

Global Operating Manual Novell NetWare Version 8.1

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1. Introduction

This manual is a user's guide to Global System Manager for Novell NetWare. It should be read in conjunction with the Global System Manager Manual and the Global Configuration Notes.

In this manual we describe the implementation of Global System Manager on Novell NetWare together with those aspects of Global System Manager that are specific to Novell NetWare.

Global System Manager is responsible for running the Global range of application software.

This chapter explains what Global System Manager is, and briefly describes the facilities that it offers.

1.1 What is Global System Manager?

In order to run on a particular computer, a computer program must be able to receive data from, and send it to, the computer's peripheral devices: screen and keyboard, disk drives, printers etc.

For example, the program has to interpret what the operator types at the keyboard and display the appropriate characters on the screen. Similarly, it has to be able to 'read' data files on a disk, process the data, and output it to the screen or printer.

People recognised early on in the development of computers that it was neither necessary, nor efficient, for every program, designed to run on a particular computer, to duplicate these 'housekeeping' routines. Reading a file of sales figures or a word processing document are identical operations at the hardware level.

Accordingly, operating systems were developed. These are sophisticated computer programs which are loaded first into the memory of a computer, and which provide an environment for other programs - applications which perform actual tasks - to run in. The application programs contain only task-specific routines, and call on the resources of the operating system when they need to perform common, low-level operations, such as reading from a disk.

As the computer industry developed, manufacturers began to produce ranges of computers, each available in a variety of configurations: that is to say, with various combinations of peripherals. A standard model could be bought with varying amounts of memory, one or many screens, different printers and different disk options. Operating systems had to be developed which could handle different configurations of the same computer, or of a range of computers from the same manufacturer.

Global System Manager represents the next stage of development. Standard operating systems are specific to computers from a particular manufacturer or, at best, to different makes of computer built around the same processor type. Because non-Global application programs are designed to run under a particular operating system, they cannot usually be transferred from one computer to another. If you want to move on to another make of computer (because you needed a bigger or better machine) you have to scrap your current applications, usually together with all your accumulated data.

Global System Manager, on the other hand, has been designed from the outset to be portable across a wide range of computers, processor types and operating systems.

This means that a company running Global applications can progress from, say, a single-user microcomputer from one manufacturer to a more powerful multi-user minicomputer from another, or to a mixed network of personal or departmental computers. Data files are easily transferred from the old machine to the new, and because Global applications run identically on different computers, so are staff skills.

Standard operating systems have another disadvantage. Their origins lie either in mainframe computing, which is oriented towards very large organizations with specialist data processing departments, or (in the case of early microprocessor operating systems) in the hobbyist market. In both cases, the consequence is complexity and user-unfriendliness.

Global System Manager, in contrast, is targeted towards small to medium-sized organizations running business applications on a wide range of equipment, but which will not normally have their own specialist data processing staff. Global System Manager can be installed, modified and run by staff with a minimum of training because, although it offers sophisticated facilities, these are presented to the user in a simple and clear fashion. All screen dialogue uses ordinary English terms in preference to jargon, and the more complex operations can be made invisible to those who use the system on a daily basis. Extensive on-screen help facilities are available at every point, and (we hope) the manuals are concise but clear when you need to use them.

1.2 An Overview of Global System Manager

So far, we have described Global System Manager in the most general terms. Let's now examine what Global System Manager does in a little more detail. This can be broken down into four main areas: hardware set-up, controlling operator access, running application programs, and providing system utilities.

1.2.1 Hardware set-up - the bootstrap process

When you switch your computer on, initially it is just an empty machine. There may be programs and data held on the hard disk, and various other peripherals attached, but the computer's memory and processor are empty and thus the machine cannot access them. By performing the bootstrap process (sometimes this involves putting a diskette into one of the drives), you cause the operating system to be loaded into memory. Once the MS-DOS operating system has been loaded and you have logged into Novell NetWare you can run Global System Manager (see Chapters 2 and 3).

The Global System Manager start-up process falls into two main stages:

- Firstly, Global System Manager loads those parts of itself, so-called 'resident' routines, which stay in memory as long as the Global System Manager session lasts. These enable Global System Manager to control peripheral devices and load the non-resident

elements (such as Global System Manager utilities which the operator may ask to run intermittently) when required.

- Next, Global System Manager allocates some of the computer's memory for use as buffers, memory banks, RAM disk or disk cache.

Buffers are areas of memory used as temporary stores for data being moved from one peripheral to another.

Memory banks, or partitions, are areas of memory into which application programs or utilities are loaded in order to be executed. Depending on how much memory is available, Global System Manager can allocate up to nine partitions for each screen attached to the computer, thus allowing each operator to run up to nine programs concurrently.

RAM disk uses spare memory as if it were a very fast hard disk or diskette. Unlike real disks, however, RAM disk is volatile (i.e. its contents are lost when the computer is switched off), and so it is used typically as a store for temporary work files set up by applications.

Disk cache keeps a copy in memory of the most frequently used tracks on a hard disk. Because it's considerably faster to read information from memory than from a disk, disk caching can dramatically speed up processing times and can reduce contention when a number of different users need to access the same disk.

1.2.2 Controlling operator access - the sign-on process

The whole process of loading Global System Manager, although internally very complex, takes only a few seconds on most computers and is wholly invisible to the user. The first sight the user has of Global System Manager is when the main menu is displayed. This menu lists the application programs installed on the computer, and you can select a particular application, such as Global Payroll, by keying the appropriate number.

Under some circumstances (described later in this manual) the first sight the user has of Global System Manager **may** be when asked for confirmation that the date and time it has picked up from MS-DOS are correct. Once confirmed, the date and time information is held internally by Global System Manager. Global System Manager can, in turn, pass the date and time on to application programs and utilities which may need to display them or print them in reports.

Under other circumstances (described later in this manual) Global System Manager **may** ask the user of each screen for an operator-id: This too is held internally by Global System Manager and may be passed on to applications and utilities, but its main importance lies in the fact that it can be used to control access to the computer and hence to your data. You can set up a table of authorized users, with associated passwords and authorization levels. Global System Manager will ensure that only these operators can access programs and data. You can also get Global System Manager to direct specified users to particular menus.

Under other circumstances (also described later in this manual) Global System Manager **may** ask the user for their terminal type: A number (between one and four digits) which tells Global System Manager what

type of screen and keyboard is being used. Global System Manager can then interpret input from that keyboard, and format any displays to the size of the screen.

Operator details are held in the User File. In multi-user and networking systems this file can be inspected using the \$STATUS command. It also serves as the basis for message passing between different users.

1.3 The Different Types of Global System Manager

There are four variations of Global System Manager: Two for single-user computers, one for multi-user computers, and one which allows numbers of computers to be linked together in networks. Because Global System Manager operates identically, the user interface is the same whichever version you have, except that for multi-user and network systems there are some extra facilities.

1.3.1 Single User and Concurrent Global System Manager

Single User Global System Manager and Concurrent Global System Manager configurations are not available for Novell NetWare.

1.3.2 Multi-User Global System Manager

Multi-User Global System Manager configurations are not available for Novell NetWare.

1.3.3 Networked Global System Manager

Networked Global System Manager is the local area network version of Global System Manager, which allows up to 255 computers (i.e. NetWare file servers and workstations) to be linked together in order to share files and other facilities. **All Global System Manager (Novell NetWare) configurations include networking.**

Up to 26 computers on the network (identified by the upper case letters A-Z) can act as Global System Manager 'file servers', which means that their disks can be accessed by all the other computers on the network. One of these Global System Manager file servers must be designated as the Global System Manager 'master' computer: This controls operator access and must be running Global System Manager before the users of other computers can sign on. Any operation which requires access to the user file (such as signing on a computer, signing one off, or running \$STATUS or the spooler) will fail unless the master computer is working. Note also that some \$F and \$V commands (e.g. the \$F INI, SCR and CON instructions) execute special unit-locks commands which require the master computer to be available.

Global System Manager workstations which are not file servers are identified by a two character code (e.g. 1B, 30, A1, C2). Users of such computers can access programs and data both locally (i.e. on the computer's own diskettes) and on file server computers. However, they cannot access each other.

1.4 An Overview of Novell NetWare

Novell NetWare allows a number of computers to share certain resources, such as disk storage and printers.

1.4.1 Computer Types

Several types of computer can be connected to a Novell network. The various computer types are described in the following sections.

1.4.1.1 Dedicated Fileservers

Dedicated Fileservers are dedicated to providing file storage to other computers on the network. Fileservers run a special purpose operating system, called a Network Operating System (NOS), which is optimised for their specialised role.

File storage on the fileserver is organised into one or more volumes. Each volume contains a separate filing system. Volumes are similar in concept to MS-DOS disk drives. For example, there may be a volume called USR:, which contains a directory USERS. USERS may have a sub-directory GSM. The full path to directory GSM is USR:USERS\GSM. There is always a volume called SYS:. Directory SYS:SYSTEM contains programs and data files which make up the NOS. Directory SYS:PUBLIC contains various NetWare utilities for use by workstations (workstations are described below).

There is no direct connection between volumes and physical disk drives. A given physical disk may contain several volumes. A given volume may span several physical disks.

Fileservers can provide additional services, such as print services, by adding software modules to the NOS. On NetWare V3.x and V4.x these modules are called NLMs (NetWare Loadable Modules).

1.4.1.2 Workstations

Workstation computers run user applications. They run a standard operating system, such as MS-DOS, with additional software to provide networking. Under MS-DOS, disk storage provided by fileservers appears as ordinary MS-DOS disk drives. Drive F: may appear to the user as a local disk, but may in fact be storage provided by a fileserver. Such drives are known as network drives.

The NetWare MAP utility is used to assign network drive letters to particular directories in the fileserver filing system. For example, to map drive F: to directory "USR:USERS\GSM":

```
MAP F: = USR:USERS\GSM
```

The mapping may be changed at any time. To change the mapping of drive F: to USR:USERS, type:

```
MAP F: = USR:USERS
```

The same effect could have been achieved using the MS-DOS change directory command CD. For example:

```
CD \USR\USERS
```

The local print devices, LPT1 to LPT3, can be assigned to network print queues, rather than local serial or parallel ports. This is done with the CAPTURE utility. Network printing is always spooled; nothing will get printed until the application closes the print device. When printing locally, output from the application appears on the printer immediately. As many applications are written with local printing in mind, CAPTURE has a number of command line options to get around some of the restrictions of network printing.

By fitting a boot ROM to the workstation network card, it is possible to boot MS-DOS over the network from a fileserver. In that case, workstations need not have any local disks at all.

1.4.1.3 Non-dedicated Fileservers

Non-dedicated fileservers combine the role of Fileserver and MS-DOS Workstation. They are not available under NetWare 3.x or 4.x. Memory is partitioned into two parts, one for use with MS-DOS, and the other for use with the fileserver NOS, with the processor switching between MS-DOS and the NOS. Non-dedicated fileservers are used in small networks, where it is not cost effective to have one machine tied up as a dedicated fileserver, unable to run applications. The loss of fileserver performance which results from the processor switching between MS-DOS and the NOS is not usually significant in this case.

1.4.1.4 Value Added Servers

Additional network services, such as printing, can be provided by dedicated computers, rather than by fileservers. Such computers are called Value Added Servers (VAS). Some value added servers are simply workstations dedicated to a particular task. For example, the NetWare utility PSERVER.EXE is a print server which runs on a workstation, allowing the workstation to act as a network print server.

1.4.2 Network Administration

Since a number of users will be using a given fileserver, some security mechanism is necessary to restrict which files and directories a given user has access to. For this reason, users have to log on to a fileserver before they can make use of it. Not only is it possible to control which directories and files each user has access to, it is possible to control the degree of access as well. For example, a given user may have the right to list the files in a particular directory, have read access to several of the files, but may not be able to write to any of the files, or create any new files in the directory.

To make administration of the fileserver easier, users can belong to one or more groups. Access to directories and files can be granted to particular groups, as well as particular users.

In general, the same security measures apply to other network services as well, such as printing. The security features are automatic for fileservers, but value added servers are responsible for their own security. They may make use of facilities provided by a fileserver to validate users, or implement their own security measures.

1.4.3 Network Printing

All network printing is spooled. Printer output from an application running on a workstation is written to a file on a fileserver. When printing has completed, the print file is placed in a print queue. The print queue is monitored by a print server. The print server takes print files off the print queue and prints them.

An application need not be aware that it is printing to a network printer. However, additional DOS function calls are provided for network printing. An application may redirect output sent to a local printer to a network printer, and select options such as form type and number of copies.

If an application does not specifically support network printing, redirection of one of the local printer devices to a network printer can be done with the CAPTURE utility. This recognises command line arguments to select options such as the form type and number of copies.

Printers may be attached directly to the print server, or they may be attached to workstations. In the latter case, the print server sends printer output to such workstations over the network. Software on the workstation sends the printer output to a serial or parallel port. The workstation can still run applications; the printer software runs in background.

1.5 Global System Manager on Novell NetWare: An Operational Overview

Global System Manager provides Novell NetWare with the ability to run the Global range of software and hundreds of industry-specific packages. These applications are designed for serious business use, and utilise a simple yet powerful system of menus, clear English commands and a consistent user interface to ensure maximum productivity.

The main features provided by Global System Manager are described in the following sections.

1.5.1 Password and authorisation

Multi-level password and authorisation checking guard against unauthorised access to the system as a whole, to individual modules or to sensitive functions within modules. Individual operators can be directed to particular functions at startup or to personalised menus of their own.

1.5.2 Security

You can set up a table of authorised users, each with their own operator code and password which are checked whenever they run Global System Manager. Use of individual menu entries can be restricted to operators with certain authorisation codes. Data files can also be password protected, and can either be private or accessible by all users.

Security copies of data and programs can be created on diskettes or tapes, either manually or under job control.

1.5.3 The Menu Handler

Global System Manager introduces a powerful yet easy to use menu handler to MS-DOS and Windows.

System menus are automatically updated as new modules are installed, and can be customised to suit each installation. Menu entries can be protected by passwords, and can include a pre-defined sequence of keystrokes to drive the application program. Operators can be restricted to certain functions, or directed to particular submenus.

1.5.4 Virtual screen facility

Each user can be configured to use up to nine virtual screens from which they can run up to nine concurrent Global applications, with the

ability to switch between each screen at will. These virtual screens continue processing even when not currently selected (displaying).

Note that, in general, it is **not** possible to "hot-key" between Global System Manager and MS-DOS (although the SPX Workstation option does include a "hot-key" facility).

1.5.5 Global utilities

Global System Manager acts as a common resource manager for modules that run under it, providing an extensive set of utilities, windowing and pop-up facilities. Global utilities include a powerful print spooler, message passing between screens, and system customisation programs. Pop-up windows provide on-screen calculator and calendar, data transfer between tasks and a standard help system.

Global applications use a common data file format across the whole range of operating systems upon which they run. This enables data transfer between a whole range of different computers. Global System Manager provides a comprehensive set of file management utilities which allow Global files to be created, modified, inspected, repaired and deleted.

1.5.6 System requests

A powerful set of 'system requests' can be invoked at any time with a minimum of keystrokes. These include:

- On-screen calculator able to take numbers from the screen and feed back results into the application program;
- Calendar - shows a month at a time on the screen and can return a selected date to the application program;
- Help - displays help windows to the current application;
- Print - prints the current screen contents;
- Transfer - transfers data between concurrent tasks;

1.5.7 The Global Cobol interpreter

The Global Cobol interpreter has been implemented on MS-DOS and Windows. This allows any programs written in Global Cobol to be run on MS-DOS or Windows.

1.5.8 The Global Spooler

Global System Manager provides a sophisticated yet user friendly spooler which allows printers to be shared by all users, with features such as priority sequencing, multiple copies and line-up patterns for pre-printed forms. The spooler can run as a background task, and can be controlled from any screen.

1.5.9 The Global Mailing System

Global System Manager provides a sophisticated yet user friendly electronic mail facility which allows operators to send mail messages to each other and take telephone messages electronically.

1.5.10 A file import and export utility

A batch file import and export utility, FILECONV, is available which converts data and text files to (and from) the Global data format. This facility allows Global applications to interface to other MS-DOS and Windows applications.

1.6 Global System Manager on Novell NetWare: A Technical Overview

The implementation of Global System Manager on MS-DOS and Windows involves the following:

- Global System Manager is started by running special MS-DOS programs or batch files;
- Global System Manager can provide both multi-user and networking environments but on standard MS-DOS, it does not provide concurrent execution of MS-DOS programs. When \$BYE (see Chapter 3) is used to quit a Global System Manager session and return to MS-DOS, the session ends for any users on serial screens and the network connection is broken;
- Global System Manager does not access the hard disk directly, the Global System Manager domain is simulated inside an MS-DOS file or files. Thus, instead of accessing the sectors of a physical disk, Global System Manager accesses the records of an MS-DOS file. These 'disks-within-a-file' are referred to as simulated volumes;
- Because Global System Manager and MS-DOS are both resident within the same computer at the same time, Global System Manager is able to access MS-DOS files directly using the INT 21 mechanism. The INT 21 functions are made available to Global System Manager programs through a special calling mechanism. Although a version of the Global File Converter product is available using these facilities, usually it would be necessary to write a program to take full advantage of them. This interface is documented in the Global File Converters Manual;
- A special device driver (DOS.PRI) is available to allow printing via the standard MS-DOS print device PRN: or LPT1:. This interface has been extended to allow printing via any MS-DOS printer device or NetWare queue. More than one printer may be used by Global System Manager at a time;
- Expanded and Extended memory is accessible through MS-DOS device drivers obeying the XMS or LIM specifications. This extra memory can be configured for use by Global System Manager for both RAM disk and cacheing;
- Global System Manager has networking facilities built in. These facilities are implemented on top of the NetWare IPX and SPX protocols.

The architecture of a Global System Manager network is similar to that of a Novell network. One or more computers act as Global System Manager file servers. When workstations run Global System Manager, they make use of the filing facilities provided by these file servers.

Global System Manager file servers can be workstations acting as value added servers, or NetWare Loadable Modules (NLMs) running on a NetWare fileserver.

Workstations acting as Global System Manager file servers can run Global applications. In this respect they are similar in concept to non-dedicated NetWare fileservers. Global System Manager NLMs only provide filing services, they cannot run Global applications, so they are analogous to dedicated NetWare fileservers.

Each workstation running Global System Manager is identified by its Global System Manager node-id. For Global System Manager file servers, the node-id is a single upper case letter in the range A to Z. For Global System Manager workstations (i.e. non-file servers), the node-id is a number, the possible node-id's (in decimal) being 0, 27 to 191, and 193 to 255. Node-id's are not tied to particular computers, but a given node-id can only be used by one computer at a time. Once a computer exits Global System Manager, another computer can run Global System Manager with the same node-id.

One Global System Manager file server, the Global System Manager "master" computer, is responsible for co-ordinating certain aspects of the whole Global System Manager network. For example, the master computer controls who can log into Global System Manager.

In a typical Global System Manager network, the only computer running Global System Manager continuously is the Global System Manager master computer, which is usually the only Global System Manager file server. Other Global System Manager nodes appear on the network as needed, when users need to run Global applications on their workstations. All Global programs and data are held on the master computer. Since the master computer is running continuously, the programs and data are always there for any workstation that needs them.

A workstation running Global System Manager (Novell NetWare) can support additional users running SPX Workstation. SPX Workstation is a terminal emulator which communicates with a computer running Global System Manager via the Novell network. Users of SPX Workstation can exit to MS-DOS at any point, and then return to the same point within Global System Manager.

You are **strongly** recommended to install an NLM as the Global System Manager master "computer" so that no workstation is tied up as the master computer. Again, it must be emphasised that the NLM cannot run Global applications. Many people are surprised that the standard Global System Manager sign-on screen doesn't appear when the NLM is loaded on the fileserver.

If it is not possible to use the NLM, the Global System Manager master computer must run on a workstation. This ties up a workstation, preventing it from running non-Global applications, but the workstation can still run Global applications. Since a computer running Global System Manager can support more than one user, it is possible to make better use of the master computer by attaching additional Global System Manager users to it. The master computer could support one user on the integral screen and a number of remote users running the SPX Workstation terminal emulator.

Global System Manager has its own version of network printing. Part of the filing system on a Global System Manager file server can be set

aside for printer spooling. This part of the filing system, the spool unit, is analogous to a NetWare printer queue. The printing of spooled files is performed by the Global Spooler, which is analogous to a NetWare print server.

Global System Manager V8.1 includes support for network printing. Alternatively, the CAPTURE utility can be used to redirect output directed from a local print device to a network printer.

1.7 Global System Manager (Novell) Version and Variant Numbers

Global System Manager consists of several software layers. Each layer has an independent software version (or variant).

1.7.1 Global System Manager (Novell NetWare) GSM Versions

The highest level in the Global System Manager (Novell NetWare) software hierarchy consists of the Global System Manager "\$ programs" (e.g. \$F) and related files (e.g. \$MONITOR). The version of this software layer is referred to as the "Global System Manager version" (e.g. V7.0, V8.0, V8.1). This version number is displayed, together with the Contract Protection Message, at start-up time and also on the first line of the \$S report (see Chapter 5 of the Global System Manager Manual).

1.7.2 Global System Manager (Novell NetWare) Executive Versions

The next level in the software hierarchy consists of the executives held in the +.JO library. The version of the executive library is displayed by \$S (see Chapter 5 of the Global System Manager Manual). When a new version of Global System Manager is initially released, the "executive version" (i.e. the version of the members of the +.JO library) will usually be the same as the version of the +.JO library and the Global System Manager version (e.g. V8.1). During the lifetime of a particular version of Global System Manager, the versions of the individual executives, and the version of the executive library, may increase.

1.7.3 Global System Manager (Novell NetWare) Controller Variants

For Global System Manager (Novell NetWare) the controllers represent the next level in the software hierarchy. The controllers are held in the +.JW, +.JWDOS, +.JWNOV and +.JWNLM libraries. The variant of the main controller library (i.e. +.JW) is displayed by \$S (see Chapter 5 of the Global System Manager Manual). In general, the "controller variant" is **independent** of the Global System Manager and executive versions. For example, the V4.2 controllers for Global System Manager (Novell NetWare), within the V4.2 +.JW library, will operate with Global System Manager V7.0, V8.0 and V8.1. The current controller variants are listed in the Global Configuration Notes.

1.7.4 Global System Manager (Novell NetWare) BACNAT Variants

The BACNAT software (i.e. "native" software: MS-DOS programs, batch files and text files etc.) represents the lowest level in the software hierarchy. In general, the BACNAT software does not include an explicit variant number. The version of the software is implied from the dates of the MS-DOS files.

1.7.5 Global System Manager (Novell NetWare) NLM Variants

The variant of the Global System Manager (Novell NetWare) NLM is displayed when the NLM is loaded. For example:

```
Global System Manager NLM V1.10
```

The Global Configuration Notes and the README.TXT file, distributed on the BACNAT diskette, both include a revision history of the Global System Manager NLM.

2. Installing Global System Manager

This chapter describes how to install Global System Manager and other Global software onto your computer. The purpose of installation is to copy the software you want to use for day-to-day running.

The installation process involves using the distribution disks, with which you have been supplied, to create hard disk volumes containing the installed software. The distribution disks should then be kept in a safe place so that they can be used to reinstall the software if this should ever become necessary.

THIS CHAPTER (ESPECIALLY SECTION 2.1.6) SHOULD BE READ IN CONJUNCTION WITH APPENDIX A.

The installation of Global System Manager on Novell NetWare is a three-stage process. All 3 stages must be completed according to the instructions in this chapter otherwise attempts to load from the installed Global System Manager will fail unpredictably.

The first, pre-installation stage (described in sections 2.1.2 and 2.1.3) involves allocating a Global System Manager directory on the file-server and copying the MS-DOS files, supplied on the BACNAT diskette, onto the Novell file-server.

The second stage involves loading Global System Manager from the BACRES distribution diskette and installing Global System Manager using the user-friendly installation dialogue as described in sections 2.1.4 to 2.1.11.

The third, post-installation stage (described in section 2.1.12) involves configuring Novell NetWare to allow a network of workstations to load Global System Manager from the Novell file-server.

Important note: Both the pre-installation and post-installation procedures require the use of NetWare commands to perform administrative functions. Because the syntax of the NetWare command and, in some cases, the actual name of the command, is dependent on the version of NetWare, details of the NetWare commands are described in the Global Configuration Notes. When a NetWare utility is referenced in this chapter only its function is described (e.g. "use a suitable NetWare utility to create a NetWare group"). Although this documentation technique may **slightly** decrease readability, the procedures described in this chapter should apply to all current and future versions of Novell NetWare.

2.1 Installing Global System Manager

You must install Global System Manager and (optionally) Speedbase Presentation Manager before installing any other software.

There are many possible Global System Manager (Novell NetWare) network configurations. Only the most common (and recommended) configuration is described in this chapter. Appendix K describes some non-standard network configurations,

The standard Global System Manager (Novell NetWare) network configuration consists of a single Global System Manager fileserver computer, which acts as the Global System Manager "master" computer,

and a number of Global System Manager workstations. The Global System Manager "master" computer may be a NetWare Loadable Module (NLM) running on a NetWare fileserver, or a NetWare workstation. **IF POSSIBLE, YOU ARE STRONGLY RECOMMENDED TO USE THE GLOBAL SYSTEM MANAGER NLM AS THE "MASTER COMPUTER"**. We shall assume the master computer has Global System Manager node-id of "A" (i.e. the default).

In the standard, single file-server configuration, all Global System Manager system files, Global application programs and data, are held on the master computer. The various Global System Manager workstations access these files over the Global System Manager network. A small Integrated Data File, GSMIPL.VOL, is created which is used by the Global System Manager workstations to load Global System Manager.

Although it is possible for several computers to share files directly under Novell NetWare, this must never be attempted with Global System Manager volumes. **Any attempts to share Global System Manager volumes will result in severe corruption of the Global System Manager data files.** The only exception to this rule is the GSMIPL.VOL volume. This volume can be shared because workstations just read from it when they load Global System Manager, they never write to it. The Discrete Data Volume GSM200, must only be accessed directly by the Global System Manager master computer: Other workstations must access it indirectly, via the Global System Manager network.

2.1.1 The Distribution Disks

Global System Manager together with Speedbase Presentation Manager are always distributed on high-capacity diskettes (1.2Mb 5¼" diskettes; 1.4Mb 3½" diskettes) for IBM PC compatibles (although exchangeable disks and magnetic tapes are sometimes used for other computers). The diskettes are:

BACNAT	MS-DOS format diskette (see Chapter 6);
BACRES	Global System Manager starter system (1st diskette). The BACRES diskette contains Global System Manager startup data;
BEA diskette);	Global System Manager starter system (1st extension
HAA diskette);	Global System Manager starter system (2nd extension
EPA	Speedbase Presentation Manager installation diskette (only present for Global System Manager PM configurations);
CFA	Global Configurator installation diskette (not required during the installation of Global System Manager). See the Global Configurator Manual for further details.

THE GLOBAL FORMAT DISTRIBUTION DISKETTES ARE UPDATED DURING THE INSTALLATION PROCESS, AND THEREFORE MUST NOT BE WRITE-PROTECTED.

2.1.2 Pre-installation NetWare Administration

Before installing Global System you must configure NetWare for use with Global System Manager and copy the MS-DOS files from the BACNAT diskette to a directory on the Novell fileserver computer.

2.1.2.1 Create a NetWare Group

On a workstation, login to the fileserver and use a suitable NetWare utility to create a NetWare group for Global System Manager (see the Global Configuration Notes). You must have NetWare SUPERVISOR privileges to create the new group. **Ensure that any NetWare user that wishes to use Global System Manager is a member of the Global System Manager group.**

It is not necessary for the NLM to login to NetWare. Note that earlier versions of Global System Manager required the creation of a Global System Manager user in order for the NLM to login to NetWare.

2.1.2.2 Allocate a Global System Manager Directory

Use a suitable MS-DOS or NetWare command to create a directory for Global System Manager and make it the home directory (see the Global Configuration Notes). This directory, which will be called the "Global System Manager directory", must be the current directory when Global System Manager is started (unless the GLDIR environment variable is used - see section 7.2.4).

Use a suitable MS-DOS COPY command to copy all the files from the BACNAT diskette to the current directory.

2.1.3 Allocating Simulated Volumes

This section of the installation procedure is dependent on the Global System Manager configuration code (see below).

If you are upgrading from an earlier version of Global System Manager there is normally no requirement to allocate a Discrete Data File although the volume type and directory size (i.e. number of files per subvolumes) must be the same for the existing configuration file (on SYSRES) and the new configuration file (on BACRES).

2.1.3.1 Simulated Volume Allocation for 5610 and 5611

If the size of the NetWare partition is less than 512Mb, use GLMKDDF.EXE (see section 6.4.1) to create the Discrete Data File directory as follows:

```
GLMKDDF GSM200 T151Z
```

If the size of the NetWare partition exceeds 512Mb, the volume type of the Discrete Data File volume in the Global configuration file MUST be changed from T151Z to T259Z (see section 8.2.1.1). Use Global Configurator to change the volume format for the SSD-FILE controller in the ++5610xx or ++5611xx configuration file on the BACRES diskette. Use GLMKDDF.EXE to create the Discrete Data File as follows:

```
GLMKDDF GSM200 T259Z
```

Note the use of the "T259Z" command line argument.

Important note: The configuration file used by the Global System Manager NetWare Loadable Module (NLM) (i.e. ++5619AA on the NLM SYSIPL volume) MUST also be updated to remain consistent with the configuration file on BACRES that is used to install Global System Manager (see section 10.2.4 for full details).

2.1.3.2 Simulated Volume Allocation for 5612 and 5613

The 5612 and 5613 configurations have been created to overcome the 512Mb partition size limitation inherent in the 5610 and 5611 configurations (see section 2.1.3.1).

Use GLMKDDF.EXE (see section 6.4.1) to create a GSM200 Discrete Data File as follows:

```
GLMKDDF GSM200 T259Z
```

2.1.4 Loading the Starter System

Begin the installation process by loading the simple starter system supplied on the distribution disks, commencing with the first system disk which is labelled BACRES. The name of the disk appears in the top right hand corner of the label.

1. After completing the steps described in sections 2.1.2 and 2.1.3 you should still be logged into NetWare on a workstation and "in" the Global System Manager directory (allocated on the file-server in section 2.1.2).
2. Insert the diskette labelled BACRES into diskette drive A: and load the Global System Manager installation system by keying:

```
GSMINST
```

The GSMINST.BAT batch file is described in section 6.3.2.

3. The computer will access the diskette for approximately 20 seconds and then the standard sign-on messages will appear.

Do not be disturbed by the WARNING messages that may appear when loading Global System Manager from the distribution diskette. They indicate that Global System Manager has re-configured itself dynamically to match your computer set-up and GSM.INI initialisation file more closely. The messages are suppressed once Global System Manager has been installed.

If Global System Manager has been supplied on the media supported by the MS-DOS B: drive it is possible to install Global System Manager from this drive although special action will be required **after** installation in order to access the diskettes drives from within Global System Manager (see Appendix H). To install Global System Manager from the MS-DOS B: drive use the following command:

```
C:\GSM>SET GLNODE=A  
C:\GSM>GSMLOAD B: I
```

The GSMLOAD.EXE utility is described in section 6.2.

2.1.5 The Serial Number Prompt

When you load the starter system for the first time you may get a prompt of the form:

```
Please key serial number (number and letters):
```

You must key in the serial number which appears in the middle of the label on the BACRES diskette. You may then be prompted for details such as the name of the company which supplied you with your Global System Manager and the address of the site where it will be used. When you have keyed these in, the following prompt will appear:

Key line number to amend, or A to accept:

Check what you have keyed carefully, and if there are any errors key in the corresponding line number to change that line. When all the lines are correct, key A to continue. Note that if you make a mistake after accepting the changes, you can apply up to 10 further amendments using the \$CUS System Maintenance option (see section 6.1.4.9 of the Global System Manager Manual).

2.1.6 The Installation Process

The starter system runs the installation program automatically when you load Global System Manager. This program displays a sequence of explanatory text and prompts to determine precisely how you want Global System Manager installed. If you cannot understand a particular prompt, check its reference in the section of Appendix A which explains what you need to do in more detail. Each prompt is prefixed by a reference to Appendix A. For example, [A.17] refers to section 17 of Appendix A.

2.1.7 Pre-installation Customisation

Although most customisation can be performed after Global System Manager has been installed, some aspects of the Global System Manager customisation must be performed before the installation process can proceed. Chapter 5 describes the Global System Manager (Novell NetWare) customisation utility.

2.1.8 Creating a Domain Error Map

This option is documented for completeness only and should be ignored when installing Global System Manager on Novell NetWare by keying <CR> to the following prompt:

Key V to amend domain error map or <CR> to continue:

DO NOT ATTEMPT TO ADD A DOMAIN ERROR MAP TO A DISCRETE DATA FILE.

DO NOT SELECT THIS OPTION IF THERE ARE PROGRAMS OR DATA ON THE SIMULATED VOLUME WHICH YOU WISH TO PRESERVE. CREATING OR AMENDING A DOMAIN ERROR MAP HAS THE EFFECT OF RE-INITIALISING THE SIMULATED VOLUME.

If you are installing Global System Manager onto an MS-DOS Integrated Data File you may want to create an error map of the simulated volume. This consists of building a list of those tracks which are known to be faulty so that Global System Manager can avoid using them.

To do this, during the installation from the distribution diskette, when you are prompted:

Key V to amend domain error map or <CR> to continue:

Key V and the installation program will proceed to run the \$V utility (see section 4.9) automatically.

Important note: Creating or amending a domain error will destroy any data currently on the disk. If you are not sure what to do, key <CR> to the above prompt.

If you key V to the prompt the \$V menu will appear, and you should then use option 2 to initialise and verify the simulated volume, followed by option 8 to amend the domain error map. \$V is fully described in section 4.9.

Run the \$BYE utility (see section 2.1.9) to return to the MS-DOS prompt and restart the Global System Manager installation from the BACRES diskette (see above). This time proceed with the installation by keying <CR> to the prompt:

Key V to amend domain error map or <CR> to continue:

2.1.9 The Installation Itself

Once you have replied to the first set of prompts, Global System Manager is installed from the distribution disks. Section 2.2 below describes problems that can arise during this process and suggests recovery actions. The installation process creates a unit on the simulated volume called SYSRES (for Global System Manager configurations other than Global System Manager (Novell NetWare), the installation may also create a SYSIPL diskette).

The installation may create more than just a SYSRES volume on the simulated volume. Optionally, a spool unit (SPOOL), a work unit (SYWORK), a log unit (SYSLOG) and a mail unit (SYSML) may be created during installation.

Once the software has been installed, there are further prompts allowing you to customise Global System Manager. For example, you must select the date format you want to use and the type of printer. Again, these prompts are explained more fully in Appendix A.

It is possible to quit the installation in order to run utility commands (e.g. \$S, \$U, \$F, \$V) in order to check the new system **BEFORE** installing onto the hard disk. To quit the installation, reply Q to the following prompt (see section A.2 in Appendix A):

[A.2]Do you want a standard installation onto hard disk (Y):

To continue with the installation, provided no unit assignments have been altered, key INSGSM to the GSM READY: prompt.

To abort Global System Manager without installing, run the \$BYE utility from the P.MIN library. For example:

```
GSM READY:P.MIN
V8.1 MINIMUM SYSTEM LIBRARY
GSM READY:*BYE
```

Note the use of both the "*" to "\$" aliasing, necessary to run the \$BYE command (typed as *BYE) from the \$P unit; and the library index load (of P.MIN) prior to running the command program. See Appendix F of the Global Utilities Manual for further details.

2.1.10 Restoring the pre-V8.1 customisation

As explained in Appendix A (sections A.40 and A.42) when installing Global System Manager V8.1 you are given the option of saving the customisation from an existing SYSRES. If you select this option, a copy of the existing SYSRES will be copied to the BACSAV sub-volume before Global System Manager V8.1 is installed, overwriting the

existing SYSRES. Once the installation has completed you are given the option of restoring the existing customisation.

If this option is selected, the following files (if present) are copied from the BACSAV sub-volume to the newly installed SYSRES:

```

$RPnnnxx Pre-V8.1 printer control files (renamed to $$Pnnnxx)
$$Pnnnxx V8.1 printer control files
$$RSxxxx Screen reset sequence files
$FKxxxxx Pre-V8.1 function key definition files (renamed to
$$FKxxxx)
$$FKxxxx V8.1 Function key definition files
$TRxxxxx Pre-V8.1 input key translation files (renamed to
$$TRxxxx)
$$TRxxxx V8.1 input key translation files
$txxxxxx $TAPE catalogue files
$$DRxxxx $DIRP personal menu selection files
$$SCxxxx Screen specific sequence files
$.xxx Global System Manager TAP's
T>xxx Speedbase Presentation Manager TAP's
$MENUxxx User-defined menu files
$$DOMxxx $VOLSAV domain layout files
$$AUTH $AUTH authorisation file
$$UREQM End-user system request menu file
$$OPID Operator-id file
$$GROUP Group file
$$MENUS System menu file
$$MPARAM Menu parameter file
$$UREQ End-user system request data library
$$CDES $STATUS computer description file
$$DEBUG $DEBUG template file
++xxxxxxx Configuration file
$DIAL Comms Support Pack component
$DIALX Comms Support Pack component
$FCOMM Comms Support Pack component
P.QG Comms Support Pack component
P.BC Comms Support Pack component
$TAPE $TAPE component
$TAPED $TAPE component
P.$TAPE $TAPE component
TACUS $TAPE component
$OZ Global Organiser component
$$$JOB End-user restore customisation job
S. $$$LST End-user restore customisation list

```

It is possible to add extra, site-specific files to the above list. This is achieved by creating a text file, S. \$\$\$LST, containing a simple list of the extra files (one file per line) to be copied back to SYSRES after Global System Manager has been installed. If a S. \$\$\$LST file is required it must be present on the existing SYSRES before the update installation is attempted.

Important note: Each file listed in the S. \$\$\$LST file is simply copied, from BACSAV to the newly installed V8.1 SYSRES, using the \$F COP command. If a file, listed in the S. \$\$\$LST text file, is not present on the BACSAV volume, the restoration of the pre-V8.1 customisation will fail leaving the newly installed V8.1 Global System Manager in an unpredictable state. The BACSAV volume is created, during the V8.1 installation, by copying all the files from the existing SYSRES volume. Ensure that only files actually present on the

existing SYSRES volume are included in the S. \$\$\$LST text file before starting the installation.

When the components in the above list (and in the optional S. \$\$\$LST file) have been restored to the newly installed SYSRES volume an optional, end-user defined, post-installation customisation job is invoked. If this job, \$\$\$JOB, is required it must be present on the existing SYSRES before the update installation is attempted.

If the restore customisation phase of the installation restores a \$\$AUTH authorization file it will be automatically upgraded to operate with Global System Manager V8.1 (see section 6.3.13 of the Global System Manager Manual). Similarly, if the restore customisation phase of the installation restores any Printer Control Files they will be automatically upgraded to V8.1 standards.

If the save/restore existing customisations option is selected then it is not possible to apply the new V8.1 customisation options (e.g. \$MAIL, \$GROUP customisations) to the freshly installed Global System Manager. These customisations must be applied using the "Install Extra Facilities" option of \$CUS as explained in section 6.1.4.13 of the Global System Manager Manual.

IMPORTANT NOTE: ALL PRE-V8.1 PRINTER CONTROL FILES MUST BE RUN THROUGH V8.1 \$CUS TO UPGRADE THEM TO THE V8.1 STANDARD. IF YOU ATTEMPT TO USE A PRE-V8.1 PRINTER CONTROL FILE UNDER GLOBAL SYSTEM MANAGER V8.1, A STOP CODE 405 WILL OCCUR.

IMPORTANT NOTE: \$AUTH V8.1 WILL CONTINUE TO WORK WITH PRE-V8.1 \$\$AUTH AUTHORISATION FILES BUT WITH REDUCED FUNCTIONALITY. SEE SECTION 6.3.13 OF THE GLOBAL SYSTEM MANAGER MANUAL FOR FULL DETAILS.

2.1.11 Returning to MS-DOS

When customisation is complete exit Global System Manager and return to MS-DOS by keying:

```
Installation of Global System Manager is now complete.  
Please restart Global System Manager as detailed in  
the Global Operating Manual:<CR>  
GSM READY:$BYE
```

2.1.12 Post-Installation NetWare Administration

Once Global System Manager has been installed from the distribution diskettes, the following post-installation customisation must be applied.

2.1.12.1 Allocating the GSMIPL Volume

After running \$BYE (see section 2.1.11), use the GLMKIDF.EXE utility (see section 6.4.2) to create a 500Kb Integrated Data File volume. Use the following dialogue:

```
GLMKIDF GSMIPL.VOL 500K
```

Use a suitable NetWare utility (see the Global Configuration Notes) to make the GSM.INI and GSMIPL.VOL files shareable.

DO NOT MAKE ANY OTHER FILES SHAREABLE.

2.1.12.2 Initialising the GSMIPL Volume

Run GSMBOOT (see section 6.3.3) to load Global System Manager on the workstation. Run the `%.IPLJOB` from the **SYSRES** volume. Note that this job requires the BACRES diskette to be present in the diskette drive and prompts for both the configuration code (e.g. `++5610GJ`) and the unit address of BACRES (i.e. 140 for an O2A BACRES; 150 for a G1A BACRES).

Important note: For versions of Global System Manager PM prior to V8.1, the installation instructions recommended the installation of Speedbase Presentation Manager V8.1 before running `%.IPLJOB`. For Global System Manager PM V8.1, and later, Presentation Manager is installed automatically during the installation of Global System Manager.

The `%.IPLJOB` copies the following files from the installed SYSRES volume to the SYSIPL volume:

```
$MONITOR
P.$MON
++NNNNxx
+.JO
```

In addition to copying the above files, the `%.IPLJOB` creates the `+.JWIPL` library, containing the following members, on the SYSIPL volume:

```
+JWCBOA from library +.JWNOV
+JWCF08 from library +.JWNOV
+JWCF0B from library +.JWNLM
+JWEF01 from library +.JWNLM
+JWCA01 from library +.JW
+JWCA04 from library +.JW
+JWCA63 from library +.JW
+JWCB01 from library +.JW
+JWMO00 from library +.JW
+JWNEXT from library +.JW
+JWNSV9 from library +.JW
+JWCA02 from library +.JWDOS
+JWCA03 from library +.JWDOS
+JWCA0B from library +.JWDOS
+JWCB09 from library +.JWDOS
+JWCB0B from library +.JWDOS
+JWCE08 from library +.JWDOS
+JWNAUT from library +.JWDOS
+JWNBYE from library +.JWDOS
+JWNERR from library +.JWDOS
+JWNLIM from library +.JWDOS
+JWNS61 from library +.JWDOS
+JWNXMS from library +.JWDOS
```

Important note: Unless the `GSM.INI` file is modified to include a local simulated hard-disk volume (see Appendix K.2), the `SSD-FILE` controller, `+JWCAOC`, MUST never be copied to the workstation SYSIPL volume. If this advice is not heeded it is possible for several Global System Manager workstations to access the central simulated volume directly by-passing the Global System Manager multi-user file access and file locking mechanisms.

Note that `%.IPLJOB` does not copy any serial console or printer drivers from the `+.JW` library. If it is ever necessary to configure a serial

device on a Global System Manager (Novell NetWare) workstation then **all** the members of the +.JW library on SYSRES should be merged into the (enlarged) +.JWIPL library on SYSIPL.

When the %.IPLJOB completes, run \$BYE to return to the MS-DOS prompt.

2.1.12.3 Checking Global System Manager Without the NLM

To check Global System Manager (Novell NetWare), in the absence of the NLM, proceed as follows. Run the GSMBOOT.BAT batch file from a workstation to initiate a Global System Manager session with a node-id of "A". On another workstation, login to NetWare, change to the Global System Manager directory on the fileserver, set the GLNODE environment variable to "0x1b":

```
F:\USERS\GSM>SET GLNODE=0X1b
```

and run the GSMWORK.BAT batch file to initiate a Global System Manager session with a node-id of "0x1b". The second workstation should load Global System Manager successfully.

This configuration is an example of a Global System Manager (Novell NetWare) network. The first workstation (with node-id "A") is the "master" computer. The second workstation (with node-id "0x1b") accesses Global System Manager programs and data on the master computer via the Global System Manager network.

Important note: This simple configuration may be required in order to install some "mature" Global application products (e.g. Global Finder) that are not "network aware" and only recognise hard-disk domain addresses in the 2nn range.

To terminate Global System Manager on the trial network, run \$BYE on system "0x1b", then \$BYE on system "A".

2.1.12.4 NetWare Permissions and Access Rights

When NetWare workstations run Global System Manager, the Global System Manager directory must be the current directory. As installed, the files in the Global System Manager directory are only accessible to the SUPERVISOR. All non-supervisor operators that wish to use Global System Manager (Novell NetWare) must be members of the "Global" group. By convention, the name of the "Global" group is GLOBAL.

Use a suitable NetWare utility (see the Global Configuration Notes) to give the "Global" group these access rights to the following files:

File	Rights for "Global" group
GSMWORK.BAT	R F
GSMLOAD.EXE	R F
GSM.INI	R F
GSM.TLT	R F
GSMIPL.VOL	R F W

where "F" indicates the "Global" group must have file-scan rights for the file; "R" indicates the "Global" group must have read-access to the file; "W" indicates the "Global" group must have write-access to the file.

2.1.12.5 Loading the Global System Manager NLM

All the necessary files and programs are already on the NetWare fileservers. To load the Global System Manager NLM (see section 10.2.2), key the following command line on the fileserver console:

```
:load directory\GSM
```

For example:

```
:load USR1:GLOBAL\GSM
```

To load the Global System Manager NLM whenever the Novell fileserver is restarted, edit the AUTOEXEC.NCF file to include the "load command line".

Important note: The Global System Manager NLM uses the pathname specified in the NetWare "load" command to locate the IPL device (i.e. it replaces the "GSM" at the end of the pathname by "NLMIPL.VOL" to obtain the full pathname of the IPL device). Consequently, the full NLM pathname is required as the parameter to the "load" command.

2.1.12.6 Preparing Workstations to Load Global System Manager

Each Global System Manager workstation requires a unique Global System Manager node-id. Several workstations may be assigned the same Global System Manager node-id, but only one of them will be able to use Global System Manager at any one time. The Global System Manager node-id is established using the GLNODE MS-DOS environment variable as described in section 7.2.3. GLNODE would normally be setup when the workstation bootstraps MS-DOS, by defining it in the AUTOEXEC.BAT file. The allowed Global System Manager node-id's are described in section 7.2.3.

To load Global System Manager on a workstation, once a Global System Manager node-id has been established, change to the Global System Manager directory and run the GSMWORK.BAT file (see section 3.1.1.3).

2.1.12.7 Running Global System Manager from Windows

If you intend to start a Global System Manager session from Windows you are advised to set up Global System Manager as a program item in the Windows Program Manager (see section 7.4).

2.1.13 Starting the Installed Global System Manager

When the installation is complete you are recommended to check the installation as described in sections 2.3 and 2.4, then to install your other Global software modules as described in 2.5. Finally, take backup copies of the installed Global System Manager as described in 2.6.

Note that there is little point taking a backup of Global System Manager before installing other software, as the menu (which is held on the SYSRES disk) will be updated as you install further software.

2.2 Errors During Installation

This section describes the error conditions most likely to arise during installation. If you get an error message that is not described here consult Appendix A of the Global System Manager Manual.

PLEASE MOUNT name ON description - uuu AND KEY <CR>

If this message is repeated when you key <CR>, despite the correct diskette being mounted, then check that you have put the disk in the drive correctly. Also check the unit number (uuu) against your Global Configuration Notes to make sure that you are using the right type of diskette. If everything appears to be correct, treat it as a READ error, as described later on in this section.

\$78 DESTROY name?

This prompt appears if the new SYSIPL diskette you mount has already been initialized by Global System Manager. If you have accidentally mounted the wrong diskette, reply N and mount the correct one. If you are deliberately re-using an old disk, reply Y to continue.

\$57 message

\$66 message

\$99 message

These error messages are explained in Appendix B.

- * **READ ERROR ON description - uuu**
- * **WRITE ERROR ON description - uuu**
- * **H ERROR ON description - uuu**

Key <CR> to retry, as these errors sometimes are transient. If it is a diskette which has the error, try taking it out of the drive, reinserting it and trying again. If this does not work then proceed as described below.

If the disk in the indicated drive is BACRES, BEA, HAA or EPA then your computer is unable to read the distribution diskette. The most likely reason is that it has been damaged in some way (e.g. by a fingerprint on the recording surface). Contact your supplier for a replacement. If this also fails then the diskette drives on your computer are probably out of alignment, and need servicing.

If the error is on a SYSIPL diskette then the diskette is either faulty or the wrong type. Try again with another diskette. If this fails check the unit number given at the end of the error message against your Global Configuration Notes to make sure that you are using the correct type of diskette.

If the error is on a hard disk you may be using the wrong configuration. If have the correct configuration, reply Q to the standard installation prompt, return to MS-DOS and use an MS-DOS utility to correct the error on the faulty disk.

- * **HARDWARE PROTECTION ON description - uuu**

The installation process needs to write to the disk in the drive described, but cannot do so because it has been 'write protected'. Remove the write protection and key <CR> to continue.

2.3 Checking Your New System

You should now have a correctly installed Global System Manager. Load from hard disk as described in Chapter 3.

If all is well the prompt:

```
CONFIRM THIS IS date and time information (Y):
```

will appear (or possibly a request for the date if your computer does not include a built-in calendar - see Chapter 3). There should be **no** error or warning messages beginning with \$57 or \$99. If there are consult Appendix B for an explanation and suggested recovery action.

Reply to the appropriate date and time prompts to get to the operator prompt, for example:

```
CONFIRM THIS IS 06.30 am Wednesday 28th Nov 1990 (Y):<CR>
.....
(serial number, user number and contract description displayed)
.....
PLEASE KEY YOUR OPERATOR-ID:
```

If you are using password checking, you must supply one of the operator-ids you specified during installation, and also reply with the same characters to the subsequent password prompt.

If the installed software includes a Speedbase Presentation Manager Run-Time Licence the following message and prompt will appear:

```
The annual rental fee password is shown on the advice note.

Please key password:
```

To use the installed software a rental fee password, consisting of a single digit followed by 13 letters, **MUST** be supplied.

If your computer supports more than one type of screen you will also get a terminal code prompt:

```
PLEASE KEY TERMINAL CODE (code):
```

If you are unsure of the terminal code key LIS to list those available.

It is very unlikely that the default terminal-type will be correct for your particular screen: Key LIS to list those terminal types that are available.

A menu ending with a selection prompt will now be displayed (or a ready prompt if you elected not to use a menu). You can run command programs by keying their names to either prompt.

Once you have replied to the confirm prompt the operator-id prompt should appear on every screen in a multi-user installation. If it does not, key \$STATUS to run the system status command which lists all the users on the system: There should be a user listed for each screen. If there are too few then your hardware may be incorrectly configured. Key <ESCAPE> to exit from \$STATUS.

If a serially-connected screen fails to display check the following: That it is connected to the mains and switched on; that the correct baud rate is selected; that the screen is on-line; and that the cabling is correct. Read the appropriate sections in Chapter 9 of this manual and the manufacturer's handbook for the screen. If all the

above appear correct, check the parity, data bit and stop bit settings for the screen, and that the hardware for these serial ports has been set up correctly. You can restart any screen from the first screen by running command \$STATUS and then keying RES and the user number corresponding to the screen to be restarted.

For serially-connected screens you should perform further tests to make sure that the option switches on the terminal are set correctly, and that the correct terminal code is being used. (Quite often it is necessary to disable "auto-wrap" and "auto line-feed".) To test the terminal, run command \$T and key TEST to its first prompt. This will give you a menu of test options. You should try tests 1 (dimensions), 6 (clear screen and cursor positioning) and 7 (extended control functions).

In the **dimensions screen** test, every character position, except one, of the available display area should be filled with a digit. The only exception is the rightmost character of the bottom line, which should be a colon to indicate that the screen serves as a prompt. If the screen display is not as described, but contains lots of blank lines, this is probably because an erroneous option switch setting is causing the terminal to automatically generate a new line sequence when the rightmost character of each line is displayed. Correct the switch setting, key <CR> to the colon prompt to return to the menu, and select the dimensions test again by keying 1.

The **clear screen and cursor positioning** test should result in a display where the screen is bordered by a continuous frame of digits. The cursor should be located to the right of a colon prompt, which appears in the top left hand corner, just inside the framing digits. If the screen does not appear like this you have probably specified the wrong terminal type during installation.

The **extended control functions** test checks that special keys on the keyboard generate the expected characters. You will be prompted with the names of 17 special keys in turn. Reply to each one by pressing the corresponding key. If the result is not as expected, ERROR will be displayed and the prompt repeated. If you are unable to find the correct key, reply N to go to the next one. If any of the keys are incorrect, but the previous two tests worked, then you have probably used the terminal code for a different version of the keyboard.

When you have completed the tests key <ESCAPE> to exit.

2.4 Checking the Printer

You should now check that your printer is working correctly. If you have installed the Global System Manager spooler, you will first need to reassign the standard printer (\$PR) to the real printer (\$RP) by running command \$A:

```
PLEASE SELECT A FUNCTION:$A
.....
..... (list of current assignments)
.....
$69 UNIT:$PR ADDRESS:$RP
$69 UNIT:<ESCAPE>
```

Run command \$T (screen description) and key P to its prompt to print out a description of your screen on the printer. Check that it is printed correctly, with no missing characters or lines. If you cannot

print anything check the cabling, parity and number of data bits, referring to the handbook on the printer. If the characters are garbled, then the baud rate is probably incorrect. If some lines or parts of lines are missing then the busy handling is probably faulty. This could be due to incorrect cabling, or the wrong option having been selected for either the printer or the configuration file (see section A.26). If only about half the characters are printed then the printer is probably checking parity, you should disable this by changing the option switches. If a blank line appears between each printed line then an "auto line-feed after CR" option is set on the printer. This too should be disabled.

If you need to change the baud rate or busy handling used by Global System Manager run command \$CUS as described in section 6.1 of the Global System Manager Manual.

If you have more than one printer then use \$CUS to set up the characteristics of the other printers as described in section 6.1 of the Global System Manager Manual, and then test these printers as described above.

2.5 Installing Other Global Software (\$INSOFT)

You are now ready to start installing other Global software modules such as Global Sales Ledger, Global Writer or Global Cobol. If you have chosen to use a menu (the default option) then select function 1, "Install Global Software:" (otherwise run the command \$INSOFT from the GSM READY: prompt).

[PHOTO HERE]

Figure 2.1 - \$INSOFT (using a diskette format code)

[PHOTO HERE]

Figure 2.2 - \$INSOFT (using a diskette unit number)

You will be asked to supply the name of the first distribution disk (two letters followed by "A", appearing in the top left corner of the label). You are then asked for the diskette format code (3 to 6 characters which appear in the bottom right corner of the label), see figure 2.1.

\$INSOFT then loads and invokes an installation job called xxINS from the distribution diskette. If you have mounted the distribution diskette in the wrong drive (or used the wrong diskette) \$INSOFT displays a mount message of the following form:

```
PLEASE MOUNT xxA ON diskette-drive - nnn AND KEY <CR>
```

\$INSOFT will accept the unit number of the diskette drive as an alternative to the format code, see figure 2.2.

Each software module has a section in its user manual describing installation. You are advised to check **all** these sections before starting, to see whether the modules need to be installed in a specific order. In particular, some of the accounting modules require other modules to be installed first.

Normally you would delete the \$INSOFT menu entry after the application software as been installed so as to avoid confusion. The \$INSOFT command can still be used, of course, by invoking it by name from the READY prompt or menu.

2.6 Global System Manager Backup and Reinstallation

Once you have installed Global System Manager and all your Global software, you should take a backup copy of the Global System Manager customisation. **This precaution is absolutely vital.** If you ever need to reinstall Global System Manager you can avoid repeating the customisation of the main menu and table of authorized users by restoring the backup copy of the customisation.

You can take a copy of the customisation by running \$CUS, selecting the "System Maintenance" function and the "Save current customisation" sub-function. You are given the option to save the customisation on diskette or on a subvolume on the hard-disk.

If you select to save the customisation onto diskette, a new pre-formatted (or pre-initialised) diskette called BACSAV is required. The "Save current customisation" sub-function will copy the customisation files to the BACSAV diskette (note that versions of Global System Manager prior to V8.0 automatically initialised a diskette as BACSAV). You should then put this diskette away safely with the BACRES, BEA, HAA (and optional EPA) diskettes. You are recommended to save the current customisation in this way every month, so that the BACSAV disk contains the latest menus and list of users.

If you select to save the customisation on a subvolume on the hard-disk, \$CUS will create a new sub-volume called BACSAV (or use an existing one if available) and copy all the files from SYSRES to the BACSAV subvolume.

If you need to reinstall Global System Manager, either for a new version or because of I/O errors on the SYSRES volume, you should re-install as described in section 2.1. When this is done and you have reloaded the newly installed Global System Manager, run command \$CUS, select the "System Maintenance" function, and then select the "Restore saved customisation" function. This will copy the saved menus, table of authorized users and system customisation from a BACSAV diskette to the freshly installed system. Note that this option **cannot** be used to restore customisation from a BACSAV sub-volume.

It is also advisable to create an "emergency SYSRES diskette" by running \$CUS, selecting the "System Maintenance" function and then selecting the "Create SYSRES diskette" function.

If the installation produced a SYSIPL diskette, it is advisable to use the \$F SAV and RES commands (see Chapter 5 of the Global System Manager Manual) to make a backup copy of this diskette.

3. Running Global System Manager

This chapter explains how to run Global System Manager under Novell NetWare.

Once Global System Manager has been started it is then responsible for running the Global range of application software.

[PHOTO HERE]

Figure 3.1 - Confirming the date and time

[PHOTO HERE]

Figure 3.2 - The sign-on screen

3.1 Starting Global System Manager

Before you start to use Global System Manager you should ensure all the peripheral devices are ready, that printers have plenty of paper and are properly aligned at the top of the page.

3.1.1 Starting Global System Manager from NetWare

Before attempting to load Global System Manager on a NetWare workstation, a Global System Manager "master" computer must be available. The default, and recommended, configuration involves running the Global System Manager NLM on the NetWare file-server computer. However, it is possible to configure a NetWare workstation to act as the Global System Manager "master" computer.

3.1.1.1 Starting the Global System Manager NLM

If the Global System Manager NetWare Loadable Module (NLM) is to act as the Global System Manager master computer (i.e. the default configuration), and the NLM is not loaded automatically when the NetWare fileserver boots (see section 10.2.2), type the following line at the NetWare fileserver system console:

```
:LOAD directory\GSM
```

where *directory* is the directory the NLM is installed in.

3.1.1.2 Starting Global System Manager on a "Master" Workstation

If the Global System Manager NLM is not being used as the Global System Manager master computer (a configuration that is not recommended), run GSMBOOT.BAT on the NetWare workstation that is to act as the Global System Manager master computer. As explained in section 6.3.3, GSMBOOT.BAT is a simple batch file that includes the line:

```
GSMLOAD GSM200 N
```

3.1.1.3 Starting Global System Manager on a NetWare Workstation

Once the Global System Manager "master" computer is running (either on the NetWare file-server or on a NetWare workstation), other workstations can run Global System Manager by keying:

```
F:\GSM>GSMWORK
```

As explained in section 6.3.4, GSMWORK.BAT is an MS-DOS batch file which contains the line:

```
GSMLOAD GSMIPL.VOL N
```

3.1.1.4 Starting the SPX Workstation Terminal Emulator

If you are using the SPX Workstation (see section 6.7) to attach a workstation to another computer that is already running Global System Manager, key:

```
SPXWS net node socket
```

where net and node together form the network address of the computer you are attaching to, and socket is the socket number assigned to you on that computer. As the network address and socket number can be difficult to remember, your system administrator may provide you with an MS-DOS batch file (e.g. GLOBAL.BAT) which contains the above command line.

3.1.2 Starting Global System Manager from Windows

The installation of Global System Manager on Windows should have created an icon and program item for Global System Manager (see sections 7.3 and 7.4). Global System Manager is started by clicking on the appropriate icon.

3.1.3 The Date Prompt

When the start-up procedure is completed successfully, Global System Manager will prompt you to confirm or supply the current date and time.

NOTE THAT THE DATE/TIME MESSAGES WILL NOT APPEAR IF AN AUTOMATIC OPERATOR-ID OR TERMINAL TYPE HAS BEEN ESTABLISHED (SEE SECTIONS 7.1.9, 7.1.10, 7.2.1 AND 7.2.2).

Normally, MS-DOS will supply the date and time information to Global System Manager. If the date and time supplied by MS-DOS are valid, the following prompt will appear:

```
CONFIRM THIS IS 7:30 am Saturday 24 November 1990 (Y):
```

Reply <CR> if both the date and time are correct.

If either the date or time supplied by MS-DOS are incorrect, you can key N to the confirm prompt to change them. For example:

```
CONFIRM THIS IS 10:00 am Monday 29 October 1990 (Y):N
PLEASE KEY DATE DD/MM/YY (29/10/90):<CR>
PLEASE KEY TIME HH.MM (10.00.02):9.00
```

If the date-time information supplied by MS-DOS is more than an hour earlier than the last time Global System Manager was used, or more than a week later, a warning message will appear. If the date and time are correct you must key Y to continue (not <CR>). For example:

```
WARNING - DATE IS MORE THAN 6 DAYS LATER THAN PREVIOUS DATE
CONFIRM THIS IS 10:00 am Monday 29 October 1990 (N):
```

If MS-DOS is unable to supply a valid date, the following prompt will appear:

```
PLEASE KEY DATE DD/MM/YY:6/2/95
```

or:

PLEASE KEY DATE MM/DD/YY:2/6/95

('American' format)

Reply, as shown, with the date in the indicated format. You may key a full stop (period) or comma in place of the / character if you prefer. Once you have supplied the date you will be prompted for the time of day:

PLEASE KEY TIME HH.MM:16.30

The 24-hour clock is used (this reply sets the time to 4.30 pm).

When you have keyed the date and time you will be asked to confirm that they are correct:

CONFIRM TODAY IS 4.30 pm Monday 6th February 1995 (Y):

Key <CR> if it is correct, or N to change the date and time.

If the date-time information specified is more than an hour earlier than the last time entered, or more than a week later, a warning message will appear as it is likely that you have made a mistake. If the date and time are correct you must key Y to continue (not <CR>).

3.1.4 Local Area Networks

All Global System Manager (Novell NetWare) configurations are "network configurations". Consequently, you may not be able to start Global System Manager successfully on a workstation until another computer on the network, with the SYSRES disk you need to access, is also running Global System Manager (on a standard configuration, this computer will be the Global System Manager NLM running on the NetWare file-server). If the SYSRES volume cannot be accessed, the following error message and prompt will appear:

* COMPUTER NOT AVAILABLE ON xxx - RETRY?:

where xxx consists of a letter, to identify the machine in question, and a two figure number indicating the drive on that machine where SYSRES should be mounted (e.g. A01). Load Global System Manager on the other computer and key <CR> to the retry prompt on your own computer to try again.

If the other computer cannot run Global System Manager (because of hardware error, for example), key N to the retry prompt and the following message will be displayed:

§57 KEY NEW SYSRES UNIT:

You should supply the address of SYSRES on another computer (if there is one on the network) which your computer can access. If there isn't one then the network will have to be reconfigured using the \$CUS System Maintenance option (see section 6.1.4 of the Global System Manager Manual).

Important note: On a standard Global System Manager (Novell NetWare) configuration (i.e. with one file-server and multiple workstations) it will NOT be possible to supply the address of an alternative SYSRES volume.

A similar problem can arise if you try to bootstrap a workstation and the master computer, which contains the user file necessary for sign-

on, is not running Global System Manager. The following message will appear:

```
$57 MASTER COMPUTER UNAVAILABLE
$57 KEY UNIT OF SYSRES ON NEW MASTER COMPUTER:
```

If Global System Manager can be run on the master computer then do so and then key <CR> to continue loading Global System Manager on your computer. If the master computer cannot run Global System Manager, then you will have to supply the address of SYSRES on another machine which can serve temporarily as the new master computer. You will then have to load Global System Manager on that machine before you can continue loading Global System Manager on your own. If the master computer is permanently disabled the network will have to be reconfigured using the \$CUS System Maintenance option (see section 6.1.4 of the Global System Manager Manual).

Important note: On a standard Global System Manager (Novell NetWare) configuration (i.e. with one file-server and multiple workstations) it will NOT be possible to supply the address of an alternative "master computer".

Important note: When specifying a new "master SYSRES" unit on the local computer, ensure the reply is a valid network address (e.g. B01) instead of a local address (e.g. 201).

3.1.5 Speedbase Presentation Manager Licence Fee Password

If the installed software includes a Speedbase Presentation Manager Run-Time Licence the following warning message will appear within 30 days of the expiry date:

```
Your Presentation Manager rental is due by dd/mm/yyyy.
```

```
Please key password, <CR> to continue:
```

The rental fee password, obtained from your software supplier, consists of a single digit followed by 13 letters. Note that either upper-case or lower-case letters are acceptable.

If the installed software includes a Speedbase Presentation Manager Run-Time Licence the following warning message will appear when the licence expires:

```
You are in danger of infringing your licencing agreement.
This software expired on dd/mm/yyyy.
```

```
Please contact your software supplier to obtain a new password.
```

```
In emergency contact the "Emergency Rental Review
Department" on phone number (international phone number)
before 16th April 1995 or phone number
(international phone number) after 16th April 1995.
```

```
Please key password, <CR> to continue.
```

The rental fee password, obtained from your software supplier, consists of a single digit followed by 13 letters. Note that either upper-case or lower-case letters are acceptable.

If the installed software includes a Speedbase Presentation Manager Run-Time Licence the following warning message will appear 14 days after the licence expiry date:

You have infringed your licencing agreement.
This software expired on *dd/mm/yyyy*.

Please contact your software supplier to obtain a new password.

In emergency contact the "Emergency Rental Review
Department" on *phone number (international phone number)*
before 16th April 1995 or *phone number*
(international phone number) after 16th April 1995.

Please key password:

A rental fee password, obtained from your software supplier, consisting of a single digit followed by 13 letters **MUST** be applied. Note that either upper-case or lower-case letters are acceptable.

3.2 The Sign-on Procedure

(If the Global System Manager has already been loaded by another operator, you will start from here when you come to use it.)

3.2.1 The Contract Protection Message

Displayed on the top line of the screen are the software level and version numbers, your TIS Software serial number, your screen number and the computer-id. Appearing below the title line is the contract description, a short summary of your licensing agreement. **Please ensure that you and your colleagues honour this agreement at all times.**

3.2.2 The Operator-id Prompt

Below the contract description the following prompt appears:

```
PLEASE KEY YOUR OPERATOR-ID:
```

Reply with your operator-id, a code up to four characters in length. Normally, you just use your initials, but sometimes special codes will be allocated by your system supervisor.

NOTE THAT THE OPERATOR-ID PROMPT WILL NOT APPEAR IF AN AUTOMATIC OPERATOR-ID HAS BEEN ESTABLISHED FOR YOUR SCREEN (SEE SECTIONS 7.1.9 AND 7.2.1).

Note that it is possible to customise Global System Manager so that the contract protection message is suppressed. If this option is selected (see section 2.4.9 of the Global Configurator Manual for more details) then no text will proceed the operator-id prompt.

Note also that it is possible to customise Global System Manager so that no messages are displayed until a character (either <CR>, <ESC> or any character, depending on the customisation) is keyed. If this option is selected (see section 2.4.9 of the Global Configurator Manual for more details) then no messages will be displayed until the "trigger character" is keyed.

3.2.3 The Terminal Type Prompt

If your computer supports more than one type of terminal, a prompt of the following form appears:

```
PLEASE KEY TERMINAL CODE (code):
```

requesting you to supply the terminal code identifying the device. The default terminal code, displayed in brackets, is the code used for the previous Global System Manager session on the terminal. Usually, the default terminal code will be correct. However, the default terminal code will NOT be correct if this is the first time your screen has been used to run Global System Manager, if you have changed terminals (e.g. replaced a Wyse-50 screen by a Wyse-60) or if \$STATUS has been used to purge the User File. You can, if necessary, list the available terminal codes by keying LIS. For example:

```
PLEASE KEY TERMINAL CODE (116 ):LIS
0      BASIC TELETYPE SUPPORT ONLY
116    KDS7362
161    MICROCOLOUR M2200
187    WYSE WY-370 (ANSI KEYBOARD)
197    TCL NYCE COLOUR TERMINAL
509    IBM PC/XT/AT MONOCHROME
519    IBM PC/XT/AT COLOUR
PLEASE KEY TERMINAL CODE (116 ):187
```

In this example, Global System Manager continues, knowing you are working at a Wyse WY-370.

Important note: If this is the first time your screen has been used, or if Global System Manager has been reloaded after the \$STATUS PUR command (see the Global Utilities Manual) has been used to purge the \$\$USER file, the default terminal type (in brackets) may be incorrect or inappropriate. If in doubt, use the LIS command (as above).

NOTE THAT THE TERMINAL TYPE PROMPT WILL NOT APPEAR IF AN AUTOMATIC TERMINAL TYPE HAS BEEN ESTABLISHED FOR YOUR SCREEN (SEE SECTIONS 7.1.10 AND 7.2.2).

The numeric terminal code may be prefixed by one of the following letters:

- E The screen is being used by a terminal emulator package. This option is obsolete - do not use;
- W Start the Global System Manager session in "wide-mode" if the terminal supports wide-mode working.

3.2.4 The Password Prompt

If your installation has decided to employ authorization checking, you will now be prompted for your password:

```
PLEASE KEY PASSWORD:
```

You should enter the password, which for security reasons will not be displayed on the terminal. If you want to change your password then key it as usual but terminate the input with <CTRL B> rather than <CR>. You will then be prompted for a new password. The option to change the password at sign-on is only allowed if the password is less than 8 characters. If the password is 8 characters in length then it can only be changed using \$AUTH as documented in section 6.3 of the Global System Manager Manual.

If you have supplied an invalid operator-id or password the following message will be displayed:

```
$94 YOU ARE NOT AUTHORIZED TO SIGN-ON - PLEASE CONTACT A SUPERVISOR
```

This message is followed by the initial sign-on screen. The above warning message is also displayed if you key <ESCAPE> to either the operator-id or password prompts.

3.3 Global System Manager

The following sections in this chapter briefly summarize the information described in the Global System Manager Manual.

3.4 The Main Menu and Ready Prompt

Once the start-up procedure is complete, the main Global System Manager menu will be displayed, unless your installation has decided not to use menus. You will be able to select any one of up to 16 functions by simply keying the appropriate number (terminated by <CR>, of course) in response to the selection prompt which appears at the bottom of the screen. Once the selected function completes, the main menu will be redisplayed so you can continue with other work.

You should note that some menu functions may be restricted to operators with special authority codes. If you are not allowed to use a particular function, an asterisk will be displayed instead of the function number.

Provided you have a sufficiently high authority code, you can run any Global System Manager command (or indeed, any other program) by keying its name in response to the selection prompt, instead of a function number. For example, you can key \$T to run the screen information command which displays or prints a page of information about your screen and keyboard. You can also get out of the main menu to the GSM Pn READY: prompt by keying the word READY in response to the selection prompt.

If you have chosen not to use menus, then instead of a menu the GSM Pn READY: prompt will be displayed by Global System Manager when you sign on. You can key the name of any command or program in response to this prompt to cause it to be run.

3.5 Concurrent Screen Handling

Concurrency (available under all versions of Global System Manager) allows you to run several programs from one screen. Associated with each physical screen are up to 9 partitions (usually 3 or 4) each of which can be running a different program. At any time the screen will be displaying one of the partitions, as indicated by the status line at the top (or sometimes the bottom) of the screen showing the partition number, followed by the computer identification letter or number. For example:

```
Partition 1 Computer A
```

or:

```
Partition 3 Computer 30
```

On some screens, the writable portion of the status line does not extend across the entire width of the screen. On such screens the partition number information will be condensed. For example:

```
P2 CA
```


If your screen does not have space to display the status line permanently, you can use the <SYSREQ> M system request to cause it to be displayed temporarily over the top line of the screen, and <SYSREQ> Z to remove it. Chapter 4 of the Global System Manager Manual fully describes "system requests".

The partition number will also appear in the Global System Manager GSM Pn READY: prompt (e.g. GSM P3 READY:). You can swap to another partition by entering a special keystroke, usually <SYSREQ> 1 for the first partition, <SYSREQ> 2 for the second, etc. (If some key other than <SYSREQ> is used the screen information command \$T will tell you which.)

A program will continue running, and writing messages to the screen, even if its partition is not the one selected, but you will only be able to read the messages when you swap back to its partition. However, if a program needs a response keying it will be halted until you swap to its partition, since the keyboard always sends characters to the currently selected screen.

Concurrency enables you to leave a lengthy, automatic process (such as printing a report) running in one partition and use another partition to do something else which requires the use of the screen and keyboard. You can also break off from what you are doing in one partition in order to run an enquiry program in another, and then continue in the original partition when you have your information. You can, if you wish, leave an enquiry program permanently loaded in one partition so that you do not have to wait for it to be loaded when you need it.

3.6 Signing Off

When you have finished using Global System Manager you should sign off by selecting the appropriate function from the main menu or by running the \$E command. Global System Manager redisplayes the contract description and the operator prompt so that another user can sign on:

```
Please select a function:$E
.....
..... (serial number, user number, contract description)
.....
PLEASE KEY YOUR OPERATOR-ID:
```

If your screen has concurrency you must be in partition 1 to sign off, and all other partitions must be at a suitable point, for example at a menu or the GSM Pn READY: prompt. If they are not, an error message will be displayed, and you will be automatically swapped into the lowest numbered active partition. If you sign off in a partition other than 1, that partition is rendered inactive and you are automatically swapped into partition 1.

\$E is fully described in section 4.3 of this manual.

3.7 Terminating Global System Manager

If you do not wish to run any further Global applications you can exit from Global System Manager and return to MS-DOS by running either the \$BYE command or use the equivalent TER instruction in \$STATUS (see Chapter 5 of the Global System Manager Manual). \$BYE performs two functions. Firstly, in a multi-user configuration, \$BYE checks that no other users are signed on to other screens on your computer. Secondly,

on Global System Manager file-server computers, \$BYE ensures that no users on other computers have files open on the disks on your computer. If either of these checks fails, an error message will be displayed, and you should take the appropriate action recommended in Appendix A of the Global System Manager Manual.

The following message, displayed by \$BYE will appear briefly:

```
GLOBAL SYSTEM MANAGER TERMINATED
```

If you started Global System Manager from MS-DOS, the screen will be cleared and the MS-DOS prompt will be redisplayed. If you started Global System Manager from Windows the window will be "closed".

\$BYE is fully described in section 4.1 of this manual.

If you are running the SPX Workstation (see section 6.7), you can exit to MS-DOS at any point by keying "<SYSREQ> ." (i.e. the <SYSREQ> key followed by a full stop). All the Global System Manager programs running on the host computer, including those initiated from the SPX Workstation console, will continue to do so whilst you are in MS-DOS on the terminal emulator computer. If you are using the standard MS-DOS command processor COMMAND.COM, you can return to Global System Manager at the point you left it, by keying EXIT at the MS-DOS command prompt.

4. Additional Utilities

In this chapter we give detailed accounts of some important Global System Manager commands that are only available when the host operating system is Novell NetWare. These commands are not described in the Global System Manager Manual.

In addition, this chapter also describes those Global System Manager commands which execute in a slightly non-standard way when the host operating system is Novell NetWare.

[PHOTO HERE]

Figure 4.1 - Unsuccessful termination using \$BYE

[PHOTO HERE]

Figure 4.2 - Successful termination using \$BYE

4.1 \$BYE - Terminate Global System Manager

\$BYE should be used if you want to terminate Global System Manager and return to MS-DOS or close a Windows session. \$BYE checks that no other users are signed on to other screens on your computer. \$BYE also ensures that no users on other computers have files open on the disks of your computer.

If your screen is configured with a number of concurrent partitions, \$BYE **must** be run from partition 1. All other partitions must be at either a menu prompt or the READY prompt. If an attempt is made to run \$BYE from a partition other than P1, the following message will appear:

```
GSM P4 READY:$BYE
CAN ONLY TERMINATE GLOBAL SYSTEM MANAGER FROM PARTITION 1
```

\$BYE does not prompt for any further information. If all is satisfactory, the following message is displayed:

```
GLOBAL SYSTEM MANAGER TERMINATED
```

You will be returned to the MS-DOS prompt (if Global System Manager was started from MS-DOS). Alternatively, the current window will be closed (if Global System Manager was started from Windows).

If other operators are still active \$BYE displays the following warning message and will not terminate Global System Manager:

```
OTHER USERS STILL SIGNED ON THIS PROCESSOR
Key <CR> to retry, <ESC> to abandon
```

If other operators are accessing files on your computer across the network \$BYE displays the following warning message and will not terminate Global System Manager:

```
FILE filename TYPE type ON UNIT uuu SHARED n USERS
User n Computer a Operator oooo
OTHER USERS HAVE THESE FILES OPEN ON YOUR COMPUTER
YOU MAY NOT TERMINATE UNTIL THEY HAVE FINISHED
Key <CR> to retry, <ESC> to abandon
```

Key <CR> to retry \$BYE again once these users have signed off (by using \$E - see section 4.3), or closed the necessary files (usually by exiting from an application).

If \$BYE prevents the termination of the Global System Manager session because other operators are accessing files on your computer across the network, you can key <CTRL B> to the retry prompt to terminate Global System Manager **WITHOUT** performing the open file checking. This option may be useful if a workstation on a network has been rebooted while running Global System Manager resulting in spurious open files on a fileserver. Without this option it is not possible to use \$BYE to terminate Global System Manager on the fileserver. **THIS OPTION MUST BE USED WITH GREAT CARE BECAUSE TERMINATING GLOBAL SYSTEM MANAGER WHILE FILES ARE GENUINELY IN-USE MAY CAUSE DATA CORRUPTION.**

Note that the <CTRL B> option does **NOT** allow \$BYE to ignore other operators that are signed on to your computer.

Figure 4.1 shows the result of keying \$BYE when there are still files in use on your computer. Figure 4.2 shows successful completion.

\$BYE is equivalent to the \$STATUS terminate (TER) command (see Chapter 5 of the Global System Manager Manual).

4.2 \$CUS - Modify Installed Global System Manager

\$CUS is documented in section 6.1 of the Global System Manager Manual. This section just describes those aspects of printer customisations that are dependent on the host operating system.

4.2.1 Printer Characteristics Customisation

When Global System Manager is installed on Novell NetWare the printer customisation function depends on the type of printer.

4.2.1.1 Parallel Printer Customisation

For parallel printers (using the "PRINTER" controller described in section 9.7) only the generic parameters apply. For example:

```
Set up device attributes for a printer unit.
PRINTER UNIT:500 PARALLEL PRINTER
The printer timeout period is rounded to multiples of 10 seconds

Printer timeout period (currently 20 sec):<CR>
Does the printer automatically provide LF after CR (N):<CR>
Do you wish the printer to throw a page at startup (N):<CR>
Do you wish the printer to throw a page at end of file (Y):<CR>

Customize printer immediately (N):Y
```

4.2.1.2 Serial Printer Customisation

For serial printers (using any of the printer controllers described in section 9.9 e.g. "S.PRINT") you can specify the baud-rate, whether X-ON/X-OFF or busy-line operation is required, the number of data and stop bits and parity. For example, to change the baud-rate of printer 501 from 9600 baud to 19200:

```
Set up device attributes for a printer unit.
PRINTER UNIT:501 Serial Printer on COM1
The printer timeout period is rounded to multiples of 10 seconds

Printer timeout period (currently 20 sec):<CR>
Does the printer automatically provide LF after CR (N):<CR>
```

Key X to use X-ON/X-OFF protocol or B to use busy line (X):<CR>

The following prompts do not apply to all printer units.
See your Global Operating Manual for more details.

Number of data bits (8):<CR>
Number of stop bits (1.0):<CR>
Parity, N for none, O for odd, E for even (N):<CR>
Printer baud rate (currently 9600):19200
Do you wish the printer to throw a page at startup (N):<CR>
Do you wish the printer to throw a page at end of file (Y):<CR>

Customize printer immediately (N):Y

4.2.1.3 DOS.PRI Printer Customisation

For MS-DOS printers (either parallel or serial using the "DOS.PRI" controller described in section 8.4.1) only the generic parameters apply. For example:

Set up device attributes for a printer unit.
PRINTER UNIT:500 MS-DOS PRINTER
The printer timeout period is rounded to multiples of 10 seconds

Printer timeout period (currently 20 sec):<CR>
Does the printer automatically provide LF after CR (N):<CR>
Do you wish the printer to throw a page at startup (N):<CR>
Do you wish the printer to throw a page at end of file (Y):<CR>

Customize printer immediately (N):Y

4.2.1.4 NET.PRI Printer Customisation

For NetWare printers (either parallel or serial using the "NET.PRI" controller described in section 8.4.2) only the generic parameters apply. For example:

Set up device attributes for a printer unit.
PRINTER UNIT:500 MS-DOS PRINTER
The printer timeout period is rounded to multiples of 10 seconds

Printer timeout period (currently 20 sec):<CR>
Does the printer automatically provide LF after CR (N):<CR>
Do you wish the printer to throw a page at startup (N):<CR>
Do you wish the printer to throw a page at end of file (Y):<CR>

Customize printer immediately (N):Y

Important notes: All NET.PRI printers must be configured with a printer unit number in the range 550 to 598 (see section 8.4.2.1). Furthermore, a Printer Control File (see section 6.2 of the Global System Manager Manual) **MUST** be defined for a NET.PRI printer. The naming convention for Printer Control Files is described in section 6.2.5 of the Global System Manager Manual.

When the Printer Control File option of \$CUS is used to create/amend a Printer Control File for a NET.PRI printer, the following customisations **MUST** always be set as follows:

6.2.1.1.2 Stationery Sequences sent always?Y

6.2.1.1.3 Mount messages never displayed?Y

6.2.1.1.4 Honour mount messages in the middle of file?N

6.2.1.1.5 Never print alignment pattern?Y

The numbers refer to sections in the Global System Manager Manual that describe the customisation in full detail.

Note also that the standard Global System Manager technique of automatically sending the printer start-sequence before the first print-report is suppressed for NET.PRI printers. To send the printer start sequence, as defined in the Printer Control File, for a NET.PRI you must use either the \$P utility (see section 5.30 of the Global System Manager Manual) or the \$SP "I" command (see section 8.4.10 of the Global System Manager Manual).

4.2.2 Configuration Maintenance

The "LAN Buffers", "RAM Disk/Cache" and "Network Control Block" options from the \$CUS Configuration Maintenance menu are all available for Global System Manager (Novell NetWare) configurations. Note that the number of FULL LAN BUFFERS and SHORT LAN BUFFERS defined in the Global configuration file is ignored by the SPX LAN controller (see section 8.6.1.1).

Furthermore, the "Extended Customisation" option invokes the =.56nn utility described in Chapter 5.

4.3 \$E - Operator Sign Off

\$E should be used to sign off once you have finished using Global System Manager utilities or Global applications. When \$E is used, Global System Manager responds by re-displaying the contract description and the operator prompt so that another user can sign on (figure 4.4). It is particularly important to sign off using \$E if you have access to sensitive data which must be kept secure. Running \$E forces anyone wishing to use your screen to sign on with a valid operator-id and password (providing \$AUTH has been used to set up a table of authorised users).

In addition, \$E leaves the screen in a state which can be readily displayed by the system supervisor using \$STATUS. Thus the supervisor can check to see if anyone is using the computer before turning it off at the end of the day. Note that \$BYE and the \$STATUS TER command require that \$E is run on all screens before allowing Global System Manager to be terminated.

If your screen has a number of concurrent partitions you must be in partition 1 to sign off, and all other partitions must be inactive. If you try to sign off from a partition other than partition 1, \$E will display the following message:

```
PARTITION INACTIVE
```

and you will be automatically swapped into partition 1. If you try to sign off from partition 1 while another partition is still in use, Global System Manager will display the active partition. You will have to come out of whatever program is being run in that partition and return to the main menu.

Running \$E will clear the assignment table of all temporary unit assignments. It should also be used if you want to specify a different terminal type or user-id.

Note that you can set up automatic logging off (which has the same effect as \$E) to occur if a screen has not been used for some time by

using the functions of the menu system (see Chapter 7 of the Global System Manager Manual).

Important note regarding system security: The sign-on screen displayed as a result of running \$E includes the following line before the standard contract description (see section 3.2):

```
OPERATOR 0000 SIGNED OFF AT hh:mm:ss
```

If this message is left on the screen a potential hacker can glean a valid operator-id from the top line of the display. If you key <ESC> to the PLEASE KEY YOUR OPERATOR-ID: prompt that follows the contract description the sign-on screen will be redisplayed **without** revealing the identification of the previous operator.

[PHOTO HERE]

Figure 4.3 - Before running \$E

[PHOTO HERE]

Figure 4.4 - After running \$E

4.4 \$REMOTE - Non-networked File Transfer Utility

\$REMOTE allows you to transfer files between two computers running Global System Manager which do not have compatible direct access volumes and are not linked by a network. For example, you can transfer files from one computer that only supports 3½" diskettes to another that only supports 5¼" diskettes. The computers must be connected using a serial RS232 cable, and both must support \$REMOTE and be capable of using the same baud rate.

At a baud rate of 9600, \$REMOTE can transfer about 900 bytes per second, which means that 1Mb of data will take approximately 20 minutes to transfer.

4.4.1 Using \$REMOTE

When \$REMOTE is used to connect two computers, the direct access units of the remote computer, 100-299, can be accessed as if they are units 800-999 respectively of your local computer. Although typically you would simply wish to copy files between the computers (using \$F), any program or command can be used and can access the remote devices as normal direct access units.

Note that it is not possible to use \$V to format a diskette or hard-disk on a remote computer. Formatting can only be performed locally.

The computer whose screen you are using is termed the master and the remote computer is termed the slave. Before you can access files on the remote computer the following steps must be performed:

1. Connect up the RS232 link between the computers;
2. Run \$REMOTE on the slave computer and reply S to the OPTION: prompt;
3. Run \$REMOTE on the master computer and reply M to the OPTION: prompt.

The direct access units on the slave should now be accessible from the master. While the link is in use the slave computer cannot be employed for any other purpose, whereas the master appears as normal, except that the user area is decreased by about 2 Kbytes and units in the range 800-999 are available.

When you have finished using the link, terminate \$REMOTE on the master, by re-running \$REMOTE (which will release the 2 Kbytes of memory occupied) then on the slave by keying <CTRL W>. If you disconnect the link but fail to terminate \$REMOTE on the master, you will notice a long delay each time you return to the ready prompt. This delay will also occur if you terminate \$REMOTE on the slave before terminating on the master.

\$REMOTE can be used on multi-user systems, but since it takes exclusive control of the processor while transferring data it is best to exclude other users when you run it.

[PHOTO HERE]

Figure 4.5 - Establishing \$REMOTE options

[PHOTO HERE]

Figure 4.6 - Designating your machine as the master computer

4.4.2 The Option Prompt

Normally you need only key two commands in response to the option prompt: S to put \$REMOTE into slave mode, or M to put \$REMOTE into master mode. There are, however, a number of other options that can be used to control the way in which \$REMOTE works. The defaults for these options are taken from the configuration file.

4.4.2.1 The H Option

The H option is used to specify the name of the assembler driver which is used to control the serial port during a \$REMOTE session. The name of the assembler driver for Global System Manager (Novell NetWare) configurations is %.JWR. The necessary option would be keyed as H=%.JWR. **You must not change this option.**

4.4.2.2 The D Option

The D option is used to specify the device address to be employed by \$REMOTE. The port address may be altered. The device address can be specified in hexadecimal (normally), decimal or octal:

D=#03F8	(A hexadecimal port address)
D='001770	(An octal port address)
D=1016	(A decimal port address)

4.4.2.3 The B Option

Use the B option to specify the baud rate. The baud rate can be specified in decimal (normally), hexadecimal or octal. For example, the two commands B=#2580 and B=9600 both set the baud rate to 9600.

4.4.2.4 The T Option

The T option is used to specify a time-out for communication error conditions (see section 4.4.6). A time-out of zero allows \$REMOTE to calculate its own time-out. The value specified is not in seconds, but in terms of executions of an internal processing loop.

4.4.2.5 Changing the Default Options

On Global System Manager (Novell NetWare) configurations, \$REMOTE standardly transmits and receives at 9600 baud to a serial port configured at I/O address #3F8 (i.e. COM1). No special time-out values are normally required. When running \$REMOTE it is possible to modify both the I/O address of the adapter and the baud rate. In the following example dialogue, the serial port address is changed from #03F8 to #02F8, and the baud rate is changed from 9600 to 19200:

```
GSM READY:$REMOTE
$39 OPTION:H=% .JWR           Name of assembler handler
$39 OPTION:T=#0000           Time-out value
$39 OPTION:D=#03F8           Port address (# = hexadecimal)
$39 OPTION:B=#2580           Baud rate (# = hexadecimal)
$39 OPTION:D=#02F8           Change port address
$39 OPTION:B=19200           Change baud rate
$39 OPTION:
```

4.4.3 Communication Errors

If the RS232 link has not been properly established then accessing the slave with \$F will probably result in the following dialogue:

```
GSM READY:$F
$66 INPUT DEVICE:901 INVALID - REINPUT
```

If an irrecoverable error is detected during data transfer an error message of the following form will be displayed:

```
* NETWORK ERROR ON description - unit
* RETRY?:
```

If these errors occur when you try to access the remote units then see below.

4.4.4 Troubleshooting a \$REMOTE Link - RS232 Wiring

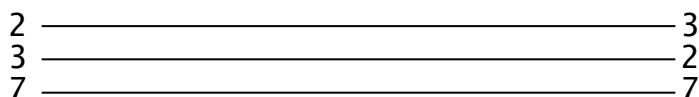
The two computers must be connected using an RS232 cable. \$REMOTE does not make use of the modem control lines: RTS, DCD, or CTS etc., and normally only needs wires connected between the TRANSMIT DATA, RECEIVE DATA and GROUND pins of the RS232 connector (i.e. normally pins 2, 3 and 7). The pin connections on a simple cable would be:

RS232 port on slave Pin		RS232 port on master Pin
2	_____	2
3	_____	3
7	_____	7

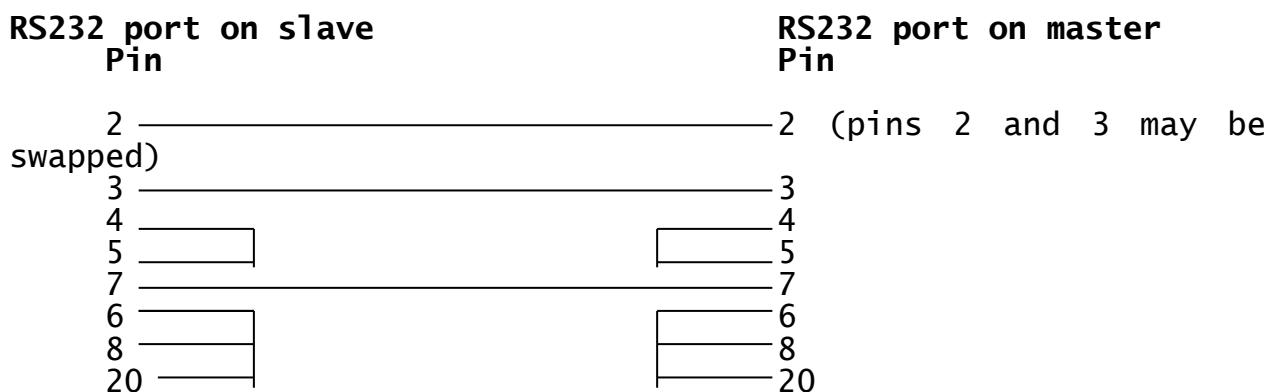
This represents the ideal situation, but in practice it will probably be affected by two factors.

Firstly each computer will have its own idea of which pin is TRANSMIT DATA and which RECEIVE DATA. They may both be transmitting on pin 2 and receiving on pin 3. To overcome this try the following cable connection:

RS232 port on slave Pin		RS232 port on master Pin
----------------------------	--	-----------------------------



The second factor relates to the modem control lines. Although \$REMOTE does not use these, some computer hardware demands that they be set up. In some cases this will need very special wiring but most situations can be solved with the following cable:



Pins 4 and 5 are connected together at each end of the cable as are pins 6, 8 and 20.

The end of the cable that is attached to the IBM PC compatible computer must be wired using the following pin conventions (no other connections are required):

Description	25-pin	9-pin
Computer transmits data via	Pin 2	Pin 2
Computer receives data via	Pin 3	Pin 3
Signal Ground (Earth)	Pin 7	Pin 5

4.4.5 Troubleshooting a \$REMOTE Link - Checking Device Address

Before connecting the two computers together it is wise to check that the two separate ends of the link perform correctly. To do this, isolate each computer from the other, then connect a "breakout box" to each computer in turn while running in slave mode. While in slave mode, the transmit line should be continuously active so you should see the indicator for either pin 2 or pin 3 illuminated on the box.

The same test can be carried out using a serial terminal instead of a breakout box, but the terminal must support "transparent" or "monitor" mode so that it can display characters in the range #00-1F. When running in slave mode \$REMOTE sends a continuous stream of "ENQ" characters (#05) which will be visible on a suitably configured terminal.

If none of the indicators on the box light up, or "ENQ" characters are not being transmitted, then it is for one of the following reasons:

- You have plugged the cable into the wrong RS232 port or used the wrong device address with the D option;

- You need to connect some of the modem control lines;
- There is a broken or missing connection in one of the wires of the cable.

Check that both computers transmit in slave mode. If they don't there is no point in connecting the two computers together, they are unlikely to communicate with each other.

If both computers transmit successfully in slave mode then connect the two computers together using the cable, and try one in slave mode and one in master mode. If things don't work at this stage it is probably for one of the following reasons:

- Pins 2 and 3 at **one** end of the cable need to be swapped;
- The computers are not using the same baud rates;
- The modem lines are incorrectly wired and are not operating the same way as when connected to the "breakout box";
- You may need to establish a time-out. See next section.

4.4.6 Timeout Handling

The T option is used to set up time-outs on both the master and slave so that one computer does not hang if it gets no response from the other. The time-out is normally set to 0 (T=0) which causes \$REMOTE to calculate its own value based on processor speed and baud rate.

However, it may be necessary to set the time-out value explicitly if the serial ports being used have large hardware buffers associated with them (or if the link uses modems). Start with T=200, then try T=1000. If these don't work, experiment!

It can also be useful in these circumstances to try the other computer as the master.

4.5 \$REORG - Reorganise/Reallocate Disk Volumes and Domains

The \$REORG command reorganizes the volumes on a domain, increasing or decreasing their sizes as required, and moves all the free space to the end of the domain. If you run it on a domain initialised under Global System Manager V5.0 it has the side-effect of putting the volumes into numeric order. The command can also be used to reorganize files within a single volume in a similar way. However, most Global software modules contain their own facilities to change file allocations, and if available these must be used rather than \$REORG.

Before starting to reorganize a domain or volume, you should make sure you have recent backups of all the data it contains, since if the reorganization fails some or all the data will be lost. You should also verify the disk by using the \$F VER instruction, since a read error on the disk will cause one or more volumes or files to be lost.

Important note: There is very little point in using \$REORG to simply condense the sub-volumes of a Discrete Data File domain (aka Separated Subunit Domain) as the domain layout is automatically reconstructed

each time Global System Manager is invoked. Furthermore, the MS-DOS utilities GLENDDF.EXE (see section 6.4.3) and ALLOCATE.EXE (see section 6.5.3) can be used to increase the size of a subvolume within a Discrete Data File domain. These utilities are more efficient than \$REORG. However, \$REORG (or the \$F CON instruction) are still required in order to condense the Global System Manager files within a subvolume of a Discrete Data File domain.

If there are volumes allocated on a domain that are no longer required these should be de-allocated, using \$V, before \$REORG is used (see section 4.9.5).

A domain or volume cannot be reorganized while files on it are in use. You should run the command when no one else is using the computer as it will lock out other users while it is in progress.

When you run \$REORG you will first be asked to specify the unit you want to reorganize. The name of the domain or volume will be displayed for confirmation. If it is not the one you want key <ESCAPE> to the subsequent prompt.

```
Please select a function:$REORG
.....
(explanatory text)
.....
REORGANIZE UNIT:200 SYSDOM
```

Next you assemble a list of the new sizes the volumes (if you specified a domain address) or the files (if you gave the address of a subvolume) are to have after the reorganization. A series of prompts of the form:

```
KEY UNIT ADDRESS TO CHANGE SIZE, ? TO LIST, R TO REORGANIZE:
```

or:

```
KEY FILE NAME TO CHANGE SIZE, ? TO LIST, R TO REORGANIZE:
```

will appear (the unit or file prompts).

[PHOTO HERE]

Figure 4.7 - After keying \$REORG

[PHOTO HERE]

Figure 4.8 - Typical dialogue prior to reorganization

If you want to change the size of any volume on the domain, or of any file on a volume, key its unit address or name respectively. The current size will be displayed, and you can key in a new size in bytes, Kbytes or Mbytes. For example:

```
CURRENT SIZE 395264 (386.0K)
KEY NEW SIZE, OR M FOR MAXIMUM:
```

DO NOT ATTEMPT TO USE \$REORG TO TRUNCATE DMAM FILES.

If the new size you specify is smaller than the current size, the volume or file will be checked to make sure that there will remain sufficient space for its current contents. If there is not, a message will be displayed indicating the minimum possible size the volume or file's contents require. If the reduction in size requires a volume to

be reorganized so that all the files are at the beginning, the following prompt will appear:

```
UNIT uuu REQUIRES REORGANIZING - CONTINUE ? (Y):
```

Key <CR> to continue and reorganize this volume so that all the free space is at the end, or N to return to the unit prompt and leave the current volume the same size. Note that the reorganization of the volume takes place as soon as you key <CR>.

The special reply of M to the new size prompt causes the volume or file to be given all the available free space on the domain or volume. You can, of course, specify this option for only one volume on any one domain, or for one file on a volume.

To check what new sizes you have specified, and how much space is free, key ? to the unit or file prompt. Note that the new sizes shown may be slightly greater than you specified, as all sizes are rounded up to a whole number of logical tracks.

Up to this point none of the volumes or files will have been moved or had their sizes changed (though they may have been internally reorganized). If you want to abandon the reorganization of the domain or volume, key <ESCAPE> to quit and it will be left unchanged.

When you are happy with the new size allocations key R to start the reorganization process. The command displays messages indicating its progress and a "Reorganization complete" message when it has finished. If a read or write error occurs, and persists when you retry, reply N to the retry prompt. The address of the volume or file affected will then be displayed: You will need to restore this volume or file later from a backup as at least one of its files or some of its data will be corrupt. The reorganization will then continue: **DO NOT ATTEMPT TO ABANDON THE REORGANIZATION OR YOU WILL LOSE ALL YOUR DATA.** If there is an error on the domain it is likely to be reported twice: Once on the original volume containing the error, and once on the volume being moved to that part of the disk.

4.6 \$STATUS - Control Multi-user System or Network

\$STATUS is documented in Chapter 5 of the Global System Manager Manual. This section just describes those aspects of status-reporting that are dependent on the host operating system.

The \$STATUS DIS command is functionally equivalent to the RES command when the host operating system is Novell NetWare.

The RES and DIS commands can be used to disconnect a remote console on an "emulator" workstation running the SPX Workstation (see section 6.7). The "emulator" workstation will automatically return to MS-DOS.

The \$STATUS MON command can be used to monitor serial terminals that are connected to the computer via modems, and ensures that if the communications line goes down the Global System Manager session on that terminal is returned to a known state. This facility provides protection against unauthorised use of a user session that might otherwise be left open. This command can only be used to monitor serial terminals connected to the following peripheral cards if the "modem control" option is enabled in the configuration file (see section 9.9.2.2.1):

IBM Asynchronous Adapter

Arnet Multiport

Arnet Multiport/2

Arnet Smartport

In particular, note that the MON command cannot be used to monitor screens connected to the Hyperport sub-system.

Once in monitor mode \$STATUS watches all serial lines and when it detects that the modem control lines have "dropped" (i.e. that the telephone connection has been broken) it automatically re-starts that screen (as if a RES instruction had been executed). Global System Manager then attempts to transmit the sign-on dialogue, but this will be stalled until a connection is re-established. When the connection is re-established (the remote user dials in again) the sign-on dialogue will be transmitted and the operator can sign-on.

When you first start monitor mode by keying MON, \$STATUS prompts for the time in seconds between scans of the serial lines:

Delay between each check of the serial lines in seconds (60):

You can specify a different frequency for the checking, but too small a value may affect the performance of the computer. \$STATUS then displays the following message:

Line monitor running, key <CTRL G> to interrupt

Keying <CTRL G> terminates the line monitoring and returns you to the \$47 TASK CONTROL prompt.

The \$STATUS list command displays the presence of all Global System Manager NLM file-server systems. Note that such systems are not configured with Global System Manager users and would not normally be expected to appear in the \$STATUS report. For example:

```
COMPUTER X ** OURS ** - Workstation on 1st floor
1* ALAN (Z)          P1 INACTIVE FOR 12 MINS      P2 ACTIVE
                   P3 ACTIVE                    P4 INACTIVE FOR 27 MINS
                   P5 INACTIVE FOR 70 MINS     P6 INACTIVE FOR 169 MINS
                   P7 INACTIVE FOR 169 MINS    P8 INACTIVE FOR 169 MINS
COMPUTER A FILESERVER - GSM NLM FILESERVER ON SERVER1
```

Note that if the technique described in section 2.1.12.3 has been used, a stale entry for computer/system "A" will remain in the \$\$USER user file. This entry will cause \$STATUS to display a "NOT IN USE" status for COMPUTER A. The \$STATUS PUR command should be used to purge the stale user file entry.

The remaining \$STATUS commands work as documented in Chapter 5 of the Global System Manager Manual.

4.7 \$TDUMP - Tape Backup/Restore Utility

The cartridge tape dump/restore utility, \$TDUMP, can be used to create and restore security backups of entire volumes on a cartridge (streamer) tape.

Note that \$TAPE, the Streamer Tape utility, provides a much faster alternative to \$TDUMP and is not restricted to the \$TDUMP size limitation of 127.9Mb.

Each backup can hold the contents of up to 29 direct access volumes containing as many as 900 different files. The backup can extend over several tapes (up to 99) which are labelled with a volume-id, cycle-id and volume number. The disk volumes to be backed up must be on-line throughout the operation. The utility can only backup complete volumes, and cannot select files from within volumes.

The backup can be restored in its entirety, or you can select particular volumes to be restored. You cannot, however, selectively restore particular files. Any existing files on the output volumes are overwritten. By default, the volumes are restored to the logical unit-id from which they were taken, but it is possible to restore to a different unit provided it has been initialised correctly. The output units need not be the same size as the original unit, but must have sufficient space to hold all the files backed up.

4.7.1 Introduction

When you run \$TDUMP it signs on by displaying a menu followed by the selection prompt as shown in figure 4.9. You must respond by keying a selection code in the range 0 - 7. Key 0 or <ESC> to quit and return to the menu or ready prompt.

4.7.1.1 Respooling Tapes

Before you access any tape which has not been used recently you are advised to use the respooling option by replying 1 to the selection prompt. This loads the tape currently in the drive, fast-forwards, rewinds, and unloads the tape. This should ensure that the tape tension is correct for your machine, and hence improve the reliability of accesses to the tape.

After unloading the tape the menu is redisplayed.

4.7.1.2 Listing Tapes

You can list the contents of a tape created by \$TDUMP by replying 2 to the selection prompt. This then displays the tape identifier, the title, date and time of the backup, and the volume-ids and units of the volumes involved, as shown in figure 4.10.

The tape is unloaded, and you are prompted for whether you want to return to the menu:

```
$34 CONTINUE?:
```

Replying <CR> will take you back to the menu.

[PHOTO HERE]

Figure 4.9 - The \$TDUMP menu

[PHOTO HERE]

Figure 4.10 - Listing tapes

4.7.1.3 Initializing and Formatting Tapes

Before you use a tape for the first time, you must initialize it by replying 3 to the selection prompt; or, if your tape sub-system supports tape formatting, format it by replying 7 to the selection prompt. If the tape already contains a valid label you are prompted to confirm that you wish to destroy the current contents of the tape, for example:

```
$34 DESTROY SAMAST-A01?:
```

If you do not wish to destroy the contents, you should key N or <CR>. To continue, destroying the previous contents, you must key Y. You will then be prompted for the length of the tape in feet, for example:

```
$34 TAPE LENGTH IN FEET (300):
```

You should key <CR> to accept the default length shown, or key the actual length if the default is not correct. (DC300A cartridges are 300 feet long, DC300XL cartridges 450 feet.) The tape will then be respooled and initialised with a volume-id of BACKUP.

When the operation is complete the tape is unloaded, and the menu is redisplayed.

4.7.1.4 Creating a Tape Backup

To create a tape backup you must reply 4 to the selection prompt. You are asked what type of save you want to make, the backup-id and title, and then for the units to be saved. At the end of the backup operation you can optionally produce a report to record the volumes saved. Eventually the menu is redisplayed so that you can perform another \$TDUMP function, should you so wish.

4.7.1.5 Restoring a Tape Backup

By replying 5 to the selection prompt you are able to restore selected volumes from a previously created backup. You are prompted for the backup-id, and asked to mount the first (or only) tape involved. Then you select the volumes to be restored. At the end of the restore operation you can optionally produce a report to list the volumes and files involved. Finally, the menu is redisplayed so that you can perform another \$TDUMP function.

4.7.1.6 Verifying a Tape Backup

By replying 6 to the selection prompt you are able to verify that a backup that you had previously created is readable. You are prompted for the backup-id. At the end any files in error are listed on the screen, and you can optionally print a report. Finally, the menu is redisplayed so that you can perform another \$TDUMP function.

Note that the save operation verifies any backup produced as part of the creation process.

4.7.1.7 Operating Notes

The tape dump utility obtains exclusive control of the processor while it is operating. Also, in multi-user or networking systems, there must be nobody using the volumes to be backed up. Therefore, you should normally take a backup at a time when the computer is not required for any other use.

4.7.2 Creating a Tape Backup

You must reply 4 to \$TDUMP's selection prompt to create a tape dump of a volume or collection of volumes. The initial dialogue prompts for

the backup-id and title, and the units to be backed up. The backup tapes are then called for, one by one, as the dump is created. When the operation is complete you have the option of printing a single-page report which gives details of the backup.

4.7.2.1 The Save Prompts

When you create a tape backup you are first prompted for the kind of save you wish to make:

Key Duplex, No verify, <CR> for normal save:

Duplex two copies of the data are made, but the tape is not verified. This is recommended when using a tape drive on which errors may occur but that lacks sophisticated error-recovery facilities. It is faster than doing an ordinary save followed by a verification, and is more secure if the tape develops errors during storage, but it halves the data capacity of the tape.

No verify only a single copy of the data is made and the tape is not verified. This is suitable for tape drives with sophisticated error facilities.

Normal save a single copy of the data is made and the tape is verified. This is the default.

Next you are prompted for the volume-id, cycle-id and title of the backup. The volume-id should be six characters long, the cycle-id must be a single character, and the title can be up to 30 characters long. For example:

```
$34 SAVE ON:SAMAST CYCLE:A TITLE:SALES LEDGER
```

indicates that you wish to create backup cycle SAMAST-A, on tapes SAMAST-A01, SAMAST-A02 etc.

4.7.2.2 The Unit Prompt

You are next prompted for the unit-id of the first volume you wish to save. The corresponding volume-id is then displayed so that you can confirm that this is the correct volume:

```
$34 SAVE UNIT:203 SAPROG?:Y
```

You must reply Y or <CR> if you wish to include this volume in the backup. The prompt is then repeated to allow you to specify further units.

If the unit you specified was a domain then you are prompted for each subunit of the domain in turn:

```
$34 SAVE UNIT:200
 201 SYSRES?:N
 202 SAMAST?:Y
 203 SAPROG?:Y
 204 PLMAST?:
```

If you reply <CTRL A> to any of the subunits then no further subunits are saved, and the unit prompt is repeated. If you reply <CTRL B> to any of the subunits then all the subsequent subunits are saved.

In particular, if you reply <CTRL B> to the first subunit, or terminate the domain's unit-id with <CTRL B> the entire contents of the domain are saved. For example:

```
$34 SAVE UNIT:200<CTRL B>
    201 SYSRES
    202 SAMAST
    203 SAPROG
    204 PLMAST
    205 PLPROG
$34 SAVE UNIT:
```

The unit prompt is repeated until either 29 volumes have been specified, or until you reply <CR> to the unit prompt.

If, at any point, you mistakenly specify the unit which you had previously entered, the error message:

```
ALREADY BEING SAVED
```

is displayed, and the input ignored.

4.7.2.3 Multiple Tapes Warning

If more than one tape is required to complete the backup, you are warned of this by a prompt:

```
$34 SAVE WILL REQUIRE nnn nnnn FOOT TAPES - CONTINUE?:
```

You must reply Y or <CR> to continue and create the backup. If you do not have sufficient tapes prepared, you should reply N to return to the menu.

4.7.2.4 The Overwrite Confirmation Prompt

When the first tape of the backup is not new a confirmation prompt appears, so that you can confirm that you wish to overwrite the existing backup. For example:

```
$34 OVERWRITE SALES LEDGER BACKUP OF 11/12/90 15.36?:
```

You must reply Y to continue, overwriting the previous backup, or N or <CR> to cause the save operation to be terminated, leaving the existing backup undisturbed.

[PHOTO HERE]

Figure 4.11 - Backup creation report

[PHOTO HERE]

Figure 4.12 - Tape restore report

4.7.2.5 Mount Prompts

When the utility requires the next tape of the backup, a mount prompt is displayed, for example:

```
$34 MOUNT TAPE SAMAST-A02:
```

You should remove the current tape, mount the correct tape, and then reply Y or <CR> to continue. If you mount a new tape which has been initialized then the volume-id is changed from "BACKUP" to the correct

volume-id. If you reply N the operation is terminated, and the menu redisplayed.

It is good practice whenever you unload a tape which has just been created to 'write protect' it by turning the disk on the cassette to point to "SAFE". If you attempt to write to a tape protected in this way an I/O error (Hardware Protection) will occur.

The message:

```
$34 SAVING DATA
```

is displayed once the creation of the backup commences.

4.7.2.6 The Report Prompt

When the complete backup has been created you are asked whether you want to print a report giving details of the backup:

```
$34 SAVE COMPLETE
$34 PRINT REPORT?:
```

You must reply N if you do not want a report and Y or <CR> to produce the report on unit \$PR. The report lists the disk volumes backed up, the tape volumes used, and the number of errors detected on each tape during its creation. Cassette tapes can only be used a fairly small number of times before they begin to wear out, and you should consider replacing any tapes that contain a large number of errors. \$TDUMP can recover from errors on up to 5% of the total tape capacity, but you are recommended to replace any tapes with an error rate greater than 1%.

Once the report has been produced, the menu is redisplayed. An example of a backup creation report is shown in figure 4.11.

4.7.2.7 Operating Notes

If more than 5% of the tape blocks are in error the prompt:

```
$34 TOO MANY ERRORS - RETRY?:
```

appears. You should reply Y or <CR> to retry. Normally you would replace the faulty tape with a spare BACKUP tape before replying.

If there is insufficient space on the SYSRES volume for the \$TDUMP work file, the following message will appear:

```
$34 INSUFFICIENT SPACE ON $TDUMPWK
```

4.7.2.8 Example 1 - Creating a Backup of a Domain

In all the examples employed in this chapter unit 200 is a domain with the following units allocated:

```
201 SYSRES
202 SAMAST
203 SAPROG
204 PLMAST
205 PLPROG
```

Further, unit-id \$CP is assigned to 201, unit-id SA1 is assigned to 202, and unit-id SA2 to unit 203.

To create a backup of domain 200 on backup cycle SYSTEM-A, you would use the following dialogue, assuming that two tapes are needed to hold all the data:

```
GSM READY:$TDUMP
.....
..... (Menu. Function 4 is Save)
.....
PLEASE SELECT A FUNCTION:4
KEY DUPLEX, NO VERIFY, <CR> FOR NORMAL SAVE:<CR>
$34 SAVE ON:SYSTEM CYCLE:A TITLE:COMPLETE DOMAIN
$34 SAVE UNIT:200
      201 SYSRES?:<CTRL B>
      202 SAMAST
      203 SAPROG
      204 PLMAST
      205 PLPROG
$34 SAVE UNIT:<CR>
$34 SAVE WILL REQUIRE 2 300 FOOT TAPES - CONTINUE?:Y
$34 MOUNT TAPE SYSTEM-A01:Y (mount first tape)
$34 SAVING DATA
.....
..... (creation of first tape will typically take 20 minutes)
.....
$34 MOUNT TAPE SYSTEM-A02:Y (after changing tapes)
$34 SAVE COMPLETE
$34 PRINT REPORT?:<CR> (report is printed)
..... (Menu is redisplayed)
PLEASE SELECT A FUNCTION
```

4.7.2.9 Example 2 - Creating a Backup of Selected Units

You wish to create a backup of units SA1 and SA2 (202 and 203) on backup cycle SAMAST-C. You wish to specify logical unit addresses, rather than physical unit addresses, so that when the backup is restored they will go to the currently assigned SA1 and SA2 by default. You intend using a new tape. The following dialogue might take place:

```
GSM READY:$TDUMP
.....
..... (menu)
.....
PLEASE SELECT A FUNCTION:3 (initialize)
* NOT READY ERROR ON TAPE - RETRY?:<CR>
(mount tape first)
(tape is initialized, taking typically 2 minutes)
.....
..... (Menu. Function 4 is Save)
.....
PLEASE SELECT A FUNCTION:4
KEY DUPLEX, NO VERIFY, <CR> FOR NORMAL SAVE:<CR>
$34 SAVE ON:SAMAST CYCLE:C TITLE:SALES LEDGER
$34 SAVE UNIT:SA1 SAMAST
$34 SAVE UNIT:SA2 SAPROG
$34 SAVE UNIT:<CR>
$34 SAVING DATA
$34 SAVE COMPLETE
$34 PRINT REPORT?:
.....
..... (Menu is redisplayed)
.....
```

4.7.3 Restoring From a Tape Backup

You must reply 5 to \$TDUMP's selection prompt to restore a volume or collection of volumes from a tape backup. You are first prompted for the volume-id and cycle-id of the backup to be restored, and then prompted to mount the first volume. The volumes on the backup tape,

and their default unit-id's, are displayed in sequence. You can select which volumes are to be restored and the units to which they are to be restored. The volume-ids of the output volumes must match those of the volumes saved on the tape, or alternatively an output volume may have the special volume-id CLIENT. When the operation is complete you have the option of printing a single page report which gives details of the volumes restored.

4.7.3.1 The Restore Prompt

You are first prompted for the volume-id and cycle-id of the backup to be restored. For example:

```
$34 RESTORE FROM:SAMAST CYCLE:A
```

indicates that you wish to restore cycle SAMAST-A.

4.7.3.2 The Mount Prompt

When you have supplied the cycle-id, or later on when the next tape of a multi-volume backup is required, you are prompted to mount the next tape, for example:

```
$34 MOUNT TAPE SAMAST-A01:
```

You should unload any tape currently in the drive, load the tape requested, and then key Y or <CR> to continue. If for some reason the requested tape is not available, keying N causes the operation to be terminated. If you erroneously mount the wrong tape the prompt is repeated.

4.7.3.3 The Restore Confirmation Prompt

Once you have mounted the first tape its label is read and checked, and you are asked to confirm that it is the correct backup. A prompt of the form:

```
$34 RESTORE title BACKUP OF date time?:
```

appears. For example:

```
$34 RESTORE SALES LEDGER BACKUP OF 11/12/90 15.30?:
```

You must reply Y to this prompt to confirm that the operation is to proceed. A reply of N or <CR> causes the operation to be terminated.

4.7.3.4 The Volume and Unit Prompts

You will next be prompted for which volumes on the backup tapes are to be restored. For example:

```
$34 RESTORE SAPROG?:
```

If you wish to restore a volume you must key Y or <CR> to the volume-id prompt. If you do not wish to restore the volume, reply N. For volumes to be restored, you will then be prompted for the unit to which it is to be restored. The default unit-id is that from which the backup was taken, and is displayed in brackets, for example:

```
$34 RESTORE SAPROG?:Y UNIT(SA1):
```

You should reply <CR> to restore the volume to the default unit-id, or you may reply with a different unit-id. If you have already specified another volume to be restored to that unit, the error message:

```
ALREADY BEING RESTORED
```

is displayed. If the volume-id of the output unit is not the same as that of the volume to be restored (and is not the special volume-id CLIENT) then a confirmation prompt appears, so that you can confirm that you wish to overwrite the existing volume. For example:

```
OVERWRITE PRDATA?
```

Reply Y to continue, overwriting the existing volume, or N or <CR> to cause you to be prompted for a different output unit-id.

The restore prompt is repeated for each volume in the backup. If you reply <CTRL B> to any of the prompts then all the remaining volumes are restored to the default units. In particular, if you reply <CTRL B> to the first prompt the whole backup is restored. If you reply <CTRL A> to any of the prompts then no further volumes are restored. Note that if you reply <CTRL C> to the unit prompt then this will enable you to restore a file with bad (missing) blocks in it.

Note that as each unit is specified, the previous contents of that volume are destroyed.

Once you have specified all the volumes to be restored, the message:

```
$34 RESTORING DATA
```

is displayed and the restore takes place.

4.7.3.5 The Report Prompt

When all the requested volumes have been restored you are asked whether you wish to print a brief report giving details of the volumes restored:

```
$34 RESTORE COMPLETE
$34 PRINT REPORT?:
```

You must reply N if you do not want a report, and Y or <CR> to produce the report on unit \$PR. The report lists the volumes and files restored and the tape volumes used.

Once the report has been produced the menu is redisplayed. An example of the restore report is shown in figure 4.12.

4.7.3.6 Operating Notes

When restoring a backup extending over several tapes the utility checks that all the tapes were produced by the same \$TDUMP operation. If you mount a tape which does not match, the error message:

```
$34 BACKUP VOLUMES INCONSISTENT
```

is displayed and the mount prompt is repeated. This may result from you erroneously loading the wrong tape, but it normally indicates that the previous backup operation did not complete satisfactorily, and that the backup cannot be used.

If there are blocks on the tape that \$TDUMP has been unable to read, the error message:

```
$34 MISSING DATA (nnnn BLOCKS) - RETRY?:
```

is displayed. You should reply <CR> or Y to retry. This retry only attempts to read the missing blocks, and so if the retry fails again the number of missing blocks will be the same or fewer. You may, if you wish, remove the tape and clean the heads before retrying.

If you reply N to the retry prompt, the prompt:

```
$34 ATTEMPT PARTIAL RESTORE?:
```

is displayed. You should reply N to abandon the restore completely, and Y or <CR> to attempt to restore all files except for those containing missing blocks. **PARTIAL RESTORATION OF FILES SHOULD ONLY BE ATTEMPTED BY SYSTEM DEVELOPERS.** When the process is complete, the names of those files which could not be restored are displayed on the screen, and printed at the end of the report if one is produced.

4.7.3.7 Example 1 - Restoring a Complete Backup

Suppose you wish to restore the backup of SA1 and SA2 created in Example 2 in section 4.7.2.9 (above). The following dialogue might take place:

```
GSM READY:$TDUMP
.....
..... (Menu. Function 5 is Restore)
.....
PLEASE SELECT A FUNCTION:5
$34 RESTORE FROM:SAMAST CYCLE:C
$34 MOUNT TAPE SAMAST-C01:<CR>
$34 RESTORE SALES LEDGER BACKUP OF 11/12/90 15.36?:Y
$34 RESTORE SAMAST?:<CTRL B> UNIT(SA1)
$34 RESTORE SAPROG UNIT(SA2)
$34 RESTORING DATA
..... (Backup is now restored)
$34 RESTORE COMPLETE
$34 PRINT REPORT?:<CR>
.....
..... (Menu is redisplayed)
.....
PLEASE SELECT A FUNCTION
```

4.7.3.8 Example 2 - Restoring Selected Units

Suppose you wish to restore volumes SAMAST and SAPROG from the backup taken as described in Example 1 in section 4.7.2.8 (above), whilst leaving the other volumes unchanged. Furthermore, you want to restore SAPROG to unit 207 and not 203. Assuming that you have previously allocated and initialized 207 as SAPROG, the following dialogue might take place:

```
GSM READY:$TDUMP
.....
..... (Menu. Function 5 is Restore)
.....
PLEASE SELECT A FUNCTION:5
$34 RESTORE FROM:SYSTEM CYCLE:A
$34 MOUNT TAPE SYSTEM-A01:<CR>
$34 RESTORE COMPLETE SYSTEM BACKUP OF 11/12/90 9.12?:Y
$34 RESTORE SYSRES?:N
$34 RESTORE SAMAST?:<CR> UNIT(202):<CR>
$34 RESTORE SAPROG?:<CR> UNIT(203):207
$34 RESTORE PLMAST?:<CTRL A> (no more volumes to be restored)
$34 RESTORING DATA
..... (backup of SAMAST, SAPROG is now restored)
$34 RESTORE COMPLETE
$34 PRINT REPORT?:<CR>
.....
..... (Menu is redisplayed)
```

```
.....
PLEASE SELECT A FUNCTION
```

4.7.4 Verifying a Tape Backup

You must reply 6 to \$TDUMP's selection prompt to verify that all the blocks on a backup tape are readable. When the verify is complete a list of any files which contain errors is displayed. You then have the option of printing a single page report listing the files the tape contains, both those which are valid and those containing errors.

4.7.4.1 The Verify Prompt

You are first prompted for the volume-id and cycle-id of the backup to be verified. For example:

```
$34 VERIFY: SAMAST CYCLE: A
```

indicates that you wish to verify cycle SAMAST-A.

4.7.4.2 The Mount Prompt

When you have supplied the cycle-id, or later on when the next tape of a multi-volume backup is required, you are prompted to mount the next tape, for example:

```
$34 MOUNT TAPE SAMAST-A01:
```

You should unload any tape currently in the drive, load the tape requested, then key Y or <CR> to continue. If for some reason the requested tape is not available, keying N will cause the operation to be terminated. If you erroneously mount the wrong tape the prompt is repeated.

4.7.4.3 The Verify Confirmation Prompt

Once you have mounted the first tape its label is read and checked, and you are asked to confirm that it is the correct backup. A prompt of the form:

```
$34 VERIFY title BACKUP OF date time?:
```

appears. For example:

```
$34 VERIFY SALES LEDGER BACKUP OF 11/12/90 15.30?:
```

You must reply Y to this prompt to confirm that the operation is to proceed. A reply of N or <CR> causes the operation to be terminated.

The message:

```
$34 VERIFYING DATA
```

is then displayed and the operation takes place.

4.7.4.4 The Unreadable Files List

When all the tape volumes have been checked, a list of any files which could not be read correctly is displayed, followed by a verify complete message. For example:

```
$34 FILE SANAMES ON UNIT 202 2 MISSING BLOCKS
$34 FILE SAMENU ON UNIT 203 1 MISSING BLOCK
$34 VERIFY COMPLETE
```

[PHOTO HERE]

Figure 4.13 - Verify report**4.7.4.5 The Report Prompt**

When the verify operation is complete you are asked whether you wish to print a brief report giving details of all the volumes and files on the backup, including those which could not be read:

```
$34 PRINT REPORT?:
```

You must reply N if you do not want a report, and Y or <CR> to produce the report on unit \$PR.

Once the report has been produced the menu is redisplayed. An example of a verify report is shown in figure 4.13.

4.7.4.6 Operating Notes

When verifying a backup extending over several tapes the utility checks that all the tapes were produced by the same \$TDUMP operation. If you mount a tape which does not match, the error message:

```
$34 BACKUP VOLUMES INCONSISTENT
```

is displayed and the mount prompt is repeated. This may result from you erroneously loading the wrong tape, but it normally indicates that the previous backup operation did not complete satisfactorily, and that the backup cannot be used.

4.8 \$U - Display/Print Unit Information

\$U is documented in Chapter 5 of the Global System Manager Manual. This section just describes those aspects of the unit information that are dependent on the host operating system (i.e. Novell NetWare).

The information displayed by \$U describing the diskette formats supported on your computer refers to the characteristics of the physical devices. For example:

```
150   G1A   1ST DISKETTE DRIVE CAPACITY 1189.5K (99 FILES)
        2 SURFACE(S) OF 80 TRACKS WITH 15 512-BYTE SECTORS
```

The "G1" diskettes are physically double-sided, double-tracking with 15 512-byte sectors.

The information displayed by \$U describing Discrete Data Files (i.e. Separated Subunit Domains, format codes T151Z or T259Z) refers to the total size of the MS-DOS partition (e.g. C:). The CAPACITY refers to the total size of the MS-DOS partition. The SURFACE, TRACK and SECTOR information describe a virtual disk and do not relate, in any way, to the geometry of the physical disk. Note also that the SPARE SPACE value displayed by the \$F or \$V list of a Separated Subunit Domain refers to the total amount of spare space on the MS-DOS partition (rounded down to a multiple of the virtual track size).

The information displayed by \$U describing Integrated Data Files (i.e. simulated volumes, format codes P151Z, P224Z, P246Z, P249Z or P259Z) refers to the MS-DOS file that is simulating the Global System Manager domain (e.g. GSM200.VOL). The CAPACITY refers to the size of the MS-DOS file. The SURFACE, TRACK and SECTOR information describe a virtual disk and do not relate, in any way, to the geometry of the physical disk.

The information displayed by \$U describing "BOS format" integral hard disks refers to the information returned by the BIOS "Get Drive Parameters" function. This information is normally dependent on the parameters supplied to the computer's "Setup" option. For large disks, the details displayed by \$U may not reflect the physical device. There is a restriction in most BIOS's which forbids the cylinder number of a hard disk to exceed 1024 (2**10). To overcome this restriction, if a disk has more than 1024 cylinders, it is normal practise to specify (in the Setup option) an artificially small number of cylinders (i.e. not more than 1024) and an artificially large, and strictly inaccurate, number of heads and/or sectors-per-track in order to produce a correct overall capacity. If a choice is possible, it is recommended that you increase the number of logical heads so that the size of each logical track remains relatively small (i.e. less than 32 Kbytes). Note that this technique is normally only possible if the hard disk interface is ESDI or SCSI.

When a "BOS format" integral hard disk has been "split" (i.e. partitioned between BOS and MS-DOS) - see section 5.5.1) \$U displays both the total disk capacity as well as the size of the BOS partition. For example:

```
200 P88Z 1ST IBM XT/AT WINCHESTER CAPACITY 15.0M (250 FILES)
      4 SURFACE(S) OF 610 TRACKS WITH 17 512-BYTE SECTORS
```

The CAPACITY refers to the amount of the disk that is available to BOS (i.e. the size of the BOS partition). The SURFACE, TRACK and SECTOR information refer to the actual disk geometry (with the proviso detailed above) which, when multiplied together, produce the total disk capacity.

The CAPACITY information displayed by \$U describing "BOS format" hard disks accessed using the "ADAPTEC" SCSI controller refers to the total disk size returned by the SCSI "Read Capacity" command. However, the SURFACE, TRACK and SECTOR details do not correspond to the physical device. Instead, the BOS driver adjusts the number of cylinders on the standard P246Z, P249Z or P259Z volume formats to produce a disk capacity that agrees with the results of the SCSI Read Capacity command. For example:

```
200 P246Z 1ST ADAPTEC SCSI DISK CAPACITY 286.4M (250 FILES)
      16 SURFACE(S) OF 1146 TRACKS WITH 32 512-BYTE SECTORS

250 P259Z 2ND ADAPTEC SCSI DISK CAPACITY 338.8M (250 FILES)
      16 SURFACE(S) OF 678 TRACKS WITH 64 512-BYTE SECTORS
```

V8.1 \$U correctly reports on "BOS format" SCSI hard disks with a capacity of 2Gb, or larger. Any hard-disk with a capacity of 2Gb, or larger, **MUST** be partitioned using the =.56nn customisation utility before being used by Global System Manager (see section 5.10).

Note that V8.1 \$U displays the maximum number of files for diskette and hard disk formats.

The information displayed by \$U describing the printers which are attached to your computer refers to physical ports. For example:

```
500 PARALLEL PRINTER
501 SERIAL PRINTER ON COM1
```

\$U displays no useful information regarding the capacity of any tape drives connected to your computer.

In addition to displaying the unit information for the local workstation, \$U automatically displays the unit information for all Global System Manager (Novell NetWare) file-servers on the network.

[PHOTO HERE]

Figure 4.14 - The \$V menu

4.9 \$V - Volume Maintenance Utility

\$V, the volume maintenance utility, is used to prepare diskette and hard disk volumes for use with Global System Manager. Before a volume can be used, it must be initialised or formatted and allocated a volume name by which it is known.

When you run \$V it displays the menu shown in figure 4.14 and prompts for a function. To allow software compatibility with Global System Manager on other host operating systems, some options that appear are not available with Global System Manager (Novell NetWare). The functions listed are as follows:

Initialise is used to set up hard disk volumes (or subunits). You are prompted for the unit address, volume description, volume name and size. This option can also be used to initialise diskettes - you are prompted for the unit address and volume name.

Initialise and Verify performs the same function, but also verifies the volume (diskette or hard disk subunit) after initialising it, to check that each track is readable.

Format is used to format diskettes under MS-DOS only. **DISKETTE FORMATTING IS NOT SUPPORTED UNDER WINDOWS. SIMULATED HARD DISK VOLUMES (SEE SECTION 8.2) CANNOT BE FORMATTED UNDER MS-DOS OR WINDOWS.**

Format and verify performs the same function, but also verifies the diskette after initialising it, to check that each track is readable.

Scratch domain is used to wipe all current data from a specified hard disk domain. **THIS FUNCTION SHOULD ONLY BE USED BY SYSTEM SUPERVISORS.**

Reformat faulty track is used to reformat a track on a hard disk or diskette which has become unreadable. **DISKETTE FORMATTING IS NOT SUPPORTED UNDER WINDOWS. SIMULATED HARD DISK VOLUMES (SEE SECTION 8.2) CANNOT BE FORMATTED UNDER MS-DOS OR WINDOWS.**

Allocate alternate track is used to allocate an alternate track on a hard disk domain. **DO NOT ATTEMPT TO ALLOCATE AN ALTERNATE TRACK ON A DISCRETE DATA FILE (SEPARATED SUBUNIT DOMAIN).**

Amend domain error map is used to create or amend a map of faulty tracks on a domain which are not to be used. **THIS FUNCTION SHOULD ONLY BE USED BY SYSTEM SUPERVISORS. DO NOT ATTEMPT TO AMEND THE**

DOMAIN ERROR MAP ON A DISCRETE DATA FILE (SEPARATED SUBUNIT DOMAIN).

Set up special access option is for use by development programmers only.

List Directory is identical in effect to the \$F LIS option. It lists the files on a specified hard disk or diskette volume, or the volumes on a specified hard disk domain. You might want to do this before you perform one of the other operations, to avoid destroying valuable data.

Description Maintenance allows you to amend the Volume Description associated with a hard disk domain or sub unit.
[PHOTO HERE]

Figure 4.15 - Preparing new diskettes

[PHOTO HERE]

Figure 4.16 - Re-using old diskettes

To exit from the \$V command back to the ready prompt or main menu, key <CR> or <ESCAPE>.

Note that some of the \$V functions require exclusive access to a domain. On a multi-user computer the Swap File (\$\$SWAPxx on logical unit \$SW) is permanently "IN USE" unless the \$STATUS GET instruction is used to gain exclusive control (see Chapter 5 of the Global System Manager Manual). On the master computer of a network system the User File (\$\$USER on logical unit \$M) is permanently "SHARED". In order to perform some of the above \$V functions on a "master" computer it is necessary to reload the Starter System from the BACRES diskette (see section 2.1.4).

There is some overlap between the \$F and \$V system commands. For example, both the \$F INI instruction and option 1 from the \$V menu can be used to initialise diskettes. Similarly, both the \$F DES instruction and option 11 from the \$V menu can be used to amend Volume Descriptions. \$F is described in Chapter 5 of the Global System Manager Manual.

4.9.1 Preparing New Diskettes

Only rarely are new diskettes already formatted correctly, needing simply to be initialized. Usually, factory-fresh diskettes will need to be formatted. In particular, you should format a diskette if you are re-using one which has developed a bad sector.

If you choose to verify the diskette, using function 2 or 4, it will be re-read, track by track, once it has been initialized or formatted, to check that every sector is readable. In the example shown in figure 4.15, the operator has selected function 4, Format and Verify.

When the unit prompt (\$78 UNIT:) appears you should mount the diskette to be processed and then key the unit address (or unit-id) of the drive the new diskette occupies, together with its volume-id (which can be up to 6 characters). In the example shown in figure 4.15, the

operator has chosen to create a diskette named BACKUP on unit 180, and another called BWAOM1 on unit 190.

While the diskette is being formatted and verified, messages indicate the progress of the operation track by track. When both processes have finished the unit prompt re-appears so that you can create another volume if you want, or return to the \$V menu by keying <CR>. If you want to create several volumes with the same name (e.g. several backup volumes), you can reply <CR> to the volume prompt to use the volume-id you last specified.

NOTE THAT DISKETTE FORMATTING IS NOT SUPPORTED UNDER WINDOWS.

4.9.2 Re-using Old Diskettes

You proceed in much the same way when you wish to re-use an old diskette. The only difference is that Global System Manager detects that there is already a valid volume present, and prompts to make sure that you really do intend to destroy the data it currently contains (which, of course, will be the effect of an initialize or format operation).

In the example shown in figure 4.16, the operator has chosen to reformat and verify a diskette called WORK1, which was previously initialized as SAPROG, but which has now developed a bad sector. Note how by keying "?" to the destroy prompt you can obtain a listing of the files occupying the volume to see whether it really should be overwritten. You should reply N to the prompt if you do not want to proceed.

On a configuration which includes several diskette formats (as displayed by the \$U command), it can take a considerable time for \$V to check that the target diskette does not contain a valid Global System Manager directory. \$V attempts to read the directory once for each diskette format that is supported on the selected drive. For example, if the configuration file includes the following formats on drive-0:

```
150 G1A
190 C10A
196 C24A
```

\$V will attempt to read the diskette using the volume format parameters for G1A, C10A and C24A. For example:

```
$78 UNIT:150 VOLUME ID:TEST
;
; $V normally attempts to read the diskette to check for
; a valid Global System Manager directory.
;
$78 DESTROY DISK-1 ON 196?:Y
```

This exhaustive checking can be bypassed by terminating the reply to the unit number prompt with <CTRL A> instead of the normal <CR>. For example:

```
$78 UNIT:150<CTRL A> VOLUME ID:TEST
$78 CONFIRM CORRECT DISK MOUNTED ON 1ST DISKETTE DRIVE (A:) - 150?:Y
```

DO NOT USE THIS OPTION UNLESS YOU ARE ABSOLUTELY SURE THAT THE CORRECT DISKETTE IS MOUNTED IN THE SELECTED DRIVE.

4.9.3 Preparing New Simulated Volumes

You normally use function 1, Initialize, to prepare a new simulated volume, since verification is usually not needed. **Formatting is not supported on either type of simulated volume.** You will have to set up a number of units on the disk starting with the lowest unit number, the domain unit. To find the unit addresses involved consult the unit description report produced by the \$U system command (see section 4.8).

The following example assumes that you want to set up three volumes named XXWORK, XXDATA and XXPROG on subunits 201, 202 and 203 of the hard disk domain covered by unit 200. You must first establish the domain itself. You decide to name it XXDOM. The dialogue is the same as for initializing a diskette:

```
Please select a function:$V
.....
..... (Menu. Function 1 is Initialize)
.....
PLEASE SELECT A FUNCTION:1
$78 UNIT:200 VOLUME:XXDOM INITIALISED
$78 UNIT:
```

Now you must allocate the three volumes. You have to specify how large they are so that Global System Manager can provide the correct amount of space for them from the domain.

The following example dialogue will allocate 2 Mbytes for XXWORK, 250 Kbytes for XXDATA, and 128000 bytes for XXPROG (where Mbyte = 1 Megabyte, 1048576 bytes; Kbyte = 1 Kilobyte, 1024 bytes.):

```
$78 UNIT:201 VOLUME DESCRIPTION:EXAMPLE 2M WORK VOLUME
VOLUME:XXWORK SIZE:2M 2098176 INITIALISED
$78 UNIT:202 VOLUME DESCRIPTION:EXAMPLE 250K DATA VOLUME
VOLUME:XXDATA SIZE:250K 257024 INITIALISED
$78 UNIT:203 VOLUME DESCRIPTION:EXAMPLE PROGRAM VOLUME
VOLUME:XXPROG SIZE:128000 129024 INITIALISED
$78 UNIT:<CR>
.....
..... (Menu)
.....
Please select a function:
```

The volumes are now set up and can be used like any other data volumes. The value displayed before the word INITIALISED is the size actually allocated for the volume - usually slightly larger than the size requested, since each volume will occupy a whole number of virtual tracks.

Volume Descriptions are covered in section 4.9.10 (below).

Note that you can key <CR> to the SIZE: prompt, in which case the size last specified will be used. The special reply of 0 (zero) causes the maximum amount of contiguous space remaining on the Integrated Data File domain (e.g. volume format P259Z) to be allocated to the volume. **A size of 0 is NOT allowed for a Discrete Data File domain (e.g. volume format T259Z).**

When allocating a new subvolume on a Discrete Data File domain, the number of each logical track is displayed as it is being initialised. For example:

```
Allocating track nnnn INITIALISED
```

If the subvolume initialisation does not complete successfully (e.g. if <CTRL W> is used to abort \$V) a dummy MS-DOS subvolume data file (nn.SVL) will exist in the domain directory (e.g. GSM200) occupying un-reusable hard-disk space. To reclaim the space, delete this file using the MS-DOS DEL command.

4.9.4 Allocating Additional Volumes on a Simulated Volume

You can use \$V to set up new volumes on a hard disk domain, providing that some remain to be allocated and there is spare data space available. You can check the state of the domain either by using the List Directory function on the \$V menu or by keying its address in response to the unit prompt, and ? to the subsequent volume or volume description prompts. The resulting display shows the units and volumes already allocated, the number of subunits available, and the amount of free space remaining.

The allocation of a new volume takes place just as explained in the previous section. For example, to set up XXNEW with 1.5 Mbytes of storage:

```
$78 UNIT:204 VOLUME DESCRIPTION:2ND WORK VOLUME (1.5MB)
VOLUME:XXNEW SIZE:1.5M 1573888 INITIALISED
$78 UNIT:
etc., etc.
```

If you mistakenly key the address of a volume which has already been allocated the destroy prompt appears. You should key N to return to the unit prompt:

```
$78 UNIT:203 VOLUME DESCRIPTION:2ND WORK VOLUME (1.5MB)
VOLUME:XXNEW SIZE:1.5m
$78 DESTROY XXPROG?:N
$78 UNIT:
```

Note that you can use the ? response to the VOLUME DESCRIPTION or VOLUME prompts to examine the contents of a diskette or hard disk volume, as well as a domain. The display produced is the same as that which appears when you key ? in response to the destroy prompt.

If you want to allocate an additional spool unit you must prefix the size with an S to indicate its status. You will then be prompted for the "allocation". You would normally reply <CR> to accept the default shown. For example:

```
$78 UNIT:210 VOLUME DESCRIPTION:SECONDARY SPOOL UNIT
VOLUME ID:SPOOL2 SIZE:S3M
$78 ALLOCATION ( 61K):<CR> 3150336 INITIALISED
```

4.9.5 Deallocating a Hard Disk Volume

To deallocate a volume previously allocated use the initialize function as above, but reply <CTRL A> to the volume description or volume prompts. The volume will erase all the data on it. Key Y to continue, or N or <CR> to avoid deallocating the volume and losing data you want to keep. For example:

```
$78 UNIT:203 VOLUME DESCRIPTION:<CTRL A>
$78 DEALLOCATE XXNEW?:Y DEALLOCATED
$78 UNIT:
```

Note that you can use the ? response to the DEALLOCATE prompt to examine the contents of a hard disk volume as a final check before deallocating it. The display produced is the same as that which appears when you key ? in response to the destroy prompt.

4.9.6 Recovering a Faulty Track on a Hard Disk

Occasionally an I/O error will occur on a simulated volume. When this occurs the file containing the error will be corrupt, and will have to be restored. First, however, you must replace the faulty track with an "alternate" track, one of six spare tracks reserved at the end of each Global System Manager domain.

IMPORTANT NOTE: DO NOT ATTEMPT TO ALLOCATE ALTERNATE TRACKS ON DISCRETE DATA FILES (VOLUME TYPES T151Z, T224Z OR T259Z). ALTERNATE TRACKS CAN ONLY BE ALLOCATED ON INTEGRATED DATA FILES (VOLUME FORMATS P151Z, P224Z, P246Z, P249Z OR P259Z).

If you attempt to use \$V option-7 on a "T" volume format, the following message will appear:

```
FUNCTION NOT AVAILABLE
```

Start by running \$F and using the VER instruction to find the location of the bad track on the unit (alternatively you may prefer to verify the whole of the domain). When an error is detected a message of the form:

```
VERIFY ERROR - CYLINDER/HEAD/SECTOR 012E/01/0A - CONTINUE?:
```

will be displayed. Note down the first seven characters of the address, the cylinder and head number: 012E/01 in the above example. This identifies the faulty track. Reply Y to accept this track as faulty and continue verifying the remainder of the disk. If the faulty track already has an alternate track allocated a message:

```
ALTERNATIVE ALREADY ALLOCATED
```

will be displayed instead of the continue prompt. Continue until the whole of the unit has been verified.

You must now allocate an alternate track. Run \$V, select the "Allocate alternate track" option, and then key the unit address of the hard disk domain on which the fault lies. You will be prompted for the location of the fault, to which you should key the first 7 characters of the address reported by the \$F VER instruction. For example:

```
$78 UNIT:200
Information in Hex or Decimal (H)?:<CR>
LOCATION (CCCC/HH):012E/01
```

\$V then reads the track specified to make sure it really contains a fault. If it does not the warning:

```
$78 NO I/O ERROR READING TRACK - CONTINUE?:
```

appears, and you can only proceed by keying Y. Normally this message indicates that you have mis-keyed the address.

Global System Manager then checks what data currently resides on the faulty track, and displays a destroy prompt such as:

```
$78 DESTROY S.SALES ON UNIT 204?:
```

or:

```
$78 DESTROY UNIT 204?:
```

The first prompt indicates that the named file lies partly or entirely on the faulty track. The second prompt indicates that the faulty track contains the directory for that unit. Key Y to continue and destroy the file or unit, or N to abandon so that you can attempt to save the file first. Note that if no file is located over the faulty track there will be no destroy prompt.

The reallocation of the track then proceeds, and the following message will appear:

```
$78 ALTERNATE TRACK ALLOCATED
```

to indicate that the track has been replaced.

Note that there are only six alternate tracks available on each domain. If you use all these up and a further I/O error occurs, you will have to take copies of all the data on the disk, and use an MS-DOS utility to repair the damaged disk.

4.9.7 Preparing Work Volumes

Many software modules need to use special volumes, known as work volumes, when reorganizing data etc. These volumes, which can be held on any disk of sufficient capacity, have names of the form xxWORK, where xx represents the 2 character abbreviated form of the program name. Although most Global software modules automatically set up such volumes when required, in some cases you will be required to do this manually.

Work volumes are usually named \$\$WORK. The \$ characters have the special property that they will match the request for any two other characters. This means that this volume can be used as a work volume by any Global software module without having to be renamed. For example, a Sales Ledger module might require a work volume called SLWORK. If the unit assignment in its menu entry tells it to look for this volume at the \$\$WORK unit address it will not signal an error when it finds the volume \$\$WORK rather than SLWORK.

To make this easier for you, when Global System Manager is started the RAM disk (if present) is initialized with the special volume-id of \$\$WORK so that the RAM disk can be used as a work volume by any Global software module without having to be renamed.

[PHOTO HERE]

Figure 4.17 - A domain error map display

When you set up a menu entry for a particular module you must assign a unit address for a work volume if it requires one. Provided it is of sufficient capacity, you may supply the address of the RAM disk on your computer. When the module needs to use a work volume it will then use your RAM disk. For example, a Sales Ledger module might require a work volume called SLWORK. If the unit assignment in its menu entry tells it to look for this volume at unit address 109 it will not

signal an error when it finds the volume \$\$WORK rather than SLWORK. Of course, if your RAM disk is not large enough for the work volume required you will need to set up a diskette or hard disk volume in the normal way. You may want to initialize the volume you decide to use with the special name \$\$WORK, so that it can serve as a work volume for several different modules.

4.9.8 Amending a Domain Error Map

When you select this option you are prompted first for the domain address.

THIS FUNCTION SHOULD ONLY BE USED BY SYSTEM SUPERVISORS. USING THIS FUNCTION WILL DESTROY ALL THE DATA ON THE DOMAIN. DO NOT REPLY Y UNLESS YOU ARE SURE YOU KNOW WHAT YOU ARE DOING.

IMPORTANT NOTE: DO NOT ATTEMPT TO AMEND A DOMAIN ERROR MAP ON DISCRETE DATA FILES (VOLUME TYPE T151Z, T224Z OR T259Z). DOMAIN ERROR MAPS ARE ONLY SUPPORTED ON INTEGRATED DATA FILES (VOLUME FORMAT P151Z, P224Z, P246Z, P249Z OR P259Z).

If you attempt to use \$V option-8 on a "T" volume format, the following message will appear:

```
FUNCTION NOT AVAILABLE
```

A warning message appears which explains the implications of proceeding, and you are then prompted:

```
Do you wish to amend the error map??:
```

If you reply Y, you are then prompted:

```
Verify domain and add unreadable tracks to error map automatically (Y)?:
```

If you reply Y or <CR> the domain is verified, any unreadable tracks are added to the map, and the resulting amended or newly-created error map is displayed as shown in figure 4.17. If you key N the current state of the error map is displayed, it will contain no entries if this function has not been used before.

In either case, the map listing is followed by the prompt:

```
Key Print, Verify, <CR> to amend, <ESC> to exit:
```

Key P to print the error map as shown to unit \$PR.

Key V to verify the domain, in order to find out the addresses of any unreadable tracks which need to be added to the error map.

Key <CR> to amend the error map by hand. You are asked if you wish to supply the information in hexadecimal or decimal form (the Global System Manager verification routine returns the addresses of faulty tracks in hexadecimal notation, but some manufacturer's written lists give the information in decimal). Key H or D as appropriate and you are then asked for the location by cylinder and head of the first track you wish to add to the map. The location prompt is repeated until you key <CR>, when the initial prompt reappears. The entries in the domain error map are normally displayed in hexadecimal form. However, if the previous update was supplied in decimal notation, the current entries are displayed as decimal numbers.

Key <ESCAPE> to exit, and the error map is written to disk. The tracks listed in the table will not be accessible by Global System Manager once you reboot your computer. **You must now reboot your computer and re-initialize the domain.** If it contained SYSRES you will have to re-install Global System Manager before you can re-initialize it.

It is often prudent to add a "suspect track" to either the Domain Error Map or the Alternate Track Table (see section 4.9.6 above). By a "suspect track" we mean a track that is readable but only after a considerable number of retries. The track number displayed by either the \$V Initialise and Verify function, the \$V Format and Verify function of the \$F VER command can be converted into a cylinder-head number pair for use by \$V functions 6, 7 or 8 using the following technique:

1. Subtract 1 from the track number displayed by the verify;
2. Divide the "number of surfaces" displayed by \$U for the appropriate volume into (track number - 1);
3. The result of the division is the cylinder number to use for the \$V allocate or re-format function;
4. The remainder from the division is the head number to use for the \$V allocate or re-format function.

For example, on a hard disk with 16 surfaces, track 19 takes a considerable length of time to verify. Applying the rules listed above show that the potentially bad track is cylinder-1, head-2.

4.9.9 Listing a Directory

The \$V List function displays a volume or domain listing in the same format as the listing produced by the \$F LIS instruction.

The format of a domain listing produced by the List function in versions 8.0, and later, of Global System Manager differs from that produced by earlier versions. The Volume Description (see section 4.9.10) of each subvolume is displayed instead of the "start, size and protection" information. To produce a domain listing which includes the "start, size and protection" information for each subunit, terminate the unit number with <CTRL A> instead of the usual <CR>.

For example:

```
$78 UNIT:200
VOLUME SYSDOM ON 200 ACCESS OPTION 1 11/12/90 11.53.49
FIRST DOMAIN (GLOBAL SYSTEM MANAGER DEVELOPMENT)
UNIT VOL-ID DATASIZE DESCRIPTION
201 SYSRES 3150336 V8.0 GLOBAL SYSTEM MANAGER VOLUME
202 SYSDEV 1577472 V8.0 GLOBAL COBOL PROGRAMMING KIT
203 PSDATA 2101760 V8.0 GLOBAL COBOL PRODUCT SUPPORT
204 SYSLOG 791040 V8.0 SYSTEM EVENT LOGGING VOLUME
etc.
```

```
$78 UNIT:200<CTRL A>
VOLUME SYSDOM ON 200 ACCESS OPTION 1 11/12/90 11.57.14
FIRST DOMAIN (GLOBAL SYSTEM MANAGER DEVELOPMENT)
UNIT VOL-ID DATASIZE TOTAL START
201 SYSRES 3150336 3162112 49152
202 SYSDEV 1577472 1589248 3211264
203 PSDATA 2101760 2113536 4800512 PROTECTED
```

204 SYSLOG 791040 802816 6914048
etc.

4.9.10 Volume Description Maintenance

Global System Manager V7.0, and later, allows a 50 character Volume Description to be associated with each hard disk domain and subvolume. An area of the disk that was formerly unused is now utilised to hold the table of Volume Descriptions so it is not necessary to re-initialise a volume in order to use this new facility. However, on some disks the area used to hold the Volume Descriptions may not be large enough to contain descriptions for all the subvolumes. If this is the case, attempts to add Volume Descriptions for subvolumes that can't be fitted into the table will be ignored. If a domain is initialised with the V8.1 \$V, a table of sufficient size for all the subvolumes is allocated.

The Description Maintenance function allows the 50 character long Volume Description for a domain or subunit to be amended. The current Volume Description, or spaces if a description is not present, is displayed and may be overwritten by a new 50 character text string. If there is insufficient space in the volume description table for a particular subunit, the following message will appear:

```
NO ROOM FOR DESCRIPTION - RE-INITIALISE DOMAIN
```

This message will appear for subunits with a high unit number on a domain that has been initialised using a version of Global System Manager prior to V7.0. The exact number of volume descriptions that will fit on a "pre-V7.0" disk depends on the geometry of the media. For example:

```
Please select a function :11
```

```
$78 UNIT:210 DESCRIPTION:AN EXAMPLE VOLUME DESCRIPTION  
$78 UNIT:299 NO ROOM FOR DESCRIPTION - RE-INITIALIZE DOMAIN
```

The behaviour of the \$V Initialise function(s) may also depend on the volume number for domains that have been initialised prior to Global System Manager V7.0:

```
$78 UNIT:210 VOLUME DESCRIPTION:EXAMPLE VOLUME DESCRIPTION  
VOLUME ID:TEST1 SIZE:1M 1053184 INITIALISED  
$78 UNIT:299 VOLUME ID:TEST2 SIZE:1M 1053184 INITIALISED
```

Note that if the \$V Initialise function is used under Job Management and there is insufficient space in the volume description table for a particular subunit the VOLUME DESCRIPTION prompt always appears, although the reply is subsequently ignored. This is necessary to ensure a predictable and consistent Job Management dialogue.

The Initialise function contains another special feature which is only enabled when \$V is used under Job Management. If the reply to the VOLUME DESCRIPTION prompt is six characters or less and \$V is executing under Job Management, the reply (supplied by the job) is used as the volume-id and the subsequent VOLUME prompt, which normally appears, is suppressed. This feature has been incorporated into \$V to ensure a compatible dialogue for jobs developed prior to Global System Manager V7.0.

Note also that Volume Descriptions are only recognised by versions 7.0, and later, of Global System Manager. Any program generating job

dialogue must check the Global System Manager version before attempting to amend a Volume Description.

Finally, the first example shown in section 4.9.3 over-simplified the use of \$V when initialising domains. If a domain is being initialised for the first time, \$V prompts for the volume i.d. only. If however, a domain is being re-initialised, \$V prompts for both a volume i.d. and a volume description. For example:

```
Please select a function :1
$78 UNIT:250 VOLUME ID:DISK-2 INITIALISED
$78 UNIT:250 VOLUME DESCRIPTION:2ND 2.5GB HARD DISK
VOLUME ID:BIGDSK
$78 DESTROY DISK-2 ?:
```

Important note: The Volume Descriptions for Discrete Data File domains (e.g. volume format T259Z) are held in the domain header file rather than being associated with individual subvolume data files. If a subvolume data file is copied to a data directory using an MS-DOS command (e.g. COPY) it will automatically inherit the Volume Description, if any, associated with the corresponding subvolume number. The same effect will occur if a subvolume data file is "renumbered" using the MS-DOS RENAME command.

5. The `=.56nn` Customisation Utility

A special customisation program is included with Global System Manager (Novell NetWare). This utility is automatically installed onto the SYSRES volume. The name of the program file is based on the configuration code for your version of Global System Manager (Novell NetWare). For example, the name of the customisation program supplied with configuration `++5610XJ` is `=.5610`. The customisation program is run automatically when Global System Manager (Novell NetWare) is installed (hence the peculiar name) - see section 2.1.7. If further customisations are required after Global System Manager (Novell NetWare) has been installed, you can invoke `=.56nn` as a normal program from SYSRES or use the Extended Customisation option from the \$CUS Configuration Maintenance menu (see section 6.1.5 of the Global System Manager Manual).

Important note: None of the customisations applied using `=.56nn` become effective until Global System Manager (Novell NetWare) has been re-loaded on the computer.

5.1 The Main Menu

When you run `=.56nn` it displays the menu shown in figure 5.1 and prompts for a function. The functions available to you are as follows:

Screen Customisation allows you to change the type of the screen driver and alter the start and end cursor raster lines. This option also allows you to change the standard integral console controller from "CONSOLE" to "WINTTY" for use with the Global Windows Workstation;

Keyboard Customisation allows you to change the Keyboard Language Type and also modify the characters generated by the Keypad keys marked "DEL" and "+";

Hard Disk Customisation allows you to partition a hard disk between MS-DOS and the BOS operating system. **This option is only available to provide compatibility with Global System Manager (BOS).** This customisation only applies to the "BOS format" hard-disks described in section 9.2.1. It does not apply to the simulated volumes described in section 8.2. This option also allows you to mark "BOS format" hard disk units as removable devices which is necessary if cacheing is enabled because Global System Manager does not allow removable disks to be cached;

Tape Drive Customisation allows you to change the port address, DMA channel and interrupt vector for a Wangtek, Everex or Archive Viper QIC-02 controller. This option also allows you to alter the SCSI i.d. of a SCSI tape drive;

Memory Customisation allows you to activate EMS handling by specifying the name of the extended memory controller, the amount of extended memory and the manner in which it is to be split between cache and RAM disk (see section 8.5). Note that Global Configurator **cannot** be used to change the extended memory usage;

Hyperport Customisation allows you to customise the number and type of Hyperport family cards in the configuration file. Furthermore, this option allows you to modify the parameters that determine the protocol used by the Hyper/MX sub-system;

Diagnostics Customisation allows you to enable some of the diagnostic tools available with Global System Manager (Novell NetWare). **DO NOT USE THIS OPTION UNLESS EXPLICITLY ADVISED BY TIS SOFTWARE SERVICE CENTRE OR DEVELOPMENT STAFF.**

Adaptec SCSI disk partitioning allows you to partition a "BOS format" SCSI hard-disk into several Global System Manager partitions. **This option is only available to provide compatibility with Global System Manager (BOS).** This customisation only applies to the "BOS format" SCSI hard-disks described in section 9.2.4. It does not apply to the simulated volumes described in section 8.2. This option must be employed to allow "BOS format" SCSI disks of capacity 2Gb, or larger, to be accessed by Global System Manager.

[PHOTO HERE]

Figure 5.1 - The Main Customisation Menu

Nucleus Options Customisation allows you to customise some parameters in the Nucleus Options section of the configuration file. Currently, the only parameter that can be customised is the flag that controls the Global System Manager clock update methodology.

5.2 Operating Notes

The first time a menu entry between 1 and 7 is selected =.56nn responds by prompting for a unit on which the modifications are to be applied. For example:

```
Please select a function :1
```

```
Please key unit on which modifications are to be made:
```

Once a unit has been specified this prompt is not repeated during a single invocation of the customisation utility. Note that =.56nn customises **all** the configuration files on the selected unit. Because =.56nn operates in "batch mode", it is not possible, in general, to display defaults when prompting for customizable values. If a default is offered, it will be the value read from the first configuration file found on the specified unit.

A unit is not required if =.56nn is invoked from the Extended Customisation option of the \$CUS Configuration Maintenance menu. \$CUS automatically supplies =.56nn with a configuration file name and unit.

A configuration file unit is not required for function 8 (Adaptec SCSI Disk Partitioning) because this function creates and maintains the Disk Partition Table on the SCSI hard-disk. Unlike all the other =.56nn options, the Adaptec SCSI Disk Partitioning function does not modify the configuration file.

5.3 Screen Customisation

Key 1 to the =.56nn main menu to display the Screen Customisation sub-menu. From this menu you can customise the screen controller used to access the integral memory-mapped screen (i.e. +JWCB01, which appears as controller "CONSOLE" in the Console Controller section of the configuration file). The Screen Customisation sub-menu also allows you to change the start and end raster lines for the integral screen cursor.

Important note: The Screen Customisation option of =.56nn will only function correctly if the "CONSOLE" entry is the first console controller defined in the configuration file.

5.3.1 Screen Controller Customisation

There are three screen controllers for the main screen to choose from:

- Controller #1 uses only the BIOS. It is to be used only as a last resort if the other two controllers do not work;
- Controller #2 will work on most IBM PC compatibles but may cause flicker on some compatibles. All configuration files are distributed with this controller;
- Controller #3 will not work on every IBM PC compatible so try this controller only **after** installing Global System Manager (Novell NetWare). If it does not work then Global System Manager (Novell NetWare) may have to be re-installed from the distribution diskettes. It is provided to cure the flicker experienced by some look-alike users.

5.3.2 Cursor Type Customisation

The cursor of the integral screen is built up of one or more of the 'scan' lines of the screen hardware. By specifying different scan lines for the start and end of the cursor, the position and size of the cursor can be changed. The cursor for a standard monochrome screen starts on line 10 and ends on line 11. The cursor for a colour screen starts and ends on line 7. If 0 is used for both start and end values, Global System Manager will attempt to position the cursor sensibly allowing for the actual screen type.

5.3.3 Change CONSOLE to WINTTY

This option is available to change the integral console controller from "CONSOLE" (see section 9.4.1) to "WINTTY" (see section 8.3.3) for use with the Global Windows Workstation if Global Configurator is not available to effect this change. **Important note:** The customisation effected by this option is **NOT** preserved if Global Configurator is used subsequently to update the configuration file.

Warning: Do not use this option unless you are following the installation instructions in the Global Windows Workstation Notes.

5.4 Keyboard Customisation

Key 2 to the =.56nn main menu to display the Keyboard Customisation sub-menu. From this menu you can customise the keyboard language type and the characters generated by the keypad "DEL" and "+" keys.

5.4.1 Keyboard Language Customisation

The keyboard language customisation allows you to select one of the following language types:

- United States
- United Kingdom
- German
- Danish #1
- Danish #2

Finnish
Icelandic (for use with TAP 509 or 519)
French
Triumph Adler UK
Turkish
Icelandic (for use with TAP 534 or 535)

5.4.2 Keypad '+' Key Customisation

This keyboard customisation option allows the keyboard controller to translate the '+' key on the keypad into either '+' (hex 2B) or <CR> (hex 0D).

5.4.3 Keypad 'DEL' Key Customisation

This keyboard customisation can be used to translate the non-standard character value returned by the 'DEL' key on the keypad of some keyboards into the standard value (hex 7F).

5.5 Hard Disk Customisation

Key 3 to the =.56nn main menu to display the Hard Disk customisation sub-menu. From this menu you can partition a hard disk between MS-DOS and the BOS operating system. **This option is only available to provide compatibility with Global System Manager (BOS).** This option also allows you to mark selected disks as "removable".

5.5.1 Disk Partitioning

This option displays the sizes of the current disk(s). For example:

```
250  The disk has a total of 610 cylinders.  
      The BOS partition starts at cylinder 155.  
      The BOS partition is 455 cylinders in length.  
      The total size of the BOS partition is 15.1 megabytes.
```

You can specify a new starting cylinder for the BOS partition which will extend from this cylinder to the end of the disk. This means that partitions for other operating systems, if they exist, must be at the beginning of the disk. It is not possible to bootstrap Global System Manager (BOS) from a partitioned disk. **If Global System Manager (BOS) is installed on a partitioned disk, a SYSIPL diskette must be created** (please refer to the Global Operating Manual (BOS) for more details).

5.5.2 Removable Disks

Global System Manager uses disk cacheing with fixed disks but not with removable disks. If there are removable disks in the configuration, Global System Manager must be informed by using this customisation option. Note that =.56nn can change fixed disks into removable disks but cannot change removable disks into fixed disks. However, **if Global Configurator is subsequently used to amend the configuration file, for any purpose, all disks will revert to fixed disks.**

5.6 Tape Drive Customisation

Key 4 to the =.56nn main menu to display the Tape Drive customisation sub-menu. From this menu you can customise hardware parameters for the various types of tape drives supported by Global System Manager (Novell NetWare).

5.6.1 Standard Everex/CD Tape

Use this option to customise the port address, DMA channel and interrupt vector for the Wangtek and Everex QIC-02 tape controller "CD-TAPE" (see section 9.3.1). For example:

```
Key new port address in hex or <CR> for no change:0300
Key new DMA channel (1 or 3) or <CR> for no change:1
Key new interrupt level (2-7) or <CR> for no change:3
```

If the configuration file does not include a CD-TAPE tape controller the following message will appear:

```
Configuration file filename on unit uuu not modified
```

5.6.2 Adaptec SCSI Tape

Use this option to customise the SCSI ID of a Wangtek, Archive Viper or Exabyte SCSI tape drive for the SCSI tape controller "ADAPTEC" (see section 9.3.2). For example:

```
Key new SCSI ID (1-6) or <CR> for no change:2
```

If the configuration file does not include an ADAPTEC tape controller the following message will appear:

```
Configuration file filename on unit uuu not modified
```

5.6.3 Archive Viper QIC-02

Use this option to customise the port address, DMA channel and interrupt vector for the Archive Viper QIC-02 tape controller "VIPER" (see section 9.3.1.2). For example:

```
Key new port address in hex or <CR> for no change:0300
Key new DMA channel (1 or 3) or <CR> for no change:1
Key new interrupt level (2-7) or <CR> for no change:3
```

If the configuration file does not include a VIPER tape controller the following message will appear:

```
Configuration file filename on unit uuu not modified
```

5.7 Memory Customisation

Key 5 to the =.56nn main menu to display the Memory customisation sub-menu.

5.7.1 EMS Handling

The only available Memory Customisation option allows you to change the way in which EMS memory is used by Global System Manager (Novell NetWare). This section should be read in conjunction with section 8.5 ("Extended and Expanded Memory"). =.56nn allows you to perform the following customisations:

- Enable or disable the use of extended memory;
- Specify the actual amount of extended memory available in your computer. It is **strongly** recommended that you allow the extended memory handler to dynamically calculate the amount of extended memory;
- The desired extended memory usage. Extended memory can be used for RAM disk, hard disk cache or a combination of both;

- The name of the extended memory handler:

"LIM" selects controller +JWNLIM for use with the Lotus/Intel/Microsoft (LIM) Expanded Memory Manager Specification Version 4.0.

"XMS" selects controller +JWNXMS for use with the Extended Memory Specification (XMS) 2.0.

- Various controller specific prompts will follow.

Important note: In addition to using =.56nn to customise the way in which Global System Manager (Novell NetWare) uses the extended memory, the Global System Manager customisation utility, \$CUS, must be run to specify the way in which the available memory is to be used by Global System Manager (see Chapter 6 of the Global System Manager Manual).

5.8 Hyperport Customisation

Key 6 to the =.56nn main menu to display the Hyperport sub-system customisation sub-menu. **Important note:** This section should be read in conjunction with Hardware Factsheet Number 1 which describes the Hyperport family sub-system in complete detail.

5.8.1 Customise Number of Cards

This option allows you to enable or disable the Hyperport sub-system in the configuration:

Are Hyperport cards required (Y)?:

If Hyperport cards are required you are allowed to specify the number of cards (between 1 and 4):

Number of Hyperport cards (1):

5.8.2 Card-0 Customisation

This option allows you to customise the hardware parameters for the first (i.e. card-0) Hyperport card (i.e. TIS Hyperport, TCL Hyper/MX, TCL PCC/I or TCL Superport) defined in the configuration file. The following prompts apply to all types of card:

Address lines A12-A19 (C0):
Interrupt level (10):

The following prompt allows you to select the card type:

Allowed card types are:
0 = Hyperport
1 = Hyper/MX
2 = PCC/i or Superport

5.8.2.1 Hyperport Card Specific Customisations

If the selected card type is 0 (i.e. Hyperport) no further prompts are issued.

5.8.2.2 Hyper/MX Card Specific Customisations

If the selected card type is 1 (i.e. Hyper/MX) the following prompts, the meaning of which are described in Hardware Factsheet Number 1, are issued:

```

Poll period [msecs] ( 0):
Number of connected nodes ( 0):
Number of lines ( 0):
Allowed line types are:
    0 = RS485 multi-drop driver
    2 = RS422 kilostream 64Kbps
    4 = RS232 point-to-point V32 sync
    6 = RS232 point-to-point async
Line-0 type ( 0):
Line-0 speed [bps/100]; or 0 for 1Mbps ( 0):
Allowed line types are:
    0 = RS485 multi-drop driver
    2 = RS422 kilostream 64Kbps
    4 = RS232 point-to-point V32 sync
    6 = RS232 point-to-point async
Line-1 type ( 0):
Line-1 speed [bps/100]; or 0 for 1Mbps ( 0):

```

Important note: It is NOT possible to use Global Configurator to amend any of the above parameters: **=.56nn MUST be used**. The Hyper/MX customisations applied using =.56nn are retained if Global Configurator V8.1 is used subsequently to amend other sections of the configuration file (earlier versions of Global Configurator 'lost' the Hyper/MX customisations applied using =.56nn).

5.8.2.3 PCC/I or Superport Card Specific Customisations

If the selected card type is 2 (i.e. PCC/i or Superport) the following prompt, the meaning of which is described in Hardware Factsheet Number 1, is issued:

```
Ports per node (8):
```

5.8.3 Card-1 Customisation

This option allows you to customise the hardware parameters for the second (i.e. card-1) Hyperport card (i.e. TIS Hyperport, TCL Hyper/MX, TCL PCC/I or TCL Superport) defined in the configuration file. See section 5.8.2 for a description of the prompts that follow.

5.8.4 Card-2 Customisation

This option allows you to customise the hardware parameters for the third (i.e. card-2) Hyperport card (i.e. TIS Hyperport, TCL Hyper/MX, TCL PCC/I or TCL Superport) defined in the configuration file. See section 5.8.2 for a description of the prompts that follow.

5.8.5 Card-3 Customisation

This option allows you to customise the hardware parameters for the fourth (i.e. card-3) Hyperport card (i.e. TIS Hyperport, TCL Hyper/MX, TCL PCC/I or TCL Superport) defined in the configuration file. See section 5.8.2 for a description of the prompts that follow.

5.9 Diagnostics Customisation

Key 7 to the =.56nn main menu to display the Diagnostic Customisation sub-menu. **Warning:** Use of this option may prevent Global System Manager (Novell NetWare) from loading once the computer has been re-bootstrapped. **DO NOT USE THIS OPTION UNLESS EXPLICITLY ADVISED BY TIS SOFTWARE SERVICE CENTRE OR DEVELOPMENT STAFF.**

5.9.1 Core Dump Diagnostics

This option informs you if the Global System Manager "Core Dump Diagnostic" option is enabled in the default configuration file and

allows you to either enable or disable the option. For example, the following dialogue will enable Core Dump Diagnostics in a standard configuration file:

```
Core dump diagnostics are disabled in
configuration file ++5621XJ on unit 201.
```

```
Are core dump diagnostics required (N)?:Y
```

If you select to enable Core Dump Diagnostics you will be prompted for the diskette format onto which the core dump will be produced. The Global System Manager (Novell NetWare) Core Dump handler (+JWNCORE) uses the BIOS to write directly to the diskette (it does not use the standard Global System Manager (Novell NetWare) diskette device driver). For example, to indicate that the core dump is to be produced on a 3½" 1.44Mb, 02 diskette use the following dialogue:

```
These diagnostics will dump the contents of
memory onto a formatted diskette in drive 0.
Select an appropriate format from the following:
```

```
B - 720K 3-inch
G - 1.2M 5-inch
O - 1.44M 3-inch
V - 2.88M 3-inch
```

```
Diskette format (G):O
```

Note that this customisation does NOT produce a core dump. It merely enables the option in the configuration file and only becomes effective after Global System Manager (Novell NetWare) has been reloaded (re-bootstrapped) on the computer. The instructions for the creation of a core dump diskette will depend on the exact nature of the problem under investigation. However, in all cases a formatted diskette of the correct type must be present in diskette drive-0 when the core dump is being produced.

5.9.2 Other Diagnostics

This option informs you if any of the Global System Manager diagnostic options are enabled in the default configuration file and allows you to either enable or disable an option. The following options are allowed:

```
TRA Enable Value Trap Diagnostics (module +JWNTRAP);
```

```
DIA Enable Diagnostic Displays (module +JWNDIAG).
```

Note that this customisation does NOT produce any diagnostic information. It merely enables the option in the configuration file and only becomes effective after Global System Manager (Novell NetWare) has been reloaded (re-bootstrapped) on the computer. The instructions required to produce the diagnostics will depend on the exact nature of the problem under investigation.

5.10 Adaptec SCSI Disk Partitioning

Key 8 to the =.56nn main menu to select the Adaptec SCSI disk partitioning option. This option allows you to create and maintain a Global System Manager (BOS) partition map on a SCSI hard-disk. The Global System Manager (BOS) partition map is only recognised by the "ADAPTEC" hard-disk controller (see section 9.2.4). The Global System

Manager (BOS) partition map is incompatible with, and is not recognised by, any other operating systems (e.g. MS-DOS, SCO Unix).

The primary purpose of the Global System Manager (BOS) SCSI disk partitioning mechanism is to allow large disks (i.e. capacity 2Gb, or larger) to be used with Global System Manager.

This option merely updates the Global System Manager (BOS) partition map which is located on the first track of the hard-disk. The Global configuration file is not modified by this customisation option. In order to use the hard-disk partitions created by this option you must use Global Configurator to update the configuration file.

When this option is selected you are prompted for a hard-disk unit number. The reply must be the unit number of a hard-disk domain accessed using the ADAPTEC hard-disk controller. For example:

```
Unit number:200
Total disk size = 2144Mb
Space remaining = 2144Mb
Enter size (in megabytes) for partition 1 (0):
```

You can specify up to 62 hard-disk partitions. For example to partition a disk into 2 500Mb partitions and single 1144Mb partition use the following dialogue:

```
Space remaining = 2144Mb
Enter size (in megabytes) for partition 1 (0):500
Space remaining = 1644Mb
Enter size (in megabytes) for partition 2 (0):500
Space remaining = 1144Mb
Enter size (in megabytes) for partition 3 (0):<CR>
BOS partition table V1.0
```

Partition	Size	Partition	Size	Partition	Size
1	500Mb	2	500Mb	3	1144Mb

```
Write partition table to disk (Y?):<CR>
```

5.11 Nucleus Options Customisation

Key 9 to the =.56nn main menu to display the Nucleus Options Customisation sub-menu.

5.11.1 Clock Update Customisation

This option allows you to modify the method used to update the Global System Manager clock:

```
Use RTC for clock update (N)?
```

If this flag is set to "N" (the default) the Global System Manager clock will be updated by regular "interrupt ticks". If this flag is set to "Y", the Global System Manager clock will be constantly resynchronised with the Real Time Clock in the computer.

This option should be left disabled for most Global System Manager (Novell NetWare) configurations. However, it may be necessary to enable this option if Global System Manager is running as a background task under Microsoft Windows and the Global System Manager clock appears to be running slowly. **It is essential to enable this option if**

Global System Manager is being used with the Global Windows Workstation.

5.12 Exiting the Customisation Utility

If no modifications were made to the configuration file(s), using options 1 to 7, or 9; or to the SCSI hard-disk partition table, using option 8, then keying <CR> to the menu prompt will cause =.56nn to display a warning message and return control to the main menu or ready prompt. If modifications were made, =.56nn displays the following message:

```
Global System Manager must be re-loaded for the
changes you have made to become effective.
```

```
Do you wish to return to DOS? (N):
```

Key <CR> to return to the main menu or ready prompt. Key Y to return to MS-DOS.

Re-loading Global System Manager from within =.56nn bypasses all the normal \$BYE checking (see section 4.1). DO NOT REPLY Y TO THIS PROMPT UNLESS YOU ARE ABSOLUTELY SURE OF THE CONSEQUENCES.

6. MS-DOS and NetWare Utilities

This chapter describes the MS-DOS utilities distributed with Global System Manager (Novell NetWare) on the BACNAT diskette.

The first section describes GSMLOAD.EXE, the MS-DOS program that starts a Global System Manager session. The next section documents the various MS-DOS batch files that are available to run GSMLOAD.EXE.

The various utilities that are used to allocate the Global System Manager simulated hard-disk volumes are also explained in this chapter.

Further sections describe an MS-DOS device driver, distributed with Global System Manager, that may be used as an alternative to ANSI.SYS in some circumstances; the SPX Workstation Terminal Emulator and the PING network performance evaluation tool.

6.1 Contents of the BACNAT Diskette

The BACNAT diskette, supplied with Global System Manager (Novell NetWare) contains the following MS-DOS files:

GSMLOAD.EXE	MS-DOS utility to load Global System Manager (see section 6.2);
GLOBAL.BAT	MS-DOS batch file to invoke Global System Manager from either a Discrete Data File or an IPL diskette (see section 6.3.1);
GSMINST.BAT	MS-DOS batch file to invoke Global System Manager from an IPL diskette (see section 6.3.2);
GSMBOOT.BAT	MS-DOS batch file to invoke Global System Manager from a Discrete Data File (see section 6.3.3);
GSMWORK.BAT	MS-DOS batch file to invoke Global System Manager from a SYSIPL volume (see section 6.3.4);
GLMKDDF.EXE	MS-DOS utility to create a Discrete data File domain (see section 6.4.1);
GLMKIDF.EXE	MS-DOS utility to create an Integrated Data File domain (see section 6.4.2);
GLENDDF.EXE	MS-DOS utility to enlarge a sub-volume within a Discrete Data File domain (see section 6.4.3);
GLDDINF.EXE	MS-DOS utility to display disk information (see section 6.4.4);
ALLOCATE.EXE	MS-DOS utility to allocate simulated volumes - both Discrete Data Files and Integrated Data Files (see section 6.5). Note that the functionality of ALLOCATE.EXE has been incorporated into the GLMKDDF.EXE, GLMKIDF.EXE, GLENDDF.EXE and GLDDINF.EXE suite of utilities;
GSMCON.SYS	MS-DOS device driver for use with the DOS-SCR and SPX console controllers (see section 6.6);

GSM.INI	MS-DOS text file containing Global System Manager initialisation information (see section 7.1);
GSM.TLT	MS-DOS text file used by GSMLOAD.EXE when parsing the contents of the GSM.INI file (see section 7.1). THE GSM.TLT FILE MUST NOT BE AMENDED.
GSMWORK.PIF	Microsoft Windows Program Information File (PIF) to invoke Global System Manager under Windows (see section 7.3);
GSM.ICN	Microsoft Windows icon file (see section 7.4);
SPXWS.COM	SPX Workstation terminal emulator (see section 6.7);
GSM.NLM	Global System Manager NetWare Loadable Module (NLM) (see section 10.2);
NLMGSM.INI	MS-DOS text file containing Global System Manager NLM initialisation information (see section 10.2.3);
NLMIPL.VOL	IPL volume for the Global System Manager NLM for configurations 5610 and 5611 (see section 10.2.1);
NLMIPL.DLV	IPL volume for the Global System Manager NLM for configurations 5612 and 5613 (see section 10.2.1);
README.NLM	MS-DOS text file which provides useful "on-line" help-information regarding the Global System Manager NLM;
PING.EXE	MS-DOS utility used (on a workstation) to measure network throughput (see section 6.8);
PING.OVL	Overlay used by the PING.EXE utility (see section 6.8);
PING.CNF	Configuration file (sic) containing various parameters used by PING.EXE (see section 6.8);
PING.NLM	NetWare utility used (on the fileserver) to measure network throughput (see section 10.3);
PINGNLM.CNF	Configuration file (sic) containing various parameters used by PING.NLM (see section 10.3.1);
CLIB.311	Novell C library NLM for NetWare 3.11 (see the Global Configuration Notes);
GSM311.NLM	NetWare 3.11 version of GSM.NLM (see the Global Configuration Notes);

6.2 GSMLOAD.EXE - Start Global System Manager

GSMLOAD.EXE is the MS-DOS program which is responsible for starting Global System Manager under MS-DOS or in a "DOS compatibility box" of Microsoft Windows. Global System Manager can be started from a Discrete Data File directory, an Integrated Data File file or a diskette.

6.2.1 Starting Global System Manager from the MS-DOS prompt

To start Global System Manager from the MS-DOS prompt simply run the GSMLOAD.EXE utility. The syntax of the command line is as follows:

```
GSMLOAD [file|device|directory] [d] [i] [n] [s] [w]
```

The command line can be in upper-case or lower-case or a mixture of both.

If the first argument is missing, GSMLOAD.EXE will use the parameter to the BOOTSTRAP entry in the GSM.INI file (see section 7.1.8).

The other arguments are also optional. Note that the command arguments of GSMLOAD.EXE are non-standard (compared with other MS-DOS utilities) because a "/" character is not required.

6.2.1.1 Loading from a Discrete Data File

If the first parameter in the GSMLOAD command line is an MS-DOS directory, GSMLOAD.EXE will load Global System Manager from the Discrete Data File (aka Separated Subunit Domain) simulated by files within the specified MS-DOS directory. For example:

```
GSMLOAD GSM200
```

The MS-DOS file, within the specified directory (e.g. GSM200), that contains the Global System Manager start-up code is named nnSYSRES.SVL (where nn is the number of the SYSRES subvolume).

As with most MS-DOS commands the directory name can be specified in either lower-case or upper-case letters.

6.2.1.2 Loading from an Integrated Data File

If the first parameter in the GSMLOAD command line is an MS-DOS filename, GSMLOAD.EXE will load Global System Manager from the Integrated Data File simulated by the specified MS-DOS file. For example:

```
GSMLOAD GSM200.VOL
```

As with most MS-DOS commands the file name can be specified in either lower-case or upper-case letters.

6.2.1.3 Loading from a Diskette

If the first parameter in the GSMLOAD command line is an MS-DOS diskette device letter, GSMLOAD.EXE will load Global System Manager from the diskette (normally a BACRES volume) mounted in the specified device. For example:

```
GSMLOAD A:
```

or:

```
GSMLOAD A
```

As with most MS-DOS commands the drive letter can be specified as either a lower-case or an upper-case letter.

If the MS-DOS device is "B:" or "B" (or lower-case equivalents), the diskette drive swapping technique described in Appendix H will be enabled.

6.2.1.4 The Diagnostic Option (D)

The optional "D" (or "d") parameter enables diagnostics mode. If this mode is enabled the screen clear that is normally performed immediately before Global System Manager relinquishes control back to MS-DOS is suppressed, thus preventing any fatal error messages displayed by Global System Manager (see Appendix B) from disappearing from view.

6.2.1.5 The Install Option (I)

The optional "I" (or "i") parameter indicates that Global System Manager is being installed. It prevents the Novell workstation from attempting to access the Global System Manager network, allowing Global System Manager to be installed on a workstation without interfering with any other workstations that are currently running Global System Manager.

6.2.1.6 The Novell Option (N)

The optional "N" (or "n") parameter indicates Global System Manager is being run under Novell NetWare. If this flag is not specified, the GSM.INI initialisation file is opened exclusively by GSMLoad.EXE, and is not closed until Global System Manager terminates and returns to MS-DOS. This exclusive open prevents several copies of Global System Manager system being run simultaneously under Windows. Allowing uncoordinated, multiple Global System Manager sessions could result in severe corruption of Global System Manager data files.

However, several Global System Manager (Novell NetWare) workstations can load from the same SYSIPL volume, and share the same GSM.INI file. Although this scheme could theoretically result in the SYSIPL volume becoming corrupt, this doesn't occur in practice because none of the workstations ever write to the SYSIPL volume, they just read from it as Global System Manager is loaded. **Important note: In addition to specifying the "N" parameter, GSM.INI (and the SYSIPL volume) must be marked as share-able using a suitable NetWare utility (see the Global Configuration Notes).**

6.2.1.7 The Swap Diskette Drive Option (S)

The optional "S" (or "s") parameter enables the diskette drive swapping mechanism described in Appendix H. This option is included to enable diskette drive swapping when loading Global System Manager from a simulated volume.

6.2.1.8 The Windows Option (W)

The optional "W" (or "w") parameter should only be supplied when Global System Manager is being started within Windows (see section 7.3).

6.2.2 Running Global System Manager from Windows

To load Global System Manager on Windows, enter the main window in the Program Manager and double-click the Global System Manager icon. The GSMWORK.PIF file described in section 7.3 invokes GSMLoad.EXE (a non-Windows, MS-DOS application).

6.2.3 GSMLoad.EXE Operating Notes

The following notes apply to GSMLOAD.EXE.

6.2.3.1 The Global System Manager Directory

By default, GSMLOAD.EXE uses the current directory as the "Global System Manager directory". The GLDIR environment variable (see section 7.2.4) may be defined to override this default.

6.2.3.2 The GSM.INI file

As explained in section 7.1, GSMLOAD.EXE uses the MS-DOS file specification GSM*.INI (where * is the MS-DOS wildcard character) to search for the Global System Manager initialisation file (i.e. normally GSM.INI). The name of the initialisation file may be specified explicitly by defining the GLINI environment variable as described in section 7.2.6.

6.2.3.3 Preservation of MS-DOS Environment

Before invoking Global System Manager, GSMLOAD.EXE saves the hardware interrupt vectors (IRQ-0 to IRQ-15). These interrupt vectors may be initialised by the Global System Manager device drivers. The interrupt vectors are restored when the Global System Manager session is terminated (e.g. using the \$BYE command). Note that early versions of GSMLOAD.EXE only saved and restored IRQ-0 to IRQ-7.

6.2.3.4 Use of the DIAGLOG.TXT Log File

As explained in Appendix C, renaming the Global System Manager configuration file so that the last character is a "D" enables a diagnostic mode in the Global System Manager loader (aka Steering Routine). GSMLOAD.EXE routinely writes all "Steering Routine diagnostic messages", that are normally only displayed on the screen (very quickly), in an MS-DOS Diagnostics Log file, DIAGLOG.TXT. The contents of the DIAGLOG.TXT file can be examined at leisure, using the MS-DOS EDIT program, for example.

6.2.3.5 Potential Problem with Multiple SYSRES Subvolume

When starting Global System Manager from a Discrete Data File (aka Separated Subvolume Domain) GSMLOAD.EXE uses the first MS-DOS file, within the specified directory, with a filename that matches the string "??SYSRES.SVL" (where ?? can be any digits). This assumption may cause problems if an MS-DOS copy of 01SYSRES.SVL is made and the backup filename also matches the string "??SYSRES.SVL" (e.g. 02SYSRES.SVL). For example, a backup copy of SYSRES may be created as a precaution before modifying the Global configuration file. Although it is always extremely prudent to make a copy of 01SYSRES.SVL before making changes to the Global configuration file (in case the modified configuration file prevents Global System Manager from being restarted) you are advised to name the backup version of the MS-DOS file as "??SYSRES.OLD". For example:

```
C:\GSM\GSM200>COPY 01SYSRES.SVL 01SYSRES.OLD
```

6.3 GSMxxxx.BAT - Start Global System Manager

Four MS-DOS batch files are provided to start Global System Manager by invoking the GSMLOAD.EXE program (see section 6.2).

6.3.1 GLOBAL.BAT - Start Global System Manager

The GLOBAL.BAT batch file is a template batch that can be modified, using a suitable MS-DOS text editor, to invoke one of the other batch files described in sections 6.3.2, 6.3.3 and 6.3.4. **Important note:** The GLOBAL.BAT file currently distributed with Global System Manager

(Novell NetWare) is only suitable for the related Global System Manager (MS-DOS and Windows).

6.3.2 GSMINST.BAT - Install Global System Manager

The GSMINST.BAT batch file contains the following dialogue:

```
set GLNODE=A
gsmload a: I
```

GSMINST.BAT will load Global System Manager from MS-DOS diskette drive A:. This batch file is normally only used when installing Global System Manager from the distribution diskettes (see section 2.1.4). Important note: The "I" parameter prevents the workstation from appearing on the Global System Manager network, allowing Global System Manager (Novell NetWare) to be installed on one workstation without interfering with any other Global System Manager workstations (see section 6.2.1.5).

6.3.3 GSMBOOT.BAT - Start Global System Manager (as Master)

The GSMBOOT.BAT batch file contains the following dialogue:

```
set GLNODE=A
gsmload GSM200 N
```

The first line sets the Global System Manager node-id to "A" (see section 7.2.3). The "N" parameter on the GSMLoad command line allows the GSM.INI initialisation file to be shared by several workstations (see section 6.2.1.6). **Important note:** The GSMBOOT.BAT batch file should only be used to load Global System Manager on a Novell workstation that is acting as the Global System Manager "master" computer (i.e. if the Global System Manager NLM is not fulfilling this role). To load Global System Manager on other workstations, or all workstations if the Global System Manager NLM is the "master" computer, use the GSMWORK.BAT file instead (see section 6.3.4).

The GSMBOOT.BAT batch file must be modified if Global System Manager is installed onto an Integrated Data File. For example:

```
set GLNODE=A
gsmload GSM200.VOL N
```

Similarly, the batch file must be modified if Global System Manager is installed onto a Discrete Data File directory other than the default (i.e. "GSM200"). For example:

```
set GLNODE=A
gsmload GSM250 N
```

6.3.4 GSMWORK.BAT - Start Global System Manager (as Workstation)

The GSMWORK.BAT batch file contains the following dialogue:

```
gsmload GSMIPL.VOL N
```

Global System Manager is loaded from the Integrated Data File, GSMIPL.VOL. The "N" parameter on the GSMLoad command line allows the GSM.INI initialisation file to be shared by several workstations (see section 6.2.1.6).

6.4 MS-DOS Utilities to Create and Amend Simulated Volumes

Before Global System Manager (Novell NetWare) and the other Global applications can be installed on a hard-disk one, or more, simulated Global System Manager volumes, must be created.

After a simulated volume has been created using one of the MS-DOS utilities described in this section it must be initialised to the Global data format before it can be used. This is done automatically (for the first simulated volume) when Global System Manager is installed but the \$V command (see section 4.9) will have to be used for those simulated volumes that are not initialised during the installation process.

A suite of 4 MS-DOS programs are distributed with Global System Manager V8.1 to create and amend simulated volumes:

GLMKDDF.EXE	Make Discrete Data File (SSD-FILE)
GLMKIDF.EXE	Make Integrated Data File (DOS-FILE)
GLENDDF.EXE	Enlarge Discrete Data File
GLDDINF.EXE	Display Disk Information

The new program suite has replaced the ALLOCATE.EXE utility (see section 6.5).

All 4 utilities accept command line options and return a meaningful exit status. This allows them to be used in MS-DOS batch files (the dialogue of ALLOCATE.EXE prohibits its use in batch files).

If the command line option is "/?", each utility will display some help text. For example:

```
GLMKDDF /?
```

will display the help text associated with the GLMKDDF utility.

6.4.1 GLMKDDF.EXE - Make Discrete Data File Domain

The GLMKDDF.EXE utility accepts the following command syntax:

```
GLMKDDF directory [type]
```

This command creates a Discrete Data File domain with the specified name. For example:

```
GLMKDDF GSM200
```

The first (obligatory) argument, *directory*, may be a relative or absolute pathname.

The second (optional) argument, *type*, specifies the Global System Manager volume type which will be simulated by files within the MS-DOS *directory* when accessed via the SSD-FILE controller (see section 8.2.1). The following types are allowed:

T151Z	The corresponding volume format in the Global configuration file MUST be T151Z (see section 8.2.1.1);
-------	---

T259Z The corresponding volume format in the Global configuration file MUST be T259Z (see section 8.2.1.1);

If type is not specified, T259Z is assumed.

The MS-DOS directory created by GLMKDDF (e.g. GSM200) will contain a single file called 00SYSDOM.SVL. For volume type T259Z, the directory structure will appear as follows:

```
C:\GSM>DIR GSM200
Directory of C:\GSM\GSM200
. <DIR>                02.07.92  8:07a
.. <DIR>               02.07.92  8:07a
00SYSDOM.SVL 65536    02.07.92  8:07a
```

For volume type T151Z, the directory structure will appear as follows:

```
C:\GSM>DIR GSM200
Directory of C:\GSM\GSM200
. <DIR>                02.07.92  8:07a
.. <DIR>               02.07.92  8:07a
00SYSDOM.SVL 32768    02.07.92  8:07a
```

The standard naming convention for the MS-DOS directory is:

GSMnnn

where nnn is the domain number.

The MS-DOS files within this directory are named:

nnvvvvvv.SVL

where nn is the subvolume number of the domain, vvvvvv is the subvolume name and SVL is the extension of the file. For example GSM200 is an MS-DOS directory and 200 is the corresponding Global System Manager domain. 01SYSRES.SVL is a MS-DOS file in this directory which corresponds to the Global System Manager subvolume 201 with a volume name of SYSRES.

GLMKDDF is equivalent to option 1 of ALLOCATE.EXE (see section 6.5.1).

6.4.2 GLMKIDF.EXE - Make Integrated Data File Domain

The GLMKIDF.EXE utility accepts the following command syntax:

```
GLMKIDF filename filesize
```

This command creates an Integrated Data File domain with the specified name and size. The DOS-FILE (or BIOSFILE) controller (see section 8.2.2) will be used by Global System Manager to access the simulated volume. For example:

```
GLMKIDF GSM200.VOL 10M
```

The first (obligatory) argument, filename, may be a relative or absolute pathname.

The second (obligatory) argument, filesize, specifies the size of the MS-DOS file created. The filesize parameter can have an optional K or k suffix (to indicate a size in Kbytes); or an m or M suffix (to

indicate a size in Megabytes). If no suffix is supplied the file size is assumed to be in Kilobytes. The filesize parameter may have a fractional value (e.g. a value of 2.5M is valid).

GLMKIDF will refuse to allocate an Integrated Data File smaller than 100 Kbytes or larger than 2 Gbytes.

GLMKIDF is equivalent to option 2 of ALLOCATE.EXE (see section 6.5.2).

6.4.3 GLENDDF.EXE - Enlarge Discrete Data File Domain

The GLENDDF.EXE utility accepts the following command syntax:

```
GLENDDF directory
```

This command can be used to increase the size of a subvolume within a Discrete Data File domain. For example:

```
GLENDDF GSM200
```

The first (obligatory) argument, *directory*, may be a relative or absolute pathname.

GLENDDF displays the following prompt:

```
Discrete data file name (<CR> to scan):
```

The reply must be an MS-DOS filename of the form *nnvvvvvv.SVL* which corresponds to the subvolume that you wish to enlarge. For example:

```
Discrete data file name (<CR> to scan):10SLDATA.SVL
```

will select subvolume SLDATA on unit 210 (assuming the domain is configured as unit 200). Note that the domain header file (i.e. 00ddddd.SVL) cannot be enlarged.

If you are unsure of the MS-DOS filename you can key <CR> to scan through each file in the selected directory. Select the relevant file by keying Y when its name is displayed. For example:

```
Discrete data file name (<CR> to scan):<CR>
01SYSRES.SVL:<CR>
10SLDATA.SVL:Y
```

When a subvolume file has been selected, the current size is displayed and you are prompted for the new size. For example:

```
Current file size is 224K
New file size:
```

The new file size can be specified in either Kilobytes (e.g. 100K) or Megabytes (e.g. 2M). If no suffix is specified the default is Kilobytes. The new file size must not be smaller than the current file size.

The size requested will be rounded up to the next 32 Kbyte boundary to ensure that it will be recognised by the SSD-FILE controller when Global System Manager is next loaded. This "rounding" feature can be used to move a subvolume file from a T151Z domain (virtual track size 8Kb) to a T259Z domain (virtual track size 32Kb) by "enlarging" the subvolume file to its current size. GLENDDF will ensure that the new filesize is a multiple of the T259Z virtual track size.

Note that all file sizes refer to the size of the MS-DOS file and not the Global System Manager subvolume which is typically 11.5Kb smaller than the MS-DOS file.

GLENDDF is equivalent to option 3 of ALLOCATE.EXE (see section 6.5.3).

6.4.4 GLDDINF.EXE - Display Disk Information

The GLDDINF.EXE utility accepts the following command syntax:

```
GLDDINF drive
```

The only argument, drive, is optional. If the argument is absent the current drive is used.

This command displays detailed information regarding the selected drive which may be of use when diagnosing problems with the other programs in the suite.

For example:

```
GLDDINF C:

Bytes per sector = 512
Sectors per cluster = 4
Available clusters = 3714
Total clusters = 62289

Available size = 7606272 bytes
Total size = 127567872 bytes
```

6.5 ALLOCATE.EXE - Allocate Simulated Volume

The functionality of ALLOCATE.EXE has been incorporated into the program suite described in section 6.4. ALLOCATE.EXE is now considered obsolete and will not be distributed with future versions of Global System Manager. This section is included for completeness only.

6.5.1 Allocating a new Discrete Data File

Select option 1 from the menu displayed by ALLOCATE.EXE to create a new Discrete Data File (aka Separated Subunit Domain). For example:

```
C:\GSM>ALLOCATE

Create System Manager data file:

  1 - Discrete data file
  2 - Integrated data file
  3 - Enlarge discrete data file
  <CR> - Quit

Please select an option:1

Key <ESC> or <CTRL C> to quit
Path and directory name for discrete data file (C:\GSM\GSM200):<CR>
```

When the name of the MS-DOS directory has been specified (or the default selected), ALLOCATE will issue the following prompt:

```
Did you update the configuration file to add the discrete data file?:
```

If you are using a standard configuration file (configuration code 5610 or 5611) distributed with Global System Manager (Novell NetWare), use the following dialogue:

```
Did you update the configuration file to add the discrete data file?:N
Is this a GSM (Novell) installation?:Y
Is this a 5610 or 5611 configuration?:Y
```

ALLOCATE.EXE will create a Discrete Data File suitable for use with Global System Manager volume format T151Z. The MS-DOS directory that is created by ALLOCATE (e.g. GSM200) will contain a single 32Kb file called 00SYSDOM.SVL. The directory structure should appear as follows:

```
C:\GSM>DIR GSM200
Directory of C:\GSM\GSM200
. <DIR>                02.07.92  8:07a
.. <DIR>               02.07.92  8:07a
00SYSDOM.SVL 32768     02.07.92  8:07a
```

If you are using a standard configuration file (configuration code 5612 or 5613) distributed with Global System Manager (Novell NetWare), use the following dialogue:

```
Did you update the configuration file to add the discrete data file?:N
Is this a GSM (Novell) installation?:Y
Is this a 5610 or 5611 configuration?:N
```

ALLOCATE.EXE will create a Discrete Data File suitable for use with Global System Manager volume format T259Z. The MS-DOS directory that is created by ALLOCATE (e.g. GSM200) will contain a single 64Kb file called 00SYSDOM.SVL. The directory structure should appear as follows:

```
C:\GSM>DIR GSM200
Directory of C:\GSM\GSM200
. <DIR>                02.07.92  8:07a
.. <DIR>               02.07.92  8:07a
00SYSDOM.SVL 65536     02.07.92  8:07a
```

The standard naming convention for the MS-DOS directory is:

GSMnnn

where nnn is the domain number.

The MS-DOS files within this directory are named:

nnvvvvvv.SVL

where nn is the subvolume number of the domain, vvvvvv is the subvolume name and SVL is the extension of the file. For example GSM200 is an MS-DOS directory and 200 is the corresponding Global System Manager domain. 01SYSRES.SVL is a MS-DOS file in this directory which corresponds to the Global System Manager subvolume 201 with a volume name of SYSRES.

The new MS-DOS directory is created in the current directory if no over-riding path is specified.

If you have updated a configuration file to add or modify an SSD-FILE controller entry with volume format T259Z use the following dialogue so that ALLOCATE.EXE will create a Discrete Data File suitable for use with Global System Manager volume format T259Z:

```
Did you update the configuration file to add the discrete data file?:Y
Did you use volume format T259Z?:Y
```

The MS-DOS directory that is created by ALLOCATE (e.g. GSM200) will contain a single 64Kb file called 00SYSDOM.SVL.

If you have updated a configuration file to add or modify an SSD-FILE controller entry with volume format T151Z use the following dialogue so that ALLOCATE.EXE will create a Discrete Data File suitable for use with Global System Manager volume format T151Z:

```
Did you update the configuration file to add the discrete data file?:Y
Did you use volume format T259Z?:N
```

The MS-DOS directory that is created by ALLOCATE (e.g. GSM200) will contain a single 32Kb file called 00SYSDOM.SVL.

6.5.2 Allocating a new Integrated Data File

Select option 2 from the menu displayed by ALLOCATE.EXE to create a new Integrated Data File domain. For example:

```
C:\GSM>ALLOCATE

Create System Manager data file:

    1 - Discrete data file
    2 - Integrated data file
    3 - Enlarge discrete data file
    <CR> - Quit

Please select an option:2

Key <ESC> or <CTRL C> to quit
Path and file name (C:\GSM\GSM200.VOL):<CR>
File size in Mbytes or Kbytes (2.5M):10M
    GSM200.VOL allocated with 10240K bytes
Path and file name (C:\GSM\GSM200.VOL):<ESCAPE>
```

The directory structure should appear as follows:

```
C:\GSM>DIR
Directory of C:\GSM
. <DIR>                04.07.92  10.20a
.. <DIR>               04.07.92  10.20a
GSM200.VOL 1024000     04.07.92  10.30a
```

The standard naming convention for the MS-DOS file is:

GSMnnn.VOL

where nnn is the Global System Manager domain number. For example GSM200.VOL is a MS-DOS file that corresponds to the Global System Manager domain 200.

You can create as many Integrated Data Files as you wish as long as they do not exceed the total disk space. Each of these files will appear to Global System Manager as a separate simulated volume. The files created by ALLOCATE.EXE are rounded up to a multiple of 1024 bytes, and are created in the current directory if no over-riding path is specified.

6.5.3 Enlarging a Discrete Data File

Select option 3 from the menu displayed by ALLOCATE.EXE to enlarge the size of a subvolume file (e.g. 01SYSRES.SVL) within a Discrete Data File directory. When this option is selected and the name of the MS-DOS directory has been specified, ALLOCATE will prompt for the name of the MS-DOS file.

For example:

```
C:\GSM>ALLOCATE

Create System Manager data file:

    1 - Discrete data file
    2 - Integrated data file
    3 - Enlarge discrete data file
    <CR> - Quit

Please select an option:3

Path and directory name for discrete data file (C:\GSM\GSM200):<CR>
Discrete data file name <CR> to scan:
```

The reply must be an MS-DOS filename of the form nnnvvvvv.SVL which corresponds to the subvolume that you wish to enlarge. For example:

```
Discrete data file name <CR> to scan:10SLDATA.SVL
```

will select subvolume SLDATA on unit 210 (assuming the domain is configured as unit 200). Note that the domain header file (i.e. 00ddddd.SVL) cannot be enlarged.

If you are unsure of the MS-DOS filename you can key <CR> to scan through each file in the selected directory. Select the relevant file by keying Y when its name is displayed. For example:

```
Discrete data file name <CR> to scan:<CR>
01SYSRES.SVL:<CR>
02SPOOL.SVL:<CR>
10SLDATA.SVL:Y
```

When a subvolume file has been selected, the current size is displayed and you are prompted for the new size. For example:

```
Current file size is 224K
New file size:
```

The new file size can be specified in either Kilobytes (e.g. 100K) or Megabytes (e.g. 2M). If no suffix is specified the default is Megabytes. The new file size must not be smaller than the current file size.

The size requested will be rounded up to the next 32 Kbyte boundary to ensure that it will be recognised by the SSD-FILE controller when Global System Manager is next loaded. This "rounding" feature can be used to move a subvolume file from a T151Z domain (virtual track size 8Kb) to a T259Z domain (virtual track size 32Kb) by "enlarging" the subvolume file to its current size. ALLOCATE will ensure that the new filesize is a multiple of the T259Z virtual track size.

Note that all file sizes refer to the size of the MS-DOS file and not the Global System Manager subvolume which is typically 11.5Kb smaller than the MS-DOS file.

6.5.4 Exiting ALLOCATE.EXE

To exit ALLOCATE.EXE key <CR> to the main menu. Please note that in earlier versions of Global System Manager (Novell NetWare), option 3 from the main menu was required to quit ALLOCATE.

6.6 The GSMCON.SYS MS-DOS Device Driver

The special MS-DOS console device driver, GSMCON.SYS, is supplied with Global System Manager (Novell NetWare) for use with the DOS-SCR console controller (see section 8.3.1) and SPX console controller (see sections 6.7 and 8.3.2). It is similar to the standard ANSI.SYS device driver but supports Global PC Workstation escape sequences and key bindings allowing the use of standard Global PC Workstation Terminal Attribute Programs (TAPs). These TAPs (i.e. \$.704, \$.705, \$.706 and \$.707) offer more functionality than the TAPs available for use with the DOS-SCR controller when the ANSI.SYS device driver is used (see section 8.3.1).

Unlike ANSI.SYS, GSMCON.SYS does not become the standard CON: device when installed. Instead, a new device, GLC:, must be added to MS-DOS by including a line of the form in the CONFIG.SYS file:

```
DEVICE=C:\GSM\GSMCON.SYS
```

To use the MS-DOS device driver with the Global System Manager DOS-SCR controller redirect standard in/out for GSMLOAD.EXE to GLC:. For example:

```
GSMLOAD GSM200 < GLC: > GLC:
```

6.6.1 GSMCON.SYS Command Line Options

GSMCON.SYS recognises the following command line options:

/R Reset terminal on open. This option should be used if GSMCON.SYS is being used by the DOS-SCR controller. The terminal starts in 80-column mode, the cursor is turned on, colour is set to white on black and the status-line is cleared.

THIS OPTION IS NOT REQUIRED IF GSMCON.SYS IS BEING USED BY THE SPX WORKSTATION.

/S Suppress reset on close. This option is useful if a startup error message is displayed (normally the screen would be cleared during a close).

/E Enhanced keyboard. Specify this option if you want to use the F11 and F12 keys on an enhanced keyboard.

/Wnn Wide display mode. The hexadecimal byte nn corresponding to 132-column mode for the particular display adapter. Note that not all display adapters support a 132-column mode.

/Nnn Narrow display mode. If this is not specified, the driver assumes the current screen mode when it is loaded is the narrow display mode. Typical values are 03 for colour screens and 07 for monochrome screens.

/8 Specify an 8-bit keyboard. By default all data returned from the keyboard is 7-bit data for PC Workstation compatibility.

This option only affects the F11 and F12 keys. For example, F11 will return 0x1F, 0x85, rather than 0x1F, 0x05, if this switch is enabled.

6.7 The SPX Workstation Terminal Emulator

The SPX Workstation allows a NetWare workstation (the "emulator") to act as a terminal to another NetWare workstation (the "host") that is running Global System Manager (Novell NetWare).

6.7.1 Introduction

The SPX Workstation software comprises of two parts: A Remote Console controller that runs on the Global System Manager "host" computer, and an MS-DOS Terminal Emulator that runs on the "emulator" workstation. The Global System Manager Remote Console controller is fully described in section 8.3.2, which should be read in conjunction with this section.

Each Remote Console Controller entry in the Global configuration file (see section 8.3.2.1) specifies a socket number. This is analogous to specifying the serial port number when attaching serial terminals. The main difference is that several Remote Consoles can share a socket.

When the SPX Workstation is run on an "emulator" workstation, a socket number, as well as the internet address of the "host" workstation that is running Global System Manager, must be specified. If several Remote Consoles share a socket, the "emulator" workstation will attach to the first available console on that socket. This technique can be used to group users together. For example, suppose a group of users is assigned socket number 9001. If four Remote Consoles are available on that socket as specified in the Global configuration file (see section 8.3.2.1), then up to four users from that group can attach to Global System Manager simultaneously. As soon as a user exits Global System Manager, the console that was being used becomes available for another user. Four more Remote Consoles could be assigned to socket 9002 for another group of users.

6.7.2 Running the SPX Workstation Terminal Emulator

Either the standard ANSI.SYS device driver or the specialised GSMCON.SYS device driver (see section 6.6) **MUST** be installed under MS-DOS on any "emulator" workstation that will be running the SPX Workstation terminal emulator.

Copy SPXWS.COM from the supplied BACNAT diskette to whichever directory you wish to run it from.

The format of the SPXWS.COM command line is as follows:

```
SPXWS net node socket [/I ECBs] [/D device]
```

The net and node fields are the internet address of the "host" workstation running Global System Manager (where net is the network number, and node is the node address). If the workstation is on the same physical network as the Global System Manager "host" workstation, net can be specified as 0.

NetWare utilities are available to determine the Internet address of any workstation (see the Global Configuration Notes for full details). For example, suppose Global System Manager is running on a "host"

workstation which has logged in as user GLOBAL use a suitable NetWare utility to determine the Internet address of user GLOBAL. Note that the network and node addresses may be displayed with leading zeros. Leading zeroes do not have to be entered on the SPXWS command line.

The socket field is the socket number of the Remote Console to attach to (see section 8.3.2.1).

The optional /I switch specifies the number of receive ECBs for the Terminal Emulator. If this is not specified, a default number of 16 is used, which should be sufficient.

The optional /D switch allows you to specify a device other than the default (i.e. CON:) to be used with the SPX Workstation terminal emulator. The final ":" character of the device name is optional. This parameter **MUST** be supplied, to specify the GLC: device driver, when using the SPX Workstation with GSMCON.SYS (see section 6.6). Note that the performance of the SPX Workstation is very much improved when used with the GLC: device driver.

Once you are satisfied that all the SPXWS command arguments are correct, you are strongly recommended to create an MS-DOS batch file containing the SPXWS command line. For example, the file GLSPX.BAT might contain:

```

    SPXWS 1 E8 9001                (using ANSI.SYS)
or:
    SPXWS 1 E8 9001 /D GLC        (using GSMCON.SYS)

```

6.7.3 SPX Workstation Operating Notes

Running \$E on the "emulator" workstation disconnects from Global System Manager and returns control to MS-DOS. The keystroke sequence <SYSREQ> . (i.e. the <SYSREQ> key followed by a full-stop) can be used to temporarily exit to MS-DOS. An MS-DOS command processor is run from within the emulator. To return to Global System Manager, exit the command processor. For the standard COMMAND.COM processor, this is achieved by keying EXIT.

The Restart and Disconnect commands in \$STATUS (see section 4.6) can be used to disconnect a remote console on an "emulator" workstation from Global System Manager on the "host" workstation. The "emulator" workstation will automatically return to MS-DOS.

6.7.4 Errors from the SPX Workstation Terminal Emulator

The following error messages may be displayed when the SPXWS.COM terminal emulator is run:

Incorrect DOS version

MS-DOS version 3.30 or later is required.

IPX is not installed

NetWare IPX is not installed.

SPX is not installed

NetWare SPX is not installed. SPX is installed automatically when IPX is installed.

Socket already open

This can occur if "<SYSREQ> ." is used to exit to MS-DOS, and a second copy of the SPX Workstation terminal emulator is run, with the same socket number.

Socket table full

Edit the workstation file SHELL.CFG if it exists, or create one if it doesn't, and increase the number of IPX sockets. Refer to your NetWare documentation for information regarding SHELL.CFG.

Local connection table full

Edit the workstation file SHELL.CFG if it exists, or create one if it doesn't, and increase the number of SPX connections. Refer to your NetWare documentation for information regarding SHELL.CFG.

Connection failed

A connection couldn't be established to the Global System Manager "host". This can happen if the internetwork address of the Global System Manager "host" workstation was incorrectly specified on the command line, or if there are no free Remote Consoles in the Global System Manager configuration file.

Incorrect internet address format

The network, node, and socket number of the Global System Manager "host" workstation **MUST** be specified on the command line. All these parameters are obligatory.

Invalid number of incoming ECBs

The number of ECBs specified on the command line with the /I switch must be between 2 and 256 inclusive.

Global: Connection has failed

Global: Connection ended abnormally

Global: Connection not currently established

Any of the above messages may be displayed if the SPX connection fails.

6.8 The PING Utility

The PING utility measures the throughput on a Novell NetWare network which is probably the most important factor affecting the performance of a Global System Manager (Novell NetWare) installation. **Important note:** PING is intended to **supplement**, not replace, the NetWare performance monitoring tools available from Novell.

PING is completely separate from Global System Manager so it can be used to identify possible problems and test different network topologies before Global System Manager (Novell NetWare) is installed.

The PING utility is supplied in two forms: PING.EXE for NetWare workstations running MS-DOS V3.30, or later; and PING.NLM for NetWare

file-servers running NetWare V3.11, or later. PING.NLM is described in section 10.3.

6.8.1 The PING Node-id

Each workstation running PING.EXE requires a unique node-id. PING obtains this parameter from the GLNODE environment variable. If this variable is undefined, key the following line at the MS-DOS prompt:

```
set GLNODE=xxx
```

where xxx is the node-id. Note that no spaces are required on either side of the equals sign. The node-id can be specified in either decimal or hexadecimal notation. Either upper-case or lower-case letters may be used.

Valid values for the node-id are as follows:

A to Z	
27 to 191	(decimal)
0x1b to 0xbf	(hexadecimal)
193 to 255	(decimal)
0xc1 to 0xff	(hexadecimal)
0	(decimal)
0x00	(hexadecimal)

6.8.2 The PING.CNF Configuration File

The PING.CNF configuration file contains various parameters used by PING.EXE. All numeric parameters can be specified in either decimal or hexadecimal notation. The standard PING.CNF file, supplied on the Global System Manager (Novell NetWare) BACNAT diskette contains the following parameters:

SOCKET	0xA000
REQUESTS	8
PACKETS	16
PERIOD	5

6.8.2.1 The SOCKET Parameter

The SOCKET number must be unique to PING. It must be between 0x8000 and 0xffff.

6.8.2.2 The REQUESTS Parameter

The REQUESTS parameter specifies the number of packets that PING.EXE will attempt to transmit at once. The number of requests must be between 1 and 64 inclusive.

6.8.2.3 The PACKETS Parameter

The PACKETS parameter specifies the number of receive buffers to allocate for incoming packets from other nodes. The number of buffers must be between 2 and 256, inclusive.

6.8.2.4 The PERIOD Parameter

The PERIOD parameter specifies the time (in seconds) that PING.EXE will spend transmitting packets before reporting throughput results. The period must be between 1 and 10 seconds, inclusive.

6.8.3 Running PING.EXE

Before attempting to run PING, ensure the following files are in the current MS-DOS directory:

PING.EXE
PING.OVL
PING.CNF

PING will prompt you for the destination node. This can be another workstation running PING.EXE, or a NetWare fileserver running PING.NLM (see section 10.3.2). Leave PING at the "node-id" prompt if you merely want to transmit packets to the workstation from another node.

6.8.4 Using PING to Measure Throughput

To measure throughput between two workstations, run PING.EXE on one workstation and leave it at the target node-id prompt. Run PING.EXE on another workstation, specifying the first workstation as the target node.

To measure throughput between a workstation and a fileserver, load PING.NLM on the server (see section 10.3.2), and then run PING.EXE on the workstation, specifying the fileserver as the target node.

7. Configuring Global System Manager

This chapter describes how to configure Global System Manager for your Novell NetWare environment.

The first section covers the GSM.INI initialisation file: The MS-DOS text file that defines the various MS-DOS resources (e.g. files, printers) accessed by Global System Manager. Further sections describe the MS-DOS environment variables recognised by Global System Manager and the special considerations that apply when Global System Manager is used in the Windows environment or in conjunction with the MS-DOS Task Swapper.

7.1 The GSM.INI and GSM.TLT Files

The Global System Manager (Novell NetWare) initialisation file, GSM.INI, is used to configure various Global System Manager options. This file is a standard MS-DOS text file and can be created and modified using any appropriate text editor (e.g. EDIT, EDLIN etc.).

For some MS-DOS resources (e.g. simulated volumes and printers) the GSM.INI file is used in **conjunction** with the Global configuration file (e.g. ++5612BJ) in that an entry for a Global System Manager simulated volume or printer must appear in **both** the Global configuration file and the GSM.INI file. For other MS-DOS resources (e.g. File Handles) the GSM.INI file **supplements** the Global configuration file in that an entry in the GSM.INI file is used to define an MS-DOS resource that cannot be specified using Global Configurator.

The GSM.TLT template file is used by GSMLOAD.EXE during the processing of the GSM.INI file. **DO NOT ATTEMPT TO ALTER THE CONTENTS OF THE GSM.TLT FILE.**

THE INITIALISATION FILE, AND THE TEMPLATE FILE, MUST BOTH BE IN THE CURRENT DIRECTORY WHEN GLOBAL SYSTEM MANAGER IS LOADED (unless the GLDIR environment variable is defined).

Before loading Global System Manager, GSMLOAD.EXE (see section 6.2) searches the current MS-DOS directory for a file matching the specification GSM*.INI (where "*" is the MS-DOS wildcard character). If it finds one, **and only one**, file that matches the specified filename, it uses that file as the initialisation file. If the current MS-DOS directory contains no file that matches the wildcard name, or more than one file that matches the wildcard name, GSMLOAD.EXE will report an error and terminate the startup process (see Appendix I). Note that the GLDIR variable can be defined to override the current directory (see section 7.2.4).

Important note: The Global System Manager (Novell NetWare) node-id can be specified in the initialisation filename. This technique is not recommended and will be withdrawn in a future version of Global System Manager (Novell NetWare). You are **strongly** advised to use the GLNODE environment variable (see section 7.2.3). Specifying the node-id in the initialisation filename has been maintained purely for compatibility with earlier versions of Global System Manager (Novell NetWare) when it was the only way to specify the node-id. It is not possible for multiple Global System Manager computers to share such an initialisation file, as each node must have a unique node-id. The file names for Global System Manager file servers A to Z are GSM-A.INI to GSM-Z.INI respectively. The possible file names for Global System

Manager workstations (i.e. non file servers) are GSM-27.INI to GSM-191.INI, and GSM-193.INI to GSM-255.INI. The node-id's are specified as decimal numbers within the name of the initialisation file, but are displayed in hexadecimal by Global System Manager utilities (e.g. \$STATUS). The "filename" technique for specifying the Global System Manager node-id overrides the node-id defined by the GLNODE MS-DOS environment variable (see section 7.2.3).

The following entries may appear in the initialisation file:

MEMORY nnn	Determines memory used
SSD-FILE n dir_spec	Specifies domain directory
name	
DOS-FILE n file_spec	Specifies domain file name
BIOSFILE n file_spec	Specifies domain file
name	
DOS.PRI nnn device_spec	Specifies local print devices
NET.PRI nnn etc.	Specifies network print
devices	
SSD-HANDLE nn	Specifies the number of MS-DOS file
handles	
BOOTSTRAP dir_spec or file_spec	Specifies the location of the Global System Manager startup data
OPID nn opid	Specifies the operator-id for a
particular console	
TERM nn type	Specifies the terminal type for a
	particular console

The meaning and use of each of these entries is explained in the following sections.

7.1.1 MEMORY nnn

The MEMORY entry specifies the amount of conventional memory (in Kb) that Global System Manager will allocate for its exclusive use. This figure does not include the size of the GSMLOAD.EXE program. If nnn is zero, or the MEMORY entry is absent, all available conventional memory will be used. Note that nnn must be at least 256.

Only a single MEMORY entry is allowed in the GSM.INI file. No matching entries in the Global configuration file are required.

7.1.2 SSD-FILE n dir_spec

The SSD-FILE entries specify the location and names of the simulated volumes (Discrete Data Files aka Separated Subunit Domains) for use with the SSD-FILE controller (see section 8.2.1).

The first parameter, n, is the drive number for the corresponding SSD-FILE entry in the Global configuration file. By convention, the drive numbers start from 0. Note that the drive numbers for the SSD-FILE

entries and DOS-FILE entries (see section 7.1.3) are numbered independently so that there can, for example, be entries for both "SSD-FILE 0" and "DOS-FILE 0".

The second parameter, `dir_spec`, is an MS-DOS directory (created using `GLMKDDF.EXE`, see section 6.4.1; or `ALLOCATE.EXE`, see section 6.5) which contains the MS-DOS files that correspond to the individual subvolumes of the respective domain. Although it is normally sufficient to specify a relative pathname for the MS-DOS directory in the `GSM.INI` file, an absolute pathname must be specified if either the MS-DOS "Select Disk" or "Set Default Directory" functions are executed using the SVC-61 interface.

Multiple SSD-FILE entries are allowed in the `GSM.INI` file.

7.1.3 DOS-FILE n file_spec

The DOS-FILE entry specifies the location and names of the simulated volumes (Integrated Data Files) for use with the DOS-FILE controller (see section 8.2.2).

The first parameter, `n`, is the drive number for the corresponding DOS-FILE entry in the Global configuration file. By convention, the drive numbers start from 0. Note that the drive numbers for the DOS-FILE entries and SSD-FILE entries (see section 7.1.2) are numbered independently so that there can, for example, be entries for both "DOS-FILE 0" and "SSD-FILE 0".

The second parameter, `file_spec`, is an MS-DOS file (created using `GLMKIDF.EXE`, see section 6.4.2; or `ALLOCATE.EXE`, see section 6.5) which corresponds to the Global System Manager domain. Although it is normally sufficient to specify a relative pathname for the MS-DOS file in the `GSM.INI` file, an absolute pathname must be specified if either the MS-DOS "Select Disk" or "Set Default Directory" functions are executed using the SVC-61 interface.

Multiple DOS-FILE entries are allowed in the `GSM.INI` file.

7.1.4 BIOSFILE n file_spec

The BIOSFILE entry specifies the location and names of the simulated volumes (Integrated Data Files) for use with the obsolescent BIOSFILE controller (see section 8.2.3).

The first parameter, `n`, is the drive number for the corresponding BIOSFILE entry in the Global configuration file. By convention, the drive numbers start from 0. Note that the drive numbers for the BIOSFILE entries and DOS-FILE entries (see section 7.1.3) are numbered independently so that there can, for example, be entries for both "BIOSFILE 0" and "DOS-FILE 0".

The second parameter, `file_spec`, is an MS-DOS file (created using `GLMKIDF.EXE`, see section 6.4.2; or `ALLOCATE.EXE`, see section 6.5) which corresponds to the Global System Manager domain. Although it is normally sufficient to specify a relative pathname for the MS-DOS file in the `GSM.INI` file, an absolute pathname must be specified if either the MS-DOS "Select Disk" or "Set Default Directory" functions are executed using the SVC-61 interface.

Multiple BIOSFILE entries are allowed in the `GSM.INI` file.

7.1.5 DOS.PRI nnn device_spec

The DOS.PRI entry allows a local printer specification to be defined.

The first parameter, nnn, is the printer device number (e.g. 500) as defined in the Global configuration file. **The printer device number for a DOS.PRI printer MUST be between 500 and 549, inclusive.**

The second parameter, device_spec, defines an MS-DOS printer device, file or directory. Note that the following terminology is used:

device_spec	generic term for MS-DOS device, directory or file
device_name	MS-DOS device name
file_name	MS-DOS filename
dir_name	MS-DOS directory name

Multiple DOS.PRI entries are allowed in the GSM.INI file.

7.1.5.1 DOS.PRI nnn device_name

A device_name string terminated by a ":" character indicates an MS-DOS print device. For example:

```
DOS.PRI 500 LPT1:
DOS.PRI 501 PRN:
DOS.PRI 501 LPT:
```

Important note: The syntax for the DOS.PRI entry is incompatible with earlier versions of Global System Manager (Novell NetWare). Earlier versions of GSMLOAD.EXE assumed the DOS.PRI device_name ALWAYS specified a print device so the trailing ":" was optional. If an existing GSM.INI file contains entries of the form:

```
DOS.PRI 500 LPT
```

it will be necessary to edit the file to append a ":" to the MS-DOS device name.

7.1.5.2 DOS.PRI nnn dir_name

A dir_name string terminated by a "\" character indicates an MS-DOS directory. For example:

```
DOS.PRI 500 C:\GSM\SPool\
```

The MS-DOS directory will be treated as a "spool directory" by the DOS.PRI device controller (see section 8.4.1). Although it is normally sufficient to specify a relative pathname for the MS-DOS directory in the GSM.INI file, an absolute pathname must be specified if either the MS-DOS "Select Disk" or "Set Default Directory" functions are executed using the SVC-61 interface.

7.1.5.3 DOS.PRI nnn file_name

A file_name string that is not terminated by either ":" or "\" indicates an MS-DOS file. For example:

```
DOS.PRI 500 C:\GSM\PRINT.TXT
```

All output from the DOS.PRI device controller will be written to the MS-DOS file (see section 8.4.1). Although it is normally sufficient to specify a relative pathname for the MS-DOS file in the GSM.INI file, an absolute pathname must be specified if either the MS-DOS "Select Disk" or "Set Default Directory" functions are executed using the SVC-61 interface.

7.1.6 NET.PRI nnn dev QUEUE queue TIMEOUT to BANNER btext FORM ft

The NET.PRI entry allows a network printer specification to be defined (see section 8.4.2).

The first parameter, nnn, is the printer device number (e.g. 500) as defined in the Global configuration file. **The printer device number for a NET.PRI printer MUST be between 550 and 598, inclusive.**

The second parameter, dev, MUST be of the form LPTn:, where n is 1, 2 or 3; or a dash (i.e. "-") if the first free LPT device is to be used. Note that several NET.PRI printers can share an LPT device but only one printer can use it at any time, otherwise an "IN USE" error will be reported when attempting to open the print device.

The queue name queue can be specified in one of two ways. To specify a queue on your **default** server use the short-format:

```
QUEUE queue
```

To specify a queue on **any** server you are attached to use the long-format:

```
QUEUE server\queue
```

For example, suppose you are attached to two NetWare servers, called SERVER1 and SERVER2, and you load Global System Manager from SERVER1, thus making SERVER1 the default server. If SERVER1 has a print queue named PQUEUE1, and SERVER2 has a print queue named PQUEUE2, the two queues can be specified as:

```
QUEUE PQUEUE1                * Print queue PQUEUE1 on SERVER1
QUEUE SERVER2\PQUEUE2        * Print queue PQUEUE2 on SERVER2
```

Alternatively, both queues can be specified using the long-format:

```
QUEUE SERVER1\PQUEUE1        * Print queue PQUEUE1 on SERVER1
QUEUE SERVER2\PQUEUE2        * Print queue PQUEUE2 on SERVER2
```

The timeout to specifies a delay of up to 3640 seconds (approx. 1 hour) after which NetWare will release that part of the print file that has been sent to the print queue so far. You are strongly recommended to leave this parameter set to the default value of 0 which indicates that no timeout value is to be used.

The banner text btext is a string of up to 12 characters that will appear on the banner printed by NetWare at the start of each print file. To suppress the banner text, specify a dash "-":

```
BANNER -
```

The form text ft has the following format:

```
<default form number>[,<format letter><form number> ...]
```

The default form number is the NetWare form number that will be used if no Global System Manager Printer Control File has been defined for the printer (see section 6.2 of the Global System Manager Manual).

The explicit form mappings follow the default form number. These mappings are used in conjunction with the Global System Manager Printer Control File defined for the printer. Each form mapping associates a Global System Manager printer format letter (i.e. "A" to "Z") with a NetWare form number (i.e. 0 to 255). The default form number will be used for any Global System Manager format letter that is not given an explicit mapping.

For example, the following form text specifies a default NetWare form number of 0, and explicit mappings for Global System Manager printer format letters "A" (to NetWare form 100) and "B" (to NetWare form 200):

```
0,A100,B200
```

Multiple NET.PRI entries are allowed in the GSM.INI file.

7.1.6.1 Example NET.PRI Initialisation File Entries

The following example NET.PRI entry defines the print queue PQ0 on the default server, using device LPT1, with no time-out and banner text "GSM_550":

```
NET.PRI 550 LPT1: QUEUE PQ0 TIMEOUT 0 BANNER GSM_500 FORM 0
```

The following example NET.PRI entry defines the print queue BQUEUE0 on server SERVER2, using the first free LPT device, and no banner:

```
NET.PRI 551 - QUEUE SERVER2\BQUEUE TIMEOUT 0 BANNER -  
FORM 10,A20,B30,C40
```

Note that the NET.PRI entry, in common with all GSM.INI entries, can extend over several lines. It is often desirable to define the FORM option on a line by itself as in the second example.

7.1.7 SSD-HANDLE nn

The SSD-HANDLE entry specifies the number, nn, of MS-DOS File Handles that are available for use by the SSD-FILE controller. This number MUST be in the range 6 to 10. A File Handle is required for each MS-DOS "subvolume file" (e.g. 01SYSRES.SVL) kept open by the SSD-FILE controller. Increasing the number of File Handles will **slightly** increase the theoretical performance of the SSD-FILE controller by reducing the number of MS-DOS Open and Close operations (although no actual performance increase has ever been detected). If this range is exceeded the SSD-FILE controller will automatically substitute it by a more suitable value. Note that since MS-DOS regards Global System Manager as a single process it restricts the number of File Handles available to 20, of which 5 are reserved, thus reducing the usable number to 15. Global System Manager uses one MS-DOS File Handle per valid DOS-FILE and DOS.PRI entry in the configuration file so the number available for use by the SSD-FILE controller can be calculated as follows:

```
File handles available = 15 - f - p
```


where: f = number of valid DOS-FILE's
 p = number of valid DOS.PRI's

Note that the DOS.PRI controller only uses a File Handle when the printer is in use, thus Global System Manager will load successfully even if too many File Handles are allocated for the SSD-FILE controller. However, printing will fail with an ERROR K since there will be no spare File Handles available for the DOS.PRI controller.

Note also that the MS-DOS SVC-61 based file converter, the MS-DOS Access Method and Global Integrator all require a number of spare MS-DOS File Handles.

Only a single SSD-HANDLE entry is allowed in the GSM.INI file. No matching entries in the Global configuration file are required.

7.1.8 BOOTSTRAP file_spec or directory_spec

If the location of the Global System Manager startup code is not specified on the GSMLOAD.EXE command line (see section 6.2), Global System Manager will be loaded from the specified Discrete Data File (if the parameter is an MS-DOS directory) or Integrated Data File (if the parameter is an MS-DOS file).

The optional GSMLOAD.EXE command line argument, if present, overrides the BOOTSTRAP option in the GSM.INI file.

Only a single BOOTSTRAP entry is allowed in the GSM.INI file. No matching entries in the Global configuration file are required.

7.1.9 OPID nn opid

The OPID entry specifies an automatic operator-id for a particular screen.

The first parameter, nn, is a console number which identifies an entry in the Console Controller section of the Global configuration file (see section 2.4 of the Global Configurator Manual). By convention, the console numbers in the GSM.INI file start from 0 (i.e. the first console defined in the Global configuration file is number 0, the second is number 1, etc.). **Important note:** This numbering scheme is different from that used elsewhere within Global System Manager (e.g. the Console Control Block customisation function in the \$CUS Configuration Maintenance option).

The second parameter, opid, is the operator-id that will be supplied automatically to Global System Manager for the screen corresponding to the console number nn. The opid string must not exceed four characters.

Multiple OPID entries are allowed in the GSM.INI file.

7.1.10 TERM nn type

The TERM entry specifies an automatic terminal type (i.e. TAP number) for a particular screen.

The first parameter, nn, is a console number which identifies an entry in the Console Controller section of the Global configuration file (see section 2.4 of the Global Configurator Manual). By convention, the console numbers in the GSM.INI file start from 0 (i.e. the first

console defined in the Global configuration file is number 0, the second is number 1, etc.). **Important note:** This numbering scheme is different from that used elsewhere within Global System Manager (e.g. the Console Control Block customisation function in the \$CUS Configuration Maintenance option).

The second parameter, type, is the terminal type code that will be supplied automatically to Global System Manager for the screen corresponding to the console number nn. The type string must not exceed five characters and would normally be a numeric string (e.g. 519).

Multiple TERM entries are allowed in the GSM.INI file.

7.1.11 GSM.INI File Structure

The various entries can appear in any order within the GSM.INI initialisation file. The items within each entry can be separated by spaces, tabs or newlines. Items can be in upper or lower case. If a "*" character is encountered anywhere in a line, the rest of the line is ignored.

The following example GSM.INI file includes an example of each of the non-obsolete entries described in sections 7.1.1 to 7.1.10:

```
* This is an example comment line
*
* These are example SSD-FILE entries:
*
SSD-FILE 0 GSM200 * SSD-FILE drive 0
SSD-FILE 1 GSM250 * SSD-FILE drive 1
*
* These are example DOS-FILE entries:
*
DOS-FILE * DOS-FILE drive 0
0
GSM200.VOL
DOS-FILE 1 GSM250.VOL * DOS-FILE drive 1
*
* This is an example SSD-HANDLE entry:
*
SSD-HANDLE 10
*
* These are example DOS.PRI entries:
*
DOS.PRI 500 LPT1:
DOS.PRI 501 C:\GSM\GSMSPPOOL\
DOS.PRI 502 C:\GSM\GSMPRINT
*
* This is an example OPID entry:
*
OPID 0 BMK
*
* This is an example TERM entry:
*
TERM 0 519
*
* Further OPID and TERM entries:
*
OPID 1 MDT
OPID 2 AJU
TERM 1 163
TERM 2 202
```

The standard initialisation file, supplied on the BACNAT diskette, contains the following entries:

```
MEMORY 0
SSD-FILE 0 GSM200
DOS-FILE 0 GSMIPL.VOL
DOS.PRI 500 LPT1:
```

7.2 MS-DOS Environment Variables

Global System Manager recognises a number of MS-DOS Environment Variables defined using the SET command. These variables are usually established in the MS-DOS AUTOEXEC.BAT file. For example:

```
set variable=string
```

7.2.1 The GLOPID Variable

The MS-DOS variable GLOPID overrides the OPID entry for console number 0, if present, in the GSM.INI initialisation file (see section 7.1.9). For example:

```
SET GLOPID=MDT
```

Note that it is not possible to define MS-DOS variables for any console other than the first one defined in the Global configuration file (which is almost invariably the integral screen).

7.2.2 The GLTERM Variable

The MS-DOS variable GLTERM overrides the TERM entry for console number 0, if present, in the GSM.INI initialisation file (see section 7.1.10). For example:

```
SET GLTERM=519
```

Note that it is not possible to define MS-DOS variables for any console other than the first one defined in the Global configuration file (which is almost invariably the integral screen).

7.2.3 The GLNODE Variable

The MS-DOS variable GLNODE is used by Global System Manager (Novell NetWare) to specify the Global System Manager node-id for a given computer.

For a Global System Manager file server, the node-id is a single letter, between "A" and "Z". The letter can be either upper or lower case.

For a Global System Manager workstation (i.e. non-file server), the node-id is a number. The possible node-id's are 0, 27 to 191, and 193 to 255 (all numbers in decimal). In hexadecimal notation, the possible node-id's are 0, 1B to BF, and C1 to FF. Here are some examples using GLNODE:

SET GLNODE=A	Computer A
SET GLNODE=c	Computer C
SET GLNODE=27	Computer 1B (27 decimal = 1B hex)
SET GLNODE=0x1c	Computer 1C (1c hex = 28 decimal)
SET GLNODE=0xFF	Computer FF (FF hex = 255 decimal)

Node-id's specified in hexadecimal notation must be prefixed by "0x" or "0X".

Note that if you specify the node-id in the initialisation file name, then the GLNODE environment variable is ignored.

7.2.4 The GLDIR Variable

By default, GSMLOAD.EXE (see section 6.2) uses the current directory as the "Global System Manager directory". If the MS-DOS variable GLDIR is defined, GSMLOAD.EXE will use the associated string as the "Global System Manager directory". For example:

```
set GLDIR=c:\gsm2
```

7.2.5 The GLCONFIG Variable

The name of the configuration file used when loading Global System Manager is embedded into the startup data when Global System Manager is installed. If the MS-DOS variable GLCONFIG is defined, the associated string will identify the name of the Global configuration file to be used instead of the installed file. For example:

```
set GLCONFIG=++5620XJ
```

This variable should only be defined by experienced users.

7.2.6 The GLINI Variable

By default, GSMLOAD.EXE (see section 6.2) uses GSM*.INI as the target filename when opening the Global System Manager (Novell NetWare) initialisation file (see section 7.1). If the MS-DOS variable GLINI is defined, GSMLOAD.EXE will use the associated string as name of the initialisation file. For example:

```
set GLINI=gsmtest.ini
```

or:

```
set GLINI=c:\gsm\gsmtest.ini
```

This variable should only be defined by experienced users.

7.3 The Windows PIF File

Global System Manager is a non-Windows (i.e. MS-DOS) application and thus requires a Program Information File (GSMWORK.PIF) to allow it to run successfully under Windows. PIF files are fully documented in the "MS-DOS Applications" chapter of the Microsoft Windows User Guide (Chapter 12 in the Windows V3.0 Manual, Chapter 11 in the Windows V3.1 Manual). The GSMWORK.PIF file is set up to run the GSMLOAD.EXE program from the current directory with three command line parameters:

```
GSMLOAD GSM200 W N
```

The first parameter is the name of the directory (Discrete Data File) or file (Integrated Data File) from which Global System Manager is to be loaded. The second parameter must always be a "W" to indicate that Global System Manager is being used under Windows (see section 6.2.1.8). The third parameter allows several Global System Manager workstations to share the same GSM.INI file (see section 6.2.1.6).

Using the GSMWORK.PIF file under Windows is equivalent to using GSMWORK.BAT under MS-DOS. The PIF file also specifies how much memory (conventional, expanded and extended) an application requires.

The standard PIF file can be modified using the PIF Editor, supplied with Windows, to change any one of the following parameters:

- Global System Manager memory requirements (see section 7.3.1);
- Specifying a different load device (see section 7.3.2);
- Changing the display usage (see section 7.3.3);
- Changing the process priority (see section 7.3.4).

None of the other options defined in the GSMWORK.PIF file should be modified.

7.3.1 Altering memory requirements

The GSMWORK.PIF file is configured to allocate all the available conventional memory for use by Global System Manager: There must be at least 350 Kbytes available. If you wish to reduce the amount of memory allocated then update the "Kb Desired" value in the "Memory Requirements" section. GSMWORK.PIF also specifies that up to 1024 kilobytes of expanded memory should be allocated for use by Global System Manager (via the LIM controller, see section 8.5.5). Note that Global System Manager does not require **expanded memory** in order to run, it is used simply as either a RAM disk or for disk caching (see section 8.5). If you wish to alter the amount of expanded memory allocated then update the "Kb Limit" value in the "EMS Memory" section. Similarly, the "Kb limit" value in the "XMS Memory" section can be modified to allocate memory for use by the Global System Manager XMS memory handler (see section 8.5.4).

7.3.2 Specifying a different load device

The load device is specified as the first command line parameter for GSMLOAD.EXE. This is set to GSM200 in the standard GSMWORK.PIF file (to specify a Discrete Data File domain within the GSM200 directory). If you have named your simulated volumes differently then this parameter will have to be changed. Likewise, if you have installed Global System Manager onto an Integrated Data File domain, the first command line parameter must be changed to the filename of the MS-DOS volume file (e.g. GSM200.VOL). **Important note:** The second and third command line parameters (i.e. "W" and "N") are mandatory.

7.3.3 Changing the display usage

The GSMWORK.PIF file specifies that Global System Manager should be run in a window, in which case you must use either terminal type 585 or 586 (see 9.4.3). You can alter the PIF file to indicate that Global System Manager needs to use the entire screen by changing the "Display Usage" option to 'Full Screen'. This mode allows the standard Global System Manager TAPs (e.g. \$.509 and \$.519) and advanced console handling (e.g. wide mode) to operate with Windows. Note that if you configure the console controller to use wide mode (see section 9.4.2) when Global System Manager is running in a window then Windows will intercept any attempt to enter wide mode, display a warning and use the 'Full Screen' mode described above.

7.3.4 Changing the Process Priority

The Advanced Options within the PIF Editor allow you to alter the Background and Foreground Priorities of Windows applications. It may be necessary to increase the Global System Manager background priority on multi-user configurations if other Windows applications are running in foreground on the integral console.

7.4 Using the Global System Manager Icon

Two techniques are available to execute a program under Windows. The first involves viewing a directory with the File Manager and then selecting the program to run. The second involves setting up a program item in the Program Manager. The second technique is preferred since it is more convenient and allows an icon to be associated with the program. A Global System Manager icon, GSM.ICN, is supplied on the BACNAT diskette and can be incorporated into a program item in the following way:

1. Select an appropriate program group within the Program Manager.
2. Choose 'New' from the File menu and the New Program Object dialogue box will appear.
3. Select the Program Item option in this box and the Program Item Properties dialogue box will appear. Note that this dialogue box differs between Windows 3.0 and 3.1.

- 4a. For Windows 3.0 you must supply the following parameters:

Parameter	Example
Description	Global System Manager
Command line	C:\GSM\GSMWORK.PIF

This example assumes that Global System Manager has been installed in a directory called GSM.

- 4b. For Windows 3.1 you must supply the following parameters:

Parameter	Example
Description	Global System Manager
Command line	C:\GSM\GSMWORK.PIF
Working directory	C:\GSM
Shortcut key	None

This example also assumes that Global System Manager has been installed in a directory called GSM.

5. Choose the Change Icon option. Note that Windows 3.1 will display a warning because no icons have been defined for GSMLoad.EXE (you should ignore this warning and continue). The "Select Icon" (Windows 3.0) or "Change Icon" (Windows 3.1) dialogue box will appear. Supply the pathname of the Global System Manager icon (e.g. C:\GSM\GSM.ICN).

The program item is now complete and Global System Manager can be loaded by simply clicking on the appropriate icon. Note also that this icon will be used if Global System Manager is 'Minimised'.

7.5 Global System Manager and the MS-DOS Task Swapper

You are reminded that Global System Manager (Novell NetWare) will not function correctly if used in conjunction with the MS-DOS Task Swapper.

8. Configuring MS-DOS and NetWare Resources

This chapter describes how to configure Global System Manager (Novell NetWare) to utilise the various MS-DOS and NetWare resources on networked computers running Novell NetWare. It explains the Global System Manager device drivers that are used to access diskettes, simulated volumes, the integral screen, printers, the NetWare network and extended and expanded memory.

The next chapter (Hardware Configuration), which is structured similarly to this one, describes how to configure Global System Manager (Novell NetWare) to access hardware resources directly.

Chapter 10 describes how to configure the Global System Manager NetWare Loadable Module (NLM) on the file-server computer.

Appendix J contains a full list of MS-DOS, NetWare and BIOS controllers.

8.1 Diskette Controllers

Diskette controller "DOS-DISK" (+JWCA0B) can be used instead of the standard "DISKETTE" controller (see section 9.1), if the performance of the standard diskette controller is not satisfactory or if a "pure DOS" configuration is required (see Appendix J).

The "DOS-DISK" controller uses MS-DOS system calls to access the diskette drive. Read and write functions can be performed but diskette formatting is NOT supported by this controller. To overcome this restriction, diskettes MUST be formatted using MS-DOS before being initialised and verified by Global System Manager.

8.1.1 DOS-DISK Global Configurator Options

When Global Configurator is used to add or amend a DOS-DISK controller, the following configuration-specific prompt will appear in addition to the standard prompts described in section 3.3 of the Global Configurator Manual:

```
Diskette drive type
  0 = Dynamically determine
  1 = Low capacity (360K) 5"
  2 = High capacity (1.2M) 5"
  3 = Low capacity (720K) 3"
  4 = High capacity (1.44M) 3"
  5 = Extra high (2.88M) 3"
Specify drive type ( 0 ):
```

Normally, an explicit drive-type is only required if the device driver is unable to determine the correct diskette drive type from MS-DOS. The drive number in the configuration file refers to the MS-DOS drive, where 0 specifies A: and 1 specifies B:.

8.1.2 DOS-DISK GSM.INI Initialisation File Options

No entries in the GSM.INI file are required for the DOS-DISK controller.

8.2 Hard Disk and Simulated Volume Controllers

All hard disk domains in the standard Global System Manager (Novell NetWare) configurations are simulated by MS-DOS files. Three hard-disk controllers provide access to these simulated volumes:

SSD-FILE Discrete Data File controller (aka Separated Data File controller)

DOS-FILE Integrated Data File controller (via MS-DOS)

BIOSFILE Integrated Data File controller (via BIOS)

All standard V8.1 Global System Manager (Novell NetWare) configuration files include a single SSD-FILE controller.

8.2.1 SSD-FILE Discrete Data File controller

The terms "Discrete Data File (DDF)" and "Separated Data File (SSD)" are used synonymously throughout this manual. Simulated volume controller "SSD-FILE" (+JWCAOC) uses MS-DOS file functions (e.g. Open, Read and Write) to map a collection of MS-DOS files, within a single MS-DOS directory, to a Global System Manager domain. Each MS-DOS file in the directory corresponds to a single Global System Manager subvolume. The overwhelming advantage of a Discrete Data File controller over an Integrated Data File controller (see section 8.2.2) is that the size of the domain is not fixed but may be increased dynamically as new subvolumes (i.e. MS-DOS files) are created.

The naming convention for the MS-DOS directory is GSMnnn where nnn is the domain number (e.g. GSM200). The files in this directory will be named nnnvvvvv.SVL, where nn is the subvolume number and vvvvvv is the file name. For example, MS-DOS file 01SYSRES.SVL will correspond to Global System Manager subvolume 201 (in domain 200), volume name SYSRES. In addition to the sub-volume files, the directory always contains a special header/index file, named 00ddddd.SVL where ddddd is the name of the Global System Manager domain (e.g. SYSDOM). **THE HEADER FILE MUST NEVER BE DELETED.**

Non alphanumeric ASCII characters (e.g. *, ?, !, \$ etc.) are allowed in Global System Manager subvolume names. These special characters are filtered out by the SSD-FILE device driver to ensure that the name of the MS-DOS file corresponding to the Global System Manager subvolume conforms to the MS-DOS file naming conventions. The Global System Manager subvolume names that contain special characters, when observed in a MS-DOS directory (e.g. using the MS-DOS DIR command) will appear very different. The following example illustrates this effect:

Unit	Volume name	MS-DOS file
201	*TEST!	01TEST.SVL
202	\$\$WORK	02WORK.SVL
210	\$\$\$\$\$\$	10.SVL
268	???MD*	68MD.SVL

If two, or more, MS-DOS files with the same number are present in the MS-DOS directory (e.g. 10PLDATA.SVL and 10SLDATA.SVL) Global System Manager will ignore **ALL** the MS-DOS files with the same "unit number". In this example, if an attempt is made to access subvolume 210, a "SUBVOLUME NOT ALLOCATED" error will be displayed. If an attempt is made to list domain 200, an "ERROR Z" will result.

The following example illustrates the relationship between MS-DOS directories and files and Global System Manager domain and subvolumes

in a purely artificial configuration that includes SSD-FILE controllers (units 200 and 250):

MS-DOS Type	MS-DOS Name	GSM Type	GSM Number	GSM Volume name
Directory	GSM200	Domain	200	
File	00SYSDOM.SVL	Domain	200	SYSDOM
File	01SYSRES.SVL	Subvolume	201	SYSRES
File	02SLDATA.SVL	Subvolume	202	SLDATA
File	05LIST.SVL	Subvolume	205	LIST
File	49TEST1.SVL	Subvolume	249	TEST1
Directory	GSM250	Domain	250	
File	00DISK2.SVL	Domain	250	DISK2
File	01DISK2.SVL	Subvolume	251	DISK2
File	49TEST2.SVL	Subvolume	299	TEST2

8.2.1.1 SSD-FILE Global Configurator Options

When Global Configurator is used to add or amend an SSD-FILE controller, no configuration-specific prompts appear in addition to the standard prompts described in section 3.3 of the Global Configurator Manual.

Volume format T259Z should be used by the SSD-FILE controller. This volume format can be used with MS-DOS partitions up to 2Gb in size (i.e. the highest volume capacity supported by Global System Manager). Note that other (obsolete) SSD-FILE volume formats, that only support MS-DOS partitions up to a limit of 512Kb, are available. The complete list of Separated Subvolume Domain volume types is as follows:

Volume format	MS-DOS size limit	Virtual track size
T151Z	512 Mb	8 Kb
T224Z	512 Mb	8 Kb
T259Z	2 Gb	32 Kb

8.2.1.2 SSD-FILE GSM.INI Initialisation File Options

This section should be read in conjunction with section 7.1.2. Every SSD-FILE controller in the Global Configuration file must have a corresponding entry in the GSM.INI initialisation file otherwise the simulated volume will be removed dynamically from the configuration when Global System Manager is started (i.e. the domain will not appear in the \$U report and an ASSIGNMENT ERROR will occur when attempting to access it). The first parameter (e.g. 0) for a particular SSD-FILE entry in the GSM.INI file must be the same as the DRIVE number for that domain in the Global Configuration file.

Important note: Although it is normally sufficient to specify a relative pathname for the MS-DOS directory in the GSM.INI file (e.g. GSM200) an absolute pathname (e.g. C:\GSM\GSM200) must be specified if either the MS-DOS "Select Disk" or "Set Default Directory" functions are executed using the SVC-61 interface. SVC-61 is described in Chapter 6 of the Global File Converters Manual.

8.2.1.3 SSD-FILE MS-DOS File Creation

Either GLMKDDF.EXE (see section 6.4.1) or ALLOCATE.EXE (see section 6.5.1) must be used to create the MS-DOS directory and header file before the SSD-FILE controller will recognise a Discrete Data File domain. Note that neither of these MS-DOS utilities initialise the

domain, the \$V "Initialise" function (see section 4.9.3) must be used to prepare the simulated volume for use by Global System Manager.

8.2.1.4 SSD-FILE Operating Notes

The size of the 00ddddd.SVL header file (e.g. 00SYSDOM.SVL) within the MS-DOS directory created by GLMKDDF.EXE (see section 6.4.1) or option 1 of ALLOCATE.EXE (see section 6.5.1) MUST match the volume format in the Global System Manager configuration file:

Volume format	Size of 00ddddd.SVL
T151Z	32 Kb
T224Z	32 Kb
T259Z	64 Kb

If the size of the 00ddddd.SVL header file does not match the volume format defined in the configuration file, a "HARDWARE ERROR" will be reported for the SSD-FILE controller when Global System Manager is started and the simulated volume will be removed dynamically from the configuration (i.e. the domain will not appear in the \$U report and an ASSIGNMENT ERROR will occur when attempting to access it).

The SSD-FILE controller sets the MS-DOS "archive bit" if the contents of any sub-volume are changed. This allows the use of an MS-DOS based archival backup utility with Global System Manager sub-volume files. Note that the domain header file (i.e. 00ddddd.SVL, where ddddd is the domain name) and the MS-DOS file that corresponds to the SYSRES volume (e.g. 01SYSRES.SVL) are ALWAYS updated whenever Global System Manager is started.

Furthermore, the SSD-FILE controller checks that all MS-DOS volume files are an exact multiple of the virtual track size. If the size of an MS-DOS volume file is not an exact multiple of the track size then the corresponding Global System Manager sub-volume will be removed. The sub-volume will not appear in the domain listing produced by \$F or \$V and an ERROR Z will be reported at the end of the domain listing. Note that the GLENDFF.EXE utility (see section 6.4.3) can be used to round-up the size of an MS-DOS sub-volume file to an exact multiple of the virtual track size.

Various hard-disk compression drivers are available with MS-DOS (e.g. DoubleSpace is supplied with MS-DOS V6.0). These drivers can cause problems when used in conjunction with Global System Manager because Global System Manager expects the size of the hard-disk to remain fixed whilst it is running. This assumption may be invalid when a disk compression driver is in use: The amount of disk space occupied by a file alters as data is written to it, making it possible for the hard-disk to be filled whilst Global System Manager still reports free space. The SSD-FILE controller reports an "INSUFFICIENT SPACE" error if this condition is detected.

The Global System Manager "Long Volume Descriptions" are persistent and are not removed when an MS-DOS sub-volume file is deleted. All the 50 character Long Volume Descriptions for a domain are held in the 00ddddd.SVL domain header file rather than being associated with individual sub-volume data files (e.g. nnnvvvvv.SVL). If a sub-volume data file is copied to a data directory using an MS-DOS command (e.g. COPY) it will automatically inherit the Long Volume Description associated with the corresponding sub-volume number. The same effect

occurs if a subvolume data file is "renumbered" using the MS-DOS RENAME command.

Volume format T151Z for use with Global System Manager (Novell NetWare) is isometric with volume format T224Z for use with Global System Manager (Unix). Thus, Global System Manager "sub-volume files" can be interchanged, after appropriate copying and renaming, between Global System Manager (Novell NetWare) and Global System Manager (Unix). **Important note:** Subvolume files from T224Z Discrete Data File domains can be interchanged with subvolume files from T151Z domains **provided the number of files per subvolume is the same for both domains**. Note that the default number of files per subvolume is 99 for volume format T224Z but 250 for volume format T151Z, although the default value of 99 can be, and often is, overridden by the more sensible value of 250 when using Global Configurator to add volume format T224Z to a configuration file. If a subvolume file containing a "99 file directory" is copied to a "250 file domain", and Global System Manager restarted, the subvolume will appear correct in a \$F domain listing and may even appear correct in a \$F subvolume listing but data corruption will occur when attempting to access files on the "99 file subvolume".

Subvolume files from T151Z (and T224Z) domains can be copied to T259Z domains only if both the source and destination domains are configured with the same number of files per directory (normally 250) AND the "size rounding-up" technique of the GLENDDF.EXE utility (see section 6.4.3) is used. However, the domain header file (i.e. 00dddddd.SVL) from a T151Z domain directory cannot be copied to a T259Z directory thus all Long Volume Descriptions will be lost.

8.2.2 DOS-FILE Integrated Data File controller

Simulated volume controller "DOS-FILE" (+JWCA02) uses MS-DOS file functions (e.g. Open, Read and Write) to map a single MS-DOS file to a Global System Manager domain. This interface can be very slow for large domains but will work with any device or filing system that MS-DOS supports. Employing an MS-DOS caching program can help to overcome the performance penalties imposed by using large volumes. **This Integrated Data File technique for accessing MS-DOS simulated volumes is considered obsolete and has been superseded by the Discrete Data File controller (see section 8.2.1).**

Some obsolete pre-V8.1 Global System Manager standard configurations included the DOS-FILE controller rather than the SSD-FILE controller, which is included in all current standard configurations.

8.2.2.1 DOS-FILE Global Configurator Options

When Global Configurator is used to add or amend a DOS-FILE controller, no configuration-specific prompts appear in addition to the standard prompts described in section 3.3 of the Global Configurator Manual.

Volume format P259Z should be used by the DOS-FILE controller. This volume format can be used with MS-DOS partitions up to 2Gb in size (i.e. the highest volume capacity supported by Global System Manager). Note that other (obsolete) DOS-FILE volume formats are available. The complete list of Integrated Data File volume types is as follows:

Volume format	MS-DOS size limit	Virtual track size
---------------	-------------------	--------------------

P151Z	256 Mb	4 Kb
P224Z	512 Mb	8 Kb
P246Z	1 Gb	16 Kb
P249Z	1 Gb	16 Kb
P259Z	2 Gb	32 Kb

Note that volume formats P246Z and P249Z are isometric.

If the volume format specified in the configuration file is unable to support the appropriate simulated volume then that domain will automatically be excluded when loading Global System Manager. This fact can be verified by renaming the configuration file such that its last letter is a "D" and then reloading Global System Manager. If an inappropriate volume format is being used then the following message will be displayed:

```
UNIT nnn - TOO MANY TRACKS
```

where nnn is the domain unit number (see Appendix C).

8.2.2.2 DOS-FILE GSM.INI Initialisation File Options

This section should be read in conjunction with section 7.1.3. Every DOS-FILE controller in the Global Configuration file must have a corresponding entry in the GSM.INI initialisation file otherwise the simulated volume will be removed dynamically from the configuration when Global System Manager is started (i.e. the domain will not appear in the \$U report and an ASSIGNMENT ERROR will occur when attempting to access it). The first parameter (e.g. 0) for a particular DOS-FILE entry in the GSM.INI file must be the same as the DRIVE number for that domain in the Global Configuration file. Note that the drive numbers for the DOS-FILE and SSD-FILE entries in the GSM.INI file are numbered independently so that there can, for example, be entries for both "DOS-FILE 0" and "SSD-FILE 0".

Important note: Although it is normally sufficient to specify a relative pathname for the MS-DOS file in the GSM.INI file (e.g. GSM200.VOL) an absolute pathname (e.g. C:\GSM\GSM200.VOL) must be specified if either the MS-DOS "Select Disk" or "Set Default Directory" functions are executed using the SVC-61 interface. SVC-61 is described in Chapter 6 of the Global File Converters Manual.

8.2.2.3 DOS-FILE MS-DOS File Creation

Either GLMKIDF.EXE (see section 6.4.2) or ALLOCATE.EXE (see section 6.5.2) must be used to create the MS-DOS domain file before the DOS-FILE controller will recognise an Integrated Data File domain. Note that neither of these MS-DOS utilities initialise the domain, the \$V "Initialise" function (see section 4.9.3) must be used to prepare the simulated volume for use by Global System Manager.

8.2.2.4 DOS-FILE Operating Notes

Various hard-disk compression drivers are available with MS-DOS (e.g. DoubleSpace is supplied with MS-DOS V6.0). These drivers can cause problems when used in conjunction with Global System Manager because Global System Manager expects the size of the hard-disk to remain fixed whilst it is running. This assumption may be invalid when a disk compression driver is in use: The amount of disk space occupied by a file alters as data is written to it, making it possible for the hard-disk to be filled whilst Global System Manager still reports free space. The DOS-FILE controller reports an "INSUFFICIENT SPACE" error if this condition is detected.

Important note: A potential problem was introduced with the release of the variant 4.0 DOS-FILE controller. Early variants of this controller (i.e. pre-V4.0) were hard-coded to use volume format P151Z (i.e. a track size of 4Kb). This limitation was removed in the variant 3.0 controller to include the support of volume formats P224Z, P246Z, P249Z and P259Z. However, the variant 3.0 controller continued to assume a track size of 4Kb. The code was finally corrected in the variant 4.0 controllers (i.e. the hard-coded track size of 4Kb was replaced by the true (virtual) track-size) but this change could cause simulated volumes initialised using the variant 3.0 controller (with volume format P224Z, P246Z, P249Z or P259Z) to become inaccessible by the variant 4.0 controller (with a WRONG VOLUME FORMAT error). The problem is extremely unlikely to occur in practise because large MS-DOS domain files (e.g. GSM200.VOL) will normally be allocated in terms of Megabytes and hence the volume size will always be an exact multiple of the virtual track size (see above table) so there will never be any partial tracks to cause the disk size discrepancies that are responsible for the WRONG VOLUME FORMAT errors.

Finally, the DOS-FILE controller functions correctly with read-only MS-DOS files. This facility should only be used on NetWare workstation IPL volumes (i.e. where the information is used on a read-only basis). A read-only file can be created by using either the NetWare FILER utility or the MS-DOS ATTRIB command. For example, the following MS-DOS command will set the read-only attribute on the file GSMIPL.VOL:

```
ATTRIB +R GSMIPL.VOL
```

See the Global Configuration Notes for more details regarding MS-DOS and NetWare utilities.

Important note: If the IPL volume is made read-only then the \$F PIP command must be used to patch \$MONITOR to load the \$MONnn monitor pages from the P.\$MON library on the read-write SYSRES volume.

8.2.3 BIOSFILE Integrated Data File controller

Simulated volume controller "BIOSFILE" (+JWCA03) uses BIOS functions to map a single MS-DOS file to a Global System Manager domain. The BIOSFILE controller bypasses the MS-DOS file handling once it establishes where the simulated volume resides on the disk and it is consequently often much faster than the DOS-FILE controller (see section 8.2.2). However, the BIOSFILE controller will only work with standard IBM devices and files. In particular it will not work with some 'enhanced' disk drivers that allow more than one logical disk drive (e.g. C: and D:) to exist on the same physical drive and it will not work with disks formatted with sector sizes other than 512 bytes (a technique sometimes used to circumvent the historical MS-DOS 32Mb partition limit). The BIOSFILE controller will not work with NetWare network drives (i.e. simulated volumes provided by a NetWare file-server).

This Integrated Data File technique for accessing MS-DOS simulated volumes is considered obsolete and has been superseded by the Discrete Data File controller (see section 8.2.1).

THE USE OF THE "BIOSFILE" IS NOT RECOMMENDED AS ENHANCEMENTS TO MS-DOS (E.G. DISK-CACHING AND DATA COMPRESSION) HAVE RENDERED THIS INTERFACE OBSOLETE.

8.2.3.1 BIOSFILE Global Configurator Options

When Global Configurator is used to add or amend a BIOSFILE controller, no configuration-specific prompts appear in addition to the standard prompts described in section 3.3 of the Global Configurator Manual.

All the volume formats supported by the DOS-FILE controller are also supported by the BIOSFILE controller (see section 8.2.2.1).

8.2.3.2 BIOSFILE GSM.INI Initialisation File Options

This section should be read in conjunction with section 7.1.4. Every BIOSFILE controller in the Global Configuration file must have a corresponding entry in the GSM.INI initialisation file otherwise the simulated volume will be removed dynamically from the configuration when Global System Manager is started (i.e. the domain will not appear in the \$U report and an ASSIGNMENT ERROR will occur when attempting to access it). The first parameter (e.g. 0) for a particular BIOSFILE entry in the GSM.INI file must be the same as the DRIVE number for that domain in the Global Configuration file. Note that the drive numbers for the BIOSFILE and DOS-FILE entries in the GSM.INI file are numbered independently so that there can, for example, be entries for both "BIOSFILE 0" and "DOS-FILE 0".

8.2.3.3 BIOSFILE MS-DOS File Creation

Either GLMKIDF.EXE (see section 6.4.2) or ALLOCATE.EXE (see section 6.5.2) must be used to create the MS-DOS domain file before the BIOSFILE controller will recognise an Integrated Data File domain. Note that neither of these MS-DOS utilities initialise the domain, the \$V "Initialise" function (see section 4.9.3) must be used to prepare the simulated volume for use by Global System Manager.

8.2.3.4 BIOSFILE Operating Notes

Various hard-disk compression drivers are available with MS-DOS (e.g. DoubleSpace is supplied with MS-DOS V6.0). **The BIOSFILE controller will not operate if any form of MS-DOS data compression is enabled.**

Important note: A potential problem was introduced with the release of the variant 4.0 BIOSFILE controller. Early variants of this controller (i.e. pre-V4.0) were hard-coded to use volume format P151Z (i.e. a track size of 4Kb). This limitation was removed in the variant 3.0 controller to include the support of volume formats P224Z, P246Z, P249Z and P259Z. However, the variant 3.0 controller continued to assume a track size of 4Kb. The code was finally corrected in the variant 4.0 controllers (i.e. the hard-coded track size of 4Kb was replaced by the true (virtual) track-size) but this change could cause simulated volumes initialised using the variant 3.0 controller (with volume format P224Z, P246Z, P249Z or P259Z) to become inaccessible by the variant 4.0 controller (with a WRONG VOLUME FORMAT error). The problem is extremely unlikely to occur in practice because large MS-DOS domain files (e.g. GSM200.VOL) will normally be allocated in terms of Megabytes and hence the volume size will always be an exact multiple of the virtual track size (see above table) so there will never be any partial tracks to cause the disk size discrepancies that are responsible for the WRONG VOLUME FORMAT errors.

8.2.4 Other Hard Disk Controllers

Although the direct access controller "ASPI" (+JWCA0D) also appears in the Global Configurator help text, this controller is not distributed

with Global System Manager (Novell NetWare). All other Global System Manager (Novell NetWare) hard-disk controllers access the hardware directly and are described in section 9.2.

8.3 Console Controllers

Standard Global System Manager (Novell NetWare) configurations include the "CONSOLE" integral screen controller (see section 9.4). Three alternative controllers are available:

DOS-SCR Integral console controller that only uses MS-DOS functions

SPX Console controller for use with the SPX Workstation terminal emulator

WINTTY Console controller for use with the Global Windows Workstation

8.3.1 DOS-SCR Console Controller

Console controller "DOS-SCR" (+JWCB09) can be used instead of the standard "CONSOLE" controller (see section 9.4), if a "pure MS-DOS" configuration is required (see Appendix J).

The DOS-SCR controller uses standard MS-DOS function calls to handle character displays and accepts. **It requires either the ANSI.SYS or GSMCON.SYS device driver to be loaded under MS-DOS.** The ANSI.SYS device driver is supplied with MS-DOS. The GSMCON.SYS device driver is supplied with Global System Manager (see section 6.6). Note that the enhanced keyboard is not supported by this driver on early versions of MS-DOS, so the F11 and F12 keys may not be usable.

If the DOS-SCR controller is used in conjunction with ANSI.SYS, the following terminal attribute programs may be used:

\$.573	Colour TAP for the DOS-SCR controller;
\$.581	Monochrome TAP for the DOS-SCR controller.

If the DOS-SCR controller is used in conjunction with GSMCON.SYS, the following terminal attribute programs, developed for Global PC Workstation, may be used:

\$.704	Global PC Workstation; monochrome; 132-wide
\$.705	Global PC Workstation; colour; 132-wide
\$.706	Global PC Workstation; monochrome; 80-wide
\$.707	Global PC Workstation; colour; 80-wide

Because of deficiencies in ANSI.SYS, TAPs \$.573 and \$.581 lack several desirable options (e.g. a status-line). You are strongly advised to use the DOS-SCR controller in conjunction with GSMCON.SYS and a Global PC Workstation TAP.

8.3.1.1 DOS-SCR Global Configurator Options

When Global Configurator is used to add or amend a DOS-SCR controller, no configuration-specific prompts appear in addition to the standard prompts described in section 3.4 of the Global Configurator Manual.

The SCREEN DEPTH must be changed to 25 from the default value of 24 in order to use this controller with terminal type 573 or 581.

8.3.1.2 DOS-SCR GSM.INI Initialisation File Options

No entries in the GSM.INI file are required for the DOS-SCR controller.

8.3.2 SPX Console Controller

Console controller "SPX" (+JWCBOA) must be included in the configuration file of the "host" Global System Manager workstation in order to use the SPX Workstation terminal emulator as described in section 6.7. This section should be read in conjunction with section 6.7.

The SPX controller running on a "host" workstation uses the NetWare SPX network protocol to interface to the SPX Workstation terminal emulator (SPXWS.COM) running on an "emulator" workstation.

If the SPX controller (running on the "host" computer) is used in conjunction with SPXWS.COM and ANSI.SYS (on the "emulator" workstation), the following Terminal Attribute Programs may be used:

\$.573	Colour TAP for the SPX controller;
\$.581	Monochrome TAP for the SPX controller.

If the SPX controller (running on the "host" computer) is used in conjunction with SPXWS.COM and GSMCON.SYS (on the "emulator" workstation), the following Terminal Attribute Programs may be used:

\$.704	Global PC Workstation; monochrome; 132-wide
\$.705	Global PC Workstation; colour; 132-wide
\$.706	Global PC Workstation; monochrome; 80-wide
\$.707	Global PC Workstation; colour; 80-wide

Because of deficiencies in ANSI.SYS, TAPs \$.573 and \$.581 lack several desirable options (e.g. a status-line). You are strongly advised to use the SPX controller in conjunction with SPXWS.COM and GSMCON.SYS and a Global PC Workstation TAP.

Note that the SPX console controller automatically closes all sockets when Global System Manager terminates thus allowing the SPX Workstation to be reloaded on a workstation running NetWare V3.12, or later.

8.3.2.1 SPX Global Configurator Options

When Global Configurator is used to add or amend an SPX controller, the following configuration-specific prompts appear in addition to the standard prompts described in section 3.4 of the Global Configurator Manual:

Socket Number	(#9001):
Polled Operation?	(Y):
Number of Receive ECBs	(4):
Recovery Socket Number	(#FFFF):
Number or Recovery ECBs	(2):

The socket number must be different to that used by the Novell NetWare LAN controller (which uses socket 9000). The socket number must be greater than 8000.

The Polled Operation prompt should be set to Y.

Each receive ECB is capable of receiving one character. The default number of 4 ECBs should be adequate. If several consoles share a socket, their receive ECBs are pooled together. A total of 8 ECBs should be sufficient on any one socket, so if a third console is added to a socket, the number of receive ECBs for that console can be set to 0.

The Recovery Socket number determines what happens if the SPX connection fails whilst the "emulator" workstation is connected to the Global System Manager "host". When a connection fails, \$STATUS will indicate a SCREEN I/O ERROR or LINE DOWN condition against the affected user. If the recovery socket number is FFFF, it is not possible to reconnect at the point the connection failed. \$STATUS must be used to restart the console before a workstation can attach to it again. If the Recovery Socket Number is 0, a workstation can reconnect at the point the connection failed, on the original socket number. Any other number means the session can be recovered by reconnecting with that socket number. A problem with allowing a session to be recovered on the original socket is that a different workstation could connect to the crashed session without realising it. Using a different socket number for recovery can help prevent this. When a crashed session is recovered, <SYSREQ> 0 must be used to redisplay the screen contents.

The Recovery ECBs are used if the workstation recovers a crashed session on a different socket. If several consoles share a recovery socket, their recovery ECBs are pooled together. It is recommended that users exit a recovered session as quickly as possible, and then re-attach on the original socket number.

The SCREEN DEPTH must be changed to 25 from the default value of 24 in order to use this controller with terminal type 573 or 581.

8.3.2.2 SPX GSM.INI Initialisation File Options

No entries in the GSM.INI file are required for the SPX controller.

8.3.2.3 SPX Startup Errors

The following errors may be reported by the SPX Remote Console Controller when Global System Manager is loaded:

ERROR I IPX/SPX is not loaded.

ERROR H A socket couldn't be opened. Edit the DOS file SHELL.CFG on the Global System Manager "host" workstation, or create one if it doesn't exist, and increase the number of IPX sockets. Refer to your NetWare documentation for information on SHELL.CFG

MISSING DEVICE No SPX connections are available. Edit the SHELL.CFG file on the Global System Manager "host" workstation, or create one if it doesn't exist, and increase the number of SPX connections. Refer to your NetWare documentation for information on SHELL.CFG.

8.3.3 WINTTY Console Controller

Console controller "WINTTY" (+JWCB0B) MUST be used in place of, or as well as, the standard "CONSOLE" controller (see section 9.4), in order to use the Global Windows Workstation.

reports to a named MS-DOS file (if new file creation is enabled). It is not possible to switch mode for a particular printer unit without running Global Configurator and reloading Global System Manager. If both modes are required in a single Global System Manager session, two printer units must be configured.

The option to open the MS-DOS device in "raw mode" is only relevant if the DOS.PRI controller is configured (in GSM.INI, see section 8.4.1.2) to print to an MS-DOS device. In the default mode (i.e. "cooked mode") the MS-DOS device driver will intercept some control characters (e.g. <CTRL Z> - the MS-DOS file terminator character) thus preventing DOS.PRI from correctly downloading character fonts to the printer, for example. In "raw mode" all characters are printed from Global System Manager without MS-DOS intercepting or translating them.

8.4.1.2 DOS.PRI GSM.INI Initialisation File Options

This section should be read in conjunction with section 7.1.5. Every DOS.PRI controller in the Global Configuration file must have a corresponding entry in the GSM.INI initialisation file otherwise the printer controller will be removed dynamically from the configuration when Global System Manager is started (i.e. the printer will not appear in the \$U report and an ASSIGNMENT ERROR will occur when attempting to print to the 5nn unit). The first parameter (e.g. 500) for a particular DOS.PRI printer entry in the GSM.INI file must be the same as the UNIT NUMBER for that printer in the Global Configuration file.

Important note: Although it is normally sufficient to specify a relative pathname for the MS-DOS print file or spool directory in the GSM.INI file (e.g. GSMSPPOOL) an absolute pathname (e.g. C:\GSM\GSMSPPOOL) must be specified if either the MS-DOS "Select Disk" or "Set Default Directory" functions are executed using the SVC-61 interface. SVC-61 is described in Chapter 6 of the Global File Converters Manual.

8.4.1.3 DOS.PRI Operating Notes

The pertinent features of the DOS.PRI controller when it is used to print to an MS-DOS device (e.g. LPT1:) or a named file (e.g. C:\PRINT.PRN) are described in section 8.4.1.1. This section describes the operation of the DOS.PRI controller when device_spec parameter in the GSM.INI file is an MS-DOS directory (e.g. C:\GSM\SPOOL\). The specified directory path must exist otherwise the printer controller will be removed dynamically from the configuration when Global System Manager is started (i.e. the printer will not appear in the \$U report and an ASSIGNMENT ERROR will occur when attempting to print to the 5nn unit). Every Global System Manager print file will generate a corresponding MS-DOS file with a unique filename in the spool directory. The name of the MS-DOS file will be of the form:

xxxxxxx.nnn

where xxxxxxx is the name of the Global System Manager print file and nnn is an incrementing sequence number that ensures the MS-DOS filename is unique. The DOS.PRI controller removes all non-alphanumeric characters from the Global System Manager filename and converts any lower-case letters to upper-case to generate the first part of the MS-DOS filename. For example, using \$F in partition 2 to create a report (e.g. PRI) produces a Global System Manager print file called D.\$F02. This filename will be converted to DF02.nnn (e.g. DF02.001) by the DOS.PRI controller.

If the removal of non-alphanumeric characters in the filename results in an empty string (i.e. if the Global System Manager filename includes **no** alphanumeric characters) the first part of the filename is set to "NONAME" (note that earlier versions of the DOS.PRI controller would report an ERROR Z if this condition occurred).

The sequence number is derived from those MS-DOS files that are resident in the MS-DOS "spool directory" when Global System Manager is started. The sequence number will start from "001" if the directory is empty. The maximum sequence number is "999". If this limit is reached no more files will be written to the "spool directory" and a Global System Manager "DIRECTORY FULL" error will be reported when attempting to print.

8.4.1.4 Network Printing with Novell NetWare

This section describes the use of the DOS.PRI controller in conjunction with the NetWare CAPTURE command. However, although the combination of DOS.PRI and CAPTURE may be used to print across NetWare networks, use of the NET.PRI controller (see section 8.4.2) is recommended if network printing is desired.

The NetWare CAPTURE utility can be used to redirect one or more of the MS-DOS print devices, LPT1: to LPT3:, to a network print queue. When Global System Manager opens the print device, a print file is opened on the fileserver, into which the printer output is written. When Global System Manager closes the print device, the print file is closed and placed in a print queue. A NetWare print server takes print files from the print queue and prints them out. When printing locally, direct to a local printer, print output appears as it is sent to the printer. With network printing, nothing is sent to the printer until the print device is closed.

The following example illustrates how to redirect output sent to LPT1 to a print queue called APRINTQ:

```
CAPTURE L=1 Q=APRINTQ
```

If all Global System Manager workstations are to print to this queue, the above command could be included in GSMWORK.BAT, before the GSMLOAD command line. To stop a local printer from being redirected to a network print queue, use the ENDCAP command. For example to stop redirection of LPT1:

```
ENDCAP L=1
```

There is a potential problem when Global System Manager applications print to a network printer. Stationery alignment patterns do not appear because the application does not close the print device after printing the alignment pattern. To avoid this problem, you should specify a timeout for the CAPTURE command. For example, to include a 10 second timeout:

```
CAPTURE L=1 Q=APRINTQ TI=10
```

If no output is sent to the printer for 10 seconds, the print file is automatically closed, and placed in the print queue for printing. A new print file is opened for subsequent print output. The application will send no further output to the printer until you confirm the

stationery alignment. After 10 seconds, the print file will be automatically closed and sent to the print queue for printing.

The NetWare CAPTURE command is far more sophisticated than the above examples would indicate, and there are several command line options for CAPTURE which have not been covered here. Please consult the Novell NetWare documentation for further information on CAPTURE, and NetWare printing in general.

8.4.2 The NET.PRI Printer Controller

The "NET.PRI" (+JWCE08) controller has been designed to overcome the problems that occur when the DOS.PRI controller is used in conjunction with the CAPTURE command to print across NetWare networks (see section 8.4.1.4).

There is no method of printing to a NetWare print queue directly. To print to a queue, one of the parallel printer devices (LPT1:, LPT2: or LPT3:) is redirected to the queue. This can be done with the NetWare CAPTURE utility (see section 8.4.1.4), or from within a program using NetWare extended MS-DOS calls. As a result, it is not possible to print to more than three NetWare print queues simultaneously. This isn't usually a problem, as most MS-DOS applications are single tasking, and so can only print to one queue at a time anyway. However, Global System Manager allows each partition to print to a queue, so there may be up to 9 simultaneous prints.

When configuring a network printer under Global System Manager, you can choose to print via a specific LPT device or via the first free device. An IN USE error will result if the specific LPT device chosen by you isn't free at the time, or if you have chosen to print via a free LPT device, but none are free.

To help clarify the above, the following table gives an example Global System Manager printer configuration, showing the unit number, the LPT device each unit uses, and the NetWare queue it prints to:

550	LPT1	QUEUE0
551	LPT1	QUEUE1
552	LPT2	QUEUE2
553	LPT3	QUEUE0
554	-	QUEUE1
555	-	QUEUE2

As units 550 and 551 use the same printer device (LPT1), it is not possible to print to those units simultaneously. So, if a print to unit 550 is started in partition 1, and a print started to unit 551 in partition 2, unit 551 will give an IN USE error. As soon as the print to unit 550 completes, the print to unit 551 can proceed. However, it would be possible to print to units 550 and 552 simultaneously, as these use different logical printer devices.

No devices have been specified for units 554 and 555. These printers will use the first free LPT device. If a print is started on unit 554, it will use the first free LPT device, LPT1. If a second print is started on unit 555 whilst the first print is still in progress, it will use the next free device, LPT2.

Note that if you wish to use the MS-DOS MODE command to redirect an LPT device to COM1, for example, the redirection must be performed

before the NetWare shell is loaded otherwise NetWare will be unable to redirect to the specified device.

8.4.2.1 NET.PRI Global Configurator Options

When Global Configurator is used to add or amend a NET.PRI controller, no configuration-specific prompts appear in addition to the standard prompts described in section 3.6 of the Global Configurator Manual.

The printer unit for a NET.PRI printer must be in the range 550 - 598, inclusive.

8.4.2.2 NET.PRI GSM.INI Initialisation File Options

This section should be read in conjunction with section 7.1.6 Every NET.PRI controller in the Global Configuration file must have a corresponding entry in the GSM.INI initialisation file otherwise the printer controller will be removed dynamically from the configuration when Global System Manager is started (i.e. the printer will not appear in the \$U report and an ASSIGNMENT ERROR will occur when attempting to print to the 5nn unit). The first parameter (e.g. 550) for a particular NET.PRI printer entry in the GSM.INI file must be the same as the UNIT NUMBER for that printer in the Global Configuration file.

8.4.2.3 NET.PRI Startup Errors

This section should be read in conjunction with section 7.1.6 The following error may be reported by the NET.PRI printer controller when Global System Manager is loaded:

```
ERROR F      Invalid form text
```

8.4.2.4 NET.PRI Run-Time Errors

This section should be read in conjunction with section 7.1.6 The following errors may be reported when attempting to use the NET.PRI printer controller:

```
IN USE ERROR      The LPTn: device is in use by another Global
                   System Manager printer or the LPT device has
                   been captured by a non-Global application on
                   the network;
```

```
ERROR 0           The Printer Queue, or the server on which it
                   resides cannot be accessed. Alternatively,
                   the Banner Text is longer than 12 characters;
```

```
HARDWARE ERROR   Access to the printer queue has been denied.
```

8.5 Extended and Expanded Memory

Global System Manager (Novell NetWare) operates in "real" mode on all members of the Intel 80x86 CPU family. Consequently, the **theoretical** maximum amount of memory that can be addressed directly is 1Mb. However, memory addresses between 640Kb and 1Mb (i.e. the 384Kb Upper Memory Area) are usually reserved for use by system hardware such as display adapters, peripheral cards and the BIOS (see Appendix D), so the effective conventional memory limit is 640Kb. This is further reduced by the amount of memory occupied by the MS-DOS operating system and may be fixed by the MEMORY entry in the GSM.INI file (see section 7.1.1). Note that Global System Manager cannot utilise Upper Memory Blocks (UMBs - those unused parts of the Upper Memory Area).

Similarly, Global System Manager **cannot** utilise the High Memory Area (i.e. the first 64Kb of Extended Memory).

8.5.1 Conventional Memory

The Global System Manager (Novell NetWare) permanently resident nucleus requires approximately 64Kb and, for a typical configuration, between 100Kb and 300Kb is used for peripheral control blocks, screen images and data buffers. These values are very approximate - the Global Configurator Manual describes Global System Manager memory usage in more detail.

When Global System Manager is started it automatically allocates memory for each user (a memory bank of approximately 57Kb for each partition) and any remaining conventional memory will be used as RAM disk unless disk cacheing is enabled. When enabled, disk cacheing normally takes priority over RAM disk in standard systems.

In a typical Global System Manager configuration (e.g. 3 concurrent screens with a total of 12 partitions) all of conventional memory allocated by MS-DOS will be used by the nucleus, high-memory buffers and memory banks. Indeed, on all but the smallest configurations, there will be insufficient conventional memory for all the required memory banks so that disk-swapping, using a Swap File, must be employed by Global System Manager. **Consequently, on most Global System Manager (Novell NetWare) configurations it will NOT be possible to configure either a RAM disk or a Disk Cache in conventional memory.**

8.5.1.1 Conventional Memory RAM Disk

RAM disk is used in exactly the same way as a diskette, and is accessed as unit 109. The memory used as RAM disk is volatile and is erased when the computer is turned off. Before the computer is turned off any important data must be copied to diskette or hard disk. By default, in all standard, distributed configuration files, any conventional memory that is not required for the nucleus, high-memory buffers or memory-banks is used for a RAM Disk.

8.5.1.1.1 RAM Disk Global Configurator Options

All standard Global System Manager configuration files include the direct access controller "RAM DISK" (+J0CA63). When Global Configurator is used to add or amend a RAM DISK controller no configuration-specific prompts appear in addition to the standard prompts described in section 3.3 of the Global Configurator Manual. The volume format for the RAM DISK controller should always be P00A.

8.5.1.2 Conventional Memory Disk Cacheing

The use of Conventional Memory for Disk cacheing is supported by Global System Manager (Novell NetWare) but all the standard configuration files are distributed with Disk Cacheing disabled. \$CUS (see section 8.5.1.2.1) or Global Configurator (see section 2.9.18 of the Global Configurator Manual) must be used to enable it. Disk Cacheing can improve performance by a factor of two to three on disk intensive activities.

8.5.1.2.1 Using \$CUS to Enable Conventional Memory Disk Cacheing

The "RAM Disk/Cache" option of the \$CUS Configuration Maintenance sub-menu (see section 6.1.5.5 of the Global System Manager Manual) allows you to partition any unused conventional memory between RAM Disk and a Disk Cache. When this option is selected, the following screen is displayed:

The RAM disk and cache are allocated in memory above the user memory banks. If you require RAM disk only, specify a cache start address (CSA) of 0. Specifying a RAM disk start address (RSA) of 0 will allocate any spare memory above the memory banks to RAM disk. Setting a specific RSA will cause the RAM disk to start at that address and will limit the user banks to the area below that address.

If you require disk cache only, set the RSA to 0 and the CSA to 1. Any memory remaining after the allocation of the user banks will be allocated to the cache, but no cache will be created if less than 128K is available.

To configure both RAM disk and cache the RSA must be strictly less than the CSA.

Example 1: RSA = 0 Dynamically allocate user banks
CSA = 600 Start cache at 600K

Example 2: RSA = 400 Limit user banks to first 400K
CSA = 600 RAM disk from 400K to 600K

Size of cache buffers is 16384 bytes

Start address of RAM disk (in Kbytes) (0): 0
Start address of cache (in Kbytes) (0): 1

Cacheing is enabled by setting the field "Start address of cache" to 1 unless both RAM Disk and Disk Cache are required in which case the absolute start address must be calculated and entered.

8.5.2 Extended and Expanded Memory

This section starts by defining the terms "Extended" and "Expanded" Memory.

8.5.2.1 Extended Memory

Memory beyond 1Mb on 80286, 80386, 80486 and Pentium based computers is termed Extended Memory.

Global System Manager can use Extended Memory, up to a limit of 16Mb, for RAM disk, disk cacheing or both. Currently, Global System Manager **cannot** use Extended Memory for memory banks. Most IBM PC compatible computers are standardly configured with between 4Mb and 16Mb of memory thus Extended Memory is almost invariably available for use by Global System Manager.

8.5.2.2 Expanded Memory

Expanded Memory is installed on an expanded-memory board. The Expanded Memory is not directly addressable by the CPU. Instead, it is normally partitioned into "banks". A single bank, usually between 4Kb and 64Kb in size, is mapped to a "bank-sized" area within the Upper Memory Area. Because only a limited amount of Expanded Memory is available at a time, using Expanded Memory is slower than using Extended Memory. Since most modern IBM PC compatible computers can be configured with sufficient Extended Memory for most needs, Expanded Memory is rapidly becoming obsolete.

Global System Manager can use Expanded Memory, up to a limit of 16Mb, for RAM disk, disk cacheing or both. Global System Manager **cannot** use Expanded Memory for memory banks.

8.5.3 Global System Manager Memory Usage Customisation

The standard Global System Manager configurations do not include support for Extended/Expanded (EMS) Memory. Global System Manager must be customised to use EMS memory using a **combination** of the "RAM Disk/Cache" option selected from the \$CUS Configuration Maintenance sub-menu (see section 8.5.1.2.1) **and** the =.56nn customisation program (see section 5.7).

EMS memory is treated differently to normal memory in the way that Global System Manager divides it into RAM Disk and Disk Cache. You will need to use **both** the "RAM disk size" parameter in =.56nn EMS customisation (see section 8.5.3.1) **and** the "Start address of cache" parameter (i.e. CSA) in the "RAM Disk/Cache" option of the \$CUS Configuration Maintenance sub-menu (see section 8.5.1.2.1). Note that the "RAM Disk start address" parameter (i.e. RSA) in \$CUS has no effect on EMS memory.

Requirement (\$CUSA)	RAM Disk size (in =.56nn) CSA (\$CUSA)	RSA
RAM disk only	0	0
Disk cacheing only	1	0
RAM Disk AND Disk Cache	Actual size	0

8.5.3.1 Global System Manager Memory Usage Customisation, =.56nn

The "EMS Handling" option in the =.56nn Memory Customisation sub-menu allows you to perform the second stage in the Global System Manager EMS memory customisation. The first stage is to use the "RAM Disk/Cache" option of the \$CUS Configuration Maintenance sub-menu (see section 8.5.1.2.1).

Note that it is **not** possible to effect these changes using Global Configurator.

The following example dialogue allocates all of Extended Memory for use as a Global System Manager Disk Cache:

```

Is EMS handling required (N)? :Y
Amount of expanded memory
  > 0 = actual size (K)
  0 = dynamically determined ( 0 ) :<CR>
RAM disk size
  > 15 = actual size
  1 = no RAM disk
  0 = dynamically determined ( 0 ) :1
The following controllers are available:
  'LIM' for Lotus/Intel/Microsoft
  'XMS' for Extended Memory Specification V2.0
Choose a controller ( ) :XMS

Are these changes acceptable? (Y) :Y
    
```

The following memory controllers are available:

- XMS Extended memory using the Lotus/Intel/Microsoft Extended Memory Specification (XMS) version 2.0.
- LIM Expanded memory using the Lotus/Intel/Microsoft expanded memory specification.

EXT The use of the EXT controller is NOT recommended on Global System Manager (MS-DOS and Windows) configurations. If this controller is used Global System Manager will take control of all the extended memory, preventing the use of an MS-DOS RAM disk or hard disk cache. In particular, EXT must not be used if an MS-DOS extended memory handler (e.g. HIMEM.SYS) is being used. **Use XMS instead of EXT.**

8.5.4 The XMS Memory Handler

The Global System Manager XMS memory handler (+JWNXMS) uses the XMS version 2.0 interface to access extended memory directly. MS-DOS must be configured to provide the XMS service used by the +JWNXMS memory handler. This is normally achieved by loading an MS-DOS device driver which manages extended memory and conforms to the Lotus/Intel/Microsoft/AST Extended Memory Specification (XMS) version 2.0 (e.g. the HIMEM.SYS driver supplied with MS-DOS 4.0, and later).

Note that Microsoft Windows requires the HIMEM.SYS device driver to be loaded to allow it to access extended memory. Hence, the Global System Manager XMS memory handler will work when Global System Manager is running under Windows. The amount of extended memory allocated to Global System Manager is controlled by an entry in the GSMBOOT.PIF file (see section 7.3.1). The default value is 0 in the GSMBOOT.PIF file supplied on the BACNAT diskette.

Use the PIF editor to update GSMBOOT.PIF to set the XMS Memory Kb Limit to a suitable value, considering the following constraints:

- It is possible for a Windows application to allocate all the extended memory in the computer by specifying an "XMS Kb Limit" which is equal to the total amount of memory in the computer. However, this will prevent other applications from running efficiently since Windows will have to perform extensive disk swapping;
- As described above, Global System Manager will use extended memory for two purposes: Disk caching and RAM Disk. We strongly recommend you allow Windows to perform disk caching (using SMARTDRV.EXE) since this has benefits for all applications running under Windows rather than just Global System Manager. A RAM Disk is useful in Global System Manager, mainly as a work unit, but only if it is really kept in memory. Windows will move slices of memory onto the hard-disk when several applications are running, which may cause the memory allocated for the Global System Manager "RAM Disk" to be swapped to hard-disk. It is possible to fix an allocated portion of extended memory in physical memory (i.e. to prevent it being swapped to hard-disk) by use of the "Locked Flag" in the PIF file but this may degrade the performance of other Windows applications.

8.5.5 The LIM Memory Handler

The Global System Manager LIM memory handler (+JWNLIM) uses the Lotus/Intel/Microsoft interface to access expanded memory. This interface supports expanded memory on a real expanded memory card (e.g. the Simon card) or via an expanded memory emulator (e.g. EMM386.SYS with MS-DOS version 4.0; or EMM386.EXE with MS-DOS version 5.0).

To use LIM memory you must firstly install the device driver according to the supplier's instructions (this will normally require modifications to CONFIG.SYS). For example, to use the expanded memory emulator, EMM386.EXE (supplied with DOS V5.0) changes to the CONFIG.SYS are required. The EMM386.EXE driver allows extended memory to simulate expanded memory. This driver will work on any 386 or 486-based machine provided the HIMEM.SYS extended memory manager is also loaded. The following two lines must be added to the CONFIG.SYS file:

```
DEVICE=HIMEM.SYS
DEVICE=EMM386.EXE
```

LIM specification memory is viewed through a number of 16Kb windows. When installing the manufacturer's device driver you must specify that 4 such windows be created.

The expanded memory interface uses a 64Kb segment in the Upper Memory Blocks.

This can cause the following problems:

- Some computers do not contain a spare 64Kb block in the Upper Memory Blocks. The expanded memory interface cannot be used on these computers;
- Where a computer does have a spare 64Kb segment in the Upper Memory Blocks, use of expanded memory may clash with a peripheral card that is memory-mapped into one of the Upper Memory Blocks (e.g. Smartport, Arnet);
- MS-DOS version 5.0, and later, may be configured to load device drivers into the Upper Memory Blocks thus freeing conventional memory. Use of expanded memory may clash with an MS-DOS device driver that is loaded into one of the Upper Memory Blocks.

Because of these limitations inherent in the LIM interface you are strongly advised to use the XMS interface (see section 8.5.4)

8.6 LAN Controllers for Novell NetWare

All standard Global System Manager (Novell NetWare) configurations include the NOV-SPX LAN controller.

8.6.1 NOV-SPX SPX LAN Controller

Console controller "NOV-SPX" (+JWCFOB) uses the NetWare Sequenced Packet Exchange Protocol (SPX). This NetWare layer provides a guaranteed-delivery packet stream by providing positive acknowledge of packet delivery and provides a much more reliable protocol than IPX (see section 8.6.2).

The NOV-SPX broadcasts a NetWare SAP packet every 30 seconds.

8.6.1.1 NOV-SPX Global Configurator Options

When Global Configurator is used to add or amend a NOV-SPX controller, the following configuration-specific prompts appear in addition to the standard prompts described in section 3.7 of the Global Configurator Manual:

Maximum Packet Length	(522)
Maximum Pending Requests	(8):

```
Socket Number                (#9000):
Number of Receive Packets    ( 16):
```

The **Maximum Packet Length** is a "display-only" field and cannot be modified. The **Maximum Pending Requests** and **Socket Number** should not be changed. You should only ever attempt to alter the **Number of Receive Packets**. If the master computer is a NetWare workstation (instead of the NetWare file-server), it may be possible to improve the performance of the network by increasing this parameter in the configuration file for the Global System Manager "master" computer. Try initially to increase this parameter from 16 to 32 receive packets.

Important note: The number of FULL LAN BUFFERS and SHORT LAN BUFFERS defined in the Global configuration file is ignored by the SPX LAN controller. There is absolutely no benefit to be gained from altering these parameters for an NOV-SPX controller.

8.6.1.2 NOV-SPX GSM.INI Initialisation File Options

No entries in the GSM.INI file are required for the NOV-SPX controller.

8.6.2 NOVELL IPX LAN Controller

Console controller "NOVELL" (+JWCF08) uses the NetWare Internetwork Packet Exchange Protocol (IPX). IPX does not guarantee packet delivery. **You are strongly advised to always use the default NOV-SPX controller (see section 8.6.1).** There should be no reason to replace the NOV-SPX SPX controller by the NOVELL IPX controller. The IPX controller will not operate with the Global System Manager NLM which only communicates to workstations via the SPX protocol. This section is included for completeness only. The IPX LAN controller will not be included with future versions of Global System Manager.

8.6.2.1 NOVELL Global Configurator Options

When Global Configurator is used to add or amend a NOVELL controller, the following configuration-specific prompts appear in addition to the standard prompts described in section 3.7 of the Global Configurator Manual:

```
Data Length of Full LAN buffer    ( 2000):
Maximum packet length             ( 400)
Number of receive buffers         ( 3):
Node-id table size                ( 20):
```

None of the values should be changed from their default settings. You **must** update all the configuration files on the network. So both the master computer configuration file on SYSRES, and the workstation configuration file on SYSIPL (in GSMIPL.VOL) must be updated. The LAN executive used with the NOV-SPX controller is not compatible with that used by the NOVELL controller. Using, \$LIB, rename component +JWEF01 to *JWEF01 in both the library +JWNLM on SYSRES and in the library +JWIPL on SYSIPL. If you decide to go back to the NOV-SPX controller, you must remember to rename this component back to +JWEF01 in both libraries.

8.6.2.2 NOVELL GSM.INI Initialisation File Options

No entries in the GSM.INI file are required for the NOVELL controller.

9. Hardware Configuration

This chapter describes how to configure additional (i.e. non MS-DOS) peripherals for use with Global System Manager (Novell NetWare). Chapter 8 describes how to configure MS-DOS resources for use with Global System Manager (Novell NetWare).

When configuring a new peripheral device the guidelines described in Appendix D, Appendix E and Appendix F, and (more importantly) the Computer Technical Reference Manual, should be consulted to prevent conflicting memory addresses (Appendix D), I/O addresses (Appendix E) or interrupt levels (Appendix F).

Note that the phrases "interrupt level" and "IRQ level" are used synonymously in this documentation.

Note also that although the MCA-bus architecture on IBM PS/2 computers (and PS/2 compatibles) includes a "shared interrupt" facility, the Global System Manager (Novell NetWare) device drivers do not currently allow multiple devices to share a common interrupt level.

In addition to hardware details (e.g. switch settings, jumper positions etc.) this chapter describes the controller-specific prompts displayed by Global Configurator.

9.1 Diskette Drives

Global System Manager is normally supplied for computers with one or two 5¼" or 3½" diskette drives (a hard disk is always required, see section 9.2). Global Configurator can be used to change the number of drives and their physical drive numbers. A 5¼" drive can be changed into a 3½" drive or vice versa by removing the diskette formats and entering formats appropriate for the drive. The drives share a common controller called "DISKETTE" (see section 9.1.2).

9.1.1 Diskette Hardware Information

For Global System Manager (Novell NetWare) to be able to determine the number of drives connected to the computer, the switches or CMOS RAM within the computer must be set correctly. Your computer's Technical Reference Manual should be consulted for details of these settings.

Diskettes can be formatted using Global System Manager when running under MS-DOS. **DISKETTES CANNOT BE FORMATTED USING GLOBAL SYSTEM MANAGER WHEN RUNNING UNDER WINDOWS.** Once installed, Global System Manager can be loaded from diskette if required.

Most IBM PC compatible computers include high capacity drives capable of using 1.44Mb or 2.88Mb 3½" diskettes (1.2Mb for 5¼" drives). Any special restrictions concerning diskette compatibility documented in your computer's Operations Guide pertain to Global System Manager also. Some computers that can support high capacity drives mislead Global System Manager (Novell NetWare) into detecting they can't. Global Configurator can be used to force Global System Manager (Novell NetWare) to recognise the high capacity drive by specifying that it is available (see section 9.1.2).

The Global Configuration Notes contain details of the diskette formats that are available on your computer and the unit addresses with which they are standardly associated.

9.1.2 Diskette Global Configurator Options

Direct access controller "DISKETTE" (+JWCA01) is used to access diskettes. When Global Configurator is used to add or amend a DISKETTE controller, the following configuration-specific prompt will appear in addition to the standard prompts described in section 3.3 of the Global Configurator Manual:

```
Diskette drive type
  0 = Dynamically determine
  1 = Low capacity (360K) 5"
  2 = High capacity (1.2M) 5"
  3 = Low capacity (720K) 3"
  4 = High capacity (1.44M) 3"
  5 = Extra high (2.88M) 3"
Specify drive type ( 0):
```

Normally, an explicit drive-type is only required if the device driver is unable to determine the correct diskette drive type from the BIOS. The first DISKETTE drive should be drive 0. Up to 2 diskettes are supported.

Although the diskette controller "FDC" (+JWCA0A) also appears in the Global Configurator help text, this controller is not distributed with Global System Manager (Novell NetWare) and should NOT be used.

The diskette controller "DOS-DISK" (+JWCA0B) is described in section 8.1.

9.2 Hard Disks

Standard Global System Manager (Novell NetWare) configurations include hard-disk volumes simulated by a series of MS-DOS files. The standard hard-disk controllers (SSD-FILE, DOS-FILE and BIOSFILE) are all described in section 8.2. However, to provide compatibility with Global System Manager (BOS), Global System Manager (Novell NetWare) can be configured to use additional "BOS format" hard-disks. This section describes the use of "BOS format" hard-disks as adjuncts to the standard MS-DOS hard-disk(s) which host the Global System Manager (Novell NetWare) simulated volumes.

Global System Manager (Novell NetWare) can operate with a "BOS format" IBM integral hard disk configured as physical drive-1 (the MS-DOS volume will normally be configured as physical drive-0). Global System Manager also provides support for various hard-disks connected to Adaptec SCSI controller cards. Global System Manager will also work with removable disks.

9.2.1 BIOS Hard Disk Controller

The BIOS hard disk controller operates with the standard IBM integral hard disk. This controller also operates with non-IBM disks (e.g. IDE drives) provided that their controller cards are compatible with IBM's in providing a standard BIOS interface. These disks need not be restricted to the sizes used by MS-DOS, because the Global System Manager hard disk controller interrogates the BIOS at startup time to determine the true size of the disk.

9.2.1.1 BIOS Hard Disk Hardware Information

To determine the disk size and geometry Global System Manager interrogates the BIOS. The BIOS in its turn deduces the size from the disk type specified by the setup program (or reference diskette for a

PS/2) supplied with the computer. This reliance on the BIOS information results in some of the restrictions described in section 9.2.1.3.

Global System Manager cannot be loaded from a BIOS hard-disk.

9.2.1.2 BIOS Hard Disk Global Configurator Options

Direct access controller "DISK" (+JWCA04) is used to access BIOS hard disks. When Global Configurator is used to add or amend a DISK controller, the following configuration-specific prompts will appear in addition to the standard prompts described in section 3.3 of the Global Configurator Manual:

```
Dynamic size of disk
0 = use configuration file
1 = determine at bootstrap           ( 1):
BOS partition start track           ( 1):
Interleave factor                    ( 0):
```

Normally the disk size is dynamically determined at bootstrap time unless disk partitioning (using Global Configurator) is being employed (see section 9.2.1.7.1). The Global System Manager partition start track is always 1, unless compatibility with obsolete pre-V6.0 hard-disks is required. The interleave factor is only used by the Format operation and should normally be left at 0.

The hard-disk format must be P88Z. The first DISK drive should be drive 0. Up to 2 BIOS hard disks are supported.

9.2.1.3 Restrictions in the BIOS Interface

Because Global System Manager relies on a BIOS call (INT 13h, Function 08H "Get Drive Parameters") to return the hard-disk size information, the size of disk usable by Global System Manager is restricted by the limits imposed by the BIOS interface. In practice, the following restrictions apply:

```
Maximum number of cylinders          1024
Maximum number of heads              256
Maximum number of sectors            63
```

In addition to the limitations imposed by the BIOS, Global System Manager contains some further restrictions:

```
Maximum number of tracks (i.e. heads * cylinders) 65535
Maximum number of heads                          255
```

In general, if a parameter for a particular disk drive exceeds the limit imposed by the BIOS or Global System Manager, the parameter will be reduced to the limiting value. This will, in turn, result in a reduction in the effective capacity of the hard-disk as evidenced by a \$U report, for example.

Furthermore, Global System Manager will only recognise a hard-disk if the sector size is 512 bytes. The largest capacity disk supported by Global System Manager is 2Gb.

For some hard-disk interfaces (e.g. ESDI; **but not IDE drives**) it is possible to define a virtual disk geometry used by the BIOS, and hence by Global System Manager, that avoids the restrictions that would apply if the physical disk geometry was being used.

In practice, it has been found that the limit of 1024 cylinders debilitates the use of Global System Manager with some large IDE hard-disk drives (i.e. the Global System Manager domain is restricted to just the first 1024 cylinders).

9.2.1.4 Reinstallation of MS-DOS Bootstrap onto a BIOS Hard Disk

If Global System Manager is installed onto a hard disk so that Global System Manager boots from the hard disk it is not usually possible to re-install an MS-DOS bootstrap directly on top of the Global System Manager bootstrap. To re-install MS-DOS on a disk previously entirely occupied by Global System Manager you must re-format the first track on the disk using the track formatting option of \$V. Once you have formatted the first track (cylinder/head = 0000/00) MS-DOS can be installed as normal.

Alternatively, if reformatting the first track is not possible, because hard-disk formatting is forbidden, the following zap may be applied to unit 200 directly (using \$ZAP - see section 6.4 of the Global System Manager Manual):

```
ZZZZZZ
BBBBBB
QKMYKM
WVSYKB
YFKLVV
DNKTPZ
```

9.2.1.5 Removable BIOS Hard Disks

Global System Manager will operate with removable disks but if disk cacheing is being used, the =.56nn disk customisation option (see section 5.5.2) must be used to inform Global System Manager about the removable disks and disable cacheing on those disks.

Flagging disks as removable disks is best done **after** installation because the =.56nn customisation utility cannot change a removable disk back to a fixed disk. However, running the configuration file through Global Configurator automatically resets all disks back to fixed disks.

9.2.1.6 Formatting BIOS Hard Disks

It is generally best to use the manufacturer's own format program to prepare the hard disk. The manufacturer's program will normally perform a more extensive surface analysis of the disk than the format and verify option in \$V (see section 4.9.3). Following a manufacturer's format, areas of the disk which are unreliable but occasionally readable will have been specially marked to return an error.

Global System Manager can be used to reformat the entire hard disk. Furthermore, individual tracks can also be formatted.

Note that the MS-DOS program FORMAT.COM does **NOT** perform a low level format and analysis of the hard disk. It simply notes which parts of the disk are readable and creates an MS-DOS directory and File Allocation Table.

Some disks are pre-formatted and require no further formatting. **DO NOT ATTEMPT TO REFORMAT AN IDE HARD-DISK DRIVE.** Once a disk has been formatted by the manufacturer's format program the "Amend domain error

map" function of \$V should be used followed by "Initialise" to prepare the Global System Manager domain (see section 4.9).

9.2.1.7 Partitioning BIOS Hard Disks

Note that although it is not generally useful to partition a second hard-disk between BOS and MS-DOS when the first disk is also an MS-DOS format disk, Global System Manager does not forbid such an esoteric configuration. Furthermore, it is also possible to configure a single hard-disk both as a simulated volume (see section 8.2) and a split "BOS format" hard-disk using, for example, the "SSD-FILE" controller to access the MS-DOS simulated volume (domain 200) and the "DISK" controller to access the "BOS partition" on the same disk (domain 250).

The following sections have been extracted from the Global Operating Manual (BOS on IBM PC compatibles) for completeness only:

Disk partitioning **MUST** be performed before Global System Manager is installed.

9.2.1.7.1 Partitioning BIOS Hard Disks using Global Configurator

Global Configurator can be used to enable disk partitioning on any BIOS disk providing dynamic disk sizing is **NOT** being used. The start and end head and cylinder are entered for each disk, care being taken to allow a track for the domain error map which resides before the start of the partition. For example:

```
Dynamic size of disk
  0 = use configuration file
  1 = determine at bootstrap          ( 1):0
BOS partition start track            ( 1):1
Interleave factor                    ( 0):<CR>

VOLUME FORMAT ( ) :P88Z IBM PC XT/AT FIXED DISK
MAXIMUM NUMBER OF FILES ( 99) :
NUMBER OF SUBUNITS ( 29) :
  UNIT NUMBER ( 200) :<CR>
  VOLUME START ADDRESS -
    CYLINDER ( 0) :100 HEAD ( 1) :0
  VOLUME END ADDRESS -
    CYLINDER ( 405) :299 HEAD ( 3) :3
```

THIS TECHNIQUE IS OBSOLETE AND SHOULD NOT BE USED.

9.2.1.7.2 Partitioning BIOS Hard Disks using =.56nn

The recommended technique for disk partitioning is to use the =.56nn customisation utility. Dynamic disk sizing (i.e. the default) **MUST** be defined in the configuration file. Details of attached disks are displayed and you are prompted for where you require the Global System Manager area of the disk to start. The Global System Manager area will always be at the end of the disk. Room for the Global System Manager domain error map is automatically provided.

The hard disk must be partitioned to allow the co-existence of Global System Manager with MS-DOS (or related operating systems). The hard disk is divided using FDISK.COM, supplied with the computer as part of MS-DOS. FDISK allows the size of the MS-DOS partition to be specified in megabytes so a conversion from a partition address in megabytes to a cylinder number must be performed (note that early versions of FDISK allowed the number of cylinders used by MS-DOS to be specified). If =.56nn is being used to partition the disk, Global System Manager **MUST** always be the last partition on the disk.

If the partitioned disk contains Global System Manager, it must be bootstrapped from diskette when using a partitioned disk, so you must respond N when prompted for a hard disk bootstrap during the installation of Global System Manager (see section A.11 of Appendix A). If you wish to make MS-DOS boot automatically from hard disk you must make the MS-DOS partition 'active' by using FDISK.

The formatting of the disk and the allocation of partitions with FDISK must be done before installing Global System Manager. When the disk is being shared in this manner **do not** attempt to format the entire disk using Global System Manager. The single-track formatting facilities of Global System Manager may be used to re-format bad tracks but care should be taken to format tracks only within the Global System Manager partition.

9.2.2 Tandon Personal Data Pack (PDP)

Global System Manager (Novell NetWare) does not provide support for either the original Tandon Personal Data Packs or the Tandon Data PAC-II.

9.2.3 OMTI 510 SCSI Disks

Global System Manager (Novell NetWare) does not provide support for SCSI disks attached to the OMTI 510 host adapter card. Note that the OMTI 510 card is considered obsolete and has been superseded by faster SCSI host adapter cards such as the Adaptec range (see section 9.2.4). Although the hard-disk controller "OMTI 510" (+JWCA07) appears in the Global Configurator help text, this controller should NOT be used.

9.2.4 Adaptec SCSI Disks

The Adaptec SCSI has emerged as a common hard disk interface for several families of IBM PC compatible computers. When a SCSI hard disk is configured as an integral device, it is normally accessed using the standard BIOS controller (see section 9.2.1). However, if the hardware configuration includes a SCSI tape-drive attached to the same Adaptec host-adapter card as the hard-disk AND the tape-drive is to be accessed using either \$TAPE or \$TDUMP (via the Global System Manager SCSI tape driver - see section 9.3.2), the Global System Manager SCSI hard-disk driver **MUST** be used to access the SCSI hard-disk. Also, the Global System Manager SCSI hard-disk driver **MUST** be used to access the SCSI hard-disk if the capacity is 2Gb, or larger, and requires partitioning. Notwithstanding, some **slight** speed improvement may be gained by accessing an integral SCSI disk using the Adaptec hard-disk controller. **Only the SCSI host adaptor cards described in section 9.14 are supported by Global System Manager.**

Global System Manager provides support for both SCSI hard-disks and tape drives accessed via the SCSI host adapter card. This section just describes SCSI hard-disks. Other sections describe SCSI tape drives (9.3.2) and the host adapter card itself (9.14)

9.2.4.1 Adaptec SCSI Disks Hardware Information

The controller normally uses 4 bytes at I/O address #330 (see section 9.14 for further details). Any interrupt or memory-address can be used providing it does not clash with other cards (see Appendix D, E and F).

Global System Manager can be bootstrapped from an Adaptec SCSI disk provided the SCSI id is set to 0 AND the Adaptec BIOS is enabled. The disk size is determined dynamically at bootstrap time.

The Adaptec SCSI hard-disk device driver uses the SCSI class-1 READ and WRITE commands both of which include a 32-bit Logical Block Address field in the command block allowing any size of hard-disk to be used with Global System Manager. However, if the capacity of the hard-disk is 1Gb, or larger, volume format P259Z (with a logical track size of 32Kb) **MUST** be used. If the capacity of the hard-disk is less than 1Gb, volume format P259Z, P249Z or P246Z (both with a logical track size of 16Kb) can be used.

To summarize, the following Volume Formats may be used with the ADAPTEC hard-disk controller:

Volume format	Track size	Comments
P246Z	16 Kb	Default volume type. Included in all standard configuration files that contain the ADAPTEC hard-disk controller.
P249Z	16 Kb	Alternative to P246Z. Note that volume format P249Z is incompatible with P246Z (see below).
P259Z	32 Kb	Volume format for use with SCSI disks 1Gb (or larger) and partitioned SCSI disks.

Important notes: If \$TAPE is being used to save from, or restore to, a P259Z format hard-disk, the Tape Buffer Length **MUST** be customised to 16384. The default value of 0 cannot be used as this would result in \$TAPE attempting to use the track size (i.e. 32768 bytes) which is larger than the maximum Tape Buffer Length supported by \$TAPE (i.e. 32767 bytes).

The initialisation code in the ADAPTEC hard-disk controller, +JWCA09, did not always size the hard disk correctly (i.e. it did not calculate accurately the difference between the actual disk capacity and the default capacity in the configuration data). As a result of this error the last 23 sectors (11.5Kb) of the data portion of the disk overlay the first alternate track. **Thus, if a SCSI hard-disk (format P246Z) is completely full of data and an alternate track is allocated, data corruption will occur when the alternate track is used.** Although this problem has been fixed, the corrected disk-sizing algorithm (which is incompatible with the original, incorrect disk-sizing algorithm) only applies to volume formats P249Z and P259Z. The original, incorrect disk-sizing algorithm continues to be used for volume format P246Z disks: If the corrected algorithm is applied for P246Z disks, a VOLUME TYPE error will occur when attempting to access existing P246Z format hard-disks. Unless, compatibility with a P246Z hard-disk is required, volume formats P249Z and P259Z are recommended. Standard Global System Manager V8.1 configurations continue to be distributed with volume format P246Z to provide compatibility with earlier versions.

Finally, if the capacity of the hard-disk is 2Gb, or larger, the SCSI hard-disk **MUST** be partitioned before it can be used by Global System Manager (see section 9.2.4.3).

9.2.4.2 Adaptec SCSI Disks Global Configurator Options

Direct access controller "ADAPTEC" (+JWCA09) is used to access hard disks connected to an Adaptec SCSI host adapter card. When Global

Configurator is used to add or amend an ADAPTEC controller, the following configuration-specific prompt will appear in addition to the standard prompts described in section 3.3 of the Global Configurator Manual:

```
Partition number ( 0):
```

The Partition number should be 0 if the hard-disk is non-partitioned. Partitioned SCSI hard-disks are described in section 9.2.4.3.

The DRIVE number specified in the configuration file must correspond to the SCSI-id of the hard-disk. Up to 7 ADAPTEC hard disks are supported.

In addition to including "ADAPTEC" in the Direct Access Controller section of the configuration file, the Adaptec Nucleus component (see section 9.14) must be enabled in the Nucleus Options section of the configuration file.

9.2.4.3 Partitioning Adaptec SCSI Hard Disks

SCSI disk partitioning **MUST** be performed before Global System Manager is installed. **Disk partitioning is mandatory for SCSI disks of capacity 2Gb, or larger.** Partitioning is optional for SCSI disks that are smaller than 2Gb. The Global System Manager SCSI disk partitioning mechanism is incompatible with disk partitioning schemes for other operating systems (e.g. MS-DOS, SCO Unix) thus it will not allow a disk to be split between Global System Manager and SCO Unix, for example. Note also that the SCSI disk partitioning mechanism is completely independent from the "traditional" BIOS disk partitioning schemes described in section 9.2.1.7.

In order to partition a SCSI hard disk, the following steps must be followed (this procedure assumes the computer is configured with a single SCSI hard-disk):

1. Load Global System Manager from the BACRES starter diskette with a configuration file that includes a **non-partitioned** SCSI hard-disk (i.e. the default configuration for all standard SCSI Global System Manager (BOS) systems). The non-partitioned disk configured on SCSI-id 0 will appear as unit 200;
2. Quit the installation of Global System Manager by replying Q to the prompt described in section A.2 of Appendix A;
3. Use the =.56nn customisation utility to create a partition map on the hard-disk as described in section 5.10;
4. Use \$V to initialise domain 200 and allocate a small (500Kb) work volume. This work volume will only be required to update the standard configuration file and will disappear once the hard disk has been successfully partitioned;
5. Copy the contents of the Global Configurator CFA diskette to the hard-disk work volume. Copy the configuration file and the A.JW action file from the BACRES diskette to the hard-disk work volume;
6. Use Global Configurator to update the standard configuration file, setting the Partition number in the ADAPTEC controller section of the configuration file nonzero to indicate a partition

on a partitioned disk. **THE VOLUME FORMAT MUST BE P259Z FOR A PARTITION ON AN ADAPTEC SCSI DISK.** For example, to split a single hard-disk (with a SCSI-id of 0) into 3 partitions, matching the example given in section 5.10, the configuration file should contain the following entries:

```
CONTROLLER (ADAPTEC) :<CR> Adaptec SCSI disk
  DRIVE ( 0 ):0
  DESCRIPTION (1ST ADAPTEC SCSI DISK ) :1ST PARTITION
  Partition number ( 0 ):1

VOLUME FORMAT ( ) :P259Z ADAPTEC SCSI DISK > 1GB
MAXIMUM NUMBER OF FILES ( 99 ) :250
NUMBER OF SUBUNITS ( 49 ) :29
  UNIT NUMBER ( 200 ) :<CR>
  VOLUME START ADDRESS -
    CYLINDER ( 0 ) :<CR> HEAD ( 1 ) :<CR>
  VOLUME END ADDRESS -
    CYLINDER ( 499 ) :<CR> HEAD ( 15 ) :<CR>
  VOLUME FORMAT ( ) :<CR>

CONTROLLER (ADAPTEC) :<CR> Adaptec SCSI disk
  DRIVE ( 1 ):0
  DESCRIPTION (1ST ADAPTEC SCSI DISK ) :2ND PARTITION
  Partition number ( 0 ):2

VOLUME FORMAT ( ) :P259Z ADAPTEC SCSI DISK > 1GB
MAXIMUM NUMBER OF FILES ( 99 ) :250
NUMBER OF SUBUNITS ( 29 ) :29
  UNIT NUMBER ( 230 ) :<CR>
  VOLUME START ADDRESS -
    CYLINDER ( 0 ) :<CR> HEAD ( 1 ) :<CR>
  VOLUME END ADDRESS -
    CYLINDER ( 499 ) :<CR> HEAD ( 15 ) :<CR>
  VOLUME FORMAT ( ) :<CR>

CONTROLLER (ADAPTEC) :<CR> Adaptec SCSI disk
  DRIVE ( 1 ):0
  DESCRIPTION (1ST ADAPTEC SCSI DISK ) :3RD PARTITION
  Partition number ( 0 ):3

VOLUME FORMAT ( ) :P259Z ADAPTEC SCSI DISK > 1GB
MAXIMUM NUMBER OF FILES ( 99 ) :250
NUMBER OF SUBUNITS ( 29 ) :29
  UNIT NUMBER ( 260 ) :<CR>
  VOLUME START ADDRESS -
    CYLINDER ( 0 ) :<CR> HEAD ( 1 ) :<CR>
  VOLUME END ADDRESS -
    CYLINDER ( 499 ) :<CR> HEAD ( 15 ) :<CR>
  VOLUME FORMAT ( ) :<CR>
```

Note that the DRIVE number remains fixed for all the partitions on the same disk (only the partition number changes). Beware: Global Configurator is not intelligent enough to realise that the multiple ADAPTEC controller entries are for a partition disk and blindly attempts to increment the default drive number (which is sensible behaviour only for physically different disks).

Note also that the VOLUME START ADDRESS and VOLUME END ADDRESS values are dynamically determined by the controller software and should be left at the default values in the configuration file.

7. When the configuration file has been updated, copy it from the hard-disk work-volume to the BACRES diskette and reload Global System Manager from the BACRES starter diskette. Three hard-disk domains at addresses 200, 230 and 260, should appear in the \$U report.

When installing Global System Manager you should be aware that it is only possible to bootstrap from the first partition (i.e. partition number 1) on a partitioned SCSI disk.

In multiple SCSI hard-disk configurations it is possible to partition more than one disk. For example, to split the first SCSI hard-disk (SCSI-id = 0) into 3 partitions and the second SCSI hard-disk (SCSI-id = 1) into 2 partitions the following DRIVE number/Partition number combinations are required:

DRIVE 0	Partition number 1	1st disk, 1st partition
DRIVE 0	Partition number 2	1st disk, 2nd partition
DRIVE 0	Partition number 3	1st disk, 3rd partition
DRIVE 1	Partition number 1	2nd disk, 1st partition
DRIVE 1	Partition number 2	2nd disk, 2nd partition

9.2.4.4 Formatting Adaptec SCSI Hard Disks

Although \$V can be used to perform a Drive Format operation on a SCSI hard disk you are **STRONGLY** advised to use the Adaptec format utilities (as described in the Adaptec documentation) to reformat a SCSI hard-disk.

9.2.5 ESDI and other large Disks

These disks are treated as standard hard disks (see section 9.2.1). The standard BIOS functions impose a limit on the size of the disk that can be supported (see section 9.2.1.3). In particular, the BIOS interface only allows a 10-bit cylinder address to be specified, restricting the number of cylinders to 1024 on any disk that is accessed via the "DISK" controller.

9.2.6 Baydel S-CACHE Hard Disk Controller

Global System Manager (Novell NetWare) does not provide support for SCSI disks attached to the Baydel cached SCSI host adapter card.

9.3 Tape Drives

This section describes the tape drives that can be accessed using the Global System Manager (Novell NetWare) \$TDUMP utility. The Global Tape Utility (\$TAPE) Manual, supplied with the \$TAPE product, describes the tape drives that can be used with \$TAPE.

The standard tape drive device drivers supplied with Global System Manager (Novell NetWare) are used by the \$TDUMP utility via the RAM disk interface. This requires that enough memory be left over after the allocation of user memory banks for a RAM disk to be available. In some configurations where this is impractical for normal multi-user operation the number of memory banks can be temporarily reduced using Global System Manager customisation when tape dumping is required. Only a small amount of RAM disk is actually required but the performance of the tape will improve significantly if more RAM disk is available.

If problems are experienced installing the tape drives it is useful to check the hardware using the MS-DOS software distributed with the drive.

9.3.1 Wangtek and Everex QIC-02 Controllers and Drives

The following sections describe how to set up and use QIC-02 tape drives and controllers produced by Everex and Wangtek. The "Quarter-inch committee" define a number of standards that apply to tapes:

- QIC-02 Describes the command set from the host computer to the controller card in the PC;
- QIC-36 Defines the interface between the controller card in the PC and the tape drive;
- QIC-24 Defines the way in which data is written to the tape on 60Mb drives.
- QIC-120 Defines the way in which data is written to the tape on 120Mb drives.
- QIC-150 Defines the way in which data is written to the tape on 150Mb drives.

\$TDUMP does not work successfully with all controller cards that claim to be QIC-02 compatible. For example, \$TDUMP does not work with the Viper QIC-02 cards produced by Archive (although \$TAPE **does** work with the ISA-bus Archive Viper QIC-02 tape sub-system). \$TDUMP operates with QIC-02 cards produced by Everex and Wangtek, **except that Wangtek PS/2 Microchannel cards are not supported.**

Until recently tape drives supplied with QIC-02 controller cards all conformed to the QIC-36 interface. Wangtek, however, have introduced a new controller card/drive pairing which does not use the QIC-36 interface. Intelligence has been moved from the controller card plugged into the PC to electronics on the tape drive. Unfortunately old cards can be connected to new drives and vice versa (the cables and connectors used have stayed the same) but they will not work together - beware!

Wangtek and Everex tape drives are available, capable of producing QIC-24 (60Mb), QIC-120 (120Mb), QIC-150 (150Mb) tapes. Everex Corp. sell these under the names Excel Stream 60, 125 etc. Wangtek sell these under the names Wangtek/60, /125 etc.

Note: Global System Manager (Novell NetWare) does not support any tape drives that are controlled by the floppy diskette controller. Devices of this form are sold by Irwin, IBM and a number of other suppliers and use DC1000 and DC2000 tapes. These drives normally have a capacity of 20 or 40Mb.

9.3.1.1 QIC-02 Tape Drives Hardware Information

The interrupt level, DMA channel and port address must be set up using Global Configurator or the =.56nn customisation utility. The defaults are interrupt level 3, DMA channel 1 and port address #300.

Switch bank SW1, which may have 9 or 10 switches, sets up the port address. On Wangtek and Everex QIC-36 cards, SW1-10 is not used and should be set off. To set the switches for address #300 first translate the address into binary (i.e. 1100000000) and then discard the least significant bit (i.e. 110000000). Then set the switches using the convention that off=1 and on=0 with SW1-9 the most significant bit:

ON X X X X X X X

```

OFF          X X X
 1  2  3  4  5  6  7  8  9 10
    
```

On Everex QIC-02 cards the port address select switches have been redefined so that switches SW1-1 to SW1-9 on the QIC-36 card map onto switches SW1-2 to SW1-10 on the QIC-02 card. SW1-1 is not used. Thus, to configure a QIC-02 card for port address #300, set the switches as follows:

```

ON   X X X X X X X X
OFF          X X
 1  2  3  4  5  6  7  8  9 10
    
```

A bank of 12 jumpers is used to establish the interrupt level and DMA channel. The first set of 6 are used to set the interrupt level. The second set of 6 are used to establish the DMA channel and are subdivided into 2 groups of 3. The jumpers would be set up as follows for interrupt level 3 and a DMA level of 1:

Interrupt Level						DRQ			DACK		
2	3	4	5	6	7	1	2	3	1	2	3
.	X	X	.	.	X	.	.
1	2	3	4	5	6	7	8	9	10	11	12

In addition there are 2 jumpers which should both be off if DMA 1 is being used and on for DMA 3. The jumpers are called DACK3EN and DRQ3EN.

One of the common problems encountered when installing tape drives causes the tape software to report an error status of "FFFF". This is a timeout error normally caused by a conflict between the tape interrupt level and the level of some other device. Moving the tape to a free interrupt level solves the problem. Newer versions of the \$TDUMP tape controller return an error number (between 1 and 16) when a time-out error occurs.

A version of the Everex tape hardware is also available for the PS/2 Micro Channel bus. A flag must be set in the configuration file to indicate whether the software is running on a Micro Channel or not. The address and interrupt level are set up using the IBM reference diskette and options file. If a DSP ARC-500 card is configured in the computer, address #300 will not be available. #7FF0 can be used as an alternative.

The PS/2 Micro Channel MS-DOS software supplied with the tape drive alters the values set up by the reference diskette, so if this software has been used you may need to check that the values are still those expected.

9.3.1.2 QIC-02 Tape Drives Global Configurator Options

Tape controller "CD-TAPE" (%.JWCT01) is used by \$TDUMP to access QIC-02 tape drives. When Global Configurator is used to add or amend a CD-TAPE controller, the following computer-specific prompts will appear in addition to the standard prompts described in section 3.5 of the Global Configurator Manual:

```

Default tape length in feet      ( 600):
4K blocks per track              ( 1670):
    
```

```

Number of tracks          ( 9):
Tape flag                (#83)
Tape Port Address        (#0300):
DMA port 1 or 3          ( 1):
Interrupt level 2-7      ( 3):
Micro Channel Bus?       (N):

```

The size of the tape is specified as follows:

Capacity	Number of Tracks	Blocks per Track
60 Mb	9	1706
125 Mb	12	2505
150 Mb	18	1820

Note that only the first 127.9Mb of a 150Mb tape can be accessed using \$TDUMP.

The Tape Port Address, DMA Port and Interrupt level must agree with switch settings on the controller card (see section 9.3.1.1). The Micro Channel Bus flag must be set to N for ISA- and EISA-bus computers or Y for MCA-bus computers.

Note that tape controller "VIPER" (JWCT08) is used for the \$TAPE Archive Viper QIC-02 controller (see the Global Tape Utility (\$TAPE) Manual for further details).

9.3.1.3 Tapes

The correct kind of tape must be used to achieve the best performance.

Drive	Number of Tracks	Tape Type
60Mb	9	DC600A
120Mb	12	DC600A, DC600XTD or DC6150
150Mb	18	DC600XTD, DC6150 or DC6250
250Mb	18	DC6250

9.3.2 SCSI Tape Controllers and Drives

The following sections describe how to set up and use the following tape drives:

Tape Drive	Capacity (Mb)
Archive Viper 2060S	60
Archive Viper 2125S	125
Archive Viper 2150S	150 (or 250Mb with DC6250 tapes)

All three drives operate using the SCSI interface.

The Wangtek 5099ES, 5125ES and 5150ES SCSI tape drives are not supported under \$TDUMP although all three Wangtek drives are supported by \$TAPE.

Important note: There is an intractable problem when using \$TDUMP with a SCSI tape drive when Global System Manager is loaded under Microsoft Windows. Although the \$TDUMP SCSI tape controller functions correctly when Global System Manager is loaded under MS-DOS, the memory management of Windows prevents the controller communicating with the Adaptec hardware correctly. **DO NOT ATTEMPT TO USE \$TDUMP WITH A SCSI TAPE UNDER WHEN RUNNING GLOBAL SYSTEM MANAGER UNDER WINDOWS.**

9.3.2.1 Archive Viper Hardware Information

The SCSI-id of the tape drive is normally set to 6, parity on the SCSI bus must be enabled, and the SCSI disconnect size must be set to 16K. These settings are controlled by jumpering pins on the rear of the drive. The pins are arranged in a pad of three pins high and six pins wide. The diagram below indicates which pins should be connected by jumpers and assumes that you are viewing the drive from the rear with SCSI cable connector to the right of the jumper pad:

```

Column
      1   2   3
  1 . . .-. -.
Row 2 . . . . -.
      3 .-. .-. . .

```

The jumper in column 1 row 3 enables SCSI parity. The two jumpers in column 2 set the SCSI disconnect length to 16Kb. The two jumpers in column 3 set the SCSI-id to 6. The SCSI-id can be set to other values if necessary by installing other jumpers in column 3.

```

SCSI-ID
      0  1  2  3  4  5  6  7
Row 1 .  .  .  .  x  x  x  x
Row 2 .  .  x  x  .  .  x  x
Row 3 .  x  .  x  .  x  .  x

```

Please note that Archive Corp., the manufacturers of the Viper drives, have recently provided additional information concerning the revision levels and serial numbers of these drives. The serial number is to be found on a label on the side of the drive next to the motor. Drives with serial numbers that start with the single letter "M" (e.g. M782676) contain a very early revision of the firmware. Drives with serial numbers that start with the two letters "AA" (e.g. AA123944) contain a more recent, improved revision of the Archive firmware. Although there are no known problems using \$TDUMP on the older versions of the Archive Viper drive we recommend that a firmware upgrade is applied to drives with an "M" serial number.

9.3.2.2 Archive Viper Global Configurator Options

Tape controller "ADAPTEC" (%JWCT02) is used by \$TDUMP to access Archive Viper SCSI tape drives. When Global Configurator is used to add or amend an ADAPTEC controller, the following configuration-specific prompts will appear in addition to the standard prompts described in section 3.5 of the Global Configurator Manual:

```

Default tape length in feet          ( 600 ):
Drive SCSI I.D.                      ( 6 ):

```

The Default tape length should normally be left at 600. The SCSI-id should match the jumper settings on the tape drive.

The Adaptec SCSI host adapter must be accessed directly by Global System Manager (Novell NetWare) when performing both disk and tape I/O. Consequently, you must use Global Configurator to specify the controller used for disk access to ADAPTEC (see section 9.2.4.2). Finally, you must answer Y to the "Adaptec controller required" prompt in the nucleus options section of the configuration file (see section 9.14).

Note that tape controller "AHA-TAPE" (JWCT03) is used for the \$TAPE SCSI tape controller (see the Global Tape Utility (\$TAPE) Manual for further details).

Note also that although tape controller "ASPI" (JWCT09) appears in the Global Configurator help text, this controller is still under development.

9.3.2.3 Tapes

The correct kind of tape must be used to achieve the best performance:

Drive	Number of Tracks	Tape Type
Viper 2060S	9	DC600A
Viper 2125S	12	DC600A, DC600XTD or DC6150
Viper 2150S	18	DC600XTD, DC6150 or DC6250

DC600A tapes may be used with all drives:

Tape Drive	Capacity of DC600A tape (Mb)
Archive Viper 2060S	60
Archive Viper 2125S	125
Archive Viper 2150S	125

9.4 Integral Screens

All standard Global System Manager (Novell NetWare) configurations include an integral screen controller that interfaces to the BIOS. An alternative integral screen controller that uses MS-DOS function calls is described in section 8.3.1.

Global System Manager (Novell NetWare) automatically configures itself for use with both monochrome and colour screens. Terminal type 509, 519, 544 etc. should be used on IBM integral screens (see the Global Configuration Notes for more details). Terminal type 509 should be used for monochrome screens, 519 should be used for colour screens or for monochrome screens that emulate colour screens, and 544 should be used for screens with a non-standard screen size (see section 9.4.2).

9.4.1 Integral Screen Global Configurator Options

Console controller "CONSOLE" (+JWCB01) is used to access the integral screen and keyboard. When Global Configurator is used to add or amend a CONSOLE controller, the following configuration-specific prompts will appear in addition to the standard prompts described in section 3.4 of the Global Configurator Manual:

```

Start raster line for cursor          ( 0 ):
End raster line for cursor            ( 0 ):
Specify keyboard language type
  0 = U.S. (no translation)
  1 = U.K.
  2 = German
  3 = Danish #1
  4 = Danish #2
  5 = Finnish
  6 = Icelandic
  7 = French
  8 = Triumph Adler
  9 = Turkish

```

```

10= Icelandic (TAP 534/535)
Specify translation attributes
  bit 0 = keyboard translation
  bit 1 = screen translation
  bit 2 = caps lock extra keys
  bit 3 = keypad "+" as <CR>
  bit 4 = DEL key #7F
  bit 5 = enable prefix key
  bits 6 and 7 reserved
Hex code generated by prefix
Narrow screen mode number
Wide screen mode number
Narrow screen width
Wide screen width
Polled keyboard operation?
Concurrent controller (1,2,3)

```

(1) :

(#13) :

(#00) :

(#00) :

(#00) :

(0) :

(0) :

(N) :

(2) :

The position and size of the cursor used by the integral screen can be changed by specifying different scan lines for the start and end of the cursor. The changes can also be applied using the Screen Customisation option in the =.56nn customisation utility (see section 5.3.2).

The "keyboard language type" and "translation attributes" are described in Keyboard Customisation section of =.56nn (see section 5.4). The standard software is configured for use with the UK keyboard. Changes to the keyboard language type can be carried out at any time, before or after installation. Note that the keyboard translation tables are not contained within the +JWCB01 console controller but are loaded in a separate nucleus module, +JWNKEY.

The "Hex code generated by the prefix key" should be left at #00.

The "Narrow screen mode number", "Wide screen mode number", "Narrow screen width" and "Wide screen width" are described in section 9.4.2).

The "Polled keyboard operation" should normally be disabled. However, enabling polled keyboard operation may prevent character loss when, for example, an MS-DOS TSR program, accessing a serial port, is being used to simulate keyboard input. If you are using Global System Manager (Novell NetWare) on a non-dedicated NetWare fileserver, you **must** enable polled keyboard operation.

The Global System Manager (Novell NetWare) integral screen controller operates in one of three modes. In mode #1, the controller will work on all IBM PC compatibles but should only be used as a last resort if the other two controllers do not work. Standard systems use controller mode #2 which will work on most IBM PC compatibles but may cause flicker on some CGA screens. Controller mode #3 solves the problem of screen flicker but will not work on all compatibles. In general, controller mode #2 is the fastest controller and mode #1 is the slowest. The "concurrent controller" prompt determines the controller mode. Since some modes do not work on some screens, it is best to make any changes **after** installation so that the computer can still be bootstrapped from the distribution diskettes. The changes can be made by either Global Configurator or by the Screen Customisation option in the =.56nn customisation utility (see section 5.3.1).

The alternate console controllers "DOS-SCR" (+JWCB09), "SPX" (+JWCB0A) and "WINTTY" (+JWCB0B) are all described in section 8.3.

9.4.2 Non-standard Screen Sizes

Standard configurations include an integral screen which is 80 characters in width and 25 lines deep of which one line is used by the status line to give an image depth of 24 characters. Some video controller cards can support different sizes and, if changes are made to the configuration file, Global System Manager (Novell NetWare) can use these too, **but only when operating with screen controllers #1 or #2**. Some video-cards support non-standard sizes in a non-standard way and these boards are not supported by Global System Manager (Novell NetWare). The VEGA VGA card from Video Seven is an example of a card on which Global System Manager (Novell NetWare) does not support non-standard screen sizes.

Global System Manager (Novell NetWare) assumes the screen is either 80 or 132 characters wide and allows the user to move between the two if a TAP is used that specifies "wide screen" (e.g. \$.544).

The depth of a screen must match the value in the Terminal Attribute Program (TAP) being used. Standard TAPs are only supplied for those screens that are 25 characters deep for the integral screen (e.g. 509, 519 and 544). If other screen depths are required new TAPs must be created using \$TAP as described in the Global Screen Support Manual.

If you want to use a wide screen or a non-standard screen size, first refer to the manufacturer's documentation for your video controller card. Each card will have a number of different "Text Modes" which are identified by a mode number and specify different screen sizes. Different makes of board have a different set of mode numbers and screen sizes.

If your card supports a mode with 132 by 25 characters you will be able to use the wide screen TAP 544. Use Global Configurator to enter the mode numbers for the normal mode (80 by 25) and the wide mode (132 by 25). Also, enter the normal and wide width values which will be 80 and 132. Then use either Global Configurator or \$CUS to enter the maximum image width (132) and image depth (24).

If you wish to use any other non-standard sizes you will need to create a new TAP if the screen depth is not 25. For example to use an 80 by 60 screen, create a new TAP with dimensions of 80 by 59 and update the screen image in \$CUS. Also enter the mode number and width of the screen in the configuration file.

The only two video cards that are supported by Global System Manager (Novell NetWare) in wide mode are the Wyse WY-450 and WY-425 VGA adapter cards. The Global Configurator options for both these cards are described below.

9.4.2.1 WY-450 VGA Adapter

The extended screen modes for this adapter card are as follows:

Mode Number	Columns	Lines
#03	80	25
#22	132	44
#23	132	25
#24	132	28
#26	80	60

#43	80	43
#50	80	50

To use the wide screen TAP 544 for 132 column work, Global Configurator must be used to change the screen width and mode parameters as follows:

Narrow screen mode number	(#00):03
Wide screen mode number	(#00): <u>23</u>
Narrow screen width	(0):80
Wide screen width	(0): <u>132</u>

9.4.2.2 WY-425 VGA Adapter

To use the wide screen TAP 544 for 132 column work, Global Configurator must be used to set the wide mode to number #FF and the wide width to 132 characters. The normal mode and width should be left as zero so that the default 80 by 25 mode is selected:

Narrow screen mode number	(#00):<CR>
Wide screen mode number	(#00): <u>FF</u>
Narrow screen width	(0):<CR>
Wide screen width	(0): <u>132</u>

9.4.3 Terminal Attribute Programs (TAPs) for Windows

Several Terminal Attribute Programs (TAPs) are available for use in conjunction with the "CONSOLE" controller when Global System Manager is running under MS-DOS or in "full screen mode" under Windows. A full list of suitable TAPs is included in the Global Configuration Notes.

When Global System Manager is running in "window mode" under Windows the choice of available TAPs is restricted to the following:

\$.585	Windows terminal (monochrome)
\$.586	Windows terminal (colour)

9.5 Serial Screens

The multi-user versions of Global System Manager (Novell NetWare) utilise the integral screen and a number of additional serial screens. Serial screens can be added using Global Configurator.

Standardly, the serial screens should be configured to use XON/XOFF protocol with eight data bits, one stop bit, no parity and to send and receive at 9600 baud. The baud rate can be changed using Global Configurator.

Screens on a number of different types of serial card are supported. For full details of serial devices see section 9..

9.6 Serial Printers

All standard Global System Manager (Novell NetWare) configurations include a printer controller (i.e. DOS.PRI) that uses MS-DOS function calls to write to the print device. The "DOS.PRI" (+JWCE08) controller is described in section 8.4.1. An alternate printer controller for use with Global System Manager (Novell NetWare) configurations, "NET.PRI" (+JWCE08) sic, is described in section 8.4.2.

Global Configurator can be used to add "direct" serial printers to a standard Global System Manager (Novell NetWare) configuration.

Global System Manager can drive two types of serial printer. A variety of descriptions are applied to these printers, henceforth they will be referred to here as XON/XOFF and busy-line printers. It is necessary to ascertain which type of printer is being used. The printer customisation option (in \$CUS), described in the Global System Manager Manual and section 4.2 of this manual, must be used to indicate which type of serial printer is being used. The default protocol is XON/XOFF, 9600 baud, eight data bits, one stop bit and no parity.

Some serial cards support both XON/XOFF printers and busy line printers, and some support only one type. For full details of serial devices see section 9.9.

Although the printer controller "\$PRINTER" (+JOCE40) appears in the Global Configurator help text, this controller is not distributed with Global System Manager (Novell NetWare) and should not be used.

9.7 Parallel Printers

All standard Global System Manager (Novell NetWare) configurations include a printer controller (i.e. DOS.PRI) that uses MS-DOS function calls to write to the print device. The "DOS.PRI" (+JWCE08) controller is described in section 8.4.1. An alternate printer controller for use with Global System Manager (Novell NetWare) configurations, "NET.PRI" (+JWCE08) sic, is described in section 8.4.2.

Global Configurator can be used to add up to 2 "direct" parallel printers to a standard Global System Manager (Novell NetWare) configuration provided that the correct interface cards have been installed in the computer. The parallel printer interfaces provided in the standard BIOS are used by Global System Manager (Novell NetWare).

9.7.1 Parallel Printer Global Configurator Options

Printer controller "PRINTER" (+JWCE01) is used to access the parallel printer. When Global Configurator is used to add or amend a PRINTER controller, no configuration-specific prompts appear in addition to the standard prompts described in section 3.6 of the Global Configurator Manual. Up to 2 parallel printers are supported. The first PARALLEL printer writes to the LPT1 printer device; the second PARALLEL printer writes to the LPT2 printer etc.. It is not possible to directly associate an LPTn printer number with a PARALLEL controller.

9.8 Auxiliary-Port Printing

Global System Manager (Novell NetWare) V8.1 supports serial printers attached to the Auxiliary Printer port (AUX port) of some standard serial terminals. Unlike earlier versions of Global System Manager, where AUX port printing was restricted to just the \$PRINT command, V8.1 allows a standard printer unit (i.e. 500 - 599) to be associated with the AUX port of a serial terminal.

The terminal(s) being used for AUX printing must be configured for use by a Global System Manager user in the Console section of the configuration file. Note that it is only necessary to **configure** a serial terminal: It is not necessary for a Global System Manager user to be **signed-on** to a terminal in order to use it for AUX printing (i.e. the terminal can be waiting at the PLEASE KEY OPERATOR-ID: prompt). Because AUX printers are allocated standard printer units, **any** user can print to **any** AUX printer attached to a serial screen on

the same computer. Furthermore, a special aliasing technique (see section 9.8.1) allows a "floating" printer unit to be associated with the AUX printer attached to the terminal that is currently running a printing task.

Finally, AUX printers are subject to the same restriction as "ordinary" serial or parallel printers. Firstly, only one user may print to a printer at any given time (an IN USE error will occur if an attempt is made to open a printer that is currently in use by another operator). Secondly, printing is NOT allowed across a Local Area Network.

9.8.1 Auxiliary Printer Global Configurator Options

Printer controller "\$AUXPRI" (+JOCE50) is used to access the AUX port of a serial terminal. When Global Configurator is used to add or amend a \$AUXPRI controller, the following configuration-specific prompts appear in addition to the standard prompts described in section 3.6 of the Global Configurator Manual:

```

Console number (from 1)                ( 1):
Screen type (1=PCWS,2=NyCE)            ( 0):1
Printing mode (0, 1 or 2)              ( 0): 
Immediate error if displaying?         (N):

```

The Console number identifies the serial console driver that controls the terminal connected to the auxiliary printer (via the terminal's AUX port). The console number is simply the index of the console controller in the Console section of the configuration file. **The console number has no relationship to the user number displayed by \$STATUS.** For example, if the configuration file contains the following controller entries in the Console controller section:

```

CONSOLE
TTY (on COM1)
TTY (on COM2)

```

and the printer is connected on the AUX port of the screen attached to COM2, the "console number" should be set to 3.

The N'th console controller (where N is the \$AUXPRI Console number) MUST identify a TTY console controller (see section 9.9.2.2.1). It is NOT currently possible to print to the AUX port of a serial terminal attached to the host computer via a TIS Hyperport, or TCL Superport, for example.

If the console number is set to 0 the Auxiliary printer is defined as a "floating" printer. The "floating" printer unit specified in the configuration file (e.g. 599) will be aliased to the printer number of the physical Auxiliary printer attached to the users screen (if such a printer exists). For example, in the following configuration file:

```

Console section:   Integral screen
                  Serial screen on COM1
                  Serial screen on COM2

Printer section:  500 $AUXPRI (console number 2, COM1)
                  501 $AUXPRI (console number 3, COM2)
                  599 $AUXPRI (console number 0)

```

The user on the integral screen will be able to access printers 500 & 501 only. The user on COM1 will be able to access printers 500, 501 and 599 (aliased to 500). The user on COM2 will be able to access printers 500, 501 and 599 (aliased to 501).

The **convention** is to reserve unit 599 as the "floating" printer unit although the technique employed allows any printer unit to be used for this purpose.

The screen type identifies the type of serial terminal. The following values are allowed:

- 1 Printer connected to a computer running the MS-DOS based Global PC Workstation emulator;
- 2 Printer connected to the AUX port of the TCL NyCE or a Wyse-60 terminal.

If the screen type is set to 0 you are allowed to define the AUX-PRI ON and AUX-PRI OFF escape sequences explicitly. For example to define the AUX-PRI ON sequence as #1B6423 and the AUX-PRI OFF sequence as #14:

```
Screen type (1=PCWS,2=NyCE)          ( 1):0
Length of Printer Start seq.         ( 0):3
1st byte of Printer Start seq.       (#00):1B
2nd byte of Printer Start seq.       (#00):64
3rd byte of Printer Start seq.       (#00):23
4th byte of Printer Start seq.       (#00):<CR>
5th byte of Printer Start seq.       (#00):<CR>
Length of Printer End seq.           ( 0):1
1st byte of Printer End seq.         (#00):14
2nd byte of Printer End seq.         (#00):<CR>
3rd byte of Printer End seq.         (#00):<CR>
4th byte of Printer End seq.         (#00):<CR>
5th byte of Printer End seq.         (#00):<CR>
```

The Printing mode is defined as follows:

- 0 The AUX-PRI ON escape sequence is sent when the printer is opened. The AUX-PRI OFF escape sequence is sent when the printer is closed. Auxiliary printing has a higher priority than normal displays on the selected serial screen;
- 1 Every **character** being printed is preceded by an AUX-PRI ON escape sequence and followed by an AUX-PRI OFF escape sequence. Auxiliary printing has a **higher** priority than normal console displays;
- 2 Every **character** being printed is preceded by an AUX-PRI ON escape sequence and followed by an AUX-PRI OFF escape sequence. Auxiliary printing has a **lower** priority than normal console displays.

Although printing mode 2 is the least efficient, it must be used when there is the possibility of a stationery mount message or error message (e.g. NOT READY error) appearing on the screen attached to the auxiliary printer.

9.9 Serial Ports

In general, Global System Manager can use serial ports for both serial consoles and serial printers. Furthermore, some serial ports can be used for \$REMOTE or the Serial Port Driver (SPD).

All serial screens and serial printers require the computer end of the connector cable to be wired using the following pin conventions:

Signal description	25-pin	9-pin
Computer transmits data via	Pin 2	Pin 2
Computer receives data via	Pin 3	Pin 3
Signal Ground (Earth)	Pin 7	Pin 5
Busy line (busy line printers only)		see individual cards

Busy line printers also require an extra pin connection which may be different for different serial cards. The relevant information is given below with the details on each card.

The end of the cable connected to the serial screen or printer must be wired using the pin conventions documented by the supplier.

Cards typically have to be set up to use certain addresses and interrupt levels. The sections below on the individual cards explain how to set them up.

The IBM serial ports support a wide range of baud rates. Only baud rates from the following table should be used. Please note that some cards will not support all the baud rates.

```

110
300
600
1200
2400
4800
9600
19200
38400

```

9.9.1 Crosstalk

Long serial cables which are not properly connected can suffer from crosstalk between the receive, transmit and busy lines. Data transmitted by Global System Manager on the transmit line can appear as random noise on the receive line or the busy line. The noise on the receive line or busy line can slow down the performance of the computer significantly.

The solution to the problem is to ensure that the cables are not too long, and that screens and printers are switched on when the computer is bootstrapped. All cables plugged into the computer should be connected to a peripheral and not left hanging. Cables should have only the necessary wires connected at the computer end (for example do not connect the busy line if an XON/XOFF printer is being used) and should be carefully routed to avoid interference from external devices.

9.9.2 IBM Asynchronous Adapter

Serial screens, \$REMOTE, SPD and both XON/XOFF and busy line printers are supported on the IBM Asynchronous Adapter cards. The busy line is pin 6 on both the 25-pin and the 9-pin plugs.

9.9.2.1 IBM Asynchronous Adapter Hardware Configuration

The address and interrupt level of the ports are set up as explained in the manufacturer's documentation. An eight-byte contiguous block of I/O ports from the specified base address are used.

The standard IBM ports for an IBM AT or compatibles are:

Port	Address	Interrupt level
COM 1	#3F8	4
COM 2	#2F8	3

Some Asynchronous Adapter cards allow ports to be configured as COM3 and COM4:

Port	Address	Interrupt level
COM 3	#3E8	4
COM 4	#2E8	3

The standard IBM ports for a PS/2 Micro Channel are:

Port	Address	Interrupt level
SERIAL 1	#3F8	4
SERIAL 2	#2F8	3
SERIAL 3	#3220	3
SERIAL 4	#3228	3
SERIAL 5	#4220	3
SERIAL 6	#4228	3
SERIAL 7	#5220	3
SERIAL 8	#5228	3

The PS/2 Micro Channel ports may consist of a combination of three types of port. The computer may have one or more built-in serial ports, up to eight multi-protocol adapters each with one port or up to four dual asynchronous adapters each with two ports. There may be no more than eight ports in total.

9.9.2.2 IBM Asynchronous Adapter Global Configurator Options

Global Configurator is used to add entries for both serial consoles and serial printers.

9.9.2.2.1 Global Configurator Options for Serial Consoles

Console controller "TTY" (+JWCBO2) is used to access serial screens connected to IBM Asynchronous Adapters. When Global Configurator is used to add or amend a TTY controller, the following configuration-specific prompts will appear in addition to the standard prompts described in section 3.4 of the Global Configurator Manual:

```

Device address                (#03F8):
Baud rate                     ( 9600):
Attribute byte                 (#74):
IRQ level: 2,3,4,7,10,11,12,15
    0 = dynamically determine   ( 0):
Modem input control lines
    01=CTS, 02=DSR, 04=DCD     (#00):

```

```

Modem output control lines
  01=RTS, 02=DTR                      (#00):
Delay before raising control
  line after line down(bit0-3)
Delay before telling GSM after
  line up(bit4-7)                      (#11):
Enable NS16550A FIFO                  (N):

```

The Device address must match the switch settings on the card. The Baud rate should match one of the values listed in the table in section 9.9. The Attribute byte should be left at #74. The IRQ level must match the switch settings on the card (for COMn and SERIALn ports, the IRQ level is a function of the device address, see section 9.9.2.1). Note that IRQ levels 10, 11, 12 and 15 are supported in addition to IRQ levels 2, 3, 4, and 7.

The serial console driver can dynamically determine which interrupt levels are being used at bootstrap time so although the device address **must** be entered in the configuration file, the interrupt level does not need to be specified. A value of zero will enable the dynamic interrupt level feature. Note that the dynamic interrupt level feature only tests for IRQ levels 2, 3, 4 and 7. If the serial card is configured to use IRQ levels 10, 11, 12 or 15 the interrupt level **must** be specified explicitly in the configuration file.

The 3 values that refer to the control of modem control lines should not be modified. Modem control line handshaking is NOT supported by the serial console device driver.

If the UART is an NS16550A (or emulates the FIFO buffer feature of the NS16550A) slightly greater throughput may be obtained on serial consoles by enabling the NS16550A FIFO. The Global System Manager serial console device driver becomes "16550 aware" if this option is selected. **If the UART does not support the FIFO buffering option do NOT enable this option otherwise character loss will occur.**

9.9.2.2.2 Global Configurator Options for Serial Printers

Printer controller "S.PRINT" (+JWCE02) is used to access serial printers connected to IBM Asynchronous Adapters. When Global Configurator is used to add or amend a S.PRINT controller, the following configuration-specific prompts will appear in addition to the standard prompts described in section 3.6 of the Global Configurator Manual:

```

Baud rate                            ( 9600):
Device characteristics                 (#74):
Device address                         (#03F8):
IRQ level: 2,3,4,7,10,11,12,15
  0 = dynamically determine            ( 0):
Extra attribute flag                   (#00):

```

The Baud rate should match one of the values listed in the table in section 9.9. The Device characteristics byte is described in section 2.6.8 of the Global Configurator Manual.

The Device address must match the switch settings on the card AND must not clash with a TTY console controller (see section 9.9.2.2.1). The IRQ level must match the switch settings on the card (for COMn and SERIALn ports, the IRQ level is a function of the device address, see section 9.9.2.1). Note that IRQ levels 10, 11, 12 and 15 are supported in addition to IRQ levels 2, 3, 4, and 7.

The serial printer driver can dynamically determine which interrupt levels are being used at bootstrap time so although the device address **must** be entered in the configuration file, the interrupt level does not need to be specified. A value of zero will enable the dynamic interrupt level feature. Note that the dynamic interrupt level feature only tests for IRQ levels 2, 3, 4 and 7. If the serial card is configured to use IRQ levels 10, 11, 12 or 15 the interrupt level **must** be specified explicitly in the configuration file.

The Extra attribute flag may be set to the following values:

Value	Meaning
#00	Use DSR signal for busy-line (default)
#01	Use CTS signal for busy-line
#02	Use DCD signal for busy-line
#04	Special remote printer busy-line handshaking (DO NOT USE)

All other values are illegal and must not be used.

Note that, unlike the TTY serial console driver, the S.PRINT serial printer driver does not support the FIFO buffer feature of the NS16550A UART. The performance benefit obtained from a "16550 aware" printer device driver is minimal.

9.9.3 Arnet Multiport

The Arnet Multiport board has four or eight ports which can be configured by switches on the card to use a set of addresses starting at almost any address, with each successive address eight bytes greater than the last. It can also be configured with switches to use a number of interrupt levels. Note that only levels 2, 3, 4 and 7 are supported by Global System Manager.

Serial screens, \$REMOTE, the Serial Port Driver and both XON/XOFF and busy line printers are supported on the Arnet Multiport card. The busy line is pin 6.

9.9.3.1 Arnet Multiport Hardware Configuration

There are three sets of switches on the board marked S1, S2 and S3. The S2 switches (option I/O address) are not used by Global System Manager and all switches should be set to the "off" position.

The S1 switches determine the I/O addresses of the ports and correspond to A5 through A8 as explained by this example. To set the board to a base address of #2C0, first translate into binary - 1011000000. Then discard the five least significant digits giving 10110. Now use this binary number to set the S1 switches using the convention that off=1 and on=0 as follows:

ON	X		X		
OFF		X	X		X
	1	2	3	4	5

The S3 switches set up the interrupt level by setting all switches off except the switch for the required level:

```

S3-1 interrupt level 2
S3-2 interrupt level 3
S3-3 interrupt level 4
S3-4 interrupt level 5 (not allowed)
S3-5 interrupt level 6 (not allowed)
S3-6 interrupt level 7

```

9.9.3.2 Arnet Multiport Global Configurator Options

Console controller "TTY" (+JWCB02) is used to access serial screens connected to the Arnet Multiport card (see section 9.9.2.2.1). Printer controller "S.PRINT" (+JWCE02) is used to access serial printers connected to the Arnet Multiport card (see section 9.9.2.2.2).

The Global System Manager device drivers support up to 24 ports on each interrupt level.

The address of each port must be set up in the configuration file. The IRQ level must be defined explicitly (i.e. the dynamic determination feature should not be used) if the ports are to be successfully warm-booted because the ports are in a peculiar state after being warm-booted and the interrupt level cannot be reliably detected.

9.9.4 Arnet Multiport/2

The Multiport/2 cards use the same software as the Arnet Multiport cards (see section 9.9.3) but run on the PS/2 Micro Channel bus. If a DSP ARC500 is also present the usual address #2C0 cannot be used. An alternative address is #340.

Serial screens, \$REMOTE, the Serial Port Driver and both XON/XOFF and busy line printers are supported on the Arnet Multiport/2 card. The busy line is pin 6.

9.9.4.1 Arnet Multiport/2 Hardware Configuration

The port address and interrupt level are set up with the PS/2 reference diskette instead of switches and jumpers. The UART I/O address block is equivalent to the I/O address. There is also an Option I/O address block which Global System Manager does not use and which should be disabled.

9.9.4.2 Arnet Multiport/2 Global Configurator Options

Console controller "TTY" (+JWCB02) is used to access serial screens connected to the Arnet Multiport/2 card (see section 9.9.2.2.1). Printer controller "S.PRINT" (+JWCE02) is used to access serial printers connected to the Arnet Multiport/2 card (see section 9.9.2.2.2).

The Global System Manager device drivers support up to 24 ports on each interrupt level.

The address of each port must be set up in the configuration file. The IRQ level must be defined explicitly (i.e. the dynamic determination feature should not be used) if the ports are to be successfully warm-booted because the ports are in a peculiar state after being warm-booted and the interrupt level cannot be reliably detected.

9.9.5 Arnet Twinport

The Arnet Twinport board has two ports which can be configured by switches on the card to use a set of addresses starting at almost any

address. It can also be configured with switches to use a number of interrupt levels - levels 2, 3, 4 and 7 are permitted by Global System Manager. In addition, the Twinport can be configured to emulate a Dual serial card (i.e. to emulate COM1 and COM2).

9.9.5.1 Arnet Twinport Hardware Configuration

There are two sets of switches on the board marked S1 and S2.

9.9.5.1.1 Arnet Twinport Hardware Configuration (COM1/COM2 mode)

To use the Twinport as COM1 and COM2, set the switches as follows:

```

S1 ON  X X X   X X
    OFF      X     X X
        1 2 3 4 5 6 7 8

S2 ON  X X
    OFF      X X X X X X X X
        1 2 3 4 5 6 7 8 9 10

```

9.9.5.1.2 Arnet Twinport Hardware Configuration (Multiport mode)

To use the Twinport as a multiport serial card, use segments S1-1 to S1-3 to select the I/O locations:

S1-1	S1-2	S1-3	Port-1	Port-2
OFF	OFF	OFF	#100	#108
OFF	OFF	ON	#180	#188
OFF	ON	OFF	#200	#208
OFF	ON	ON	#200	#208 (sic)
ON	OFF	OFF	#280	#288
ON	OFF	ON	#280	#288 (sic)
ON	ON	OFF	#300	#308
ON	ON	ON	COM1	COM2 (see section 9.9.2)

S1-4 must be set to the "off" position to disable the option I/O space. S1-5 and S1-6 must both be set to the "on" position to enable both serial ports. S1-7 and S1-8 must both be set to the "off" position.

Set one of S2-3 to S2-7 in the "on" position to select the interrupt line:

```

S2-3 interrupt level 2
S2-4 interrupt level 3
S2-5 interrupt level 4
S2-6 interrupt level 5 (not allowed)
S2-7 interrupt level 7

```

S2-1, S2-2, S2-8, S2-9 and S2-10 must all be set to the "off" position.

9.9.5.2 Arnet Twinport Global Configurator Options

Console controller "TTY" (+JWCB02) is used to access serial screens connected to the Arnet Twinport card (see section 9.9.2.2.1). Printer controller "S.PRINT" (+JWCE02) is used to access serial printers connected to the Arnet Twinport card (see section 9.9.2.2.2).

9.9.6 Arnet Smartport family

The following members of the Arnet Smartport family are supported by Global System Manager:

```
Arnet Smart 8;
Arnet Smart 8 (10Mhz);
Arnet Smart 8 plus;
Arnet Octaport.
```

The following members of the Arnet Smartport family are NOT supported by Global System Manager:

```
SmartPort Plus 16;
SmartPort Plus 24;
SmartPort Plus 32;
MCA Smartport/2.
```

Serial screens, and both XON/XOFF and busy line printers, are supported, but where possible it is advisable to use busy line printers. The Smartport board responds slowly to XON and XOFF signals and some printers cannot work under these conditions. The busy line is pin 5. Neither \$REMOTE nor SPD are supported.

9.9.6.1 Arnet Smartport Hardware Configuration

The Arnet Smartport board has 4 or 8 ports, all of which use the same base I/O address. Any free address can be used. The board can be configured to use any one of the interrupt levels 10, 11, 12 or 15.

The board uses 64Kb of RAM which may be memory-mapped at any address provided that it does not conflict with other devices in the computer (e.g. LAN cards or EGA/VGA colour screen adapters). Up to four Smartport boards may be used in a computer provided that the port address, interrupt level and memory address are different for each board.

The details on interrupt level and I/O address are entered in the nucleus section of the configuration file (see section 9.15.1).

The I/O address is set up by the S1 switches. As an example take address #2C0. Translate it into binary (i.e. 1011000000) and remove the four least significant bits (i.e. 101100). Use the convention that off=1 and on=0 and switch S1-6 is the most significant bit, and set the switches as follows:

```
S1: ON  X X      X
     OFF   X X   X
           1 2 3 4 5 6
```

The memory address is set up by the S2 switches. Using #0A0000 as an example, first truncate the last four digits to give #0A and then translate into binary (i.e. 00001010). Then set the switches as follows using the convention that off=1 and on=0 and switch S2-8 is the most significant bit:

```
S2: ON  X   X   X X X X
     OFF  X   X
           1 2 3 4 5 6 7 8
```

The interrupt level is set up by the S3 switches by setting all switches off except the one required.

```

S3-1 to S3-6   interrupt level 2 to 7 (not allowed)
S3-7          interrupt level 10
S3-8          interrupt level 11
S3-9          interrupt level 12
S3-10         interrupt level 15

```

Each pair of ports (0/1, 2/3 etc) must run at the same baud rate but ports 0/1 need not run at the same baud rate as ports 2/3.

In late 1990, Arnet introduced a new version of the Smart-8 card featuring a 16MHz processor and an external slim-line D-sub box with a much simplified cabling arrangement. This card includes an extra switch bank, S4, which must be set as follows:

```

S4: ON
    OFF X X X X
        1 2 3 4

```

The D-sub box must be connected to the Smart-8 card before the computer is bootstrapped.

Although this board is **capable** of being configured to only occupy 32Kb or 16Kb of RAM (rather than the 64Kb occupied by the Smart-8 card), the current Global System Manager drivers require the full 64Kb address space as enabled by the S4 switch arrangement described above.

9.9.6.2 Arnet Smartport Global Configurator Options

Global Configurator is used to add entries for both serial consoles and serial printers. The Arnet Smartport console and printer drivers both communicate to the Smartport hardware using the +JWNBOX nucleus component. Consequently, if either controller is added to a configuration file, the "Smartport cards required?" option in the Nucleus section of the configuration file (see section 9.15.1) must be enabled.

9.9.6.2.1 Global Configurator Options for Serial Consoles

Console controller "SM.TTY" (+JWCB06) is used to access serial screens connected to Arnet Smartport cards. When Global Configurator is used to add or amend an SM.TTY controller, the following configuration-specific prompts will appear in addition to the standard prompts described in section 3.4 of the Global Configurator Manual:

```

Port number (0-7)           ( 0 ):
Baud rate                   ( 9600 ):
Attribute byte              (#74 ):
Card number (0-3)          ( 0 ):

```

The Port number refers to the channel number on the card. The Baud rate should match one of the values listed in the table in section 9.9. The Attribute byte should be left at #74. The Card number specifies a particular Smartport card in multiple Smartport configurations.

9.9.6.2.2 Global Configurator Options for Serial Printers

Console controller "SM.PRI" (+JWCE06) is used to access serial printers connected to Arnet Smartport cards. When Global Configurator is used to add or amend an SM.PRI controller, the following configuration-specific prompts will appear in addition to the standard prompts described in section 3.6 of the Global Configurator Manual:

Baud rate	(9600):
Port number (0-7)	(0):
Device characteristics	(#34):
Card number (0-3)	(0):

The Port number refers to the channel number on the card. The Baud rate should match one of the values listed in the table in section 9.9. The Device characteristics byte is described in section 2.6.8 of the Global Configurator Manual. The Card number specifies a particular Smartport card in multiple Smartport configurations.

9.9.7 TIS Hyperport

The TIS Hyperport sub-system is fully described in Hardware Factsheet Number 1.

Console controller "HYPER" (+JWCB60) is used to access serial screens connected to the TIS Hyperport sub-system. Printer controller "HYPER" (+JWCE60) is used to access serial printers connected to the TIS Hyperport sub-system.

The TIS Hyperport console and printer drivers both communicate to the Hyperport hardware using the +JWNHYP nucleus component. Consequently, if either controller is added to a configuration file, the "Hyperport card required?" option in the Nucleus section of the configuration file (see section 9.15.1) must be enabled.

9.9.8 TCL Hyper/MX

The TCL Hyper/MX sub-system is fully described in Hardware Factsheet Number 1.

Console controller "HYPERMX" (+JWCB60) or "TCLSYNC" (+JWCB60), sic, are used to access serial screens connected to the TCL Hyper/MX sub-system. Use of the TCLSYNC console controller will result in faster throughput than the HYPERMX controller (by enabling a special "block-mode display" option). Printer controller "HYPERMX" (+JWCE60) is used to access serial printers connected to the TCL Hyper/MX sub-system. Printer controller "HYPERMXP" (+JWCE60), sic, is used to access parallel printers connected to the TCL Hyper/MX sub-system.

The TCL Hyper/MX console and printer drivers both communicate to the Hyperport hardware using the +JWNHYP and +JWNMXP nucleus components. Consequently, if either controller is added to a configuration file, the "Hyperport card required?" option in the Nucleus section of the configuration file (see section 9.15.1) must be enabled.

9.9.9 TCL PCC/4, PCC/8 and PCC/16

The TCL PCC/n family are fully described in Hardware Factsheet Number 1.

Console controller "PCC/I" (+JWCB60) or "TCLASYNC" (+JWCB60), sic, is used to access serial screens connected to the TCL PCC/4, PCC/8 or PCC/16 sub-systems. Use of the TCLASYNC console controller will result in faster throughput than the PCC/I controller (by enabling a special "block-mode display" option). Printer controller "PCC/I" (+JWCE60) is used to access serial printers connected to the TCL PCC/4, PCC/8 or PCC/16 sub-systems.

The TCL PCC/N console and printer drivers both communicate to the Hyperport hardware using the +JWNHYP and +JWNASP nucleus components.

Consequently, if either controller is added to a configuration file, the "Hyperport card required?" option in the Nucleus section of the configuration file (see section 9.15.1) must be enabled.

9.9.10 TCL Superport-186

The TCL Superport-186 is fully described in Hardware Factsheet Number 1. Note the TCL Superport-RISC is NOT supported by Global System Manager.

Console controller "PCC/I" (+JWCB60) or "TCLASYNC" (+JWCB60), sic, is used to access serial screens connected to the TCL Superport-186 sub-system. Use of the TCLASYNC console controller will result in faster throughput than the PCC/I controller (by enabling a special "block-mode display" option). Printer controller "PCC/I" (+JWCE60) is used to access serial printers connected to the TCL Superport-186 sub-system.

The TCL Superport console and printer drivers both communicate to the Hyperport hardware using the +JWNHYP and +JWNASP nucleus components. Consequently, if either controller is added to a configuration file, the "Hyperport card required?" option in the Nucleus section of the configuration file (see section 9.15.1) must be enabled.

9.9.11 TCL +4D and +8D Multi Port Cards

The TCL +4D and +8D Multi Port cards can be configured to emulate AST, HOSTESS and ARNET serial boards. The emulation is controlled by a PAL located at position IC18 on the circuit board. The PAL must be labelled with either "AR/H+4D" or "AR/H+8D". These cards have been superseded by the TCL CC/4B and CC/8B cards (see section 9.9.12) so the information in this section is for historical interest only.

Serial screens, \$REMOTE, the Serial Port Driver and both XON/XOFF and busy line printers are supported on the TCL +4D and +8D cards. The busy line is pin 6.

9.9.11.1 TCL +4D and +8D Hardware Configuration

Both ISA-bus and MCA-bus variants of the TCL +4D and +8D cards are available.

9.9.11.1.1 TCL +4D and +8D Hardware Configuration (ISA bus)

The TCL +4D and +8D cards have four or eight ports, respectively, which can be configured by switches on the card to use a set of addresses starting at one of two addresses, with each successive address eight bytes greater than the last. It can also be configured with switches to use a number of interrupt levels. Levels 2, 3, 4, 7, 10, 11, 12 and 15 are permitted by Global System Manager.

There is a set of switches on the board marked SW1 which determine the I/O addresses of the ports:

SW1-1	SW1-2	Base address
OFF	OFF	Illegal
OFF	ON	Illegal
ON	OFF	0280
ON	ON	0180

If more than one TCL +4D or +8D card is installed then the cards can be set to share a common interrupt level. To enable this option proceed as follows:

1. An IRQ for the first TCL multiport card must be selected.
2. Additional card(s) should be given no IRQ. This is done by simply removing the shorting link.
3. The IE1 link on the first card should be connected to the IE0 of the second card using the supplied lead.
4. The IE1 link of the second card is then connected to the IE0 link of the next card in the same way to allow full "daisy-chaining" of the cards' interrupts.

9.9.11.1.2 TCL +4D and +8D Cards Hardware Configuration (MCA bus)

The TCL +4D and +8D cards for the Micro Channel bus are used in the same way as the ISA-bus cards except the I/O address and interrupt level are set up using the computer's reference diskette and not by switches or jumpers. The HOSTESS card emulation mode must be selected.

In addition to levels 2, 3, 4 and 7, interrupt levels 10, 11, 12 and 15 can be selected.

9.9.11.2 TCL +4D and +8D Cards Global Configurator Options

Console controller "TTY" (+JWCB02) is used to access serial screens connected to the TCL +4D and +8D cards (see section 9.9.2.2.1). Printer controller "S.PRINT" (+JWCE02) is used to access serial printers connected to the TCL +4D and +8D cards (see section 9.9.2.2.2).

The address of each port must be set up in the configuration file. The IRQ level must be defined explicitly (i.e. the dynamic determination feature should not be used) if the ports are to be successfully warm-booted because the ports are in a peculiar state after being warm-booted and the interrupt level cannot be reliably detected.

The TCL +4D and +8D cards contain the advanced UART devices that support the "FIFO buffering" option described in section 9.9.2.2.1.

9.9.12 TCL CC/4B, CC/4D, CC/8B and CC/8D Multiport Cards

The CC/4B, CC/4D, CC/8B and CC/8D cards have superseded the +4D and +8D cards described in section 9.9.11. The differences between various cards can be summarised as follows:

CC/4B	4-ports, "buffered" UARTs
CC/4D	4-ports, "direct" (i.e. non-buffered) UARTs
CC/8B	8-ports, "buffered" UARTs
CC/8D	8-ports, "direct" (i.e. non-buffered) UARTs

Switch settings allow the TCL card to emulate AST, Arnet or Hostess multiport cards. All three emulation modes are supported by Global System Manager. This is particularly important for the MCA-bus versions of the TCL Multiport cards because the IBM PS/2 Setup options only allow a small range of emulations (on some MCA-bus computers, hardware conflicts restrict the possible emulations to the AST mode only).

9.9.12.1 TCL Multiport Cards Hardware Configuration

This section should be read in conjunction with the following TCL documentation supplied with the card:

Hardware installation manual
for the CC range
of Direct and Buffered
serial communication cards

The 4-port CC/4D and CC/4B cards must be fitted with the HCASARH4 PAL. Switch bank SW1 selects the base port address (each successive address is eight bytes greater than the last). To select a base port address of #0180, SW1 must be set as follows:

```
SW1 ON  X   X X   X
      OFF X   X X   X
          1 2 3 4 5 6 7 8
```

To select a base port address of #0280, SW1 must be set as follows:

```
SW1 ON  X   X X   X X
      OFF X   X X
          1 2 3 4 5 6 7 8
```

The 8-port CC/8D and CC/8B cards must be fitted with the HCARH08 PAL. Switch bank SW1 selects the base port address (each successive address is eight bytes greater than the last). To select a base port address of #0180, SW1 must be set as follows:

```
SW1 ON      X X   X   X
      OFF X X   X   X
          1 2 3 4 5 6 7 8
```

To select a base port address of #0280, SW1 must be set as follows:

```
SW1 ON      X X   X X
      OFF X X   X   X
          1 2 3 4 5 6 7 8
```

The interrupt level is selected using a set of jumpers located on the bottom right of the card. TIMER interrupts are not used so a timer interrupt level must not be selected - this row must be left un-jumpered. A single jumper should be used to select the desired interrupt level. In addition to levels 2, 3, 4 and 7, interrupt levels 10, 11, 12 and 15 can be selected.

9.9.12.2 TCL Multiport Cards Global Configurator Options

Console controller "TTY" (+JWCB02) is used to access serial screens connected to the TCL Multiport cards (see section 9.9.2.2.1). Printer controller "S.PRINT" (+JWCE02) is used to access serial printers connected to the TCL Multiport cards (see section 9.9.2.2.2).

The address of each port must be set up in the configuration file. The IRQ level must be defined explicitly (i.e. the dynamic determination feature should not be used) if the ports are to be successfully warm-booted because the ports are in a peculiar state after being warm-booted and the interrupt level cannot be reliably detected.

Both the TCL CC/4B and CC/8B cards contain the advanced UART devices that support the "FIFO buffering" option described in section 9.9.2.2.1.

9.9.13 Apricot Quad card

The Apricot 4-port Quad card can only be used in an Apricot Xen-i/xi or Xen-S computer.

Important note: The Apricot Quad card is now considered obsolete. The following components, required to access the Quad card, are no longer supplied with standard Global System Manager configurations: +JWCB05, +JWCE05, +JWNQNT.

Only serial screens and XON/XOFF serial printers are supported on the Quad card. Busy-line printers, \$REMOTE, and the Serial Port Driver are NOT supported on the Quad card.

The Quad card firmware, rather than the Global System Manager driver, handles the XON/XOFF protocol. Consequently, \$STATUS is incapable of detecting that a screen is waiting for a <CTRL Q>.

Only configurations with a single Quad card are supported by Global System Manager.

9.9.13.1 Apricot Quad card Hardware Configuration

The card number and interrupt level of each card must be set up as specified in the PX Adapter Installation Guide to match the values in the configuration file. Card numbers and interrupt levels must be matched as shown below. Generally the cards should be set up to the lowest numbers available unless this would conflict with other cards in the computer.

The Quad card consists of two switches which need to be set to ON/OFF for the appropriate card number to obtain the respective interrupt level. The PX Adapter has a Jumper set J2 with 9 pins which needs to be aligned as shown below:

J2	Quad card Card	Quad card Switch 1	Quad card Switch 2	PX Adapter Interrupt level	PX Adapter Jumper set
1	ON	OFF		11xx...
2	OFF	OFF		15xx
3	ON	ON		10	...xx....
4	OFF	ON		12xx.
					123456789

9.9.13.2 Apricot Quad Card Global Configurator Options

Global Configurator is used to add entries for both serial consoles and serial printers.

The Apricot Quad card console and printer drivers both communicate to the Quad card using the +JWNQNT nucleus component. Consequently, if either controller is added to a configuration file, the "Apricot Quad cards required?" option in the Nucleus section of the configuration file (see section 9.15.1) must be enabled.

9.9.13.2.1 Global Configurator Options for Serial Consoles

Console controller "QUADTTY" (+JWCB05) is used to access serial screens connected to Apricot Quad cards. When Global Configurator is used to add or amend a QUADTTY controller, the following configuration-specific prompts will appear in addition to the standard prompts described in section 3.4 of the Global Configurator Manual:

```

Console baud rate           ( 9600):
Card number (1,2,3 or 4)   ( 1):
Channel number (0,1,2 or 3) ( 0):
Int. channel (10,11,12 or 15) ( 11):

```

9.9.13.2.2 Global Configurator Options for Serial Printers

Printer controller "QUADPRI" (+JWCE05) is used to access serial printers connected to Apricot Quad cards. When Global Configurator is used to add or amend a QUADPRI controller, the following configuration-specific prompts will appear in addition to the standard prompts described in section 3.6 of the Global Configurator Manual:

```

Printer baud rate           ( 9600):
Device characteristics ignored (#40)
Card number (1,2,3 or 4)   ( 1):
Channel number (0,1,2 or 3) ( 3):
Int. channel (10,11,12 or 15) ( 11):

```

9.9.14 Baydel SMUX Card

The Baydel SMUX serial card is NOT supported with Global System Manager (Novell NetWare).

9.9.15 Chase Serial Card

Although the Global System Manager device drivers for the Chase serial card are neither supported nor distributed with Global System Manager, some users upgrading from older versions of Global System Manager may still be using these devices.

Console controller "CH.TTY" (+JWCBOA) is used to access serial screens connected to a Chase card. Printer controller "CH.PRI" (+JWCE0A) is used to access serial printers connected to a Chase card.

9.9.16 Other Serial Cards

A plethora of serial cards are available for IBM PC compatible computers (e.g. AST, HOSTESS, and SPECIALIX). Some of these devices successfully emulate IBM Asynchronous adapters, some partially emulate IBM hardware and others require specialised drivers. Only those serial cards described in sections 9.9.2 to 9.9.13 are currently certified for use with Global System Manager.

9.10 Serial Port Driver

The Serial Port Driver (SPD) is supported on IBM PC compatibles on TTY serial ports. The controller is distributed on the BACRES diskette. The configuration-specific information required is held in two fields, the device address and the vector address, each four bytes long.

9.10.1 Serial Port Driver and TTY Ports

The TTY Serial Port Driver (SPD) module, %.JWS03, may be used by SPD applications to access standard TTY serial ports such as COM1, COM2, the Arnet Multiport board and the various TCL multi-port cards (see section 9.9.2). **Important note:** Earlier versions of the TTY SPD module, %.JWS01 and %.JWS02, are considered obsolete and are no longer supported.

SPD application programmers should be aware that the 4-byte SPDEV field, described in the Global Cobol Assembler Interface Manual, is redefined as follows:


```

01 FILLER REDEFINES SPDEV      * SPDEV IS USED FOR BOTH THE IRQ
                                * LEVEL AND THE PORT ADDRESS
02 FILLER      PIC X           * 1ST BYTE IS UNUSED
   VALUE      LOW-VALUES
02 SPIRQ      PIC 9(2) COMP    * IRQ LEVEL
02 SPPORT     PIC 9(4) COMP    * PORT ADDRESS

```

The 4-byte SPVECT field, described in the Global Cobol Assembler Interface Manual, is unused and should be set to LOW-VALUES.

The SPIRQ field must contain the interrupt level corresponding to the serial port established in SPPORT (e.g. 4 for COM1; 3 for COM2). **THE VALUE OF SPIRQ MUST BE NONZERO.** The potentially hazardous technique of specifying an interrupt level of 0 to allow the Serial Port Driver to dynamically determine the interrupt level is no longer supported.

The SPPORT field must contain the port address of the base-address of the UART device (e.g. #03F8 for COM1; #02F8 for COM2).

At high baud rates incoming characters may be lost if there is a lot of other activity on the computer. This can sometimes be prevented by setting the interrupt level of the serial port being used by the SPD application to the highest priority in the nucleus section of the configuration file (see section 9.15.1).

Another technique that may be used, instead of, or in conjunction with, altering the interrupt priority is to enable the FIFO buffering option available with the NS16550A UART (or compatible) device. If the SPPORT field contains an odd number (i.e. a value that is strictly illegal for a UART base-address which must be divisible by 8) the Serial Port Driver uses the low-order bit as a flag to enable the FIFO on a NS16550A device.

For example:

SPPORT value	Comments
#03F8	Use UART at address #03F8 in standard mode;
#03F9	Use UART at address #03F8 in buffered mode;
#03FA - #03FF	Invalid.

DO NOT ATTEMPT TO ENABLE THE FIFO OPTION UNLESS YOU ARE SURE THE UART IS AN NS16550A DEVICE (OR COMPATIBLE).

9.10.2 Serial Port Driver and Arnet Smartport Ports

The SPD modules for serial ports on the Arnet Smartport cards, %.JWS06 and %.JWS07, are considered obsolete and are no longer supported.

9.11 Local Area Networks

Global System Manager (Novell NetWare) only supports networking using the Novell NetWare SPX and IPX protocols. Please refer to section 8.6 for full details.

9.12 Global Communications

The section describing the use of Global Communications in conjunction with Global System Manager (Novell NetWare), that was formerly in this chapter, has been moved to Appendix G.

9.13 Memory

Section 8.5 fully describes the use of memory by Global System Manager (Novell NetWare). **You are strongly advised to use the XMS memory controller.**

9.14 SCSI Adapter Cards

The Adaptec 1540, 1542 (ISA bus) and 1640 (MCA bus) SCSI host adapter cards may be accessed directly to control both disks and tapes (see sections 9.2.4 and 9.3.2). The following versions of the AHA-154x family are supported by Global System Manager:

AHA-1540A	AHA-1540B	AHA-1540C	AHA-1540CF
AHA-1542A	AHA-1542B	AHA-1542C	AHA-1542CF
AHA-1640A			

Note that EISA-bus Adaptec host adapter cards are not currently supported by Global System Manager.

Note also that hardware emulations of the Adaptec SCSI host adapter and the AHA-1520 host adapter are not currently supported by Global System Manager.

Although Global System Manager currently cannot **directly** access the modern members of the Adaptec AHA SCSI host adapter family (e.g. AHA-174x) using the "ADAPTEC" hard-disk controller (see section 9.2.4.2) or the "ADAPTEC" or "AHA-TAPE" tape controllers (see section 9.3.2.2), it is possible to use the "DISK" hard-disk controller (see section 9.2.1) to access the SCSI hard-disk, provided the BIOS is enabled. In a configuration that includes a BIOS hard-disk connected to an **unsupported** SCSI adapter card, an additional **supported** SCSI adapter card (e.g. AHA-1540CF) must be installed in the computer to allow Global System Manager to access a SCSI tape drive.

IMPORTANT NOTE: The shared use of an Adaptec AHA-154x or AHA-164x SCSI host adapter card between Global System Manager and an MS-DOS device driver is not allowed. If a standard Global System Manager (Novell NetWare) configuration is amended to include the Adaptec handler, +JWNADA, then either Global System Manager OR the Adaptec BIOS must be used to access the SCSI devices (i.e. hard-disks and tape-drives) attached to the SCSI bus.

This restriction is likely to affect those configurations that include a SCSI tape-drive accessed using \$TAPE. The following table describes the possible combinations when a SCSI tape-drive is added to an existing Global System Manager (MS-DOS and Windows) configuration:

Hardware configuration	Comments
------------------------	----------

<p>The SCSI tape drive is the only peripheral on the SCSI bus. Non-SCSI hard-disk or a SCSI hard-disk on a separate host adapter card. Adaptec BIOS enabled. Microsoft Windows NOT in use.</p>	<p>The SCSI tape controller can be used on both ISA- and MCA-bus computers.</p>
<p>The SCSI tape drive is the only peripheral on the SCSI bus. Non-SCSI hard-disk or a SCSI hard-disk on a separate host adapter card. Adaptec BIOS disabled. Microsoft Windows NOT in use.</p>	<p>The SCSI tape controller can be used on ISA-bus computers only. Note that the +JWNADA module cannot be used with the MCA-bus AHA-1640x host Adapter card if the BIOS is disabled.</p>
<p>SCSI tape-drive and SCSI hard-disk on the same SCSI bus. ADAPTEC hard-disk controller in the Global configuration file (i.e. volume format P246Z, P249Z or P259Z). Adaptec BIOS enabled. Microsoft Windows NOT in use.</p>	<p>This is the standard "Adaptec" configuration. The SCSI tape controller can be used on both ISA- and MCA-bus computers.</p>
<p>SCSI tape-drive and SCSI hard-disk on the same SCSI bus. ADAPTEC hard-disk controller in the Global configuration file (i.e. volume format P246Z, P249Z or P259Z). Adaptec BIOS disabled. Microsoft Windows NOT in use.</p>	<p>This configuration cannot bootstrap from the SCSI disk (because the BIOS is disabled) but may be used if the SCSI disk is a 2nd disk. The SCSI hard-disk and tape controllers can be used on ISA-bus computers only. Note that the +JWNADA module cannot be used with the MCA-bus AHA-1640x host adapter card if the BIOS is disabled.</p>
<p>SCSI tape-drive and SCSI hard-disk on the same SCSI bus. DISK hard-disk controller in the Global configuration file (i.e. volume format P88Z). Adaptec BIOS enabled. Microsoft Windows NOT in use.</p>	<p>The SCSI tape controller can be used on both ISA- and MCA-bus computers. The +JWNADA module can share the Adaptec mailbox with the Adaptec BIOS.</p>
<p>SCSI tape-drive and SCSI hard-disk on the same SCSI bus. DISK hard-disk controller in the Global configuration file (i.e. volume format P88Z). Adaptec BIOS disabled. Microsoft Windows NOT in use.</p>	<p>This is not a sensible hardware configuration.</p>
<p>SCSI tape-drive and SCSI hard-disk on the same SCSI bus. SSD-FILE or DOS-FILE controller in the Global configuration file (i.e. hard-disk accessed via MS-DOS). No ASPI.SYS device driver in use. Adaptec BIOS enabled. Microsoft Windows NOT in use.</p>	<p>The SCSI tape controller can be used on both ISA- and MCA-bus computers. The +JWNADA module can share the Adaptec mailbox with the Adaptec BIOS.</p>

SCSI tape-drive and SCSI hard-disk on the same SCSI bus. SSD-FILE or DOS-FILE controller in the Global configuration file (i.e. hard-disk accessed via MS-DOS). No ASPI.SYS device driver in use. Adaptec BIOS disabled. Microsoft Windows NOT in use.	This is not a sensible hardware configuration.
SCSI tape-drive and SCSI hard-disk on the same SCSI bus. SSD-FILE or DOS-FILE controller in the Global configuration file (i.e. hard-disk accessed via MS-DOS). ASPI.SYS device driver in use. Adaptec BIOS enabled. Microsoft Windows NOT in use.	The SCSI tape controller CANNOT be used. The +JWNADA module CANNOT share the Adaptec mailbox with any of the ASPI.SYS MS-DOS device drivers.
SCSI tape-drive and SCSI hard-disk on the same SCSI bus. SSD-FILE or DOS-FILE controller in the Global configuration file (i.e. hard-disk accessed via MS-DOS). ASPI.SYS device driver in use. Adaptec BIOS disabled. Microsoft Windows NOT in use.	The SCSI tape controller CANNOT be used. The +JWNADA module CANNOT share the Adaptec mailbox with any of the ASPI.SYS MS-DOS device drivers.
Any hardware combination. Global System Manager running under Microsoft Windows.	The memory-management of Windows prevents the +JWNADA module from communicating with the Adaptec hardware. DO NOT ATTEMPT TO USE THE +JWNADA MODULE WHEN GLOBAL SYSTEM MANAGER IS RUNNING UNDER WINDOWS.

9.14.1 SCSI Adaptec Cards Hardware Configuration

The port address of the Adaptec card should normally be set to the default value of #0330. However, this address may be changed for computers that include multiple SCSI host adapter cards. Any interrupt level or BIOS memory address can be selected providing it does not clash with that of another card (see Appendix D, E and F). It is very unlikely that any of the default Adaptec jumper positions will have to be changed.

9.14.1.1 AHA-154xA and AHA-154xB Hardware Configuration

For the AHA-154xA and AHA-154xB cards, the default jumper positions are as follows:

9.14.1.1.1 Jumper Block J1

Pin(s)	Setting	Description
1	Removed	Synchronous negotiation disabled
2	Removed	Factory diagnostics disabled
3	Removed	SCSI parity checking enabled
4,5,6	Removed	SCSI-ID address set to 7 (see below)
7	Removed	DMA channel 5 selected (with pin 8)
8	Installed	DMA channel 5 selected (with pin 7)
9	Removed	Interrupt channel (default is 11)
10	Installed	Interrupt channel (default is 11)
11	Removed	Interrupt channel (default is 11)
12	Removed	DMA transfer speed (5.0 MB/sec)

13 Removed DMA transfer speed (5.0 MB/sec)

9.14.1.1.2 Jumper Block J6

Pin(s)	Setting	Description
1	Installed	I/O port address (default is #0330)
2	Removed	I/O port address (default is #0330)
3	Removed	I/O port address (default is #0330)

Please consult the Adaptec Installation Guide for further details.

9.14.1.2 AHA-154xC and AHA-154xCF Hardware Configuration

The AHA-154xC and AHA-154xCF cards do not include jumper blocks. Instead, a set of 8 DIP switches configure the BIOS option, port address, SCSI bus termination and floppy interface (AHA-1542C and AHA-1542CF only). All other customisations (e.g. interrupt level, DMA channel) are performed using a menu driven program within the Adaptec on-board BIOS (see below).

Note that the Adaptec installation guide refers to the switches being set to ON or OFF. However, the markings on the switch refers to positions OPEN or CLOSED. In the following tables, the following terms are equivalent:

OPEN	is equivalent to	OFF
CLOSED	is equivalent to	ON

The switches should be set as follows:

Switch	Position	Comments
SW1	CLOSED	The host adapter will form one end of the SCSI bus in most installations so this switch should be CLOSED. If you are using an SCSI external device set the switch OPEN and use the Adaptec configuration software to disable SCSI bus termination.
SW2,3,4	OPEN	These 3 switches determine the I/O address of the SCSI host adapter card. The default address is #0330.
SW5	CLOSED OPEN	Disable floppy controller (1542 only) Enable floppy controller
SW6,7,8	CLOSED	These 3 switches determine the memory address of the BIOS. The default address is DC000.

The complete range of I/O addresses is as follows:

SW2	SW3	SW4	I/O address
CLOSED	CLOSED	CLOSED	#330 - #333
OPEN	CLOSED	CLOSED	#334 - #337
CLOSED	OPEN	CLOSED	#230 - #233
OPEN	OPEN	CLOSED	#234 - #237
CLOSED	CLOSED	OPEN	#130 - #133

OPEN	CLOSED	OPEN	#134 - #137
CLOSED	OPEN	OPEN	Reserved
OPEN	OPEN	OPEN	Reserved

The complete range of BIOS addresses is as follows:

SW6	SW7	SW8	BIOS address
CLOSED	CLOSED	CLOSED	DC000
OPEN	CLOSED	CLOSED	D8000
CLOSED	OPEN	CLOSED	D4000
OPEN	OPEN	CLOSED	D0000
CLOSED	CLOSED	OPEN	CC000
OPEN	CLOSED	OPEN	C8000
CLOSED	OPEN	OPEN	Reserved
OPEN	OPEN	OPEN	BIOS disabled

If the host adapter card is being used solely for the purpose of controlling a tape drive then the BIOS should be disabled by setting all three switches to OPEN (this will allow the computer to bootstrap faster since the Adaptec host adapter card will not attempt to search for a device on SCSI 0).

The other parameters affecting the card are configured using a utility in the Adaptec BIOS. This can be invoked either one of two techniques:

1. When the machine is booting the Adaptec BIOS will display an identification message, during which time <CTRL A> can be keyed to enter the setup utility.
2. Using MS-DOS DEBUG, type G=nnnn:6 where nnnn is the BIOS address (e.g. for a standard configuration type "G=DC00:6").

Note that in either case the Adaptec BIOS MUST be enabled in order to access the utility.

On entering the configuration utility the host adapter port address screen will be shown. This allows the particular host adapter to be chosen via its unique port address, which will normally be 330H.

After choosing the host adapter the main menu will be displayed which includes three options:

- Configure/View Host Adapter Settings;
- SCSI Disk Utilities;
- Host Adapter Diagnostics.

Selecting the first menu option will display a screen of configurable parameters as follows:

Host Adapter Interrupt (IRQ) Channel	11
Host Adapter DMA Channel	5
Host Adapter SCSI ID	7
SCSI Parity Checking	Enabled
DMA Transfer Rate	5.0MB/sec
Host Adapter SCSI Termination	Enabled

If an external SCSI device is connected to the Adaptec host adapter card, the "Host Adapter SCSI Termination" option should be disabled. Note that SW1 should be set to the OPEN position.

The SCSI Device Configuration and Advanced Configuration Options should remain at their default values (retrieved by keying <F6>).

Please consult the Adaptec Installation Guide for further details.

9.14.1.3 SCSI id and SCSI Bus Considerations

The SCSI-ID's are standardly allocated as follows:

SCSI-ID	Standard device
0	1st hard disk
1	2nd hard disk
2	Not used
3	Not used
4	Not used
5	Not used
6	Tape drive
7	Adaptec card

The SCSI bus must be terminated correctly to ensure proper operation otherwise various problems, including random data corruption, may occur. The first and last physical SCSI devices on the SCSI cable must have terminators installed. All other SCSI devices must have terminators removed. The host adapter is usually the first device on the SCSI bus and has terminators installed at the factory. If you are using both internal and external SCSI cables make sure to remove the terminators from the host adapter, and make sure that the SCSI devices at the ends of both cables have terminators installed.

When attaching the SCSI bus to the host adapter and peripherals make sure that pin-1 orientation is maintained throughout the bus.

On internal cables, pin-1 is denoted on most 50-way grey ribbon cables by a red stripe. Multi-colour 50-pin ribbon cables signify pin-1 with a brown stripe. Pin-1 is located at the front of the 50-pin header on the host adapter.

The external connector on all supported versions of the Adaptec host adapter card is a D-shell connector that ensures the correct pin-1 orientation on the host adapter.

Check the SCSI drive or controller to determine whether Parity Checking is enabled. If Parity Checking on any SCSI device is disabled, or not supported, Parity Checking on the host adapter card must be disabled either by removing the jumper at location J8 (AHA-154xA and AHA-154xB cards) or using the BIOS configuration utility (AHA-154xC and AHA-154xCF cards). Parity Checking should only be enabled if **all** the devices on the SCSI bus support it.

9.14.2 SCSI Adaptec Cards Global Configurator Options

If the configuration file includes either the "ADAPTEC" direct access controller or the "ADAPTEC" (or "AHA-TAPE") tape controller, the Adaptec nucleus module (+JWNADA) **MUST** be specified in the Nucleus options section of the configuration file:

```

Adaptec SCSI card required?          (N):Y
Adaptec SCSI card I/O address        (#0000):

```

If the I/O address of the Adaptec SCSI card is left at the default value of #0330 there is no need to change the **Adaptec SCSI card I/O address** in the configuration file from the default value of 0. If, however, the Adaptec SCSI card that is being accessed directly by Global System Manager is configured at a different I/O address, the actual address must be established in the configuration file. For example, to cause Global System Manager to access the Adaptec host adapter card at I/O address #0334 use the following dialogue:

```

Adaptec SCSI card required?          (N):Y
Adaptec SCSI card I/O address        (#0000):334

```

9.15 Other Global Configurator Options

In addition to the various controller sections of the configuration file (i.e. Direct Access, Console, Tape, Printer, and LAN), Global Configurator prompts for additional information in the Nucleus Options and Distribution Options sections of the configuration file.

9.15.1 Global Configurator Nucleus Options

The following configuration-specific prompts will appear in the Nucleus Options section of the configuration file in addition to the standard prompts described in section 2.9 of the Global Configurator Manual:

```

Load SVC61                          (S61)
Load $BYE module                      (BYE)
Load Critical Error Handler           (ERR)
Load Automatic OPID/TERM              (AUT)
Machine-specific version no.          (#42)
Basic clock (microseconds)            ( 54927):
Clock interval (milliseconds)         ( 1000):
Swap interval (milliseconds)          ( 500):
Use RTC for clock update?             (N):
"BACNAT" format                       (G1 ):
SYSYSM=2 for DOS, 3 for Novell        ( 3):
EMS handling enabled?                 (Y)
EMS controller                        (XMS)
Priority interrupt level (0-7)         (#00):
Interrupt mask flag                   (#00):
Load keyboard tables                  (KEY)
Serial interrupt module                (INT):
Apricot Quad cards required?          (N):
Smartport cards required?             (N):
Adaptec SCSI card required?           (N):
Hyperport card required?              (N):

```

The **Load SVC61**, **Load \$BYE module**, **Load Critical Error Handler** and **Load Automatic OPID/TERM** options are displayed but cannot be updated using Global Configurator.

The **Machine-specific version no.** is displayed but cannot be updated using Global Configurator. It identifies the version of the A.JW action file (see section 1.2 of Global Configurator Manual).

The **Basic clock (microseconds)**, **Clock interval (milliseconds)** and **Swap interval (milliseconds)** are described in section 2.9 of the Global Configurator Manual. It is extremely unlikely that you will ever have to alter the default values.

The **Use RTC for clock update?** option should normally be left disabled when Global System Manager is used under MS-DOS. In this mode, the Global System Manager clock is updated by the regular timer ticks from the hardware. When Global System Manager is used under Windows the clock may lose time (especially if Global System Manager is running as a background process). If the Global System Manager clock appears to be running slowly under Windows set this flag to Y. The Global System Manager timer handler will update the Global System Manager clock from the Real Time Clock. **It is essential to enable this option if Global System Manager is being used with the Global Windows Workstation.**

The **"BACNAT" format** is only used when Global System Manager is generated and has no relevance on installed software.

The **SYSYSM flag** MUST not be changed otherwise unpredictable results will occur.

The **EMS handling enabled?** option and **EMS controller** options are displayed but cannot be updated using Global Configurator. These options are only customisable using the "EMS Handling" option in =.56nn (see section 8.5.3.1).

The **Priority interrupt level (0-7)** allows you to alter the priority interrupt level on the master Programmable Interrupt Controller (PIC) hardware. It may be necessary to alter this value to change the interrupt priority of a serial port if "lost interrupts" are causing serial data loss on a heavily used multi-user system.

The **Interrupt mask flag** allows you to select which interrupts are handled by the Global System Manager Serial Interrupt Handler (+JWNINT). By default, the +JWNINT module handles all interrupts that occur on the following IRQ levels:

2 3 4 7 10 11 12 15

By modifying this flag it is possible to select those interrupts that are NOT handled by +JWNINT by setting selected bits in this flag byte:

Bit	Mask	IRQ-level affected if bit set
0	#01	IRQ-2
1	#02	IRQ-3
2	#04	IRQ-4
3	#08	IRQ-7
4	#10	IRQ-10
5	#20	IRQ-11
6	#40	IRQ-12
7	#80	IRQ-15

The following examples should make this clear:

Value +JWNINT	IRQs handled by +JWNINT	IRQs ignored by
#00	2 3 4 7 10 11 12 15	(none)
#FF	(none)	2 3 4 7 10 11 12 15
#F0	2 3 4 7	10 11 12 15
#0F	10 11 12 15	2 3 4 7
#FB	4	2 3 7 10 11 12 15
#5A	2 4 11 15	3 7 10 12

#A5

3 7 10 12

2 4 11 15

The **Load keyboard tables** option is displayed but cannot be updated using Global Configurator. The integral screen controller, +JWCB01 (see section 9.4) will only function correctly if the keyboard translation tables have been established by the +JWNKEY module.

The **Serial interrupt module** is reserved for future use and should be left at the default value of "INT".

The **Apricot Quad cards required?** flag must be set if consoles and/or printers are connected via Apricot Quad cards (see section 9.9.13).

The **Smartport cards required?** flag must be set if consoles and/or printers are connected via Arnet Smartport cards (see section 9.9.6). If this flag is set, the following prompts will follow:

```

Number of Smartport cards          ( 0):
  Address of card 0                (#0000):
Interrupt level for card 0         ( 0):
  Address of card 1                (#0000):
Interrupt level for card 1         ( 0):
  Address of card 2                (#0000):
Interrupt level for card 2         ( 0):
  Address of card 3                (#0000):
Interrupt level for card 3         ( 0):

```

The **Number of Smartport cards** should be set to the number of cards configured in the computer (i.e. 1, 2, 3 or 4). For each card installed, the **Address of card N** should specify the I/O address of the card, and the **Interrupt level for card N** should be set to the IRQ level of the card. The values for non-configured cards should be left at 0.

The **Adaptec SCSI card required?** flag must be set if either the "ADAPTEC" hard-disk controller or the "ADAPTEC" or "AHA-TAPE" tape controllers are included in the configuration file. If this flag is set, a further prompt will follow (see section 9.14.2). **DO NOT ATTEMPT TO USE THE "ADAPTEC" OR "AHA-TAPE" CONTROLLERS IF GLOBAL SYSTEM MANAGER IS BEING USED UNDER WINDOWS.**

The **Hyperport card required?** flag must be set if consoles and/or printers are connected via TIS Hyperport (section 9.9.7), TCL Hyper/MX (9.9.8), TCL PCC/N (9.9.9) or TCL Superport (9.9.10) sub-systems. If this flag is set, further prompts will follow. Please refer to the Hardware Factsheet Number 1 for full details.

9.15.2 Global Configurator Distribution Options

The following configuration-specific prompt will appear in the Distribution Options section of the configuration file in addition to the standard prompts described in section 2.10 of the Global Configurator Manual:

```

Nucleus size in Kb                ( 200):

```

The **Nucleus size in Kb** is only used when Global System Manager is installed (to calculate the amount of free space on the SYSRES volume) and has no relevance on installed software.

10. NetWare Loadable Modules

This chapter describes the files supplied with Global System Manager (Novell NetWare) that are used on the Novell NetWare fileserver.

The first section lists all the files distributed on the BACNAT diskette that run on, or are used by utilities running on, the NetWare fileserver.

The next section describes how to install and configure the Global System Manager NetWare Loadable Module (NLM) on a NetWare fileserver. It is assumed that the installation of Global System Manager (Novell NetWare), as described in Chapter 2, has been completed.

The fileserver version of the PING utility is also described in this chapter.

10.1 NLM Components on the BACNAT Diskette

The following MS-DOS files, distributed on the BACNAT diskette (see section 6.1), comprise the NLM components:

GSM.NLM	Global System Manager NetWare Loadable Module (NLM). The NLM loads on a NetWare fileserver and runs a highly cut-down and specialised version of Global System Manager. It is solely dedicated to providing Global System Manager filing facilities for Novell NetWare workstations running Global System Manager (Novell NetWare). THE NLM CANNOT BE CONFIGURED WITH A GLOBAL SYSTEM MANAGER CONSOLE AND CANNOT RUN GLOBAL APPLICATIONS;
NLMGSM.INI	MS-DOS text file containing Global System Manager NLM initialisation information. This file is used by the GSM NLM running on the NetWare server in an analogous way as GSM.INI is used by Global System Manager (Novell NetWare) on a workstation;
NLMIPL.VOL	IPL volume for the Global System Manager NLM. This file is only present on the BACNAT diskette for configurations 5610 and 5611;
NLMIPL.DLV	IPL volume for the Global System Manager NLM. This file is only present on the BACNAT diskette for configurations 5612 and 5613;
README.NLM	MS-DOS text file which provides useful "on-line" help-information regarding the Global System Manager NLM;
PING.NLM	NetWare utility used (on the fileserver) to measure network throughput;
PINGNLM.CNF	Configuration file (sic) containing various parameters used by PING.NLM;
CLIB.311	Novell C library NLM for NetWare 3.11. This may have to be loaded on a NetWare fileserver before certain NLM's (the GSM NLM amongst them) can load

under NetWare 3.11. Although a CLIB.NLM is distributed with NetWare, some older versions are not suitable for Global System Manager. Refer to the Global Configuration Notes for full details;

GSM311.NLM Alternative version of GSM.NLM (refer to the Global Configuration Notes for full details).

10.2 The Global System Manager NetWare Loadable Module

(GSM.NLM)

The Global System Manager NLM loads on the Novell NetWare fileserver and runs a special purpose version of Global System Manager. The NLM is solely dedicated to providing Global System Manager filing facilities for Novell NetWare workstations that are running Global System Manager (Novell NetWare). The NLM does not provide any Global System Manager printing services. Furthermore, the NLM cannot be configured with a Global System Manager console and cannot run Global applications.

The NLM is best considered as a dedicated Global System Manager file-server computer.

Use of the Global System Manager NLM is not mandatory although it is highly recommended. A single NLM is installed as part of the standard installation (see Chapter 2). Appendix K describes some Global System Manager configurations that do not include the NLM, and configurations which include multiple NLM's.

10.2.1 Installing the Global System Manager NLM

The NLM loads a special purpose version of Global System Manager from the NLM IPL.VOL or NLM IPL.DLV volume. For configurations 5610 and 5611, NLM IPL.VOL is installed. For configurations 5612 and 5613, NLM IPL.DLV is installed. This volume contains the NLM configuration file and Action File. For configurations 5610 and 5611, the NLM configuration file is ++5619AA. For configurations 5612 and 5613, the NLM configuration file is ++5619BB. The NLM Action File is A.C3 for all configurations.

The NLM configuration file matches that supplied with the workstation configuration on BACRES (e.g. ++5610xx), so if you have installed the standard configuration, you will not normally need to alter the NLM configuration file. Section 10.2.4 describes how to update the NLM configuration file.

Note that, unlike the variant of the NLM supplied with earlier versions of Global System Manager, the NLM supplied with Global System Manager V8.1 does not need to login to NetWare. Consequently, there is no need to edit the LOGIN entry in the NLM initialisation file, NLMGSM.INI.

10.2.2 Loading the Global System Manager NLM

To load the NLM from the NetWare fileserver system console key:

```
:LOAD directory\GSM
```

where **directory** is the **absolute** pathname of the Global System Manager home directory.

Please refer to the Global Configuration Notes and section I.3 if you encounter any problems when loading the NLM.

Once the Global System Manager NLM has been loaded on the fileserver, it is then possible to load Global System Manager on the workstations using the NLM as the "master" computer.

If you wish the Global System Manager NLM to be loaded automatically when the fileserver boots, edit the fileserver AUTOEXEC.NCF file to include the above LOAD command.

10.2.2.1 The Global System Manager NLM Command Line

The full syntax for the Global System Manager NLM command line is as follows:

```
:LOAD directory\GSM [initialisation file]
```

Where *directory* is the **absolute** pathname of the directory the NLM is installed in. The initialisation file pathname can be absolute, or relative to *directory*. If the initialisation file pathname is missing, the NLM will look for initialisation file NLMGSM.INI in *directory*.

10.2.3 The NLM Initialisation File NLMGSM.INI

The Global System Manager NLM initialisation file is similar to that used by the Global System Manager workstations (i.e. GSM.INI). The initialisation file consists of a number of entries. Each entry contains a number of fields. Fields can be separated by any number of spaces, tabs, or newlines. Numbers can be given in decimal, or hexadecimal by prefixing the number with 0x or 0X. An asterisk denotes the start of a comment: The asterisk and the rest of the line is ignored. The following entries may appear in the initialisation file:

NODE-ID node	Specifies the NLM's node-id
MASTER-NODE node	Specifies the master node-id
DOS-FILE drive path	Specifies domain filename
SSD-FILE drive path	Specifies domain directory name
LAN-CONTROLLER etc.	Specifies network parameters
LOGIN NAME etc.	Specifies NLM user name and password
ACTIVITY-POLL nnnn	Specifies inactivity time-out period

The meaning and use of each of these entries is explained in the following sections.

10.2.3.1 NODE-ID node

The NODE-ID entry specifies the NLM's Global System Manager node-id. The node-id **MUST** be a single upper-case letter.

Only a single NODE-ID entry is allowed in the NLMGSM.INI file. No matching entries in the NLM configuration file are required.

10.2.3.2 MASTER-NODE node

The MASTER-NODE entry specifies the Global System Manager node-id of the "master" computer. As the Global System Manager NLM will normally act as the Global System Manager "master", this will usually be the same as the NODE-ID entry (see section 10.2.3.1).

Only a single NODE-ID entry is allowed in the NLMGSM.INI file. No matching entries in the NLM configuration file are required.

10.2.3.3 DOS-FILE drive path

The DOS-FILE entry specifies the drive number and path of an Integrated Data File simulated volume. The first parameter, drive, is the drive number for the corresponding DOS-FILE entry in the NLM configuration file. By convention, drive numbers start from 0. Note that the drive numbers for the DOS-FILE entries and SSD-FILE entries (see section 10.2.3.4) are numbered independently so that there can, for example, be entries for both "DOS-FILE 0" and "SSD-FILE 0".

The entry will be matched up to the corresponding DOS-FILE entry in the configuration file. If a relative path is specified (i.e. the path begins with a directory or file name), the path is taken relative to the directory the NLM is loaded from. For absolute paths you cannot use workstation network drives such as F: in the path, you must begin the path with the volume name (e.g. SYS:,USR:) instead.

The NLM can only boot from an Integrated Data File, and will attempt to boot from the first file specified. So, if any additional Integrated Data Files are added to the NLM initialisation file, they MUST be included after the entry for the boot volume GSMIPL.VOL.

Multiple DOS-FILE entries are allowed in the NLMGSM.INI file. Corresponding entries in the NLM configuration file are required.

10.2.3.4 SSD-FILE drive path

The SSD-FILE entry specifies the drive number and path of a Discrete Data File simulated volume. The first parameter, drive, is the drive number for the corresponding SSD-FILE entry in the NLM configuration file. By convention, drive numbers start from 0. Note that the drive numbers for the SSD-FILE entries and DOS-FILE entries (see section 10.2.3.3) are numbered independently so that there can, for example, be entries for both "SSD-FILE 0" and "DOS-FILE 0".

The entry will be matched up to the corresponding SSD-FILE entry in the configuration file. If a relative path is specified (i.e. the path begins with a directory name), the path is taken relative to the directory the NLM is loaded from. For absolute paths you cannot use workstation network drives such as F: in the path, you must begin the path with the volume name (e.g. SYS:,USR:) instead.

Multiple SSD-FILE entries are allowed in the NLMGSM.INI file. Corresponding entries in the NLM configuration file are required.

10.2.3.5 SSD-HANDLE n

The SSD-HANDLE entry specifies the maximum number of file handles to be used for SSD files. No more than n SSD files will be open at a given time. The value of n can be between 2 and 256. If this entry is missing, a default of 10 handles will be used.

Only a single SSD-HANDLE entry is allowed in the NLMGSM.INI file. No matching entries in the NLM configuration file are required.

10.2.3.6 LAN-CONTROLLER SOCKET socket PACKETS number

The socket numbers used by the Global System Manager NLM must be identical to that used by all the Global System Manager workstations (see section 8.6.1.1). It is strongly recommended that you use the default value of 9000 hex. In any case, the socket number must be greater than 8000 hex. The PACKETS field is the number of receive packets the NLM will allocate for requests from Global System Manager workstations and should normally be left at the default value of 64.

Only a single LAN-CONTROLLER entry is allowed in the NLMGSM.INI file. No matching entries in the NLM configuration file are required.

10.2.3.7 LOGIN NAME name PASSWORD password

The LOGIN NAME entry specifies the NLM user name and password. The standard NLMGSM.INI file, supplied on the BACNAT diskette, does not contain a LOGIN NAME entry. If the entry is absent, the Global System Manager NLM will run with NetWare SUPERVISOR privileges.

If a LOGIN NAME is specified in the NLMGSM.INI file, the NLM will login to NetWare as an ordinary user, with a login name of name and a password of password, thus making it subject to the same security restrictions as other users. The name and password arguments MUST both be in upper-case.

Important note: This option is not recommended as it introduces a breach in the NetWare security: The password for user name can be discovered by inspecting the NLMGSM.INI text file from the NLM screen (see section 10.2.5.2.2).

Only a single LOGIN NAME entry is allowed in the NLMGSM.INI file. No matching entries in the NLM configuration file are required.

10.2.3.8 ACTIVITY-POLL nnnn

The ACTIVITY-POLL entry causes all open NetWare files (i.e. files opened by GSM.NLM) to be closed after nnnn seconds of inactivity. For example:

```
ACTIVITY-POLL 10
```

will result in all NetWare files opened by GSM.NLM being closed after 10 seconds of inactivity.

The value of ACTIVITY-POLL can be between 10 and 3600 seconds.

The standard NLMGSM.INI file, supplied on the BACNAT diskette, does not contain an ACTIVITY-POLL entry. This option was introduced to allow a particular NetWare tape backup utility to complete an overnight backup without the requirement to unload the Global System Manager NLM. Without this "automatic file close" option enabled, the NetWare tape backup would fail because the Global System Manager NLM normally keeps NetWare files open on the fileserver until it is unloaded.

Use of the ACTIVITY-POLL option is NOT generally recommended. When the ACTIVITY-POLL time period elapses, the Global System Manager NLM closes all the NetWare files on the fileservers that it currently has open. However, Global applications running on workstations may still have Global files open. The Global files are held within volumes simulated by the (closed) NetWare files on the fileserver. Consequently, un-supervised use of the ACTIVITY-POLL flag can lead to

data inconsistency and possible corruption if the NetWare files are ever restored from tape! This option is only of use if you have an automatic NetWare backup utility that is unable to backup open files.

Only a single ACTIVITY-POLL entry is allowed in the NLMGSM.INI file. No matching entries in the NLM configuration file are required.

10.2.4 Updating the NLM Configuration File

The volume NLM IPL.VOL or NLM IPL.DLV volume contains the NLM configuration file and Action File. The NLM configuration file contains the configuration parameters used by the specialised, screen-less, Global System Manager running on the NetWare fileserver (i.e. normally computer "A"). **Changes to the workstation configuration files (i.e. ++5610xx, ++5611xx, ++5612xx or ++5613xx) have no effect on the configuration of the Global System Manager file-server that is running on the NLM.**

It is sometimes necessary to modify the NLM configuration file, although the default file supplied with Global System Manager, should be adequate for even the largest network. For example, the NLM configuration file supplied with Global System Manager V8.1, contains the following file parameters (which are fully described in section 2.9 of the Global Configurator Manual):

File Channels	200
File Blocks	100
File Buffers	6
Lock Table Entries	100

For configurations 5610 and 5611, the NLM configuration file (++5619AA) is located on unit a11. For configurations 5612 and 5613, the NLM configuration file (++5619BB) is located on unit a10. Normally, the NLM configuration file can be updated from a Global System Manager workstation while the Global System Manager NLM is loaded. After the configuration has been modified, the NLM must be unloaded then reloaded for the changes to become effective.

10.2.4.1 Updating the NLM Configuration File Directly

It may sometimes be necessary to update the NLM configuration file before installing Global System Manager. For example, if the NLM Discrete Data File volume format is changed from T151Z to T259Z (for configurations 5610 and 5611) the configuration file must be modified before installing Global System Manager. Note that the introduction of configurations 5612 and 5613 should remove, or at least reduce, the requirement to modify the NLM configuration file before installing Global System Manager.

If it is ever necessary to modify the NLM configuration file directly, proceed as follows:

1. Ensure that no other operators are running Global System Manager and unload the NLM if necessary.
- 2a. For configurations 5610 and 5611, edit the GSM.INI file in the Global System Manager directory, to change the GSM IPL.VOL entry to NLM IPL.VOL.

- 2b. For configurations 5612 and 5613, edit the GSM.INI file in the Global System Manager directory, to change the GSMIPL.VOL entry to NLMIPL.DLV.
- 3a. For configurations 5610 and 5611, log on to NetWare on a workstation as SUPERVISOR and run GSMBOOT to load Global System Manager. Unit 297, the NLM SYSIPL unit, appears containing the Action File A.C3 and configuration file ++5619AA.
- 3b. For configurations 5612 and 5613, log on to NetWare on a workstation as SUPERVISOR and run GSMBOOT to load Global System Manager. Unit 110, the NLM SYSIPL unit, appears containing the Action File A.C3 and configuration file ++5619BB.
4. Run Global Configurator on the NLM configuration file. The only entries you should alter are the ones in the DIRECT ACCESS CONTROLLERS section. The controller names are the same as those for the standard Global System Manager configuration (i.e. DOS-FILE and SSD-FILE). **Do not remove or alter the DOS-FILE entry at unit 110 because this is the entry for the NLMIPL.VOL volume.**
5. Once the configuration file has been updated, run \$BYE to exit Global System Manager.
6. Edit the GSM.INI file and change the NLMIPL.VOL, or NLMIPL.DLV, entry back to GSMIPL.VOL (i.e. reverse the changes made in (2)).
7. Edit the initialisation file NLMGSM.INI to match the new configuration file, if necessary.

10.2.5 The GSM.NLM Screen

After the Global System Manager NLM has loaded, a menu is displayed with the following entries:

Diagnostics

Maintenance

Unload

The Diagnostics and Maintenance entries display additional menus.

10.2.5.1 Working with Lists

The options in the maintenance menu produce various types of lists (e.g. lists of open files), which can be modified. The various lists have many features in common. The common features are collected together in this section to avoid repetition later. If you are familiar with NetWare utilities such as FILER, you will probably be familiar with what follows.

To remove an item from a list, use the up/down arrow keys to highlight the item, and then key . The effect of this will depend on what is being listed. For example, in the open file list, removing a file from the list will have the effect of closing the file.

To remove several items from a list, mark each item in turn by using the up/down arrow keys to highlight the item, followed by <F5> to mark the item. Once all the required items have been marked, key to remove all the marked items.

Sometimes an additional menu or list is associated with an item. To bring up the submenu or list, select the item by highlighting it using the up/down arrow keys, and then key <CR>. For example, selecting a shared file brings up a list of users sharing the file.

To exit from a list, key <ESC>.

Lists are NOT updated automatically. To update a list you must exit from it and display it again.

10.2.5.2 The Diagnostics Menu Entry

The Diagnostics entry from the main menu displays a further menu which allows the inspection of various run-time information and the NLM Diagnostic Log File.

10.2.5.2.1 Diagnostics/GSM Data Files

This displays details of the NLM data files. The display format is similar to that produced by the Global System Manager \$U utility (see section 4.8) but contains additional information which is often useful when diagnosing problems. Note that this screen shows data files in the order they appear in the configuration file and not in unit number order (as in the \$U report).

The Data File controller name and number are shown after the drive description. These correspond to the data file controller name and number used in the initialisation and configuration files. All data files given in the configuration file are displayed, whether they initialised successfully or not. In the latter case, the data file is shown as "NOT IN USE", together with the initialisation error code.

If the server has a large disk, and you are using an inappropriate volume format (e.g. T151Z on a 1Gb disk), the message:

```
TOO MANY TRACKS (nnnn) - DON'T USE!
```

will appear, where nnnn is the number of tracks.

Important note: If you are upgrading from variant V1.8 of the NLM, or earlier, you will not be able to use this menu entry unless you run the NLM configuration file through Global Configurator using the latest A.C3 on the supplied NLM IPL.VOL.

10.2.5.2.2 Diagnostics/Initialisation file

This displays the contents of the NLM initialisation file. The display is read-only.

If you are upgrading from an earlier version of the NLM, you should be aware that the NLM login name and password is displayed by this option. To close this potential security loophole, remove the LOGIN entry from the initialisation file, as the NLM doesn't need to login any more anyway. The initialisation file is no longer supplied with a login entry.

10.2.5.2.3 Diagnostics/Log File

This displays the NLM log file, which contains bootstrap diagnostic messages, and any errors which occur while the NLM is running. Unloading the NLM also writes a message to the log file. If an NLM doesn't initialise correctly, the log file should contain a record that will allow you to identify the problem.

10.2.5.3 The Maintenance Menu Entry

The Maintenance entry from the main menu displays a further menu which allows you to display and modify some of the run-time parameters controlled by the Global System Manager NLM.

10.2.5.3.1 Maintenance/Connections

The open connection list shows all Global System Manager nodes connected to the NLM, or which have files open on the NLM. If a node has files open on the NLM but is not connected to it, the node has probably crashed so "FAILED" is displayed after the node-id.

Removing a connection from the list will close the link between the workstation and the NLM, close any files the node has open, and remove any locks owned by the node.

You should only remove a connection if a node crashes, and has problems reloading or using Global System Manager because of files or locks left in use when it crashed. This is described further in section 10.2.5.5.

10.2.5.3.1.1 Maintenance/Connections/Connection Menu

Selecting a node from the connection list will bring up an additional menu. This submenu is a subset of the maintenance menu, allowing you to list outstanding locks and open files for the selected node.

10.2.5.3.1.1.1 Maintenance/Connections/Connection Menu/Locks

This is similar to the corresponding entry in the maintenance menu (see section 10.2.5.3.2). Only locks obtained by users on the selected node are shown. Shared locks are not displayed as there is no way of finding out who owns them.

10.2.5.3.1.1.2 Maintenance/Connections/Connection Menu/Open Files

This is similar to the corresponding entry in the maintenance menu (see section 10.2.5.3.3). Only files opened by users on the selected node are shown. For shared files, the number of users shown is the number of users on that particular node who have the file open. If you close a shared file from this menu, the file is closed with respect to the selected node, users on other nodes who have the file open are left unaffected.

10.2.5.3.2 Maintenance/Locks

The lock list shows all outstanding Global System Manager locks on the NLM. Removing a lock from the list will release the lock.

10.2.5.3.3 Maintenance/Open File List

The open file list shows all open Global System Manager files on the NLM. If a file is opened exclusively, the user number and node-id are shown.

Removing an item from the list will close the file.

10.2.5.3.3.1 Maintenance/Open File List/Shared File Users

Selecting an open shared file will list all the users who have the file open.

Removing a user from the list will close the file with respect to that user, other users are unaffected.

10.2.5.4 The Unload Menu Entry

The Unload entry can be used to unload the NLM if no Global System Manager workstations are attached to it. If you attempt to unload the NLM while Global System Manager workstations are attached, a warning will be displayed, and the NLM will not be unloaded. Note that you can use the NetWare UNLOAD command to unload the NLM at any time from the fileserver System Console whether the NLM is in use, or not.

10.2.5.5 Clearing a Crashed Workstation

The ability to clear connections is useful when Global System Manager workstations crash, and are unable to load Global System Manager again because of files and locks left in use at the time of the crash. For example, the swap file may be left open, resulting in the following message when Global System Manager is reloaded:

```
$57 INITIATION WARNING 205 - F
SWAP FILE WOULD HAVE BEEN xxx
```

Global System Manager will load but only one concurrent partition is available. To rectify a problem such as this, perform the following steps:

1. Exit Global System Manager on the workstation.
2. From the NLM main menu select, "Maintenance", followed by "Connections". Highlights the entry for the crashed node and key .
3. Reload Global System Manager on the workstation.

10.2.6 NLM Troubleshooting

This section contains some miscellaneous hints and tips.

10.2.6.1 Increasing the Number of Receive Packets

You can try increasing the number of receive packets used by the NLM to see if this increases performance. Each receive packet can hold a single request from a Global System Manager workstation. Workstations may issue as many as 8 requests at a time. The number of receive packets is given by the PACKETS field in the LAN-CONTROLLER entry of the initialisation file NLMGSM.INI. Try doubling the number of packets to 128.

10.2.6.2 Unloading the Global System Manager NLM

If you attempt to terminate the NLM, either from the NLM screen or by using the UNLOAD command, a warning will be displayed if workstations are still connected to the NLM. If unloading from the fileserver System Console you can ignore the warning and shutdown the NLM anyway, if you so wish.

10.2.6.3 Accessing NLM Volumes on a Workstation

For maintenance purposes, it is useful to be able to load Global System Manager on a workstation, and access the NLM volumes as local volumes. For this reason, the volume configuration for the Global System Manager workstations, and that of the NLM should remain consistent. The only difference should be that the standard configuration has access to the workstation boot volume, GSMIPL.VOL, and the NLM has access to the NLM boot volume, NLMIPL.VOL. To access the NLM volumes locally, unload the NLM. Log onto NetWare as the Global System Manager user, and run GSMBOOT. When finished, run \$BYE, and reload the NLM on the fileserver.

10.2.6.4 Installing Mature Applications

The installation procedures for some mature Global applications do not function correctly over Global System Manager networks and the volumes being installed must be accessed locally (i.e. the applications are not "network aware"). To install such applications proceed as follows:

1. Ensure that no other operators are using Global System Manager, and unload the NLM.
2. Login to NetWare on a workstation as SUPERVISOR, and run GSMBOOT. The NLM volume that normally appears at network address A00 is now accessible locally (i.e. as domain 200).
3. Install the Global application following the instructions supplied with the application product.
4. Run \$BYE to exit Global System Manager on the workstation.
5. Reload the NLM on the fileserver.

10.2.6.5 The NLM Diagnostic Log File

The Global System Manager NLM produces a Diagnostic Log File (NLMGSM.LOG on the Global directory) which contains any bootstrap or error messages displayed by the NLM (see section I.3). The contents of the log file may be inspected from the NLM Screen (see section 10.2.5.2.3).

10.2.6.6 Automatic File Closure

When no workstations are connected to the NLM, it will automatically close any files it has open. The automatic closure of files by the NLM that occurs when no Global System Manager workstations are active should be utilised rather than the "forced file closure" enabled by the ACTIVITY-POLL option in the NLMGSM.INI file (see section 10.2.3.8).

10.3 The Fileserver Version of PING (PING.NLM)

The workstation version of the PING utility is described in section 6.8. This section, which should be read in conjunction with section 6.8, describes the fileserver version of PING.

The fileserver version of PING (i.e. PING.NLM) can only be used as a "destination node". It is not possible to use PING.NLM as a "source" node when measuring throughput between a fileserver and a workstation.

10.3.1 The configuration file PINGNLM.CNF

The PINGNLM.CNF configuration file contains various parameters used by PING.NLM. All numeric parameters can be specified in either decimal or hexadecimal notation (if prefixed by 0x or 0X). The standard PINGNLM.CNF file, supplied on the Global System Manager (Novell NetWare) BACNAT diskette contains the following parameters:

```
NODE-ID      A
SOCKET      0xA000
PACKETS     64
```

10.3.1.1 The NODE-ID Parameter

The NODE-ID must be an upper-case letter (i.e. A to Z).

10.3.1.2 The SOCKET Parameter

The SOCKET number must be unique to PING. It must be between 0x8000 and 0xffff.

10.3.1.3 The PACKETS Parameter

The PACKETS parameter specifies number of receive buffers to allocate for incoming packets from workstations running PING. The number of buffers must be between 8 and 256, inclusive.

10.3.2 Running PING.NLM

Ensure the PINGNLM.CNF file is in the same directory as PING.NLM. At the fileserver System Console type:

```
load path\PING
```

where path is the **full** pathname of the directory containing PING.NLM. You must always type the full path, even if you have established a search path to the PING directory, as PING uses the pathname to locate the PINGMLM.CNF file.

10.3.3 Using PING to Measure Throughput

To measure throughput between a workstation and a fileserver, load PING on the server, and then run PING on the workstation, specifying the server as the target node (as described in section 6.8.4).

Appendix A - Installation Notes

A.1 Introduction

These notes refer to the prompts and messages produced during the installation of Global System Manager, as indicated by references of the form [A.17], for example. Note that messages which start \$57, \$66, \$78 or \$99 are listed separately in Appendix B.

These notes should be used for reference only, as not all of them will apply to your installation. Chapter 2 describes the installation of Global System Manager in detail.

A.2 Standard Installation

If you select a standard installation then Global System Manager will be installed onto the **first simulated volume** available.

Global System Manager will be installed so that no password is needed to sign on, and so that a menu will be displayed after sign-on. Note that most Global software modules perform their own password checks. A standard allocation of memory to each user is also assumed.

If you are installing Global System Manager for the first time you are strongly recommended to select a standard installation.

The non-standard installation option allows you to "fine-tune" the installation by specifying a particular SYSRES unit, defining the memory allocation and allocating work-volumes etc. Note that unlike previous versions of Global System Manager, the option to specify the size of the SYSRES volume is available during a **standard** installation of Global System Manager V8.1.

If you reply <CTRL A> to this prompt the installation job dialogue will not be suppressed. This "verbose mode" may be useful to identify a problem if the installation process fails unexpectedly.

If you reply Q to this prompt the installation will be aborted and a GSM READY: prompt will be displayed. This allows you to run command programs (e.g. \$F, \$V, \$U) in order to check the new system **before** installing onto the hard disk. When attempting to run commands on a Starter System please note that the various programs are dispersed amongst several libraries on the BACRES diskette - they are not all held in P.\$CMLB0.

To continue with the installation, provided no unit assignments have been altered, run "INSGSM" from the GSM READY: prompt. For example:

```
GSM READY: INSGSM
```

A.3 Type of Installation

This prompt will only appear during a non-standard installation.

Install Global System Manager (GSM). The whole of Global System Manager supported by your configuration will be installed. The installed software will occupy 5.0 - 5.5 Mbytes on hard disk, depending on the configuration. In addition, if there are more partitions defined than there is memory available, an additional 57 Kbytes will be needed for each extra partition.

Transfer GSM to disk without installing. THIS OPTION IS OBSOLETE AND SHOULD NOT BE USED FOR GLOBAL SYSTEM MANAGER (Novell NetWare) CONFIGURATIONS.

Install GSM bootstrap only. THIS OPTION IS OBSOLETE AND SHOULD NOT BE USED FOR GLOBAL SYSTEM MANAGER (Novell NetWare) CONFIGURATIONS.

A.4 No Valid SYSRES Unit

This message indicates that Global System Manager cannot be installed because there is no suitable hard disk. At least one diskette drive and one hard disk simulated volume are required to install Global System Manager.

This message will appear if **ALLOCATE.EXE** or **GLMKDDF.EXE** have not been used to establish a simulated volume prior to running **GSMINST** (see section 2.1.4).

A.5 Selecting a Unit

This prompt will only appear during a non-standard installation. The units of the simulated volumes onto which you can install Global System Manager are listed (together with the format code and capacity, in Megabytes), with a default shown. This default will usually be the best choice, but if more than one simulated volume has been allocated you might want to install onto a different simulated volume than the default.

Note that you can key any valid unit address to the prompt, and not just those listed. This feature allows you to install Global System Manager onto a specific sub-unit of a simulated volume.

A.6 Disk Requires Formatting

This message is documented for completeness only. It should not appear during the installation of Global System Manager (Novell NetWare).

A.7 Disk Will be Formatted - Is This OK?

This message is documented for completeness only. It should not appear during the installation of Global System Manager (Novell NetWare).

A.8 Overwrite Existing Global System?

There is already a copy of Global System Manager installed on the simulated volume. If you reply Y the existing SYSRES will be overwritten, otherwise Global System Manager will be installed onto a separate sub-volume on the selected simulated volume.

Note that if you want to have two copies of Global System Manager on one simulated volume, at least one of them must load from a SYSIPL volume. However, it is possible to install separate, loadable copies of Global System Manager on separate simulated volumes.

A.9 Destroy Volume-Name?

You are attempting to overwrite a simulated volume on a hard disk which is being used for some other purpose. You must key Y to confirm that this is what you intend.

A.10 Specify SYSRES Unit

This prompt will only appear during a non-standard installation. You must specify the unit address of the SYSRES volume on another computer which is to be used by the system you are installing.

A.11 Which Disk To Bootstrap From

This prompt will only appear during a non-standard installation. If you are installing Global System Manager onto a simulated volume then it is most convenient to put the startup code on the same simulated volume, so that Global System Manager can be initiated without using diskettes.

A.12 Domain xxxxxx will be initialised

This message indicates that the simulated volume requires initialising before it can be used. Initialising the simulated domain will destroy any data currently on the disk. **Note that the default reply to the following prompt is N to prevent accidental deletion of Global System Manager data:**

```
This will destroy any existing data
Key Y if it is OK to continue:
```

A.13 Computer Identification Letter

You must supply a letter (A to Z for file servers) to identify this computer on the network. This letter must be unique on the network. If it is not, network I/O errors will occur.

A.14 System Unit On Master

A network configuration must have a designated 'master' computer, where details of currently signed-on operators can be held. This computer must be powered up before anyone can sign on to the network. However, once an operator is signed-on the master computer need not be accessed again until that user signs off.

You must specify the unit address which Global System Manager occupies on the master computer (SYSRES). This is usually the identification letter of the master computer followed by 01 (e.g. A01).

A.15 Terminal Code

If your computer has serially connected screens then you must specify what type they are, so that the appropriate information can be installed. Each type of screen is identified by a number of up to three digits, and these can be listed by keying L to the prompt. You can specify up to four terminal types. When you have specified all you need key E. Note that it is easy to install further terminal types when the system has been installed by running the \$CUS System Maintenance option.

A.16 Memory Allocation

This prompt will only appear during a non-standard installation.

You must specify the manner in which Global System Manager is to divide up the Random Access Memory (RAM). The RAM is used for three purposes: holding the Global System Manager nucleus; providing memory areas (called memory banks) for Global System Manager and application programs to run in; and as a very fast but volatile storage for data. (Volatile means that the data is lost when you turn the computer off.)

In this last case, RAM can either be used as RAM disk (addressable as unit 109) in which files (normally temporary 'work' files) are held, or as disk cache, in which images of the most frequently accessed tracks on the hard disk are stored for faster access.

The size of the Global System Manager nucleus is largely fixed by the configuration. Any space remaining after allocating memory banks is used as RAM disk and/or cache. Therefore, the decision to be made is how much RAM is to be allocated for use as memory banks.

In order for Global System Manager to execute efficiently there must be a memory bank for every partition that can be active at the same time. An active partition is one in which a program is executing, as opposed to just waiting at a prompt. For example, suppose your computer has six screens, all with four partitions available, making 24 partitions in all. If you know that no more than four of the screens are frequently used, and that only two partitions on each are likely to be used, then eight memory banks should be sufficient.

The size of the memory banks determines the size of the largest program that can be run. 3 Kbytes of each bank are used by Global System Manager itself, so 57 Kbyte banks allow programs of up to 54 Kbytes to be run. The default provided is the maximum size 57 Kbytes. It is possible to install with a smaller size. Some Global System Manager programs require 49 Kbytes and most Global application software requires at least 43.5 Kbytes.

The following prompt allows you to specify the size of the memory banks:

Memory bank size in Kbytes (57K):

Note that the reply is automatically multiplied by 1024 to convert to Kbytes so that, for example, a reply of 57 would be converted to 58368 bytes (i.e. $57 * 1024$). Replies of the form 57K are deemed invalid.

Note that you can reconfigure the memory later, without needing to re-install Global System Manager, by using the \$CUS System Maintenance option.

Some applications require extra space in the nucleus. This extra memory is called System Stack. This should only be allocated if you want to run applications requiring it. System stack reduces the maximum available memory bank size.

A.17 Insufficient Space

There is insufficient contiguous free space on the hard disk to install Global System Manager. Normally this can only happen if you're re-installing Global System Manager. The error message indicates how much space is needed.

If there is enough space for the command programs but not for all the user partitions required, then you will be given the option of installing a restricted system, which will support fewer partitions. Because the size calculations are slight overestimates it is possible that this system may be completely satisfactory. If, however, there is not enough space you will be warned that the number of users is being reduced when you bootstrap the new system. If you then use \$REORG to

increase the size of the SYSRES unit by a suitable amount it will be possible to bootstrap a full system.

If you need to make more space available you must bootstrap your old system and use \$V or \$REORG to delete or reorganize units.

A.18 Existing Unit Too Large

There is more space allocated to the unit onto which Global System Manager is to be installed than is needed. If you reply Y the unit will be re-allocated to release the excess space, otherwise it will be left at its current size. You may want to have a larger than standard SYSRES if extra menus are required.

A.19 Diskettes Required

You need to provide diskettes as indicated. These can be new diskettes or you can re-use old ones. Write the names of the diskettes in the top right hand corner of their labels so that you can identify them. It is advisable to write the date on the label as well.

A.20 Key size of SYSRES in K (minimum of xxxxK)

The size of the SYSRES unit may be increased from the default to allow for extra menus, or to provide room for additional swap files.

Note that the reply is automatically multiplied by 1024 to convert to Kbytes so that, for example, a reply of 6000 would be converted to 6144000 bytes (i.e. 6000 * 1024). Replies of the form 6000K or 6M are both deemed invalid.

A.21 Date Format

Global System Manager supports two date formats: European, dd/mm/yy; and American, mm/dd/yy. For example, the date 6th February 1956 is represented as 06/02/56 (European format) or 02/06/56 (American format). Whichever format you chose will be used automatically by any Global software to input and display dates.

A.22 Password Checking

This prompt will only appear during a non-standard installation (password checking is not enabled during a standard installation). If you choose to use password checking each user will have to supply a password to sign on. You can specify operator-ids (one to four characters) of up to ten authorised users, and add further operators or change authorization levels later by running \$AUTH. You will also be asked to supply a password which must be keyed to run \$AUTH. This prevents other users from adding new operator-ids.

Each operator is given an initial password the same as their operator-id. They can (and should) change these by keying <CTRL B> rather than <CR> at the end of their password when signing on.

Note that most Global software modules contain their own password checking, and so it is not normally necessary to check passwords at sign on.

A.23 Menu

This prompt will only appear during a non-standard installation (a menu is always installed during a standard installation). Most users

will prefer to go into a menu after signing on. If, however, the computer is used mainly for program development you may prefer to go to the Global System Manager ready prompt instead. The default menu contains the following entries:

```
Install Global Software . . . . 1
GSM Utilities . . . . . 2
```

The "GSM Utilities" sub-menu contains the following options:

```
Volume Maintenance. . . . . 1
Directory Maintenance . . . . . 2
System Status . . . . . 3
File Inspection . . . . . 4
Exit. . . . . <CR>
```

A.24 The Spooler

The Spooler (see Chapter 8 of the Global System Manager Manual) allows a printer to be shared between several users. This is achieved by writing all reports to a special disk unit, the spool unit, rather than directly to the printer. The reports are printed off by a program called the spooler (command \$SP) which typically is running all the time in a background partition. Note that it is still possible to print reports directly if the spooler is not printing.

As well as allowing you to share the printer, the spooler gives you more control over the printing of reports. You can 'hold' some reports for printing later, give others high priority, or print multiple copies. There is also a spooler status command, \$SPS, that allows you to re-schedule printing in this way from screens other than the one running the spooler.

You must specify the unit address and size of the spool unit to be allocated. The default unit is the next free unit on the disk after SYSRES (e.g. if SYSRES is unit 210, the default spool unit will be 211). This is usually satisfactory, but on a network you may want to use a spool unit on another computer, in which case you should supply its address to the prompt. The size must be sufficient to hold all the reports waiting to be printed. As a guide, a typical report of 50 pages will occupy about 400 Kbytes. Clearly, if you intend holding a lot of reports without printing them you will need a larger unit than if you intend to print everything immediately.

Important note to users of the Global Cobol Development system: The size of the spool unit for Global System Manager V8.1 should be larger than for earlier versions of Global System Manager to accommodate the larger listing files produced by the V8.1 Global Cobol compiler.

The following prompt allows you to specify the size of the spool unit:

```
[A.24] Size of spool unit ( nnnnK):
```

The reply may be suffixed by K (to specify a size in Kilobytes), M (to specify a size in Megabytes) or G (to specify a size in Gigabytes).

If you asked for a menu to be entered after sign-on then two extra entries will be added to the "GSM Utilities" sub-menu (see section A.23) for the spooler. These entries will be:

```
Start spooler . . . . . 5
Check spooler status. . . . . 6
```

A.25 Selecting a Printer Unit

Most Global System Manager configurations support both serial (RS232) and parallel printer units, so you can attach printers of either type. You must select the correct type for your printer.

If you intend attaching more than one printer, you should specify the unit to be used for plain paper printing, as this unit will be used (unless overridden) for any report not on special stationery. If you have installed the spooler, then it will print reports to this printer.

A.26 Printer Busy Handling

Your computer is capable of sending characters to the printer faster than they can be printed, so the printer needs to be able to signal to the computer when it is busy. Serially connected printers normally use one of two methods: an extra wire, the **busy line**; or sending X-ON and X-OFF characters (sometimes called DC1 and DC3).

Which type of busy handling is used depends on your printer, your computer and the cabling used. See your printer handbook if you are in doubt. You can change later if necessary by using the \$CUS Printer Customisation option.

This prompt will not appear if the main printer is a parallel printer (i.e. if the word "PARALLEL" or "parallel" appears in the Printer Description text).

A.27 Printer Baud Rate

For serially connected printers you must specify the baud rate at which characters are to be transmitted to the printer. A rate of 9600 baud is most often used.

This prompt will not appear if the main printer is a parallel printer.

A.28 Domain Error Map

If you need to build a domain error map for the simulated domain before installing Global System Manager because, for example, the manufacturer has identified a list of faulty tracks on the hard disk, you should key V to the prompt as indicated. \$V will then be run to allow you to set up an error map as documented in section 4.9.8.

Do not choose to create a domain error map if there is data you wish to preserve on the domain.

This message is documented for completeness only. It should not appear during the installation of Global System Manager (Novell NetWare).

A.29 Standard Printer Control Files

This prompt will not appear during the installation of Global System Manager V8.1. No Printer Control Files (see section 6.1.3.3 of the Global System Manager Manual) are installed.

A.30 Menu Entry For Menu Maintenance

You are asked whether you want an entry in the main menu for running the menu maintenance software. The software itself is installed onto

the SYSRES of the computer except in a network configuration, when it is put onto only the master computer's SYSRES unit.

If this option is selected, the following extra entry will be added to the default menu (see section A.23):

Menu maintenance. 3

A.31 Event Logging Installation

On the master computer in a network environment, or on a single computer system, you are asked whether you want the event logging software installed. Event logging is fully described in the Global Utilities Manual. If you answer Y you will be prompted for the size of the master event log file, given a default of 200 Kbytes. The installation will allocate a unit on the computer called SYSLOG which will contain the event logging programs (about 160 Kbytes), a master event log file \$\$MLOG of the size given and leave free space of 1/5 of the size of \$\$MLOG for the event logging file \$\$LOG. An insufficient space message will be given if a unit cannot be allocated of the required size.

The following prompt allows you to specify the size of the SYSLOG volume:

[A.31] Specify size of master event log file in Kbytes (200):

Note that the reply is automatically multiplied by 1024 to convert to Kbytes so that, for example, a reply of 200 would be converted to 204800 bytes (i.e. 200 * 1024). Replies of the form 200K are deemed invalid.

If the computer is not the master of a network then you will be asked if event logging is installed on the master computer. If the answer is Y you will further be prompted for the LAN unit address of the SYSLOG unit on the master which will have been allocated as part of the Global System Manager installation onto the master computer.

A.32 Century Start Year

This prompt gives you the option to change the year before which dates are regarded as being in the 21st century rather than the 20th (see section 6.1.2.12 of the Global System Manager Manual for further details).

A.33 Work Space Allocation

This prompt will only appear during a non-standard installation. It gives you the option to allocate a work unit for use by some Global System Manager commands. If you reply Y to this prompt a SYWORK unit of the appropriate size (the default is 200Kb) is allocated. The logical unit \$WK is permanently assigned to this unit.

The following prompt allows you to specify the size of the SYWORK volume:

[A.33] Specify size of work unit in KBytes (200):

Note that the reply is automatically multiplied by 1024 to convert to Kbytes so that, for example, a reply of 200 would be converted to

204800 bytes (i.e. 200 * 1024). Replies of the form 200K are deemed invalid.

A.34 Install Operator Groups

On the master computer in a network environment, or on a single computer system, you are asked whether you want to install the operator group option. The operator group option is fully described in the Global Utilities Manual. If you answer Y, the installation will create an empty group file (\$\$GROUP) of size 200Kb on the SYSRES sub-volume (i.e. on logical unit \$M).

A.35 Is the Mailing System Installed on the Master Computer

If the computer is not the master of a network then you will be asked if the Global System Manager mailing system is installed on the master computer. If the answer is Y you will further be prompted for the LAN unit address of the SYSML unit on the master which will have been allocated as part of the Global System Manager installation onto the master computer (see A.37, below).

A.36 Disk Requires Partitioning

This message is documented for completeness only. It should not appear during the installation of Global System Manager (Novell NetWare).

A.37 Install Mailing System

On the master computer in a network environment, or on a single computer system, you are asked whether you want the Global System Manager mailing software installed. The Global System Manager mailing system (\$MAIL) is fully described in the Global Utilities Manual.

If you answer Y you will be prompted for the size of the Mail unit, given a default of 1 Mbyte. The installation will allocate a unit on the computer called SYSML which will contain an empty \$MAIL file of maximum size (i.e. default 1Mb). An insufficient space message will be given if a unit cannot be allocated of the required size.

The following prompt allows you to specify the size of the mail unit:

[A.37] Size of mail unit (*nnnnK*):

The reply may be suffixed by K (to specify a size in Kilobytes), M (to specify a size in Megabytes) or G (to specify a size in Gigabytes).

A.38 Install Speedbase Presentation Manager

Speedbase Presentation Manager V8.1 MUST be installed during the installation of Global System Manager. **Unlike pre-V8.1 versions of Speedbase Presentation Manager, it is NOT possible to use \$INSOFT or run EPINS from the EPA distribution diskette.** If your software is for a Global System Manager PM configuration, key Y to install Speedbase Presentation Manager.

If Speedbase Presentation Manager is installed, the default menu (see section A.23) will contain the following options:

```
Install Global Software . . . . 1
GSM Utilities . . . . . 2
Presentation Manager. . . . . 3
```

or, if a menu entry for Menu Maintenance has been requested (see section A.30), the default menu will contain the following options:

```

Install Global Software . . . . . 1
GSM Utilities . . . . . 2
Menu maintenance. . . . . 3
Presentation Manager. . . . . 4

```

A.39 Install Speedbase Demonstration System

The installation of the Speedbase Presentation Manager demonstration software is optional. If you select to install the demonstration software you will be prompted for a sub-volume on which to install the demonstration data. **Important note:** The sub-volume selected must already be allocated on the hard-disk. The installation of the Speedbase Demonstration System will NOT allocate a new sub-volume automatically.

A.40 Save Current Global System Manager Customisation

If you are upgrading to Global System Manager V8.1 from Global System Manager V7.0 or V8.0 you have the option of saving the current Global System Manager customisation before installing. If this option is selected a BACSAV sub-volume will be allocated of the same size as the existing SYSRES. All the files on the existing SYSRES will be copied to BACSAV before Global System Manager is installed, overwriting the existing SYSRES.

A.41 Insufficient Space for a Save Unit

There is insufficient space to allocate a BACSAV sub-volume to save the contents of the existing SYSRES (see A.40, above). If you choose to continue with the installation the current Global System Manager customisation will NOT be saved.

A.42 Existing Customisation will be restored

This option only appears if you selected to save the existing Global System Manager customisation prior to installing Global System Manager V8.1 (see section A.40, above).

If you choose to restore the customisation, the files listed in section 2.1.10 will be copied from the BACSAV sub-volume to the new SYSRES subvolume.

Furthermore, if the save/restore existing customisations option is selected then it is NOT possible to apply the new V8.1 customisation options (e.g. \$GROUP - see A.34; \$MAIL - see A.37) during the installation of Global System Manager. These customisations must be applied using the "Install Extra Facilities" option of \$CUS as explained in section 6.1.4.13 of the Global System Manager Manual.

Appendix B - Installation Error and Warning Messages

The messages listed in this appendix appear when you attempt to startup, sign on to or use Global System Manager which has been invalidly customized, has had its configuration file wrongly updated by Global Configurator, or has been incorrectly generated. Those messages designated as errors are fatal and prevent Global System Manager from being loaded. Warnings are less severe and normally allow a degraded system with missing features to operate so that you can use Global System Manager itself to analyse the problem. A warning message should never be ignored unless the documentation indicates it is to be expected.

Important note: It may be necessary to use the GSMLOAD.EXE Diagnostic option (see section 6.2.1.4) to prevent the error message from disappearing when Global System Manager returns to MS-DOS.

The following notes are referred to from the message descriptions overleaf:

Note 1 This condition is documented for completeness only to assist the TIS Software staff responsible for software generation and porting Global System Manager to new operating systems. If it does occur it indicates that the system has been incorrectly or incompletely generated, or there is an internal error in the installation jobs.

Note 2 When there is insufficient space to load a program this may be due to you specifying too large a system stack or too small a memory bank. You may need to re-install Global System Manager.

Note 3 If an error occurs on a distribution volume (i.e. BACRES, BEA or HAA) you will normally have to obtain a new set of diskettes before you can proceed. If the error is on a system volume you should either restore the volume from a backup, or re-install Global System Manager.

\$57 INITIATION WARNING 1 - FILE name NOT FOUND
\$57 INITIATION WARNING 2 - FILE name HARD ERROR H
\$57 INITIATION WARNING 3 - FILE name CORRUPT
\$57 INITIATION WARNING 4 - FILE name READ ERROR

These messages appear if a problem occurs during the startup process when attempting to load the named machine-specific file. Note 1 applies to warning 1. Warning 2 usually indicates a drive electronics error rather than a media error, and if it persists after retrying the startup process several times the drive should be serviced. Note 3 applies to warnings 3 and 4. If a target system volume is affected it will be the one containing the machine-specific software (i.e. SYSIPL if present, or SYSRES).

\$57 INITIATION WARNING 5 - FILE name MISSING DEVICE

The physical device or simulated volume associated with a particular nucleus file is not present on this computer. This usually indicates that the software has been supplied with a configuration file which describes a configuration which is a

superset of the current one. For example, the configuration file might support both 3½" and 5¼" diskette drives whereas the computer you are working with possesses just one diskette drive. The message appears only when the starter system is loaded and is suppressed during the loading of the target system to avoid an unnecessary warning when the reason for it is understood. The file name indicates the type of missing device:

+JWCAXx	direct access device
+JWCBxx	screen
+JWCExx	printer
+JWCFxx	local area network
+JWNADA	Adaptec disk/tape
+JWNBOX	Arnet Smartport
+JWNHYP	TIS Hyperport
+JWNMXP	TCL Hyper/MX, PCC/Ni or Superport

\$57 INITIATION WARNING 6 - FILE name ERROR x

Note 1 applies to this message. An unexpected problem, not covered by the previous 5 warnings, has occurred when accessing the indicated file. The error code is a single letter whose meaning is given under "\$99 ERROR x ..." see below.

**\$57 INITIATION ERROR 10 - UNABLE TO LOAD P.\$MON uuu
e**

Note 1 applies to this message. It was not possible to open the monitor overlay library. This may be because of illegal use of the \$F INS or PIP instructions. The attempt to open P.\$MON from unit uuu failed with an error of type e.

**\$57 INITIATION ERROR 11 - UNABLE TO LOAD P.\$MON INDEX
e**

Note 1 applies to this message. It was not possible to read the monitor overlay library index. This probably means that the library is corrupt. The attempt to read the library index failed with an error of type e.

**\$57 INITIATION ERROR 12 - UNABLE TO READ MONITOR OVERLAY
e**

Note 1 applies to this message. It was not possible to read the monitor overlay from the P.\$MON library. This probably means that the library is corrupt or incomplete. The attempt to read the library failed with an error of type e.

\$57 INITIATION ERROR 13 - UNABLE TO CREATE MONITOR PAGE

Note 1 applies to this message. It was not possible to load an overlay from P.\$MON into a monitor page. This error will occur if the number of monitor pages has been reduced by injudicious use of the \$F PAM instruction.

**\$57 INITIATION ERROR 14 - UNABLE TO LOAD P.\$PAGES
e**

Note 1 applies to this message. It not possible to read the monitor overlay library P.\$PAGES. This maybe because of illegal

use of the \$F INS or PIP instructions. The attempt to open P.\$PAGES failed with an error type e. It is still possible to initiate Global System Manager but attempts to run some command programs will result in PGM CHK-8.

\$57 INITIATION ERROR 55 - STOP -98 ON ODD BOUNDARY

Note 1 applies to this message. An error has occurred when loading the monitor file (\$MONITOR).

\$57 INITIATION ERROR 60 - MONITOR AND COMMAND LIBRARY INCOMPATIBLE

This error usually indicates that you are using a SYSIPL diskette which is incompatible with the SYSRES disk. They contain different versions of Global System Manager.

\$57 INITIATION ERROR 61 - INVALID GENERATION

The serial code keyed in response to the "please key serial code" prompt, though a valid code, did not match the software on the disk. Try again in case you mis-keyed the number. If the error occurs again, it probably indicates an error in the generation of Global System Manager, and you will need to obtain replacement disks.

\$57 INITIATION ERROR 101 - \$STARC I/O ERROR
\$57 INITIATION ERROR 102 - \$STARC NOT FOUND

The startup process has been unable to load the main sign-on procedure overlay, \$STARC, from the command library on BACRES (starter system) or SYSRES (target system). If the error is on SYSRES either restore it from a backup or re-install Global System Manager. See Note 3.

\$57 INITIATION ERROR 103 - \$STARC TOO LARGE

This error terminates the startup process because there is insufficient space to load the main sign-on procedure overlay. See Note 2.

\$57 INITIATION ERROR 151 - INITIATION INCOMPLETE

This error, which terminates the startup process, will occur if you key <CTRL W> to interrupt it before the process is complete. The message will not appear immediately you key <CTRL W>, but will occur at the point at which the ready prompt would normally be output.

\$57 INITIATION WARNING 201 - TOO MUCH MONITOR IS SWAPPED
SWAP UNIT WOULD HAVE BEEN nnn

Note 1 applies to this message. The initiation of memory by the system has not been properly completed.

\$57 INITIATION WARNING 203 -
NOT ENOUGH ROOM FOR ALL USERS ON SWAP FILE OF SIZE ssssss
SYSTEM OF pp PARTITIONS POSSIBLE
IS THIS OK?:

There is insufficient room on the unit assigned to \$SW (normally SYSRES) for a swap file large enough to hold information for all the users of this system. This may occur if you change the configuration using \$CUS (Configuration Maintenance) or Global Configurator.

If you reply Y or <CR> to the outstanding prompt Global System Manager will continue by initiating a restricted system as indicated by the message. A response of N also causes the startup process to continue, but in this case only a single-user system will be initiated.

If the system as loaded is satisfactory but you wish to prevent this prompt appearing in the future, you should run \$CUS and decrease the number of users as described in Chapter 6 of the Global System Manager Manual.

To support the full number of users you must use \$REORG to increase the size of SYSRES by at least (memory bank size * number of extra users needed) bytes. An alternative is to establish a separate subvolume for swap files (by convention called \$\$SWAP) of the required size, and then use the \$CUS Permanent Unit assignments option to reassign \$SW to the address of this unit.

\$57 INITIATION WARNING 205 - IRRECOVERABLE ERROR ON \$\$SWAP FILE - x

An irrecoverable error has prevented the swap file from being used. The single character at the end of the message indicates the type of error: R or W indicate an I/O error on the disk; S indicates that the disk is full. The startup process continues, but only a single user system will be initiated. See Note 3.

\$57 INITIATION WARNING 206 - SWAP FILE ERROR 2

\$57 INITIATION WARNING 207 - SWAP FILE ERROR 3

\$57 INITIATION WARNING 208 - COMMAND \$STARN OR \$STARO CANNOT BE LOADED

These warnings indicate that internal consistency checks within the startup process have failed. Note 1 applies. The startup process continues but only a single-user system will result.

**\$57 INITIATION WARNING 209 - NO TIMER AVAILABLE
SWAP UNIT WOULD HAVE BEEN nnn**

You have attempted to run a multi-user system on a computer which does not support a timer. The startup process continues, but only a single-user system will result.

\$57 INITIATION WARNING 210 - TOTAL NUMBER OF PARTITIONS EXCEEDS 99

The configuration file has become corrupt.

\$57 INITIATION WARNING 251 - program CANNOT BE LOADED

This warning appears if you have used customization to include the indicated program in the system stack, but this is not possible. If an I/O error prevented the program from being loaded the warning will be preceded by an explanatory message. Otherwise the problem is either due to the program (or command) not being present on the device assigned to \$P (or \$CP), or to there being

insufficient room in the system stack for it. Global System Manager will continue as though the customization had not taken place.

\$57 INITIATION WARNING 302 - \$MONITOR VERSION x; \$STARC VERSION y

This warning message indicates that the version code of the monitor is not the same as that associated with Global System Manager command library. See Note 1. The startup process continues unaffected.

\$57 INITIATION ERROR 303 - CANNOT BOOTSTRAP FROM V.R.K

This message should not occur and is documented for completeness only.

\$57 INITIATION ERROR 35x - USER FILE ERROR

This indicates that an error has occurred on the user file when initiating a multi-user system. If it is an I/O error affecting the file itself the warning will be preceded by an error message. Otherwise SYSRES is probably corrupt and should be restored. See Note 3.

\$57 INITIATION ERROR 36x USER FILE ERROR

This indicates that an error has occurred on the user file when initiating a multi-user system. If it is an I/O error affecting the file itself the warning will be preceded by an error message. Otherwise SYSRES is probably corrupt and should be restored. See Note 3.

\$57 INITIATION ERROR 360 - NO ROOM FOR PROCESSOR IN USER FILE

The user file has become fragmented so that there is not a contiguous range of user numbers available, and in consequence it is not possible for this processor to join the network. The user file has been marked as requiring reorganization, but this cannot be done until the master computer is restarted, when it will happen automatically.

\$57 INITIATION ERROR 363 - INITIALISING MORE THAN MAXIMUM NUMBER OF USERS

See error 369.

\$57 INITIATION WARNING 364 - CANNOT INITIALISE ALL USERS

There is insufficient space in the system to initialise all the users so a reduced number of users will have been initialised. This may happen because the user file is too small. The user file can be extended by using the \$STATUS command to purge the user file, allocating a larger size, and then restarting the system again.

\$57 INITIATION ERROR 368 - INCOMPATIBLE CONFIGURATION

The software level defined by the configuration file is incompatible with the software level of Global System Manager.

This is probably caused by changing your configuration file to a higher level of Global System Manager.

\$57 INITIATION ERROR 369 - MORE THAN PERMITTED NUMBER OF USERS

Global System Manager has been generated for a maximum number of users. This error will occur if more than the maximum number of users have been configured. This may occur if more screens have been added to the configuration file, or the number has been exceeded by more users joining a network. If you require more screens you must obtain an upgraded system.

\$57 INITIATION WARNING 370 - LOG FILE IS NEARLY FULL

The log file, \$\$LOG on unit \$LG, is nearly full (i.e. there is space for less than 50 records in the logfile). When this message appears, it is prudent to use the \$LOG command to purge the log-file.

\$57 INITIATION WARNING 371 - LOG FILE IS FULL

The log file, \$\$LOG on unit \$LG, is full. No more events will be logged until the \$LOG command is used to purge the log-file.

\$57 INITIATION WARNING 372 - UNABLE TO LOCK USER FILE

DO YOU WISH TO TRY AGAIN (Y)

\$57 INITIATION WARNING 373 - UNABLE TO UNLOCK USER FILE

DO YOU WISH TO CONTINUE (Y)

The system is unable to lock or unlock the user file. This can occur if another computer on the network is in the process of initiating Global System Manager or a utility (e.g. \$STATUS or \$BYE) is being run on the network which temporarily requires exclusive use of the user file. If you key "Y" in reply to the prompt the lock or unlock operation will be retried. A reply of "N" will cause initiation to be abandoned and the system will need to be restarted. If either of these warnings occur check that no other operators are using \$STATUS or \$BYE.

\$57 INITIATION ERROR 374 - BOOTSTRAP ABANDONED

This message appears if "N" has been keyed to warnings 372 and 373.

\$57 INITIATION WARNING 375 - UNIT ALIASING FAILURE

An error has occurred during the calculation of the aliases for units 100 - 108. This problem may occur if the 100 unit stored in \$MONITOR has not been patched correctly using the \$F PAM instruction.

\$57 INITIATION WARNING 401 - CUSTOMISATION HAS INCREASED COUNT OF SCREENS

\$57 INITIATION WARNING 402 - CUSTOMISATION HAS INCREASED COUNT OF USERS

The user details customization instruction has either increased the number of normal users beyond the maximum number of screens the configuration supports, in which case warning 401 appears, or has increased the total number of users beyond the maximum

defined in the configuration file. This error usually results from changing the configuration file to contain fewer screens or users. A single user system will be initiated so that you can change the erroneous user details customization.

\$57 INITIATION WARNING 403 - S-USER CUSTOMISATION OF M-USER NUCLEUS

This warning appears if user details customization has reduced the number of users of a multi-user system to just one. In this case the startup process will continue but only a single-user system will be initiated.

\$57 INITIATION WARNING 404 - M-USER CUSTOMISATION OF S-USER NUCLEUS

This warning appears, together with either warning 401 or 402, if you employ user details customization to set the number of users of a single-user system to more than 1. See the notes accompanying warnings 401 and 402.

\$57 INITIATION WARNING 405 - BANK CUSTOMISATION INVALID IN S-USER BOS

This message occurs on a single user system when the number of memory banks has been customised into the monitor. This customisation is ignored for single user initiation.

\$57 INITIATION WARNING 407 - TINT CUSTOMISATION INVALID IN S-USER BOS

This message occurs on a single user system when the time slice interval has been customised. This customisation is ignored for single user initiation.

\$57 INITIATION WARNING 409 - WIDTH OF PRINTER 5xx NOW nnn

This warning appears if you have attempted to increase the line width of the indicated printer past the maximum (nnn) established when your system was generated. Your request will be ignored and the width will be set to the maximum allowable, as indicated by the message.

\$57 INITIATION WARNING 410 - CUSTOMISATION OF NON-EXISTENT PRINTER 5xx

You have mistakenly used customization to modify the printer attributes of the unit whose address appears in the message, but that unit is not supported as a printer on your configuration. The spurious customization is ignored.

\$57 INITIATION WARNING 411 - CUSTOMISATION INCREASE OF CBOS SCREENS

\$57 INITIATION WARNING 412 - CUSTOMISATION INCREASE OF CBOS PARTITIONS

These are equivalent to messages 401 and 402, but for a single-screen configuration.

\$57 INITIATION ERROR 413 - CANNOT BOOT WITH THIS VERSION OF USER FILE

The user file present on the master is incompatible with the present system. It is essential to make sure that all computers on a network are running compatible versions of Global System Manager.

\$57 INITIATION WARNING 414 - INAPPROPRIATE VERSION OF USER FILE

The user file present on the master is inappropriate but not incompatible. It is possible for initiation to proceed but it is advisable to ensure that all computers on a network are running compatible versions of Global System Manager.

\$57 INITIATION WARNING 450 - INVALID TERMINAL TYPE

The TAP supplied from the host operating system does not exist or has not been installed.

**\$57 INITIATION WARNING 460 - NO GUI LICENCE
(PLEASE CONTACT YOUR SOFTWARE SUPPLIER)**

You have attempted to use the Global Windows Workstation on a Global System Manager configuration that has not been licenced to use this software. Please contact your software supplier to obtain a Global Windows Workstation licence.

**\$57 INITIATION WARNING 461 - GUI LICENCE EXCEEDED
(PLEASE CONTACT YOUR SOFTWARE SUPPLIER)**

You have attempted to exceed your Global Windows Workstation licence. Please contact your software supplier to upgrade your Global Windows Workstation licence.

\$57 INITIATION ERROR 462 - INCOMPATIBLE NUCLEUS

You have attempted to use the Global Windows Workstation with a pre-V8.1 nucleus. This is not allowed.

\$57 INITIATION WARNING 5xx - USER FILE ERROR DURING SIGN-ON

This indicates that an error has occurred on the user file when initiating a multi-user system. The xx number in the warning code indicate the File Executive operation that suffered the error. If it is an I/O error affecting the file itself the warning will be preceded by an error message.

\$57 INITIATION WARNING 501 - USER FILE ERROR DURING SIGN-ON

This indicates that an error has occurred on the user file when initiating a multi-user system. The error has occurred in the OPEN operation. If it is an I/O error affecting the file itself the warning will be preceded by an error message.

\$57 INITIATION WARNING 510 - USER FILE ERROR DURING SIGN-ON

This indicates that an error has occurred on the user file when initiating a multi-user system. The error has occurred in the CLOSE operation. If it is an I/O error affecting the file itself the warning will be preceded by an error message.

\$57 INITIATION ERROR 55x - MEMORY BANK INITIATION, DISK ERROR

There has been an I/O error on the swap file during the initiation of the memory banks. Error codes 551, 552 and 553 indicate an error opening the swap file. Error codes 554, 555 and 556 indicate an error on the first read of the swap file. Error

codes 557, 558 and 559 indicate an error on subsequent reads of the swap file.

\$57 KEY NEW SYSRES UNIT:

It is not possible to access the SYSRES unit, usually because of a network error. You should supply the address of SYSRES on another computer (if there is one on the network) which your computer can access to initiate Global System Manager from. If there isn't one then the network will have to be reconfigured using the system maintenance function of \$CUS (see Chapter 6 of the Global System Manager Manual).

\$57 MASTER COMPUTER UNAVAILABLE

\$57 KEY UNIT OF SYSRES ON NEW MASTER COMPUTER:

You have tried to initiate a Global System Manager network configuration and the master computer, which contains the user file necessary for sign-on, is not running Global System Manager. If Global System Manager can be initiated on the master computer, do so and then key <CR> to continue initiating Global System Manager on your computer. If Global System Manager cannot be initiated on the master computer, then you will have to supply the address of SYSRES on another computer which can serve temporarily as the new master computer. You will then have to initiate Global System Manager on that computer before you can continue initiating Global System Manager on your computer. If the master computer is permanently disabled the network will have to be reconfigured using the system maintenance function of \$CUS (see Chapter 6 of the Global System Manager Manual).

\$57 SYSTEM IS QUIESCED - PLEASE DO NOT ATTEMPT TO SIGN ON

A supervisor has used the \$STATUS QUI command to quiesce Global System Manager. New users are not allowed to sign on to Global System Manager.

\$57 SWAP FILE NOT FOUND

You have attempted to sign off using \$E but have failed to load the volume containing the swap file, although requested to do so by a previous mount prompt. In this circumstance control returns to the monitor and you remain signed on to the system.

\$57 \$STARxx MUST NOT BE RUN

You have attempted to run from the menu or ready prompt one of the command program overlays used by the sign-on procedure. This is not allowed. The overlay returns control immediately to the ready prompt.

\$66 INSTALLATION ERROR 1

There is insufficient free memory for the installation program to install the startup initialisation data. The installation or transfer operation can only take place on a system with a larger user area.

\$66 INSTALLATION ERROR 2

The startup unit is invalid. See Note 1.

\$66 INSTALLATION ERROR 3
\$66 INSTALLATION ERROR 4

The part 1 startup data file (error 3) or the part 2 startup data file (error 4) cannot be found on the input volume. The missing file is neither present as a stand-alone file, nor is it a member of startup data library #.nnnn, where nnnn is the set number (the numeric part of the configuration file name). Note 1 applies.

\$66 INSTALLATION ERROR 5

The BH record on the part 1 startup data file is inconsistent with information held on the configuration file. See Note 1.

\$66 INSTALLATION ERROR 6

The INS instruction is unable to allocate a +BOOT file because the output volume already contains other data. It should be empty. See Note 1.

\$66 INSTALLATION ERROR 7

The volume type of the output volume is not the same as the volume type required for the startup data, as held in the configuration file. See Note 1.

\$66 INSTALLATION ERROR 8

The assignment tables are full and it is impossible for the INS instruction to assign \$P to the input unit in order to access the startup data library. See Note 1.

\$66 INSTALLATION ERROR 9

The output diskette is software interleaved, but the startup process cannot use interleaving. The volume should have been initialised (or formatted) with access option 1. See Note 1.

\$78 DESTROY xxxxxx?
\$78 DESTROY xxxxxx ON UNIT xxx?

The SYSIPL diskette you have mounted has previously been initialized by Global System Manager with the name shown. The second form of the message indicates that it is also formatted differently. If you intend overwriting an old diskette reply Y to continue, otherwise key N and then mount the correct diskette.

\$94 message

All messages prefixed by "\$94" are documented in Appendix A of the Global System Manager Manual.

\$99 ERROR c LOADING +JWCFnn

A fatal error has occurred in the Global System Manager (Novell NetWare) LAN controller. The error code c is a single upper-case letter. A more informative error message will accompany the error

code. The possible errors, together with the addition messages, are:

D Node ID not set

The Global System Manager node-id has not been specified, either in the initialisation file name, or using the GLNODE shell variable.

D Node already in use

The Global System Manager node-id is already in use by another workstation, or by a Global System Manager NLM.

**H Can't open SPX socket
Can't open SAP socket**

Increase the number of sockets available by altering the workstation SHELL.CFG file. Refer to your Novell NetWare documentation.

I IPX is not installed

The IPX protocol is not installed. This must be installed, by running the NetWare client software on the workstation, before Global System Manager can be used with Novell NetWare.

I SPX is not installed

The SPX protocol is not installed. This must be installed, by running the NetWare client software on the workstation, before Global System Manager can be used with Novell NetWare.

I Insufficient SPX connections available

At least one free SPX connection is required to load Global System Manager. The number of SPX connections can be increased by modifying the workstation SHELL.CFG file. Refer to your Novell NetWare documentation.

\$99 ERROR c LOADING component

There has been a fatal error during the startup process which prevented the loading of the identified component. The startup process cannot continue, and it is impossible to initiate Global System Manager. The quantity c is a single character error code defining the problem:

3 The required component is missing. Normally Note 1 applies.

H There was a hardware error (associated with the drive electronics). Retry the startup process several times and if the error persists have the drive serviced.

L An internal error has occurred within the software that controls the Hyperport sub-system. See Note 1.

M The resident part of Global System Manager is too large to be loaded into the available memory. Normally Note 1 or Note 2 applies, but if you have updated the configuration file

using Global Configurator this means you will have to reduce its size by allocating fewer or smaller buffers, or by removing support for some devices.

- P The configuration file version is incompatible with the nucleus version. Note 1 applies.
- R There was an I/O error (associated with the magnetic medium) when reading the component. See Note 3.
- V The Global System Manager directory of the volume containing the nucleus files and monitors has become corrupt. See Note 3.
- Z Sequence number fields in the records of the component itself are in error, indicating that it has become corrupt. See Note 3.

Appendix C - Steering Routine Error and Warning Messages

C.1 Steering Routine Diagnostic Messages

The following messages are displayed by the Global System Manager loader (aka Steering Routine). These messages contain diagnostic information and will only appear if the configuration file is renamed so that the last letter in the filename is a "D" (e.g. ++5612AD).

MODULE name LOADED AT address oooo
MODULE name LOADED AT address oooo MEMORY HIGH ADDRESS = mmmmmmmm

These messages are displayed by the Steering Routine as each Global System Manager nucleus module (e.g. device controller or executive) is loaded. The name indicates the name of the module. The address is the full 32-bit machine address at which the module is loaded. The offset oooo is the offset address, within the nucleus segment, at which the module is loaded. If the MEMORY HIGH ADDRESS is displayed, the nucleus component has allocated a work-area in the high-memory block, starting from address mmmmmmmm.

As the Global System Manager nucleus is loaded, address and oooo should increase; and mmmmmmmm should decrease monotonically. If Global System Manager fails to load unexpectedly, the filename and addresses contained in these warning messages may prove valuable in the problem investigation.

MODULE filename LOAD FAILED, ERROR c

This message is displayed by the Steering Routine if the nucleus module filename (e.g. device controller or executive) fails to load correctly with error code c. The most **common** error codes are:

- 3 File filename is not present on the IPL device (either as a stand-alone file or as a member of a nucleus library, +.J0 or +.JW);
- M There is insufficient memory space in the nucleus segment to load nucleus component filename;
- D File filename has been loaded correctly but has failed to initialise. The relevant peripheral device is either missing or incorrectly configured.

The above list is not exhaustive, other error codes may appear in the messages. If Global System Manager fails to load unexpectedly, the filenames and error codes contained in these warning messages may prove valuable in the problem investigation.

READING BAD TRACK TABLES

This message indicates that the Steering Routine has loaded all the available Global System Manager modules from the IPL device and is about to attempt to read the bad-track tables from the hard-disk(s).

UNIT uuu - REMOVING DOMAIN

This message indicates that the Steering Routine has encountered an I/O error (read error) when attempting to read the bad-track table from the hard-disk (unit uuu). The disk has been dynamically removed from the configuration data (unit uuu is not accessible and will not appear in a \$U listing).

UNIT uuu - TOO MANY TRACKS

This message indicates that the hard disk (unit uuu) contains more than 65535 tracks and cannot be used by Global System Manager. The disk has been dynamically removed from the configuration data (unit uuu is not accessible and will not appear in a \$U listing). The disk must be partitioned or the virtual disk geometry reconfigured to reduce the number of tracks.

ENTERING INTERPRETER

This message indicates that the Steering Routine has loaded Global System Manager successfully.

C.2 Steering Routine Error Messages

The following messages are displayed by the Global System Manager loader (aka Steering Routine) and indicate severe problems with the nucleus files on the IPL device. These messages cannot be suppressed **AND SHOULD NEVER BE IGNORED.**

URL IX-BLOCK AT WRONG OFFSET

The bootstrap on the IPL device is incompatible with the Steering Routine. This message should never appear and is documented for completeness only.

WARNING - MULTIPLE ENTRIES IN IX-BLOCK FOR filename

THIS MESSAGE IS A SEVERE WARNING AND SHOULD NOT BE IGNORED. It warns that there is more than one version of the file filename present on the IPL device. This situation will never occur with distributed or cleanly installed software but may occur if new nucleus components are copied to a SYSRES (or SYSIPL) volume without correctly renaming the redundant component. The most common examples of this mistake are:

- Copying a single nucleus component to an IPL volume without renaming the version included in the +.J0 or +.JW library;
- Attempting to de-activate a nucleus library (i.e. +.J0 or +.JW) by renaming it to +.JWOLD, for example. The Global System Manager loader considers ALL nucleus libraries with filenames that start with the two characters "+" as valid.

Appendix D - Reserved Memory Locations on IBM PC Comptatibles

Some cards (e.g. the TIS Hyperport and Arnet Smartport cards) contain on-board memory. The range of memory occupied by a peripheral card is dependent on the actual card (e.g. the Arnet Smartport card occupies 64Kb while the TIS Hyperport only occupies 4Kb). The memory can normally be mapped at a range of addresses and for each card a set of switches determine the base address of the on-board memory (see Chapter 9).

Note that cards with an MCA bus interface do not normally include memory address selection switches. For MCA cards, the memory addresses are configured using the "Set Configuration" facility supplied on the manufacturer's Reference Diskette.

In the unlikely event that the computer has less than 640Kb of system memory the memory immediately below 640Kb can be used. Otherwise the memory must be mapped between 640Kb and 1Mb. Great care must be taken to ensure that the memory is mapped at a free space.

The memory above 640Kb on an IBM PC compatible is normally used as follows:

#A0000-AFFFF	64Kb EGA/VGA screen, available if no EGA/VGA
#B0000-B0FFF	4Kb for monochrome adapter
#B1000-B7FFF	Available
#B8000-BBFFF	16Kb for colour graphics adapter
#BC000-BFFFF	Available
#C0000-C7FFF	32Kb EGA/VGA BIOS, available if no EGA/VGA
#C8000-C87FF	2Kb disk adapter BIOS, sometimes available
#C9000-CFFFF	Available
#D0000-DFFFF	Usually available
#DC000-DCFFF	Default for the Adaptec SCSI card
#E0000-EFFFF	Duplicates area #F0000, sometimes available
#F0000-FFFFF	BIOS and EPROM

The above table should only be used as a general guide. The exact memory usage on a particular IBM PC compatible computer sometimes differs from this scheme. Always consult the manufacturer's Technical Reference Manual for precise details.

As explained above, different cards use different amounts of memory. If a card is mapped at #D0000 and uses 64Kb then the area #D0000 to #DFFFF is used; if the card uses 32Kb then the area #D0000 to #D7FFF is used; if the card only uses 4Kb then the area #D0000 to #D0FFF is used.

Important note: Use of the EMM386.EXE Memory Manager to re-map memory in the Upper Memory Area may interfere with some peripheral cards. In addition to the HIGHSCAN argument in the EMM386.SYS command line, it may be necessary to exclude a block of memory explicitly. For example, if a peripheral card is mapped to the 16Kb block from address #D0000, the following line may be required in the CONFIG.SYS file:

```
DEVICE=C:\DOS\EMM386.EXE HIGHSCAN X=D000-D3FF
```

Appendix E - Reserved I/O Addresses on IBM PC Compatibles

Some cards (e.g. the Arnet Multiport card) include I/O (Input/Output) ports that must be mapped to addresses within the 64Kb I/O address space. Do not confuse addresses in the 64Kb I/O address space with memory-mapped ports within the 1Mb memory address space (see Appendix D). Some cards (e.g. the TIS Hyperport card) do not include any I/O ports at all.

The range of I/O ports occupied by a peripheral card is dependent on the actual card. The I/O ports can normally be set to a range of values and for each card a set of switches determines the base address within the I/O address space (see Chapter 9).

Note that cards with an MCA bus interface do not normally include I/O port address selection switches. For MCA cards, the port addresses are configured using the "Set Configuration" facility supplied on the manufacturer's Reference Diskette.

When cards are added to an IBM PC compatible, great care must be taken to ensure the on-board I/O port addresses do not conflict with the addresses already being used.

A partial list of the I/O addresses used on an IBM PC compatible is provided below. These addresses should be avoided when adding a new card. **This table should only be used as a general guide. The exact I/O map on a particular IBM PC clone sometimes differs from this scheme. Always consult the manufacturer's Technical Reference Manual for precise details.**

#000 - #01F	I-8237A DMA controller 1
#020 - #021	I-8259A Interrupt controller 1
#040 - #043	I-8253 Timer controller
#040 - #05F	I-8254 Timer controller
#060 - #06F	I-8042 Keyboard controller
#070 - #07F	CMOS real time clock
#080 - #09F	DMA Page Register
#0A0 - #0A1	I-8259A Interrupt controller 2
#0C0 - #0DF	I-8237A DMA controller 2
#0E0 - #0EF	Reserved
#0F0 - #0FF	Optional maths co-processor
#1F0 - #1F8	Fixed disk
#200 - #20F	Game controller
#210 - #217	Expansion unit
#220 - #24F	Reserved
#278 - #27F	Parallel printer port 2
#2F8 - #2FF	Serial communications (COM2)
#320 - #32F	Fixed disk (often unused)
#330 - #333	Default for the Adaptec SCSI card
#378 - #37F	Parallel printer port 1
#3B0 - #3BF	IBM Monochrome Display/Printer
#3C0 - #3CF	Reserved (sometimes EGA)
#3D0 - #3DF	Colour/Graphics Adaptor
#3E0 - #3E7	Reserved
#3F0 - #3F7	Diskette controller
#3F8 - #3FF	Serial communications (COM1)

Appendix F - Reserved Interrupts on IBM PC Compatibles

Some cards (e.g. the Arnet Multiport card) indicate to the processor that a significant event has occurred (e.g. a character has been received from a serial port) by generating an interrupt. Each card must generate a unique interrupt signal: This is achieved by ensuring that every card interrupts at a unique IRQ level. For each card, a set of jumpers usually determines the interrupt level (see Chapter 9).

Note that cards with an MCA bus interface do not normally include interrupt jumpers or switches. For MCA cards, the interrupt level is configured using the "Set Configuration" facility supplied on the manufacturer's Reference Diskette. Note also that although the MCA-bus architecture on IBM PS/2 computers (and PS/2 compatibles) includes a "shared interrupt" facility the Global System Manager device drivers do not currently allow multiple devices to share a common interrupt level.

When cards are added to an IBM PC compatible, great care must be taken to ensure that the interrupt level is not already being used by another device. Cards may conflict even if Global System Manager itself does not make use of the interrupt. Conflicting interrupts usually result in unpredictable system crashes! **Each device requires a unique interrupt level.**

Most standard IBM PC compatible computers include 16 interrupt levels numbered 0 to 15 (interrupt 0 has the highest priority). The interrupts are normally used as follows:

0	Timer
1	Keyboard
2	Cascade Interrupt Control (often available from IRQ9)
3	COM2, if present
4	COM1, if present
5	Hard Disk(s)
6	Diskette(s)
7	Parallel Printer(s) (normally available)
8	Real Time Clock
9	Normally software redirected to IRQ2
10	Available
11	Available (default for the Adaptec SCSI card)
12	Mouse (normally available)
13	Math Co-processor (normally available)
14	Hard Disk(s)
15	Available

Note that although hardware interrupt level 2 is used to cascade from the second interrupt controller chip containing interrupts 8 to 15, it can often be used because interrupts from level 9 are normally redirected by software to IRQ2.

The above table should only be used as a general guide. The exact interrupt usage on a particular IBM PC clone sometimes differs from this scheme. Always consult the manufacturer's Technical Reference Manual for precise details.

Appendix G - Global Communications Hardware Options

If Global Communications has been installed on your computer it is necessary to initialise the main Global Comms menu with data for the computer.

G.1 Asynchronous Line Controller (+JWCLA)

This controller drives an IBM Asynchronous Communications Adapter available as a extra card to plug into one of the IBM PC/XT expansion slots. The use of this card is described in detail in the IBM PC Technical Reference Manual (ref 6936844).

G.1.1 Asynchronous Line Controller - Line Control Parameters

First Device Address may be #3F8 or #2F8.

Second Device Address is not used.

First Interrupt Vector may be #30 or #2C.

Second Interrupt Vector is not used.

Device parameter A is not used and should be set to 0.

Device Parameter B is not used and should be set to 0.

G.1.2 Asynchronous Line Controller - Operating Notes

The cabling requirements are described in the IBM Technical Reference Manual, but may have to be modified for some devices. Users must consult their own documentation in special cases.

G.2 Synchronous Line Controller (+JWCLS)

This controller drives the IBM PC Binary Synchronous Communications Adapter (BSC Adapter) card. It is described in the IBM Technical Reference Manual.

G.2.1 Synchronous Line Controller - Line Control Parameters

First Device Address is #3A0.

Second Device Address is not used.

First Interrupt Vector is #2C.

Second Interrupt Vector is #30.

Device Parameter A is not used and should be set to 0.

Device Parameter B is not used and should be set to 0.

G.2.2 Synchronous Line Controller - Operating Notes

The interrupt vector addresses used by this board replace those used by the Asynchronous communications boards so they cannot both be used at the same time. The cabling required by this board is described in the IBM Technical Reference.

Note that there is a problem with the DTR (pin 20) output on this card. In some circumstances when DTR should be on, it will drop briefly and can cause particularly sensitive modems to disconnect. To solve this problem another pin on the RS232 interface (pin 11) has also been programmed to act as DTR, if you are having problems with modems disconnecting unexpectedly then you should make up a special

cable with pin 11 on the Bisynch comms board connected to pin 20 on the modem.

Important note: Several versions of the IBM Bisync Comms card are currently available. The manufacturer's documentation should be read thoroughly when configuring the hardware.

Appendix H - Loading Global System Manager from MS-DOS

Drive B:

All Global System Manager starter systems (i.e. the software distributed on BACRES, BEA and HAA) are configured to load from logical drive-0 which is always MS-DOS drive A:. Using pre-V8.0 System Manager, if an attempt is made to load System Manager from the BACRES diskette in MS-DOS drive B: the following fatal error message is displayed:

```
C:\GSM>gsmload b:
$99 ERROR U LOADING +J?S???
```

All standard 5¼" diskette configurations include 5¼" diskette formats (e.g. G1A) accessed using logical drive-0 and 3½" diskette formats (e.g. 02A) accessed using logical drive-1. All standard 3½" diskette configurations include 3½" diskette formats (e.g. 02A) accessed using logical drive-0 and 5¼" diskette formats (e.g. G1A) accessed using logical drive-1.

If the supplied distribution diskette is the incorrect medium for MS-DOS drive A: (i.e. a 3½" diskette when MS-DOS drive A: is a 5¼" diskette drive; or a 5¼" diskette when MS-DOS drive A: is a 3½" diskette drive) and your computer includes a 2nd diskette drive (MS-DOS drive B:) of the correct size then it is possible to install Global System Manager from the B: drive. For example:

```
C:\GSM>GSMLOAD B:
```

The "B:" (or "B", "b", "b:") option is recognised by GSMLOAD.EXE and results in a swap of the logical drives within the configuration data (i.e. A: becomes logical drive-1; B: becomes logical drive-0).

After the installation has completed, **but before \$BYE is used to return to MS-DOS**, Global Configurator must be used to amend the configuration file to match the actual diskette drives attached to the computer. If the configuration is not updated immediately any attempt to load Global System Manager from the installed software will result in the dynamic removal of both diskette drives! To prevent a "catch-22" situation from occurring (i.e. Global Configurator must be run from diskette to fix a problem that caused the diskettes to be removed from the system), the "S" (or "s") command line option is recognised by GSMLOAD.EXE. This option enables the same diskette swapping mechanism that is automatically invoked when "B:" (and derivatives) is used as the device specification. For example:

```
C:\GSM>GSMLOAD GSM200 N S
```

Appendix I - Startup and NLM Error Messages

The messages listed in this appendix may appear during the Global System Manager startup process (messages from GSMLOAD.EXE) or when attempting to create a simulated volume (messages from ALLOCATE.EXE).

For every error message a description of the error is given and a solution is offered, wherever possible. The errors are listed below by program:

I.1 Error messages from GSMLOAD.EXE

Error 1001 - Device does not contain bootstrap

The file (specified explicitly by a command line argument, or implicitly by the GSM.INI file) does not have the bootstrap information required to load Global System Manager. Ensure that Global System Manager has been installed on the specified file.

Error 1002 - Insufficient memory

The amount of memory available is not sufficient to load Global System Manager. You must free some memory on the MS-DOS or Windows system.

Error 1003 - Error accessing bootvolume

Could not find, open or read the MS-DOS file (specified explicitly by a command line argument, or implicitly by the GSM.INI file). Ensure that the file exists (created by ALLOCATE.EXE).

Error 1004 - Read error on diskette

Media error on Global System Manager start-up diskette (i.e. BACRES).

Error 1005 - Read error on disk

Unable to read the Global System Manager start-up code due to a media error on the simulated volume.

Error 1006 - Error opening initialisation file

Could not find, open or read the GSM.INI file. Ensure that the file GSM.INI exists in the correct directory. Alternatively, a sharing violation has occurred. Ensure that Global System Manager is loaded only once.

Error 1007 - Error opening template file

Could not find, open or read the GSM.TLT file. Ensure that the file GSM.TLT exists in the correct directory. Under no circumstances should the GSM.TLT file be deleted or its contents modified.

Error 1008 - No bootstrap device specified in initialisation file

The bootstrap entry does not exist in the initialisation file and needs to be specified with the respective parameters (see Chapter 5). Alternatively, specify the name of the MS-DOS file or directory as a command line argument to GSMLOAD.EXE.

Error 1009 - No initialisation file found

The GSM.INI initialisation file does not exist in the current directory.

Error 1010 - Several initialisation files found

Ensure that there is only one initialisation file (i.e. a file named GSM*.INI) in the current directory.

Error 1011 - IPL Diskette has unrecognized format

The IPL diskette does not contain Global System Manager.

Error 1012 - Invalid directory selected by GLDIR

The MS-DOS directory specified by the GLDIR environment variable is invalid.

Error 1013 - Unable to get current working directory

The current working directory is invalid.

Error 1014 - Invalid drive selected by GLDIR

The drive identifier in the MS-DOS directory specified by the GLDIR environment variable is invalid.

Error 1015 - Incompatible DOS version

Global System Manager is not supported on the version of MS-DOS you are using.

Error 1016 - File selected by GLINI does not exist

The Global System Manager initialisation file specified by the GLINI environment variable does not exist in the Global System Manager directory.

I.2 Error messages from ALLOCATE.EXE

Failed to get current working directory

Either you are in the wrong directory or the pathname is longer than 128 characters.

Failed reading filename

The specified file does not exist.

filename access error

The specified filename is a directory or an attempt has been made to open a read-only file for the purposes of writing.

filename already exists

filename specified for the integrated data file you are attempting to create already exists.

Failed reading an answer

This message is displayed when an inappropriate answer is given to the "delete existing file" prompt.

No more file handles available

There are no more File Handles available to open the file.

filename not found

filename does not exist or it is in the wrong directory.

Failed reading filesize

The required filesize has not been specified.

No space allocated

A filesize of 0 has been specified. A filesize of 0 is not allowed.

File allocation failed

When creating an integrated data file, the size specified is guaranteed by writing to every byte of the file. This error indicates that the position needed to seek, to write to the file, was set before the beginning of the file. This error could have also been caused by an invalid File Handle associated with this process.

filename not open

This may be due to an invalid File Handle or the file is not open for writing.

No space left on device

There is no space left on the system to allocate this file.

Failed reading directory name

The directory does not exist. You must create a new directory.

Failed to open the file

The file specified was not found. Alternatively, this error may be caused by the non-availability of File Handles.

Failed to allocate domain

The domain file OOSYSDOM.SVL within the specified directory (discrete data file) could not be created. ALLOCATE.EXE could not

write to the domain successfully due to lack of space on the systems or the non-availability of sufficient File Handles.

I.3 NLM Error and Warning Messages

Most of these messages will only occur whilst the NLM is starting up. A few may occur whilst the NLM is running. The messages divide into two classes. Fatal errors will cause the NLM to terminate. Such errors are prefixed by "GSM Fatal Error". The remaining messages are not considered serious enough to terminate the NLM, though they may affect operation of Global System Manager (e.g. not being able to open the discrete data file containing SYSRES). Messages in this second class are lost from the screen when the NLM maintenance/diagnostic screen is displayed. However, all messages are written to a log file, which can be viewed from the NLM diagnostics menu (see 10.2.5.2.3).

Some of the messages given below should never occur. If such an error occurs, it indicates a serious problem with either the NLM or NetWare.

Bootstrap from SSDs not supported

This error should never occur and is documented for completeness only.

Can't open SSD header for drive n

The domain header file (discrete data file 0) couldn't be opened. Either the file is missing, or already in use.

Can't open Integrated Data File x

Can't open the NetWare file x. Either the file is missing, or already in use.

Can't read SSD header file for drive n

This error implies that the header file (discrete data file 0) is corrupt.

Can't size SSD n

This error should never occur and is documented for completeness only.

Can't update SSD header for drive n

This error should never occur and is documented for completeness only.

FreeMemory: attempt to free unallocated block

This error should never occur and is documented for completeness only.

GSM Fatal Error: Bootstrap not specified in initialisation file

No DOS-FILE entries are specified in the initialisation file. The first DOS-FILE entry specified is assumed to be the bootstrap device.

GSM Fatal Error: Can't advertise service. Error x

This error should never occur and is documented for completeness only (x is the hexadecimal error code).

GSM Fatal Error: Can't get new task number

This error should never occur and is documented for completeness only.

GSM Fatal Error: Can't get user ID from Bindery

This error should never occur and is documented for completeness only.

GSM Fatal Error: Can't open bootstrap file

The DOS-FILE containing the bootstrap can't be found, or was found but couldn't be opened. Ensure the NLM's full path was specified when loading it.

GSM Fatal Error: Couldn't open initialisation file

The initialisation file wasn't found, or was found but couldn't be opened. Ensure the NLM's full path was specified when loading it.

GSM Fatal Error: Dummy routine called

This error should never occur and is documented for completeness only.

GSM Fatal Error: Error reading bootstrap volume

This may occur if the bootstrap volume has become corrupt, such as its size being truncated to zero.

GSM Fatal Error: Error starting new thread

This error should never occur and is documented for completeness only.

GSM Fatal Error: Error whilst processing initialisation file

The structure of the initialisation file contents is incorrect. A more explanatory message detailing the exact nature of the problem will be printed before this message.

GSM Fatal Error: Invalid argument passed to BeginThread

This error should never occur and is documented for completeness only.

GSM Fatal Error: Item already in list x

This error should never occur and is documented for completeness only.

GSM Fatal Error: LAN controller entry missing from initialisation file

The entry beginning with keyword LAN-CONTROLLER is missing from the initialisation file.

GSM Fatal Error: Login unsuccessful

The NLM couldn't login to NetWare. This is probably because the password is incorrect.

GSM Fatal Error: Malformed receive packet

This error should never occur and is documented for completeness only.

GSM Fatal Error: Malformed transmit packet

This error should never occur and is documented for completeness only.

GSM Fatal Error: Master node ID in initialisation file must be a single alphabetic character

The master node-id must be a single alphabetic character in the range A to Z (alphabetic case not significant).

GSM Fatal Error: Master node ID missing from initialisation file

There is no MASTER-NODE entry in the initialisation file.

GSM Fatal Error: Multiple ACTIVITY-POLL entries found in initialisation file

There must be at most one initialisation file entry beginning with the keyword ACTIVITY-POLL.

GSM Fatal Error: Multiple LAN controller entries in initialisation file

There is more than one initialisation file beginning with the keyword LAN-CONTROLLER.

GSM Fatal Error: Multiple LOGIN entries found in initialisation file

There must be at most one initialisation file entry beginning with the keyword LOGIN.

GSM Fatal Error: Multiple master node ID entries in initialisation file

There is more than one entry in the initialisation file beginning with the keyword MASTER-NODE.

GSM Fatal Error: No bootstrap installed on bootstrap volume

The bootstrap volume has become corrupt, or the wrong volume is being used for bootstrap. The NLM loads the bootstrap from the volume specified by the first DOS-FILE entry it finds in the initialisation file.

GSM Fatal Error: Node x already active

There is another Global System Manager node already operating with node-id x.

GSM Fatal Error: Node ID in initialisation file must be an alphabetic character

The node-id entry in the initialisation file must specify a node in the range A to Z inclusive (alphabetic case not significant).

GSM Fatal Error: Node ID specified more than once in initialisation file

There is more than one node-id entry in the initialisation file.

GSM Fatal Error: Not enough memory

There is insufficient free memory to load the NLM.

GSM Fatal Error: Number of packets must be between n and m

The number of packets specified in the LAN-CONTROLLER entry in the initialisation file must be within the specified range.

GSM Fatal Error: Out of memory

There is insufficient free memory to load the NLM.

GSM Fatal Error: Socket already open

The socket specified in the LAN-CONTROLLER entry in the initialisation file must be exclusive to Global System Manager.

GSM Fatal Error: Socket not open

This error should never occur and is documented for completeness only.

GSM Fatal Error: Socket number must be between n and m

The socket number in the LAN-CONTROLLER entry in the initialisation file must be within the specified range.

GSM Fatal Error: Socket table full

This error should never occur and is documented for completeness only.

GSM Fatal Error: steering routine error

A message detailing the exact nature of the error will be displayed before this one.

GSM Fatal Error: The ACTIVITY-POLL value in the initialisation file must be between n and m

seconds.

The ACTIVITY-POLL value must be within the range indicated.

GSM Fatal Error: Unexpected error reading bindery: x

This error should never occur and is documented for completeness only (x is the hexadecimal error code).

GSM Fatal Error: Unknown error opening socket: x

This error should never occur and is documented for completeness only (x is the hexadecimal error code).

GSM Fatal Error: VC3GB.C: atexit() registration failed

This error should never occur and is documented for completeness only.

GSM Fatal Error: VC3GD.C: atexit() registration failed

This error should never occur and is documented for completeness only.

GSM Fatal Error: VC3GD.C: Can't set SIGTERM handler

This error should never occur and is documented for completeness only.

Initialisation file entry not found for Discrete Data File n

There is an entry in the configuration file for SSD-FILE drive n, but no corresponding initialisation file entry.

Initialisation file entry not found for Integrated Data File n

There is an entry in the configuration file for DOS-FILE drive n, but no corresponding initialisation file entry.

Initialisation File Error: expected "x" found "y" at line nnn

Besides the keyword which starts an initialisation file entry (such as "LAN-CONTROLLER") there may be keywords within the entry as well (e.g. "SOCKET"). These keywords are not optional. This message is displayed if keyword x is missing.

Initialisation File Error: expected number, found "x" at line nnn

A number was expected, but the non numeric item x was found instead.

Initialisation File Error: unknown entry name "x" at line nnn

An initialisation file entry was found with an unknown keyword.

Multiple initialisation file entries found for Discrete Data File n

The initialisation file contains more than one entry for SSD-FILE drive n.

Multiple initialisation file entries found for Integrated Data File n

The initialisation file contains more than one entry for DOS-FILE drive n.

**Multiple initialisation file entries found for number of SSD handles
m handles will be used**

More than one SSD-HANDLE entry was found in the initialisation file.

Multiple SV n entries found for SSD drive m

There are two discrete data files with the same number (n) in the directory for drive m.

**Number of SSD file handles must be between n and m
p handles will be used**

The number of file handles specified in the SSD-HANDLE entry in the initialisation file must be within the range indicated. The default number of handles will be used instead, as though the SSD-HANDLE entry wasn't present.

Path name for Discrete Data File x is too long

The full path of discrete data file x, not including the file name, must not be greater than 480 characters in length.

Receive packet overflow!

This error should never occur and is documented for completeness only.

SPX connection table full

If this error occurs, increase the number of SPX connections on the fileserver.

SSD directory for drive n doesn't exist

The directory for SSD-FILE n couldn't be found.

Unknown error from Listen For Connection

This error should never occur and is documented for completeness only.

Unknown error from Send Packet

This error should never occur and is documented for completeness only.

Unknown error receiving packet

This error should never occur and is documented for completeness only.

Appendix J – BIOS Controllers and MS-DOS Controllers

The various device controllers for use with Global System Manager (Novell NetWare) can be split into four groups:

- MS-DOS controllers;
- NetWare controllers;
- BIOS controllers;
- Hardware controllers.

The MS-DOS controllers use only standard MS-DOS function calls and would be expected to work on any MS-DOS compatible operating system or in the "DOS-compatibility mode" of another operating system (e.g. OS/2).

The NetWare controllers use standard MS-DOS function calls, Novell NetWare extended MS-DOS function calls, and NetWare IPX/SPX function calls.

The BIOS controllers use IBM PC compatible BIOS (Basic I/O System) calls. Consequently, the BIOS controllers are not guaranteed to function correctly on any BIOS that is not 100% compatible with the industry standard IBM PC BIOS.

The Hardware controllers access the hardware directly, usually for efficiency reasons. Consequently, the hardware controllers cannot be guaranteed to function correctly on all types of hardware.

The following controllers are available in the A.JW file:

Class	Name	Type
DISKETTE	DISKETTE	BIOS
	DOS-DISK	MS-DOS
DISK	SSD-FILE	MS-DOS
	DOS-FILE	MS-DOS
	BIOSFILE	BIOS
	DISK	BIOS
	ADAPTEC	Hardware
CONSOLE	CONSOLE	BIOS (and Hardware)
	DOS-SCR	MS-DOS
	WINTTY	MS-DOS
	TTY	Hardware
	SM.TTY	Hardware
	HYPER	Hardware
	HYPERMUX	Hardware
	TCLSYNC	Hardware
	PCC/I	Hardware
	TCLASYNC	Hardware
	SPX	NetWare
TAPE	CD-TAPE	Hardware
	ADAPTEC	Hardware
	AHA-TAPE	Hardware
	VIPER	Hardware

PRINTER	DOS . PRI	MS-DOS (and NetWare)
	PRINTER	BIOS
	S . PRINT	Hardware
	SM . PRI	Hardware
	HYPER	Hardware
	HYPERMx	Hardware
	HYPERMXP	Hardware
	PCC/I	Hardware
	\$AUXPRI	Hardware (via S.PRINT)
LAN	NOV-SPX	NetWare
	NOVELL	NetWare

The controller in emboldened text is the default for that class of device.

No other device drivers are supported by Global System Manager (Novell NetWare) even though some obsolete controllers may be available in the A.JW (for purely historical reasons).

It is possible to create a "pure DOS/NetWare" configuration, with only a single integral screen (of course) by including only the following controllers in the configuration file:

Class	Name
Diskette	DOS-DISK
Hard disk	SSD-FILE or DOS-FILE
Screen	DOS-SCR
Printer	DOS . PRI
Network	NOV-SPX

Appendix K – Non-Standard Configurations

The standard, and recommended, configuration for Global System Manager (Novell NetWare) includes the Global System Manager NLM, running on the NetWare fileserver, as the "master" computer. NetWare workstations load Global System Manager and access Global data via the NLM (see figure K.1). However, this configuration is not the only one possible. This appendix describes some alternative configurations that may be appropriate for some network topologies.

Throughout this appendix each example configuration is illustrated by a figure (e.g. figure K.1 for the standard configuration). The following conventions are used in these figures:

- The example NetWare configurations apply to configuration codes 5612 and 5613. Exactly the same considerations apply to configuration codes 5610 and 5611 except that NLM IPL.VOL replaces NLMDLV.DLV; and an Integrated File Domain unit a96 replaces the DLV unit a10;
- The "Global System Manager directory" on the fileserver is assumed to be "F:\GSM".
- The MS-DOS or NetWare command used to load Global System Manager on the fileserver or workstation is enclosed in double-quotes. For example:

```
"GSMWORK.BAT"
```

- The Global System Manager initialisation file used on the fileserver or workstation is enclosed in round-brackets. For example:

```
(F:\GSM\GSM.INI)
```

- The mapping between an MS-DOS file (or directory) and a Global System Manager DLV (or Separated Subunit Domain) is indicated as follows:

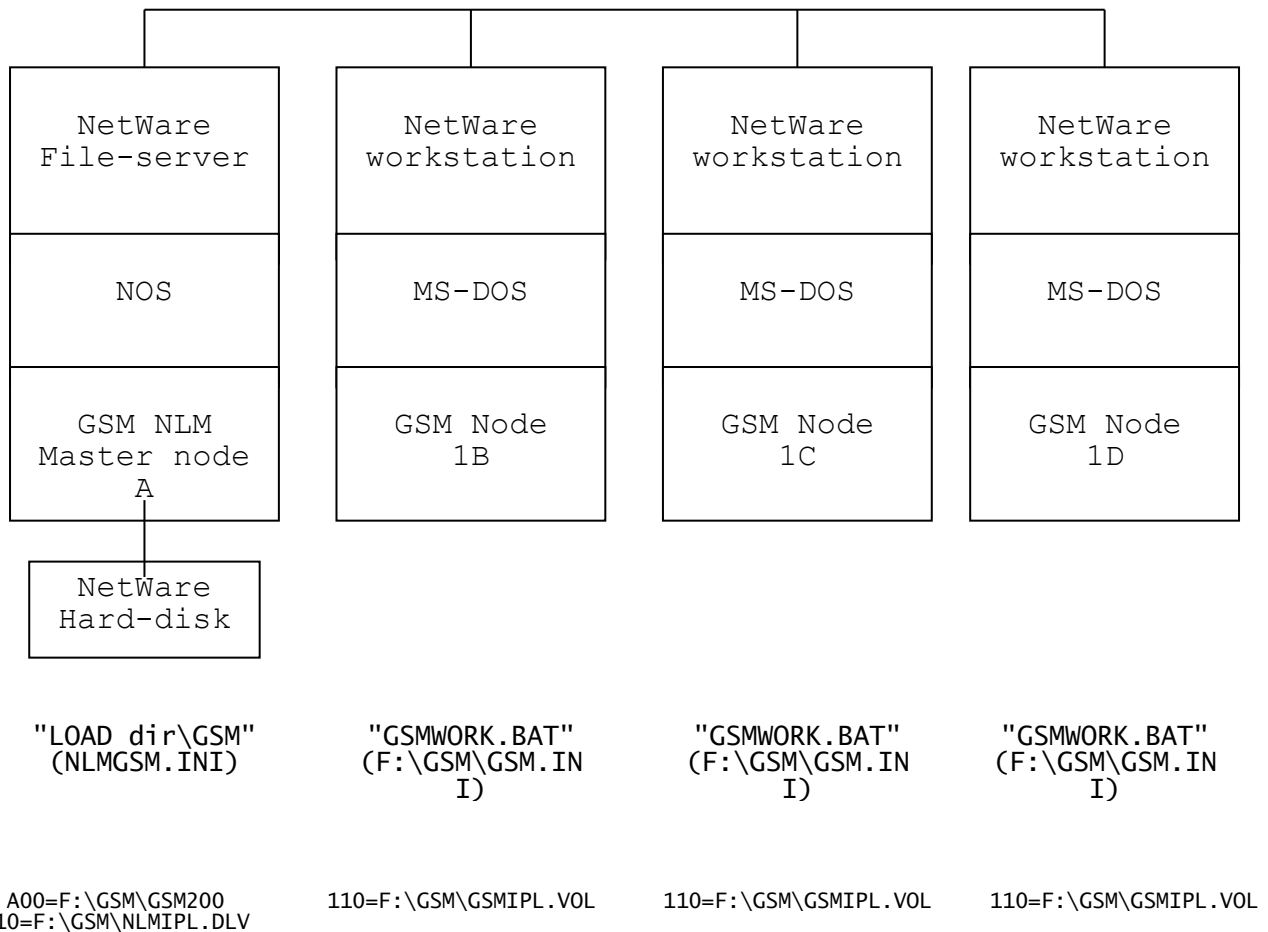
```
GSM unit=file or directory
```

For example:

```
A00=F:\GSM\GSM200
```

- All the illustrations include a very simplified description of the network accesses that occur when a Global System Manager workstation performs a single read operation on a simulated volume on the Global System Manager "master" computer.

Appendix K - Non-Standard Configurations



The following network accesses are required for a Global System Manager workstation (e.g. computer "1C") to perform a read on the simulated volume on the Global System Manager "master" computer:

1. File Executive control block sent using SPX (workstation to fileserver);
2. Read data returned using SPX (fileserver to workstation).

Figure K.1 - The Standard Configuration

K.1 Non-NLM Configurations

K.1.1 Early Versions of NetWare

If you are running NetWare 2.x, or a version of NetWare 3.x or 4.x for which the Global System Manager NLM is not supported, you will have to use a NetWare workstation as the Global System Manager "master" computer. The installation of such a configuration is exactly the same as a the standard NLM installation (see section 2.1) but does not involve loading the NLM (see section 2.1.12.5).

K.1.2 A Simple Non-NLM Configuration

If the Global System Manager NLM is not used, a NetWare workstation will have to be dedicated to the task of running Global System Manager all the time. Global System Manager is loaded on the "master computer" workstation by running the GSMBOOT.BAT batch file. Once this workstation is running Global System Manager, other workstations can load Global System Manager by running the GSMWORK.BAT file. This configuration is illustrated in figure K.2.

K.1.3 Enhancing the Non-NLM Master Computer

Although using a NetWare workstation as the Global System Manager "master" computer prevents that workstation from being used for other tasks, it is possible to build some configurations that would be impossible in an NLM configuration. Global System Manager Discrete Data Files and Integrated Data Files can be allocated on the local hard disk as well as the NetWare fileserver by modifying the Global configuration file on SYSRES and the GSM.INI file in the fileserver Global System Manager directory (see figures K.3 and K.4).

Serial screens and/or SPX Workstation consoles can be added, making the workstation a multi-user system as well as the master computer by modifying the Global configuration file on SYSRES (see figure K.5).

K.1.4 Adding Local Volumes to Workstations

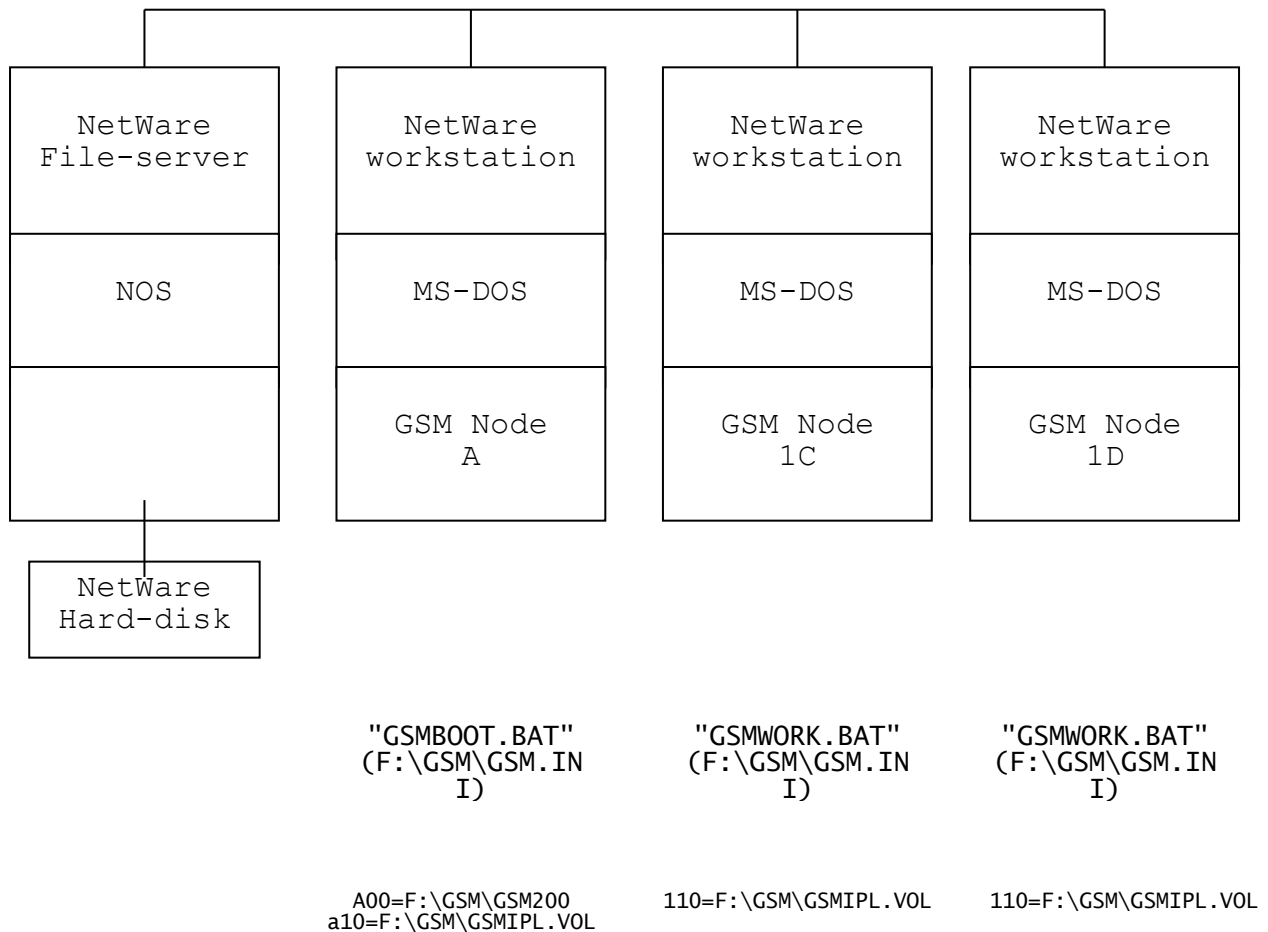
It is possible to add local Global System Manager volumes to a workstation (see figure K.6). By this we mean a Global System Manager volume which can be accessed locally rather than from across the Global System Manager network (i.e. with unit numbers not beginning with 6 or an alphabetic character). Although such volumes are local, they may be located either on a hard disk or a network drive. The local hard-disk may be used for one, or more, of the following functions:

- Allocation of application work units to improve the performance of application sorts and the generation of some reports;
- Allocation of local program units to improve program load performance;
- Allocation of local data units to improve application performance. This may not be possible if the data is shared between two, or more, workstations;
- Allocation of a swap-unit (i.e. \$SW) for workstations that are configured as multi-user Global System Manager workstations;
- Allocation of a System Request load/work unit (i.e. \$OV) to reduce the amount of extra network traffic that results when a System Request is loaded (see table 2.1 of the Global Utilities Manual).

By changing the node-id of the workstation computer, that is configured with a local hard-disk, to an upper-case letter between "B" and "Z" (i.e. "A" is usually reserved for the Global System Manager "master" computer) it is possible to make the local disk "network visible" to Global System Manager users (see figure K.7).

If a NetWare workstation is being used as a Global System Manager fileserver, and that fileserver has a Global System Manager simulated volume on a local hard-disk, the use of MS-DOS caching software (e.g. SmartDrive) may improve the performance of the Global System Manager fileserver when accessed over the Global System Manager network.

Appendix K - Non-Standard Configurations

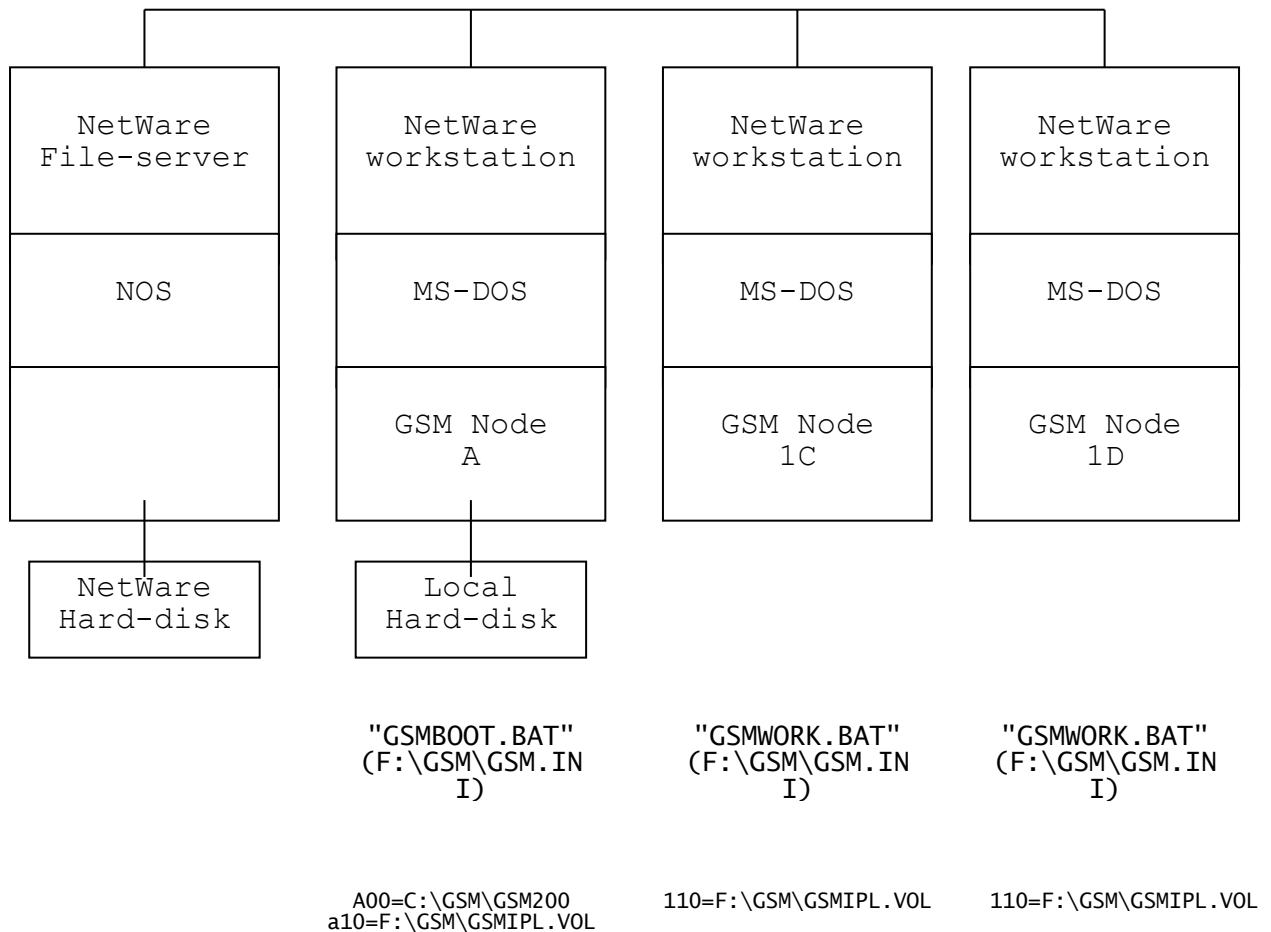


The following network accesses are required for a Global System Manager workstation (e.g. computer "1C") to perform a read on the simulated volume on the Global System Manager "master" computer:

1. File Executive control block sent using SPX (workstation to workstation);
2. NetWare Core Protocol (NCP) read request to fileserver (workstation to fileserver);
3. Read data returned using the NetWare Core Protocol (NCP) (fileserver to workstation);
4. Read data returned using SPX (workstation to workstation).

Figure K.2 - The Classic non-NLM Master Configuration

Appendix K - Non-Standard Configurations

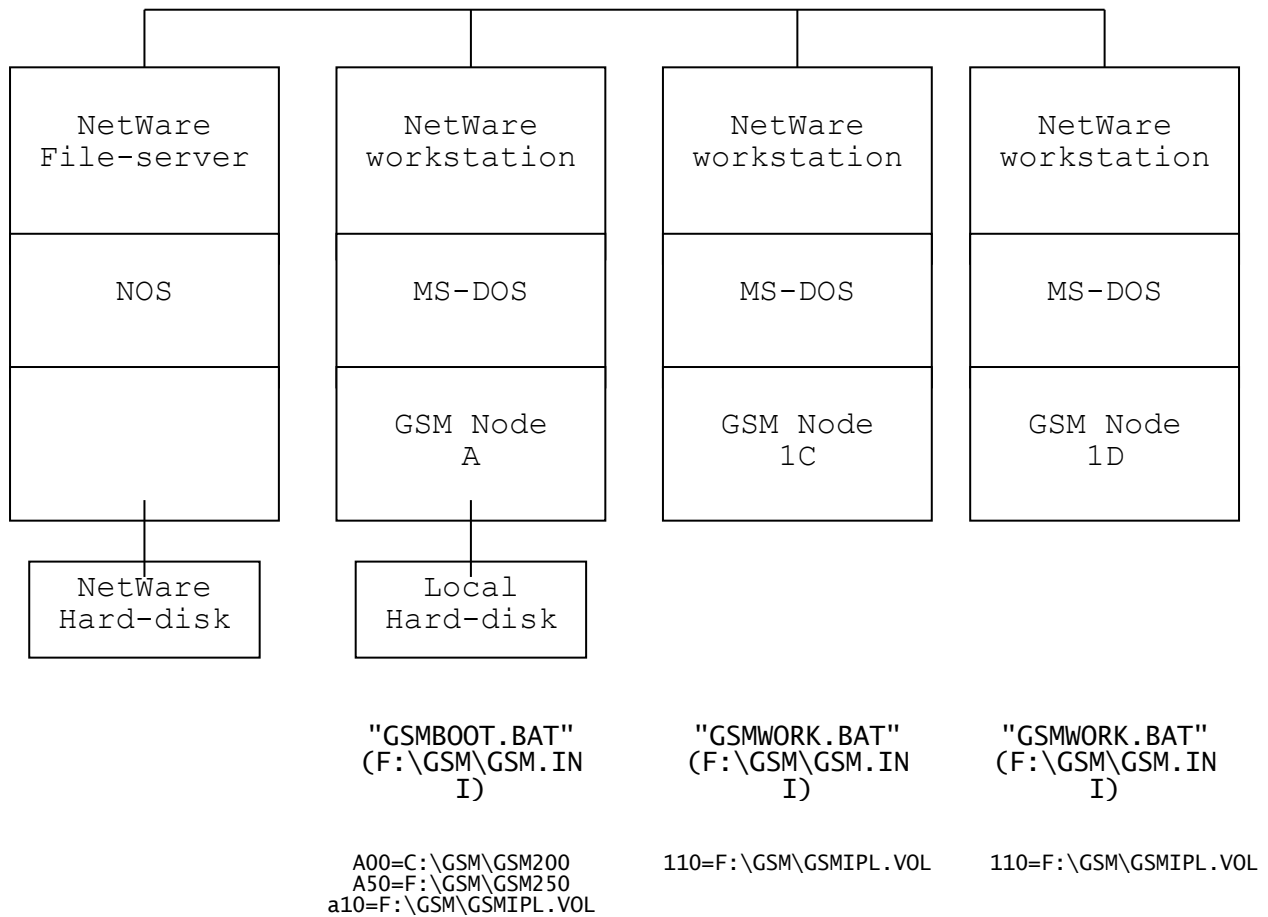


The following network accesses are required for a Global System Manager workstation (e.g. computer "1C") to perform a read on the simulated volume on the Global System Manager "master" computer:

1. File Executive control block sent using SPX (workstation to workstation);
2. Read data returned using SPX (workstation to workstation).

Figure K.3 - Non-NLM Master With Local Hard-Disk Configuration

Appendix K - Non-Standard Configurations



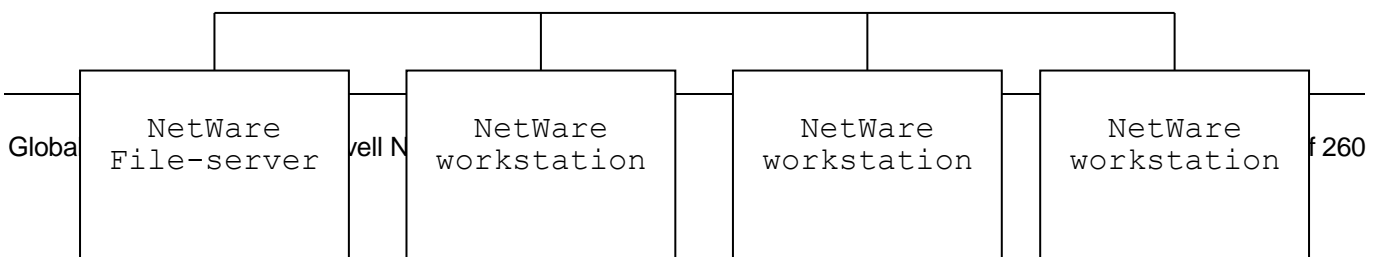
The following network accesses are required for a Global System Manager workstation (e.g. computer "1C") to perform a read on the "local" simulated volume (i.e. A00) on the Global System Manager "master" computer:

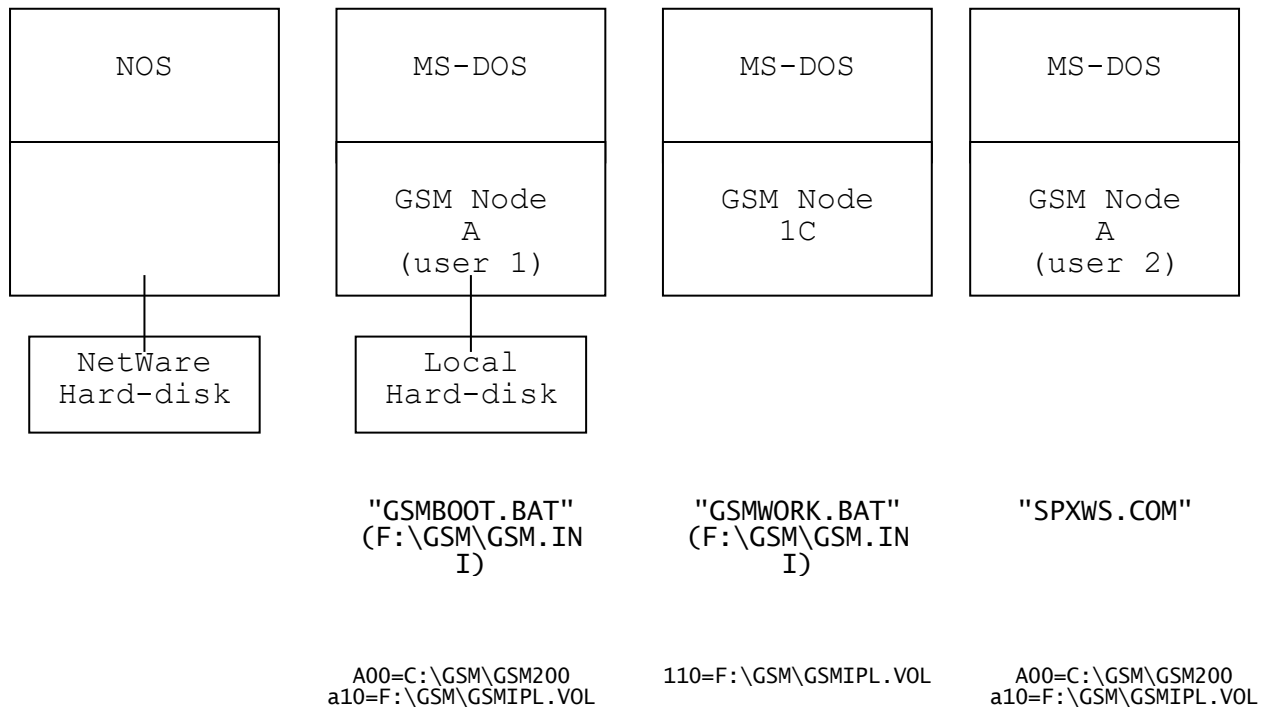
1. File Executive control block sent using SPX (workstation to workstation);
2. Read data returned using SPX (workstation to workstation).

The following network accesses are required for a Global System Manager workstation (e.g. computer "1C") to perform a read on the "fileserv" simulated volume (i.e. A50) on the Global System Manager "master" computer:

1. File Executive control block sent using SPX (workstation to workstation);
2. NetWare Core Protocol (NCP) read request to fileserv (workstation to fileserv);
3. Read data returned using the NetWare Core Protocol (NCP) (fileserv to workstation);
4. Read data returned using SPX (workstation to workstation).

Figure K.4 - Non-NLM Master With Multiple Hard-Disk Configuration





The following network accesses are required for a Global System Manager workstation (e.g. computer "1C") to perform a read on the simulated volume on the Global System Manager "master" computer:

1. File Executive control block sent using SPX (workstation to workstation);
2. Read data returned using SPX (workstation to workstation).

The workstation running the SPX terminal emulator appears as a second user on the Global System Manager "master" computer so no extra network accesses are required.

Figure K.5 - Non-NLM Master With SPX Workstation Configuration

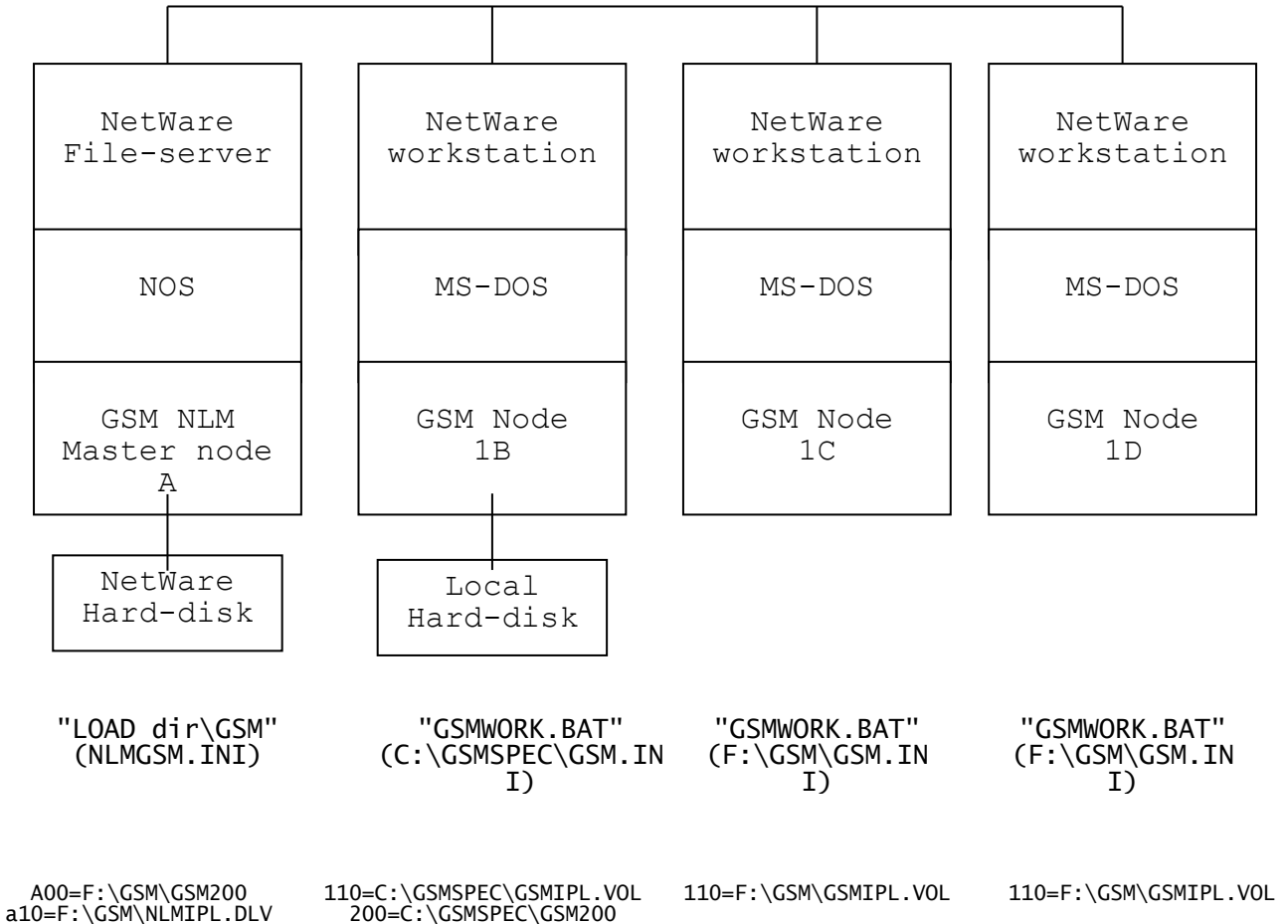
Important note: Although there are no problems configuring local, private hard-disk simulated volumes on Global System Manager workstations, we do not recommend employing a Novell workstation as a Global System Manager file-server. Novell NetWare is not designed for use as a peer-to-peer network and, although a Novell workstation can be used as a Global System Manager fileserver, the resulting configuration often overloads the networking resources of the workstation resulting in Global System Manager NETWORK ERRORS. **This problem is particularly acute if the Novell workstation that is functioning as a Global System Manager fileserver is running Microsoft Windows. WE DO NOT RECOMMEND RUNNING GLOBAL SYSTEM MANAGER FILE-SERVERS UNDER MICROSOFT WINDOWS.**

It is not possible to add local volumes or screens to a workstation which loads Global System Manager from the standard SYSIPL volume. An additional SYSIPL volume must be produced (see section K.2), or

additional Global System Manager installations performed for such workstations (see section K.3).

K.1.5 Adding Local Screens to Workstations

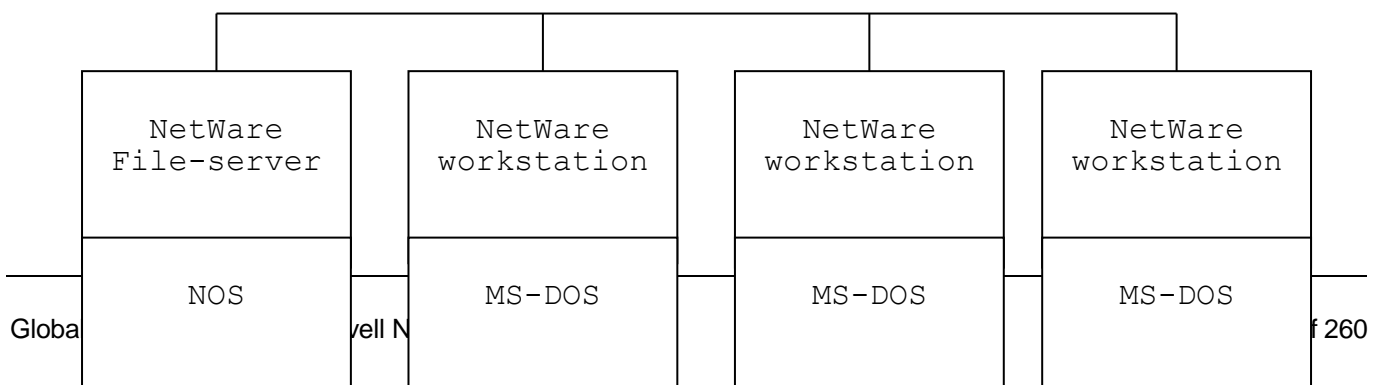
In addition to creating simulated volumes on local hard-disks you may wish to add one or more serial screens or SPX Workstation consoles to a workstation (see figure K.8). If you wish to add SPX consoles, use Global Configurator (see section 8.3.2) to add them to the configuration file on SYSIPL (see section K.2).



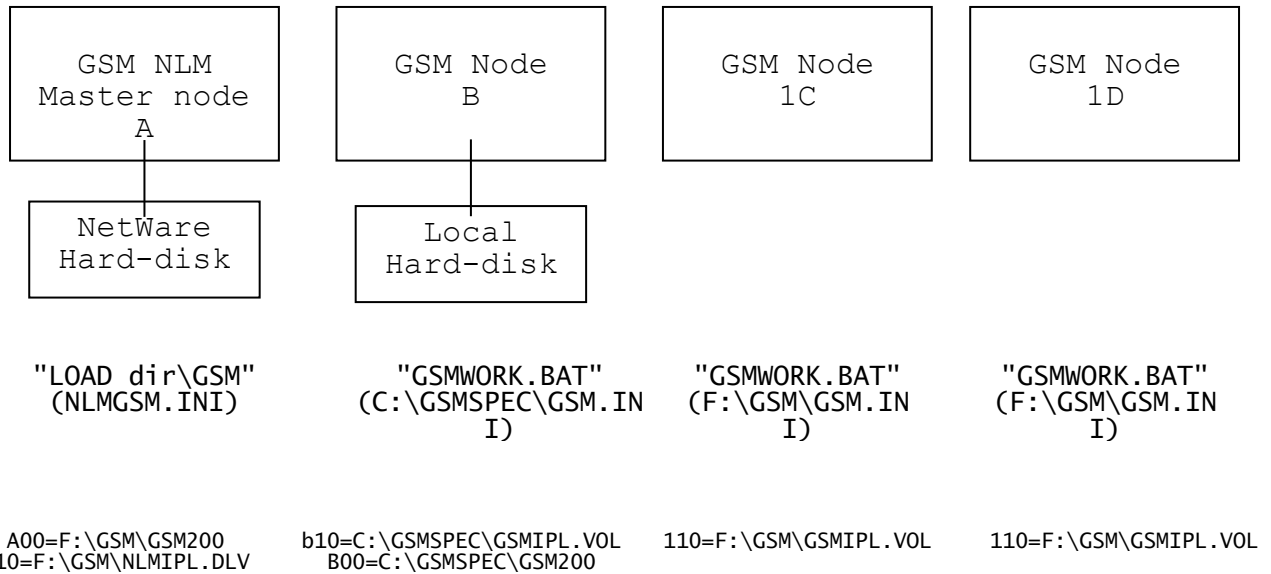
The following network accesses are required for a Global System Manager workstation (e.g. computer "1C") to perform a read on the simulated volume on the Global System Manager "master" computer:

1. File Executive control block sent using SPX (workstation to fileserver);
2. Read data returned using SPX (fileserver to workstation).

Figure K.6 - Adding a local, private hard-disk



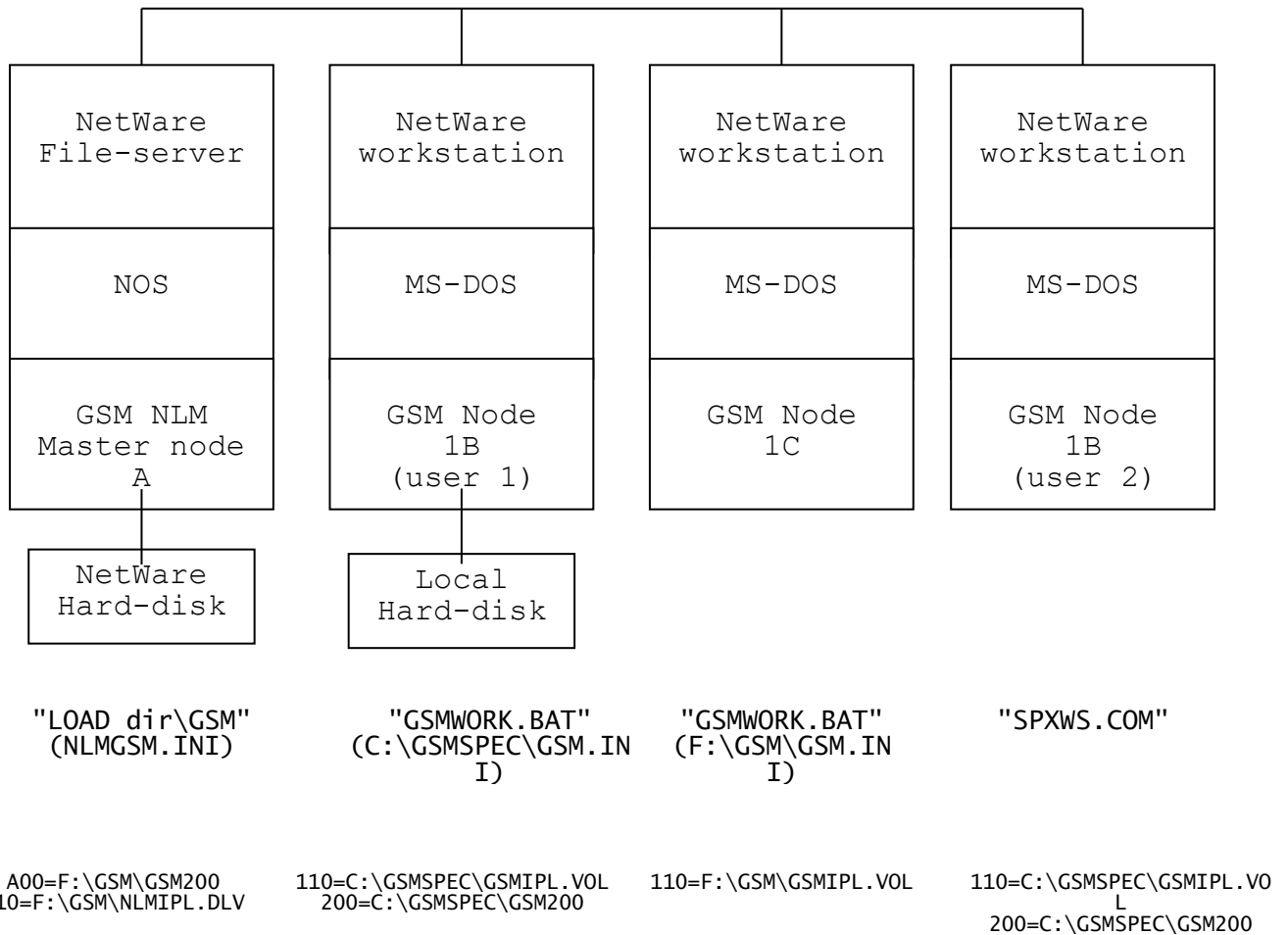
Appendix K - Non-Standard Configurations



The following network accesses are required for a Global System Manager workstation (e.g. computer "1C") to perform a read on the simulated volume on the Global System Manager "master" computer:

1. File Executive control block sent using SPX (workstation to fileserver);
2. Read data returned using SPX (fileserver to workstation).

Figure K.7 - Adding a network visible hard-disk (NOT RECOMMENDED)



The following network accesses are required for a Global System Manager workstation (e.g. computer "1C") to perform a read on the simulated volume on the Global System Manager "master" computer:

1. File Executive control block sent using SPX (workstation to fileserver);
2. Read data returned using SPX (fileserver to workstation).

Figure K.8 - Adding a local, private hard-disk (with SPXWS)

K.2 Creating an Additional SYSIPL Volume

The advantage of creating an additional SYSIPL volume over performing an additional Global System Manager installation (see section K.3) is that it only has to be done once. A copy of the additional SYSIPL volume can be made for each workstation that requires one.

To create an additional SYSIPL volume, logon to NetWare on a workstation as SUPERVISOR and proceed as follows:

1. Ensure no workstations are running Global System Manager and unload the Global System Manager NLM (if it is in use);
2. Change to the Global System Manager directory. Copy the workstation IPL volume GSMIPL.VOL to GSMIPL.BAK.

3. Load Global System Manager (as a "master" computer) by running GSMBOOT.BAT. Delete the +.JWIPL library from the workstation SYSIPL volume (unit 110). Copy all the files beginning with "+.JW" (e.g. +.JW, +.JWDOS, +.JWNOV and +.JWNLM) from SYSRES to SYSIPL.
4. Run \$BYE on the workstation to return to MS-DOS.
5. Copy GSMIPL.VOL to GSMIPL.FUL. Copy GSMIPL.BAK to GSMIPL.VOL, and make GSMIPL.VOL shareable again.
6. Reload the NLM, or reload Global System Manager on the workstation acting as the Global System Manager "master" computer.
7. On the workstation, which will be running the non-standard configuration, create a new directory (e.g. GSMSPEC) on the local disk or on a network drive. Make the new directory the current directory.
8. Copy the contents of the BACNAT diskette to the new directory. Copy GSMIPL.FUL from the Global System Manager computer directory to GSMIPL.VOL in the new directory. Since only one workstation will be using this GSMIPL.VOL, there is no need to make it shareable.

K.2.1 Creating Additional Simulated Volumes

To add a local Global System Manager volume to the workstation, use GLMKIDF (or GLMKDDF) to create discrete data file GSM200, in exactly the same way as you did for the initial Global System Manager installation (see section 2.1.3). Load Global System Manager on the workstation by running GSMWORK.BAT, and use \$V to initialise unit 200.

K.3 Installing Additional Copies of Global System Manager

All the configurations described thus far consist of a single SYSRES volume on the Global System Manager "master" computer. Under some circumstances it may be necessary to install local SYSRES volumes to increase the performance of Global System Manager by reducing the amount of network activity on the Global System Manager "master" computer. However, before installing a local SYSRES it may be possible to increase network performance by implementing one, or more, of the less drastic suggestions described in section K.1.4). The installation of local SYSRES volume is considered drastic because the multiplicity of Global System Manager system files (e.g. P.\$CMLB0) is very difficult to maintain.

A complete installation is required for each additional copy of Global System Manager. The advantage of this method over the additional SYSIPL approach (see section K.2) is that network traffic is reduced, especially if local copies of Global programs are installed as well. This approach is recommended if serial screens or SPX consoles are going to be added to the workstation.

To install an additional SYSRES volume, proceed as follows:

1. Ensure the Global System Manager "master" computer is running. Create a new directory for the installation, either on the local

disk or on a network drive, and make this new directory the current directory.

2. Copy the contents of the BACNAT diskette to the directory.
3. Before starting the installation, edit the GSMBOOT.BAT file and change the GLNODE setting to the node-id for this workstation (e.g. "B"). If you require the local Global System Manager volumes to be accessible to other Global System Manager nodes, making the workstation a Global System Manager fileserver, select a node-id in the range "B" to "Z". Remember that each Global System Manager node must have a unique node-id.
4. The secondary Global System Manager installation follows the same path as the initial installation (see section 2.1), except you **MUST** not create a GSMIPL.VOL file, or run %.IPLJOB when the installation is complete.
5. Copy GSMBOOT.BAT to GSMWORK.BAT, so that either batch file can be used to load Global System Manager from the local SYSRES.

K.4 Multiple NLM configurations

It is not possible to run more than one Global System Manager NLM on a NetWare fileserver. However, if you have more than one fileserver, you can run a Global System Manager NLM on each of them to obtain additional storage (see figure K.9).

To install Global System Manager on another NetWare file-server, after it has been installed on the primary fileserver, proceed as follows:

1. Allocate a Global System Manager directory on the new fileserver.
2. Copy the contents of the BACNAT diskette to the new fileserver (see section 2.1.2.2).
3. Allocate a discrete data file volume called GSM200 (see section 2.1.3).
4. Edit the NLM initialisation file and change the NODE-ID setting (see section 10.2.3.1) to the node-id for the NLM on the new fileservers (e.g. "B"). **Each Global System Manager NLM must have a unique node-id.** Make sure the MASTER-NODE (see section 10.2.3.2) is that of the NLM running as Master Computer.
5. Load the NLM on the new fileserver. Run \$V from a workstation to initialise unit B00.
6. Note that additional Global System Manager NLMs do not require a SYSRES, so extra Global System Manager installations are not required.

K.5 Configurations for low speed connections

Many Novell NetWare installations include some low speed connections, such as Kilostream links, to remote workstations or networks at other locations. Performance of Global System Manager over such links is usually very poor. If remote workstations need to run Global System Manager, you should use SPX Workstation, or install a complete Global System Manager system at the remote site, complete with programs.

If the remote site is to use SPX Workstation, a local workstation will have to be configured with SPX consoles, and left running continuously for the benefit of the remote users (see figure K.10).

If the remote site includes its own Novell fileserver, a complete installation should be performed at the remote site (see K.11). Remember to change the GLNODE setting in GSMBOOT.BAT, and the NODE-ID setting in the NLM initialisation file NLMGSM.INI. Install Global application programs at the remote site as well. Any data that is only needed by the remote site should be installed there, so that only shared data will need to travel over the slow link.

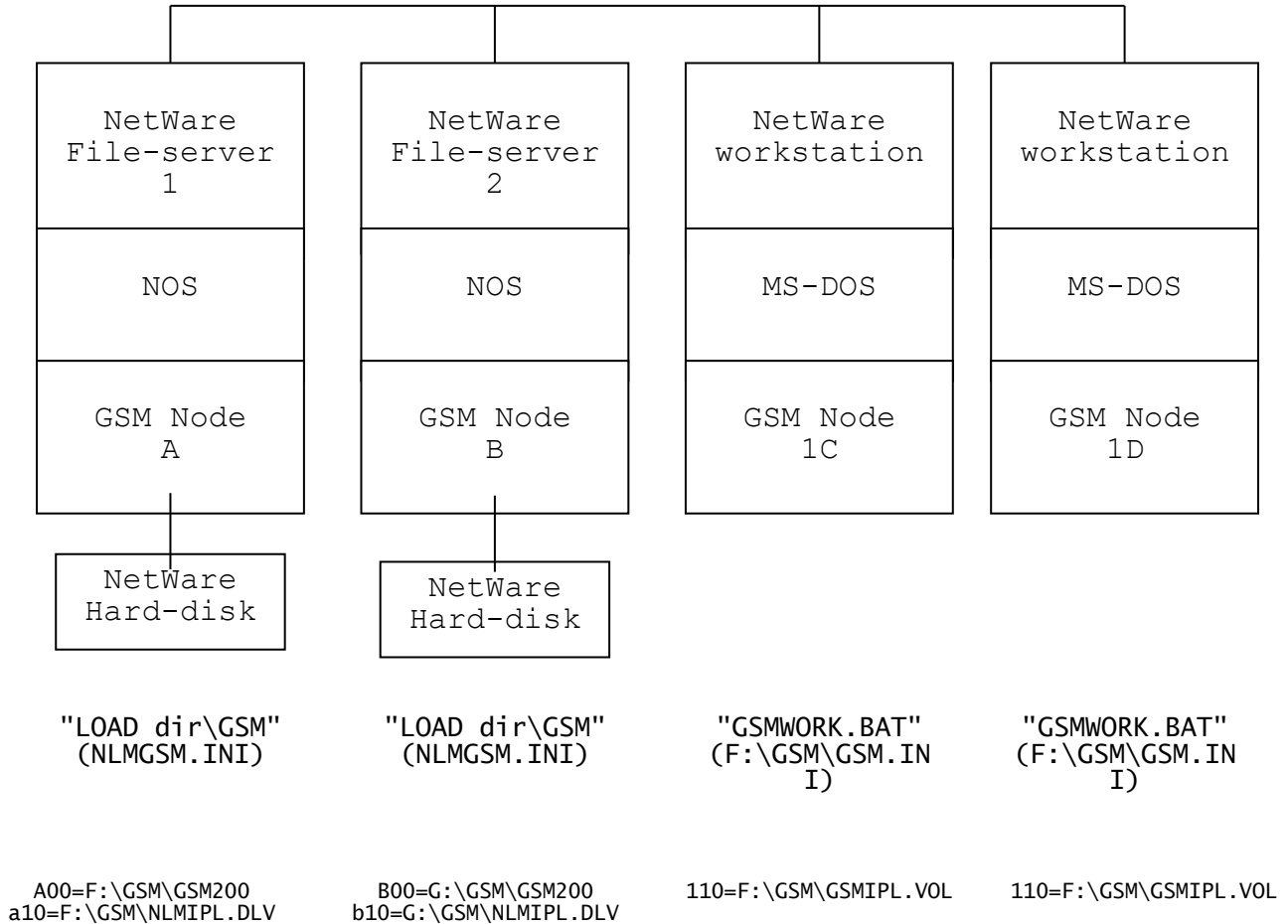


Figure K.9 - Multiple NLM Configuration

Appendix K - Non-Standard Configurations

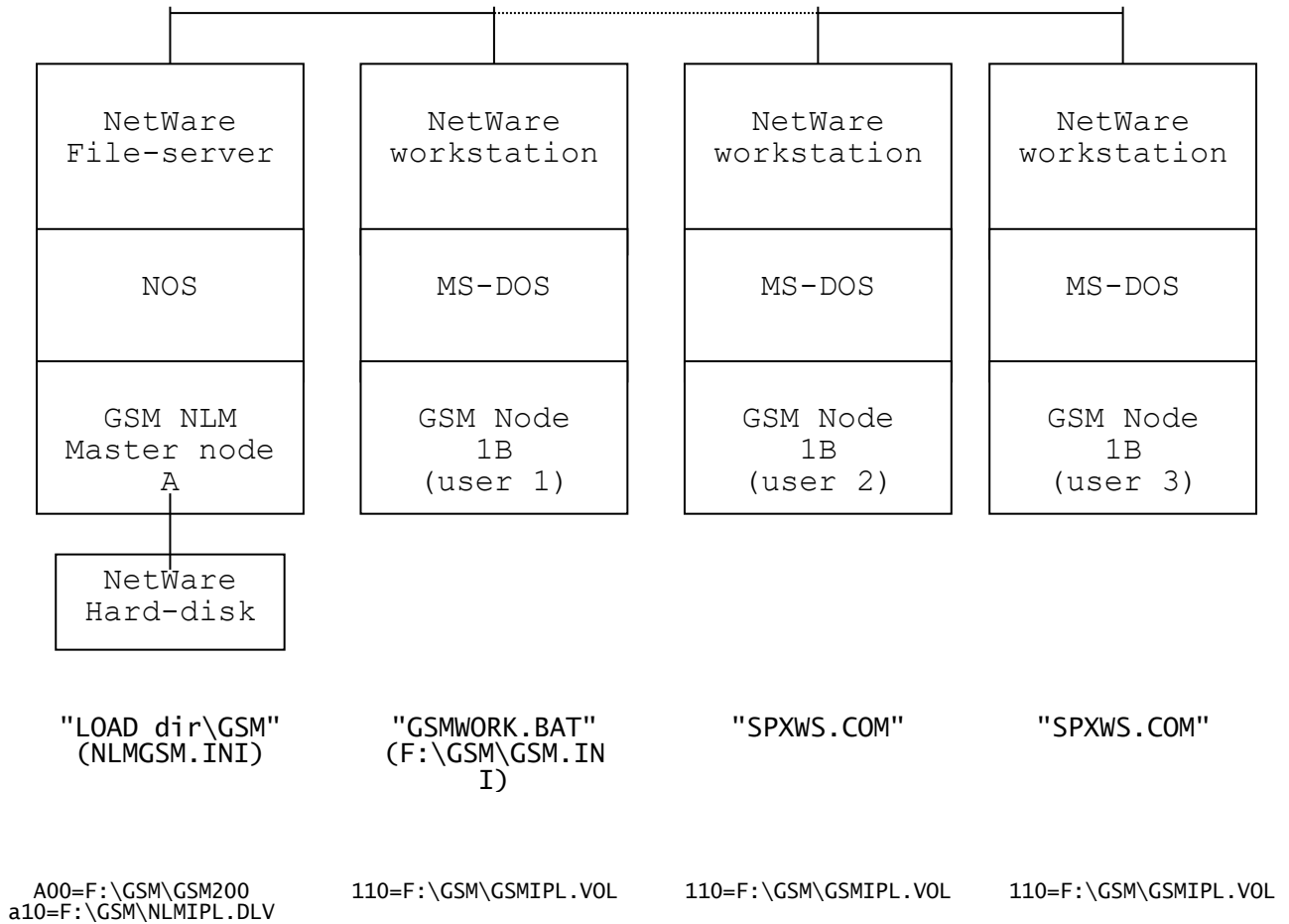


Figure K.10 - Remote Site with SPX Workstation

Appendix K - Non-Standard Configurations

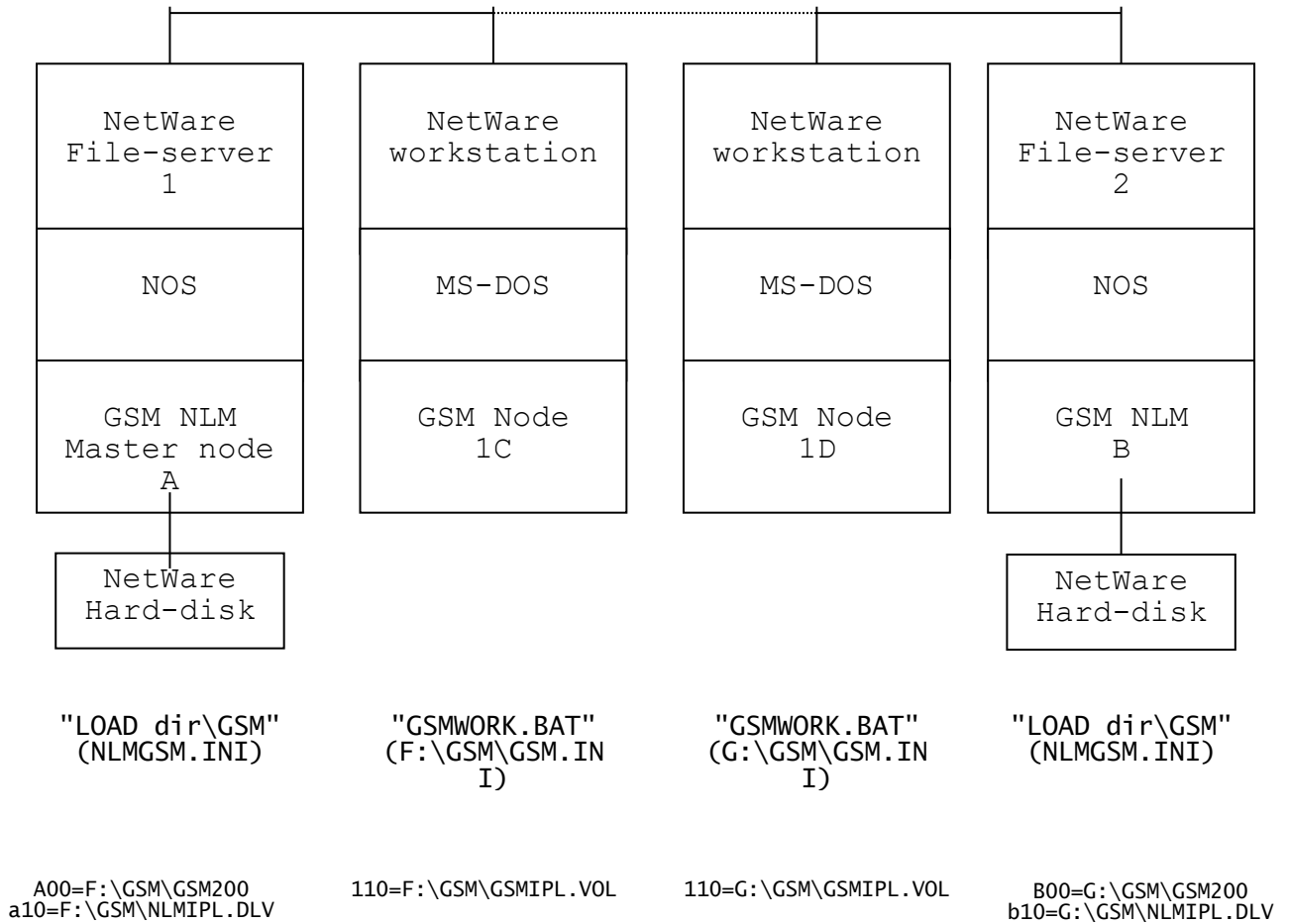


Figure K.11 - Remote Site with Separate Fileserver

Appendix L - Troubleshooting Guide

This appendix contains a list of commonly encountered problems and misunderstandings that have been reported with Global System Manager (Novell NetWare) together with the recommended solutions.

This appendix contains sections on the following topics:

- L.1 Hard-Disk Volume Formats for 5611 and 5613 Configurations
- L.2 Where are the Configuration Files?
- L.3 Where are the Nucleus Libraries?
- L.4 The Discrete Logical Volume (DLV) is special
- L.5 Why use =.NOVELL instead of %.IPLJOB
- L.6 How to create special configuration files
- L.7 How to configure a local hard-disk
- L.?? Global System Manager (Novell NetWare) and Windows 95
- L.?? Global System Manager (Novell NetWare) and PCI cards
- L.?? The CLIB.NLM library
- L.?? T151Z must be DLV if > 1 => date of A.VTYPE is important
- L.?? Multiple NLM's on multiple servers
- L.?? Watchdog timeouts
- L.?? Troubleshooting SPXWS
- L.?? Local SYSRES required because only 1 \$SW not in \$MONITOR but in \$STARB
- L.?? \$CUS apply nucleus update
- L.?? \$CUS GSM revision upgrade
- L.?? CLIB.NLM and implications
- L.?? README.TXT for NLM revisions
- L.?? See K.5 need example of a local SYSRES at the other end of a low-bandwidth link
- L.?? Message file viewer is limited
- L.?? New diags with NLM V1.11
- L.?? Configure 2nd disk at a00 (a01-a99) and lose IPL
- L.?? Diags screen show directory where NLM was loaded from
- L.?? Memory issues cf. GSM (BOS) - see 1996 Hotline 71

L.1 Hard-Disk Volume Formats for 5611 and 5613 Configurations

Two configuration numbers, 5611 and 5613, are available for Global System Manager V8.1 (Novell). It is our intention to gradually phase out configuration code 5611 (for the reasons explained below). Note that the related configurations 5610 (the 5¼" equivalent of the 3½" 5611) and 5612 (the 5¼" equivalent of the 3½" 5613) are not available with Global System Manager V8.1.

L.1.1 Hard-Disk Volume Formats for 5611 Configurations

After Global System Manager V8.1 (Novell) with a configuration code 5611xJ (or with the pre-V8.1 code 5610xJ) has been standardly installed (see section ??) the following simulated hard-disk volumes are available from a workstation while the GSM.NLM is running:

Domain	Units	Description
A00		Discrete Data File format T151Z with 95 subvolumes and 250 files per directory
	A01	First subvolume on domain A00 (invariably
	SYSRES)	
	Ann	Other subvolumes on domain A00

	A95	Last subvolume on domain A00
a10		Integrated Data File format P151Z with 1 subvolume and 99 files per directory
	a11	First, and only, subvolume on domain a10 (always SYSIPL for the GSM.NLM, containing the special NLM configuration file ++5619AA and special Action File A.C3). After a standard installation, this will contain just the following files:
		A.C3 ++5619AA
296		Integrated Data File format P151Z with 1 subvolume and 99 files per directory
	297	First, and only, subvolume on domain 297 (always SYSIPL for the workstations, created by %.IPLJOB or =.NOVELL, see section L.2 and L.3). After a standard installation, this will contain just the following files:
		\$MONITOR P.\$MON A.JW ++5611xJ +.JO +.JWIPL

This configuration is restrictive for 2 reasons. Firstly, the largest Novell disk partition size supported by volume format T151Z is 512Mb (see section ??). This size is very small by today's standards and would normally require a special, low-capacity partition to be created on the file server. Secondly, the presence of the domain at address A96 prevents the allocation of the maximum number of subvolumes (i.e. 99) on the central volume, A00. To remove these restrictions in configurations 5611 (and the pre-V8.1 only 5610) configurations 5613 (and the pre-V8.1 only 5612) have been created.

L.1.2 Hard-Disk Volume Formats for 5613 Configurations

After Global System Manager V8.1 (Novell) with a configuration code 5613xJ (or with the pre-V8.1 code 5612xJ) has been standardly installed (see section ??) the following simulated hard-disk volumes are available from a workstation while the GSM.NLM is running:

Domain	Units	Description
A00		Discrete Data File format T259Z with 99 subvolumes and 250 files per directory
	A01	First subvolume on domain A00 (invariably SYSRES)
	Ann	Other subvolumes on domain A00
	A99	Last subvolume on domain A00
<none> demountable	a10	Integrated Data File DLV format Z151Z (i.e. a non-virtual diskette simulated on a hard-disk) with 250 files per directory (always SYSIPL for the GSM.NLM, containing the special NLM configuration file ++5619BB and special Action File A.C3). After

a standard installation, this will contain just the following files:

```
A.C3
++5619BB
```

<none> 110 Integrated Data File DLV format Z151Z (i.e. a non-demountable virtual diskette simulated on a hard-disk) with 250 files per directory (always SYSIPL for the workstations, created by %.IPLJOB or .NOVELL, see section L.2 and L.3). After a standard installation, this will contain just the following files:

```
$MONITOR
P.$MON
A.JW
++5613xJ
+.JO
+.JWIPL
```

This configuration removes the two restrictions described above. The largest Novell disk partition size supported by volume format T259Z is 2Gb (see section ??). Furthermore, up to 99 subvolumes (i.e. the maximum allowed for any domain format) can be allocated on domain A00. However, the use of a Discrete Logical Volume (DLV) does introduce a few small features which are explained in section L.??.

L.2 Where are the Configuration Files?

Two configuration files are distributed with Global System Manager V8.1 (Novell).

The first configuration file, ++5613xJ (or ++5611xJ) is plainly visible on the Global format BACRES diskette (e.g. it is displayed by a \$F LIS of the BACRES diskette). This configuration file is normally referred to as the "Workstation Configuration File" for the reasons explained below. The standard A.JW Action File (see section ?? of the V8.1 Global Configurator Manual), which is also distributed on the BACRES diskette, is required if CFUPDATE is to be used to update this configuration file.

The second configuration file (++5619BB for configuration 5613; or ++5619AA for configuration 5611) is encapsulated within the NLMIPL.DLV file (for configuration 5613) or the NLMIPL.VOL file (for configuration 5611) on the MS-DOS format BACNAT diskette. This special, covert configuration file is normally referred to as the "NLM Configuration File" for the reasons explained below. The special A.C3 Action File (see section ?? of the V8.1 Global Configurator Manual), is also encapsulated within the NLMIPL.DLV (or NLMIPL.VOL) file on the BACRES diskette. This special Action File is required if CFUPDATE is to be used to update the NLM Configuration File.

When Global System Manager (Novell) is standardly installed the contents of the BACNAT diskette are copied to the Global directory (see section ??). As a result of this MS-DOS file copy, the NLM Configuration File and A.C3 Action File automatically appear on unit a10 (for configuration 5613 - see section L.1) or unit a97 (for configuration 5611 - see section L.1). This configuration file is used

by GSM.NLM when it is loaded, by the Novell LOAD command, on the file-server.

During the installation of Global System Manager, the Workstation Configuration File and A.JW action file are copied from BACRES to the SYSRES volume. This configuration file is used when GSMBOOT is used to check the installation (see section ??.??) before the NLM has been loaded on the file-server.

When the =.NOVELL utility (or %.IPLJOB job) is used to create an IPL volume for the workstations (see section ??.??), the Workstation Configuration File and the A.JW action file are copied from the SYSRES volume (i.e. normally A01) to the SYSIPL volume (i.e. 110 or 297). The configuration file on the SYSIPL volume is used during normal day-to-day operation when GSMWORK is invoked to load Global System Manager on a workstation (i.e. when the NLM is running on the file-server).

When using CFUPDATE, or the Configuration Maintenance option (option 5) of \$CUS, it is important to amend the correct configuration file in order for the change to have the intended result:

Configuration file	Unit	Description
++5619BB	a10	Configuration file used by GSM.NLM (for 5613 configuration). Only amend this configuration to change the parameters that apply to virtual computer "A" when the NLM is running and GSMWORK has been used to load Global System Manager on a workstation. For example, if a TOO MANY OPEN FILES ON UNIT Ann message appears, amend this configuration file to increase the number of the relevant File Executive control blocks.
++5619AA	a97	Configuration file used by GSM.NLM (for 5611 configuration). Only amend this configuration to change the parameters that apply to virtual computer "A" when the NLM is running and GSMWORK has been used to load Global System Manager on a workstation. For example, if a TOO MANY OPEN FILES ON UNIT Ann message appears, amend this configuration file to increase the number of the relevant File Executive control blocks.
++5613xx	110	Configuration file used by GSMWORK when Global System Manager is loaded on one, or more, workstations while GSM.NLM is running. Amend this configuration file to amend the workstation configuration (see section L.??).
++5611xx	297	Configuration file used by GSMWORK when Global System Manager is loaded on one, or more, workstations while GSM.NLM is running. Amend this configuration file to amend the workstation configuration (see section L.??).
++5613xx	A01	Configuration file used by GSMBOOT when Global System Manager is loaded on a single workstation when the NLM is unloaded. Normally, it is good practice, but not essential, to keep this configuration file in step with ++5613xx on 110.

++5611xx	A01	Configuration file used by GSMBOOT when Global System Manager is loaded on a single workstation when the NLM is unloaded. Normally, it is good practice, but not essential, to keep this configuration file in step with ++5611xx on 297.
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L.3 Where are the Nucleus Libraries?

Several nucleus libraries (i.e. files that start with the 2 characters "+.") are distributed with Global System Manager V8.1 (Novell). The nucleus libraries contain the executives and controllers that constitute the Global System Manager nucleus (see section 1.????).

The following nucleus libraries are distributed on the Global format BACRES diskette:

```
+.JO
+.JW
+.JWDOS
+.JWNOV
+.JWNLM
```

The executives and controllers are dispersed amongst these libraries for reasons that are beyond the scope of this manual.

During the installation of Global System Manager, the various nucleus libraries listed above are copied from BACRES to the SYSRES volume. The contents of these libraries are used when GSMBOOT is used to check the installation (see section ??.??) before the NLM has been loaded on the file-server.

When the =.NOVELL utility (or %.IPLJOB job) is used to create an IPL volume for the workstations (see section ??.??), the nucleus libraries are copied from the SYSRES volume (i.e. normally A01) to the SYSIPL volume (i.e. 110 or 297). These nucleus components (i.e. executives and controllers) are used during normal day-to-day operation when GSMWORK is invoked to load Global System Manager on a workstation (i.e. when the NLM is running on the file-server). Note that =.NOVELL (and %.IPLJOB) actually merge some of the nucleus libraries on the SYSRES volume into a single nucleus library on SYSIPL:

BACRES	SYSRES	SYSIPL	Description
+.JO	+.JO	+.JO	Always copied intact
+.JW	+.JW +.JW	+.JWIPL	Some (or all) members merged from on SYSRES to +.JWIPL on SYSIPL
+.JWDOS	+.JWDOS of	+.JWIPL	All the members (with the exception +JWCAOC - see section L.??) merged from +.JWDOS on SYSRES to +.JWIPL on SYSIPL
+.JWNOV	+.JWNOV SYSRES	+.JWIPL	All members merged from +.JWNOV on to +.JWIPL on SYSIPL

`+.JWNLM` `+.JWNLM` `+.JWIPL` All members merged from `+.JWNLM` on
SYSRES
to `+.JWIPL` on SYSIPL

Note that, perhaps surprisingly, there are no nucleus libraries on the NLM IPL volume. All the functionality that is normally contained in the components of the nucleus libraries is actually included within the `GSM.NLM` module.

If you are modifying the contents of a nucleus library, either by applying a zap or including a new controller, be careful to ensure that the correct library is updated. For example, applying a zap to `+.JWDOS` on SYSRES will have no effect when `GSMWORK` is used to load Global System Manager on a workstation, using the contents of the `+.JWIPL` volume on SYSIPL.

L.4 How to configure a local hard-disk

EXPLAIN NEED TO UPDATE CONFIG FILE ON SYSIPL & COPY SSD CONTROLLER TO SYSIPL (REFER TO `=.NOVELL` OPTIONS). USE OF `GLCONFIG` VARIABLE; USE OF WORKSTATION SPECIFIC SYSIPL VOLUME (POTENTIAL PROBS WITH MULTIPLE COPIES OF KEY FILES EG. `+.JWIPL`)

L.5 How to create special configuration files

SEE PREVIOUS SECTION - MORE NEED FOR `GLCONFIG` OR

L.6 Global System Manager (Novell NetWare) and Windows 95

PROBLEMS IF DON'T USE MICROSOFT NETWORK.

L.7 Global System Manager (Novell NetWare) and PCI cards

EXPLAIN PROBLEMS (UNDER INVESTIGATION)

L.8 The `CLIB.NLM` library

PROBLEMS WITH V4.10f `CLIB.NLM` (SUPPLIED WITH `ARCSERVE V6.0`) - WAIT FOR SOLUTION.

L.9 The Discrete Logical Volume (DLV) is special

`$TAPE` & `$FIND` TREAT IT AS A DISKETTE (WHAT ELSE WILL?)

L.10 Why use `=.NOVELL` instead of `%.IPLJOB`

ADVANTAGES OF `=.NOVELL`