USER MANUAL

KEITHLEY DATA ACQUISITION

KEITHLEY METRABYTE/ASYST

COM-485
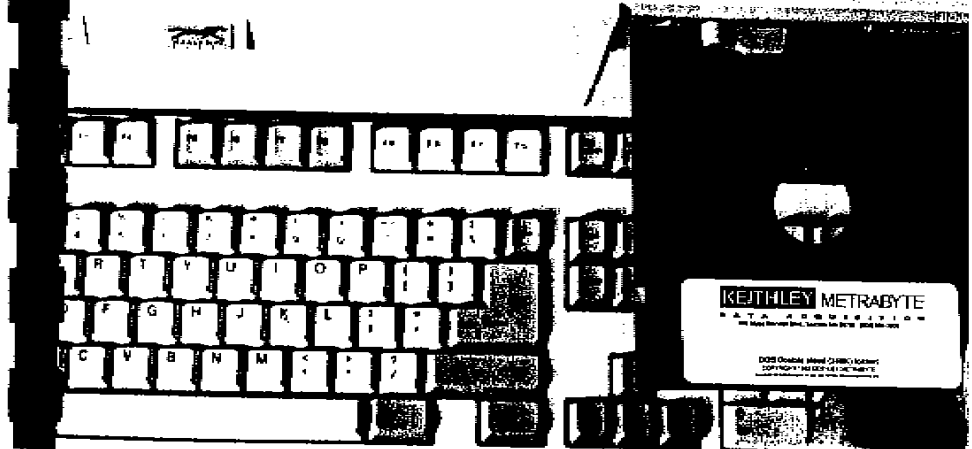
KEITHLEY METRABYTE

DATA ACQUISITION

User Guide

for the

COM-485
Network & Communications
Board

Revision A - July 1992
Copyright © Keithley Data Acquisition 1992
Part Number: 24448

KEITHLEY DATA ACQUISITION - Keithley MetraByte/Asyst

440 MYLES STANDISH BLVD., Taunton, MA 02780
TEL. 508/880-3000, FAX 508/880-0179

Warranty Information

All products manufactured by Keithley MetraByte are warranted against defective materials and workmanship for a period of one year from the date of delivery to the original purchaser. Any product that is found to be defective within the warranty period will, at the option of Keithley MetraByte, be repaired or replaced. This warranty does not apply to products damaged by improper use.

Warning

Keithley MetraByte assumes no liability for damages consequent to the use of this product. This product is not designed with components of a level of reliability suitable for use in life support or critical applications.

Disclaimer

Information furnished by Keithley MetraByte is believed to be accurate and reliable. However, the Keithley MetraByte Corporation assumes no responsibility for the use of such information nor for any infringements of patents or other rights of third parties that may result from its use. No license is granted by implication or otherwise under any patent rights of Keithley MetraByte Corporation.

Note:

MetraByte™ is a trademark of Keithley MetraByte Corporation.

Basic™ is a trademark of Dartmouth College.

IBM® is a registered trademark of International Business Machines Corporation.

PC, XT, AT, PS/2, and Micro Channel Architecture® are trademarks of International Business Machines Corporation.

Microsoft® is a registered trademark of Microsoft Corporation.

Turbo C® is a registered trademark of Borland International.

Contents

■ ■ ■

INTRODUCTION

1.1 OVERVIEW

The COM-485 allows the networking of IBM PC/XT/AT and compatible computers over an RS-485 bus. Unlike the RS-422 bus, which allows multiple receivers but only a single transmitter on the bus, the RS-485 allows multiple transmitters and receivers to communicate over a 2-wire bus in a *party-line* configuration.
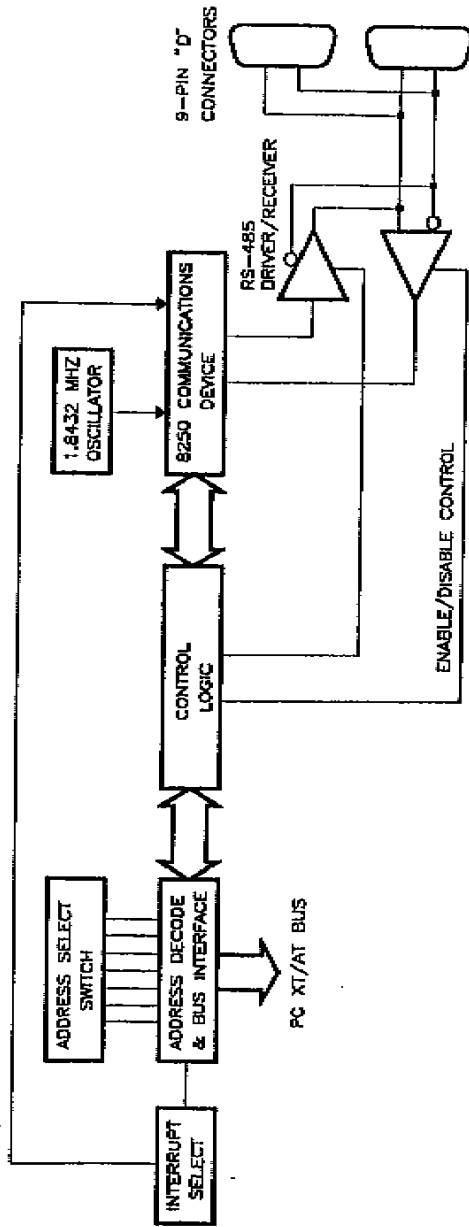
The COM-485 permits up to 32 different Driver/Receiver stations to communicate at 56 kilobaud. While standard IBM communications software limits communication speed to 19.2 kilobaud, alternative software options are available to overcome this obstacle.

Spacing between COM-485 stations may be up to 4000 feet.

The Board may use the COM1 or COM2 serial ports, and it configures for any required I/O address and Interrupt Level. A single write to Base Address +7 (3FFh for COM1 or 2FFh for COM2) enables/disables the RS-485 transmitter and receiver chip. This chip is the industry-standard 8250 peripheral interface adapter chip.

Applications for the COM-485 include networking instruments, scanning and updating various user input and output devices (such as CRTs, keyboards, etc.), and any other communications application requiring more than one device to be simply and inexpensively networked to a personal computer.

9-PIN "D" CONNECTORS

RS-485 DRIVER/RECEIVER

8250 COMMUNICATIONS DEVICE

1.8432 MHZ OSCILLATOR

ENABLE/DISABLE CONTROL

CONTROL LOGIC

ADDRESS SELECT SWITCH

ADDRESS DECODE & BUS INTERFACE

PC XT/AT BUS

INTERRUPT SELECT

1.2 SPECIFICATIONS

Power Supply

+5 volt   500 mA typ, 600 mA max.

Environmental

Operating Temp.   0 to 50 °C.
Storage Temp.   -55 to +125 °C.
Humidity   0 to 95% noncondensing.

■ ■ ■

CHAPTER 2

INSPECTION, CONFIGURATION, & INSTALLATION

2.1 INSPECTION

After removing the wrapped Board (COM-485 board) from its outer shipping carton, proceed as follows:
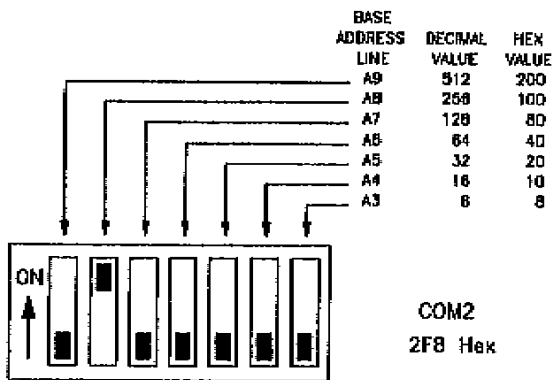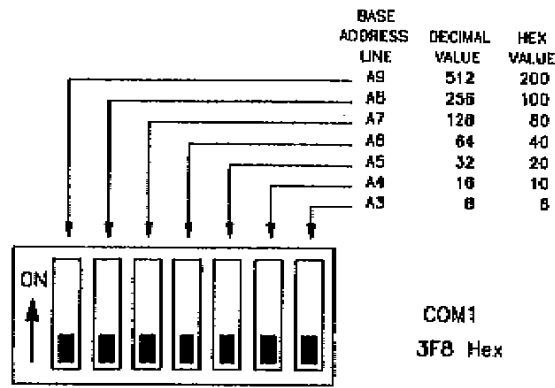
1. With the wrapped Board in one hand, place your other hand firmly on a metal portion of the computer chassis (the computer must be powered off but grounded). The purpose of this step is to discharge static electricity from you and the wrapped Board, thereby preventing damage to Board components.

2. Carefully unwrap the Board from its anti-static wrapping material. Save the wrapping material for possible future handling or storage of the Board.

3. Inspect the Board for signs of damage. If any damage is apparent, return the Board to the factory.

4. Check the remaining contents of your package against the packing list to be sure your order is complete. Report any missing items to the factory immediately.

5. When you are satisfied with preliminary inspection, you are ready to configure the Board. Refer to Section 2.2 for configuration options. After configuring the Board, refer to Section 2.4 for installation instructions.

2.2 CONFIGURATION OPTIONS

Base Address Switch

Use the Board's 7-position DIP switch to set the Base Address. While the Base Address may be anywhere in the PC's I/O address space, its setting for Communications Ports COM1 and COM2 must be 3F8h and

2F8h, respectively. The DIP switch settings for these addresses are illustrated as follows:

BASE ADDRESS LINE	DECIMAL VALUE	HEX VALUE
A9	512	200
A8	256	100
A7	128	80
A6	64	40
A5	32	20
A4	16	10
A3	8	8

COM1
3F8 Hex

| BASE ADDRESS LINE	DECIMAL VALUE	HEX VALUE
A9	512	200
A8	256	100
A7	128	80
A6	64	40
A5	32	20
A4	16	10
A3	8	8

COM2
2F8 Hex

Note that a switch in the ON position has no value, but a switch in the Off position sets the Binary weight of the corresponding Base Address bit (512, 256, 128, 64, 32, 16, or 8). The Base Address is the sum of all the settings.

|	IRQ	ADDR
Com 1	4	3F8
"	3	2F8
" 3	3	3E8
"	4	2E8

Interrupt Levels

The COM-485 board allows access to all IBM PC Interrupt Levels. If the Board is to be installed as a COM1 or COM2 port, it must be set to Interrupt Level 4 or 3, respectively. The Level is set by jumpers on the IRQ LEVEL connector (J3). Simply place the jumper on the required Interrupt Level position, as shown in the diagram.

INSTALL JUMPER HERE TO SET UP AS COM2.

INSTALL JUMPER HERE TO SET UP AS COM1.
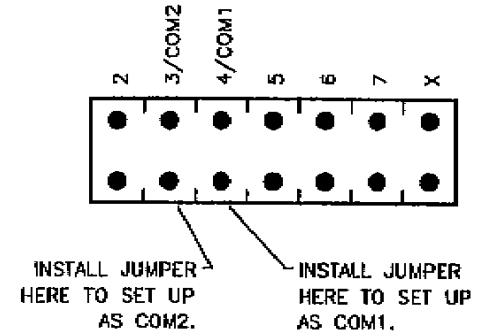
2.3 CONNECTOR PIN ASSIGNMENTS

Note that on the Board, Pin 4 is connected to Pin 8 and Pin 5 is connected to Pin 9.

GND
N/C
FUSED GND
TX/RX+
TX/RX−

+5 V
TX/RX+
TX/RX−
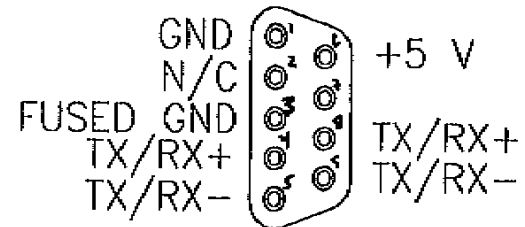
RS-485

2.4 BOARD INSTALLATION

To install the Board in a PC, proceed as follows.

WARNING!
ANY ATTEMPT TO INSERT OR REMOVE ANY ADAPTER BOARD
WITH COMPUTER POWER ON COULD DAMAGE
YOUR COMPUTER!

1. Turn Off power to the PC and all attached equipment.

2. Remove the cover of the PC as follows: First remove the cover-mounting screws from the rear panel of the computer. Then, slide the cover of the computer about 3/4 of the way forward. Finally, tilt the cover upwards and remove.

3. Choose an available option slot. Loosen and remove the screw at the top of the blank adapter plate. Then slide the plate up and out to remove.

4. Hold the Board in one hand placing your other hand on any metallic part of the PC/AT chassis (but not on any components). This will safely discharge any static electricity from your body.

5. Make sure the board switches have been properly set (refer to the preceding section).

6. Align the board connector with the desired accessory slot and with the corresponding rear-panel slot. Gently press the board downward into the socket. Secure the board in place by inserting the rear-panel adapter-plate screw.

7. Replace the computer's cover. Tilt the cover up and slide it onto the system's base, making sure the front of the cover is under the rail along the front of the frame. Replace the mounting screws.

8. Plug in all cords and cables. Turn the power to the computer back on.

2.5 NOTICE!!

After power-up, the COM-485 requires a software reset of its UART. Normally, your programming language or your software package performs this reset upon openning the COM port. However, some languages (such as ITT BASICA) do not.

If you are having difficulty communicating with a COM-485, try writing Data 0 to Address &H3FC (for COM1) or &H2FC (for COM2) prior to opening the COM port. This action should reset the UART and allow proper operation.

If you continue to experience difficulty, please contact Keithley MetraByte Technical Support at 508/880-3000.

■ ■ ■

PROGRAMMING

The COM-485 configures easily for operation in that it sets up for either the COM1 or COM2 port. In addition, a simple software write to Base Address +7 (3FFh for a COM1; 2FF for a COM2) enables/disables the transmitter and receiver. The following register map details the required write for the desired function.

BIT:	0	1	2	3	4	5	6	7
	RCVR	XMTR	X	X	X	X	X	X
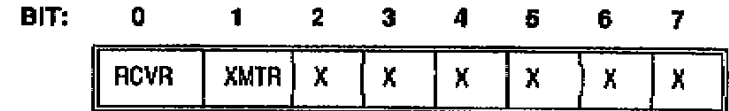
Where:

BIT 0	BIT 1	RECEIVER	TRANSMITTER
0	0	Disabled	Disabled
0	1	Disabled	Enabled
1	0	Enabled	Disabled
1	1	Enabled	Enabled

Note that Base Address +7 is a Read/Write address. Writing controls the enabling of the RCVR and XMTR input and output; Reading returns the current status of the RS-485 Driver/Receiver.

Though most versions of BASIC (and DOS) do not recognize comunications speeds above 9600 Baud (sometimes 19.2 kilobaud) on COM1 or COM2, you may override a small portion of their initialization routine and operate the COM-485 (or COM-422) boards at 38.4 or 56 kilobaud. To perform this process, you must set the Board up as a COM1 or COM2 and then override the Baud Rate Registers in the 8250 Interface adapter (on the Board).

The following is a simple test routine that communicates between two COM-485 boards set as COM1 and COM2. The routine tests communications at 56 kilobaud.

```
10  OPEN "com1:4800" AS #1        'Set up standard COM1
20  OPEN "com2:4800" AS #2        'Set up standard COM2
30  T1$ = "testing COM1 TX/COM2 RX 'Define test xmsn data
40  OUT &H3FF,2                   'Enable COM1 RS-485 Driver
50  OUT &H2FF,1                   'Enable COM2 RS-485 Rcvr
60  '**** start of Baud rate override routine ****
70  DUMMY = INP(&H3FB)           'Read Control Register
80  OUT &H3FB,128:OUT &H2FB,128  'Select Baud Rate Cntrl Regs
90  OUT &H3F8,2:OUT &H3F9,0      'Set COM1 at 56 kilobaud
100 OUT &H2F8,2:OUT &H2F9,0      'Set COM2 at 56 kilobaud
110                              'Note that if selecting 38.4
120                              'KBaud, Write a 3 instead of
130                              '2 to &H3F8 and &H2F8
140 OUT &H3FB,DUMMY:OUT &H2FB,DUMMY 'Reset Control Register
150 PRINT #1, T1$               'Transmit data from COM1
160 INPUT #2, R2$               'Rcv COM2 data, store in R2$
170 PRINT R2$                   'Print received results
180 '
190 IF T1$< > R2$ THEN PRINT  "error in transmission"
200 '
210 CLOSE                       'Close communications ports
220 END
```

■ ■ ■

CHAPTER 4

FACTORY RETURNS

Before returning any equipment for repair, please call 508/880-3000 to notify MetraByte's technical service personnel. If possible, a technical representative will diagnose and resolve your problem by telephone. If a resolution of your problem by telephone is not possible, the technical representative will issue you a Return Material Authorization (RMA) number and ask you to return the equipment. Please reference the RMA number in any documentation regarding the equipment and on the outside of the shipping container.

Note that if you are submitting your equipment for repair under warranty, you must furnish the invoice number and date of purchase.

When returning equipment for repair, please include the following information:

1. Your name, address, and telephone number.

2. The invoice number and date of equipment purchase.

3. A description of the problem or its symptoms.

4. Be sure to reference the RMA number on the outside of the package!

Repackage the equipment. Handle it with ground protection; use its original anti-static wrapping, if possible.

Ship the equipment to

■ ■ ■