Additional Operating Instructions

for

Blaster™ Advantage and Solus II™ Ethernet Printers

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Blaster Advantage and Solus II printers are manufactured by

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INTRODUCTION

Blaster Advantage and Solus II Ethernet printers are full-featured bar code label and tag printers designed to interface directly with the Ethernet network. The printer works with any TCP/IP system.

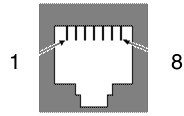
This document only covers those features unique to the ethernet printer. Please refer to the user's guide for information on using and maintaining the printer. For printer programming information, refer to the printer programming guide provided on disk with the printer.

Ethernet link indicator

A green LED on the printer rear panel illuminates when there is a proper Ethernet connection to the hub.

Ethernet connector

The printer is physically attached to the network by Ethernet cabling, via a 10Base-T (twisted pair) connection. The Ethernet connector is a type RJ45 on the printer rear panel. Its pinout is shown below.



Pin #	Description
1	TXD +
2	TXD -
3	RXD +
6	RXD -

Figure 1. Ethernet connector wiring

Physical address

The Physical Address of each printer is assigned at the factory, and cannot be changed. Each printer's Physical Address is indicated on a label affixed to the bottom of the printer.

Network protocols

The printer will work with any system having TCP/IP support. It will *not* work with Netware IPX, Microsoft NetBEUI protocol, Appletalk, LAN Manager, or Microsoft Windows Network.

Network applications

Cognitive Ethernet equipped printers utilize TCP/IP for their communications protocol. The printer acts as a remote host, providing the following application level interfaces:

LPR

The printer acts as an LPR (Line PRinter) daemon to accept print jobs, and will accept one connection at a time for incoming data. A second connection is available for status checks. This is the recommended method for sending print jobs to the printer.

You must use TCP port 515 to connect to the printer using LPR.

TFTP

A TFTP (Trivial File Transfer Protocol) daemon implemented on top of the UDP (User Datagram Protocol) provides a fast way to upload new code and objects to the printer. You can use TFTP in conjunction with bootp to automatically update the printer firmware or stored objects.

Connect to the printer via UDP port 69 for TFTP operations.

RTEL

An RTEL (Reverse Telnet) daemon is implemented on top of TCP. This is a user definable TCP port, allowing a direct socket connection to the TCP port without data processing. Connection via RTEL is effectively the same as sending data directly to the printer's serial or parallel port.

The default RTEL port is 9100.

TELNET

A Telnet daemon is implemented on top of TCP, and can be used to monitor the printer. The printer will not accept print jobs via the Telnet port.

Use TCP port 23 for Telnet connection to the printer. the port supports the following commands:

Telnet commands

Command	Function
Config	Set printer options (password is required; default is PASS)
Help	Displays available commands
Label	Prints a test label
List	List stored objects
Status	Display printer status
Reset	Reset the printer
QUIT	End Telnet session

BOOTP

Bootp (Boot protocol) is provided to enable dynamic IP address assignment. Bootp requests are broadcast via UDP port 67. Port 68 will listen for a response. When Bootp is enabled it will cause a 5 second delay at turn-on. The printer supports the following Bootptab variables; all other variables are ignored.

Bootptab variables

Variable	Function	Notes
ip	IP address specifier	Required
ha	Printer hardware address	Required
sm	Subnet mask	Optional
gw	Gateway address	Optional
bf	Boot file	Optional
ht	Hardware type	Required - must be `ether`
to	Time offset	Optional

The printer supports several print methods. Select the print method appropriate for your application.

In most cases, LPD is the recommended method. The printer appears as a remote host with a remote print queue when using this method.

An alternate method is via a direct socket connection using RTEL in the printer. Using this method, all data sent is dumped directly into the printer's text buffer. This approach may be appropriate when developing an application in C or another high level language that can make direct socket calls.

Configuration options

You must configure the printer for your network environment before using it. Your network administrator should be involved in the process.

You must select and set the printer IP address. You may also select and set and network Subnet Mask, or optionally, leave the Subnet Mask set at its default value (0.0.0.0). If the Subnet Mask is left at 0.0.0.0 the printer will choose the appropriate mask based on the class or your chosen IP address.

After selecting the IP address and Subnet Mask, you may configure the printer either manually, or automatically when the printer is turned on through the use of a bootp server.

Manual configuration

To send configuration data to the printer manually:

1. Connect the printer to a PC or terminal via the RS-232 serial or Centronics parallel port.

2. Send a configuration file to the printer using the appropriate VARIABLE commands.

You may disconnect the serial or parallel port and connect the printer to your network after sending the configuration data to the printer. A sample configuration file follows:

```
! 0 0 0 0
V ETHERNET IP 130.10.50.105
V ETHERNET NETMASK 255.255.0.0
V ETHERNET GATEWAY 130.10.250.1
V ETHERNET RESET
END
```

Note:
All Ethernet VARIABLE commands write directly to NVRAM, so no VARIABLE WRITE statement is needed.

The new configuration settings will not take effect until you reset the printer. In the above example, the VARIABLE ETHERNET RESET command resets the printer. Turning the printer off and on will also reset the printer and enable the new settings.

Configuration via bootp

This method requires the use of a bootp daemon on your system, but is the most flexible way to configure the printer. The use of bootp allows your system to automatically configure the printer, check the current firmware revision, and update the firmware if required.

To configure the printer via bootp, you must add an entry for the Blaster Ethernet printer to the system boot file (`/etc/bootptab` on most systems). The printer Physical Address is printed on the serial number label on the bottom of the printer. You will need this address for inclusion in the file.

The boot file entry for the Ethernet printer is in the following format:

```
<host name>:ht=<hardware type>:vm=<vendor magic>:\
:ha=<hardware address>:ip=<internet address>:\
:sm=<subnet mask>:gw=<router ip address>:\
:bf=<bootfile>
```

Example:

```
EB_media_lbl:\
:ht=ether:\
:vm=rf1048:\
:ha=0.e0.70.00.07.14:\
:ip=130.10.103.5\
:sm=255.255.0.0:\
:bf=/tftpboot/EM_boot.txt:\
:gw=130.10.250.1
```

The **ht**, **vm**, **ha**, and **ip** entries are required. If **sm** is unspecified, the Subnet Mask will be set according to the class of the chosen ip address.

The **bf** command specifies a file that will be uploaded via tftp from the machine that sent the bootp response. This file can contain any valid label format, up to a maximum size of 8 KB. Normally, this is a nonprinting configuration file as shown in the previous section, but printable label formats are also valid.

The **bf** command line must specify the full path for the file. If your system TFTP daemon has a specific subdirectory designated as root for TFTP requests, the specified path must be relative to this directory.

Here is a sample boot file:

```
! 0 0 0 0
VARIABLE ETHERNET FIRMWARE 60100100 V1.5
   /tftpboot/60100100.105
END
```

Note:
The syntax requirements of the printer command language forbid the use of carriage returns or line feeds within a command line. The indented lines in all examples on this page indicates the continuation of the preceding line.

The second line in the example file specifies that a printer having firmware part number 60100100 should have version 1.5 or higher. If the currently loaded firmware is below version 1.5, the system will load the firmware update 60100100.105 from directory `/tftpboot` to the printer.

The firmware update file does not have to be on the same server as the bootp host. To access the update file from a different host, add the host IP address at the end of the line specifying the file path. For example:

```
! 0 0 0 0
VARIABLE ETHERNET FIRMWARE 60100100 V1.5
   /tftpboot/60100100.105 130.10.103.106
END
```

The code only uploads if the firmware part numbers match and the revision number listed in the script file is higher (i.e., newer code) than the version the printer is currently running. The printer checks the code validity after the upload and before reprogramming itself.

One script file can specify multiple part numbers and revisions. This allows one file to update different firmware part numbers. The printer ignores any lines that do not have matching firmware part numbers. For example:

```
! 0 0 0 0
VARIABLE ETHERNET FIRMWARE 60100100 V1.5
   /tftpboot/60100100.105
VARIABLE ETHERNET FIRMWARE 60100131 V2.00
   /tftpboot/60100131.200
END
```

EXAMPLE SETUP FILES

```
# Sun OS 4, OSF1, BSD, ULTRIX , FreeBSD --------------------------------
REM_HOST_NAME = host name of printer added to host table

Add Host to host table
ex.
REM_HOST_NAME 130.10.103.2

Access printer via lpr command.

# Sun OS 5, SYS V4 ------------------------------------------------------
PRINTER = name you choose for printer access on your system
REM_HOST_NAME = host name of printer added to host table

Add Host to host table
ex.
REM_HOST_NAME 130.10.103.2

lpsystem -t bsd $REM_HOST_NAME >> $instalog
/usr/lib/lpadmin -p$PRINTER -s$REM_HOST_NAME!pr1\-I"any"

# HP-UX ------------------------------------------------------------------
REM_HOST_NAME = host name of printer added to host table

Add Host to host table
ex.
REM_HOST_NAME 130.10.103.2
/usr/lib/lpshut
while true; do
        test -f /usr/spool/lp/SCHEDLOCK
        if test $? != 0; then
                break
        fi
done
/usr/lib/lpadmin -p $PRINTER -v /dev/null -orm $REM_HOST_NAME \-orp "pr1" -m
"rmodel"
/usr/lib/lpsched
/usr/lib/accept $PRINTER
/usr/bin/enable $PRINTER

# AIX (IBM AIX 3) -------------------------------------------------------
PRINTER = name you choose for printer access on your system
REM_HOST_NAME = host name of printer added to host table
```

```
Add Host to host table
ex.
REM_HOST_NAME 130.10.103.2

mkque -q$PRINTER -a"up = "'TRUE' -a"host = "$REM_HOST_NAME\
             -a"s_statfilter = "'/usr/lpd/bsdshort'\
             -a"l_statfilter = "'/usr/lpd/bsdlong' -a"rq = "'pr1'
mkquedev -q$PRINTER -d$PRINTER'd' -a"backend = "'/usr/lpd/rembak'

# BOS (BULL DPX 2), SGI, SYS V3, SCO ----------------------------------
PRINTER = name you choose for printer access on your system
REM_HOST_NAME = host name of printer added to host table

Add Host to host table
ex.
REM_HOST_NAME 130.10.103.2

/usr/lib/lpshut
lpsystem -t bsd $REM_HOST_NAME >> $instalog
/usr/lib/lpadmin -p$PRINTER -s$REM_HOST_NAME!pr1\-I"any"
/usr/lib/lpsched
/usr/lib/accept $PRINTER
/usr/bin/enable $PRINTER
```

OPERATION

Printer operation and use is as described in the user's guide, except for the Ethernet Link Indicator described on page 4 and the printer self test.

Self test

To run a printer self test, press and hold in the FEED button while turning the printer on. This initiates limited diagnostic tests.

The printer READY indicator glows red if the printer detects an error. Turn the printer off and on once to clear the error report.

During self test and on power up, the printer performs a loopback test on the Ethernet port. The loopback test validates operation of the Ethernet interface prior to transmitting and receiving packets on a live network. The loopback test verifies the integrity of the data path and the cyclic redundancy check (CRC) logic's ability to generate and receive correct check words.

If the self test is successful, the printer prints a label showing the NVRAM settings, including the Ethernet Physical Address (in hexadecimal) and IP address (in decimal). These addresses are reported in the following format:

Parameter	Data format
Ethernet Physical Address	XX XX XX XX XX XX
IP address	ddd.ddd.ddd.ddd

The reported settings may not be the actual operating conditions if they are changed via a Bootp or SNMP operation. The label will show "Ethernet Not Initialized" to indicate that the settings are from NVRAM only, and that the Ethernet protocol has not been initialized and is not operational.

The printer enters Hex Dump mode after printing the self-test label. If the Ethernet Hex Dump bit is set, the printer continues to prepare the Ethernet port. If the setup is successful, any data sent to the printer via the Etnernet port is printed in Hex Dump format. If the Ethernet bit is not set or the initialization is not successful, the printer prints data received from the parallel and serial ports in Hex Dump mode.

Note:
Turn the printer off and back on again to clear Hex Dump mode and resume normal operation.

VARIABLE COMMANDS

Several VARIABLE commands support configuration of the Ethernet printer. Most of these commands execute simple on-off functions, and accept ON or OFF as their associated parameters. Follow these rules when using the VARIABLE commands:

1. Do not use these commands in label formats that print labels.
2. Enter all commands as shown. You may abbreviate VARIABLE as V, but do not use any other abbreviations.
3. You must reset the printer for the commmands to take effect. The VARIABLE ETHERNET RESET command allows you to easily reset the printer from a remote location via the Ethernet bus.

> ***Note:***
> The following commands supplement the commands in the programmer's guide provided on disk with the printer.

VARIABLE ETHERNET BOOTP

Function: Starts up the printer by reading configuration information from the server.

Implicit form: **`VARIABLE ETHERNET BOOTP status`**

Parameters: **`status`** = Bootp enabled or disabled; **`ON`** or **`OFF`**. The default is **`ON`**.

> ***Note:***
> If you enable bootp, you must use it to configure the printer.

VARIABLE ETHERNET LPD

Function:

Implicit form: **`VARIABLE ETHERNET LPD status`**

Parameters: **`status`** = LPD enabled or disabled; **`ON`** or **`OFF`**. The default is **`ON`**.

VARIABLE ETHERNET TELNET

Function: Enables or disables Telnet communication with the printer.

Implicit form: **`VARIABLE ETHERNET TELNET status`**

Parameters: **status** = Telnet enabled or disabled; **ON** or **OFF**. The default is **ON**.

VARIABLE ETHERNET IP ADDRESS

Function: Sets the printer's Ethernet address.

Implicit form: **VARIABLE ETHERNET IP ddd.ddd.ddd.ddd**

Parameters: **ddd.ddd.ddd.ddd** = the new Ethernet address. The default is 000.000.000.000.

Note:
This command will not work if bootp is enabled.

VARIABLE ETHERNET RTEL

Function: Enables or disables reverse telnet communication with the printer.

Implicit form: **VARIABLE ETHERNET RTEL status**

Parameters: **status** = RTEL enabled or disabled; **ON** or **OFF**. The default is **OFF**.

VARIABLE ETHERNET RTEL PORT

Function: Sets the reverse telnet port address.

Implicit form: **VARIABLE ETHERNET RTEL PORT ddddd**

Parameters: **ddddd** = Reverse telnet port address. The default is 9100.

VARIABLE ETHERNET HEXDUMP

Function: Redirects the printer hex dump output to the Ethernet port.

Implicit form: **VARIABLE ETHERNET HEXDUMP status**

Parameters: status = Ethernet hex dump enabled or disabled; **ON** or **OFF**. **ON** redirects the hex dump to the Ethernet port. The default is **OFF**.

VARIABLE ETHERNET NETMASK

Function: Sets Ethernet Subnet Mask.

Implicit form: **VARIABLE ETHERNET NETMASK ddd.ddd.ddd.ddd**

Parameters: **`ddd.ddd.ddd.ddd`** = netmask value. The default is 000.000.000.000

VARIABLE ETHERNET GATEWAY

Function: Sets ethernet Gateway address.

Implicit form: **`VARIABLE ETHERNET GATEWAY ddd.ddd.ddd.ddd`**

Parameters: **`ddd.ddd.ddd.ddd`** = Gateway address. The default is 000.000.000.000.

VARIABLE ETHERNET RESET

Function: Resets the printer.

Implicit form: **`VARIABLE ETHERNET RESET`**

Parameters: none.

VARIABLE ETHERNET FIRMWARE

Function: Used in conjunction with the **Bootp** function to automatically update the printer firmware.

Explicit form: **`VARIABLE ETHERNET FIRMWARE pn r f s`**

Parameters: **`pn`** = Firmware part number. The printer will ignore the command if this number does not match the part number of the installed firmware.

`r` = Firmware revision. The printer will ignore the command if the installed firmware revision is equal to or higher than the revision specified in the command.

`f` = Firmware filename and path on server; use standard path and filename conventions.

`s` = Server IP address.

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