

OM-480-SW Software Guide

Operator's Manual

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Table of Contents

| | |
|--|-----------|
| Introduction | 1 |
| Networking | 1 |
| HELP Screens | 2 |
| The Main Menu | 2 |
| | |
| Operation | |
| Set up RS232 Port; Set Time/Date | 3 |
| Set/Review Data Logger Channels | 4 |
| Set/Review Single Channel | 5 |
| Set/Review Channel Data Program | 5 |
| Review Recorded Data | 6 |
| Real-time Display | 6 |
| | |
| Appendix A - PC Communication Software | 8 |
| Appendix B - Implementing mX+b | 12 |
| Appendix C - Networking | 14 |
| Appendix D - RS-232 Serial Port | 15 |
| Appendix E - Data Conversion to DIF (Data Interchange Format) | 18 |

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Introduction

This User's Guide covers the Applications and Communications Software package provided as an option for the OM480, 481, 580, and 581 dataloggers. Some of the material presented herein is also covered in the "USER'S GUIDE for the OM480, 481,580,581 DATALOGGERS". However, specific modes of datalogger operation and various other parameters, tests, data formats, etc. are not covered and you should refer to the Datalogger users guide for a rigorous explanation of these.

The OM480 series dataloggers are complete, standalone data acquisition and control systems capable of reading various analog and digital signals from such common industrial applications as temperature, voltage, current, contact closures, relays, etc. and transmitting the level of these signals to a computer, printer, terminal, etc. The OM481 series has a built-in display panel and pressure sensitive keypad for local readout of the signals and for setting up the datalogger as desired. All dataloggers are capable of operation via a computer. The dataloggers are also capable of being networked or linked together via the RS-422 serial net with maximum (total) transmission distance of up to one mile.

This Applications and Communication Software allows complete datalogger control while allowing you to review data, store data, set up the various alarms with upper and lowers limits, display alarm messages, and view the data as it is collected and transmitted back to the computer. Data is stored to disk in ASCII and may be easily converted to DIF format (conversion program provided) so that it is fully compatible with other analysis and graphics packages such as LOTUS 1-2-3. In addition, the data is also available for your own programs and may be easily edited, annotated, or reviewed at any time. Full screen menus and data display are also standard features.

Networking

A typical datalogger network may look like that shown below with a single Master Unit being linked to the computer via the RS-232 serial port and the remainder of the dataloggers being linked via their RS-422 serial ports. In this way, up to 50 dataloggers may be linked together allowing 800 analog input channels (16 channels per datalogger) and 200 digital inputs (4 per datalogger). Each datalogger also has 16 digital output channels which may be used as alarms.

HELP Screens

The Applications and Communication Software package is complete with HELP screens explaining the operation of each of the choices on the Main Menu. These HELP screens may be used at any time by simply going to the Main Menu and selecting "H HELP". These HELP Screens may be transmitted to a printer by displaying the screens and using the "Shift-PrtSc" keys on your PC for each screen. It is suggested that you do this so that a hard copy is readily available when needed.

The Main Menu

Before using the Application Software Package, it is suggested that you make a back-up copy of the programs DDL.EXE (and HELP.DOC) as a working disk (or create a directory with these programs on it on your hard disk). Store the original disk in a safe place. Once this has been done, run the DDL.EXE program by simply typing DDL, followed by the "Enter" key:

A:DDL<cr>

The first screen will be displayed which gives information about Copyright dates, version number, and whether you have a color monitor. Answer Y or N (default is Yes). A second question will be asked concerning the number of dataloggers in your configuration (default is 1). If you have more than one datalogger in your system, the software program will allow you to set up all channels within the datalogger network. Else, press the "Enter" key for default.

The Main Menu will appear along with the TIME and DATE in the upper left-hand and right-hand corners, respectively. The Main Menu will look something like this:

- A Exit to DOS
- B Set up RS232 Port; Set Time/Date
- C Set/Review Data Logger Channels
- D Set/Review Single Channel
- E Set/Review Channel Data Program
- F Review Recorded Data
- G Real-Time Display
- H Help

Set up RS232 Port

The first choice, Exit to DOS, does exactly that and needs no further explanation. Choice B Setup RS232 Port; Set Time/Date allows you to configure your computers serial port for data communications with the datalogger as well as set the Time and Date in the datalogger. All data sent to the computer from the datalogger will be time and date stamped. Remember, the communication parameters for both the PC and the datalogger must match.

Selecting B displays the following menu:

Select Option:

- A - Set Baud Rate
- B - Set Line Control Data
- C - Toggle XON/XOFF Enable/Disable
- D - Toggle Wait on CTS
- E - Set Time
- F - Set Date
- G - Transmit Time and Date
- H - Toggle Serial Port

Current RS-232 Configuration:

Baud Rate = 9600
Stop Bits = 1
Supports XON/XOFF = yes
Serial Port = COM1

Word Length = 8
Parity = None
Wait on CTS = yes

F10 - Return to Main Menu, Selection?

"A" allows you to choose from four different baud rates;
1200, 2400, 4800, 9600.

"B" allows you to set:
7 or 8 data bits
Odd, Even, or No parity
1 or 2 Stop Bits

"C" allows you to Enable or Disable XON/XOFF support

"D" essentially enables handshaking between the datalogger and computer.

"E" sets the Time in the format (12 or 24 hour) displayed HH:MM:SS

"F" sets the date MM/DD/YY

"G" transmits the date and time to the datalogger for updating

"H" changes the selected COM port to the alternative COM port

Set/Review Data Logger Channels

Each datalogger stores a program with setup information in battery backed RAM. This program can be displayed and/or modified by selecting "C" on the Main Menu. The program for the OM580 series of dataloggers also displays the "m" and "b" constants for the embedded $mX+b$ algorithm implemented on all OM580/581 dataloggers. The High and Low limits may be set for each channel by using this menu. Selecting "B" will cause the following message to appear:

Please Wait. Loading program from data loggers ...

After a brief pause the following (or a similar) screen will appear:

| Channel | Units/M(x) + | B | High Limit | Low Limit |
|---------|--------------|-------|------------|-----------|
| 0 | | | Disabled | Disabled |
| | 1.000 | 0.000 | | |
| 1 | | | Disabled | Disabled |
| | 1.000 | 0.000 | | |
| 2 | | | Disabled | Disabled |
| | 1.000 | 0.000 | | |
| 3 | | | Disabled | Disabled |
| | 1.000 | 0.000 | | |
| 4 | | | Disabled | Disabled |
| | 1.000 | 0.000 | | |
| 5 | | | Disabled | Disabled |
| | 1.000 | 0.000 | | |
| 6 | | | Disabled | Disabled |
| | 1.000 | 0.000 | | |
| 7 | | | Disabled | Disabled |
| | 1.000 | 0.000 | | |
| 8 | | | Disabled | Disabled |
| | 1.000 | 0.000 | | |

F1 - Implement, F2 - Save, F3 - Print, F10 - Main Menu, Selection?

Comments may be added by moving the light bar (via the arrow keys) beneath the channel and typing in the comment. Limits are set in a similar fashion and comments may be added with the limits. These comments will be displayed when the channel is in ALARM. For example:

| Channel | Units/M(x) + | B | High Limit | Low Limit |
|--------------|--------------|-------|--------------|--------------|
| 0 | | | Disabled | Disabled |
| Bearing Temp | 1.000 | 0.000 | 0210 Too Hot | 0050 Too Low |
| 1 | | | Disabled | Disabled |
| Stack Temp 1 | 1.000 | 0.000 | | |
| 2 | | | Disabled | Disabled |
| | 1.000 | 0.000 | | |

Enabling and disabling the limits is done by moving the light bar over the corresponding channel limit and typing either E or D, respectively. For example:

| Channel | Units/M(x) + | B | High Limit | Low Limit |
|--------------|--------------|-------|--------------|--------------|
| 0 | | | Enabled | Enabled |
| Bearing Temp | 1.000 | 0.000 | 0210 Too Hot | 0050 Too Low |
| 1 | | | Disabled | Disabled |
| Stack Temp 1 | 1.000 | 0.000 | | |
| 2 | | | Disabled | Disabled |
| | 1.000 | 0.000 | | |

Once you have modified the channels, limits, etc. the program may be saved to disk by using "F2 - Save". You will be asked for the name of the program under which the parameters are to be saved. This program may then be called at some later date for use. You may also print the program to a printer via F3 - Print or you may implement the program which will download it to the datalogger (Alarm Limits and Enable/Disable are the only things sent). At any rate, the program just created will remain in computer memory until it is either modified or you exit to DOS. In this way, several programs can be created and called as required for your various applications.

Set/Review Single Channel

Assigning comments, upper and lower limits, enabling/disabling limits, and assigning "m" and "b" constants (OM580/581 only) may be done for all channels (using "C-Set/Review Data Logger Channels" above) or for a single channel. The implementation is the same as that explained above. Using this choice has the advantage of allowing the datalogger to continue operation while the single channel parameters are being displayed or modified.

Set/Review Channel Data Program

The Channel Data Program allows you to create new application programs with labels, setpoints, etc or view previously stored programs. Unlike the "Set/Review Data Logger Channels" program, this selection does not retrieve the setup program from the datalogger. It does, however, allow creation of new programs or modification of existing programs that have been stored on disk. Its implementation and application is the same as that in the "Set/Review Data Logger Channels".

NOTE: to create a new application program, simply press the "Enter" key when the program asks for "FILENAME:".

Review Recorded Data

Review Recorded Data, when invoked, allows you to data of the type previously collected as follows:

- A Review Periodic Data
- B Review Alarms-Only Data
- C Review Transitions-Only Data

Selection?

After making one of the above choices, you will be prompted for the filename under which previous data had been stored. If data has not been previously collected using "Real-time Display", naturally, data cannot be viewed. If you have collected data and logged it to disk, type in the name of the file to view the data. For a full explanation of Alarms-Only & Transitions Only, see the next section (Real-time Display) of this manual.

Real-time Display

Once the datalogger has been set up or configured and you are happy with the various applications programs, if any, then you will want to begin data collection. The Real-time Display menu allows data to be displayed in a variety of formats:

- A Display Data
- B Display Alarms Only
- C Display Transitions Only
- D Begin/End Recording Session
- E Set/Review Single Channel

As you can see, there are a number of different data formats to choose from. **Note that choices A, B, and C require the datalogger to have been previously set to Enable those channels that you wish to view. This is done using the C E command via the Communication program KERMIT (for a full explanation, see Appendix A of this manual or the GETTING STARTED section of the datalogger manual).** If this is not done, data will not be displayed and the datalogger will act as if it is not communicating. The channels must also have been enabled via the hardware (rotary) switch. Channels that have been disabled in hardware cannot be enabled via software.

Display Data allows you to view data as it is being transmitted to the datalogger. Since the screen will show only the first 9 channels (0-8), use the "PgDn" key to view the remainder, if desired. You may also Acknowledge Alarms for any specific channel by using the F4 key and specifying the channel number.

Display Alarms Only allows viewing of those channels that are in Alarm. If no channels are in Alarm, the screen does not display data.

Display Transitions Only allows viewing of only those channels that have gone into or out of Alarm status. If no channels have been in the Alarm state, data is not displayed.

Begin/End Recording Session does not require any previous datalogger setup so that data may be collected and stored to disk immediately. This menu prompts you for the beginning and ending channels for data storage as well as the datalogging interval (how often data is written to disk). The datalogging session is ended by pressing D again from the Real-time Display menu.

Set/Review Single Channel may be used to modify comments, high/low limits, etc for any channel while allowing the datalogger to continue operation and data storage.

APPENDIX A

PC COMMUNICATION SOFTWARE (MSKERMIT)

The PC Communication Software package is provided on the same diskette as the Data Logger Application Software. This Comm package is called KERMIT and is provided free of charge since it is in the public domain and cannot be sold. The following brief discussion is reproduced here for your convenience (it is also provided in the GETTING STARTED section of the datalogger manual).

Using MSKERMIT and this discussion, will allow you to send commands to and receive information from the datalogger. It assumes no knowledge of the datalogger itself and minimal knowledge of the computer being used. MSKERMIT and a datalogger is all that is required to "converse" with the datalogger. In order to use the Communication program provided (MSKERMIT.EXE), you will need the following minimal system components:

- o A OM480, 481, 580, or 581 datalogger
- o The Applications and Communications Software package
- o An IBM PC/XT or PC/AT compatible
- o An interface cable (DDL-PC-6 for the PC/XT or DDL-AT-6 for the PC/AT)

Serial Port Switches

On the underside of the datalogger is an 8-gang DIP switch for configuring the serial port. It is important that the datalogger serial port be configured to match that of the computer you are using. Generally, you will set the datalogger serial port to the following settings (this matches those in the MSKERMIT communication program):

| Parameter | Sw | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-------------|----|-----|-----|----|-----|-----|-----|----|----|
| 9600 Baud | | OFF | OFF | ON | | | | | |
| No Parity | | | | | OFF | OFF | | | |
| 8 Data Bits | | | | | | | OFF | | |
| XON/XOFF | | | | | | | | ON | ON |

Failure to set the switches in the above manner may result in conflicts with the MSKERMIT program and may cause difficulty in communicating with the datalogger.

Invoking MSKERMiT

Connect the serial cable between the IBM PC/XT/AT or compatible (COM1) and the datalogger. Check the datalogger to be certain that the power switch is in the OFF position. Plug the datalogger power supply into the rear of the datalogger and a convenient wall outlet, respectively. "Boot" the computer and insert your working copy of the Application and Communication Software package (or use your Hard Disk, as required). Type MSKERMiT<cr> (target the Hard Disk directory with the MSKERMiT files on it and type MSKERMiT<cr>). The following should be displayed on the computer screen:

MSKERMiT<cr>

[Connecting to host, type Control-] C to return to PC

and the bottom of the screen should look like this:

Esc chr: ^] Port:1, Speed: 9600, Parity: None, Echo: Lcl,
Type ^]? for Help

NOTE: MSKERMiT will normally autoconnect when invoked. If it does not, simply type "CONNECT". The status line normally states that Echo is in a Lcl state. If it does not, simply type "Ctrl-] C" to disconnect from the datalogger, then type "set local on" and reconnect to the datalogger (by typing "connect"). Also note that there is a file called MSKERMiT.DOC that may be read for further information concerning the MSKERMiT program. You may also want to check the status of the MSKERMiT settings by using the "status" command (computer must not be "connected" to the datalogger for this command to work).

If your datalogger is not turned on, turn it on now. The datalogger will sign on like this:

| | | |
|------------------|-----------|----------|
| Powered down at: | 07 Mar 89 | 09:09:12 |
| Current time is: | 10 Oct 89 | 10:11:41 |

If you have a OM580 or 581 model, you may scan all the data channels by typing the following (spaces are important):

```
Kermit-MS>S D 000 019<cr>
```

The OM480 and 481 models will always send data for all channels so that the channel specifiers are not required. The computer screen should look something like this depending upon the way the TCV-16 rotary switches are set:

| | |
|----------------------|-----|
| Ch000 = ?XXXX. Deg F | OFF |
| Ch001 = ?XXXX. Skip | OK |
| Ch002 = +0000. Skip | OK |
| Ch003 = ?XXXX. Skip | OK |
| Ch004 = ?XXXX. Skip | OK |
| Ch005 = ?XXXX. Skip | OK |
| Ch006 = ?XXXX. Skip | OK |
| Ch007 = ?XXXX. Skip | OK |
| Ch008 = ?XXXX. Skip | OK |
| Ch009 = ?XXXX. Skip | OK |
| Ch010 = ?XXXX. Skip | OK |
| Ch011 = ?XXXX. Skip | OK |
| Ch012 = ?XXXX. Skip | OK |
| Ch013 = ?XXXX. Skip | OK |
| Ch014 = ?XXXX. Skip | OK |
| Ch015 = ?XXXX. Skip | OK |
| Ch016 = ?XXXX. Skip | OK |
| Ch017 = ?XXXX. Skip | OK |
| Ch018 = ?XXXX. Skip | OK |
| Ch019 = ?XXXX. Skip | OK |

At this point, both your datalogger and computer serial ports are operating correctly. If none of the above works, check all cable connections, switch settings, and make sure that the power is on. Also check that all cables are properly seated. Retry the above or see the trouble-shooting guide if problems persist.

Enabling Channels

Using the Applications Software package for Real-time Data Display requires that the datalogger be continually transmitting data. Several parameters must be set prior to using the Real-time Display portion of the Applications software. First, you should enable any channels that have not been enabled (using C E and specifying the channels desired). **Remember, channels disabled via hardware cannot be enabled in software.** Next, set a sampling interval using the Interval Set command and specifying the sampling interval. For example, to set a sampling interval of 20 Seconds, simply type:

```
I S 00:00:20
```

This sets the sampling interval but does not enable sampling.

Lastly, use the Interval Enable command to begin data transmission:

```
I E
```

Once this is done, you can call the DDL.EXE program and run the Real-time Display section of the program.

Troubleshooting the Serial Port

If you have had any trouble communicating with the datalogger, several common problems and their most immediate resolutions are listed below:

- 1) One of the most common problems is loose connectors. Make sure that all cables and connectors are securely seated in their respective receptacles.
- 2) Beyond this, make sure that the switches are set according to the description and drawings shown earlier.
- 3) If your computer has more than one serial port, you may be connected to Port 2. If so, simply invoke MSKERMIT, disconnect from the datalogger (by typing Control-] C) and type the following MSKERMIT command :

```
Kermit-MS>DO COM2
```

Then "reconnect" the datalogger and computer (type "connect") and run through the above procedure again.

Appendix B *Implementing $mX+b$ (DDL-4100 Series)*

The following section is reproduced from the Datalogger User's Guide for your convenience. It assumes use of MSKERMIT for implementation, but is specifically reproduced here for the examples and given. When implementing $mX+b$ via the Application Software package, you can simply enter the values and transmit them to the datalogger.

The OM580 and 581 dataloggers were designed specifically for interfacing to a very wide variety of sensors and transducers and reporting/displaying their resultant data in engineering units. The software built into the datalogger is capable of implementing a standard $mX+b$ algorithm and applying this mathematical function to the input signal (VDC, 4-20mA, etc.) with resultant conversion to virtually any engineering unit (GPM, psi, Degrees, Tons, lbs, etc). The OM580 series actually applies the $mX+b$ algorithm to all input signals with a default function of $m+1$ and $b+0$ (the incoming signal is multiplied by 1 and therefore remains unchanged). Implementation of $mX+b$ involves changing the default values to the values you wish to use. This is done on a per channel basis allowing each channel to implement a different scaling factor (m) and offset (b) as required.

Programming

The following discussion is directed at the OM580 and computer system. Assigning values for m and b can be done only via the serial port in conjunction with a computer. This example uses the MSKERMIT communication program supplied on the "GETTING STARTED" diskette and assumes some familiarity with the program and its operation. If you are not familiar with MSKERMIT, you might want to review the START-UP section of this manual for a full explanation.

Invoke MSKERMIT:

The program should autoconnect. If not, simply type **connect**. Make sure that you have local echo ON. Then simply type:

| | |
|----------------------|--|
| m set -5 0 5 | This command sets m to a value of -5 for channels 0 thru 5 |
| bn set 20 1 3 | Sets b to +20 for channels 1 thru 3 |
| scan b 1 3 | Returns value of b for channels 1 thru 3 |
| scan m 0 10 | Returns value of m for channels 0 thru 10 |

Assigning Labels to the Channels

In conjunction with the $mX+b$ algorithm, the OM580/581 dataloggers are also capable of label assignments in order to identify the various channels other than the default

labels (automatically assigned with the TCV-16 channel type rotary switch). Assigning the various labels is simply a matter of using the "UNITS SET" command followed by the label (no spaces) and the various channels desired.

units set psig 1 3 Assigns the label "psig" to channels 1 thru 3

Calculating Values for M and B

Suppose a flow rate transmitter (4-20mA) has been calibrated to read a full scale range of 0 to 400 gallons per minute. The output from the transmitter must be scaled by the datalogger to read/report data as Gallons per Minute. The 4mA signal corresponds to 0 gallons per minute and the 20mA signal corresponds to a maximum reading of 400 gallons per minute. Since the full scale range of the input signal is 16mA (20 minus 4), each mA corresponds to 25 gallons per minute ($400/16 = 25$). Therefore, we must multiply the datalogger signal "X" by 25 ($m=25$) and use a zero offset of -100 (since $4mA \times 25 = 100$).

The M and B values are applied to the input signal prior to data transmission or display (on the front panel) so that the number seen is actual gallons per minute, in this case.

Appendix C
Single Signal to Multiple Channels,
Multiple Units, Networking, etc.

Connecting Slaves to a Master Unit _____

Multiple (slave) dataloggers may be connected to a Master Unit when more input channels are required. Any OM580 or 581 may act as a Master Unit (channel 000) and can control up to 4 additional units (80 Analog input channels plus 15 Digital Input channels, max). In any Master/Slave combination, data is sent to the Master Unit from the Slaves allowing the Master Unit to act as the controller for data transmission. As such, the time and date of the Master Unit is used for all slaves.

When controlled from any IBM PC/XT/AT compatible computer via an RS-422 link, up to 50 dataloggers may be controlled from the computer (800 Analog Input Channels and 195 Digital Input Channels, max). A OM580 or 581 is desirable in a network so that some of the parameters may be controlled directly from the front panel.

Slaves are connected to Masters and to each other via the RS-422 ports (DB-9 connectors) on each datalogger. An RS-422 cable (part # DDL-C422) is used to interconnect the Masters to slaves (normally contiguous channels) and slave to slave for a total of 5 units when not computer controlled and up to 50 units when used with a computer. The total maximum length for all RS-422 cables must not exceed 1 mile.

Making an RS-422 Serial Cable _____

In the event that you either have an existing serial cable (DB-9P to DB-9P) or simply want to purchase the connectors and make your own interconnect cable, the following diagram is provided:

| <u>DB-9P</u> | | <u>DB-9P</u> |
|--------------|-------------|--------------|
| Pin 1 ----- | Shield ---- | Pin 1 |
| Pin 4 ----- | Twisted --- | Pin 4 |
| Pin 5 ----- | Pair ---- | Pin 5 |
| Pin 8 ----- | Twisted --- | Pin 8 |
| Pin 9 ----- | Pair ---- | Pin 9 |

Note that on very long cable lengths, connect the shield to pin 1 or earth ground at one end only. This will avoid ground loop problems.

Appendix D
Serial Communications

All OM480/580 series dataloggers are equipped with a built-in communication port (RS-232) for data transfer to printers, terminals, other dataloggers, etc. for use with a computer as a powerful Data Acquisition and Control System. In order to communicate with other devices, the serial port configuration for both devices must match. The datalogger serial port is configured via a DIP switch on the underside of the unit along with a series of charts showing how to set the switches for the particular configuration desired. The charts below are a reproduction of those on OM480. Typical settings are in BOLD type.

| |
|--------------------------|
| RS-232 PORT SETUP |
|--------------------------|

| BAUD RATE | | | |
|------------------|------------|------------|-----------|
| Switch | 1 | 2 | 3 |
| 19.2K | OFF | OFF | OFF |
| 9600 | OFF | OFF | ON |
| 4800 | OFF | ON | OFF |
| 2400 | OFF | ON | ON |
| 1200 | OFF | ON | ON |
| 600 | ON | OFF | ON |
| 300 | ON | ON | OFF |
| 75 | ON | ON | ON |

| PARITY | | |
|---------------|-----------|------------|
| Switch | 4 | 6 |
| ODD | ON | ON |
| EVEN | OFF | ON |
| NONE | ON | OFF |
| NONE | OFF | OFF |

| WORD LENGTH | |
|--------------------|------------|
| Switch | 6 |
| 7 BITS | ON |
| 8 BITS | OFF |

| HANDSHAKE PROTOCOL | | |
|---------------------------|-----------|-----------|
| Switch | 7 | 8 |
| XON/XOFF | ON | ON |
| ACK/NAK | ON | OFF |
| NONE | OFF | ON |
| NONE | OFF | OFF |

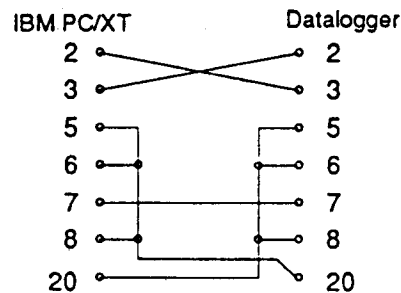
Cables, Connectors, & Software

The START-UP GUIDE is supplied with every OM480/580 datalogger (it is the first section of the manual) along with the GETTING STARTED diskette. Make certain that you have this diskette. Communication to the datalogger may be done via the MSKERMIT.EXE file on the GETTING STARTED diskette. The serial cable that you require for your specific setup will depend upon several factors, but should not be difficult to ascertain with a little help from the following section and drawings.

If you are using an IBM PC/XT compatible with an RS-232 port (either built-in or a plug-in card) you will most likely require the DDL-PC-6. This is a relatively standard configuration with a DB-25-S on one end and a DB-25-P on the other (the S and P are Socket and Plug). However, some serial cards use a DB-9 rather than a DB-25 so that you will then require a DB-9 to DB-25 cable. Also, certain serial cards may require a null modem or gender changer for proper operation. This will become apparent once you start working with the various parts and looking at the computers serial I/O port. The following serial pin-out should be of help if you need anything other than the standard cable.

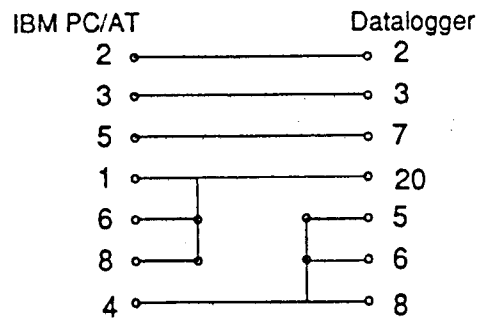
| Datalogger Pin # | Function |
|------------------|---|
| 1 | Ground |
| 2 | TD (Transmit Data from Datalogger) |
| 3 | RD (Receive Data to Datalogger) |
| 4 | RTS (Ready to Send from Datalogger) |
| 5 | CTS (Clear to Send to Datalogger) |
| 6 | DSR (Data Set Ready to Datalogger) |
| 7 | SG (Signal Ground) |
| 8 | CD (Carrier Detect to Datalogger) |
| 19 | SCD (Signal Carrier Detect from Datalogger) |
| 20 | DTR (Data Terminal Ready from Datalogger) |

The DDL-PC-6 has the following internal wiring scheme and will, normally, be all that is required for datalogger operation with a PC compatible.



Part # DDL-PC-6

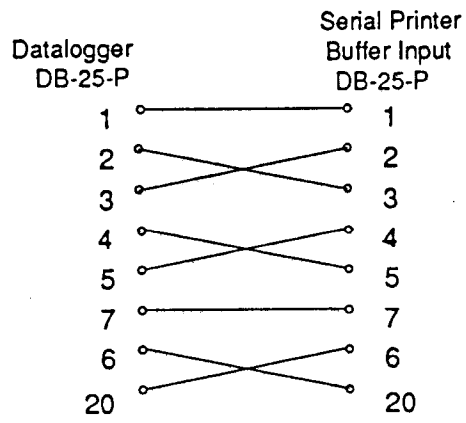
The IBM PC/AT uses a DB-9 connector and is wired somewhat differently requiring a DDL-AT-6 cable. Its internal wiring scheme is as follows:



Part # DDL-AT-6

Serial Printer Connections

Serial printers may also be connected to the datalogger via the serial port (A serial to parallel converter is also available for connecting to centronics compatible printers). Most serial printers use a standard serial cable with two DB25P connectors so that you may use any standard serial interface cable or the DDL-S-6. The pinout is shown below.



Part# DDL-S-6

Appendix E
Data Conversion to
Data Interchange Formt

Data that has been stored to disk may be converted to a format compatible with several common spreadsheet programs such as Lotus 1-2-3. This allows data to be analyzed, graphed and otherwise manipulated under the control of these spreadsheet packages. Conversion is a simple matter of invoking the conversion program (BUF2DIF.EXE) and, when prompted, entering the filename (with .DAT) extension of the file to be converted. For example:

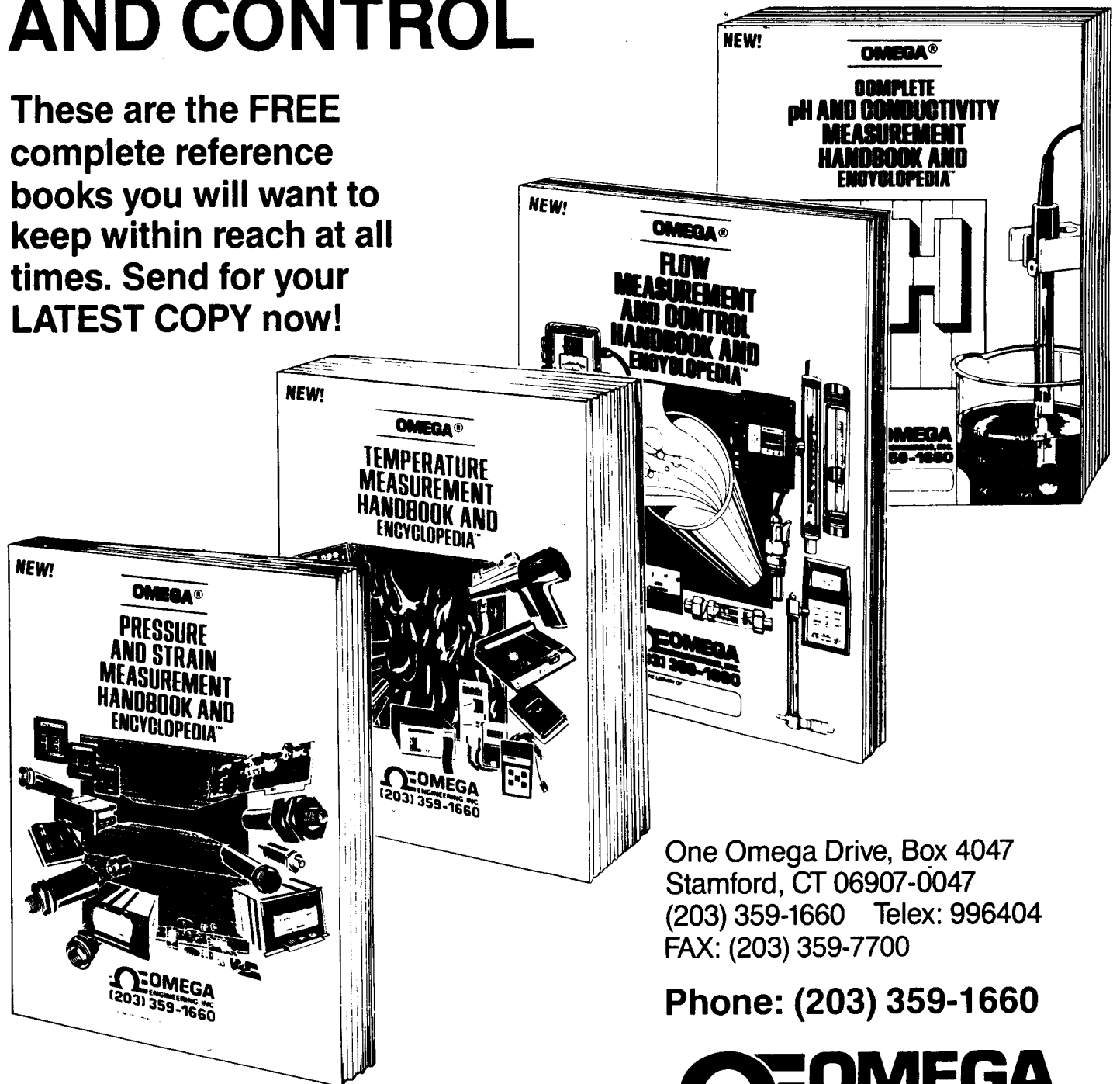
C:BUF2DIF<cr>

Enter the input filename or <Esc><cr> to exit:TEST.DAT<cr>

Invalid data, if found, is identified by the line number where it was found within the data file.

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