

# High-Speed Fiber-Optic GPIB Extenders

GPIB-140, GPIB-140/2

## GPIB-140, GPIB-140/2

Extends the maximum GPIB cable distance

1 km (GPIB-140)

2 km (GPIB-140/2)

High-speed serial transmission

Maximum transfer rates

Up to 1.05 Mbytes/s using IEEE 488.1

Up to 2.2 Mbytes/s using HS488

Expands the number of GPIB devices to 26

Compatible with both IEEE 488.1

and IEEE 488.2 standards

Handles IEEE 488.2 Find All Listeners protocol

Choice of buffered or unbuffered transfers

Software transparent – no software modifications required

Complete error-checking capabilities ensure successful data transmission

Transparent passing of control to remote GPIB devices

Complete parallel polling

Self-testing capabilities

Compact size

Built-in 115 or 230 VAC power supply

### Applications

Control remote printers or plotters as if they were next to your computer

Isolate devices located in noisy or hazardous environments

Interface up to 26 devices on one logical GPIB system

Control factory floor tests from a remote office

### Kit Contents

GPIB Extender, power card, and documentation



## Overview

The high-performance GPIB-140 and GPIB-140/2 fiber-optic bus extenders remove the restrictions on cable length imposed by the IEEE 488 (GPIB) standard while maintaining maximum system throughput and requiring virtually no desktop space. The IEEE 488 standard specifies that the total cable length for a GPIB system cannot exceed 20 m and that the maximum number of devices is 15. A pair of GPIB-140/2 bus extenders can extend the cable length to 2 km without compromising the integrity of the GPIB or requiring any application program modifications. Both the GPIB-140 and GPIB-140/2 can handle the IEEE 488.2 Find All Listeners protocol. The ability to respond to parallel poll commands is maintained, even at the longest extension distance.

The GPIB-140 series uses a buffered transfer technique with a serial extension bus to transfer data at the fastest rates in the industry while keeping the cabling cost at a minimum. An error-checking scheme is further implemented in each extender to ensure an error-free link. The maximum data transfer rate over the extension is 2.2 Mbytes/s using the HS488 protocol. To meet your system requirements, transfers can take place in one of two selectable modes – buffered or unbuffered. Buffered transfers, which use FIFO buffers, have the highest transfer rates. In unbuffered mode, the IEEE 488 handshaking is maintained so each byte is confirmed by both sender and receiver.

## IEEE 488 Compatibility

The GPIB-140 and GPIB-140/2 bus extenders are compatible with both IEEE 488.1-1987 and IEEE 488.2-1987. Unlike other

extenders that respond to all GPIB addresses during the Find All Listeners protocol, the GPIB-140 and GPIB-140/2 allow this operation to occur normally.

## Software

When a pair of GPIB-140 units are used to extend the GPIB system, all devices on the two GPIBs are logically interfaced to a single System Controller. That is, the GPIB-140 units are software transparent to the system. When you add the GPIB-140 extenders to a system, existing programs work properly without modification. You can even retain the ability to respond to a parallel poll Identify (IDY) message.

## Hardware

Each GPIB-140 series extender monitors and translates all the GPIB activities into serial signals for transmission to a matching extender. The receiving extender converts the signals back to IEEE 488 signals. The GPIB-140 has two data transfer operating modes – buffered and unbuffered. In the unbuffered mode, the GPIB-140 maintains the IEEE 488 double-interlocked handshake across the extension. Each byte is held on the transmission cable until both the sender and receiver confirm that it has been transmitted correctly. In the buffered mode, the GPIB-140s use high-speed FIFO buffers to increase data transfer rates. Buffered mode is used for all HS488 data transfers. The buffering, which is managed completely by the hardware, requires no modification of user software.

The GPIB-140 uses a standard fiber-optic connection as the transmission medium. The fiber-optic cable electrically isolates

GPIB Instrument Control

# High-Speed Fiber-Optic GPIB Extenders

GPIB-140, GPIB-140/2

GPIB Instrument Control

the remote bus from the local bus, is extremely easy to route, and is immune to noise. It is well suited for transmitting signals through electromagnetically active or physically hazardous areas. The GPIB-140 can use fiber-optic cable lengths up to 1 km; the GPIB-140/2 can extend the GPIB up to 2 km.

The GPIB-140 series has two selectable modes to handle parallel polls – immediate and latched. In immediate mode, valid parallel poll responses from remote devices are returned within the required time period for cable lengths of 100 m and below. For longer distances, you can use the parallel poll latched mode.

In latched mode, the response to the previous parallel poll is returned. To obtain the most current parallel poll response, you issue successive parallel poll commands.

## Performance

Any bus extender or bus expander degrades normal system performance. This degradation is caused by the propagation delay introduced by the extender itself and the distance between the extenders. The data transfer rate without buffering between the extenders decreases as the length of the cable increases.

## Part Numbers

### GPIB-140

U.S. 120 VAC .....	776948-01
Swiss 220 VAC .....	776948-02
Australian 240 VAC .....	776948-03
Universal Euro 240 VAC .....	776948-04
North American 240 VAC .....	776948-05
United Kingdom 240 VAC .....	776948-06

### GPIB-140/2

U.S. 120 VAC .....	777134-01
Swiss 220 VAC .....	777134-02
Australian 240 VAC .....	777134-03
Universal Euro 240 VAC .....	777134-04
North American 240 VAC .....	777134-05
United Kingdom 240 VAC .....	777134-06

### T7 fiber-optic cable for GPIB-140 (up to 1 km)

10 m .....	182805-010
50 m .....	182805-050
100 m .....	182805-100
500 m .....	182805-500
1,000 m .....	182805-01K

### T8 fiber-optic cable for GPIB-140/2 (up to 2 km)

100 m .....	183164-100
200 m .....	183164-200
500 m .....	183164-500
1,000 m .....	183164-01K
1,100 m .....	183164-01K1
1,200 m .....	183164-01K2
1,500 m .....	183164-01K5
2,000 m .....	183164-02K

## Specifications

### IEEE 488 Compatibility

Compatible with IEEE 488.1 and IEEE 488.2

### Maximum Sustained GPIB Transfer Rates

Buffered mode .....	2.2 Mbytes/s (using HS488 protocol)
	1.05 Mbytes/s (using IEEE 488.1 protocol)

### Unbuffered mode

5 m .....	200 kbytes/s
1,000 m .....	80 kbytes/s

(actual rates depend upon system configuration and instrument capabilities)

### Power Requirement (50-60 Hz)

100-120 VAC $\pm 10\%$ .....	120 mA
220-240 VAC $\pm 10\%$ .....	80 mA

### Physical

Dimensions .....	14.3 by 8.9 by 4.2 cm (5.7 by 3.5 by 1.7 in.)
Weight .....	0.25 kg (0.55 lb)

Transmission .....	HFBR1414 transmitter or equivalent HFBR2416 receiver or equivalent
--------------------	---

Transmission connector .....

GPIB connector .....

### Fiber-Optic Cable

GPIB-140 .....	Core/Clad 62.5/125 $\mu$ m Wavelength 850 nm
----------------	---

GPIB-140/2 .....	Core/Clad 62.5/125 $\mu$ m Wavelength 1300 nm
------------------	--

### Operating Environment

Temperature .....	0° to 40° C
Relative humidity .....	0% to 90%, noncondensing

### Storage Environment

Temperature .....	-20° to 70° C
Relative humidity .....	5% to 90%, noncondensing