RomEm®

USER'S MANUAL

VERSION 3.1

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This manual was designed and composed in Monotype Apollo by Windfall Software, using ZzTeX.

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1. Introduction

The RomEm device substitutes RAM for ROM so that code can be developed and debugged without burning ROMs. Code is simply downloaded into RomEm via your PC's parallel, serial, or USB port. Code can be modified and downloaded as many times as necessary.

1.1 RomEm Features

- **Emulation of 2716 through 27080** (2KByte–64KByte or 16KBits–8MBits) with a single RomEm. RomEm is available in 1MBit, 2MBit, 4MBit or 8MBit versions.
- **Cascade** RomEm units to emulate separate devices, or to emulate larger single devices.
- **Support for 16-bit to 32-bit systems.** More than one physical RomEm unit can be addressed as one logical unit with data interleaved, to make handling 16- and 32-bit bus sizes easy.
- **Reset feature.** RomEm provides an external reset line as a convenient method of resetting your prototype system, or for providing a pulsed output for other reasons. This output can be configured as normally high, normally low, or normally High-Z.
- **Flexible power options.** RomEm can be powered from its own AC adapter so that the target system can be turned on and off without affecting RomEm's memory. When this option is used, RomEm can be used to power the target system also. Parallel port RomEm can also be powered from the target system by using one of the test clips.
- **Powerful software.** RomEm Plus interactive software is complete and easy to use. Functions include: Load, Write, Display, Edit, Monitor, Help, Calculator, and more . . .

  The following features are unique to the parallel port Romem:

- **Portability.** After downloading, RomEm can be disconnected from your computer for true stand alone operation. RomEm stays close to your prototype—where it should be, not inside your PC!

- **Battery operation.** RomEm can be moved and operated where it is needed: to your prototype, to an EPROM programmer, or back to your PC.
- **Rechargeable battery.** RomEm can also be powered by an internal 9V rechargeable battery.

The following features are unique to the USB port RomEm:

- **Battery backup.** Battery backup is provided by an internal lithium battery.
- **High speed operation.** The USB port provides high speed operation.

Additional features are:

- **Demo mode.** By selecting demo mode in the software (virtual port 0) your PC's RAM will be used in place of RomEm's RAM. Use this mode to browse and learn RomEm's commands. You can also use it to convert, display, edit, and otherwise manipulate a file.
- **File conversions.** RomEm can load and write binary, Intel Hex, and Motorola S format files. By using demo mode (port 0), RomEm software can be used even without a RomEm unit, to convert files from one format to another.

1.2 System Requirements

The requirements to use the rep32 command line application are:

- Processor: IBM PC or compatible, 386/33MHz or better
- RAM: 1 MB
- Disk: 156 KB
- Port: parallel, operating system: Windows 95/98/SE/Me
- Port: USB, operating system: Windows 98/SE/Me/2000/XP
- CD-ROM or floppy drive for installation (unless obtained on the Internet)

The requirements to use the Windows graphical application are:

- Processor: IBM PC or compatible, Pentium/100MHz or better
- RAM: 5 MB
- Disk: 5 MB
- Port: USB
- OS: Windows 98/SE/Me/2000/XP
- CD-ROM or floppy drive for installation (unless obtained on the Internet)

2.

Installation and Quick Start

2.1 Parallel Port RomEm

To get started right away, follow these directions:

1. Plug the RomEm's parallel connector (DB25 on rear panel) to your PC's parallel port using a good quality shielded cable, like the one supplied.
2. Select unit 0 by setting both switches on the rear panel in the down position.
3. Insert the RomEm DIP Header into your prototype system. Bottom justify the header to emulate 24 or 28 pin parts. Pin 1 is on the marked side of the flat cable. Leave the test clips disconnected for now.
4. Plug in the AC adapter into the rear panel and switch on the power. The red Power LED next to the power switch will be lit.
5. It is recommended that you use the 32-bit version of the console application. Copy `rep32.exe` and `rep32.hlp` into a directory that is on your path. The 32-bit application runs on DOS and Windows 95/98/SE/Me.

   If you need the 16-bit application, copy `rep.exe` and `rep.hlp` into the directory. Run `rep` in place of `rep32`.

   No drivers are needed. There is no Windows graphical application for parallel RomEms.
6. Run the RomEm Plus software on your PC by typing the following (in boldface):

```
C:\>rep32
Pl1U0>p l2                          to change parallel port to LPT2, for example
Pl2U0>t 27010                       to emulate a 27010
Checking P2U0 as 27010              RomEm checks the attached unit
Pl2U0>l test.hex                    load a file named test.hex
Hex-File load of all bytes from offset 0 to offset 0
Load Completed with No errors (2000 Bytes Loaded)
Pl2U0>qy                            exit RomEm and save a configuration file
C:\>
```

7. You are now emulating!

To reload your program, you need to type only `rep32 l;q`. This is because RomEm Plus software will save a configuration file containing the port number, EPROM type, filename, and other configuration data. This file, named `rep32.cfg` will be created in the current working directory on your PC. Note that when RomEm commands are entered directly on the DOS command line, a semicolon (`;`) must be used between them.

If you are unsure of what parallel port you have connected RomEm to, type `p l?` to scan ports for connected RomEm units.

In the interactive mode, type `help` for a list of available commands, and type `h` *x* to get help on the command *x*.

Note: The help file (`rep32.hlp`) must be must be in the current directory or the same directory from which the RomEm Plus software (`rep32.exe`) was located.

2.2 USB Port RomEm

To get started right away, follow these directions:

1. Plug the RomEm's USB connector to your PC's USB port using the cable provided.
2. Select unit 0 by setting both switches on the rear panel in the down position.
3. Plug in the AC adapter into the rear panel and switch on the power. The red Power LED next to the power switch will start to blink.
4. Install the software.
   a. To install the USB driver, insert the RomEm CD. When Windows prompts for the driver location, specify the CD. This needs to be done only once. The LED will stop blinking once the driver is correctly installed and then RomEm unit is enumerated by the USB.
   b. To install the Windows graphical application, run `setup.exe` from the CD. The application is installed and a RomEm entry is added to your Start menu. The graphical applications supports only USB RomEm units, not parallel port units. *Note:* you must remove the previous version of the graphical application before installing a new version.
   c. Install the console application as described in Section 2.1.
5. Insert the RomEm DIP Header into your prototype system. Bottom justify the header to emulate 24 or 28 pin parts. Pin 1 is on the marked side of the flat cable. Leave the test clips disconnected for now.
6. You can use the RomEm with the Windows application by clicking the RomEm entry on your Start menu and following the on-screen instructions.

You can use the RomEm with the console application by typing the following (in boldface):

```
C:\>rep32
Pl1U0>p u                                  to select USB port
PuU0>t 27010                               to emulate a 27010
Checking PuU0 as 27010                     RomEm checks the attached unit
PuU0>l test.hex                            load a file named test.hex
Hex-File load of all bytes from offset 0 to offset 0
Load Completed with No errors (2000 Bytes Loaded)
PuU0>qy                                    exit RomEm and save a configuration file
C:\>
```

7. You are now emulating!

To reload your program, you need to type only `rep32 l;q`. This is because RomEm Plus will save a configuration file containing the port number, EPROM type, filename, and other configuration data. This file, named `rep32.cfg` will be created in the current working directory on your PC. Note that when RomEm commands are entered directly on the DOS command line, a semicolon (`;`) must be used between them.

If you are unsure of what USB port you have connected RomEm to, type `p u?` to scan ports for connected RomEm units.

In the interactive mode, type `help` for a list of available commands, and type `h` *x* to get help on the command *x*.

Note: The help file (`rep32.hlp`) must be must be in the current directory or the same directory from which the RomEm Plus software (`rep32.exe`) was located.

3. RomEm Hardware

3.1 Front Panel and Cable

3.1.1 Power Switch and LED

PARALLEL ROMEM The front panel power switch will power RomEm via the AC adapter, internal 9V (if installed) battery, or the red test clip. The red power LED will be on steady when the switch is in the on position and power is being supplied. If power is being supplied by the AC adapter or by an internal battery, and the power switch is off, power to the red test clip is off as well.

USB ROMEM The front panel power switch will power RomEm via the AC adapter and control Vcc out on the red test clip. The red power LED will be on steady when the switch is in the on position, power is being supplied, and the unit has been enumerated by the USB. If the LED blinks, power is being supplied, but connection to the USB has been lost.

3.1.2 Target Interface—DIP Header

Interface to your target prototype system is provided via the 34 pin header on the front panel. The supplied cable converts this header to a 32 pin DIP plug suitable for plugging into a socket on your prototype system. If you are emulating 24 or 28 pin devices, *bottom justify* RomEm's DIP plug in your prototype socket. Refer to the Appendix for the exact pinout of this cable.

3.1.3 Vcc In/Out—Red Test Clip

PARALLEL ROMEM The red test clip on the flat cable can be used for either input or output as follows:

Vcc Out If RomEm is being powered by the AC adapter or the internal 9V battery, the red test clip is a 5V output and can be used to power the target system. Note that RomEm's power switch will control this output as well. If left unconnected, the target system's power will be separate from RomEm, and the target system can be turned on and off without RomEm losing its memory.

Vcc In The red test clip can also be used to power RomEm from your target system if you are not using an AC adapter or internal battery.

USB RomEm The red test clip on the flat cable can be used to supply Vcc out to your target system. It cannot be used to power the RomEm unit. Vcc out is adjustable from 2.5 to 5.3V by the use of internal jumpers.

3.1.4 Reset Output—Yellow Test Clip

The RESET signal is an output and can be used for resetting your prototype, or for generating a pulse for other purposes. This is controlled via the RomEm console or Windows application. This output can be configured as normally high, low, or high-Z. See the `r` command for more details.

3.2 Rear Panel

3.2.1 Power Input

Power can be supplied to the RomEm using the supplied AC adapter, plugged into the connector on the rear panel. The supplied AC adapter is 9VDC, 500ma.

For the parallel port RomEm, power can also be supplied using a 9 Volt battery. This battery must be connected internally to J5 by unscrewing an end plate from the RomEm case and sliding the board out. A standard alkaline battery or a rechargeable ni-cad can be used.

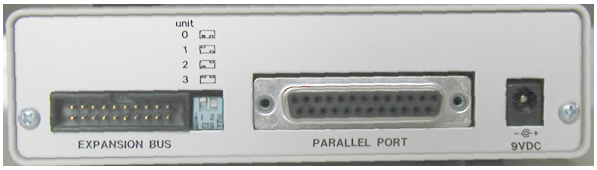
3.2.2 Parallel Interface

The DB25 connector on the rear of the parallel port RomEm unit is designed to be connected to a parallel printer port of an IBM compatible PC with a 25 pin Male-to-Male cable. By using a parallel connection, code can be loaded in and out of RomEm's memory much faster than using serial methods.

Use a good quality shielded printer cable no longer than 8 feet. If you experience problems interfacing to RomEm through the parallel port, it could be due to an inferior cable.

If you have the need for multiple RomEm units, you can use a separate parallel port for each unit, or you can use the 20-pin bus header to stack RomEms.

Use the 20-pin bus header on the rear of the RomEm if you want to connect more than one unit to a single parallel port. In this case, stack the RomEms on top of each other and connect them with a short interface cable between the 20 pin headers on the rear panel. Contact MicroSystems Development to purchase the appropriate cable. Up to four RomEms can be connected in this manner. *Each RomEm must have a unique Unit Number*. The RomEm software addresses each RomEm unit based on this jumper setting.

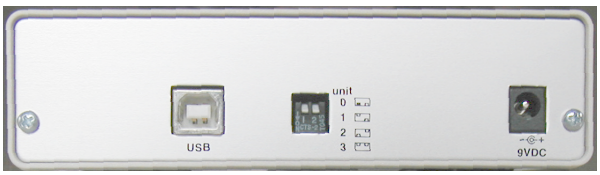


3.2.3 USB Interface

The USB connector on the rear of the USB port RomEm unit is designed to be connected to a USB port of an IBM compatible PC. A USB connection is faster than a parallel connection.

Use a good quality shielded USB cable no longer than 6 feet. If you experience problems interfacing to RomEm through the USB port, it could be due to an inferior cable.

If you have the need for multiple RomEm units, you must use a separate USB port for each unit.



3.2.4 Unit Number Switches

The unit number switches are located next on the rear panel of the RomEm unit. This is the unit number (or address) of the RomEm as seen by the RomEm software. It has no effect on emulation.

Up to four RomEms can be connected to a single parallel port. Each RomEm connected to the same parallel port must have a unique unit number.

Up to four RomEms can be connected to four USB ports. Each unit must have a unique unit number.

The unit number switches are set as follows:

UNIT NUMBER 0 Both switches down (factory default)

UNIT NUMBER 1 Switch 1 up, switch 2 down

UNIT NUMBER 2 Switch 1 down, switch 2 up

UNIT NUMBER 3 Both switches up

If only one RomEm is connected to your PC, switch both unit number switches *down*. This is the factory default setting.

NOTE: If two or more RomEm units are connected to the same parallel port, and their unit number switches are set to the same number, neither RomEm will work properly.

3.3 Internal Battery

3.3.1 Parallel Port Unit

Jumper J7 selects the type of battery installed, if any. Install the jumper if you are using a rechargeable nickel cadmium battery and would like the AC Adapter to continuously charge it. Remove the jumper to disable charging or if you are not using a rechargeable battery.

The RomEm unit can operate off the internal battery. If the unit is turned off, its memory is lost.

> Warning: Installation of this jumper with a non ni-cad battery may cause the battery to leak, melt, or explode!

3.3.2 USB Port Unit

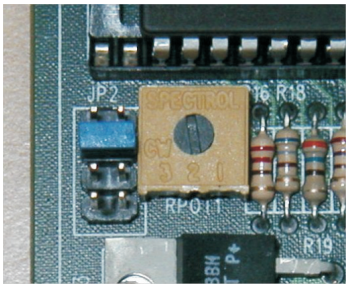
An internal 3V lithium battery (type CR2032) is standard. This will back up RomEm memory if the unit is turned off. The unit cannot operate from the battery.

3.4 USB RomEm Voltage Options

The USB RomEm operates from the supplied AC adapter. Internally, however, it must be configured such that it will match the voltage of your target application. This effects the voltage levels of the Data Output pins on the 32-pin header, the voltage output supplied on the Vcc (red) test clip, and the output voltage of the Reset (yellow) test clip.

The USB unit has four voltage settings: 2.7V, 3.3V, 5.0V, and adjustable. To change the settings, you must open the RomEm case, slide the board out, and locate jumper JP2 and RPOT1.

- For 2.7V operation, place a jumper on pins 7–8 of JP2.
- For 3.3V operation, place a jumper on pins 5–6 of JP2.
- For 5.0V operation, place a jumper on pins 3–4 of JP2, as shown in this photo.



For a voltage other than these three standard ones, place a jumper on pins 1–2 of JP2 and adjust RPOT1 for the desired voltage, as measured on the red test clip.

Please note the following:

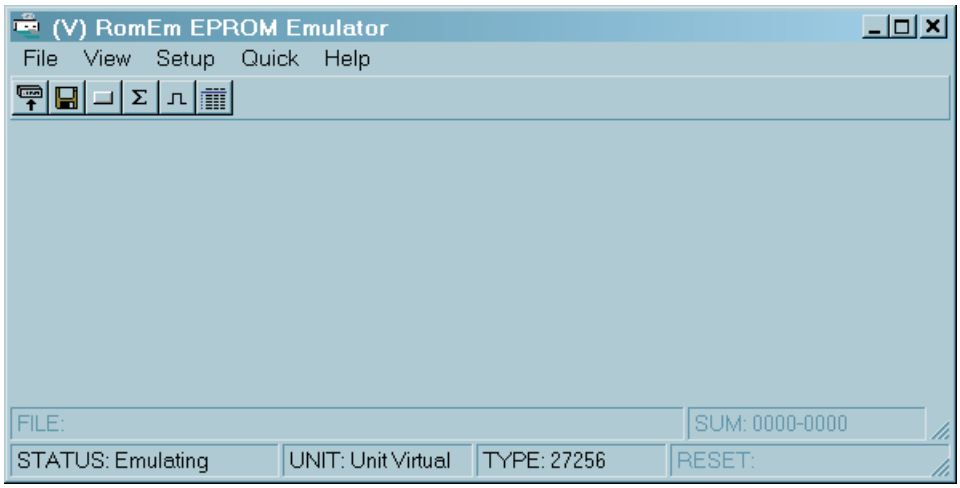
- On JP2, pins 1 and 2 are the two closest to UH1. Pins 7 and 8 are the pins closest to VREG3.
- There must be *one and only one* jumper on JP2.
- Change the JP2 jumper setting only when power is off. *Failure to do so may damage the unit and void any warranty.*
- To determine the operating voltage for which a USB RomEm is configured, use a voltmeter to measure the voltage between the Vcc (red) test clip and ground (pin 16 of the 32-pin DIP header).

4. Windows Application

The RomEm CD includes a graphical application for controlling the RomEm unit. It runs on Windows 98/SE/Me/2000/XP and supports the USB port RomEm unit. It does not support a serial or parallel port unit.

The graphical application must be installed after the USB driver, as described in section 2.2.

Once installed, the application can be run by selecting the RomEm item on your Start menu. You will see the following window:



Introductory help and quick start instructions can be obtained from the Help menu. Help for each subordinate dialog window is available through the Help button on the dialog window.

5.

RomEm Plus Console Application

5.1 General Operation

The RomEm Plus console application is used to operate the RomEm units. It is invoked by typing `rep32` followed by ENTER. Up to four emulator RomEm units may be connected to any one port. The program accepts commands from the user. These commands can be used to perform actions on the RomEm units connected to the PC.

A configuration file named `rep32.cfg` is maintained in the current working directory to allow termination and re-invocation of the program without losing most of the working environment. In addition, a DOS environment variable, `ROMEM`, allows the user to specify a fixed list of commands to be executed whenever the program is started.

Upon invocation of the program, the following steps are performed:

1. If the file `rep32.cfg` exists in the current directory:
   a. The file is opened and the default configuration is set from its contents.
   b. The emulator units defined in that configuration are initialized.
   c. The current port and unit are set to those defined in the configuration.
   d. Other default command arguments are initialized from information in the configuration file.
   e. If the option `/N` is present in either the environment variable or on the DOS command line, this entire step is bypassed and the configuration defaults to: no defined emulator units, current port 1, and current unit 0. This step is referred to as *configuration initialization* throughout this document.
2. Any commands in the `ROMEM` environment variable are executed.
3. Any commands on the DOS command line are executed.
4. Commands are accepted from the keyboard.

In interactive mode, commands are entered at the keyboard in response to a greater-than (>) prompt character. The prompt character is always preceded by the current port and unit number in the form P*xxxx*U*n*, where *xxxx* is the 1–4 digit

(hex) port value and *n* is the one-digit unit number. For example: `P1U0` for Port 1 and Unit 0 (the default). The maximum length of any command line is 71 characters.

Help is available by entering `h` in the interactive mode. The file `rep32.hlp` must reside in the same drive and directory as the `rep32.exe` file, in the current directory, or on the DOS path.

When more than one command is entered on a line, a semicolon (`;`) must be used between them. For example:

```
C:\>rep32 r h ; l test.hex ; r l ; qy
```

The above line can be inserted into a batch file to start RomEm, set reset high, load a file called `test.hex`, set reset low, and exit.

5.2 Batch Mode

RomEm normally runs in interactive mode, which means that it accepts commands from the keyboard after it executes the commands in the environment variable and on the command line. In batch mode, RomEm exits immediately after it executes the environment variable and command line commands.

Batch mode is requested with the `/b` option on the command line:

```
C:\>rep32 /b r h ; l test.hex ; r l
```

After the three commands are executed, RomEm exits automatically, without accepting commands from the keyboard. Notice that no `q` command is required to exit.

The exit status in interactive mode is always zero. In batch mode, the exit status is non-zero if any errors occurred during operation.

5.3 Command Syntax and Usage

A command consists of a single command character followed by zero or more arguments. Commands can be specified in upper- or lowercase. Where multiple arguments are required, arguments are separated from each other by commas. Optional spaces may appear before each argument.

More than one command may be placed on a line. Commands are separated from each other by a semicolon (`;`).

Required arguments are always first, and optional arguments are always last. An omitted optional argument takes on a default value that is specific for each optional argument of each command. Some take on fixed values while others take on values dependent on the current state and environment. Six kinds of items may be specified in command arguments:

keywords These arguments must exactly match one of a list of strings allowable for that argument (case is not significant).

file names May be any valid DOS drive/path/filename string.

values A hexadecimal number is written with no special syntax (example: `142c`). A decimal value must be preceded by a number sign (example: `#25`). An ASCII character must be preceded by a single apostrophe (example: `'f` or `'F`). Case is significant for ASCII only.

operators Values may be combined using the following set of operators:

`+`	add
`-`	subtract
`*`	multiply
`/`	divide
`&`	bitwise and
`|`	bitwise or
`^`	bitwise exclusive or
`{`	shift left
`}`	shift right
`~`	not (1's complement)

There is no precedence. Evaluation is left to right, but parentheses can be used to control the order of operation. For example: `124C+#10-'A` is equal to `1215` or `#4629`.

$ registers There are ten registers, `$0` to `$9`, which can be assigned a value with the `=` command. For example, `=11,22,33` will assign he value of 11 to `$0`, 22 to `$1`, and 33 to `$2`. The `$` registers may be used in subsequent expression, enabling quite sophisticated functions.

strings A string argument is any set of ASCII characters enclosed in quotation marks, including spaces, tabs, and commas. If a string argument is the last thing on a command line, then the closing quotation mark is optional. The special character backslash (\) causes the next character or characters to have special meaning as follows:

`\r`	represents a single carriage return character, hex 0d.
`\n`	represents a single line feed character, hex 0a.
`\"`	represents a quotation mark.
`\x`*dd*	represents a single character whose hexadecimal equivalent is *dd*. (example: `\x0d` is equivalent to `\r`).
`\\`	represents a single backslash character.

5.4 Editing Keys

A rich set of editing keys is supported during command line entry. This has been done for those users who wish to run rep32 as their operating environment, but who miss the features of DOSKEY. The last 200 commands are kept in a history buffer.

BACKSPACE	Back up over and delete previous character.

Escape	Go to beginning of line and erase line.
Left Arrow	Move cursor left without erasing.
Right Arrow	Move cursor right without erasing.
Home	Go to beginning of line without erasing.
End	Go to end of line.
Ctrl Left Arrow	Move to first char of word.
Ctrl Right Arrow	Move to first char of next word.
Ctrl Home	Same as Escape.
Ctrl End	Erase from cursor to end of line.
Ins	Toggle insert/overstrike mode; cursor shape changes.
Del	Delete character at cursor.
Up Arrow	Recall previous command for editing. May be used to scroll backwards through the last fifty commands. Position always starts at the bottom of the list for each new command line. Recalled commands that are executed with no editing are copied to the bottom of the list.
Down Arrow	Scroll down in recall list.
Tab	Move cursor right 10 characters.
Shift Tab	Move cursor left 10 characters.
PgUp	Recall search backward. Look for command that starts with what is on the line up to the current cursor position.
Ctrl PgUp	Recall very first command in the buffer.
PgDn	Recall search forward.
Ctrl PgDn	Clear command line and move recall pointer all the way to the end of the buffer.
Enter	Execute current line.

5.5 Demo Mode

Normally, RomEm Plus software operates on the RomEm memory connected to parallel port 1–4 or to a USB port. In order to test and use the RomEm Plus software without having a RomEm attached, define a unit on a "virtual" port by entering a `p v` command. RomEm software will then use your PC's RAM in place of a RomEm. You can then load, display, edit, and write files just as you would if a RomEm were connected.

5.6 Setup Commands

COMMAND P port—select port

PURPOSE Select port for subsequent operations.

FORMAT p *type*[*value*], *delay*

ARGUMENTS The *type* argument specifies the type of port. It may be `l` for a parallel (LPT) port, `c` for a serial (COM) port, `u` for a USB port, or `v` for a virtual port.

The optional *value* is required when selecting a parallel or serial port, and must be a single digit to select LPT1–4 or COM1–9, as defined in the ROM BIOS port address table. The *value* is not specified for USB or virtual ports.

If a question mark (`?`) is specified with any port type other than `v`, rep32 will scan all the ports of the given type for RomEm units and display its findings.

> Warning: Using the p *x*? command may have undesired effects on devices attached to other ports of the specified type.

For parallel ports, a *value* in the range 100–1FFFC (hex) specifies an absolute parallel port address, the I/O address of the data output register. It may or may not be a duplicate of a port address in the ROM BIOS table.

The *delay* argument is only used for parallel ports. It specifies the delay, in the range 0–99, used when writing to a RomEm unit through the parallel port. Some parallel ports cannot handle very high data rates, so an additional delay is necessary. The default delay is 2. If files load with no errors, try delay values of 1 or 0 for faster loading. If you occasionally experience errors when downloading to RomEm, try a higher delay.

COMMENTS No error message is given for a bad port selection if the value given is within range. An undefined or inaccessible port will not be flagged until the first attempt to use that port (with the `t` command).

All arguments are saved in the configuration file and may be displayed using the `?` command. If a configuration file was loaded at program startup, then the current port specified in that file is selected until the first `p` command is executed. If no configuration was loaded, then LPT1 is the default.

The RomEm prompt will change to reflect the new port number or address.

EXAMPLES

`p 11`	Selects LPT1 (default) with the default delay of 2.
`p 12,0`	Selects LPT2 with no delays (for fastest subsequent downloads).
`p u?`	Scans all USB ports for attached RomEm units.
`p l?,1`	Scans all parallel ports for attached RomEm units at delay of 1.
`p 278`	Selects parallel port at hex address 278.

COMMAND `T` type—define EPROM type

PURPOSE Define type of EPROM / ROM to be emulated on the current port and unit.

FORMAT `t` *keyword* `,` *fold-type*

ARGUMENTS *keywords* are EPROM part numbers with the "27" prefix optional, or ROM sizes in hex or decimal. The acceptable keywords are:

2716	16	2048	800	2K
2732	32	4096	1000	4K
2764	64	8192	2000	8K
27128	128	16384	4000	16K
27256	256	32768	8000	32K
27512	512	65536	10000	64K
27010	010	131072	20000	128K
27020	020	262144	40000	256K
27040	040	524288	80000	512K
27080	080	1048576	100000	1024K

fold-type refers to the way in which this RomEm unit is connected and the location in which RomEm will load files into it. There are three types of folding, as follows:

`nf` No folding. This is the fastest loading/verifying mode but imposes the most restrictions on the target system. The emulated ROM image is loaded in one and only one place in the emulator RAM space. All pins labeled Vcc, /PGM, Vpp, etc must be in their proper states on the target system socket. All pins labeled N/C for the EPROM device type must be unconnected. In addition, when the 32 pin RomEm target cable is plugged into a 24 or 28 pin socket., the unused pins must be left unconnected.

`pf` Partial folding (default). This is not quite as fast as the `nf` mode but eliminates very long load times for small target devices into large emulator RAMs while not being quite so insistent about the states of certain pins. The emulated ROM image is loaded in all possible positions in the emulator RAM space assuming that only those for the physical device size are connected. Pins such as Vcc, /PGM, and Vpp can be in any state. When emulating a 28 pin device however, pins 1, 2, 30, and 31 on the 32 pin target cable must be left unconnected, and when emulating a 24 pin device, pins 1, 2, 3, 4, 29, 30, 31, and 32 on the target cable must be left unconnected.

`ff` Full folding. This mode results in the slowest download, but is the safest mode because no assumptions about special or unconnected pins are made. The emulated ROM image is loaded into all possible locations in the emulator RAM. For example, when emulating a 27256 with a 1Megabit RomEm, the ROM image will be "folded" (loaded) four times, at addresses 0h, 8000h, 10000h, and at 18000h. Because load times may be excessive, we recommend that you do not regularly use this mode, rather check/alter your target socket so that one of the above two modes can be used.

COMMENTS

Execution of the `t` command causes a "quick test" to be run on the selected port and RomEm unit. This verifies that the unit can be accessed, and that its memory can be read and written (not an exhaustive RAM test).

The *keyword* argument is optional if the type for the current port and unit has already been defined in a previously successful `t` command or in the default configuration.

Upon successful completion of a `t` command the port, unit and type become part of the current configuration, and can be displayed using the ? command. If the configuration is saved upon program exit, then a quick test will be run on the unit during the next configuration initialization.

If the RomEm unit fails the quick test (for example, because it is not connected to the PC), the current unit information is taken out of the configuration.

If the current unit number consists of more than one physical unit, for example `u01`, each physical unit will be tested as the selected type.

Note that the unit is taken out of emulation mode during this test.

EXAMPLES

`t 2764`	Set EPROM type to 2764 and do a quick test of the current RomEm unit on the current port.
`t 010`	Set EPROM type to 27010 and do a quick test of the current RomEm unit on the current port.
`t 2764,nf`	Set EPROM type to 2764, do a quick test of the current RomEm unit on the current port, and when loading, load the file into only one location in RomEm (make sure your target socket has any special pins in the proper state).
`t`	Perform a quick device check on the current unit.

COMMAND U unit—select RomEm Unit Number

PURPOSE Select emulator unit (on current port) to be used for subsequent operations.

FORMAT u *value*

ARGUMENTS The *value* parameter is required and must be 0, 1, 2, 3, or a combination of up to four different numbers. This number must correspond to the Unit Number switches on the rear panels of the attached RomEm units.

COMMENTS No error message is given for a bad unit selection if the value given is within range. An inaccessible or non-functional unit will not be flagged until the first attempt to use that port (t command).

A *value* which is a combination of numbers such as 10, 01, 0123, etc. is used to indicate that data should be interleaved between the chosen unit numbers. This is for 16- or 32-bit systems.

The *value* is stored in the configuration and can be displayed using the ? command.

If a configuration file was loaded at program startup then the current unit specified in that file is selected until the first u command is executed. If no configuration was loaded then unit 0 is selected until the first u command.

The RomEm prompt will change to reflect the new unit number.

EXAMPLES

u 1	Select unit 1 on the current port.
u01	Selects units 0 and 1 on the current port. Data will subsequently be interleaved when loaded. Even bytes will be loaded into unit 0 and odd bytes will be loaded into unit 1.
u10	Selects units 1 and 0, but bytes will be loaded opposite of the above.
u0123	Selects units 0, 1, 2 and 3. Subsequent loads will cause every fourth byte to be loaded into each RomEm unit.

5.7 File Commands

COMMAND L load—load file into RomEm

PURPOSE Load current emulator unit's RAM from a file.

FORMAT `l` *filename*, *start-value*, *length-value*, *target-value*, *width-value*, *verify-opt*

ARGUMENTS All arguments are optional. If ALL arguments are omitted, then the load command arguments saved in the configuration for the current port and unit are used.

filename gives the drive/path/name of a binary file, an Extended Intel Hex file, or a Motorola S-format file to be loaded. The type of the file is determined automatically by inspection of the beginning of the file. If no filename is given, the default is taken from the configuration file, if one exists.

The remaining arguments are used to select exactly what from the file is loaded where. They may be omitted, and default values will be used. Interpretation of the optional arguments differs depending on the file type. This is described below.

If any other arguments are specified, they must all be given with the command. None will be used from the configuration.

COMMENTS Load arguments are stored in the configuration and may be displayed using the `?` command.

This command must be preceded by a successful `t` command (or configuration initialization) with the same port and unit selected. The unit is taken out of emulation mode during this operation.

Binary File Load *start-value* is the file offset of the first byte to be loaded. The initial default is 0.

length-value is the number of bytes to be loaded. The resulting value may not cause a read past the end of the file or a load address past the end of the defined type.

target-value is the byte offset into the defined emulated ROM where the first byte is to be loaded. The default is 0. The value may not cause a byte to be loaded past the end of the defined emulated ROM.

width-value is used to cause the loading of every Nth byte of the input data into the emulated ROM. The default is 1.

For example, to load all of the even bytes of a 4K file into a 2K emulator "l imagefile,0,#2048,0,2" could be used. To load the odd bytes "l imagefile,1,#2048,0,2" could be used.

verify-opt is the option to verify the download or not, and can be:

- `v` Verify (default). This causes the file to be read back out of RomEm memory and compared with what was loaded. This is the safest option but does cause the download to take a little longer because of the read back.

`nv` No verify. The downloaded file is not read back and verified. This will result in fast downloads, but is not recommended until you have had some experience with using RomEm on your system, and have not experienced any download errors.

`vo` Verify only. This options does not load, but only verifies the contents of RomEm with the specified file.

Extended Intel Hex File Complete support for Extended Intel Hex Files is provided. The reader should be somewhat familiar with this format before attempting to understand what follows.

In order to understand how the arguments apply to a hex file it is useful to construct the following mental model: Consider a 16 megabyte address space. An Extended Hex File contains instructions for placement of data bytes into various locations in this address space. Think of the hex file being converted into a 16 Megabyte binary file with file addresses from 0 to FFFFFF. The arguments are then applied to this binary file in the same way as described for binary files above.

The only other thing to remember is that in an Extended Intel Hex File, data records before any segment record are applied to segment 0000. Also note that bytes of the 16 Meg binary file that have no data specified for them in the hex file are left unchanged in the emulated ROM and will therefore retain their previous random data or filled data.

Motorola S-format File The same scenario applies for mapping of arguments into a large memory image. A Motorola S format file maps onto a 16 Megabyte binary file.

EXAMPLES

`l`	Load the last file used (as defined in the configuration file) for the current unit into RomEm.
`l test.hex`	Loads the file named `test.hex` from the current drive and directory into the current RomEm.
`l test.bin,,,8000`	Loads the file named `test.bin` into RomEm with an offset of 8000 hex. This will load the file starting at address 8000h in RomEm.
`l test.bin,,100`	Loads the first 100 hex bytes of the file `test.bin`.
`l test.bin,,10,,,nv`	Loads the first 10 hex bytes of the file `test.bin`, and does not verify the data.
`l test.hex,,,,,nv`	Loads the file `test.hex` and does not verify the data.

Note: the $0 register is set to the address of the highest byte loaded, plus 1.

COMMAND `Q` quit—exit RomEm software

PURPOSE Exit RomEm Plus software, leaving all units in emulation mode.

FORMAT `q` *keyword*

ARGUMENTS *keyword* can be: `y` or `n`. `y` will automatically update the configuration file. `n` will not update the configuration file.

COMMENTS If the configuration has not been changed during the session being concluded, then *keyword* is ignored and no further action with regard to the configuration file is taken.

If the configuration has changed during the session, and no *keyword* is given, the user is asked if he wants to update the configuration and must respond with `y` or `n`.

> Note: RomEm Plus software cannot be re-entered without taking the unit out of emulation mode. Use the `!` command to exit and return to RomEm software without disturbing the RomEm units.

EXAMPLES

`q`	Exit RomEm Plus software. If the configuration has changed, the user will be asked whether or not he wishes to update the file.
`q n`	Exit RomEm Plus software without updating the configuration file.
`q y`	Exit RomEm Plus software and update the configuration file if it has changed.

COMMAND `W` write—write RomEm memory to a file

PURPOSE Write an image of the current emulator's memory to a file

FORMAT `w` *filename*, *start-value*, *length-value*, *mode*, *type*, *rec-length*, *fill*, *target*, *entry*, *signon*

ARGUMENTS The *filename* argument is required and specifies the file to be written to.

start-value and *length-value* define the portion of the emulator memory that is to be written. *start-value* defaults to 0 and *length-value* defaults to the rest of the defined size of the memory. Combined, they must not reference a byte outside of the defined type.

mode is optional and may be:

`r`	replace an existing file
`a`	append onto existing file
`c`	cancel if the file exists
`?`	ask operator what to do if the file already exists (default)

type is optional and may be:

`b`	binary file (default)
`h`	Intel extended HEX format
`h-`	Intel extended HEX format without an EOF record
`h32`	Intel linear extended HEX-32 format
`h32-`	Intel linear extended HEX-32 format without an EOF record
`s`	Motorola S format
`s-`	Motorola S format without an EOF record
`s28`	Motorola S28 format
`s28-`	Motorola S28 format without an EOF record
`s37`	Motorola S37 format
`s37-`	Motorola S37 format without an EOF record

Notes: H type automatically selects conventional extended HEX or linear extended HEX-32 based on the size of the required output addresses. S type automatically selects S19 (16 bit), S28 (24 bit) or S37 (32 bit) based on the largest address that must be output.

rec-length can be from #1 to #255 (default #32) and specifies the maximum number of data bytes that are to go into each formatted record.

fill is a byte value from #0 to #255 (ff) which causes all these values present at the beginning and the end of any record to be eliminated from the formatted file. If the record consists entirely of this value, it will not be written to the file.

target is the offset address that the first output data byte is to be given in the output file. If omitted, *start-value* is assumed.

entry is the entry point address that is to be stored into the formatted file. For Intel HEX, the address is output in a "start address record" or a "linear start address

record." For Motorola S, the address is output in the appropriate place in the EOF record.

signon may be present for Motorola S format files only and causes a signon record to be generated with the given string text.

COMMENTS

This command must be preceded by a successful `t` command (or configuration initialization) with the same port and unit selected. The unit is taken out of emulation mode during this operation.

EXAMPLES

`w new.bin`	Write the entire contents of RomEm memory to a binary file named `new.bin` in the current drive and directory.
`w junk,0,ff`	Write the first 256 bytes of the RomEm memory to a binary file named `junk` in the current drive and directory.
`w test.bin,,,r`	Write RomEm memory to a binary file named `test.bin` and replace (overwrite) the file if it already exists.
`w xyz.hex,,,,h,,ff`	Write the contents of RomEm to an Intel HEX file named `xyz.hex`, but do not include any values of ff (hex) that may be present at the beginning and the end.
`w xyz.s,,,,s,,ff`	Same as above, but write a Motorola S format file to `xyz.s`.

COMMAND `@` indirect—use command file

PURPOSE Proceed by taking commands from a given file.

FORMAT `@` *filename*`,` *keyword*

ARGUMENTS The *filename* argument is required, and must be an ASCII text file.

keyword is an optional argument that allows control over what is displayed on the screen as the commands in a command file are executed. If omitted, all command lines and progress reports are displayed just as if the commands are entered at the keyboard. Allowed keywords are:

- `v` display all normal progress reports
- `q` suppress progress reports
- `e` echo command lines in the normal way
- `n` suppress command line echo

COMMENTS Each line of the file is treated like a command line entered from the keyboard. Blank lines and lines beginning with two slashes (`//`) are ignored. When the end of the file is reached or an error occurs in a command, control returns to the keyboard. Lines are displayed as they are executed. If an error occurs in the execution of any command line in the file, all file reading is terminated, and control is returned immediately to the keyboard.

EXAMPLES

`@ run.re`	Proceed by taking commands from the file `run.re` in the current drive and directory.

5.8 Edit Commands

COMMAND D display—display RomEm memory

PURPOSE Display (or Dump) data from the current RomEm's memory.

FORMAT `d` *start-value*`,` *length-value*`,` *width-value*

ARGUMENTS The optional *start-value* is the offset in the emulator memory of the first byte to be displayed and must be within range of the defined type. The default is the next byte after the last byte displayed by the most recent `d` command for the same emulator unit or 0 if no `d` command precedes.

The optional *length-value* is the number of bytes to be displayed. It defaults to the *length-value* of the most recent `d` command (for any port/unit) or to #128 if no `d` command precedes. If the *start-value* plus *length-value* exceeds the size of the defined ROM, the display address will automatically wrap to 0 when the end of the defined ROM is reached.

The *width-value* is also optional and tells how displayed bytes are to be grouped. A new display line is started every *width-value* bytes. It defaults to the *width-value* of the most recent `d` command (for any port/unit) or to #16 if no `d` command precedes.

COMMENTS All of these arguments are saved in the configuration file and re-instated during configuration initialization.

During the display, the user may press CTRL-S to temporarily suspend the display, or CTRL-C to cancel the display operation.

If the current unit number consists of more than one physical unit, for example `u01`, data will be displayed in an interleaved fashion, taking one byte from each physical unit on a round robin basis.

EXAMPLES

`d 100`	Dump 128 bytes starting at address location 100 hex.
`d`	Dump the next 128 bytes.
`d 100,#32,#8`	Dump 32 bytes, 8 bytes per line, starting at 100 hex.

Note: The $0 register is always set to the last byte value displayed.

COMMAND E edit—edit RomEm memory

PURPOSE Edit (or enter) data in the current RomEm's memory.

FORMAT `e` *start-value*`,` *data-value or data-string*`,` ···

ARGUMENTS The *start-value* argument gives the offset into the memory of the first byte to be entered. *start-value* may be omitted if and only if the immediately previous command was also an `e` command. In this case it will default to the next byte address after the last byte entered by the previous command. The first `e` command of a session must always have a *start-value* argument.

Any number of *data-value* and/or *data-string* arguments may follow. A *data-value* argument must be in the range 0–ff hex and causes one byte to be written to the memory. A *data-string* argument is enclosed in quotes and causes all bytes of the string to be written to successive memory locations. The *start-value* plus the length of the arguments must not exceed the size defined for the current emulated ROM (`t` command).

COMMENTS If no data arguments are given, a byte-by-byte interactive editing mode is begun. The current value of the next byte address is displayed in hex, and the user may enter a replacement value for it in hex, decimal or ASCII. If no value is entered, the contents of the address are not changed. A space proceeds to the next address. Backspace will back up, but only to the beginning of the current line. A return terminates the command.

If the current unit number consists of more than one physical unit, for example `u01`, data will be displayed in an interleaved fashion, taking one byte from each physical unit on a round robin basis.

EXAMPLES

`e 0`	Begin the interactive editing process at address 0.
`e 2a7,0d`	Enters the hex value 0d into hex address 2a7.
`e 200,#76`	Enter the decimal value 76 into hex address 200.
`e 100,"Hello`	Enters the ASCII values for the string "Hello" into memory starting at hex address 100.

COMMAND F fill—fill RomEm memory

PURPOSE Fill all or a portion of the current emulator unit's RAM with a certain value.

FORMAT `f` *fill-value*`,` *start-value*`,` *length-value*

ARGUMENTS *fill-value* is required and must be within the range 0–ff hex.

start-value is optional and specifies the offset within the emulated ROM where filling is to start. It may not specify a byte that is beyond the end of the defined emulated ROM. The default is 0.

length-value is optional and specifies the number of bytes to be filled. When combined with *start-value* it may not cause filling to go beyond the end of the defined type. The default is to fill the rest of the defined ROM.

COMMENTS The unit is taken out of emulation mode during this operation.

EXAMPLES

`f ff`	Fill the entire memory of the current unit with hex ff.
`f 'A`	Fill the entire memory of the current unit with ASCII "A" (hex 41).
`f #255,0,ff`	Fill the first 256 bytes (0 to ff hex) of the current unit with decimal 255 (hex ff).

COMMAND S sum—display 32-bit checksum

PURPOSE Display the 32-bit checksum of the current emulator's memory.

FORMAT `s` *start-value*`,` *length-value*

ARGUMENTS The optional *start-value* and *length-value* arguments specify the starting address and the number of bytes to be included in the checksum. The *start-value* default is 0 and the *length-value* default is the rest of the defined size of the memory.

COMMENTS The unit is taken out of emulation mode during this operation. This command must be preceded by a successful `t` command (or configuration initialization) with the same port and unit selected.

The output is of the form *XXXX-XXXX*, which are the eight hex digits of the 32-bit checksum. the first four digits can be ignored for a 16-bit checksum, the first six can be ignored for an 8-bit checksum.

EXAMPLES

`s`	Display the checksum for the entire defined memory.
`s 0,2000`	Display the checksum for the first 2000h bytes of memory. This is equivalent to the s command with no arguments if the defined type is 2764.
`s 0,#4094`	Display the checksum for the first 4094 bytes of memory.

Note: The $0 register is always set to the 32-bit result value.

COMMAND R reset—control the Reset clip

PURPOSE Pulse the reset line, or set it to a steady state.

FORMAT `r` *keyword*

ARGUMENTS *keyword* is two letters to specify the normal (that is, inactive) and asserted (active) states of the reset output. Using a keyword causes this command the reset signal to be set to the normal state based on the given keyword. The allowable letters in the keyword are:

- `h` High (Vcc)
- `l` Low (0V)
- `z` High impedance

The six allowable two letter keywords are: `hz hl lh lz zh zl`

If *keyword* is omitted, the reset signal is pulsed to its active state for 100 to 150 milliseconds. An additional delay of 100 to 150 milliseconds is done before the next command is executed.

COMMENTS The *keyword* is saved in the configuration file and can be displayed using the `?` command. During subsequent configuration initializations, the unit's reset line will be set to the inactive state.

The default state, if no `r` command with keyword has been given, is zl, inactive high impedance, and active low.

The unit is not taken out of emulation mode during this operation. This command must be preceded by a successful `t` command (or configuration initialization) with the same port and unit selected.

EXAMPLES

`r`	Pulses the reset signal from its current inactive state to the active state.
`r lh`	Set the reset signal low and define this as the inactive state. Subsequent `r` commands with no arguments will pulse the reset signal high.
`r zh`	Set the reset signal to high impedance and define this as the inactive state. Subsequent `r` command with no arguments will pulse the reset signal high.
`r hl`	Set the reset signal high and define this as the inactive state. Subsequent `r` command with no arguments will pulse the reset signal low.

5.9 Miscellaneous Commands

COMMAND H help—display help

PURPOSE Display builtin help.

FORMAT `h` *keyword*

ARGUMENTS *keyword* is any command letter. Details about that command will be displayed.

COMMENTS If no arguments are given, a list of available commands and arguments is displayed. A file named `rep32.hlp` is used, and must reside in the same drive and directory as the `rep32.exe` file, in the current directory, or in your DOS path.

EXAMPLES

`h`	Display a list of available commands.
`help`	Display a list of available commands. Same as: `h`.
`h t`	Display help for the `t` command.
`h m`	Display help for the `m` command.

COMMAND K key—define function key

PURPOSE Display or define a function key macro.

FORMAT `k` *key*`,` *command-string*

ARGUMENTS The *key* can be:

1 through 10	to specify F1 through F10
a1 through a10	to specify ALT-F1 through ALT-F10
s1 through s10	to specify SHIFT-F1 through SHIFT-F10
c1 through c10	to specify CTRL-F1 through CTRL-F10

The *command-string* is a list of RomEm commands (enclosed in quotes) to be executed with the selected function key.

COMMENTS An automatic return is signified by `\r` at the end of the string. Otherwise the user must press return to execute the command.

If the first item in the string is `\r`, then replacement strings typed on the command line before pressing the function key will be used in function key expansion, in place of the replacement flags `%0` through `%9`. Replacement strings on the command line are separated by spaces. The text of one macro may be inserted into another by referring to its name using `%f`*n*, `%a`*n*, `%s`*n*, `%c`*n*.

If the `k` command is invoked with no arguments, a list of the currently defined function keys is displayed. If only a *key* argument is supplied, the macro for that function is deleted (factory supplied macros can be changed but not deleted).

> Note: A single backslash character has special meaning in string arguments, so a double backslash (`\\`) must be used to represent a single backslash.

The factory supplied function key macros are:

`F1: \rc%0 ; m\r`	To use this macro, type an address and then press F1. The COMPARE address will be set and monitor mode will be entered.
`F2: ; as ; m\r`	Activate the SNAP feature and enter monitor mode.
`F3: ; at ; m\r`	Activate the TRIGGER feature and enter monitor mode.
`F10: ; qn\r`	This macro will exit the RomEm interactive software without updating the configuration file. If any configuration parameters have changed, they will be lost.

EXAMPLES

`k`	Display a list of the currently defined function keys.
`k 4`	Delete the definition for function key F4.

`k a5,"t2764 ;fff ;l a:test.bin\r"`	Sets function key ALT-F5 to define RomEm as a 2764, fill all locations with ff hex, then load a file named `test.bin` from drive a.
`k 7,"\rl d:\\assembly\\%0.hex\r"`	This will set function key F7 to load a hex file from the `assembly` directory on drive d. Note the use of the double backslash to represent a single backslash. To use this macro, type the name of the file (without the .hex extension), then press F7.

COMMAND ! run—run a DOS command or start a DOS shell

PURPOSE Execute a single DOS command, or start a DOS shell and remain resident.

FORMAT `!` [*command*]

ARGUMENTS None.

COMMENTS If nothing follows the `!` on the input line, DOS is nvoked in interactive mode. Upon entering an `exit` command to DOS, command processing continues with the next input line with everything still intact.

If anything follows the `!` on the same input line, the remainder of the line is executed as a single DOS command and command processing continues immediately with the next command input line.

EXAMPLES

`!`	Exit to DOS but leave the RomEm Plus software resident in RAM. Type `exit` to return to RomEm Plus software.
`!dir`	Run the DOS `dir` command, and return to RomEm Plus software.

COMMAND `=` calculate—calculate a value

PURPOSE Provide a means to calculate the value of an expression specified in hexadecimal, decimal, or ASCII.

FORMAT = *value*, *value*, · · ·

ARGUMENTS *value* is any expression as described in section 5.3. RomEm displays the value of the expression in hexadecimal, decimal, and ASCII.

COMMENTS The expression operators are:

`+`	add
`-`	subtract
`*`	multiply
`/`	divide
`&`	bitwise and
`|`	bitwise or
`^`	bitwise exclusive or
`{`	shift left
`}`	shift right
`~`	not (1's complement)

There is no precedence. Evaluation is left to right, but parentheses can be used to control the order of operation.

EXAMPLES

`=45+23`	Computes the value of hex 45 plus hex 23, and displays the result in hexadecimal, decimal, and ASCII.
`='A-#10`	Computes the value of ASCII A minus decimal 10.

Note: Values can be assigned to $ registers.

COMMAND ? display—display configuration

PURPOSE Displays current configuration and environment information in tabular form.

FORMAT ?

ARGUMENTS None.

COMMENTS This commands causes a table of current information to be displayed. The table contains one line of information for each current RomEm unit. Each line shows such pertinent information as port, unit, type, active features, etc.

The configuration file actually contains more information than is displayed using this command. For example, the arguments for the dump command are saved, but are not shown in this display.

EXAMPLES

```
?
```

Display current configuration information.

6. How to Use Multiple RomEms

6.1 Parallel Port Units

To connect two or more units on one port:

1. Set the rear panel DIP switches on each unit to a unique number as follows:

Unit 0	switch 1 down, switch 2 down
Unit 1	switch 1 up, switch 2 down
Unit 2	switch 1 down, switch 2 up
Unit 3	switch 1 up, switch 2 up

2. Stack the RomEm units on top of one another.
3. Connect the 10 × 2 headers on the rear panel with the short ribbon cable.
4. Connect a wall transformer to *only one* of the units.
5. Connect one end of a male to male 25 pin cable to any one of the RomEm units and the other end to a parallel port on your PC.
6. Switch all units on.

8-Bit Systems, Example #1

This is an example of how to emulate two 8-bit EPROMs on a 8-bit bus, loading from a single file:

```
C:\>rep32
Pl1U0>p l2                  to change parallel port to LPT2, for example
Pl2U0>t 27010               to emulate a 27010
Checking P2U0 as 27010      RomEm checks the attached unit
Pl2U0>l test.bin,,20000     load the first 20000h bytes from a file named test.bin
Binary-File Load/Verify of 20000 bytes from offset 0 to offset 0
Load/Verify Completed with no errors (20000 Bytes Loaded)
Pl2U0>u 1                   to change to RomEm unit #1
Pl2U1>l test.bin,20000      load all bytes after 20000h from a file named test.bin
Binary-File Load/Verify of all bytes from offset 20000 to offset 0
Load/Verify Completed with no errors (xxxx Bytes Loaded)
```

```
P12U1>qy                    quit RomEm and save a configuration file
C:\>
```

16-Bit Systems, Example #1

This is an example of how to emulate two 8-bit EPROMs on a 16-bit bus, loading from a single file, addressing two physical RomEm units as one logical unit:

```
C:\>rep32
P11U0>p l2                  to change parallel port to LPT2, for example
P12U0>u01                   to select  0 & 1 interleaved (use 'u10' to swap bytes)
P12U01>t 27010              to emulate two 27010s, one for unit 1 and
1 for unit 0
Checking P2U0 as 27010      RomEm checks the attached units
Checking P2U1 as 27010      RomEm checks the attached units
P12U01>l test.bin           load all bytes from a file named test.bin
Binary-File Load/Verify of all bytes from offset 0 to offset 0
Load/Verify Completed with no errors (xxxx Bytes Loaded)
P12U01>qy                   quit RomEm and save a configuration file
C:\>
```

16-Bit Systems, Example #2

This is an example of how to emulate two 8-bit EPROMs on a 16-bit bus, loading from a single file, addressing each RomEm unit separately:

```
C:\>rep32
P1U0>p l2                   to change parallel port to LPT2, for example
P12U0>t 27010               to emulate a 27010
Checking P2U0 as 27010      RomEm checks the attached unit
P12U0>l test.bin,0,,,2      load all even bytes from a file named test.bin
Binary-File Load/Verify of all bytes from every 2nd
byte at offset 0 to offset 0
/Verify Completed with no errors (xxxx Bytes Loaded)
P12U0>u 1                     to change to RomEm unit #1
P12U1>l test.bin,1,,,2      load all odd bytes from a file named test.bin
Binary-File Load/Verify of all bytes from every 2nd
byte at offset 1 to offset 0
Load/Verify Completed with no errors (xxxx Bytes Loaded)
P12U1>qy                    quit RomEm and save a configuration file
C:\>
```

6.2 USB Port Units

Unlike parallel port RomEm units, USB units are completely independent of each other. To attach multiple USB units to your PC, you must have multiple ports available, or use a USB hub. Each unit must be set to a unique unit number using the switches on the rear panel (see section 3.2.4).

7.

Tips for Fast Parallel Port Downloading

For the fastest downloading (loading a file into the RomEm), use as many of the following tips as possible:

- Experiment with the port delay using the `p` (port) command. In order to be compatible with the widest variety of systems and ports, RomEm has a built in delay which it uses when writing to the RomEm unit via a parallel port. The default delay is 2. If files load with no errors, try delay values of 1 or 0, for example:

  ```
  p 2,1          use port LPT2, with a delay of 1
  ```

  A delay of 0 will result in the fastest downloads, if your parallel port can support it. Once the delay has been changed, it will be stored in the `rep32.cfg` configuration file for that port.

- If you are using Intel Hex or Motorola S files, check your assembler or compiler to see if it can generate binary files. Binary files are the quickest to load since there are no extra checksums, headers, addresses, etc., to be stripped out each time the file is loaded.

- If the EPROM you are emulating is smaller than the memory in RomEm, try the `nf` (no folding) option on the `t` (type) command. By default, RomEm software may be loading more than one copy of your file into the RomEm memory. This is done so that you can get RomEm up and running quickly without having to worry about exact pinouts and what to do with unused pins on your target system. This can make download time excessive however, if you are emulating small device types, for example if you are emulating a 2764 but your RomEm can support 27010 or 27040 device types. If this is the case, the fastest downloads will occur if you can either:

  a. Define the largest possible device type, for example, 27010 if you have a RomEm with 1MBit of memory. This requires that your target socket be configured for this device.
  b. be sure that your target socket conforms to strict JEDEC standards, that is, Vpp=High, /PGM=High, N.C.=unconnected, etc., for the device type you are emulating, and use the `nf` (no folding) option on the `t` (type) command as follows:

```
t 2764,nf       emulate a 2764 and load files into only one place in RomEm
```

- Try loading with the `nv` (no verify) option. By default, RomEm first loads, then reads back and verifies data every time the `l` (load) command is executed. This is the safest method because it insures that data is loaded correctly into RomEm. To speed up downloading however, you can eliminate the verify process using the `nv` option as follows:

  ```
  l test.hex,,,,,nv       load the file test.hex but do no verify
  ```

  Once the no verify option is selected, it will be stored in the `rep32.cfg` configuration file for the port. You can also use the `vo` (verify only) option to verify the contents of RomEm without loading.

Warning: We do not recommend changing to the no verify option, since there is no checking done on the data loaded into RomEm.

8. Troubleshooting

8.1 Parallel Port

If you are having difficulty loading a file into a parallel port RomEm, for example, the `t` (type) command reports that the emulator is not operational, or the `l` (load) command is reporting errors:

1. Try a different parallel port, if possible.
2. Use a good quality shielded cable no longer than 6 feet to connect RomEm to your parallel port. RomEm usually comes with such a cable. Longer cables or extensions may cause problems.
3. Try increasing the port delay with the `p` (port) command. In order to be compatible with the widest variety of systems and parallel ports, RomEm has a built in delay which it uses when writing to the RomEm unit. The default delay is 2. Occasionally, this may not be enough and you may need to try delay values of 3 or more, for example:

   ```
   p 2,4                    use port LPT2, with a delay of 4
   ```

   The greater the delay, the more time it will take to download, but it is important to get it working first, then make it more efficient if you can. Once the delay has been changed, it will be stored in the `rep32.cfg` configuration file for that port.

   If RomEm loads with no errors, but your target system is not operating correctly:

4. It is always a good idea to start with a known good system by burning your code into an EPROM and trying it. This must work first before you attempt to make RomEm work in your system.
5. Try the `ff` (full folding) option on the `t` (type) command, for example:

   ```
   t 27512,ff
   ```

   Then reload your file. This will cause RomEm to load your data into all possible locations within the addressable range. If this works, there is probably a pin or two on your target system which is being held to a "non-standard" logic level. This does not necessarily need to be corrected, but it will take longer to download files into RomEm.

6. You may need faster or different drivers to interface with your target. HCT interface devices are standard. Replacing these with LS, F, or ACT logic may be required in some systems.
7. Faster RAMs in RomEm may be needed in your application. We have faster versions available. Contact us for more information.
8. In some cases a shorter target cable (IDC to DIP Plug) may be necessary. Contact us if you think you may need one of these and we will be happy to supply one.

8.2 USB Port

If you are having difficulty loading a file into a USB port RomEm, for example, the `t` (type) command reports that the emulator is not operational, or the `l` (load) command is reporting errors:

1. Check your system device manager to make sure there is a USB Root Hub listed under the Universal Serial Bus Controller item, and that its properties show that it is working properly.
2. Try a different USB port, if possible.
3. Use a good quality shielded cable no longer than 6 feet to connect RomEm to your USB port. RomEm usually comes with such a cable. Longer cables or extensions may cause problems.
4. If you are using a USB hub, trying connecting the RomEm unit directly to the USB port on the computer, bypassing the hub.

If you are having problems with the Windows application, be sure to remove all previous versions and then install the latest version again.

If RomEm loads with no errors, but your target system is not operating correctly:

4. It is always a good idea to start with a known good system by burning your code into an EPROM and trying it. This must work first before you attempt to make RomEm work in your system.
5. Try the `ff` (full folding) option on the `t` (type) command, for example:

   ```
   t 27512,ff
   ```

   Then reload your file. This will cause RomEm to load your data into all possible locations within the addressable range. If this works, there is probably a pin or two on your target system which is being held to a "non-standard" logic level. This does not necessarily need to be corrected, but it will take longer to download files into RomEm.
6. You may need faster or different drivers to interface with your target. ALS interface devices are standard. Replacing these with LS, F, or ACT logic may be required in some systems.

7. Faster RAMs in RomEm may be needed in your application. We have faster versions available. Contact us for more information.
8. In some cases a shorter target cable (IDC to DIP Plug) may be necessary. Contact us if you think you may need one of these and we will be happy to supply one.

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