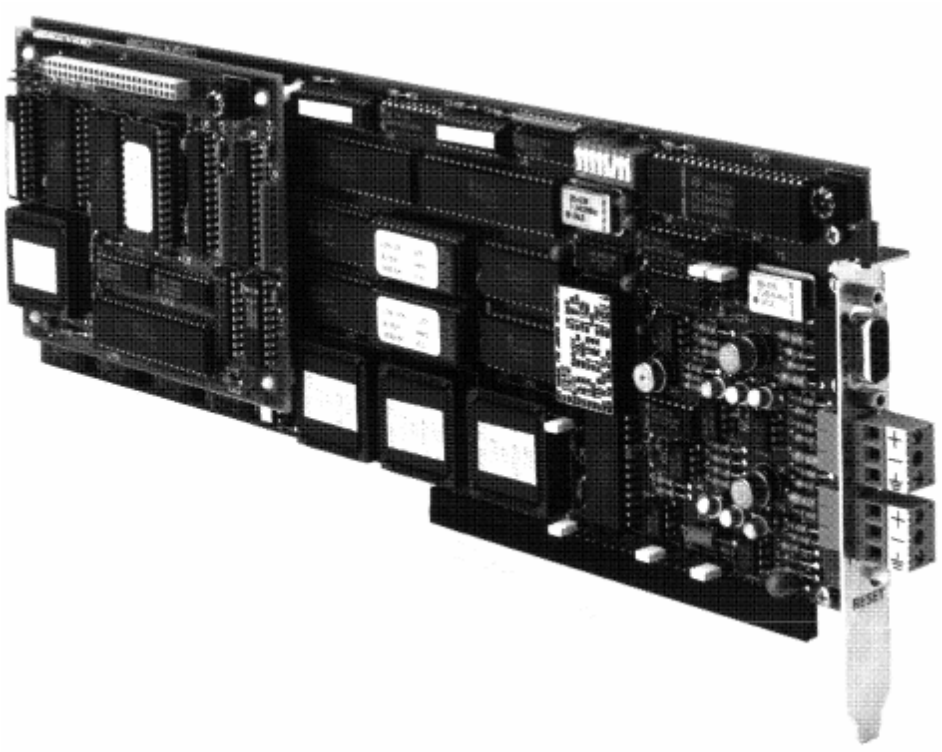
ICN Mini Link

User's Guide

1731N Model A – Mini Link Board for PC AT (Version 1)
1732N Model A – ICN Interface Board (Version 1)



MicroMod
AUTOMATION

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3. Normal safety procedures must be taken to avoid the possibility of an accident occurring when operating in conditions of high
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6. When disposing of chemicals, ensure that no two chemicals are mixed.

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MicroMod AUTOMATION

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SECTION 1
INTRODUCTION

1.1 DESCRIPTION

The 1731N Mini Link with 1732N ICN Interface Board, Figure 1-1, provides a general purpose serial interface to MOD 30 and MODCELL instruments via the Instrument Communications Network (ICN). The 1731N Mini Link supports one ICN and the 1732N ICN Interface Board supports a second ICN. The Mini Link provides intelligent buffers that enable the operation of higher level devices (such as personal or other computers) by:

- Assembling display and tuning information for a number of instruments and storing the data in block format. This relieves the host from executing individual requests and improves the efficiency of the communications.

- Permitting the host device to download and upload instrument configuration information. This enables instrument configuration to be performed at a central location using a personal computer that can easily display, manipulate and document data.

- Permitting limited peer-to-peer communications between ICNs.

- Providing diagnostic checks for message validity resulting in secure general purpose serial interfaces to the ICN.

- Off-loading trend functions when supported by the host application software.

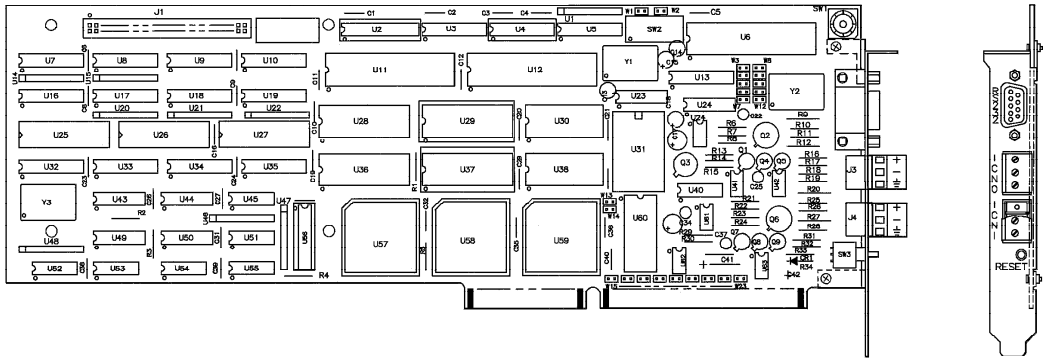


Figure 1-1. Mini Link Module

Physically the Mini Link is a PC/AT plug-in module which completely emulates the 1720N Communications Link (refer to **IB-23C001**) for up to two Instrument Communications Networks. The base configuration consists of:

- An Integral PC/AT Serial Port (dedicated to the Mini Link)
  This serial port is DIP switch and jumper configurable to perform as an I/O-mapped memory device at I/O base addresses 000_h through $3F8_h$. These addresses include the memory maps for the standard serial ports COM1, COM2, COM3 and COM4 (see **Section 2.4, Switch and Jumper Settings**).

- One Instrument Communications Network Controller
  The base ICN Controller is accessed via a two-wire or three-wire connection at the rear of the personal computer using the three screw terminal block at the connection marked "ICN0". Communication can be maintained between the personal computer and up to 15 field instruments.

- Optical Isolation Between Instruments and Personal Computer
  The optical isolation feature is jumper-selectable (see **Section 2.4, Switch and Jumper Settings**) and provides a minimum of 3000 Vdc electrical insulation between the Instrument Communications Network and the personal computer. THIS FEATURE IS NOT FACTORY SET.

- External Pushbutton Reset
  A 750ms reset pulse can be issued to the Mini Link by pressing the reset button located at the rear of the personal computer. The button is prominently labeled "RESET".

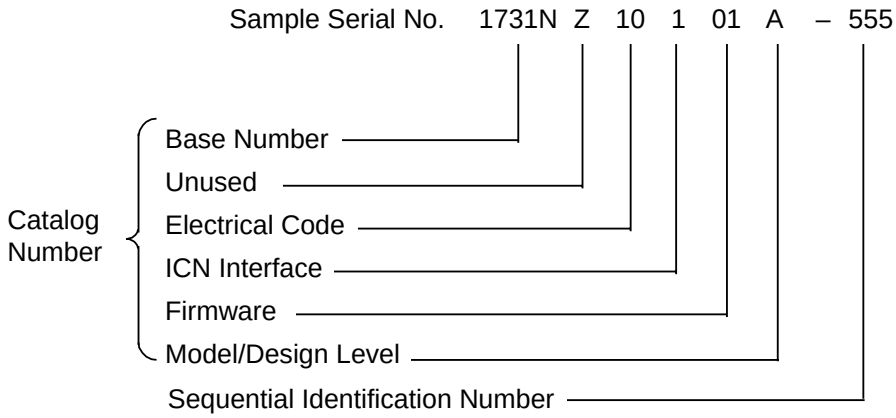
- A Second Serial Port for An External Controlling Device
  The Mini Link includes a nine-pin D-Shell connector for an external RS-232 serial port. This serial port could be used to provide redundant control of the instrument system with a local or remote external computer.

The 1731N Mini Link Board can be enhanced with a 1732N ICN Interface Board to provide communications access to an additional 15 field instruments. This daughter board is mounted to the Mini Link board and is accessed via a two- or three-wire connection at the rear of the personal computer using the three-screw terminal block at the connection marked "ICN1".

1.2 EXPLANATION OF SERIAL AND CATALOG NUMBER

The products described in this book have numbers that help identify specific features. The general format of these numbers is described below. Specific product descriptions follow in **Section 1.3**.

The serial number stamped on the product data plate consists of the catalog number and, in some cases, a sequential identification number. The serial number, which is described below, contains a series of single and multiple-character codes. These codes provide specific information concerning various electrical and/or structural options. Certain combinations are not allowed. Options and combinations are subject to change.



1.3 PRODUCT DESCRIPTIONS

The following product is maintained at the serial and catalog number level. The descriptions included in this section give a brief overview of its functions and features.

1.3.1 1731N Mini Link Board for AT Style PC

The 1731N Mini Link Board is a full length card with dimensions and bus connections for use in the IBM PC/AT style personal computer. The central processor for the Mini Link is the 63B09E using an 8-bit bus and a 2 mHz dual phase clock. The processor board checks message protocol and handles all data transfers between the ICN interface boards and intelligent devices connected to the serial I/O board. Each ICN interface board services direct communication with one ICN (up to 15 instruments).

The processor board keeps track of all message requests and responses. A request to the processor board for foreground (display) data from a host device results in the data being retrieved from the instrument ICN interface board which is automatically updated every 250 msec. This permits the data to be sent immediately to the host. A request from a host device for the background (tuning) data of an instrument is acknowledged with a "wait and acknowledge" response. The instrument ICN interface board retrieves the requested background data from the instrument and passes it to the processor board. When all of the data for the deferred request is received by the processor board, it is immediately transmitted to the host.

Catalog Number Description for 1731N

BASE NUMBER	**1731N**	Mini Link Board for AT Style PC
UNUSED	**Z**	Unused Character
ELECTRICAL CODE	**10**	General Purpose
ICN INTERFACE	**1**	One ICN
	2	Two ICNs
VERSION	**01**	Version 1
MODEL	**A**	1st design level
Sample Number	**1731NZ10101A** (Product is serialized)	

1.3.2 1732N ICN Interface Board

The ICN Interface Board is an ICN controller card only and is used to add a second ICN to the 1731N when the option board was not originally specified. The central processor is the 63B09E using an 8-bit bus and a 2 mHz dual phase clock.

Catalog Number Description for 1732N

BASE NUMBER	**1732N**	ICN Interface Board
UNUSED	**Z**	Unused Character
ELECTRICAL CODE	**10**	General Purpose
UNUSED	**0**	Unused Character
FIRMWARE VERSION	**01**	Version 1
MODEL	**A**	1st design level
Sample Number	**1732NZ10001A**	

1.4 TECHNICAL SUMMARY

POWER REQUIREMENTS

1731N Mini Link Board for AT Style PC
+5VDC at 0.8 Amp provided by personal computer
+24VDC at 0.2 Amp generated on Mini Link board

PHYSICAL CHARACTERISTICS

Card Dimensions (Including Card Edge Connector)

1731NZ10101A	Length:	13.26 inches (336.80 mm)
	Width:	4.75 inches (120.65 mm)
	Height:	0.70 inches (17.78 mm)

I/O Ports
Serial Port 1: Internal AT I/O Channel compatible card edge
Serial Port 2: J2, DB9 female
ICN0: J3, 2-wire communications, ground
ICN1: J4, 2-wire communications, ground

ICN Connections: 18 AWG (1mm), twisted pair wire (an additional 18 AWG wire is required to use the isolation feature as described in **Section 2.4.2**.).

Switches and Jumpers: See **Appendix A**

Microprocessor
Link Processor: 63B09E, 8 bit, 2 mHz dual phase clock
ICN Processor: 63B09E, 8 bit, 2 mHz dual phase clock

COMMUNICATIONS

PC/AT Serial Port 1: Configurable as COM1, COM2, COM3, or COM4 as well as non-standard I/O addresses

External Serial Port 2: Configurable as IRQ3 through IRQ7

Serial Port Transmission Standard: RS-232

Serial Port Parity: None (not configurable)

Serial Port Baud Rates: 76800*, 38400*, 19200, 9600

ICN Baud Rates: 62500*, 31250

* Software and firmware support for these baud rates is currently unavailable.

PERFORMANCE CHARACTERISTICS

Absolute Maximum Ratings*
- Temperature Under Bias: 0°C to +60°C (32°F to 140°F)
- Storage Temperature: –40°C to +85°C (–40°F to 185°F)
- Power Dissipation: 10W

Ambient Temperature Specifications
- Operating: +4°C to +49°C +(40°F to +120°F)
- Storage: -40°C to +74°C (–40°F to +165°F)

Relative Humidity
- 5 to 90% RH at 32°C

I/O Mapping: Supports I/O mapping on any 8-byte boundary between 000h and 3F8h (cannot be installed as a memory mapped device).

Message Queue
- Active: 4
- Waiting Processing: 4

ICN Interface Memory Size
- RAM: 16K bytes
- PROM: 32K bytes

Trend
- Variables Accumulated: 100 maximum; 16-bit words
- Types per Variable: Minimum, maximum, average
- Resolution: 1 minute

* Maximum ratings indicate limits beyond which permanent damage may occur. Continuous operation at these limits is not intended and should be limited to those conditions specified under DC ELECTRICAL CHARACTERISTICS.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	One ICN		Two ICNs		Units
		Min	Max	Min	Max	
ICC	Supply Current (Vcc=5V)	0.6	0.9	1.25	1.75	A
VILAT	Input Low Voltage (PC to Mini Link)	-0.5	0.8	-0.50	0.80	V
VIHAT	Input High Voltage (PC to Mini Link)	2.0	Vcc	2.00	Vcc	V
VOLAT	Output Low Voltage (Mini Link to PC)	---	0.4	---	0.40	V
VOHAT	Output High Voltage (Mini Link to PC)	2.4	---	2.40	---	V

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	One ICN		Two ICNs		Units
		Min	Max	Min	Max	
tADS	Address Strobe Width	60	---	60	---	ns
tAH	Address Hold Time	0	---	0	---	ns
tMR	Master Reset Pulse Width	100	---	100	---	us
tRC	Read Cycle Delay	175	---	175	---	ns
tAR	Read Delay from Address	60	---	60	---	ns
tRD	IOR Read Strobe Width	125	---	125	---	ns
RC	Read Cycle = tRC + tAR + tRD	360	---	360	---	ns
tWC	IOW Write Strobe Width	100	---	100	---	ns
tAW	Write Delay from Address	60	---	60	---	ns
tWR	IOW Write Strobe Width	100	---	100	---	ns
WC	Write Cycle = tWC + tAW + tWR	360	---	360	---	ns

1.5 RELATED DOCUMENTATION

Additional reference information on ICN/Link communications can be found in the following documents.

- IB-23G001 ICN Communication Link Programmers Reference Manual
- IB-23C001 ICN Communication Link Instruction Book for 1720N

SECTION 2
INSTALLATION

2.1 PREPARING THE PERSONAL COMPUTER

Prepare your PC/AT as follows:

1. Turn off the system unit.
2. Turn off all external options (printer, display, etc.).
3. Unplug the system unit power cord from the electrical outlet.
4. Unplug any external options from the electrical outlet.
5. Remove the system unit cover mounting screws.
6. Remove the system unit cover.
7. Use Table 2-1 as a worksheet to record the types of devices already installed in your system unit. Keep this worksheet filed in a safe place for reference purposes when troubleshooting.

NOTE

To determine the base address and/or Interrupts used by previously installed devices you may have to refer to the device documentation.

Table 2-1. Personal Computer Device Inventory

Expansion Slot	Installed Device	Base Address	Interrupts
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____
5	_____	_____	_____
6	_____	_____	_____
7	_____	_____	_____
8	_____	_____	_____

2.2 DETERMINING MINI LINK BASE ADDRESS/INTERRUPT LEVEL

The total I/O address space required by the Mini Link is eight bytes in length. To guarantee operation, the selected base address must be at least eight bytes below any base address listed in Table 2-1.

Generally, if there are no serial devices (mouse, modem, or RS-232 serial card) any of the standard COMx locations can be selected. These addresses have been reproduced in this document. See the **Section 2.4, Switch and Jumper Settings**.

If your system is configured with a mouse, modem, RS-232 card or other serial devices, more care will need to be taken.

1. If you have previously determined that there exists an open COMx address area (including the associated Interrupt Line) use Table 2-2 to set the correct I/O address on switch SW2. Select the corresponding Interrupt Line as shown in Table 2-3.

2. If you already have serial devices installed in your system, you must select a new address for the Mini Link. Any selected base address will be a multiple of 8 (i.e., $2E8_h$, 300_h, $3F0_h$, $3F8_h$, etc.). **Base addresses below 100_h are not recommended!** Additionally, the highest address decoded by the Mini Link is $3FF_h$. Use Table 2-2 to set the base address.

   NOTE

   Address lines A0, A1 and A2 are not switch selectable. These lines are used as Register Select Lines for the Mini Link UART.

3. Once the base address has been selected, you must select an interrupt level. Use Table 2-3 to set ONE of the jumpers W15, W16, W17, W18 or W19 to select IRQ3, IRQ4, IRQ5, IRQ6, or IRQ7, respectively.

2.3 INSTALLING THE MINI LINK BOARD

1. Remove the screw from the rear plate of an empty expansion slot. Save the screw and discard the expansion slot cover.

2. Hold the Mini Link by the top and firmly press it into the expansion slot. If your system's chassis has an expansion card guide, make sure the Mini Link card fits snugly without interference to any card components.

3. Install the screw you removed in Step 1.

4. Install the system unit cover.

5. Install the cover mounting screws.

6. Install the external options and power cords.

2.4 SWITCH AND JUMPER SETTINGS

This section contains a brief description of the Mini Link switches and jumpers with an application table for each. A quick reference table of all switches, jumpers, and their functions is in **Appendix A**.

2.4.1 Serial Ports

The Mini Link has two serial ports. Each serial port can be configured with an independent baud rate and CTS signal for access by two controlling consoles. The first serial port is dedicated to the PC/AT I/O Channel and requires base address and interrupt configuration. The second (optional) serial port can be accessed via a nine pin D-type connector at the rear of the PC/AT by any RS-232 device.

Base Address of PC/AT Serial Port

The serial port dedicated to the PC/AT I/O Channel is factory configured to occupy the standard I/O address of COM2 ($02F8_h$) with an interrupt level of IRQ3. The base address of the PC/AT Serial Port is switch selectable using DIP switch SW2. Table 2-2 identifies the possible DIP switch configurations for SW2.

Table 2-2. DIP Switch SW2, PC/AT Serial Port Base Address

Switch	Assign-ment	Switch Setting for Port / Interrupt / Address			
		COM1, IRQ4, $3F8_h$	**COM2, IRQ3, $2F8_h$**	**COM3, IRQ4, $3E8_h$**	**COM4, IRQ3, $2E8_h$**
SW2-1	A3	OPEN	OPEN	OPEN	OPEN
SW2-2	A4	OPEN	OPEN	CLOSED	CLOSED
SW2-3	A5	OPEN	OPEN	OPEN	OPEN
SW2-4	A6	OPEN	OPEN	OPEN	OPEN
SW2-5	A7	OPEN	OPEN	OPEN	OPEN
SW2-6	A8	OPEN	CLOSED	OPEN	CLOSED
SW2-7	A9	OPEN	OPEN	OPEN	OPEN
SW2-8	CommPort Enable*	OPEN	OPEN	OPEN	OPEN

* Set SW2-8 to the CLOSED position to disable the Mini Link entirely without removing the board from the personal computer.

Hardware Interrupts and Polarity for PC/AT Serial Port

The Mini Link hardware interrupt levels may be set as shown in Table 2-3. Interrupt polarity is set as shown in Table 2-4.

Table 2-3. Mini Link Hardware Interrupts

Interrupt Level	Jumper IN				
	W15	W16	W17	W18	W19
IRQ3	Y	N	N	N	N
IRQ4	N	Y	N	N	N
IRQ5	N	N	Y	N	N
IRQ6	N	N	N	Y	N
IRQ7	N	N	N	N	Y

Table 2-4. Mini Link Interrupt Polarity

Interrupt Polarity	Jumper IN	
	W20	W21
Logic 1*	Y	N
Logic 0	N	Y

* In most applications, the personal computer requires the factory set Interrupt Polarity of Logic 1.

BAUD Rates for Serial Ports 1 and 2

The Mini Link BAUD rates may be set as shown in Table 2-5 for serial port 1 and inTable 2-6 for serial port 2.

Table 2-5. Mini Link PC/AT Serial Port Baud Rates

BAUD	Jumper IN				
	W3	W4	W5	W6	W7
76800*	Y	N	N	N	N
38400*	N	Y	N	N	N
19200	N	N	Y	N	N
9600	N	N	N	Y	N

* Not recommended for use with currently available software.

Table 2-6. Mini Link External Serial Port Baud Rates

BAUD	Jumper IN				
	W12	W11	W10	W9	W8
76800*	Y	N	N	N	N
38400*	N	Y	N	N	N
19200	N	N	Y	N	N
9600	N	N	N	Y	N

* Not recommended for use with currently available software.

Clear-To-Send (CTS) for Serial Ports 1 and 2

Both the PC/AT and the External Serial Ports are outfitted with a CTS connection. In most cases, the CTS signal will not be needed. In the event that your configuration requires a CTS signal, install jumpers W1 and W2 as follows:

W1 Enables Clear To Send on External Serial Port 2

W2 Enables Clear To Send on PC/AT Serial Port 1

RS-232 Test Signal Jumper

Jumper W22 provides access to the 5V power plane of the Mini Link. If Jumper W22 is connected, the 5V signal will appear on pin 9 of the RS-232 connector. This jumper will normally be used for test purposes only.

2.4.2 ICN

ICN Isolation
The Mini Link is fitted with Opto-isolation components capable of providing a minimum of 3000 VDC electrical insulation between the Instrument Communication Network and the PC/AT digital circuitry. This option is jumper-selectable by disabling the connection on W23 (remove this jumper to enable optical isolation). If optical isolation is enabled, the ICN connector must be fitted with a ground wire. This third wire should be secured to a GROUND TERMINAL on the termination panel.

Mini Link ICN Device Address
Each device on a given Instrument Communication Network must be assigned a unique address between 0 and 15. Normally, the Mini Link will be assigned an address of 0 (Factory Set) with the instruments starting at 1, 2, 3, etc. In the case where the factory-set device address is not suitable, use SW1 to change the address for ICN0 and use switch U1 .to change the address for ICN1.

ICN Baud Rate
The factory-set baud rate for instrument communication over the ICN is 31,250 bps. This baud rate can be increased to 62,500 bps as follows:

ICN0
W13 Installed – Selects ICN0 Baud Rate of 62,500 bps
W14 Installed – Selects ICN0 Baud Rate of 31,250 bps

ICN1
J2 Installed – Selects ICN1 Baud Rate of 31,250 bps
J3 Installed – Selects ICN1 Baud Rate of 62,500 bps

SECTION 3
PROGRAMMING MINI LINK INTERRUPTS

3.1 GENERAL

The IBM PC/AT has reserved hardware interrupts for common devices (printers, disk drives, etc.) within the interrupt level range (IRQ3-IRQ7) of the Mini Link. The Mini Link does not support the high order (8-15) interrupt request lines available on the IBM PC/AT.

To operate the Mini Link on COM1, COM2, COM3 or COM4, the jumper settings from Tables 2-2, 2-3 and 2-4 must be employed exactly as they appear. MicroMod Automation assumes no liability for improperly installed hardware or damage caused by improperly installing the Mini Link card in your personal computer.

3.2 COMMUNICATIONS POLLING (NO INTERRUPTS)

Not all serial communications routines require the use of hardware interrupts. If your controlling software polls the Transmit Data Register Empty (TDRE) and Receive Data Register Full (RDRF) status bits of the PC/AT Serial Port, you probably will not need to enable ANY of the interrupt lines. The Mini Link will continue to function properly without an enabled Interrupt Request Line.

3.3 COMMUNICATIONS USING INTERRUPT SERVICE ROUTINES

To enable a particular Mini Link Interrupt line (IRQ3-IRQ7), Interrupt Service Routine commands must be issued to the 8259 Programmable Interrupt Controller (PIC) by the controlling software. In most cases, these commands are issued by the controlling software package (PC30, etc.). In those cases where the user is programming the Mini Link, the software protocol described below is observed.

CPU Response to Programmed Interrupt
When an interrupt is generated by a device on the personal computer I/O channel, the CPU responds by:

1. Completing the current CPU instruction
2. Saving the contents of volatile registers
3. Fetching the interrupt ID from the PIC
4. Fetching the interrupt service routine vector associated with interrupt ID
5. Executing the interrupt service routine at the memory location pointed to by the interrupt service routine vector
6. Restoring the contents of volatile registers
7. Continuing execution of the current program

Interrupt Service Routine Location

It is the user's responsibility to install an Interrupt Service Routine at an appropriate memory location (according to the configured hardware interrupt) which does not interfere with concurrently operated software or hardware.

In most cases, these interrupt service routines will be simple Transmit/Receive operations with user conditions determining success or failure of the routines. Table 3-1 lists the interrupt service vector locations. These are valid for most default system memory maps.

Table 3-1. Interrupt Service Vector Locations

Interrupt	**Low Memory Location Of Service Vector ***
IRQ3	$0000:000C_h$
IRQ4	$0000:0010_h$
IRQ5	$0000:0014_h$
IRQ6	$0000:0018_h$
IRQ7	$0000:001C_h$

* These addresses are assigned by software only. Because they are not hardwired into the system, they could be changed by resident or normally terminated routines.

SECTION 4
TROUBLESHOOTING THE MINI LINK

4.1 NO RESPONSE FROM LINK

For software that polls Transmit Data Register Empty (TDRE) and Receive Data Register Full (RDRF), a "No Response From Link" error indicates that:

- The hardware-configured base address (see Table 2-2 settings for switch SW2) does not match the address used by the controlling software for serial communications

  or,

- There exists installed hardware whose I/O address space conflicts with the Mini Link base address as configured by SW2.

In addition, if the controlling software uses Interrupt Service Routines for serial communications, the configured Interrupt Request Line for the PC/AT Serial Port (see Table 2-3 jumper settings for W15 - W19) must match the Interrupt Request line expected by the controlling software. There must be no conflict with any other installed interrupt-driven hardware. Use Table 2-1 to determine an appropriate Interrupt Request Line.

If the Mini Link is configured for an address location other than COM1 or COM2 and the controlling software is interrupt-driven, it is the user's responsibility to make sure that proper Interrupt Service Routine Vectors and Interrupt Service Routines are in place at the time of operation.

Be wary of serial ports that are integrated on the personal computer system board. Some manufacturers have included a serial port (usually COM1, IRQ4) as part of the system board, eliminating that address and interrupt space for use by user-installed hardware. See the User's Manual for your system for more information.

4.2 PARITY, FRAMING OR OVERRUN ERROR

Check the configured baud rate for the PC/AT Serial Port of the Mini Link. Confirm that the configured baud rate is the same as that expected by the controlling software (see Table 2-5 jumper settings for W3 - W7).

If this error occurs on the External Serial Port, check the configured baud rate for the External Serial Port (see Table 2-6 jumper settings for W8 - W12).

4.3 FROZEN DISPLAY/NO RESPONSE FROM PC KEYBOARD

This type of problem is usually indicative of address or interrupt conflict on the personal computer I/O channel. You must establish a clear range of eight bytes I/O address space (in the range 000_h to $3FF_h$) to successfully operate the Mini Link. In addition, there can be no other installed devices using the same interrupt request line as the Mini Link.

Use Table 2-1 as a guide to determine unused address space on your system's I/O channel and Interrupt Request Bus. If you cannot determine the base addresses of the installed hardware, contact the technical support representative of the hardware in question.

If you continue to have difficulties in making the Mini Link work, contact your sales representative.

4.3 NO RESPONSE FROM THE FIELD INSTRUMENTS

If communication has been established between the Mini Link and the Personal Computer, but the instruments on the ICN do not respond, compare your configuration to the checklist below:

1. The ICN (+) lead of the two-wire interface is connected to the terminal block (+) screw on the rear of the Mini Link.

2. The ICN (–) lead of the two-wire interface is connected to the terminal block (–) screw on the rear of the Mini Link.

3. If using the Isolation Feature (see jumper setting for W23), there is a third wire connected between the Mini Link terminal block GND screw and ICN ground on the instrument termination panel.

4. The length of the ICN (including the total length of the physical two-wire bus between each node on the ICN and the length of the instrument cables between the nodes and the instruments) does not exceed 2000 feet or 609.6m.

5. The ICN is appropriately terminated as described in the instructions for MOD 30 or MODCELL.

6. If using a base configuration of the Mini Link (supporting 1 ICN) the two- wire interface is connected to the Mini Link terminal block labeled ICN0.

7. If using a fully-configured Mini Link (supporting 2 ICNs) the two-wire interface for the first ICN is connected to the Mini Link terminal block labeled ICN0 while the two-wire interface for the second ICN is connected to the Mini Link terminal block labeled ICN1.

8. Instrument address is properly configured in hardware and software.

9. Mini Link ICN device address (as set by BCD switch SW1) does not conflict with any instrument ICN device address.

APPENDIX A
JUMPERS AND SWITCHES

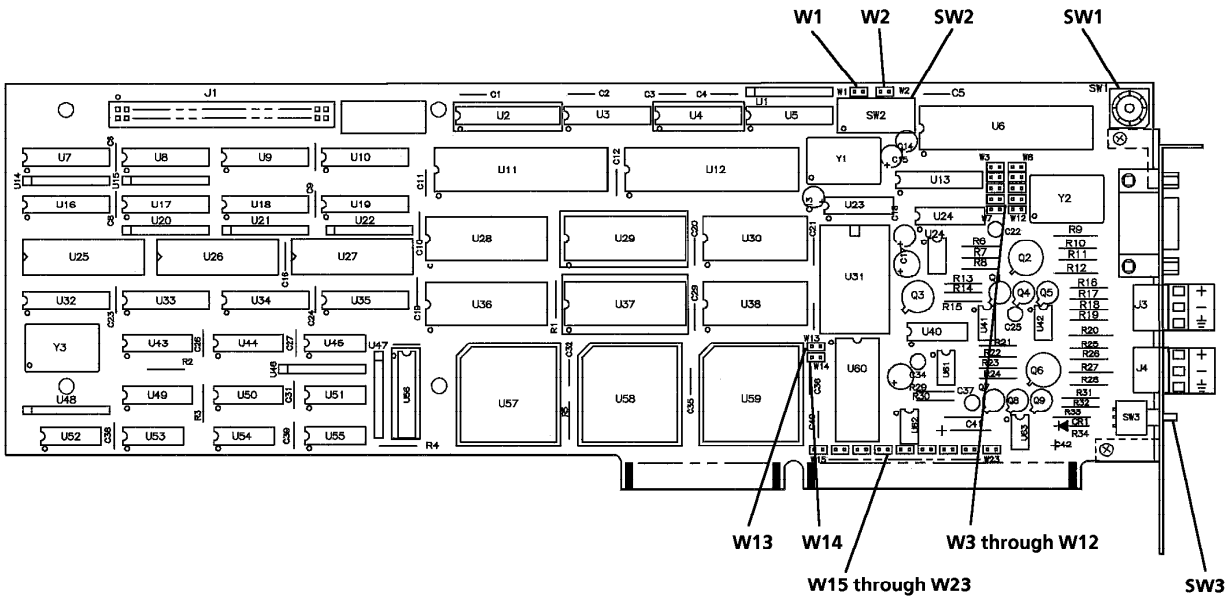


Figure A-1. Switch and Jumper Locations for 1731N Mini Link

Table A-1. Alphanumeric Listing of Jumpers and Switches for 1731N Mini Link

Ref.	Function	Ref.	Function
SW1	Mini Link ICN Device Address	W11*	Select 38400 Baud on External Serial Port
SW2	Base Address of Integral Serial Port	W12*	Select 76800 Baud on External Serial Port
SW3	Mini Link Reset Switch	W13	Select ICN Baud Rate of 62500 bps
W1	Enable CTS on External Serial Port	W14	Select ICN Baud Rate of 31250 bps
W2	Enable CTS on PC/AT Serial Port	W15	Select IRQ3 for Integral Serial Port
W3*	Select 76800 Baud on Integral Serial Port	W16	Select IRQ4 for Integral Serial Port
W4*	Select 38400 Baud on Integral Serial Port	W17	Select IRQ5 for Integral Serial Port
W5	Select 19200 Baud on Integral Serial Port	W18	Select IRQ6 for Integral Serial Port
W6	Select 9600 Baud on Integral Serial Port	W19	Select IRQ7 for Integral Serial Port
W7	RESERVED	W20	Select Interrupt Polarity Logic 1
W8	RESERVED	W21	Select Interrupt Polarity Logic 0
W9	Select 9600 Baud on External Serial Port	W22	Enable 5V Test Signal on 9-pin RS-232
W10	Select 19200 Baud on External Serial Port	W23	De-Select Isolation Feature on ICN / PC Interface

* Software and firmware support for these baud rates is currently unavailable.

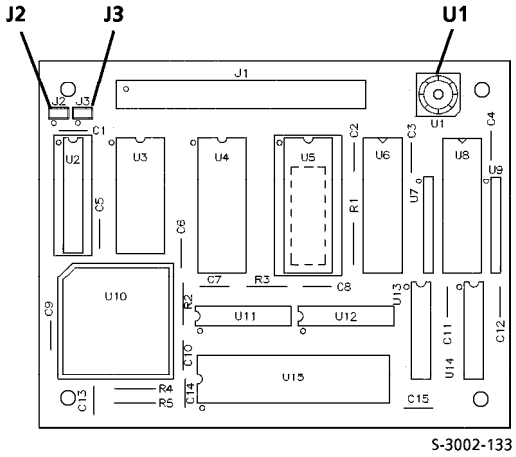


Figure A-2. Switch and Jumper Locations for 1732N ICN Interface Board

Table A-2. Alphanumeric Listing of Jumpers and Switches for 1732N ICN Interface Board

Ref.	Function
J2	Select ICN1 Baud Rate of 31,250 bps
J3*	Select ICN1 Baud Rate of 62,500 bps
U1	Mini Link ICN1 Device Address

* Firmware support for this baud rates is currently unavailable.

APPENDIX B
CONNECTOR DESCRIPTIONS

Table B-1. IBM PC/AT Mini Link Board Connector Pinout

Component Side ("A" side w/A1 near rear panel)			Circuit Side ("B" side w/B1 near rear panel)		
I/O Pin	**Signal**	**I/O**	**I/O Pin**	**Signal**	**I/O**
A1	–I/OCHCK	I	B1	GND	GND
A2*	SD7	I/O	B2*	RESET D	O
A3*	SD6	I/O	B3*	+5V	Power
A4*	SD5	I/O	B4	IRQ9	I
A5*	SD4	I/O	B5	–5V	Power
A6*	SD3	I/O	B6	DRQ2	I
A7*	SD2	I/O	B7	–12V	Power
A8*	SD1	I/O	B8	0WS	I
A9*	SD0	I/O	B9	+12V	Power
A10	–IOCHRDY	I	B10*	GND	GND
A11*	AEN	O	B11	–SMEMW	O
A12	SA19	I/O	B12	–SMEMR	O
A13	SA18	I/O	B13*	–IOW	I/O
A14	SA17	I/O	B14*	–IOR	I/O
A15	SA16	I/O	B15	–DACK3	O
A16	SA15	I/O	B16	DRQ3	I
A17	SA14	I/O	B17	–DACK1	O
A18	SA13	I/O	B18	DRQ1	I
A19	SA12	I/O	B19	–Refresh	I/O
A20	SA11	I/O	B20	CLK	O
A21	SA10	I/O	B21*	IRQ7	I
A22*	SA9	I/O	B22*	IRQ6	I
A23*	SA8	I/O	B23*	IRQ5	I
A24*	SA7	I/O	B24*	IRQ4	I
A25*	SA6	I/O	B25*	IRQ3	I
A26*	SA5	I/O	B26	–DACK2	O
A27*	SA4	I/O	B27	T/C	O
A28*	SA3	I/O	B28	BALE	O
A29*	SA2	I/O	B29*	+5V	Power
A30*	SA1	I/O	B30	OSC	O
A31*	SA0	I/O	B31*	GND	GND
C1	SBHE	I/O	D1	–MEMCS16	I
C2	LA23	I/O	D2	–I/OCS16	I
C3	LA22	I/O	D3**	IRQ10	I
C4	LA21	I/O	D4**	IRQ11	I
C5	LA20	I/O	D5**	IRQ12	I
C6	LA19	I/O	D6**	IRQ15	I
C7	LA18	I/O	D7**	IRQ14	I
C8	LA17	I/O	D8	–DACK0	O
C9	–MEMR	I/O	D9	DRQ0	I
C10	–MEMW	I/O	D10	–DACK5	O
C11	SD08	I/O	D11	DRQ5	I
C12	SD09	I/O	D12	–DACK6	O
C13	SD10	I/O	D13	DRQ6	I
C14	SD11	I/O	D14	–DACK7	O
C15	SD12	I/O	D15	DRQ7	I
C16	SD13	I/O	D16	+5V	Power
C17	SD14	I/O	D17	–MASTER	I
C18	SD15	I/O	D18	GND	GND

* Currently in use by the Mini Link

** Usable by the Mini Link with minor modification

Table B-2. Mini Link RS-232 Connector Pinout

I/O Pin	Signal Name	I/O
1	GND	GND
2	RXDATA	I
3	TXDATA	O
4	NC	-
5	GND	GND
6	NC	-
7	RTS	I
8	CTS	O
9*	NC	-

* Pin 9 can be configured to present Mini Link's 5VDC (for test purposes only) by using jumper W22.

Table B-3. Mini Link ICN0 and ICN1 Connector Pinout

Terminal	Signal Name*
1	IBUS(+)
2	IBUS(–)
GND	GND

* Two- or Three-Wire Connection for ICN0 and ICN1. The (+) and (-) terminals accept signals from the ICN. The third terminal, labeled "GND" is used when the Isolation Feature is employed (see jumper setting for W23).

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