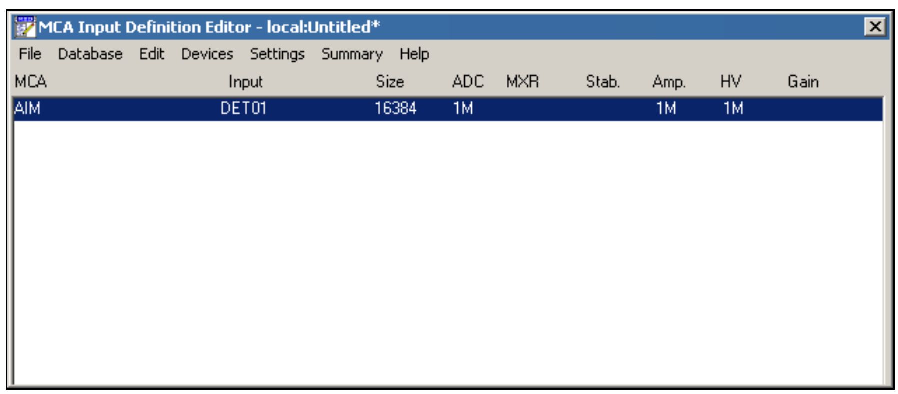


Figure 7 Selecting the MCA to Set Up

Address Settings

In the sections which follow you'll be required to enter instrument address settings such as the AIM module's Station (Ethernet) Address and the ICB Address for any programmable NIM you may be using. Refer to your NIM unit's manual for information on setting the ICB address for each unit. The values you enter must correspond to the settings on the NIM unit(s) that you are going to use.

LPT Parallel Port Assignments

In order to control a sample changer or an AMX module through an LPT (parallel) port, the port must be assigned to the device to be controlled (see "Address Settings", above). In order to know which LPT port number to use, you must know which physical address is assigned to which logical port number.

Refer to your computer’s technical documentation or use the Windows Control Panel’s System icon to determine which physical parallel ports are available and what address has been assigned to each one.

Device Setup

Device setup covers setting the parameters for the system’s hardware, starting with the MCA itself. Clicking on **Device** in the **Menu** bar shows the menu in Figure 8. There is a command in the menu for each of the hardware sections of the MCA. The disabled (grayed) commands do not apply to the MCA currently being set up.

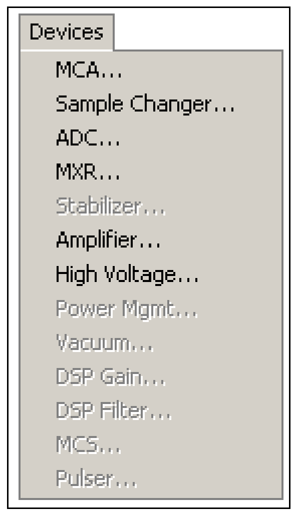


Figure 8 The Device Setup Menu

You’ll notice that the MXR and Stabilizer commands are disabled, since there are no Digital Stabilizer functions which need to be specified, and the MXR command is only enabled when you specify that a Mixer/Router is to be used.

MCA

We'll begin by defining the characteristics of the AIM MCA itself. This is done with the MCA Input dialog box (Figure 9), which opens when you select the **MCA** command from the **Device** menu.

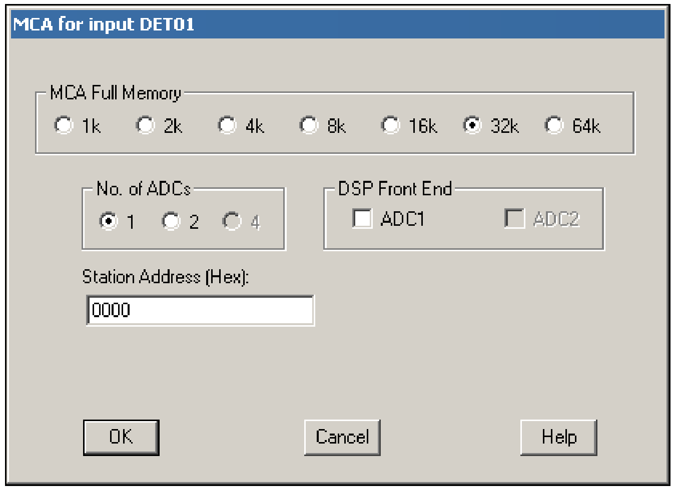


Figure 9 The MCS Settings Dialog

Full Memory and Number of ADCs

Radio buttons are used to specify the maximum number of data channels to be used and the number of ADCs to be connected to the module. Simply click on your choice for each, keeping in mind that if you'll be using two ADCs, each will receive half of the Full Memory size that you select. For proper operation, the first input entry for the AIM must be connected to AIM ADC 1. If two ADCs are selected, the second input entry must be connected to AIM ADC 2.

This means that the Device Setup and Settings will have to be performed for each of the ADCs. Click on one of the inputs to set it up. After completing the setup for that input, click on the next input and repeat the process for that ADC.

DSP Front End

Check the **ADC1** or **ADC2** to indicate that the ADC is a Model 9660 or 9660A ICB Digital Signal Processor.

Station Address

Since the AIM connects to the system via Ethernet, you must specify the network address that will be used to communicate with the module. In the **Station Address** text box enter the four digit address which has been assigned to the AIM module which you are setting up.

Sample Changer

If you're going to be using a **Sample Changer**, select that command from the Device menu next. The result will be the dialog box shown in Figure 10.

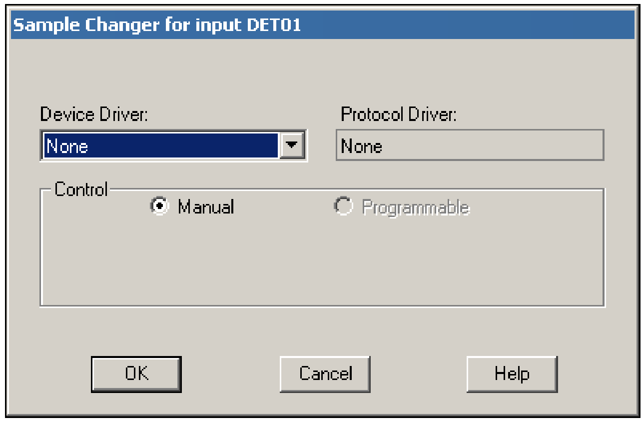


Figure 10 The Sample Changer Dialog

Device Driver

This parameter sets the type of sample changer, if any, that is going to be used. To see the available choices, select from the drop down list.

LPT Sample Changer

If you specified that the Sample Changer was going to be connected to one of your PC's parallel printer ports, the dialog box will change to that shown in Figure 11 to allow you select the port that is to be used. Select from the drop down list the port number (LPT1, LPT2, or LPT3) that is to be used.

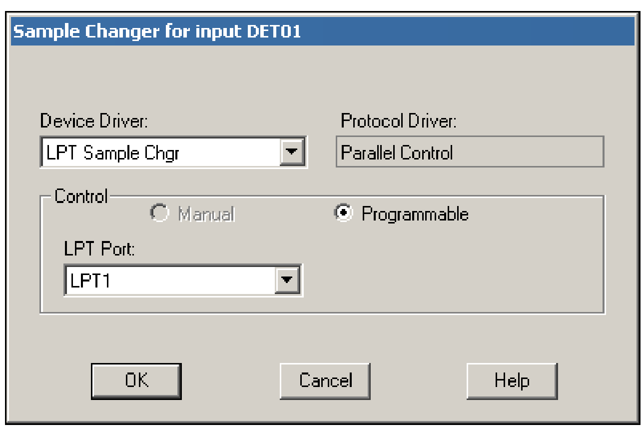


Figure 11 Setting an LPT Sample Changer

RPI Sample Changer

If you had selected the RPI (Remote Parallel Interface) Sample Changer, the dialog box you'd see would be similar to the one shown in Figure 12, but with "ICB Address" in place of "LPT Port" and with an additional text box called "Start with line".

Since RPI Sample Changers connect to the AIM's Instrument Control Bus (ICB), the first thing you have to specify is the sample changer's ICB address. Select the ICB address from the drop down list.

A similar process is used for the Start with line parameter, with the selected line number representing the number of the input/output line pair on the RPI that will be used for sample changer control.

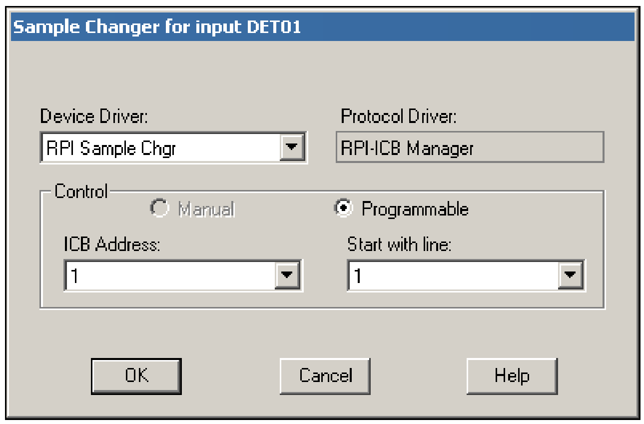


Figure 12 Setting a RPI Sample Changer

ADC

To set up the AIM's ADC, click on the **Device | ADC** command to see the ADC Input dialog box (Figure 13).

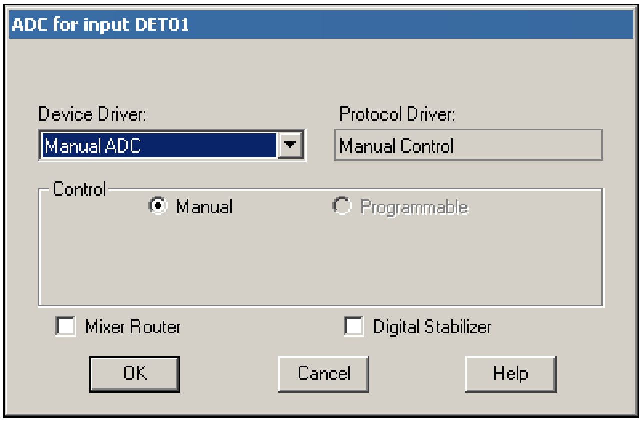


Figure 13 The ADC Device Dialog

You can choose whether you're going to use a Mixer/Router (also called Analog Multiplexer or AMX) or a Stabilizer with it. If you choose Stabilizer, you'll notice that there are no selections to make under Stabilizer in the Settings menu.

If you enabled a Mixer/Router, you'll notice that the MXR column of the Genie-2000 (or Genie-PC) entry in the MCA Definition Table now contains the entry 1-1M. This means that a Mixer/Router has been selected, is currently set to only one input, and the Mixer/Router is of the Manual control type.

Device Driver

The Device Driver drop down list is used to specify the type of ADC which will be connected to the AIM. Select your choice from the list. Note that from a setup point of view, the only difference between the 9633 and the 9635 is the maximum conversion gain (16K vs. 8K).

ICB Address

Since the 9633 and 9635 ADCs also connect to the AIM's Instrument Control Bus, the first thing you have to specify is the ICB address. Select an ICB address from the drop down list. Note that each module connected to a given AIM must have a unique ICB address.

Mixer/Router

To use a Mixer/Router, also called an Analog Multiplexer or AMX, select the **Mixer Router** check box. (If you're not going to use a Mixer/Router, skip ahead to *Amplifier* on page 26.) Selecting Mixer/Router makes the AIM entry in the MID definition table look like the one shown in Figure 14.

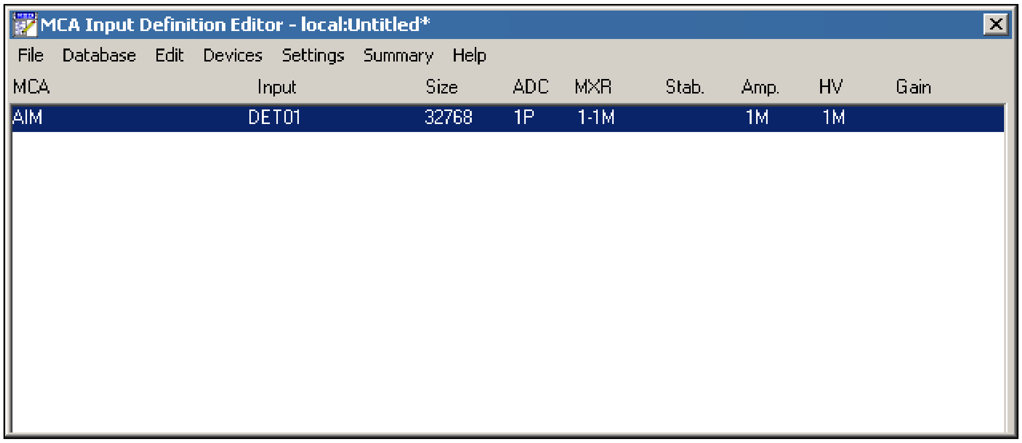


Figure 14 MID Definition Table with Mixture/Router

In the MXR column you'll see the entry 1-1M to indicate that a single-input manually controlled Mixer/Router is going to be used. The next section (MXR) will show you how to change that setting to the one you'll actually be using.

MXR

With Mixer/Router selected in the ADC setup, you'll see the **MXR** command in the **Device** menu. Selecting it will result in the Mixture Router Input dialog box (Figure 15).

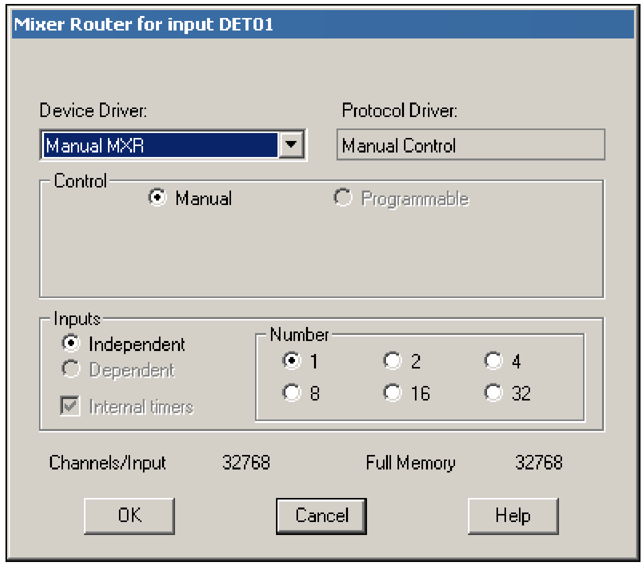


Figure 15 The Mixer/Router Drivers

Device Driver

Once again the first step is to tell the system about the type of device you're going to be using. Select from the Device Driver drop down list.

The Model 8224/589 AMX can be connected to your system in one of two ways. If it's going to be controlled through one of your PC's parallel ports, click on **LPT 8224/589 AMX**; if the Mixer/Router is going to be connected to the AIM's ICB, click on **RPI 8224/589 AMX**.

Note that if you choose **RPI 8224/589 AMX**, you must have a Remote Parallel Interface (RPI) available on your AIM module's ICB to control the Mixer/Router.

LPT 8224/589 AMX

This choice changes the dialog box to that shown in Figure 16. Click on the LPT Port box’s down arrow to specify the parallel printer port you’re connecting the AMX to.

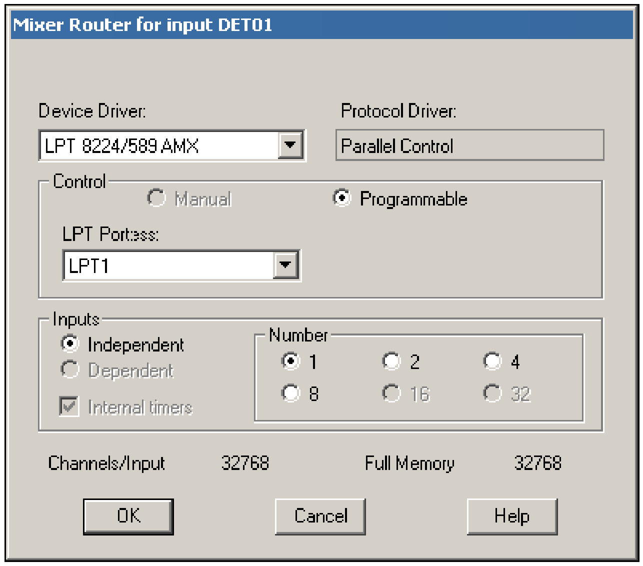


Figure 16 The LTP Controlled Mixer/Router Dialog

Once that has been done, radio buttons are used to select the number of inputs to the Mixer/Router. Note the **Channels/Input** and **Full Memory** fields displayed just below the Inputs section. As you change the number of inputs, the Channels/Input display will automatically be updated to let you see exactly how the system will be configured.

RPI 8224/589 AMX

Selecting this changes the dialog box to the one shown in Figure 17. Drop down lists are used to set the module's ICB Address and Start with line. The "Start with line" parameter indicates which set of eight output lines on the RPI is going to be used for multiplexer (AMX) control. Now select the option for the Number of inputs that you'll be using.

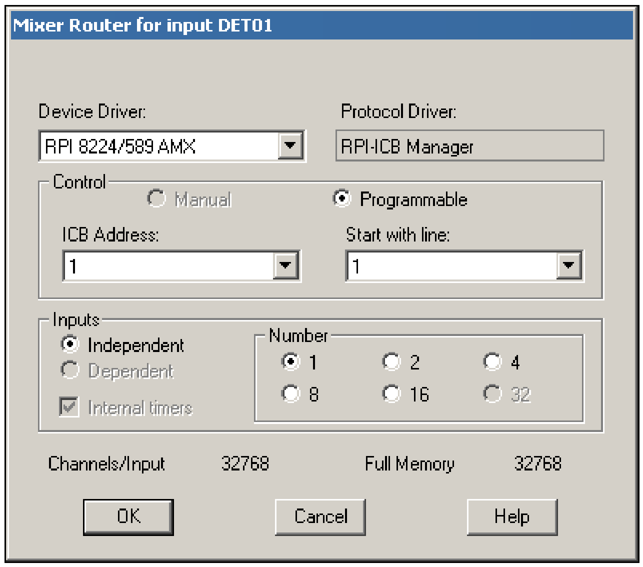


Figure 17 The RPI Controlled Mixure/Router Dialog

Note: If you are going to be using a Mixer/Router, each of the MXR's inputs will show up as a separate input in the MID's input definition table, as shown in Figure 18, and each will have its own Amplifier and High Voltage Bias Supply.

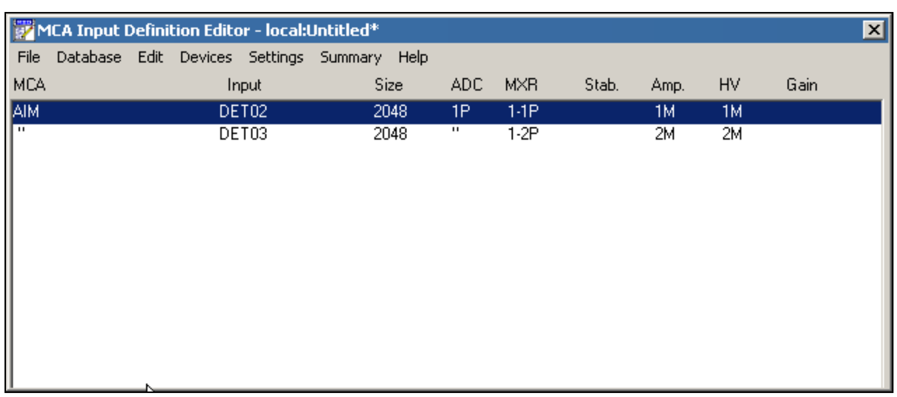


Figure 18 MID Definition Table with Several Mixtures/Routers

This means that the sections which follow will have to be performed for each of the MXR's inputs, so before going on, click on one of the Inputs to select it for setup. After completing the setup for that input, click on the next input and repeat the process until all of the MXR's inputs have been defined.

Amplifier

The spectroscopy amplifier that's going to be used is set up next with the **Amplifier** command in the **Device** menu, which uses the Amplifier Input dialog box (Figure 19).

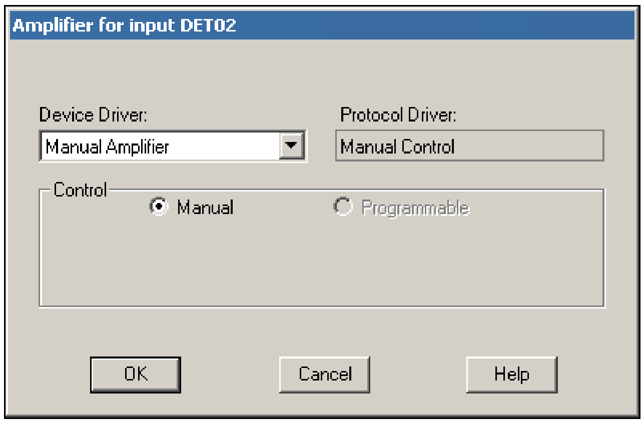


Figure 19 The Amplifier Device Dialog

Device Driver

From the Device Driver drop down list, select between a Manual Amplifier and the Model 9615 Programmable Spectroscopy Amplifier. If you'll be using a manually controlled amplifier, there are no settings to make.

If you select the 9615, the dialog box in Figure 20 will appear to allow you to specify the amplifier's **ICB Address**. As we've seen in the previous sections, it's set through a drop down list. Note that the amplifier, like all ICB modules connected to any one AIM, must have its own unique address.

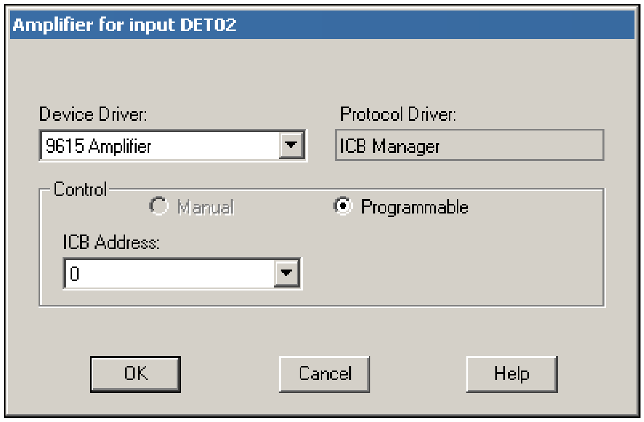


Figure 20 The ICB Amplifier Dialog

High Voltage

The last device to set up is the High Voltage Bias Supply for your Detector. This is done with the **High Voltage** command in the Device **menu**, which opens the High Voltage Input dialog box (Figure 21).

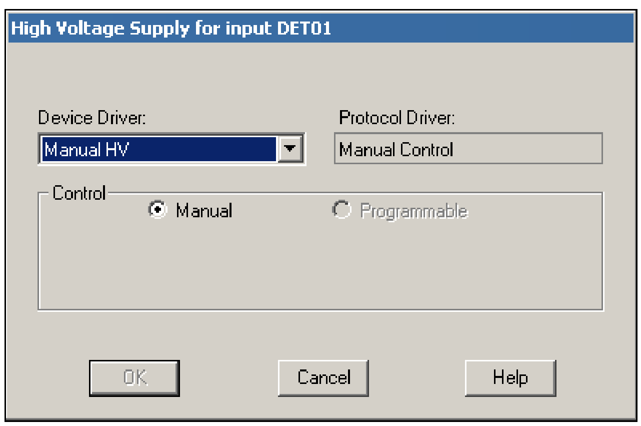


Figure 21 The High Voltage Dialog

Functionally, this dialog box operates just like the one for the amplifier. First you select the type of device, then – if it's an ICB device – you specify its unique **ICB Address**.

If you're using multiple ADCs and/or multiple inputs via a Mixer/Router you'll need multiple input definitions, so be sure you've set up *all* of your AIM's inputs as discussed in this section. Note that for many of the parameters, the initial values entered during Settings can be adjusted as necessary from within the Acquisition and

Analysis Acquisition and Analysis application. The text will specify which controls can be changed only from the MID.

Parameter Settings

The commands in the Settings menu set the MCA's operating parameters. Note that for many of the parameters, the initial values entered during Settings can be adjusted as necessary from within the Acquisition and Analysis Acquisition and Analysis application. The following descriptions of each parameter specify which controls can be changed only from the MID Editor. Begin your Settings setup in the MID definition table by clicking on the AIM input that is to be set up. Once you've selected the input, the Settings menu, shown in Figure 22, is used to set its initial operating parameters.

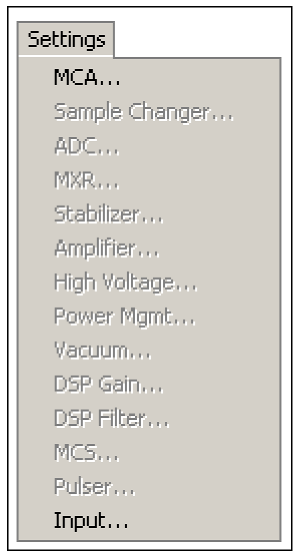


Figure 22 The Settings Menu

You'll notice that some commands are disabled here, since those functions are not available for an AIM. The **MXR** (Mixer/Router) command will only be enabled when the Device description of the ADC includes a Mixer/Router.

MCA Settings

The **MCA** command in the **Settings** menu lets you select the MCA's data acquisition mode from the drop down list. Note that the mode can also be changed from within the Acquisition and Analysis Acquisition and Analysis application.

ADC Settings

The **ADC** command in the **Settings** menu uses the ADC Input (Figure 23) to establish the initial control settings for the 9633 and 9635 ICB ADCs.

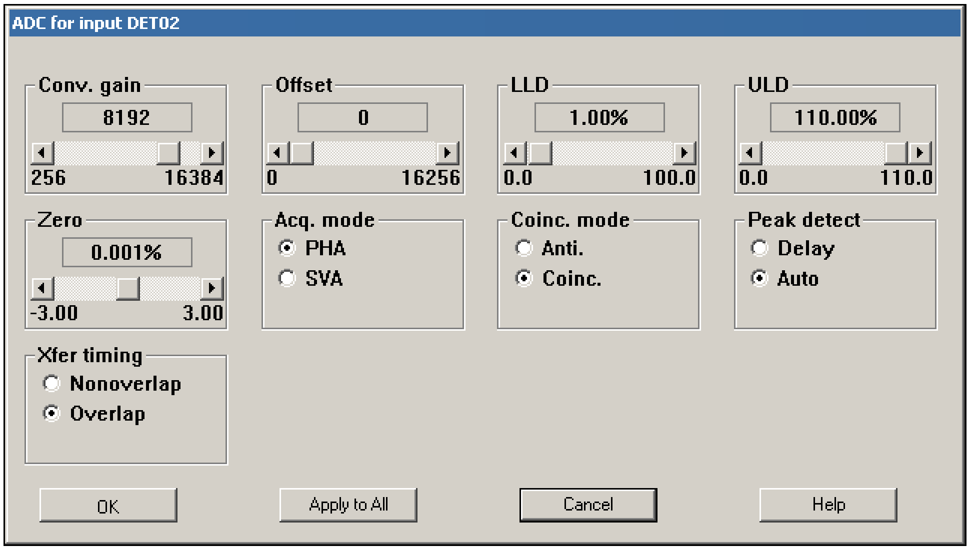


Figure 23 The ADC Settings Dialog

Since the ADC's Scroll Bar controls may need to be changed often in the course of daily work, they can be adjusted both here and in the Acquisition and Analysis application. Since some of the controls, such as Acquisition Mode, are not usually changed during the course of data acquisition, they can only be changed here.

Conversion Gain

This scroll bar is used to set the **Conversion Gain** of the ADC. Clicking on the arrows at the ends of the scroll bar changes the gain by a factor of two.

Offset

The ADC's **Digital Offset** can be adjusted from 0 to 8064 channels in 128 channel steps (0 to 16 256 channels in 256 channel steps for a 16K ADC).

LLD

The ADC's Lower Level Discriminator (**LLD**) can be set from 0.0% to 100.0% of the ADC's full scale input.

ULD

The ADC's Upper Level Discriminator (**ULD**) can be set from 0.0% to 110.0% of the ADC's full scale input.

The window between the LLD and ULD settings is used as a “filter” to limit the energy range to be considered by the ADC. Only signals within this window will be converted.

Zero

The **ADC Zero** can be set between –3.0% and +3.0% of full scale.

Acquisition Mode

The Acquisition Mode is either **PHA** (Pulse Height Analysis) or **SVA** (Sample Voltage Analysis). This control can only be changed here.

Coincidence Mode

The ADC’s input gating is either **Coincidence** mode or **Anticoincidence** mode. This control can only be changed here.

Peak Detect

If **Auto**matic peak detection is selected, the ADC will begin converting the input pulse at the peak’s maximum amplitude. Choosing **Delay** will cause the conversion to start at a fixed (front panel adjustable) time after the peak’s leading edge. This control can only be changed here.

Transfer (Xfer) Timing

For maximum throughput, you would normally want the ADC to operate in the **Overlap** mode. That is, the ADC will begin converting the next input pulse while the previous pulse is being stored. This control can only be changed here.

However, when you’re doing coincidence work or using a Mixer/Router, you need a precisely predictable ADC dead time. For those cases, choose **Nonoverlap** mode.

MXR Settings

If you select this command, you’ll see a message telling you that there are currently no adjustable MXR controls. Click on **Cancel** to acknowledge it.

Amplifier Settings

Selecting the **Amplifier** command from the **Settings** menu will open the Amplifier Input dialog box (Figure 24).

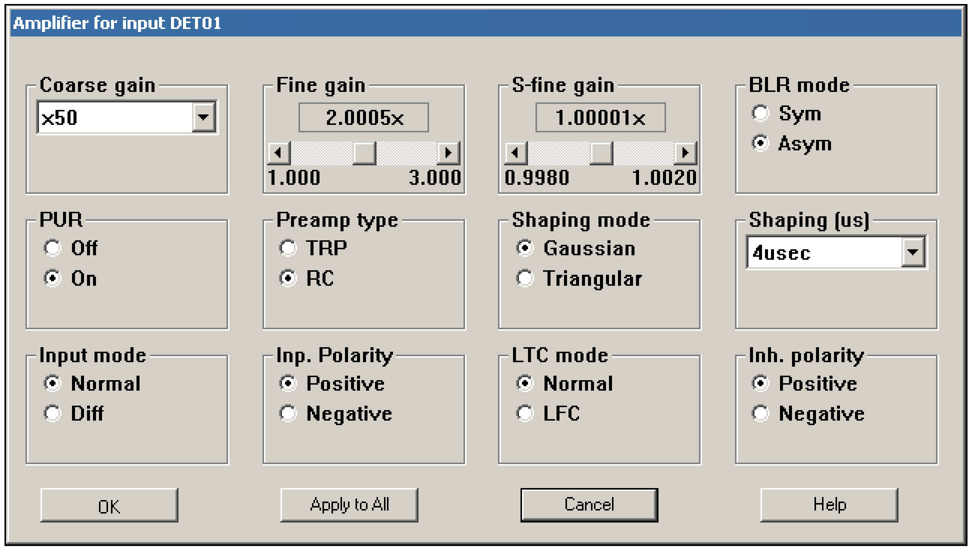


Figure 24 The Amplifier Settings Dialog

Though many of the Amplifier controls can also be adjusted in the Acquisition and Analysis application, the Preamp Type, Shaping Mode, Input Mode, Input Polarity, LTC Mode, and Inhibit polarity can only be changed in this Dialog Box.

Coarse Gain

The Amplifier's **Coarse gain** setting is selected from the drop down list. The total gain is the product of all three Gain controls.

Fine Gain

The **Fine gain** control is set by a Scroll Bar.

S-fine Gain

The **S-fine Gain** control can be used to establish a specific gain (energy per channel).

BLR Mode

Radio buttons set the Baseline Restorer to either **Sym**metrical or **Asym**metrical Mode.

PUR

Radio buttons enable the amplifier's Pulse Pileup Rejector (**On**) and Live Time Corrector or disable it (**Off**).

Preamp Type

Specify the preamplifier type: **TRP** (transistor reset preamp) or **RC** (RC coupled). This control can only be changed here.

Shaping Mode

Select either Gaussian or Triangular pulse shaping for the amplifier. This control can only be changed here.

Shaping

Set this control to the shaping time constant you want to use for this datasource. When the datasource is first opened, this setting is compared with the amplifier's setting. The system will remind you if the two settings are not the same so that you can correct the amplifier's setting.

Input Mode

Select either **Normal** or **Off** input mode for the amplifier. This control can only be changed here.

Inp. Polarity

Select either **Positive** or **Negative** input polarity for the amplifier. This control can only be changed here.

LTC Mode

Select the amplifier's LTC (Live Time Correction) Mode: Normal or LFC (Loss Free Counting). This control can only be changed here.

Inh. Polarity

If you're using a reset-type preamplifier, such as a TRP, you'll have to select the polarity of its Inhibit signal: Positive or Negative. This control can only be changed here.

High Voltage Settings

The **High Voltage** command in the **Settings** menu lets you set up the High Voltage Power Supply. Of all of the controls shown in Figure 25, only the Voltage control can also be adjusted from within the Acquisition and Analysis Acquisition and Analysis application; all of the others can only be changed in this dialog box.

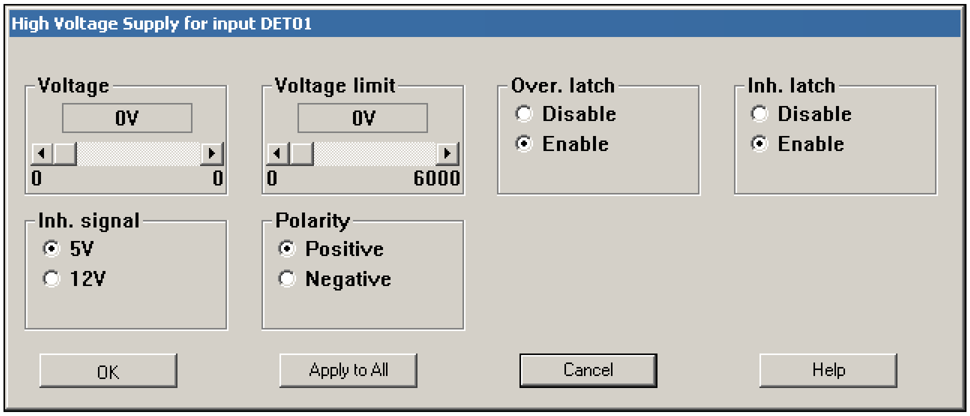


Figure 25 The High Voltage Settings Dialog

Voltage

The **Voltage** control sets the power supply's operating Voltage, which cannot exceed the limit set in Voltage Limit. This control can also be adjusted in the Acquisition and Analysis application.

Voltage Limit

The **Voltage Limit** control establishes the maximum level to which the power supply may be set. This control must be set before the Voltage control is adjusted.

Over. Latch

The **Overload Latch** command refers to the power supply's ability to shut itself down if an excess current condition is sensed. Select **Disable** to automatically restore the high voltage when the overload condition is corrected.

If you select **Enable**, the alarm will be latched. This means that the latch must be reset through the MCA Adjust (in the Acquisition and Analysis application) screen before high voltage will be restored.

Inh. Latch

The Inhibit Latch command works in the same manner as the Overload Latch command, except that it is triggered by the Inhibit signal from the associated preamplifier.

Inh. Signal

The Inhibit Input Signal is compatible with all Canberra preamps; it isn't necessary to select the signal level to match the HV Inhibit level of your Canberra preamp.

The **5V** and **12V** selections are provided for compatibility with Inhibit signals from instruments made by other manufacturers. Please consult the manual provided with that preamp for its Inhibit Signal Level requirements.

Polarity

The Polarity setting must match the high voltage polarity expected by the associated detector.

Input Settings

The **Input** command (Figure 26) is used to change the name of the Input and define the Input. These commands are not available in the Acquisition and Analysis application.

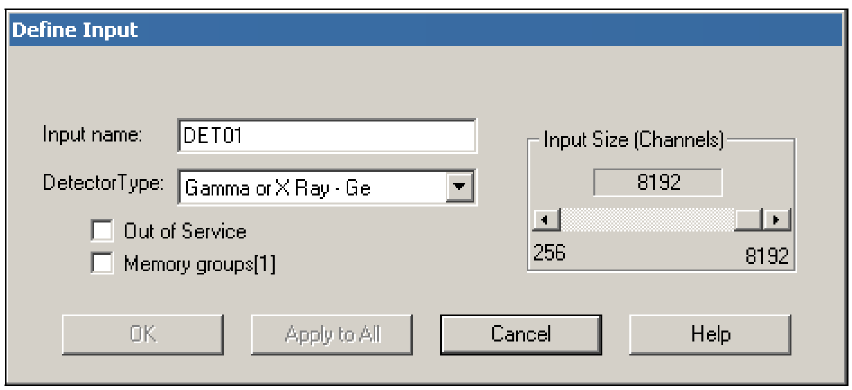


Figure 26 The Define Input Dialog

Input Name

The default DETnn name is the name displayed here, allowing you to easily change it to a more meaningful name, such as "H2OSampl", up to a total of eight characters. This is the name by which the detector is referred to in all applications.

Detector Type

Use this drop-down list to select the type of detector to be used with this MCA; this also assigns appropriate default values to the spectrum display and analysis parameters. Five choices are available: Gamma or X Ray - Ge, Gamma or X Ray - NaI, Gamma or X Ray - Si, Alpha or Beta Particle - Si, or Other. For additional information please refer to *Genie 2000 Operations Manual*.

Input Size

This parameter defaults to the number of channels that you selected during the MCA Device setup. To use less than the maximum available memory, slide the scroll bar to select the size you want.

Out of Service

Select the **Out of Service** check box when the MCA or its front end electronics are temporarily disconnected from the system. Though the MCA will still be listed in your MCA Definition File, it will not be available for data acquisition.

Memory Groups

The **Memory Groups** check box is used with the Input Size control to segment the memory of the MCA into Halves, Quarters, and so forth. This is a two-step process.

1. First, you'll have to set the Input Size to the desired group size. For example, to operate an 8192 channel MCA in quarters, set the Input Size to 2048.

2. Then click on the Memory groups Check Box to enable it. The numeral 4 will appear in the brackets to let you know that the MCA is set to four quarters of 2048 channels each.

Saving and Loading the Input Definition

Having completed a definition, the next step is to save the file using the Mid Editor's File Save as or Save command.

- **Save As** saves the definition to a user defined MID file.

- **Save** saves the settings to an existing MID file.

To remind you to save a changed definition, you'll see an asterisk (*) next to the name of the current definition in the Title Bar.

CAUTION: If you change an existing Input Definition, saving it will clear the Acquisition Start time. You will be asked to retain the existing energy calibration information.

After having saved the definition, the next step is to load it into the run-time database so that it can be used by the Genie 2000 applications. To load the definition, from the **Database** menu select the **Load To** menu option.

Refer to the "MCA Input Definition" chapter of the *Genie 2000 Operations Manual* or *Genie-PC Operations Manual* for additional information regarding saving and loading definition files, as well as editing existing files.

By loading this configuration into the VDM runtime database, then exiting the MID Editor, you will be able access this detector in the MCA View and Control (MVC) window utilizing your Genie 2000 software.

The MID Wizard

The MID Wizard helps you set up simple Input Definitions quickly and easily. It allows you to create a MID definition in a few simple steps.

If your Input Definition is more complex than the MID Wizard was designed to handle, you'll have to use the MID Editor to create your definition. It is covered in detail starting in the *MCA Input Definition (MID) Editor* on page 12.

Step 1 - Selecting the MCA

The Select MCA screen (Figure 27) lets you select the MCA you want to create a definition for. Select "AIM MCA" from the list of available MCAs by clicking on the '+' symbol next to Network MCAs, and then click the **Next** button.

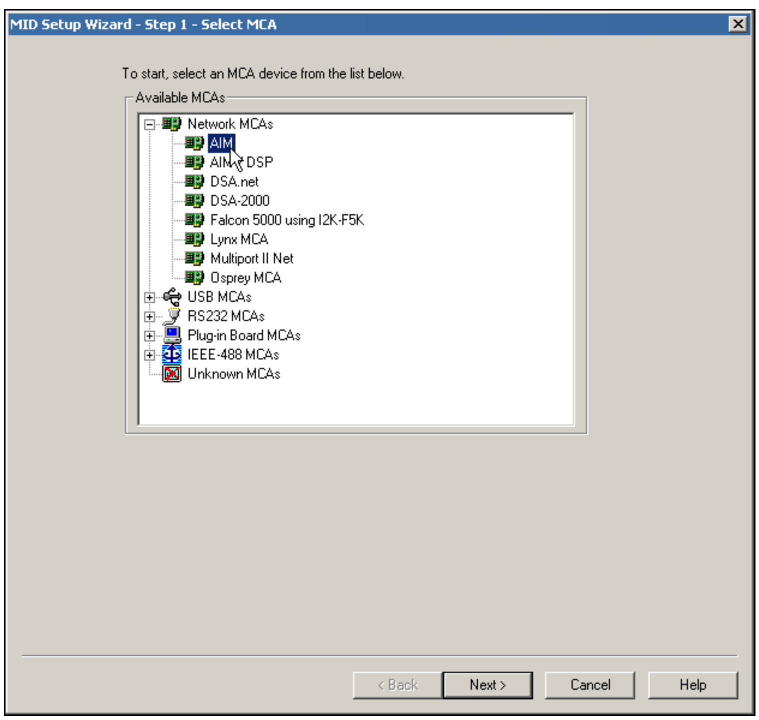


Figure 27 Selecting the MCA

Step 2 - Configuring the MCA

The Configure MCA screen (Figure 28) lets you define the MCA's Full Memory number of inputs, Station Address and number of ADC's.

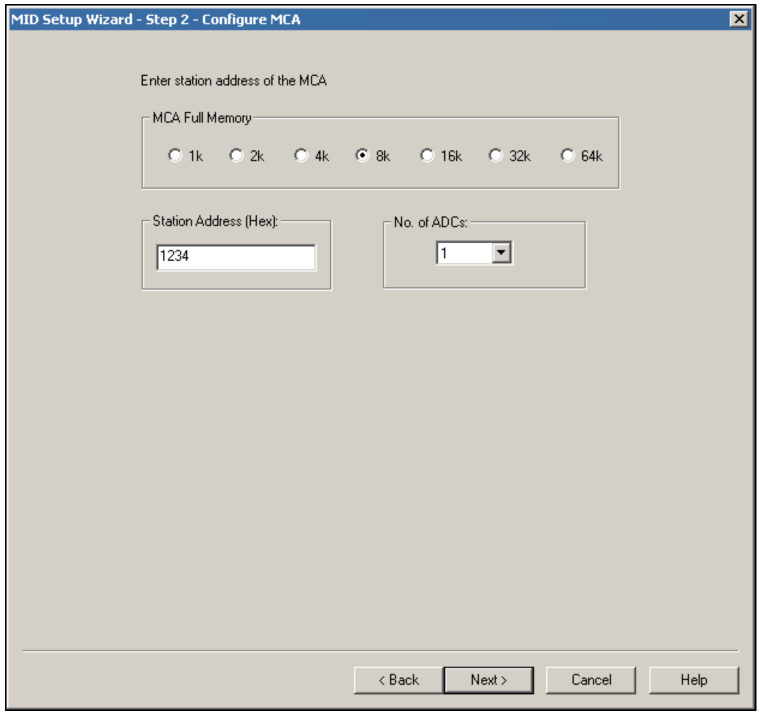


Figure 28 Configuring the MCA

Step 3 - Configuring the Detector

The Configure Detector screen (Figure 29) lets you enter an Input Name, Memory Groups, Number of Channels, and Detector Type (this parameter is described in detail in *Input Settings* on page 34).

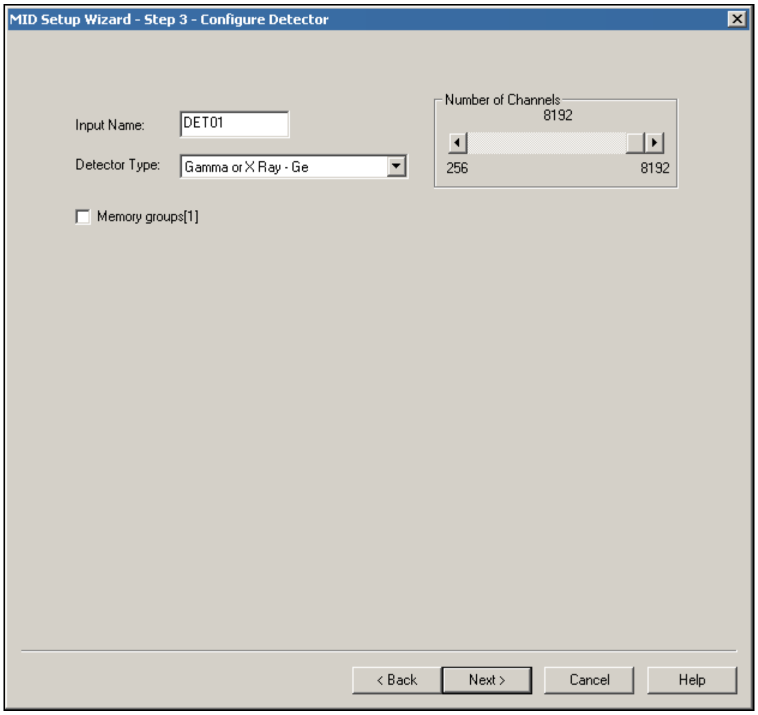


Figure 29 Assigning the Detector Type

You can change the default Input Name if you like, but if the field is empty, you won't be able to go to the next screen.

With the Memory Groups box selected, the full memory can be divided into two memory groups.

Step 4 - Select External Modules

The Select External Modules screen (Figure 30) lets you enter an Amplifier Type, ADC Type, and High Voltage Power Supply Type.

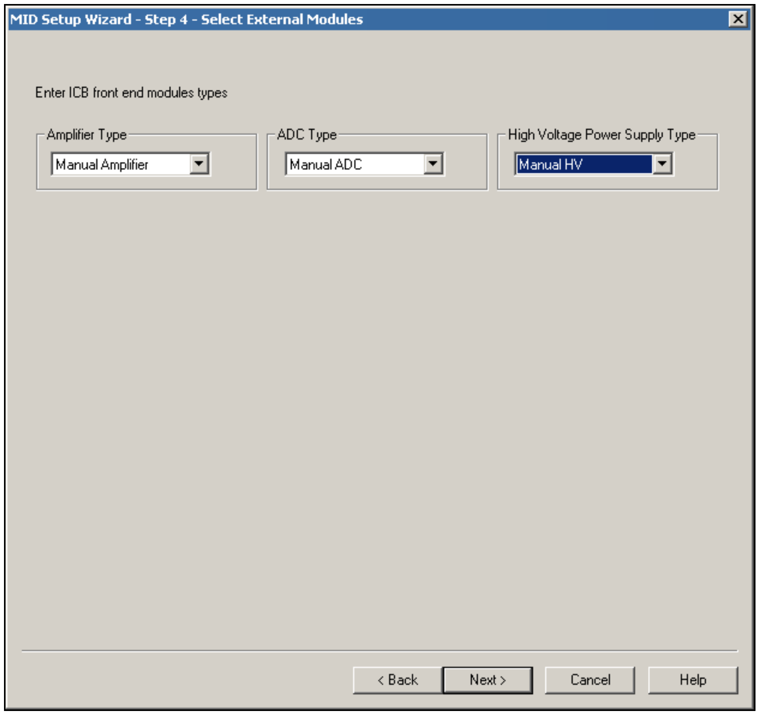


Figure 30 Selecting the External Modules

Steps 5 and 6

You won't see the screens for Steps 5 and 6; these are not used when setting up a 556B.

Step 7 - Summary

The Summary screen (Figure 31) displays a summary of the current MCA's configuration for review and lets you enter the name of the MID file that the configuration is to be saved to.

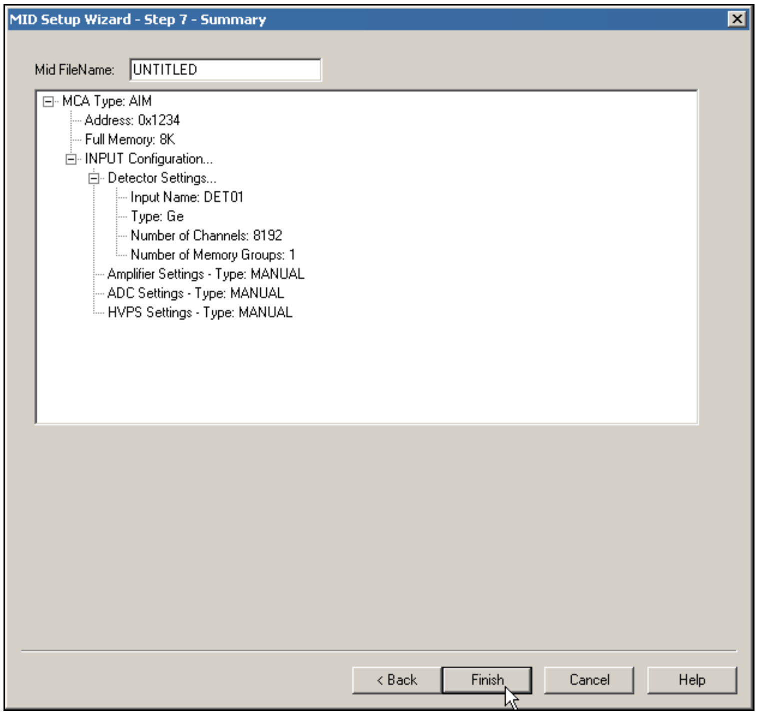


Figure 31 Summary of the Configuration

Ending the Definition

To complete your Input Definition, select **Finish**. The input that you just defined will be stored as an MID file named inputname.MID and is automatically loaded into the MCA Runtime Configuration Database. When you select **Finish**, you will be asked if you would like to define another input. Answering “Yes” will start the Wizard again and “No” will close the Wizard.

Note that if you didn’t enter an Input Name, you won’t be allowed to exit the Step 3 screen. If the name you entered is the same as the name of an existing MID file, the system informs you and goes back to Step 3 to let you enter another name.

The Step 7 Mid FileName defaults to UNTITLED, which you’ll probably want to change to something more meaningful. If the name you enter is the same as that of an existing MID file, the system will ask if you want to overwrite the existing file.

Verifying the Genie-2000 Setup

This section tells you how to verify the operation of the 556B AIM on a Genie-2000 system.

1. Create and save the MID file and install the 556B in a system.

2. Start the Gamma Acquisition and Analysis application and open the AIM datasource by selecting **File | Open datasource**, then choosing the AIM datasource. Now click on the **Acquire Start** button to start data acquisition. The AIM's ACQUIRE LED for the selected ADC should turn on and you should see a spectrum acquiring.

3. Click on the **Acquire Stop** button to stop acquisition. Select **File | Close** to close the datasource and release the AIM.

Verifying the Genie-PC Setup

This section tells you how to install and verify the operation of the 556B AIM on a Genie-PC system.

1. Create and save the MID file and install the 556B in a system.

2. Start Genie-PC's Spectroscopy Assistant application. For more information, refer to the chapters, *Spectroscopy Assistant Tutorial* and *Spectroscopy Assistant Reference*, in your Genie-PC Basic Operation Binder.

3. Start the MCA View Control application by selecting it from the Spectroscopy Assistant's Applications menu. In the MCA View Control window, open the AIM datasource by selecting **File | Open datasource**, then choosing the AIM datasource. Now click on the **Acquire On** button to start data acquisition. The AIM's ACQUIRE LED for the selected ADC should turn on and you should see a spectrum acquiring.

4. Click on the MCA View Control's **Acquire Off** button to stop acquisition. Select **File | Close** to close the datasource and release the AIM.

6. Diagnostic Monitor Mode

This section describes the 556B's Power On Diagnostics, executed every time the unit is powered on. The TEST LED will be on when the diagnostics function is executing. The test descriptions in this section assume that the Internal Serial Diagnostics Port (J-1) is connected to a local terminal.

A Soft Error will be indicated by the ERROR LED flashing for 60 seconds before entering the main application. This is a recoverable error, which allows Host Commands to be honored. A Hard Error will be indicated by a constantly illuminated ERROR LED, this is a fatal error, which keeps the AIM from honoring Host Commands. It also forces the AIM into the Diagnostics Mode.

Power On Diagnostics

The following tests are performed by the AIM 556B at power up. The designator (SOFT/HARD) indicates the type of error if encountered.

1. UART (SOFT): Tests the AIM's serial communications channel.
2. Microprocessor SRAM (HARD): Tests the 256k x 16 microprocessor SRAM.
3. Flash (HARD): Tests the 4 MB x 16 microprocessor flash memory. The ERROR, TEST and OK LEDs will all turn on at power up.
4. Acquisition SRAM (HARD): Tests the 128k x 16 ADC SRAM.
5. ADC (HARD): Tests the ADC FPGA.
6. ICB (HARD): Tests the ICB FPGA.
7. PHYTER (HARD): Tests the PHYTER and Ethernet controller.
8. TDR (HARD if both Ethernet ports fail): Determines the Ethernet link status and reports the speed of the correction and duplex modes.

During the startup initialization of the main application, the AIM module puts itself into diagnostics command monitor mode. This allows startup diagnostics messages to be displayed to the VT-100 terminal. When the diagnostics have finished, a detailed account of the working status of all hardware components on the board will be presented.

After the diagnostics have finished, you'll see the menu shown below:

Mode	Keys
Command Monitor On	CTRL + N
Command Monitor Off	CTRL + F
Erase Local Terminal	CTRL + E
Ethernet Monitor	CTRL + L
Diagnostic Monitor	CTRL + D

The menu will appear on startup and when exiting from Command Monitor, Ethernet Monitor, and Diagnostic Monitor modes.

Command Monitor Mode

The Command Monitor mode displays the Ethernet command being processed and the final status of the command. This mode is entered with the CTRL + N key combination. The layout for the message is:

> Ethernet Type – Message Type – Command Type – Status (only failure will be indicated)

For example:

> UI – Packet Message – Return ADC Status
> or
> UI – Packet Message – Return ADC Status – FAIL

This mode scrolls the messages on the screen as they are received and processed by the AIM. To exit this mode, enter CTRL + F from the terminal. Exiting from this mode will return you to the main menu.

Erase Local Terminal

The Erase Local Terminal command will send the escape sequence to the terminal that will delete all text from the screen. This is only available at the top level of the menu tree and during the Command Monitor mode. It will not be accessible in Ethernet Monitor Mode or Diagnostic Monitor Mode.

Ethernet Monitor Mode

Ethernet Monitor Mode displays the current Ethernet statistics for the module. These statistics indicate the number of receive, transmit, and miscellaneous errors. It also indicates the number of received messages, transmitted messages, and multicast messages processed. A typical Ethernet Error Monitor display is shown in Figure 32.

To update the display, press L. To clear the counters, press Z. Pressing Q will return you to Command Monitor Mode if it is enabled, otherwise it will return you to the Main Menu.

```
                        Ethernet Error Monitor

Receive Errors                      Transmit Errors

CRC                        0        Collision Occurred         0
Frame Alignment            0        Transmit Aborted           0
FIFO Overrun               0        Carrier Sense Lost         0
Missed Packet              0        FIFO Underrun              0
                                    CD Heartbeat               0
                                    Out of Window Collision    0


Valid Traffic                       Miscellaneous Errors

Frames TX                  0        Overwrite                  0
Frames RX                  0        Tally Count Overflow       0
Multicast RX               0



Options
  L - Update Display    Z - Zero all counters     Q - Return to Command Monitor
```

Figure 32 The Ethernet Error Monitor Display

Diagnostic Monitor Mode

Diagnostic Monitor mode is a user interactive diagnostics mode which presents a menu of diagnostics tests that can be run on the module. This mode cannot be entered while the module is owned. The reason for this is that some tests are time intensive and would cause communications between a host and the module to fail. Also, the acquisition memory tests perform write/read tests which during an acquisition have the potential to corrupt a spectrum being collected.

The Diagnostic Monitor Mode menu is shown in Figure 33. This screen is divided into two parts, the menu, enclosed by the graphical outline, and the scrolling output region below it which consists of six lines available for output. When running tests multiple times, the output will be displayed at the bottom and will scroll up as space is needed.

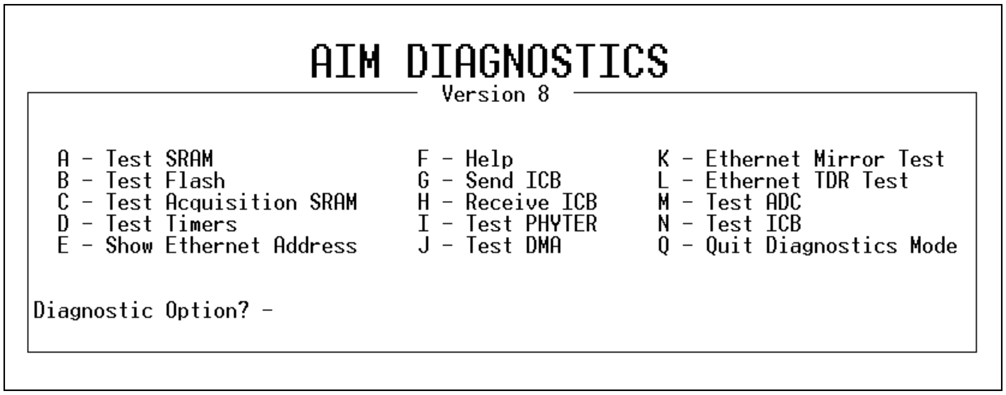


Figure 33 The Diagnostics Monitor Mode Menu

Options A, B, C, D, I, J, K, L, M, and N will ask you to enter the number of times the test is to be run; the value must be in the range 1–999.

A. Test SRAM

This test uses a reserved area of the SRAM to perform read/write tests to ensure its ability to perform these tasks. The test writes a few bytes to the reserved area and then verifies the values read back from the same locations. It should be noted that for the AIM to enter the main application, SRAM would have to be valid due to the fact that the bootstrap program runs partly out of the SRAM.

B. Test Flash

The flash test verifies the checksums of the parameters sector of the flash to ensure the flash is programmed correctly. The test calculates the checksums on each of the sectors and compares them to those stored in the parameters sector. The test will pass only if all checksums for sectors 4, 5, and 7 are identical to those stored.

C. Test Acquisition SRAM

This test writes values to specific areas of the acquisition SRAM and then verifies that those values have been written. The previous values at those locations before the test are saved and restored after the test. The test is considered passed if the values written are equivalent to the values read.

D. Test Timers

This test verifies the ability of the timers to count correctly. The test reconfigures Timers 0 and 1 an internal clock. Interrupts are disabled during the setup process and when enabled, Timer 2 counts for 10 time ticks or 100 ms. At the end of this count, the contents of Timers 0 and 1 checked for a value greater than or equal to 750. The test is considered passed if both timer channels have a count of 750 or greater.

E. Show Ethernet Address

This option displays the Ethernet address for the module in the output area of the screen. The address is displayed separated by dashes; for example: 00–00–AF–00–AA–CC. The last two are the ID used by the host when setting up the module.

F. Help

This menu option will give help on any of the menu options. You will be prompted to enter the option for which help is wanted. An incorrect entry will return to the initial option prompt after displaying an error. If a valid entry is made, the help text for that option will be displayed in the output area of the screen.

G. Send ICB

This menu option will enable you to send a one byte value (00–FF hex) over the ICB bus to an address between 00 and FF hex. You will first be prompted for the ICB address. When that value has been entered, you will be prompted to enter the value to send to that address. The function will occur and a status message will appear in the output area of the screen.

H. Receive ICB

The Receive ICB command will prompt you for an address to receive data from the ICB bus. Once entered, the function will be performed and a request for data will be made across the ICB bus. The status of the function will be displayed in the output area of the screen. If the function was successful, the value for the specified address will be displayed. If a timeout error occurs, the appropriate error message will be displayed.

I. Test PHYTER

This option will perform a loopback test on the PHYTER. The test verifies the ability of the PHYTER to send and receive Ethernet messages. The same test is part of the initial hardware startup tests that are performed when entering the main application.

J. Test DMA

This test is no longer needed, the AIM 556B does not use DMA to move data inside the unit. Instead dual-ported memory provides the same capability. The DMA test will always run successfully.

K. Ethernet Mirror Test

The Ethernet mirror test requires another module or node that understands 802.2 messages of type TEST. The mirror test composes and transmits a TEST type message over the Ethernet and waits for a response. The responses to 802.2 TEST messages are just a reply to the message with the same data, and the reversal of the destination and source addresses by the receiver. This test requires a test for timeout in the event that no response is received. If no response is received or the response received is not what is expected, the appropriate error message will be displayed, otherwise the pass condition message will be displayed.

L. Ethernet TDR Test

This test determines the link status and reports the speed of the Ethernet connection and duplex mode. If no connection is detected this will also be reported.

M. Test ADC

The test ADC option tests that the status register of the ADC FPGA for a value of 0 for the overflow bits on channels 1 and 2 and a 0 for the acquisition status for both channels, as well. If this is not the case, the test indicates a failure.

N. Test ICB

To test the integrity of the ICB FPGA, the status word is read and a test of the enable remote write bit are made. The test passes if and only if this value is a 0.

Q. Quit Diagnostics Mode

This option will exit from diagnostics mode and return you to the Command Monitor mode.

A. Specifications

Input/Outputs

ADC1 and ADC2 (Data acquisition) – 34-pin ADC standard.

ETHERNET – RJ-45 jack provides connection to network through 10 Base-T and 100 Base-TX transceivers.

ICB (Instrument Control Bus) – Provides Host access to ICB Bus.

RS-232 – Terminal I/O for diagnostic functions.

Manual Control

ADC TRANSFER TIME – Internal jumper plugs to select transfer times compatible with cable length to each ADC. Factory set for 1 µs (≤4.6 m). Other selections are: 0.75 µs, 1.5 µs, 2 µs. Can be set independently for ADC1 and ADC2.

Front Panel Indicators

ERROR – LED indicates a hard, non-recoverable error (continuously lit) or soft error (blinks for 60 s on startup) in the module.

OK – LED; indicates module is operational.

TEST – LED; indicates module is in internal test mode.

COMM TX – LED; indicates module is sending data to host.

COMM RX – LED; indicates module is receiving data from host.

IN USE – LED; indicates host has put module on-line.

ACQUIRE – LEDs for ADC ports 1 and 2; indicates corresponding port is acquiring data.

ACTIVE – LEDs for ADC ports 1 and 2; indicates activity on corresponding ADC port.

Performance

AIMS/NETWORK – Unlimited.

COMMUNICATION STANDARD – IEEE 802.2 and 802.3.

NETWORK ADDRESS – 00-00-AF-00-nn-nn, where nn-nn is a unique address factory set for each Model 556B.

ADC Interface Port

NUMBER OF PORTS – 2.

TOTAL MEMORY IN AIM MODULE – 64K channels.

MEMORY PER PORT – 0 to 64K Channels.

COUNTS PER CHANNEL – 2^{32} -1 (>4 x 10^{9}).

GROUPS PER PORT – 64, maximum.

CHANNELS PER GROUP – 0 to 32K in 256 channel increments.

Acquisition Modes

PHA – Read, +1, Write.

PHA/LFC – Read, +N, Write.

Acquisition Cycle

Jumpers set for a transfer time of 1 µs:

PHA – 2 µs.

PHA/LFC – 4 µs.

PHA Preset

CONTROL – Live and/or true time; counts in an ROI; overflow in any channel.

TIME RESOLUTION – 0.01 s.

TIME RANGE – 0.01 to >42 x 10^6 s.

COUNT RANGE – 1 to 2^{32} -1 counts.

Connectors

ADC1 and ADC2 – 34-pin male ribbon headers; ADC1: rear panel; ADC2: internal connector accessed through rear panel cutout.

RJ-45 JACK – Ethernet 10 Base-T; rear panel.

ICB – 20-pin male ribbon; rear panel.

LOCAL TERMINAL – Internal 10-pin ribbon connector header.

Power Requirements

+6 V dc – 250 mA

Physical

SIZE – Standard single-width NIM module 3.43 x 22.12 cm (1.35 x 8.71 in.) per DOE/ER-0457T.

NET WEIGHT – 0.7 kg (1.6 lb).

SHIPPING WEIGHT – 1.6 kg (3.7 lb).

Environmental

OPERATING TEMPERATURE – Range: 0 to 50 °C (32 to 122 °F).

OPERATING HUMIDITY - 0 to 80% relative, non-condensing.

Meets the environmental conditions specified by EN 61010, Installation Category I, Pollution Degree 2.

Accessories (Included)

C1560 – 12-unit ICB connecting cable.

C1703-2 – Two 60 cm (2 ft) AIM to ADC/AMX cable.

C1721 – Local terminal cable.

10 Base-T patch cable.

Options

C1720-.5 – 556B Sample changer interface cable.

C1722-.5 – 556B External start/stop cable.

556B-CONV – 10 Base-2 to 10 Base-T converter.

B. Signal Connectors

This section describes signals and pinouts for the 556B's front panel (Local Terminal) and rear panel (Data Interface, ICB Interface, Ethernet Interface and NIM Power) connectors.

Local Terminal Connector

The internal Local Terminal connector supports a standard RS-232 interface to a terminal, which can be used to run local AIM diagnostics and monitor the status of the module. All input and output signal levels are RS-232 compatible; Output is > +5 V space and < –5 V mark. Input is +0.4 V to +15 V space and –0.4 V to –15 V mark.

Pin Number			
J1 9-pin	**25-pin EIA Adapter**	**Signal**	**Description**
1,4,6,7,8,9	1,5,6,8-19 21-25	NC	No connection.
2	3	TXDB+	Transmitted data to terminal.
3	2	RXDB+	Received data from terminal.
5	7	GND	Signal ground.
N/A	4-20	RTS/DTR	Request To Send and Data Terminal Ready are connected together in the 25-pin EIA Adapter.

Communications Parameters

The local terminal connector's serial character protocol is fixed at:

9600 baud
8 data bits
no parity
1 stop bit

Data Interface Connecters

These two rear panel 34-pin ribbon connecters (ADC1 and ADC2) provide all the necessary signals for connection to the ADC. Negative true signals are shown with a trailing asterisk (ACEPT*); all other signals are positive true.

Pin	Signal	Pin	Signal
1	GND	2	ACEPT*
3	GND	4	ENDATA*
5	GND	6	CDT* or CDT
7	GND	8	ENC* or ENC
9	GND	10	READY*
11	GND	12	INB* (INV*)
13	NC	14	ADC00*
15	ADC07*	16	ADC01*
17	ADC08*	18	ADC02*
19	ADC09*	20	ADC03*
21	ADC10*	22	ADC04*
23	ADC11*	24	ADC05*
25	ADC12*	26	ADC06*
27	ADC14*	28	ADC15*
29	NC	30	NC
31	NC	32	NC
33	NC	34	ADC13X*

Data Interface Signal Functions

This section describes the function of each data interface signal in detail. All input and output signals are TTL compatible with 2.2 kΩ resistors to +5 V. Unless otherwise noted, the input signal levels are:

Low = 0 to 0.8 volts
High = 2.0 to 5.0 volts

And the output signal levels are:

Low = 0 to 0.5 volts
High = 3.0 to 5.0 volts

Signal	Pin	Description
ADC00*	14	INPUT: Binary data 2^0 (LSB).
ADC01*	16	INPUT: Binary data 2^1.
ADC02*	18	INPUT: Binary data 2^2.
ADC03*	20	INPUT: Binary data 2^3.
ADC04*	22	INPUT: Binary data 2^4.
ADC05*	24	INPUT: Binary data 2^5.
ADC06*	26	INPUT: Binary data 2^6.
ADC07*	15	INPUT: Binary data 2^7.
ADC08*	17	INPUT: Binary data 2^8.
ADC09*	19	INPUT: Binary data 2^9.
ADC10*	21	INPUT: Binary data 2^{10}.
ADC11*	23	INPUT: Binary data $2^{11.}$
ADC12*	25	INPUT: Binary data 2^{12}.
ADC13X*	34	INPUT: Binary data 2^{13}.
ADC14*	27	INPUT: Binary data 2^{14}.
ADC15*	28	INPUT: Binary data 2^{15} (MSB).
ENDATA*	4	OUTPUT (Enable Data): Used to enable the tri-state buffers driving the 16-bits of data onto the lines ADC00* through ADC15*.
READY*	10	INPUT (Data Ready): Indicates that data is available for transfer from the ADC. High level > 3.5 V.
ACEPT*	2	OUTPUT (Data Accepted): Signals the ADC that the data has been accepted.
INB*	12	INPUT (Inhibit): In non-LFC mode or State 2 of the LFC transfer cycle, this signal indicates that the data available for transfer from the ADC is to be discarded. In LFC mode, this signal indicates that the number transferred during State 1 is the LFC increment (1 → 255). High level > 3.5 V.
ENC*	8	OUTPUT (Enable Converter): This signal enables or disables the ADC module. ENC* = logic 0 enables ADC operation.
CDT*	6	INPUT (Composite Dead Time): This signal indicates the time when the ADC or connected amplifier is busy and cannot accept another input event. It is used to gate the live time clock circuit in the MCA. High level > 3.5 V.

Signal	Pin	Description
NC	13	No connection.
NC	29	No connection.
NC	33	No connection.
NC	31	No connection.
NC	32	No connection.
NC	30	No connection.
GND	1,3,5,7,9,11	DC common for all interface signals.

ICB Interface Connector

This rear panel 20-pin ribbon connector (ICB) provides all the necessary signals for connecting the 556B to the Instrument Control Bus (ICB). Negative true signals are shown with a trailing asterisk (LWE*); all other signals are positive true.

Pin	Signal	Pin	Signal
1	GND	2	LD0
3	LD1	4	GND
5	LD2	6	LD3
7	GND	8	LD4
9	LD5	10	GND
11	LD6	12	LD7
13	GND	14	LWE*
15	GND	16	LDS*
17	GND	18	LAS*
19	GND		

ICB Interface Signal Functions

This section describes the function of each ICB interface signal in detail. All input and output signals are TTL compatible with a 2.2 kΩ resistor to +5 V. Unless otherwise noted, the input signal levels are:

Low = 0 to 0.8 volts
High = 2.0 to 5.0 volts

And the output signal levels are:

Low = 0 to 0.5 volts
High = 3.0 to 5.0 volts

Signal	Pin	Description
LD0	2	INPUT/OUTPUT: Address/Data line 0 (LSB).
LD1	3	INPUT/OUTPUT: Address/Data line 1.
LD2	5	INPUT/OUTPUT: Address/Data line 2.
LD3	6	INPUT/OUTPUT: Address/Data line 3.
LD4	8	INPUT/OUTPUT: Address/Data line 4.
LD5	9	INPUT/OUTPUT: Address/Data line 5.
LD6	11	INPUT/OUTPUT: Address/Data line 6.
LD7	12	INPUT/OUTPUT: Address/Data line 7. (MSB)
LWE*	14	OUTPUT (Write Enable): This signal is active when the AIM is writing to the ICB.
LDS*	16	OUTPUT (Data Strobe): Used to latch the data into a slave during a write cycle or gate the data onto the bus during a read cycle.
LAS*	18	OUTPUT (Address Strobe): Used to latch the address which the AIM is accessing from the slave unit.
GND	1, 4, 7, 10, 13, 15, 17,19	DC common for all interface signals.

Ethernet Interface Connectors

10 Base T

10 Base-T, or 100 Base-TX, connection is through an isolated RJ45 jack, see the figure in *Rear Panel* on page 3.

NIM Power Connector

+6 V ………………………… pin 10

Power return to ground ……… pin 34

C. Hardware Setup Diagrams

These diagrams, which include several of the more common systems, are provided to help you set up a system using the 556B AIM.

Typical ICB Bus Installation

Figure 34 shows a single-input system with a Model 556B AIM controlling the Models 9635, 9615, and 9645.

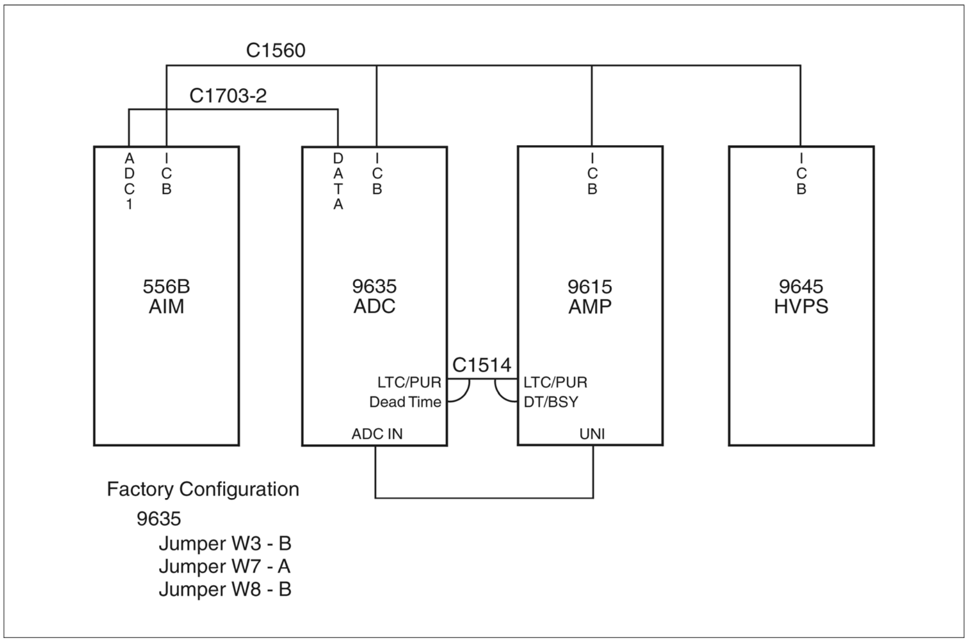


Figure 34 Typical ICB Bus Installation

Multiple 556B AIMs in a Network

Figure 35 shows a system employing several AIM modules in a network, each controlling more than one ICB ADC.

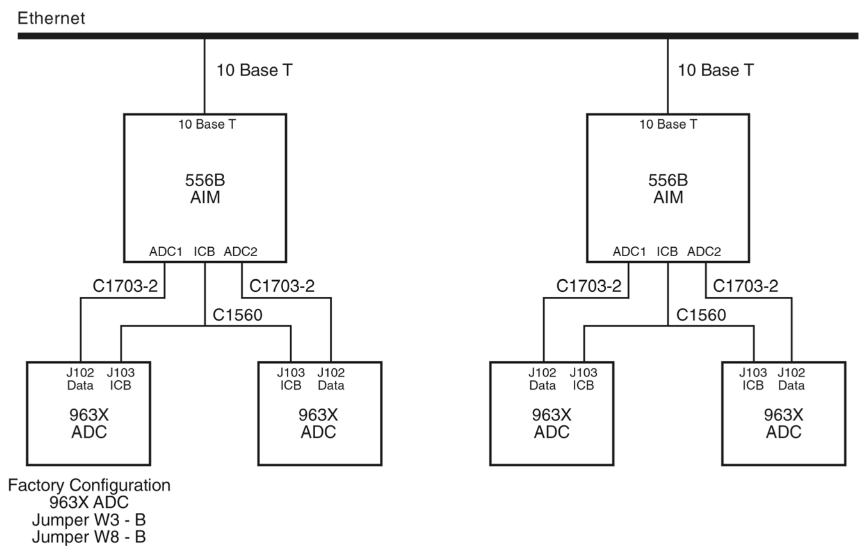


Figure 35 Multiple 556B AIMs in a Network

556B AIM with 554 RPI and AMX Modules

A multi-input multiplexer system with Independent Start/Stop Control can be set up with Genie 2000, the 556 AIM, a 554 RPI, 8700 ADCs and 8244 AMXs.

A 16-Input System

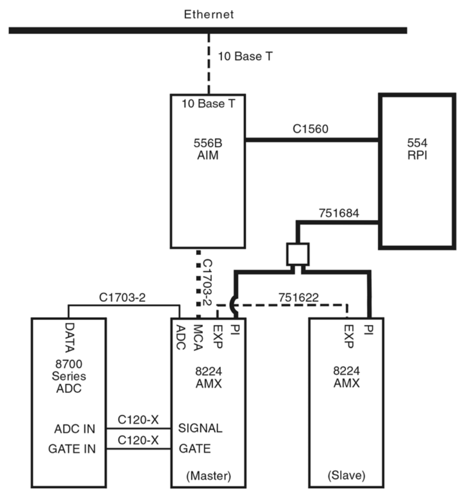
The MCA/ADC system shown in Figure 36 on the next page supports up to two Model 8224 AMXs for a maximum of 16 inputs with Independent Start/Stop Control.

Note: The Independent Start/Stop control accessories described in the Figure are not optional. Independent Start/Stop Control is required when using 8224's.

A 32-Input System

A 16-input system can be expanded to 32 inputs by connecting a second ADC with its two 8224s to the AIM's ADC 2 input.

Though a single AIM is limited to two ADCs and 32 inputs, a larger system can be assembled, using a second AIM.



AIM-AMX Connection
Each AIM is supplied with two C1703-2 Interface Cables.

ADC-AMX Connections
Each 8224 AMX is supplied with one C1703-2 Interface Cable.

The C120-X Coax Cables for the Signal and Gate connections must be purchased separately.

AMX Master-Slave Connection
Each slave requires a 751622 Expansion Cable, which must be purchased separately.

Independent Start/Stop for the 8224 AMXs
This option requires the purchase of a Model 554 Remote Parallel Interface (RPI) and at least one 751684 cable assembly. Each 751684 Cable Assembly supports two 8224s and each RPI supports 2 such cable assemblies. If independent start/stop is not required, 8223 AMXs may be substituted.

Note: The number and type of AMX modules supported is limited by the software platform being used. Please refer to the appropriate manual for information.

Internal Jumpers

8223	8224	8701	8706	8713/8715/9633/9635	
W1 - Installed W2 - B Internal Switches set for Group Size, Number of Inputs, etc. Refer to 8223 Manual.	J1 - ENC* W1 - Removed W2 - Installed Internal Switches set for Group Size, Number of Inputs, etc. Refer to 8224 Manual.	J1 - ENC* J3 - NEG J8 - B PHA/SVA - SVA AUTO/DELAYED - Delayed COINC/ANTI - Coinc ADJ - Full CCW	J4 - B J5 - ENC* J9 - NEG PHA/SVA - SVA AUTO/DELAYED - Delayed COINC/ANTI - Coinc ADJ - Full CCW	W3 - B W8 - B PHA/SVA - SVA AUTO/DELAYED - Delayed COINC/ANTI - Coinc ADJ - Full CCW	96XX ADC can be Substituted with the Addition of the ICB Cable C1560 Connection.

Figure 36 556B AIM Setup with 554 RPI

D. Field Installing the Option Cables

The cables for either the Start/Stop Option or the Sample Changer Option are normally installed at the factory. If you need to install either of these cables in the field, follow the steps in “Installing the Cable”, below, then proceed to the final two steps for the option, which tell you how to connect the cables.

Installing the Cable

1. Remove the five screws holding the 556B side cover to the Module frame, then remove the side cover.

2. At the rear of the module remove the two screws holding the Cable Clamp for the ADC2 cable to the Module frame.

3. Remove the Cable Clamp.

4. Insert the 10-pin header of the Sample Changer cable or Start/Stop cable into J5 (labeled SAMP CHG on the circuit board).

5. Place the cable’s two BNC connectors on top of the 34-pin ribbon cable of ADC2 outside of the Module.

6. Place the Cable Clamp in place over the two screw holes in the Module frame.

7. Insert the screws and tighten lightly.

8. Make sure in the process of tightening the screws that the two BNC cables are spread apart.

9. Replace the Module cover and its five screws.

Connecting the Sample Changer Cables

1. CONNECT THE SAMPLE CHANGER'S READYOUT CONNECTOR TO THE 556B'S READY CONNECTOR.

2. CONNECT THE 556B'S ADVANCE CONNECTOR TO THE SAMPLE CHANGER ADVANCE IN CONNECTOR.

Connecting the Start/Stop Cables

1. Connect the START/STOP OUTPUT for ADC Port 1 to the 556B's SS1 input.

2. Connect the START/STOP OUTPUT for ADC Port 2 to the 556B's SS2 input.

E. Interface Technical Information

The 556B has two Sample Changer–Start/Stop interfaces for each ADC input channel. This appendix is a technical description of each interface. See the appendix *Ethernet Command Set* on page 64 for further information.

Interface Toggle Rate

This interface is interrupt driven with a maximum toggle rate (change rate) of 100 Hz (10 ms). This rate is the result of the latency of the processor interrupts and the resolution of the time clocks of the 556B (10 ms).

Interface Signals

The Sample Changer–Start/Stop Interface includes the following signals:

READY IN

Input level of programmable polarity used by the Sample Changer Interface to begin acquisition. Normally TTL logic 1 will indicate a ready condition.

STOP*

Negative edge used to start and stop acquisition. Each negative edge of this signal shall cause acquire to toggle on/off for the given ADC channel.

ADVANCE

Output used by the Sample Changer Interface to change sample positions. Duration is 150 ms (active state) the polarity of this signal is user programmable. Normally TTL logic 0 will indicate an advance condition out to the sample changer.

Interface Selection and Polarity

Interface Selection and Polarity is user programmable. The Sample Changer option is provided only for channel 1 by way of an option cable. The Start/Stop option is provided through another cable with Start/Stop signals provided for both channels.

Sample Changer Timing

This function is Host driven. The hardware provides only the interface logic/registers required for communicating with the Sample Changer.

1. MCA arms channel by turning acquire on.

2. READYIN input level turns acquire on (Host will poll READYIN to determine this).

3. Acquire runs to preset.

4. ADVANCE is issued for 150 ms, return to 1 (Host will set/reset ADVANCE).

Start/Stop Timing

The logic supports either firmware-driven acquisition control or hardware-driven acquisition control. Currently acquisition control is firmware-driven.

1. MCA arms channel by turning acquire on.

2. Each negative edge of STOP* changes the ADC channel acquire state as follows:

    Start Mode: Negative edge of STOP* starts and runs acquisition to preset.

    Stop Mode: Negative edge of STOP* stops acquisition.

    Start/Stop Mode: Each Negative edge of STOP* toggles the MCA Acquire on/off.

F. Ethernet Command Set

This appendix defines the Ethernet command set for both the Sample Changer and Start/Stop AIM options.

Sample Changer Interface

The Sample Changer interface is Host controlled via the Ethernet Commands given below. Ready Input and Advance Output signal polarities are host programmable. The default signals are:

Ready Input – active TTL high.

Advance Output – active TTL Low.

Set Sample Changer Command (To AIM)

Channel	(0 = Channel 1, 1 = Channel 2)
Advance Polarity	(0 = non-invert, 1 = invert)
Ready Polarity	(0 = non-invert, 1 = invert)

Return Sample Changer Status (To AIM)

Channel	(0 = Channel 1, 1 = Channel 2)

Sample Changer Status Response (From AIM)

Advance Polarity	(0 = non-invert, 1 = invert)
Ready Polarity	(0 = non-invert, 1 = invert)
Ready Status	(0 = not ready, 1 = ready)
Advance Status	(0 = advance off, 1 = advance on)

Return Ready Status (To AIM)

Channel	(0 = Channel 1, 1 = Channel 2)

Ready Status Response (From AIM)

Status	(0 = Not ready, 1 = Ready)

Advance (To AIM)

Channel	(0 = Channel 1, 1 = Channel 2)
State	(1 = On, 0=Off)

Start/Stop Interface

The Start/Stop interface is a negative TTL edge signal

Set Start/Stop Status Command (To AIM)

Channel	(0 = Channel 1, 1 = Channel 2)
State	(0 = none, 1 = start only, 2 = stop only, 3 = start/stop)

Return Start/Stop Status (To AIM)

Channel	(0 = Channel 1, 1 = Channel 2)

Start/Stop Status Response (From AIM)

Mode	(0 = none, 1 = start only, 2 = stop only, 3 = start/stop)
Status	(Bit 0 indicates waiting for start: 1 – waiting, 0 – not waiting. Bit 1 indicates acquisition on 1 – on, 0 off)
Time Difference	(Time difference between arming and actual external start)

Old/New AIM Differentiation

To make use of the Start/Stop Sample Changer Interfaces we can use the Hardware/Firmware Revisions that are returned in the Module Inquiry Ethernet Message.

Old AIM Hardware Revision: 0

Old AIM Firmware Revision: 6 or 5

Any other return values implies a New AIM is in Use.

G. Installation Consideration

This unit complies with all applicable European Union requirements. Compliance testing was performed with application configurations commonly used for this device.

During design and assembly of the device, precautions were taken by the manufacturer to minimize the effects of EMI on the system. However, care should be taken to maintain full compliance. These considerations include:

- A rack or tabletop enclosure fully closed on all sides with rear door access
- Single point external cable access
- Blank panels to cover open front panel Bin area
- Compliant grounding and safety precautions for any internal power distribution
- The use of CE compliant accessories such as fans, UPS, etc.

Preventive Maintenance

This unit does not require any periodic cleaning maintenance.

Any maintenance should be performed by a qualified Canberra service representative.

Operating Protection Impairment

Canberra is not liable for any operational malfunctions or personal injuries due to mishandling or unauthorized repair and maintenance not detailed in this manual.

Cleaning/Decontamination

When needed, the front panel of the unit may be cleaned. Remove power from the unit before cleaning. Use only a soft cloth dampened with warm water and make sure the unit is fully dry before restoring power. Because of access holes in the NIM wrap, *do not* use any liquids to clean the wrap, side or rear panels.

Request for Circuit Information

The Schematics, Block Diagrams, and/or Circuit Description may be available for this unit directly from CANBERRA. Request can be made by calling, faxing, or emailing:

Training and Technical Services Department
Canberra Industries
800 Research Parkway, Meriden, CT 06450
Telephone: (800) 255-6370FAX: (203) 639-2067
Email: **techsupport@canberra.com**

If you would like schematics and/or a circuit description, if available, for this unit, please provide us with the following information.

Your Name ______________________________________

Your Address ______________________________________

____

____

____

____

Unit's model number ________________________

Unit's serial number ________________________

Note: Schematics, block diagrams, and circuit descriptions are provided for information only; if you service or repair or try to service or repair this unit without Canberra's written permission you may void your warranty.

Note

Warranty

Canberra (we, us, our) warrants to the customer (you, your) that for a period of ninety (90) days from the date of shipment, software provided by us in connection with equipment manufactured by us shall operate in accordance with applicable specifications when used with equipment manufactured by us and that the media on which the software is provided shall be free from defects. We also warrant that (A) equipment manufactured by us shall be free from defects in materials and workmanship for a period of one (1) year from the date of shipment of such equipment, and (B) services performed by us in connection with such equipment, such as site supervision and installation services relating to the equipment, shall be free from defects for a period of one (1) year from the date of performance of such services.

If defects in materials or workmanship are discovered within the applicable warranty period as set forth above, we shall, at our option and cost, (A) in the case of defective software or equipment, either repair or replace the software or equipment, or (B) in the case of defective services, reperform such services.

LIMITATIONS

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EXCLUSIONS

Our warranty does not cover damage to equipment which has been altered or modified without our written permission or damage which has been caused by abuse, misuse, accident, neglect or unusual physical or electrical stress, as determined by our Service Personnel.

We are under no obligation to provide warranty service if adjustment or repair is required because of damage caused by other than ordinary use or if the equipment is serviced or repaired, or if an attempt is made to service or repair the equipment, by other than our Service Personnel without our prior approval.

Our warranty does not cover detector damage due to neutrons or heavy charged particles. Failure of beryllium, carbon composite, or polymer windows, or of windowless detectors caused by physical or chemical damage from the environment is not covered by warranty.

We are not responsible for damage sustained in transit. You should examine shipments upon receipt for evidence of damage caused in transit. If damage is found, notify us and the carrier immediately. Keep all packages, materials and documents, including the freight bill, invoice and packing list.

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