Installing and Configuring Ethernet Remote Boot ROMs
Module NOS06 – Training Workbook

Performance Objectives

When you complete this module you will be able to:

- Find the proper remote boot PROM to use for each Artisoft ethernet adapter.

- Walk a user through an ethernet boot rom installation using both Old-Style and Find/Found methods.

- Recognize and correct common remote boot problems.

Overview

In the play "No Exit," French existentialist Jean-Paul Sartre portrayed hell as a small room where the devil has placed damed souls most likely to antagonize each other unmercifully for all time and eternity. If Sartre had been a computer technician, he would have known better: hell is trying to get a remote boot installation working.

Before jumping right in with the installation, here is a brief description of how a remote boot ROM does its tricks:

1. When an 80x8 computer is first energized, the boot circuitry jumps to the last 16 bytes in conventional memory at address 0000:FFF0. This contains the start address of the ROM BIOS, usually F000. Here is a DEBUG dump of F000. Note the BIOS manufacturer's name.

```
-d f000:0000
F000:0000   30 31 32 33 41 41 41 41-4D 4D 4D 4D 49 49 49 49   0123AAAAMMMMIIII
F000:0010   42 42 42 42 49 49 49 49-4F 4F 4F 4F 53 53 53 53   BBBBIIIIOOOOSSSS
F000:0020   28 28 28 28 43 43 43 43-29 29 29 29 41 41 41 41   ((((CCCC))))AAAA
F000:0030   4D 4D 4D 4D 49 49 49 49-31 31 31 31 32 32 32 32   MMMMIIII11112222
F000:0040   2F 2F 2F 2F 31 31 31 31-32 32 32 32 2F 2F 2F 2F   ////11112222////
F000:0050   31 31 31 31 39 39 39 39-39 39 39 39 31 31 31 31   1111999999991111
F000:0060   20 44 61 74 65 3A 2D 31-32 2F 31 32 2F 39 31 20    Date:-12/12/91
F000:0070   28 43 29 31 39 38 35 2D-31 39 39 31 2C 41 4D 49   (C)1985-1991,AMI
F000:0080   41 6D 65 72 69 63 61 6E-20 4D 65 67 61 74 72 65   American Megatre
F000:0090   6E 64 73 20 49 6E 63 2E-2C 41 6C 6C 20 52 69 67   nds Inc.,All Rig
F000:00A0   68 74 73 20 52 65 73 65-72 76 65 64 E8 2E 00 BE   hts Reserved....
```

2. Among other duties, the BIOS performs a Power-On Self-Test (POST), which checks the status of hardware and memory, as well as other diagnostic evaluations.

3. After a successful POST, the BIOS installs a 1024 byte interrupt vector table in low memory starting at address 0000:0000. Then the machine begins scanning memory starting at address A000:0000 looking for BIOS-accessible ROM chips. It recognizes such a chip by an AA55 in the first byte.

4. For example, here is a DEBUG dump of the C000 address where the VGA card has its nest. (Recall that DOS is Little Endian, so the last byte comes first.)

```
-d c000:0000 1100
C000:0000   55 AA 40 EB 5B 54 68 69-73 20 69 73 20 6E 6F 74   U.@.[This is not
C000:0010   20 61 20 70 72 6F 64 75-63 74 20 6F 66 20 49 42    a product of IB
C000:0020   4D 20 20 28 49 42 4D 20-69 73 20 61 20 74 72 61   M  (IBM is a tra
C000:0030   64 65 6D 61 72 6B 20 6F-66 20 49 6E 74 65 72 6E   demark of Intern
C000:0040   61 74 69 6F 6E 61 6C 20-42 75 73 69 6E 65 73 73   ational Business
C000:0050   20 4D 61 63 68 69 6E 65-73 20 43 6F 72 70 2E 29    Machines Corp.)
C000:0060   EB 59 20 2A 20 43 6F 70-79 72 69 67 68 74 28 63   .Y * Copyright(c
C000:0070   29 31 39 38 38 20 54 73-65 6E 67 20 4C 61 62 6F   )1988 Tseng Labo
C000:0080   72 61 74 6F 72 69 65 73-2C 20 49 6E 63 2E 20 30   ratories, Inc. 0
C000:0090   36 2F 30 34 2F 39 32 20-56 38 2E 30 32 58 01 00   6/04/92 V8.02X..
C000:00A0   68 00 C0 00 00 00 00 00-00 00 00 00 00 00 00 BD   h...............
C000:00B0   00 00 C0 00 00 00 00 00-00 00 00 EB 3E 1A 00 D7   ...........>...
```

5. Normally a ROM has instructions for the machine to perform, initializing the adapter and rehooking interrupt vectors and so forth. Once the machine has finished performing these instructions, the ROM-scan continues.

6. Under normal circumstances, once the ROMs have been scanned, the machine will make an INT19 call looking for a bootable device, either on cassette or floppy drive A or hard drive C (or whatever bootable hard drive is called out in the boot partition.) If a boot ROM is present on a network adapter, though, and the adapter has been configured to make that boot ROM available to the ROM scan by placing it in conventional memory, then the story is significantly different.

7. For a Noderunner, the boot ROM can be any address between A400 and EC00, although it is not adviseable to use addresses in the EGA/ VGA/CGA video ranges of A000-BFFF. For an AE-2 card, the available addresses range from C000 to E800 by using jumpers.

8. Here is a DEBUG dump of the first part of a boot ROM at addressed at D000:

```
-d d000:0000
D000:0000   55 AA 04 50 53 51 52 56-57 1E 06 55 0E B8 1B 00   U..PSQRVW..U....
D000:0010   50 8C C8 05 03 00 50 33-C0 50 CB 5D 07 1F 5F 5E   P.....P3.P.]._^
D000:0020   5A 59 5B 58 CB 00 00 00-00 00 00 00 00 00 00 00   ZY[X............
D000:0030   33 C0 8E D8 B8 37 01 FA-87 06 64 00 A3 A4 04 8C   3....7....d.....
D000:0040   C8 87 06 66 00 A3 A6 04-FB CB 49 42 4D 4E 45 54   ...f......IBMNET
D000:0050   42 4F 4F 54 0D 0A 4C 41-4E 74 61 73 74 69 63 20   BOOT..LANtastic
D000:0060   28 74 6D 29 20 4E 65 74-77 6F 72 6B 20 42 6F 6F   (tm) Network Boo
D000:0070   74 20 55 74 69 6C 69 74-79 20 56 31 2E 30 37 20   t Utility V1.07
D000:0080   2D 20 28 43 29 20 43 6F-70 79 72 69 67 68 74 20   - (C) Copyright
D000:0090   31 39 39 30 20 41 52 54-49 53 4F 46 54 20 49 6E   1990 ARTISOFT In
D000:00A0   63 2E 0D 0A 00 4E 45 54-42 49 4F 53 20 6E 6F 74   c....NETBIOS not
D000:00B0   20 70 72 65 73 65 6E 74-2D 20 4E 65 74 77 6F     present - Netwo
D000:00C0   72 6B 20 62 6F 6F 74 20-61 62 6F 72 74 65 64 0D   rk boot aborted.
D000:00D0   0A 00 4E 65 74 77 6F 72-6B 20 62 6F 6F 74 20 69   ..Network boot i
D000:00E0   6E 20 70 72 6F 67 72 65-73 73 20 2D 20 50 6C 65   n progress - Ple
D000:00F0   61 73 65 20 73 74 61 6E-64 20 62 79 2E 2E 2E 0D   ase stand by....
D000:0100   0A 0A 00 4E 65 74 77 6F-72 6B 20 62 6F 6F 74 20   ...Network boot
D000:0110   66 61 69 6C 75 72 65 20-2D 20 50 72 65 73 73 20   failure - Press
```

9. The boot ROM contains instructions that diverts the machine from its normal boot sequence and tells it, instead, to make Netbios calls in search of a server that supports remote booting. If such a server exists on the network, the workstation will find a file on the server's hard drive, put there by the user as part of the setup for this operation. The file is an image of a bootable floppy that contains a copy of the DOS kernel files, IO.SYS and MSDOS.SYS, as well as COMMAND.COM and the necessary network drivers that the workstation will need to establish full-fledged network sessions so that it can have access to drives and printers on this and other servers.

There are two flavors of remote booting, Old Style and Find/Found.

Old-Style method -- the boot ROM contains the code for the card driver, NR.EXE or AEX.EXE, and the Netbios driver, AILANBIO.EXE. When the boot ROM takes over the boot sequence, it loads these two drivers into memory just as they would be loaded from a floppy drive then uses them to set up the network communication to the remote boot server. The DOS files and the copy of REDIR.EXE and NET.EXE the workstation will need to complete the boot sequence are in the boot image file on the server.

Find/Found method -- there are no network drivers, per se, in the ROM chip. The chip contains code that searches for a boot rom server with a special bootstrap loader, FFRPL (Find/Found Remote Program Loader.) When the chip finds this loader, it sniffs out the boot image then instructs the workstation to set up a RAM drive in conventional memory on the workstation and designates this RAM drive as Drive A. It then copies the boot image from the server into this RAM drive, shifts gears, and does a normal boot as if the RAM drive were a regular floppy drive.

The end result of either method is the same: the workstation is connected to the network server and able to run applications and print and transfer files just as if it had booted from a disk. There is no performance penalty associated with having used remote booting to load the network.

Choosing the Right Boot ROM

AE-3 Family -- This includes AE-2 rev F, G, and H cards and all AE3 cards. These cards use the National Semiconductor DP83902 chip (the big square one with the metal mount.) **Use part number 882** boot ROM. This is a 32K programmable ROM with an accompanying GAL (Gate Array Logic) chip.

AE-2 Rev E -- Use part number 153 for LANtastic version 4.1 and part number 176 for version 5.0 and 6.0. Neither of these ROMs are programmable.

AE-2 Rev B or C -- Use part number 153 for LANtastic version 4.1 and part number 853 for version 5.0 and 6.0. Neither of these ROMs are programmable. The 853 chip must use FFRPL because it is only 16K.

Noderunner NR2000 or NR2000SI -- Use part number882T. This has a GAL chip that may not be needed depending on the style of card. Discard if not required.

Boot ROMs come with an image file programmed onto the chip. This file contains instructions that the chip needs to find a server and complete the login. This image can be changed using the PROG-ROM program that comes on the driver disk that accompanies the boot ROM. Here is a list of descriptions for the images that come on that disk.

EAE24104.IMG -- Image for 16K ROM for AE-2 Rev. E Ethernet adapters. Used with LANtastic V4.X remote booting.

A2MB4106.IMG -- Image for 32K PEROM for A2Mbps adapters. Used with LANtastic V4.X and 5.0 remote booting.

AEX4102.IMG -- Image for 32K PEROM for AE-2/C, AE-2/T and AE-3 Ethernet adapters. Used with LANtastic V4.X remote booting.

NODE4102.IMG -- Image for 32K PEROM for NodeRunner adapters using Artisoft or Artisoft/8 modes. Used with LANtastic V4.X remote booting.

AEX5000.IMG -- Image for 32K PEROM for AE-2 and AE-3 adapters using LANtastic V5.0 and Old Style remote booting.

NODE5000.IMG -- Image for 32K PEROM for NodeRunner adapters using LANtastic V5.0 and Old Style remote booting.

AEX6000.IMG -- Image for 32K PEROM for AE-2 and AE-3 adapters using LANtastic V6.0 and Old Style remote booting.

NODE6000.IMG -- Image for 32K PEROM for NodeRunner adapters using LANtastic V6.0 and Old Style remote booting.

SNR.IMG -- Image for 32K PEROM for NodeRunner adapters used to connect to Novell Netware 2.X, 3.X IPX boot servers.

FFRPL10.IMG -- Image for 32K PEROM for NodeRunner, AE-3 and 16K PEROM for AE-2 Rev. E and greater adapters. Used for connecting with LANtastic V5.0 Find/Found boot type, NetWare 4.0 RPL and all other IBM Standard boot servers.

Preliminary Actions

1. Obtain a Boot Rom training package containing:

   - One NR2000A adapter for use in the remote boot server.

   - Two NR2000C adapters with Artisoft 182 boot ROMs already mounted. Please do not remove the chips. The fingers are fragile and will not withstand repeated installations.

   - Two blank unformatted high density 3-1/2 inch diskettes

   - A blank unformatted 5-1/4 inch diskette

   - A diskette labeled BOOT ROM WORKSHOP FILES

   - Set of four LANtastic version 6.0 installation disks, 5 user license

   - Sufficient coax cable (supported cable only), t-connectors and terminators to make an independent three-node network.

2. Obtain the following computers:

   - Two machines for use as remote boot workstations. They are labeled TWEEDLEDUM and TWEEDLEDEE. These machines have no hard drives and no floppy drives. Make sure you have a mouse connected to COM1.

   - A machine for use as a boot server. It is labeled ALICE. This machine has a hard drive formatted with DOS 6.0 or above and a 3½-inch floppy drive.

3. Install the NR2000A adapter in ALICE and configure it using NRSETUP as follows. (You will find a copy of NRSETUP.EXE on the BOOT ROM WORKSHOP FILES

        a.   I/O Base300

        b.   IRQ 15

        c.   Boot ROM AddressDisabled

        d.   IOCS16 TimingNormal

        e.   Ethernet TypeCoax

        f.   ModeArtisoft

4.   Perform a normal DOS install of LANtastic 6.0 on machine ALICE (INSTALL/DOS.) Do not select Exchange Mail, Special Client Services, or Install Services. Be sure to name the machine ALICE. Leave all Net Manager settings at their defaults.

Preparing a Boot Image Diskette -- Old Style

1.   At machine ALICE, format one of the blank high-density 3½-inch diskettes as a bootable diskette using FORMAT A: /S. Please note that this will make a bootable floppy with the same version of DOS as the server. If you use another server as the remote boot server, it is imperative that it has the same version of DOS. The remote boot workstation will need access to the server's COMMAND.COM and will lock if it is a different version.

2.   Copy the following network files to the bootable floppy. This could be done using the LANtastic 6.0 INSTALL/DOS/FLOPPY option, but in this exercise we will copy the files manually.

3.   Change directory to the C:\LANTASTI directory. Type REDIR and press Enter. This displays the serial number and license information. Verify that this copy of REDIR has sufficient licenses to support all the remote boot workstations. You will receive a "Serial number unavailable at this time" error if the license slots are all taken when you bring up the remote boot workstation.

4.   Copy the following files from the LANTASTI directory to the root of the bootable floppy:

```
NR.EXE
AILANBIO.EXE
REDIR.EXE
NET.*
```

5.   Change to the DOS directory and copy the following files to the bootable floppy:

```
HIMEM.SYS
EMM386.EXE
```

6.   Use COPY CON or EDIT to build a CONFIG.SYS file with the following lines:

```
DEVICE=HIMEM.SYS
DOS=HIGH
FILES=50
BUFFERS=32
LASTDRIVE=Z
FCBS=16,8
```

7. Build an AUTOEXEC.BAT file with the following lines:

```
PROMPT $P$G
REDIR # BUFFERS=2 SIZE=2048
NET LOGIN \\ALICE
NET USE C: \\ALICE\C-DRIVE
SET COMSPEC=C:\DOS\COMMAND.COM
C:
```

8. Explanation of File Contents

CONFIG.SYS

•   HIMEM.SYS must be installed so that DOS can be high loaded into the HMA (High Memory Area.) Later we will discuss loading other drivers high.

AUTOEXEC.BAT

•   Ordinarily this file would start with an @ECHO OFF statement. We have excluded it from this exercise so we can watch the drivers load during the boot sequence.

•   There is no need to load NR or AILANBIO. These are loaded from the boot ROM.

•   The # sign on the REDIR line tells redirector to use the ethernet node address burned into the adapter for the machine name. This is an important feature if you want to boot more than one machine from the same boot image. If you specified a particular name on this line, the second and subsequent remote boot workstations would get a "Name already in use" error.

•   The extra buffer and increased buffer size on the REDIR line will help the workstation handle the extra traffic involved with loading executables across the network.

•   The COMSPEC variable is needed because you will eventually cut the workstation loose from boot image. Without a COMSPEC pointing at the server, the first time the workstation attempted a page-fault to get the transient portion of COMMAND.COM, it would spiral into an "Insert disk with copy of COMMAND.COM into Drive A" loop or lose track of COMMAND.COM entirely and lock the machine.

9. Remove the diskette from the drive and label it OLD STYLE BOOT DISK.

Installing a Boot ROM--Old Style

1. The boot ROMs in this module have already been mounted on adapter cards. Under normal circumstances you would not be so lucky. There are two common errors to watch out for when mounting the ROM chips:

   a. Orient the chip correctly in the socket. There is an indent on the end of the chip and a corresponding indent on the socket. These must be aligned. If inserted backwards, the chip will fry and possibly ruin the adapter as well. This would not be a manufacturing defect.

   b. Be sure to insert all pins fully into their respective socket holes. One or more pins may have folded under or crumpled sideways or lapped over the side like a snaggle tooth.

2. Turn off machine ALICE and remove the NR2000A adapter.

3. Install one of the NR2000C/Remote Boot adapters in ALICE. Boot the machine and use F1 to bypass remote booting then tap the F5 key when you see "Starting MS-DOS..." to vanilla the machine.

4. Run NRSETUP and configure the card as follows:

   ```
   IOBASE 300
   IRQ 15
   BOOT ROM ADDRESS  D000
   IOCS16 TIMING  NORMAL
   MODE  ARTISOFT
   ```

NOTE: *The ROM address you select needs to be well clear of all video and shadow ROM areas in upper memory. Somewhere between C800 and D800 should do fine. It isn't likely that a remote boot workstation would contain lots of fancy peripherals that would interfere with a boot ROM in the middle address ranges. You never can tell, though, so it's a good idea to verify the addresses of other adapter cards, especially the video card.*

5. Escape back to the command prompt. Verify that the EEPROM on the adapter updates without error.

NOTE *In the following step, there are **no spaces** on either side of the forward slash marks. If a space is included, you will get an error:* Unable to find data file.

6. Insert the BOOT ROM WORKSHOP FILES diskette into a floppy drive and enter the following command:

   ```
   PROG-ROM/ADDRESS=D000/SIZE=32K NODE6000.IMG
   ```

   This will replace the image on the chip with an Old-Style image for NOS 6.0. Note that the ADDRESS switch does not set the rambase, it points PROG-ROM at right spot in memory so it can load the image on the chip. The SIZE switch is the size of the boot ROM.

7. You will get a notification when PROG-ROM finishes reprogramming the chip. The whole process should only take 15 seconds or so. If the program hangs then do the following:

   a. Turn off the machine.

   b. Remove the cable from the network adapter.

   c. Turn on the machine and use the F1 option to boot from the hard drive.

   d. Repeat the PROG-ROM steps.

8. Once the chip is programmed, swap in the second boot rom adapter and program that chip using the same PROG-ROM procedure.

9. Insert the boot rom adapters with the freshly programmed boot ROM chips into their respective workstations. Install the network cabling. Leave the workstations de-energized.

Preparing a Server for Remote Booting -- Old Style

1. Before proceeding, make sure that the files needed to make the boot image are present on the server.

2. At server ALICE, change directory to C:\LANTASTI.NET\SYSTEM.NET and do a directory. You should find the following files:

   ```
   BOOT.IMD
   IBMBOOT.TYP
   FFRPL.TYP
   FFRAMRPL.BST
   FFRAMRPL.BSD
   ```

   If these are not present, you can either copy them from another server or reinstall LANtastic to this machine. The boot image files you will be creating will also be stored in this subdirectory.

3. Run NET SHOW. If Server is in memory, remove it using SERVER/REM.

4. Run NET_MGR. From the main Net Manager menu, select *Remote Boot Maintenance*. The remote boot maintenance screen appears. Note that there are no listings yet.
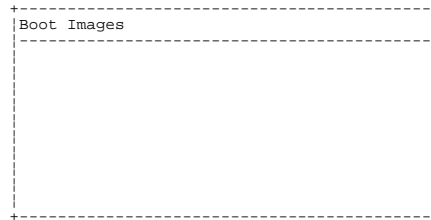
```
+------------------------------------------------------------------+
|Boot Type          Node Address   Boot Strap   Boot Image   Status |
|------------------------------------------------------------------|
|                                                                  |
|                                                                  |
|                                                                  |
|                                                                  |
|                                                                  |
|                                                                  |
|                                                                  |
|                                                                  |
|                                                                  |
|                                                                  |
|                                                                  |
|                                                                  |
+------------------------------------------------------------------+
```

5. Tap the Ins-Add to add an image. The Boot Types screen appears.

```
+----------------------------------------+
|Boot Types                              |
|----------------------------------------|
|Find/Found                              |
|Old Style Boot                          |
|                                        |
|                                        |
|                                        |
```

```
|                                        |
|                                        |
|                                        |
+----------------------------------------+
```
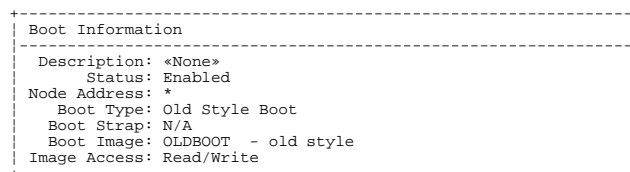
6.   Select Old Style. The Boot Images screen appears. The list is empty because you have not yet burned an image.

```
+----------------------------------------+
|Boot Images                             |
|----------------------------------------|
|                                        |
|                                        |
|                                        |
|                                        |
|                                        |
|                                        |
+----------------------------------------+
```

7.   Tap Ins-Add. Enter OLDBOOT when prompted for a file name. It is important not to include an extension. Two files will be created using this name, an IMG and and IMD file.

8.   Place the diskette labeled OLD STYLE BOOT DISK in drive A then select the A: drive when prompted. The program will begin gathering data.

9.   When the program has completed saving the boot image, you will be prompted for a description. Enter OLD STYLE IMAGE #1. You will be returned to the Boot Images screen.

10.   Highlight the name of the new boot image and press Enter. It will be added to the list of boot types. Press Enter on this line. The Boot Information screen appears.

```
+------------------------------------------------------------+
| Boot Information                                           |
|------------------------------------------------------------|
|  Description: «None»                                       |
|       Status: Enabled                                      |
| Node Address: *                                            |
|    Boot Type: Old Style Boot                               |
|   Boot Strap: N/A                                          |
|   Boot Image: OLDBOOT  - old style                         |
| Image Access: Read/Write                                   |
+------------------------------------------------------------+
```

11.   Highlight each item in turn and press Enter:

Description -- enter a short description of your choice.

Status -- note that the field toggles between Enabled and Disabled. This permits you to load several boot images then choose which one you want to use.

Node Address -- the asterisk performs a wildcard function. Any machine with any node ID can use this image. You can selectively filter node ID numbers, and thereby use multiple boot images, by making this into a template with a specific node ID or series of IDs (in the case where a group of network adapters have sequential numbers.)

Boot Type -- you could conceivably change the boot style to Find/ Found, but it would not work with this image, so why bother, right?

Boot Strap – a bootstrap loader is not used for Old Style images because the card and netbios driver is on the ROM chip. Find/Found uses the FFRPL loader. More on this later in the exercise.

Image Access – Recall that the boot image will appear to be the A drive to the workstation until you unlink it. If you do not unlink, and access is set to Read/Write, you can modify the boot image once you have completed remote booting. You will see an example of this later in the exercise.

12. Escape back to the Net Manager menu and select Server Startup Parameters. Enable Remote Booting.

13. Escape to the command prompt then change to the C:\LANTASTI.NET\SYSTEM.NET directory. Do a directory and note the two OLDBOOT files.

14. Type out the OLDBOOT.IMD file. Note that it is a text file with the description you entered for the boot image. The OLDBOOT.IMG file is a binary file.

15. Load Server. You will get a message that "The network buffer size is being adjusted to accomodate remote booting." Server will automatically increase network buffer size to speed up task handling from the remote boot workstations. How much? Do this:

16. Remove Server using SERVER/REM.

17. Load Server with SERVER/VERBOSE. Note that the buffer size is 9216.

18. Remove Server from memory.

19. Run NET_MGR and select Server Startup Parameters.

20. Select Network Buffer and pick 10240 from the popup list.

21. Select Max Users and enter 5. An Old-Style boot will take two login sessions, so you will need four logins for the two workstations and one for the server to log into itself.

22. Escape back to the command prompt and load Server.

23. Proceed to the next section.

Remote Booting -- Old Style

1. Verify that TWEEDLEDEE and TWEEDLEDUM are properly cabled to ALICE.

2. Boot both workstations and watch the monitors closely. Note that the machine performs the following steps: (reboot several times if necessary to see it all happen)

   a. POST (Power-On Self-Test)

   b. Loads the NR and AILANBIO drivers

   c. Displays the CMOS settings

   d. Loads the Network Boot Utility

   e. Starts MSDOS

   f. Loads REDIR and performs the remainder of the AUTOEXEC.BAT

3. When the boot has finished, you will be on the C drive of the server. Do a directory to verify this.

4. Do a directory of the A drive. Note that the green drive light does not energize and that you get a listing of the files on the image. This proves you are still linked to the image file.

5. Go back to the C drive and run NET SHOW. Note that you get a "Bad command or file name." This is because there is no path statement in the image file. We will correct that in just a few minutes.

6. Change directory to the C:\LANTASTI directory. Run NET SHOW. Note that the machine name is the node ID of the adapter card. This can be annoying, especially if this machine logs into other servers that keep individual accounts or use Exchange Mail. We'll correct this, too. For now, make note of the ID numbers. You'll need this information later.

   TWEEDLEDEE _____

   TWEEDLEDUM _____

7. Go to the C:\DOS directory and run MEM/C/P. Note that you have about 590K of memory available for executing a program, which is quite a bit but it would be better to free up as much as possible by loading REDIR high as well as other TSRs that might be needed later, like a mouse driver.

8. One result of using the Old Style method is that each remote boot workstation takes two login sessions at the server. Demonstrate this as follows:

   a. Turn off TWEEDLEDEE.

   b. At machine ALICE, remove Server from memory and reload.

   c. Boot TWEEDLEDUM. Note that the boot proceeds normally and you end up on the C drive of the server.

   d. Boot TWEEDLEDEE. Note that you get a "Network boot failure" error.

   e. Turn off TWEEDLEDUM and reboot TWEEDLEDEE. Note that you still get the failure. This is because the server is still connected to TWEEDLEDUM at the Netbios level.

   f. At machine ALICE, remove Server from memory and reload. This will break the Netbios connection.

   g. Boot TWEEDLEDEE. Note that the boot proceeds normally now.

   h. Boot TWEEDLEDUM. Note that you get a "Network boot failure."

   i. At machine ALICE, remove Server from memory. Use Net Manager to set max users to 5. Reload server.

   j. Reboot both workstations. Note that they both complete a normal boot sequence.

NOTE: *Unlinking the workstation from the boot image (done later in this exercise) will free up one session.*

9. At machine TWEEDLEDEE, change directory to C:\DOS. Copy EMM386.EXE to the A drive. Recall that you are able to do this because the A drive is actually the image and that the image is configured to permit Read/Write access.

10. Use EDIT to modify the CONFIG.SYS file on the boot image as indicated in bold:

```
DEVICE=HIMEM.SYS
DEVICE=EMM386.EXE  NOEMS  X=D000-D7FF
DOS=HIGH
DOS=UMB
FILES=50
BUFFERS=32
LASTDRIVE=Z
FCBS=16,8
```

11. Modify the AUTOEXEC.BAT file as indicated in bold:

```
@ECHO OFF
PROMPT $P$G
SET NAME=XXXXXXXXXXXXXX
NET STRING NAME ?"Enter your name: "
LH REDIR %NAME% BUFFERS=2 SIZE=4096
NET LOGIN \\ALICE %NAME%
NET USE C: \\ALICE\C-DRIVE
SET COMSPEC=C:\DOS\COMMAND.COM
SET PATH=C:\;C:\DOS;C:\LANTASTI
C:
```

12. Explanation of changes:

   • EMM386 permits drivers to be loaded high. The exclusion is for the memory taken up by the boot ROM. The ROM takes up 32K, so half of the D000 range is lost. If you were going to run a network installation of Windows on this machine, you would need to put EMMExclude=D000-D7FF in the [386Enh] section of the SYSTEM.INI file.

   • The SET statement sets aside room in the environment for the variable. The NET STRING statements prompts for input from the user then instantiates the environment variable with the response. The ? prompt causes the response to echo on the screen. If you need to prompt for a password, too, then use an ^ prompt. This will echo diamonds to the screen when the user enters a password.

   • The %NAME% on the REDIR line will use the value stored in the environment variable NAME for the machine name.

   • The PATH statement must be issued after the NET USE statement so that there will be a drive for the path to use.

13. Reboot both workstations. Note that you are prompted for a name. Enter TWEEDLEDEE or TWEEDLEDUM as appropriate. When the boot sequence has finished, use NET SHOW to verify the new machine names.

   Proceed to the next section.

Working with Multiple Boot Images -- Old Style

WARNING   *The server may lock during this operation. Run the NOS600.EXE patch from the* BOOT ROM WORKSHOP FILES *diskette to cure this problem.*

There are instances where different images must be used for different machines. An example would be a network with a mix of adapters, or users with different configuration files or login scripts. There are several ways to approach this problem. Easiest is to have multiple boot images. Here is how that works:

1.   Turn off both workstations.

2.   At machine ALICE, remove Server from memory.

3.   Change directory to C:\LANTASTI.NET\SYSTEM.NET.

4.   Copy the two OLDBOOT files to OLDBOOT1 using COPY OLDBOOT.* OLDBOOT1.*

5.   Run NET_MGR and select Remote Boot Maintenance.

6.   Tap Ins-Add to add the copied image. The Boot Types screen appears.

7.   Select Old Style Boot. The Boot Images screen appears.

8.   Select OLDBOOT1. The image is added to the boot type list.

9.   Highlight the OLDBOOT image and press Enter. The Boot Information screen appears.

10. Select Node Address. Replace the asterisk and string of zeros with the node ID of TWEEDLEDEE. Escape back to the Boot Types screen.

11. Use the same series of steps on OLDBOOT1 to insert the node ID of TWEEDLEDUM.

12. Escape back to the command prompt and load Server.

13. Boot both workstations.

14. At TWEEDLEDEE, edit the AUTOEXEC.BAT file and add the following line to the end of the file: @ECHO I AM TWEEDLEDEE. Save the file.

15. At TWEEDLEDUM, edit the AUTOEXEC.BAT file and adde the following line to the end of the file: @ECHO I AM TWEEDLEDUM. Save the file.

16. Reboot both workstations. Verify that the machines are using their own unique boot image by noting the echo statements.

This is a handy method but it can absorb a lot of disk space, especially for users with many remote boot workstations. An alternative, if a user has DOS 6.0, is to use the multiple configuration feature for CONFIG.SYS and AUTOEXEC.BAT.

Another alternative that is a little harder to use is the RBCONFIG.SYS program on the Artifacts BBS. We will not use this feature in this workshop. Refer to the Special Situations section for an explanation.

Working with Floppy Drives in Remote Boot Workstations

Some users have floppy drives on their remote boot workstations. They prefer to use remote boot ROMs to access the server instead of a boot floppy. In the current configuration, the floppy drive would not be available because the A drive is pointed at the image file. The NET UNLINK command will break this connection, but there are a few precautions:

1. At TWEEDLEDUM, edit the AUTOEXEC.BAT file.

2. Make the following modifications to the AUTOEXEC.BAT file:

    ```
    @ECHO OFF
    PROMPT $P$G
    REM SET NAME=XXXXXXXXXXXXXXX
    REM NET STRING NAME ?"Enter your name: "
    LH REDIR TWEEDLEDUM BUFFERS=2 SIZE=4096
    NET LOGIN \\ALICE TWEEDLEDUM
    NET USE C: \\ALICE\C-DRIVE
    SET COMSPEC=C:\DOS\COMMAND.COM
    SET PATH=C:\;C:\DOS;C:\LANTASTI
    C:
    PAUSE
    NET UNLINK
    ```

3. Save the file and reboot.

4. When you are prompted to "Press any key....", press the spacebar. You will get the error "Not Ready Reading Drive A. Abort, Retry, Fail." This happens because you broke the link to the A drive with the NET UNLINK command while you were still inside a batch file on the A drive. Fail out of the error and go to the C drive.

5. Change to the C:\LANTASTI directory. Use COPY CON to make a file named UNLINK.BAT with a single line: NET UNLINK. By issuing the command from a batch file within a batch file, the batch interpreter will pass over to the C drive and the COMSPEC will take over so the error will be avoided.

6. Reboot TWEEDLEDUM and use ^C to break out of the batch file at the pause prompt.

7. Edit the AUTOEXEC.BAT file and change the NET UNLINK line to C:\LANTASTI\UNLINK.BAT.

8. Save the file and reboot. Attempt to do a directory of the A drive. Note that it is no longer a valid drive. This verifies that you are no longer linked to the image. If the machine had a floppy, you would be able to use it.

9. Depending on the BIOS of the machine and the particular initialization sequence it uses during POST, you may get a "Sector not found" error when accessing a floppy after a NET UNLINK. Fixing this is a two-step process:

    a. Include the DOS device DRIVEPARM in the CONFIG.SYS file. Switches that are appropriate for floppies are:

        /C - the drive is capable of detecting that the door is open

        /F:# - drive type, where # is

        0 - 180K or 360K

        1 - 1.2M, 5¼-inch

        2 - 720K, 3½-inch

        7 - 1.44M, 3½-inch

        9 - 2.88M, 3½-inch

        /I - specifies 3½-inch drive if BIOS does not support one

        Example: A 1.44M floppy with a functional change line would use: DRIVEPARM=/D:0 /C /F:7

    b. Obtain a file from the Artifacts BBS called DRIVEFIX.EXE. Run DRIVEFIX in the UNLINK.BAT file right after the NET UNLINK command.

    c. If more than one workstation is using the image and the others have different floppy drive types, then you will need to use one of the multiple configuration alternatives.

10. Turn off both workstations.

11. At server ALICE, remove Server from memory.

12. Run NET_MGR and select Remote Boot Maintenance.

13. Tap F3-Images. Delete the OLDBOOT1 image. Note that once the image has been deleted, the status on the Boot Types screen goes to Disabled. Delete the image from the list.

14. Select the OLDBOOT image and change the Node Address back to *00000000000.

15. Escape out to the command prompt and load server.

16. Reboot both workstations and verify that they go through a normal boot sequence and that their A drives still look at the image.

17. Proceed to the next section.

Demonstrating Remote Boot Performance -- Old Style

1. At machine TWEEDLEDEE, verify that you have a mouse connected to COM1.

2. Change to the C:\WINDOWS directory and perform a network installation of Windows for this workstation as follows:

    a. Run SETUP/N. It may take a while for the SETUP program to load. Be patient.

    b. When prompted for a directory, enter C:\TWEEDEE.

    c. If you are warned that "their" network might have "problems," choose to continue the install. "Their" graphical user interface will just have to learn how to adjust.

    d. If you are prompted to insert a floppy in the A drive, choose Cancel.

    e. Answer other prompts as you would if you were doing a normal Windows installation.

3. When the install has completed, go to machine TWEEDLEDUM.

4. Go to the A drive and edit the AUTOEXEC.BAT file to add C:\WINDOWS to the end of the path. Save the file.

5. Reboot both workstations.

6. At machine TWEEDLEDEE, change to the C:\TWEEDEE directory and run WIN. The Windows program will load.

7. Choose the GAMES group and play a little solitare then close Windows.

8. Change to the C:\TWEEDEE directory and do a directory. Note that the user gets a personalized suite of INI files, Program Manager groups, and list of PIF files. You could run Windows on TWEEDLEDUM from the TWEEDEE directory, but it is preferable to have a separate directory for each user so they don't squabble about the color of the wallpaper.

9. You have completed the Old Style section of this exercise. Leave the remote boot workstations energized and proceed to the next section.

Preparing a Boot Image Diskette—Find/Found

Recall that the Find/Found method for remote booting sets up a RAM drive at the workstation. The size of this RAM drive is determined by the size of the Find/Found boot image on the server. Thanks to the 640K limit of DOS and the allowable size increments when formatting floppies, you are limited to using a 360K boot floppy.

The first hurdle is to make a 360K boot floppy. Unfortunately, many machines (including server ALICE) come with only 3½-inch drives, and many of these drives will not format a 360K disk.

1. Insert the second blank 3½-inch floppy in the A drive of server ALICE.

2. Enter the command FORMAT A: /F:360. (You can add the system later if this is successful.)

3. More than likely you got an "Parameters not compatible" error. Don't bother trying other variations of the FORMAT switches. They won't work, either. At this point, you have a limited number of choices:

- Try every machine you have available to find one with a 3½-inch floppy drive that supports this style of format. Don't hold your breath, though.

- Install a 5¼-inch drive in the server so you can format a floppy that directly supports a 360K format.

- Burn the boot image on a server that has a 5¼-inch drive then copy the two image files across the network to the remote boot server. This is often the simplest alternative.

4. Another alternative is to use a program on the Artifacts BBS called CHGSIZE.EXE to convert a 720K floppy to 360K. (NOTE: the file is stored on the BBS with a ZIP extension.) Perform this operation as follows:

a. Verify that you still have the blank 3½-inch diskette in drive A.

b. Enter the command: FORMAT A: /F:720. This should be successful.

c. Remove the floppy from the drive and insert the diskette labeled BOOT ROM WORKSHOP FILES. In the root directory you will find a file named CHGSIZE.EXE with an accompanying DOC file.

d. Type out the CHGSIZE.DOC file and read the instructions. Pretend you always read the instructions. Here are a couple of things to note:

- Any information on the disk will be destroyed. The program gives no warning of this. If you have the wrong diskette in the drive, goodbye data.

- The program assumes you have the diskette in drive A. This makes sense. If you have two drives and one of them is 5¼-inch, you would not need this program.

e. Copy the CHGSIZE.EXE file to the LANTASTI directory on the server.

f. Remove the BOOT ROM WORKSHOP FILES diskette from drive A and reinsert the newly formatted 720K diskette.

g. From the LANTASTI directory, type CHGSIZE with no command line parameters. If the resize was successful, you will be returned to the command prompt. You won't be able to check the size immediately because there are no files on the disk. Don't put any there, yet.

5. So far, so good. There are many drives and BIOSs, though, that will fail to recognize a floppy that has been reconfigured with CHGSIZE. If this happens, then there is no other alternative but to find a 5¼-inch drive.

6. At the command prompt, enter SYS A: . This will transfer the DOS kernel files to the boot track of the floppy and copy COMMAND.COM to the root directory.

7. Once the system has transferred, do a directory of drive A. Note that you have only about 224K left. If a user has significantly less than this, use DIR /A to see if DBLSPACE.BIN is in the system files at a cost of 50K. If so, use ATTRIB -S -H to make it accessible then delete it.

8. Now for the network files. Unlike the Old Style image, this step must be done manually. INSTALL/FLOPPY option will copy too many files.

NOTE: *360BOOT.TXT on the BBS outlines the following steps.*

9. Copy the following files from the LANTASTI directory to the root of the diskette:

```
NR.EXE
AILANBIO.EXE
REDIR.EXE
NET.EXE
```

10. Change to the DOS directory and copy HIMEM.SYS to the A drive.

11. Do a directory of drive A. You should have about 62K left. A tight fit-- too tight to include EMM386.EXE (115K.) If a user needs to load drivers high, he or she should use an Old Style image.

12. Use COPY CON or EDIT to build the following CONFIG.SYS:

```
DEVICE=HIMEM.SYS
DOS=HIGH
FILES=50
BUFFERS=32
LASTDRIVE=Z
FCBS=16,8
```

13. Build an AUTOEXEC.BAT file with the following lines:

```
@ECHO OFF
PROMPT $P$G
SET NAME=XXXXXXXXXXXXXX
SET PASSWORD=XXXXXXXXXXXXXX
NET STRING NAME ?"Enter your name: "
NR
AILANBIO
REDIR %NAME% BUFFERS=2 SIZE=2048
NET LOGIN \\ALICE %NAME%
NET USE C: \\ALICE\C-DRIVE
SET COMSPEC=C:\DOS\COMMAND.COM
SET PATH=C:\;C:\DOS;C:\LANTASTI
C:
C:\LANTASTI\UNLINK.BAT
```

NOTE: *Unlinking from the boot image is imperative when using the Find/ Found remote boot method. The 360K RAM drive will stay in memory and leave no room for running programs unless the image is unlinked.*

14. Label the diskette as FIND/FOUND BOOT DISK then put it back into drive A. Proceed to the next section.

Preparing the Server for Remote Booting—Find/Found

1. At machine ALICE, run NET_MGR and select Remote Boot Maintenance. The remote boot maintenance screen appears with the Old Style image on the list.

2. Tap the Ins-Add to add an image. The Boot Types screen appears.

3. Select Find/Found. The Boot Straps screen appears with the FFRAMRPL boot strap file listed. Recall that you did not get this screen when installing an Old Style image. An external bootstrap loader is not required with the Old Style method.

```
+-------------------------------------------+
|Boot Straps                                |
|-------------------------------------------|
|FFRAMRPL - F/F RAMDISK                     |
|                                           |
|                                           |
|                                           |
|                                           |
|                                           |
|                                           |
|                                           |
+-------------------------------------------+
```

4. Select FFRAMRPL. The Boot Images screen appears. The Old Style image is on the list. We need to add a Find/Found image.

5. Verify that the FIND/FOUND BOOT IMAGE is still in drive A.

6. Tap Ins-Add. Enter FINDFND when prompted for a file name. Remember not to include an extension. The program will begin gathering data.

7. When the program has completed saving the image you will be prompted for a description. Enter FIND/FOUND IMAGE. You will be returned to the Boot Images screen.

8. Press enter on the new boot image. It will be added to the list of boot images. Press Enter on this line. The Boot Information screen appears. Note that the list of information now includes a Boot Strap loader.

```
+----------------------------------------------------------+
| Boot Information                                         |
|----------------------------------------------------------|
|   Description: «None»                                    |
|        Status: Enabled                                   |
| Node Address: *                                          |
|     Boot Type: Find/Found                                |
|    Boot Strap: FFRAMRPL - F/F RAMDISK                    |
|    Boot Image: Find/Found Image                          |
|  Image Access: N/A                                       |
+----------------------------------------------------------+
```

9. Escape back to the command prompt. Do not remove Server from memory. You still need to program the boot ROM chips.

NOTE: *A server can have an Old Style and a Find/Found image active at the same time. If the machine locks in this configuration, the Server program will need to be patched using the most current version of NOS600.ZIP from the Artifacts BBS.*

Proceed to the next section.

Installing a Boot ROM—Find/Found

1. The boot ROMs in TWEEDLEDEE and TWEEDLEDUM are currently programmed with Old Style images. They will need to be reprogrammed to work with the Find/Found image you just saved. You could swap the boot ROM adapters back into the server and reprogram the chips, but since they are already on a network, there is an easier way to reprogram them.

2. At machine ALICE, put the "BOOT ROM WORKSHOP FILES" diskette in drive A.

3. Redirect logical A drive at TWEEDLEDUM to the A-DRIVE resource at server ALICE with the following command: NET USE A: \\ALICE\A-DRIVE.

4. Verify the redirection by doing a directory of the A drive.

5. Enter the following command: PROG-ROM/ADDRESS=D000/ SIZE=32K FFRPL10.IMG. The PROG-ROM program loads. You will be notified when the ROM is reprogrammed. The program may hang at this point, but the chip probably will have been programmed.

6. Reboot the machine. Note that the CMOS display comes up immediately. The Remote Program Loader loads and starts looking for a server with a Find/Found boot image. It can't find one because you have not reset server ALICE yet.

7. Reprogram the boot ROM in TWEEDLEDUM using the same procedure. Now you have two workstations ticking off their search for a server.

8. At server ALICE, remove server from memory using SERVER/REM and reload. Note that a second program, FFRPL.EXE, loads immediately after SERVER. This is the Find/Found boot loader.

NOTE: *This boot loader is a TSR called up by the Server program. If Server is loaded high using EMM386.EXE, then FFRPL may lock the machine when it loads. If this happens, REDIR and SERVER must be patched using the most current copy of NOS600.ZIP from the Artifacts BBS.*

9. Note that the workstations now proceed with the boot sequence. Enter the machine name when prompted.

10. Do a directory of the A drive. Note that you get a "Not ready reading drive A" error. This verifies that the NET UNLINK was issued from the server.

11. From the C drive, run MEM/C and note that the RAM drive is gone.

12. A problem that comes up every once in a while is a remote boot server that has a logical C drive redirected to its own physical C drive. Among all the other problems this causes, it will prevent Find/Found remote booting from working. Demonstrate this as follows:

    a. At server ALICE, issue the following command:

    ```
    NET USE C: \\ALICE\C-DRIVE
    ```

b. Reboot both workstations. Note that the bootstrap loader comes up but the workstations tick away looking in vain for the server.

c. At server ALICE, issue the following command

```
NET UNUSE C:
```

The workstations will now proceed with the boot sequence.

Remote Boot Performance -- Find/Found

1. At machine TWEEDLEDUM, verify that you have a mouse connected to COM1.

2. Change to the C:\WINDOWS directory.

3. Perform a network install of Windows as follows:

   a. Run SETUP/N. It may take a while for the SETUP program to load. Be patient.

   b. When prompted for a directory, enter C:\TWEEDUM.

   c. Proceed with the installation as you did for TWEEDLEDEE. Answer prompts as you would if you were doing a normal Windows installation.

4. When the install has completed, you will need to change the image file to add the new directories to the path. Unfortunately, you cannot access the boot image directly using Find/Found as you could for the Old Style image.

5. Put the FIND/FOUND BOOT DISK diskette into drive A. Use EDIT to modify the AUTOEXEC.BAT file to add C:\WINDOWS to the path.

6. Remove FFRPL and SERVER from memory using the REM switch.

7. Run NET_MGR and select Remote Boot Maintenance.

8. Highlight the Find/Found image and tap the Del key to delete it. This only removes it from the list. You also want to delete the file from the drive.

9. Tap Ins-Add to add a new Boot type. The Boot Types screen appears.

10. Select Find/Found. The Boot Straps screen appears.

11. Select FFRAMPL. The Boot Images screen appears. The existing Find/Found image is on this list.

12. Tap Del-Delete to delete this file from the hard drive.

13. Tap Ins-Add save the new Find/Found image. Enter FINDFND when prompted for a name.

14. When the image has been saved, you are prompted for a description. Enter Find/Found Image #2. You will be returned to the Boot Images screen.

15. Press Enter on the new image to select it. You will be returned to the Boot Types screen. Note that the new image is on the list. Escape back to the command prompt.

16. Load server. Note that the FFRPL program loads, also.

17. Reboot both workstations.

18. At machine TWEEDLEDUM, change to the C:\TWEEDUM directory and run WIN. The Windows program will load.

19. Choose the GAMES group and play a little solitare. Leave the program loaded.

20. At machine TWEEDLEDEE, change to the C:\TWEEDEE directory and run WIN. The Windows program will load.

21. Choose the GAMES group and play a little solitare. Note that changing from Old Style to Find/Found remote boot method had no effect on the workstation's functionality. Also note that both workstations have access to the same program. The normal rules for sharing programs apply. It may be necessary to modify Path statements and ATTRIB the executables to Read/Only

Congratulations

You have completed the Remote Boot module. Feel free to repeat the exercise if you want additional experience.

The key points to remember are:

• Remote booting must be enabled on the remote boot server.

• An Old Style image has no size limit on the floppy.

• A Find/Found image floppy is limited to 360K. The CHGSIZE.EXE program on the Artifacts BBS can be used to convert a 720K 3½-inch floppy into a 360K floppy for a Find/Found image.

• A PROG-ROM program ships with the boot ROM and is used to reprogram the ROM chip with the appropriate boot image.

• Upgrading to newer versions of the network may require reprogramming the boot ROM and saving a new boot image on the server. The BOOT60.ZIP file on the BBS contains images for LANtastic version 6.0. The FFRPL10.IMG image has not changed.

• There is no difference in functionality or performance between booting from floppy or a boot ROM.

Special Situations -- Using RBCONFIG to Manage Multiple Nodes

Although LANtastic (tm) supports remote program loading (RPL), which allows diskless workstations to boot MS-DOS from a diskette image stored on a network server, all workstations on a network must share the same boot image and consequently, the same CONFIG.SYS file. This makes it impossible to load different device drivers or set different tuning parameters (FILES=, BUFFERS=, etc.) based on each workstation's intended use.

RBCONFIG.SYS overcomes this limitation by allowing you to specify, on a node address basis, the exact CONFIG.SYS statements to apply to each workstation at boot time. RBCONFIG.SYS is loaded as the first item in CONFIG.SYS, and the various sections of CONFIG.SYS statements are separated by special keyword lines.

To illustrate how this works, examine the following CONFIG.SYS file:

```
DEVICE=A:\RBCONFIG.SYS
SHELL=A:\COMMAND.COM /P /E:800
FILES=50
REM !NODE 00006E123456
REM !NODE 00006E123457
REM !NODE 00006E123458
DEVICE=A:\ANSI.SYS
REM !GLOBAL
REM !NODE 00006E123459
DEVICE=A:\HIMEM.SYS /M:2
REM !GLOBAL
BUFFERS=32
REM !NODE NONE
DEVICE=A:\RAMDRIVE.SYS
REM !GLOBAL
LASTDRIVE=Z
FCBS=16,8
REM !END
```

Using this CONFIG.SYS file will cause all nodes to execute the following lines:

```
SHELL=A:\COMMAND.COM /p /e:800
FILES=50
BUFFERS=32
LASTDRIVE=Z
FCBS=16,8
```

Nodes 00006E123456, 00006E123457, and 00006E123458 will execute:

```
DEVICE=A:\ANSI.SYS
```

Node 00006E123459 will execute:

```
DEVICE=A:\HIMEM.SYS /M:2
```

Any node which is not RPL'ed (i.e., has no NETBIOS running at boot time) will execute:

```
DEVICE=A:\RAMDRIVE.SYS
```

The following rules apply when parsing the CONFIG.SYS file:

- The "REM !END" statement must be present and should be the last line in the CONFIG.SYS file.

- Lines occuring before DEVICE=RBCONFIG.SYS are global and will be present for all nodes.

- Lines occuring after DEVICE=RBCONFIG.SYS, but before the first "REM !NODE" statement are global and will be present for all nodes.

- Lines occurring after "REM !GLOBAL", but before the next "REM !NODE" statement, are global and will be present for all nodes.

- Any lines not defined by (2) to (4) above is LOCAL, and will only be included if a "REM !NODE" statement (which matches the adapter ID number) preceeds the line without an intervening "REM !GLOBAL" statement.

- Node IDs in the "REM !NODE" statement must be 12 hex digits with leading zeroes. The special Node ID "NONE" is used to designate a node that is not remote booted.

Special Situations -- IBM MCA Machines

To set IBM PS/2 for remote booting:

1. Boot the machine with the reference diskette.

2. Go to Set Features (NOT Set Configuration) and then go to Set Startup Sequence. You may get a message about the drive letters changing. Press <Enter> to get past that.

3. A screen appears that says Set Starting Sequence. There are three choices: Floppy disk, Hard disk and RPL from Network. Make the first entry RPL from network, the second Floppy disk and the third Hard disk. Press <F10> to save this setup.

4. An info window appears saying that the new sequence will take effect upon reboot. Press Enter. Then press F3 to exit that menu and F3 to exit the Set Features menu and F3 to exit the Main menu.

5. A message will appear to press Enter to restart the system. Remove the reference disk from the drive and press Enter.

6. NOTE: Model 35 machines may not be able to see the boot ROM. IBM has a system board upgrade that resolves this problem.

Special Situations -- Remote Booting in Novell Networks

Arisoft ethernet cards are Novell compatible. They can use Novell boot ROMs to attach to Netware servers. The Novell ROM can be either a Standard or Enhanced model and can be purchased from Artisoft/Eagle.

If the user has an AE2 card, he or she must purchase an NE2000 boot ROM kit from Artisoft. This kit contains a PAL compatible with the NE2000 boot ROM as well as additional jumpers for the card.

There are only a limited number of configurations of IOBase, IRQ, and ROM address that will work with a Netware installation. For an NR2000 card, the configuration is done using NRSETUP or NRCONFIG. For an AE2 card, the configuration is done with jumpers.

See the next page for configurations.

Configuration 1:

     W5 -- N (Novell Mode)

     W4 -- AB (IOBASE 300)

     W1 -- 3 (IRQ 3)

     W6 -- ENA (enable the boot ROM)

     No jumpers on A-D (ROM Base Address C800)

     8K (Novell PROMs are only 8K)

     UV jumpered (Novell ROMs are not programmable)

Configuration 2:

     W5 -- N (Novell Mode)

     W4 -- AC (IOBASE 320)

     W1 -- 5 (IRQ 5)

     W6 -- ENA (enable the boot ROM)

     A (ROM Base Address CC00)

     8K (Novell PROMs are only 8K)

     UV jumpered (Novell ROMs are not programmable)

Configuration 3 (Can only be used if the Netware server uses Ethernet II packet type)

     W5 -- N (Novell Mode)

     W4 -- BD (IOBASE 340)

     W1 -- 4 (IRQ 4)

     W6 -- ENA (enable the boot ROM)

     B (ROM Base Address D000)

     8K (Novell PROMs are only 8K)

     UV jumpered (Novell ROMs are not programmable)

Choose the same configuration options when running SHGEN to create IPX.COM for the workstation boot disk. After running DOSGEN this workstation boot disk becomes the boot image file which is loaded by the boot ROM. See the Novell Installation Manual, Appendix D, for more information.

Installing and Configuring Ethernet Remote Boot ROMs

Training Workbook
Module NOS06
Revision 2.1
2/10/95

ARTISOFT CORPORATE MISSION

To be a leading developer and marketer of network solutions to workgroups, small businesses, and remote network users.

SALES AND SUPPORT MISSION

To establish channel franchises through sales execution, support, and technical services on a global basis.

SALES AND SERVICE DEPARTMENT MISSION

To provide such excellent service to our customers that they will recommend and repurchase our products.

SERVICE AND PRODUCT QUALITY DEPARTMENT MISSION

To provide Artisoft Technical Support and Sales associates with the best training and best information tools in the industry.

PLEASE NOTE: This is a training document. It is not intended for use as a troubleshooting reference. Product features and concerns can and often do change without notice. Please refer to source documents or Folios for the most current product information.