AccuRange High Speed Interface

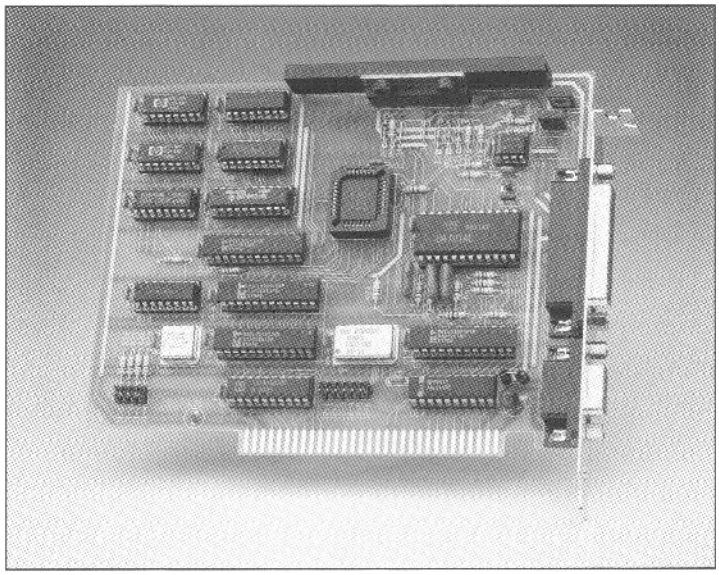
by Acuity RESEARCH

PC-104 VERSION NOW AVAILABLE

The AccuRange™ High Speed Interface can be used to increase the sample rate capability of Acuity Research's line of AccuRange sensors, using any PC-compatible computer. It can sample all the AccuRange outputs at up to 50,000 times per second and buffer the data for reading by the host computer. The High Speed Interface can also be used to control the AccuRange Line Scanner. For a full description of the AccuRange 4000 and AccuRange Line Scanner, see the corresponding data sheets.

Key Features

- Sample rates to 50,000 samples per second.
- Samples AccuRange distance, amplitude, ambient light, and temperature outputs.
- Supplies 8-byte samples over the standard PC ISA bus.
- 2K or optional 16K byte buffer for sample data onboard.
- Buffer empty, half-full, and overflow indicators, and half-full interrupt.
- Start/stop sampling control input.
- 3 general purpose input data lines for event recording.
- Improved resolution and higher sample rate capability than the AccuRange 4000 alone.
- Supplies power to the AccuRange sensor.
- Optional motor power control and shaft encoder reading capability.



AccuRange High Speed Interface Technical Specifications

Mechanical and Power

Form Factor

IBM-PC ISA bus, half-length board, 6.25 by 4.75 inches

Power Requirements: +5V @ 500 ma

Includes power for AccuRange sensor

AccuRange 4000 Interface

The AccuRange High Speed Interface measures the duration of the pulse width output of the AccuRange 4000. Setting sample rate and all other configuration of the 4000 is done through the serial interface on the 4000, over a computer serial port (not included on the High Speed Interface). Signal strength, ambient light, and sensor temperature are also sampled. For maximum accuracy, calibration to obtain actual distance then occurs in software on the host computer.

P1: DB-9 power and signal connector

Pin	Function	Direction
1	Power, +5V (5V min, 6V max)	Out
2	Ground	
3	Heater Power, 4.5 to 6.0 V	Out
4	Heater Power Ground	
5	Temperature signal, 0-5V	In
6	Pulse Width Range Signal	In
7	Ambient light signal, 0-5V	In
8	Amplitude signal, 0-5V	In
9	No Connection	
Shield	Ground	

Amplitude, Ambient Light, and Temperature Inputs

Analog signals, 0-5V: 8 bit samples

Response times:

One sample period, as programmed

General Purpose Inputs & Motor Control

General Purpose Inputs

3 general purpose input bits.

Input lines 1, 2: Latched high, non-inverting.
Minimum pulse width to guarantee latching: 500 ns.

Input line 3: Not latched, inverting.

Inputs 1 and 2 may be used to detect the index pulse on motor encoders, or for other purposes. They will latch any high signal for one sample interval, so that the signal will appear as a 1 in the data stream for the sample during which the signal ocurred.

Optional Motor Control

The AccuRange High Speed Interface can be ordered with two pulse-width modulated power control channels, or with two variable-current motor control outputs.

Maximum Motor Power

Pulse-width control:	2A @ 48V.
Variable-current control:	0.5A @ 24V.
Motor power control resolution:	1 part in 64.

A separate power supply is required to drive the motors. With the pulse-width drivers, motor direction may also be controlled.

Encoder Readers

Two 8-bit motor encoder readers.

Inputs: 2-channel quadrature from motor encoders.
Outputs: 8 bit motor positions inserted in sensor data stream.

P2: I/O Connector

Pin	Function	Direction
1	Motor 2 Control	Out
2	Motor 2 Return	Out
3	Motor Power	In
4	No Connection	
5	+5V Power, 100 mA	Out
6	Ground	
7	Ground	
8	Ground	
9	Ground	
10	Ground	
11	No Connection	
12	Start / Stop Sample Control	In
13	Input 2 / Encoder 2 Index Pulse	In
14	Motor 1 Control	Out
15	Motor Power Ground	
16	Motor 1 Return	
17	No Connection	
18	+5V Power, 100 mA	Out
19	Motor 2 Encoder Channel A	In
20	Motor 2 Encoder Channel B	In
21	Motor 1 Encoder Channel A	In
22	Motor 1 Encoder Channel B	In
23	No Connection	
24	Input 1 / Encoder 1Index Pulse	In
25	Input 3	In

Bus/Software Interface

Data Bus Width: 8 bits

Port Addressing

Four jumpers control the I/O port address space of the board, which may be configured to start at any of 16 locations between 0 Hex and 3C0 Hex. The board occupies 8 locations starting at the selected base.

Port 0:	Read:	Sensor Data
	Write:	Send Command
Port 1:	Read Only:	Buffer Status
Port 2:	Write Only:	Motor 1 Power, Direction
Port 3:	Write Only:	Motor 2 Power, Direction
Ports 4-7:	Repeat Functions of ports 0-3.	

Command Set Summary

There are 2 software commands that can be executed by writing to Port 0:

Reset Board - Flush memory buffer, reset encoder counts to zero.
Clear buffer overflow flag.

Buffer Status: Port 1

Bit 0: Sensor data available on port 0.
Bit 1: Buffer at least half full.

Half Full Interrupt

The half full signal may be jumpered onto an interrupt line to generate an interrupt when the buffer is half full. To clear the interrupt, the buffer must be read until less than half full, or the board must be reset.

Interrupts available: IRQ lines 3, 4, 5, 7, 9

Sampled Data Format

Sample size: 8 bytes/sample, in a sequential stream. The range sample is 19 bits. All other data are 1 byte or 1 bit fields.

Byte 0: Amplitude Sample
Byte 1: Ambient Light Sample
Byte 2: Temperature Sample
Byte 3: Bits 7-5: 3 Range bits 0-2
Bit 4: Always 0
Bit 3: Data Lost: Buffer Overflow
Bit 2: Input 3
Bit 1: Input 2 / Motor 2 Index
Bit 0: Input 1/ Motor 1 Index
Byte 4: Range Bits 3-10
Byte 5: Range Bits 11-18
Byte 6: Motor 1 Encoder Position
Byte 7: Motor 2 Encoder Position

Motor Power Control

Power and direction for the motors is controlled by writing to ports 2 and 3.

Motor 1 Power:	Lower 6 bits of port 2
Motor 1 DIrection:	High bit of port 2
Motor 2 Power:	Lower 6 bits of port 3
Motor 2 DIrection:	High bit of port 3