

LINUX for S/390



Installing TurboLinux[®] for S/390[®] - December 4, 2000

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Note

Before using this document, be sure to read the information in "Notices" on page 55.

First Edition (November 2000)

This edition applies to the preliminary version of TurboLinux LINUX for S/390 (November 2000).

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About this document

This document was written for use in the Turbo Linux LINUX Install Fest, November 2000. Instructions in this document work only with the TurboLinux LINUX for S/390 distribution. Use with other versions or distributions at your own risk.

If you have questions about any of the material covered in this document, contact the LINUX for S/390 team at: contact_linux390@de.ibm.com

How to obtain the most recent version

As needed, this document will be updated with new and changed information. The latest document will be made available on the Install Fest website, <http://www.ibm.com/s390/linux/installfest/>. Check the website regularly to ensure that you have the newest documentation.

After the Install Fest, the documents will be made available on the LINUX for S/390 website.

Who should read this document?

This document is provided as a help for customers participating in the Install Fest of LINUX for S/390, November, 2000. This document can be used by system programmers, security administrators, and others involved in setting up the hardware and software in preparation for LINUX.

Assumptions

The following general assumptions are made about your background knowledge:

- You have an understanding of LINUX and S/390 terminology.
- You have an understanding of basic computer architecture, operating systems, and programs.

Installation process overview

This section gives a quick overview of the installation methods you can use and the installation process.

Installation methods

You can install in three different ways:

- Install in an LPAR
- Install natively
- Install as a guest under VM/ESA

Installation mediums

You can use one of the following installation media:

- Tape supplied by TurboLinux, or created under OS/390, VM/ESA or VSE/ESA. On a Multiprise 3000 the tape may be an emulated tape.
- VM reader. The files are obtained through the network.
- CD-ROM.

Differences between installation methods

IPL from tape is identical for all platforms. The only difference is the console:

- Under VM/ESA: 3270 screen
- All other methods: Hardware console (directly or via HMC)

Installation process

If installing from tape	If installing from VM reader	If installing from CD-ROM
Prepare the IPL tape	Get the installation files into the VM reader	Use the Load from CD-ROM or Server option on the HMC or SE
IPL from tape to load mini-system into RAM	IPL from VM reader to load mini-system into RAM	IPL from the CD-ROM
Start the installation program	Start the installation program	Start the installation program
The installation program will install LINUX on DASD	The installation program will install LINUX on DASD	The installation program will install LINUX on DASD
IPL from DASD	IPL from DASD	IPL from DASD

What to read in this document

If you are installing on...	IPLing using...	Then read this
G5 or G6		
as a VM/ESA guest	Tape	<ul style="list-style-type: none"> • “Chapter 2. IPL from tape using a VM guest” on page 5 • In “Part 2. Installing on S/390” on page 17 particularly: <ul style="list-style-type: none"> – “Network setup using a VM/ESA guest” on page 22 – “IPL on a VM/ESA system” on page 35
	VM reader	<ul style="list-style-type: none"> • “Chapter 3. IPL from the VM reader” on page 7 • In “Part 2. Installing on S/390” on page 17 particularly: <ul style="list-style-type: none"> – “Network setup using a VM/ESA guest” on page 22 – “IPL on a VM/ESA system” on page 35
on an LPAR or natively	Tape	<ul style="list-style-type: none"> • “Chapter 1. IPL from tape in a native/LPAR environment” on page 3 • In “Part 2. Installing on S/390” on page 17 particularly: <ul style="list-style-type: none"> – “Network setup using the HMC” on page 19 – “IPL on an LPAR or native system” on page 35
	Server or CD-ROM	<ul style="list-style-type: none"> • “Performing a load from CD-ROM on a G5 or G6 system” on page 9 • In “Part 2. Installing on S/390” on page 17 particularly: <ul style="list-style-type: none"> – “Network setup using the HMC” on page 19 – “IPL on an LPAR or native system” on page 35

If you are installing on...	IPLing using...	Then read this
Multiprise 3000		
as a VM/ESA guest	Tape	<ul style="list-style-type: none"> • “Chapter 2. IPL from tape using a VM guest” on page 5 • In “Part 2. Installing on S/390” on page 17 particularly: <ul style="list-style-type: none"> – “Network setup using a VM/ESA guest” on page 22 – “IPL on a VM/ESA system” on page 35
	VM reader	<ul style="list-style-type: none"> • “Chapter 3. IPL from the VM reader” on page 7 • In “Part 2. Installing on S/390” on page 17 particularly: <ul style="list-style-type: none"> – “Network setup using a VM/ESA guest” on page 22 – “IPL on a VM/ESA system” on page 35
on an LPAR or natively	Tape	<ul style="list-style-type: none"> • “Chapter 1. IPL from tape in a native/LPAR environment” on page 3 • In “Part 2. Installing on S/390” on page 17 particularly: <ul style="list-style-type: none"> – “Network setup using the HMC” on page 19 – “IPL on an LPAR or native system” on page 35
	Server or CD-ROM	<ul style="list-style-type: none"> • “Performing a boot from CD-ROM on a Multiprise 3000” on page 15 • In “Part 2. Installing on S/390” on page 17 particularly: <ul style="list-style-type: none"> – “Network setup using the HMC” on page 19 – “IPL on an LPAR or native system” on page 35

Prerequisites

It is essential that you have read the *Preparing for Installing TurboLinux for S/390* document. Before starting the installation, you must have:

- Performed the tasks necessary to set up your S/390 system
- Obtained the information requested (including APARs and MCFs)
- Obtained an IPL tape and verified that it contains the correct files

Part 1. IPL from the installation medium

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This part describes how to use the installation medium, either tape, the VM/ESA reader or CD-ROM, to load the initial file-system.

Chapter 1. IPL from tape in a native/LPAR environment

To IPL from tape in a native/LPAR environment:

1. If it is not already connected, attach your IPL tape unit to your S/390 hardware system.
2. Mount the tape cartridge to the tape unit that you intend to IPL from.
3. Get access to the service element, select the image you want to IPL and perform a **load** from the device number of your IPL tape unit. An example of the dialog box that comes up for the load is shown in Figure 1:

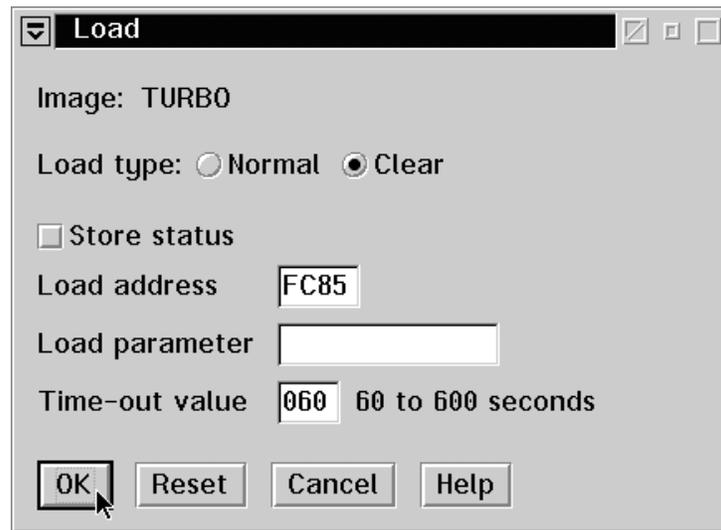


Figure 1. Load from device address of tape device

4. Confirm the load on the dialog box shown in Figure 2:

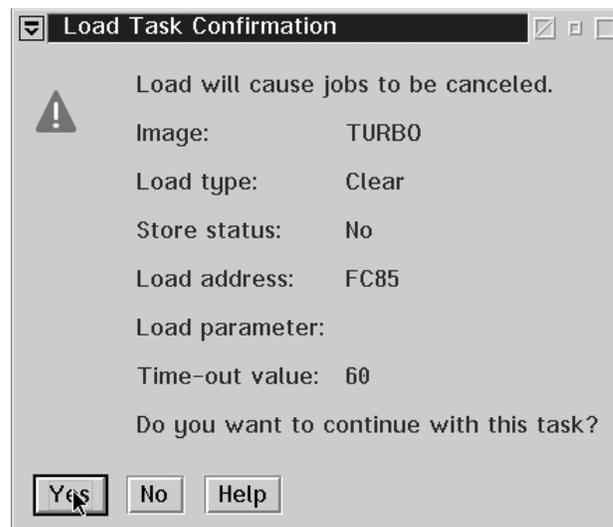


Figure 2. Confirming the load

5. After the load completes, confirm again on the dialog box shown in Figure 3 :

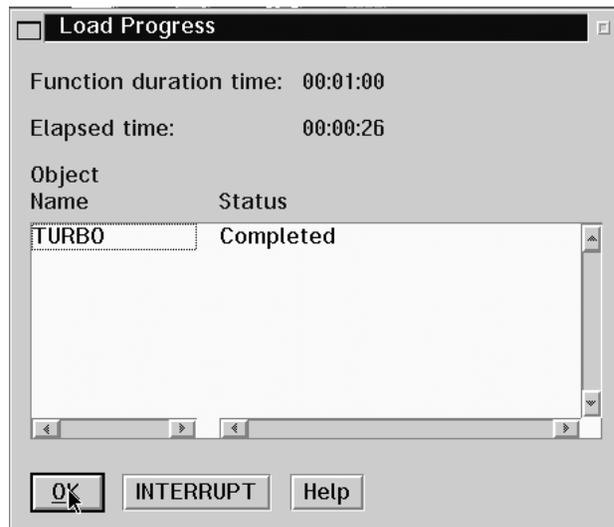
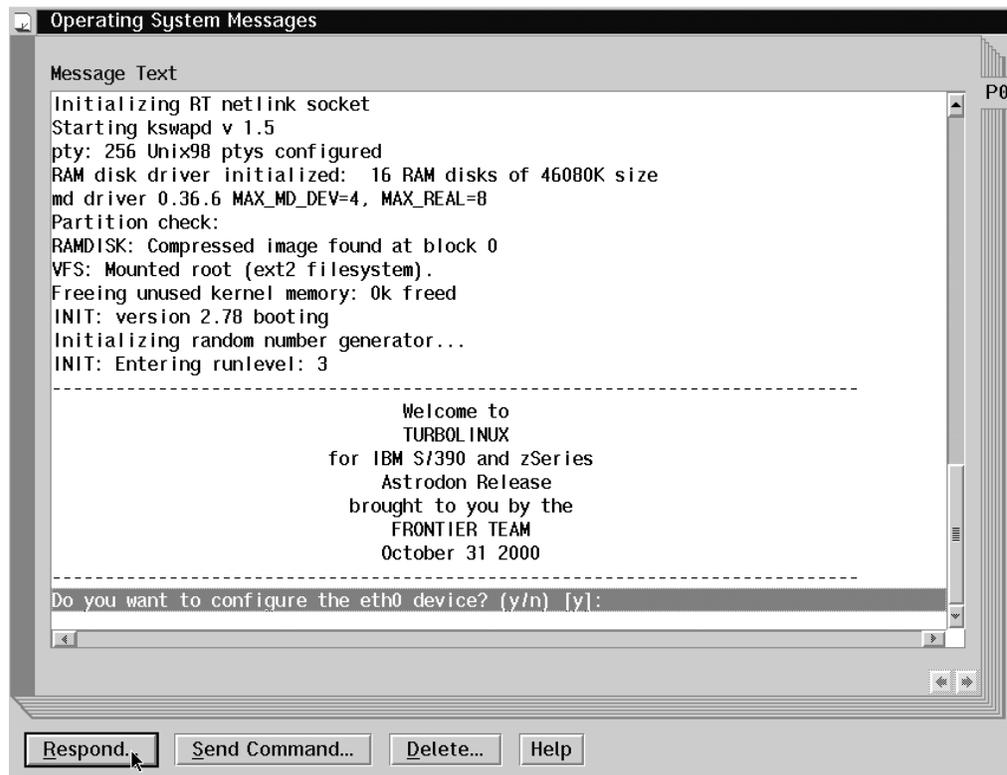


Figure 3. Completing the load

Check the operating system messages of your system, which should appear on your system console. You should see LINUX for S/390 boot messages:



Your hardware console may "hang" if it receives too many messages. Use the **Delete** button to enable further output.

To continue, see "Part 2. Installing on S/390" on page 17.

Chapter 2. IPL from tape using a VM guest

To IPL from tape using a VM guest:

1. If it is not already connected, attach your IPL tape unit to your S/390 hardware system.
2. Mount the tape cartridge to the tape unit that you intend to IPL from.
3. Perform the command:

```
#CP IPL <devno>
```

Where *devno* is the device number of your IPL tape unit.

Check the operating system messages of your system, which - under VM - appear on your system console. The kernel will be booted, and you will see boot messages on the console:

```
-----  
Welcome to  
TURBOLINUX  
for IBM S/390 and zSeries  
Astrodon Release  
brought to you by the  
FRONTIER TEAM  
October 31 2000  
-----  
Do you want to configure the eth0 device? (y/n) [y]:
```

To continue, see “Part 2. Installing on S/390” on page 17.

Chapter 3. IPL from the VM reader

To run the LIN EXEC executable that you created (see *Preparing for Installing TurboLinux for S/390*), enter:

LIN

This will use the CMS punch command to put the following files into the reader:

1. The kernel
2. The boot parameter file
3. The initial root file system (RAMdisk)

Then the kernel will be booted, and you will see boot messages on the console:

```
-----  
Welcome to  
TURBOLINUX  
for IBM S/390 and zSeries  
Astrodon Release  
brought to you by the  
FRONTIER TEAM  
October 31 2000  
-----  
Do you want to configure the eth0 device? (y/n) [y]:
```

To continue, see “Part 2. Installing on S/390” on page 17.

Chapter 4. Load from CD-ROM

This chapter describes how to do a load from CD-ROM on a Multiprise 3000, G5, or G6 system. A G5 or G6 system is delivered with an internal SE (a ThinkPad without a CD-ROM drive) and an HMC (with a CD-ROM drive). A Multiprise 3000 has an integrated CD-ROM drive and an integrated SE. The boot is slightly different on a Multiprise 3000 to that on a G5 or G6 system.

Before you begin:

- All required microcode fixes must be installed on the SE and the HMC.

Performing a load from CD-ROM on a G5 or G6 system

1. On the HMC, select **Single object operation** on the machine you want to work with, as shown in Figure 4.

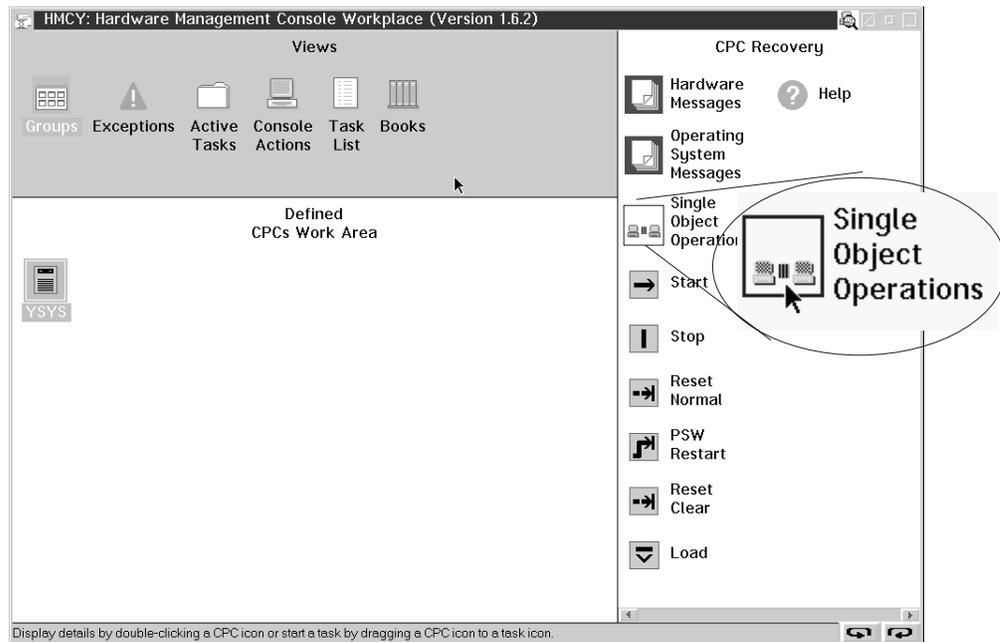


Figure 4. The HMC with the CPC Recovery window

2. Select the machine in which you want to IPL, as shown in Figure 5.

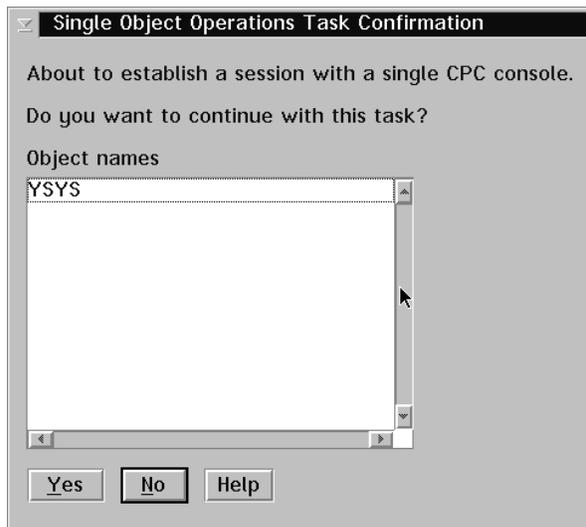


Figure 5. Selecting the machine

3. From CPC Recovery, select the image you want to IPL and then click the **Load from CD-ROM or server** icon as shown in Figure 6

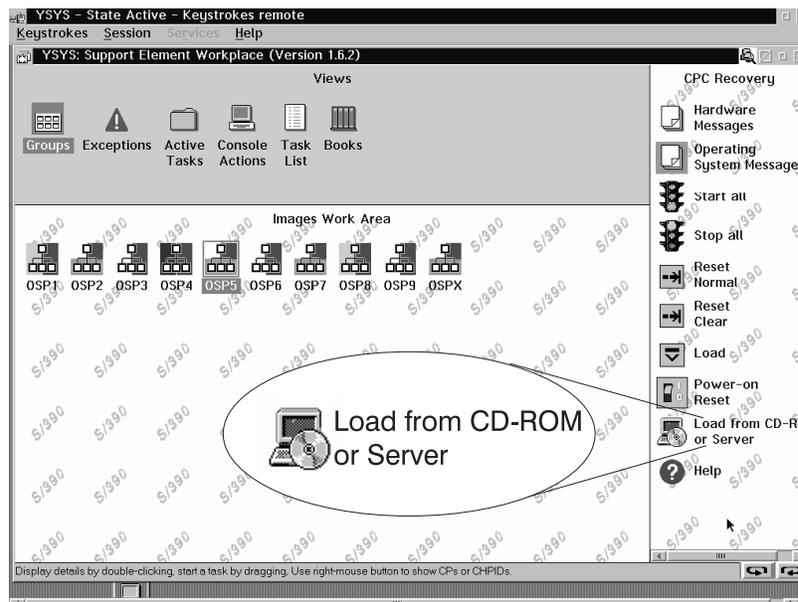


Figure 6. Load from CD-ROM or Server

4. If you selected more than one image, select the image you want to IPL, and click **OK**
5. On the task confirmation panel, select **Yes** as shown in Figure 7 on page 11

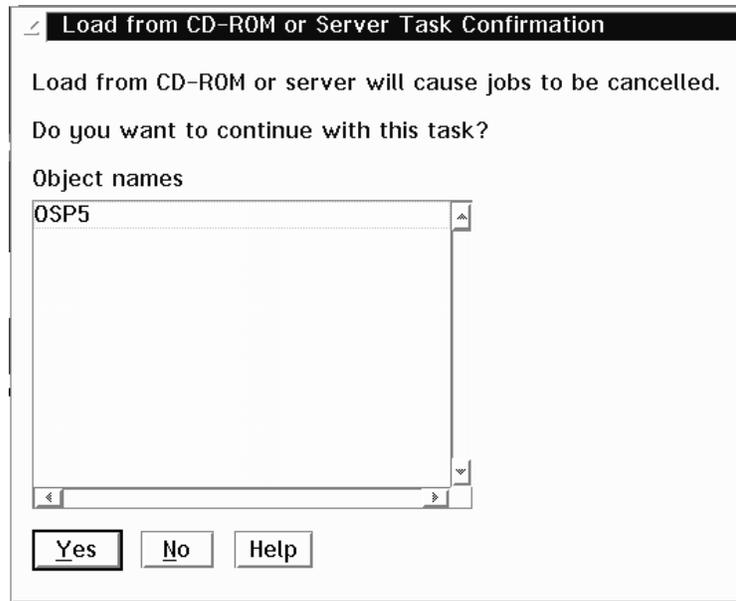


Figure 7. Confirming the action

6. Select the **Hardware Management Console CD-ROM** radiobutton for the source for IPL, as shown in Figure 8. This is because the CD that you are loading from is integrated with the HMC. On a Multiprise 3000 system, the CD-ROM drive is local.

An alternative would be to have the CD-ROM or the CD image on a PC in the network. Then you would choose **FTP source** here.

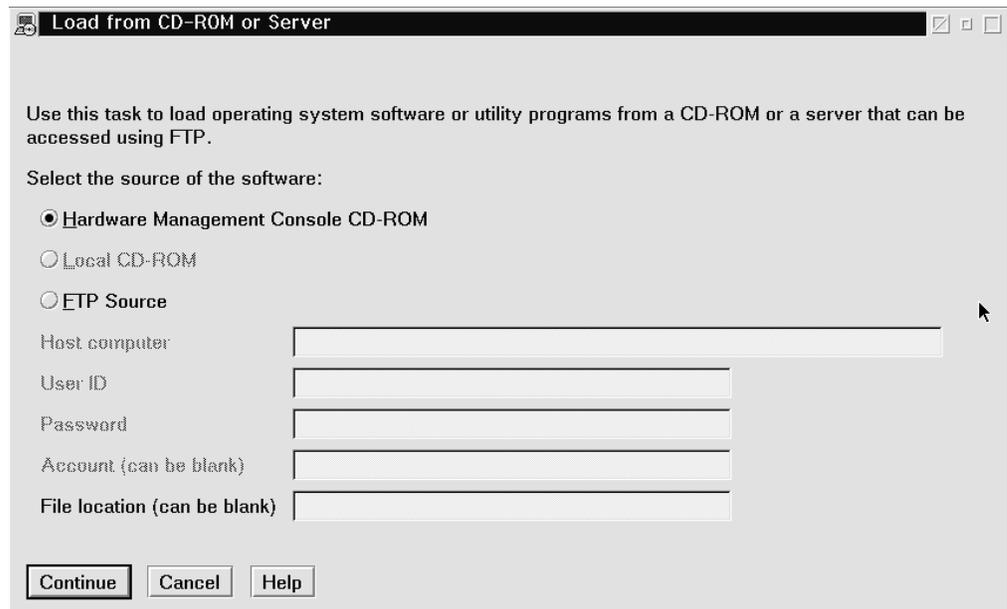


Figure 8. Selecting the source of the software

7. From the list of files on the CD, select the TurboLinux installation file (TURBO.INS), as shown in Figure 9 on page 12. (If you have your own installation files on a server, you could have chosen one of them here.)

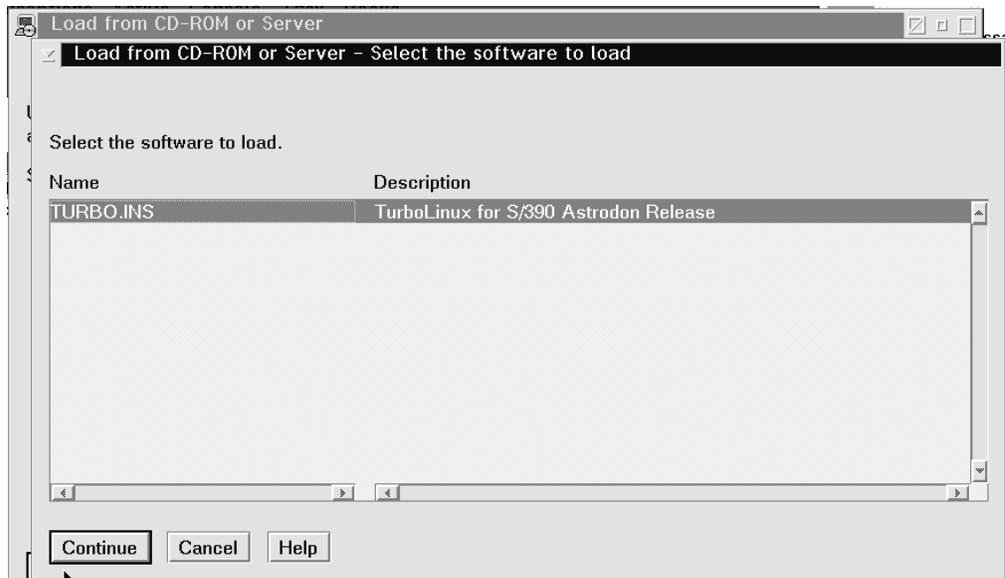


Figure 9. Selecting the software

8. Deactivate all channels of devices that are not supported, for example, coupling facility channels.
9. Confirm the action by selecting **Yes**, as shown in Figure 10.

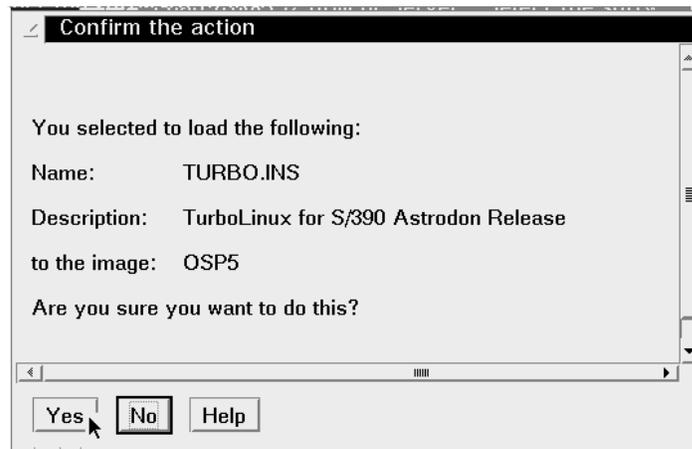


Figure 10. Confirm the action

First the software is loaded from the CD-ROM. A progress windows will appear as shown in Figure 11 on page 13.

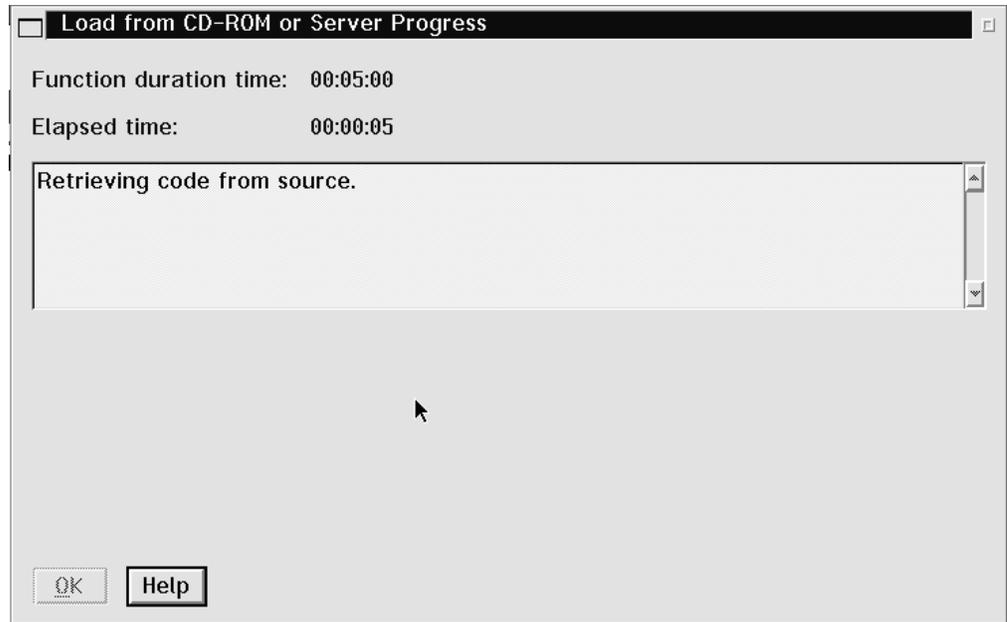


Figure 11. Retrieving code from CD-ROM progress

Next, the software will be loaded into the system, as indicated by the progress window shown in Figure 12

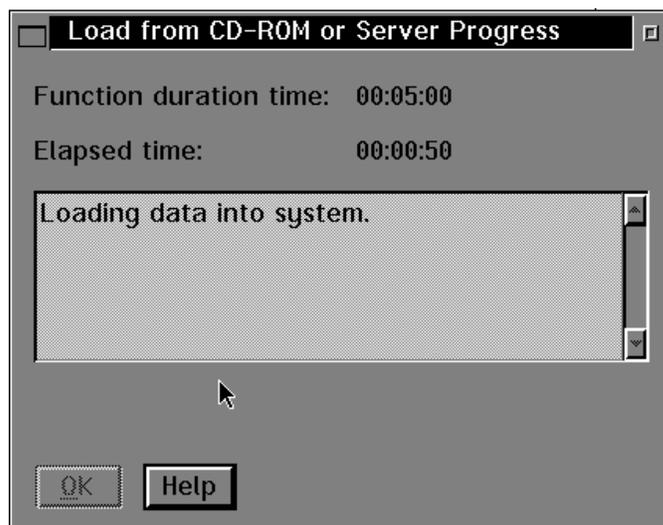


Figure 12. Loading the software into the system

Successful completion of the load will be reported by a message shown in Figure 13 on page 14

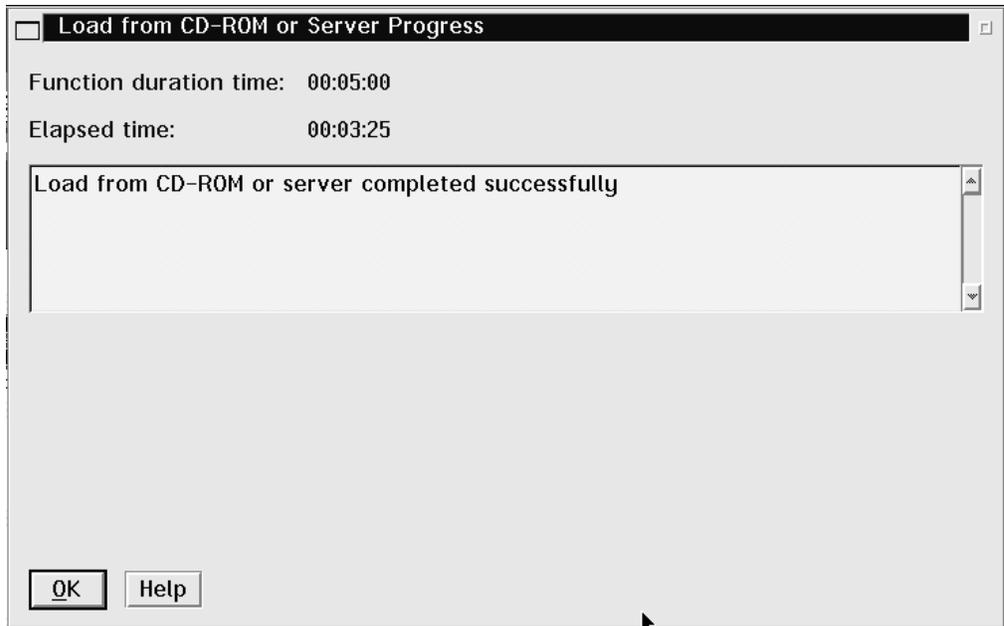


Figure 13. Completion message

10. You can then look at the operating system messages by selecting the icon as shown in Figure 14.

You will see messages as shown in Figure 15 on page 15:

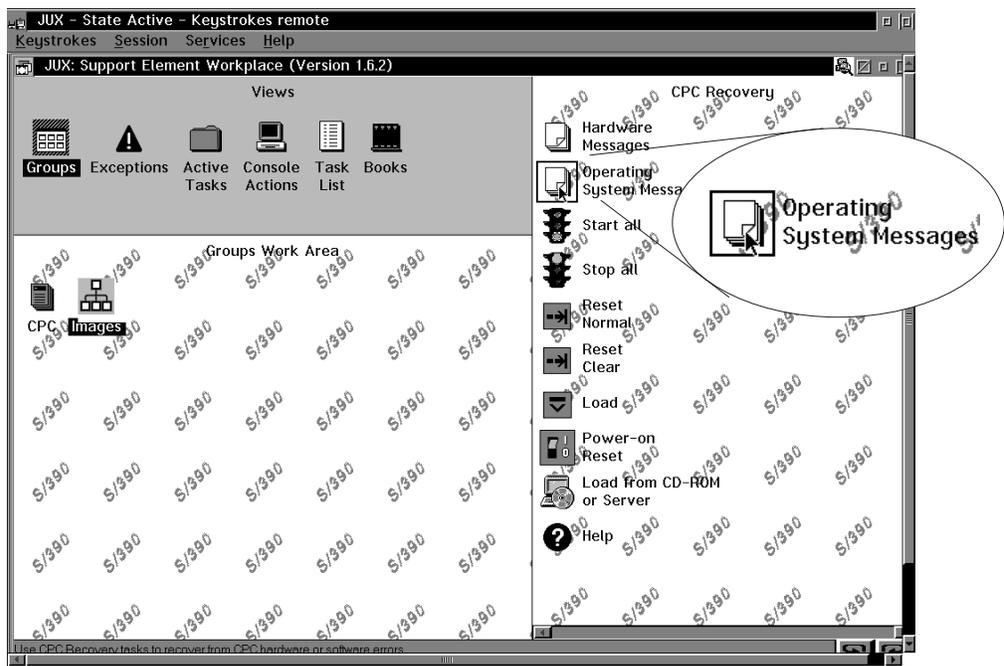


Figure 14. Selecting the Operating System Messages icon

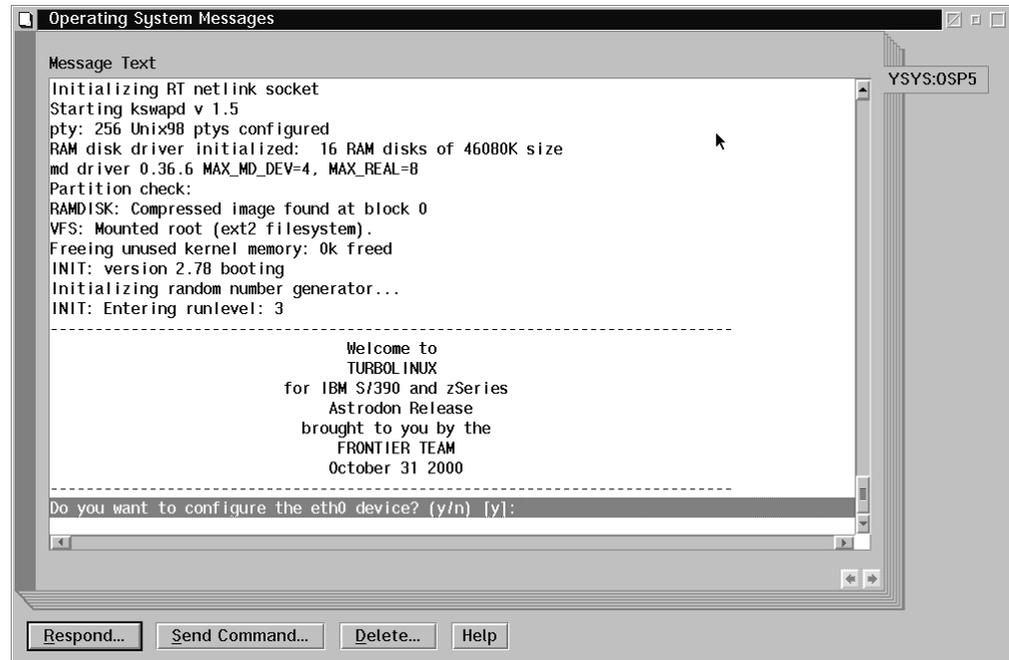


Figure 15. Operating System Messages

Now the installation proper will begin. You will be prompted for information.

To continue, see "Part 2. Installing on S/390" on page 17.

Performing a boot from CD-ROM on a Multiprise 3000

The steps to perform on a Multiprise 3000 are very similar to those on a G5 or G6 system, with the exception of step 7 below, where you choose Local CD as the source for the files:

1. On the integrated SE, log on and wait for the license agreement to finish displaying.
 2. Insert the CD in the CD-ROM drive.
 3. Select the machine in which you want to IPL
 4. From CPC Recovery, select the image you want to IPL and then click the **Load from CD-ROM or server** icon
 5. On the task confirmation panel, select **Yes**
 6. Select the **Local CD-ROM** radiobutton for the source for IPL.
 7. From the list of files on the CD, select the TurboLinux installation file (TURBO.INS)
 8. Deactivate all channels of devices that are not supported, for example, coupling facility channels.
 9. Confirm the action by selecting **Yes**
- Source code will be retrieved from the CD and loaded into the system. Finally you will see the TurboLinux boot messages appear on the console message window

To continue, see "Part 2. Installing on S/390" on page 17.

Part 2. Installing on S/390

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The following scenario describes installation of the final system using a bootstrap system. Differences between different systems and access methods are described:

- Differences using the HMC or SE and the VM console.
- Differences using OS/2 telnet and a Windows telnet client.
- Differences when IPLing the VM guest and the LPAR or native system.

Chapter 5. Setting up the bootstrap system

This chapter describes how to set up the network connection for the bootstrap system in order to access the installation CDs for the full system.

Network setup for bootstrap system

Depending on how you have chosen to install, use these sections when setting up the network

- For a description of how to use the HMC or SE, see “Network setup using the HMC”.
- For a description of how the installation will look on VM, see “Network setup using a VM/ESA guest” on page 22

Network setup using the HMC

1. On the Operating messages console, you will see a screen similar to Figure 16. To answer the question put to you by the installation script, click the **Response** button.

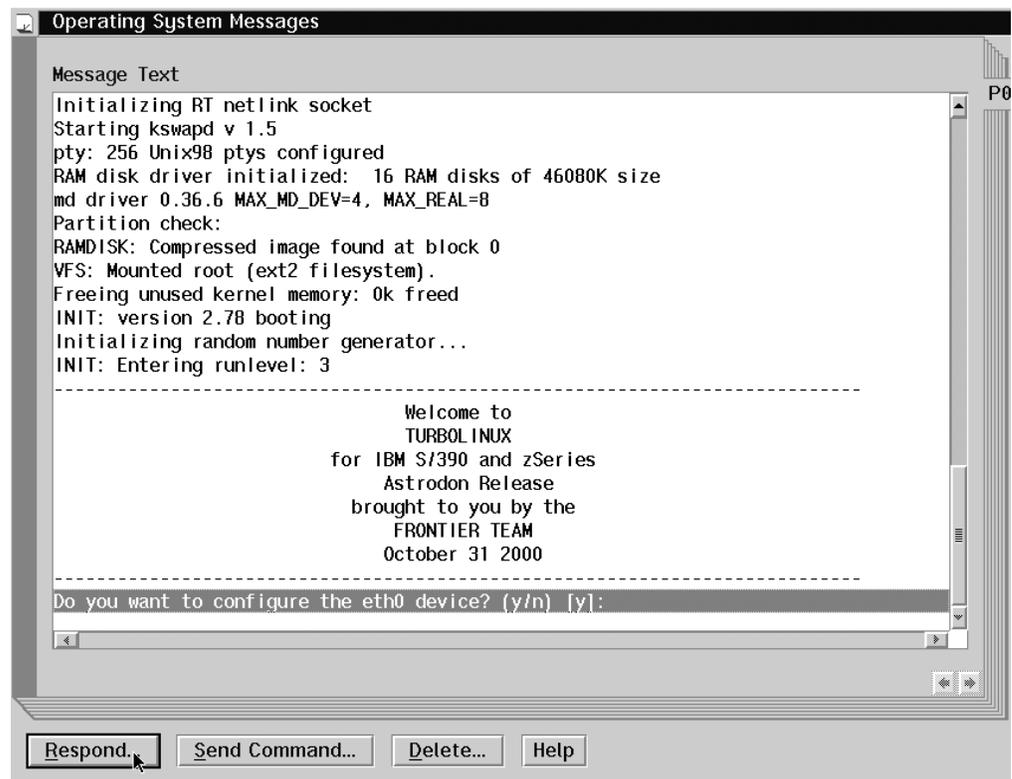


Figure 16. Operating messages

2. In the Response dialog shown in Figure 17 on page 20, answer the question, here, for example, **n** in order not to configure the eth0 device:

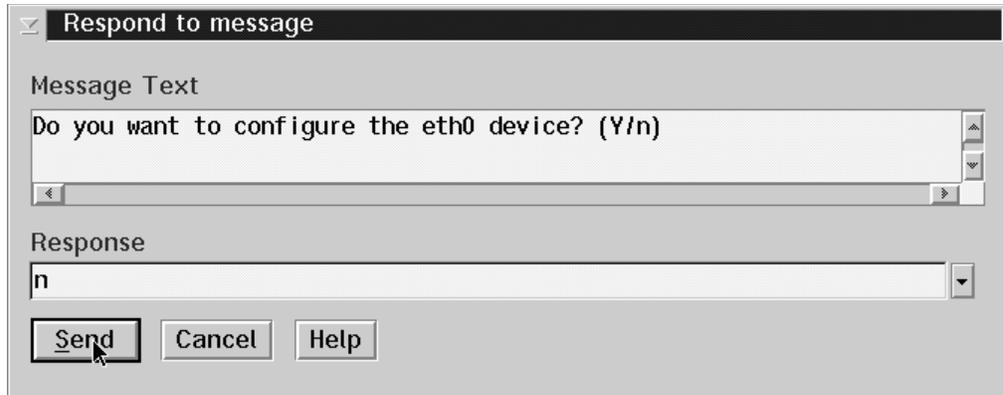
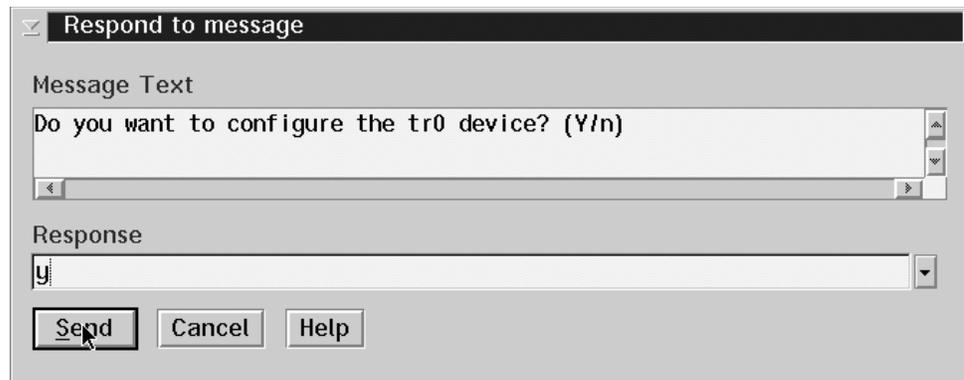


Figure 17. Ethernet and Token Ring

3. In this example, we will configure the Token Ring interface, and so answer yes to the question about the tr0 interface:



4. Using the **Response** button, fill in the data about the Token Ring connection. An example is shown in Figure 18 on page 21.
The broadcast address and the network address will be calculated for you from the IP address and the netmask; accept the offered default values. Also accept the default value for the MTU size.

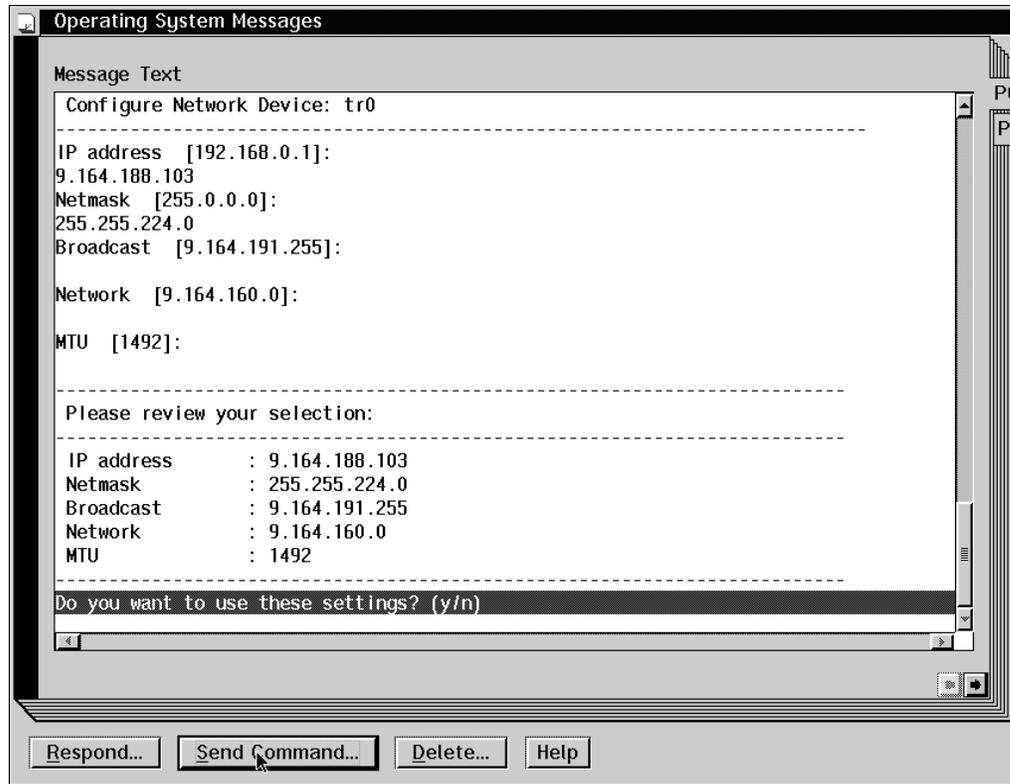


Figure 18. Response

5. You will then be prompted to review your settings. Respond with **y** as shown in Figure 19, if the settings are correct. Otherwise respond with **n** to correct the settings.

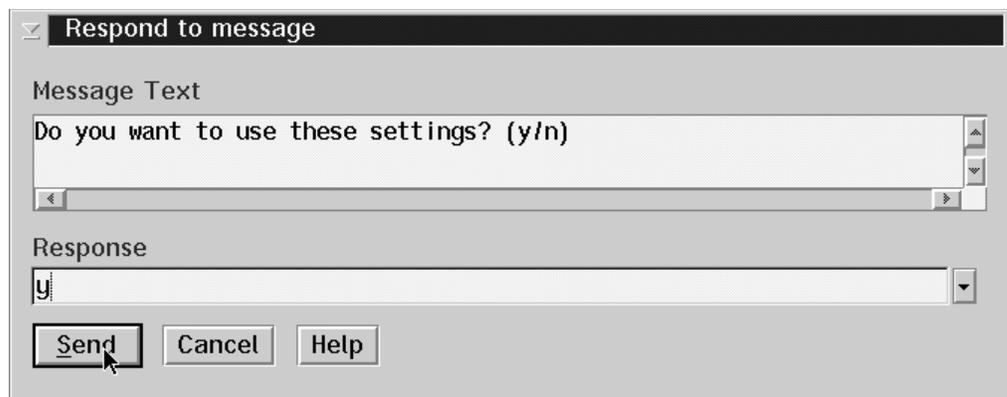


Figure 19. Confirm TokenRing settings

To continue, see “Setting the device independent settings” on page 23.

Network setup using a VM/ESA guest

After kernel initialization, you will be asked to specify the network settings:

```
-----  
Welcome to  
TURBOLINUX  
for IBM S/390 and zSeries  
Astrodon Release  
brought to you by the  
FRONTIER TEAM  
October 31 2000  
-----  
Do you want to configure the eth0 device? (y/n) [y]:
```

1. Select the connection you need, for example, in order to specify a Token Ring connection, answer, **n** to eth0 (Ethernet) and **y** to tr0:

```
Do you want to configure the eth0 device? (Y/n)n  
Do you want to configure the tr0 device? (Y/n)  
y
```

Alternatively, if you are using, for example CTC, you answer **y** to ctc0:

```
Do you want to configure the ctc0 device? (y/n) [y]:  
y
```

2. For Token Ring, enter the IP address and the netmask.

The broadcast address and the network address will be calculated for you from the IP address and the netmask; accept the offered default values by pressing **Enter** (you might need to press **Enter** twice on VM/ESA). Also accept the default value for the MTU size.

```
-----  
Configure Network Device: tr0  
-----  
IP_address__[192.168.0.1]: 9.164.185.103  
Netmask__[255.0.0.0]: 255.255.224.0  
Broadcast__[9.164.191.255]:  
Network__[9.164.160.0]:  
MTU__[1492]:
```

If you are using, for example, CTC, you will be asked to configure the point-to-point connection:

```
-----  
Configure Point to Point Device: ctc0  
-----
```

```
IP address [192.168.0.1]:  
9.117.32.54  
9.117.32.54  
Peer address [192.168.0.1]:  
9.117.32.15  
9.117.32.15  
MTU [1492]:  
1492  
1492
```

3. If your entries are correct, confirm your settings, for example, for Token Ring, with **y**:

```
Please review your selection:
```

```
IP_address      : 9.164.185.103  
Netmask         : 255.255.224.0  
Broadcast       : 9.164.191.255  
Network        : 9.164.160.0  
MTU             : 1492
```

```
Do you want to use these settings? (y/n)  
y
```

4. Answer **n** to the questions about specifying other network devices:

```
Do you want to configure the escon0 device? (y/n)n
```

To continue, see “Setting the device independent settings”.

Setting the device independent settings

1. The installation script will ask for the device independent settings. You will need to specify:
 - Hostname
 - Gateway IP address
 - Gateway device
 - Nameserver IP address
 - Domain search list

Use the values from the installation worksheets in *Preparing for Installing TurboLinux for S/390* for network data and devices. For example:

```
-----  
Configure Device Independent Network Settings  
-----
```

```
Hostname [darkstar.frop.org]: g2usr09.boeblingen.de.ibm.com  
Gateway IP address [9.164.185.254]: 9.164.181.1  
Gateway device [tr0]: tr0  
Nameserver IP-address [9.164.185.254]: 9.164.178.1  
Domain search list [boeblingen.de.ibm.com]: boeblingen.de.ibm.com
```

As before, on the HMC or SE, use the Response button to enter the answers.

- Depending on the interface you are using, you will be asked for the LCS settings. For example, both tr0 and ctc0 require the LCS module. For Token Ring, these should reflect your device number, in the example 4810, and the port, in the example 0, so in the example we would enter:

```
noauto=1 devno_portno_pairs=0x4810,0
```

The following interface require the lcs module:

```
tr0
```

Please type in the required options for the lcs module, e.g. to select relative port 1 on device 0xfd00 you should enter:

```
noauto=1 devno_portno_pairs=0xfd00,1
```

```
lcs options []: noauto=1 devno_portno_pairs=0x4810,0
```

- For CTC, you need to enter the CTC options, as in this example, where virtual channels 0B40 and 0B41 have been set up and connected:

The following interfaces require the ctc module:

```
ctc0
```

Please type in the required options for the ctc module, e.g.

```
ctc=0,0x600,0x601,ctc0
```

```
ctc options []:
```

```
ctc=0,0xb40,0xb41,ctc0
```

```
ctc=0,0xb40,0xb41,ctc0
```

For more information about the LCS device driver options, see *LINUX for S/390 Device Drivers and Installation Commands*.

- Confirm your settings with y:

Please review your selection:

```
-----
Hostname       : g5usr09.boeblingen.de.ibm.com
Gateway IP     : 9.164.181.1
Gateway Device : tr0

Nameserver IP  : 9.164.178.1
Searchlist     : boeblingen.de.ibm.com
LCS options    : noauto=1 devno_portno_pairs=0x4810,0
-----
Do_you_want_to_use_these_settings?_(y/n)y_
```

You will see messages about configuring LCS and services being started.

When you see the bash prompt, you can log in via telnet. See "Starting the installation program" on page 25.

Chapter 6. Setting up the final system

This chapter describes how to set up the system where LINUX will run. Start with establishing a telnet session to that system and starting the installation program.

Starting the installation program

This section describes two methods of using telnet to log on to the LINUX for S/390 system:

- OS/2 telnet
- Windows putty

Telnet in to the system using OS/2 telnet

After you have entered a password, bash comes up, as shown in Figure 20. This is where you should use telnet to access the system.



```
...  
bash-2.04#
```

Figure 20. Bash command line

1. Telnet in to the system, using, for example, OS/2, as shown in Figure 21:



Figure 21. Telnet

2. At the login prompt, enter root. No password is necessary.
3. Start the install script `install.pl` as shown in Figure 22:



Figure 22. Starting the installation program

You are now ready to select the DASDs you want to use for LINUX. To continue, see "Selecting DASDs and installation method" on page 27.

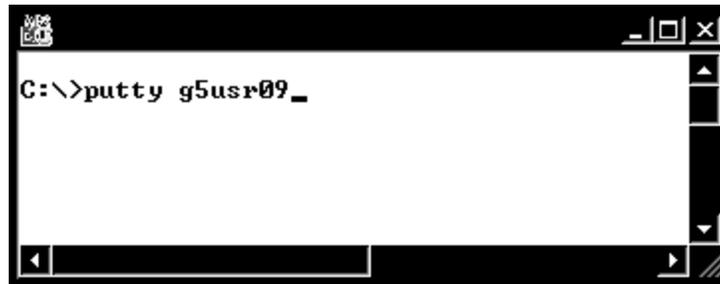
Telnet into the system using Windows PuTTY

After you have entered a password, bash comes up, as shown in Figure 23. This is where you should use telnet to access the system.

```
...  
bash-2.04#
```

Figure 23. Bash command line

1. To telnet in you can use, for example, PuTTY:



2. Login to the LINUX for S/390 system with user ID root (no password is necessary).
3. Start the install script by entering
install.pl



You are now ready to select the DASDs you want to use for LINUX. To continue, see “Selecting DASDs and installation method” on page 27.

Selecting DASDs and installation method

1. Enter the DASDs you want to use for LINUX at the prompt as shown in Figure 24:

```
-----  
Which DASD's do you want to have available in Linux?  
-----  
Example: 192, 194-196  
Example: fd02, fd04-fd06  
  
DASD's: fd14, fd1a  
insmod das_mod das=fd14,fd1a  
Using /lib/modules/2.2.16/misc/dasd_mod.o
```

Figure 24. DASDs

2. You might be asked to format the DASDs. Enter the number for the DASD to format:

```
One or more dasds need low level fomatting  
-----  
      Number  Type   Name   Status  BlkSize  Blocks  FS  
1      FD14   ECKD   dasda   n  
2      FD1A   ECKD   dasdb   n  
-----  
Format disk[# or q]: 1  
dasdfmt -b 4096 -f /dev/dasda
```

3. Confirm the format with **yes**:

```
I am going to format the device /dev/dasda in the following way:  
Device number of device : 0xfd14  
Major number of device : 94  
Minor number of device : 0  
Labelling of device      : yes  
Disk label                : LNX1 x80405200  
Blocksize                 : 4096  
  
--->> ATTENTION! <<---  
All data in the specified range of that device will be lost.  
Type "yes" to continue, no will leave the disk untouched: yes
```

The format can take up to 25 –30 min depending on your disk. Format all the disks in the same way.

4. Enter your choice of swap device as shown in Figure 25:

```
Choose a swap device  
-----  
      Number  Type   Name   Status  BlkSize  Blocks  FS  
1      FD14   ECKD   dasda   active  4096    601020  
2      FD1A   ECKD   dasdb   active  4096    200340  
-----  
Swap_disk_[#_or_q] 2
```

Figure 25. Swap device

Messages will show the swap device being defined:

```

mkswap /def/dasdb1
init_swap: Setting up swapspace version 1, size = 820576256 bytes
chmod 600 /dev/dasdb1
swapon / dev/dasdb1

```

5. Enter your choice of root file system, as shown in Figure 26:

```

Which disk should be the root filesystem?
-----
      Number  Type   Name   Status  BlkSize  Blocks  FS
-----
1         FD14   ECKD   dasda   active  4096    601020
-----
Root_Disk_ [#] 1
Create_a_new_filesystem_on_/dev/dasda1?_[y/n]y

```

Figure 26. Root file system

The root file system will be set up, and you will see messages like those shown in Figure 27:

```

setup_fs: Fragment size=4096 (log=2)
setup_fs: 300960 inodes, 601017 blocks
setup_fs: 30050 blocks (5.00%) reserved for the super user
setup_fs: First data block=0
setup_fs: 19 block groups
setup_fs: 32768 blocks per group, 32768 fragments per group
setup_fs: 15840 inodes per group
setup_fs: Superblock backups stored on blocks:
setup_fs:      32768, 98304, 163840, 229376, 294912
setup_fs:
setup_fs: Writing inode tables: done
setup_fs: Writing superblocks and filesystem accounting information: done
mount /dev/dasda1 /mnt/root/
      Number  Type   Name   Status  BlkSize  Blocks  FS
-----
1         FD14   ECKD   dasda   active  4096    601020  /
2         FD1A   ECKD   dasdb   active  4096    200340  swap

```

Figure 27. Messages after setting up root file system

6. Enter the choice for where the installation data is stored:

- 1) For an NFS server
- 2) For an FTP server
- 3) To quit the installation

In the example, Figure 28, NFS is chosen:

```

Please choose an install method:

1) NFS
2) FTP
3) quit

Which_method? 1

```

Figure 28. NFS

Alternatively, for FTP, enter a 2. You will be prompted for a the hostname, the path, a user ID and a password for the FTP server.

7. Depending on what you chose, you now need to tell the install program what the path is to the NFS or FTP server. Figure 29 shows an example of an NFS path.

```
NFS_hostname: hetaix
NFS_path: /home/linux/linux/turbo
mount -t nfs hetaix:/home/linux/linux/turbo /mnt/rpms
```

Figure 29. NFS path

The messages will show the NFS server being mounted.

8. Now you must select the type of server to be installed.

```
1      Web server
2      Ftp server
3      SMB file server
4      Web/Ftp Proxy server
5      All servers
6      Development (All-in-One)
```

Package selection:

Enter the number corresponding to your selection

- 9.

Next all the rpm packages are installed:

```
1/488: setup-6.0-10.noarch.rpm
2/488: filesystem-1.3.5-3.noarch.rpm
3/488: ldconfig-1.9.5-17.s390.rpm
4/488: glibc-2.1.3-13.s390.rpm
5/488: bash-2.04-4.s390.rpm
...
...
...
486/488: howto-6.2-2.noarch.rpm
487/488: kernel-doc-2.2.16-122.s390.rpm
488/488: libungif-devel-4.1.0-3.s390.rpm
```

You are now ready to set the timezone for your system.

Setting the timezone

1. To select you timezone, scroll forward through the screens, an example is shown in Figure 30 on page 30, until you see your time zone.

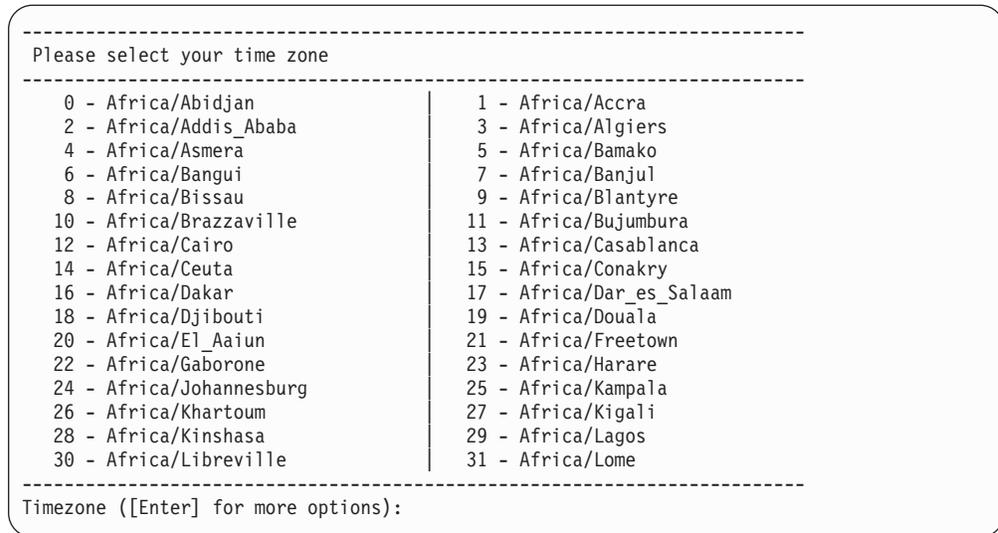


Figure 30. The timezones

2. Enter the number in front of your timezone, as shown in Figure 31:

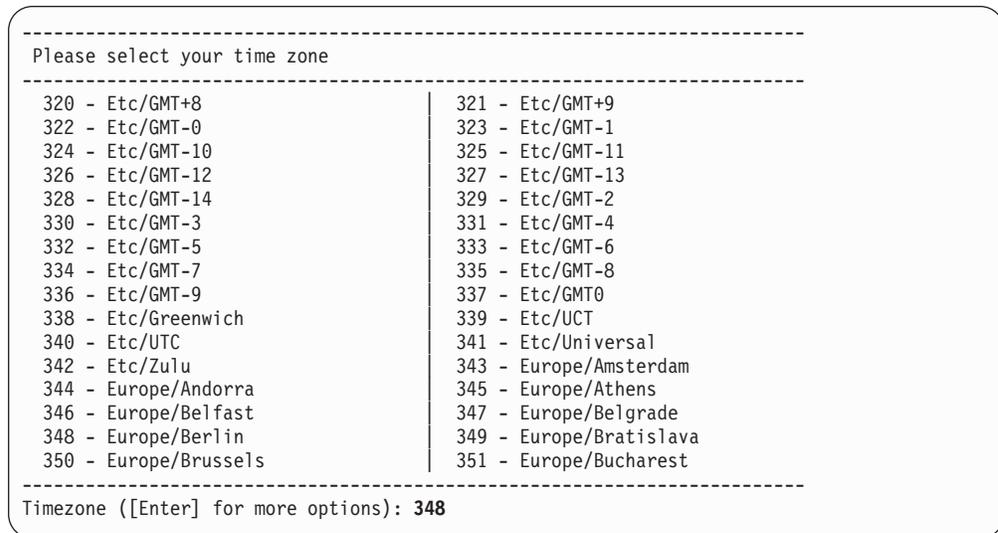


Figure 31. The number of the timezone

You are now ready to set the network settings for the final system.

Specifying the network device settings for the final system

After the time zone settings, you will be asked for network devices to configure.

1. You need to configure either a Token Ring or an Ethernet connection. In this example, a Token Ring connection is used. To select the tr0 device, enter **y** when asked for the tr0 device:

```

Do_you_want_to_configure_the_eth0_device?(Y/n)n
Do_you_want_to_configure_the_tr0_device?(Y/n)y

```

2. Enter the:
 - IP address
 - Netmask
 - Broadcast address (will be calculated based on the IP address and the netmask; accept the offered default value)
 - Network address (will be calculated based on the IP address and the netmask; accept the offered default value)
 - MTU

```

-----
Configure Network Device: tr0
-----

IP_address_[192.168.0.1]: 9.164.188.103
Netmask_[255.0.0.0]: 255.255.224.0
Broadcast_[9.164.191.255]: 9.164.191.255
Network_[9.164.160.0]: 9.164.160.0
MTU_[1492]: 1492

```

3. Confirm the settings with **y** if they are correct.

```

-----
Please review your selection:
-----

IP_address      : 9.164.188.103
Netmask         : 255.255.224.0
Broadcast       : 9.164.191.255
Network         : 9.164.160.0
MTU             : 1492

-----
Do_you_want_to_use_these_settings?(y/n)y

```

4. Answer **n** for the other devices unless you want to configure another one:

```

Do_you_want_to_configure_the_ctc0_device?(Y/n)n
Do_you_want_to_configure_the_escon0_device?(Y/n)n

```

You are now ready to set the device independent network settings for the final system.

Specifying device independent network settings for the final system

1. For the network independent settings, specify:
 - Hostname
 - Gateway IP address
 - Gateway device
 - Nameserver IP address
 - Domain search list

Use the values from the "Installation worksheet for LPAR or native" or "Installation worksheet for VM/ESA" in *Preparing for Installing TurboLinux for S/390* for network data. For example:

```
-----  
Configure Device Independent Network Settings  
-----
```

```
Hostname__[darkstar.frop.org]: boeaet34.boeblingen.de.ibm.com  
Gateway_IP_address__[9.164.188.254]: 9.164.181.1  
Gateway_device__[tr0]: tr0  
Nameserver_IP-address__[9.164.188.254]: 9.164.178.1  
Domain_search_list__[boeblingen.de.ibm.com]: boeblingen.de.ibm.com
```

2. Since the tr0 interface requires the LCS module, you will be asked for the LCS settings. Ensure that the values from the installation worksheets in *Preparing for Installing TurboLinux for S/390* for "Device for network connection" is used. Press **Enter** to accept the proposed defaults if they are correct, or enter different parameters if required:

```
The following interface require the lcs module:
```

```
tr0
```

```
Please type in the required options for the lcs module, e.g. to  
select relative port 1 on device 0xfd00 you should enter:
```

```
noauto=1 devno_portno_pairs=0xfd00,1
```

```
lcs_options__[noauto=1 devno_portno_pairs=0xfc24,3]:
```

3. Confirm your settings, if they are correct:

```
-----  
Please review your selection:  
-----
```

```
Hostname      : boeaet34.boeblingen.de.ibm.com  
Gateway IP    : 9.164.181.1  
Gateway Device : tr0  
  
Nameserver IP : 9.164.178.1  
Searchlist    : boeblingen.de.ibm.com  
LCS options   : noauto=1 devno_portno_pairs=0xfc24,3
```

```
-----  
Do_you_want_to_use_these_settings?(y/n)y
```

You are now ready to add a user to the system.

Adding a user

After specifying the network settings you will be asked to add a user:

1. Answer **y** to add a new user:

```
Do_you_want_to_add_a_new_user?(Y/n)Y
```

2. Enter a name and a password for the user:

```
User_Name:__[neo]: linuser  
Please set a password for linuser:  
Changing password for user linuser:  
New UNIX password:  
  
Retype new UNIX password:  
passwd: all authentication tokens updated successfully
```

You are now ready to specify a root password for the system.

Specifying a root password

1. Specify a root password.
2. Retype the root password to confirm:

```
Please enter a password for the root user:
Changing password for user root
New UNIX password:
Retype new UNIX password:
passwd: all authentication tokens updated successfully
```

You are now ready to set the boot disk for the system.

Disk configuration

1. Select the disk to use for boot, in the example FD14 will be used:

```
-----
Silo Configuration
-----
      Number  Type   Name   Status  BlkSize  Blocks  FS
1         FD14   ECKD   dasda   active  4096    601020  /
2         FD1A   ECKD   dasdb   active  4096    200340  swap
-----
Boot_Disk_[#] 1
```

You will see messages as silo sets up the boot disk:

```
chroot /mnt/root silo -f /boot/image-2.2.16-122-tape -d /dev/dasda -p /boot/parm
-b /boot/ipleckd.boot -t2
Silo: o->image set to /boot/image-2.2.16-122-tape
Silo: o->ipldevice set to /dev/dasda
Silo: o->parmfile set to /boot/parm
Silo: o->bootsect set to /boot/ipleckd.boot
Silo: Testonly flag is now 0
Silo: Testlevel is set to 0
Silo: IPL device is: '/dev/dasda'
Silo: bootsector is: '/boot/ipleckd.boot'...ok...
Silo: bootmap is set to: './boot.map'...ok...
Silo: Kernel image is: '/boot/image-2.2.16-122-tape'...ok...
Silo: original parameterfile is: '/boot/parm'...ok...final parameterfile is: '/b
oot/parm'...ok...
Silo: ix 0: offset: 078523 count: 0c address: 0x00000000
Silo: ix 1: offset: 078530 count: 80 address: 0x0000c000
Silo: ix 2: offset: 0785b0 count: 80 address: 0x0008c000
Silo: ix 3: offset: 078630 count: 6f address: 0x0010c000
Silo: ix 4: offset: 07a8de count: 01 address: 0x00008000
Silo: Bootmap is in block no: 0x00001ed7
[root@boeaet34 /root]#
```

You are now ready to IPL the final system. See “Chapter 7. IPL of the final system” on page 35.

Chapter 7. IPL of the final system

This chapter describes how to IPL from DASD. Use the section corresponding to the system you have installed on:

- For VM/ESA: “IPL on a VM/ESA system”.
- For LPAR or native: “IPL on an LPAR or native system”.

IPL on a VM/ESA system

1. Issue a halt command:

```
[root@boeaet34 /root]# halt
```

A message will confirm the halt command:

```
Broadcast message from root (tty0) Fri Sep 29 14:45:50 2000...
The system is going down for system halt NOW !!
[root@boeaet34 /root]#
```

2. Re-IPL from your newly generated DASD IPL using the following command on the console:

```
#CP IPL <devno> clear
```

Where *devno* is the device number of your DASD. If you are in CMS or CP read mode, you do not need the #CP:

```
ipl FD14 clear
```

You can see messages as TurboLinux loads and starts services such as inetd:

```
...
Starting cron daemon: cron
Starting INETD services: inetd
Starting sshd: sshd
Give root password for maintenance
(or type Control-D for normal startup):
```

When asked to, type in the root password to, for example, add more users, or start apache.

Installation is now complete.

IPL on an LPAR or native system

To re-IPL the image:

1. Issue a halt command:

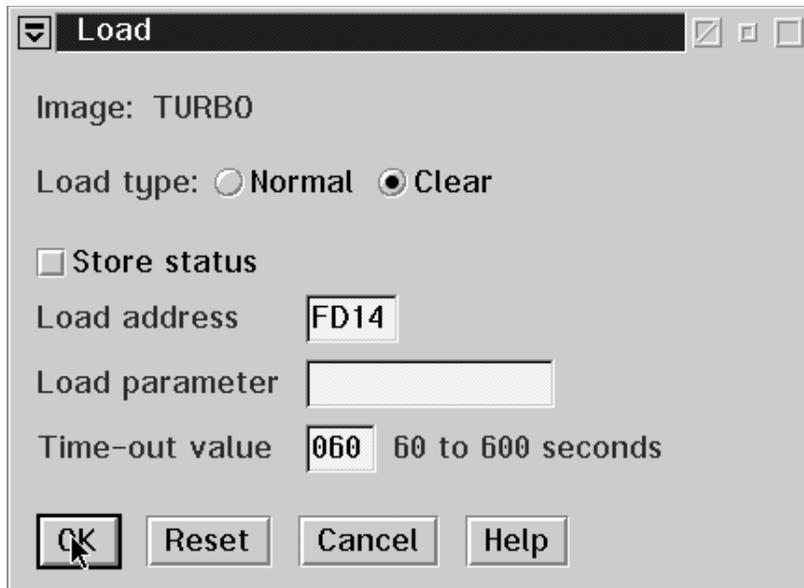
```
[root@boeaet34 /root]# halt
```

A message will confirm the halt command:

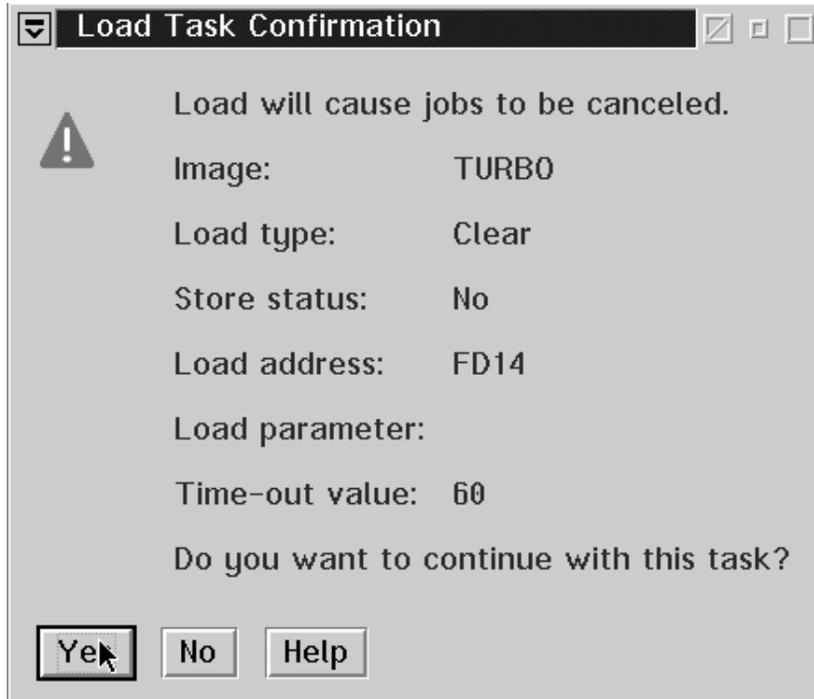
```
Broadcast message from root (tty0) Fri Sep 29 14:45:50 2000...
```

```
The system is going down for system halt NOW !!  
[root@boeaet34 /root]#
```

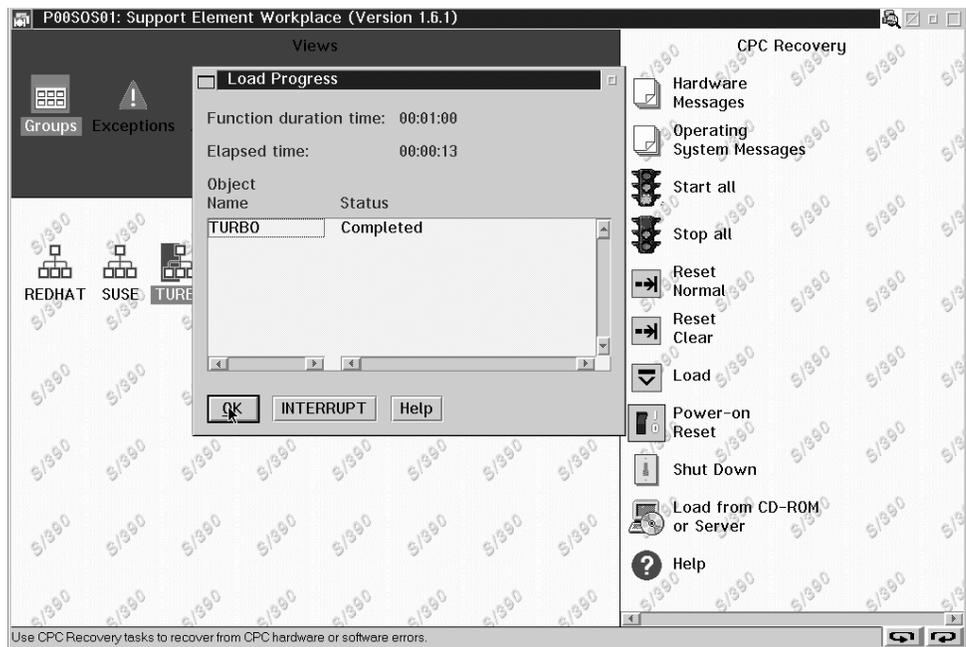
2. On the HMC or SE, do a LOAD from the boot disk previously specified:



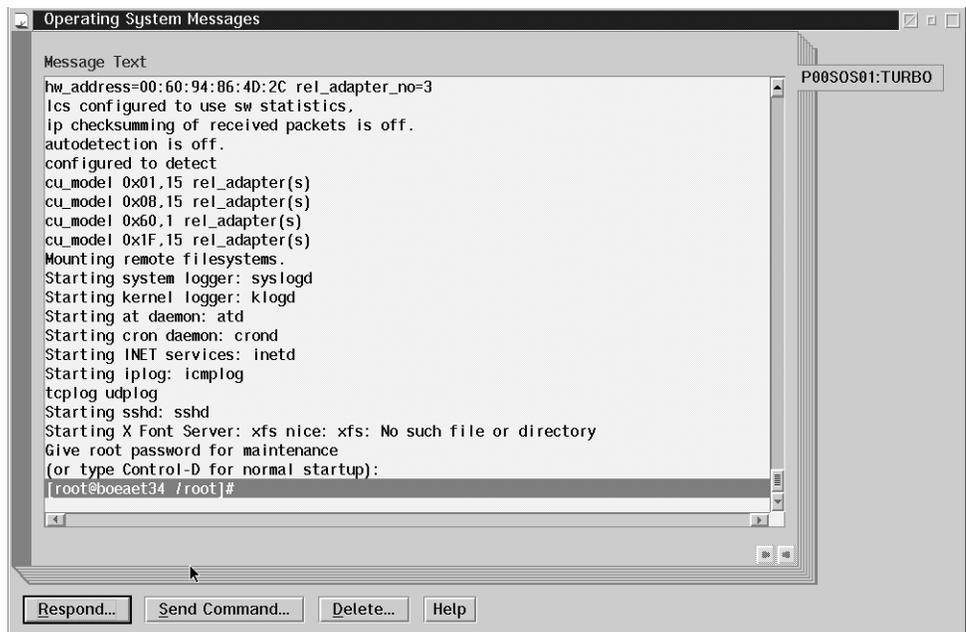
3. Confirm the load:



- Wait until the load has completed and click OK:



- On the operating messages panel, you can see messages as TurboLinux loads and starts services such as inetd. When asked to, either respond with Ctrl-D or enter the root password to use the bash on the console, for example, to add more users:



You can access the LINUX for S/390 system before you enter the root password through either an ssh connection or a telnet connection. However, using telnet you cannot access the system as "root".

Installation is now complete.

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Chapter 8. Hints, tips, and troubleshooting

What are the corresponding device names to my DASD devnos?

When you issued the `dasd=...` boot parameter, the devices are sorted in order of the supplied ranges. The range component of `dasd=range` is a from-to pair of hexadecimal values that correspond to the device number of that DASD. The DASD with the lowest from-to value is the first device, `dasda`. If a configured device is not present, its device number is left blank.

If you do not include the parameter, the DASDs are not made available to LINUX for S/390 and a log message is written.

If you specify `dasd=autodetect`, all recognized DASD devices are ordered by subchannel number.

The device names start with `/dev/dasda` and continue with the last letter being incremented for each device.

You can also inspect the `/proc/dasd/devices` file to find out the DASD minor number (`dasd<letter>`).

Some devices are not detected by LINUX for S/390

Check that the device is supported in *LINUX for S/390 Device Drivers and Installation Commands*.

The hardware console "hangs"

In the native or LPAR environment, the hardware console can sometimes "hang" because it receives too many messages. The solution is to use the **Delete** button of the GUI on the Service Element or Hardware Management Console to enable further output.

No messages on system console during IPL

In the native or LPAR environment, the IPL process can appear to "hang" with no messages displayed on the Service Element System Messages console. This does not always mean that there is a problem with your tape, or the files contained on it. At an early stage in the IPL process, the machine environment is checked and if there are any conflicts in device usage, or a device fails to respond due to it being hardware reserved, the IPL process can "hang". Other, similar, conflicts can occur and you should remember to ensure there are no problems with your environment, as well as checking the IPL tape and files, if the IPL process does not appear to talk to the terminal.

Emulating 'Ctrl' character combinations

The 3215 terminal does not have a Ctrl key. That makes it impossible to enter control characters directly. The character `^` in combination with certain other characters can emulate the Ctrl key:

- `^c` is interpreted as a Ctrl+C

- `^d` is interpreted as a Ctrl+D
- `^z` is interpreted as a Ctrl+Z
- `^n` is used at the end of the input line (on the terminal) to prevent the generation of a new line character.

Refer to the 3215 device driver description for more information.

Using AIX as a workstation for the telnet sessions

Before starting the installation script, issue the following command:

```
export TERM=vt220
```

DASDFMT

Refer to *LINUX for S/390 Device Drivers and Installation Commands* for more information about the DASDFMT command.

When is it necessary?

On an MP3000 the `install.pl` detects automatically whether a `dasdfmt` is required or not.

In a VM guest there should be no need to `dasdfmt` the DASD.

However, if you use a real 3390 DASD, a manual DASDFMT might be required.

Performing a DASDFMT

If you are using real 3390 DASDs, a manual DASDFMT might be needed. In this case, first perform an

```
insmod dasd_mod dasd=<dasdaddresses>
```

then perform the DASDFMT, for example:

```
dasdfmt -f /dev/dasda -b 4096
dasdfmt -f /dev/dasdb -b 4096
```

All RPMs fail

If all RPMs fail, and you see messages like:

```
UNABLE TO SCAN /usr/share/zoneinfo
```

Then make sure that you have DASD formatted your disks, using the DASDFMT command as described in "DASDFMT".

Unmount file systems

Make sure that the file systems are unmounted before you re-IPL from DASD.

1. To check what is mounted, at the root prompt enter **mount**:

```
/root # mount
/dev/ram2 on / type minix (rw)
none on /proc type proc (rw)
/root #
```

2. If anything is mounted on **/mnt**, for example:

```
/dev/dasda1 on /mnt
```

you must perform an unmount command:

```
umount /mnt
```

Setting the LINUX root password

The password is limited to eight (8) characters.

If you enter more characters it will be truncated to eight.

Setting the MTU size

If your network uses a MTU size of 1492, you must change it to 1492 in LINUX as well. For example, for ethernet adapter 0 you can do this with the following command:

```
ifconfig eth0 mtu 1492
```

How to solve install problems related to the network adapter on a MP3000

1. Open an OS/2 window on the SE (use **Desktop on call** if you are working on an HMC), enter **mpts**.
2. Press **configure** twice.
3. Write down the number of the adapter (IBM IEEE 802.2 only).
4. Press **cancel - cancel - exit**.
5. Double click on **Emulated I/O Configuration** in the CPC configuration menu (use **Desktop on call** if you are working on an HMC).
6. Press **enter** and **F2** to view the active device map.
7. Write down the addresses of the 3088 devices (for example 20/21 or 22/23). (If you have to edit the device map, be sure that the device map number corresponds to the **IOCDS** number.)
8. Press **ESC - F10 - F10** to leave without changing anything. (If you want to save your changes, press **ESC - F6 - F10**.)
9. Double click on **Console Actions** and **Network Diagnostic Information**.
10. Look up the adapter number (recorded above) and its associated **MAC** address.
11. Write down this **MAC** address.
12. Double click on **Input/Output (I/O) Configuration** in the CPC configuration menu.
13. Open the source of the appropriate **IOCDS**. (The **IOCDS** number must correspond to the device map number.)
14. Look for the line where the **UNITADD** is equal to the smaller address of the 3088 device recorded above.
15. Write down the **CUNUMBR** of this line.
16. Look for the line starting with **IODEVICE** and with the **CUNUMBR** as noted above. Write down the corresponding **ADDRESS**. (This is the address required for the **LCS** driver.)

After IPL:

1. When the **Network device number** is requested: enter the **IODEVICE ADDRESS** as noted above.
2. When the **Relative port** is requested: enter the adapter number (from **MPTS**).

3. Verify that the shown **hw_address** is the **MAC** address noted above.
The network adapter should now be properly set up and work correctly.

Chapter 9. Building a parameter line file

In special cases, you need to modify your parameter line file.

Building a parameter line file on OS/390

To create a parameter line file on OS/390, allocate a 1 track sequential dataset, record format F, LRECL 1024. Then edit the file using ISPF edit.

Here is an example of data set information for a parameter line file:

```
Data Set Name . . . : LINUX390.PARM.LINE
General Data Current Allocation
Volume serial . . . : SP3010 Allocated tracks . : 1
Device type . . . . : 3390 Allocated extents . : 1
Organization . . . . : PS
Record format . . . : F
Record length . . . : 1024
Block size . . . . : 1024 Current Utilization
1st extent tracks . : 1 Used tracks . . . . : 1
Secondary tracks . : 1 Used extents . . . . : 1
```

The contents of the parameter line file are:

```
root=/dev/ram0 ro ipldelay=xyz
```

Where:

- `root=/dev/ram0 ro`

This tells LINUX where to IPL from. This is a temporary RAMdisk (`ram0`) used only to get a mini-LINUX system running so that you can perform the rest of the IPL tasks. Use the root statement as given here when mounting the root file system from `initrd`.

- If you have problems with your OSA-2 card after the IPL, you might want to insert a delay to allow the card to settle down. The recommended delay time is two minutes. The following entry should be used in the `parm.line` file:

```
ipldelay=xyz
```

where `xyz` is the delay period. For example, `30s` means a delay of thirty seconds between the IPL and the initialization of the OSA-2 card, `2m` means a delay of two minutes. The value `xyz` must be a number followed by either `s` or `m`.

Here is an example of the content of a parameter line file:

```
root=/dev/ram0 ro ipldelay=2m
```

Note that when IPL-ing from tape using an ASCII encoded parameter file which you have generated on a UNIX or PC operating system, make sure that your `parm.line` contains no special characters (for example, tabs or new lines). In particular your parameter file cannot span over more than one line and must not be larger than 1023 Byte.

Building a parameter line using VM/ESA

The parameter line file `parm.line` can be built in VM. Alternatively, you can run LINUX on another device (for example an Intel PC) and then transfer `parm.line` as a binary file to your current environment.

You can create the parameter file using your favorite editor on your favorite OS. It can be ASCII or EBCDIC, at boot time the kernel knows how to deal with both. In both cases, the contents of the file are the same.

The contents of the parameter line file are:

```
root=/dev/ram0 ro ipldelay=xyz
```

Where:

- root=/dev/ram0 ro

This tells LINUX where to IPL from. This is a temporary RAMdisk (ram0) used only to get a mini-LINUX system running so that you can perform the rest of the IPL tasks. Use the root statement as given here when mounting the root file system from initrd.

- If you have problems with your OSA-2 card after the IPL, you might want to insert a delay to allow the card to settle down. The recommended delay time is two minutes. The following entry should be used in the parm. line file:

```
ipldelay=xyz
```

where xyz is the delay period. For example, 30s means a delay of thirty seconds between the IPL and the initialization of the OSA-2 card, 2m means a delay of two minutes. The value xyz must be a number followed by either s or m.

Here is an example of the content of a parameter line file:

```
root=/dev/ram0 ro ipldelay=2m
```

Note that when IPL-ing from tape using an ASCII encoded parameter file which you have generated on a UNIX or PC operating system, make sure that your parm line contains no special characters (for example, tabs or new lines). In particular your parameter file cannot span over more than one line and must not be larger than 1023 Byte.

Creating a parameter line file on VSE/ESA (CREAVSAM)

You can create LINUX.PARM.FILE (PARMLIN) and write IPL information into the file. For example, use the following job to create a parameter line file and write the IPL information in the file:

```
* $$ JOB JNM=LINUXVSA,CLASS=0,DISP=D,NTFY=YES
// JOB SYSA DEFINE FILE
// EXEC IDCAMS,SIZE=AUTO
DEFINE CLUSTER ( -
    NAME (LINUX.PARM.FILE) -
    CYLINDERS(2 2) -
    SHAREOPTIONS (3) -
    RECORDSIZE (1024 1024) -
    VOLUMES (DOSRES ) -
    REUSE -
    NONINDEXED -
    FREESPACE (15 7) -
    NOCOMPRESSED -
    TO (99366) ) -
DATA (NAME (LINUX.PARM.FILE.@D@) -
    CONTROLINTERVALSIZE (4096) ) -
CATALOG (VSESP.USER.CATALOG)
IF LASTCC NE 0 THEN CANCEL JOB
/*
// OPTION STDLABEL=ADD
// DLBL PARMLIN,'LINUX.PARM.FILE',,VSAM,CAT=VSESPUC
/*
```

```

// EXEC IESVCLUP,SIZE=AUTO
A LINUX.PARM.FILE                                PARMLIN VSESPUC
/*
// UPSI 1
// EXEC DITTO
$$DITTO CVS BLKFACTOR=1,FILEOUT=PARMLIN,CISIZE=1024
ANEXIT 'root=/dev/ram0 ro ipldelay=2m'
$$/*
$$DITTO EOJ
/*
/&
* $$ EOJ

```

The contents of the parameter line file are:

```
root=/dev/ram0 ro ipldelay=xyz
```

Where:

- `root=/dev/ram0 ro`

This tells LINUX where to IPL from. This is a temporary RAMdisk (`ram0`) used only to get a mini-LINUX system running so that you can perform the rest of the IPL tasks. Use the root statement as given here when mounting the root file system from `initrd`.

- If you have problems with your OSA-2 card after the IPL, you might want to insert a delay to allow the card to settle down. The recommended delay time is two minutes. The following entry should be used in the `parm.l` line file:

```
ipldelay=xyz
```

where `xyz` is the delay period. For example, `30s` means a delay of thirty seconds between the IPL and the initialization of the OSA-2 card, `2m` means a delay of two minutes. The value `xyz` must be a number followed by either `s` or `m`.

Here is an example of the content of a parameter line file:

```
root=/dev/ram0 ro
```

Note that when IPL-ing from tape using an ASCII encoded parameter file which you have generated on a UNIX or PC operating system, make sure that your `parm` line contains no special characters (for example, tabs or new lines). In particular your parameter file cannot span over more than one line and must not be larger than 1023 Byte.

Creating a parameter line file for the VM reader

Create a VM file with the name **LINUX PARM** on minidisk A. Enter the following commands in the file:

```
root=/dev/ram0 ro ipldelay=xyz
```

Where:

root=/dev/ram0 ro

The root file system is mounted on a RAMdisk in the directory `/dev/ram0` and is defined as a read-only file system by using the command `ro`

ipldelay=xyz

If you have problems with your OSA-2 card after the IPL, you might want to insert a delay to allow the card to settle down. The recommended delay time is two minutes. `xyz` is the delay period. For example, `30s` means a

delay of thirty seconds between the IPL and the initialization of the OSA-2 card, 2m means a delay of two minutes. The value xyz must be a number followed by either s or m.

When IPL-ing from the virtual reader of VM/ESA, and your parameter file spans more than one line, make sure that a blank character precedes any kernel parameter. To avoid errors you should start on column 2 of the parameter line.

Chapter 10. Preparing your root file system for initial IPL

You might decide to modify the initial RAMdisk before using it in the installation process. Note however, that only the `initrd` file supplied on the CD or TurboLinux web site will be supported by IBM and TurboLinux. Modify the file at your own risk!

If you have access to a LINUX system you are able to customize the configuration files of the root file system before using it:

1. Make a backup copy of the downloaded file
2. Uncompress the downloaded file, for example `initrd` (note that there is no file extension shown for this file). A compressed file is required because of memory limitations, and because certain download methods can automatically uncompress a `.gz` file during transfer, the extension is removed. The uncompression stage has an additional step to get the names correct:

```
mv initrd initrd.gz
gunzip initrd.gz
```

3. Set up a loopback device on the downloaded file by issuing

```
losetup /dev/loop<#> initrd
```

4. Mount the loopback device by issuing

```
mount -t ext2 /dev/loop<#> <mountpoint>
```

5. Change your working directory to the mountpoint and edit the following files according to your requirements

- `etc/fstab`

Check that it contains at least the following two lines

```
/dev/ram0    /      ext2 defaults 0 1
none         /proc  proc  defaults 0 0
```

- The `initrd` comes with a network setup script that asks for you network configuration every time you boot. If you don't want to re-enter the network configuration every time then you have to delete the link `/etc/rc.d/rc3.d/S00netsetup` and setup the following files:

```
etc/sysconfig/network and etc/resolv.conf
```

Adapt them according to your network environment

```
etc/sysconfig/network-scripts/ifcfg-<netdevice>
```

Adapt it according to your network environment.

6. Unmount the loopback device by issuing

```
umount /dev/loop<#>
```

7. Detach the loopback device by issuing

```
losetup -d /dev/loop<#>
```

8. Compress the file, (`initrd`) and rename it:

```
gzip initrd
mv initrd.gz initrd
```

Part 4. Appendixes

Where to find more information

This section lists books that can be of help to you.

Table 1. *LINUX for S/390 books*

Book name	Number
<i>LINUX for S/390 Device Drivers and Installation Commands</i>	LNUX-1003-00
	This document can be downloaded from http://www.ibm.com/s390/linux/press.html
<i>Preparing for Installing TurboLinux for S/390</i>	LNUX-1004-00
	This document can be downloaded from http://www.ibm.com/s390/linux/press.html
<i>LINUX for S/390 Redbook</i>	SG24-4987
	This document is available at the IBM Systems Center redbooks website: http://www.ibm.com/redbooks/

Table 2. *Multiprise books (redbooks)*

Book name	Number
<i>Multiprise 3000 Technical Introduction</i>	SG24-5633
<i>Multiprise 3000 Basic Emulated I/O Definitions</i>	SG24-5669

Table 3. *IOCDs related books*

Book name	Number
<i>IOCP User's Guide and ESCON Channel-to-Channel Reference</i>	GC38-0401
<i>HCD User's Guide</i>	SC28-1848

Table 4. *Network connection books*

Book name	Number
<i>OSA Planning</i>	GC23-3870
<i>OS/390 OSA/SF User's Guide</i>	SC28-1855
<i>VM/ESA OSA/SF User's Guide</i>	SC28-1992
<i>VSE/390 OSA/SF User's Guide</i>	SC28-1946
<i>OSA Express Customer Guide and Reference</i>	SA22-7403

Useful websites

These websites can be of use to you.

IBM websites:

- <http://www.ibm.com/linux/> - Overall LINUX at IBM website
- <http://www.ibm.com/s390/linux/> - LINUX for S/390 website

- <http://www.ibm.com/s390/vm/linux/> - VM/ESA and LINUX resources

Other websites:

- <http://turbolinux.com/> - The TurboLinux website
- <http://linux.s390.org/> - LINUX for S/390 applications website hosted by Millenux.
- <http://tune.linux.com> - General tuning information for LINUX

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