microplex

Microplex M302 Print Server

Installation and Configuration Guide

Version 1.9

microplex

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1 OVERVIEW OF THE MANUAL

This manual describes the installation and configuration of an M302 on your network. For the latest information on the M302, please see the Technical Support section of Microplex's Web site:

http://www.microplex.com

Contents of the Manual

This manual contains the following chapters:

2: Introduction to the M302 Print Server.   How the M302 works and its main features.

3: Installing the M302.   Installing and connecting the M302 Print Server to a printer and the network.

4: Configuration Tools.   Utilities provided with the M302 Print Server and some basic TCP/IP commands that you will need to configure the M302.

5: Configuring the M302 on Your Network.

6: Configuring Printers in Windows.

7: Configuring Printers in UNIX.   Providing some procedures for specific UNIX variants and scenarios.

8: Configuring Printers in a Mac OS System.

9: Configuring Printers on a Novell Server.

10: Using HTML Pages to Configure the M302.   Descriptions of the M302 Web pages for configuring the Print Server and viewing its status.

11: Reference Information.   Provides a complete command list and information about using the *npsh* command line interface shell. Describes the M302 naming scheme, how to reset units to factory defaults, and how to upgrade the firmware.

12: Extra Features/Additional Information.   Topics covered include Print Server architecture, general options, security features, monitoring and logging printer information, using the FTP daemon to access the M302, and managing with SNMP.

13: M302 Specifications.   Providing hardware and software specifications for the M302, connector pinouts, serial flow control, LED status indicators, and variable definitions.

14: Getting Help.   Where to find help and how to return the M302 for repair.

15: Glossary.

Documentation Conventions

The document conventions used in this manual and the appendices are as follows:

- The Courier font in **boldface** indicates commands that you type.

      $**ping ftp.microplex.com**

- Regular Courier font indicates displayed results.

      ftp.microplex.com is alive

- Example names, numbers, and commands are presented in **boldface**.

   To create an IP address for the M302 using the TCP/IP **arp** command, do the following...

- Variable values are shown in *italics*. *Italics* may also be used to add emphasis.

      ping *ipname*

      ipname is alive

   Please enter the ***ipname*** at the prompt.

   Make sure you *first* contact...

2 INTRODUCTION TO THE M302 PRINT SERVER

This chapter describes the M302's architecture and special features. The topics included are:

What is the M302?

The M302 10/100 Pocket Print Server allows you to locate your printer anywhere on a 10Base-T, 100Base-T, or Wireless LAN rather than attaching it directly to a host system. After following some simple configuration steps, the printer can be *simultaneously* shared with users from Unix, Windows, Novell, or Apple operating systems across a TCP/IP network. Multiple concurrent users and operating systems are supported.

Note: The M302 is compatible with most printers with a Centronics parallel interface or an RS-232 serial interface.

Physical Features

The key physical components of the M302 Print Server are:

- a 10/100 network interface connector to connect to the network
- a PCMCIA slot for use with a Wireless PCMCIA card
- a parallel port for printers with a Centronics interface
- a serial port for serial printers or other peripherals
- Flash memory to store firmware and user-configurable settings
- SDRAM for speed and efficiency

For more detailed specifications of the M302 Print Server, please see Chapter 13, *M302 Specifications*.

How Does the M302 Work?

The **print path** is the path that data follows when the host sends a job to a printer through the M302. This print path can be divided into three parts, as shown in Figure 1.

Figure 1—Print Path Components
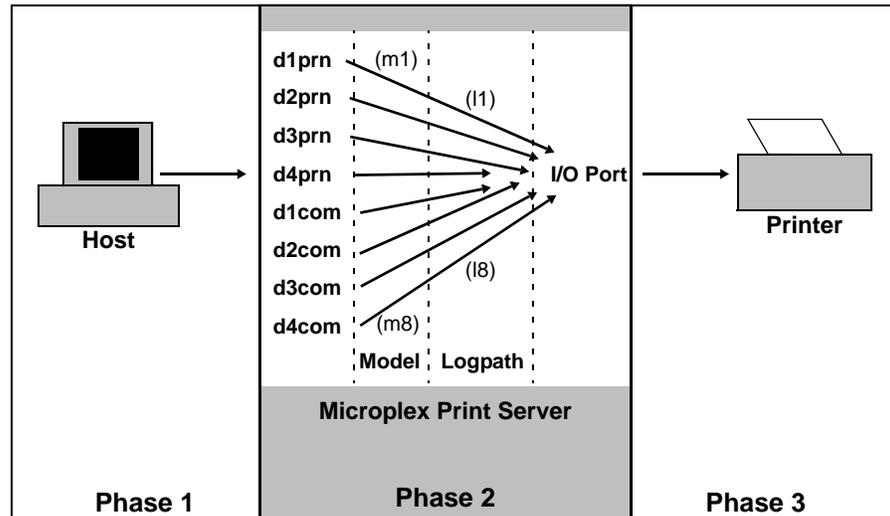
		The host sends the job to one of eight predefined **destinations** (e.g., *d1prn*) on the Print Server, rather than directly to the I/O port.
Host		
Print Server		The job passes through the destination's associated **model** (e.g., *m1*) for optional processing and then continues through the destination's associated **logpath** (e.g., *l1*) where logging information is recorded. The data then ends up at the destination's associated **I/O port**, *prn* and *com*.
Printer		The data passes from the Print Server's I/O port to the attached printer for output.

There are eight destinations on the M302, and each has an associated *model* and *logpath*. The **model** determines whether any extra data processing (e.g., ASCII to PostScript conversion) is required and the **logpath** determines whether job logging (e.g., user ID) or printer errors must be reported. A model or logpath can be associated with more than one destination. See *Figure 28* on page 109 for a diagram of the M302 models and logpaths.

Product Features

The M302 offers an extensive list of features including:

- built-in HTML forms for easy cross-platform configuration with any Web browser

- Waldo, a utility for automated TCP/IP configuration (included on the CD-ROM supplied with the M302 or the latest version online at http://www.microplex.com)

- "**npsh**", a detailed and easy-to-use command line interface shell

- multiple levels of configurable security through passwords, user permission levels, and access lists

- numerous methods of printer error and usage logging

- remote management through telnet sessions, "**rsh/rcmd/remsh**" commands, and SNMP

- extensive built-in troubleshooting tools

- built-in "**telnet**" and "**ping**" clients

- ability to disable protocols and destination services

- multiple destinations for versatile printer manipulation and distinct print setups

- header and trailer strings to instruct printers on tray, font, pitch, or simplex/duplex selection, for example

- autosensing of job format for ASCII to PostScript conversion or to automatically switch printer emulations

- flexible naming conventions

- flash memory upgrades over TCP/IP

- configurable parallel port bit rate for additional printer compatibility

- ability to simultaneously print on both ports to different printers

Non-Printing Uses

The M302's serial port can also be used for peripherals other than printers. For example, a terminal can be connected to a network by attaching it to the serial interface of the M302. Terminals can be used to display information received over the network for applications as varied as viewing airline or prescription details. Other devices like scales, pill dispensing machines, and environmental controls have also been attached to the serial port of the M302 for network access.

3 INSTALLING THE M302

This chapter describes the following:

*   *Site Requirements* on page 13

*   *Unpacking the M302* on page 13

*   *Connecting to the Network and Printers* on page 14

Site Requirements

Prepare to install the M302 in a clean, well-ventilated environment protected from extremes of temperature, humidity, mechanical shock, or vibration. Provide enough space at the front and back of the unit for cable connections.

Prepare to install the M302 within four meters (13 feet) of a grounded 115 or 230 VAC outlet. Power is supplied to the M302 from an external transformer through an output cord to a barrel jack connector. The external transformer connects to a 115 or 230 VAC outlet.

Unpacking the M302

Upon receiving the M302, check the packaging for any damage or missing pieces. Immediately report problems to the shipping company or vendor.

Table 1—M302 Packing List

Print Server	• M302
	• Power Supply
CD-ROM	• M302 PPO Installation and Configuration Guide (PDF format)
	• Software utilities for the M302 PPO

Connecting to the Network and Printers

The installation procedure is as follows:

1. Unpack the unit and connect a printer to the appropriate I/O port on the rear panel (Figure 2) of the M302 (see *Step 1: connect to printers* on page 14).

Figure 2—M302 Rear View: I/O Ports

Parallel Port (PRN)   Serial Port (COM)

2. Print test pages to check that the Print Server and printer are working correctly (see *Step 2: print test pages* on page 15).

3. Connect the M302 to the network (see *Step 3: Connect to the network* on page 16).

Step 1: connect to printers

A maximum of two peripherals can be attached to the M302 at the same time: one on the parallel port and one on the serial port (see Figure 2). These can be used simultaneously.

Parallel port connections (PRN)

One 25-pin female DB-25 connector with an IBM PC-compatible pinout is provided on the rear panel for connection to printers with Centronics interfaces. The port can be configured with print mode parameters that depend on the interface of the attached printer. These parameters include:

bb	*bit bucket* mode, for simulating an attached printer
fast	*fast* mode, for high-performance parallel interfaces that can handle an increased transfer rate
pc	*pc* mode, for most modern printers
cen	*centronics* mode, for older printers (usually impact printers)
slow	*slow* mode, for slower parallel interfaces that need a slower transfer rate.

Serial port connections (COM)

One 9-pin male DE-9P connector with an IBM PC AT-compatible pinout is provided for connection to printers requiring serial ports. The port has various parameters that control attributes such as:

- parity selection, generation, and detection

- hardware and software flow control

- character description.

Note: The M302 serial port is as a 9-pin DTE connector.

For additional I/O port configuration help, see the *Set commands* on page 84.

Step 2: print test pages

Use the test page feature of the M302 to test the connection between the Print Server and the printer. Successfully printed test pages indicate a solid connection.

To output test pages:

1. Unpack and plug in the power supply. The power connector plugs into the M302 front panel. (see Figure 3).

Figure 3—M302 Front View: Network and Power Connections
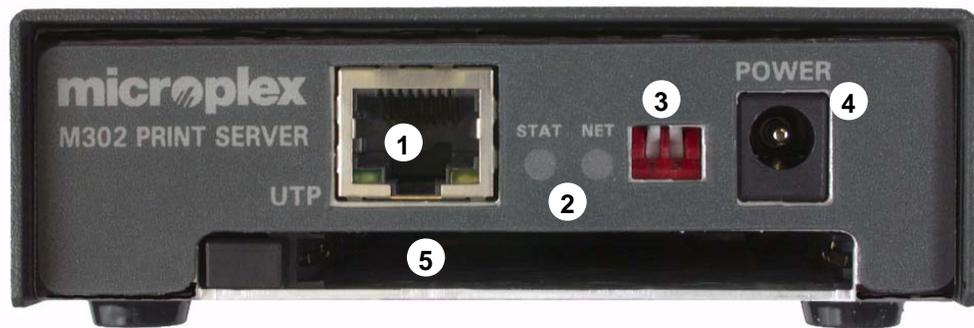
① RJ45 Network Interface Connector to connect to a 10/100Base network

② LEDs to indicate network stataus (STAT) and data transmission status (NET)

③ Dipswitches (1 and 2) for configuring operating modes

④ Power connector

⑤ a PCMCIA slot for use with an 802.11b wireless PCMCIA card

2. Ensure that the M302 is **powered off.** Disconnect the network connector (if it is connected) and remove the PCMCIA card if present.

   If the Print Server is connected to a network with link integrity, the proceeding step will force the unit into download mode instead of printing the desired test page.

3. Set **Dipswitch 1** and **Dipswitch 2** to the "**on**" position (down).

   Dipswitch setting options are shown in Table 2. The dipswitches are located on the front of the M302 (see Figure 3).

4. **Power on** the printer and then the M302.

   The M302 will generate two test pages automatically.

5. When done, **power off** the M302, and then the printer. Set **Dipswitch 1** and **Dipswitch 2** to the "**off**" position (up) again for normal operations.

   Note: It is very important that the dipswitches be returned to their default states once you are finished with the test pages.

Table 2—M302 Dipswitch Settings

Dipswitch		Comments
1	2	
OFF	OFF	**Normal operation.** With both dipswitches in the "OFF" position, the unit will boot up using the settings in Flash rather than the default settings. Dipswitch 2 is in the "OFF" position from the factory so that the new settings that you store will be used.
ON	OFF	**Factory default settings**. With the dipswitches in this configuration, the unit will boot up and all settings stored in Flash will be erased except the Ethernet address and key value.
OFF	ON	**Default IP (0.0.0.0).** With the dipswitches in this configuration, the unit will boot **with factory default settings, but the stored settings in Flash remain intact.** This enables you to set an IP address of your own. Setting dipswitch 2 to "ON" will not clear any settings that you have stored in Flash. It simply boots the unit in a different state with the settings in Flash temporarily ignored.
ON	ON	If the unit is reset and detects link integrity from a hub, download mode is initiated. If the unit is not connected to a network, it will print a test page.

Step 3: Connect to the network

Two network connection options are provided (see Figure 3):

  • an RJ45 network connector for 10/100Base-T (UTP) networks

  • a PCMCIA slot for a supported 802.11b PCMCIA card

To attach the M302 to the network as shown in Figure 4, do the following:

1. Plug the network cable into the RJ45 network connector for an Ethernet network, and/or insert a wireless PCMCIA card into the PCMCIA slot for a wireless network, on the front panel of the M302 (see Figure 3).

Watch the LED lights on the front panel of the device as they cycle through the power-on self-test. When the test is complete, the STAT LED will flash once per second or, if there is no IP address configured, twice per second (see *Waldo* on page 19).

Figure 4—Diagram of M302 Connected to Network and Printer(s)
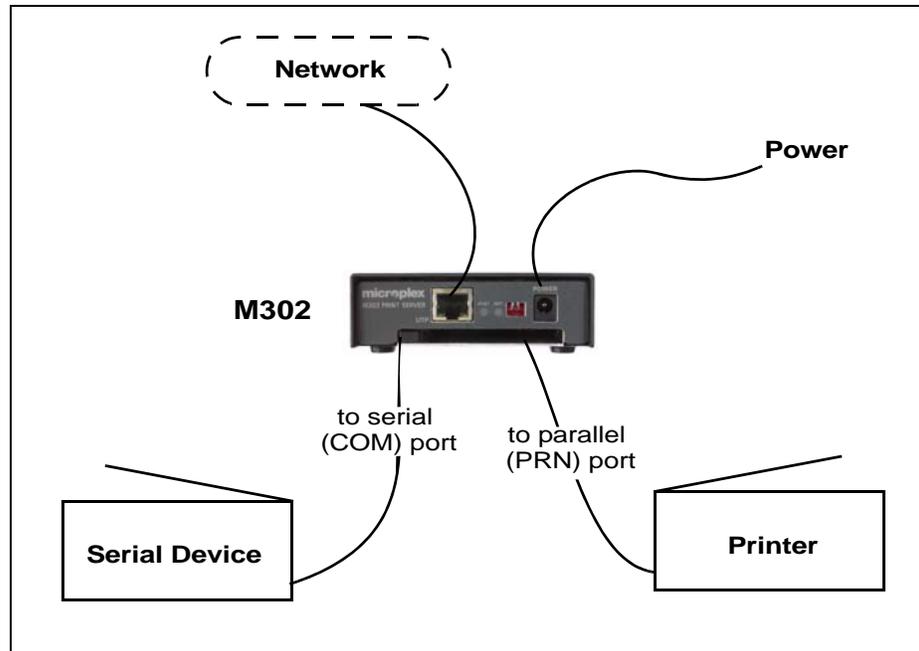
4 CONFIGURATION TOOLS

This chapter briefly describes some of the M302 utilities provided to help you set up your M302 Print Server:

- *HTML forms* on page 18
- *Waldo* on page 19

In addition, two TCP/IP commands that you will need are briefly described:

- *Telnet* on page 20
- *Ping* on page 20

M302 Utilities

HTML forms

The M302's settings can be configured over TCP/IP through a standard Web browser. The M302's Web pages provide a user-friendly way to access some of the commands built into the Print Server.

To access the M302's home page, do the following:

1. Ensure that the Print Server has an IP address and subnet mask so that it is identifiable on your TCP/IP network.

2. Ensure that your network station can successfully "**ping**" the M302 over the network.

3. Direct your Web browser to the Uniform Resource Locator (URL):

   http://*M302IPaddress*

   For example: **http://192.168.11.9**

4. When prompted for a User ID and Password, type in "**root**" for the ID and either press ENTER at the password prompt or, if a password has been set, type the password and then press ENTER.

The M302's HTML structure is divided into several menus as shown in Figure 5. More detailed information about M302 Web pages is found in Chapter 10, *Using HTML Pages to Configure the M302*.

Figure 5—M302 HTML Menu Structure

```
                          ┌───────────────┐
                          │  Index/Home   │
                          └───────┬───────┘
   ┌─────────┬──────────┬─────────┼──────────┬─────────┬─────────┐
┌──────┐ ┌──────────┐ ┌───────┐ ┌──────────────┐ ┌────────┐ ┌────────┐ ┌──────┐
│Network│ │Print Path│ │I/O Port│ │Administration│ │ Status │ │ Reboot │ │ Help │
└──────┘ └────┬─────┘ └───┬───┘ └──────────────┘ └───┬────┘ └────────┘ └──────┘
              │ ┌──────┐  │ ┌──────┐                 │ ┌────────┐
              ├─│d1prn │  ├─│ prn  │                 ├─│ TCP/IP │
              │ └──────┘  │ └──────┘                 │ └────────┘
              │ ┌──────┐  │ ┌──────┐                 │ ┌────────┐
              ├─│d2prn │  └─│ com  │                 └─│I/O Port│
              │ └──────┘    └──────┘                   └────────┘
              │ ┌──────┐
              ├─│d3prn │
              │ └──────┘
              │ ┌──────┐
              ├─│d4prn │
              │ └──────┘
              │ ┌──────┐
              ├─│d1com │
              │ └──────┘
              │ ┌──────┐
              ├─│d2com │
              │ └──────┘
              │ ┌──────┐
              ├─│d3com │
              │ └──────┘
              │ ┌──────┐
              └─│d4com │
                └──────┘
```
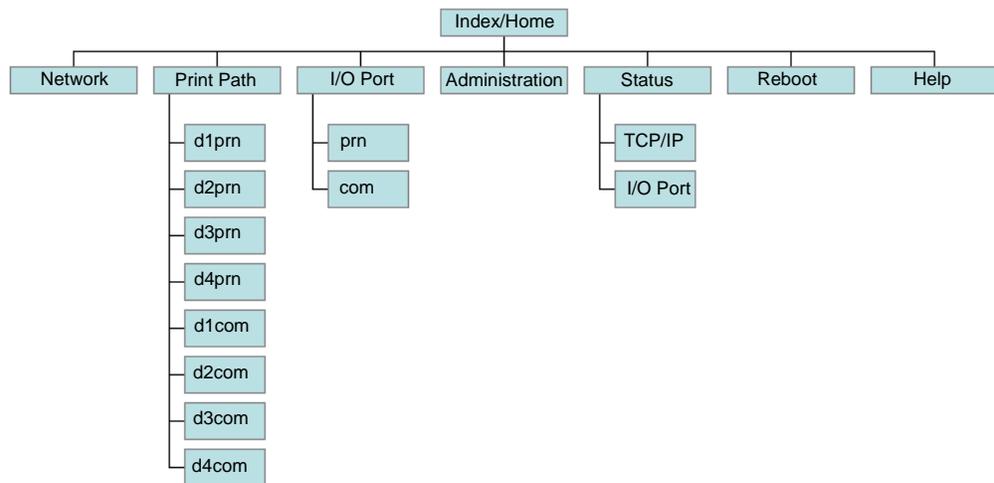
Waldo

Waldo is a Windows tool for discovering, monitoring, and configuring Microplex print/frame server devices on a TCP/IP network. The program is a Java stand alone program.

The M302 can be configured on a TCP/IP network using Waldo. Two steps are involved:

1. Identify the M302 on the network using TCP/IP as the underlying protocol.

2. Configure the M302 with its required TCP/IP settings (i.e., IP address and subnet mask).

Additional settings like routing entries can also be configured to allow for communications across subnets. Once Waldo is up and running, select Help Topics from the Help menu for more detailed information about Waldo.

The installation procedure for Waldo is described below; how to use Waldo to configure your M302 is described in *Using Waldo (Windows)* on page 24.

Waldo Environment Requirements

Before installing Waldo, ensure that you have met the following system environment requirements:

•   the Java Runtime Environment™ (JRE) from Sun Microsystems. JRE consists of the Java virtual machine, the Java platform core classes, and supporting files. The latest supported version of JRE is available at Microplex's Web site: *http://www.microplex.com*.

•   the TCP/IP protocol installed and configured on your workstation.

Installing Waldo in Windows

To install Waldo on a Windows workstation:

1. Insert the M302 CD-ROM and bring up the CD directory listing in My Computer or Windows Explorer.

2. Double click on *waldo.exe* in the Waldo directory to run the InstallShield Wizard.

3. Answer the prompts throughout the Wizard.

   Once the install process is completed, you will be prompted to view the ReadMe file. Select "Yes" to read this, and when done, close the file.

   Note: The latest version of Waldo is available on Microplex's Web site: *http://www.microplex.com.*

TCP/IP Commands

Telnet

Telnet can be used to access a remote computer on a network. To use this command, you must know the IP address of the M302 Print Server. You can start a Telnet session on a UNIX or Windows-based computer, which is connected to the network, to log in to the M302 command line interface shell to alter and view settings.

Syntax:

```
telnet ipaddress
```

Example:

```
telnet 192.168.11.9
```

This will bring up the M302 login prompt. Enter "`root`" for the User ID and press ENTER at the password prompt or, if a password has been set, then type it in and press ENTER.

Ping

You can use the "`ping`" command to check that an assigned IP address (for example, the IP address for the M302) is active.

Syntax:

```
ping IPaddress
```

For example:

```
ping 192.168.11.9
```

The response will indicate whether the IP address is active or not.

5 CONFIGURING THE M302 ON YOUR NETWORK

This chapter describes how to configure the required and optional TCP/IP settings for the M302 on your network. The following steps are covered:

- *Required TCP/IP Settings*:
    - *Configure an IP address for the M302 using the ARP command* on page 22
    - *Configure the M302 IP address and subnet mask* on page 22
- *Optional TCP/IP Settings*:
    - *Communicating across routers* on page 26
- *Configuring the M302 for a Wireless Network* on page 27

The procedures found in this chapter are common to Windows, UNIX, Novell and Mac OS networks. Further M302 printer configuration requirements specific to your TCP/IP server operating system are described in the following chapters:

- *Configuring Printers in Windows* on page 32
- *Configuring Printers in UNIX* on page 42
- *Configuring Printers in a Mac OS System* on page 55
- *Configuring Printers on a Novell Server* on page 58

There are two parts to setting up the M302 Print Server on your system:

1. Configuring the M302 so that it can be seen on the network. This involves network-related settings configured through the M302 HTML forms or built-in command line interface shell, **npsh**.

2. Configuring the host to be able to connect to the M302 and printer(s) so that the host can send print jobs to the M302.

Network environments that use DHCP or BOOTP do not require any network settings to be configured on the M302. However, *all* network setups require configuration on the host end.

Required TCP/IP Settings

Configure an IP address for the M302 using the ARP command

To create an IP address for the M302 using the TCP/IP **arp** command:

1. Open a command window in Windows, or log on to a UNIX station as the superuser root.

    Note: This station must be located on the *same* subnet as the M302 because ARP traffic is limited to subnets.

2. Create an IP address entry for the M302 in the ARP table:

    ```
    arp -s IPaddress ethernetaddress
    ```

    where:

IPaddress	the M302 IP address, e.g., **192.168.11.6**
ethernet address	the M302 ethernet address, e.g.,

            00-80-72-0A-00-60 (Windows)
            00:80:72:0A:00:60 (UNIX)

    Note that

    *   in a Windows environment a hyphen ("–") is used between each pair of characters in the ethernet address;

    *   in a UNIX environment a colon (" : ") is used.

    If this syntax does not apply, look in your host's reference manual to find the proper syntax for the **arp** command.

3. Check that the **arp** entry was accepted:

    ```
    arp -a
    ```

4. Check that the assigned IP address is active:

    ```
    ping IPaddress
    ```

Configure the M302 IP address and subnet mask

Once the IP address has been created, you can configure it on the M302 Print Server using one of the following:

*   M302 HTML forms, page 23

*   the M302 Waldo utility (Windows only), page 24

*   the TCP/IP **telnet** command, page 25

Using HTML forms

1. Load the M302 HTML forms as described in *HTML forms* on page 18, then select "Network" from the Main Menu.

   Or, go directly to the Network Configuration form by typing the following into your browser:

   ```
   http://M302IPaddress/tcpipConf.html
   ```

   Enter "**root**" for the User ID and press ENTER at the password prompt, as there is no password by default.

   The Network TCP/IP configuration form is displayed (Figure 6).

Figure 6—Network TCP/IP Form

2. For 10/100Base-T (UTP) networks, enter the IP address in the **Interface 1** IP Address field.

   For wireless networks (using a PCMCIA card), enter the IP address in the **Interface 2** IP Address field.

3. Enter the M302's subnet mask in:

   • the Interface 1 Subnet Mask field for UTP networks

   • the Interface 2 Subnet Mask field for wireless networks.

   If you wish to communicate with the M302 from across subnets, you will also need an entry in the "Routing" section of the form. Please see *Communicating across routers* on page 26 for further details.

4. Click on "Submit" when done.

5. Go to the Reboot page and click on "Reboot" to apply the new settings to your system. At this point, you can now configure your host.

Using Waldo (Windows)

Ensure that you have installed Waldo on your Windows PC (see *Installing Waldo in Windows* on page 19). To configure the M302 with its required TCP/IP settings (i.e., IP address and subnet mask):

1. Select Programs → Waldo → SuperWaldo in the Windows Start menu.

   The Waldo main screen is displayed, as in Figure 7.

2. Click on "Search…" to open the Discover Devices dialog box.

3. Select "local" and click on "OK".

   Or, click on "Add..." to find a device on another subnet.

   The main dialog box will now build up a list of Microplex devices. This process may take a minute or two to find the devices on the network.

4. Click on "Stop Searching" after the device has been found.

5. Select the M302's ethernet address from the list box and press "Assign IP…".

6. In the Assign IP dialog box, fill in the IP address and subnet mask for this M302.

   You can also assign a default router/gateway entry in this dialog box to allow your M302 to communicate across subnets. Please see *Communicating across routers* on page 26 for further details.

7. Click "Assign" when done to assign these TCP/IP settings to the M302. Waldo will then display its progress status in a separate dialog box.

After successfully assigning the settings, you will see the M302 with its new IP address in the device list. At this point, you can configure your host.

Figure 7—Waldo Main Screen
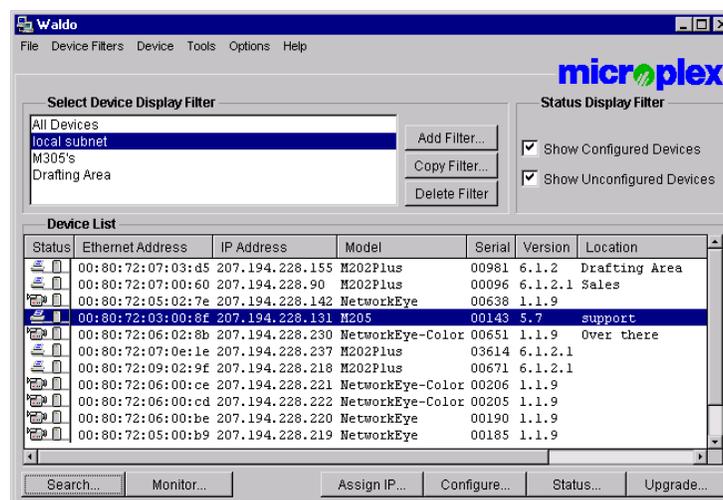
Using Telnet

1. Start a Telnet session with the M302. Type

    telnet *M302IPaddress*

    where ***M302IPaddress*** is the IP address of the M302 unit. This will bring up a login prompt.

2. Enter "**root**" for the User ID and press ENTER at the password prompt, as by default there is no password set.

    The following WARNING message is normal at this point and may be ignored.

    STORED AND CURRENT VALUES DIFFER

    You should now see the prompt

    ***M302IPaddress*:root>**

3. Store the new IP address and netmask in EEPROM so that the setting will remain intact after reboot. To do this, enter

    store tcpip *ifnum* addr *M302IPaddress*
    store tcpip *ifnum* mask *M302netmask*

    where:

ifnum	is the index to a particular network interface. It is "**1**" for an Ethernet network and "**2**" for a wireless network.
M302netmask	is the netmask address for the M302.

    If you would like to communicate with the M302 from across routers, you will need to make an entry in the "Routing" section. See *Communicating across routers* on page 26 for further details.

4. [**Optional, but recommended**] Configure root and guest user passwords with the following commands:

    set user passwd root *newRootPssswd*
    set user passwd guest *newGuestPasswd*

5. Save these configurations to EEPROM. Enter

    save

6. Verify the IP address and netmask. Enter:]

    list stored tcpip

7. Log out of the telnet session with "**quit**", then reboot the M302 by powering the unit off and then back on again.

8. Test the equipment and configuration after installation is complete.

    ping *M302IPaddress*

An Important Note

Once you have configured the unit using any of the above methods, the STAT LED will flash once per second. This means the M302 is configured and recognizable on the network. At this point, you can now configure your host.

The STAT LED will flash when the IP address is configured; it does not mean that the unit is properly configured, only that an IP address has been saved.

If you need to communicate with the M302 across routers, you must now fill in an entry within the "Routing" section.

Optional TCP/IP Settings

Communicating across routers

Since Windows and UNIX environments depend on TCP/IP to communicate with the M302, crossing routers can be an issue.

After following one of the M302 configuration methods described above, you will only be able to communicate with the Print Server from the *same* subnet. This means that the M302 will *not* be able to accept any requests from hosts across a router (i.e., on another subnet).

To allow the M302 to communicate across a router, it is best to store a default router/gateway within the Print Server so that any packets destined for another subnet get forwarded to this router automatically. The router (or series of routers) can then ensure the packets arrive at their final destination on the other subnet.

You can configure a default router/gateway within the M302 using either the M302 HTML forms or the TCP/IP **telnet** command.

Using HTML forms

1. Follow the instructions for accessing the Network TCP/IP form (page 23).

2. In the Routing section of the Network TCP/IP form (Figure 6 on page 23), enter the IP address of the default router/gateway for the M302's subnet in the first Gateway field.

   Ensure that the correct Interface number, either "1" or "2", is selected. It should be "1" for an Ethernet network and "2" for a wireless network.

3. Click on "Submit" when done.

4. Go to the Reboot page and click on "Reboot" to apply the new settings to your system.

Using Telnet   1.   Telnet to the Print Server as described on page 25.

> **telnet *M302ipaddress***

2.   Enter "**root**" for the User ID and press ENTER at the password prompt, as by default there is no password set.

The following WARNING message is normal at this point and may be ignored.

> **STORED AND CURRENT VALUES DIFFER**

You should now see the prompt

> ***M302IPaddress*:root>**

3.   Type "**list tcpip**" to view the Print Server's current settings, then configure the M302's default router/gateway as follows:

> **store tcpip route add|del default *routerIPaddress ifnum***

where "***ifnum***" is "**1**" for an Ethernet network and "**2**" for a wireless network.

It is easier to store one default entry than an entry for every remote host or network, though it is possible to do this. The syntax for this method is

> **store tcpip route add|del [host|net] *IPaddress*[/mask] *routerIPaddress ifnum* [metric]**

4.   Logout of the Telnet session with "**quit**". Then reboot the M302 by powering the unit off and then on again.

Configuring the M302 for a Wireless Network

The wireless network for the M302 can be configured as an *adhoc* or *managed* (infrastructure) WEP protocol network (Figure 8). Please refer to your PCMCIA card manual for details on configuring your wireless network.

User-configurable parameters can be modified using either the M302 HTML forms or the TCP/IP **telnet** command.

Using HTML forms   1.   Follow the instructions for accessing the Network TCP/IP form (page 23).

2.   In the Network TCP/IP form (Figure 6 on page 23), enter the IP address of the default router/gateway for the M302's subnet in the first Gateway field in the Routing section of the form.

Ensure that the correct Interface number, "2", is selected.

3.   Click on "Submit" when done.

4.   Go to the Reboot page and click on "Reboot" to apply the new settings to your system.

Using Telnet   1.   Telnet to the Print Server as described on page 25.

            `telnet `*`M302ipaddress`*

2.   Type "`list tcpip`" to view the Print Server's current settings.

Figure 8—Wireless Networks with the M302
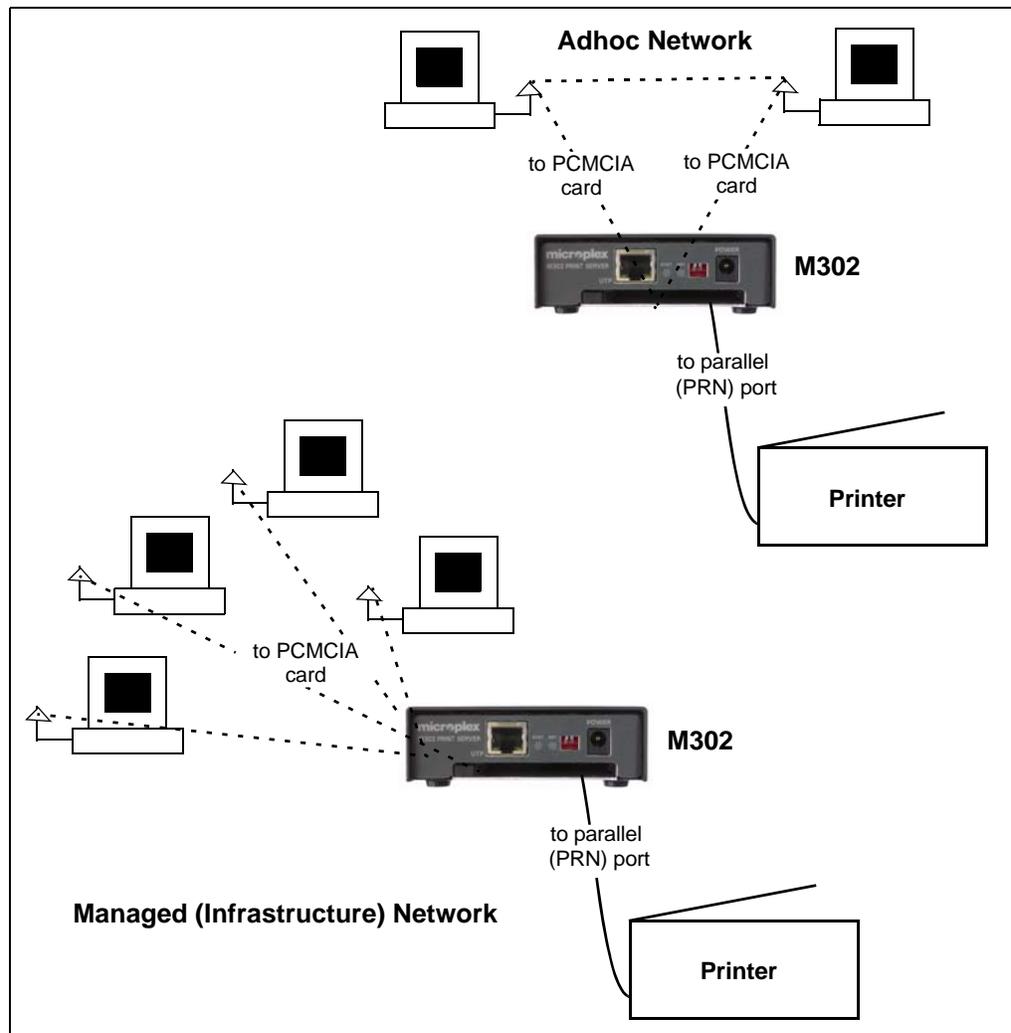
3.   Configure the M302's default router/gateway settings as required, using the following command:

        `store ifc `*`ifnum`*` wlan `*`option`*

where "*`ifnum`*" is "`2`" for a wireless network and "*`option`*" is any of the parameters listed in Table 3 on page 29.

For more information on the **store** command, see Table 8 on page 99.

4.   When done, logout of the Telnet session with "`quit`". Then reboot the M302 by powering the unit off and then on again.

Table 3—User-configurable M302 parameters for a wireless network

Parameter	Description
`antenna antenna-type`	Set the antenna type for the wireless network. `antenna-type` is the type of antenna to be used: "`primary`", "`aux`" (auxiliary or external) and "`diverse`". The default "diverse" allows the PCMCIA card to decide on the optimal antenna operation.
`channel channel-num`	Set the RF channel number for a wireless network. `channel-num` selects the RF channel number (1 to 15) used in adhoc mode. The word "`default`" will inform the device driver to use the card's factory set default channel.
`defkey key-num`	Set the default key for wireless network encryption. `key-num` is the number identifying one of the four keys, starting with one. The default value of zero disables encryption.
`key key-num key-value`	Set a key to a given value for a wireless network. `key-num` is the number identifying one of the four keys. The default value of zero disables encryption for `key-num` `key-value` is the encryption key value for `key-num`. The value must consist of 5, 13 or 16 double- or quad-digit HEX numbers, separated by (':') or dash ('–') characters for readability (e.g., D1C2–B3A4–9586–7768–594A–3b2c–1D). Alpha characters are NOT case sensitive. If '$' is the first character the remainder of the argument is treated as a literal string with all alphanumeric characters allowed (spaces can be used if the string is enclosed in double quotes, for example: `store ifc 2 wlan key 1 "$a simple password"`). Key length is inferred from the length of `key-value`, so leading zeros of longer keys must be explicitly entered (not blanked).
`mode net-mode`	Set the network mode for a wireless network. `net-mode` is the type of network operation mode: "`adhoc`" or "`managed`". Default: `adhoc`

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Table 3—User-configurable M302 parameters for a wireless network

Parameter	Description
`opts` *`option-list`*	Set options for a wireless network. *`option-list`* is a space separated list of options that need to be enabled or disabled. An option is enabled by including it in the list and disabled by preceding it with a '–' character in the list. Currently one option is available: `intnl` sets the network to international mode (used in international zones)
`pmm` *`sleep-time`*	Set the Power Management Mode for a wireless network. "`off`" will disable power-save mode, "`on`" will enable power-save mode.
`preamble` *`len-type`*	Set preamble length for TX packets in a wireless network. *`len-type`* is the type of preamble length required. It can be "`long`", "`short`" or "`default`". "`default`" allows the card to use its own factory-default.
`speed` *`speed-flags`*	Set the transmit transfer rate for a wireless network. *`speed-flags`* are the speeds being selected. The following values are supported: 1 for 1Mbps, 2 for 2Mbps, 5 for 5.5Mbps, and 11 for 11 Mbps. The default "`auto`" sets the PCMCIA card to use automatic negotiation.
`ssid` *`network name`*	Set the wireless network name (SSID). *`network name`* is a 1 to 32 ASCII character string. Default is "`101`"
`txpwr` *`power`*	Set the Transmit Power level used to send packets out on a wireless network as a percentage of full power (100%). *`power`* is a number from 1 to 100, the default is 100.

Troubleshooting Tips

Waldo error messages: M302 will not talk on the network

Unable to assign temporary IP. The address is already in use.

• Ensure that you have assigned an IP address that is not being used by another device.

Unable to assign temporary IP. The device is not responding. The network may be down, or an invalid IP address has been used.

• Ensure that the IP address that you used is valid for your network.

M302 will not talk on the network

• Have you assigned it a unique and valid IP address that corresponds with the other IP addresses on your network? For example, are you sure no other device is using this IP address, that the subnet mask is the same as other hosts on the network, and that the unique IP address is part of the network specified by the subnet mask?

• Are you sure you are trying to talk to the M302 from a host on the *same subnet*? The Print Server can only be seen locally if you configured a routing entry earlier on.

• Is the STAT LED on the front of the M302 flashing once per second, or is it flashing faster? A slower, once-a-second rate indicates that the Print Server is in fact configured with an IP address. A faster rate indicates that the M302 is unaware of the IP address and you may need to try the configuration process again.

• Have you confirmed the network connection to the M302 is working correctly? Trying different network cables and locations will help narrow down the problem.

HTML configuration forms will not display

• Can you "`ping`" the M302 from your Windows station? If not, please see section above, *M302 will not talk on the network* on page 31, or *Cannot ping the M302* on page 52 for UNIX systems.

• Have you used the correct URL for the M302's home page? It should be

   `http://M302IPaddress`

   For example,

   `http://192.168.11.9`

6 CONFIGURING PRINTERS IN WINDOWS

The M302 supports Windows NT/2000/XP operating systems. How to setup printers on a Windows-based network is described in this chapter, in the following sections:

- *M302 Configuration Requirements* on page 32

- *Creating an LPR Printer (Windows NT/2000/XP/2003)* on page 32

- *Changing Destination Names on Windows NT/2000/XP* on page 36

Identifying the M302 on the network using TCP/IP and configuring the M302 with its required TCP/IP settings (i.e., IP address and subnet mask) are described in the previous chapter, *Configuring the M302 on Your Network*.

M302 Configuration Requirements

Required: The M302 must be configured with an IP address and subnet mask before it can be seen on the network, since Windows printing depends on TCP/IP.

Optional: Additional settings such as routing entries can also be configured, allowing communication across subnets.

Procedures for these configuring the M302 to meet these requirements are described in chapter 5, *Configuring the M302 on Your Network*. To configure an IP address and subnet mask on your M302, Microplex recommends the use of their TCP/IP configuration utility, Waldo, described in detail on page 24.

Creating an LPR Printer (Windows NT/2000/XP/2003)

There are two procedures for creating an LPR printer:

- *Creating an LPR Printer on Windows 2000/XP/2003*

- *Creating an LPR Printer on Windows NT4*

LPR software may have to be installed in Windows NT before using the create procedure (*Installing LPR Network Software on Windows NT4*).

Creating an LPR Printer on Windows 2000/XP/2003

To configure a new LPR printer on a Windows 2000/XP/2003 station or server, do the following:

1. From the Windows Start menu, select Settings → Printers.

2. Double click on the Add Printer icon.

3. Select "Local Printer" in the Add Printer Wizard (Figure 9). *Do not select* "Automatically detect and install my Plug and Play printer".

Figure 9—Add LPR-compatible Printer Dialog Box

4. Click on "Next" and select "Create a new port" and "Standard TCP/IP Port".

5. Click on "Next" and enter the DNS name or IP address in the Printer Name or IP Address field. For example,

   192.197.122.101

6. You can leave the Port Name unchanged or rename it. The default based on the above IP address will be

   IP_192.197.122.101

7. Click on "Next", then select the Device Type "Custom" and click on "Settings".

8. In the Port Settings dialog box (Figure 10), give the printer any unique name and select "LPR" as the protocol.

Figure 10—Port Settings
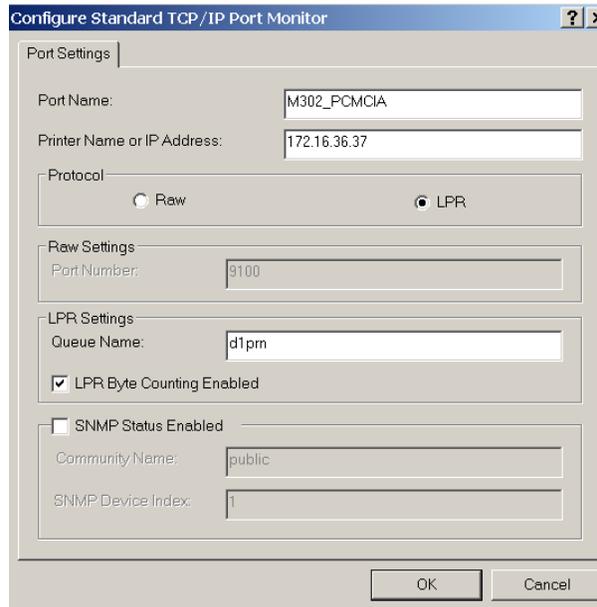
9. For Queue Name enter "**d1prn**" and check the "LPR Byte Counting Enabled" checkbox. Click on "OK" and then "Finish".

10. Click on "Next", decide whether you want to share the printer, and then click on "Next" again.

11. When prompted for a test page, select either "Yes" or "No" depending on the state of the attached printer, and click on "Finish".

    Windows may ask for a disk or CD-ROM to load the appropriate printer driver to complete this new printer setup.

There should now be a new printer icon in the Printers folder. This new network printer uses LPR over TCP/IP as the underlying protocol to print to the M302.

Installing LPR Network Software on Windows NT4

You may need to install LPR software on Windows NT computers running Windows NT4 operating systems; this is not necessary for Windows 2000/XP/2003 computers.

If "Microsoft TCP/IP Printing" is not installed in your Network control panel, perform the following steps:

1. Select Settings → Control Panel in the Windows Start menu.

2. Double click on the Network icon.

3.   Select the Services tab and click on "Add...".

4.   Select "Microsoft TCP/IP Printing" in the Network Service list, and click on "OK".

5.   Click on "OK" and answer "Yes" when prompted to reboot.

Creating an LPR Printer on Windows NT4

To configure a new LPR printer on a Windows NT4 station:

1.   Select Settings → Printers in the Windows Start menu and double click on the Add Printer icon.

2.   Select the "My Computer" radio button in the Add Printer Wizard that loads, and then click on "Next".

3.   Click on "Add Port..." to bring up the Printer Ports dialog box.

4.   Select the "LPR Port" entry from the Available Printer Ports list, and click on "New Port..." to bring up the Add LPR Compatible Printer dialog box (Figure 11).

Figure 11—Add LPR-compatible Printer Dialog Box
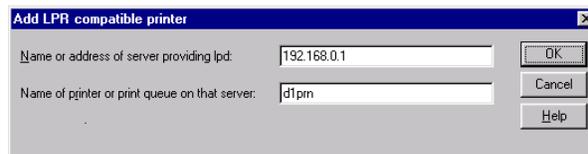
5.   Type in the IP address or host name of the M302 in the first field, and the name of a *predefined destination/queue* on the M302 in the second field.

   This name must be an existing destination/queue name on the M302, and it must be *lowercase*. You will most likely use "**d1prn**" for the PRN port or "**d1com**" for the COM port.

6.   Click "OK" when done, then close the Printer Ports dialog.

7.   Select the appropriate printer manufacturer and model of the printer attached to the M302 in the Add Printers Wizard.

8.   Click on "Next" and fill in a Printer Name for this new network printer, and decide whether you want this to be the default printer. This printer can be referred to by any unique name.

9.   Click on "Next", decide whether you want to share the printer, and then click on "Next" again.

10. When prompted for a test page, select either "Yes" or "No" depending on the state of the attached printer and then click on "Finish".

    Windows may prompt for a disk or CD-ROM to load the appropriate printer driver to complete this new printer setup.

There should now be a new printer icon in the Printers folder. This new network printer uses LPR over TCP/IP as the underlying protocol to print to the M302.

Changing Destination Names on Windows NT/2000/XP

When defining some printers within Windows NT/2000/XP environments, the M302 requires that you specify a predefined destination. For example, when creating a new LPR printer under Windows NT, you will see the dialog box shown in Figure 12.

Figure 12—Windows NT/2000/XP LPR Print Setup Dialog Box
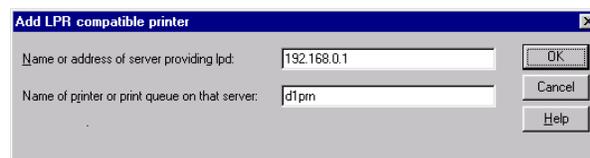
The first field specifies the IP address for the M302 and the second an existing destination on the Print Server (e.g., **d1prn**). Otherwise, the M302 will not accept this as a valid network printer. The M302 has eight destinations: d1prn, d2prn, d3prn, d4prn d1com, d2com, d3com, and d4com. Each of these names can be changed to something more meaningful to you.

There are two methods for changing destination names described in the following sections:

- using M302 HTML forms (*HTML method*)

- using the TCP/IP telnet command (*Telnet method*)

These are described below.

HTML method
1. Open the Print Path configuration form (Figure 13) in a Web browser
   - by the standard method (page 18) and then select Print Path from the menu, or
   - by entering the following URL in your Web browser:

     http://*M302IPaddress*/destConf.html

2. In the Print Path configuration form, select a destination link from the Print Path submenu listing all eight available destinations to bring up the appropriate destination's form, for example, **d1prn**.

   The selected destination default name will appear in the Name field of the form.

3. Enter a new name for this destination in the Name field (optional).

   When renaming a destination, keep the name similar to the I/O port or printer it points to on the M302. For example, if you have an HP LaserJet IV attached to the PRN port, you may want to use a name such as "`lsr4prn`".

4. Select any other options that are appropriate. See *Print Path Forms* on page 67 for information on available options.

5. Click on "Submit" when done.

6. Go to the Reboot page and click on "Reboot" to apply the new settings to your system.

Figure 13—Print Path Form

Telnet method

1. Telnet to the Print Server:

    telnet *M302IPaddress*

    If prompted, enter "**root**" for the User ID and then your password. If you have yet to set a default password, simply press ENTER at the password prompt.

    You should now see the following prompt:

    ***M302IPaddress*:root>**

2. Change the current name of the *destination* to a new name:

    set dest *destination* name *newname*

    For example,

```
        set dest d1prn name lsr4prn
```

Newname is case sensitive and must have nine characters or less. When renaming a destination, keep the name similar to the I/O port or printer it points to on the M302. For example, if you have an HP LaserJet IV attached to the PRN port, you may want to use a name such as "**lsr4prn**".

Note: When you change a destination name, you may have to reconfigure the host to reflect the change.

3.   Save these configurations to Flash memory. Enter

```
    save
```

4.   Logout of the Telnet session with "**quit**". Reboot the M302 by powering the unit off and on.

Troubleshooting Tips

Errors occur when defining an LPR printer

•   Can you "**ping**" the M302 from your Windows station? If not, please use *Waldo* to find the unit.

•   Did you specify the correct IP address or host name for the M302 in the first field of the Add LPR Compatible Printer dialog box?

•   Did you specify a valid destination/queue on the M302 in the second field of the Add LPR Compatible Printer dialog box? If so, did you also enter it in lowercase letters, for example, *d1prn*?

Printer errors when printing, or no output

•   Is a large job currently printing (and taking up all of the printer's resources)?

A busy printer can cause Windows to display a printer error message. If this is a frequent problem, it is better to use a central spooling station.

•   Have you tried restarting the spooler under the "Services" control panel? Sometimes this is needed to get printing going.

As a last resort, you may want to reboot the Windows station. This may be the only option to completely clear this situation. Usually the M302 has nothing to do with this problem.

Queue hangs

Hanging print jobs or queues usually indicate a problem at the host end. Most likely the printer and Print Server are on the network waiting for some activity, but the host is not doing anything. This is most common with LPR print setups, and is possible with other setups as well.

First, check that the printer is ready to print and can accept more data. Do this by using the Telnet command to connect to the Print Server and then issuing the "**lpstat**" command. Output from this command will indicate exactly where the problem is.

Search under the appropriate I/O port for messages such as the following:

• "printing data – blocked"

    This message (along with the seconds to the right of the "blocked" message incrementing each time you issue the "**lpstat**" command) indicates that the printer is not allowing the Print Server to pass data to it. The print queue is hung because the Print Server cannot take more data in its output buffer until the "blocked" message is cleared (i.e., the printer sends a signal indicating that it is ready for more data).

    Once the printer is cleared of any error situation and the "blocked" message disappears, the print job should then go through and the queue should move along properly.

    If the printer is ready to print and there are still "blocked" messages, then it may be a communications problem between the Print Server I/O port and the printer:

    • The cable may be faulty and the send signal is not getting through to the Print Server.

        Replace the cable.

    • The printer and Print Server may not be communicating properly.

        Check the settings on both the printer's interface and the Print Server's I/O port interface. See if another printer will work better.

• "printing data – waiting"

    This message indicates that the Print Server knows about the print connection but it is waiting for the host to send data. Currently the unit's buffer has room for more data, but the host is not cooperating.

    Look to the host to see why it is hung up. Look for errors that may cause the host to hang and make sure that the host can still see the Print Server on the network by using "**ping**" or "**telnet**".

Other errors

Printing in a Windows environment can produce various error messages that may not be meaningful to you. Some common ones are "Windows cannot write to this file" and "A network error has occurred."

These error messages appear when the Print Server cannot take more data because the printer is in an error state. When Windows cannot send all of the print job data right away and is blocked from sending further data, its spool file continues to build until an error such as one of the above is generated.

Check the "`lpstat`" output on the Print Server to determine where the problem is.

7 CONFIGURING PRINTERS IN UNIX

The M302 supports all UNIX-based or similar operating systems.

An alternative method for assigning an IP address to the M302 Print Server is described in *Assign an IP Address Using RARP or BOOTP* on page 44.

How to setup printers on a UNIX-based network is described in the following sections:

- *Direct Printing Without the Spooler* on page 46

- *Manual LPR/LP Host Setup* on page 47

- *HP SAM Setup* on page 48

- *Printing from AIX* on page 50

- *Printing using the FTP Daemon* on page 51

- *Direct Socket Printing* on page 52

Troubleshooting Tips are provided on page 52.

Environment Description

The M302 supports network printing under various TCP/IP environments including *all* flavors of UNIX. Printing can come from multiple hosts directly or through central spooling machines, as shown in Figure 14.

Figure 14—UNIX Integration
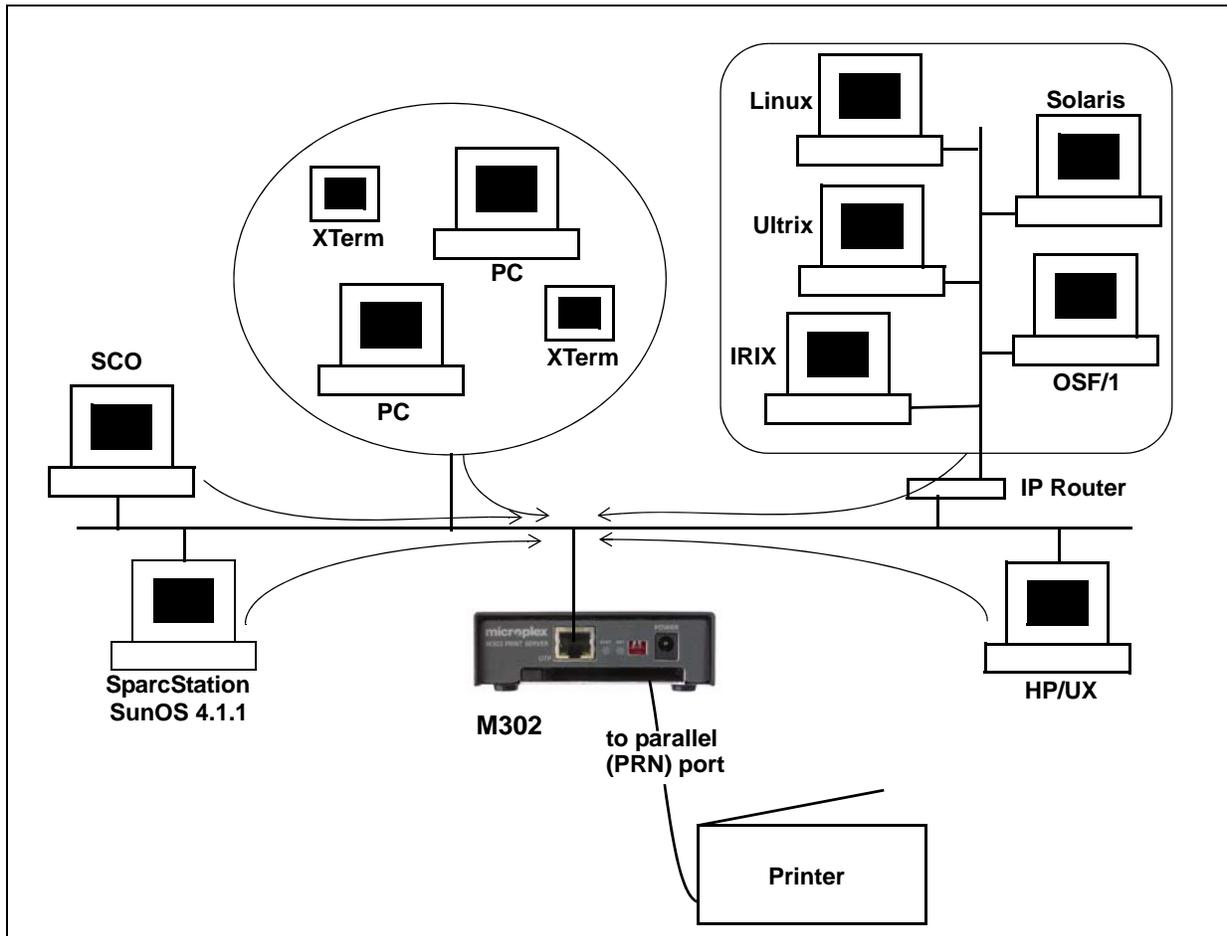
M302 Configuration Requirements

Required: Since TCP/IP is used, the M302 must be configured with an IP address and subnet mask before it can be seen on the network.

Optional.   Additional settings such as routing entries can also be configured, allowing communication across subnets.

Procedures for these requirements are described in Chapter 5, *Configuring the M302 on Your Network*. To configure an IP address and subnet mask on your M302, Microplex recommends the use of their TCP/IP configuration utility Waldo, described in detail on page 24.

An alternate method of assigning an IP address is to use RARP or BOOTP as described below.

Assign an IP Address Using RARP or BOOTP

An IP address can be assigned to the M302 using the **arp** (page 22) command, RARP protocol (page 44), or BOOTP (page 45) protocol. The **arp** command is described in *Configuring the M302 on Your Network*; RARP and BOOTP protocols are described below.

Using RARP to assign an IP address to the M302

RARP allows you to dynamically assign an IP address to the M302 upon bootup. When a RARP-configured TCP/IP host boots, it broadcasts a RARP request for an IP address. Your network must have this daemon running on some host. If you do not know whether the daemon is running on your network, please configure the M302 using one of the other methods described in this document.

To configure the M302 with its TCP/IP settings using RARP, you will need to:

1. On your RARP server, make an entry in the /etc/ethers file for the M302.

    Syntax:

    > **`ethernetaddress M302IPaddress`**

    `ethernetaddress` is the Ethernet address located on the bottom of the M302 unit. **`M302IPaddress`** is a unique IP address on your network.

    Example:

    > **`00:80:72:09:00:60 192.168.11.9`**

2. Start the RARP daemon on the RARP server if it is not running already. If it is running, send a HUP signal to it with the "**`kill`**" command:

    Syntax:

    > **`kill -HUP`** *pid*

    where *pid* is the process ID of the RARP daemon.

3. Power on the M302 so that it will send a RARP request out to the network. Wait one minute to allow the address assignment process to complete. You should see the STAT LED on the front of the M302 slow down, indicating that it has been assigned an IP address to use.

4. Try to "**ping**" the M302's IP address from a local UNIX station to see if it can be seen on your network.

   You will only be able to communicate with the M302 from a network station on the *same* subnet as the Print Server. The M302 needs to be told about a default router/gateway so any packets that come in from a different subnet can be returned via this gateway. See *Communicating across routers* on page 26 to set this up.

   For this reason, RARP is an inferior solution to BOOTP in situations where additional configuration parameters such as a default router/gateway are required to be set dynamically. BOOTP is described below.

5. [Optional but recommended] Set up the user passwords. Please refer to *Set commands* on page 84.

If no response is received from the M302, the RARP process is likely to have failed. If after checking your configuration you are unable to ascertain the source of the problem, Microplex recommends attempting one of the other configuration methods available to you.

Using BOOTP to assign an IP address to the M302

BOOTP allows you to dynamically assign an IP address and additional configurations to the M302 upon bootup. During the boot sequence, the Print Server will broadcast a BOOTP request. If a BOOTP server is running on the network configured to respond to the requesting device, it will provide the M302 with its IP address, netmask, default router, and a time server from which to query the current time (GMT) and the time zone in which the M302 is located.

By default, the Print Server will broadcast a BOOTP request when it boots. The following command can be used to control this request:

```
store tcpip ifnum opts [[-]rarp] [[-]bootp]
```

where "*ifnum*" is "**1**" for an Ethernet network and "**2**" for a wireless network.

1. On your BOOTP server, make an entry in the /etc/bootptab file for the M302.

```
M302IPname:\
:sm=netmask:\
:hd=homedirectory:\
:bf=null:\
:gw=defaultgateway:\
:ht=ethernet:\
:ha=ethernetaddress:\
:ip=ipaddress:\
:ts=timeserver:\
:to=timezone:
```

   For example,

```
spike:\
:sm=255.255.255.0:\
:hd=/usr/null:\
```

```
:bf=null:\
:gw=192.168.11.1:\
:ht=ethernet:\
:ha=0080720A0060:\
:ip=192.168.11.9:\
:ts=192.168.11.7:\
:to=25200:
```

2. Turn the M302 on so that it immediately sends out a BOOTP request.
    Wait one minute to allow the IP address assignment process to complete.

    You should see the STAT LED on the front of the M302 slow down, indicating it
    knows which IP address to use.

3. Try to "`ping`" the M302's IP address from a network station to see if it can be seen
    on your network.

You will be able to communicate with the M302 from network stations on different
subnets if the Print Server has been told about its default router/gateway in the BOOTP
response from the BOOTP server.

Direct Printing Without the Spooler

Before configuring the spooling system, test that basic communications are working
between the M302 and the printer. Perform tests by sending print jobs directly to the
M302 and bypassing the spooler altogether. You can send print jobs directly to the M302
with **rsh/rcmd/remsh**.

rsh/rcmd/remsh

The **rsh/rcmd/remsh** commands are remote command execution clients that talk to the
rshd server in the M302. **rsh, rcmd,** and **remsh** are different names for the same
command on different UNIX systems, and there may be other names as well.. Enter **man
rshd** to display the online manual pages for information on the remote shell server for
your version of UNIX.

The M302 provides **lp, lpstat,** and **cancel** commands for print services through the **rshd**
server. The **lp** command reads data from standard input and sends it to the specified port
as follows:

*   on SCO UNIX, either of the following:

        rcmd spike lp -d d1prn < testfile.txt

        cat testfile.txt | rcmd spike lp -d d1prn

*   on Sun UNIX, either of the following:

        rsh spike lp -d d1prn < testfile.txt

        cat testfile.txt | rsh spike lp -d d1prn

where **spike** is the M302's IP name and **d1prn** is the destination. **rsh/rcmd/remsh** will exit with an error code if the network connection is down.

Manual LPR/LP Host Setup

The M302 also supports UNIX operating systems that follow a BSD print system (e.g., SunOS 4.1.x). This means that a printcap file is used to configure LPR/LPD, which defines all printers available on the host for printing.

LPD remote printing

The **lpd** daemon spools files locally, then sends them to an M302 acting as a remote printer. As interface scripts cannot be used with this spooling method, processing must be done by the M302.

This method should be used in the following conditions:

- your UNIX host supports BSD 4.3 LPD protocol,

- no bi-directional communication is required between the printer and printing application,

- you wish to avoid using special host software.

In BSD printing, two files are sent to the M302, a data file and a control file. The control file contains information about originating user and host. However, since the control file may not arrive before the data file in the current LPD standards, fully detailed banner pages cannot be guaranteed**.**

To manually configure an LPR/LPD printer on a BSD UNIX system, you will need to add an entry to the /etc/printcap file and then create its associated files and directories.

1. Define an entry for this new printer within the printcap file, /etc/printcap.

```
printername:
:sh:pw#80:mx#0:\
:rm=M302name:\
:rp=M302destination:\
:lp=:\
:sd=/usr/spool/lpd/printername:\
:lf=/usr/spool/lpd/printername/log:\
:af=/usr/spool/lpd/printername/acct:
```

where *printername* is any name you'd like to give to this new printer, *M302name* is the host or IP name of the Print Server, and *M302destination* is one of the predefined destinations/queues on the device. For example,

```
laser:
:sh:pw#80:mx#0:\
:rm=spike:\
```

```
:rp=d1prn:\
:lp=:\
:sd=/usr/spool/lpd/laser:\
:lf=/usr/spool/lpd/laser/log:\
:af=/usr/spool/lpd/laser/acct:
```

2. Create the spool directory specified by the "`sd=`" entry in the printcap entry for this printer. For example,

   ```
   mkdir -p /usr/spool/lpd/laser
   ```

3. Create the log and account files specified by the "`lf=`" and "`af=`" entries in the printcap entry for this printer. For example,

   ```
   touch /usr/spool/lpd/laser/log
   ```

   ```
   touch /usr/spool/lpd/laser/acct
   ```

4. Change permissions and ownership on the spool directory and everything within it. For example,

   ```
   chmod -R g+rwX,o+rX /usr/spool/lpd/laser
   ```

   ```
   chmod -R daemon.daemon /usr/spool/lpd/laser
   ```

5. Start the printer daemon for this new printer. For example,

   ```
   lpc start laser
   ```

You now have a new printer that relies on LPR/LPD to print to an M302 printer. Use the following command to test printing:

   ```
   lpr -Pprintername filename
   ```

For example,

   ```
   lpr -Plaser /etc/hosts
   ```

HP SAM Setup

Configuring print queues using SAM (HP-UX systems)

Before executing the SAM program, select an IP address for the Microplex Print Server and set up an entry for it in the /etc/hosts file on the system running HP-UX.

1. Start the SAM utility as a superuser.

2. Select Peripheral Devices from the main menu.

3. Select Printers/Plotters from the Printers/Plotters menu.

4. Select LP Spooler from the Peripheral Devices menu.

5. Select "Add a Remote Printer" from the Actions list, then select a printer name.

   Examples: **my_printer** or **printer1**

---

6. Select a remote system name.

    Example: *M302IPaddress*

7. Select a remote printer name.

    Example: **d1prn**

8. Check for a remote printer on a BSD system. Type "**Y**".

9. Choose "OK" at the bottom of the menu. If the configuration is successful, the program prints the message

    ```
    The printer has been added and is ready to accept print requests.
    ```

10. Choose "OK" and select "Exit" from the List menu.

11. Select "Exit Sam".

You now have a new printer that relies on LPR/LPD to print to an M302 printer. Use the following command to test printing:

```
lpr -Pprintername filename
```

For example,

```
lpr -Plaser /etc/hosts
```

Solaris 2.X LPR setup

You can manually add an LPR setup for Solaris 2.X systems by executing the following commands as root user.

```
lpsystem -t bsd ipname

lpadmin -p localqueuename -s ipname!destination

accept localqueuename

enable localqueuename
```

For example,

```
lpsystem -t bsd np5353

lpadmin -p myqueue -s np5353!d1prn

accept myqueue

enable myqueue
```

Printing from AIX

IBM has a unique print spooler system that uses the **qdaemon** program. AIX Version 4.0 and above offer LPR/LPD support for network printing. This means to set up a new printer under this operating system, you only need to define these two parameters:

*   **M302 IP address** - the IP address or host name of the Print Server you want to print to.

*   **M302 destination/queue** - a predefined name on the Print Server telling the device which I/O port to send the jobs to. You will most likely use "**d1prn**" for the PRN port.

Setting the IP address

Use the following steps to interface with the M302 using **rsh**:

1. Log onto your AIX workstation as **root**.

2. Add an entry to the host table by typing in the command line

    ```
    arp -s ether ip_address M302address temp
    ```

    ```
    arp -s ether 192.168.11.32 00:80:72:09:00:60 temp
    ```

    M302address is located on the bottom of the unit. *ip_address* is assigned.

3. Connect to the M302 by typing

    ```
    telnet IPaddress
    ```

    If prompted for a "User ID" and password, type in "root" for the ID and press ENTER at the password prompt since the default is no password.

4. You should now see a prompt displayed that has the M302's IP address followed by a colon then root.

    ```
    IPaddress:root>
    ```

5. To view the Print Server's current settings, type **list tcpip** then configure the TCP/IP Configuration option that you wish to configure such as the subnet mask or default router/gateway address. For example,

    ```
    store tcpip route add|del default routerIPaddress ifnum
    ```

    where "*ifnum*" is "**1**" for an Ethernet network and "**2**" for a wireless network. See *Store commands* on page 99 for additional information.

6. Log out of the Telnet session with **quit**. Reboot the M302 by powering the unit off and on.

Set up printing on AIX 4.x

1. Log in as **root** and type

    ```
    smit mkrque
    ```

2. From the Attachment Type field, choose "remote".

3. Type an entry for the option you want to configure for remote printing:

Name of Queue to Add	Type the name of the local print queue.
HOSTNAME of Remote Server	Type the HOSTNAME of the M302 you added to the host table.
Name of QUEUE on Remote Server	Valid QUEUE names are **LPT_PASSTHRU** (for PCL, PostScript or application files), or **LPT_TEXT** (for standard AIX files)
Type of Print Spooler on Remote Server	Click list, then click BSD, the printing protocol of the M302.

4. Click "OK" then "Done" to save your configuration.

5. Click "Cancel" to exit **smit**.

You now have a new printer from which to print to an M302 printer. Use the following command to test printing:

```
lpr -Pprintername filename
```

For example,

```
lpr -Plocal_print_queue /etc/hosts
```

local_print_queue is the name you assigned in the Name of Queue to Add field in step 3 above.

Printing using the FTP Daemon

The following example shows how to print a file using FTP.

1. Change to the local directory where the file to print resides.

2. Login to the M302 using **ftp**, as **guest**, **root,** or **anonymous**:

```
ftp ipname
```

Guest and **root** users require passwords as configured in the unit's user list. **Anonymous** is a special login that does not require a password.

3. Change to the **/dest** directory:

```
cd dest
```

4. List the contents of this directory using the "**dir**" command and determine which destination/queue you'd like to send the print job through. Most likely you will select "**d1prn**" for the PRN port.

5. Change to this destination directory. For example,

   cd d1prn

6. Change the mode to correspond to the type of file to be printed. Choose binary mode if the file to be printed contains both text and graphics and ASCII mode if the file is text only. The default mode is always ASCII.

   bin

7. Copy the file you want to print to this directory:

   put *filename*

   The file is spooled and printed.

8. Logout of the FTP session:

   quit

Direct Socket Printing

Within TCP/IP environments, there are some setups that require the host to print directly to a TCP port number on the M302, bypassing all of the higher-level destination/queue names. If you run into a setup which requires this, you will need to define two parameters for a new print setup:

M302 IP address	the IP address or host name of the Print Server you want to print to.
M302 TCP port number	a predefined number (**4400**) for the I/O port on the Print Server.

Though the host will be sending directly to the TCP port number on the M302, the port number is still mapped to destinations/queues in case there is some type of special processing or logging to be done to the job. However, the destination name does not come into play within this type of printer definition. Just the two parameters mentioned above need to be defined for printing to work.

Troubleshooting Tips

Communication problems

Cannot ping the M302

There are a number of possible reasons for this

- Have you rebooted the M302? Sometimes this will solve various communication problems.

- Are the network cables securely connected?

- Have you checked your network connection to the M302? Try it at a new location on your network, if possible, or swap in another device.

- Have you made an entry in your host table (**/etc/hosts**, **host nis** map, or DNS name table) for the M302?

- Have you tried to **ping** with the IP address instead of the IP name? This will eliminate any name-lookup issues and focus more on the communications between the M302 and your host.

- Is it possible that a duplicate IP address has been assigned?

- Did you use the correct netmask for your particular environment?

- Has the M302 been moved from another network? If so, it needs to be reconfigured to integrate with its new location. This includes, at minimum, a new IP address and netmask. Please see *Resetting to Factory Defaults* on page 110 for possible configuration methods.

- Is there a router between the M302 and your host? If so, a default router or a static route must be configured on the unit so the M302 knows how to get its response back to the originating host. Please see *Store commands* on page 99.

- Have you set any hosts or networks in the M302's TCP access list? If so, only these entries can access the unit. Please see *list [default/stored] tcpip* on page 84 (in Table 6) to view current entries.

- Do you have a RARP or BOOTP server running on your network? By default, the M302 comes with the RARP and BOOTP request turned *on,* so although you may have stored a particular network configuration in the unit's EEPROM, a RARP or BOOTP server may supply new *network* parameters upon bootup. To turn off RARP and BOOTP on the unit, please see *list [default/stored] tcpip* on page 84.

If none of these help, try the following:

- Reset the unit to default settings. Please see *Resetting to Factory Defaults* on page 110. Once the unit is in the default state, use one of the configuration options listed in "M302 Configuration" above to reconfigure it.

Cannot Telnet to the M302   If you are unable to **ping** the M302 as well, please see *Communication problems* on page 52. If it is **telnet** only that you are having problems with, these points should be considered:

- Are you able to **telnet** to another host on your network or **telnet** from another host? If not, look into your host's TELNET configuration.

- Have you tried rebooting the M302?

- Are the dipswitches in the "off" position?

- Does the fourth octet of the M302's given IP address equal 0 or 255? Each of the four octets in the IP address should be between 1 and 254.

Printing problems

Print setup complete but nothing prints

This can be the most frustrating problem. Here are some things to check:

• Are you able to communicate with the M302? If you are having communication problems, please see *Communication problems* on page 52.

• Is the printer online and in the correct mode for the file being sent to it?

• Is the printer spooler up and running on the host?

• Have you confirmed communications between the M302 and the printer? This can easily be done with the ASCII output tests provided on the unit. Please see *start fox/tts/loopb prn* on page 108 for information on these various tests. If you are not successful with these, look at flow control, I/O port settings, or the cable.

• Is anything happening on the printer when the print job is sent? Sometimes, the print job may have gotten to the printer but just may need a manual formfeed. If this is the case, please see *set model `model` trailer `trailerstring`* on page 91 for information on trailer strings.

• Is the print job data even getting to the M302? Once you've sent the job from the host, try continuous **lpstat** commands on the M302. You should see the byte count for that particular port incrementing as the job passes through. If you are not seeing this happen, you may need to try a larger job or consider some of the other suggestions in this section.

• Are there any error messages in your Email, a log file, or other standard error files on your particular host? These messages can be very helpful in narrowing down the problem.

• Are all permissions correct on relative directories and files to be printed?

• Is the destination or I/O port on the M302 disabled? Please see *Debug commands* on page 80.

If you are not able to print successfully yet, try the following:

Avoid the print spooler altogether by printing directly to the M302 from your host. If you are successful, go over your host's print setup. For example:

```
cat test.txt | rsh spike lp -d d1prn
```

This sends **test.txt** to an M302 Print Server named **spike**, to be remotely printed on the printer attached to **d1prn**. The print spooler is not used at all.

8 CONFIGURING PRINTERS IN A MAC OS SYSTEM

This chapter details a complete printer setup for Mac OSX 10.3. For assistance with your particular version of OSX, please refer to the online help system (click on "Mac Help" in the Help menu of Finder.)

Environment Description

The M302 supports network printing under TCP/IP environments by utilizing LPR. Multiple stations in multiple zones can print simultaneously to the M302 as seen in Figure 15.

Figure 15—Mac OS Integration
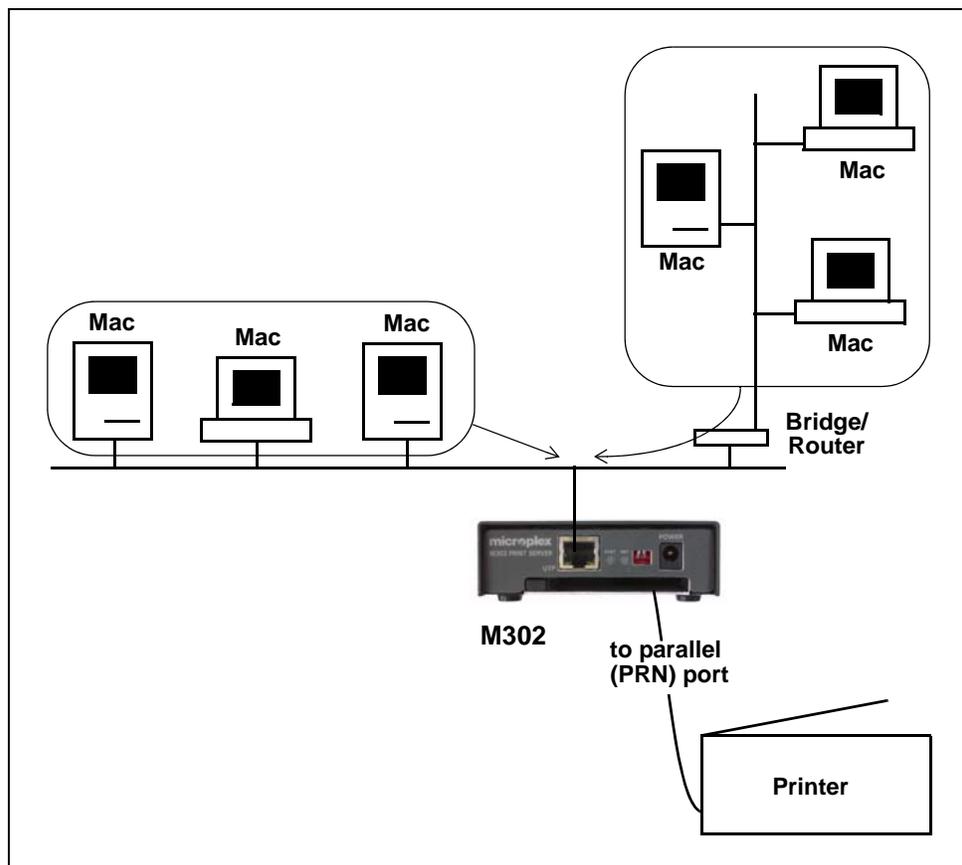
M302 Configuration Requirements

Required: The M302 must be configured with an IP address and subnet mask before it can be seen on the network, since printing depends on TCP/IP.

Optional: Additional settings such as routing entries can also be configured, allowing communication across subnets.

Procedures for these requirements are described in Chapter 5, *Configuring the M302 on Your Network*. To configure an IP address and subnet mask on your M302, Microplex recommends the use, if possible, of their TCP/IP configuration utility Waldo, which is described in detail on page 24.

Printer Configuration

The IP address for the M302 must be created (*Configure an IP address for the M302 using the ARP command* on page 22) and assigned to the M302 (*Configure the M302 IP address and subnet mask* on page 22) before using any of these procedures.

Mac OSX

1.   Open System Preferences, click Print & Fax, click Printing, and then click the Set Up Printers button.

2.   Click the Add button.

3.   Under Printer Type select "LPD/LPR", under Printer Address type either the DNS name or IP address associated with the M302 Print Server, and under Queue Name type the desired M302 destination name (such as **d1prn**).

4.   Under Model, choose the printer's manufacturer and then choose the printer model from the list below.

5.   Click the Add button. You will now be able to print to this printer from within your applications.

Troubleshooting Tips

Errors Occurring When Defining an LPR Printer

- Can you "`ping`" the M302? If not, please see *M302 will not talk on the network* on page 31.

- Did you specify the correct IP address or host name for the M302?

- Did you specify a valid destination/queue on the M302? If so, did you also enter it in lowercase letters, `d1prn`?

9 CONFIGURING PRINTERS ON A NOVELL SERVER

This chapter details a complete printer setup on Novell 5.x and Novell 6 servers.

Environment Description

The M302 supports network printing in TCP/IP environments by utilizing LPR. Multiple stations can print simultaneously to the M302 as seen in Figure 16.

Figure 16—Novell Integration
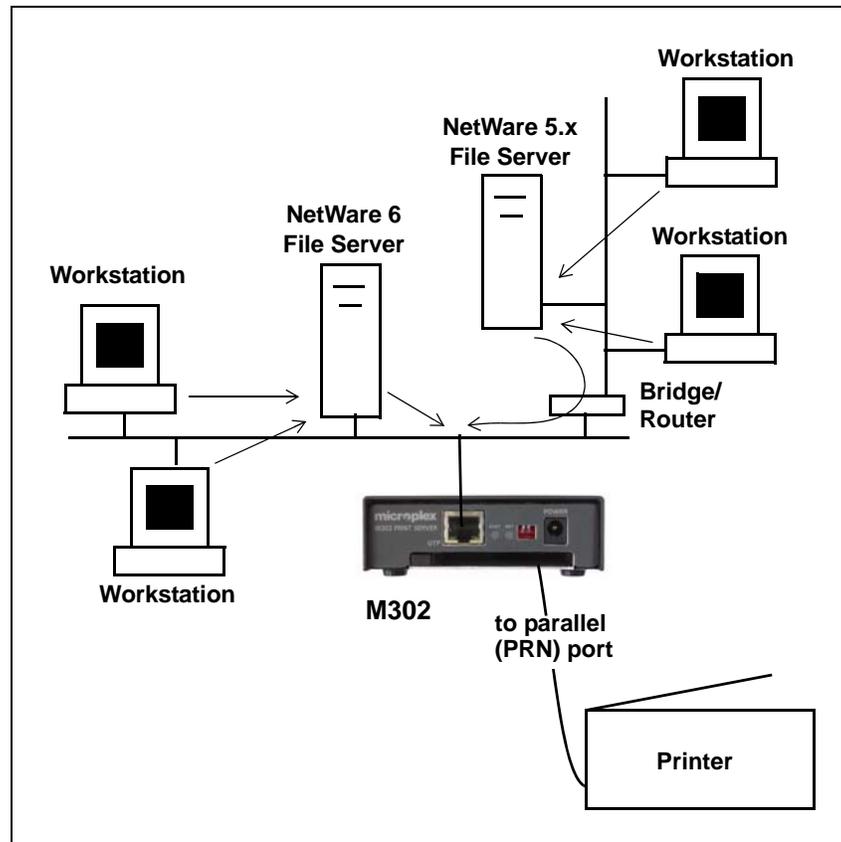
M302 Configuration Requirements

Required: The M302 must be configured with an IP address and subnet mask before it can be seen on the network, since Windows printing depends on TCP/IP.

Optional: Additional settings such as routing entries can also be configured, allowing communication across subnets.

Procedures for these requirements are described in Chapter 5, *Configuring the M302 on Your Network*. To configure an IP address and subnet mask on your M302, Microplex recommends the use of their TCP/IP configuration utility Waldo, described in detail on page 24.

Printer Configuration

Novell 5 and 6

Although creating an NDPS broker and manager can be done at the file server console with the necessary NLMs loaded, the procedures outlined below use the NetWare Administrator only.

The steps for configuring the M302 on a Novell network are:

*   *Step 1: Create an NDPS Broker*
*   *Step 2: Create an NDPS Manager*
*   *Step 3: Create Printer Agents (LPR in TCP/IP)*
*   *Step 4: Create Printer Agents for queue-based printing*

Procedures for each step are provided in the following sections.

Step 1: Create an NDPS Broker

1.   Open NetWare Administrator and highlight the appropriate container for the new NDPS Broker object.

2.   Choose Object $\rightarrow$ Create.

3.   Choose NDPS Broker.

4.   Enter the Broker name.

5.   Browse to find a volume in which to store the NDPS Resource database.

6.   Click "Create" to exit and create the NDPS Broker object.

Typically you need only one NDPS Broker, one NDPS Manager and as many Printer Agents as there are actual printers attached to the network. You must create a NDPS Manager for each file server that is attached to a printer.

Step 2: Create an NDPS Manager

1. Open NetWare Administrator and highlight the appropriate container for the new NDPS Manager object.

2. Choose Object → Create.

3. Choose NDPS Manager.

4. Enter the NDPS Manager Name.

5. Browse to find a server and volume in which to store NDPS data.

6. Click Create to exit and create the NDPS Manager object.

Step 3: Create Printer Agents (LPR in TCP/IP)

1. Open NetWare Administrator and highlight the appropriate container for the new NDPS Printer Agent object.

2. Choose New Object → Create.

3. Choose NDPS Printer.

4. Fill in the NDPS Printer name.

5. Select "Create a New Printer Agent".

6. Choose the NDPS Manager.

7. Specify "Novell Printer Gateway" and click "OK".

8. Select a printer model and Novell Port Handler.

9. Select the connection type as "Remote LPR on IP".

10. Enter the host address (M302 IP address) and printer name (e.g., d1prn, d2prn, d1com, or d2com).

11. Select the printer driver for each client operating system.

Step 4: Create Printer Agents for queue-based printing

This configuration has been subjected to extensive system testing and is being provided based on customer reports. We cannot offer support at this time.

1. Open NetWare Administrator and highlight the appropriate container for the new NDPS Printer Agent object.

2. Choose New Object → Create.

3. Choose NDPS Printer.

4. Fill in the NDPS Printer name.

5. Select "Create a New Printer Agent".

6. Choose the NDPS Manager.

7. Specify "Novell Printer Gateway" and click "OK".

8. Select a printer model and Novell Port Handler.

9. Select the connection type as "Forward Jobs to Queue".

10. Select the Queue name and Queue user name.

11. Select the printer driver for each client operating system.

10 USING HTML PAGES TO CONFIGURE THE M302

This chapter describes the HTML pages provided with the M302. The Print Server settings can be configured and its status observed at any time by calling up these pages.

The following HTML pages are described here:

- *Accessing the M302 HTML Pages* on page 61
- *M302 Home Page* on page 62
- *Network Forms* on page 63
- *Print Path Forms* on page 67
- *I/O Port Forms* on page 70
- *Administration Form* on page 72
- *Status Pages* on page 74
- *Reboot Page* on page 75
- *Help Page* on page 76

Accessing the M302 HTML Pages

To access the M302's HTML pages:

1. Ensure that the Print Server has an IP address and subnet mask so that it is identifiable on your TCP/IP network.

2. Ensure that your network station can successfully "`ping`" the M302 over the network.

3. Direct your Web browser to the Uniform Resource Locator (URL):

   `http://M302IPaddress`

   For example: `http://192.168.11.9`

4. When prompted for a User ID and Password, type in "`root`" for the ID and press ENTER at the password prompt.

   The default is no password set. Alternatively, if a password has been configured, then type it in and press ENTER.

Each page can be accessed directly by directing your browser to the URL:

http://*M302IPaddress*/*filename*.html

where "***filename***" is one of:

tcpipConf	Network: TCP/IP form
destConf	Print Path: d1prn form
prnConf	I/O Port: d1prn form
adminConf	Administration form
tcpipStatus	Status: TCP/IP status page
reboot	Reboot page
help	Help page

M302 Home Page

The Home page for the M302 Print Server provides a menu of pages (see Figure 17) that can be viewed or programmed and a link to the Microplex internet Web site. It also provides some basic system information for the M302.

Figure 17—M302 Web Pages Menu
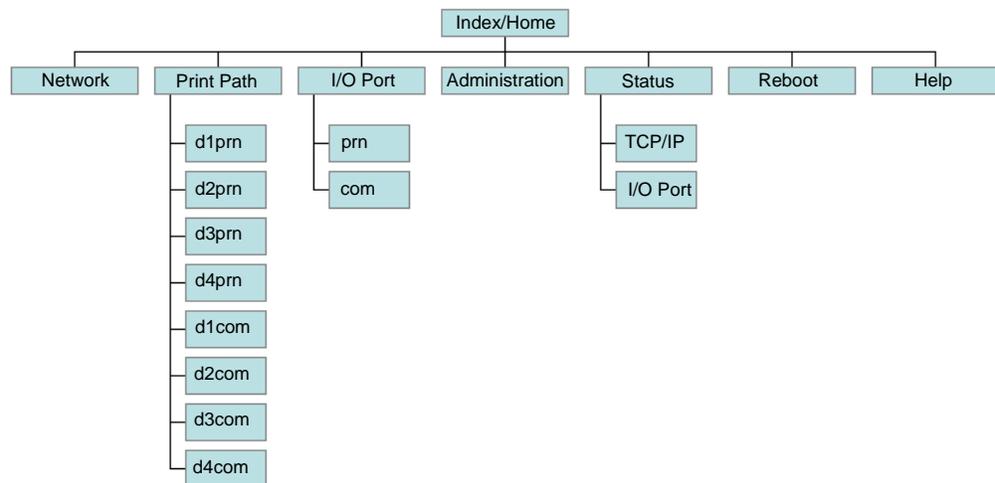
System Information

The first three fields of this page, Label, Location, and Contact, can be changed by going to the Administration page. The other fields are information provided by the M302 Print Server itself.

Figure 18—M302 Home Page

Network Forms

Selecting "Network" from the main menu opens the Network TCP/IP page.

TCP/IP

If no PCMCIA card is present in the M302 Print Server, then the Network TCP/IP page appears as shown in Figure 19.

Figure 19—Network TCP/IP Form, for Ethernet Networks

Interface 1   Interface 1 settings are for Ethernet connections to the host.

Configure the IP Address and Subnet Mask fields if the Print Server has a permanent IP address. Checkboxes enable the **RARP**, **BOOTP**, and **DHCP** protocols, which are alternate methods of assigning IP addresses from a central server. Print servers with a permanent IP address and subnet mask typically disable all these checkboxes.

Default: Unconfigured (blank) IP address and subnet mask; RARP, BOOTP and DHCP requests enabled.

Interface 2   Interface 2 settings are for wireless PCMCIA connections to the host. They have the same defaults as for Interface 1.

Routing   The routing table tells the Print Server which router or gateway to forward packets for other networks to. You can leave this section blank if you are not communicating across a router (from one network to another). In most other situations, you simply add your router's IP address in the default Gateway field.

If you have more complex routing requirements, add static routing entries for specific hosts or networks in the remaining **Routing** fields. Packets with IP addresses that match a given **Destination** and **Mask** will be routed to the router/gateway named in the **Gateway** field. Packets that do not match any of the listed Destinations and Masks will be routed to the default router, if one is set.

Default: Unconfigured (blank).

DNS Server   Enter the IP address of the local domain name service (DNS) host in this field. This allows the Print Server to automatically resolve hostnames (e.g., host.domain.com) to IP addresses (e.g., 192.168.0.42).

If a PCMCIA card is present in the M302 Print Server, then the Network TCP/IP form appears as shown in Figure 20.

Figure 20—Network TCP/IP Form, for Wireless Networks

The top part of the form is the same as for Ethernet networks, the bottom part of the form provides user-configurable options for a wireless network, as described below.

Network Name Set the wireless network name (SSID). Enter a 1 to 32 ASCII character string. Default is "**101**".

Mode Set the network mode for a wireless network. Choices are: "**adhoc**" or "**managed**", with "**adhoc**" being the default.

Speed Set the transmit transfer rate for a wireless network. Select the default, "**auto**", to set the PCMCIA card to use automatic negotiation. Other options are:

1	for 1 Mbps
2	for 2 Mbps
5.5	for 5.5 Mbps,
11	for 11 Mbps.

Channel   Set the RF channel number for a wireless network. Select "**default**" to use the card's factory set default channel, or enter an RF channel number (1 to 15) to be used in adhoc mode.

Antenna   Set the antenna type for the wireless network. Options are: "**primary**", "**aux**" (auxiliary or external), and "**diverse**". The default, "**diverse**", allows the PCMCIA card to decide on the optimal antenna operation.

Preamble   Set the preamble length for TX packets in a wireless network. Select the preamble length required to "**long**", "**short**", or "**default**". "**default**" allows the card to use its own factory-default.

Power Management Mode and Time   Set the Power Management Mode for a wireless network. Select **Off** to disable power-save mode, or **On** to enable power-save mode.

Transmit Power   Set the Transmit Power level used to send packets out on a wireless network as a percentage of full power (100%). Enter a number from **1 to 100**, the default is **100**.

Options   Set options for a wireless network. Select international mode (used in international zones).

Key   Set a key to a given value for a wireless network. Select a number identifying one of the four keys. The default value of zero disables encryption for key-num.

Next, enter the encryption key value for the selected key in either hex or string. For hex, the value must consist of 5, 13 or 16 double- or quad-digit HEX numbers, separated by colon (':') or dash ('–') characters for readability (e.g., D1C2–B3A4–9586–7768–594A–3b2c–1D). Alpha characters are NOT case sensitive. Key length is inferred from the length of encryption key value, so leading zeros of longer keys must be explicitly entered (not blanked). Alternatively, specify the length in the optional Length dropdown.

Default Key   Set the default key for wireless network encryption. key-num is the number identifying one of the four keys, starting from one. The default value of zero disables encryption.

Print Path Forms

A print job follows a path through the Print Server. The job is submitted by the client to a **destination/queue** (e.g., d1prn) where an associated **model** (e.g., m1) defines the processing that must be done to the job (e.g., ASCII to PostScript conversion). An associated **logpath** (e.g., l1) determines how job reporting is done. The end of the path is an **I/O port** (e.g., PRN) where data passes through to an attached printer.

The "Print Path" form (Figure 21) displays one destination's settings at a time. From here, you can then select another destination from the Print Path submenu, or you can go directly to an I/O port to configure port settings.

Figure 21—Print Path Form

Destination Settings

When "Print Path" is selected from the main menu, the destination settings for the first destination, d1prn, are shown by default.

Name   Name of the destination.

                    Default: d1prn, d2prn, d3prn, d4prn, d1com, d2com, d3com, or d4com. It depends on
                    which submenu form is being displayed.

Back Channel   I/O port to receive printer feedback when a print job passes through this destination.

                    A COM or PRN port or "none" can be selected. If a COM or PRN radio button is
                    selected, then click on the label for that button to go directly to the I/O Port page to
                    configure the port mode setting.

                    Default: None.

Services   Define the type(s) of print services the destination will support.

socket	printing to a TCP port number (e.g., 4000)
lpd	remote printing using the Line Printer Daemon
lpsched	System V printing using the "lp" command
ftpd	printing using the File Transfer Protocol (FTP).

                    Default: d1prn, d2prn, d3prn, d4prn have all services enabled.

Model Type   Define the processing that will be performed on print jobs passing through the associated
                    destination.

raw	job data to pass through unchanged
a2ps	text jobs to be converted to PostScript and PostScript jobs to pass through
pcl-ps	job format is determined and the attached printer is switched to the appropriate emulation mode (i.e., PCL or PostScript) for printing.

                    Default: Raw.

Banner Page   Whether or not to produce a banner page data for each job, what type, and what position.

none	no banner page
Postscript	produce banner page data in PostScript format
text	produce banner page data in text format
auto	automatically determine which banner page data format should be sent with each job, based on its data format.

                    You can also specify whether the banner page should come at the front (before) or the
                    end (after) of a print job.

                    Default: No banner page ("none").

Filter   Specify whether linefeeds (0x0A) are converted to carriage return/linefeeds (0x0A/0x0D). Use this option sparingly; the extra processing reduces throughput significantly.

Default: Unconfigured (blank).

Header String   Defines a string to be sent to the printer before each print job. For example, you may want to send a sequence for jobs to be printed in landscape mode or for a certain tray on the printer to be used.

Up to four separate sequences can be specified per header string. The Print Server will execute them in order from top to bottom. If specifying fewer than four sequences, be sure to start at the top, leaving undefined fields at the bottom.

The most common sequences are listed on the form:

Switch to PCL	tell the printer to switch to PCL mode
Switch to PostScript	tell the printer to switch to PostScript mode
Print to upper tray	tell the printer to use the upper tray's paper
Printer to lower tray	tell the printer to use the lower tray's paper
Print landscape	tell the printer to print in landscape mode
Print portrait	tell the printer to print in portrait mode

Default: Unconfigured: ("None").

Trailer String Defines a string to be sent to the printer after each print job. For example, you may want to send a sequence to add a formfeed so you don't have to manually press the formfeed button on the printer.

Up to three separate sequences can be specified per trailer string. The Print Server will execute them in order from top to bottom. If specifying fewer than four sequences, be sure to start at the top, leaving undefined fields at the bottom.

The most common sequences are listed on the form:

PCL Reset	tell the printer to reset itself once the data completes
End of Transmission (EOT)	tell the printer to force the end of the job
Formfeed	tell the printer to do a formfeed at the end of the data

Default: ("None").

Logpath Type   Define what type of log information will be tracked for each print job passing through the associated destination.

        job   job ID, username, etc.

        user   user ID and three messages per job about the start and finish

        page count   total number of pages printed in the job, if supported by PostScript printer

        checksum   value used when troubleshooting integrity of data transferred

        printer   miscellaneous messages from the printer

        i/o port   status of parallel port printers based on parallel interface signals.

Default: Unconfigured (blank).

Logpath Port   Define where logging information for print jobs passing through the associated destination will be reported.

        prn   report to the PRN port; click on "prn" to go directly to the I/O Port form for the PRN port

        none   don't report any logging information

        TCP/IP port   report to a TCP port number (specify in the edit field)

        syslog   report to a host (specify the IP address in the edit field) running a SYSLOG daemon

        email   report to an email address (specify an email address with an IP address rather than a hostname)

Default: None, logging disabled.

I/O Port Forms

An I/O port configuration form can be reached through a Print Path destination form (by clicking on a port) or by selecting I/O Port from the main menu. There are two forms, one for the parallel port (Figure 22) and one for the serial port.

Parallel Port (PRN)

The timing of the parallel port can be controlled with the mode setting.

Figure 22—I/O Port Parallel Port Settings Form

slow	slowest data transfer rate
centronics	data transfer rate appropriate for most centronics printers
pc	data transfer rate similar to PC parallel interface
fast	fastest data transfer rate
bit bucket	throw data away

Default: PC mode.

Serial Port (COM)

Set the RS-232 parameters for the serial port: baud rate, character size (bits), parity, stop bits, flow control method, and others (ignore break signal, ignore DCD).

Figure 23—I/O Port Serial Port Settings Form

Baud Rate   Set the speed (baud rate) of the port. This can be one of 50, 110, 134, 300, 600, 1200, 24090, 4800, 9600, 19200, 38400, 57600, or 115,200.

Default: 9600 baud.

Character Size (bits)   Set the character size from 5 to 8 bits: cs5, cs6, cs7, or cs8.

Default: cs8 (8-bit characters).

Parity   Set parity to Odd or Even, or Disable parity.

Default: no parity (Disabled).

Stop Bits   Set to one or two stop bits after each character.

Default: 1 stop bit.

Flow Control Method   Set flow control to hardware or none.

Default: hardware flow control (ctsflow/rtsflow).

Others   Ignore break signals or ignore DCD detection. Setting to ignore DCD prevents error messages, setting to ignore break signals allows you to use a modem connected to the serial port to establish terminal sessions.

Default: ignore DCD.

Administration Form

The Administration Configuration form (Figure 24) is displayed when "Administration" is selected from the main menu. It is broken down into general Print Server-related settings and password security.

Figure 24—Administration Form

System Information

Label, Location, Contact

Free format fields for user. A label for the Print Server, its location, and contact information for support can be entered in these fields and they will appear on the M302 home page.

Default: Unconfigured (blank).

Passwords

All settings are protected by a password so that only authorized users can make changes. When you try to open any configuration page, you will be asked for a user name and password. At the prompt, you will need to enter `root` (unless you have another user configured with root privileges) followed by the associated password. If there is no password, leave the field blank and press ENTER.

Settings can only be altered by a user with root privileges; guest users can only view settings. Both types of users can be assigned passwords. To change a password, type the old password in the "Old" field. Then type the new password twice: once in the "New" field and once in the "Confirm" field.

Default: Blank passwords for root or guest users.

Status Pages

The TCP/IP Status page appears when "Status" is selected from the main menu. Two submenu options are available on this page: TCP/IP and I/O Port.

TCP/IP

Use this form to troubleshoot network-related problems. Network status indicators are recorded in this page; there are no configured settings. The page refreshes every minute. The ARP table and TCP connection information are displayed.

Figure 25—Status TCP/IP Webpage

I/O Port

The I/O Port Status form displays the status of each I/O port. A submenu of I/O ports (PRN and COM) is displayed and a view of either port can be selected. By default, PRN settings are displayed when I/O Port is first selected from the Status submenu.

Figure 26—Status I/O Port Web page

If you see "waiting" in the "Status" line, this indicates the Print Server is either waiting for data from the host or back channel data from the printer. If you see "blocked" in this line, this indicates the printer is busy. The printer could be processing data it has already received or it could be in an error state.

Default: there are no configurable fields in this page. The default status for an unconnected port is "online busy out-of-paper".

Reboot Page

The Reboot page (Figure 27) allows you to reboot the Print Server with one of three options.

Figure 27—Reboot Webpage
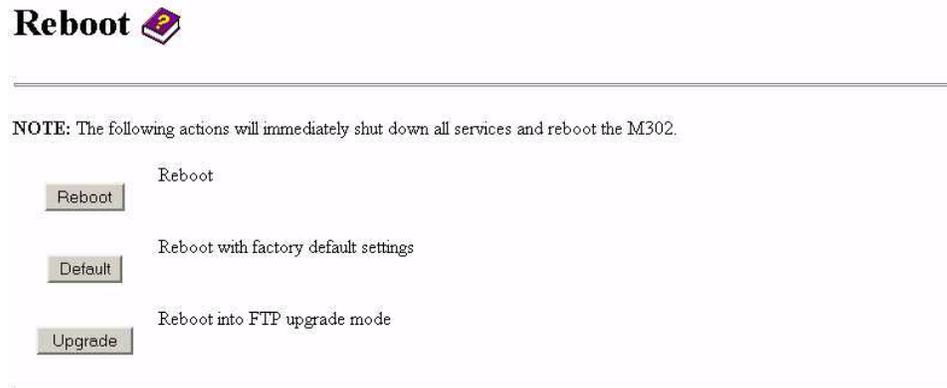
Reboot   Reboot the Print Server with any new settings that have been configured or changed in these forms.

Default   Reboot the Print Server with the factory default settings.

Upgrade   Reboot the Print Server into FTP upgrade mode.

Help Page

Selecting "Help" from the main menu opens the Help information page with all of the Help information available for these forms. This page can also be opened at the appropriate location by clicking on the Help book icon at the top of each HTML form or page.

11 REFERENCE INFORMATION

This chapter describes some of the most common features of the M302:

- *M302 Command Line Interface Shell (npsh)* on page 77: a description of the built-in command line interface shell, **npsh**, along with a table of the most common commands

- *Complete Command Reference* on page 80: syntax and descriptions of all commands available in the npsh command line interface shell

- *M302 Naming Scheme* on page 109: important predefined names

- *User Accounts and Permissions* on page 110: logging in as a "root" or "guest" user

- *Resetting to Factory Defaults* on page 110: how to reset the unit to factory default settings

- *Performing Firmware Upgrades* on page 111: a complete overview of the Flash upgrade procedure

M302 Command Line Interface Shell (npsh)

Within the M302, the command line interface shell "**npsh**" is built into the firmware. It allows you to manipulate objects such as destinations, models, and I/O ports and also provides some monitoring and troubleshooting capabilities.

npsh access methods

Access the command line interface shell using these methods:

HTML Forms	When you configure a setting using the built-in HTML configuration forms, npsh commands are actually executed remotely on the M302.
Telnet Session	Opening a Telnet session with the M302 allows you to log into the device and access the npsh command line interface shell. (e.g., "`telnet 192.168.11.9`")
Remote Shell Command	Remotely executes one npsh command at a time from your local TCP/IP station. (e.g., "`rsh spike list prn`")

Main npsh command prefixes

The four main command prefixes within the npsh command line interface shell are:

store	Change settings stored in Flash. When the "**store**" prefix is used, the M302 must be rebooted to apply the changes to the system. Since "**store**" affects Flash settings only, the Print Server must reset and read the new settings now in Flash.
set	Change current/working settings in memory. When the "**set**" prefix is used, a "**save**" command must be executed as well so that the new settings are retained after power cycles. Since "**set**" only affects the settings in memory, they will be lost after a power cycle unless they are saved into Flash ROM.
list	View current/working settings in memory.
debug	View certain debugging information.

npsh prompt

When npsh is accessed through a Telnet session, a prompt is displayed after login to indicate that it is ready to accept a command from the user. The Telnet prompt is formatted **ipaddress:userid>** where *IPaddress* is the IP address of the M302 and *userid* is the user ID of the currently logged-in user. For example,

192.168.11.32:root>

where **192.168.11.32** is the M302's IP address and the user is **root**.

Getting command help

The M302's command line interface shell provides several online help tools. These include:

"?" Command	Typing "**?**" once logged in to the command line interface shell will produce a full list of all commands available.
Command Prefixes	Typing in the beginning of a command will produce an error message showing the correct syntax. For example, typing in "**store tcpip**" will produce a list of all commands that start with this prefix.

Common npsh commands

The npsh command line interface shell consists of more than 50 commands. Table 4 outlines some of the more common commands. For a complete command reference, please refer to *Complete Command Reference* on page 80.

> **Note:** When you encounter the word "*ifnum*", substitute "**1**" for an Ethernet network or "**2**" for a wireless network.

Table 4—Common Commands

Command Syntax	Description
`store tcpip` *`ifnum`* `addr` *`IPaddress`*	Store the IP address for the M302.
`store tcpip` *`ifnum`* `mask` *`netmask`*	Store the subnet mask for the M302.
`store tcpip route add default router`*`IPaddress ifnum`*	Store a default router/gateway for the M302 to forward remote packets to.
`store tcpip` *`ifnum`* `opts [[-]rarp] [[-]bootp] [[-]dhcp]`	Control RARP, BOOTP, and DHCP requests for IP addresses.
`set prn mode slow|cen|pc|fast|bb`	Configure the speed of the parallel port.
`set com` *`baud`*	Configure the speed of the serial port.
`set dest name` *`newname`*	Change the name of a destination/queue.
`list tcpip`	List the current TCP/IP network settings.
`list prn|com`	List the current settings of the I/O port.
`list dest`	List the current destination/queue settings.
`list model`	List the current model settings.
`list sysinfo`	List current system information for the M302.
`cancel` *`jobID`*	Cancel a queued job.
`save`	Save all current settings to Flash.
`reset`	Reset the M302.
`ping` *`IPaddress`*	"`ping`" another TCP/IP host on the network.
`telnet` *`IPaddress`* `[escapecharacter]`	"`telnet`" to another TCP/IP host on the network. If `escapecharacter` is used, it resets the key sequences to exit the Telnet session.

Table 4—Common Commands

Command Syntax	Description
`start fox|tts|loopb prn|com`	Begin a debugging test on an I/O port of the M302. These tests confirm that the M302's parallel (or serial) port is communicating properly with connected devices. **fox** - A continuous stream of text sent to the attached printer. **tts -** A continuous stream of Gandalf 400C TTS-compatible text sent to the attached printer. **loopb -** Loopback test. Any input characters from the device attached to the I/O port is echoed back.
`stop all|prn|com`	Stop an output test on the I/O port.
`quit`	"Quit" out of the npsh command line interface shell.

Complete Command Reference

This section outlines the entire M302 command set including the command syntax, a description, and in most cases, an example for each command listed. These commands are available in the npsh command line interface shell. See *M302 Command Line Interface Shell (npsh)* on page 77 for information on accessing these commands.

- *Debug commands* on page 80
- *List commands* on page 82
- *Set commands* on page 84
- *Store commands* on page 99
- *Miscellaneous commands* on page 105

When you see the word "*ifnum*" (which stands for "interface number") in any of these commands, you should substitute a "**1**" for the RJ45 (10/100 UTP) "wired" interface or "**2**" for the PCMCIA "wireless" interface.

Debug commands

The "`debug`" set of commands help troubleshoot problems that may occur in the M302. Some of the output may be cryptic, but it helps when troubleshooting with Microplex Technical Support.

Table 5—Debug Command Options

Command Syntax	Description
`debug dhcp`	List DHCP parameters.
`debug eeprom`	List ROM contents.
`debug err`	List error listing.
`debug flash`	List Flash info.
`debug io`	List statistics from the I/O port module.
`debug ip`	List IP stack statistics.
`debug lpq`	List statistics from the queue module.
`debug mem`	List statistics from the M302's memory module.
`debug nif`	List network interface statistics.
`debug pcmcia`	List PCMCIA card info.
`debug task`	List task info.
`debug tcp`	List TCP stack statistics.

List commands

These commands list the *current* or *working* settings for a particular section within the command line interface shell. To view stored settings in Flash memory, you'll need to add "**stored**" to the beginning of any of the following commands. For example, "**list prn**" shows you the current PRN settings but "**list stored prn**" shows you the settings sitting in Flash. Normally these should match. You may also type "**list default**" to view the factory default settings.

Table 6—List Command Options

Command Syntax	Description
list all	List all current settings.
list arp	List the contents of the M302's ARP table.
list com	List com ioport information.
list [default|stored] dest	List the current destination settings (e.g., names and mapped I/O port, model used, logpaths, state and service(s)).
list diff	List the differences between the current settings and the stored settings in Flash. Normally, you want these values to match, so issue a "**save**" command followed by a "**reset**".

Table 6—List Command Options

Command Syntax	Description
`list [default|stored] ifc`	Display the module's physical network interface properties, such as its interface number and Ethernet address.
	ssid — *network name* is a 1 to 32 ASCII character string
	mode — *net-mode* is the type of network mode of operation: "adhoc" or "managed"
	channel — *channel-num* is the RF channel being used for communication
	antenna — *antenna-type* is the type of antenna: "Primary", "Auxiliary", or "Diverse"
	speed — *speed-flags* is the speeds being used for communication 1, 2, 5, 11 or "auto"
	preamble — *len-type* indicates the selected preamble length: "long", "short", or "default"
	pmm — If power save is disabled, "normal (power-save off)" is displayed
	defkey — *key-num* is the number identifying one of the four encryption keys, starting from one. Encryption is disabled if "Encryption disabled" is displayed
	quality — *comms-quality* indicates the strength or quality (in percent) of the wireless signal
	txpwr — *power* is a percentage indicating the fraction of full power
	opts — *option-list* is a list of options that are enabled (disabled options not shown)
	status — *assoc-stat* is the association state ("associated" or "disassociated)
	"`list stored ifc`" will not display the **status** or **quality** line.

Table 6—List Command Options

Command Syntax	Description
`list [default|stored] key`	List the license details and license key number.
`list logins`	List any active user logins on the M302.
`list [default|stored] logpath`	List the current logpath settings (e.g., names and mapped destinations).
`list [default|stored] model`	List the current model settings (e.g., names and mapped destinations).
`list [default|stored] prn`	List the current parallel port settings (e.g., mode).
`list [default|stored] pserver`	List Print Server configuration.
`list [default|stored] snmp`	List SNMP configuration.
`list [default|stored] sysinfo`	List the current M302 system information (e.g., contact name and protocol stacks enabled).
`list [default|stored] tcpip`	List all current TCP/IP network settings (e.g., IP address and subnet mask).
`list [default|stored] test`	List the status of output tests on the I/O port.
`list time`	List the current time on the M302.
`list [default|stored] user`	List the current user definitions (e.g., user names and types).
`list [default|stored] var`	List all predefined variables including any newly created ones. Any of these defined variables can be referenced in a string by placing a "`$`" before the variable name (e.g., "`set model m1 trailer $FF`").
`list uptime`	List the time the unit has been powered up since the last power cycle. (e.g., "Uptime: 12 days, 22:50:23").

Set commands

These commands alter the current or working settings in memory only. They will be lost if the M302 is turned off and on. To ensure this does not happen, be sure to issue a "`save`" command so the current settings get written to Flash.

Table 7—Set Command Options

Command Syntax	Description
`set com [speed]`	Set the baud rate (speed) and character size at the serial port. `[speed]` can be one of `50`, `110`, `134`, `300`, `600`, `1200`, `2400`, `4800`, `9600`, `19200`, `38400`, `57600`, or `115200`.
`set com [-]cstopb`	Use two [one] stop bits per character on the serial port.
`set com from default`	Set all serial port settings back to factory defaults.
`set com from stored`	Set all current serial port settings to the stored values in Flash.
`set com [-]ctsflow`	Hardware flow control. Observe [ignore] CTS input and do not transmit data if it is low. CTS is an RS232 signal line from the peripheral to the M302 informing the M302 when it may continue to send seral data.
`set com [-]rtsflow`	Hardware flow control. Set RTS low when the M302 is not ready to accept data. RTS is an RS232 signal line from the M302 to the peripheral informing the peripheral when it may continue to send data.
`set com [bits]`	Select character size (five to eight bits). *[bits]* can be one of **cs5**, **cs6**, **cs7**, or **cs8**.
`set com [-]ixon`	Enable [disable] START/STOP output flow control. If **ixany** is set, any character can restart output, otherwise the start character is used to restart it. The default flow control method is **ixon**.
`set com [-]ixoff`	Enable [disable] the sending of START/STOP characters when the input queue is nearly empty/full. Use **rtsflow** if the rts signal is used in the flow control process.
`set com [-]ignbrk`	Ignore break signals on the serial port. If this option is not set and a break signal is received by the M302, the M302 will start a serial terminal session.
`set com [-]igndcd`	Ignore DCD detection on the serial port. If this option is not set and the DCD line is asserted by a peripheral, the M302 will start a serial terminal session. Disable this feature if you are using a modem connected to the serial port to establish terminal sessions.

Table 7—Set Command Options

Command Syntax	Description
set com [-]parenb	Enable [disable] parity generation and detection on the serial port.
set com [-]parodd	Enable odd [even] parity on the serial port.
set com flush	Flush the data in the serial port's input and output buffers.
set com [-]opost	Allow [disallow] output processing on the serial port such as carriage return insertion (**onlcr**), tabstops (**xtab**) or descrambling. With "**-**" do not allow any of this processing.
set com [-]onlcr	Enable [disable] carriage return insertion on the serial port. This may be needed for UNIX text jobs coming through with solitary linefeeds. This feature is almost always set at the model level rather than the I/O port level.
set com timeout *minutes*|none	Terminate the print job sent to the serial port if it is not printed after the timeout period in *minutes* expires. The *minutes* value is an integer in the range of 0 to 255 with 0 indicating no timing out to take place. This is the default setting and should be fine for most print setups. For example: **set com timeout none** Printer errors will cause the M302 to postpone printing until the printer is fixed regardless of whether the timeout feature is set or not.
set com unlock	Release the access lock on the serial port. Using **unlock** option when the port is active can cause output from two jobs to intermix.
set com xtab *tablength*|none	Set the tabstop width as indicated by *tablength*. The range is 1 to 16 spaces. For example: **set com xtab none**

Table 7—Set Command Options

Command Syntax	Description

`set dest `*`destination`*` backchannel [prn]`	Enables/disables IEEE 1284 nibble mode over parallel port.
	
	For example, to turn the backchannel on:
	    `set dest d1prn backchannel prn`
	
	To turn it off:
	    `set dest d1prn backchannel`

`set dest `*`destination`*` ioport [prn|com]`	Change the physical port for the ***destination***.
`set dest `*`destination`*` name `*`newname`*	Change the current name of the ***destination*** to a new name as indicated by ***newname***. This ***newname*** must be 29 characters or less. These names are case sensitive. When you change a destination name, you may have to reconfigure the host to reflect the change. For example, `set dest d1prn name laser`
`set dest `*`destination`*` model `*`modelname`*	Associate a model with a destination. Jobs sent to the named ***destination*** are processed according to the options defined in the named model. See *set model from default* on page 90 to configure this model name. For example, `set dest d3prn model m3root`
`set dest `*`destination`*` logpath `*`logpathname`*	Associate a logpath with a destination. Jobs sent to the named ***destination*** are logged according to the settings defined in the named logpath. For example, `set dest d1prn logpath l5`

Table 7—Set Command Options

Command Syntax	Description
`set dest destination service [[-]socket] [[-]lpd] [[-]lpsched] [[-]ftpd]`	Set the ***destination*** to handle only certain print services. To add a service, specify the service name. To disable a service, use "-" before the name. The available services are: **socket** — direct socket printing via TCP/IP **lpd** — LPR printing with TCP/IP including LPR clients on any platform **lpsched** — LP or System V printing with TCP/IP **ftpd** — printing using the File Transfer Protocol (FTP) via TCP/IP For example, to disable ftp service, type `set dest d2prn service -ftp`
`set dest from default`	Set all destination settings back to factory defaults.
`set dest from stored`	Set all current destination settings to the stored values in Flash.
`set logpath from default`	Set all logpath settings back to factory defaults.
`set logpath from stored`	Set all current logpath settings to the stored values in Flash.
`set logpath logpath name newname`	Change the current name of the ***logpath*** to a new name as indicated by ***newname***. This ***newname*** must be 29 characters or less; these names are case sensitive. For example, `set logpath l1 name pagecount`

Table 7—Set Command Options

Command Syntax	Description
`set logpath` *`logpath`* `port` *`prn`*`|email|syslog`	Determine where the log information should be sent for a print job or attached printer. The choices are: **prn** — Parallel port **prn**. **email** — Email address. This address is set using the "`set sysinfo email` *`emailname@IPaddress`*" command. **syslog** — A central TCP/IP host running the SYSLOG daemon. This host is set using the "`set sysinfo syslog` *`IPaddress`*" command. For example, `set logpath l3 port 2000`
`set logpath` *`logpath`* `type` `[[-]job] [[-]user] [[-]pgcnt] [[-]cksum] [[-]printer] [[-]ioport]`	Establish the type of printer and print job logging to be done within this *logpath*. The options are: **job** — Job ID, username, etc. **user** — User ID along with three messages per job about start and finish. **pgcnt** — Number of pages printed per job. Needs bidirectional communication. **cksum** — 16-bit checksum value to confirm integrity of data printed. **printer** — Special printer messages if supported (needs bidirectional communication). **ioport** — Printer error messages determined through the parallel port pins. For example, `set logpath l2 type job user printer pgcnt`

Table 7—Set Command Options

Command Syntax	Description
`set model` *`model`* `banner` `[ps|text|auto [after]]`	Determine whether a banner page should be added for print jobs passing through the *model*'s mapped destination/queue. **ps** will produce a PostScript banner page. **text** will produce a text banner page. **auto** will determine which type is needed depending on the type of print job data passing through. By default, banner pages are added to the front of the job. However, if **after** is set, the banner page will come at the end. Banner type and printer type must match. For example, `set model m4 banner text`
`set model from default`	Set all model settings back to factory defaults.
`set model from stored`	Set all current model settings to the stored values in Flash.
`set model` *`model`* `header` *`headerstring`*	Set a header string to be sent to the printer ahead of any print jobs passing through this *model*. *headerstring* can consist of up to nine elements. An example element is a hexadecimal code (e.g., 0x04) or a predefined variable on the Print Server (e.g., $PCL-RST for a printer reset). Use "`list var`" to see all available variables. For example, `set model m4 header $PCL-RST` When inputting a "$" or "&" and you're using RSHD to execute this command, you must place a "\" beforehand so the local shell interpreter does not parse it out.
`set model` *`model`* `name` *`newname`*	Change the current name of the *model* to a new name as indicated by *newname*. This *newname* must be 29 characters or less; these names are case sensitive. For example, `set model m1 name landscape`

Table 7—Set Command Options

Command Syntax	Description
`set model model stty [[-]onlcr] [xtab tablength|none]`	Control of job processing is also done by the *model*. The processing options are: **onlcr** Carriage return insertion for Unix text jobs. Adds carriage returns to text jobs with solitary linefeeds. This will prevent stair-stepped output or output running off the right side of the page. *Use of* **onlcr** *may slow throughput performance on the M302.* **xtab** Tab expansion from 1 to 16 spaces. For example, `set model m3 stty onlcr`
`set model model trailer trailerstring`	Set a trailer string to be sent to the printer at the end of any print jobs passing through this *model*. *trailerstring* can consist of up to nine elements. An example element is a hexadecimal code (e.g., 0x04) or a predefined variable on the Print Server (e.g., $FF for a formfeed). Use "`list var`" to see all available variables. For example, `set model m3 trailer $FF`

Table 7—Set Command Options

Command Syntax	Description
`set model model type a2ps [pageorientation [pagesize [rows columns]]] [cont]`	Converts text or ASCII data which passes through the model to PostScript data before sending it to the attached PostScript printer. The a2ps default settings are portrait, letter, 60 rows, and 80 columns. These can be altered using these options: **pageorientation** orientation of page (i.e., **portrait** or **landscape**) **pagesize** size of page (i.e., **letter**, **legal**, **exec**, or **a4**) **rows** number of rows in page **columns** number of columns per line **cont** continuously senses print job for data format. For example, if a PostScript banner page comes before an ASCII job, the M302 senses both parts of the job separately. This way, the banner page gets left alone but the ASCII data still gets converted to PostScript. *Use of this option will decrease output performance*. For example, `set model type a2ps`

Table 7—Set Command Options

Command Syntax	Description

`set model model type pcl-ps [PCLswitchstring PostScriptswitchstring]`	Switch printer emulation modes (e.g., PCL or PostScript) depending on the type of data passing through the M302. To do this, the model prepends a header string telling the printer which mode to enter for the job. It then appends a string to switch the printer back at the end of the job. The default switch strings are compatible with HP III printers and higher. These can be changed by defining a new *PCLswitchstring* and a new *PostScriptswitchstring*.
	
	For example,
	`set model m4 type pcl-ps`
	
	Another example shows the model m3 switching printer modes between PCL and PostScript for an HPLJIIIse-compatible printer. The two variables defined represent a PCL switch string and a PostScript one.
	
	For example,
	`set model m3 type pcl-ps $HP3-SWPCL $HP#-SWPS`

`set model model type raw`	Set the model **type** to **raw** so that it does not process the data passing through it in any way (no sensing or conversion). In this mode there is no ASCII or PostScript processing and no switching strings appended to jobs. For example, `set model m2 type raw`
`set prn [-]autofd`	Assert or do not assert the AUTOFD line for carriage return insertion. This only affects printers that support this function such as impact printers. For example, `set prn -autofd`
`set prn from default`	Set all parallel port settings back to factory defaults.
`set prn from stored`	Set all current parallel port settings to the stored values in Flash.

Table 7—Set Command Options

Command Syntax	Description
`set prn flush`	Flush the data in the parallel port's input and output buffers. For example, `set prn flush`
`set prn mode slow|cen|pc|fast|bb`	Set the parallel port mode. The choices are: **slow** Slow mode. Used with older, slower laser printers. **cen** Centronics mode. Use with older impact printers. **pc** Default mode. Will work with most printer models. **fast** Fast mode. Increased transfer rate. Use with newest laser printers. **bb** Bit Bucket mode. Simulate an attached printer even if one is not there. For example, `set prn mode cen`
`set prn [-]opost`	Allow or disallow output processing on the parallel port such as carriage return insertion (`onlcr`), tabstops (`xtab`) or descrambling. With a dash "-", no processing of any sort is performed. For example, `set prn -opost`
`set prn [-]onlcr`	Enable or disable carriage return insertion on the parallel port. This may be needed for UNIX text jobs coming through with solitary linefeeds. This feature is almost always set at the model level rather than the I/O port level. For example, `set prn -onlcr`

Table 7—Set Command Options

Command Syntax	Description
`set prn timeout minutes|none`	Terminate the print job sent to the parallel port if it is not printed after the timeout period in ***minutes*** expires. The ***minutes*** value ranges from 0 to 255, with 0 indicating no timing out to take place. This is the default setting and should be fine for most print setups. For example, `set prn timeout none` Printer errors will cause the M302 to postpone printing until the printer is fixed regardless of whether the timeout feature is set or not.
`set prn unlock`	Release the access lock on the parallel port. Using `unlock` option when the port is active can cause output from two jobs to intermix.
`set prn xtab tablength|none`	Set the tabstop width as indicated by ***tablength***. The range is 1 to 16 spaces. For example, `set prn xtab none`

`set sysinfo contact contactname`	Set a person or department to contact in case of Print Server trouble.
	
	 For example,
	     `set sysinfo contact`
	     `Christopher_Owen`

`set sysinfo dns IPaddress`	Set your DNS server's IP address so the M302 can resolve host names when used with its built-in Telnet and Ping clients.
	
	 For example,
	     `set sysinfo dns`
	     `192.168.1.254`

`set sysinfo email emailname@IPaddress`	Define the user's email address to receive printer and job logging information from a particular logpath on the M302. ***emailname*** is the host or IP name of the user and ***IPaddress*** is the IP address where the mail is stored on your network.
	
	 For example,
	     `set sysinfo email`
	     `joe@192.168.11.21`

Table 7—Set Command Options

Command Syntax	Description

`set sysinfo location` *`description`*	Set the physical location of the M302. This is for identification purposes and is not used in the operation of the Print Server in any way.
	
	For example,
	`set sysinfo location`
	`salesdept`

`set sysinfo logport` `null|prn|com|syslog`	Define where the debugging information should be sent to. This can be sent to an output device off the M302's I/O port or to a central TCP/IP host running a SYSLOG daemon. To set this host, use the command `set sysinfo syslog` *`hostIPaddress`*

`set sysinfo name` *`newname`*	Set a descriptive name defined by ***newname*** for the M302 for identification purposes. This is not used in the operation of the Print Server in any way.
	
	For example,
	`set sysinfo name`
	`salesprinter`

`set sysinfo syslog`
`hostIPaddress`
	Set the IP address of the host running the SYSLOG daemon. M302 debugging or print job and printer logging information can be sent there.
	
	For example,
	`set sysinfo syslog`
	`192.168.11.30`

`set user add|del` *`username`*	Add or remove a user on the M302 defined by ***username***. Be careful not to delete the **root** user, however, or you will be unable to configure any further settings. For example, `set user add eng`

Table 7—Set Command Options

Command Syntax	Description
`set user passwd username password`	Assign a ***password*** to a defined user on the M302. This ***password*** must be less than eleven characters. If the new password is not entered, the user's old password will be cleared. For example, `set user passwd eng mplex1` If you forget the root password, you can use a TCP/IP host and RSHD to set the users back to factory defaults, or you can set the dipswitches to restore settings to factory defaults. See *Resetting to Factory Defaults* on page 110.
`set user type username root|guest`	Assign root or guest privileges to a particular user defined by ***username***. Guest permissions allow viewing of settings only, whereas root permissions allow complete control of the M302. For example, `set user type eng root`
`set user from default`	Set all user settings back to factory defaults.
`set user from stored`	Set all current user settings to the stored values in Flash.

Table 7—Set Command Options

Command Syntax	Description
`set var variablename variablestring`	Define a new variable to be used in header, trailer, or switch strings on the M302 and call it *variablename*. *variablestring* can be a space-separated list of words, hexadecimal numbers (e.g., 0x04), or references to other pre-defined variables. It's easiest to make up the *variablestring* with hexadecimal values as shown in the example, however. Most printer codes in hexadecimal format can be retrieved from the printer manual.
	One variable counts as one element within header and trailer strings.
	Defined variables are referenced in strings by placing a "`$`" before the variable name (e.g., "`set model m1 trailer $FF`"). When inputting a "$" or a "&" and using RSHD to execute this command, you must place a "\" beforehand so that the local shell interpreter does not parse it out.

	For example,
	`set var LANDSCAPE 0x1b 0x26 0x6c 0x31`
	`set var FINISH $FF $PCL-RST`

`set var from default`	Set all variable settings back to factory defaults.
`set var from stored`	Set all current variable settings to the stored values in Flash.

Store commands

These commands change the settings stored in Flash (permanent memory) and do *not* affect the current or working settings in memory. A power cycle is needed before the stored settings become current.

Table 8—Store Command Options

Command Syntax	Description
`store ifc from default`	Set all network settings back to factory defaults.
`store ifc from current`	Store all current network settings to Flash so they are retained after a power cycle. This ensures all current settings match what is stored in Flash.
`store ifc ifnum mode [auto|10half|10full|100half|100full]`	Set the line speed for the interface *ifnum*. This is for ethernet interfaces only.
`store ifc ifnum utp [-]li [-]rx`	Modify the physical UTP interface properties where `li` enables link integrity and `rx` enables the increased receive threshold. A "-" disables the feature. *ifnum* is `1` for the UTP interface. For example, `store ifc 1 utp li`
`store ifc ifnum wlan antenna antenna-type`	Set the antenna type for the wireless network. *ifnum* `2`, is the interface number for the PCMCIA device. *antenna-type* is the type of antenna to be used: "`primary`", "`aux`" (auxiliary or external), and "`diverse`". The default "`diverse`" allows the PCMCIA card to decide on the optimal antenna operation.
`store ifc ifnum wlan channel channel-num`	Set the RF channel number for a wireless network. *ifnum* `2` is the interface number for the PCMCIA device. *channel-num* selects the RF channel number (1 to 15) used in ad-hoc mode. The word "*default*" will inform the device driver to use the card's factory set default channel.
`store ifc ifnum wlan defkey key-num`	Set the default key for wireless network encryption. *ifnum* is `2` for the PCMCIA card. *key-num* is the number identifying one of the four keys, starting from one. The default value of zero disables encryption.
`store ifc ifnum auth authmethod`	Set the authentication method. *authmethod* can be one of **open**, **shared**, or **leap**.
`store ifc ifnum user username`	Set the username for authentication.

Table 8—Store Command Options

Command Syntax	Description
`store ifc ifnum pass password`	Set the password for authentication.
`store ifc ifnum wlan key key-num key-value`	Set a key to a given value for a wireless network. `ifnum` is `2` for the PCMCIA card. `key-num` is the number identifying one of the four keys. `key-value` is the encryption key value for `key-num`. The value must consist of 5, 13 or 16 double- or quad-digit HEX numbers, separated by (':') or dash ('–') characters for readability (e.g., D1C2-B3A4-9586-7768-594A-3b2c-1D). Alpha characters are NOT case sensitive. If '$' is the first character the remainder of the argument is treated as a literal string with all alpha-numeric characters allowed). Key length is inferred from the length of `key-value` so leading zeros of longer keys must be explicitly entered (not blanked). The default value of zero disables encryption for `key-num`.
`store ifc ifnum wlan mode net-mode`	Set the network mode for a wireless network. `ifnum` is `2` for the PCMCIA card. `net-mode` is the type of network operation mode: "`adhoc`" or "`managed`". Default: `adhoc.`
`store ifc ifnum wlan opts option-list`	Set options for a wireless network. `ifnum` `2` is for the PCMCIA card. `option-list` is a space separated list of options that need to be enabled or disabled. An option is enabled by including it in the list and disabled by preceding it with a '–' character in the list. Currently one option is available: "`intnl`" sets the network to international mode.
`store ifc ifnum wlan pmm on`	Set the Power Management Mode for a wireless network. `ifnum` `2` is the interface for the PCMCIA card. "`off`" will disable power-save mode and "`on`" will enable power-save mode.
`store ifc ifnum wlan preamble`	Set preamble length for TX packets in a wireless network. `ifnum` `2` is the interface for the PCMCIA card. `len-type` is the type of preamble length required. It can be "`long`", "`short`" or "`default`". "`default`" allows the card to use its own factory-default.

Table 8—Store Command Options

Command Syntax	Description
`store ifc ifnum wlan speed speed-flags`	Set the transmit transfer rate for a wireless network. `ifnum 2` is the interface number for the PCMCIA card. `speed-flags` are the speeds being selected. The following values are supported: 1 for 1Mbps, 2 for 2Mbps, 5 for 5.5Mbps, and 11 for 11 Mbps. The default "`auto`" sets the PCMCIA card to use automatic negotiation.
`store ifc ifnum wlan ssid network name`	Set the wireless network name (SSID). `ifnum 2` is for the PCMCIA card. `network name` is a 1 to 32 ASCII character string. Default is "`101`"
`store ifc ifnum wlan txpwr power`	Set the Transmit Power level used to send packets out on a wireless network as a percentage of full power (100%). `ifnum 2` is for the PCMCIA card. `power` is a number from 1 to 100, the default is 100.
`store pserver from default`	Set all general Print Server settings back to factory defaults.
`store pserver from current`	Store all current general Print Server settings to Flash so they are retained after a power cycle. This ensures all current settings match what's stored in Flash.
`store pserver name newname`	Configure the M302's name, indicated by `newname`.
`store pserver opts [[-]jobsecurity]`	Only root users can cancel print jobs on the unit. Disabling jobsecurity allows all users to issue the **cancel** command.
`store pserver opts [jobtimeout time]`	An active job will wait *time* seconds for a response from the printer.
`store pserver opts [[-]iobuffer]`	Enable [or disable] buffering on the I/O port when the printer is in an offline state. When disabled, no new data will be buffered until the print returns to an online state.
`store pserver opts [[-]multcp]`	Allow or disallow multiple TCP connections for printing. Disabling the option will force the M302 to only accept one connection per TCP port when printing.

Table 8—Store Command Options

Command Syntax	Description
`store pserver lpd [-]dest1default`	Configure the destination "**d1prn**" to receive LPR jobs that are directed to an unknown destination. A "–" disables the feature. For example, `store perver lpd dest1default`
`store pserver tcpsocket tcpport port newtcpport`	Change the current *tcpport* to a new *newtcpport*. For example, `store pserver tcpsocket 4400 port 9100`
`store pserver tcpsocket tcpport dest dest`	Change the *dest* for the *tcpport*. *dest* is the logical destination. For example, `store pserver tcpsocket 4400 dest d2prn`
`store pserver tcpsocket add tcpport dest dest`	Add a new rawsocket *tcpport* for *dest*. For example, `store pserver tcpsocket add 4401 dest d2prn`
`store pserver tcpsocket del tcpport dest dest`	Delete a rawsocket *tcpport* for *dest*. For example, `store pserver tcpsocket del 4401 dest d2prn`
`store pserver testpage [off|prn|com]`	Print a test page on each reset of the M302.
`store tcpip ifnum addr IPaddress`	Store the IP address for the interface specified by `ifnum`. For example, `store tcpip 1 addr 192.168.11.9`
`store tcpip ifnum frametype [[-]ethernet2] [[-]802.2snap]`	Control which frame type or types is supported with the TCP/IP protocol. By default, both **Ethernet II** and **802.2snap** are enabled, but normal TCP/IP communications rely only on Ethernet II. For example, `store tcpip 1 frametype ethernet2 802.2snap`

Table 8—Store Command Options

Command Syntax	Description
`store tcpip from default`	Set all TCP/IP network settings back to factory defaults.
`store tcpip from current`	Store all current TCP/IP network settings to Flash so they are retained after a power cycle. This ensures all current settings match what's stored in Flash.

`store tcpip ifnum mask netmask`	Store the subnet mask for the M302.
	
	For example,
	`store tcpip 1 mask`
	`255.255.255.0`

`store tcpip ifnum opts [[-]rarp] [[-]bootp] [[-]dhcp]`	Enable or disable the automatic RARP, BOOTP, or DHCP requests for IP addresses upon bootup. If you are storing the M302's TCP/IP network settings within the device, you will not need to rely on RARP, BOOTP or DHCP for new settings.
	
	For example,
	`store tcpip 1 opts -rarp`
	`-bootp`

`store tcpip route add|del default routerIPaddress ifnum`	Store a default router/gateway defined by *routerIPaddress* so the M302 knows where to direct packets destined for another subnet. It is easier to store one default entry rather than an entry per remote host or network as in the next command.
	
	For example,
	`store tcpip route add`
	`default 192.168.11.1 1`

`store tcpip route add [host|net] networkIPaddress[/mask] routerIPaddress ifnum [metric]`	Add a static route to a particular TCP/IP host or subnet specified by *networkIPaddress* so the M302 knows how to communicate with it. Normally one entry for a default router/gateway is all that is needed for communications between different subnets. Please see the previous command for details.
	
	For example,
	`store tcpip route add`
	`204.195.175.50/24`
	`192.168.12.0 1`

Table 8—Store Command Options

Command Syntax	Description

`store tcpip route del [host|net] networkIPaddress`	Remove a static route to a particular TCP/IP host or subnet specified by *networkIPaddress* so the M302 will not communicate with it.
	
	For example,
	    `store tcpip route del net`
	    `192.168.12.9`

`store tcpip tcp access [root] add|del IPaddress`	Add or remove an entry from the M302's TCP access list defined by *IPaddress*. If the list has an entry, only this host can print to and remotely interact with the Print Server.
	
	For example,
	    `store tcpip tcp access add`
	    `192.168.11.25`

`store tcpip tcp opts [-]keepalive [-]disbufmgmt`	Control whether the M302 maintains a connection with a host when data cannot be accepted into its buffer. Normally the **keepalive** feature is enabled so when the printer cannot accept data, the print job connection is maintained and continues with once the situation clears. If **disbufmgmt** is disabled (i.e., "-"), the M302 will not buffer any data when there's a blocked situation with the printer. Normally it's best to have both **keepalive** and **disbufmgmt** enabled.
	
	For example,
	    `store tcpip tcp opts`
	    `keepalive disbufmgmt`

`store tcpip tcp rxwin packets`	Determine the receive window size for the M302. Usually the *packets* value ranges from 2-8, with the lower number allowing for more simultaneous TCP connections with the Print Server. For example, `store tcpip tcp rxwin 2`

Miscellaneous commands

These commands do not fall under any specific section of the command line interface shell, but they are used quite frequently.

Table 9—Miscellaneous Commands

Command Syntax	Description
`cancel` *`jobID`*	Remove a job from an I/O port's queue. Use "`lpstat`" to find a particular job's ID first. For example, `cancel d1prn1-10`
`chr` *`string`*	Used with redirection, the **chr** command sends output control codes to the printer. Arguments must be separated by spaces. Arguments can be a combination of words, any printable character or the common set of $BS, $STAB, $ESC, $DEL, $EOF, $NULL, $FF, $LF, or 0xhh (hexadecimal code for any character). You will echo *string* or redirect *string* to the I/O port. For example, `chr` *`string`* `> ioport`
`close tcp` *`TCPindexnumber`*	Force a TCP/IP connection between a TCP/IP host and the M302 to close. The *TCPindexnumber* can be retrieved from "`debug tcp`" output. For example, `close tcp 3`
`disable` *`ioport|destination`*	Disable the *I/O port* so queued jobs are not printed or disable a *destination* so jobs cannot be queued to it. The I/O port is always prn. For example, `disable prn`
`enable` *`ioport|destination`*	Enable an *I/O port* so queued jobs are printed or enable a *destination* so jobs can be queued to it. The I/O port is always prn. For example, `enable prn`
`keycode`	Determine the hexadecimal value for a key to be used as the escape character with the M302's built-in "`telnet`" command.

Table 9—Miscellaneous Commands

Command Syntax	Description
`load [default]`	Load the settings stored in Flash and use them as the current or working settings. If `default` is specified as well, factory settings will be loaded. Use this after power failure to restore settings saved in Flash.
`lp options -d destname`	Print to the M302 using standard TCP/IP rsh/rcmd/remsh. `destname` is the name of the M302 destination. This command in default mode will show any parallel port printer errors to the user. The options are:
	`-v` Show incremental byte counts as the job is printing and show the job's position in the queue as it moves to the top
	`-V` Show the number of bytes printed.
	`-onlcr` Insert a CR character before LF characters
	`-ttabwidth` Number of spaces of the tab in the range of 1 to 16
	`-off` Generate an FF character at the end of the job
	`-oeof` Generate an EOF character at the end of the job
	`-uusername` The name of the user that will be printed on the banner page
	`-ffilename` The name of the file that will be printed on the banner page
	For example, to print the file **tests.txt** followed by a formfeed to the M302 destination **d1prn** on the Print Server named **spike**, you would type: `rsh spike lp -d d1prn -off < test.txt`
`lpstat`	Display active and queued jobs and I/O port status. For example, `lpstat`

Table 9—Miscellaneous Commands

Command Syntax	Description
`ping [-s]` *`hostIPaddress`* `[datasize [packetnumber]]`	"`ping`" another TCP/IP host, specified by *hostIPaddress*, on the network. *datasize* is the datagram packet size, which defaults to 64 bytes if no size is included in the syntax, and *packetnumber* is the number of requests to be sent. To use a host or IP name instead of the address, you must have set the DNS server on the M302. Use the command "`set sysinfo dns...`" to do this. For example: `ping 192.168.11.30`
`reset`	Perform a warm boot or hardware reset simulating a power-on reset. This will restore current settings to those stored in Flash as the Flash settings will be read and loaded into memory upon bootup.
`save [default]`	Save the current settings to Flash so they are remembered after power cycles. Sysinfo, destination, model, logpath, variable, user, and I/O port settings will be saved. If `default` is specified as well, factory settings will be saved to Flash, overwriting any new settings you have configured. Resetting the unit is not required.

Table 9—Miscellaneous Commands

Command Syntax	Description
`start fox|tts|loopb prn`	Begin a debugging test on the I/O port of the M302. These tests confirm that the parallel port on the M302 is communicating properly with connected devices. Three types of tests can be done: **fox** A continuous stream of text sent to the attached printer. This is a good test for troubleshooting hardware as long as the attached printer supports text output. **tts** A continuous stream of Gandalf 400C TTS-compatible text sent to the attached printer. **loopb** Loopback test. Any input characters from the device attached to the I/O port are echoed back. For example, `start fox prn`
`stop all|prn`	Stop an output test on the I/O port.
`telnet IPaddress [escapecharacter]`	Start a Telnet session with another TCP/IP host specified by *hostIPaddress* on the network. If *escapecharacter* is used, it resets the key sequence used to exit the Telnet session. It will return you to the `telnet>` prompt where you can execute "`quit`" or "`?`" to print the help information. Use the "`keycode`" command to find out exact escape characters if needed. The default character is CTRL-]. To use a host or IP name instead of the address, you must have set the DNS server on the M302. Use the command "`set sysinfo dns...`" to do this. For example, `telnet 192.168.11.35`

M302 Naming Scheme

The M302 always follows this naming scheme:

M302_xxxxx   A default name of M302 is followed by "*xxxxx*", the serial number found on the bottom of the Print Server. For example: M302_00091

Refer to Figure 28 for an illustration of the default names.

Figure 28—M302 Default Names
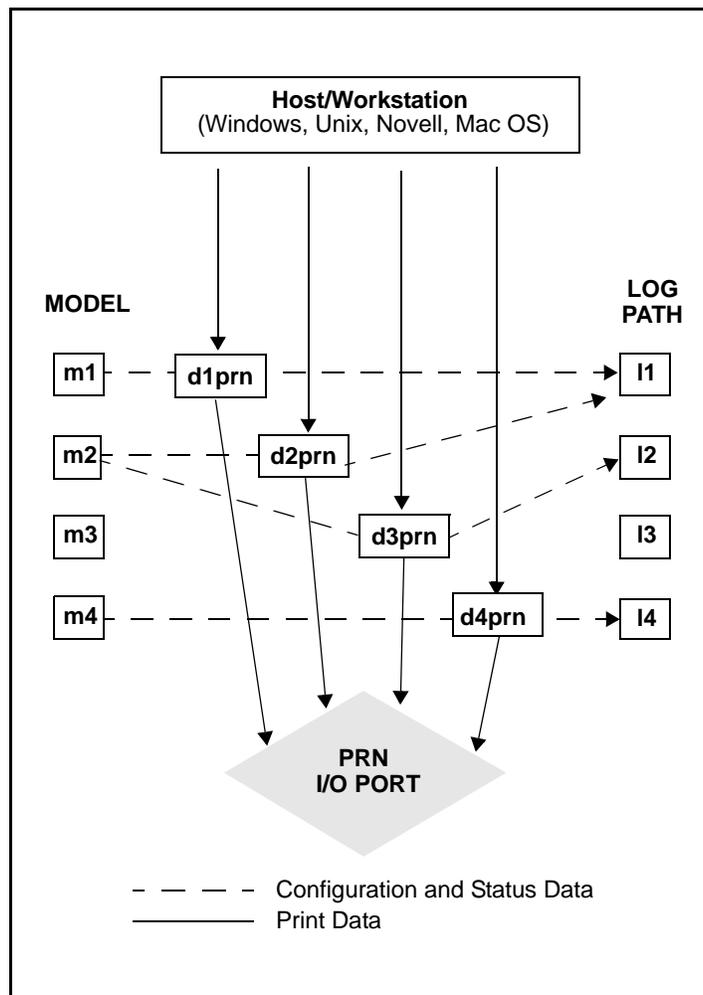
User Accounts and Permissions

When you log in to the M302, you either log in as a **guest** or as a **root** user. The commands you will be able to utilize on the Print Server depend on which login name you use. By default, there is one **root** user and one **guest** user; users can then be added to this with either permission level.

Users with **root** permission can execute all commands; users with **guest** permission can not do any configuration and can only execute commands that display settings on the M302. However, they can use **ping** and **telnet** as well.

Use *list [default|stored] user* on page 84 to look at current user definitions. Use *set user add|del* `username` on page 96 to see how the **root** user can change these settings.

Resetting to Factory Defaults

Sometimes it is beneficial to return the M302 to its factory default state. For example, if you are having problems communicating with the Print Server over the network, you may want to put it back to a default state and reconfigure the network settings.

To reset to factory defaults:

1. Move dipswitch 1 to the "**off**" position and dipswitch 2 to the "**on**" position as described in Table 2, *M302 Dipswitch Settings*, on page 16. This is the Factory Settings mode.

2. Reboot the unit by turning the power off then on.

You now have the M302 booted into a default state, meaning its current/working settings are those stored at the factory. All settings configured and stored in Flash are ignored while the dipswitches are in the "Factory Settings" position.

At this point, you can use **npsh** commands on the M302 to configure certain settings. Here are some common examples of steps taken when the device is in a default state:

1. **Forgotten password**

    If you have forgotten a password set on the M302, you can reset the user settings using these commands:

    ```
    set user from default

    save
    ```

2. **Restore all settings in Flash to defaults**

    Since this default state is temporary and you may want to make sure *all* settings sitting in Flash are back to their factory default values, you will need to use these commands:

```
save default

store tcpip from default
```

or set dipswitch 1=on and 2=off. See Table 2, *M302 Dipswitch Settings*, on page 16.

3. **Set dipswitches for normal operation**

   Set dipswitch 1=off and 2=off. See Table 2, *M302 Dipswitch Settings*, on page 16.

Performing Firmware Upgrades

Since the M302's firmware is stored in Flash ROM, upgrading is easy. Using the File Transfer Protocol (FTP) on a TCP/IP network, the Print Server can be upgraded to a newer firmware version without needing new hardware.

Upgrade files

There are two files involved in the upgrade process. One is the Print Server binary (the new firmware) and the other is the upgrade instructions document, which provides detailed steps for completing the upgrade.

These files are always available at Microplex's FTP site ("`ftp.microplex.com`") and Web site ("`http://www.microplex.com`"), or they can be ordered through Microplex Technical Support. Please see *Help Methods Available* on page 144 for further information.

12 EXTRA FEATURES/ADDITIONAL INFORMATION

This chapter provides information about additional features available with the M302.

- *Print Server Architecture* on page 112

- *General Options* on page 116: miscellaneous Print Server options

- *M302 Security* on page 118: how to use the M302's built-in security features as well as taking advantage of your Network's security features

- *Printer Monitoring and Logging* on page 120

- *Managing with SNMP* on page 129, including creating custom MIBs

- *Troubleshooting Tips* on page 132

Print Server Architecture

When you send a print job to the Print Server, the job goes first to a ***destination*** before going to an I/O port. A destination is the *logical* place on the Print Server where print jobs are sent. Each destination has an ***I/O port*** and a ***model*** associated with it (see below). The I/O port can be the parallel port called ***prn*** or the serial port called ***com***. The purpose of ***destinations*** is to allow you to configure a number of different print setups on the Print Server.

Figure 29—Print Server Operating Logic
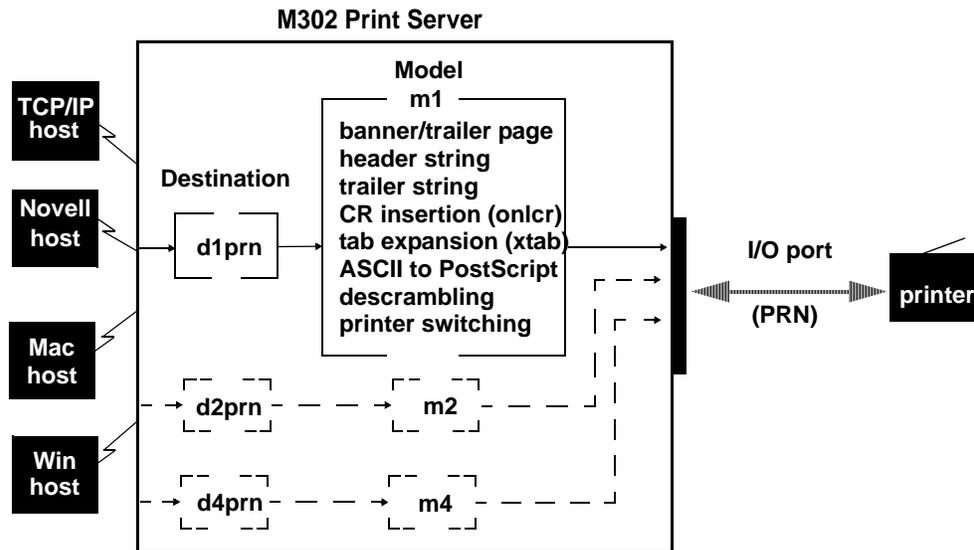
This example follows a print job sent to destination *d1prn. d1prn* is associated with model *m1* and the I/O port *prn*.

When the data is passed through the associated model, any job processing specified by the model is performed on the data.

If no additional processing is specified, the data is passed through to the I/O port untouched.

Destinations

The M302 provides four printer destinations that are used by all hosts. Destinations map a name of up to nine characters to the I/O port **prn**. The I/O port has eight destinations mapped to it. The **default destination** names are: d1prn, d2prn, d3prn, d4prn, d1com, d2com, d3com and d4com. The user may change the destination names to something more meaningful.

Each destination uses one of the defined models for processing. The destination list is limited to a maximum of four entries and is configured through the **npsh** interface on the Print Server. Default destination names can also be changed to something more meaningful.

Destination definitions include: name, I/O port, model used, logpath, state, and service(s) supported.

See also: *Manipulating the M302's services* on page 117*, list des*t (Table 6 on page 82), and *set dest* (Table 7 on page 85)*.

Models

Each destination on the M302 also has a ***model*** associated with it. The four models (one per destination) can be thought of as a series of mini-filters that can do special processing with the print job data. For example, a model can be set up to do such things as ASCII to PostScript conversion (a2ps) or carriage return insertion (onlcr).

These processing options include:

* banner page generation

* header string insertion

* trailer string insertion

* tab expansion (**xtab**)

* carriage return insertion (**onlcr**)

* ASCII to PostScript conversion (**a2ps**)

* print job descrambling

The default model names are *m1* to *m4*, and each comes mapped to a particular destination. By default, the model settings are **raw**, that is, they simply pass data through to the I/O port untouched. This provides a clean slate to begin your configuration. Model names can be changed to something more meaningful. Models only need to be reconfigured when you want to do special processing to all the print jobs that are sent to a particular destination.

Note: Throughput may decrease if **onlcr** or **a2ps** is enabled.

Each **model definition** includes: name, type, and some of these processing parameters, if any.

See also: *Setting up special job processing* on page 116, *list model* (Table 6 on page 82), and *set model* (Table 7 on page 85).

Table 10—Model Types

Setting	Inclusions
raw	No content sensing. Jobs are assumed to match the printer type, or else the printer does the autosensing and switching.
pcl-ps	For printers that *cannot* autosense the print job format and switch modes by themselves. Precedes each job with a string to switch from PostScript to PCL, or vice versa, depending on job content. These strings must be specified in the setup command.
a2ps	Convert ASCII jobs to PostScript or pass PostScript jobs directly to PostScript printers.

Variables

Variables are actually utilized within the M302's *models* and are useful for defining lengthy header or trailer strings. This might be necessary for certain printer switch strings, for example. Each variable consists of a combination of escape codes and text for the printer control.

Variables are used to make efficient use of the limited space in header and trailer strings. Only nine elements can be included in the strings. Each element can be one of the following:

letter	**a**
code	**0x40**
variable	**$FF**

Therefore, you could make up a series of variables and specify each of these (up to nine) in the header or trailer string. Each variable could then contain up to 14 elements of its own.

Commands are described in detail in *Complete Command Reference* on page 80. See: *list var* and *list model* (Table 6 on page 82), *set var* and *set model* (Table 7 on page 85).

Logpaths

The term *logpath* comes from the UNIX **syslog** logging system. With the M302, each destination can report statistics on user, page count, job name, and printer errors. In addition, a checksum calculation can be obtained to confirm data integrity when a job is sent to the printer.

Logging occurs either through the printer connected to the I/O port or through a Telnet session to a particular TCP port. A logpath can also be configured to report statistics via email to a particular user. This can then be saved to a file if desired. In addition, messages can be logged to SYSLOGD on a particular TCP/IP host.

Each logpath is associated with a particular destination and the four default logpath names range from *l1* to *l4*. Logpath names can be changed to something more meaningful.

Logpath definitions include: name, log port, and log type.

See also: *Controlling the frame types used by the M302* on page 117, *list logpath* (Table 6 on page 82), and *set logpath* (Table 7 on page 85).

I/O Port

The M302 comes with one IEEE 1284-I compliant four-speed parallel port that attaches directly to the parallel port of the printer. The I/O port has an internal queuing mechanism that automatically queues print jobs on a first-come, first-served basis even if the print jobs come from different network environments (e.g., Novell and TCP/IP).

The port has several parameters that can be manipulated to best suit your attached peripherals. These parameters are configured using the **set** commands, while **list** commands display the port's settings.

- to learn more about the I/O port's parameters, see *Parallel port (PRN) pinouts* on page 136

- to view current I/O port settings, see the *list prn* command on page 84

- to change the I/O port settings, see the *set prn* command on page 93

General Options

Manipulating the M302's UTP interface

If using UTP on your network, you have some control over the UTP interface and its properties on the M302.

By default, link integrity is turned on, but this can be turned off.

You can increase the sensitivity of the 10Base-T receiver for implementations where line lengths exceed the recommended 10Base-T maximum of 100 meters. However, this increases the receiver's vulnerability to noise and should only be used in installations with 2-pair cable. Factory default for this setting is *off*.

To see the current UTP interface settings for a particular network interface, please see *list ifc* in Table 6 on page 82. To manipulate the UTP interface, please see *store ifc* in Table 8 on page 99.

Setting up special job processing

Printing with the M302 adds many extra job processing options to your current print setup. No matter the environment, you now have the choice of several helpful features including:

- ASCII to PostScript conversion (**a2ps**)

- carriage return insertion (**onlcr**)

- tab expansion (**xtab**)

- banner page generation

- printer mode switching and general printer manipulation

These are just some of the many features provided, and each of these may be set on a Unix host within an interface file, named either **nprbsd.if** or **nprsysv.if**, or on the Print Server itself.

You are automatically given the choice between four different **destinations** on the M302 allowing for four different print setups; each of these print setups is defined by the extra processing specified by its associated **model**. The model defines most of these extra processing options.

To make use of these special job processing features, please read over the appropriate host configuration section or the full list of extra job processing options documented in *Set commands* on page 84.

Manipulating the M302's services

The M302 provides many different functions; however, the more features it has, the more memory it requires. Therefore, it is possible to control the number of features enabled.

For example, you can disable the destination services. Not every destination on the M302 needs to have the same functionality. Please see *Set commands* on page 84.

Controlling the frame types used by the M302

Various frame types can be used by the M302 at any given time.

TCP/IP offers this configuration. Please see *Store commands* on page 99 to find out how to change frame types.

Remotely managing the M302

In a TCP/IP environment, various methods are available for remotely monitoring the Print Server. These include using:

- the built-in **HTML** forms

- a **Telnet** session

- either **rsh, rcmd,** or **remsh** and a command from the unit's command set

- the **FTP Daemon**

- **SNMP** management

M302 Security

This touches upon the most popular built-in security feature - permission levels and passwords. Setting passwords and assigning a permission level to users makes it difficult for unauthorized users to gain access to the M302's command set and manipulate the settings.

However, the Print Server also uses TCP access lists to restrict host connections with the device and allows scrambling/descrambling of print jobs.

Users and Passwords

The M302 supports two user types:

root   Access to everything within the Print Server including all configurable settings.

guest   Ability to list settings but not configure them.

For each user type, passwords can be set. However, you would normally only set a password for the root user to protect the M302's configuration. Guest users cannot alter the Print Server's configuration in any way.

To configure a root password on your M302:

HTML Method

1. Load a Web browser on a network station that can communicate with the Print Server over TCP/IP.

2. Direct your Web browser to the URL
   http://M302IPaddress/adminConf.html
   (e.g., **http://192.168.11.9/adminConf.html**)

   Note: If prompted for a "User ID" and password first, type in "**root**" for the ID and press ENTER at the password prompt as there is no password by default.

3. At the "Administration Configuration" HTML form, scroll down to the "Passwords" section.

4. Click in the "Old" field beside the "Root Password" heading and enter the existing root password. By default, there is no root password and this step can be skipped.

5. In the "Root Password" section, click in the "New" field and enter the new root password.

6. In the "Root Password" section, click in the "Confirm" field and enter the new root password again. Remember, the password is case sensitive.

7. Click on the "Submit" button when done.

8. Go to the Reboot page and click on "Reboot" to apply the new settings to your system.

Manual (Telnet) Method

1. Start a Telnet session with the M302. Type:

    telnet *M302IPaddress*

2. Log in to the M302 through an **npsh** session as a root user.

    Note: If prompted for a "User ID" and password first, type in "**root**" for the ID and press ENTER at the password prompt since there's no password by default.

3. At the **npsh** prompt, follow this syntax:

    set user passwd *username password*

    For example, to set the root password to "mplex1" type:

    set user passwd root mplex1

    save

From this point on, anytime you log in to the M302 as "**root**", you will need to specify this password or else your login attempt will fail.

Note: This process can be repeated to clear or change the password. An alternate method to clear the password has the following syntax:

set user from default

save

TCP access lists

Within TCP/IP environments, the M302 can restrict host access to destinations/queues and remote command (i.e., rsh, rcmd, remsh and telnet) execution services. This is done using an access list similar in function to the Unix .rhosts file.

To view the current access list on the Print Server:

1. Start a Telnet session with the M302.

    telnet *M302IPaddress*

2. Log in as "**root**". By default there is no password and you can therefore simply press ENTER when prompted for a password. If you have set a password, type it in and press ENTER.

3. List the current access list.

    list tcpip

    Note: Access list settings are not configurable through the HTML forms provided with the M302.

If the list is empty, all hosts have access to the M302's services. If there are entries in the list, only those hosts specified have access to printing and remote command execution.

Note: Only users that have **root** permission can configure the remote access entries. Users with **guest** permission may only display them.

The following syntax is used to add and delete access list entries:

```
store tcpip tcp access add|del
hostIPaddress|networkaddress

reset
```

where ***hostIPaddress*** is the IP address of a TCP/IP host on your network and
networkaddress is the address of a subnet on your network. For example,

```
store tcpip tcp access add 192.168.11.25

store tcpip tcp access add 192.168.12.0

store tcpip tcp access del 192.168.11.25

reset
```

Note: Although the maximum number of entries in the access list is 10, each entry can
refer to a network rather than a specific host. This allows all hosts on that
specified network to have access plus any individual hosts specified in the list.

SNMP security

SNMP does not include any formal type of security definition. However, security can be
accomplished using *communities*. A *community* is a string that is sent with every SNMP
request and is used to define a certain view of the MIB. By doing this, you can control
what parts of the MIB are accessed by an SNMP manager.

To access the M302's custom MIB, the public *community* string can be used to read any
variables that have access. To restrict **write** access, there is an additional security step,
involving defining a user named **snmp** on the M302 with **root** privileges. The password
defined for this **snmp** user will then be used as the *community* string, which allows **write**
access.

Note: If no **snmp** user is defined with **root** privileges, no **write** requests will be
accepted by the M302.

Printer Monitoring and Logging

One of the key aspects of maintaining a computing environment is monitoring printer
status and logging this information to useful places. The destination of this information
is controlled through logpaths. In addition, the M302's `lpstat` command provides
parallel port printer status and job information as a user sends a job.

Printer and print job monitoring

To view the current status of the I/O port on the M302, two methods are available:

1. Selecting the desired I/O port on the "Status" HTML form located at the URL
   http://M302IPaddress/indexStatus.html.

2. Typing the "**lpstat**" command directly on the Print Server once logged in as
   "**guest**" or "**root**" in a Telnet session or through rshd.

Table 11 describes some of the common terms you may come across when viewing this status.

Table 11—Key Printer Logging Terms

Term	Description
"**idle**"	There is no job queued for the M302's I/O port.
"**blocked**"	The printer is not allowing the M302 to send data to it. Check that there is no printer error, the printer is online, and it is ready to go.
"**waiting**"	The M302 knows about a print job but is waiting for the host to send more data or an expected packet.

Printer logging through logpaths

In this manual, destinations are described as logical queues with associated models and logpaths. Models determine whether any extra processing is needed with the print jobs passing through and logpaths determine what logging is needed for each job. With the M302, destinations can report statistics, or a checksum calculation can be obtained to confirm data integrity when a job is sent to a printer.

Logging can occur through a printer connected to the I/O port, a Telnet session, email to a particular user, or to SYSLOGD that runs on a remote host.

Each logpath is associated with a particular destination, and the four default logpath names range from 11 to 14. Logpath names can be changed to something more meaningful.

Each logpath on the M302 consists of two parts:

Type   The type of log information to be captured. The choices are "**job**" for job ID and username, "**user**" for user ID (and three messages per job), "**pgcnt**" for total pages printed in a job, "**cksum**" for file checksums, "**printer**" for special printer feedback, and "**ioport**" for parallel printer status messages.

Port   Where this log information will be sent. The choices are a **TCP port number** (e.g., 4400), an **email address**, or a central host running a **SYSLOG daemon**.

To view the current logpath settings on the Print Server:

HTML Method   1. Load a Web browser on a network station that can communicate with the Print Server over TCP/IP.

2. Direct your Web browser to the URL
    http://M302IPaddress/destConf.html
    (e.g., **http://192.168.1.10/destConf.html).**

Note: If prompted for a "User ID" and password first, type in "**root**" for the ID and press ENTER at the password prompt since there's no password by default.

3. At the "Print Path Configuration" HTML form, select a destination link (e.g., **d1prn**) from the top of the page to bring up the appropriate destination's form.

4. Once the desired destination's HTML form displays, scroll down to the "Logpath Type" and "Logpath Port" sections to view the current logpath settings for this particular destination.

5. Click on the "Submit" button when done.

6. Go to the Reboot page and click on "Reboot" to apply the new settings to your system.

Manual (Telnet) Method

1. Start a Telnet session with the M302.

    telnet *M302IPaddress*

2. Log in as "**root**" and either type the password or press ENTER at the password prompt since there is no password by default.

3. The command to view the logpath settings is:

    list logpath

At this point, you can alter any of these settings by using the **set logpath** commands. For further information, refer to *set logpath from default* on page 88.

lp method

The M302 provides its own version of the **lp** print command. This is used in conjunction with **rsh/rcmd/remsh** within an interface script or directly from the command line on the host. By default, it provides parallel port printer status and can also be configured to report incremental byte counts as the job prints and the job's position in the M302's queue.

Note: Using **lp** will provide printer error messages as well as job status.

If **lp** is used from the command line, any printer status will come right back to the screen. If used within an interface script, the messages will go to the log file located in the spooling directory.

Note: Since **lp** must be used with **rsh/rcmd/remsh** only, this feature is only offered with a print setup utilizing an interface script or with a **rsh/rcmd/remsh** command from the command line on the host.

Please see *lp options -d destname* on page 106 and *Direct Printing Without the Spooler* on page 46 for further details.

Using FTP Daemon to Access the M302

The FTP Daemon provides an additional method to access the M302. Using the FTP Daemon, users are able to submit print jobs, cancel print jobs, monitor the print queue, and upload/download M302 configuration files.

For the purposes of FTP, a pseudo file system has been defined on the M302 to allow access to the unit's functions. Three types of users can access this file system: **root**, **guest**, and **anonymous**. **Root** and **guest** correspond to the entries in the M302's user list; **anonymous** is a special type that does not require a password. For each directory or file within this file system, there are access restrictions according to the type of user logged in.

M302 FTP file system

The M302 FTP file system is where you execute all **ftp** commands on the unit. Please see the examples on the following pages for a complete description of the commands and how they are executed.

The following is the structure of the file system you will see when you **ftp** to the unit:

/queue
> Contains one file with information pertaining to the print queue associated with the M302's parallel port. This file allows you to view the current status of the queue.

/dest
> Contains four subdirectories, one for each of the four print destinations on the M302. Please see Figure 1 on page 11 for a graphic representation to better understand destinations and printing. Files **put** in these directories are printed on the associated print destination.

/jobs
> Contains files representing all the print jobs currently queued. Issuing the **del** command on a file in this directory will cancel the job.

/config
> Contains three subdirectories: **current**, **stored**, and **default**. Each file in these subdirectories represents one data structure of the M302. The files in the **current** directory reflect the current configuration, files in the **stored** directory reflect the stored configuration, and files in the **default** directory reflect the default configuration. These files are in binary format.

/exec
> This directory is used to perform command interpretation. The contents of files **put** in this directory will be interpreted as a series of **npsh** commands.

Printing a file using FTP daemon

The following example shows how to print a file using FTP:

1. Change to the local directory where the file to print resides.

2. Login to the M302 using **ftp**.

    ```
    ftp ipname
    ```

3. Login as **guest**, **root,** or **anonymous**.

    Note: **Guest** and **root** users require passwords as configured in the unit's user list. **Anonymous** is a special login that does not require a password.

4. Change to the **/dest** directory that you want to print to.

    ```
    cd dest
    ```

5. List the contents of this directory using the "**dir**" command and determine which destination/queue you'd like to send the print job through. Most likely you will select "**d1prn**" for the PRN port.

6. Change to this destination directory. For example:

    ```
    cd d1prn
    ```

7. Change the mode to correspond to the type of file to be printed. Choose binary mode if the file to be printed contains both text and graphics and ASCII mode if the file is text only. The default mode is always ASCII.

    ```
    bin
    ```

8. Copy the file you want to print to this directory.

    ```
    put filename
    ```

    The file is spooled and printed.

9. Logout of the FTP session.

    ```
    quit
    ```

Removing a print job using FTP

The following example shows how to remove a print job using FTP:

1. Login to the M302 using **ftp**.

    ```
    ftp ipname
    ```

2. Login as **guest**, **root,** or **anonymous**.

3. Change to the **/jobs** directory.

    ```
    cd jobs
    ```

4. Display a list of all currently queued print jobs.

> ```
> ls
> ```

The currently queued print jobs are listed by their ID number.

5. Remove desired print job from the list.

> ```
> del jobname
> ```

6. Logout of the FTP session.

> ```
> quit
> ```

Monitoring a print queue using FTP

The following example shows how to monitor a print queue using FTP:

1. Login to the M302 using **ftp**.

> ```
> ftp ipname
> ```

2. Login as **guest**, **root,** or **anonymous**.

3. Change to the **/queue** directory.

> ```
> cd queue
> ```

4. Turn interactive mode off.

> ```
> prompt
> ```

This enables you to copy a number of files without having to respond to prompts by the M302.

5. Download the file in the print queue directory.

> ```
> mget *
> ```

The file prn is downloaded to the user's local directory.

6. Logout of the FTP session.

> ```
> quit
> ```

7. View file with information pertaining to print queue status.

> ```
> cat prn
> ```

Note: This command gives you the same information as a **lpstat** in **npsh**. **cat** is a UNIX command; with DOS, use the **type** command.

Configuring M302 parameters using FTP

Users have two ways to configure the M302's parameters using FTPD. The first is by uploading binary files to the /**config** directory and the second is by uploading text configuration files to the /**exec** directory. We discuss each method and give appropriate examples below.

Example 1:
/config
directory

The /**config** directory is divided into three subdirectories: **current**, **stored**, and **default**. Each of the files in these subdirectories represents one data structure regarding the configuration of the unit. These files can be used to make a backup copy of the unit's configuration parameters or to copy configuration parameters from one unit to another.

Note: The configuration files are in binary form and their format may differ between firmware versions; a configuration file that was downloaded from a previous version may not work with the current version.

Copying a configuration using FTP. The following procedure shows how to copy a configuration file using FTP:

1. Login to the M302 using **ftp**.

    ```
    ftp ipname
    ```

2. Login as **root**.

    You must be a **root** user in order to copy a configuration file.

3. Change to the **config/stored** directory.

    ```
    cd config/stored
    ```

4. Set mode to binary.

    ```
    bin
    ```

5. Turn off the interactive mode.

    ```
    prompt
    ```

6. Download all the files in this directory.

    ```
    mget *
    ```

    This will download a copy of all files in the **config/stored** directory to the current local directory of the host that the **ftp** command was issued from.

7. Logout of the FTP session.

    ```
    quit
    ```

Now you have a copy of the M302's stored configuration parameters. These files can be saved for archival purposes, used to reconfigure the unit to a previous setting, or used to set a number of units to the same configuration.

Note: It is only necessary to save the files from the **stored directory**. Files from the default and current directory are not required in order to restore a unit's configuration.

Restoring a configuration using FTP. FTP can be used to restore a configuration saved from the unit or restore a configuration saved from another unit.

Note: If you are restoring a configuration saved from another unit, the unit's firmware must be the same version as the unit receiving the configuration.

1. Change to the local directory on the host where the saved configuration files reside.

2. Login to the M302 using **ftp**.

   ```
   ftp ipname
   ```

3. Login as **root**.

   Note: You must be a **root** user in order to FTP files to the /**config** directory.

4. Change to the **config/stored** directory.

   ```
   cd config/stored
   ```

5. Set mode to binary. Configuration files are always in binary form.

   ```
   bin
   ```

6. Turn off the interactive mode.

   ```
   prompt
   ```

7. Upload all the files from the user's local directory.

   ```
   mput *
   ```

   This copies all files from the local directory to the **config/stored** directory.

8. Logout of the FTP session.

   ```
   quit
   ```

   Note: It will be necessary to **reset** the M302 for the changes to take effect.

**Example 2:
/exec directory**

Using the /**exec** directory, users can upload a text file that includes a number of configuration commands. When this file is placed in the /**exec** directory, the commands contained in it are executed as if they were commands entered sequentially from a Telnet session using **npsh**. This feature enables the user to create a single text configuration file that can be used to quickly and easily configure a number of M302s.

Note: The command syntax for the text configuration file is exactly the same as if you were entering individual commands with **npsh** through a Telnet session. See *M302 Command Line Interface Shell (npsh)* on page 77 for details regarding the commands and their syntax.

The configuration file can be seen as simply a user-defined script that includes a number of configuration commands to be executed. Comments describing the configuration can also be included in this file, provided they follow the correct syntax.

The following is an example of a simple configuration file:

```
; These are comments for the example config file.
; Note that comments have to start at the beginning
; of a line and be preceded by an ';'
;
version 1.0
; If this command is found and the current version
; does not correspond to the command parameter, the
; file execution will abort.
;
```

```
redirect prn
load default
set dest d1prn name newdest
set dest d2prn name another
set model m1 name newmod
set prn slowmode
save
```

Notes: The above example includes a line for the **version number**. Because the commands and/or syntax **may** change from one firmware version to another, an old configuration file may be incompatible with the current version. By entering a version number, the transfer will be aborted and the user notified to check if the commands are compatible with the current firmware version if the version numbers do not match.

The example includes the optional **load default** command. Including **load default** ensures that you always begin a configuration from the factory default settings.

The example also uses the **redirect** command, which redirects standard output to the attached printer. This allows the user to monitor the commands as they are being executed. Without the **redirect** command, users will be unable to view output from the commands as they are being executed.

It is not possible to generate a text configuration file from an existing binary configuration file in the **/config** directory.

Executing a configuration file using FTP.   The following procedure shows how to execute a configuration file using FTP:

1. Change to the local directory where the text configuration file resides.

2. Login to the M302 using **ftp**.

    ```
    ftp ipname
    ```

3. Login as **root**.

    Note: You must be a **root** user in order to FTP files to the /**exec** directory.

4. Change to the /**exec** directory.

    ```
    cd exec
    ```

5. Copy the text configuration file to the **exec** directory.

    ```
    put filename
    ```

    The M302's parameters are now set according to the commands in the configuration file.

    Note: Depending on the specific commands in the configuration file, it may be necessary to **reset** the M302 for the commands to take effect. Basically, the same rules apply whether you are using **npsh** to issue commands or a

configuration file to issue commands. See *M302 Command Line Interface Shell (npsh)* on page 77 for more information on the rules regarding configuration commands and options.

6.   Logout of the FTP session.

   quit

Note: If two FTP clients try to send configuration files to the **/exec** directory at the same time, the second file will fail.

Managing with SNMP

SNMP (Simple Network Management Protocol) is a protocol for internet management services. This protocol provides a means for computers (or *agents*) to be managed remotely by *managers*. The level of management depends on the manager and agent. The level of management ranges from providing information such as statistics to providing full management capabilities.

MIB (Management Information Base) files are a description of managed objects available in an agent. MIB files provide the data for the manager so they can remotely manage the agent. A MIB file is simply a formal description of the way an agent can be accessed using SNMP and the functions that can be managed.

The M302 is a fully manageable SNMP agent that supports MIB-II, custom MIBs, and traps.

MIB II support

The M302 is MIB II compliant, allowing SNMP managers to monitor protocol, network, and routing statistics.

Custom MIBs and traps

The M302 provides a custom MIB definition file which consists of 150 variables and three traps. This MIB file allows you to monitor and configure the Print Server directly. In fact, the MIB file represents all of the possible configuration options such as destination settings, network configurations, print queue status, loading of defaults, etc.

The M302's custom MIB definition file is included on the CD-ROM supplied with the M302. This file can also be downloaded from the Microplex FTP site:

   ftp.microplex.com

or can be accessed via the Microplex Web site:

   http://www.microplex.com

Custom MIB variables

The variables found within the custom MIB definition file describe all information that can possibly be accessed on the M302 by an SNMP manager. These variables can be divided into two groups: system variables and product variables.

System Variables

The first grouping of variables contains general information about the Print Server such as firmware version, serial number, etc. In addition to these, it includes a trap table that defines what SNMP managers will receive by the traps generated on the M302. The trap table can have up to ten entries, but only the first entry is saved to Flash memory.

Product Variables

The second group of variables contains information defining all of the remaining functionality of the Print Server. The product variables are divided into

config group	Includes all configuration components such as models, destinations, logpaths, and users.
status group	Includes all dynamic monitoring components such as print queues, user logins, and RPRINTER configurations.
command group	Includes the save, load, and reset commands.

Note: These variables can have read, write, or read-write permissions. Along with these permissions, there are other elements that can limit the write access to these variables. Please see *SNMP security* on page 120 and *Users and Passwords* on page 118 for more information.

Custom MIB traps

A trap is an event generated by an agent to indicate a significant event to the manager. By default, the M302 will generate three traps:

coldstart	A generic trap generated every time the M302 is powered on or reset.
authenticationFailure	A generic trap generated whenever a disallowed access is attempted.
lpqIOStatusChanged	The only custom trap. This trap is generated whenever the I/O port's status changes.

Adding an SNMP user

To add a user named **snmp** with **root** privileges, please follow the steps below:

1. Log in to the M302 as a **root** user.

2. Add a user named **snmp**.

   ```
   set user add snmp
   ```

3. Set the user type to **root**.

```
          set user type snmp root
```

4. Set the password for the **snmp** user.

```
          set user passwd snmp snmppassword
```

5. Save the changes.

```
          save
```

The user **snmp** is now created and *snmppassword* is the only community string that will allow **write** access.

Compiling and monitoring the custom MIB

For read-only SNMP functionality, please follow the steps below:

1. Copy the M302 MIB definition file (**m302mib.txt**) from the CD-ROM supplied with the M302. This file can also be downloaded from the Microplex FTP site (**ftp.microplex.com**) or can be accessed via the Microplex Web site (**http://www.microplex.com**).

2. Compile this MIB description file to work with your SNMP manager.

3. Using your SNMP manager, view the particular MIB variables that you wish to monitor.

Notes: If you are using SunNet Manager, you will need to download a special MIB file (**m302mib.txt.SNM**) from the Microplex FTP site. This file can also be accessed via the Microplex Web site.

If you are using Castle Rock Computing's *SNMPc* package, you will need to rename the MIB variable *UInteger32* to another name such as *U32*.

Writing to the custom MIB

The following example explains how to use the custom MIB variables to set the M302's parameters. For example, to turn on **bb mode** and **onlcr** on the M302's **prn** port, please follow the steps below:

Note: This example assumes that the snmp password has been defined as *custommib*, that the M302's host name is *spike,* and that the SNMP manager is the Tricklets package.

1. Set up an **snmp** user with **root** privileges on the M302. Please see *Adding an SNMP user* on page 130 for details.

2. Issue the following configuration commands using the snmp user's password as the community string.

```
      echo "m305IfPrnbbM[1.2]=2" | snmp-set spike custommib

      echo "m305IfOnlcr[1.2]=2" | snmp-set spike custommib
```

Configuring the M302 to send traps to an SNMP manager

The M302 continuously generates traps, but unless the trap table is filled in, no SNMP manager will receive this information. To set the M302 to send traps to a particular SNMP manager, please follow the steps below:

Note: This example assumes that the snmp password has been defined as *custommib*, that the M302's host name is *spike,* and that the SNMP manager is the Tricklets package.

1. Set up an **snmp** user with **root** privileges on the M302. Please see *Adding an SNMP user* on page 130 for details.

2. Set the following M302 trap variables using your SNMP manager. The actual syntax of the commands will depend on the particular SNMP manager you are using.

    ```
    echo "trapCommunity[1]=\"building-A\"" | snmp-set spike
    custmmib
    ```

    where **building-A** is the string that you want the M302 to send with the trap information. This community string has a 14 character maximum.

    ```
    echo "trapDest[1]=192.168.11.11" | snmp-set spike
    custommib
    ```

    where **192.168.11.11** is the IP address of your SNMP manager.

    Note: To disable the entry in the trap table, set the IP address to 0.0.0.0

The M302 will now send trap information with the community string *building-A* to the SNMP manager with the IP address *192.168.11.11*. For more information on these trap variables, please see their description in the custom MIB definition file.

Note: The trap table can hold up to ten entries, but only the first entry is stored in Flash memory. If you turn the unit off, you will lose the additional entries.

Troubleshooting Tips

Test pages

To test M302 and printer communications without involving the network, you can run test pages from the M302. See *Step 2: print test pages* on page 15, *Installing the M302* on page 13 for the procedure. Before starting the procedure, note the position of the dipswitches, and return them to that state after running the procedure.

13 M302 SPECIFICATIONS

Hardware and software specifications are described in this chapter.

Hardware specifications are covered in the following sections:

- *Physical Features* on page 133

- *Electrical Details* on page 134

- *M302 LEDs* on page 135

- *Network Interfaces* on page 135

- *Printer Support* on page 136

Software Specifications are covered in the following sections:

- *Standards supported* on page 141

- *TCP port numbers used on the M302* on page 141

- *UDP port numbers used on the M302* on page 142

- *Error conditions* on page 142

- *Variable definitions* on page 142

Physical Features

Dimensions

Metric: Width: 9.9 cm
      Height: 3.0 cm
      Length: 13.5 cm

Imperial: Width: 3.9"
      Height: 1.2"
      Length: 5.3"

Weight: 0.06756 kg or 0.150 lbs, without external transformer.

Environmental details

Operating: 0° C to 50° C
Storage: -40° C to 70° C

90% maximum humidity, non-condensing.

Electrical Details

Power socket

Figure 30 shows the power socket on the M302 front panel.

Figure 30—Power Socket

–VC ⟶ ⦿ ⟵ +VC
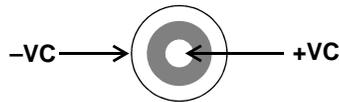
Power supply options:	External transformer available in 120V/60Hz or 220-240V/50Hz.

Power supply requirements:	Typical	115VAC +/- 10% 36mA, 60Hz
		220VAC +/- 10% 18mA, 50/60Hz
	Maximum	115VAC +/- 10% 54mA, 60Hz
		220VAC +/- 10% 27mA, 50/60Hz

DC power requirements

Voltage   6 VDC regulated
Current, Typical   350mA (with no PCMCIA card)
Current, Maximum   1A

Customer-supplied external transformers must be rated at 20 VA or greater for proper operation.

Power consumption:

Typical   2100 mW
Maximum   6000 mW

FCC warning

This equipment generates, uses, and can radiate radio frequency energy. If it is not installed and used as directed in this manual, interference with radio communications may result. The equipment has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference. In such a case, the user will be required to correct the interference at his or her own expense.

CE Mark conformity declaration

The M302 fulfills the requirements for radiated emissions according to limit B of EN55022/1987 and the requirements for immunity according to EN50082-1/1992 residential, commercial, and light industry.

M302 LEDs

STAT	System Status
NET	Data to Network

Run and auto-reset mode

Run Mode is the normal operating state of the M302. Auto-reset mode is entered when the watchdog timer is triggered and the Print Server has reset itself. The STAT LED flashes differently depending on whether the device's IP address is configured.

Table 12—STAT LED Patterns

FLASH RATE	INDICATES
Green, on once per second (i.e., more off than on)	Normal Mode, IP address configured
Green, on twice per second	IP address not configured
Amber, off once per second (i.e., more on than off)	Download (MOS)
Amber, off twice per second	Download (MOS), no IP address configured
Red, off twice per second	System error

Table 13—NET LED Patterns

FLASH RATE	INDICATES
On	Network link present
Off	Network link not present
Blinking, off 1/3 second	Network link present and transmitting; flashes off 1/3 second each time a packet is transmitted

Network Interfaces

The M302 network interfaces provide compatibility with TCP/ICMP/IP and 802.3 Ethernet protocols with an IEEE 802.3 10/100Base-T UTP Ethernet female RJ45 connector.

Network connector pinouts

Table 14 shows the pinout for the UTP (RJ45) connector.

Table 14—UTP (RJ45) Connector Pinout

Pin	Signal	Source	Pin	Signal	Source
1	TX_D1+	M302	5	BI-D3-	M302
2	TX_D1-	M302	6	RX_D2-	Network
3	RX_D2+	Network	7	BI_D4+	Network
4	BI-D3+	M302	8	BI_D4-	Network

Printer Support

Two I/O ports are provided on the rear panel of the M302:

•   parallel (PRN) port

•   serial (COM) port.

Parallel port (PRN) pinouts

The M302 provides one IBM PC compatible parallel interface (Centronics) female DB25 connector (Figure 31) that is IEEE 1284-I compliant. DMA-driven state-machine implementation supports data rates in excess of 600,000 characters per second.

Figure 31—Parallel Port (PRN) Connector
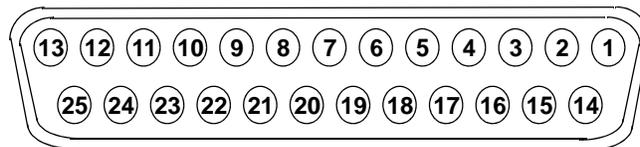
The pinout for the parallel port connector is shown in Table 15.

Table 15—Parallel Port (PRN) Pinout

Pin	Signal	Source	Pin	Signal	Source
1	-STROBE	M302	9	DATA 8	M302
2	DATA 1	M302	10	-ACK	Printer
3	DATA 2	M302	11	BUSY	Printer
4	DATA 3	M302	14	-AUTOFD	M302
5	DATA 4	M302	15	-ERROR	Printer
6	DATA 5	M302	16	-INIT	M302
7	DATA 6	M302	17	-SLCTIN	M302

Table 15—Parallel Port (PRN) Pinout

Pin	Signal	Source	Pin	Signal	Source
8	DATA 7	M302	18-25	GROUND	-

Serial port pinout

The M302 provides one bi-directional IBM AT compatible serial interface male DE09 connector (Figure 32), that acts as a DTE.

Figure 32—Serial Port (COM) Connector
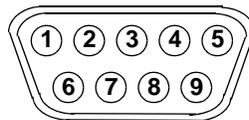
The pinout is shown in Table 16.

Table 16—Serial Port (COM) Pinout

Pin	Abbr.	Name	Source
1	DCD	Data Carrier Detect	DCE
2	RXD	Receive Data	DCE
3	TXD	Transmit Data	DTE
4	DTR	Data Terminal Ready	DTE
5	GND	Signal Ground	-
6	DSR	Data Set Ready	DCE
7	RTS	Request to Send	DTE
8	CTS	Clear to Send	DCE
9	+12V	12V Power Supply	DTE

Most often, printers attached are 25-pin DTEs, with pinouts as shown in Table 17.

Table 17—25-Pin Serial Device Pinout

Pin	Abbr.	Name	Source
2	TXD	Transmit Data	DTE
3	RXD	Receive Data	DCE
4	RTS	Request to Send	DTE
5	CTS	Clear to Send	DTE

Table 17—25-Pin Serial Device Pinout

P i n	Abbr.	Name	Source
6	DSR	Data Set Ready	DCE
7	GND	Signal Ground	-
8	DCD	Data Carrier Detect	DCE
20	DTR	Data Terminal Ready	DTE
22	RI	Ring Indicator	DCE

Serial flow control methods

The M302's serial port supports both software and hardware flow control:

Software   Default setting. Indicated by "`ixon`". Uses XON/XOFF.

Hardware Indicated by "`ctsflow`". Uses RTS/CTS signals.

Minimal cable requirements for software flow control are pins 2, 3, and 7. This may not be as robust as hardware flow control so a fuller cable pinout is recommended that allows for hardware flow control.

The following schematic (Figure 33) shows the most common 9-pin to 25-pin setup. This setup relies on the DTR signal meaning that the printer must toggle DTR if it can or cannot take more data. If the printer uses another signal to do this, this schematic will not work. Therefore, the key to hardware flow control working properly is to know what signal the printer toggles when it is able to accept more data. Once you know this, you can make this signal go to the CTS pin (i.e., Pin 8) on the M302's serial interface.

Figure 33—Typical 9-pin to 25-pin Setup

```
 M202Plus                          DTE
  9-pin F                        25-pin M

     1 ───────────────────────►  4
     2 ───────────────────────►  2
     3 ───────────────────────►  3
     4 ──────────────────┐   ►   5
                         └──────  6
     5 ───────────────────────►  7
     6 ───────────────┐     ───►  20
     8 ───────────────►
     7 ───────────────────────►  8

        Typical 9-pin to 25-pin RS-232C cable
```
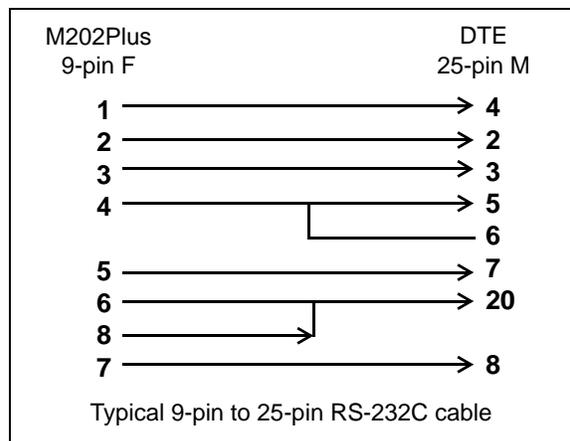
> **Note:** Sometimes a device with a 9-pin connector (e.g., PCs and some terminals) is attached to the M302's serial port. When choosing the correct "crossover" 9-pin to 9-pin serial cable for this setup, remember to cross over pins 2 and 3 (i.e., Transmit and Receive). Otherwise, the cable will have Transmit going to Transmit and Receive going to Receive, resulting in no data flow between the two devices.

Parallel port timing in fast and other modes

Diagrams and tables of parameters for parallel port timing in different modes are provided below.

Figure 34—Parallel Port Timing in Fast Mode
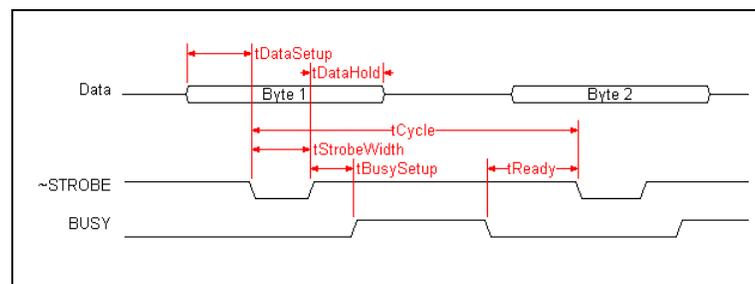
Table 18—Parallel Port Timing in Fast Mode

#	Parameter	fast (μS)			Comment
		min	max	typ	
1	Data Setup	-	-	1	Time data driven before asserting ~STROBE
2	Strobe Width	-	-	1	Width of ~STROBE signal assertion
3	Data Hold	1	-	-	Time data held on bus after negation of ~STROBE
4	BusySetup	-	1	-	Time in which BUSY must be asserted by peripheral (if it wishes to do so) after ~STROBE negated
5	Ready	1	-	-	Period from negation of BUSY until ~STROBE asserted for next character
6	Cycle	5	-	-	Minimum time between consecutive characters if BUSY is not asserted or asserted for a negligible period of time by the peripheral

Figure 35—Parallel Port Timing in Other Modes Diagram
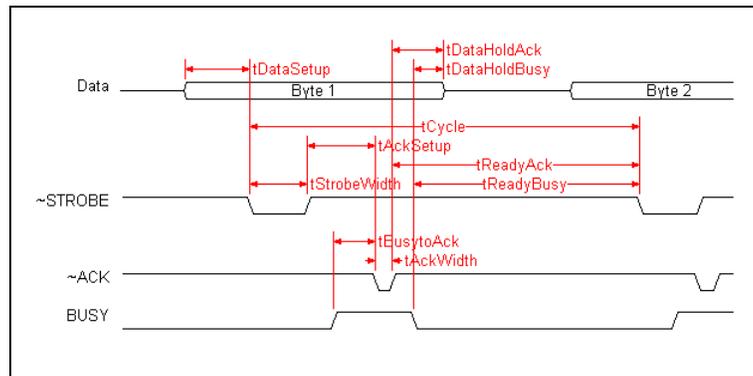
Table 19—Parallel Port Timing in Other Modes

#	Parameter	pc (μS)			cen (μS)			slow (μS)		
		min	max	typ	min	max	typ	min	max	typ
1	Data Setup	-	-	0.5	-	-	1.0	-	-	4.0
2	Strobe Width	-	-	0.5	-	-	1.0	-	-	4.0
3	Data HoldAck	0	-	-	0	-	-	0	-	-
4	DataHoldBusy	0	-	-	0	-	-	0	-	-
5	AckSetup	0.1	-	-	0.1	-	-	0.1	-	-
6	BusytoAck	0	-	-	0	-	-	0	-	-
7	AckWidth	0.1	-	-	0.1	-	-	0.1	-	-
8	ReadyAck	1.5	-	-	1.0	-	-	6.0	-	-
9	Ready Busy	1.5	-	-	1.0	-	-	6.0	-	-
10	Cycle Time	2.5	-	-	5.0	-	-	20.0	-	-

Table 20—Definition of Parameters (except Fast Mode)

	Parameter	Comment
1	DataSetup	Time data driven before asserting ~STROBE
2	StrobeWidth	Width of ~STROBE signal assertion
3	DataHoldAck	Time data held on the on bus after peripheral negates ~ACK
4	DataHoldBusy	Time data held on bus after peripheral negates BUSY
5	AckSetup	Minimum length of time after ~STROBE is negated that ~ACK may be asserted by a peripheral
6	BusytoAck	Minimum period of time that ~ACK may be asserted after BUSY (if BUSY must be asserted) in order for BUSY signal to be recognized after assertion of ~ACK

Table 20—Definition of Parameters (except Fast Mode)

	Parameter	Comment
7	AckWidth	Period which ~ACK must be asserted by peripheral to be recognized by the Print Server
8	ReadyAck	Period from negation of ~ACK until ~STROBE asserted for next character
9	ReadyBusy	Period from negation of BUSY until ~STROBE asserted for next character
10	Cycle	Minimum time between consecutive characters if BUSY is not asserted or asserted for a negligible period of time by the peripheral

Software Specifications

Standards supported

ARC	Ethernet Address Control Protocol
ARP	Address Resolution Protocol
BOOTP	Bootstrap Protocol
FTP	File Transfer Protocol
GOSIP RFC-1042	Government Open Systems Interconnection Profile
ICMP	Internet Control Message Protocol
IP	Internet Protocol
LPD	Line Printer Daemon Protocol
PAP	Printer Access Protocol
SNMP	Simple Network Management Protocol
SMTP	Simple Mail Transfer Protocol
RARP	Reverse Address Resolution Protocol
RSHD	Remote Shell Daemon
TCP	Transmission Control Protocol
TELNET	Telnet Protocol
UDP	User Datagram Protocol

TCP port numbers used on the M302

20	TCP Protocol for FTPD (data)
21	TCP Protocol for FTPD (control)
23	TCP Protocol for TELNETD port
514	TCP Protocol Remote Command daemon port
515	TCP Protocol BSD 4.3 LPD port
4410	TCP Protocol PRN port for logging
4400	TCP Protocol PRN port
8200	Microplex Communications Protocol Port for Waldo

Note: Client application software can send raw data to PRN by opening a socket to the associated TCP port number as defined above. Such connections are queued along with print jobs using other print methods (e.g., LPR/LPD).

UDP port numbers used on the M302

161	UDP port for SNMP
514	SYSLOG client support
68	BOOTP client port

Error conditions

Firmware panic   Unrecoverable errors detected by the M302 firmware force it into panic mode. Manually reset the M302 to resume normal operation.

Watchdog halt   The watchdog timer is a hardware device that resets the system if not serviced regularly by the CPU. Its purpose is to prevent the CPU from entering an infinite loop because of a hardware or firmware problem. After a watchdog interrupt, some diagnostic information is saved for debugging and the device resumes operation in Auto-reset Mode. The M302 will auto-reset up to 16 times before entering non-operational Watchdog Halt.

Spurious halt   Unsupported interrupts force the M302 into this non-operational mode and typically indicate a hardware problem.

Hardware exception   Internal errors such as bus errors, address errors, or illegal instructions force the M302 into this non-operational mode.

Variable definitions

Table 21—Variable Definitions

Name	Hexadecimal	Description
BS	08	backspace
FF	0C	formfeed
CR	0D	carriage return
SP	20	space
LF	0A	linefeed
TAB	09	tab
ESC	1B	escape
DEL	7F	delete
EOT	04	end of transmission
NUL	00	NULL character
PCL-POP	1B 26 6C 30 4F	portrait page orientation

Table 21—Variable Definitions

Name	Hexadecimal	Description
PCL-POL	1B 26 6C 31 4F	landscape page orientation
PCL-PORP	1B 26 6C 32 4F	reverse portrait page orientation
PCL-PORL	1B 26 6C 33 4F	reverse landscape page orientation
PCL-PSZ1	1B 26 6C 31 41	executive page size
PCL-PSZ2	1B 26 6C 32 41	letter page size
PCL-PSZ3	1B 26 6C 33 41	legal page size
PCL-PSZ4	1B 26 6C 32 36 41	A4 page size
PCL-PSRC0	1B 26 6C 30 48	eject page paper source
PCL-PSRC1	1B 26 6C 31 48	upper tray paper source
PCL-PSRC2	1B 26 6C 32 48	manual feed paper source
PCL-PSRC3	1B 26 6C 33 48	manual envelope feed paper source
PCL-PSRC4	1B 26 6C 34 48	lower tray paper source
PCL-PSRC6	1B 26 6C 36 48	envelope feeder paper source
PCL-PDST1	1B 26 6C 31 47	upper output bin paper destination
PCL-PDST2	1B 26 6C 32 47	reader output bin paper destination
PCL-RST	1B 45	printer reset
PCL-JSEP	1B 26 6C 31 54	job separation
HP3-SWPCL	1B 25 2D 31 32 33 34 35 58 40 50 4A 4C 20 45 4E 54 45 52 20 4C 41 4E 47 55 41 47 45 20 3D 20 50 43 4C 0A	PCL-5 PJL command to switch printer into PCL Language mode
HP3-SWPS	1B 25 2D 31 32 33 34 35 58 40 50 4A 4C 20 45 4E 54 45 52 20 4C 41 4E 47 55 41 47 45 20 3D 20 50 6F 73 74 53 63 72 69 70 74 0A	PCL-5 PJL command to switch printer into PostScript Language mode
PAC-SWPCL	1B 26 6C 31 30 35 37 2E 33 32 32 35 39 4A	PacificPage PE cartridge command to switch printer into PCL Language mode
PAC-SWPS	1B 26 6C 35 30 35 37 2E 31 30 35 38 4A	PacificPage PE cartridge command to switch printer into PostScript Language mode

14 GETTING HELP

This chapter identifies other sources of Help for installing and configuring your M302 Print Server and defines the repair procedure.

Help Methods Available

"Troubleshooting Tips" sections

Troubleshooting tips are listed at the end of each network configuration chapter. These are the most commonly asked relevant questions. There are additional troubleshooting tips in the appendices as well.

Web site

Microplex's Web site, **http://www.microplex.com/**, contains information about the company and its products. You will find a link to the Technical Support page that contains the "Support Shack", a central location for technical bulletins and firmware and software histories and files.

FTP site

Microplex's FTP site, **ftp.microplex.com**, contains firmware and software for the M302. Once logged in anonymously, you will need to change to the M302 directory. Here, you will find several subdirectories pointing to software, firmware, documentation, and miscellaneous files.

Contacting Microplex

If you need technical assistance from Microplex, please have this information on hand:

- M302 serial number found on the bottom of the Print Server.

- Description of your network environment and peripherals attached.

- Description of the problem.

Contact options

Email **support@microplex.com**

Fax to "Support" at **+1 604 468-2445**

Call **+1 604 468-2444** and select Technical Support from the list of options (#3)

> **Note:** Email queries will have the fastest response time.

Repair Procedure

Warranty description

Microplex Systems Ltd. warrants this product to be free from defects in workmanship and material for **one** (**1**) **year** from the original purchase date.

During this period, Microplex will repair or replace a defective product with a new or rebuilt product at no extra charge except as stipulated below.

At no time shall Microplex's liability exceed the replacement cost of the subject item.

All expressed and implied warranties for this product including all warranties of Merchantability, Suitability, and Fitness for a particular application are limited to **one** (**1**) **year** from the time of the original purchase date. In no event shall Microplex be liable for Loss of Use, Loss of Profits or Revenues, or other Indirect, Incidental, or Consequential Damages. This warranty *does not imply the right to loaner or replacement units during the time required to perform repairs*.

This warranty *does not* cover any losses or damage caused by:

- shipping,
- improper installation, use, or maintenance,
- unauthorized repair, modification, alteration, or replacement of components,
- excessive environmental conditions including electrical power surges, temperature, humidity, or any other irregularities,
- negligence or abuse.

Returning for repair

To obtain service under this warranty, you must *first* contact Microplex's Technical Support department to rule out configuration errors. A Support Technician will ensure the problem is related to the hardware. If so, a Return Merchandise Authorization (RMA) number will be given to you by the technician. The defective product should then be returned to Microplex for repair.

Please use the following guidelines when shipping goods back for warranty claim:

- Package the product securely, in original packaging if possible, to prevent damage during shipping.
- Indicate the RMA number clearly on the address label of the shipping carton.

- Include a copy of the invoice/receipt.

- You may use any courier company. However, we recommend using Federal Express due to its lower charges for customs.

Note: Under a normal warranty repair, Microplex will only pay for the shipping charges to return the M302 to you.

If you ship from a country other than Canada, type (on any paper) a commercial invoice containing the following information:

- your address

- Microplex's address (as "consignee")

- country of origin of the product (i.e., Canada)

- number of packages in the shipment

- description of the product

- quantity

- total value of shipment (i.e., your total purchase price)

- reason for return (e.g., warranty repair)

- a declaration.

Canada Customs requires that this invoice accompany the returned product. For an example, refer to Figure 36.

Download a copy from the Web site:

http://www.microplex.com/support/docs/ComInvoice.html

Figure 36—Sample Commercial Invoice

COMMERCIAL INVOICE from
Leslie Smith
ABC Corporation
1234 Western Parkway
Anycity, NC
USA, 27511

DATE OF EXPORT: 22/02/96

AIR WAYBILL NO: 123-12341234

CONSIGNEE:
Microplex Systems Ltd.
104 - 2071 Kingsway Avenue
Port Coquitlam, B.C.
V3C 6N2, Canada

IMPORTER (if other than consignee)
same as consignee

COUNTRY OF ORIGIN: Canada

# OF PKGS	DESCRIPTION	QTY	TOTAL VALUE
1	Ethernet Print Server	1	100.00

REASON FOR RETURN: warranty repair

I declare all information contained in this invoice to be true and correct.

_____   Leslie Smith   24/03/2002

SIGNATURE   **NAME**   **DATE**

15 GLOSSARY

ARP	*Address Resolution Protocol.* Associates a selected IP address with a network device's Ethernet address.
Banner page	A page printed before the print job that includes details about the job.
BPS	Bits per second.
Centronics	Parallel port interface standard found on most printers.
Daemon	A continuously running process that handles system-wide functions such as print spooling.
Default router	A network device that allows communication to and from external subnets by forwarding any IP packets accordingly.
Destination	Logical print queue on the M302 to which hosts send their print jobs. There are eight destinations on the M302: d1prn, d2prn, d3prn, d4prn, d1com1, d2com, d3com, and d4com.
DHCP	*Dynamic Host Configuration Protocol.* Allows a network device to discover its IP address dynamically upon bootup.
DNS	Domain Name Server. Host providing responses to queries for a given host name's IP address.
EEPROM	*Electronically-Erasable, Programmable Read-Only Memory.* Preserves data after power is removed. Also known as Flash memory.
Factory defaults	Print server settings shipped with the M302.
Flash	Permanent memory in the EEPROM. Stores firmware code and configurable settings. Allows for upgrades without replacing hardware inside the M302.
FTP	*File Transfer Protocol.* Used for transferring files from one TCP/IP host to another and used in the upgrade process.
Header strings	Strings that precede print jobs; used to control the printer and set printing options.
HTML	*HyperText Markup Language.* Format used for documents viewable on the World Wide Web.
HTTP	*HyperText Transport Protocol.* Protocol used for the delivery of Web pages.
IEEE	*Institute of Electrical and Electronics Engineers.*
Ifnum	*Interface Number.* Represents the network interface. This will be "1" for an Ethernet network and "2" for a wireless network.
Interface script	UNIX host filter file that processes the print job before it is sent over the network to the M302.

I/O port	Port for attaching peripherals to. The M302 provides two: PRN and COM.
Logpath	Determines type of print job and printer logging needed per job. One logpath is associated with every destination.
LPD/LPR	*Line Printer Daemon.* The most common TCP/IP remote printing protocol.
MIB	Management Information Base. A set of variables (a database) managed by an SNMP manager application.
Model	Defines how a print job should be processed (e.g., banner pages added or ASCII to PostScript conversion) as it passes through the M302. One model is associated with every destination.
Netmask	see *subnet mask*.
Npsh	Extensive built-in command line interface shell within the M302.
PCMCIA	*Personal Computer Memory Card International Association.* A standard developed for PC cards roughly the size of a credit card. Originally used to add memory to portable computers, now used for a variety of functions (memory, portable disk drive, fax, modem, etc.).
PDF	*Portable Document Format.* Encodes different types of documents enabling them to be read across multiple platforms.
Ping	A program used to test reachability of destinations by sending them an ICMP echo request and waiting for a reply. It is a standard command to test a TCP/IP connection. (e.g., "`ping 192.168.11.9`")
Print path	The three-stage path that a print job takes when it is sent from a host to a printer through the M302.
RAM	*Random Access Memory.* Volatile memory within the M302 that contains current/working settings. Settings are lost once the power is removed.
RARP	*Reverse Address Resolution Protocol.* Allows a network device to discover its IP address dynamically upon bootup. The IP address does not need to be stored within the device permanently.
Router	A device that forwards IP packets to their destination. Also called a gateway. See *Default Router.*
Serial number	Number found on the bottom of the M302. Each M302 is assigned a unique serial number.
SNMP	*Simple Network Management Protocol.* A standard protocol used to monitor network devices called "SNMP agents".
Socket	TCP connection between two hosts consisting of a source and destination TCP port number at each end.
Spooling	Storing data in memory or in a file until it can be printed.

Subnet mask	A binary value used to divide IP networks into smaller subnetworks or subnets. This mask is used to help determine whether IP packets need to be forwarded on to other subnets.
Tar	UNIX command for archiving data onto a permanent storage medium.
TCP/IP	*Transmission Control Protocol/Internet Protocol.* Suite of protocols that act as the base protocol for the Internet.
TCP port	A logical connection point in the software of a TCP host or device. When two IP devices talk, they establish a socket which consists of a source and destination TCP port number on both ends.
Telnet	Command and protocol to establish a terminal connection between two hosts on an IP network.
Trailer strings	Strings that follow print jobs; used to control the printer and set printing options.
Waldo	TCP/IP configuration utility provided with the M302 Print Server.
WEP	*Wired Equivalency Privacy.* A security protocol for wireless networks.