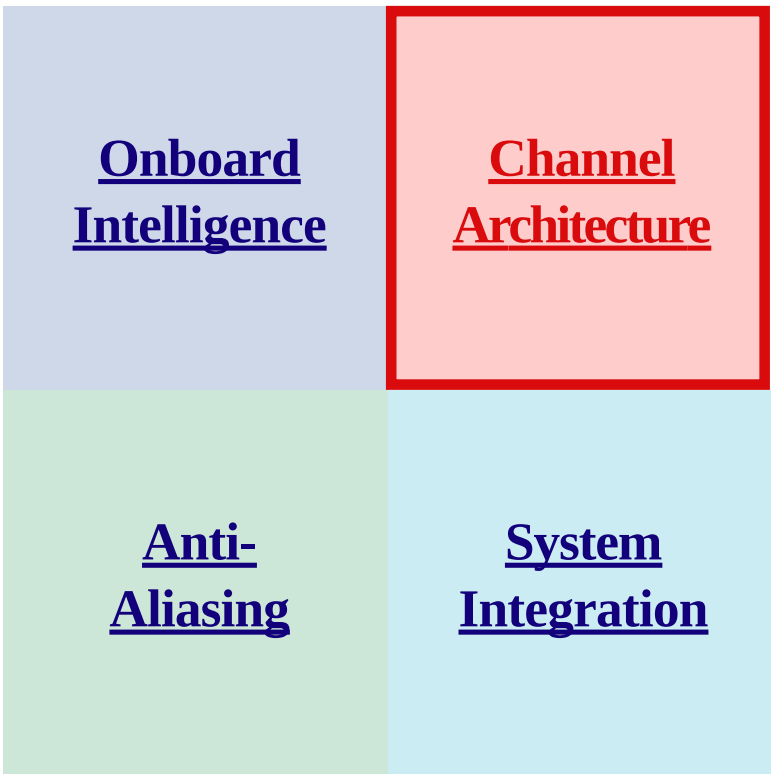
Channel Architecture



CHANNEL ARCHITECTURE

from

MICROSTAR LABORATORIES™

Channel Architecture

connecting the world to a DAP board

A Data Acquisition Processor (DAP) board that plugs into a PCI slot forms the foundation of any new system from Microstar Laboratories. A channel architecture based on Eurocards – plug-in hardware that mounts in industry-standard 19" racks – provides expansion, termination, and other functions that greatly increase the range of even a single DAP.

Introducing This Catalog

This catalog guides you through the channel architecture that Microstar Laboratories uses. It does so in enough detail to allow you to select all the components required to configure your DAP system and then to calculate its cost from our price list. It includes photographs of most Eurocards and of the more popular cables, and it gives enough information on part numbers to act as a useful index to the complete set of all user manuals on every hardware product the company ships to customers. If you do not yet have all our user manuals, please ask us for them. You can do this right now by phone or on the Web. If you do not have our current price list please ask us for that as well.

During your visit to our Web site, you can request the DAPtools Basic CD. This contains all our user manuals for all our software and hardware products in Windows Help format as well as in PDF format. When you want more detail on a product than you can find in this catalog, please refer to the relevant user manual on this CD.

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Microstar Laboratories warrants all hardware products for one year. After that, the company will repair products at minimal cost if vendors still supply any parts needed. In practice, Microstar Laboratories buys discontinued parts for inventory to prolong the useful life of older products. Please ask for a copy of the Microstar Laboratories Limited Warranty for details of the one-year warranty.

MICROSTAR LABORATORIES™

the onboard intelligence company

A Message to New Customers and Old Friends

Your success matters to us. We make it our business to help you succeed in what you do; we

listen carefully to what you want to achieve,

show you, if we can, how to use our products to do that, and

support you while you work toward your goals.

You teach us; we respect you and thank you for that. We learn from you what to build into our business processes and products so that you find us even more helpful the next time you call on us.

Meanwhile, and before you turn the page, please also read the introduction on the left.

Best wishes,

Neil Fenichel

President

Microstar Laboratories, Inc.

Neil Fenichel founded Microstar Laboratories in 1982. As often as he can, he works directly with customers alongside company application engineers.

Customers

Our customers cover almost all fields of industry and science, and range in size from one-person operations to Fortune 500 companies. They include a growing number of VARs and OEMs (Value Added Resellers and Original Equipment Manufacturers).

For customers large or small, reseller or end user, we offer a unique approach to PC-based data acquisition. You can see for yourself on our Web site how some of our customers use this in their applications.

Products

Microstar Laboratories produces a line of Data Acquisition Processor (DAP) boards, each with an onboard processor, memory, and a dedicated, multitasking, real-time operating system: DAPL. With this onboard intelligence, a DAP board can handle time-critical aspects of an application without any delays or resource demands imposed by Windows or by other software running on the PC.

Applications require onboard intelligence to run in real time under Windows. However, onboard intelligence also makes it much easier to implement applications requiring a high channel count, anti-aliasing, or synchronized integration over a network.

As well as providing DAPL software to run on DAP boards, we develop and ship PC software to support DAP boards in many user environments. All our design follows a channel architecture that makes it easy to connect our hardware to a large array of sensors and actuators.

Support

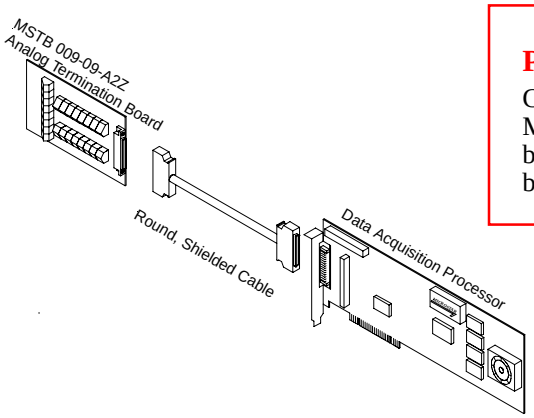
Microstar Laboratories provides complete technical support to each customer. When you first call us, an application engineer examines how well our products fit your proposed application. If our products do not fit, we say so. If our products fit, we work with you until your application runs as planned.

Hardware and software engineers work with application engineers to provide the technical support you need to reach your goals.

To talk about your application, call us toll free in the United States, at 888 MSTARLABS (678-2752). Outside the United States, email us or contact one of our international distributors.

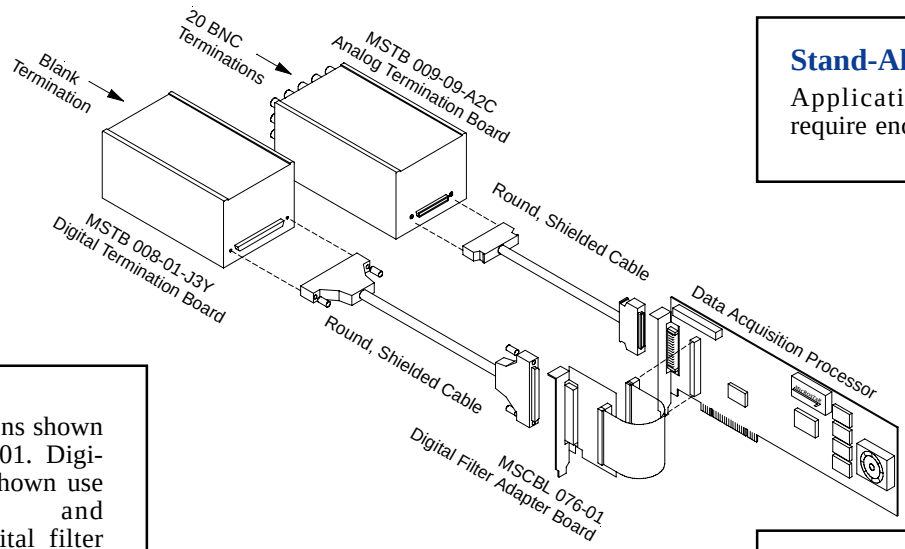
For more information, please register on our Web site. When you register, ask us to send you a CD that contains every user manual we publish.

Channel Architecture



Putting It All Together

Create systems like these with Microstar Laboratories DAP boards, 3U Eurocard-format boards, and optional enclosures.

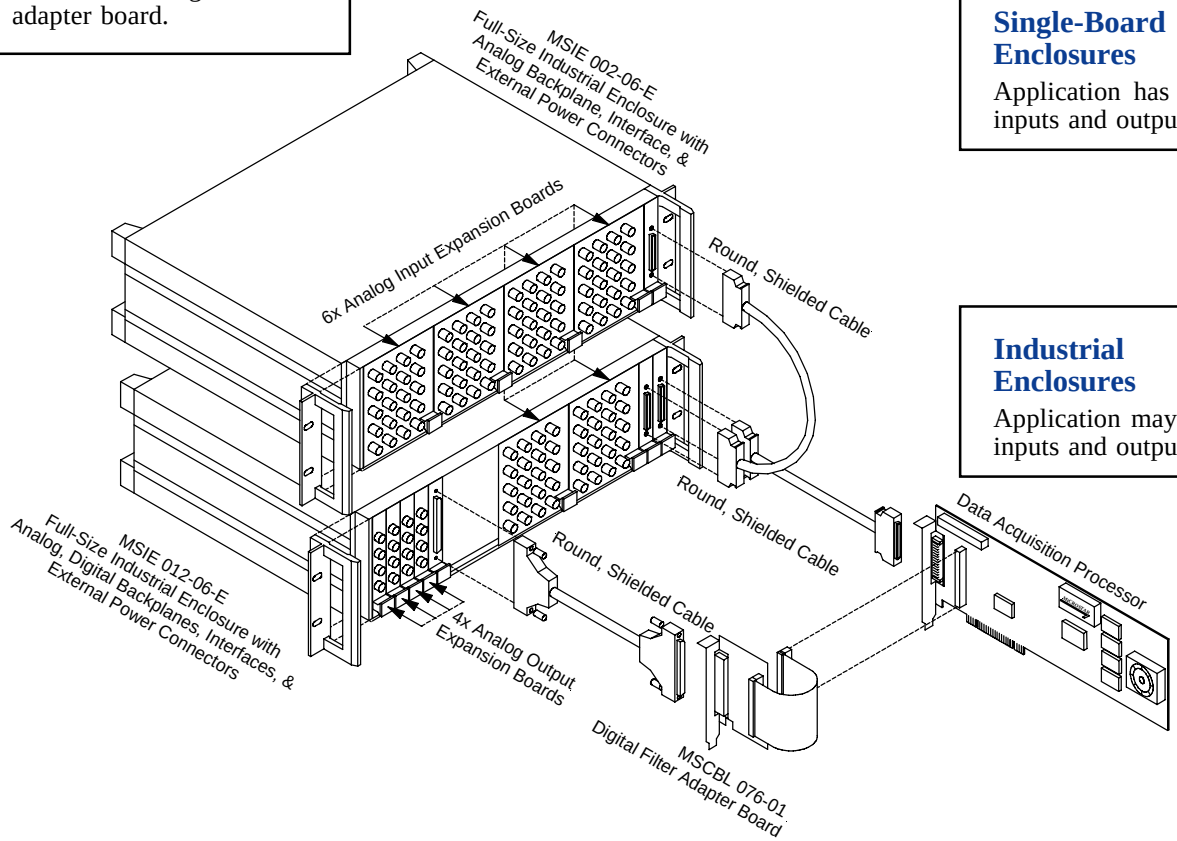


Stand-Alone Board

Application does not require enclosed hardware.

Cables

Analog connections shown use MSCBL 040-01. Digital connections shown use MSCBL 054-01 and MSCBL 076 digital filter adapter board.



Single-Board Enclosures CE

Application has only a few inputs and outputs.

Industrial Enclosures CE

Application may have many inputs and outputs.

Several DAP boards – in any combination of model numbers – can work together as a single, synchronized, PC-based system[1]. Some simple DAP systems will have only a handful of inputs and outputs; others may have maybe a hundred or so. A multi-DAP system potentially may have several thousand analog and digital inputs and outputs. Whatever the case, the signals have to connect somewhere. The examples here illustrate the channel architecture used by Microstar Laboratories: signal connectors on 3U (100mm high) Eurocard B[2] (220mm deep) boards – Eurocards – that often pre-process a signal.

All Microstar Laboratories Eurocards – other than DAP-to-backplane interfaces – offer one or more types of termination. Most also multiplex inputs or outputs. Many perform additional functions. On the right you can review the full range, arranged in the seven main function groups:

simple termination

simple multiplexing

anti-alias filtering

simultaneous sampling

isolation

counter/timer

quadrature-decoder

The need for one or more of the listed functions, the number and speed of inputs and outputs, the mix of analog and digital signals, and termination choices – as well as the extent that your application can benefit from onboard processing – determines the DAP board, Microstar Laboratories Eurocards, and enclosure models required.

Account Representatives and Application Engineers at Microstar Laboratories know the product range, know how it works in a number of applications, and they welcome the opportunity to talk with you about how it can work in yours. So call us. We can confirm a suitable channel architecture and overall signal configuration, illustrated by a 3-D line drawing, like the samples you see here. You will clearly see the products you need and the ways they connect. We do not charge for this service, so go ahead and contact us today.

Eurocards by Function

Simple Termination

MSTB 008: Digital Termination Boards
MSTB 009: Analog Termination Boards
MSTB 010: Termination Boards for the DAP 820 and DAP 840

Simple Multiplexing

MSXB 038: Digital Expansion Boards
MSXB 037: Analog Input Expansion Boards
MSXB 032: 12-bit Analog Output Expansion Boards
MSXB 024: Analog Input Expansion/Termination Board for the DAP 820
MSXB 022: 16-bit Analog Output Expansion Boards
MSXB 018: Analog Input Expansion Boards, connects to MSTB 009
MSXB 014: 12-bit Analog Output Expansion Boards
(MSXB 032 recommended)
MSXB 013: Digital Expansion Boards, connect to the MSTB 008

Anti-Alias Filtering *See related products below*

MSXB 048: Filtered Analog Input Expansion Boards

Simultaneous Sampling *See related products below*

MSXB 028: Simultaneous Sampling Boards

Isolation

MSXB 039: Digital Opto-Isolator Boards
MSXB 027: Analog Isolation Boards
MSXB 016: Digital Opto-Isolator Boards
(MSXB 039 recommended)

Counter/Timer

MSXB 036: Counter/Timer Boards

Quadrature-Decoder

MSXB 050: Quadrature Decoder Boards

Related products for the iDSC 1816, a specialized DAP board that filters out all aliases and samples all channels simultaneously:

Eurocards

MSXB 042: Analog Termination Boards
MSXB 044: Signal Conditioning Boards included in MSSC-8 module – itself included in the SCS-xx Signal Conditioning Systems packages

Other Boards

MSXB 043: BNC Termination Boards
MSXB 045: LVDS Boards for iDSC synchronization for SCS-xx systems with multiple iDSC 1816 boards

[1] On one PC or several networked PCs. DAPcell Local Server and DAPcell Network Server software allow a number of DAP boards to act as a single synchronized system even though spread across networked PCs.

[2] The Eurocard A format, used in CompactPCI systems, has the same 3U height (100mm) but not the depth: 160mm against 220mm for the Eurocard B format.

Complete List of Microstar Laboratories Eurocard Part-Number Suffixes

Most Microstar Laboratories Eurocard part numbers in the price list include a three-character suffix that holds information on how the Eurocard connects to a DAP and on how it connects to the world outside. To use this information, refer to the table below. It partially decodes the three-character suffixes for all Eurocards listed for sale. Each row shows a suffix preceded by appropriate cable/connection to a DAP, followed by enclosure [:<number of slots>] and type of connector for sensor/actuator. Some customers use ribbon cables in special cases. However, the cables listed here fit every case, and most people choose them.

Connection to the DAP board, indicated in the first letter and the digit of the...	**Eurocard suffix**, the last letter of which varies with...	**Type of Enclosure** (SBE=Single Board Enclosure; IE=Industrial Enclosure) and the...	**Panel on Enclosure** where the signals come in to the Eurocard	
50-line connection				
MSCBL048	C1C	SBE	20 BNC panel	Note: The 50-line cable listed here connects directly to a DAP 820 or DAP 840, or to an iDSC 1816. No other DAP boards use 50 lines.
MSCBL048	C1Y	SBE	blank panel	
MSCBL048	C1Z	n/a	*	
68-line connection				
MSCBL040	A2A	SBE	68-line panel	Note: The 68-line cable listed here connects directly to a DAP. See Channel Architecture for details and diagrams.
MSCBL040	A2C	SBE	20 BNC panel	
MSCBL040	A2Y	SBE	blank panel	
MSCBL040	A2Z	n/a	*	
MSCBL040	B2Z	n/a	*	
Analog Backplane	E2A	IE:1	68-line panel	
Analog Backplane	E2C	IE:5	20 BNC panel	Note: The MSXB 029 Analog Backplane Interface Board does not follow this convention.
Analog Backplane	E2F	IE:5	20 BNC panel	
Analog Backplane	E2K	IE:1	DB37 panel	
Analog Backplane	E2V	IE:5	blank panel	
Analog Backplane	E2X	IE:4	blank panel	
Analog Backplane	E2Y	IE:1	blank panel	
100-line connection				
MSCBL054	C3B	SBE	100-line panel	Note: The 100-line cables listed here connect to a DAP through a digital filter adapter board like the MSCBL076. See Channel Architecture for details and diagrams.
MSCBL054	C3C	SBE	20 BNC panel	
MSCBL054	C3D	SBE	50-line panel	
MSCBL054	C3F	SBE	DB25 panel	Note: An alternate version for every BNC panel includes a signal ground isolated from chassis ground. An added -B identifies this version.
MSCBL054	C3Y	SBE	blank panel	
MSCBL054	C3Z	n/a	*	
Digital Backplane	E3B	IE:1	100-line panel	
Digital Backplane	E3C	IE:5	20 BNC panel	Note: The MSXB 033 Digital Backplane Interface Board does not follow this convention.
Digital Backplane	E3E	IE:1	4 BNC panel	
Digital Backplane	E3F	IE:5	20 BNC panel	
Digital Backplane	E3G	IE:4	50-line panel	
Digital Backplane	E3M	IE:1	DB25 panel	* See individual Eurocard descriptions for termination on unenclosed models.
Digital Backplane	E3W	IE:4	blank panel	
Digital Backplane	E3X	IE:4	blank panel	
Digital Backplane	E3Y	IE:1	blank panel	
MSCBL054	J3C	SBE	20 BNC panel	
MSCBL054	J3Y	SBE	blank panel	
MSCBL058	K3Z	n/a	*	(K denotes square AMP ribbon-cable connector)

Eurocards Listed by Number

	■		MSTB 008: Digital Termination Boards	J3C J3Y
■	■		MSTB 009: Analog Termination Boards	A2C A2Y
			MSTB 010: Termination Boards for the DAP 820 and DAP 840	C1C
	■	■	MSXB 013: Digital Expansion Boards	
	■		MSXB 014: 12-Bit Analog Output Expansion Boards	
	■		MSXB 016: Digital Opto-Isolator Boards	
■	■	■	MSXB 018: Analog Input Expansion Boards	
	■		MSXB 022: 16-Bit Analog Output Expansion Boards	
			MSXB 024: Analog Input Expansion/Termination Board for the DAP 820	
■	■	■	MSXB 027: Analog Isolation Boards	A2C A2Y E2F E2V
■	■	■	MSXB 028: Simultaneous Sampling Boards	A2A A2C A2Y E2A E2C E2Y
■	■		MSXB 029: Analog Backplane Interface Boards	
■	■		MSXB 030 & MSXB 031: Analog Backplanes	
	■		MSXB 032: 12-Bit Analog Output Expansion Boards	C3C C3Y E3E E3Y
	■		MSXB 033: Digital Backplane Interface Boards	
	■		MSXB 034 & MSXB 035: Digital Backplanes	
	■	■	MSXB 036: Counter/Timer Boards	C3C C3Y E3C E3E E3Y
■	■	■	MSXB 037: Analog Input Expansion Boards	A2Y E2C E2K E2Y
	■	■	MSXB 038: Digital Expansion Boards	C3B C3C C3Y E3B E3C E3X E3Y
	■	■	MSXB 039: Digital Opto-Isolator Boards	C3C C3Y C3D E3F E3W E3G
			MSXB 042: Analog Termination Boards for the iDSC 1816	
			MSXB 043: BNC Termination Boards for the iDSC 1816	
			MSXB 044: Signal Conditioning Boards for the MSSC-8	
			MSXB 045: LVDS Boards for iDSC 1816 synchronization	
■	■	■	MSXB 048: Filtered Analog Input Expansion Boards	E2K
	■	■	MSXB 050: Quadrature Decoder Boards	C3F E3M

Color Key

- ■ works with DAP 4400a and DAP 5400a
- ■ works with all other a-Series DAP models except as qualified by
  - ■ works with DAP 4000a/112 only for termination or
  - ■ does not work with DAP 4000a/112

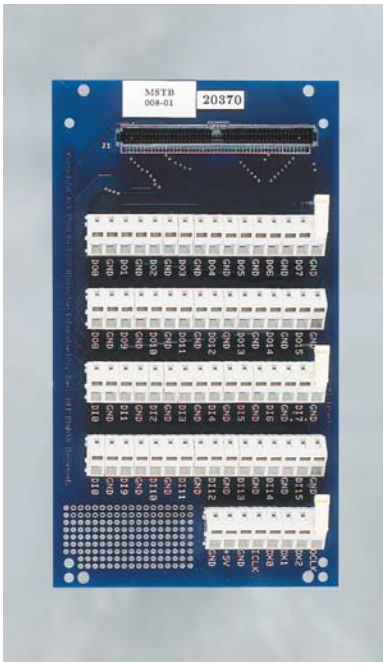
In the list above, part-number suffixes following the descriptions identify the enclosure versions. E2x identifies a Eurocard designed for an analog backplane, E3x identifies a Eurocard designed for a digital backplane. See the table opposite for more detail.

Example 1: The suffix E2C in the part number MSXB028-05-E2C indicates that the MSXB028 Simultaneous Sampling board (product rev 5) connects to a DAP through the analog backplane in an Industrial Enclosure (IE) like the MSIE002-06. It samples inputs applied to 20 BNC connectors in a front panel that covers five slots. (A full-size backplane has 20 available slots; a half-size backplane has 9.)

Example 2: The suffix C3C in the part number MSXB039-01-C3C, indicates that this Eurocard, the MSXB039 Opto Isolation board (product rev 1), occupies a Single Board Enclosure (SBE) with 20 BNC connectors on its front panel, and connects to a DAP through a 100-line cable, an MSCBL054.

Eurocards for Low Channel Counts or for Unenclosed Systems

Eurocards for *all* functions – as listed on page 3 – are available in unenclosed versions. Eurocards MSXB 013 through MSXB 024 are available *only* in unenclosed versions. Eurocards MSTB 008, MSTB 009, and MSTB 010 are available also in single-board enclosures.



MSTB 008 Digital Termination

MSTB 009 Analog Termination

MSTB 008
Digital Termination

The MSTB 008 Digital Termination Board allows quick and secure connection of discrete wires to a DAP.

MSTB 008 requires cable MSCBL 036-01.

- **Model MSTB 008-01 Wago terminals**
- **Model MSTB 008-02 screw terminals**

MSTB 009
Analog Termination

The MSTB 009 Analog Termination Board allows quick and secure connection of discrete wires to Data Acquisition Processors.

MSTB 009 includes locations to install voltage divider resistors and 0-20mA termination resistors, as well as a Cold Junction Compensation (CJC) circuit for thermocouple applications.

- **Model MSTB 009-09 Wago terminals**
- **Model MSTB 009-10 screw terminals**

MSTB 010
Termination

The MSTB 010 Termination Board allows quick and secure connection of discrete wires to a DAP 820 or DAP 840. MSTB 010 combines analog and digital termination on the same board.

MSTB 010 boards includes locations for voltage divider resistors and 0-20mA termination resistors. Models include onboard cold junction compensation circuitry for thermocouple applications.

Cable MSCBL 048-01 or MSCBL 050-01 is required.

- **Model MSTB 010-06 Wago terminals**
- **Model MSTB 010-08 screw terminals**

MSXB 013
Digital Expansion

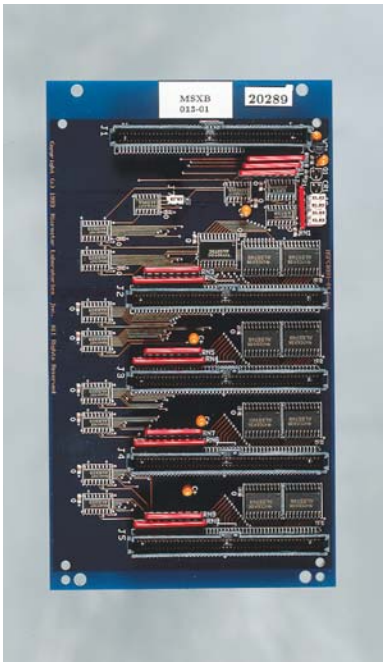
The MSXB 013 Digital Input/Output Expansion Board expands 16 digital input lines and 16 digital output lines to 64 digital input lines and 64 digital output lines.

Multiple Digital Input/Output Expansion Boards can be connected to a single DAP for a total of 128 digital input lines and 1024 digital output lines. Input expansion is at a maximum with two MSXB 013 boards (128 points). Output can be expanded to 1024 points by connecting 16 MSXB 013 boards to a single DAP.

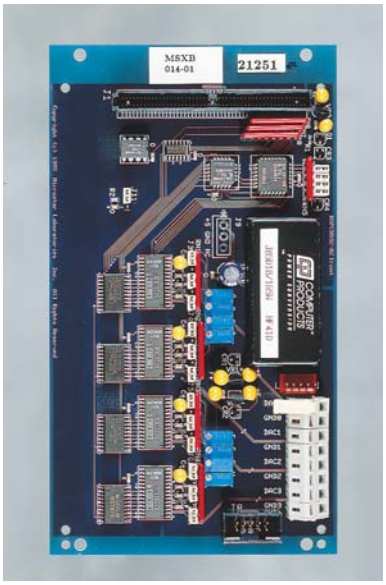
MSXB 013 requires cable MSCBL 036-01. Two or more units require MSCBL 036-xx, a multi-drop daisy-chain cable.

- **Model MSXB 013-04: Digital I/O Expansion Board, 64 in, 64 out, 100-line I/O**

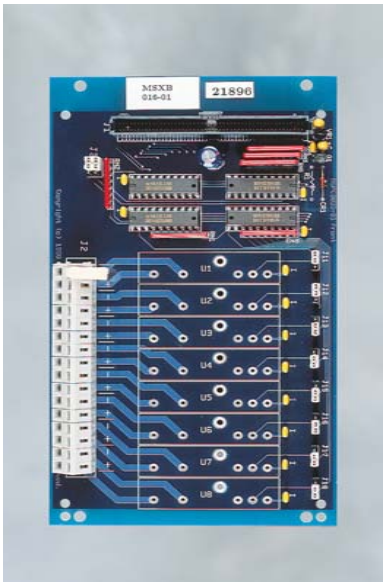
MSTB 010 Termination



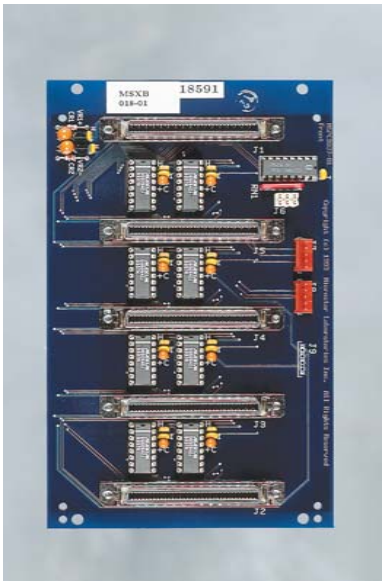
MSXB 013 Digital Expansion



MSXB 014 12-Bit Analog Output



MSXB 016 Opto Isolation



MSXB 018 Analog Input

MSXB 014
12-Bit Analog Output Expansion

The MSXB 014 Analog Output Expansion Board provides 4 additional analog outputs. Up to 16 Analog Output Expansion Boards can be connected to a single DAP for a total of 64 additional output channels.

MSXB 014 requires cable MSCBL 036-01. Two or more units may be daisy-chained on cable MSCBL 036-xx.

- **Model MSXB 014-01 Wago terminals**
- **Model MSXB 014-02 Wago terminals, external power**
- **Model MSXB 014-03 screw terminals**
- **Model MSXB 014-04 screw terminals, external power**

MSXB 016
Opto Isolation

The MSXB 016 Opto-Isolator Board allows quick and secure connection of discrete wires at high DC and AC voltages to up to 8 separately available optically isolated digital switching/sensing modules. Each channel may be configured for input or output. Available modules can sense 280 VAC and 280 VDC, and can switch 280 VAC @ 3 amps, 60 VDC @ 3 amps, and 200 VDC @ 1 amp. MSXB 016 handles only digital inputs and outputs.

MSXB 016 requires an MSCBL 036-01 cable.

- **Model MSXB 016-01 Wago terminals**
- **Model MSXB 016-02 screw terminals**

MSXB 018
Analog Input Expansion

The MSXB 018 Analog Input Expansion Board expands 16 analog input lines to 64 analog input lines. The MSXB 018 provides 4 expansion ports compatible with MSTB 009 Analog Termination Boards.

MSXB 018 requires cable MSCBL 040-01 or MSCBL 041-xx. Two or more units may be daisy-chained on cable MSCBL 041-xx.

- **Model MSXB 018-04 with sockets & fault-protected multiplexers**

MSXB 022
16-bit Analog Output

The MSXB 022 16-bit Analog Output Expansion Board provides 4 additional analog outputs with 16-bit resolution. Up to 16 Analog Output Expansion Boards can be connected to a single DAP for a total of 64 additional output channels.

MSXB 022 requires cable MSCBL 036-01. Two or more units may be daisy-chained on cable MSCBL 036-xx.

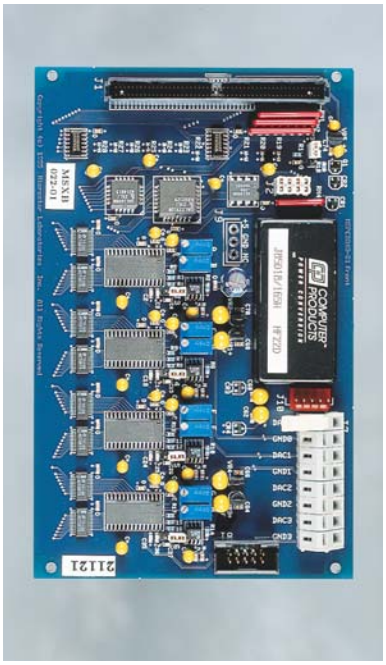
- **Model MSXB 022-05 Wago terminals**
- **Model MSXB 022-06 screw terminals**

MSXB 024
Analog Input Expansion Termination

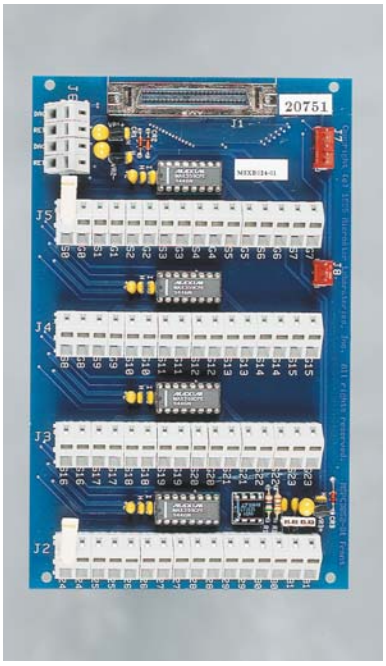
The MSXB 024 Analog Input Expansion Termination Board expands 8 analog input lines on a DAP 820 to 32 analog input lines and provides connection points for each line. Each model has an onboard temperature reference sensor for cold junction compensation.

Cable MSCBL 048-01 or MSCBL 050-01 is required.

- **Model MSXB 024-01 Wago terminals**
- **Model MSXB 024-02 screw terminals**



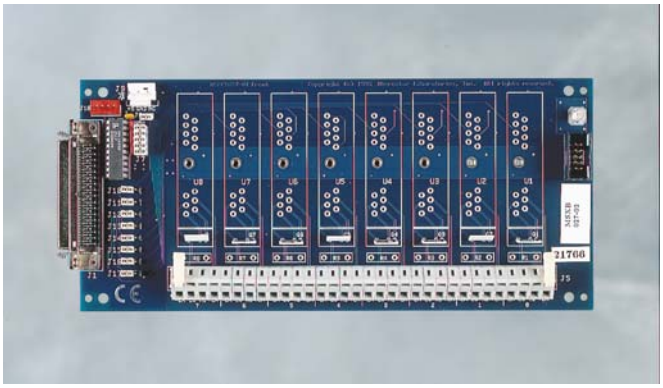
MSXB 022 16-Bit Analog Output



MSXB 024 Analog Input

MSXB 027
MSXB 028
MSXB 029
MSXB 030
MSXB 031
MSXB 032

Although Eurocards for *all* functions – as listed on page 3 – are available in unenclosed versions, Eurocards illustrated here and on all following pages were designed for use primarily in enclosed systems that use industry standard 19" racks. Those of them listed on page 3 are available also in single-board enclosures.



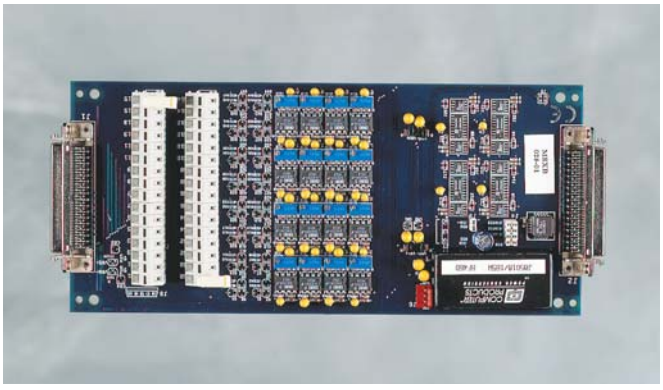
MSXB 027 Analog Isolation

MSXB 027
Analog Isolation

The MSXB 027 Analog Isolation Board accommodates up to 8 isolation modules in any combination of input and output. Up to 64 5B Analog Isolation Boards can be connected to a single DAP for a total of 512 isolated channels. When used in conjunction with Analog Output Expansion Boards, up to 66 of these channels can be specified as isolated analog outputs.

MSXB 027 requires cable MSCBL 040-01 or MSCBL 041-xx, and, for isolated analog outputs, MSCBL 014-01.

- **Model MSXB 027-05 Wago terminals**
- **Model MSXB 027-06 screw terminals**
- **Model MSXB 027-07 Wago terminals, no CJC**
- **Model MSXB 027-08 screw terminals, no CJC**



MSXB 028 Simultaneous Sampling

MSXB 028
Simultaneous Sampling

Simultaneous Sampling Boards are used in multi-channel spectral analysis and other applications that require simultaneous acquisition of several channels. The MSXB 028 usually is used for applications that require inter-channel phase measurements such as applications that perform transfer function computations. This board eliminates phase error introduced by sequential sampling.

Up to 16 boards can be connected to a DAP for a total of 256 channels. The MSXB 028 is a 12-bit board. If you need 16-bit simultaneous sampling, take a look at the iDSC 1816.

The a-Series Simultaneous Sampling Board requires cable MSCBL 40-01 or MSCBL 041-xx.

- **Model MSXB 028-01 Wago terminals**
- **Model MSXB 028-02 Wago terminals, external power**
- **Model MSXB 028-03 screw terminals**
- **Model MSXB 028-04 screw terminals, external power**
- **Model MSXB 028-05 Wago terminals, vertical input connector**

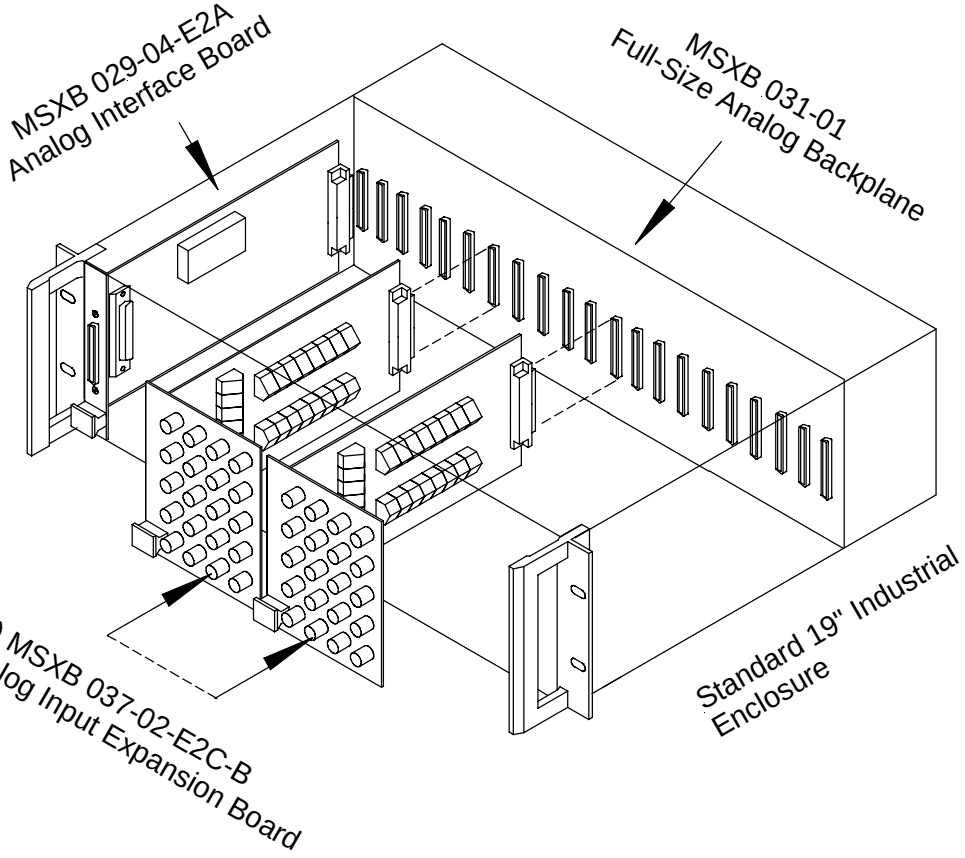
MSXB 029
Analog Backplane Interface

The Microstar Laboratories Analog Backplane Interface Board, part number MSXB 029, interfaces the Analog Backplane with a Data Acquisition Processor. The Analog Backplane Interface Board must be installed in the Analog Backplane to connect the backplane to a Data Acquisition Processor.

One Analog Backplane Interface Board is required for each Analog Backplane.

The Analog Backplane Interface Board requires cable MSCBL 040-01 or MSCBL 041-xx.

- **Model MSXB 029-03-E2A**
- **Model MSXB 029-04-E2A External Power**



MSXB 030 and MSXB 031 Analog Backplanes

The Microstar Laboratories Analog Backplanes allow easy analog expansion for large systems. Backplanes typically are used with Industrial Enclosures, which provide electrical shielding and provide a compact unit for multiple Eurocards.

Analog Backplanes provide expansion slots to accommodate compatible analog Eurocards. Analog Backplanes are passive, and connect all signals in each of the expansion slots in parallel. All expansion slots are identical.

- **Model MSXB 030-01 Half-Size Analog Backplane (10 expansion slots)**
- **Model MSXB 031-01 Full-Size Analog Backplane (21 expansion slots)**

The Full-Size Analog Backplane is compatible with any VME standard subrack enclosure that has the following dimensions: 84-HP length, 3U height, and 220mm depth.

The Half-Size Analog Backplane is compatible with any VME standard subrack enclosure that has the following dimensions: 42-HP length, 3U height, and 220mm depth.

Microstar Laboratories manufactures MSIE industrial enclosures with required backplanes and interface boards pre-installed. **See note on page 15.**

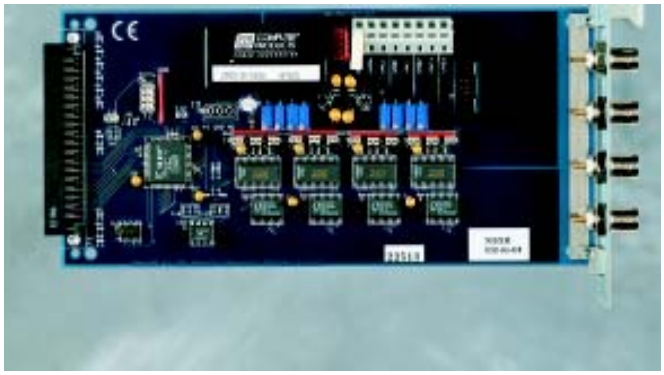
MSXB 032
Analog Output Expansion

The MSXB 032 Analog Output Expansion Board converts digital inputs from a Data Acquisition Processor into four separate analog outputs. Up to 16 Analog Output Expansion Boards can be connected to a Data Acquisition Processor for a maximum expansion of 64 analog output channels. The MSXB 032 is compatible with Microstar Laboratories Industrial Enclosures.

The Analog Output Expansion Board connects to the Data Acquisition Processor's digital connector. If digital input/output is needed in addition to analog output expansion, a Digital Expansion Board is required.

There are several cabling options for the MSXB 032 Analog Output Expansion Board. The MSXB 032 may be connected to a DAP using various 100-line cabling options, or can be installed into a Digital Backplane.

- **Model MSXB032-05 Wago terminals**
- **Model MSXB032-06 screw terminals**



MSXB 032 Analog Output Expansion

MSXB 033
MSXB 034
MSXB 035
MSXB 036
MSXB 037
MSXB 038

Microstar Laboratories manufactures MSIE industrial enclosures with required backplanes and interface boards pre-installed. **See note on page 15.**

MSXB 033
Digital Backplane Interface

The Microstar Laboratories Digital Backplane Interface Board, part number MSXB 033, interfaces the Digital Backplane with a Data Acquisition Processor. The Digital Backplane Interface Board must be installed in the Digital Backplane to connect the backplane to a Data Acquisition Processor.

One Digital Backplane Interface Board is required for each Digital Backplane.

The Digital Backplane Interface Board has several cabling options. Contact Microstar Laboratories for more information.

- **Model MSXB 033-01**
- **Model MSXB 033-02 External Power**

MSXB 034 and MSXB 035
Digital Backplanes

The Microstar Laboratories Digital Backplanes allow easy digital input and output expansion for large systems. Backplanes typically are used with Industrial Enclosures, which provide electrical shielding and provide a compact unit for multiple Eurocards.

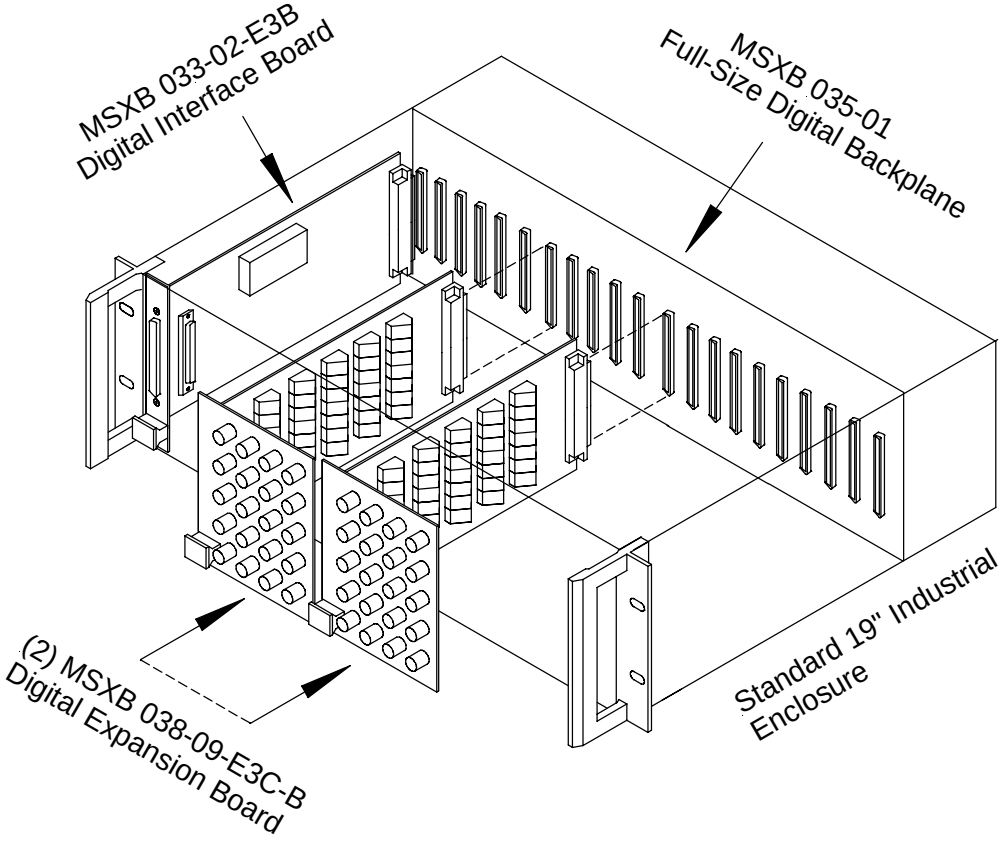
Digital Backplanes provide expansion slots to accommodate compatible digital Eurocards. Digital Backplanes are passive, and connect all signals in each of the expansion slots in parallel. All expansion slots are identical.

Each Digital Backplane requires a Digital Backplane Interface Board.

- **Model MSXB 034-01 Half-Size Digital Backplane (10 expansion slots)**
- **Model MSXB 035-01 Full-Size Digital Backplane (21 expansion slots)**

The Full-Size Digital Backplane is compatible with any VME standard subrack enclosure that has the following dimensions: 84-HP length, 3U height, and 220mm depth.

The Half-Size Digital Backplane is compatible with any VME standard subrack enclosure that has the following dimensions: 42-HP length, 3U height, and 220mm depth.



MSXB 036
Counter/Timer

The MSXB 036 Counter/Timer Board is used for frequency counting, rotational speed (tachometer) measurement, and closed loop process control based on frequency criteria. Engine performance monitoring is a typical application.

The Counter/Timer Board provides 16 digital input lines and 16 digital output lines, counts up to 6 MHz on 10 channels, and has two 100 MHz frequency prescalers.

There are several cabling options for the MSXB 036 Counter/Timer Board. MSXB 036 may be connected to a DAP using various 100-line cabling options, or can be installed into a Digital Backplane.

- **Model MSXB 036-03**

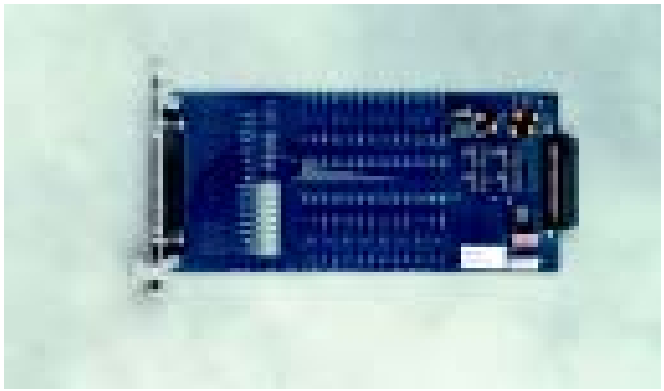
MSXB 036 Counter/Timer

MSXB 037
Analog Input Expansion

The Microstar Laboratories Analog Input Expansion Board, part number MSXB 037, provides analog input expansion for Analog Backplane systems. The Analog Input Expansion Board is compatible with the MSXB 030-01 and MSXB 031-01 Analog Backplanes.

The Analog Input Expansion Board provides 16 single-ended or eight differential analog inputs with onboard termination points. Up to 32 Analog Input Expansion Boards can be connected to a DAP for 512 inputs.

- **Model MSXB 037-02 DB37 connector**
- **Model MSXB 037-03 Wago terminals**



MSXB 037 Analog Input Expansion

MSXB 038
Digital Expansion

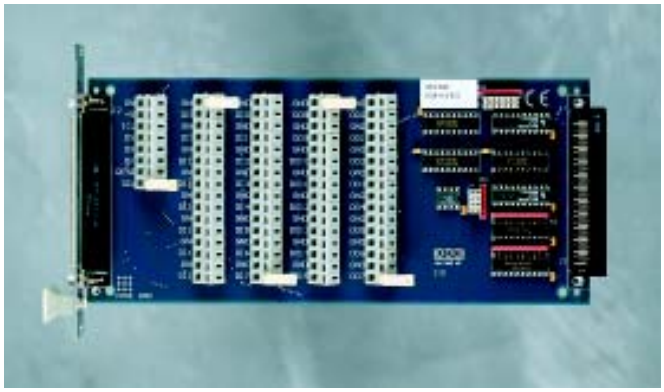
The MSXB 038 Digital Expansion Board provides 16 digital inputs and 16 digital outputs.

Multiple Digital Expansion Boards can be connected to a single DAP for a total of 128 digital input lines and 1024 digital output lines. Input expansion is at a maximum with two MSXB 038 boards (128 points). Output can be expanded to 1024 points by connecting 16 MSXB 038 boards to a single DAP.

There are several cabling options for the MSXB 038 Digital Expansion Boards. MSXB 038 may be connected to a DAP using various 100-line cabling options, or can be installed into a Digital Backplane.

Available models include

- **Model MSXB 038-07 Wago terminals**
- **Model MSXB 038-08 screw terminals**
- **Model MSXB 038-09 Wago terminals, vertical I/O connector**



MSXB 038 Digital Expansion

MSXB 039
MSXB 042
MSXB 043
MSXB 044
MSXB 045
MSXB 048
MSXB 050

An upcoming catalog on Anti-Aliasing will cover in more detail Eurocard MSXB 048, the Filtered Analog Input Expansion board shown opposite. It also will illustrate and further describe the iDSC 1816, a specialized DAP board with onboard analog filters, as well as related items that work with that: MSXB 042, MXSB 043, MSXB 044, and MSXB 045. For completeness, this page includes brief descriptions of these last four products.

MSXB039 Opto Isolation

MSXB 039
Opto Isolation

The MSXB 039 Opto-Isolator Board allows quick and secure connection of discrete wires at high DC and AC voltages to up to 8 separately-available optically isolated digital switching/sensing modules. Each channel may be configured for input or output. Modules are available that can sense 280 VAC and 280 VDC, and that can switch 280 VAC @ 3 amps, 60 VDC @ 3 amps, and 200 VDC @ 1 amp. MSXB 039 handles only digital inputs and outputs.

There are several cabling options for the MSXB 039 Opto-Isolator Board. An MSXB 039 may be connected to a DAP using various 100-line cabling options, or can be installed into a Digital Backplane.

- **Model MSXB 039-01 Wago terminals**
- **Model MSXB 039-02 Wago terminals, external power**
- **Model MSXB 039-03 screw terminals**
- **Model MSXB 039-04 screw terminals, external power**
- **Model MSXB 039-05 Wago terminals, right-angle 50-line I/O connector**

MSXB 042
Analog Termination

The MSXB 042 Analog Termination Board allows quick and secure connection of discrete wires to the iDSC 1816 Board.

MSXB 042 includes locations to install voltage divider resistors and 0-20mA termination resistors, as well as a Cold Junction Compensation (CJC) circuit for thermocouple applications.

Bare Board Models (These models require cable MSCBL 048-01.)

- **Model MSXB 042-01 Wago terminals, D connector**

MSXB 043
BNC Termination

BNC Termination Boards for the iDSC 1816.

- **Model MSXB 043-01**

These four items – MSXB 042, MSXB 043, MSXB 044, and MSXB 045 – relate to systems built around the iDSC 1816. An upcoming catalog on Anti-Aliasing will illustrate and more fully describe them.

MSXB 044
Expansion

The MSXB 044 Expansion Board works with the iDSC 1816 to add signal conditioning to the data acquisition and anti-aliasing capabilities. Four MSXB 044 boards are included in each MSSC-8 module . Purchase the MSXB 044 as part of a complete SCS system: an enclosure and 1, 2, 3, or 4 MSSC-8 modules, for a total of 8, 16, 24, or 32 channels.

The MSXB 044 board itself provides direct connection to sensors, and offers many signal-conditioning services in a single convenient package.

- **Model MSXB 044-01**

MSXB 045
LVDS

The MSXB 045 LVDS Board works with multiple iDSC 1816 boards to provide synchronization for many channels of data. An MSXB 045 board in each of two or more networked PCs, that each contain one or more iDSC 1816 boards, allows the whole networked system to work as a single synchronized system with possibly hundreds of conditioned channels.

MSXB 045 uses cable MSCBL 083-01 and one of MSCBL 084-01 or MSCBL 085-01.

- **Model MSXB 045-01 transmitter/internal receiver**
- **Model MSXB 045-10 external receiver only**

MSXB 048
Filtered Analog Input Expansion

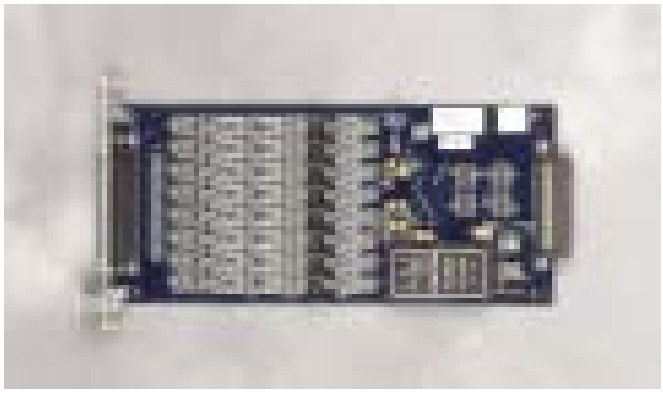
The Microstar Laboratories Filtered Analog Input Expansion Board, part number MSXB 048, provides filtered analog input expansion for Analog Backplane systems. The Filtered Analog Input Expansion Board is compatible with the MSXB 030-01 and MSXB 031-01 Analog Backplanes.

The MSXB 048 provides anti-alias filtering and analog input expansion for 16 single-ended channels. MSXB 048 has a four-pole low-pass Butterworth filter on each of the 16 channels. Input signals are connected to the MSXB 048 by means of a DB-37 connector on the front panel or an optional 40-pin shrouded header that is not on the front panel. Up to 16 MSXB 048 boards can be connected to a single DAP/backplane system, providing up to 256 channels of filtering and input expansion.

MSXB 048 is compatible with the standard Data Acquisition Processor backplane system and optionally can be built in a stand-alone configuration. MSXB 048 most commonly is mounted in the standard Microstar Laboratories industrial enclosure and connects directly to the standard 68-line analog backplane. MSXB 048 derives +5V power from the 68-line backplane, with a typical power consumption of 8 Watts.

In addition to the input signals, MSXB 048 also can sample an onboard +5V reference and the onboard analog signal ground. This allows software offset calibration and verification of proper operation without changing the input cabling.

- **Model MSXB 048-03-100** **100Hz Filtered Analog Input Expansion, DB37 I/O**
- **Model MSXB 048-03-1K** **1kHz Filtered Analog Input Expansion, DB37 I/O**
- **Model MSXB 048-03-10K** **10kHz Filtered Analog Input Expansion, DB37 I/O**



MSXB 048 Filtered Analog Input Expansion

MSXB 050
Quadrature Decoder

The MSXB 050 Quadrature Decoder Board allows a Data Acquisition Processor to read quadrature-encoded signals through its digital port. Quadrature-encoded signals are often used to measure the angular velocity and angular position of wheels, gears, and motors.

The Quadrature Decoder Board has four input channels. Each channel can measure quadrature-encoded signals with frequencies up to 1 MHz. The board has a counter resolution of 16 bits, and can be extended to 32 bits with software provided on the DAPtools Basic CD. Up to six Quadrature Decoder Boards can be used in a system for a total of 24 channels.

There are several cabling options for the MSXB 050 Quadrature Decoder Boards. MSXB 050 may be connected to a DAP using various 100-line cabling options, or can be installed into a Digital Backplane.

- **Model MSXB 050-01 DB25 and Wago terminals**

MSXB 050 Quadrature Decoder

Enclosures

The channel architecture used by Microstar Laboratories lets you easily configure a system that neither receives nor radiates electromagnetic interference. To configure such a system, select only enclosure versions of the Eurocards you need from the table on page 5.

Single-Board Enclosure: Input Side

Single-Board Enclosure: DAP-Connection Side

If you plan to use industrial enclosures that mount in standard 19-inch racks, choose Eurocards with part-number suffixes E2x or E3x – for analog and digital backplanes respectively. See **Industrial Enclosures** below for more on selecting these rack-mount enclosures and on specifying shielded connections from them to a DAP.

If your application requires only a small number of channels, you may prefer to use a free-standing enclosure for each Eurocard. So choose Eurocards with the other part-number suffixes shown on page 5. Microstar Laboratories ships each of these pre-installed in its own single-board enclosure.

From the table on page 4, choose the appropriate cable or connection to a DAP, and decide on the type of connector for sensors or actuators. If you decide on a blank panel, make sure that you shield your custom connector to meet EMC Directive 89/336/EEC.

By following these steps and – as required – those under **Industrial Enclosures** below, you will have configured a system that neither receives nor radiates electromagnetic interference and that meets or exceeds every requirement of EMC Directive 89/336/EEC issued by the EU.

Industrial Enclosures

Several Eurocards can fit into each factory-installed backplane in every industry-standard, full size, 19-inch rack-mountable enclosure. Eurocard part number suffixes E2x or E3x denote the required backplane type: analog or digital.

The installed backplanes come in three variations: full-size analog, full-size digital, or half-size analog and half-size digital. A full-size enclosure can accept two half-size backplanes. Microstar Laboratories also offers half-size enclosures with single half-size backplanes installed.

Each backplane has a factory-installed DAP interface board, analog or digital as appropriate. With interface boards installed, full-size backplanes have 20 available slots; half-size backplanes have 9. The table on page 4 lets you see how many slots your chosen Eurocards occupy, and from that you can decide what industrial enclosures you need.

The 3-D line drawings on page 2 show shielded cable connections between enclosures and DAPs. Choose these MSCBL part numbers to prevent electromagnetic interference. More details follow on page 16.

The available Industrial Enclosure options include

MSIE 001-01	**Half-size industrial enclosure with an analog backplane and interface**
MSIE 002-06	**Full-size industrial enclosure with a full-size analog backplane and interface**
MSIE 010-06	**Full-size industrial enclosure with two half-size analog backplanes and interface**
MSIE 003-01	**Half-size industrial enclosure with a digital backplane and interface**
MSIE 004-06	**Full-size industrial enclosure with a full-size digital backplane and interface**
MSIE 011-06	**Full-size industrial enclosure with two half-size digital backplanes and interface**
MSIE 005-06	**Full-size industrial enclosure with one half-size analog backplane (on the left side) and one half-size digital backplane (on the right side), both with interfaces**
MSIE 012-06	**Full-size industrial enclosure with one half-size analog backplane (on the right side) and one half-size digital backplane (on the left side), both with interfaces**

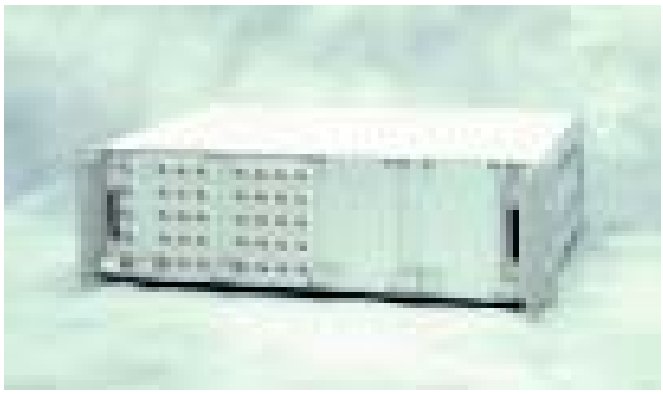
Interface boards come pre-installed in the above products; order all other Eurocards separately.

If you have custom requirements, please contact us for more information.

Of course, if your system does not require packaging, or if you have no concerns about EMI, you always can buy stand-alone Eurocards.

Note: Only if you want to package Eurocards in third-party enclosures would you buy backplanes and analog or digital interface boards as separate items. This catalog provides related details on pages 9 and 10. We do not include the items in published price lists. The Eurocard part number suffixes for these interface boards do not follow the usual convention.

Half-Size Industrial Enclosure



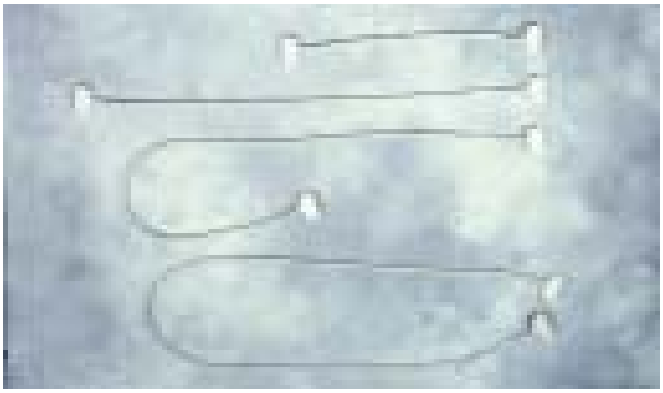
Full-Size Industrial Enclosure, Interface Cards at Left and Right

MSIE 010 – Full-Size Industrial Enclosure, MSXB 027 removed

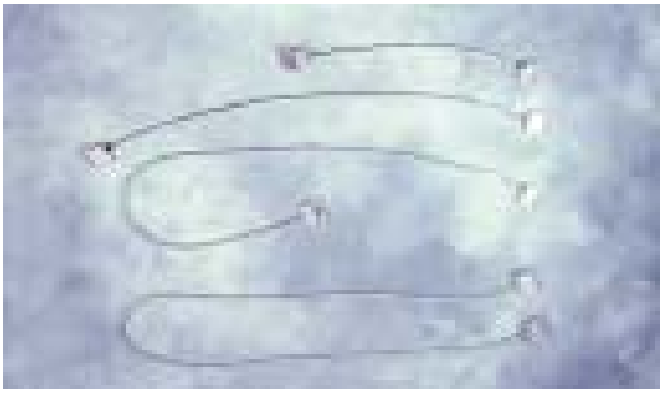
Two Full-Size Industrial Enclosures, Daisy-Chained

Cables

Cables connect DAPs to Eurocards and provide connections between DAPs and between Eurocards. Eurocard part number suffixes contain information on connecting DAPs to Eurocards as well as on enclosure options.



MSCBL 040: Four Standard Lengths, -L18 on Top



MSCBL 048: Four Standard Lengths, -L18 on Top

MSCBL 054: Four Standard Lengths, -L18 on Top

Enclosed Eurocards connected with shielded cables protect against electromagnetic interference. The Microstar Laboratories channel architecture makes it easy to configure systems with this protection. To do this for applications with low channel counts, choose from Eurocards already enclosed – each in its own single-board enclosure. Connect a single-board enclosure to a DAP with one of these three cables: MSCBL 048, MSCBL 040, or MSCBL 054, depending on whether the Eurocard requires a 50-, 68-, or 100-line connection to the DAP. The table on page 4 indicates the number of lines required. An MSCBL 054 connects to a DAP through a digital filter adapter board like the MSCBL 076. See the diagram on page 2.

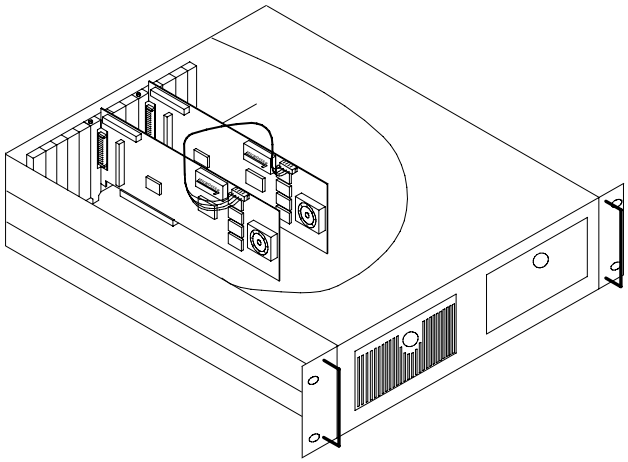
For applications with higher channel counts, Eurocards connect to a DAP through an industrial enclosure backplane, interface, and cables. An analog backplane connects through its interface and a 68-line round, shielded cable, MSCBL 040, to the DAP analog connector in the PC back panel. A digital backplane connects through its interface and a 100-line round, shielded cable, MSCBL 054, to a digital connector in the PC back panel with integral digital filter adapter board, MSCBL 076; this occupies the PC slot next to the DAP and connects through its own short ribbon cable to the board-mounted digital connector on the DAP. The short ribbon cable runs entirely within the PC enclosure, and this shields it. See the diagram on page 2.

For any system where electromagnetic interference matters, choose only items marked CE, except where no part of the electrical path runs outside an enclosure. In practice, this greatly simplifies the selection by restricting the list of possible connections for new products in most cases to

MSCBL 040	**68-line cable, described above**
MSCBL 048	**50-line cable, described above**
MSCBL 054	**100-line cable, described above**
MSCBL 063	**1-slot 68-line connector in one enclosure to allow a daisy chain to another**
MSCBL 064	**1-slot 100-line connector in one enclosure to allow a daisy chain to another**
MSCBL 076	**PC back-panel 1-slot 100-line connector, described above**
MSCBL 078	**synchronization cable for multiple iDSC 1816 systems**
MSCBL 101	**synchronization cable for multiple DAP systems**

You may order any item in this section by part number from the Microstar Laboratories price list. All -L36 cables also come in standard lengths of 18 inches, 54 inches, and 72 inches. Contact us for custom cable options.

The CE mark indicates that the cable meets the EMC Directive 89/336/EEC.



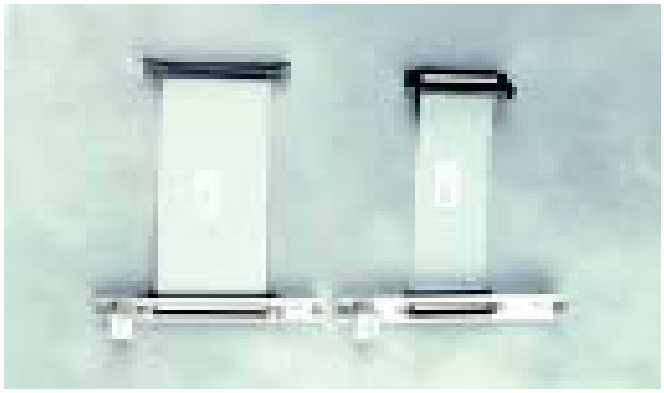
MSCBL 101 connecting two DAP 5200a boards in a PC.

Note: 50-line cables are used with the DAP 820 and DAP 840. 68-line cables connect to the analog connector of a-Series DAPs. 100-line cables carry all-digital signals. Some older DAP models use 40-line cables for digital and analog connections, and 10-line cables for analog expansion control; customers who still use these older boards may require these cables.

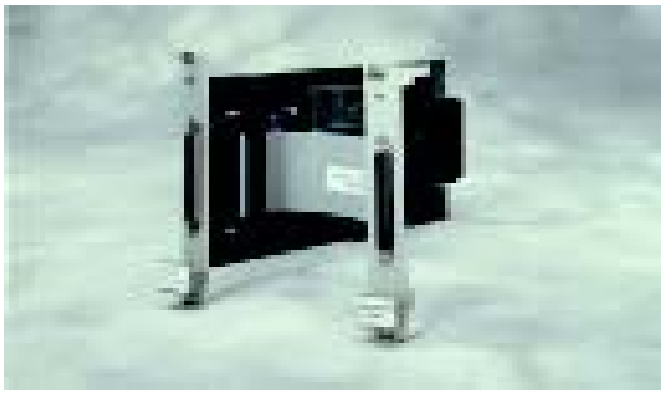
All 68-line and all current 50-line cables have D-style connectors. All 40-line and 10-line cables have square connectors. Some 100-line cables have square connectors, others have D-style connectors.

Square connectors have 90-degree corners and fit into complementary board-mounted DAP or Eurocard connectors. Their all-plastic construction provides no electromagnetic shielding.

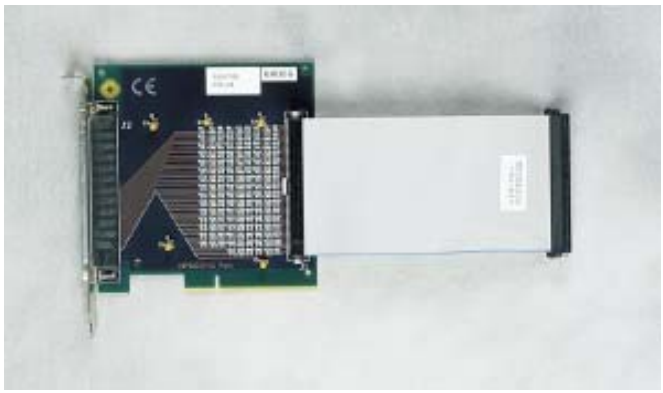
Metal-and-plastic D-style connectors fit over complementary DAP or Eurocard connectors, shielding the connection. *Ribbon* cables that run outside enclosures do not provide electromagnetic shielding, even if they include D-style connectors.



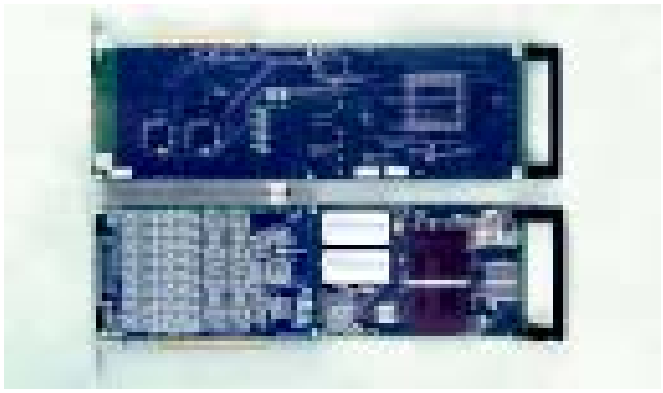
MSCBL 063-01-L4.5 and MSCBL 064-01-L4.5



MSXB 029 with an MSCBL 063-01-L4.5 Plugged In



MSCBL 076



MSCBL 078 Connecting Two iDSC 1816 Boards

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