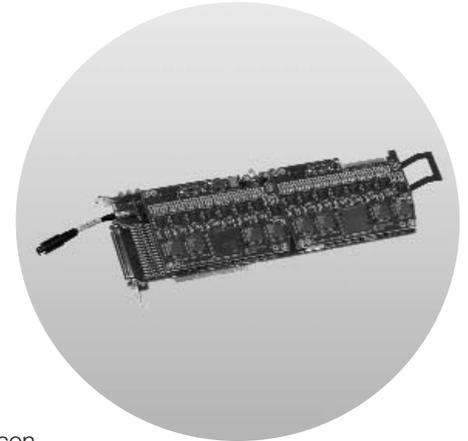




# MSI/80PCI-GBL and MSI/160PCI-GBL Station Interface Boards

The MSI/80PCI-GBL and MSI/160PCI-GBL Station Interface Boards incorporate a variety of analog devices, such as local 2500-type touchtone telephones, modems, and fax machines, into computer telephony (CT) systems that are based on the open, industry-standard SCbus architecture.

With these boards, applications can be extended to incorporate live agent stations or third-party add-on technology. Up to 16 analog station devices, such as local telephones, telesales agent headsets, modems, fax machines, or audio equipment can be connected to the SCbus and CT Bus in SCbus mode. A conferencing feature enables applications to establish conferences between any of the time slots on the SCbus and the station devices connected to the board.



Features	Benefits
<b>Connect up to 16 analog telephone devices directly to computer telephony (CT) systems</b>	Create affordable, low-end to mid-size, PC-based telemarketing systems and call centers
<b>Expandable, modular design</b>	Lets you deploy just the right number of ports today and efficiently add more tomorrow — with configurations of up to 16 boards per system
<b>SCSA SCbus and CT Bus connectivity</b>	Enables customized, integrated applications using a wide range of complementary technologies, like speech recognition, facsimile, and text-to-speech
<b>Power ringing with automatic ring trip</b>	No additional external circuitry required
<b>Call conferencing support</b>	Allows up to 32 conferees in flexible configurations of two to eight parties per conference
<b>C language application program interfaces (APIs) for Linux*, Windows NT*, Windows* 2000, and Windows XP*</b>	Shortens your development cycle, so you can get your applications to market faster
<b>Downloadable front-end impedance and gain</b>	Allows MSI boards to connect to commercially available phones worldwide

The MSI/PCI80-GBL baseboard contains a digital signal processor (DSP) and an 8-station interface daughterboard. An additional daughterboard (containing eight station interface circuits) can be added to the MSI/PCI80-GBL for a total of 16 stations. Preconfigured 16-port MSI/PCI160-GBL models can also be ordered.

Both MSI/PCI-GBL boards have a 32-bit bus that fits in a single PCI expansion slot. Each MSI/PCI-GBL station interface board connects an application-selectable time slot on the SCbus to an analog station device. The 37-pin D-Sub female connector on the enables easy connection to the available breakout box. For standard RJ-11 jack connections, an optional SA/240 station adapter and a 37-pin cable are available.

An MSI External Power Module provides loop current (battery) and ring voltage to local telephones through the MSI/PCI-GBL boards. The system can handle all stations going on- or off-hook simultaneously.

Both boards are capable of providing a power ring that generates the AC voltage needed to ring standard 2500-type telephones. This power ring capability is contained completely onboard within the slot. No additional external circuitry is required. The boards default to a 33-percent duty cycle ring cadence and can ring 16 phones simultaneously.

Balanced lines ensure low noise and allow stations to be installed up to 1 mile (1.61 km) from the host PC. Built-in electrostatic discharge (ESD) protection lets agents insert and remove headset jacks, without damaging circuits on the MSI/PCI-GBL boards.

Application-programmable channel gain controls the volume for each channel and matches line impedance from country-specific telephone sets and devices. Station status event detection collects call traffic statistics and enables cost-effective management of call setup/call termination. These boards can be used to establish conferences between any of

the time slots on the CT Bus/SCbus and the station devices connected to the MSI/PCI-GBL station modules. Call conferencing connects two to eight parties for up to 32 parties of total conferencing.

These features are provided.

- Two- to eight-party conferencing
- Up to 32 conferencing resources, total
- Conferences of any combination of agents and network channels
- Hidden training for smooth entry of new conferees, without disruptive training noise
- Supervisory monitoring of agents, without disrupting the conversation
- Coaching feature that allows supervisors to speak to agents without the customer listening to the supervisor; customer can hear the agent at all times (no switching)
- Programmable channel gain to optimize volume levels for station devices
- Programmable cadence allows you to select and set ring cadence options

Full digital conferencing capabilities allow a call center supervisor to participate in a transaction or to monitor a transaction in listen-only mode. The MSI/PCI-GBL boards' hidden training algorithms permit conferees to smoothly enter and exit a conference without hearing bothersome noises. By using the CT Bus/SCbus' broadcast capability, a virtually unlimited number of parties can monitor a conference. And by using tone generation capabilities, an application can send alert tones to agents when an incoming call requires action.

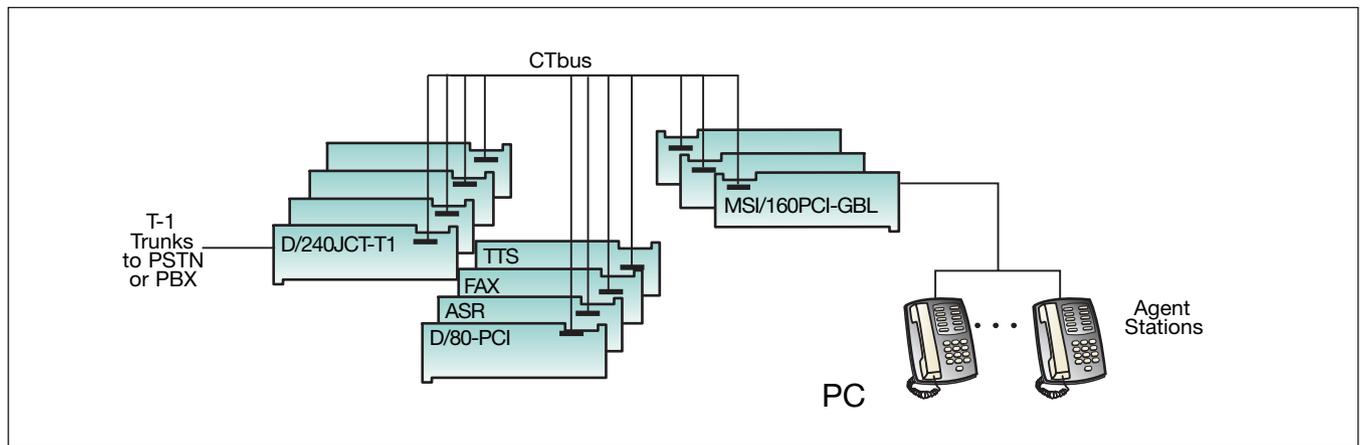
Both boards are fully compatible with all Intel and third-party products that use North-American  $\mu$ -law or European A-law pulse code modulation (PCM) coding schemes.

## Applications

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- Inbound and outbound telemarketing
- Customer service, help desks
- Dictation/transcription
- Operator services, such as billing automation, directory assistance, and intercept treatments
- Automatic call distribution (ACD)
- Teleconferencing/conferencing bridge
- Audiotex
- Local information services

**Figure 1.** Sample Call Center System



## Configurations

Use MSI/80PCI-GBL and MSI/160PCI-GBL Station Interface Boards to expand the capabilities of switching and station interface applications and to design economical cost-effective CT applications of any size. They install in PCI computers (Pentium® processor-based PC platforms).

In a typical telemarketing application, a voice board or other resource board dials outbound numbers. When the system detects a called party going off-hook, the call is passed to a local operator through an available channel. For inbound applications, calls that are not handled by voice automation can be passed directly to a live agent. The agent can be alerted to the incoming call by a power ring or zip tone.

You can use these station interface boards as a conference resource, independent of the onboard station interfaces. For example, adding one to your CT system can provide conferencing to PBXs lacking that capability. Two MSI/PCI160-GBL boards can be used to service all 30 channels of an E-1 network.

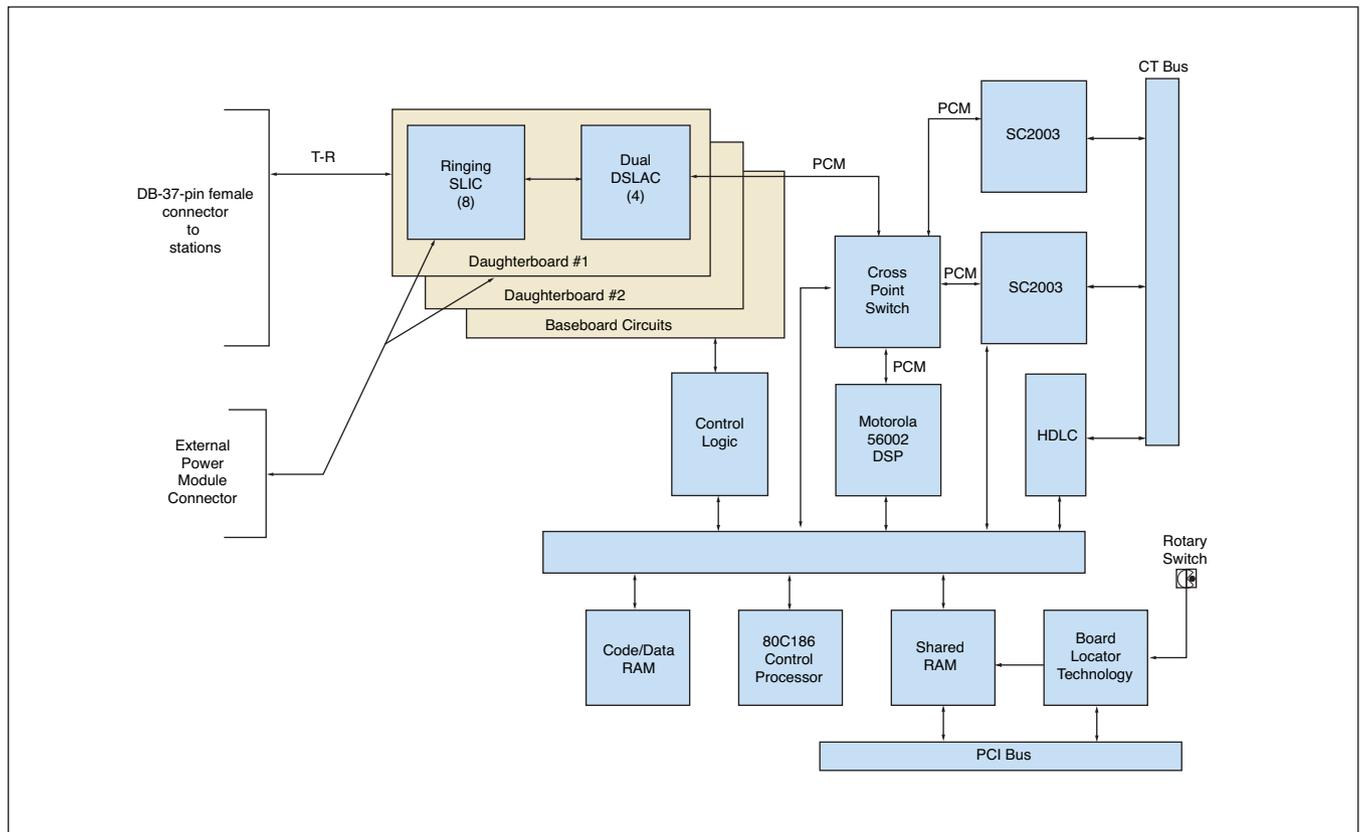
MSI/PCI-GBL station interface boards can be independently assigned to any CT Bus/SCbus time slot, enabling station-connected agents or devices to serve as shared resources. Multiple boards can be installed in a single system, each sharing the same PC interrupt. The boards' hardware permits up to 16 MSI/PCI-GBL boards in a single system. (System size limitations depend on the application and host processing power.) See Figure 1 for a sample configuration.

**Note:** The MSI/PCI-GBL station interface boards must not be connected directly to the public telephone network. Use them only with local headsets and telephones.

## Software Support

The MSI/80PCI-GBL and MSI/160PCI-GBL Station Interface Boards are supported by the Intel® Dialogic® System Software and Software Development Kit (SDK) for Linux, Windows NT, Windows 2000, and Windows XP that contains a set of tools for developing complex multichannel applications.

**Figure 2.** Block Diagram for MSI/PCI-GBL boards



## Functional Description

The signals from each station device (phone, headsets, etc.) enter the line circuitry on the MSI/80PCI-GBL and MSI/160PCI-GBL Station Interface Boards through an ESD filter, and are applied to a line interface on an MSI/PCI-GBL local daughterboard (see Figure 2). This filter protects the board against conditions such as electromagnetic interference (EMI) and voltage transients on the station device lines — including electrostatic discharge and transients generated by plugging in or removing operator headsets.

Each MSI daughterboard contains eight line interfaces and dual subscriber line audio processing circuits (DSLACs) for Coder/Decoder (CODEC) functions. Each line interface provides battery feed and ring to one station device. The line interface performs the 2- to 4-wire conversion that separates the inbound signal into an audio signal sent to the DSLAC. An on-hook/off-hook signal that is transmitted by the onboard control microprocessor via the input/output buffer is sent by the host PC AT bus to the application program.

The CODECs convert inbound audio from analog to eight-bit

digital audio signals, and outbound audio from digital to analog signals. The digital-to-analog gain of the CODEC is controlled separately for each station through the application. The DSLAC transmits and receives digital audio signals to and from the crosspoint switch conferencing circuit.

The crosspoint switch receives digitized audio signals from the DSLAC, and channel switching/connection signaling from the onboard control microprocessor for each channel. The crosspoint switch acts as the traffic coordinator to route PCM audio data from the local station interfaces to a DSP and the CT Bus/SCbus.

The crosspoint switch routes PCM data to and from the CT Bus/SCbus, any baseboard or daughterboard line interface, or DSP. The conference bridge feature of each MSI/PCI-GBL board enables a user or an application to establish conferences (connect two or more parties) between any of the time slots present on the CT Bus/SCbus or station interfaces.

The control microprocessor interprets and executes commands from the host PC and controls all operations of the MSI/PCI-GBL boards via a local control bus.

Communications between this microprocessor and the host PC are through the shared RAM interface to the PCI bus. All operations are interrupt-driven to meet the demands of real-time systems. All MSI/PCI-GBL boards installed in the PC share the same interrupt line. When the system is initialized, firmware to control all board operations is downloaded from the host PC to the onboard RAM. This downloadable firmware gives the board all of its intelligence and enables easy feature enhancement.

The Board Locator Technology circuit operates in conjunction with a rotary switch to determine and set nonconflicting board IDs. This feature eliminates the need to set confusing jumpers or DIP switches. More than one board can be set to ID 0.

## Technical Specifications

Number of ports	8 or 16
Max. boards/system	16
Resource sharing bus	SCbus (on CT Bus)
Control microprocessor	Intel 80C186 @ 16 MHz
Digital signal processor	Motorola* DSP56002 @ 57 MHz, with 32 K word private, 0 wait state SRAM

### Host Interface

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Bus compatibility	PCI compatible. Complies with PCISIG Bus Specification, Rev. 2.1.
Bus speed	33 MHz max.
Bus mode	32- to 16-bit conversion in target mode
Shared memory	8 KB page
Base addresses	<ul style="list-style-type: none"><li>• 8000h to E800h, on 32 K boundaries</li><li>• All MSI/PCI-GBL boards share the same base address</li><li>• Shared memory is page-mapped in/out dynamically as needed</li></ul>

### Conferencing

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Group sizes	2 to 8 ports
Maximum ports	32
Modes	Duplex, monitor, coach, pupil
Notification tones	Tones automatically generated when caller is added or deleted, periodically for tariff notification, or under application control

### Programmable Tone Parameters

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Frequency	300 Hz to 3400 Hz, 31.25 Hz increments
Level	-10 dBm0 to -40 dBm0, 3 dB increments
Duration	10 ms to 4 sec, 10 ms increments
Interval between	2 sec to 17 minutes (Tariff Tone only)

### Station Interface

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Connectors	DB-37 female for connecting to SA/240 station adapter
Signaling type	Loop start originate
Telephone set connection	Two-wire loop start, balanced
Loop current	20 mA +3 mA
Default D-to-A signal level gain	-3 dB adjustable; $\pm 6$ dB in 1 dB steps (telephone line, approx.)
Default A-to-D signal level gain	-3 dB
Impedance	600 ohms $\pm 7\%$
2-wire return loss	25.0 dB
Receive signal/noise ratio	36 dB +3 dB (-10 dBm, 1004 Hz)
Noise-to-ground	32 dBrc +3 dB
Idle channel noise	15 dBrc +3 dB
Channel-to-channel crosstalk	-70 dB max. (0 dBm, 1004 Hz)
Open loop voltage	-20 VDC +1.5 VDC (with -24 V)
Closed loop current	-20 mA $\pm 3$ mA
CT/SCSA clock rate	2048, 4096, and 8192 MHz
PCM algorithm	A-law or $\mu$ -law, software selectable
Ring voltage	54 Vrms @ 20 Hz (balanced)
Ringer Equivalency Number (REN)	2 REN max. per station
Telephone ring frequency	20 Hz (default), 25 Hz, 50 Hz
Loop length	1 mile (1.16 km), typical (24 gauge) <i>WARNING: This Intel analog station interface product is designed to support analog station equipment only within the walls of a single standalone building or structure (i.e., on-premise). It is not designed to sustain electrical overstress from external sources and factors such as severe weather conditions. Electrical overstress can be introduced on cables extending outside of the walls of a single standalone building or structure (i.e., off-premise) such as in a campus environment or other multibuilding facility. Severe electrical overstress caused by misuse of this interface product with cables extending outside of the walls of a single standalone building or structure could cause property damage and/or personal injury and/or death. Such misuse voids the warranty for this interface product.</i>

## Technical Specifications (cont.)

### Power Requirements

+5 VDC	2.5 A max.
External power	-24 VDC 1 A -70 VDC 300 mA
Operating temperature	0° C to 50° C
Storage temperature	-20° C to 70° C
Humidity	8% to 80% noncondensing
Form factor	PCI
Length	12.5 in. (31.75 cm)
Width	0.79 in. (2 cm)
Height	4.1 in. (10.41 cm)

### Approvals

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#### Safety and EMC Certifications

Canada	ICES-003 Class A CSA 950 ULc File E96804
Europe	EN60950 EN55022 EN55024
Japan	VCCI Class A
US	FCC Part 15 Class A UL 1950 UL File E96804
International	IEC 950 CISPR 22 CISPR 24

#### Telecom Approvals

United States	EBZUSA-43111-CE-T
Canada	IC:885 11531 X

### Warranty

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Warranty	See the Intel® Telecom Products Warranty information at <a href="http://www.intel.com/network/csp/products/3144web.htm">http://www.intel.com/network/csp/products/3144web.htm</a> For specific country approval designation, see the Intel® Telecom Products Global Product Approvals listing at <a href="http://resource.intel.com/globalapproval/globalapproval.asp">http://resource.intel.com/globalapproval/globalapproval.asp</a> or contact your Authorized Distributor.
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## MSI External Power Module

The MSI External Power Module generates –24 V and –70 V to power the MSI daughterboard station interface loop. One power module is required per MSI baseboard when station modules are used. The power module connects to a prewired power cable attached to each MSI/PCI-GBL board.

Input voltage	90 VAC to 265 VAC, 47 Hz to 63 Hz
Output voltage	–24 VDC, 1.0 A –70 VDC, 300 mA
Output ripple	<100 mV (peak-to-peak main)
Percent regulation	±2.5% for –24 V ±7.5% for –70 V
Operating temperature	0° C to +50° C
Height	2.17 in. (5.51 cm)
Width	3.75 in. (9.53 cm)
Depth	6.5 in. (16.51 cm)

### Safety Certifications

UL:	1950 3rd edition File No: E148586
TUV:	EN60950 File No: B970624072005
CE:	CUL (CSA 950) File No: E160908
DENAN:	PS-E MEL 080801-NC 4339

### Warranty

Warranty

See the Intel® Telecom Products Warranty information at <http://www.intel.com/network/csp/products/3144web.htm>  
For specific country approval designation, see the Intel® Telecom Products Global Product Approvals listing at <http://resource.intel.com/globalapproval/globalapproval.asp> or contact your Authorized Distributor.

## A/240 Station Adapter Kit

### PCI Version for MSI/PCI-GBL Boards

The SA/240 Station Adapter Kit PCI version includes a cable assembly and an RJ-11 breakout box. The cable has a female RJ-21X connector, and a male 37-pin D-Sub. The breakout box converts the RJ-21X connectors into 24 standard RJ-11 connectors for easy connection to standard telephone sets. The same SA/240 breakout box is used for both ISA and PCI products. The SA/240 can be wall-mounted.

Telephone set connection	RJ-11 standard connectors
Number of RJ-11 connectors	24
Front panel connector	RJ-21X jack
Length	6.0 in. (15.4 cm)
Width	3.8 in. (9.7 cm)
Height	1.25 in. (3.2 cm) excluding RJ-21X connector 1.50 in. (3.8 cm) including RJ-21X connector
Weight	24 oz.
Operating temperature	0° C to +50° C
Storage temperature	-20° C to +70° C
Humidity	8% to 80% noncondensing

#### PCI Cable

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Length	Approx. 4.0 ft (1.2 m), shielded
Connectors	37-pin male D-Sub to MSI/PCI-GBL board RJ-21X, 50-pin female standard USOC to breakout box

## Additional Components

- MSI Power Module (99-2550-00x) or user-supplied -24 VDC/-70 VDC power supply (one per MSI/PCI-GBL board)
- SA/240 Station Adapter Kit for MSI/SC (PCI version) (95-0005-00x)
- Use the following numbers to order PCI kit components separately
  - DB-37-pin male to RJ-21X 50-pin female cable (86-0157-00x)
  - RJ-21X to RJ-11 Breakout Box (71-0004-00x)

To learn more, visit us at <http://www.intel.com>.

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