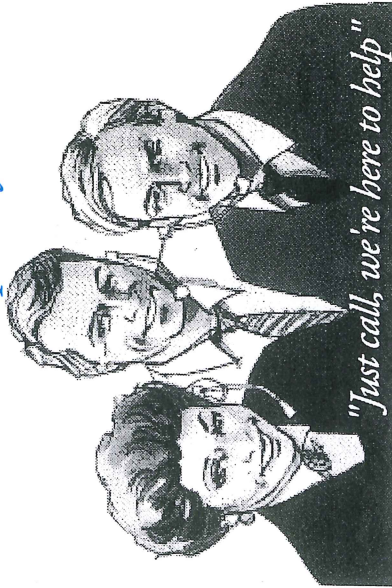


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*Microbuffer
Universal 16™*

**OPERATING
MANUAL**

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1 Introduction

Congratulations on your purchase of the Practical Peripherals MicroBuffer Universal 16 printer/plotter buffer.

Your new buffer is built with pride in the United States using the latest surface-mount technology. Each unit is tested at the factory and subjected to a *burn-in* period before being packaged for shipment to your dealer. We are so confident of the quality of this product that it is covered by a lifetime repair or replacement warranty.

MBU16 MicroBuffer Package

Your Microbuffer package was carefully checked before shipment from the factory. If any item on the following list is missing, please repack the unit and return the entire package to your dealer for exchange.

The package includes:

- MicroBuffer Universal 16 Printer Buffer (MBU16)
- MBU16 Power Supply: 120 VAC input - 9VAC 850 Ma. Output
- MBU16 MicroBuffer Reference Manual
- MBU16 Utility Diskette
- Warranty Registration Card

The included IBM PC utility diskette contains the MBU.EXE and PPIMODE programs. These files can be useful for changing buffer parameters under some circumstances. Neither program is necessary for normal operation of your Microbuffer. Please see Section 4 for more complete details.

Your New MBU16 MicroBuffer

The MBU16 is a stand-alone hardware buffer designed for use with virtually any computer and printer/plotter combination supporting either an RS232C serial port or the industry-standard Centronics parallel interface.

Your MBU16 allows you to increase the efficiency of your computer and printer/plotter operations. It does this by allowing your PC to return to data processing chores while the much slower printer or plotter is supplied with characters stored in the buffer memory.

With the MBU16 installed in your system, you will be able to pause the buffer output or produce multiple copies of your documents at the touch of a front-panel button. You can even buffer multiple print jobs.

To maximize computer productivity, however, the buffer memory size *must* always be larger than the largest file or group of files you intend to send to your printer or plotter in one session.

Your MBU16 is shipped with 32,768 bytes of memory, but it is user expandable to 16 megabytes (characters) of buffer memory. When fully expanded, the memory capacity of this Microbuffer is more than adequate to handle the largest CAD, graphics, or Postscript files. This makes it an ideal peripheral for the desktop publisher or graphic artist. The details of memory expansion are presented in Appendix E.

Ease of Use

The MBU16 is extremely easy to install and use. For the majority of users, installation will be a matter of cabling the Microbuffer between the computer and its printer, then turning the power on. The MBU16 will instantly detect the port type connected to its input and output and automatically configure itself to be compatible. The automatic port sensing feature of the MBU16 is enabled in the factory default settings. This plug-and-play functionality is available to the majority of users in the IBM PC world. It is even there for other microcomputer platforms which support a standard RS232 serial port or the Centronics parallel interface. Even when the automatic port detection feature cannot decipher what the MBU16 is connected to, the user can intercede by pressing a few front-panel buttons, forcing the buffer input and output to the desired port configuration.

In the IBM PC environment, serial port configurations for data format and speed can be changed with the use of the supplied MBU.EXE utility program. This same capability is available by using MBU command files created with an ASCII text editor and the small but powerful MBU Command Language.

Because the MBU16 can recognize most serial (RS232) or parallel (Centronics interface) devices automatically, most users can enjoy the benefits of hardware buffering immediately. In many cases, installation requires nothing more than selecting and connecting the appropriate cables between the computer, the buffer and the printer. Please see Section 2, *Installing Your Buffer*, for complete details on cabling and installation.

General Buffer Background

The limiting factor in document printing or plotting is usually the mechanical operations of your printer or plotter. Many older printers are also very limited in the amount of memory they have to handle

incoming characters. Often they will have as little as 80 characters of internal memory. While the printer is busy printing the characters, your PC must wait until the printer or plotter can accept more characters.

There are two methods used to address this problem: the software print spooler and the hardware printer buffer. The two are significantly different.

A software print spooler allows you to continue with a foreground computer task while your printer does its job in the background. The total resources of your PC are split between the two tasks. Often this will result in overall degradation of system performance. Even on a *fast* computer this system degradation can be disappointing.

The hardware printer buffer approaches the problem differently. It provides a reservoir of fast memory between the output of your PC and the input of your printer or plotter. This memory will accept characters as quickly as the PC and its software can send them out.

How soon your PC completes its part of the printing or plotting task depends upon the type of buffer, the amount of memory installed, the type of interface, the size of the file, the size of your printer's internal character buffer, and the output characteristics of the software being used. It does not depend upon the actual output speed of the printer or plotter itself, *unless* the buffer memory capacity is less than the size of the file to be printed or plotted.

Once the file size is greater than the size of the buffer memory, system performance drops dramatically. This condition forces your PC to wait for your printer or plotter to clear characters from the buffer memory before it can send the remainder of the file.

Remember...

To maximize computer productivity, the buffer memory size must always be greater than the size of the largest file you intend to print.

Buffer Misconceptions

Perhaps the most prevalent misconception about hardware printer/plotter buffers is that they somehow make the printer or plotter operate faster. This not true. If the printer *throughput* is 100 characters

per second before a buffer is placed in the system, it will continue to be about 100 characters per second after the buffer is installed. The buffer turns *waiting* time into *productive* time.

Introduction of the buffer into the system splits the communication channel between the computer and the printer into two parts. There is an input channel to the buffer from the computer and an output channel from the buffer to the printer.

The computer is an extremely fast device when compared to the printer. Therefore, when printing a long document, the computer spends almost all of its time waiting for the printer to indicate that it is ready to accept more characters from the computer's memory. The buffer provides external memory where the computer can quickly dump the document. The buffer then takes over the job of providing the printer with characters to print, releasing the computer to be available for another task.

As a general rule, if the computer is waiting for the output device to accept more data, a hardware printer buffer will improve system performance. If the output device is waiting for data from the computer, a buffer will do little if anything to improve the situation.

System Performance Considerations

Remember, when using a hardware buffer such as the Microbuffer Universal 16, performance will almost always be improved if any installed software print spoolers are disabled. In the Windows 3 environment, *Print Manager* is the Windows print spooler. In most instances, when using the MBU16, performance will be improved if Print Manager is disabled.

The front panel input and output lights, CLEAR and COPY respectively, can be used to monitor the way data is flowing into and out of the buffer. You can learn a great deal about how your specific application handles the print function by watching the light pattern on these two LEDs.

Manual Conventions

Throughout the remainder of this manual certain typographical conventions have been followed to show keyboard input, illustrate screen display dialog, and clarify terminology. The following table provides a key to that usage.

←	This symbol may also be shown as Enter or Return on your computer keyboard.
← → ↑ ↓	These symbols represent the various arrow keys for cursor movements you can access from your computer keyboard.
F1 Esc	These symbols represent function keys on your computer keyboard.
"computer"	This word refers to any computer system that has an RS232 serial or Centronics parallel port.
"printer"	This word refers to a printer, plotter, or other RS232 serial or Centronics parallel output device.
CLEAR	This symbol is used for buttons on your MBU16.
PASS	This symbol is used for the lights on your MBU16.

Figure 1-1 Manual Conventions

Bold type is used to reference MBU16 configuration items (such as **MicroBuffer Configuration File Name**). **UPPERCASE BOLD TYPE** is used to show actual text strings typed on the keyboard or supplied to your MBU16 (such as PAU OFF).

Bold italic type is used to designate general text field categories (such as *baud*) and figures (such as *Figure 1-1*). *Normal italic type* is used to reference figure descriptions (such as *MBU16 MicroBuffer Configuration Window*), and to emphasize key concepts and terms.

Function keys and other function specific keys are represented as shown in *Figure 1-1*.

Manual Overview

This manual has been divided into sections to make desired information easily accessible to users of varying needs and experience levels. The following descriptions provide a brief synopsis of the subjects covered by this manual.

Most users will likely need to read only Sections 2 and 3.

Section 1 — *Introduction*

General information is provided about your MBU16. A brief overview of buffer concepts is given along with pertinent technical details about your unit.

Section 2 — *Installing Your Buffer*

This section explains how to physically connect your buffer to your computer and your printer or plotter.

Section 3 — *Operating Your Buffer*

The front-panel buttons and associated display lights are described to enable you to better manage your print jobs.

Section 4 — *Using the MBU.EXE Program*

In this section you will learn how to use an IBM PC specific utility that automatically updates the buffer's configuration.

Section 5 — *Improving Serial Throughput Speed*

This section applies only if you want to buffer to a serial device.

Section 6 — *In Case of Difficulty*

If you are experiencing difficulty obtaining the expected results, this section provides a list of problems and suggested causes. Please read this section on troubleshooting before calling Technical Support.

Appendix A — *Summary Tables*

All functions, commands, controls, and configuration options are documented in the summary tables of this section.

Appendix B — *Using Command Files*

This section describes the creation and use of MBU command files with non-IBM PC computers.

Appendix C — *Command Language*

Each command, its use, and syntax are explained. Factory default settings are indicated where applicable. This appendix is designed for the more technical user who wants to bypass the automated utility or wishes to configure the buffer for a non-IBM PC computer.

Appendix D — *Memory Installation*

This appendix outlines how to install up to 16 megabytes of SIMM memory in your MBU16.

Appendix E — *FCC Certification*

The U.S. Federal Communication Commission requires certain notifications to the user about the use and repair of digital equipment.

Appendix F — *Warranty & Technical Support*

Important information regarding your MBU16 warranty is given here along with guidelines for obtaining technical assistance.

2 Installing Your Buffer

Installing the MBU16 MicroBuffer into your computer system is a very simple process. In an existing installation, you just disconnect the printer cable at the computer port, reconnect it to the output of the MBU16, and finally, connect the computer's printer port to the input of the Microbuffer. (See *Figure 2-1*).

Before connecting or disconnecting any cables, however, be sure that the power to all devices is OFF. Do not attempt to make connections to a computer, printer, or any peripheral device under power.

It is important that you leave the cable currently attached to your printer or plotter connected as it is. The output of the MBU16 is designed to look exactly like the output of the IBM PC. So, if your existing arrangement works when connected to your PC, it will work when connected to the output of the MBU16. This is true whether the interface on your printing device is a parallel Centronics port or an RS232 serial port.

For Maximum Safety...

Always turn the power OFF whenever you connect or disconnect any peripheral device to or from your computer or other output device.

The Power Connection

Before you actually start your installation, be certain your printer or plotter works correctly when hooked directly to your computer. Then, turn your computer and your printer or plotter off.

Next, make sure the power switch on your buffer is OFF. This is the *down* position of the slide switch on the rear panel of the MBU16. Then:

1. Fit the small plug of the power cube into your MBU16.
 2. Plug the power cube into a standard 120V AC wall socket.
 3. Slide the rear-panel power switch to the UP position.
- and...

Installing Your Buffer

MicroBuffer Universal 16

1-8

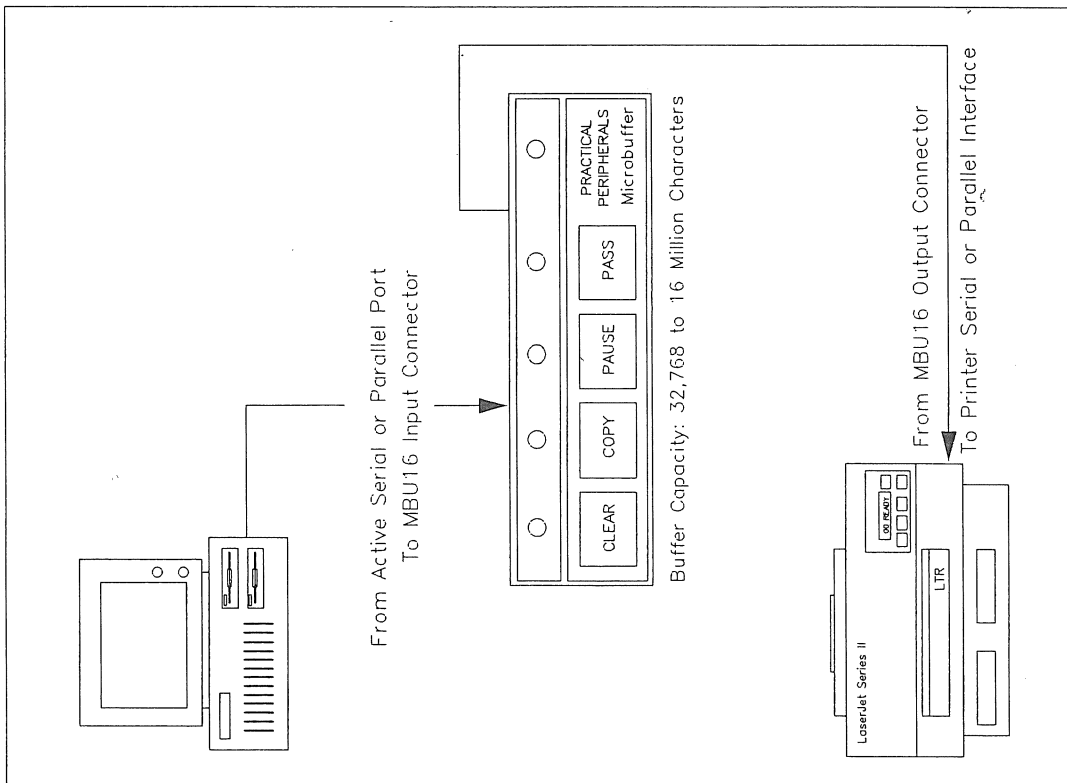


Figure 2-1 Typical MBU16 System Installation

2-1

4. Observe the indicator sequence:

CLEAR COPY PAUSE PASS

This display indicates the buffer has powered up and passed its internal tests successfully and is ready for normal operation. Please turn the buffer power OFF before proceeding with the installation.

IMPORTANT

When following this installation procedure, be certain to remove the printer cable connection at the computer end, leaving the cable connected to the printer. This connector is then attached to the output connector on the MBU16. If you reverse this aspect of the procedure, the installation probably will not work or will not work properly.

The Parallel Connection

The parallel printer output on the IBM PC is a DB25S (female) connector. This is the same type of connector found on the output of the MBU16. So, you can simply plug the printer cable into the MBU's output port.

To complete the physical connections, you will need a 25-pin shielded cable with a DB25P connector on each end. This is a standard male-to-male "serial cable." Since it will be used for parallel data, it is important that it supports *all* 25 pins. Some cables, which look exactly the same, will have wires between only 9 or 15 of the connector pins. So be sure the cable between your computer's parallel port and the buffer contains the required 25 wires and they are connected straight through pin for pin.

Since the MBU16 factory default is for automatic port detection, once your cables are properly connected, your buffer is ready to turn on and operate. Simply power up your computer, printer, buffer and use your printer or plotter in the usual manner. The MBU16 should be totally transparent to your computer, printer, and software applications.

The Serial Connection

The serial port connector on the IBM PC is generally a DB25P or a DE9P. These are male connectors. So when you disconnect the existing cable connected to your printer or plotter from the computer, you will

not be able to just plug it directly into the output port of the MBU16. You will need a male-to-male adapter with the proper number of pins on each end so the connection can be made.

Just as it is with the parallel connection, you want to disconnect the *computer* end of the printer cable, not the printer end. This is extremely important on serial connections since they will often have crossover connections in the existing cable. These are necessary to allow two DTE (Data Terminal Equipment) devices to talk to each other correctly. If your existing cable allows your serial port to talk to your serial printer, then moving the computer end of that cable over to the output of the MBU16 will assure proper signal configuration.

Next you must install a cable between your computer's serial port and the input to the Microbuffer. This cable must be a standard shielded serial cable supporting a minimum of 9 signal lines. For the IBM PC, the cable would be a female-to-male with DB25 connectors on each end. For an IBM AT-style serial port, the computer end would require a DE9 connector instead of the DB25.

The factory defaults of the MBU16 will allow the buffer to automatically detect that it has a serial device on both its input and output ports. The defaults for baud rate and data format are 9600,8,N,1 (9600 baud, 8 data bits, No parity, and one stop bit). If your printer or plotter requirements are different than this, you will need to make the appropriate configuration changes using the MBU.EXE program or with an MBU command file.

You should also be aware that some serial printer cables jumper various signals at one or both ends and the wires may not have continuity from end to end. If you are using such a cable and it does not provide an appropriate signal on pin 3 of the MBU output, the buffer will incorrectly conclude that it is connected to a parallel device.

If you are currently using such a cable, you will still be able to use the MBU16, however, you must override the automatic detection feature of the buffer. Since you *know* what type of device you have, you can easily override the automatic selection by pressing a few front panel buttons. The details are contained in Appendix A in the table *Viewing/Changing Buffer Ports*.

The Hybrid Connection

The Microbuffer Universal 16 has the ability to accept data in either serial or parallel form. It can also output data in either format. This means that you can output data to a serial plotter, for example, while sending that data from your computer to the MBU16 via the parallel port, if your application software will allow this.

The versatility of the MBU16 will actually allow you to configure any of the possible serial or parallel combinations of input and output. All of the suggestions and cautions detailed in the parallel and serial sections above will apply equally when the input and output ports are of different types.

With the single exception where a proper signal is not presented on pin 3 of the buffer's port, the MBU16 will be able to automatically detect and configure itself properly for the attached devices.

In those rare instances where the MBU16 cannot identify device type with its automatic port detection feature, you will be able to force the Microbuffer to set its input and output ports directly with the front panel buttons. Please see the table *Viewing/Changing Buffer Ports* in Appendix A for complete details.

A Final Note...

If a valid signal is not presented to the MBU16 ports on pin 3, the automatic port type detection may not correctly configure the Microbuffer's ports. In this case, it will be necessary to force your buffer's port settings to match your computer's output and/or your printer's input. See the table *Viewing/Changing Buffer Ports* in Appendix A for details.

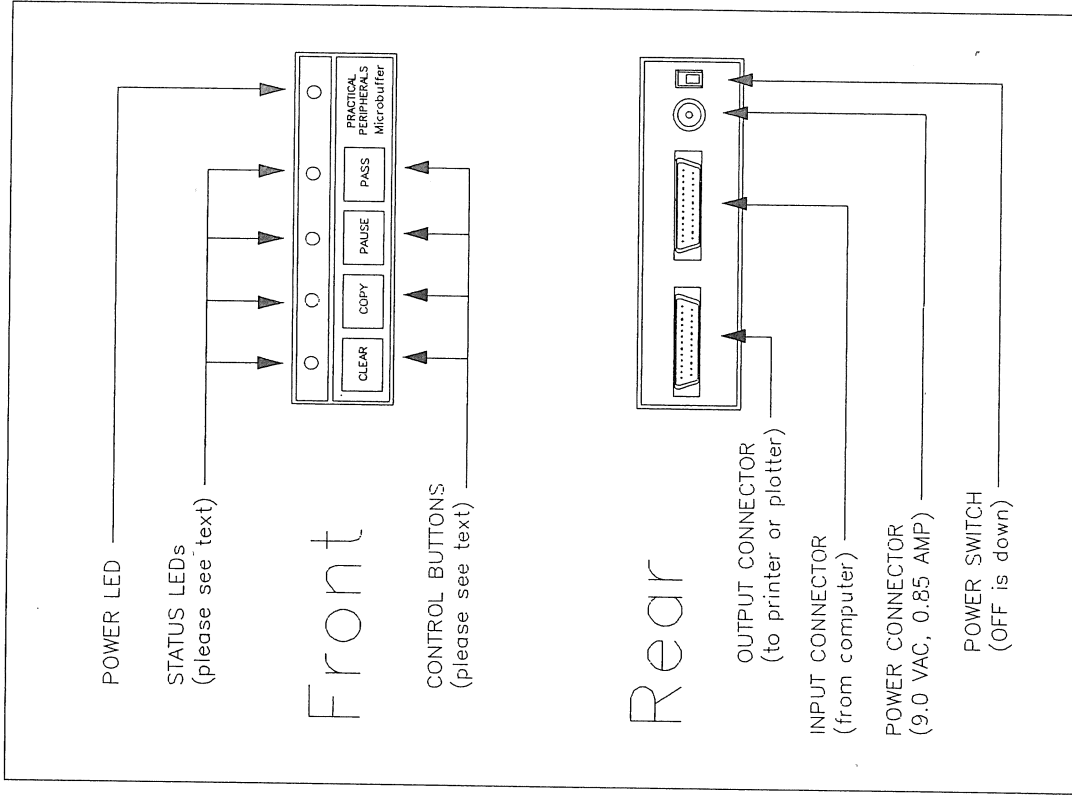


Figure 2-2 MBU16 MicroBuffer Front- and Rear-Panel Views

3 Operating Your Buffer

Once the MBU16 MicroBuffer has been installed into your system and properly configured, operation is very simple and straightforward. The MBU16 will be completely transparent to your application software. Normal operation involves nothing more than using your PC and printer in the usual way.

However, with the MBU16 you can now make multiple copies of any document that will fit within the limits of the installed memory by simply pressing a front panel button. You will no longer need to send the file to the printer a second time.

You may also pause the printing of a long document and then resume. You might need to do this if the printer's paper supply is running low. In a plotter application, you might want to pause to replace a pen with one of a different color, or replace the paper and start again without making the computer spend time to recalculate the plot.

Perhaps you will want to send a printer command sequence to your laser printer to switch it from portrait to landscape mode without losing the data already buffered. All of these things are possible by using the front panel buttons on your Microbuffer.

This section will discuss the more common operations that are done with the MBU16.

Power Up Your MBU16

With the data cables installed on both the input and output as described in the preceding installation section, power up your MBU16 by following the steps listed below:

1. Slide the rear-panel power switch to the UP position.
2. Observe the front-panel indicator sequence:

CLEAR COPY PAUSE PASS

This display indicates the buffer has powered up successfully, completed its initial internal tests and is ready for normal operation. If you have not already done so, power up the rest of your computer system at this time.

Sending Data to Your Printer or Plotter

Your MBU16 is now ready to go to work for you. Use one of your regular PC applications to print or plot a small example. The lights on the buffer front-panel will tell you about the flow of your data as it moves from the PC through your MBU16 to your printer or plotter.

Watching Data Flow through Your Buffer

Very quickly, you will notice a rhythm to the data entering and exiting your buffer. The front-panel LEDs will show you how often your computer sends data to your buffer and at what rate your printer accepts that data from your buffer. Different applications will often produce a different rhythm on the lights. This is caused by the way the application's printer driver is written.

Incidentally, when you have multiple jobs to print, there is no need to wait for the first document to print completely before sending the next. Once your cursor returns to the screen of your application, you may go ahead with your next task or send the next document to print.

The table below summarizes the buffer light behavior as data moves through your buffer. The term *flicker* denotes a rapid on-and-off fluctuating action of the indicated light. The word *blink* refers to a slow on-and-off akin to your car's turn-signal. The term *blip* indicates a single brief on-and-off event like a camera's flash bulb.

When	You Will See
Data flows from your PC to your MBU16	CLEAR flicker
Data flows from your MBU16 to your printer or plotter	COPY flicker
Buffer is full and your buffer file is still inputting (original output is okay, but any copy will be incomplete)	COPY flicker and blink
Buffer marks end of file	CLEAR blip

Note: When data activity between PC and MBU16 stops for the number of seconds specified in the **CLOSE** command (see *Command Language* in Appendix C or *Close File after n Seconds* in Section 4), an end of file is marked.

Controlling Your Buffer

Although you can alter parameters and perform certain buffer control functions using MBU.EXE or the MBU command language, almost all daily-use functions will be handled using the four front-panel buttons. The function entries in the following table are also the names of

summary tables under *Standard Button Operations* in Appendix A. The Appendix A tables contain additional information pertaining to the use of the MBU front-panel buttons.

Front-Panel Button Summary

Press	Function
CLEAR	Delete Outputting Buffer File(s)
COPY	Copy Newest Incoming Buffer File
PAUSE	Pause and Resume Outputting of a File
PASS	Temporarily Bypass Buffered Data

Delete Outputting Buffer File(s) — **CLEAR**

If a printer problem occurs, such as a paper jam, wrong ribbon, or wrong forms, pressing **CLEAR** will stop the currently outputting file. Should another file be in queue waiting behind this one, the current file will be deleted from buffer memory, and **PAUSE** will light. It will then be necessary to press **PAUSE** to start output of this next file.

If the aborted file is the only file (**PAUSE** remains off) you can restart output of that file using **COPY**.

If you wish to delete all files from your buffer, press and hold **CLEAR** for at least three seconds.

Copy Newest Incoming Buffer File — **COPY**

When you wish one or more additional copies of the document currently being sent to the buffer, press the **COPY** button for each additional copy desired. You can request from 1 to 255 additional copies. Each press will add a copy to be printed. As each new file is input to the buffer, you can request additional copies of that file by pressing the **COPY** button during the time it is actively inputting to the buffer.

If you are working with a single file, you can add copies by pressing the **COPY** button during input, while the file is still printing, or after both input and output have ceased. Until you send a second file, turn the buffer off, or press **CLEAR**, you can continue to make copies of the file in the buffer's memory by pressing the **COPY** button.

If Buffer Is Full...

When the buffer memory is FULL the COPY indicator will be blinking to signal this condition. To make complete copies, the buffer memory size must always be large enough to accommodate the entire file you intend to copy. Copies requested while the COPY indicator is blinking will be incomplete.

Copy Example for Multiple Buffer Files — (COPY)

To obtain two copies of one file and three copies of another, do the following:

1. Begin sending the first file to your MBU16.
2. Press (COPY) once to cause output of the additional desired copy of the inputting file.
3. Notice that the COPY indicator briefly goes from flickering to steady as you press the COPY button.
4. Watch the CLEAR indicator flicker during the entire time your first file is being sent to your MBU16.
5. Note that the CLEAR indicator stops flickering when your PC completes transmission of the first file to the buffer.
6. Wait for the CLEAR indicator to flash (Blip: end of file marker). This indicates completion of the file just sent to your MBU16.
7. Begin sending the second file to your MBU16.
8. Press (COPY) twice to cause output of two additional copies of this second file.
9. Notice that the COPY indicator comes on steady during the time you are pressing the (COPY) button. It flickers during the entire period that the buffer is outputting data to your printer.
10. Continue this process for as many additional files and copies as desired within the memory capacity of your MBU16.

Pause and Resume Outputting of a File — (PAUSE)

If a minor printer problem occurs, such as a faded ribbon or low toner indication, pressing (PAUSE) will stop the currently outputting file and PAUSE will light. This will allow you to change the ribbon or toner cartridge, or reposition the paper before resuming the print job. Pressing (PAUSE) again will resume output of this file.

Temporarily Bypass Buffered Data — (PASS)

When you wish to temporarily put any outputting data on hold in order to send configuration commands to your printer or even print a short file, bypassing the data stored in the buffer memory, press (PASS). This function allows you to change printer configurations via application software or a batch file without losing or corrupting the data stored in the buffer memory. This function is applicable to all combinations of input/output port configurations. Pressing (PASS) again will resume any pending printer output.

The LONG PASS function (press (PASS) and hold for 3 seconds) is only applicable when *both* the input and output of the buffer are set for serial operation. LONG PASS also bypasses the internal buffer memory and the data residing there. This function effectively ties the input of the buffer to the output and creates a virtual cable between the computer's serial port and the device attached to the MBU's output. In the LONG PASS mode, the internal UART circuits of the MBU are bypassed completely. Therefore, input and output baud rates and data formats will be determined solely by the computer's serial port and the serial device attached to the output of the MBU. Pressing (PASS) again will restore normal buffer operation and resume any pending printer output.

The LONG PASS function should not be confused with the standard PASS function. While both bypass the data stored in the buffer memory the similarity ends there. LONG PASS is only possible when *both* ports are set for serial operation. You cannot use LONG PASS if either port is set as a parallel port. Where the PASS function provides a minimal 256-byte buffer, LONG PASS is totally unbuffered.

Sending a Printer Control String — (PASS) Example

To immediately send printer or plotter control codes to your printer or plotter while there is a file in the MBU16 memory, do the following:

1. Press (PASS) to temporarily suspend MBU16 output to your printer or plotter.
2. Notice that the PASS indicator comes on.
3. Send the desired control codes to your printer or plotter.
4. Note that while the PASS function is active there is only a 256-byte buffer available to allow proper input and output handshaking.
5. Press (PASS) to resume any pending printer or plotter output.
6. Notice that the PASS indicator goes out.

4 Using the MBU.EXE Program

The MBU.EXE program is written to be used in the IBM PC environment. However, most users will probably never need to install the program. The MBU16 defaults, automatic port type detection, and front-panel buttons will do all that needs to be done for the majority of installations. MBU.EXE is provided as an aid for those instances where the power-up defaults *must* be changed to accommodate non-standard devices or data formats.

If your serial printer will only accept data at 1200 baud, or your parallel printer uses ACK instead of BUSY for handshaking, you will be able to set and store the required parameters in the MBU's nonvolatile memory using the MBU.EXE utility.

If you do not have an IBM-compatible personal computer, the issues discussed here may still be applicable, but you will need to create command files as detailed in Appendix B using the commands described in Appendix C. To create and transfer command files to a non-IBM PC machine you must rely on the editor and output driver available for your particular computer system.

Installing MBU.EXE from Floppy Diskette

Please make a backup copy of the distribution diskette with DISKCOPY before attempting to install the program. MBU.EXE may be used directly from a floppy diskette or installed on a hard drive. Do not use the original distribution diskette for daily operation. Use a copy if you are going to run from a floppy drive. If you want to install the application on a hard disk, do the following:

1. Place the utility diskette in drive A.
2. With the A> prompt showing, you may enter the following command to install it on drive C in the \MBU16 subdirectory:
HDINSTAL A,C,MBU16 ⊕

Follow the screen prompts to complete installation on your hard disk. The installation routine will create the subdirectory for you automatically.

Ready to Run

Now that you have installed MBU.EXE, you are ready to begin using it. If you are using a floppy disk based system, be sure that you have your diskette in drive A with the A> prompt showing. If you are using a

hard disk based system, you should be in the \MBU16 subdirectory, and have the C> prompt showing. At this time, type the following command to start the MBU16 MicroBuffer Configuration Utility:

MBU Ⓜ

The *MBU16 MicroBuffer Configuration Window* will soon appear as shown in *Figure 4-1*. An annotated quick reference "roadmap" to this screen can be found under *Using MBU.EXE* in Appendix A.

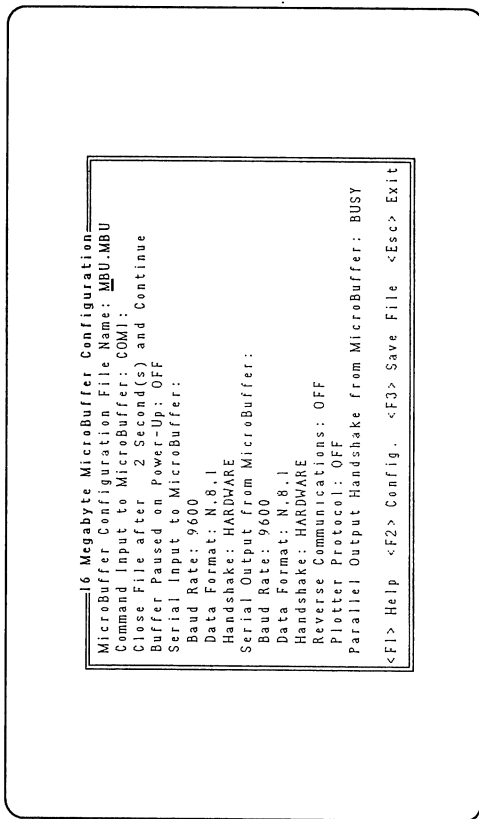


Figure 4-1 MBU16 MicroBuffer Configuration Window

Naming MicroBuffer Configuration Files

When no MBU16 MicroBuffer Configuration File Name is supplied, the default file, MBU.MBU, is automatically assumed. If the MBU.MBU file does not already exist, factory default settings are furnished. The input cursor is initially positioned on the file name for easy modification. Any valid DOS file name can be entered here. In the absence of a file extension, .MBU is automatically supplied. Pressing **[F3]** at any time causes the specified configuration file to be saved to disk.

Naming and saving your configuration files allows you to have more than one configuration file easily accessible. If your applications are diverse and one configuration can not meet all your needs, you can create a customized configuration file for each application.

Before any other window settings can be changed, you must learn how to move around the configuration window. The process is very simple. The table below lists the operations you can perform:

Navigating the MBU16 Main Configuration Window

To:	Press:
Move down to next entry	↓
Move up to previous entry	↑
Pop up configuration choices	←
Pop up help for selected configuration entry	[F1]
Configure MBU16	[F2]
Save configuration file (current DOS directory)	[F3]
Exit to DOS	[Esc]

Command Port Selection

To select the desired command port for the MBU, place the cursor on **Command Input to MicroBuffer** entry, and press **[←]**. Notice the pop-up window which appears as shown in *Figure 4-2*. This is the port where you have the MBU16 physically attached to your computer.

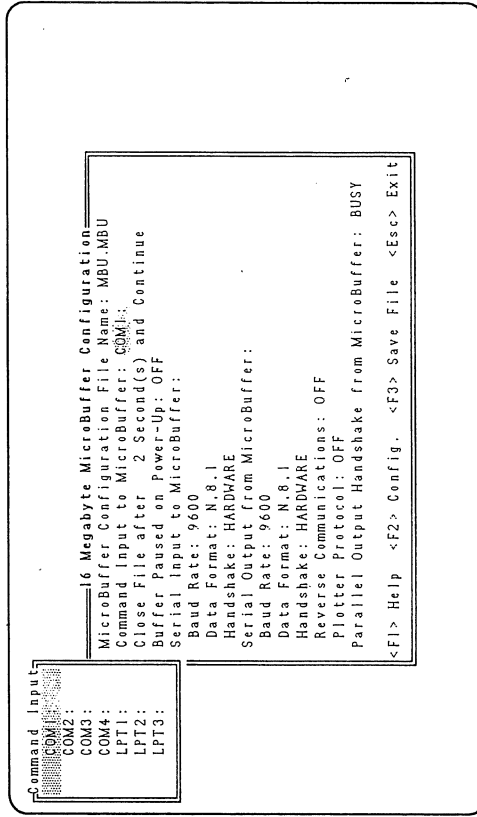


Figure 4-2 PC Ports Available for MicroBuffer Command Input

This selection tells MBU.EXE which port to use for the command file it will create. The choices listed are all the possible serial and parallel IBM PC ports you can attach to the buffer input. Pick the port choice that matches your buffer connection. The table below shows the keystrokes available for highlighting and selecting a choice for configuration update:

Getting Around in the Configuration Pop-Up Window

To:	Press:
Move down to next choice	↓
Move up to previous choice	↑
Update configuration setting	←
Cancel configuration update	ESC

Using Context-Sensitive Help — (F1)

Pressing (F1) makes on-line help information available. For example, when the **Command Input to MicroBuffer** entry has been selected, a *MicroBuffer Command Input Help Information* window (Figure 4-3) appropriate to this entry appears.

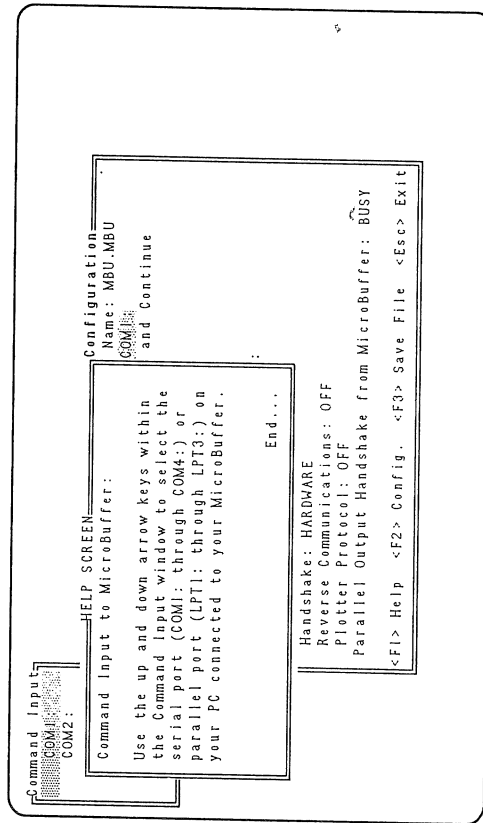


Figure 4-3 *MicroBuffer Command Input Help Information*

The presence of *End...* on the lower right corner of the help window indicates that no additional help information follows. In some instances, the appearance of *more...* on the lower right corner of the help window indicates that an additional page of help information will be displayed by hitting any key.

Each press of (F1) toggles the help window off and on. (Esc) also clears the help window from the screen.

Updating Configuration Parameters

The various configuration parameters described below enable you to customize your MBU16 to do the following:

- Set a time delay to separate print/plot jobs.
- Automatically stop buffer output between print/plot jobs.
- Pause buffer output on power-up.
- Match buffer serial input to your PC.
- Match buffer serial output to your printer.
- Buffer data from output to input (such as data collection using a computer on the input and a modem on the output).
- Simulate a CalComp plotter for AutoCAD.
- Match buffer parallel handshake to your printer or plotter.

Changing End of File Marker Time

Calculation-intensive applications such as a CAD program or a desktop publishing package may stop sending data while processing a document. Application processing delays that stop data flow longer than the time allowed for the *close file time* will mark the end of buffer file incorrectly. To correct this problem, lengthen the close file time to exceed your longest application processing delay.

If the output of two or more documents unintentionally appears on the same page, shorten the close file time or wait longer between computer file transmissions.

Selection of the **Close File after n Second(s)** entry permits a time delay to be specified, after which the information just sent to your MBU16 will be considered a separate print/plot job.

The number of seconds, *n*, can range from 1 to 255. Should an *n* of 0 be entered, it is automatically changed to 1. Should an *n* of greater than 255 be entered, it is automatically changed to 255.

Output Pause or Continue Selection

The end of file time option also allows selecting if the MBU16 will Pause or Continue when seeing an EOF (end of file). This option tells the MBU16 to either Continue to the next file or Pause (such as for a forms change) before outputting the next file.

The Continue default is usually appropriate for printers that allow continuous feeding of paper. When you need to change forms, pens, or plotter setups between buffer files, use the Pause choice.

Pause Buffer Output on Power-Up

The Buffer Paused on Power-Up entry provides an ON/OFF toggle to determine whether or not you want your MBU16 output to be paused on power-up. The factory default is OFF.

When your MBU16 is paused on power-up, the PAUSE indicator is lit, indicating that output from the MBU16 to your printer or plotter will be suspended until (PAUSE) is pressed. This allows you to begin printing after you have made sure that the forms are properly installed and aligned in your printer.

When your MBU16 is not paused on power-up, the PAUSE indicator is not lit, indicating that output from the MBU16 to your printer or plotter can proceed immediately.

Matching the MBU16 Serial Input to Your PC

If you are using your serial port for buffering and your application requires a speed and data format other than 9600 bps, 8 data bits, no parity, 1 stop bit, and hardware handshaking, you must update the buffer settings appropriately. See the *Buffer Handshaking with Your Computer Application* table in Appendix A for a technical explanation of handshaking options.

Selection of the serial input Baud Rate entry activates the pop-up window displaying *Serial Input Baud Rates* (Figure 4-4).

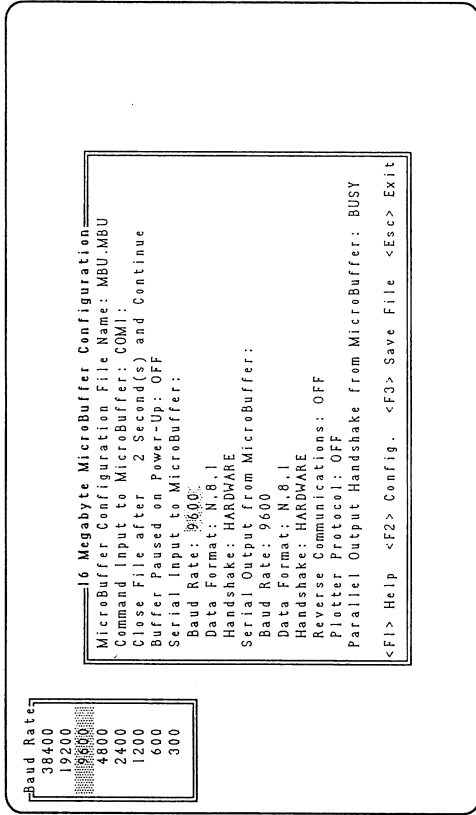


Figure 4-4 Serial Input Baud Rates

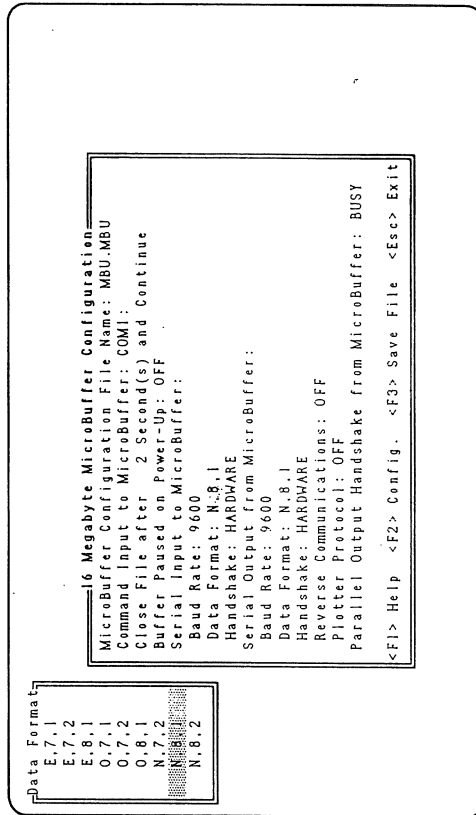


Figure 4-5 Serial Input Data Formats

Selection of the serial input **Data Format** entry activates a pop-up window displaying all available *Serial Input Data Formats* (Figure 4-5).

Finally, selection of the serial input **Handshake** entry provides a selection list for the specification of CTS/DSR hardware handshaking (the factory default), Xon/Xoff software handshaking, ETX/ACK software handshaking, or no serial input handshaking at all.

Two references may help you as you update your buffer configuration: 1) the operations manual for your computer application(s) and 2) the user's manual for your printer. See Section 5 for options available on *Improving Serial Throughput Speed*.

Matching the MBU16 Serial Output to Your Printer

If your serial printer requires a speed and data format other than 9600 bps, 8 data bits, no parity, 1 stop bit, and hardware handshaking, update settings appropriately. See the *Buffer Handshaking with Your Printer* table in Appendix A for a technical explanation of handshaking options.

In addition to the factory default of 9600 bps, selection of the serial output **Baud Rate** entry allows you to choose 300, 600, 1200, 4800, 19200, or 38400 bps. The factory default of N,8,1 **Data Format** entry allows the same alternate choices as those available for the serial input **Data Format** discussed above.

Selection of the serial output **Handshake** entry provides a selection list for the specification of CTS/DSR hardware handshaking (the factory default), XON/XOFF software handshaking, XON/XOFF software handshaking in which an XON character is first expected from the output device before output can begin, ETX/ACK software handshaking, or no serial output handshaking at all.

Buffering Data from Output to Input

This is an advanced feature of your MBU16 that allows data buffering to go from the output to the input. It can only be used when both the input and output port are attached to serial devices.

When reverse communications is on you can buffer data from a modem hooked to the output port back to the computer hooked to the input port. If you use differential speeds with this mode, the output port must be set to a *faster* speed than the input port.

Review the four *Handshaking* tables in Appendix A to determine if you must change your serial input or serial output speed, data format, or handshaking. Study the *Handshaking when Buffer Input and Output Are Serial* table to learn how the RS232 lines interact through the buffer. Change the **Reverse Communications** entry to ON for this application. The factory default is OFF.

Special Considerations for CAD Users

Certain PC plotter application packages, such as AutoCAD, send commands requiring immediate response from the plotter. In addition, the plotter may send responses back to the PC requiring immediate acknowledgment. Choosing **CalComp** on the selection list simulates the CalComp plotter protocol for AutoCAD at both ends of your MBU16 so plot file buffering can proceed unimpeded. The factory default is OFF.

Selection of the serial output **Plotter Protocol** entry provides a selection list for determining whether or not you want your MBU16 to simulate operation of certain CalComp plotters for AutoCAD.

If your plotter is fed paper one plot at a time you may also want to be concerned with the *Changing End of File Marker Time* and *Output Pause* or *Continue* sections above.

Parallel Output Handshaking Options

Most IBM PC printers control data flow using the *busy* line. If your printer uses the *acknowledge* line instead, change this parameter.

Selection of the **Parallel Output Handshake from MicroBuffer** entry provides a selection list for designating the control line to be associated with parallel output from your MBU16.

You can select either the **Busy Line**, the factory default, or the **Acknowledge Line**.

Configuring Your MicroBuffer — [F2]

When you are ready to send the your parameter selections in the *MBU16 MicroBuffer Configuration Window* to your MBU16, press [F2]. The *MBU16 MicroBuffer Configuration Update Window* (Figure 4-6) appears.

Your MBU16 must be in command mode in order to accept your new configuration. Therefore, power down the buffer, press and hold the [PASS] button while you power up the buffer. Then, release the [PASS] button. The pass light will blink indicating you are in command mode.

Press the [Space Bar] to transfer your configuration to the MBU16. If you forget to save your configuration there is a temporary file, **MBU.TMP**, generated automatically and then copied out to your MBU16 via the PC port you specified in the **Command Input** to **MicroBuffer** entry.

All front-panel indicators will come on briefly and then go off, indicating successful processing of the configuration commands and return to normal operation. This new configuration is stored permanently in the MBU16 even when the power is OFF.

Saving MicroBuffer Configuration Files — **F3**

If you wish to save the current parameter selections in the *MBU16 MicroBuffer Configuration Window* to a file for later use, press **F3**. The file specified in the *MicroBuffer Configuration File Name* entry is immediately updated to reflect this current configuration.

For example, if the factory default settings as illustrated in the *MBU16 MicroBuffer Configuration Window* example were to be saved to *MBU.MBU*, the default *MicroBuffer Configuration File Name*, that file would contain eight lines as shown in *Figure 4-7*.

```
REM COM1:
CLO 2 CON
PAU OFF
SER INP 9600,N,8,1,HAR
SER OUT 9600,N,8,1,HAR
REV OFF
PLO OFF
PAR OUT BUS
```

Figure 4-7 Default MicroBuffer Configuration File

The **REM** line shown in *Figure 4-7* is included in the configuration file so that when the configuration file is accessed in the future the **Command Input to MicroBuffer** entry will be correct. Details on the *MBU16* command language example shown in *Figure 4-7* are explained in Appendix C.

Retrieving A Saved Configuration

You can automatically load your configuration by typing

```
MBU yourfile
```

As an example, to load your configuration file named *CAD.MBU*, type

```
MBU CAD
```

Using the MBU.EXE Program

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```
16 Megabyte MicroBuffer Configuration
MicroBuffer Configuration File Name: MBU.MBU
Command Input to MicroBuffer: COM1
Close File after 2 Second(s) and Continue
Ready to Configure MicroBuffer
over port COM1:
Ba
Ha Power down MicroBuffer and power it up
Ser while holding down PASS button
Ba
Ha Press Space Bar to Continue
Ba
Ha Press <Esc> to Cancel
Ba
Ha
Plotter Protocol: OFF
Parallel Output Handshake from MicroBuffer: BUSY
<F1> Help <F2> Config. <F3> Save File <Esc> Exit
```

Figure 4-6 MBU16 MicroBuffer Configuration Update Window

IMPORTANT

Bad command or file name

If you see
at the bottom of the configuration window, *PPIMODE.EXE* is not in the current directory or on your DOS path.

IMPORTANT

*Write fault error writing device xxx
Abort, Retry, Ignore, Fail?*

If you see
underneath the configuration window, you have attempted to send commands through a computer port that is not available. Check your computer and change *Command Input to MicroBuffer* field as necessary. Then try sending your configuration again.

MicroBuffer Universal 16

4-10

5 Improving Serial Throughput Speed

This section only applies if you are using a serial printer, plotter or other serial output device.

When sending data from the computer to the buffer, you have two choices: serial or parallel. If your computer output is via the serial port, you can either: 1) send data to the buffer at the same speed your printer is set for or, 2) send data *faster* than your printer can accept it. Since the MBU16 buffer can accept serial data at 38,400 baud, this would provide the most effective serial choice. Of course, your software application must permit this high serial speed. A third option, which is the best choice to improve serial data throughput, is to send parallel data to the buffer and let the MBU16 feed serial data to the printer.

Maximizing Buffer Effectiveness with Parallel Input

Because your buffer can translate parallel data to serial data, the buffer can look like a parallel printer to your computer and a PC serial port to your serial printer. If your software application allows you to change your printer driver from serial to parallel, then you will be able to output from your computer program at a rate close to 6,000 characters per second instead of a much slower serial speed.

This input speed increase means that your computer cursor will return much sooner than your printer can finish printing. So you will be back to productive work in less time. The cases where you might not be able to take advantage of this feature would be if your software application driver supports only serial software handshakes such as XON/XOFF or ETX/ACK.

Using PPIMODE.EXE

If your computer application relies on the DOS MODE command for the initialization of the computer's serial port, you may be able to use the PPIMODE utility to raise your serial input speed. This will allow you to set the input speed to the MBU16 as high as 38,400 baud. This will optimize the time to cursor return during serial printer operations.

When you installed MBU.EXE on your computer you also installed a program called PPIMODE.EXE. You can substitute PPIMODE.EXE for the DOS MODE command. PPIMODE.EXE provides two advantages over the DOS MODE command: 1) PPIMODE handles baud rates greater than 9600 bps and 2) PPIMODE supports COM3: and COM4: if you want to use one of these ports for buffering.

For example, at the DOS command prompt, typing:

PPIMODE COM4:38400,N,8,1 ☐

establishes COM4: operation at 38,400 bps with a data format of no parity, 8 data bits, and 1 stop bit.

If you decide to use this high-speed serial feature, you may want to include a PPIMODE command in your AUTOEXEC.BAT file so that your computer serial port will be ready whenever you want to buffer.

Adapting a Parallel Printer to a PC Serial Port

There are some arrangements which are possible but they often do not increase productivity. One of these would be to attach a parallel printer to the MBU16's output and feed the buffer input from a slow serial port. While the Microbuffer will allow this attachment scheme, it is not recommended. Except for extenuating circumstances (such as not having a computer parallel port), you would not want to hook a parallel printer to a serial computer port through the buffer because your data throughput would be degraded. However this arrangement could be used if your need were to connect to a parallel printer which was beyond the 12-foot limitations of the Centronics standard. The RS232 serial standard permits using cables lengths up to 50 feet.

6 In Case of Difficulty

The majority of products returned to Practical Peripherals for warranty repair are found to be in proper working condition. Computer systems are complex devices and it is easy to overlook some small detail when setting up new devices. Please read the instructions completely and follow each step given for the installation and testing of your MBU16 MicroBuffer.

Before calling Technical Support, verify that the computer and printer are working properly *without* your MBU16 installed in the system. This will verify the integrity of your system, printer, and cables.

If your computer and printer are operating together properly, review Section 2 *Installing Your Buffer* and follow the testing procedures in Appendix A. Carefully read and follow the step-by-step instructions again. If your MBU16 still does not work, check the following before calling your local dealer or Practical Technical Support.

1. Confirm that you have power to your MBU16 as well as your computer and printer. Be sure that normal line voltage is available at the wall receptacles where you have the equipment plugged in.
2. Verify that ALL units involved with the system are plugged in and the appropriate switches are turned ON.
3. Check the cables and connections between the printer and your MBU16 as well as those between the computer and the buffer. Also verify that the small, round, low-voltage plug from the power cube is properly seated in the receptacle in the MBU16. There should be a red LED visible on the MBU16 front panel when the unit is receiving power.

Be certain you have not changed anything *after* you tested that your printer, computer, and cable all worked properly together.

If your serial printer works when connected to your computer, but does not work when the MBU16 is introduced into the system, be certain that you have attached the existing cable from the printer to the output of the MBU16 and *not* between the computer and the input of the MBU16.

4. If your serial printer or plotter cable does not provide a valid signal on pin 3, the buffer's automatic port detect function will not work. In such a case it will be necessary to force your buffer's port settings to match your computer and your printer. See the *Viewing/Changing Buffer Ports* table in Appendix A to do this.

5. If the input (CLEAR) and output (COPY) lights show data flow by flickering and the printer does not print:
 - a.) Improper port type selection
 - b.) Miswired cable on output port
 - c.) Mixed baud rate between Microbuffer and serial printer.
 6. No data flow indication on buffer input (CLEAR) resulting in DOS error:

"Not ready. Error writing device PRN"

 - a.) Improper port type selection
 - b.) Miswired cable on input port
 7. On serial IN and serial OUT operation with data flow indicated by CLEAR and COPY lights, but nothing outputs to the printer:
 - a.) Mismatch of computer port speed/data format and speed/data format of MBU16 input
 - b.) Mismatch of MBU16 output speed/data format and speed/data format of serial printer.
 8. Data flows through buffer and prints on serial printer, but after one page the printing turns garbled:
 - a.) Improper flow control setup or missing wires in cable
 9. Remove ALL user-installed memory from the buffer and with the same connections and configuration, attempt to print a small file. If the buffer works with the SIMMs removed, replace the SIMMs and run the tests in Appendix A to determine which memory module is bad.
- If you still cannot get your MBU16 to operate properly, call Technical Support at (770) 840-9966

When you make the call, have your notes about what you have done and what the exact symptoms of the problem are. The technician will also want to know the serial number and purchase date of your unit. Please have that information available. The technician will try to troubleshoot your problem over the telephone, so have your system up and running when you call.

If the technician cannot resolve your problem and get your MBU16 to operate to factory specifications, you will be issued an RMA (Return Materials Authorization) number under which you can return the unit for repair or replacement. *Remove and keep any SIMM memory modules you have added to your MBU16 before packaging it for shipment.* Be sure to pack your unit in the original materials to prevent damage during shipment.

The RMA number **MUST** be on the outside of the package. Please mark your package with a legible return address, and include your phone number inside the parcel should a repair technician wish to call you about your unit.

Be sure that you insure your unit when it is shipped back to the factory for repairs. Practical Peripherals cannot be responsible for goods lost or damaged in shipment. **DO NOT** send back a unit without an RMA number. If you do, it will not be directed to the proper department. This may result in additional delays in getting your MBU16 repaired and returned to you.

Send all RMA parcels to:

Practical Peripherals
 375 Conejo Ridge Avenue
 Thousand Oaks, CA 91361

Please mark the outside of the package with the RMA number issued to you.

Remember...

Be sure to remove and keep any SIMM memory modules you have added to your MBU16 before packaging it for shipment.

Appendix A — Summary Tables

The tables in this section provide complete details of all the functions, controls, and indicators of the Microbuffer Universal 16 printer buffer. Be sure to read all the notes when using these tables.

Standard Light Indications

Watching Your Buffer during Power-Up

When:	You Will See:
Your MBU16 powers up normally and is ready to buffer	CLEAR, COPY, PAUSE, PASS sequence once
Your MBU16 fails to power up normally	All lights flash three times

Note: Failure of your MBU16 to power up normally usually indicates a configuration profile problem. This warning will probably mean you have no SIMM memory installed and you configured the input for 38,400 bps. In this instance, you must reconfigure your buffer input to operate at a slower baud rate.

Watching Data Flow through Your Buffer

When	You Will See
Data flows from your PC to your MBU16	CLEAR flicker
Data flows from your MBU16 to your printer or plotter	COPY flicker
Buffer is full and your buffer file is still inputting: (original output is okay, but any copy will be incomplete)	COPY flicker and blink
Buffer marks end of file	CLEAR blip

Note: When data activity between PC and MBU16 stops for the number of seconds specified in the **CLOSE** command (see *Command Language* in Appendix C or *Close File after n Seconds* in Section 4) an end of file is marked.

Standard Button Operations

Delete Outputting Buffer File(s) — (CLEAR)

To:	Observe:	Press:	See:
Abort buffer's outgoing file and advance to next outgoing file if any	(Note 1) (Note 2)	(CLEAR)	CLEAR on
Delete all buffer files	(Note 3)	(LONG CLEAR)	All lights on

Note 1: Should the next file transfer from the PC to your MBU16 already be underway, the PAUSE indicator will also light. Press (PAUSE) before you output the next file to your printer or plotter.

Note 2: If the aborted file is the only file (PAUSE remains off), you can restart output of that file using (COPY).

Note 3: To execute (LONG CLEAR), hold (CLEAR) at least three seconds.

Copy Newest Incoming Buffer File — (COPY)

To:	Observe:	Press:	See:
Copy newest incoming buffer file (Note 1)	(Note 2)	(COPY)	COPY on

Note 1: Newest incoming buffer file is:

- the file *currently flowing* from your PC to the buffer, or
- the file *most recently sent* to the buffer.

Note 2: Press (COPY) repeatedly for up to a maximum of 255 additional copies.

Pause and Resume Outputting of a File — (PAUSE)

To:	Observe:	Press:	See:
Pause outgoing file or pause before sending file	PAUSE off	(PAUSE)	PAUSE on
Resume outgoing file	PAUSE on	(PAUSE)	PAUSE off

Note: The PAUSE indicator blinks when an AutoCAD CalComp output file is pending. Pressing (PAUSE) is required before output to the CalComp plotter can proceed (see the PLOTter command in *Command Language* of Appendix C or *Special Considerations for CAD Users* in Section 4).

Temporarily Bypass Buffered Data — (PASS)

To:	Observe:	Press:	See:
Pass over buffer files and output data directly	PASS off	(PASS)	PASS on
Pass over buffer files and send/receive serial data directly	PASS off	(LONG PASS)	PASS on then PASS off
Stop pass and resume outputting buffer files	PASS on	Release (LONG PASS) (PASS)	PASS on then PASS off

Note: While the (PASS) function is active a minimal 256-byte buffer allows input and output handshaking. While the (LONG PASS) function is active the MBU16 acts like a serial cable, where the RX and TX lines are physically crossed inside the buffer.

Using MBU.EXE

Roadmap to MBU16 MicroBuffer Configuration Window

1.	16 Megabyte MicroBuffer Configuration
2.	MicroBuffer Configuration File Name: MBU.MBU
3.	Command Input to MicroBuffer: COM1
4.	Close File after 2 Second(s) and Continue
5.	Buffer Paused on Power-Up: OFF
6.	Serial Input to MicroBuffer:
7.	Baud Rate: 9600
8.	Data Format: N, 8, 1
9.	Handshake: HARDWARE
10.	Serial Output from MicroBuffer:
11.	Baud Rate: 9600
12.	Data Format: N, 8, 1
13.	Handshake: HARDWARE
14.	Reverse Communications: OFF
15.	Plotter Protocol: OFF
16.	Parallel Output Handshake from MicroBuffer: BUSY

<F1> Help <F2> Config. <F3> Save File <Esc> Exit

Figure A-1 Annotated MBU16 MicroBuffer Configuration Window

To:	Update Line(s):
Name configuration file to be saved in current DOS directory	1
Select command channel (Note 1)	2
Avoid 2 documents overlaid on one page (Note 2)	3
Avoid 1 page of text/graphics/plot splitting onto more than one page (Note 3)	3
Pause buffer output to change forms, pens, or plotter setups (Note 4)	3
Use AutoCAD with CalComp plotter (Notes 4 and 5)	3, 14
Pause buffer output on power-up (Note 6)	4
Match buffer input serial settings to computer serial port settings (Note 7)	5, 6, 7, 8
Match buffer serial output to serial printer (Note 8)	9, 10, 11, 12
Buffer data from output port to input port where computer is on the input and modem is on the output (Note 9)	13
Match buffer parallel output to parallel printer (Note 10)	15

Navigating the MBU16 Main Configuration Window

To:	Press:
Move down to next entry	↓
Move up to previous entry	↑
Pop up configuration choices (Note 11)	↵
Pop up help for selected configuration entry	F1
Configure MBU16	F2
Save configuration file (current DOS directory)	F3
Exit to DOS	ESC

Getting Around in the Configuration Pop-Up Window

To:	Press:
Move down to next choice	↓
Move up to previous choice	↑
Update configuration setting	↵
Cancel configuration update	ESC

Note 1: Commands can be sent via the computer's serial or parallel port. You must identify the port type (such as COM1: or LPT1:).

Note 2: If the output of two or more documents appears overlaid on one page, shorten the close file time or wait longer between computer file transmissions.

Note 3: Processing-intensive applications such as a CAD program or a desktop publishing package may stop sending data while processing a document. Application processing delays that stop data flow longer than the close file time mark the end of buffer file incorrectly. To correct this problem, lengthen the close file time to exceed your longest application processing delay (up to 255 seconds is allowed).

Note 4: The **Continue** default is usually appropriate for printers that allow continuous feeding of paper. When you need to change forms, pens, or plotter setups between buffer files, use the **Pause** choice.

Note 5: Change the **OFF** default for plotter protocol to **CAL**.

Note 6: Change the **OFF** default for pause buffer on power-up to **ON**.

Note 7: If you are using your serial port for buffering and your application requires a speed and data format other than 9600 bps, 8 data bits, no parity, and 1 stop bit, update settings appropriately. See the *Buffer Handshaking with Your Computer Application* table later in this appendix for a technical explanation of line 8 options.

Note 8: If you are using your serial printer for buffering and it requires a speed and data format other than 9600 bps, 8 data bits, no parity, and 1 stop bit, update settings appropriately. See the *Buffer Handshaking with Your Printer* table later in this appendix for a technical explanation of line 12 options.

Note 9: Change the **OFF** default for reverse channel communications to **ON**. See the *Handshaking when Buffer Input and Output Are Serial* table later in this appendix for a technical explanation of hardware line interaction.

Note 10: See the *Buffer Handshaking with Your Printer* table later in this appendix for a technical explanation of line 15 options.

Note 11: The **MicroBuffer Configuration File Name** and **Close File after n Seconds** entries are typed in directly. All other entries are obtained through pop-up windows which enumerate legal choices.

Configuring with MBU.EXE

Sending a New Configuration to the Buffer

To:	Action:	Observe:
Enter command mode	Hold [PASS] prior to and during power-up	PASS blinking
Send new configuration (Note 1)	Use MBU.EXE per Section 4 or copy configuration file to buffer per command summary below (Note 2)	All lights on then all lights off
To:	Use:	
Close file after specified time delay and continue.		CLO seconds CON
Close file two seconds and continue. *		CLO 2 CON
Close file after specified time delay and pause.		CLO seconds PAU
Use acknowledge line for parallel output handshaking.		PAR OUT ACK
Use busy line for parallel output handshaking*		PAR OUT BUS
Allow buffer output to proceed after power-up. *		PAU OFF
Pause buffer output after power-up.		PAU ON
Simulate CalComp plotter protocol for AutoCAD.		PLO CAL
Do not simulate CalComp plotter protocol. *		PLO OFF
Ignore user-supplied remarks.		REM text
Buffer data from serial input port to serial output port. *		REV OFF
Buffer data from serial output port to serial input port.		REV ON
Setup serial input <i>baud</i> rate, <i>parity</i> , <i>data</i> bits, <i>stop</i> bits, and <i>handshake</i> .		SER INP <i>baud,p,d,s,h</i>
Setup factory default serial input settings. *		SER INP 9600,N,8,1,HAR
Setup serial output <i>baud</i> rate, <i>parity</i> , <i>data</i> bits, <i>stop</i> bits, and <i>handshake</i> .		SER OUT <i>baud,p,d,s,h</i>
Setup factory default serial output settings. *		SER OUT 9600,N,8,1,HAR

Note 1: Commands can be sent via the computer's serial or parallel port. If commands are sent serially, the sending port **MUST** be configured to 9600 bps, no parity, 8 data bits, and 1 stop bit. Commands must be sent to buffer in a continuous stream as a configuration file **NOT** interactively from a keyboard. After 2 seconds, the new configuration is stored automatically and the buffer returns to normal buffer operation. The stored configuration file is permanent even when the buffer is turn off.

Note 2: The * is the factory default. See Appendix C for more information.

Configuration Error Indications

CLEAR	If You See:			It Means:
	COPY	PAUSE	PASS	
		Blinking		CLO syntax error
		Blinking	Blinking	PAR syntax error
	Blinking			PAU syntax error
	Blinking		Blinking	PLO syntax error
	Blinking	Blinking		REV syntax error
	Blinking	Blinking	Blinking	SER syntax error
Blinking				SER INP syntax error
Blinking			Blinking	SER OUT syntax error
Blinking		Blinking		Unrecognized keyword
Blinking		Blinking	Blinking	Incomplete command line
Blinking	Blinking			PAR OUT syntax error
Blinking	Blinking		Blinking	Reserved for future use
Blinking	Blinking	Blinking		Reserved for future use

Note: When an error occurs, your MBU16 remains in command mode ready to send out a configuration report, accept a configuration file, restore factory defaults, or abort to normal operation.

Aborting Command Mode

To:	Action:	Observe:
Enter command mode	Hold [PASS] prior to and during power-up	PASS blinking
Abort command mode	Press [PASS] then Release [PASS]	PASS on then CLEAR, COPY, PAUSE, PASS sequence

Note: When you abort the command mode, your configuration is not changed from its previous settings.

Reset Buffer to Factory Defaults

To:	Action:	Observe:
Enter command mode	Hold [PASS] prior to and during power-up	PASS blinking
Reset to factory defaults	Press [CLEAR] then Release [CLEAR]	All lights on then CLEAR, COPY, PAUSE, PASS sequence
Factory Default Description		Equivalent Command
Close file after specified time delay and continue.		CLO 2 CON
Use busy line for parallel output handshaking.		PAR OUT BUS
Allow buffer output to proceed after power-up.		PAU OFF
Do not simulate CalComp plotter protocol.		PLO OFF
Buffer data from serial input port to serial output port.		REV OFF
Setup factory default serial input settings.		SER INP 9600,N,8,1,HAR
Setup factory default serial output settings.		SER OUT 9600,N,8,1,HAR

Note: The default configuration is stored permanently in the MBU16 even when power is OFF.

Printing Buffer Configuration

To:	Action:	Observe:
Enter command mode	Hold [PASS] prior to and during power-up	PASS blinking
Send configuration to printer (Note 1)	Press [COPY]	COPY flickers briefly PASS keeps blinking (Note 2)
And Read Your Printer Output		
<pre> REM MICROBUFFER UNIVERSAL 16 REM VERSION MBU0121.1 REM PRACTICAL PERIPHERALS, INC. REM (C) COPYRIGHT 1991, 1992 REM MEMORY MODULES REM ----- REM M1 = EMPTY REM M2 = 1MEG REM M3 = 1MEG REM M4 = 1MEG FACTORY SUPPLIED 32K RAM SER INP 9600,N,8,1,HAR SER OUT 9600,N,8,1,HAR REV OFF PAR OUT BUS BUS NOR PAU OFF PLO OFF CLO 002 CON </pre>		

Note 1: When the buffer input is hooked to a serial port, the output is sent out BOTH the buffer input port and output port.

Note 2: After you press **[COPY]**, your MBU16 remains in command mode ready to send out another configuration report, accept a configuration file, restore factory defaults, or abort to normal operation.

Handshaking

Buffer Handshaking with Your Computer Application

With:	When Buffer Ready:	When Buffer Full:
SER INP ... HAR	Buffer asserts CTS and DSR to computer	Buffer inhibits CTS and DSR to computer
SER INP ... XON	Buffer sends XON to computer	Buffer sends XOFF to computer
SER INP ... ETX	Buffer sends ACK to computer when it receives ETX from computer (Note 2)	Buffer does not send ACK to computer until buffer can output data
Parallel input to buffer	Buffer inhibits busy and pulses acknowledge to computer	Buffer asserts busy and will not pulse acknowledge to computer

Note 1: CLEAR blinks if buffer is full and cannot output data. When your MBU16 is 1024 characters from being full, it signals your PC to stop sending data. When your MBU16 is 2048 characters from being full, it signals your PC to resume sending data.

Note 2: Your MBU16 will not recognize an ETX if it follows an ESC (1B hex) in a 3-character string. The rationale is that ESC is often the start of a printer formatting command. If the printer escape sequence contains a 03 hex, it would be a printer command and not a flow control character, and thus would correctly be ignored.

Handshaking: LONG PASS Mode

Buffer input RTS is passed to buffer output RTS
 Buffer output DCD is passed to buffer input DCD
 Buffer output CTS is passed to buffer input CTS
 Buffer input DTR is passed to buffer output DTR
 Buffer output DSR is passed to buffer input DSR
 Buffer output RI is passed to buffer input RI

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MicroBuffer Universal 16

Buffer Handshaking with Your Printer

With:	When Printer Ready:	When Printer Busy:
SER OUT ... HAR	Buffer waits for Printer to assert CTS and DSR	Printer inhibits CTS and DSR to buffer
SER OUT ... XON	Printer sends XON to buffer	Printer sends XOFF to buffer
SER OUT ... XOF	Buffer waits to send data until printer sends XON	Printer sends XOFF to buffer
SER OUT ... ETX	Buffer sends ETX to printer (Note 2)	Printer sends ACK to buffer when it receives ETX from buffer
PAR OUT BUS	Printer inhibits busy to buffer	Printer asserts busy to buffer
PAR OUT ACK	Printer pulses acknowledge to buffer	Printer will not pulse acknowledge to buffer

Note 1: COPY blinks if buffer is full and printer is busy.

Note 2: If the buffer input and out are both configured for ETX/ACK, the buffer output will pass the ETX character from the computer through to the printer. However, if the buffer input is set for either XON/XOFF or hardware handshaking, the MBU16 must create its own ETX character. The MBU16 will send an ETX character to the printer and stop sending data until an ACK character is received from the printer whenever any of the following occur: 1) a carriage return, 2) a linefeed, 3) a formfeed, 4) an ETX, 5) 128 characters have passed.

Handshaking when Buffer Input and Output Are Serial

Buffer input RTS is passed to buffer output RTS: REV OFF
 Buffer output DCD is passed to buffer input DCD: Always
 Buffer output CTS is passed to buffer input CTS: REV ON

Summary Tables

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Technical Abbreviations

Name	Description	Also Known As	Handshake	Standard
XON	Start sending data	Control-Q, DC1, ASCII 17	Software	RS232 Serial
XOFF	Stop sending data	Control-S, DC3, ASCII 19	Software	RS232 Serial
ETX	End of TeXt	Control-C, ASCII 3	Software	RS232 Serial
ENQ	ENQUIRE (allowed alternate for ETX)	Control-E, ASCII 5	Software	RS232 Serial
ACK	ACKnowledge end of text	Control-F, ASCII 6	Software	RS232 Serial
DTE	Data Terminal Equipment	Buffer output port	N/A	RS232 Serial
DCE	Data Communications Equipment	Buffer input port	N/A	RS232 Serial
RTS	Request To Send	Pin 4	Hardware	RS232 Serial
CTS	Clear To Send	Pin 5	Hardware	RS232 Serial
DSR	Data Set Ready	Pin 6	Hardware	RS232 Serial
DCD	Data Carrier Detect	Pin 8	Hardware	RS232 Serial
DTR	Data Terminal Ready	Pin 20	Hardware	RS232 Serial
ACK	ACKnowledge	Pin 10	Hardware	Centronics Parallel
BUS	BUSY	Pin 11	Hardware	Centronics Parallel

Port Configuration & Testing

Viewing/Changing Buffer Ports

To:	Action:	Observe:
Begin buffer port check/change mode	Hold [COPY] prior to and during power-up	View Current setting as shown below:
Observe:	Then Input Port Set to:	And Output Port Set to:
[CLEAR]	Parallel	Parallel
[COPY]	Parallel	Serial
[PAUSE]	Serial	Parallel
[PASS]	Serial	Serial
If above settings are already okay, power down your buffer and power it back up again and start using your buffer. If above settings do not match what you expect read notes 1, 2, and 3, then force the correct port setting with the procedure below.		
To:	Action:	Observe:
Force port setting	Press button for desired change below:	[CLEAR] , [COPY] , [PAUSE] , [PASS] sequence once
Press:	Force Input Port to:	Force Output Port to:
[CLEAR]	Parallel	Parallel
[COPY]	Parallel	Serial
[PAUSE]	Serial	Parallel
[PASS]	Serial	Serial
[LONG CLEAR]	Automatic Parallel/Serial I/O Detection	

Note 1: If you turn your computer and printer or plotter off frequently as part of your normal serial operation (to initialize serial printer/plotter setups for example), force port setting to match your computer and printer for reliable operation.

Note 2: If your serial printer or plotter cable does not have pin 3 connected, the buffer's port autodetect circuit does not work. Force port setting to match your computer and your printer.

Note 3: To activate **[LONG CLEAR]**, hold **[CLEAR]** at least three seconds.

Appendix B — Using Command Files

Most MBU16 users will never need to manually create a buffer configuration command file. However, if your application does not allow the MBU16 to automatically configure or you cannot use the MBU.EXE program on your system, you can still configure the buffer using an ordinary ASCII text file. Such ASCII text files can be created on almost any system using a standard text editor.

The eight commands recognized by the MBU16 are listed in Appendix C along with proper syntax to be used. The following example demonstrates what is involved in configuring the buffer using an ASCII text command file.

Sample Command File

The short ASCII file shown in *Figure B-1* is a typical buffer configuration file. This file can be created in any ASCII text editor and then sent to the MBU16 by either uploading it to the serial port or printing it to the parallel port. Remember that the MBU must be in the command mode to accept a command file.

```
CLO 10 PAU
PAU ON
SER INP 38400,N,8,1,HAR
SER OUT 9600,E,7,1,HAR
REV OFF
PLO OFF
PAR OUT BUS
```

Figure B-1 Typical MicroBuffer Configuration File

This sample ASCII command file would change the defaults so that:

1. Application processing delays less than 10 seconds will not mark the end of a buffer file and the buffer will automatically pause output between files.
2. The buffer automatically pauses output on every power-up.
3. The buffer input matches a computer serial port that is set to 38,400 bps, no parity, 8 data bits, 1 stop bit, and sends data when CTS/DSR are asserted.
4. The buffer output matches a serial printer that is set to 9600 bps, even parity, 7 data bits, 1 stop bit, and tells buffer it's busy by inhibiting CTS/DSR.

5. The rest of the commands remain as factory defaults. You can create your configuration file using a text editor that saves files in ASCII format.

Entering Command Mode

The commands described above are recognized by your MBU16 only after it has been powered up while holding down the **(PASS)** button. This puts the MBU16 in the command mode. You cannot send commands to the MBU16 from the keyboard. A command file *must* be created and sent to the buffer either via the serial port or the parallel printer port. If the serial port is used, the port must be configured to 9600 bps, no parity, 8 data bits, and 1 stop bit.

Sending a Command File to the Parallel Port

An ASCII command file can be sent to the MBU16 via the parallel printer port with the DOS COPY command. With the MBU16 cabled to LPT1:, type the following at the DOS prompt:

```
COPY MBU.MBU LPT1: ␣
```

If you have a computer other than an IBM PC, you must use the appropriate command for your operating system. You may find that simply sending the command file to the printer with the PRINT command will do the job.

Sending a Command File to the Serial Port

Before sending a command file to the MBU16 via the serial port (such as COM1:) of your PC, that port must be initialized to the appropriate parameters. This can be done with the PPIMODE utility. At the DOS prompt, type:

```
PPIMODE COM1:9600,N,8,1 ␣
```

Once the serial port has been initialized and the MBU16 is placed in the command mode, you can send a command file, such as MBU.MBU to the port. If the buffer is cabled to COM1: the command would be:

```
COPY MBU.MBU COM1: ␣
```

If you are unable to use PPIMODE because your computer is not an IBM PC, you must still set your port to 9600,N,8,1. You might be able to do this with a communications program and use the ASCII upload function to send the command file to your buffer.

Exiting Command Mode

After you send your file, all front-panel lights will come on briefly and then go off. This indication means your configuration file was

successfully processed. The buffer is ready for normal operation and this new configuration is stored permanently in the MBU16 even when the power is OFF.

If an error occurs, a fixed LED pattern appears on the front-panel indicators and can be interpreted according to the table of *Configuration Error Indications* in Appendix A. Your MBU16 remains in command mode until you send a correct configuration file, restore the factory defaults, or abort the command mode. See also *Configuring* in Appendix A.

Configuration Error Indications

If You See:			It Means:
CLEAR	COPY	PAUSE	PASS
		Blinking	
		Blinking	Blinking
	Blinking		
	Blinking		Blinking
	Blinking	Blinking	
	Blinking	Blinking	Blinking
Blinking			
Blinking			Blinking
Blinking		Blinking	
Blinking		Blinking	Blinking
Blinking	Blinking		
Blinking	Blinking		Blinking
Blinking	Blinking	Blinking	
Blinking	Blinking	Blinking	Blinking

Note: When an error occurs, your MBU16 remains in command mode ready to send out a configuration report, accept a configuration file, restore factory defaults, or abort to normal operation.

Appendix C — Command Language

When the MBU.EXE utility is used in an IBM PC, it automatically generates a buffer command file based upon the eight commands listed in this appendix. If you cannot or do not wish to use the MBU.EXE program, you can create a command file using a standard ASCII text editor. Almost all computers and operating systems allow for the creation of ASCII files.

Should you find the need to override the automatic port detection function of the buffer and alter the stored power-up parameters, you may do so with an ASCII text file containing the appropriate commands. This command file can be sent to the MBU16 only when it is in the command mode. This file can be sent either via the serial or the parallel port as your requirements demand.

This appendix contains the complete command language for your MBU16 MicroBuffer. **UPPERCASE BOLD TYPE** is used to show actual command text expected by the MBU16. In addition, *lowercase bold italic type* indicates general text fields in the command descriptions. For additional clarity, normal type is combined with the command text (such as CLOSe). However, only the command text itself is recognized by the MBU16.

CLO seconds action	Close File after Specified Time Delay
---------------------------	--

The CLOSe command specifies the number of *seconds* of data inactivity required for the information associated with that data flow to be considered a separate and complete file. The number of *seconds* can range from **1** to **255**. The factory default is **2**. The subsequent *action* to take must be set to either CONTinue or PAUSe, in which CON instructs the MBU16 to continue uninterrupted to the next file, and PAU directs the MBU16 to pause (such as for a forms change) before continuing output of the next file. The factory default is CON.

PAR OUT control	Specify Parallel Output Control Line
------------------------	---

The PARAllel OUTput command designates the *control* line associated with parallel output from your MBU16. The *control* line must be set to either ACKnowledge or BUSy. The factory default is BUSy. This must be followed by BUS NOR on the following line to set the normal BUSy line voltage for parallel printers. Substitute BUS INV for BUS NOR when your MBU16 is to be used to output data to a Dataproducts

parallel printer. This command change can best be accomplished by creating a new command file. To do this you should use the ASCII text file method as described in Appendix B.

PAU setting **Is MicroBuffer to Be Paused on Power-Up?**

The PAUse command specifies whether or not your MBU16 is to be paused on power-up. The *setting* must be either ON or OFF. The factory default is OFF.

When PAU ON is in effect, the PAUSE indicator is lit, indicating that output from the MBU16 to your printer or plotter will be suspended until (PAUSE) is pressed.

When PAU OFF is in effect, PAUSE indicator is not lit, indicating that output from the MBU16 to your printer or plotter can proceed immediately.

PLO choice **Specify Plotter Control Protocol**

The PLOtter protocol command can be used when your MBU16 is required to simulate operation of certain CalComp plotters for AutoCAD. Certain PC plotter application packages, such as AutoCAD, send commands requiring coordinated response from the plotter. In addition, the plotter may send responses back to the PC requiring coordinated acknowledgment. A *choice* of CAL simulates CalComp plotter protocol at both ends of your MBU16 so plot file buffering can proceed unimpeded. The factory default is OFF.

Since two-way communications are involved when PLO CAL is in effect, it is expected that your MBU16 will be handling serial input and output at its connections.

REM text **Annotate Configuration File**

The REMarks command is useful for annotation of your MBU16 configuration files. When this command is encountered, all *text* that follows to the end of the line is ignored by the MBU16.

REV setting **Are Reverse Communications Required?**

The REVerse communications command controls the *Reverse Channel* option of your MBU16. The *setting* must be either ON or OFF. The factory default is OFF.

In the default OFF situation, data is buffered from the serial input port to the serial output port, and data appearing at the serial output port is passed immediately back to the serial input port.

When REV ON is in effect, data is buffered from the serial output port to the serial input port, and data appearing at the serial input port is passed immediately back to the serial output port. So, the result is as if the serial connectors were swapped.

This is an advanced feature of your MBU16.

SER INP baud,p,d,s,handshake **Specify Serial Input**

The SERIAL INPut command allows you to specify serial input parameters for your MBU16. The factory default is

SER INP 9600,N,8,1,HAR

In addition to the factory default of 9600 bps, *baud* rate can be set to 300, 600, 1200, 2400, 4800, 19200, or 38400 bps.

In addition to the factory default of None, *parity* can additionally be set to Even or Odd, the number of *data* bits can further be set to 7, and the number of *stop* bits can also be set to 2.

In addition to the HARDware factory default, *handshake* can be set to XON for XON/XOFF software handshaking, ETX for ETX/ACK software handshaking, or NONE for no serial input handshaking at all.

SER OUT baud,p,d,s,handshake **Specify Serial Output**

The SERIAL OUTut command allows you to specify serial output details for your MBU16. The factory default is

SER OUT 9600,N,8,1,HAR

In addition to the factory default of 9600 bps, *baud* rate can be set to 300, 600, 1200, 2400, 4800, 19200, or 38400 bps.

In addition to the factory default of None, *parity* can additionally be set to Even or Odd, the number of *data* bits can further be set to 7, and the number of *stop* bits can also be set to 2.

In addition to the HARDware factory default, *handshake* can be set to XON for XON/XOFF software handshaking, XOF also for XON/XOFF software handshaking (in which an XON character is first expected from the output device before output can begin), ETX for ETX/ACK software handshaking, or NONE for no serial output handshaking at all.

Appendix D — Memory Installation

Your MBU16 MicroBuffer supports various memory size configurations ranging from 32,768 bytes (on-board memory) to 16 megabytes. The Microbuffer is user expandable with SIMMs (Single Inline Memory Modules). The retailer from whom you purchased the Microbuffer should be able to supply the appropriate memory modules.

Your MBU16 can accommodate either 8-wide or 9-wide SIMMs. These must be *page-mode* SIMMs. It is recommended that the SIMM memory modules be composed of chips rated at 150 nanoseconds or faster. Each of the SIMM sockets can accept SIMM memory modules built with either surface-mount or dual-inline packaged chips. The 256 kilobyte, 1 megabyte, and 4 megabyte SIMM memory modules can be intermixed in the four sockets. To obtain the maximum 16 megabyte expansion, however, would necessitate using 4 megabyte SIMM memory modules in all four sockets.

Your MBU16 has four SIMM sockets inside the case. These are labeled *M1*, *M2*, *M3*, and *M4*. When the SIMM sockets are empty, the 32,768 bytes of memory supplied by the factory are operational. Populating any or all of these SIMM sockets with 256 kilobyte, 1 megabyte, or 4 megabyte SIMM memory modules overrides the factory-supplied memory. To access these sockets, your MBU16 case cover must be removed.

CAUTION!
Never insert or remove a SIMM memory module from your MBU16 MicroBuffer unless the unit's power is turned off.
Dynamic memory chips are extremely sensitive to static electricity. Be sure to discharge any static charge build-up on your body before removing your new SIMM memory modules from their protective packaging. Read and follow all the instructions that came with your SIMM memory modules pertaining to proper handling procedures.
SIMM memory modules are expensive and can be destroyed by static discharge from your body. If you do not understand this warning, do not proceed with the installation of the expansion memory. Get your dealer to make the installation for you.

To remove the MBU16 case cover, place the unit upside down on your work surface and remove the four retaining screws. Do not lift the lower section at this time. Hold the two sections together and place your MBU16 back on its rubber feet. Then, carefully lift the top section off to expose the printed circuit board.

As shown in *Figure D-1*, each SIMM socket has two tabs at each end. One set of these tabs provides a locating pin which fits into the holes in the SIMM memory module. The arrows indicate the locating pins and the holes. The other set of tabs snap into place in front of the SIMM memory module to hold it securely in place.

To install a SIMM memory module, start with *M1*, the rear-most empty socket. Insert the SIMM memory module's edge connector into the SIMM socket, press the SIMM memory module back against the locating pins, and the retaining tabs will snap into place in front of the SIMM memory module.

When installing more than one SIMM memory module, start at the lowest numbered empty socket (*M1*) and proceed toward the highest numbered empty socket (*M4*). This is a physical requirement predicated by the incline of the SIMM sockets.

REMEMBER!

Never insert or remove a SIMM memory module from your MBU16 MicroBuffer unless the unit's power is turned off.

Dynamic memory chips are extremely sensitive to static electricity. Be sure to discharge any static charge build-up on your body before removing your new SIMM memory modules from their protective packaging. Read and follow all the instructions that came with your SIMM memory modules pertaining to proper handling procedures.

SIMM memory modules are expensive and can be destroyed by static discharge from your body. If you do not understand this warning, do not proceed with the installation of the expansion memory. Get your dealer to make the installation for you.

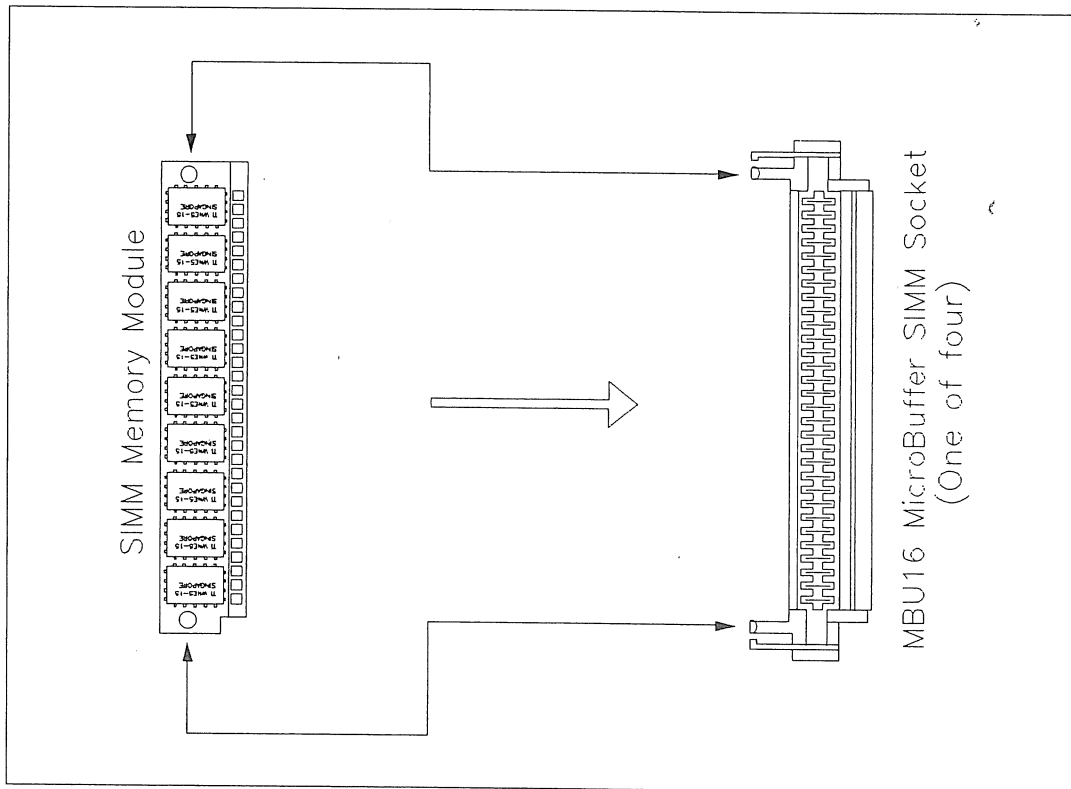


Figure D-1 SIMM Memory Module Installation

Appendix E — FCC Certification

The U.S. Federal Communications Commission (FCC) requires certain notifications to the user of any digital device which may radiate radio frequency energy. This appendix contains the notices required by the FCC pertaining to your Practical Peripherals MBU16 MicroBuffer.

FCC rules Part 15

The Practical Peripherals MicroBuffer Universal 16 is covered by FCC rules for a Class B computing device. As required by FCC regulations, the following is provided for the information and guidance of the user.

Manufacturer:	Practical Peripherals, Inc. 375 Conejo Ridge Avenue Thousand Oaks, CA 913621
Model:	MicroBuffer Universal 16
FCC Registration Number:	See Certification Label on Case *
* The FCC certification label is placed at the bottom of the MicroBuffer Universal 16 case. This label displays the appropriate certification number and other required information.	

Warning:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Shielded interconnect cables must be employed with this equipment to ensure compliance with pertinent RF emission limits governing this device.

Changes or modifications not expressly approved by Practical Peripherals, Inc. could void the user's authority to operate the equipment.

Appendix F — Warranty and Technical Support

Your MBU16 MicroBuffer is covered by a lifetime limited warranty, the terms and conditions of which are stated on the Warranty Registration Card included in your Microbuffer package.

Please fill out and return the bottom half of your registration card immediately. Receipt of this card activates your warranty.

Warranty and Return Policy

The Practical Peripherals lifetime warranty is a warranty that the product will be free from defects in materials and workmanship for the period of coverage. If a product becomes defective during the warranty period, it will be repaired or replaced. This warranty, however, is not a guarantee that the product will be suitable for any and all applications envisioned by the end user.

Practical Peripherals will not design nor advise on any special modifications or applications for this product. If the end user decides to make modifications to the product or design special applications for it, that user must assume responsibility for engineering and programming those modifications or applications.

It should be noted that any modifications or repairs made by anyone other than the manufacturer could, under FCC Rules and Regulations, void the user's authority to operate the MBU16 MicroBuffer.

Should you experience any difficulty with your Microbuffer, **DO NOT** send it back to the factory. Contact your local dealer where you purchased the product. If you cannot resolve your problem with your local dealer, please contact our technical support department.

If it is determined that your problem cannot be solved on the telephone and the product must be returned to the factory for repair, our technician will issue you an RMA number. The RMA number must be clearly shown on the parcel so that we may identify the unit and its owner.

Remember...

Be sure to remove and keep any SIMM memory modules you have added to your MBU16 before packaging it for shipment.

RMA returns are subject to a nominal fee to cover handling and return shipment costs. There are no charges made for any repair covered by the terms of the warranty.

If you send a product in for repair and fail to obtain an RMA number or do not place the issued RMA number on the outside of the package, you may experience a lengthy delay before your unit is repaired and returned.

Please remember to include your name, address, and your daytime phone number inside the package. Since Practical Peripherals cannot be responsible for loss or damage of a returned item during shipment, be certain that your product is properly packaged and adequately insured.

Technical Support

Practical Peripherals provides several avenues for technical support of their product line. The company maintains both the PPI BBS as well as a support forum on CompuServe. In addition, there is standard telephone technical support.

Telephone support

The telephone support number is:

(770) 840-9966

Before you call, gather your notes about your specific problem and what you have done in your attempt to find a solution. Have your system up and running when you call. The technician will discuss your problem with you and guide you through some troubleshooting procedures.

If your problem cannot be resolved on the telephone and it is determined that you indeed have a faulty product, the technician will issue an RMA (Return Materials Authorization) number to you. This number must be on the outside of the package containing the product you are returning.

Please note that neither the PPI BBS nor the forum on CompuServe can issue an RMA. You must call the technical support line to obtain an RMA number.

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MicroBuffer Universal 16

PPI BBS

Practical Peripherals maintains a technical support bulletin board where you may call and leave detailed messages about your product. Your questions will usually be answered within 24 hours.

The PPI BBS supports 1200, 2400, and 9600 bps connects. The parameters are NO parity, 8 data bits, and 1 stop bit. The BBS operates 24 hours each day, seven days each week. The phone number is:

(805) 496-4445

All Practical Peripherals customers are welcome to call and use the PPI BBS.

PPIFORUM on CompuServe

The Practical Peripherals product support forum on CompuServe can be accessed from any CompuServe ! prompt by typing:

GO PPIFORUM

There is no cost for this support service other than the normal CompuServe on-line time charges. The service is available seven days each week, 24 hours each day. Questions posted in the forum usually have a response within 24 hours. Often a reply is entered within hours.

Forum members can exchange information with each other directly, ask technical support questions of the forum SysOp, or offer application tips and hints to other users in the various message areas. The libraries in PPIFORUM contain both telecommunications files as well as utility and text files of general interest to microcomputer users.

If you do not already have a membership to CompuServe, you may use the complimentary booklet enclosed in your MicroBuffer package to join.

Warranty and Technical Support

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PLEASE COMPLETE AND RETURN THIS PRODUCT REGISTRATION CARD TODAY!

IMPORTANT: To ensure that you receive product information, please complete this product registration card and return it to us today.

Name _____
 Address _____
 City _____ State _____ Zip _____
 Home phone # () _____
 Work phone # () _____

Product Serial Number:
 (It is printed on the bar coded strip ON your Product)

A _____
 Store/dealer name _____
 Purchase date _____

1. Where is your PPI product primarily used?
 A. At home
 B. At work
 C. At school
 D. On a BBS
 If at work, company name: _____
2. How did you learn about this product?
 A. Advertisement
 B. Magazine article
 C. Word of mouth
 D. Dealer
 E. Retail display
 F. Trade Show
 G. BBS/SysOp recommendation
3. Which of the following magazines do you read? (Please check all that apply)
 A. PC Magazine
 B. Byte
 C. PC Computing
 D. Computer Shopper
 E. PC World
 F. PC Week
 G. InfoWorld
 H. Home Office Computing
 I. People
 J. Business Week
 K. Time
 L. Newsweek
4. Where did you purchase this product?
 A. Dealer/Retail store
 B. Mail order
 C. Wholesaler/Distributor
 D. Manufacturer
 E. VAR/Consultant

5. What were the main reasons for purchasing your PPI product? (Please check up to 3)
 A. Access to online services (e.g. CompuServe, Prodigy or BBS)
 B. Low price
 C. Brand name
 D. Speed
 E. Made in USA
 F. Recommendation
 G. 7 day-a-week technical support
 H. Chosen from an approved list

6. If you purchased a modem, is this your first modem?
 A. Yes
 B. No
7. If No, what was the speed of your previous modem?
 A. 300
 B. 1200
 C. 2400
 D. 9600
 E. 14,400
 F. 28,800
8. Was your previous modem a PPI modem?
 A. Yes
 B. No

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FIRST CLASS
POSTAGE
REQUIRED
POST OFFICE WILL
NOT DELIVER
WITHOUT PROPER
POSTAGE.

PRODUCT REGISTRATION DEPT.
PRACTICAL PERIPHERALS
375 CONEJO RIDGE AVE.
THOUSAND OAKS, CA 91361-4928

