



Flash Memory Card Demo for the IBM Network Station Version 1 Release 3

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IBM Network Computer Division

Flash memory card support was provided on Network Station Manager beginning with Version 1 Release 3.0.1. This is the setup documentation for demonstrating flash boot. **The features described in this document pertain only to IBM Network Station Manager Version 1 Release 3.0.3 (aka 1.3.0.3) and later.** Information on flash boot support in Version 2 for the Series 300, 1000, 2200, and 2800 is contained in the publications.

1. Introduction

Overview

The flash card memory solution for the Network Station can be employed to provide boot and application loading capabilities where no local server is available. This is typical of wide-area networks where a few Network Stations are located in a remote site and it is not cost-effective to provide a boot server in each location. This document describes the server and Network Station setup required to demonstrate the local and peer boot capabilities using a pre-programmed PCMCIA flash card.

In order to respond quickly to demo requests, a flash card image containing all of the Network Station native applications has been created. This requires that the customer obtain a 28 Mbyte flash card from any of the Network Station flash card vendors. The vendors can supply a card already loaded with the demo code. Vendor contacts can be found in <http://www.ibm.com/nc>. Click on the Library link and then follow the link to White Papers. Click on the Flash memory Card Support link.

Each flash card vendor has provided a special part number for the demo flash card. These are listed in the table below.

Vendor	Part Number
Centennial	PM91066
SiliconTech	IBMFL028NDC
Electronic Designs	P0075

After the flash boot capability has been successfully demonstrated, North American customers who wish to deploy a production solution must apply for the Request for Price Quotation (RPQ) 97000 in order to obtain support.

The RPQ process can be initiated by an IBM Network Station representative or business partner. You may also contact the IBM Network Station Inside Sales Reps: Tina Johnson at (770) 863-1709 or Ed Winthrop at (800) 426-2255. More information can be obtained at <http://www.pc.ibm.com/us/accessories/networkstation/flashcard.html>.

Customers in Europe, Middle East, and Africa are not required to apply for the RPQ.

Demo Scenarios

The 28 MByte demo flash card contains the modules to run the following applications:

- 5250 emulator
- 3270 emulator

- VTxxx emulator
- NC Navigator browser with Java enablement
- ICA client (requires a Citrix MetaFrame or WinCenter Pro server)
- Java applet (a Solitaire demo)
- lpr/lpd printer support

These applications have all been taken from the Network Station Manager (NSM) 1.3.0.1 and later code base. In the interests of space and cost, the flash card only contains the kernel and modules required to run the Network Station applications. Fonts are set up to be obtained from the server. While this may not provide optimal performance in a WAN environment, it does demonstrate the flash boot and peer boot capabilities adequately in a LAN scenario.

The files on the demo card are usable for booting both Series 100/300 and Series 1000 systems. Series 1000 systems will require the PCMCIA adapter feature in order to use a flash card. Configuration files are provided with the demo card to allow for both local and peer booting.

The demo card works only in conjunction with ACTLogin. Not only does this greatly simplify the card, it servers to demonstrate the configuration capabilities of the NSM/ACTLogin tools. The procedure for using flash with ACTLogin is very straightforward. First, the global, workstation, and user preferences are configured on the server system using the Network Station Manager administration tool. Then the demo flash card is used to boot and load applications on the Network Station. The configuration information is read from the server and augmented by flash-specific overrides.

In some cases, it is desirable to not have the ACTLogin screen displayed. This would be the case if, for example, the user just wanted to have an emulator session and didn't want/need to login explicitly to the Network Station to establish personal preferences. Information on configuring ACTLogin in kiosk (read-only) mode can be found in [Full-Screen Solutions](#) (<http://publib.boulder.ibm.com/pubs/html/netcom/template.htm>). This can be demonstrated with the demo card by creating the **kiosks.nsl** file.

Locale Support

The 28 Mbyte card contains keyboards, message files, and other setup information for the following locales:

- DE_DE: German (Germany)
- EN_US: English (US)
- EN_GB: English (UK)
- ES_ES: Spanish (Spain)
- ES_LA: Spanish (Latin America)
- FR_FR: French (France)

Due to limitations on the size of the card, other locales will not be supported for demos.

References

- [Flash Memory Card Support for the IBM Network Station Version 1 Release 3](#). This is the prerequisite document for flash memory support. It provides background information on flash memory card support in the Network Station and discusses sizing and procuring flash memory

cards. This document can be found at <http://www.ibm.com/nc> by selecting the `Library` link and then selecting the `White Papers` link.

- [*AS/400 IBM Network Station: Techniques for Deployment in a WAN.*](#)
This Redbook may be ordered in the US as publication SG24-5187-00 or accessed on the web at <http://www.redbooks.ibm.com>. Several areas in Chapter 3 are out of date so this white paper and the document listed above should be used as the latest sources of information.
- [*IBM Network Station Manager Installation and Use.*](#)
This document may be ordered in the US as publication SC41-0664 or accessed on the web at <http://www.ibm.com/nc/pubs>.
- [*Configuration Files.*](#)
This document may be accessed on the web at <http://www.ibm.com/nc/pubs>.
- [*Full-Screen Solutions.*](#)
This document may be accessed on the web at <http://www.ibm.com/nc/pubs>.

2. Demo Setup

Introduction

This section details the steps required to use the demo flash card to boot the Network Station.

Throughout the remainder of this document it will be necessary to refer to path names for the location of the configuration files. The path names will be referred to as *CONFIGBASE* and *CONFIGDIR*. These directories and the files within are created by the installation procedure on each server. Data in many of these files is maintained by the Network Station Manager (NSM).

For the supported IBM servers, the values for *CONFIGBASE* and *CONFIGDIR* are shown in the following table.

Boot Server	<i>CONFIGBASE</i> Path	<i>CONFIGDIR</i> Path
AS/400	/QIBM/ProdData/NetworkStation/configs	/QIBM/ProdData/NetworkStation/configs
AIX	/usr/netstation/configs	/usr/netstation/configs
Windows NT 4.0	/nstation/Prodbase/configs	/netstation/prodbase/configs
OS/390	/usr/lpp/nstation/standard/StationConfig	/usr/lpp/nstation/standard/StationConfig
VM	/QIBM/ProdData/NetworkStation/configs	/QIBM/ProdData/NetworkStation/configs

Please consult Chapter 10 of the [IBM Network Station Manager Installation and Use](#) for more details.

Server Setup

Installing NSM

The Network Station Manager software for Release 1.3.0.3 or later must be installed on a supported server. This code can be [downloaded](#) from the web or ordered on a CDROM. Installation and configuration instructions are provided in the [IBM Network Station Manager Installation and Use](#) document that accompanies the software.

Configuring the Applications

NSM provides a browser-based administration capability to configure Network Stations on a system-wide, workstation, group, or user basis. Details on the use of NSM administration program to configure the Network Station and its applications are provided in the [IBM Network Station Manager Installation and Use](#) document. All of the applications are configured from either the Startup -> Programs OR Startup -> Menus section of NSM, depending on whether you want them to automatically start at boot time or be launched from the task bar.

Here are some suggestions for setting up each of the demo scenarios using the NSM web tool. After configuring the applications, the Network Station(s) should be booted from the server and tested to ensure that the scenarios are functioning correctly prior to booting from flash.

5250 Emulator

The configuration instructions for 5250 sessions are fully explained in Chapter 8. Options like full screen and number of sessions can be set through NSM.

3270 Emulator

The configuration instructions for the 3270 emulator are fully explained in Chapter 8. Options like full screen and number of sessions can be set through NSM.

VTxxx Emulator

The configuration instructions for VTxxx emulation is explained in the *Configuring a Terminal Session* section.

ICA Client

The configuration instructions for using the ICA client application to connect to a Citrix MetaFrame server are provided in the *Configuring a Terminal Session* section.

Note: Some versions of the document show information in uppercase. The entries should all be in lower case, e.g. ICACLNT should be `icac1nt` and `-H` should be `-h` or, preferably, `-host`.

NC Navigator

The configuration instructions for Navigator is explained in Chapter 8. Configuration must be done under both the `Internet -> Network` and `Internet -> NC Navigator` sections.

Java Applet

The Java Solitaire demo application is configured in the `Java Applet Menu Items` section. Enter `Java Solitaire` as the `Menu item label` and `${BOOTPATH}/java/Solitaire.html` as the `Applet URL`.

Configuration Files

Two special configuration files are required for flash boot. These are listed in [Section 3](#) of this document. They should have been supplied along with the demo flash card. If you did not receive these files, please contact the [Network Station Technical Marketing Center](#) and we will supply the files by return e-mail.

The **flash.nsm** file is read by the Network Station that contains the flash card. It points the Network Station to an authentication server to obtain the system/workstation/group/user preferences for the demo. It also redirects certain file lookups to obtain data from the flash card rather than the boot server. It also starts a Network File System service in the Network Station itself to allow other Network Stations to peer boot.

The **peer.nsm** config file provides the redirection to allow a peer Network Station to boot from another Network Station rather than a server. These files are read from the server at boot time. They must be placed in the `CONFIGBASE` directory on the server where NSM has been installed. See the earlier [table](#) for the values for `CONFIGBASE` on each platform.

Two changes to **flash.nsm** are required to make the files operational for the demo.

1. Uncomment the two lines in the `file-service-table` entry that pertain to the server type that you are using. Replace the `0.0.0.0` with the IP address of the NSM server.
2. The line

```
{ "actlogin -authserv 0.0.0.0" }
```

must be changed to replace `0.0.0.0` with the IP address of the NSM server. This will usually be the same as the server IP address used above in the File Service Table entries. Note that the quotation marks are required. No other changes are required to the supplied **flash.nsm** and **peer.nsm** files.

When editing this file, ensure that the lines do not wrap. Each entry must remain contiguous on the line or the file will not be parsed correctly.

Network Station Setup

Once the server has been installed, applications have been defined and configured, and the changes to the config files have been made, all that remains is to set up the Network Station(s) that are to be used for flash/peer boot.

Boot Monitor Update

In order to use the flash boot capability, the Network Station boot monitor version must be at V3.0.7 or later. The boot monitor version is displayed when the system is powered on.

A boot monitor update can be accomplished simply by booting the Network Station from the server with NSM release 1.3.0.3 or later installed. The boot monitor code will be automatically updated if not already at the V3.0.7 level. If the system/application setup done through NSM has already been tested, the boot monitor should have been updated to the correct level.

Installing the Flash Card

In order to be recognized by the Network Station, the flash card must be in the PCMCIA slot at boot time. The card size information is read from the card during boot. The card is *not* hot-pluggable so do not insert or remove it while the Network Station is powered on. Power off the Network Station and insert the demo flash memory card. Then proceed to the following sections.

Clearing NVRAM

The first step is to clear the NVRAM to ensure that there is no residual information. This procedure only has to be performed before the first boot from the flash card.

1. Power on or reboot the Network Station.
2. Enter the Setup Utility by interrupting the boot process during the Search for Host System... phase (use the Esc key).
3. Use <LeftCtrl>-<LeftAlt>-<LeftShift>-F1 to enter the Boot Monitor. The Boot Monitor responds with


```
IBM Network Station model xxxx-xxx 8-bit Color Boot Monitor
>
```
4. > nv
5. ->> 1
6. ->> s
7. Are you sure? y
8. ->> q
9. > se

You will now be back at the Setup Utility screen.

Setting the Boot Parameters

From the Setup Utility, complete the following steps. If you are unsure about a particular entry, more information can be found in Chapter 10 of the [IBM Network Station Manager Installation and Use](#).

1. Choose F2 = View Hardware Configuration
 - a. Verify that the flash card has been successfully configured. The type of flash card will be listed under PCMCIA Card:.
 - b. Depress Enter to return to the Setup Utility screen.
2. Choose F3 = Set Network Parameters
 - a. Set the IP Addressed from to NVRAM.
 - b. Set the Network Station IP Address to reflect the IP address of the Network Station.

- c. Leave the entries under `Boot Host IP Address` as `0.0.0.0`.
 - d. Set the `First Host` value under the `Configuration Host IP Address` section to the IP address of the server.
 - e. Set the `Gateway IP Address`, `Subnet Mask`, and `Broadcast IP Address` parameters as appropriate for your network.
 - f. Depress `Enter` to return to the `Setup Utility` screen.
3. Choose `F4 = Set Boot Parameters`
 - a. Leave the `Boot File` value blank.
 - b. Leave the `TFTP Boot Directory` and `NFS Boot Directory` entries blank.
 - c. Set the `TFTP Order` and `NFS Order` under `Boot Host Protocol` to `D`.
 - d. Set `LOCAL Order` to `1`.
 - e. Depress `Enter` to return to the `Setup Utility` screen.
 4. Choose `F5 = Set Configuration Parameters`
 - a. Set the `Configuration File` to `flash.nsm`.
 - b. Set the `First` entry under `Configuration Directory` to `CONFIGDIR/`.
See the earlier [table](#) for the values for `CONFIGDIR` on each platform. For example, in `WindowsNT 4`, enter `/netstation/prodbase/configs/`.
The trailing `/` is required at the end of the `Configuration Directory` path.
 - c. Set the `First` entry under `Configuration Host Protocol` depending on your server:
 - `AIX: NFS`
 - `NT: NFS`
 - `AS/400: RFS/400`
 - d. Press `Enter` to return to the `Setup Utility`.
 5. Choose `F7 = Set Language Parameters`
 - a. Choose `F2 = Select Keyboard Language`
 - b. Set the appropriate language for your system using the cursor keys.
 - c. Press `Enter` to return to the `Select Keyboard Language` screen.
 - d. Press `Enter` to confirm your keyboard language (if correct). You will return to the `Set Language Parameters` screen.
 - e. Press `Enter` to return to the `Setup Utility`.
 6. Press `Enter` again to start the boot process.

The Network Station should boot and display the message `Booting from local device` and then load the kernel. The Network Station Login screen will appear shortly. After logging in, you should be able to launch applications from the task bar. If you get a blue screen with the Console window, something has been set up incorrectly. Check the `Configuration Directory` settings on the `Setup Utility`. If you are still having problems, see the "Troubleshooting" section below.

Peer Boot

To boot a Network Station from another Network Station's flash card, the following configuration information is required:

- The IP address of the client Network Station
- The IP address of the host/server Network Station (the one with the flash card installed)

- The subnet mask for the network (if any)
- The IP address of the gateway (if any)

First configure the Network Station containing the flash card as per the section above.

Then, on each peer Network Station, complete the following steps:

1. Clear NVRAM, as explained earlier.
2. From the Setup Utility screen, choose F3 = Set Network Parameters
 - a. Set the IP Addressed from to NVRAM.
 - b. Set the Network Station IP Address to reflect the IP address of the Network Station.
 - c. Set the First Host entry under Boot Host IP Address to the IP address of the Network Station containing the flash card.
 - d. Set the First Host value under the Configuration Host IP Address section to the IP address of the server.
 - e. Set the Gateway IP Address, Subnet Mask, and Broadcast IP Address parameters as appropriate for your network.
 - f. Depress Enter to return to the Setup Utility screen.
3. Choose F4 = Set Boot Parameters
 - a. Leave the Boot File value blank.
 - b. Set the NFS Boot Directory to /peerboot/
The trailing / is required at the end of the /peerboot/ path.
 - c. Set the TFTP Order and LOCAL Order under Boot Host Protocol to D.
 - d. Set NFS Order to 1.
 - e. Depress Enter to return to the main Setup Utility screen.
4. Choose F5 = Set Configuration Parameters
 - a. Set the Configuration File to peer.nsm
 - b. Set the First entry under Configuration Directory to *CONFIGDIR*/.
See the earlier [table](#) for the values for *CONFIGDIR* on each platform. For example, in WindowsNT 4, enter /netstation/prodbase/configs/
The trailing / is required at the end of the Configuration Directory path.
 - c. Set the First entry under Configuration Host Protocol depending on your server:
 - AIX: NFS
 - NT: NFS
 - AS/400: RFS/400
 - d. Press Enter to return to the Setup Utility.
5. Choose F7 = Set Language Parameters
 - a. Choose F2 = Select Keyboard Language
 - b. Set the appropriate language for your system using the cursor keys.
 - c. Press Enter to return to the Select Keyboard Language screen.
 - d. Press Enter to confirm your keyboard language (if correct). You will return to the Set Language Parameters screen.
 - e. Press Enter to return to the Setup Utility.
6. Press Enter again to start the boot process.

The Network Station should boot and display a message that it is booting the kernel from the IP address of the flash-enabled Network Station. The Network Station login screen will appear shortly. After logging in, applications can be started from the task bar. If you get a blue screen with the Console window, something has been set up incorrectly. Check the `Configuration Directory` settings on the Setup Utility. If you are still having problems, see the "Troubleshooting" section below.

Troubleshooting

The first thing to ensure is that the flash card is recognized by the Network Station. This can be done by depressing

`F2 = View Hardware Configuration`

from the Setup Utility to ensure that a valid card has been recognized. After that, check all of the NVRAM setup information. Trailing slashes ("/") must be on the `Configuration Directory` and `NFS Boot Directory` entries. It also helps to clear NVRAM and re-enter the settings if you have made any changes to the network or the server configuration.

By default, the Network Station uses an NFS block size of 8192 when booting. If you are seeing a message that the kernel cannot be loaded or are having other problems loading files, especially when peer booting, try the following. It may be necessary to clear NVRAM and start over if you experience a problem where the peer system gets the kernel loaded correctly but subsequent file reads are unsuccessful. Try clearing NVRAM on both systems, reset the block size to 1024 as per the directions below, and re-enter the NVRAM values. The block size values can be increased/decremented in multiples of 2 (e.g. 256, 512, 1024, 2048) to a maximum of 8192 until the system boots reliably. Trial and error is often required, especially if the server is on another network segment.

1. Edit the file `CONFIGBASE/flash.nsm` on the server. Change the 4096 values in the `file-service-table` to 1024 if they are not already set to 1024.
2. Create the file `ns1.dft` in `CONFIGBASE` on the server with the following entries:

```
Login.RFS_buffer_size: 1024
Login.NFS_buffer_size: 1024
Login.OTHER_buffer_size: 1024
```

If you are on Windows 95/98/NT, use WordPad **not** NotePad to edit this file. NotePad adds extra control characters that will cause the file to be ignored by the Network Station.

3. Power on or reboot the Network Station.
4. Enter the Setup Utility by interrupting the boot process during the `Search for Host System...` phase (use the `Esc` key).
5. Use `<LeftCtrl>-<LeftAlt>-<LeftShift>-F1` to enter the Boot Monitor. The Boot Monitor responds with


```
IBM Network Station model xxxx-xxx 8-bit Color Boot Monitor
>
```
6. `> nf 1024`

The Boot Monitor responds with
Current block size is 1024 bytes

7. > rs

The system will now reboot.

The best tools for troubleshooting are the Console diagnostics. The Console is a Network Station application that provides access to other local clients and to diagnostic messages. The default key combination to display/hide the Console window is <LeftShift>-<LeftAlt>-<Home>.

The basic diagnostics messages can be enabled by pressing

```
F10 = Set Verbose Diagnostic Messages Enabled
```

on the Setup Utility screen. This will cause the system to output file access information on the screen that is also captured in the Console log. Much more verbose diagnostics can be enabled by specifying

```
set file-extended-diagnostics = true
set diag-buffer-size = 65535
```

in **flash.nsm**. This will produce *very* detailed output.

The Console log can be viewed at the Network Station by bringing up the Console and then clicking on the Messages button in the Console window. The Console log can also be viewed and saved remotely using **telnet**. The diagnostics port number is 5998 and a telnet session to this port will yield a log of the Console messages. For example, under AIX the command

```
telnet 5998 | tee /tmp/console.out
```

will cause the Console messages to be displayed on the screen and also captured in file **/tmp/console.out**.

AS/400 Tips

Here are some additional things to watch out for on AS/400 systems:

1. The **flash.nsm** and **peer.nsm** files must be put in the **configs** directory, not in **StationConfig**. If you are using AS/400 Client Access for Windows, verify that your files have actually been copied to the correct directory by using **wrklnk**.

Performance Tips

If you are experiencing slow boot times, especially after logging in, ensure that all of the Network Station IP addresses are in the **hosts.nsm** file. This will greatly speed up the boot process. The best way to refresh **hosts.nsm** is to put all of the Network Station names and IP addresses in the server's DNS file (e.g. **/etc/hosts** on AIX) if they are not already there. Then start NSM and select Hardware => Workstations => System defaults => Next. In the "Domain Name Server" section of the panel, check the box "Update Network Station Manager DNS File". Then click on the "Finish" button.

3. Demo Config Files

flash.nsm

Here is the prototype for the **flash.nsm** configuration file. Replace the indicated lines with information for the boot/authentication server you will be using for the demo. See the [Configuration Files](#) section for more information as to the changes to be made.

When editing this file, ensure that the lines do not wrap. Each entry must remain contiguous on the line or the file will not be parsed correctly.

When using the AS/400, be sure the **flash.nsm** and **peer.nsm** files are put in the **configs** directory, not in **StationConfig**. If you are using AS/400 Client Access for Windows, verify that your files have actually been copied to the correct directory by using **wrklnk**.

```
#
# flash.nsm - place in the "CONFIGBASE" directory on the server
#
# Uncomment the two lines for the server type being used for authentication
# and replace 0.0.0.0 with the IP address of that system.
# Do not break any of the lines. Entries between {...} must be kept on the
# same line. The file-service-table entries are
# shown in a smaller font to get everything printed on one line.
#
set file-service-table = {

#
# The following two lines are for WindowsNT.
# {"/netstation/prodbase" nil 0.0.0.0 nfs "/netstation/prodbase" unix 3 10 1024 1024}
# {"/netstation" nil 0.0.0.0 nfs "/netstation" unix 3 10 1024 1024}
#
# The following two lines are for AIX.
# {"/netstation/prodbase" nil 0.0.0.0 nfs "/usr/netstation" unix 3 10 1024 1024}
# {"/usr/netstation" nil 0.0.0.0 nfs "/usr/netstation" unix 3 10 1024 1024}
#
# The following two lines are for AS/400
# {"/netstation/prodbase" nil 0.0.0.0 tftp "/QIBM/ProdData/NetworkStation" unix 3 10 1024 1024}
# {"/QIBM/ProdData" nil 0.0.0.0 tftp "/QIBM/ProdData" unix 3 10 1024 1024}

}
#
# Read the basic config information from the server
read standard.nsm
#
# Augment/override server values
set boot-desired-source = local
set boot-second-source = none
set boot-third-source = none
set diag-buffer-size = 65535
set exec-startup-commands = {
    { mcuis }
#
# Modify the following line to replace 0.0.0.0 with the IP address of your
# authentication server
    { "actlogin -authserv 0.0.0.0" }
}
#
# The following lines enable peer boot
set file-enable-nfs-server = true
set file-export-directory-list = { { "/peerboot" "/local" } }
set file-nfs-access-control-default = read-only
#
set file-try-all-matches-on-open = true
#
```

```

# Set up to get Java classes from flash
set java-directory = /local/java
#
# Set up to get executable files from flash
set modules-directory = /local/mods
#
# Get the splash screen and screensaver from flash
set pref-screen-background-bitmap-file = "/local/SysDef/nc.xbm"
set pref-screensaver-bitmap-file = "/local/SysDef/nc.xbm"
set time-server = nil
set xserver-keysym-file = /local/XKeysymDB
set xserver-rgb-file = /local/rgb.txt
#
# The following statements override the standard settings
# to allow the IBM Network Station console to be used for
# debug.
#set config-enforce-passwords-locally = false
#set config-pref-enforce-passwords-locally = false
#set config-console-enforce-password-locally = false
#set exec-disabled-commands = { }
#set file-extended-diagnostics = true
#set xserver-initial-x-resources = "ncdconsole.disableReboot: false\n\
#   ncdconsole.disableLoginMenu: false\n\
#   ncdconsole.disableTerminalMenu: false\n\
#   ncdconsole.disableSetupMenu: false"

```

peer.nsm

Here is the **peer.nsm** configuration file. There are no edits/changes required.

```

#
# peer.nsm - place in the "CONFIGBASE" directory on the server
#
# Read the basic config information from the server
read flash.nsm
#
# Augment/override server values
set boot-desired-source = nfs
set boot-nfs-directory = /peerboot/
set file-enable-nfs-server = false
set file-try-all-matches-on-open = true
#
# Set up to get Java classes from flash
set java-directory = /peerboot/java
#
# Set up to get executable files from flash
set modules-directory = /peerboot/mods
#
# Get the splash screen and screensaver from flash
set pref-screen-background-bitmap-file = "/peerboot/SysDef/nc.xbm"
set pref-screensaver-bitmap-file = "/peerboot/SysDef/nc.xbm"
set xserver-keysym-file = /peerboot/XKeysymDB
set xserver-rgb-file = /peerboot/rgb.txt

```

*** End of Document ***