



Using the MicroRidge MPX-4S Digital Gage Multiplexer Application Note #10

Overview

The MicroRidge MPX-4S multiplexer is designed to multiplex digital dial gages from a number of manufacturers including Chicago Dial, Fowler, Federal, Mitutoyo, Ono Sokki and Sytac. It may also be used to multiplex other RS-232 serial devices such as smart bar code wands, scales, etc. The MPX-4S consists of an enclosure that has slots for up to 4 input modules, each input module has 4 inputs, total inputs is 16. Two types of input cards are available, the 4G-MOD for digital gages and the 4SP-MOD for serial ports. In addition up to 3 MPX-4S may be connected together using the S/MUX multiplexer available from MicroRidge Systems. Contact Canary Systems or MicroRidge Systems (www.microridge.com) for more information on these products.

This application note will describe how to connect the MPX-4S multiplexer to the Campbell based data acquisition system and then program MultiLogger to read the connected dial indicators. The advantage of this system is that data acquisition for a project becomes centralized to the Campbell based data acquisition system, this insures a higher reliability of data acquisition as well as simplified setup of the data acquisition system using the Canary Systems MultiLogger software. There are 3 issues involved with the setup, hardware (the physical interconnection between MPX-4S and Control Module), MPX-4S configuration (setting the DIP switches) and software (MultiLogger configuration).

Hardware

The MPX-4S must be connected to the data acquisition system. This is best done using an optically isolated interface, the Campbell SC32A Optically Isolated Interface is well suited to this task because it provides optical isolation as well as conversion of the Control Module signals to RS-232. Using an optically isolated interface insures that noise or other problems with the local AC supply (which is used to power the MPX-4S using the supplied AC adaptor) does not affect the operation of the data acquisition hardware. **Note: If the frame ground or the enclosure of the SC32A is in contact with the frame ground or the enclosure (if its metallic) of the data acquisition system then optical isolation will be comprised because the frame ground of the SC32A connects to the ground of the incoming RS-232 signal which will be the ground of the MPX-4S!** Campbell Control Modules are capable of sending and receiving simple RS-232 commands through its control ports, these will be utilized to communicate with the MPX-4S multiplexer and its attached digital gages. Use the following table to connect the MPX-4S to the data acquisition system. Note that Canary Systems will install a connector to facilitate rapid connect and disconnect of the MPX-4S from the system. Contact Canary Systems to obtain these prefabricated cables/connectors.

Control Module to SC32A Wiring

Female DB-9 (SC32A)	Inside Wire	Function	To CR10X
1	Red	5V Power	5V
2	Black	Ground	G
4	Green	Receive Data (into CR10X)	C6
5	Red	Modem Enable	C4
9	White	Transmit Data (out of CR10X)	C5



SC32A Wiring to MPX-4S

Male DB-25 (SC32A)	Inside Wire	Function	10 Pin Bendix	Cable Color	Male DB-25 (MPX-4S)
1	Black	Ground	A	Black	7
2	Green	Receive	B	Green	3
3	White	Transmit	C	White	2
20	Red	DTR	G	Red	6

Note: If the MPX-4S was supplied with the MPX-COM-1 communication cable with integrated AC Adaptor (connected to the DB-9 connector) it will require dismantling and construction of an AC adaptor cable utilizing the coaxial power plug located on the back of the MPX-4S. Alternately a separate AC Adaptor may be purchased to power the MPX-4S. The coaxial power plug is a 2.1x5.5mm type, center is negative.

MPX-4S Configuration

There are 2 sets of DIP switches on the back of the MPX-4S that must be configured for proper operation, they are the Master DIP switch banks MPX 1 and MPX 2. Settings for these switches are outlined below, with descriptions. See page 12 of the MPX-4S User's Guide for complete information on switch settings.

Switch	Position	Description
MPX 1 	8 - OFF	8 – Warm start
	7 - OFF	7, 6, 5 – No handshake
	6 - OFF	
	5 - OFF	
	4 - ON	4, 3 – No parity, 8 data bits, 1 stop bit
	3 - OFF	
	2 - ON	2, 1 – 1200 baud
	1 - ON	
MPX 2 	8 - OFF	8 – MicroRidge Protocol
	7 - OFF	7 – Not used
	6 - OFF	6 – Not used
	5 - OFF	5 – User commands disabled
	4 - OFF	4 – 100msec bounce
	3 - OFF	3 – 1 digit ID, letters A, B, C, etc.
	2 - OFF	2 – Single read mode
	1 - OFF	1 – Send CR only

The front panel switch labeled **S M A** should be set to **A**, for automatic read mode.

Software Configuration

Now that the MPX-4S has been connected to the data acquisition system and configured, the software must be configured for proper operation. Specifically this means selecting the MicroRidge gage type for each channel you wish to read.

There are actually 2 ways to configure these devices in MultiLogger, as Direct Connect Instruments or as channels of a multiplexer. Configuring them as multiplexer channels is the preferred method, in fact I cannot think of a good reason to configure them as Direct Connect Instruments. Configuring them as multiplexer channels allows you to read up to 16 devices (or up to 48 if necessary), this corresponds with the maximum capacity of a single MPX-4S multiplexer.

Start MultiLogger, select the datalogger from the Network Configuration you wish to configure. This will be the datalogger that has been modified as detailed in the Hardware section.

Select **Program | Multiplexers**. Configure the multiplexer Model then select **Digital** as the Gage Type.

Press Edit Channels to configure each channel of the multiplexer. Select **Digital** as the Gage Type on the channel configuration form, select **MicroRidge** as the Make, then select the appropriate model for each channel, you will notice there is a Model selection for each channel, i.e. channel #1 use **MPX-4S_CH1**, channel #2 use **MPX-4S_CH2**, etc.

If required to manually program the reading of the dial indicators the following instructions may be used:

```
;  
;Read a digital dial indicator connected to a MicroRidge MPX-4S Mux  
;Channel A  
P30 Z=F ;  
1:[60 ] F ;Send command prefix <  
2:[0 ] Exponent of 10 ;  
3:[ScratchLoc1 ] Z Loc ;  
  
P30 Z=F ;  
1:[82 ] F ;Send R command  
2:[0 ] Exponent of 10 ;  
3:[ScratchLoc2 ] Z Loc ;  
  
P30 Z=F ;  
1:[65 ] F ;Select channel, 65=A=CH1, 66=B=CH2, etc.  
2:[0 ] Exponent of 10 ;  
3:[ScratchLoc3 ] Z Loc ;  
  
P15 Port Serial I/O ;  
1:[1 ] Reps ;  
2:[01 ] P15 SERIAL I/O (ASCII/RS-232, 1200 Baud)  
3:[10 ] P15 Serial I/O (Delay (units = 0.01 sec))  
4:[4 ] First Control Port ;  
5:[ScratchLoc1 ] Output Loc ;  
6:[3 ] No. of Locs to Send ;  
7:[13 ] Termination Character ;  
8:[20 ] Maximum Characters ;  
9:[100 ] CTS/Input Wait (units = 0.01 sec) ;  
10:[ReadingLoc ] Loc ;  
11:[1 ] Mult ;  
12:[0 ] Offset ;
```

Note: The labels ScratchLoc1, ScratchLoc2, ScratchLoc3 and ReadingLoc in the above example programming are specific to the MultiLogger software, use appropriate Input Storage locations if writing your own program.

Note: The units of the channel are a function of the configuration of the dial indicator, i.e. if the output of the dial indicator is set for inches then the reading units are inches.

Appendix B of CR10/CR10X Operator's Manual contains detailed information on the P15 instruction.