TI SYSTEM V
RELEASE INFORMATION

System 1000 Series, System 1500

MANUAL REVISION HISTORY

TI System V Release Information (2549448-0001)

Original Issue	September 1987
Revision A	June 1988
Revision B	April 1989
Revision C	April 1990
Revision D	February 1991
Revision E	November 1991
Revision F	April 1992

The system-defined windows shown in this manual are examples of the software as this manual goes into production. Later changes in the software may cause the windows on your system to be different from those in the manual.

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SYSTEM 1000 SERIES, SYSTEM 1500 RELEVANT DOCUMENTATION

SOFTWARE MANUALS

System 1500 Environment	General Description	2534827-0001
	System 1500 Product Overview	DBND007A
	DX10/DNOS to TI System V: System 1500 Migration Guide	2534842-0001
Operating System	TI System V Release Information	2549448-0001
	TI System V Administrator's Guide	2540539-0001
	TI System V User's Reference, Volume 1	2579788-0001
	TI System V User's Reference, Volume 2	2579788-0002
	TI System V Error Messages	2549477-0001
	TI System V User's Guide	2540542-0001
	TI System V Terminal Concentrator Software	2564122-0001
	TI System V Performance Monitor User's Guide	2555397-0001
	TI System V Performance Monitor Quick Reference	2555398-0001
	TI System V Programmer's Reference, Volume 1	2579789-0001
	TI System V Programmer's Reference, Volume 2	2579789-0002
	TI System V Programmer's Guide	2540545-0001
	TI System V Support Tools Guide	2540546-0001
	TI System V Streams Primer	2564861-0001
	TI System V Streams Programmer's Guide	2564870-0001
	TI System V Network Programmer's Guide	2564863-0001
Programming Languages	C System V	2540551-0001
	COBOL Forms System V Utility Manual	2540564-0001
	COBOL System V ANIMATOR™ Operating Guide	2540563-0001
	COBOL System V Programmer's Guide	2540552-0001
	COBOL System V Error Messages	2534838-0001
	COBOL System V Getting Started	2534836-0001
	COBOL System V Language Reference	2540565-0001
	COBOL System V Operating Guide	2540561-0001
	COBOL System V Source Conversion for RM/COBOL™	2540562-0001
	COBOL System V Source Conversion for TI-990 COBOL	2540566-0001
	FORTRAN System V	2540553-0001
	COBOL System V, COBOL Forms System V, and Sort/Merge System V Installation Guide	2544360-0001
	Pascal System V	2540554-0001
	Sort/Merge System V User's Guide	2540556-0001
	GNU C Compiler User's Manual (for TI System V ANSI C compiler)	2549440-0001
	TI ANSI C Library	2569416-0001
Communications	3780/2780 System V User's Guide	2549931-0001
	3270 SNA System V	2549897-0001
	3770 SNA System V	2549948-0001
	DNIO/1500 System V	2549409-0001
	X.25/1500 System V	2555701-0001
	TCP/IP System V	2564120-0001
	NFS™ System V	2564121-0001
	APPC SNA System V Programmer's Guide	2564118-0001
	APPC SNA System V Administrator's Guide	2564119-0001

HARDWARE MANUALS

System 1500 Installation and Operation	System 1500/MP Computer Installation and Operation Documentation Kit	2557936-0001
	System 1500/CC Computer Installation and Operation Documentation Kit	2558006-0001
	System 1505/1507 Computers Installation and Operation Documentation Kit	2579743-0001
	System 1500 Mass Storage Tower Installation and Operation	2579752-0001
	Mass Storage Unit (MSU IIA) Installation and Operation	2557935-0001
	WD1200 Disk Drive Installation and Operation	2557944-0001
System 1500 Field Maintenance	NuBus™ Systems System 1500 Field Maintenance Handbook Kit	2549260-0001
	System 1500/CC Field Maintenance Handbook Kit	2549268-0001
	Diagnostics User's Guide	2534850-0001

CONTENTS

1 INTRODUCTION

TI System V

1.1 TI System V is a multiuser, multitasking operating system for the System 1000 Series, System 1500 computers. It is derived from the UNIX™ System V timesharing system and includes numerous enhancements for business applications.

Release History

1.2 This document provides instructions for applying the 3.3.1 system software to systems running earlier versions of TI System V. Subsequent updates will be available from regular update releases.

In the TI System V release number, the first digit indicates the source base employed. The second and third digits specify the TI release of the product.

TI System V release 3.3.1 has been tested using the AT&T System V Verification Suite and conforms to the Base System and the Kernel Extension as specified in Issue 2 of the AT&T System V Interface Definition Volumes 1, 2, and 3.

Appendix A contains information about software enhancements made to earlier versions of TI System V.

Appendix B contains information about new and revised error messages.

Release Methodology

1.3 Unlike some software update releases that update selected files on your disk, this release replaces entire file systems. Thus, if you are replacing an installed system, backup of current files is strongly suggested.

Release Contents

1.4 Your 3.3.1 release kit should include the 3.3.1 cartridge tape (TI part number 2540590-0001) and this release document. (Depending on how or where you purchased the operating system software, the release kit also includes a set of documentation updates.) This release document contains complete instructions on installing the 3.3.1 software on your system. In addition, new features of TI System V effective in this release are described in Section 6.

Documentation

1.5 If you purchased TI System V release 3.3.1 in the U.S.A., updates to the entire software documentation kit may not have been shipped with your software. The documentation kit that shipped automatically with previous releases has been reorganized into two subkits to reduce costs and to allow customers more choice about the manuals they need. Table 1-1 lists the documents in the User's Manuals Documentation Kit, TI part number 2571650-0001. Table 1-2 lists the documents in the Programmer's Manuals Documentation Kit, TI part number 2571650-0002. To order a kit or an individual manual, contact your TI Representative.

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Table 1-1 User's Manual Kit

Document	TI Part Number
TI System V Release Information (this document)	2549448-0001
TI System V Administrator's Guide	2540539-0001
TI System V User's Reference, Volume 1	2579788-0001
TI System V User's Reference, Volume 2	2579788-0002
TI System V Error Messages	2549477-0001
TI System V User's Guide	2540542-0001
TI System V Terminal Concentrator Software	2564122-0001
TI System V Performance Monitor User's Guide	2555397-0001
TI System V Performance Monitor Quick Reference	2555398-0001

Table 1-2 Programmer's Manual Kit

Document	TI Part Number
TI System V Programmer's Reference, Volume 1	2579789-0001
TI System V Programmer's Reference, Volume 2	2579789-0002
TI System V Programmer's Guide	2540545-0001
TI System V Support Tools Guide	2540546-0001
TI System V Streams Primer	2564861-0001
TI System V Streams Programmer's Guide	2564870-0001
TI System V Network Programmer's Guide	2564863-0001

Alternately, you can order a complete TI System V Documentation Kit (combined User's/Programmer's Manuals), TI part number 2540579-0001.

Effective November 1991, TI no longer ships the *T-ISAM System V* manual (TI part number 2564854-0001) or the *TI System V 68020 Assembler* manual (TI part number 2540559-0001) as part of the software package for the TI System V operating system (this affects release 3.3.1 and later). The *T-ISAM System V* manual has been folded into the current *TI System V Programmer's Guide.* T-ISAM man pages now reside in the appropriate TI System V Reference manuals.

The *TI System V 68020 Assembler* manual is not shipped because the Quelo 68020 assembler is being phased out and will not be available after release 3.3.1. To special order this assembler manual, contact TI-CARE℠ Support Services at (512) 250-7407.

In addition, TI no longer ships the *MC68020 32-bit Microprocessor User's Guide* (TI part number 2544386-0001) as part of the software package for the TI System V operating system (this affects release 3.2.1 and later).

The *MC68020 32-bit Microprocessor User's Guide* describes the capabilities, operation, and programming of the MC68020 32-bit second-generation enhanced microprocessor. It provides information on the instruction set and the architecture of the MC68020 chip. The guide may be useful for persons who:

- Program in assembly language
- Develop compilers
- Disassemble code

To order the *MC68020 32-bit Microprocessor User's Guide* or any of the MC680X0 manuals, contact your local Motorola sales office or:

Prentice Hall Inc.
Attn: Mail Order Billing
200 Old Tappan Road
Old Tappan, NJ 07675
(800) 223-1360

Caution — Downloading Devices

1.6 Previous to the 3.2.2 release, entries 0, 1, and 2 were used in the configuration bands for loading the operating system on the different processors. With release 3.2.2 and later, entry 3 is also used for loading the operating system onto the 1507 processor. Any downloadable devices, such as the MSC or NUPI-2, should use entries 8 and above for their configuration modules. Entries 4 through 7 are reserved for future expansion. Please refer to **cband**(1T) and the installation notes that came with the download software for documentation on adding entries to the configuration bands.

Caution — GDOS

1.7 You must use General Diagnostics Operating System (GDOS) release 2.6.0 or later to install TI System V release 3.3.1 from the distribution tape. Failure to do so under certain circumstances may result in unallocated disk space, which would require reconfiguration of disk partitions for recovery.

NOTE: You must use a later version of GDOS to test the following devices:

- For a CP II processor, use GDOS release 2.8.0 or later.
- For a 68040 MP board and/or a high-performance Ethernet™ (HPE) interface, use GDOS release 2.9.0 or later.

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Ethernet is a trademark of Xerox Corporation.

Caution — Mirroring Transactional Log Partition

1.8 If you intend to mirror the log partition used by transactional logging, you must disable transactional logging with **cband** and reboot before running **mkmirr**. After running **mkmirr**, run **mklg** on the mirror band to initialize the log partition. Then run **cband** on the configuration band to change the log partition slot, unit, and partition name to point to the mirror band and enable the transactional logging. Then you may reboot and run with the transactional log partition mirrored. Refer to the *TI System V Administrator's Guide* for more information on transactional logging and mirrored partitions.

Caution — NTC/LAN

1.9 Versions 9, A, D, and E of the network terminal concentrator (NTC) hardware cause NTC software panics with the use of TI System V 3.2.1 software and later releases. These NTCs must be upgraded to revision AJ or later to correct the problem.

The affected NTC units were shipped between February and December, 1989. Older or newer units are not subject to this problem. NTC boards with revision AD through AH may be subject to this problem. Boards with revision prior to AD or later than AJ are not subject to this problems.

Caution — Symbolic Links

1.10 TI System V release 3.3.1 supports symbolic links in the kernel and system utilities. This is intended for VARs and other developers to allow them to add support for symbolic links to their applications. As of this release date, this support does not extend to TI add-on packages and applications. These include the following:

- COBOL/85 System V
- DNIO/1500
- Informix
- MultiView
- NFS
- Oracle
- SVS FORTRAN
- SVS Pascal
- TCP/IP System V
- UNIPLEX
- uucp
- IBM communications packages

Similarly, VAR-supplied applications may not support symbolic links at this time. End users and system administrators should be aware of this before employing symbolic links.

Symbolic links allow for great flexibility in setting up and accessing files, directories, and entire filesystems. However, this flexibility can lead to confusion and undesirable behavior, particularly in the areas of backup/restore, directory management, and tree searching. System administrators are encouraged to use caution and prudence in establishing and maintaining symbolic links.

In release 3.3, the **lstat** system call was added to prepare for support of symbolic links in a future release. In release 3.3.1, the stat system call has been changed to follow through a symbolic link if it exists. In most cases, applications should continue to use the stat system call as they always have. However, those applications that require information on the link itself should use the lstat system call.

Caution — Relinking Field Edit Applications

1.11 If a field edit application is relinked using the **ld** command, the C library needs to be included in the link. Otherwise, **ld** will report unresolved references for **dup**, **unlink**, and the **setpgrp** functions that are found in the C library. Sites that install 3270 need to modify the install script to correct this problem before attempting the 3270 installation. Tar the 3270 tape into the /tmp directory per the installation instructions, but before typing `./install`, edit the install script and change this line:

```
ld -o /usr/bin/v3279 /usr/ucs/v3279fe.o -lfe
```

by adding `-lc` to the end of the line, as follows:

```
ld -o /usr/bin/v3279 /usr/ucs/v3279fe.o -lfe -lc
```

Proceed then to follow the normal 3270 installation procedure.

Caution — Shared Libraries

1.12 Shared library archive files are produced by the **mkshlib** utility; they should never be created or modified with the **ar** command. System-supplied shared libraries such as libc_s.a and libtisam_s.a should never be modified by users. Modifying these files (for example, with the **-r** option of **ar**) almost always corrupts the library and causes errors at link time.

Caution — Streams-based XNS Internet Driver

1.13 If you plan to use the high performance Ethernet (HPE) interface and configure your system to use the Streams-based XNS Internet driver, you need to obtain a patch to resolve the problems listed in paragraph 8.8 under the STR numbers 24268 and 24269. See paragraphs 6.3 through 6.5 in the New Features section of this document, and paragraph 8.8 in the Problems section for more information.

Link Issues Based on Page Size

1.14 One of the primary differences between the 68040 CPU chip and its predecessors is that the 68040 supports a minimum 4K-byte memory page size. Previous CPUs, and their respective operating systems, were based on a 1K-byte page size.

Applications linked with the linker provided with TI System V release 2.2.0 or earlier are aligned on a 1K-byte boundary. Applications linked with release 2.3.0 or later are aligned on a 4K-byte boundary (unless they are deliberately forced to a 1K-byte boundary using a link-control file).

Release 3.2.2 (and later) allows you to run both the 4K- and 1K-aligned programs. However, some anomalies have been found regarding 1K-aligned objects:

- The **sdb** utility exhibits an anomaly when you debug programs (executables) that are linked on a 1K-byte boundary. In such a program, **sdb** cannot show the last page of text when that page contains less than 4K bytes. Work around: while still in **sdb** interactive mode, press the i key, then press Return. This executes a single instruction and eliminates the problem.

- Programs that are linked on a 1K-byte boundary and contain less than 4K bytes of text do not execute.

If you have not already done so under 3.2.2, we recommend that you relink with the linker provided with release 3.3 or later. Relinking ensures a smooth transition from your present environment to future releases of TI System V.

Quelo Assembler

1.15 Although the Quelo 68020 assembler is offered in release 3.3.1, it will not be available in future releases. The suggested assembler for development purposes is the portable 680X0 assembler, which can be invoked by using the **mc68as**(1) command. The portable 680X0 assembler is replacing the Quelo 68020 assembler because it provides a superset of the instructions available previously, including support for the 68030 processor. See the section on the assembler in the *TI System V Programmer's Guide* for details on syntax differences between the two assemblers.

The *TI System V 68020 Assembler* manual mentioned on the man pages associated with the Quelo assembler is not included in this release of the operating system documentation. If this manual is still needed, contact TI-CARE Support Services at (512) 250-7407.

Due to the fact that the Quelo 68020 assembler is being phased out, the following commands are being phased out as well: **as**(1), **a68k**(1T), **a68m**(1T), **ltxcoff**(1T), **ltxdump**(1T), and **qsym**(1T). These utilities will be removed in a future release of the operating system.

System 1507 Considerations

1.16 The System 1507 is based on the Motorola 68040 CPU chip, which made certain changes necessary in the TI System V operating system. Releases 3.2.2 and later include these changes. Although most existing applications will run on the System 1507, be aware that some underlying design changes exist. For example, memory page size requirements are different for the 68040 chip, and certain applications that contain self-modifying code may fail to execute properly.

System 1507 Support in Appendix A contains details about how releases 3.2.2 and later may affect your applications.

68040 MP Board Considerations

1.17 The following paragraphs describe important aspects of the 68040 MP board that differ from other NuBus CPU boards used in the System 1500 family of computers. Note that the 68040 MP board is used in the 7-slot and 16-slot chassis, but not in the compact chassis systems (i.e., System 1505 and 1507).

On-Board Peripherals

1.17.1 The 68040 MP board comes with two peripheral interfaces onboard. One is the SCSI interface, which is equivalent to a NUPI-2 disk/tape controller. The other is a high performance Ethernet (HPE) connection. If you are using those peripheral interfaces and you move the board from one chassis slot to another, you must use **devadm** to remove and redefine the disks, tapes, and so forth, just as you would if you moved a disk/tape controller board or a communications board. The CPU boards based on the Motorola 68020 and 68030 chips do not have any such peripheral interfaces on board and, consequently, can be moved from one slot to another without having to use **devadm** to inform the system of the change.

If you remove a 68040 MP board from a slot, you may want to replace it with a NUPI-2 disk/tape controller in order to continue accessing the disks and/or tapes that are connected through that slot. This also requires replacing the backplane adapter.

During the system boot operation, the system checks for the existence of an HPE connection and, since one is onboard, attempts to access it. This requires some of the Streams-related cband parameters to have nonzero values to avoid out-of-streams error messages. The default cband parameters have been set to values that are sufficient to prevent these error messages. However, if you want to use the connection, you must set the Streams parameters to larger values depending on which optional packages are installed and on how many of the HPE connections you intend to use.

The Performance Monitor utility has been modified to display the statistics for the SCSI interface on the 68040 MP board as if it were a separate disk/tape controller, although it does appear to be in the same chassis slot as the CPU board.

Binary Compatibility

1.17.2 No changes are required to run most existing user applications on Motorola 68040-based boards (e.g., 1507, 68040 MP). All of the 680x0 application processors are object code compatible, which makes system expansion more economical by allowing you to retain software and peripherals as you upgrade to larger systems.

- The Motorola 68040 chip is significantly faster, so applications that use looping to implement timing delays may need to be changed to loop more times.

- Applications that build (or modify) instructions in the data (or stack) segment and then branch to those instructions may fail to execute correctly. Such applications may have worked on previous chips only because the on-chip caches were small (256 bytes) and consequently were flushed easily. The on-chip caches of the Motorola 68040 are significantly larger (4K bytes). Building or modifying instructions in the data (or stack) segment causes the on-chip data cache to have the new/modified instruction, but the on-chip instruction cache may still retain the old instruction from the last time the program counter was in that section of memory. A C-runtime routine, **cflsh68k( )**, is available for applications to call if they specifically need to have the on-chip caches flushed. The routine requires no arguments and does not return a value. It will flush the on-chip caches regardless of the type of CPU board in use. If used with a version of the operating system prior to 3.2.2, it will perform no action.

The run time used by COBOL/85 System V applications builds instructions in the data segment (by loading the user application there), modifies certain instructions (to perform relocation), and then branches into the data segment. If you want to run COBOL/85 System V release 2.2 or 2.1 on a Motorola 68040-based CPU, you *must* obtain a patch to the run time from TI Customer Support. COBOL/85 System V release 2.0 and COBOL System V release 1.0 are *not* supported. COBOL/85 System V release 2.3 comprehends the features of the Motorola 68040 and does not require the patch.

Process Migration

1.17.3 When a program begins executing on a Motorola 68040-based CPU board, the program cannot be migrated to a Motorola 68020- or 68030-based CPU board. Likewise, a program that begins execution on a Motorola 68020- or 68030-based CPU board cannot be migrated to a Motorola 68040-based CPU board. The automatic load balancing code in the kernel enforces this restriction. Any attempt to use the **opctl**(1T) utility to manually force such a migration results in an error message.

This migration restriction is the result of the significant difference in the way the Motorola 68040 processor handles floating point instructions compared to the way the 68020 and 68030 processors handle them. Processes can, however, be migrated between Motorola 68020- and 68030-based CPU boards since the handling of floating point instructions by these two boards is sufficiently similar to allow such migrations.

Caching

1.17.4 The Motorola 68040 chip has one 4K-byte instruction cache and one 4K-byte data cache built onto the chip. The data cache supports both a write-through and a copy-back mode. The TI System V operating system is coded to use the copy-back mode for the data and stack segments for all application programs since the copy-back mode gives significantly better performance. The method of caching used should be transparent to all user applications with the possible exceptions of those using looping to implement timing delays and those which use self-modifying code such as described in the preceding paragraph. In the latter case, the **cflsh68k**( ) runtime routine can be used to flush the caches as needed. For details on the two different kinds of caching, see the *Motorola 68040 32-Bit Microprocessor User's Manual.*

Move16 Instruction

1.17.5 The Motorola 68040 chip supports a new instruction, called move16, which moves 16 bytes of data quickly from a source address to a destination address. Applications can make use of that instruction to improve performance in some cases. However, such an application will not execute on Motorola 68020-based or 68030-based CPU boards. Nor will the instruction work on a 68040 MP board if (1) there are other CPU boards in the chassis, (2) either the source operand or the destination operand is in a page of a shared memory segment, and (3) that page does not happen to be allocated on the same CPU board as the one which is executing the move16 instruction. For other details on the move16 instruction, see the *Motorola MC68040 32-Bit Microprocessor User's Manual.*

T-ISAM

1.18 If your T-ISAM applications are built using the shared T-ISAM library (a feature included in release 3.3), you do not need to relink your programs to take advantage of modifications or bug fixes in the new T-ISAM library. However, if your applications are built using the T-ISAM archive library, it is necessary to relink the programs to take advantage of the new version of T-ISAM.

Transactional Logging

1.19 For best performance and data safety, the transactional logging feature should be enabled. This is done with a cband parameter. Transactional logging is not enabled in the system as it is shipped because the log partition must also be set up and its size depends on the size of the memory. Refer to Section 8 in the *TI System V Administrator's Guide* for information about enabling transactional logging as part of the system installation.

Dynamic File Buffer Cache

1.20 This feature is controlled by the cband parameter, Max dynamic 1k FS buffers. The default value is *, which means there is no fixed maximum on the number of buffers used for the buffer cache. This value will normally provide optimum performance with regard to the buffer cache, but there are scenarios where performance can be improved by tuning this parameter to a fixed value. This will limit the size of the file buffer cache to the number of buffers specified (per CPU).

If your system has more than 24 MB of memory and there is a high degree of client-side NFS activity dealing with directories, you could experience a problem. The characteristics are:

- NFS performance seems sluggish on the client. Terminal users may notice pauses in their terminal response.
- **pm** utility shows very high CPU activity (over 90%) on the client.

If you experience this problem it is suggested that you try tuning the Max dynamic 1k FS buffers parameter on the client. Start with a value in the range 5000–10000 divided by the number of CPUs. This limits the number of buffers that NFS must scan periodically and should enhance its performance. The optimum value is the largest number that eliminates the problem.

If your system has more than 32 MB of memory and you are not running transactional logging, you may see interactive response time occasionally degrade. This can happen when the 'sync' operation executes. This normally happens every 30 seconds and is done to write all of the dirty buffers in the buffer cache to disk. If you experience this problem, it is suggested you enable transactional logging (see paragraph 1.16). If for some reason this is not feasible, there are two possible alternatives:

- Try tuning the Max dynamic 1k FS buffers parameter. Start with a value in the range 10000–20000 divided by the number of CPUs. The optimum value is the largest number that eliminates the problem.
- Change the frequency at which the sync operation executes. The default frequency is every 30 seconds. If you increase the frequency, the sync will occur more often, but the response time degradation will be less because there will be fewer dirty buffers. The frequency is changed by modifying the line /etc/update –t 30 ... in the file /etc/rc. The second parameter to the update daemon is the frequency in seconds at which it runs. To increase the frequency, you would lower the number (e.g. /etc/update –t 20 ...).

Add-On Products for Release 3.3.1

1.21 The following paragraphs discuss add-on products available with TI System V release 3.3.1.

Caution — COBOL/85 System V

1.21.1 Some restrictions apply when using COBOL/85 System V.

CAUTION: COBOL/85 System V release 2.2 or earlier will not operate correctly on a System 1500 with a 68040 processor (e.g., a System 1507 or a system with a 68040 MP board). You must install a patch and relink your COBOL run time. The *cache flush* patch is available for COBOL/85 System V release 2.2 and 2.1. Earlier releases are not supported. COBOL/85 System V release 2.3 or later does not require this patch.

After applying the 3.3.1 software release to your system, you should rebuild the standard COBOL/85 System V run time, $COBDIR/rts32. You should also rebuild all COBOL executable applications (i.e., applications that were created by linking the COBOL/85 System V run time with the application program and executed by entering the application file name rather than **cobrun** *program_name*). The purpose of rebuilding these files is to ensure that the latest Field Edit and T-ISAM software are used when running your COBOL applications. (It is not necessary to perform this rebuild in environments or applications that do not use Field Edit and either do not use T-ISAM or are already built using the T-ISAM shared library.)

Caution — SNA Installation

1.21.2 Users of 3270 SNA or 3770 SNA who install TI System V release 3.3.1 must upgrade their SNA packages to release 2.0 or later.

Network Products

1.21.3 The existing installed base of TCP 3.0 is upward-compatible and runs on 3.3.1 with new kernel drivers that are provided on the 3.3.1 tape. The TCP 3.0 install script will automatically pick up these updated drivers when installed on a 3.3.1 operating system.

DNIO/1500 System V release 2.1 is shipped on the 3.3.1 tape. It consists of bug fixes and new installation scripts. Please refer to the Administrator Notes section in this manual.

Add-On Product Release Numbers

1.21.4 We recommend the following product releases or later to be used with TI System V 3.3.1:

- ANSI C — release 1.0 or 1.1
- APPC SNA System V — release 1.0
- COBOL/85 System V — release 2.4
- DNIO/1500 — release 2.1 (shipped with system)
- Informix — release 4.0
- MultiView — release 2.0.2
- NFS — release 3.2.5
- Oracle — release 6.0.26 or 6.0.30
- SVS C — release 1.12 or 1.2
- SVS FORTRAN — release 1.12
- SVS Pascal — release 1.12
- TCP/IP System V — release 3.0
- T-ISAM — release 2.8.2 (shipped with system)
- X/Motif — release 1.0
  - TI X — release 11.4.18.0
  - TI Motif — release 1.1.1.0
- X.25/1500 — release 2.0
- 3780/2780 System V — release 1.4
- 3270 SNA System V — release 2.0
- 3770 SNA System V — release 2.0
- Node Type 2.1 SNA System V — release 2.0
- UNIPLEX — release 7.0 or 7.01

Changes Made in Release 3.3

1.22 The following paragraphs discuss changes that were made to the TI System V operating system in release 3.3.

New Configuration Parameters

1.22.1 Several new configuration parameters were included in release 3.3 which must be tuned for your system. If you plan to increase the PROCESS TABLE SIZE parameter, you should increase SEGMENT DESCRIPTOR COUNT and SEGMENT SWAP MAP COUNT. See paragraph A.5.14, New Configurable Parameters, for more details.

Basic Networking Utilities (uucp)

1.22.2 Significant changes were made in the Basic Networking Utilities (**uucp**) in release 3.3. The version of this software being shipped with this release is commonly known as BNU or HoneyDanBer **uucp**. The previous version was commonly known as Version 2 **uucp**. While most users will not be significantly affected, there are major differences from the point of view of the system administrator. You are cautioned to carefully read the section on Basic Networking in *TI System V Administrator's Guide* before trying to bring up your network.

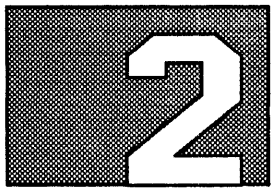
devadm

1.22.3 The syntax of several **devadm** command line mode options was changed in release 3.3. See paragraph A.5.11.4 for more information about these changes.

Explorer LX Systems

1.22.4 Releases 3.3 and later no longer support TI Explorer LX Systems. For additional information, please contact your TI Representative or Reseller.

INSTALLATION — READ FIRST



Introduction

2.1 This section provides a general overview of the steps required to update your system software to the 3.3.1 revision level.

The steps required to update to Release 3.3.1 include:

1. Determining the current state of your operating system software (see the following paragraph).

2. Following the instructions in the appropriate section for installing your system (Section 3, Installation-Selective, or Section 4, Rebuilding a System Disk).

Current State of TI System V

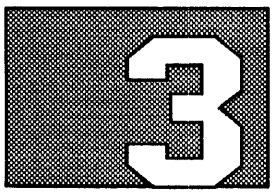
2.2 TI System V software is usually delivered on the disk purchased with your system. You can determine the current revision of your system software by executing the command **uname -v**.

- If your system software is already loaded on the disk and is at the 3.3.1 level, proceed to Default Load in Section 4 (Rebuilding a System Disk) for instructions on booting and configuring the system.

- If you are currently running a release of TI System V previous to Release 3.3.1, follow the instructions in Section 3, Installation-Selective.

- If your system disk has been replaced, needs formatting (for example, after surface analysis), or is not currently usable due to file system corruption, proceed to Section 4, Rebuilding a System Disk, for instructions on rebuilding the system software.

For additional information, refer to the appropriate hardware installation and operation manuals.



INSTALLATION — SELECTIVE

Introduction

3.1 This section provides instructions for installing TI System V Release 3.3.1 by restoring selected partitions from the TI System V installation tape. Use this method of upgrading your system software if your system disk currently contains a previous version of TI System V that you want to replace. If your system disk requires formatting or has just been formatted, proceed to Section 4, Rebuilding a System Disk, for installation instructions.

Saving Files

3.2 Because using the selective-installation process does not format the system disk, user file systems and other partitions on the system disk are not destroyed (nor is the src partition). However, before selectively restoring the root and usr partitions from tape, be sure that you have backed up all data files in the / and /usr file systems using a utility such as **tar**(1) or **cpio**(1). The / and /usr file systems are completely overwritten during the restoration process, and whatever was on either of these two file systems will be lost. The recommended procedure follows:

1. Save all user data files on the / and /usr file systems to tape using **tar** or **cpio.**

CAUTION: When saving the / and /usr file systems, you should be in single-user mode.

---

2. Save and print any special system files that you have customized. The following files are likely to be customized:

NOTE: The list below is not all-inclusive. Check carefully for other customized files on your system. Refer to the section entitled File Formats in the *TI System V Programmer's Reference, Volume 2,* TI part number 2579789-0002, for other possibly customized files.

/.profile
/.login
/.cshrc
/.exrc
/bin/sysboot
/etc/.bshlogin
/etc/.bshlogout
/etc/alpcaps
/etc/alpdefs
/etc/backups/monthly.usr
/etc/backups/weekly.usr
/etc/backups/daily.usr
/etc/backups/do_monthly
/etc/backups/monthly
/etc/backups/ff_to_frec
/etc/bcheckrc
/etc/checklist
/etc/download
/etc/fecap
/etc/fstab
/etc/gettydefs
/etc/group
/etc/inittab
/etc/issue
/etc/passwd
/etc/profile
/etc/rc
/etc/shutdown
/etc/sitename
/etc/softpwd
/etc/termcap
/etc/TZ
/etc/TIMEZONE
/usr/lib/acct/holidays
/usr/lib/terminfo_src/s32.ti
/usr/lib/terminfo_src/printer.ti
/usr/lib/uucp/Devices
/usr/lib/uucp/Dialers
/usr/lib/uucp/Systems
/usr/lib/uucp/Permissions
/usr/lib/uucp/Poll
/usr/lib/uucp/Dialcodes
/usr/lib/uucp/Devconfig
/usr/lib/uucp/Sysfiles
/usr/lib/uucp/Maxuuxqts
/usr/lib/uucp/Maxuuscheds
/usr/ti/dnio/fecap.inl
/usr/skel/.cshrc
/usr/skel/.login
/usr/skel/.logout
/usr/skel/.profile
/usr/spool/cron/crontabs/adm
/usr/spool/lp/model/standard
/usr/ti/master

3. Save any third-party software or application software that you previously installed on either the / or /usr file systems. (Be prepared to reinstall software packages that need to be relinked; for example, TCP/IP System V, NFS System V, DNIO/1500, and SNA System V.)

4. Print the output of the command **devadm -l slot**. This listing provides device configuration information useful in customizing devices (see paragraph 3.15.2, Customizing Devices).

5. Execute **cband**(1T) to print a list of your configurable parameters.

6. Install the system software, as described in the following paragraphs.

7. Boot and reconfigure the system.

8. Restore data files, user directories, and third-party and application software, and recustomize system files. In addition, you may need to reinstall and relink third-party and application software.

NOTE: Restoring device nodes from backup may cause problems and is discouraged.

Installing System Software

3.3 To install the system software, you need the following TI System V and Diagnostics software cartridge tapes and manuals:

- System 1000 Series, System 1500 TI System V tape, Release 3.3.1 (TI part number 2549448-0001)
- System 1500 General Diagnostics Operating System (GDOS) tape, Release 2.6.0 or later. If you have the following devices, you must use a later version of GDOS than 2.6.0:
  - For a CP II processor , use GDOS Release 2.8.0 or later.
  - For a Motorola 68040 MP board and/or a high performance Ethernet (HPE) interface, use GDOS Release 2.9.0 or later.

NOTE: For best results, you should use the latest version of GDOS.

- *Diagnostics User's Guide* (TI part number 2534850-0001)

To install the system software:

1. Power up the system.
2. Boot GDOS from tape (refer to Section 2, Loading GDOS, in the *Diagnostics User's Guide*).
3. Install selected partitions from the TI System V software tape.
4. Configure your system, as described in the installation paragraphs of this section.

Restoring Partitions

3.4 To load the tape onto your disk, follow the instructions in the paragraph entitled Restoring Bootable Tape Utility in Section 4 of the *Diagnostics User's Guide*. To load the tape onto your disk, begin at the Extended-Interactive Diagnostic Mode Menu (in GDOS) procedures in that paragraph and select item 8. Select Restore Bootable (Labelled) Tape. Accept the default option (Y) for Selectively Restore.

To install release 3.3.1, you should answer the GDOS prompts with `y` for the restoration of all types of partitions unx1, unx2, and unx3. If you are installing from a previous release, some of these partitions will already exist. You must tell GDOS to restore over these partitions.

You must then answer `y` to the prompts for partitions cfg1, cfg2, cfg3, root, and usr. These partitions will also already exist if you are upgrading from a previous release. The new software will be restored over the old system.

Do not restore the partitions named src, swap, and anch if you are currently running a previous release. Answer `n` to these GDOS prompts. These partitions do not contain new system software.

If your system is running 2.3.0 or earlier, answer `y` to the `restore pipe` question if you wish to have a separate pipe file system (the system default).

If your system is running release 3.2.2 or earlier, answer `y` to the `restore mirr` question. This restores an empty mirror partition one block long on which you can create a mirrored file system. If you are running release 3.3 or later, answer `n` to this GDOS prompt, because you should already have a partition of this type that may be in use and should not be destroyed.

Booting TI System V

3.5 When TI System V has been restored, exit GDOS by pressing the Ctrl-t key sequence or the F2 key. This causes the system to reboot.

Default Load

3.6 When the system is rebooted, several messages and status lines are displayed. When the following load prompt is displayed, select D for the default load:

```
D=Default load, M=Menu load, R=Retest, E=Extended tests:
```

Password

3.7 The next prompt to appear requests the TI System V software protection adapter (SPA) password:

```
Enter correct password:
```

If you enter the password incorrectly, you will be prompted to enter it again. The SPA password was enclosed with your original TI System V cartridge tape and did not change for this release. This password should be saved in a secure location.

Defining Console Environment

3.8 After you successfully enter the password, the shell prompt (#) appears. Enter the appropriate command to set your terminal type. Examples follow:

Terminal Type	Mode	Command
TI 924	931 mode	TERM=t9; export TERM
TI 924	924 mode (default)	TERM=t1; export TERM
TI 928	VT320 (default)	TERM=x1; export TERM
TI 931	931 mode (default)	TERM=x5; export TERM

Notes:
x5 works on a real 931 only.
t9 works on any 931 or 931 emulator.

The default terminal type for the console is x1 (TI 928).

Setting Date

3.9 Use the **date**(1) command to set the system clock to the correct date and time if necessary.

Initial Configuration

3.10 The **devadm**(1T) utility finds the slots of all mass storage devices and communications carrier boards (CCBs). If the tape drive is not powered on and online, **devadm** will be unable to define the tape device in the initial configuration. For each CCB with a local area network (LAN) option installed, **devadm** creates device path names for two network terminal concentrators (NTCs), each with 16 terminals. For each CCB with a multidrop host adapter (MHA) installed, **devadm** creates device path names for four multidrop terminal concentrators (MTCs), each with 8 terminals. If your system has different numbers of terminal concentrators and/or terminals, you can modify these default values later using **devadm** in the interactive mode.

The **devadm** autoconfig mode has various options that allow you to change the default settings for the terminal type, baud rate, number of TCs, and attached terminals. Other options give you the ability to exclude CCBs from automatic configuration and allows the default names for disk devices to be accepted automatically. Use of these options now may simplify your configuration later when using **devadm** in the interactive mode. For more details on the autoconfig options, see **devadm**(1T).

To generate a default device configuration, run **devadm** in the autoconfig mode, as follows:

```
devadm -c
```

The default configuration created by the execution of **devadm** can later be modified using **devadm** in the interactive mode. During the execution of **devadm -c**, the utility displays all disk devices, asking you to enter the volume name.

```
Current volume name for disk at
Controller 2        Unit 00      is: sys
Enter new name or <ret> to continue:
```

Select `sys` as the name of the disk that contains the TI System V software just installed. You can accept the default volume names displayed in the prompts for your other disks or change them. Volume names must be unique and are limited to nine characters or less.

NOTE: Restoring device definitions from tape is discouraged.

Mounting /usr

3.11 Now flush the buffers and mount the /usr file system by entering the following:

```
sync
mount /usr
```

Note that the last command assumed that the system disk volume name is sys. If your system disk volume is not named sys, you must also edit the following files to rename the volume names:

- /etc/rc
- /etc/fstab

- /etc/checklist
- /usr/sys/makefile

Editing the Password File

3.12 You can restore the /etc/softpwd file from your backup copy (as noted in paragraph 3.2, Saving Files) or edit the /etc/softpwd file to add your TI System V password and any other passwords to the file. If you restore the file and are upgrading from 2.2.1 or earlier, edit the file to change the product identifier from TISys5.2 to TIV.030.

To edit the /etc/softpwd file, enter:

```
vi /etc/softpwd
```

The screen clears and the following line appears:

```
TIV.030::TI System V password
```

Move the cursor to the second colon in the entry by pressing the l key to move right and the h key to move left. Type `i` to enter insert mode. Insert your password (without spaces) between the two colons. To exit the insert mode, press the Esc key. Type `ZZ` (uppercase) to exit the **vi** editor. To flush the buffers to disk, enter:

```
sync
sync
```

Editing /etc/inittab

3.13 If your console is not a TI 928, you must edit /etc/inittab to place the correct terminal type for the console in this file. When this is done, the console will be set to the correct type for multiuser mode.

To edit the /etc/inittab file, enter:

```
vi /etc/inittab
```

Move to the following line in the file by pressing the j key:

```
ta:2:respawn:/etc/getty console 9600 x1
```

The following table is a partial list of terminals and types. Choose the terminal type that is correct for your system console.

Terminal/Mode	Type
TI 924/931 mode	t9
TI 924/924 mode	t1
TI 928/default	x1
TI 931/default	x5

Notes:
x5 works on a real 931 only.
t9 works on any 931 or 931 emulator.

Proceed in the /etc/inittab file to the last field on the line and change the two-character terminal type field (x1) to your console's terminal type. Position the cursor on the "x" and type `cw` to enter Change Word mode. Type in your terminal type. Press the Esc key and then type `ZZ` (uppercase). Enter the following commands to write this file out to disk:

```
sync
sync
```

Editing /etc/sitename

3.14 Edit /etc/sitename to add your site name. Enter the following commands to write the file out to disk:

```
sync
sync
```

Completion

3.15 The following steps are necessary to complete the installation.

System Files

3.15.1 In paragraph 3.2, Saving Files, you were advised to save certain system files. The following files have *not* changed between Release 3.3 and Release 3.3.1; they can be restored directly from your backup **tar** or **cpio** tape. (Note: If you are upgrading from a release prior to 3.3, you must check to verify that no changes have been made since then.)

/.profile
/.login
/.cshrc
/.exrc
/bin/sysboot
/etc/.bshlogin
/etc/.bshlogout
/etc/alpcaps
/etc/alpdefs
/etc/backups/monthly.usr
/etc/backups/weekly.usr
/etc/backups/daily.usr
/etc/backups/do_monthly
/etc/backups/monthly
/etc/backups/ff_to_frec
/etc/bcheckrc
/etc/checklist
/etc/fecap
/etc/fstab
/etc/group
/etc/inittab
/etc/issue
/etc/passwd
/etc/profile
/etc/shutdown
/etc/sitename
/etc/softpwd
/etc/termcap
/etc/TZ
/etc/rc
/etc/TIMEZONE
/usr/lib/terminfo_src/s32.ti
/usr/lib/uucp/Devices
/usr/lib/uucp/Systems
/usr/lib/uucp/Permissions
/usr/lib/uucp/Poll
/usr/lib/uucp/Dialcodes
/usr/lib/uucp/Devconfig
/usr/lib/uucp/Sysfiles
/usr/lib/uucp/Maxuuxqts
/usr/lib/uucp/Maxuuscheds
/usr/skel/.cshrc
/usr/skel/.login
/usr/skel/.logout
/usr/skel/.profile
/usr/spool/cron/crontabs/adm

Refer to the discussion of Basic Networking Utilities (**uucp**) in Section 5 for considerations when restoring /etc/passwd.

The following system files *have changed* between Release 3.3 and Release 3.3.1 and should not be restored from a backup copy. Rather, these should be customized to fit your environment. Use backup paper copies of these files as a guide in customizing the following system files.

/etc/download
/etc/gettydefs
/usr/lib/acct/holidays
/usr/lib/terminfo_src/printer.ti
/usr/lib/uucp/Dialers
/usr/ti/dnio/fecap.inl
/usr/spool/lp/model/standard
/usr/ti/master

Please note that the following files contain names of file systems that need to be modified if you have renamed any volume during the execution of **devadm -c**. You must edit these files and ensure that the device names of the file systems now agree with the new volume names:

/etc/fstab /etc/checklist /etc/rc

NOTE: You must create directories for mounting file systems other than / and /usr. Review the fstab file to determine which directory nodes must be re-created. Use the **mkdir** command to create these directories.

Customizing Devices

3.15.2 Use **devadm** in the interactive mode (**devadm -i**) to customize your devices. Refer to Configuring Devices in the *TI System V Administrator's Guide* (TI part number 2540539-0001) for detailed information concerning configuration of secondary disks, tapes, terminals, printers, and terminal concentrators.

Unmounting /usr

3.15.3 Before proceeding to multiuser mode, unmount the /usr file system by entering the following command:

```
umount /dev/dsk/sys:usr; sync
```

Note that the preceding command assumes that your system disk is named sys. If it is not, substitute your volume name in place of `sys`.

init 2

3.15.4 Now proceed to multiuser mode by entering the following command:

```
init 2
```

Answer `y` when prompted for date and file system checking. All file systems created before the 3.2.0 release must be checked by the **fsck** command before they can be mounted.

Restoring Files

3.15.5 You can now restore any data files, application programs, or user files that were backed up before this installation began. In addition, you may need to reinstall and relink third-party and application software. When restoring files, do not replace any files that were on the distribution tape.

Customizing Your System

3.15.6 The File Formats and Miscellaneous sections in the *TI System V Programmer's Reference, Volume 2*, discuss file formats and miscellaneous topics. Become familiar with these sections to help you customize your system. See **environ**(5) for a description of how the system sets environment variables when a user logs in.

1. Edit the file /etc/TZ. If necessary, set up /etc/TZ so that it contains your time zone. The format is *xxxnzzz* where *xxx* is the standard local time zone abbreviation, *n* is the difference in hours from Greenwich mean time, and *zzz* is the abbreviation for the daylight-saving local time zone, if any. Note that you must also edit the file /etc/TIMEZONE. Make sure the value for TZ in that file matches the contents of /etc/TZ. The following list gives examples of time zone abbreviations:

Time Zone	Entry
Eastern	EST5EDT
Central	CST6CDT
Mountain	MST7MDT
Pacific	PST8PDT

2. Create user accounts and environment. See the section entitled User Management in the *TI System V Administrator's Guide* and **environ**(5). Assign passwords to all user IDs.
3. Configure spooler devices. See the section entitled Printer Spooling System in the *TI System V Administrator's Guide*.
4. Configure **uucp**, if necessary. See the section entitled Administering Basic Networking (uucp) in the *TI System V Administrator's Guide* and paragraph 5.1.2 in this document.
5. Tune your system for optimum performance. See the section entitled System Performance in the *TI System V Administrator's Guide*.
6. Determine if you want to run the **netcp**(1T) utility on the HPE interface(s) if you are using a 68040 MP or a HPE01 Ethernet option card. See Configuring the STREAMS XNS Driver in the Ethernet section of the *TI System V Administrator's Guide* for details.
7. Configure the Streams-based pseudo-tty driver if you have any add-on products that use this facility. See paragraph 5.1.16 for more information.

4 REBUILDING A SYSTEM DISK

Reinstalling System Software

4.1 Loss or replacement of your system disk will require you to reinstall TI System V from the original 3.3 release tape. This section describes the procedure to follow to rebuild your system disk.

A simpler procedure is available if you have saved your configured file systems (particularly / and /usr) using the General Diagnostics Operating System (GDOS) Make Bootable (Labeled) Tape utility in the Backup/Restore and Edit Label menu feature described in Section 5, Administrator Notes. If you do have a bootable tape of the 3.3 system, reload GDOS (from tape or disk) and follow the instructions in the Restore Bootable Tape Utility paragraph in Section 4 of the *Diagnostics User's Guide* to restore the partitions that you had previously saved. After rebooting your system, it may be necessary to restore up-to-date data files from your most recent backup tapes.

Installing System Software

4.2 To install the system software, you need the following TI System V and Diagnostics software cartridge tapes and manuals:

- System 1000 Series, System 1500 TI System V tape, Release 3.3 (TI part number 2540590-0001)
- System 1500 General Diagnostics Operating System (GDOS) tape, Release 2.6.0 or later. If you have the following devices, you must use a later version of GDOS than 2.6.0:
  - For a CP II processor , use GDOS Release 2.8.0 or later.
  - For a Motorola 68040 MP board and/or a high performance Ethernet (HPE) interface, use GDOS Release 2.9.0 or later.

NOTE: For best results, you should use the latest version of GDOS.

- *Diagnostics User's Guide* (TI part number 2534850-0001)
- *Release and Installation Information, System 1500 Diagnostics* (TI part number 2540673-9901*C or later) or *System 1500 Diagnostics Release Notes* (TI part number 2549447-0001*H)
- Mass Storage Firmware Update Tape (TI part number 2546907-0001) (optional)

Booting GDOS

4.3 To install the system software, you must first power up the system, and then boot the system from the GDOS tape. Refer to the Loading GDOS paragraph in Section 2 of the *Diagnostics User's Guide* for instructions on booting GDOS from tape.

Formatting the Disk

4.4 Format and verify your disk. The procedure to perform the format and verify function is fully described in the Disk Format/Verify Utility paragraph in Section 4 of the *Diagnostics User's Guide*.

Installing TI System V

4.5 Once your disk has been formatted and verified, follow the instructions in the paragraph titled Restore Bootable Tape Utility in Section 4 of the *Diagnostics User's Guide* to load the tape onto your disk. Begin at the Extended-Interactive Diagnostic Mode Menu (in GDOS) procedures in that paragraph and select item 8. Select Restore Bootable (Labelled) Tape. Change the Selectively Restore default to No, because you will be restoring the entire TI System V tape.

Installing GDOS

4.6 Install GDOS onto your disk (if desired); refer to the Diagnostic Test and Utilities section in the *System 1500 Diagnostics User's Guide* for instructions on installing GDOS on your system disk.

Installing the Mass Storage Firmware Update Tape (Optional)

4.7 Install the mass storage firmware update tape, if applicable. Refer to the *Mass Storage Firmware Update Tape Release Information* for installation instructions.

The mass storage firmware update software (previously known as the slave device boot software) provided for intelligent controllers can fix problems and enhance your system without requiring that you replace system read-only memory (ROM) chips. The product is shipped on a tape with a one-year subscription service. TI sends renewal reminders at the end of one subscription year and recommends subscription renewal.

CAUTION: Previous to Release 3.2.2, entries 0, 1, and 2 were used in the configuration bands for loading the operating system on the three different processors. With Release 3.2.2 and later releases, entry 3 is also used for loading the operating system onto the 1507 processor. Any downloadable devices such as the MSC or NUPI-2 should use entries 8 and above for their configuration modules. Entries 4 through 7 are reserved for future expansion. Please refer to cband(1T) and the installation notes that came with the download software for documentation on adding entries to the configuration bands.

The current release number of this tape is 2.6.0. The current revision level of the downloadable firmware for each type of disk controller is as follows:

MSC	*J
NUPI-1	*G
SPC	*M
NUPI-2	*D

Initial Configuration

4.13 The **devadm**(1T) utility finds the slots of all mass storage devices and communications carrier boards (CCBs). If the tape drive is not powered on and online, **devadm** will be unable to define the tape device in the initial configuration. For each CCB with a local area network (LAN) option installed, **devadm** creates device path names for two network terminal concentrators (NTCs), each with 16 terminals. For each CCB with a multidrop host adapter (MHA) installed, **devadm** creates device path names for four multidrop terminal concentrators (MTCs), each with 8 terminals. If your system has different numbers of terminal concentrators and/or terminals, you can modify these default values later using **devadm** in the interactive mode.

The **devadm** autoconfig mode has various options that allow you to change the default settings for the terminal type, baud rate, number of TCs, and attached terminals. Other options give you the ability to exclude CCBs from automatic configuration and allows the default names for disk devices to be accepted automatically. Use of these options now may simplify your configuration later when using **devadm** in the interactive mode. For more details on the autoconfig options, see **devadm**(1T).

To generate a default device configuration, run **devadm** in the autoconfig mode, as follows:

```
devadm -c
```

The default configuration created by the execution of **devadm** can later be modified using **devadm** in the interactive mode. During the execution of **devadm -c**, the utility displays all disk devices, asking you to enter the volume name.

```
Current volume name for disk at
Controller 2        Unit 00     is: name
Enter new name or <ret> to continue.
```

Select `sys` as the name of the disk that contains the TI System V software just installed. You can accept the default volume names displayed in the prompts for your other disks or change them. Volume names must be unique and are limited to nine characters or less.

Creating src File System

4.14 Create the src file system by entering the following command as shown:

```
MKSRCFS
```

Mounting /usr

4.15 Now flush the buffers and mount the /usr file system by entering the following:

```
sync
mount /usr
```

Note that the last command assumed that the system disk volume name is sys. If your system disk volume is not named sys, you must also edit the following files to rename the volume names:

- /etc/rc
- /etc/fstab

- /etc/checklist
- /usr/sys/makefile

Editing the Password File

4.16 You can restore the /etc/softpwd file from your backup copy (as noted in paragraph 3.2, Saving Files) or edit the /etc/softpwd file to add your TI System V password and any other passwords to the file. If you restore the file and are upgrading from 2.2.1 or earlier, edit the file to change the product identifier from TISys5.2 to TIV.030. Then, skip to the Editing /etc/inittab paragraph. Otherwise, edit the /etc/softpwd file as follows:

To invoke the **vi** editor, enter:

```
vi /etc/softpwd
```

The screen clears and the following line appears:

```
TIV.030::TI System V password
```

Move the cursor to the second colon in the entry (press the l key to move right and the h key to move left). Type `i` to enter insert mode. Insert your password (without spaces) between the two colons. To exit the insert mode, press the Esc key. Type `ZZ` (uppercase) to exit the **vi** editor. To flush the buffers to disk, enter:

```
sync
sync
```

Editing /etc/inittab

4.17 If your console is not a TI 928, you must edit /etc/inittab to place the correct terminal type for the console in this file. When this is done, the console will be set to the correct type when proceeding to multiuser mode.

To edit the /etc/inittab file, enter:

```
vi /etc/inittab
```

Move to the following line in the file by pressing the j key:

```
ta:2:respawn:/etc/getty console 9600 x1
```

The following table is a partial list of terminals and types. Choose the terminal type that is correct for your system console.

Terminal/Mode	Type
TI 924/931 mode	t9
TI 924/924 mode	t1
TI 928/default	x1
TI 931/default	x5

Notes:
x5 works on a real 931 only.
t9 works on any 931 or 931 emulator.

Proceed in the /etc/inittab file to the last field on the line and change the two-character terminal type field (x1) to your console's terminal type. Position the cursor on the "x" and type `cw` to enter Change Word mode. Type in your terminal type. Press the Esc key and then type `ZZ` (uppercase) to exit the **vi** editor. Enter the following commands to write this file out to disk:

```
sync
sync
```

Editing /etc/sitename

4.18 Edit /etc/sitename to add your site name. Enter the following commands to write the file out to disk:

```
sync
sync
```

Completion

4.19 The following steps are necessary to complete the installation.

Customizing Devices

4.19.1 Use **devadm**(1T) in the interactive mode (**devadm -i**) to customize your devices. Refer to Configuring Devices in the *TI System V Administrator's Guide* for detailed information concerning configuration of secondary disks, tapes, terminals, printers, and terminal concentrators.

Unmounting /usr

4.19.2 Before proceeding to multiuser mode, unmount the /usr file system by entering the following commands:

```
umount /dev/dsk/sys:usr; sync
```

Note that the preceding commands assume that your system disk is named sys. If it is not, substitute your volume name in place of `sys`.

init 2

4.19.3 Now proceed to multiuser mode by entering the following command:

```
init 2
```

Answer `y` when prompted for date and file system checking. All file systems created before the 3.2.0 release must be checked by the **fsck** command before they can be mounted.

Restoring Files

4.19.4 You can now restore any data files, application programs, or user files from your most recent backup copies. In addition, you may need to reinstall and relink third-party and application software. Do not replace any files that were on the distribution tape.

Customizing Your System

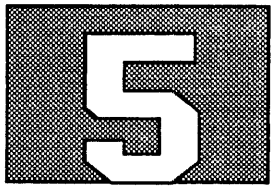
4.19.5 The File Formats and Miscellaneous sections in the *TI System V Programmer's Reference* discuss file formats and miscellaneous topics. Become familiar with these sections to help you customize your system. See **environ**(5) for a description of how the system sets environment variables when a user logs in.

1. Edit the file /etc/TZ. If necessary, set up /etc/TZ so that it contains your time zone. The format is *xxxnzzz*, where *xxx* is the standard local time zone abbreviation, *n* is the difference in hours from Greenwich mean time, and *zzz* is the abbreviation for the daylight-saving local time zone, if any. Note that you must also edit the file /etc/TIMEZONE. Make sure the value for TZ in that file matches the contents of /etc/TZ. The following list gives examples of time zone abbreviations:

Time Zone	**Entry**
Eastern	EST5EDT
Central	CST6CDT
Mountain	MST7MDT
Pacific	PST8PDT

2. Create user accounts and environment. See User Management in the *TI System V Administrator's Guide* and **environ**(5). Assign passwords to all user IDs.
3. Configure spooler devices. See Printer Spooling System in the *TI System V Administrator's Guide.*
4. Configure **uucp**, if necessary. See Administering Basic Networking (uucp) in the *TI System V Administrator's Guide* and paragraph 5.1.2 in this document.
5. Tune your system for optimum performance. See System Performance in the *TI System V Administrator's Guide.*
6. Determine if you want to run the **netcp**(1T) utility on the HPE interface(s) if you are using a 68040 MP or a HPE01 Ethernet option card. See Configuring the STREAMS XNS Driver in the Ethernet section of the *TI System V Administrator's Guide* for details.
7. Configure the Streams-based pseudo-tty driver if you have any add-on products that use this facility. See paragraph 5.1.16 for more information.

ADMINISTRATOR NOTES



Administrator Notes

5.1 This section describes some of the steps that a system administrator should follow to ensure that a system is fully functional.

STR Form

5.1.1 A Software Trouble Report (STR) form is included in the back of this document. Please make copies of this form and use them when communicating System 1500 software problems to Texas Instruments.

Basic Networking Utilities (uucp)

5.1.2 The administrative login for Basic Networking Utilities (BNU) maintenance in the file /etc/passwd is uucp. One remote system call-in user login ID (nuucp) is also supplied. In releases of TI System V prior to release 3.3, the administrative login supplied with the software was uucpadm, and the user login supplied was uucp. The change to the new login IDs was made to conform to common industry practice.

When upgrading from an earlier release of TI System V, it is common to simply copy the previous /etc/passwd file over the new /etc/passwd file in the new release. Now, however, you must define the new administrative login (uucp) and one or more remote system call-in IDs. The remote call-in IDs must have a different user number from uucp, but must have the same group number. The administrative login (uucp) must have a user ID of 5. The administrative login (uucp) and the remote call-in IDs must have a group number of 5.

The files containing control information for BNU have new names, and in some cases the data content is different from corresponding files used in previous releases. A shell script is provided in /usr/lib/uucp/SetUp which copies information from pre-release 3.3 files to appropriate files for the current software as an aid in migration. However, it is likely that additional editing of the file contents will be required to complete the transition to release 3.3 BNU.

If you restore uucp control files from releases prior to Release 3.3 in anticipation of using them as a basis for building BNU control files through use of /usr/lib/uucp/SetUp or some other means, be careful not to inadvertently destroy any of the files or directories created at installation time for BNU use. These files/directories are located primarily in /usr/spool/uucp and /usr/lib/uucp.

vi: Arrow Keys

5.1.3 The **vi** editor has been modified to use arrow keys. However, due to the manner in which vi processes multiple escape sequences, the arrow keys are occasionally misinterpreted. For proper, consistent operations, use the h, j, k, and l keys instead.

Master Message File

5.1.4 If you have customized the /usr/ti/master message files for different languages, please note that the master message file has been changed in Release 3.3.1 and you must add the new messages to your customized version. The easiest way to note the differences is to use the **diff**(1) utility to compare the current master file to the previous master file, add the changes, and rebuild the message files.

Root File System Maintenance

5.1.5 Certain occasional system failures may require reinstallation of the root file system. These failures include accidental deletion of the /etc/init program, loss of the /etc/passwd file, catastrophic file system damage, and accidentally writing over the root file system. File systems other than the root file system can be rebuilt or recovered from backups in the event of damage. Damage to the root file system that prevents the system from operating requires a full replacement of the root file system partition. Root file system installation from scratch can be tedious due to the necessary configuration of devices, customization of boot scripts and the **shutdown** script, creation of user accounts, and installation of other software packages. To simplify root file system recovery, it is recommended that a bootable tape be created that contains a backup of the root and usr file system partitions (see Reinstalling System Software in Section 4) after the system is fully configured, all customization is complete, and all software is installed.

A partition backup of the fully configured root file system partition can be accomplished only by using the General Diagnostics Operating System (GDOS). This is a special tape backup format called a *bootable* or *labeled* tape. Use the **Make Bootable Tape** utility, and back up the following partitions:

root	unx3	cfg3
usr	cfg1	mirr
unx1	cfg2	anch
unx2		

These partitions can be easily restored by GDOS using the **Restore Bootable Tape** utility. Consult Section 4, Using the GDOS Utilities, in the *Diagnostics User's Guide* for a detailed description of these utilities.

If you add your own programs or data to the root file system, you should keep them in separate directories and back them up often, allowing you to easily restore the latest backup of your programs or data after a complete root file system replacement under GDOS.

Future releases of TI System V may require replacement of your root and usr file systems. You can simplify this procedure in several ways. Avoid changing the sizes of these partitions to allow easy partition replacement under GDOS. Keep programs and data that you add to the root and usr file systems in separate directories. This will allow easy back up and restoration of these directories. Keep track of those files that you have customized, such as /etc/checklist, /etc/fstab, /etc/rc, /etc/inittab, and /etc/shutdown. This will simplify merging of your customized files and the new released files.

Network Toolkit Library

5.1.6 The Network Toolkit Library (/usr/lib/libnet.a) is no longer provided with TI System V Release 3.3 and later due to low usage and the availability of other network interface libraries. For users who are interested in network programming, please refer to *TI System V Network Programmer's Guide* or the Socket Programming section in TCP/IP System V.

SNA Installation Notes

5.1.7 SNA 3270 uses field edit capabilities and will need to be relinked. Refer to the caution in paragraph 1.11 for information about relinking field edit applications.

SNA Configuration Notes

5.1.8 Users of Systems Network Architecture (SNA) System V packages will find that some customization of the kernel is necessary for the proper functioning of the SNA package.

The system parameters that affect SNA System V can all be modified with the **cband**(1T) utility (Refer to Configurable System Parameters, Appendix C, in the *TI System V Administrator's Guide*). These system parameters control resources for the entire System V environment. Therefore, when the user chooses new values for these parameters, the needs of all products running on the system must be considered, not just the SNA package. For some parameters, this may simply mean using the sum of the requirements for a parameter for all products installed on the system. For other parameters, however, this may not be the case. Documentation of the system parameters in the Configurable System Parameters appendix in the *TI System V Administrator's Guide* will help the user understand how the parameters are interrelated in the system.

The following system parameters may be adjusted to include the resources needed by SNA System V:

Number of Message Queues

5.1.8.1 This value should include one for each 3270 SNA, 3770 SNA, or APPC SNA emulator that will be active at any one time; one for each v3279 Program Station Control (VPSC) process that will be active; one for the PU process; one for each APPC transaction program that will be active; and any required by other products.

Shared Memory Segment Count Limit

5.1.8.2 This value should include one for each 3270 SNA emulator that will be active at any one time, plus any required by other products.

Total Shm Limit

5.1.8.3 Each 3270 SNA emulator requires approximately 12K bytes of shared memory. This value should include 12K bytes for each SNA emulator that will be active at any one time, plus any required by other products.

Message Segment Size and Number of Message Segments

5.1.8.4 The SNA Physical Unit (PU) task and SNA emulators communicate through the message queues. These two parameters must provide enough memory for all outstanding messages (sent, but not yet received) in the system at any one time. If the SNA emulators return errors about sending data to the PU, these values may need to be increased.

Maximum Number of Messages

5.1.8.5 This value determines the number of outstanding messages (sent, but not yet received) on the system at any one time. If the SNA emulators return errors about sending data to the PU, this value may need to be increased.

TCP/IP System V Installation Notes

5.1.9 TCP/IP System V release 3.0 is supported on TI System V 3.3.1. The 3.3.1 media provides a set of updated objects under /usr/ti/tcp that allow the existing TCP/IP release 3.0 tape to install and operate. These updates allow TCP/IP to be configured to use the new high performance Ethernet (HPE) interfaces supported by the 3.3.1 release.

TCP/IP can be configured to use any of the HPE options. For 68040 MP systems, simply specify the slot number of the 68040 MP that will be connected to each Ethernet for use by TCP/IP. For Compact Chassis systems, specify the slot number of the aux slot where the HPE01 interface is installed. In both cases, a unique IP address is required for each network interface, just as with communication processor (CP) based Ethernet options. The only difference in the install prompts is that a slot number and a port number are required for CP LANs, while only a slot number is needed on the HPE interfaces.

NOTE: The HPE interfaces have a switch on the hardware that selects between thin or thick Ethernet. This switch must be positioned correctly to match the type of cable that is used. If your HPE interface is not functioning properly at this point, this could be the cause. Refer to the appropriate documentation for further information. For the HPE interface on the 68040 MP board, refer to the *System Board Installation and Operation* manual, part number 2557941-0001. For the HPE01 option board for a Compact Chassis, refer to the *Systems 1505/1507 Computer Installation and Operation* manual, part number 2579747-0001.

Changing the HPE Configuration

5.1.9.1 The following information pertains to TCP/IP administrators who want to change an HPE configuration to add a new network or to move an existing Ethernet from one slot to another. Refer to the section entitled Maintaining TCP/IP in the *TCP/IP System V Release Information* document for more information.

The HPE uses the same convention for specifying the interface:

en*XXP*

where *XX* is the slot number and *P* is the port. Port must always be 0 (zero) for the HPE. In addition, when editing the `tienet` entry in the /etc/strcf file, you must specify the device name of /dev/senet instead of the name /dev/strnet to switch to the high performance Streams Ethernet driver instead of the StreamNet driver used to access the CP-based Ethernet. (See the comments in the new /dev/strcf file provided with TCP 3.0 on TI System V 3.3.1.

The following examples shows the `ifconfig` entries in /etc/tcp and the `tienet` entries in the /etc/strcf file for a system with one CP LAN in slot 3, port 1 and an HPE in slot 10, port 0.

/etc/tcp File Example:

```
#          ifconfig en[slot][port] [Internet Address] -trailers
ifconfig lo0 127.0.0.1
ifconfig en031 128.247.31.250 -trailers
ifconfig en100 192.91.99.2 -trailers
```

/etc/strcf File Example:

```
tienet ip /dev/strnet en031 10 10 10 2
tienet ip /dev/senet en100 10 10 10 2
```

Configurable Parameters Defaults

5.1.10 The table that follows lists information concerning TI System V configurable parameters. These parameters are documented in the System Parameters appendix in the *TI System V Administrator's Guide*. For each parameter, the table lists the maximum, minimum, and default values. Additionally, the size in bytes used for each structure is included. This value is approximate because many other aspects of the system will determine the amount of memory actually used. A reasonable estimate of the memory requirements can be determined by multiplying the parameter value by the number in the size column in the table that follows.

There are a few configurable parameters that, in previous releases, reflected the number of 1K pages. These no longer reflect pages but now reflect 1K-byte increments. The parameters are: Shm page count limit (now called Total shm limit), Shm break value, Maximum process size, and Maximum user stack size.

Parameter	Max	Min	Default	Size
Process table size:	5015	50	100	268
Inode segment count:	3009	20	80	98
Segment descriptor count:	30037	60	500	48
Segment swap map count:	15034	40	300	88
Open file table size:	25258	100	250	12
Inode table size:	10005	100	200	256
Callout table size:	1228	10	50	20
Mount table size:	255	8	10	34
I/O memory distribution:	100	0	50	0
Max dynamic 1K FS buffers:	Note 1	100	Note 1	1184
Mirror buffer headers:	Note 14	1	1	160
RAM disk size:	Note 2	0	Note 10	Note 11
File read ahead count:	127	0	3	0
Swap buffer pool size:	100	4	20	160
Raw I/O header pool size:	51	2	8	160
Swap map size:	4096	128	256	8
Kernel virtual map size:	4096	128	256	8
Record lock limit:	30068	23	400	44
Comm packet pool size:	2048	32	200	224
Max number of MTCs per MHA:	16	0	4	0
Number of cblocks:	10240	50	50	72
Shm segment count limit:	1024	8	8	68
Total shm limit (kbytes):	Note 3	32	140	0
Shm break value (kbytes)	122820	1	1024	0
Message segment size:	65535	0	8	Note 4
Number of message segments:	8186	0	1024	Note 4
Number of message queues:	4096	0	50	100
Message queue size limit:	65535 Note 5	0	16384	0
Maximum number of messages:	8192	0	40	12
Maximum message size:	65535 Note 5	0	8192	0
Number of semaphore sets:	512	0	5	48
Maximum semaphores per set:	2048	0	10	2
Number of semaphores:	4096	0	60	48
Max semaphore ops per call:	682	0	10	6
Max semaphore undos:	Note 6	0	30	Note 6
Max undos per process:	Note 6	0	10	Note 6
Streams net heapsize:	40	Note 12	0	1024
Streams net link max:	70	Note 13	0	150
Number of streams queues:	4096	0	16	36
Number of streams:	2048	0	8	54
Number of linked streams:	2048	0	8	12

Parameter	Max		Min	Default	Size
Number of streams events:	682		0	8	12
Extra event cells:	512		0	6	0
Max pushed streams modules:	512		0	0	0
Max streams data size:	40960		0	128	1
Max streams control size:	40960		0	128	1
Low priority threshold:	100		0	80	0
Med priority threshold:	100		0	90	0
4096 byte block count:	512	Note 15	0	0	4096
2048 byte block count:	1024	Note 15	0	0	2048
1024 byte block count:	2048	Note 15	0	0	1024
512 byte block count:	4096	Note 15	0	0	512
256 byte block count:	8192	Note 15	0	0	256
128 byte block count:	16384	Note 15	0	1	128
64 byte block count:	20480	Note 15	0	16	64
16 byte block count:	20480	Note 15	0	64	16
4 byte block count:	20480	Note 15	0	256	4
SDMA segment count limit:	2048		0	0	16
SDMA attach limit:	Note 7		0	0	Note 7
File size limit:	4194304		1024	16384	0
Maximum processes per user:	Note 8		4	25	0
Maximum process size:	131072		1000	16384	0
Maximum user stack size:	131072		1000	16384	0
Time slice size:	4000		1	20	0
Load balancing interval:	N/A		2	5	0
TTY mapout table size:	Note 9		256	1024	Note 9
Number of TTY mapout tables:	15		1	1	Note 9
Number of mapout devices:	585		1	1	28
Enable core dump (Y/N):	N/A		N/A	Y	0

Notes:

1. The default is 95% of the user available memory on each CPU. User available memory is the memory that is available for user processes. With the dynamic file buffer cache, it is highly recommended that the default value is used, specified as "*". The number of file buffers is limited only in that they must fit in physical memory.
2. The size of this item is limited only in that the configured system must fit in physical memory with 600K bytes available.
3. Total shm limit maximum is 75% of all available user memory in the system.
4. The amount of physical memory for messages is the product of the message segment size and the number of message segments, plus 4 extra bytes for each 2 message segments.
5. It serves no purpose for this value to exceed the total amount of message memory configured in the system.
6. Max semaphore undos and max undos per process are related. The amount of memory used is calculated as follows:
   X = max semaphore undos
   Y = max undos per process
   Memory use = X * (8Y + 6)
   Memory use must be less than 540,672 bytes.
7. SDMA attach limit memory usage is calculated as follows:
   X = Process table size
   Y = SDMA attach limit
   Memory use = 4X * Y
   Memory use must be less than 131,072 bytes.
8. The maximum processes per user must not exceed the process table size −5.
9. The memory size for **mapout** tables is calculated as follows
   X = tty **mapout** table size
   Y = number of tty **mapout** tables
   Memory use = Y * (624 + X)
   Memory use must be less than 40,960 bytes.
10. Default value of RAM disk size depends on whether a data buffer board is installed in the system. If a data buffer board is in the system, the default size of the RAM disk and overhead is the size of the board. If no data buffer board is in the system, the default size of RAM disk is 0.
11. 4K bytes of overhead is used for each 3584K bytes of RAM disk configured in the system.
12. When configured for more than 0, the minimum is 5.
13. When configured for more than 0, the minimum is 4.
14. The maximum value of mirror buffer headers is the number of total buffers in the system.
15. These are individual limits. The sum of all the blocks from the 4096-byte blocks to the 4-byte blocks cannot exceed 20480.

TI X/Motif

5.1.11 Certain files needed by X/Motif will be overwritten during TI System V installation. The user must either save these files prior to installing TI System V or execute the TI X Initial System Setup procedure after installing TI System V. Refer to the *TI X Release Information* for further information on the Initial System Setup and which files to save.

Many TI System V screen-oriented utilities (**vi, show, dfm, tx**) have been modified to comprehend window sizing in an xterm window. You can now take advantage of larger window sizes, provided by X, in these utilities.

T-ISAM Performance

5.1.12 T-ISAM utilities and user applications accessing T-ISAM files generally execute faster if the "File read ahead count" system parameter is configured to 0, rather than the default value of 3. Refer to the Configurable System Parameters appendix in the *TI System V Administrator's Guide* for more information.

Network Printer Spooler

5.1.13 If you are using network spooling, some setup is required by the system administrator or lp administrator. Following are the major considerations:

- TCP/IP must be installed and running on the user's machine and on the machine which has the printer.
- On the machine which has the printer, a list of the machines whose users have access to printers must be included in one of the following files:

  /etc/hosts.equiv
  /etc/hosts.lpd

- The administrator can now use the **lpadmin** utility with the **-p** and **-u** options to restrict access to a network printer by using a combination of user name and host name. See the *TI System V User's Reference, Volume 1*, for details.
- Before a user can access a remote printer, the administrator must create a dummy local printer using the **lpadmin** utility with the **-p** and **-s** options. See the *TI System V User's Reference, Volume 1*, for details.

DNIO/1500 System V

5.1.14 In TI System V release 3.3.1 and later, the directory /usr/ti/dnio contains the entire installation directory of the DNIO/1500 System V, Release 2.1. This new release can be installed from the /usr/ti/dnio directory without using any DNIO/1500 installation tape. You will be prompted to make a tape backup of this directory when DNIO/1500 is installed.

A software license and SPA password are still required to install and use DNIO/1500.

The DNIO/1500 network libraries libnetc.a and libnettisam.a cannot be linked with the shared C library (libc_s) or the shared T-ISAM library (libtisam_s). You must use the nonshared versions of these libraries when using DNIO/1500.

* The parameters marked with an asterisk (*) may need to be increased if other packages such as TCP/IP System V or NFS System V are also installed on this system. These guidelines are the minimum required to run 256 Streams-based pseudo-tty devices. See the appropriate installation document for details about specific **cband** parameter requirements.

CD-ROM File Systems

5.1.17 Release 3.3 and later provides support for CD-ROM (compact disk read-only memory) devices and CD-ROM file systems. CD-ROM devices are treated much like standard hard disks. (See Sections 3 and 4 of the *TI System V Administrator's Guide*.) Support is included for both the ISO-9660 and the High Sierra standard CD-ROM file systems. (See Section 5 of the *TI System V Administrator's Guide*.)

1. The NUPI-1 disk controller does not support CD-ROM devices. The NUPI-2, MSC, and SPC disk controllers will support CD-ROM devices if they have the proper revision level of disk controller firmware. If the proper firmware does not exist in the board's ROM, it can be downloaded from disk at system boot time.

2. To determine whether your disk controller has the proper firmware in its ROM, check its revision level. (If you received the board before 8/1/91 it will not have the firmware in its ROM to support CD-ROM devices.) To check the revision level, run the **pm** (performance monitor) command by entering the following:

   ```
   pm -f
   ```

   Press `s` to display the system slot configuration. The type column tells what type of board it is (MSC, SPC, or NP2).

   The revision column tells the revision level of the board. If the revision level of your disk controller is one of the following, the board's ROM contains the firmware to support CD-ROM devices:

   - MSC — revision BU or higher (in alphabetical order)
   - SPC — revision AL or higher
   - NP2 — revision F or higher

   If not, the board's ROM does not contain the firmware to support CD-ROM devices. Be sure to note the slot number and type of the disk controller board. You may need this information later.

   If your disk controller's ROM does not contain the firmware to support CD-ROM devices, you have to use a download partition. A download partition is used to download a more recent version of a disk controller's firmware at system boot time.

   See the *Mass Storage Firmware Update Tape Release Information* manual (part number 2546910-0001) for instructions on installing a download partition. Releases 2.5.0 and later of this tape support CD-ROM devices. See paragraphs 4.2 and 4.7 of *TI System V Release Information* (this manual) for additional information.

Upgrading a CCB to the CP II

5.1.18 Release 3.3 and later of TI System V supports the CP II communications carrier board. If you upgrade existing hardware by replacing an existing CCB with the CP II, you can use your existing option and adapter boards with the CP II, with one exception. The CK-301 multifunction option board, part number 2535580-0001, will not work with the CP II. If the CCB to be upgraded to a CP II is used to control communications through a CK-301, the CK-301 option board must also be upgraded to part number 2535580-0002. The new -0002 option board is compatible with all multiprocessor chassis CCBs.

Determining If the Correct unx Band Is Currently Booted

5.1.19 Some TCP and NFS commands function by using the /unix file to interrogate the memory-resident copy of unx1, unx2, or unx3. In order for these commands to work, the /unix file must match the information loaded from the partition specified when the system was booted. The utility /usr/local/crash has a **var** command that can be used to verify whether the system is currently booted on the correct unx partition. This utility is entered as follows:

```
/user/local/crash
var
```

If output similar to the following appears, the **crash** utility has determined that the /unix file matches the currently booted unx partition, which in this case is unx2.

```
Load Source: Slot=800000a, Boot Band=unx2, Cfg Band=cfg2
   .
   .
   .
```

If the output consists of error messages, the /unix file does not match the current unx band.

If **crash** indicates a match, there is a very good chance that /unix is the same file that was used to create the unx partition. But this may not always be true. Slight differences between the files can go undetected by the **crash** utility. Therefore, the system administrator should ensure that the /unix file matches the unx booted under normal circumstances.

Refer to the *TI System V User's Reference* for additional information on the **crash** utility.

Boot Band Size

5.1.20 If several optional packages are installed, the kernel and stbm primitive may not fit in the 1-megabyte boot bands created on the shipped system. If this is the case, the **bband** utility (invoked by the makefile in /usr/sys) will report an error when it attempts to write past the end of the boot band. In this case, you can use the **ptu**(1T) utility or the GDOS partition table editor to increase the size of one of your boot bands and then retry the **make** command.

NTC Reconfiguration and TCDL

5.1.21 The following information pertains to reconfiguring network terminal concentrators (NTCs) when the system is not in single-user mode. For example, this may be necessary if you need to add an NTC to the system or if you need to change the 48-bit address of an NTC due to a board swap after a hardware failure.

tcdl is a daemon process for downloading and uploading the NTCs defined on the system. As noted in the **tcdl**(1T) man page, the NTC definitions are contained in file /etc/tctab, and each communication processor (CP) with active NTCs has a **tcdl** daemon that corresponds to it.

Unfortunately, the information in /etc/tctab is only examined once by **tcdl** during its initialization when it is invoked. The information then is stored in a piece of shared memory that all the NTC utilities—including **tcdl** itself—refer to until the system is taken down. Therefore, any changes made to NTC definitions after the system has already entered the multiuser mode will not be known by the **tcdl**. For example, newly added NTCs and associated terminals will not become alive, or unwanted NTCs will still show up in the **tcstat** unless the system is taken down to single-user mode and brought back to multiuser mode again, or a **slotload**(1) is done to the proper CPs.

For systems with large user counts, it is sometimes inconvenient to take the system down or to execute a **slotload**(1). The following procedure provides a way to add or remove NTCs any time during the day without disturbing existing users:

1. Become the super user.

2. Use **devadm**(1) to reconfigure NTCs. You can define new NTCs, remove NTCs, modify NTC network addresses, or turn existing NTCs off or on. Please refer to the Configuring Devices section of the *TI System V Administrator's Guide* and also the **devadm**(1T) man page for more information.

3. Find all the running **tcdl** daemons by using the following command:

   ```
   ps -ef | grep tcdl
   ```

   If you don't have any **tcdl** running, go to step 5.

4. Do `kill -15` to each **tcdl** that is running. Make sure that all **tcdl** daemons terminate before you proceed.

5. Restart **tcdl**. Please note that you may need to start **tcdl** twice now. If **tcdl** had been running on your system, there is some cleanup that needs to be done after it terminated abnormally. **tcdl** will detect this situation in its initialization and try to clean up. Since this is considered as an abnormal situation, **tcdl** will terminate right after the cleanup is done. So, a new **tcdl** needs to be invoked again, which will reinitialize the shared memory and start all the daemons properly. To start the **tcdl**, simply enter `tcdl -v`. The following messages may appear:

   ```
   tcdl is started
   Error from the INET device driver on CCBxx, Error = 1003924
           .
           .
   NTC download process completed
   ```

   If so, the **tcdl** you just started has terminated. Use the `ps -fe |grep tcdl` command to verify. If you do not see any **tcdl** process running, start the **tcdl** again. When **tcdl** is started properly, the following messages should appear:

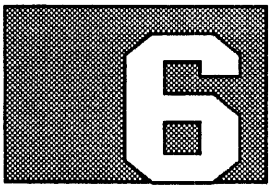
   ```
   tcdl is started
   Checking status for tcname
   tcname is online
           .
           .
   NTC download process completed
   ```

These are the same messages you would see if you have taken the system from single-user mode to multiuser mode or if you have done a **slotload** to certain CPs.

6. The NTC reconfiguraion is done. You can use the **tcstat** command to verify your NTC configurations.

This procedure can be performed as many times as needed. If **tcdl** terminated abnormally for some other reason, for example, if one of the **tcdl** daemons is accidentally killed, you can also use the same procedure to restart it. Please note that if **tcdl** is not started properly, all the NTC utilities (e.g., **tcstat** and **tcreset**) will stop working. Most likely, they will report an error in locating the shared memory and terminate. Please refer to the *TI System V User's Reference* for more information about all the NTC utilities.

NEW FEATURES OF RELEASE 3.3.1



Introduction

6.1 This section describes changes and enhancements included in Release 3.3.1 of TI System V. Major enhancements include:

- 68040 MP board support
- High performance Ethernet (HPE) interface
- Streams Ethernet driver
- Symbolic links
- Performance Monitor (PM) enhancements
- New and modified utilities

For additional information about each topic, refer to the relevant manuals in your TI System V documentation.

68040 MP Board Support

6.2 Release 3.3.1 of TI System V adds support for the new 68040 MP board, which is based on the Motorola 68040 CPU chip and goes in a NuBus chassis. (The 68040 MP board is used in the 7-slot and 16-slot chassis, but not in the compact chassis systems, i.e., System 1505 and 1507.) The board also includes the functionality of a NUPI-2 disk controller and has a high performance Ethernet (HPE) interface. See Section 1 for more details.

High Performance Ethernet (HPE) Interface

6.3 The HPE interface hardware is provided as an integral part of each 68040 MP processor board. In addition, a new add-on option board is provided for the compact chassis family—the HPE01 board. (The term "HPE" is used to refer to both interfaces.)

For more details, on how to use and configure this device, see the Ethernet section in the *TI System V Administrator's Guide*.

Streams Ethernet Driver

6.4 TI System V Release 3.3.1 provides a new kernel-resident Streams-based Ethernet driver that supports the new HPE interfaces and allows other Streams-based protocols to access these HPE interfaces. This includes the following add-on packages:

- TCP/IP System V
- NFS System V
- NetWare for TI System V

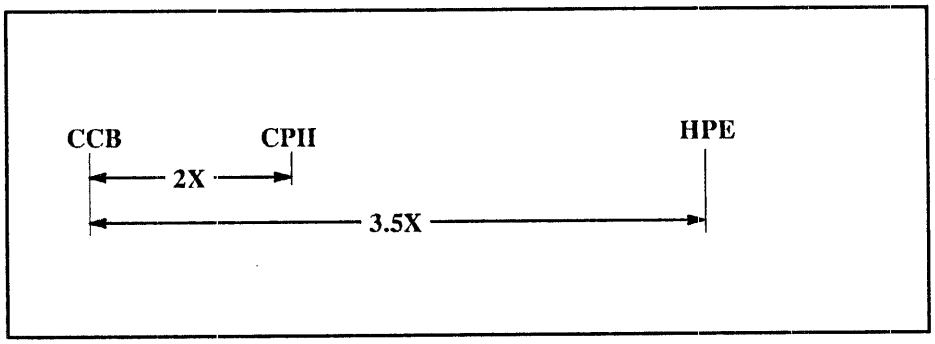
In addition, if the system is configured to run the new XNS Streams driver, these TI System V utilities are supported: **netcp**(1T), **netexec**(1T), **netecho**(1T), **networks**(1T)

This driver does not support NTCs or DNIO/1500 System V because they are not Streams-based. These products must still operate from Ethernet interfaces on a communication processor.

Performance Differences

6.4.1 Figure 6-1 shows the performance differences between the various interfaces described in this section. For example, a file transfer of a file in binary mode using the TCP/IP FTP utility would result in the file being transferred twice as fast with a CPII when compared with a CCB or 3.5 times as fast with an HPE when compared to a CCB. These numbers assume that both the client and server system are configured with the same Ethernet interface. For example, both have a CCB or both have a CPII when the test was run.

Figure 6-1 **FTP File Transfer Performance Improvement With the HPE Interface**



Summary

6.4.2 A summary of Ethernet support by protocol for the two types of hardware configurations is shown in the following table:

Software	Ethernet Hardware CP-based[1]	HPE-based
TI System V provided:		
Network Utilities[2]	Yes	Yes
Network Terminal Concentrator (NTC)	Yes	No
Add-on products:		
DNIO/1500 System V	Yes	No
TCP/IP System V	Yes	Yes
NFS System V	Yes	Yes
TI X/Motif	Yes	Yes
NetWare for TI System V	Yes	Yes

Notes:

1 CP-based refers to either a CCB or CP II.

2 The network utilities are **netcp**(1T), **netexec**(1T), **netecho**(1T), and **networks**(1T). The XNS-based utilities require that **xnsd**(1T) daemon be configured and started. See **xnsd**(1T) and xnscf(4) for more details.

netstat(1T) accesses Ethernet statistics for both types of hardware and does not require **xnsd**.

Streams XNS Driver

6.5 A new kernel resident Streams-based XNS driver is provided. This driver allows the following XNS protocol based utilities to work with the Streams-based Ethernet driver; **netcp**(1t), **netexec**(1T), **netecho**(1t), and **networks**(1T). This driver supports the XNS internet datagram services and the Packet Exchange Protocol. It also provides an XNS internet router so that packets can be routed between any of the HPE interfaces.

For more information on this feature and how to configure a system to use this driver, see the Ethernet section of the *TI System V Administrator's Guide*.

Symbolic Links

6.6 TI System V now provides support for symbolic links. A symbolic link is a special file that consists of a reference to the name of another file, directory, or symbolic link. It can be created in the same manner as a hard link by using the **-s** option of the **ln** utility, but is different from a hard link in several ways. A symbolic link can span file system boundaries and can be created to point to a non-existent path name. With a hard link, the original file can be removed and the contents of the file remain intact under the link name. This is not true with a symbolic link. A symbolic link contains only the name of the linked-to file. Once the original file is deleted, its contents are gone.

NOTE: Refer to paragraph 1.10 for cautions concerning symbolic links.

The following documents discuss the symbolic links feature:

chgrp(1)
chown(1)
cpio(1)
file(1)
find(1)
ln(1)
ls(1)
rm(1)
tar(1)
lchown(2)
lstat(2)
readlink(2)
symlink(2)

Performance Monitor

6.7 There are several new features that have been added to Performance Monitor (PM) for this release. Some of these features are in support of the 68040 MP board that has a CPU and disk controller in the same slot. Other features are enhancements to make PM more customizable and usable.

68040 MP Board Support

6.7.1 When there is a disk controller and CPU in the same slot, entering the slot number will usually take you to the CPU screen. There are two ways to get to the Disk Controller screen for that slot. One way is to enter the slot number and go to the CPU screen. At that screen, you can use the **u** command to go to the Disk Controller screen. The second way is to go to the General Information screen and use the **D** command to display only the disk controller's bar graphs. Now, entering the slot number will take you to the Disk Controller screen.

A new background option, **-u***n*, has been added to collect utilization data on a NUPI-2 disk controller that is in the same system board slot number, specified by *n*, as a CPU. Without the **u**, you get data on the CPU in that slot. *n* is in the range 0–9 and A–F (0–15 hex).

If there are more than 16 bar graphs needed for the General Information screen, which can happen when there are 68040 MP boards in a chassis, then only 16 bars will be displayed, and the screen will be scrollable with the → and ← keys.

For more information about 68040 support, refer to the *Performance Monitor User's Guide*.

Enhancements

6.7.2 Several new commands are available at the General Information screen that allow you to change the layout of this screen when running PM in foreground or in playback mode. The **D**, **N**, **S**, and **G** commands change which bar graphs are displayed and also the order in which they appear.

PM looks for an environment variable PM_CONTROL, which points to a PM control file. This control file can be used to customize PM. Currently, the PM control file can only be used to customize the General Information screen layout.

Pressing the **v** command at the Virtual Memory Subsystem screen, the **t** command at the Systems Totals screen, or the **m** command at the Memory Map screen will display the data for the next CPU. When at the last CPU, these commands will take you to the first CPU. Previously, you had to go to the CPU screen for the CPU desired first.

For more information about PM enhancements, refer to the *Performance Monitor User's Guide*.

New Utilities

6.8 The following paragraphs describe the new utilities offered by TI System V release 3.3.1. The man pages for these utilities are provided in the *TI System V User's Reference, Volume 1* and *Volume 2*. In addition, the *TI System V Administrator's Guide* offers further discussion on some of these utilities.

xnsd

6.8.1 The **xnsd** utility is a daemon that is used to configure and activate the Streams XNS Internet driver and bind it to one or more HPE slots. This utility is required to support the various XNS based network utilities, such as **netcp**(1T), over the HPE interfaces.

xns

6.8.2 Streams XNS start and stop script. This script will start or stop the **xnsd**(1T) and **tdts**(1T) daemons required to support XNS protocol over the HPE interfaces.

Utility Updates

6.9 Some utilities in release 3.3.1 have been expanded with new options to further enhance their functions.

devadm

6.9.1 The **devadm** utility can now be used to define 8-bit printers. This can be done in either the command line or the interactive mode of **devadm**. Refer to Section 3 of the *TI System V Administrator's Guide* for more information on defining 8-bit printers.

The keyword `etherlan` has been added to the command line mode of **devadm** to display the Ethernet address of the HPE interface. This feature is discussed in the **devadm**(1T) manual page and in Section 3 of the *TI System V Administrator's Guide.*

Network Utilities

6.9.2 The following utilities were changed to work over the HPE interfaces using the new STREAM Ethernet driver and the Streams XNS driver.

netcp(1T)
netexec(1T)
netecho(1T)
networks(1T)

The **netstat**(1T) utility was changed to display Ethernet statistics from the new HPE interfaces.

---

chgrp

6.9.3 The **chgrp** utility has a new option, **−h**, which changes the group of a symbolic link, and option **−R**, which recursively descends through the directory, and any subdirectories, setting the specified group ID as it proceeds.

---

chown

6.9.4 The **chown** utility has a new option, **−h**, which changes the ownership of a symbolic link, and option **−R**, which recursively descends through the directory, and any subdirectories, setting the ownership ID as it proceeds.

---

cpio

6.9.5 The **−L** option has been added to the **cpio** utility. This causes **cpio** to follow symbolic links as if they were normal files or directories. Without this option, **cpio** backs up the links themselves, not what they point to.

---

file

6.9.6 The **file** utility has a new option, **−h**, which does not follow symbolic links.

---

find

6.9.7 The **-type** expression of the **find** utility has been expanded to optionally look for symbolic links.

---

ln

6.9.8 The **−s** option has been added to the **ln** utility to create symbolic links to files or directories.

---

ls

6.9.9 The **ls** utility has a new option, **−L**, which will list the file or directory that a symbolic link references, rather than the link itself.

---

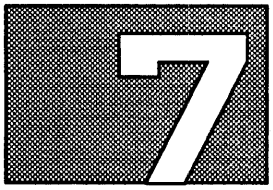
opctl

6.9.10 The operator control utility, **opctl**(1T), has several new options that allow various system parameters to be changed that were previously changable only by using **cband**(1T) and rebooting. See the **opctl**(1T) man page for a detailed description.

tar

6.9.11 The **−L** option has been added to the **tar** utility. This causes **tar** to follow symbolic links as if they were normal files or directories. Without this option, **tar** backs up the links themselves, not what they point to.

PROBLEMS FIXED BY RELEASE 3.3.1



Utilities and Functions

7.1 The following is a list of known problems in utilities and functions that were fixed in Release 3.3.1. They are listed in alphabetical order with the software trouble report (STR) number following the name.

bsh: 23372, 23738
bsh sometimes loses commands after background execution.

cpio: 23858
When writing single tapes with multiple **cpio** commands using no rewind, the tapes sometimes fail to read back correctly.

cron: 23851
cron has a limit of 25 jobs.

devadm: 23708
In command line mode, **devadm** cannot change the volume name of a disk using the **-v** option.

devadm: 23838
devadm does not handle a mirrored partition on disk unit 0x0e.

devadm: 23930
In command line mode, **devadm** does not work if the environment variable TMPDIR is set to the pathname of a file in a file system other than root.

devadm: 24010, 24026
You cannot list the MSC controller using command line mode.

devadm: 24860
When defining a disk, if a mirror band is located between two anchor bands in the partition table, the nodes for the second anchor band are created with the wrong major device numbers.

dfm: 23803
A very long directory pathname may cause a segmentation violation.

ed: 23661, 23069
The **ed** editor does not work correctly on an NFS-mounted file.

get: 23802
get does not allow **-fm** names longer than 16 characters.

get: 23138, 23744
get returns an unexpected error message if you do a get **-e** and someone else has already done a get **-e** on the same file.

killall: 23760
The **-r** option of **killall** does not work.

lp: 20941
The CCB crashes with an NMI panic when printing to a Printronics parallel printer model P6040.

lp spooler: 23635
The TI850 wide mode setting does not work.

lpadmin: 20382
lpadmin -lp shows the model interface instead of the actual interface path.

lpstat: 20023
The long report of **lpstat (lpstat -t -1)** will display garbage in some fields.

memcmp: 23796, 23835
The **memcmp** routine sometimes returns a positive result when it should return a negative result.

mkfs: 23721
mkfs will create file systems larger than the partition size.

mkmirr: 23037
mkmirr runs even if the specified mirror band is already mounted.

packfs: 23703
packfs will not run on certain file systems. It reports errors of the type that should be fixed by **fsck**, but **fsck** sees no errors.

pm: 1181
pm sometimes displays `Number of Semaphore Undos` inaccurately.

tar: 23766, 23773
When a **tar** archive contains absolute pathnames and links on files, an extract with the **A** option fails on the links.

T-ISAM: 23475
Opening a T-ISAM file for I/O changes the modify date, even if you do not write to it.

T-ISAM: 23523
When you have adv-on-lock set and do a start on some value, if you read the next record after the start and the record is locked, the advance does not work correctly.

usradm: 23079
Using **usradm** to modify user information may cause the permissions on the file /etc/shadow to be changed.

uucp: 23901 23920
Fixed problems performing long file transfers with 3.3 uucp. These problems can also cause erratic terminal I/O behavior, e.g., display of garbage or loss of input.

vfisam: 23899, 23900
vfisam does not accept long pathnames.

Directories and Files

7.2 The following directory and file problem has been fixed in Release 3.3.1:

inittab: 23769, 23770, 23771
There are duplicate entries in **inittab** for MTC printers.

terminfo: 23772, 23774
In terminfo, the page length for the microLaser™ printer is wrong.

Terminals

7.3 The following terminal problems has been fixed in Release 3.3.1:

DNIO: 23194
If you use an NCSA terminal to log on to a 1500 and then use inl990 to get onto a 990 system, there are three keys that do not work as expected: erase input, erase field, and blank grey.

terminals: 23723
The Delete and Erase Fields keys do not work properly when used in a numeric field.

Kernel

7.4 The following kernel problems have been fixed in Release 3.3.1:

unkillable process: 23761
A process getting a recursive bus error can hog the CPU and be unkillable.

streams: 23031
System does not boot because the maximum number of streams buffers has been reached.

tape driver: 21097, 20297
On systems configured with multiple 1/2-inch or CT2000 (8-millimeter) tape drives (or combinations thereof), data being read from or written to one tape drive can overwrite the data being read from or written to another tape drive. This rare problem occurs only when the two (or more) drives are being accessed concurrently and when the two processes doing the reading or writing are both using buffers whose length is not a multiple of 4 bytes. Standard utilities used with tape drives (such as **tar** and **volcopy**) use buffers that are multiples of 1024 bytes and thus do not encounter this problem.

UPS: 23622
Under certain conditions the system may crash immediately after a power failure, even though it has an Uninterruptible Power Supply.

UPS: 23984
When there is a power failure on a system with UPS hardware support, the system does not correctly perform a shutdown.

microLaser is a trademark of Texas Instruments.

8 PROBLEMS

Introduction

8.1 This section describes problems that were still unresolved at the time of the 3.3.1 release.

If you have a subscription service, contact TI-CARE Support Services to obtain TI System V software updates for problems fixed since the initial release. If you do not have a subscription contract, TI-CARE Support Services can supply the update on a billable basis.

SeaGate 380MB Half-Height Disk Drives

8.2 SeaGate 380MB half-height disk drives that were formatted with a GDOS prior to version 2.7 contain invalid disk label data in the 'sectors per track' field. In particular, the field contains 75 instead of the correct value, 74, causing the total number of disk blocks to be incorrect.

Because the block count of these drives is too large, it is likely that one or more partitions will extend beyond the end of the disk. Of course, this will cause a problem in UNIX whenever a process tries to access one of these invalid blocks. The disk label must be repaired to prevent such an access from happening.

To determine whether a SeaGate 380MB half-height drive has an incorrect disk label, use **ptu**(1T) to examine the disk label contents. If the 'sectors per track' field contains 75, then the label is incorrect and needs to be repaired.

The only valid partition that will contain these invalid blocks is a swap partition. If invalid blocks were allocated to a file partition for example, **mkfs**(1M) would have failed and the file system would not contain valid data. For this reason, you should not need to backup any partition containing invalid blocks.

To repair an invalid disk label perform the following steps:

1. In GDOS (any version), edit the disk label and change the sectors-per-track value from 75 to 74. Note: this step cannot be done using **ptu**. Refer to the *System 1500 Diagnostics User's Guide* for more information on using GDOS.
2. Write the disk label to disk and exit GDOS.
3. In UNIX single-user mode, use **ptu**(1T) to save the volume label/partition table to a file.
4. In UNIX single-user mode, use **ptu**(1T) to update the volume label/partition table with the saved file.

Steps 3 and 4 will cause **ptu** to recalculate the available disk blocks based on the new sectors per track value and update the partitions that extend beyond the end of the disk. You do not need to edit the intermediate file.

5. Use **devadm**(1T) to remove and redefine the disk.

The invalid disk label problem is caused by an error in the algorithm used for zone-bit recorded media and has been fixed in GDOS version 2.7. The above procedure is the easiest method of correcting the problem. An alternative method is to reformat the disk using GDOS version 2.7 or later.

Cipher CT60 Tape Problem

8.3 Older model CT60 tape drives have a problem with data transfer requests in Release 3.3.1. The tape drives affected are the Cipher model, which can be identified by a red light on the front panel. (The newer CT60 tape drives have a green light on the front.) The firmware in the formatter of the Cipher CT60 tape drives is incompatible with the latest SCSI conventions with regard to synchronous data transfer requests. The latest firmware on the TI disk controllers (e.g., MSC, NUPI-2, SPC) uses these SCSI conventions and therefore is incompatible with these tape drives.

The result is that the first request issued to the tape drive after the system is booted may fail. Subsequent requests, however, execute properly. This may cause problems if you are doing unattended backups. The workaround is to issue a dummy command to access the tape drive, such as **tar xt**.

The following TI boards have the incompatibility with the Cipher CT60 tape drive:

- MSC — revision BU and later
- NUPI-2 — revision F and later
- 1505 main logic board — revision AL and later
- 1507 main logic board — revision F and later
- SCSI processor option board — all revisions
- 68040 MP board — all revisions

If you use the Mass Storage Firmware Update tape, the incompatibility exists with version 2.6 and later. See paragraph 4.7 for more information.

Directories and Files

8.4 At the time of this release, the following directory problems exist:

/bin/bsh: 23192
The permissions on /bin/bsh are rwx--x--x which are not correct. When a debugger executes /bin/bsh under ptrace, it needs to have read permission. The permissions should be changed to rwxr-xr-x.

FIFO: 472
If a system crash occurs while a named pipe is in use (not closed), up to 10 disk blocks can remain allocated to the pipe. If the pipe is later removed, these blocks are not added to the free list. These blocks are recovered when **fsck** is run on the file system. Two system-created named pipes may be in use on your system—these are /usr/spool/lp/FIFO and /usr/ti/dnio/niopipe.

Terminals

8.5 At the time of the release, unfixed STRs include the following:

sending a break: 1210
The **ioctl** for sending a break from a tty port will hang the tty port sending the break.

termio: 20065, 20661
Setting the **ioctl** line speed option B0 (hang up) is not supported on controllers other than the MTC.

VDT with attached printer: 866
If a print request is made to an attached printer on a VDT that is turned off, the job will not start by itself when the VDT is turned back on. To resume attached printing, enter the appropriate escape sequence on the terminal to which the printer is attached, as listed below:

Terminal	Sequence
ti931	ESC 1
ti924, 931 mode	ESC 1
ti924, 924 mode	ESC Q
ti928	ESC Q

Utilities and Functions

8.6 At the time of the release, unfixed STRs include the following:

accounting: 22922
accounting may report a record containing a partial ip address for the tty field. The entry is recorded by **ftp**.

awk: 774
The \r in an **awk printf** statement does not work correctly.

bsh: 821
If a command is executed from history, the prompt is sometimes displayed before the output from the command can be displayed.

bsh: 21298
It is possible to break out of /etc/.bshlogin when "onintr -" is set.

cpio: 24027
cpio is unable to read past the first tape of a multivolume archive from a CT2000 tape drive or a Cipher CT60 tape drive.

devadm: 902
Terminals associated with a particular device cannot be turned on using the **change** command.

lp: 1125
Sending an Esc-S key sequence (expanded print) to an attached printer on a 924 in 931 mode may cause the printer to hang. Press the Esc-1 key sequence at the terminal to resume printing.

mapout: 781
mapout can only be run by root.

menu/spooladm: 20346
Some TI utilities cause the cursor to be turned off on the 924 and 928 terminals.

nawk: 20640
In some instances, programs executed with **nawk** run substantially longer than the same programs executed with **awk**.

sdb: 20757
When initially calling user-defined functions (using the **sdb** command line), **sdb** returns an integer stored in a register with the wrong return value. Subsequent calls work correctly.

sdb: 20758
The /f edit code does not work correctly for functions returning a type float result in registers D0 and D1. Use the /g edit code instead.

show: 1029
Pressing the Escape key followed by a function key will cause strange results on some terminals.

slotload: 357
The second time **slotload** is run on a CCB from the console, it completes but the user (super, root) is logged out.

sort: 750
The **sort** utility will not handle files that contain binary data (i.e. COBOL files containing comp-3 fields).

spooladm: 1257
Using the F6 key when no print requests are queued produces a misleading `working ...` message.

spooladm: 20608, 20609
Some **spooladm** screens may not display correctly on the console. **t** and **s** commands do not always display all print requests.

sysdump: 20720
sysdump does not prompt or take dumps for MTCs.

tar: 24055
tar is unable to read past the first tape of a multi-volume archive from a CT2000 tape drive.

tar: 23685
The **-p** option in **tar** does not adhere to the POSIX standard on multi-volume tapes.

topc/frpc with 931 emulator: 409
When **topc/frpc** utilities are invoked with a 931 emulator, the user will see the characters `>9c` displayed on the terminal for about 10 seconds. The **topc/frpc** utilities will then clear the screen and initiate the file transfer.

tx: 540
Insert mode is prematurely turned off when characters are inserted across column 80 and the line length is specified as greater than 80 columns.

tx: 22842
The version of the **tx** editor in this release will not display older EDITKEYS.DAT files properly. This means that any function key modifications made in version 3.2.2 or earlier and saved in an EDITKEYS.DAT file will not be displayed correctly in this version of **tx**. However, the modifications will still work correctly. To correct the problem, make the same function key modifications with the new tx and save a new copy of the EDITKEYS.DAT file.

tx: 23873
The shifted-function keys are not defined correctly for a 928 terminal.

version number: 1173
T-ISAM does not update the internal version number of single format files.

MTCs

8.7 At the time of this release, unfixed STRs include the following:

MTC: 1052
The **mnetecho** utility will cause MTC attached terminals to hang. This problem only happens when executing the **mnetecho** utility to a specific MTC while other terminals attached to the MTC are active. Only use the **mnetecho** utility when the MTC attached terminals are quiescent.

MTC: 1079
The **mtcdl** utility verbose option does not work when executed in multiuser mode. The verbose option works at system boot time or when going from single-user to multiuser mode.

MTC: 1105
Using the **devadm** utility to remove an MTC while in multiuser mode will cause problems with the **mtcdl** utility. Refer to the *TI System V Terminal Concentrator Software* manual for procedures on removing an MTC.

MTC: 1152
The **mtcdl** utility will still execute even though no port number is specified in the **-p** option. An error message is displayed and the **-p** option is ignored.

MTC: 1260
The **mtcdl** utility may not download MTCs under the following circumstance: the highest numbered slot containing an MTC must be the last entry in the /etc/mtctab file. You must edit the /etc/mtctab file if this is a problem.

Kernel

8.8 At the time of this release, the following kernel STRs remain unfixed:

error messages: 21737
Error messages reported by communication processor boards are displayed correctly in the error log, but may show up as `message not found` on the console. If you see such a message on the console, use the **errpt** command to check the error log.

character overflow: 21737
Reading and writing to a TCP socket returns EINVAL after 0x80000000 characters have been transmitted. This could happen on any character device given enough time. This problem will occur only if you are using the read and write I/O calls on a TCP socket. A workaround to this limitation is to use the **send**(2) and **recv**(2) calls provided in the socket library with TCP/IP.

HPE driver: 24262
On a compact chassis system with the HPE01 high performance Ethernet controller installed, the system may panic with `knalloc failure` if **tcp start** and **tcp stop** or **xns start** and **xns stop** are run numerous times without rebooting the system. The HPE LAN driver does not release memory in this configuration and repeated restarting of the driver will consume kernel memory. The workaround is to reboot the system. A patch is available to fix this problem.

Streams XNS driver: 24268
If your system is configured to use the Streams XNS driver for the HPE interface, the system may panic. The driver may corrupt another buffer by going one byte past the end of its current buffer which may result in a system panic. A patch is available to correct this problem.

Streams XNS driver: 24269
The Streams XNS driver does not recognize an unnumbered network (i.e., a network with number zero). If a network connected to an HPE does not have an XNS router and is not assigned a nonzero network number, then the XNS driver will not recognize the network as being connected. This will prevent utilities like **netcp**(1T) from working over this LAN. A patch is available to correct this problem.

Streams XNS driver: 24270
If over 29,000 **netcp** commands are executed, then the XNS driver will no longer allocate a socket properly. This may occur if your system is not rebooted for extended time periods and you do a large number of **netcp** commands. The workaround is to do an **xns stop** followed by an **xns start**. A patch is available to fix this problem.

CD-ROM

8.9 At the time of this release, the following problems with CD-ROM file systems exist:

mount command
When you use the **mount** command to mount a CD-ROM file system, you generally get a warning message. For example, if you issue the following **mount** command:

```
mount -f CDROM /dev/dsk/cd0 /cdrom
```

you will probably get a warning message similar to the following:

```
WARNING! - mounting <abcdef> as </cdrom>
```

This is not a problem. The warning is simply telling you that the last node of the mount point (cdrom) is not the same as the volume ID (abcdef). The volume ID comes from the Volume Identifier field in the Primary Volume Descriptor of the CD, which is defined by the ISO-9660 standard.

Incompatible commands
Some commands do not work on a CD-ROM file system. Some of these do not really make sense on a CD-ROM file system. Some make assumptions about the internal structure of the file system that are not true for a CD-ROM file system:

fsck, ff, finc, frec, ncheck, ptu, volcopy

TCP/IP

8.10 At the time of this release, the following problem with TCP/IP remains unfixed:

Terminal hang going to multiuser mode: 23862
The following set of conditions causes the system console to appear to hang:

1. Having the system in multiuser mode with TCP/IP started.
2. Performing **/etc/shutdown** with **vi** edits in progress.
3. Entering **init 2** without rebooting.

The init process will stop at the point where expreserve sends mail to users who had edits in progress. Typing the interrupt character, CTRL-C, (possibly more than once) will allow the init process to continue. Another workaround is to reboot the system; this problem will not occur if TCP/IP has not been started before.

Since expreserve was aborted, mail informing users of their recovery files will not be sent. The recovery files, however, will exist and the edits will be able to be preserved.

Miscellaneous

8.11 At the time of this release, unfixed STRs include the following:

3270 SNA: 24271
The installation fails due to errors in the link edit phase. See paragraph 1.11 for a workaround.

COBOL: 24397
Using the statement "OPEN OUTPUT *filename*" in COBOL will not create the file if *filename* is assigned to a nonexistent file on a remote system. You must create the file on the remote system before the program attempts to access it.

printing: 405
When the system has just been booted, the first character of a print request will not be sent to a parallel printer.

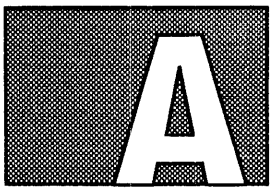
T-ISAM/Streams error message: 1262
The T-ISAM error numbers in /usr/include/tisam.h overlap Streams error numbers in /usr/include/sys/errno.h in the range of 100 to 128.

xload: 22755
The **xload** utility terminates after about 20 seconds. A patch is available to fix this problem.

xman: 22753
Because the TI System V man pages are now stored in packed text format, **xman** can no longer display them. Man pages of other products, including X/Motif, that are stored in plain text format can still be displayed by **xman**. A patch is available to fix this problem.

xterm/active: 22465
When running the **active** utility in an xterm window, the reverse video used to highlight the user shows text in a smaller font. A patch is available to fix this problem.

RELEASE HISTORY



Introduction

A.1 This appendix contains information about enhancements to previous releases of the TI System V operating system.

Release 2.3.0

A.2 The following paragraphs describe changes and enhancements included in release 2.3.0 of TI System V. Major enhancements include:

- Support for the new 68030 central processing unit (CPU) board
- Support for the 16-megabyte and 32-megabyte data buffer boards
- Support for the 512 terminals
- Increased logical address space
- Updated libraries
- T-ISAM Library changes
- Performance monitor (**pm**)
- Kernel improvements
- Networking additions
- Program linking change
- Floating-point unit enhancement
- CT2000 tape drive support
- Utility upgrades
- Enhancements to the **vi** editor

68030 Processor Support

A.2.1 Release 2.3.0 of TI System V adds support for the new 68030 CPU board. The 68030 CPU has about twice the power of a 68020 CPU. This means that a single 68030 CPU can replace two 68020 CPUs with similar performance.

No changes required to run existing applications on the 68030 CPU, and 68030 CPUs can coexist with 68020 CPUs. It is recommended that a 68030 CPU be placed in slot 0 of a mixed 68020/68030 system. This places shared data structures in the fastest possible memory, yielding better system performance.

The TI System V, release 2.3.0 distribution tape contains two partition table entries for each boot partition (unx1, unx2, and unx3). One partition table entry is used to boot 68020 processors, and the other is used to boot 68030 processors. The user type in the partition table is 02 for a 68020 boot partition and 0a for a 68030 boot partition. It is important that these partition table entries claim the same disk blocks. (That is, the starting block and the length in the partition table for unx1 of type 0a must be the same as unx1 of type 02. The same is true for unx2 and unx3.)

Data Buffer Boards

A.2.2 The 16-megabyte and the 32-megabyte data buffer boards can be used as a RAM disk and for file system buffer cache. Any data buffer board memory not allocated for RAM disk is automatically used for file system buffers. Additionally, memory for RAM disk can be allocated from processor board memory, if desired. Memory on the data buffer boards cannot be used by the system for program execution. See Section 17, External Memory Boards and RAM Disk and Appendix C, Configurable System Parameters in the *TI System V Administrator's Guide*, and see **rdload(1T)**; **rdflush(1T)**; and **rdlist(4)** for more details on RAM disk and setting up file system buffers.

512 Terminals

A.2.3 Enhancements to the system and various utilities now support as many as 512 terminals logged in at one time, with as many as 256 terminals active. The performance of systems with a large number of active terminals is, of course, highly application-dependent.

Logical Address Space

A.2.4 In previous releases, the maximum logical address space for a process was 16 megabytes. In the 2.3.0 release, the maximum logical address space for a process has been increased to 128 megabytes. Two **cband** parameters have also been added so that the system administrator can have some control over the working maximum because processes that demand large amount of memory can have a detrimental effect on the system as a whole.

The increase in logical address space also means that addresses of variables in the process stack segment are now seven hex digits long rather than only 6 hex digits. A user program that assumes addresses to be 6 hex digits long will no longer work correctly. However, you will probably not encounter such programs because that assumption is considered bad programming and it is avoided by most programmers.

Updated Libraries

A.2.5 The libraries have been updated in this release. Major changes have been made in the **curses** library, but changes to other libraries did not add new functionality. If you wish to use the new **curses** library in your application, you must relink your application. The new features of the **curses** library include the following:

- The standard **vi(1)** screen editor has been compiled to use the new **curses** library.
- Two new utilities convert termcap entries to terminfo and compare and print terminfo entries in alphabetical order. These utilities are **captoinfo(1M)** and **infocmp(1M)**.
- The **tic(1M)** compiler that compiles terminfo source has a new option to check for file errors in the terminfo source.

- The **tput(1)** utility has added capability to initialize a terminal or query the terminfo database.
- The new **curses** library contains many new **curses** functions, terminfo level functions, and termcap compatibility routines.
- The new **curses** library contains several new function keys and new line graphics functionality that is used to add line-drawing characters to the screen.
- Many new terminfo variables are also defined.

For more detailed information on the new functionality in the **curses** library, refer to **curses(3X)**, **terminfo(4)**, **captoinfo(1M)**, **tic(1M)**, **infocmp(1M)**, and **tput(1)** in your TI System V documentation.

T-ISAM Library

A.2.6 The T-ISAM library now features the following:

- The Fast Duplicates key flag has been added. The significant decrease in performance caused by large numbers of duplicate records is eliminated if this flag is selected for keys that allow duplicate values.
- The Start functions will now work correctly in cases where the T-ISAM default key values (tiflgs, tiflge, tiflgds, and tiflgde) have been modified since the creation of the key. This means that it is no longer necessary to rebuild all T-ISAM files when these default values are changed.
- An error is now issued if a child process attempts to access a file opened by an ancestor process. This has always been illegal, but T-ISAM previously did not detect this, resulting in potential file corruption.
- Automatic locks are now removed upon successful or unsuccessful completion of the next operation (unless multilocks are selected). Previously, the lock was removed only after successful completion of the next operation. This change was made for C-ISAM™ compatibility.
- Internal calls to **ldlong**, **ldint**, **stlong**, and **stint** have been removed. This eliminates a conflict introduced in T-ISAM System V, release 2.5.1 with a COBOL run-time internal routine that is also named **ldint**.
- Tighter verification of format is performed when reading node information from file. This means that T-ISAM will no longer slow down trying to process non-T-ISAM files that it has been given.
- The Sleep-on-Lock option did not always awake the process promptly when the record became available. This has been fixed.
- Several performance improvements have been made in Open and Read.
- A features compatibility check has been added. Open will not fail on files with future features not comprehended by this version of T-ISAM.

C-ISAM is a trademark of Informix Software, Inc.

Performance Monitor

A.2.7 The performance monitor (**pm**) utility provides data that can be used by a skilled system administrator to tune the performance of a system. Data can be displayed in a graphic, real-time basis, or performance data can be sampled on a periodic basis for later playback or report generation. The *Performance Monitor User's Guide* (TI part number 2555397-0001) manual provides details on the operation of **pm**.

The TI Educational Center has added a System 1500 performance tuning class to train system administrators in how to analyze the data provided by **pm** and other available tools and make changes to optimize system performance. For more details on this class, call the TI Educational Center at (512) 250-7000.

Kernel

A.2.8 File system buffer cache is now allocated proportionally across CPU boards based on the amount of memory on each board. See the new **cband** parameter described in Appendix C, Configurable System Parameters, in the *TI System V Administrator's Guide* for details on configuring file system buffers.

Networking

A.2.9 The following networking additions or enhancements are available in this release:

- DNIO/1500 System V — A new directory, /usr/ti/dnio, has been added. This directory contains TI System V, release 2.3.0 kernel-compatible parts and fixes for problems found in DNIO/1500 System V, release 2.0. The installation script of DNIO/1500 System V, release 2.0 automatically accesses this directory to get the modules required for proper operation of DNIO/1500 System V on a TI System V, release 2.3.0 system.

  NOTE: Do not delete the files in the /usr/ti/dnio directory if you are going to install DNIO/1500 System V.

- CCB download control — The code that is downloaded to the communications carrier board (CCB) to provide network access has been changed. Code that was originally in the module /etc/ccbnet is now split into five separate modules—/etc/ccbnet, /etc/ccbenet, /etc/ccbtokr, /etc/ccbxns, and /etc/ccbiop. Functionally, the code is the same. However, dividing the code provides a way to minimize memory usage and to configure the software that is downloaded to meet specific needs. The **devadm(1T)** utility was also changed to facilitate this modification, and the file /etc/ccbdev contains the additional CCB download modules.

Program Linking

A.2.10 The link editor, **ld**, has been modified to link programs so that the data segment starts on the next 4K-byte boundary following the end of the text segment. In previous releases, **ld** started the data segment on the next 1K-byte boundary.

TI System V, release 2.3.0 still supports programs linked with the previous version of **ld**, but a future release of the operating system may not. Therefore, it is strongly recommended that all user programs be relinked before 1990 with the new version of **ld**. If a program is adversely affected by the change to the starting address of the data segment, you either will have to fix the program or, as a temporary solution only, you will have to use a control file when linking the program to force **ld** to put the data segment on the next 1K-byte boundary following text.

Floating Point Units

A.2.11 In previous releases, the system issued a warning message on the console at boot time if the floating-point units (Motorola 68881 chip) on all of the CPUs were not the same revision level. This message signaled that processes could not migrate freely between the CPUs, causing load balancing problems.

In the 2.3.0 release, the system has been enhanced to remove this restriction. Processes can now be migrated freely between CPUs with floating-point units that have different revision levels, and even between one CPU with a Motorola 68881 chip and another with a Motorola 68882 chip. Load balancing could be affected slightly if you have processes that make extensive use of certain complex floating-point functions, but most processes can migrate freely.

CT2000 Support

A.2.12 Release 2.3.0 contains all the support necessary to operate the CT2000 8-mm tape drive on the System 1500. Tapes for this drive hold up to 2 gigabytes of data on a single tape. Like the half-inch tape, the 8-mm tape has a variable block size, and only one block at a time can be read or written. The **ioctl** system calls that work on the half-inch tape drive are also valid on the 8-mm tape drive.

Several utilities have been modified to support the CT2000:

- **devadm** now asks if the tape drive is an 8-mm, a half-inch, or a quarter-inch drive, and **devadm** can create device nodes for the CT2000 in the /dev/vt and /dev/rvt directories.
- **volcopy** now has a density called video that you can specify for the CT2000.

Before TI System V, release 2.3.0, software for the CT2000 tape drive was released as an update to anyone who purchased the drive. When release 2.3.0 is installed, the CT2000 software update should no longer be applied.

Utilities

A.2.13 The following utilities have been added or enhanced:

- **captoinfo** — This utility converts a termcap description into a terminfo description. This utility is new in this release and is used to create terminfo databases to run application linked with the new curses library.
- **cband** — The configuration partition format has changed from previous releases. In any previous release, the configuration partition contained one entry of the TI System V configuration module. Now, two entries are used for the configuration module. One entry is used to boot TI System V on a 68020 processor, and the other entry is used to boot TI System V on a 68030 processor.
- **cpisam** — Verification that a minimum number of command line parameters exists has been added.

- **devadm** — Several enhancements were made to this utility, which defines devices. This utility will now define virtual printers for virtual terminals. It will also define as many as 100 virtual terminals. The way in which a CCB is defined has changed somewhat to allow for other protocols to be defined on a CCB, **devadm** will define X.25 devices. For more information, refer to Section 3, Configuring Devices in the *TI System V Administrator's Guide*.

- **frisam** — The **−B** option has been added, problems with the **−S** and **−E** options have been fixed, and verification that command line option for record size is positive has been added.

- **infocmp** — The utility compares or prints terminfo descriptions in alphabetical order. It can be used to compare two compiled terminfo entries or print a terminfo description in a variety of formats. This new utility in this release is used for defining terminfo entries for **curses** applications.

- **mapisam** — The Fast duplicates key option has been added.

- **mkisam** — The Fast duplicates key option has been added and verification that command line option for record size is positive has been added.

- **mvisam** — Verification that a minimum number of command line parameters exists has been added, and the source and destination indexes may now be the same file.

- **opctl** — This utility has been enhanced so that it can be used to halt or resume a process. This is useful when a process seems to be running out of control. The utility can also be used to set the speed factor for a CPU, which affects the load balancing algorithm.

- **rdflush** — This utility copies to a disk-based file system the RAM disk files that are marked as flushable in the RAM disk list **rdlist**. This utility is used to write files on a RAM disk back to real disk. It is new to this release and was implemented to support the RAM disk.

- **rdload** — This utility fills the RAM disk with files from the real disk, and also reports the size of the RAM disk. This utility was designed to support the RAM disk.

- **sa2** — A new option was added to this utility. This option reports RAM disk activity and was added to support the RAM disk.

- **sadsp** — This utility, which displays the system activity on a screen, was enhanced to display certain RAM disk statistics. It displays the number of RAM disk reads and writes, and the average size of the RAM disk reads and writes. This functionality was added to support the RAM disk.

- **sar** — This utility has a new option to support the RAM disk. This utility will now report the number of data transfers to and from RAM disk per second as well as the number of 1K-byte blocks transferred to and from RAM disk per second.

- **tic** — This utility is used to compile terminfo source. A new option was added that simply checks the terminfo source file for errors, and does not compile it.

- **tire** — The following changes have been made:

  - The manual page on **tire** in Section 2, T-ISAM Utilities of *T-ISAM System V* has been rewritten. Please reread this clearer and more complete documentation.

- **tire** now verifies that the records read by each key are in the proper order. The new option **–t** causes **tire** to verify that each key matches the record.
- **tire** will now repair mismatched usage values in data and index file pairs following a **–t** verification.
- A bug prohibiting using **tire** on files with the no-exclusive option has been fixed.
- In the event of corrupted data, **tire** will now allow the user to skip over the bad spot and resume recovering data for a rebuild. **tire** will display potentially valid records beyond bad spots for user verification.
- **tire** now interprets data records that are too small to contain all keys as invalid data.

- **tput** — This utility now initializes a terminal and queries the terminfo database. This utility was enhanced to initialize a terminal using terminfo, output a terminal's reset strings, and output the long name of a terminal if an entry for that terminal exists in the terminfo database. These options were added to support the TI System V, release 2.3.0 **curses**.
- **update** — This utility has two new options. One specifies how often to flush the system buffer cache. The other allows you to specify file or directory inodes to be kept in memory.

vi Editor

A.2.14 Release 2.3.0 of TI System V includes the following enhancements to the **vi** editor:

- You can now use **vi** to edit files of virtually unlimited size.
- **vi** now supports line lengths of 1024 characters rather than 512 characters as before.
- **vi** has been compiled to use the new **curses** library.

NOTE: This new feature requires that you define terminal entries in the terminfo database instead of in the termcap file. Users who use unsupported terminals will need to create an entry in the terminfo database. For information on converting from the termcap to the terminfo database, refer to **terminfo**(4), **captoinfo**(1M), **tic**(1M), and **infocmp**(1M).

Release 3.2.0

A.3 The following paragraphs describe changes and enhancements included in release 3.2.0 of TI System V. Major enhancements include:

- Libraries
- T-ISAM library
- Utilities
- T-ISAM utilities
- Uninterruptible power supply (UPS)
- Line printer (LP) spooler
- Pipe file system
- Shadow password support
- Password aging support
- MTC support
- 928 terminal support
- 931 terminal support
- System 1505 support
- CT150 tape support
- NUPI-2 controller
- TCP/IP-NFS support
- Streams/TLI interface support
- Shared memory segment

Libraries

A.3.1 The following libraries are new or enhanced from the previous release.

- Security — The security library (libsec.a) has been included in this release to provide services to shadow password file interface. The following are the function calls for the security library:
  - **endspent** — Closes the /etc/shadow file when processing is complete.
  - **getspent** — Returns a pointer to the first shadow password structure in the /etc/shadow file. Successive calls are used to search the entire file.
  - **getspnam** — Searches the /etc/shadow file for the login name passed to it and returns a pointer to that shadow password structure.
  - **lckpwdf** — Locks a lock file to gain modification access to password files.
  - **putspent** — Writes a shadow password file structure to the /etc/shadow file.
  - **setspent** — Moves the pointer back to the first shadow password file structure to allow repeated searches.

- **ulckpwdf** — Releases a lock file after completing modification to a password file.

- Network Services — The Network Services library (libnsl.a) has been included in this release to provide services to the TI System V Transport Layer Interface. See the Security and Network Services Libraries section in the *TI System V Programmer's Guide* (TI part number 2540545-0001).
  - TLI — Transport Layer Interface library. This library provides a standard interface layer for performing network interconnect and communication.

- **curses** — The **curses** library has been enhanced to include new functions. See **curses**(3X).

- C — The C library has the following new or modified routines:
  - **cftime** — Returns a string representation of date and time given in integer form. This string can be easily internationalized.
  - **fstatfs** — Given a file descriptor, buffer, and file system type, this function returns a generic superblock that describes a file system. It returns a **statfs** structure that includes a file system type, a block size, the total number of blocks, the number of free blocks, the number of inodes and free inodes, and the volume and file system name.
  - **getmsg** — This is a new system call available in libc.a. Its purpose is to get a message from a stream.
  - **mount** — Modified to accept many more parameters to support the operating system file system switch code and Network File System (NFS).
  - **poll** — This is a new system call available in libc.a. It provides users with a mechanism for multiplexing input/output over a set of file descriptors that reference open streams.
  - **putmsg** — This is a new system call available in libc.a. Its purpose is to put a message on a stream.
  - **statfs** — Returns the same structure as **fstatfs**, but accepts a path name rather than a file descriptor.
  - **sysfs** — Returns different information about file system types, depending on the opcode given to the function.

T-ISAM Library

A.3.2 The T-ISAM library has been enhanced in the following ways:

- Achieved a performance improvement of about 10% (excluding system time).
- Write operations now check to see that the record is large enough to contain all keys. If not, the TIE_RECLEN error is issued.
- The add index operation now checks to see that all records are large enough to contain the key. The TIE_RECLEN error is issued if the records will not fit.

- Any T-ISAM operation to an open file will now terminate with the error TIE_REDEF if another process has redefined the file since the file was opened by the process receiving the error. The file is considered redefined if an index was added or removed or if global options were modified.

- Modified the delete index operation to allow deletion of primary index. The following changes support this new feature:

  - Caused add index operation to assign lowest unused index ID to the new index. This means that after primary index is deleted, the next index to be added will become the primary index. (The primary index is, by definition, the index with the ID of 1.)

  - Changed open logic to handle cases of no primary index and of no index at all. Previously, open logic positioned currency at beginning of primary index. Now, it will position at beginning of index with lowest ID. This will always be the primary index if the primary index exists. If there are no indexes, currency is undefined.

  - Modified various functions to comprehend the possibility of no primary index or of no index at all. This was made necessary because of the modification to the delete index operation to allow the deletion of the primary index.

  - The **tiindexinfo** function now returns the index ID in the k_kdid field of the **tikeydesc** structure when information is requested about a specific index.

Utilities

A.3.3 The following utilities have been added or enhanced:

- **cband** — Added support for several new configurable parameters and for the new **−a** and **−p** options.

- **chrtbl** — Generates character classification and conversion tables (for use by applications).

- **date** — Allows specifications of native language translations of month and weekday names.

- **devadm** — Several enhancements were added to this utility, which defines devices. The Logical Link Control to Ethernet (LLIEN) protocol was added as an option when defining a CCB with a local area network (LAN) option board. The LLIEN protocol is used by TCP/IP. **devadm** now supports the multidrop host adapter (MHA) option board for supporting multidrop terminal concentrators (MTCs) in a similar manner as it supports network terminal concentrators (NTCs). The NUPI-2 small computer systems interface (SCSI) interface board is supported in the same manner as the NUPI and MSC boards. **devadm**'s auto-configuration mode added an option for the number of terminal concentrators, NTCs or MTCs, to define for each appropriate CCB option card. For more information, refer to the section Configuring Devices in the *TI System V Administrator's Guide*.

- **df** — Modified to display both locally and remotely mounted file systems (NFS). The **−l** option has been added to report only on local systems.

- **ff** — New **−f** option to display the output of **ff** in the **frec**(1) input format.

- **find** — Added 2 new options. The **−mount** option restricts the search to the file system containing the directory specified. The **−local** option restricts the search to the local system.

- **frec** — Now supports file recovery from a tape that contains multiple file systems. (CT2000 only)

- **fsck** — New **−o** option to override the new default, which is to not check a file system that was properly unmounted. It uses a new state flag in the superblock to do this. This new flag requires that file systems that were created during previous releases must be checked with **fsck** before mounting the first time after installing 3.2.0. Any time a file system was not unmounted correctly, it must be checked before it can be mounted.

- **fsstat** — Reports on the status of a file system. It determines if the state of a file system is okay for mounting, if it is already mounted, or if it needs to be checked with **fsck**(1M) before it is mounted.

- **fstyp** — Determines a file system identifier of mounted and unmounted file systems. This script executes all commands in /etc/fstyp.d directory. Currently only a 1K-byte file system type is supported.

- **getoptcvt** — New utility to read shell scripts and convert them to use **getopts**(1) instead of **getopt**(1).

- **install** — Added three new options to allow the user to set the mode, user, and group of the installed file.

- **mail** — Will use TCP/IP **sendmail** if it is installed. Also added options **−w** to send mail without waiting for completion and **−h** to display a window of headers. Added commands are **h** to display headers, **a** to print messages that arrived during the mail session, **r** to reply to sender, **u** to undelete a message, and **y** to save.

- **mailx** — Will use TCP/IP **sendmail** if it is installed. Added **−U** option to convert uucp style addresses to internet standards. Also added the new command **mail** to mail a message and record a copy in a file named after that user.

- **mkdir** — Added a **−p** option that will create all nonexisting parent directories.

- **mkfs** — Change for the operating system's new file system switch code and the new file system state flag.

- **mnetecho** — This new utility echoes multidrop terminal concentrator (MTC) messages.

- **mnetstat** — This new utility displays multidrop terminal concentrator (MTC) link statistics.

- **mount** — Supports NFS file system mounting and the new format of /etc/mnttab.

- **mountall** — This is a new script that mounts all of the file systems in the /etc/fstab file. It is called from /etc/rc when proceeding to multiuser mode.

- **mtcdl** — This new utility downloads multidrop terminal concentrators (MTCs).

- **mtcdump** — This new utility enables or disables the dump capability of MTCs.
- **mtcreset** — This new utility forces a download of MTCs.
- **mtcstat** — This new utility lists the status of multidrop MTCs.
- **nawk** — This is a new version of **awk.** This version will become the default version of **awk** in the next major TI System V release.
- **pack** — New **-f** option to force the packing of a file.
- **packfs** — This utility rearranges the data blocks of all files within a specified file system so that each file resides in a contiguous region of the disk. Performance of the system can be significantly improved by having each file occupy a contiguous region of the disk. With **packfs**, a control file can be used, if desired, to specify the order of the files within the file system. This allows you to place frequently accessed files close to each other on the disk, improving performance even further.
- **passwd** — This utility has been enhanced to include new options to lock and delete passwords, display attributes for all entries, and modify password aging attributes.
- **pm** — Added support for the System 1505, streams, several new configurable parameters, the NUPI-2 disk controller, and the ability to play back a history log on a system other than the one where the log was produced.
- **prompts** — The following had all prompts removed:
  - **acct, cd, errstop, sadc, sar, shutdown**

  The following have prompts that were modified:
  - **devadm** — Removed prompt `Auto-Config Mode:`
  - **find**
    - Allows wildcard characters in `File Name Pattern to Match:`
    - Added new prompts `Search All Systems:` and `Search All File Systems:`
  - **strip**
    - Removed prompt `Reset Line Number Indexes:`
    - Added new prompt `Not Strip Scoping Information:`
  - **lp** — Rewritten to include all of the options available with the new **lp**(1M) command.
  - **lpadmin** — Rewritten to include all of the options available with the new **lpadmin**(1M) command.
- **prs** — New **-c** option to allow the user to give a cutoff date for the search.
- **ps** — The **ps** utility now supports the **-f** option. This allows the user to get the command line arguments of a process when it was started.

- **pwconv** — This utility creates and updates /etc/shadow with information from /etc/passwd.

- **pwunconv** — This utility converts the TI System V two-password file scheme (/etc/passwd and /etc/shadow) to a one-password file scheme (/etc/passwd). It updates /etc/passwd with password information from /etc/shadow.

- **rmdir** — Added a **-p** option that attempts to remove all empty parent directories in the given path name.

- **sdb** — Now disassembles floating-point coprocessor instructions. Other coprocessor instructions are now handled more accurately.

  All floating-point coprocessor data types, including extended-precision real and packed-decimal real are now supported by **sdb**.

- **sed** — Added a new flag to the substitute command to limit substitution to the *n*th occurrence in each line.

- **sh** — **getopts**(1) is a new internal Bourne shell command used to parse positional parameters and to check for legal options. It should be used in place of the **getopt**(1) command.

- **show** — This utility has changed from a 24-line by 79-column display to a 23-line by 80-column display.

- **spaid** — Now displays your licensed user count in addition to the software protection adapter (SPA) ID.

- **spooladm** — Rewritten to support the new LP spooler directory structure.

- **strace** — Facility to print streams trace messages. Writes all streams event trace messages from all drivers and modules to its standard output.

- **strclean** — Used to clean up the streams error logger directory.

- **strerr** — Receives error log messages from the streams log driver and appends them to a log file.

- **strnstat** — This new utility displays the StreamsNet statistics for one or all network interfaces.

- **tar** — This now has internal double buffering, which decreases the time for **tar** to archive files. The /etc/tar.default file contains the path name of the default **tar** device.

- **umount** — Modified due to the change in format of /etc/mnttab, which now contains complete device path names.

- **umountall** — This script unmounts all the file systems in /etc/mnttab except the root file system. It has a **-k** option that will send a kill signal, via **fuser**(1M), to processes that have files open on a file system. This script is called from **shutdown**(1M) and **sysboot**(1M).

- **units** — This is a new utility that converts quantities expressed in various standard scales to their equivalents in other scales.

- **usradm** — This now handles password aging, and the optional shadow password file.

- **volcopy** — Support was added for the 150MB cartridge tape drive. Please refer to **volcopy**(1M) in the *TI System V User's Reference* (TI part number 2540558-0001) before attempting to use **volcopy** on the CT150 to obtain the correct density for the tape.

- **what** — New **--s** option to quit after finding the first occurrence of the pattern in a file.

T-ISAM Utilities

A.3.4 The following is a list of changes to the T-ISAM utilities:

- **vfisam** — **vfisam** incorporates many of the changes T-ISAM users have requested. These include the ability to modify T-ISAM file options without rebuilding the entire file and to compress a file and free unused space for reuse by the file. **vfisam** runs without user intervention for those who wish to verify or fix T-ISAM files from a script or background process. It has a verbose option that displays when errors are found in the file and also shows the location and severity of the error.

- **tire** — Has been replaced by a new utility, **vfisam**. If it is necessary to have the old **tire** utility available, it can be obtained from TI-CARE Support Services.

CAUTION: If vfisam is run with the −c option to compact a file, the file cannot be accessed by programs or utilities linked with previous versions of T-ISAM. This includes all versions of the tire utility.

- All T-ISAM utilities (**cpisam, findisam, frisam, kiftisam, mapisam, mkisam, mvisam, toisam,** and **vfisam**) are combined into a single executable file with the original names linked to it. This is for conservation of disk and possibly memory space. The linkable object file, /usr/ti/tisam/isam.o contains all utilities, but not the T-ISAM library routines. If it is necessary to redefine the collating sequence for the T-ISAM library by rewriting the tiucoll module, /usr/ti/tisam/isam.o should be linked with the new T-ISAM library so that the utilities can access the T-ISAM files with the alternate collating sequence.

- **toisam** — Produces illegal record errors (100 − Illegal duplicate key value and 127 − Invalid record length) to be treated as soft errors. A warning is issued giving the offset in the sequential file, the record is not entered in the file, and the utility continues execution.

UPS

A.3.5 TI System V 3.2.0 now features uninterruptible power supply (UPS) support. The UPS software provides for automatic shutdown on loss of wall power to the system. You can configure your system to go into multiuser mode upon power restoration thereby providing a completely unattended and graceful restart during power outages.

A full description of the UPS support and its application is contained in the *TI System V Administrator's Guide*.

On TI 1500 systems that have internal UPS hardware support, the built-in UPS interface is disabled during an overtemp condition. See the **upsstat**(1T) man page for more information. You can, however, specify that overtemp be treated as a powerfail condition.

LP Spooler

A.3.6 The LP spooler for TI System 3.2.0 has been completely rewritten. This new spooler has a variety of new features including:

- Forms support
- Support for user-specified job priorities
- Allow/Deny on a per-user basis for individual printers or forms
- Automatic destination determination by the scheduler based on forms, character set, and content requirements
- Multiple print wheel/font support
- Enhanced support for printer error conditions (offline/no paper, etc.)
- New command line options for **lp**(1) to allow tty port settings on a per-request basis.

The print spooling mechanism now uses the **terminfo**(4) database to determine the control sequences for various settings such as line spacing, font selection, etc. By using the **terminfo**(4) database as a resource for this information, the spooler no longer utilizes the printer interface files that existed in previous releases. Be sure that your printers are properly defined to the **terminfo**(4) database. To assist in migrating to this new method of printer control, the old printer interface programs have been carried over to this release and will function as before, but their use is discouraged since this type of printer interface will not be supported in future releases. Some (TI-supported) printers have also been defined to the **terminfo**(4) database for you. You can find the printer-specific **terminfo** definitions in the file:

```
/usr/lib/terminfo_src/printer.ti
```

See **terminfo**(4) for more information on defining printer-specific **terminfo** entries.

The following is a list of issues regarding use of the new LP spooler.

The LP print service makes use of the system's node (site) name when generating names for temporary files. Be sure to have a node name that does not contain any special characters (like spaces) or you can experience problems when printing.

The LP print service no longer officially supports the remove after print (**-r**) option. This functionality was removed to be compliant with AT&T standards. You must now remove the file yourself after using the **-c** (copy) option or send the file to **lp** via standard input. To assist in migrating your applications to the new standard, you can set the environment variable OLDLPCOMPAT to regain the remove after print option.

To have the **-r** option function as remove after print, do the following (this example assumes you are using the Bourne shell, /bin/sh):

```
OLDLPCOMPAT=y
export OLDLPCOMPAT
lp -r ...
```

The LP print service provides vastly increased capabilities and therefore incurs a considerable amount of overhead when processing print requests. These delays can become very noticeable, especially on heavily loaded system. Most of the overhead falls within the processing of the standard interface program. If you find the need to optimize the performance of your LP system, the largest amount of performance gain can be achieved by optimizing the interface script. Be aware that you will most likely lose some functionality in doing so.

For a full description of the LP spooler, see the Printer Spooling System section in the *TI System V Administrator's Guide.*

Printer Error Checking Considerations

A.3.6.1 Delays for offline, lost XONs, etc., are checked in the standard interface file, /usr/spool/lp/model/standard. This interface is shipped with this delay checking disabled since the proper parameters are site-dependent. If you desire full error checking on the part of the spooler, you will need to edit this interface file and select the appropriate delay time. Look for the section of the file starting with the following:

```
if [ -z "${FILTER}" ]
then
        #####
        ....
```

Note that if a request uses a filter to process the print data, it is then up to that particular filter to provide checks for delays and offline conditions.

Pipe File System

A.3.7 Release 3.2.0 of TI System V allows a separate file system to be used exclusively for unnamed pipes that are created by processes. Prior to this release, the root file system was used for these pipes.

There are several reasons why a pipe file system was developed. The main reason is that some of the add-on packages for TI System V (like TCP/IP) create and heavily use many pipes. If the system crashes or stops unexpectedly, many corrupted pipes will remain in the file system that was used to store these pipes. If the pipe file system is also the root file system, you must reboot after fixing the corrupted pipes. You may also miss real corruption in the root file system if there are a large number of messages about pipes. Please refer to File Systems and Pipes section in the *TI System V Administrator's Guide* for more detailed information on the pipe file system.

A pipe file system partition is shipped on the tape with release 3.2.0. The system default in the configuration bands is to use the pipe partition as the pipe file system. If you decide not to use a pipe file system, you must change your configuration bands to use the root file system for pipes. In other words, you must change the **cband** parameters Pipe partition slot, Pipe partition unit, and Pipe partition name to the same as the root partition slot, unit, and name. The system will not boot if you have no pipe partition and do not change these parameters. The boot process will give you a configuration verification error and prompt you for the correct pipe parameters. After the initial boot and defining your devices, you must use the **cband** command to permanently change these parameters. If you decide to use the pipe partition as the pipe file system, the system will boot normally.

Please refer to the File Systems and Pipes section in the *TI System V Administrator's Guide* for more information about pipes in general and the pipe file system in particular.

Shadow Password Support

A.3.8 This release of TI System V optionally allows the system administrator to hide password-encrypted strings and password aging information for all users in a file readable only by the system. This file is called the shadow password file.

Utilities are provided to create and maintain the shadow password files.

See User Management in the *TI System V Administrator's Guide* for details.

Password Aging Support

A.3.9 This release of TI System V allows the system administrator to optionally require selected users to change their passwords on a periodic basis. The administrator can also prevent selected users from changing their passwords at all. Other convenient utility functions for password control are also provided.

See User Management in the *TI System V Administrator's Guide*.

MTC Support

A.3.10 The MTC (CK802) provides new terminal interconnect capability for 1500 MP and 1505 systems. The MTC provides a compact, low-cost, distributed terminal interconnect that allows multiple I/O devices to be connected to the system. A new CCB option board MHA (CK202 for 1500 MP and CC202 for 1505) provides the system interface to the distributed MTCs over twisted pair cable. Up to eight asynchronous serial devices can be connected to one MTC. These devices can be a mixture of terminals, printers, VDTs with attached printers, and full-duplex asynchronous modems. Device connections to the MTC are made using Modified Modular Jack (MMJ) connectors and 6-wire, flat (telephone-style) cable. MMJ-to-25 pin adapters are available for attaching EIA 232 devices to MTCs.

NOTE: The parallel printer option for the MHA is not supported.

---

928 Terminal Support

A.3.11 Support for the TI Model 928 video display terminal (VDT) is added to this release. The 928 VDT is a low-cost, high-performance, ANSI-compatible display terminal. The 928 VDT keyboard is an IBM™ 101-style key layout with enhancements. The 928 uses American National Standards Institute (ANSI) X3.4 (ASCII) characters and the International Standards Organization (ISO) Latin-1 multinational character set. It uses host to VDT controls and commands compatible with the following national and defacto standard VDT definitions.

ANSI X3.64
DEC™ VT320 VDT
DEC VT220™ VDT
DEC VT100™ VDT
DEC VT52 VDT

931 Terminal Support

A.3.12 The terminal names for the TI931 terminal types have changed in the terminal descriptor files for TI System V 3.2.0 release. The following describes these modifications:

```
t9 - TI924 terminal in TI931 mode
x5 - TI931 terminal
```

x5 was created to further enhance setting TI931 terminal attributes.

System 1505 Support

A.3.13 Release 3.2.0 of TI System V adds support for the new System 1505. The System 1505 is a single-board computer that is based upon the Motorola 68030 CPU chip. The board also includes the functionality of a NUPI-2 disk controller and of a CCB.

No changes are required to run existing user applications on the System 1505. The System 1505 is binary-compatible with the other models in the System 1500 family of computers.

The autocall unit (ACU) is not supported on the System 1505.

Several communication add-on products require a new release to support the 1505. The following releases are required for the 1505:

Product	Release Required (or later)
3780/2780 System V	1.4
3270 SNA System V	1.5
3770 SNA System V	1.1
X.25 System V	1.2

See the System 1505/1507 Considerations paragraph of Section 1 in the *TI System V Administrator's Guide* for additional information.

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DEC, VT100, and VT220 are trademarks of Digital Equipment Corporation.

CT150 Tape Support

A.3.14 A CT150 1/4-inch tape drive is available for the System 1500 in place of the CT60 and is shipped standard with a System 1505. Tapes for this drive hold up to 150 megabytes of data. See the following table for tape densities and capacities:

Table A-1 Tape Cartridge Characteristics for CT150

3M Tape Cartridge Type	DEI Tape Cartridge Type	CT150 Characteristics For Tape Type		
		Functions	**Formats**	**Write Capacity**
DC6150	Series II Gold Plus™	Read/Write Read Only	QIC-150(h) QIC-24 and QIC-11(h)	150 Megabytes
DC600A	Series II Gold™	Read/Write Read Only	QIC−120(h) QIC-24 and QIC−11(h)	120 Megabytes
DC300XL	Series II Silver™	Read Only	QIC-24 and QIC-11(h)	

The CT150 reads the tape cartridge in the density in which it was written.

CAUTION: The CT150 can read a tape cartridge written by a CT60 in either QIC-24 or QIC-11 format. However, a CT60 cannot read a tape cartridge written by a CT150 because the CT60 cannot read QIC-150 or QIC-120 format. Do not write a cartridge with a CT150 with the intention of having it read with a CT60 drive.

CAUTION: Higher-capacity 1000-foot cartridges have become available and can be used successfully with the CT150. Use of such cartridges for more than a few hundred hours, however, can reduce the reliability of the CT150 in operations with the standard 600-foot cartridges.

NUPI-2 Controller

A.3.15 The NUPI-2 is an SCSI-only host controller board. It is set to default SCSI formatter address 5 and has block major number 3 and character major number 25. The following table shows the NUPI-2 formatter and unit numbers for each logical unit.

Series II Gold Plus, Series II Gold, and Series II Silver are trademarks of Data Electronics Incorporated.

Table A-2

Logical Unit, Formatter, and Unit Numbers

Logical Unit Number	NUPI-2 Formatter	NUPI-2 Unit
0	0	0
1	0	1
2	1	0
3	1	1
4	2	0
5	2	1
6	3	0
7	3	1
8	4	0
9	4	1
A	6	0
B	6	1
C	7	0
D	7	1

Device default logical unit numbers for devices connected to the NUPI-2 are set by TI manufacturing processes and are as follows:

Default Logical Unit Numbers for the NUPI-2

Disk	0
8-mm video tape	2
Cartridge tape	6
9-track tape	C

TCP/IP — NFS Support

A.3.16 To support add-on packages such as TCP/IP and NFS, changes were made to the TI System V operating system, utilities, and libraries. Some of these changes are as follows.

TI System V, release 3.2.0, contains new features to support add-on networking products. This includes the Streams device driver facility, the File System Switch, and Transport Layer Interface (TLI) library.

These facilities are used by the add-on products TCP/IP System V and NFS System V.

- Streams — Streams is a facility for writing communication device drivers in the kernel. This facility is used by TCP/IP System V and NFS System V. It is also possible for end users to write their own stream modules or drivers.

- TCP/IP — The Transmission Control Protocol/Internet Protocol (TCP/IP) System V add-on product. This product is based on the Department of Defense (DOD) standard protocols and various defacto standard protocols from the Berkeley BSD 4.3 release. Some of the services provided with TCP/IP include File Transfer Protocol (FTP), **telnet** and **rlogin** virtual terminal, Sendmail, the Berkeley r-utilities, and the Berkeley Sockets library.

- NFS — The NFS System V add-on product allows your machine to have file systems mounted from other machines and for other machines to mount your file systems. Files can then be accessed as though the files were on the local file system.

  NFS System V also provides a complete set of SUN™ Open Network Computing (ONC) services, including Remote Procedure Protocol (RPC), eXternal Data Representation (XDR), Lock Manager, Remote Execution (REX), and yellow pages (YP).

Shared Memory Segment

A.3.17 In the TI System V 3.2.0 release, more utilities now use shared memory segments. These include **tar**(1) and **mtcdl**(1T) in addition to the previous **tcdl**(1T) and **netcp**(1T). It is possible to run out of shared memory segments. If this occurs, increase the cband parameter.

Release 3.2.2

A.4 The following paragraphs describe changes and enhancements included in release 3.2.2 of TI System V. Major enhancements include:

- System 1507 support
- Enhanced field edit library
- Larger page size
- Streams-based pseudo-tty driver
- 64-megabyte RAM upgrade
- Multidrop host adapter (MHA) parallel printer support
- Multidrop terminal concentrator (MTC) automatic redownload
- Miscellaneous

For additional information about each topic, refer to the relevant manuals in your TI System V documentation.

System 1507 Support

A.4.1 Release 3.2.2 of TI System V adds support for the new System 1507. The System 1507 is a single-board computer that is based on the Motorola 68040 CPU chip. The board also includes the functionality of a NUPI-2 disk controller and of a communications carrier board (CCB).

Binary Compatibility

A.4.1.1 No changes are required to run most existing user applications on the System 1507. The System 1505 and System 1507 680X0 application processors are object-code compatible with other System 1500 computer application processors, which makes system expansion more economical by allowing you to retain software and peripherals as you upgrade to larger systems.*

SUN is a trademark of Sun Microsystems, Inc.

* TI cannot guarantee that any specific applications software may not need minor modifications.

However, you should consider the following technical items regarding the way the 68040 chip can affect applications that were written to execute on earlier Motorola chips:

- The Motorola 68040 chip is significantly faster, so applications that used looping to implement timing delays may need to be changed to loop more times.

- Applications that build (or modify) instructions in the data (or stack) segment, and then branch to those instructions, may fail to execute correctly. Such applications may have worked on previous chips only because the on-chip caches were small (256 bytes) and consequently were easily flushed. The on-chip caches of the Motorola 68040 are significantly larger (4K bytes). Building or modifying instructions in the data (or stack) segment causes the on-chip data cache to have the new or modified instruction. The on-chip instruction cache may still retain the old instruction from the last time that program counter was in that section of memory. A new C run-time routine, **cflsh68k()**, is available for applications to call if they specifically need to have the on-chip caches flushed. The routine requires no arguments and does not return a value. It will flush the on-chip caches regardless of the type of CPU board in use. If used with a version of the operating system prior to 3.2.2, it will return to the caller without doing anything.

The run time used by COBOL/85 System V applications builds instructions in the data segment (by loading the user application there), modifies certain instructions (to perform relocation), and then branches into the data segment. If you want to run COBOL/85 System V release 2.2 or 2.1 on a System 1507, you *must* obtain a patch to the run time from TI Customer Support. COBOL/85 System V release 2.0 and COBOL System V release 1.0 are *not* supported. COBOL/85 System V release 2.3 comprehends the features of the System 1507 and does not require the patch.

Other Considerations

A.4.1.2 The following add-on product releases are required for the System 1507:

Product	Release Required (or later)
3780/2780 System V	1.4
3270 SNA System V	1.5
3770 SNA System V	1.1
X.25 System V	1.2

See the paragraph titled System 1505/1507 Considerations in Section 1 of the *TI System V Administrator's Guide* for additional information.

NOTE: The RS366 autocall unit (ACU) interface is not supported on the System 1507.

Enhanced Field Edit Library

A.4.2 Field edit now supports access from TCP/IP (telnet), X terminals, and pseudo-tty drivers. It does this by making a decision when **FE_open** is executed. If the file descriptor passed to **FE_open** points to an intelligent terminal controller (CCB, network terminal concentrator (NTC), or MTC), field edit executes as it always has on the System 1500. If the file descriptor points to a pseudo-tty driver, field edit executes entirely as a library in the host processor. Because this new library combines both access methods, it is called *combined field edit*. The library providing this support is somewhat larger, and applications linked with the library require more disk storage.

The old library is being shipped in this release to ease any potential problems in transition. To relink with the 3.2.2 field edit library, simply find the link option string **−lfe** and change it to **−loldfe**. You can determine which field edit library is linked with an application by executing **what** on the linked object file and using **grep** to find the word *COMBINED*. For example, the command line `what /usr/src/cob23/rts32 | grep COMBINED` produces output similar to the following:

```
FE_open.c       1.9  90/08/13 COMBINED FE 3.2.1
FE_read.c       1.10 90/10/05 COMBINED FE 3.2.1
```

COBOL/85 System V run time, when rebuilt with the TI System V release 3.2.2 field edit library, automatically incorporates combined field edit. This causes the COBOL/85 System V run time to be larger in size. If you do not need TCP/IP System V *and* you are concerned about the additional size, edit the file $COBDIR/coblib/liblist and change the line `c-lfe` to `c-loldfe`.

Larger Page Size

A.4.3 The memory page size used for all prior releases of the TI System V operating system has been 1024 (1K) bytes. The Motorola 68040 chip used in the System 1507 supports a minimum 4K-byte page size. Consequently, the virtual memory subsystem has been changed to use 4K-byte pages. The block size on disk, however, remains at 1K byte so all files in all existing file systems are completely usable. The change to 4K-byte pages should be transparent to most applications, but there are some issues that must be comprehended:

1. Shared memory segments must be attached at 4K-byte boundaries. Most applications that use shared memory segments do not specify a particular address to attach the shared memory segment, but allow the operating system to choose the address. In this case, the operating system will choose a value that is a multiple of 4K bytes, and there is no problem. If the application specifies a particular address that is not a multiple of 4K bytes, the **attach** system call will fail and an error message will be written to the system log. The application must be modified to use an address that is a multiple of 4K bytes.

   Also, an application that uses two or more shared memory segments and allows the operating system to choose the address at which to attach each segment might not function correctly if the application assumed that the operating system would choose an address for the second shared memory segment that was the next 1K-byte boundary after the last byte of the first shared memory segment. Each segment must begin at a logical address that is a multiple of 4K bytes. Such a program would not receive an error on any **attach** system call, but will behave in an unpredictable way.

2. When an application makes its first reference to a 4K-byte page of its logical address space, a page-fault occurs and the operating system must bring in the instructions or data that belong in the 4K-byte page from the executable file. Since the disk block size is only 1K byte, this may result in four separate disk I/Os, but these will be combined into one disk I/O if the four 1K-byte blocks are contiguous on disk (see **packfs**(1T)). Thus, significantly better *load times* will be realized if the executable file is contiguous on disk.

3. Certain performance-monitoring utilities, such as **ps**(1) and **sadsp**(1T), report paging data differently than in past releases of TI System V. For example, if you use the **−l** option when running the **ps** utility, the RSSZ (resident set size) and SZ (size) fields now show pages in increments of 4K bytes instead of 1K bytes.

Streams-Based Pseudo-tty Driver

A.4.4 Release 3.2.2 now includes support for a streams-based pseudo-tty driver. Note that this is not the pseudo-tty driver used with TCP/IP or DNIO virtual terminals. It is not necessary to configure the system for the streams-based pseudo-tty driver unless it is required by the installation instructions for a particular add-on package. Third party applications requiring a pseudo-tty driver should use the streams-based pseudo-tty driver, since it will continue to be shipped as part of the operating system and not as part of an add-on package.

64 Megabyte RAM Upgrade

A.4.5 Release 3.2.2 provides support for up to 64 megabytes of memory on a System 1505, System 1507, or a Motorola 68030 based CPU board that can be used in other System 1500 models.

MHA Parallel Printer Support

A.4.6 Release 3.2.2 includes support for parallel printer connections to the multidrop host adapter (MHA) option board for the communication processor. The **devadm** utility now can be used to configure a parallel printer connected to an MHA.

MTC Automatic Redownload

A.4.7 In Release 3.2.2, the MTC software has been enhanced to support automatic recovery of MTCs that have been affected by a temporary loss of power or disconnection. When an MTC has not responded to the system for about five seconds, due either to lost power or a disconnected cable, the MTC status is changed to TIMEOUT, as displayed by the **mtcstat** utility. A series of messages about the lack of response from the MTC are written to the CCB log file in /usr/adm/comlog.

At this point, the MTC(s) in a TIMEOUT state are placed on a *slow poll* list, where they are polled by the system every 30 seconds. If getty processes are running on the terminals controlled by the MTCs, a series of `cannot open ttyxx: errno 19` messages are written to the system console (once every 30 seconds) until either the MTC is brought back online or the getty processes are turned off in the /etc/inittab file. The slow poll of the MTCs will continue indefinitely; thus, to optimize system performance, use **devadm -i** to logically turn off any MTCs that will be offline for an extended period of time.

When the MTC is brought back online, either by having power restored or the cable reconnected, it executes self-test and begins responding to polls from the host. The MTC is uploaded, if dumps are enabled, and the MTC state is changed to UPLDING. The MTC is then redownloaded, and the state is changed to DNLDING.

When the download completes, log messages are written to the MTC download log file in /usr/adm/comlog, and the MTC is returned to normal operating state. If getty processes are respawned on the terminals connected to the MTC, the login screen reappears on those terminals and normal operations can resume. Note that if attached printers are connected to terminals on that MTC, run **initterm p** to reinitialize those printers.

Miscellaneous

A.4.8 The following miscellaneous new features have been added to release 3.2.2:

- T-ISAM now allows opening the T-ISAM file for *input only* if the user has read but not write privileges for the data file. The user still must have both read and write privileges for the index file. (In the past, you needed both read and write privileges for both the data and index files.) If the user does not have write privileges to the data file, no record locks can be applied.
- In cases where the logical end of file (EOF) of a T-ISAM file precedes the physical EOF (after running **vfisam** with the **-c** option), **cpisam** will now copy only to the logical EOF, thus reducing the disk allocation for the copy of the file. This new feature allows you to recover disk space from previously fragmented files.
- A new function, **nap**(3C), has been added. **nap** is used by programs to suspend execution for very short periods of time. The **sleep**(3C) function has a 1-second granularity and may not have been sufficient for some types of programs. With the **nap** function, it is now possible for a program to request suspension in milliseconds. Note that the resolution is based on the system clock, which has a 10-millisecond resolution.
- Options have been added to the **killall**(1M) utility to enhance timing control. With options, **killall** can delay the shutdown procedure, allowing ample time for processes with extended cleanup needs to properly exit.
- The **chmod**(1) command supports a previously undocumented feature regarding permissions. In addition to protecting memory residency of executable files, you can use the *save text image* permission setting (also known as the *sticky bit*) on a directory to prevent the removal of files from that directory by anyone other than the owner of the directory or the super-user, even if other users have write permission in that directory. Only the super-user or the owner of the directory can set this mode. To enable this feature, add octal 1000 (absolute mode) to the permissions value, for example, `chmod 1755 dir_name`.

Release 3.3

A.5 The following paragraphs describe changes and enhancements included in release 3.3 of TI System V. Major enhancements include:

- Shared libraries
- Mirrored disks
- Network spooler
- CD-ROM file system
- Dynamic buffer cache
- Transactional logging

- 525MB tape drive
- CP II
- Basic Networking Utilities (uucp)

For additional information about each topic, refer to the relevant manuals in your TI System V documentation.

Shared Libraries

A.5.1 A shared library allows all the programs that link with a library to share a single copy of the library code at run time. Without shared libraries, every library routine that a program calls occupies space in the executable file. Larger executables require larger memory spaces in which to run. Moreover, every program consumes memory for its own copy of every library routine it calls. Thus, sharing the library code provides significant savings in disk space and memory usage. The libraries to be shipped as shared libraries in the 3.3 release include the following:

- Standard C (libc)
- T-ISAM (libtisam)
- Network services (libnsl)

The following documents discuss this feature:

- *TI System V Programmer's Guide,* Sections 1 and 8
- *TI System V Administrator's Guide,* Section 8 and Appendix C
- *Network Programmer's Guide,* Section 2
- The following man pages:

  chkshlib(1)
  mkshlib(1)

Mirrored Disks

A.5.2 A mirrored partition contains an exact duplicate of data on two partitions for the purpose of recovery in the event of hardware failure. If a disk containing one copy of the data in the mirrored partition has a hardware (disk) failure, the other copy can continue to be accessed by the system until repairs can be made to the failed unit. All or part of a disk can be mirrored by mirroring each disk partition separately. File systems as well as other partition types can be mirrored on different disk types and controller types.

The following documents discuss this feature:

- *TI System V Administrator's Guide,* Sections 4 and 7
- The following man pages:

  mirupdate(1T)
  mkmirr(1M)

Network Spooler

A.5.3 On systems linked by TCP/IP, users can be given access to printers on other systems directly through the **lp** utility and related utilities. Dummy local printers are set up that refer to specific remote printers. Users print to the dummy local printer using the **lp** utility just as they would print to a local printer. The print spooler automatically transfers the file and destination information to the spooler on the remote machine. The remote spooler queues the print request with other local and remote requests. The principal utilities affected are **lpadmin, lp, lpstat,** and **cancel.**

The following documents discuss this feature:

- *TI System V Administrator's Guide,* Section 15
- The following man pages:

accept(1M)
cancel(1)
disable(1M)
enable(1M)
lpmove(1M)
reject(1M)
lp(1)
lpstat(1)
lpadmin(1m)
lpforms(1M)
lpsched(1M)
lpusers(1M)
lpmove(1M)

CD-ROM File Systems

A.5.4 An interface has been provided to make a CD-ROM device look like a normal TI System V file system and allow access in the same manner as a standard read-only UNIX file system. The CD-ROM file system supports the most commonly used industry standards (High Sierra and the ISO-9660 (level 1) formats).

CD-ROM devices lend themselves to applications that require large amounts of static data to be distributed to a large number of users (e.g., distribution of parts manuals to automobile dealerships, and distribution of drug catalogues to doctors and pharmacies). Besides providing a much more compact and cost-effective medium than printed material, CD-ROMs provide the important advantage of allowing computerized searches to be performed on the data.

The following documents discuss this feature:

- *TI System V Administrator's guide,* Sections 3, 4, and 5
- The following man page:

mount(1M)

Dynamic Buffer Cache

A.5.5 The UNIX operating system has two major mechanisms for managing the main memory for caching disk-based information First, the file buffer cache (FBC) is used to cache file-based information in main memory. Second, the virtual memory (VM) system is used to keep the active portion of program address space (code and data) in main memory. Each of these two managers has a portion of the total main memory under its control for keeping in memory the items that are frequently accessed.

Allocation of memory to each of these functions in earlier versions of TI System V was resolved by static specification of the size of the file buffer cache and size of program memory. The dynamic buffer cache provides a dynamic solution to this memory allocation problem such that the allocation of memory between the two managers is optimized for the load on the system. The allocation of memory may change over time as the system load changes, thus the optimal amount of memory for each function will be allocated on a real-time basis by the operating system.

The following documents discuss this feature:

- *TI System V Performance Monitor User's Guide,* Section 2
- *TI System V Administrator's Guide,* Sections 8, 17, and Appendix C

File System Transactional Logging

A.5.6 The Transactional Log facility makes the UNIX file system reliable by logging all changes to a log partition. This facility also improves performance by reducing the amount of disk output performed by the **sync** command. In the event of an unscheduled system shutdown (such as a power failure), all changes logged prior to the shutdown will be automatically restored when the system is restarted.

The following documents discuss this feature:

- *TI System V Administrator's Guide,* Section 8
- The following man page:

  mklg(1T)

525MB Tape Drive

A.5.7 This drive is capable of reading 60/150/525MB tapes and writing tapes in 150/525 MB formats. It can be used in place of (or in addition to) the CT150 for media distribution and backups. For small systems, it can be used for unattended backups.

The following documents discuss this feature:

- *TI System V Administrator's Guide,* Sections 3 and 4
- The following man page:

  devadm(1T)

CP II

A.5.8 CP II is a higher performance communications processor for the 7- and 16-slot 1500 systems.

Except for the enhanced performance, use of the CP II instead of another communication processor board should be largely transparent.

Basic Networking Utilities

A.5.9 A major upgrade to uucp is included in release 3.3 of TI System V and, in accordance with common industry practice, this software is now being referred to as the Basic Networking Utilities (BNU).

The following documents discuss this feature:

- *TI System V Administrator's Guide,* Section 12
- The following man pages:

ct(1C)
cu(1C)
nlsadmin(1M)
uucheck(1M)
uucico(1M)
uucleanup(1M)
uucp(1C)
uuencode(1C)
uugetty(1M)
uustat(1C)
uuto(1C)
uux(1C)
uusched(1M)
Uutry(1M)
uuxqt(1M)

New Utilities

A.5.10 The following paragraphs describe the new utilities offered by TI System V release 3.3. The man pages for these utilities are provided in the *TI System V User's Reference, Volume 1* and *Volume 2*. In addition, the *TI System V Administrator's Guide* offers further discussion on some of the following utilities:

active

A.5.10.1 The **active** utility helps system administrators determine which users are logged in and what utilities they are executing. It presents a real-time display of user and login processes on the system. Each user login name, tty number, and active status are located in a separate box on the main screen. This utility includes commands to search for open user files and processes run by users, as well as many other options.

chkshlib

A.5.10.2 The **chkshlib** utility checks for compatibility between files. Input files can be combinations of host shared libraries, non-stripped target shared libraries, and non-stripped executable files. A file is compatible with another file if every library symbol in the first file that should be matched is matched in the second file (i.e., the symbol exists and has the same address in both files).

col

A.5.10.3 The **col** utility performs the line overlays implied by reverse line feeds (ASCII code ESC-7), and by forward and reverse half-line feeds (ESC-9 and ESC-8). It is particularly useful for filtering multicolumn output made with the **.rt** command of nroff and output resulting from use of the **tbl**(1) preprocessor.

fsfmon

A.5.10.4 The **fsfmon** utility is a daemon that monitors specified (or all) mounted file systems for the percentage of space used.

mirupdate

A.5.10.5 The **mirupdate** utility is a daemon that continuously updates mounted or opened mirrored partitions to have a good state if no writes are outstanding.

mklg

A.5.10.6 The **mklg** utility initializes a log partition for use by the transactional logging facility.

mkmirr

A.5.10.7 The **mkmirr** utility is used to create a mirrored partition.

mkshlib

A.5.10.8 The **mkshlib** utility makes a shared library.

nlsadmin

A.5.10.9 The **nlsadmin** utility provides network listener service administration. It administers the network listener process(es) on a machine.

uucheck **A.5.10.10** The **uucheck** utility checks for the presence of the uucp system required files and directories. It also checks for some obvious errors in the Permissions file (/usr/lib/uucp/Permissions).

uucleanup **A.5.10.11** The **uucleanup** utility provides uucp spool directory clean-up. It scans the spool directories for old files and takes appropriate action to remove them in a useful way.

uuencode **A.5.10.12** The **uuencode** utility encodes a binary file for transmission via mail.

uudecode **A.5.10.13** The **uudecode** utility decodes a file previously encoded using **uuencode.**

uugetty **A.5.10.14** The **uugetty** utility sets terminal type, modes, speed, and line discipline. The **uugetty** utility is similar to **getty**(1m), but changes have been made to support using the line for **uucico, cu**, and **ct.**

uusched **A.5.10.15** The **uusched** utility is a scheduler for the uucp file transport program.

Uutry **A.5.10.16** The **Uutry** utility is a shell that is used to invoke **uucico** to call a remote site.

uuxqt **A.5.10.17** The **uuxqt** utility executes remote job requests from remote systems generated by the use of the **uux** command.

Utility Updates **A.5.11** Some utilities in release 3.3 have been expanded with new options to further enhance their functions:

AT&T Compatibility **A.5.11.1** Some utilities have been updated in release 3.3 to make them compatible with AT&T UNIX System V release 3.2. Many of the changes will be transparent to the user. However, some of the changes include new command line options and features. The following utilities have been updated for this release of TI System V: **cpio, errpt, getty, labelit, mkfs, shutdown, sort, tar**, and **vi.** Refer to the manual pages for each of these utilities for more details on these updated features.

8-Bit Character Support **A.5.11.2** Some utilities have been updated to allow support for 8-bit characters, such as **cat, ed, egrep, expr, find, grep, ls, pg, sed, sort, vi**, and the **curses** library. These commands no longer use the eighth bit of each byte. This change enables these commands to handle code sets where all 8 bits are used. Because ASCII only uses 7 of the available 8 bits in a byte, some commands made special use of this eighth bit; other commands assumed that if the bit was set, the byte was invalid. Most of the other commonly used commands, such as **sh** (the shell), already support 8-bit code sets.

X-Window Size Comprehension **A.5.11.3** Several utilities have been updated to comprehend the variable screen sizes available when using X terminals. The following utilities can handle variable numbers of rows on a screen: **dfm**(1T), **more**(1), **show**(1T), **showhex**(1T), **tx**(1T), **usradm**(1T), and **vi**(1). In addition, **show, tx,** and **vi** can handle variable numbers of columns on a screen.

If the particular xterm being executed is to a remote system, the LINES and COLUMNS environment variables must be set to the new window size for the utilities to work properly. For example, if the xterm window has been expanded to 40 rows by 100 columns, execute the following in the business shell to set the environment variables:

```
setenv LINES 40
setenv COLUMNS 100
```

devadm **A.5.11.4** The **devadm** utility now supports mirrored disks, CD-ROM file systems, CT525 tape drives and CP II boards.

The syntax of several command line mode options has changed. The way the TTYs and LPs are added to CCB async options and terminal concentrators (NTCs and MTCs) has changed. The way that CCB option ports are defined and the values used to specify the various options have changed.

Additional information is displayed for multivolume file systems.

The following documents discuss these features:

- *TI System V Administrator's Guide,* Section 3
- The following man page:

  devadm(1T)

man **A.5.11.5** The **man** command has been modified in this release of the operating system to print entries for manual pages in the *TI System V User's Reference* manual as well as the *TI System V Programmer's Reference* manual. In addition, the location of the manual pages has changed from the /usr/catman directory to the /usr/man directory. The /usr/catman directory still exists on the system for backward compatibility with other packages which keep their manual pages there, such as TI X/Motif. See the **man**(1) manual page in the *TI System V User's Reference* manual for more information on new options for the **man** command.

netecho **A.5.11.6** The **netecho** utility was changed to support local and remote loopback testing of remote NTCs connected with V.35 modems.

netstat **A.5.11.7** The **netstat** utility has expanded its output format to display more network information. See the **netstat**(1) man page for a detailed description.

opctl **A.5.11.8** The **opctl** utility has a new option which allows you to change the nice value of a running process. See man pages for **opctl** and **nice**.

sar **A.5.11.9** The **sar** utility has a new option, **-p**, which displays CPU memory usage, and option **-z**, which displays swap space information.

The **lstat** system call was added to this release so that applications previously using the **stat** system call that do not want to go through a symbolic link can be changed to use the **lstat** system call. The **stat** system call will be changed in a future release to follow through a symbolic link if it exists.

Library Upgrades

A.5.12 Release 3.3 includes the following library upgrades:

libc, libm, libgen, libld, libPW	Upgraded to AT&T System V release 3.2
libm881	New in release 3.3. A coprocessor version of the math library
libc, libnsl, libtisam	Now shipped in both shared and non-shared versions

Using Shared Libraries

A.5.13 To link with the shared version of the C library, include -lc_s as the last library name on the compiler or linker command line. For example:

```
          gcc prog.c -lm -o prog
becomes→  gcc prog.c -lm -lc_s -o prog
```

To link with the shared rather than the unshared version of any other library, simply add _s to the library name on the compiler or linker command line. For example:

```
          gcc prog.c -ltisam -o prog
becomes→  gcc prog.c -ltisam_s -o prog
```

NOTE: At this time, it is impossible to use the shared standard C library and the DNIO library, libnetc, at the same time. If you link with DNIO, you must use the unshared version of the standard C library.

NOTE: The front end to **gcc** performs various tasks when invoking the linker that are hidden from the user. To call the linker directly, the user must supply the necessary parameters on the command line, as described below:

```
          gcc p1.o p2.o -ltisam_s -o prog
becomes→  ld /lib/crt1.o p1.o p2.o -ltisam_s -lc /lib/crtn.o -o prog
```

Note the following:

1. `/lib/crt1.o` must be the first object listed
2. `-lc` (or `-lc_s`) must be the last library listed
3. `/lib/crtn.o` must be the last object or library linked in

NOTE: The front end to the SVS C compiler does *not* supply these parameters on the linker command line. These parameters are necessary for the proper function of programs linked with shared libraries. Therefore, it is not possible to use **cc** to link programs with shared libraries. Either use **gcc** (TI ANSI C compiler version 1.1, TI part number 2569355-0001), or call the linker directly, as explained above.

New Configurable Parameters

A.5.14 TI System V release 3.3 offers several new configurable parameters. Following are brief descriptions and some rules for figuring appropriate values for them:

Inode Segment Count The Inode Segments (ISEGS) replaced the TEXT table. One ISEG is required for each object currently executing on the system. For example, if one copy of **vi** is running, then one ISEG is required. If four copies of **vi** are running, still only one ISEG is required. However, if it was compiled with one shared library (which no other currently running program is using), **vi** requires a total of two ISEGs, regardless of how many copies of **vi** are running. If multiple different programs are using the same shared library, one ISEG is required for them all. Use the old TEXT TABLE SIZE config parameter as a start, then increase the value for shared libraries. If the number of inode segments is too small, **exec**(2) may fail.

Segment Descriptor Count Segment descriptors are new with release 3.3 They hold information about each segment, such as size and starting virtual address. Each process uses at least three segment descriptors: one each for its text segment, data segment, and stack segment. Each shared library used by a process uses two additional segment descriptors, and each shared memory segment attached uses one more. The number of segment descriptors should be set to approximately 5 times the number of processes set in the PROCESS TABLE SIZE parameter, assuming that most processes run with one shared library. As the number of shared memory segments increases, the segment descriptor count number should also increase. If this number is too small, **fork**(2) and **exec**(2) may fail.

Segment Swap Map Count Segment Swap Maps are also new with release 3.3. They hold information about the swap space allocated for processes. Each process uses at least two segment swap maps: one each for its data segment and stack segment. Each shared library used by a process uses one additional segment swap map. This number should be set to approximately 3 times the number of processes set in the PROCESS TABLE SIZE parameter, assuming that most processes run with one shared library. If the number of segment swap maps is too small, **fork**(2) and **exec**(2) may fail.

Max Dynamic 1K FS Buffers Previously, this was called *File Buffer Pool Size* and was used to allocate the buffer cache. You no longer need to tune this value, and it should be left as "*" (the shipped value). This parameter exists only because some benchmarks require a maximum on the size of the buffer cache.

Number of Mirror Buffer Headers This new parameter allocates buffer headers that are used by mirroring. Whenever a write occurs to a partition that is mirrored, two writes must be performed. These buffer headers are used for the write to the mirror. If the number of mirror buffer headers is too small, mirroring will still work, but performance will not be as good. If there is no mirroring, leave the number of mirror buffer headers to 1. If there is mirroring, set the number between 100 and 1000, and check the **pm** configurable parameter display (bottom of second screen). Adjust the number accordingly if it is too high or too low.

Transactional Log Partition Slot/Unit/Name/Enable These four parameters are new in release 3.3 and are used by transactional logging. See Section 8 in the *Administrator's Guide* for details.

Max Number of MTCs per MHA This parameter determines the maximum number of MTCs that will be supported per multidrop host adapter (MHA). This is for a future release.

Number of cblocks This parameter determines the number of character structures the console driver can use for I/O. This parameter replaces the NCLIST tunable variable in the /usr/sys/conf.c file from previous releases. Leave this parameter at its default setting, unless you tuned NCLIST in a previous release.

TI ANSI C Compiler 1.1

A.5.15 Release 3.3 supports a new section in object files, named **.comment**. This section is created only if the corresponding .c file of the object file has a **#ident** directive in it. The syntax of the **#ident** directive follows:

#ident *string*

If any C source file that has this directive is compiled with the TI ANSI C compiler version 1.1, the compiler will store the *string* in the **.comment** section of the .o file.

Changes to NTCs

A.5.16 The following changes were made in release 3.3 to improve the NTC and/or DNIO/1500 connections over v.35:

1. Enabled the XNS internet checksum for IDP for added integrity over remote lines.

2. Increased the default session timeout from 30 seconds to 120 seconds. Also increased the NTC session keep-alive timer to be the same as the SPP session timer (i.e., 120 seconds default).

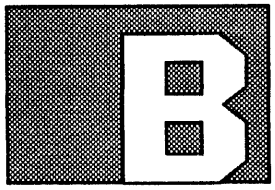
3. The Intel 82586 LAN configuration for the v.35 option has been changed to turn on the save bad frame flag. This change enables the DSR to count `Frame too small` and `No EOF` errors, allowing them to be displayed by the netstat(1T) utility. Prior to this change, these statistics were always displayed as zero.

4. Fixed a timing window in the 82586 driver which may cause the `chip lockup/recover` messaged logged into the CCB/NTC log files infinitely when the network connection is intermittent.

5. Added a new feature to the netecho utility to support the external modem loopback test. See netech(1T) for details.

6. Fixed a bug in the CCB XNS driver to prevent it from logging the `SPP timeout` message infinitely in one specific error recovery state.

ERROR MESSAGES



Introduction

B.1 This appendix contains new and revised error messages for TI System V Release 3.3.1. You should remove the pages from this appendix and insert them in your *TI System V Error Messages* manual. The following table provides a guide for inserting these pages.

NOTE: Revision bars have been placed in the right margins of the new pages to mark the general areas where the text has changed.

Remove **Obsolete pages**	Insert **New/Revised Pages**
1 – 4	1 – 4
7 – 8	7 – 8
15 – 16	15 – 16
21 – 22	21 – 22
33 – 34	33 – 34
41 – 42	41 – 42
95 – 102	95 – 102
115 – 118	115 – 118
129 – 134	129 – 134
147 – 148	147 – 148
185 – 186	185 – 186
197 – 198	197 – 198
—	198A – 198B
215 – 216	215 – 216
223 – 224	223 – 224

INTRODUCTION

This manual lists TI System V error messages, suggested problem solutions, and informative messages. Each error message provided by TI System V, with the exception of system call error messages, is associated with a tag number greater than 1000000. User-supplied error messages have tag numbers less than 1000000. The tag number can be in decimal or hexadecimal format. See the section entitled "Message Retrieval and Delivery" in the *TI System V Programmer's Guide* for further details.

CONVENTIONS USED IN MESSAGE DESCRIPTIONS

Boldface strings are used for the following items:

- References to manual entries,
- Utility names
- Command options
- Function names

Italic strings are used for the following items:

- Place-holders for actual user-supplied values
- Emphasis
- Manual titles

SYSTEM CALL ERRORS

This section describes the system calls. Most of these calls have one or more error returns. An error condition is usually indicated by a returned value of -1. (Exceptions to this error condition return value are indicated in individual manual entries.) An error number is also available in the external variable named *errno*. The *errno* variable is not cleared on successful calls, so it should be tested only after an error has been indicated.

All possible error numbers are not listed in each system call description because many errors can occur for most of the calls. The following is a list of the error numbers and their names as defined in the <errno.h> file.

1 EPERM Not super-user

Typically this error indicates an attempt to modify a file in some way forbidden except to the file's owner or the super-user. The error is also returned for attempts by ordinary users to do things allowed only to the super-user.

2 ENOENT No such file or directory

This error occurs when a file name is specified and the file should but does not exist or when one of the directories in a path name does not exist.

3 ESRCH No such process

No process can be found corresponding to that specified by the process identifier (*pid*) in **kill**(2) or **ptrace**(2).

4 EINTR Interrupted system call

An asynchronous signal (such as interrupt or quit), which the user has elected to catch, occurred during a system call. If execution is resumed after processing the signal, it will appear as if the interrupted system call returned this error condition.

5 EIO I/O error

This indicates a physical I/O error. This error may occur on a call following the call to which the error actually applies.

6 ENXIO No such device or address

I/O on a special file refers to a subdevice that does not exist or the I/O is beyond the limits of the device. This error may also occur when, for example, a tape drive is not online or no disk pack is loaded on a drive.

7 E2BIG Arg list too long
An argument list longer than 5,120 bytes is presented to a member of the **exec**(2) family.

8 ENOEXEC Exec format error
A request is made to execute a file that, although it has the appropriate permissions, does not start with a valid magic number, as described in **a.out**(4).

9 EBADF Bad file number
Either a file descriptor refers to no open file or a read (respectively write) request is made to a file that is open only for writing (respectively reading).

10 ECHILD No child processes
A **wait**(2) was executed by a process that had no existing or unwaited-for child processes.

11 EAGAIN No more processes
A **fork**(2) failed because the system's process table is full or because the user is not allowed to create any more processes.

12 ENOMEM Not enough core
During an **exec**(2), **brk**(2), or **sbrk**(2) call, a program asked for more space than the system is able to supply. This is not a temporary condition because the maximum space size is a system parameter. The error may also occur if the arrangement of text, data, and stack segments requires too many segmentation registers or if there is not enough swap space during a **fork**(2).

13 EACCES Permission denied
An attempt was made to access a file in a way forbidden by the protection system.

14 EFAULT Bad address
The system encountered a hardware fault in attempting to use an argument of a system call.

15 ENOTBLK Block device required
A nonblock file was mentioned where a block device was required, such as in **mount**(2).

16 EBUSY Mount device busy
An attempt was made to mount a device that was already mounted or, an attempt was made to dismount a device on which there is an active file (open file, current directory, mounted-on file, active text segment). This error also occurs if an attempt is made to enable accounting when it is already enabled.

17 EEXIST File exists
An existing file was mentioned in an inappropriate context, such as **link**(2).

18 EXDEV Cross-device link
A link to a file on another device was attempted.

19 ENODEV No such device
An attempt was made to apply an inappropriate system call to a device, such as read a write-only device.

20 ENOTDIR Not a directory
A nondirectory was specified where a directory is required, such as in a path prefix or as an argument to **chdir**(2).

21 EISDIR Is a directory
An attempt was made to write on a directory.

22 EINVAL Invalid argument
An invalid argument was specified (such as dismounting a nonmounted device, mentioning an undefined signal in **signal**(2), or **kill**(2), reading or writing a file for which **lseek**(2) has generated a negative pointer). Also set by the math functions described in the (3M) entries of this manual.

23 ENFILE File table overflow
The system's table of open files is full, and temporarily **open**(2) cannot be accepted.

24 EMFILE Too many open files
No process may have more than 100 file descriptors open at a time.

25 ENOTTY Not a typewriter

26 ETXTBSY Text file busy
An attempt was made to execute a pure-procedure program that is currently open for writing or reading. This error also indicates an attempt to open for writing a pure-procedure program that is being executed.

27 EFBIG File too large
The size of a file exceeded the maximum file size (1,082,201,088 bytes) or ULIMIT; see **ulimit**(2).

28 ENOSPC No space left on device
During a **write**(2) to an ordinary file, no free space is left on the device.

29 ESPIPE Illegal seek
An **lseek**(2) was issued to a pipe.

30 EROFS Read-only file system
An attempt to modify a file or directory was made on a device mounted read-only.

31 EMLINK Too many links
An attempt was made to make more than the maximum number of links (1000) to a file.

32 EPIPE Broken pipe
An attempt was made to write on a pipe for which there is no process to read the data. This condition normally generates a signal. The error is returned if the signal is ignored.

33 EDOM Math arg out of domain of func
The argument of a function in the math package (3M) is out of the domain of the function.

34 ERANGE Math result not representable
The value of a function in the math package (3M) is not representable within machine precision.

35 ENOMSG No message of desired type
An attempt was made to receive a message of a type that does not exist on the specified message queue; see **msgop**(2).

36 EIDRM Identifier removed
An operation on a semaphore or message queue failed because the identifier has been removed.

37 ECHRNG Channel number out of range
Problem with the command sent to the UPS device driver.

42 EUNATCH Protocol driver not attached
A process will receive this error when the CCB device it is accessing halts or crashes.

47 ELOOP Too many symbolic links
Too many symbolic links were encountered in translating the pathname.

50 EDEADLK Record locking deadlock detection
This error is returned when a process attempts to go to sleep waiting for a record that has been locked by another process that has gone to sleep, which is waiting for a record locked by the process that is attempting to go to sleep.

51 ENOLCK No more record locks available
The free list of file or record locks is currently exhausted, which prevents this system call from completing successfully.

52 ENOSAT Reserved

53 EOFFLN Device offline
No tape in tape unit, or the disk is powered down.

54 ENOTRDY Device not ready
Tape is retensioning, or the disk is spinning up or down.

55 ERODEV Read-only device (or write protected)
Tape or disk is write-protected.

56 ERQEOD I/O request beyond end of device
The tape device (NUPI, NUPI-2, or MSC) has received a block number read request greater than the size of the device unit as determined by the driver.

57 ETIMES Driver timeout error
A timeout occurred while waiting for a tape operation to complete.

66 EDEADLOCK File locking deadlock error
An attempt to lock a file on a TI 990 system failed because that file is already locked (niop/tisam).

72 ETIME Timer expired
A timeout occurred while waiting for a streams command to complete.

73 ENOSR Out of streams resources
An open on a streams device failed because the system is out of streams resources.

80 ECOMM Communication error on send
Broken link detected.

84 EMULTIHOP Multihop attempted
An attempt was made to perform an NFS operation that could not be completed.

87 EBADMSG Trying to read unreadable message
An attempt was made of read a message to type M_PROTO, M_PCPROTO, or M_PASSFP from a stream.

93 ELIBACC Can't access a needed shared lib
A call to exec() failed on an executable that uses a shared library for which the user does not have execute permission or which does not exist.

94 ELIBBAD Accessing a corrupted shared lib
The shared library itself is corrupted.

95 ELIBSCN .lib section in a.out corrupted
The .lib section of an executable linked with a shared library is corrupted.

96 ELIBMAX Attempting to link in more shared libraries than system limit
A program linked with more than 100 shared libraries cannot be executed.

100 ELIBEXEC Attempting to exec a shared library
An attempt was made to execute a shared library directly.

MESSAGES WITH TAGS

The following list shows messages and solution text associated with tag numbers greater than 1000000. The **showmsg**(1T) command displays the solution text. The italic string *string* indicates the location in the message text of a system-generated variable, such as a file name or a device name.

1000501 Can't open file *string*
An attempt to open a file failed. Some of the more common reasons are:
1. A syntax error exists in the file path name.
2. The file does not exist and the create flag is not set.
3. Access permission is denied for the file or a path name component.
4. The specified path name is a directory, and you are trying to open it for writing.
5. You are attempting to write to a read-only file.
6. You are exceeding the maximum number of open files allowed.

This error generates a second error message containing the reason for the failure. If the

1000517 Option *string* is illegal

Check the documentation for this command to make sure you are using the option correctly.

1000518 The *string* option requires an argument

Check the documentation for this command to make sure you are using the option correctly.

1000520 Read error on file *string*

1000521 Write error on file *string*

An attempt to write to a file resulted in an unrecoverable I/O error. Possible causes include the following:

1. The file size has been exceeded.
2. The disk is full.
3. There is a hardware problem.

Notify your system administrator.

1000522 Seek error on file *string*

1000523 Can't chown for file *string*

Only the owner can change the permissions on a file. Refer to the **chmod**(2) entry in the *TI System V Programmer's Reference* manual for other causes of this problem.

1000524 Can't mknod for *string*

An attempt to create a directory or file failed. Some of the more common reasons include:

1. A syntax error in the directory/file path name.
2. The specified directory/file already exists.
3. Access permission is denied for some component of the specified path name.
4. A component of the specified path name is not a directory.
5. A component of the specified path name does not exist.
6. Attempting to create a directory/file in a read-only file system.

The maximum length of the path name is 128 characters, and the maximum length of any path name component is 14 characters. This error generates a second error message containing the reason for the failure. If the reason for the failure is not obvious, the second error code can be found in this manual entry or with the **showmsg** command.

1000525 Can't fork

System error — Notify the system administrator.

1000526 Can't create symbolic link *string*.

1000600 Perror substitute

The error number returned by the system will be printed, along with a brief description of the reason.

MESSAGES()

1000601 Can't read contents of symbolic link *string*.

1000701 Not owner

EPERM Only the owner can modify this file, or only the super-user can complete this operation.

1000702 The file or directory doesn't exist

ENOENT The file that was specified does not exist, or a directory in the path name of the file doesn't exist.

1000703 The requested process doesn't exist

ESRCH A **kill** or **ptrace** call was made with a process number that doesn't exist.

1000704 The system call was interrupted

EINTR An asynchronous signal, such as interrupt or quit, occurred during a system call. If execution is resumed after processing the caught signal, it will appear as if the interrupted system call returned this error.

1000705 An I/O error occurred

EIO Some physical input/output error occurred. This error may occasionally be returned on the call that follows the one in which the error occurred.

1000706 The device or address does not exist

ENXIO The I/O on a special file refers to a subdevice that does not exist or that is beyond the limits of the device. This error may also occur if a tape drive is not on line or if a disk pack is not loaded.

1000707 The argument list is too long

E2BIG The argument list passed to one of the **exec** calls is longer than 5120 bytes.

1000708 Format error in the exec call

ENOEXEC A request was made to execute a file that does not have a valid magic number to identify it as an executable text file.

1000709 A bad file number has been used

EBADF An I/O call was made using a file descriptor that does not refer to an open file, or a read/write request was made to a file that was not opened to permit that request.

1000710 The child process does not exist for a wait

ECHILD A **wait**(2) system call was executed by a process that either did not have an existing child process or for which all child processes already had **wait**s outstanding.

1000711 No process numbers are available

EAGAIN The system process table was full, or the user was not allowed to create any more processes. Try again.

1001015 Block size can't be zero
The entry for bs, ibs or obs was zero.

1001016 The output file disagrees with the converted input file at character *string*
When verifying the output file, **dd** reconverts the input file and compares the result to the actual output file. A difference was found at the indicated character.

1001017 Output file not specified
The output file must be specified when using the verify option.

1001021 total *string*

1001022 Usage: ls -RadCxmnlogrtupqFbcisf [files]

1001023 Collating sequence file *string* can't be opened
The environment variable LANG has specified something other than USA, and the corresponding collate sequence file can't be opened for reading. Notify the system administrator.

1001030 Blocked tapes can't be updated (yet)

1001031 Invalid block size. Max=*string*
The default block size is 20.

1001032 Can't use the -r or -u option on the standard output
These options imply that something is already on the tape, but stdout is always empty at the start of a program.

1001033 Usage: tar [-]{txruck}[AbfFilLmopvw][0-7[lmh]] [tapefile] [control file] [blocksize] file1 [-C dirname] file2 ...

1001034 Missing links to *string*
After all the specified files have been copied, the count for this file shows that all the other files linked to it have not been copied to the tape. Probably, the other files linked to this one were not specified. When the tape is restored, **tar** will not know which other files were originally linked to this one, and that linkage information will be lost.

1001035 Checksum error on file header.
This may not be a **tar** tape. **tar** will attempt to find the next file on the tape and proceed from there.

MESSAGES()

1001036 *string* is not a file: not written

The file that **tar** is trying to write to tape is neither a regular file nor a directory. Nothing has been written to the tape.

1001037 Archive *string* is linked to *string*

THIS IS A NORMAL MESSAGE. There is no error. The file being written to tape is linked to another file that has already been written to tape. Only the file name and linking information will actually be written to tape. The body of the file is already on the tape under the name of the first file.

1001038 Out of memory - link information lost

The **tar** utility has found a file that has other files linked to it. No more memory is available to permit **tar** to save the file name, inode, etc., of this file so the other files can be linked to it. This file will be written to tape, but the other files can't be linked to it. They will also be written to the tape. No file contents will be lost, but the link between the files will be lost.

1001039 Archive *string string* blocks

THIS IS A NORMAL MESSAGE. This file has been written to the tape.

1001040 File *string* changed size

Based on the size of the file saved in the inode, **tar** calculated how many 512-byte blocks were needed to hold the body of the file, expecting to read this many blocks from the file and write this many blocks to the tape. Either the end of the file was found before this many blocks were read or the required number of blocks were written without finding the end of the file. Somehow, while **tar** was working on the file, it changed size.

1001041 Extract can't link *string*

This file was supposed to be linked to another file that had been restored from the tape earlier. For some reason, the link could not be made.

1001042 Extract *string* linked to *string*

THIS IS A NORMAL MESSAGE. Both the files were restored from the tape, and are linked to the same copy of the contents.

1001043 Extract write error on file *string*

The **tar** utility is trying to write to the file a block of information that had been read from the tape.

1001044 Extract *string*, *string* bytes

THIS IS A NORMAL MESSAGE. The file has been successfully restored from the **tar** tape.

1001045 Extract *string* linked to *string*

1001116 Enter a new name for *string*

1001117 File *string* was skipped
You responded with a RETURN to the request for a new file name. The file was not copied from the tape.

1001118 File *string* was linked to *string*

1001119 Can't rename a directory.
The logic of the **cpio** utility does not allow a directory to be renamed; only files can be renamed.

1001120 File *string* exists on tape but not on disk
The file has been found on the backup tape, but a file by that name is not on the disk. Make sure you are in the correct directory.

1001121 File *string* on disk *string* is *string string* on tape, *string* is *string string*
Verification has detected a difference between the characteristics of the file on tape and the one on disk. This may not be critical; however, you should determine why the disk version has changed since the tape was created.

1001122 File *string* on disk *string* is *string string* on tape, *string* is *string string*
Verification has detected a difference between the characteristics of the file on tape and the one on disk. This may not be critical; however, you should determine why the disk version has changed since the tape was created.

1001123 File *string* ; the tape is not the same as the disk at character *string*
The contents of the file is different at character x within the file. The comparison stopped at this point in the file.

1001130 usage: chmod [ugoa][+ - =][rwxlstugof] file ...

1001131 Can't change mode of *string*
Make sure you are the owner of the file.

1001132 Invalid mode entered
Refer to **chmod**(1) in the *TI System V User's Reference* manual for information on composing the mode for a file.

1001133 Group execution and locking not permitted together
Enforcement-mode record-locking is not allowed on a file with execute permission for group.

MESSAGES()

1001134 Group execution not permitted on *string*, a lockable file
Execute permission for the group is not allowed on a file with enforcement-mode record-locking enabled.

1001135 Set-group-ID and locking not permitted together
Set-group-ID is not allowed on a file with enforcement-mode record-locking enabled.

1001136 Set-group-ID not permitted on *string*, a lockable file
Set-group-ID is not allowed on a file with enforcement-mode record-locking enabled.

1001137 Execute permission required for set-ID on execution
Set-group-ID or set-user-ID requires the corresponding execute permission for group or user.

1001138 Locking not permitted on *string*, a group executable file
Enforcement-mode record-locking is not allowed on a file with execute permission for the group.

1001140 usage: chown [-hR] uid file ...
The **chown** command was invoked with an incorrect number of parameters. Because this command is used to change ownership of files from one user to another, you must specify the login name of the new owner and the path name of at least one file to be transferred to the new owner. Multiple files may be changed to the new owner by entering several file path names separated by at least one space.

1001141 user name *string* not in /etc/passwd
The user specified in the **chown** command is not set up on the system. Check for a typographical error, or request that the user be added to the system by the system administrator.

1001142 Can't change owner of *string*. (errno *string*)
The **chown** command was unable to successfully complete the request to change file ownership. The error number returned in the error message indicates the cause of the failure. Refer to **intro**(2) in the *TI System V Programmer's Reference* manual for a detailed explanation of the error number.

1001145 usage: chgrp [-hR] gid file ...
The **chgrp** command was invoked with an incorrect number of parameters. Because this command is used to transfer a file from one group to another, you must specify the new group to which the file(s) will belong and the path name of at least one file to be transferred to the new group. Multiple files may be moved to the new group by entering multiple file path names separated by at least one space.

1001413 No more than one -I or -O flag permitted.
The **-O** and **-I** options are mutually exclusive; specify one or the other, but not both.

1001414 Same name

1001415 Cannot recover from I/O error, (errno *string*)
After 10 retries **cpio** still encountered an unrecoverable error while reading the input medium. Notify the system administrator.

1001416 Read() in bread() failed
Cpio has encountered an unrecoverable error while reading the input medium. Verify the hardware and try the **'K'** option.

1001417 I/O error, searching to next header

1001418 header corrupted. File(s) may be lost

1001419 cpio: out of sync. searching for magic number/header

1001420 re-synchronized on magic number/header

1001421 This is not a cpio file. Bad header.
The **cpio** utility found a bad header for a file on the tape. Make sure the correct tape is in the reader. If the tape was created on a non-TI system, you must use the **-T** option.

1001422 The 'B' and 'C' options are mutually exclusive — The 'B' option was ignored.
The **'B'** and **'C'** options both specify the same attribute — record blocking. **Cpio** will use the value specified by the **'C'** option and continue.

1001423 Unable to write this medium. Try again.

1001424 ulimit reached for output file
Cpio tried to write a file on the output medium that was larger than the process file size limit. Notify the system administrator.

1001425 no space left for output file
The output medium is full. Notify the system administrator.

1001426 write() in bwrite() failed
Cpio has encountered an unrecoverable error while writing the output medium. Try again. If the problem persists, it may indicate a media or hardware problem. Notify the system administrator.

MESSAGES()

1001427 Can't read input: end of file encountered prior to expected end of archive.
Cpio reached the end of the archive unexpectedly, because the file size did not match the size specified in the file header. Try again. If the problem persists, it may indicate a media or hardware problem. Notify the system administrator.

1001428 Reached end of medium on *string*.

1001429 Encountered an error on *string*
Cpio has encountered an unrecoverable error on the input or output medium.

1001430 If you want to go on, type device/file name when ready.

1001431 That didn't work, cannot open "*string*"

1001432 popen() failed, cannot determine working directory
Cpio failed to establish a connection with the **pwd** process. Notify the system administrator.

1001433 Change to part *string* and press RETURN key. [q to quit]

1001434 Usage: *string*cpio -o[acvBLTV] [-Cbufsize] [-Mmsg] <name-list >collection
cpio -o[acvBLTV] -Ocollection [-Cbufsize] [-Mmsg] <name-list

1001435 *string*cpio -i[bcdKmrsStuvVfB6T] [-Cbufsize] [-Mmsg] [pattern ...] <collection
cpio -i[bcdKmrsStuvVfB6T] -Icollection [-Cbufsize] [-Mmsg] [pattern ...]

1001436 *string*cpio -p[adlLmuvV] directory <name-list
cpio -k[bcsSBT] [-Cbufsize] <name-list

1001500 * same *
An output line is the same as the one before.

1001520 Usage: showhex file name

1001521 help screen
Press the following keys to control the display:

q or Q	exit back to the shell	
j	scroll down 1 line (toward the end) (down arrow)	
k	scroll up 1 line (toward the beginning)	(up arrow)
h	scroll left one character	(left arrow)
l	scroll right one character	(right arrow)

1001705 Program limit of *string* exceeded for *string*

1001706 Unknown file system BSIZE
The super block of the file system is corrupted.

1001707 Path components
There were more than 50 components in the path name.

1001708 -i inumber list
Too many inode numbers were specified with the **-i** option.

1001721 Cannot open *string*

1001722 Usage: file [-c] [-f ffile] [-m mfile] file...

0001723 Level off type opcode value string

1001724 subset

1001725 Cannot open

1001726 Character

1001727 Directory

1001728 Fifo

1001729 Block

1001730 Special (*string/string*)

1001731 Cannot open for reading

1001732 Empty

1001733 Data

MESSAGES()

1001734 C program text

1001735 Assembler program text

1001736 FORTRAN program text

1001737 Assembler program text

1001738 [nt]roff, tbl, or eqn input text

1001739 Troff output

1001740 Commands text

1001741 English text

1001742 ASCII text

1001743 with garbage

1001744 No memory for magic table

1001745 Cannot open magic file <*string* >.

1001746 Fmt error, no tab after *string* on line *string*

1001747 file: magic tab overflow — increase NENT in file.c.

1001748 symbolic link to *string*

1001770 Usage: labelit /dev/??? [fsname volume [-n]]

1001771 Usage: labelit /dev/r??? [fsname volume [-n]]

1001772 labelit: -n option for tape only

1001773 Skipping label check!

1001774 labelit: cannot open device

1003671 Usage -M: maximum echo data size must be in the range 1-900

The decimal argument for the **-M** (maximum echo data size) **netecho** option is invalid. The **-M netecho** option is used to override the default maximum echo data size of 512 bytes. The decimal argument required for this option must be greater than zero and less than 901. The **netecho** utility varies the echo data size by increasing the size of consecutively transmitted packets by 1 byte, and wraps between the minimum and maximum echo data size. Note that the maximum echo data size must be greater than or equal to the minimum echo data size. The default minimum echo data size is 1 byte. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003672 Usage -a: invalid 48-bit host address

The hexadecimal argument for the **-a** (physical address) **netecho** option is invalid. The **-a** option is used to specify a **netecho** to a physical address. This option requires a valid 48-bit host address be supplied in the form of 12 consecutive hexadecimal characters. If the 16-bit host checksum is known, it may also be entered. If the host address checksum is included, the argument for the **-a netecho** option must be 16 consecutive hexadecimal digits with no spaces included. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003673 Usage -s: slot number must be in the range 0-15

The decimal argument for the **-s** (slot) **netecho** option is invalid. The **-s** option is used to specify the NuBus™ slot in which an XNS internet device is installed. The **-s** option is only valid in conjunction with the **-a** (physical address) and **-l** (local loopback) **netecho** options. If the **-s** option is not supplied when using the **-a** or **-l netecho** options, the first slot containing an XNS internet device will be used. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation. (NuBus is a trademark of Texas Instruments Incorporated.)

1003674 Usage -p: port number must be 0 or 1

The decimal argument for the **-p** (port) **netecho** option is invalid. The **-p** option is used to specify which CCB option port is to be used when echoing network messages through a CCB. The **-p** option is only valid in conjunction with the **-l** (local loopback) **netecho** option. If the **-p** option is not supplied when using the **-l** option, the first port found to contain an XNS internet device will be used. When both ports contain XNS internet devices, only port 0 will be tested. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003675 Usage -n: invalid 32-bit network number

The hexadecimal argument for the **-n** (network number) **netecho** option is invalid. The **-n** option is used in conjunction with the **-a** (physical address) **netecho** option in order to specify the network number of the target site. The 32-bit network number argument must be entered as 8 hexadecimal characters. If the **-n** option is not supplied when using the **-a netecho** option, the network number 00000000 will be used. This special network number designates all locally attached networks. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

MESSAGES()

1003676 Usage -m: minimum packet size cannot exceed the maximum packet size

The **netecho** utility detected that the minimum echo data size is greater than the maximum echo data size. This can happen when one uses the **-m** (minimum echo data size) **netecho** option to override the minimum echo data size and specifies a minimum size greater than the default maximum echo data size of 512 bytes. If both the **-m** and **-M** (maximum echo data size) options are used, verify that the minimum is less than or equal to the maximum, and furthermore that both the minimum and maximum echo data sizes are greater than 0 and less than 901, respectively. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003677 Required option omitted: must use -t, -l, or -a options

A required **netecho** option has been omitted. Use the **-t** (named echo) **netecho** option to specify a **netecho** to the NTC whose global name is the argument for the **-t netecho** option. Use the **-a** (physical address) **netecho** option to specify a **netecho** to the physical address of a site on the network which supports the XNS echo protocol. Use the **-l** (local loopback) **netecho** option to specify a **netecho** loopback through a local XNS network connection. Note that the **-l**, **-a**, and **-t netecho** options cannot be used in combination with one another. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003678 Invalid option combination

The **netecho** utility has detected an invalid combination of **netecho** options. When using the **-t** (named echo) **netecho** option, the **-a** (physical address), **-l** (local loopback), **-n** (network number), **-s** (slot), and **-p** (port) **netecho** options cannot be used. When using the **-a** (physical address) **netecho** option, the **-t** (named echo), **-l** (local loopback), **-f** (alternate name file), and **-p** (port) options cannot be used. When using the **-l** (local loopback) **netecho** option, the **-t** (named echo), **-n** (network number), and **-f** (alternate name file) **netecho** options cannot be used. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003679 Cannot open alternate name file: *string* , error=*string*

The **netecho** utility could not open the file specified as the argument for the **-f** (alternate name file) **netecho** option. The value printed for error is the value of *errno*. Verify that the file exists and its access privileges allow you to read the contents. You may also need to consult your TI System V documentation for a detailed description of the error returned. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003680 Usage -f: 48-bit host address must be specified for na type

An entry with the na (network address) property is missing the required 48-bit host address, or the format of the alternate name file is not valid. Insert the 48-bit host address into the alternate name file and retry the **netecho** command. The format for the alternate name file follows:

name:type:slot:port:network number:host address:socket: comment

Individual lines in the file may not be longer than 128 characters. Note that the valid types are na (network address) and la (loopback address). If the socket field is null (::), the well known XNS echo socket will be used for the transmission and reception of echo packets. Use the la (loopback address) property to define names corresponding to a loopback address. Leave the network number and host address fields null (::) when defining entries with the local loopback property. An example line for a name with the la (loopback address) property follows:

CCB3P0:la:03:00:::: CCB in slot 3, LAN option in port 0

Use the na (network address) property to define a name to address correspondence for any site that supports the XNS echo protocol. The port field should be left null (::). If the network number field is null, network 00000000 will be used. An example line for a name with the na (network address) property follows:

payroll:na:03::00000000:080028000001:: reach payroll through slot 3

For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003681 Usage -f: invalid 16-bit socket number

The 16-bit socket number in the alternate name file is invalid, or the file format is not correct. The 16-bit socket number must be exactly 4 hexadecimal characters. Edit the alternate name file to correct the problem and try the **netecho** command again. The format for the alternate name file follows:

name:type:slot:port:network number:host address:socket: comment

Individual lines in the file may not be longer than 128 characters. Note that the valid types are na (network address) and la (loopback address). If the socket field is null (::), the well known XNS echo socket will be used for the transmission and reception of echo packets. Use the la (loopback address) property to define names corresponding to a loopback address. Leave the network number and host address fields null (::) when defining entries with the local loopback property. A sample line for a name with the la (loopback address) property follows:

CCB3P0:la:03:00:::: CCB in slot 3, LAN option in port 0

Use the na (network address) property to define a name to address correspondence for any site that supports the XNS echo protocol. The port field should be left null (::). If the network number field is null, network 00000000 will be used. A sample line for a name with the na (network address) property follows:

payroll:na:03::00000000:080028000001:: reach payroll through slot 3

For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003682 Usage -t -f: *string* not defined in alternate name file *string*

The name specified as the argument for the **-t** (named echo) option was not found in the alternate name file specified as the argument for the **-f** (alternate name file) **netecho** option. Retry the **netecho** command using a name that is defined in the alternate name

MESSAGES()

file, or edit the alternate name file and add the desired name. The format for the alternate name file follows:

name:type:slot:port:network number:host address:socket: comment

Individual lines in the file may not be longer than 128 characters. Note that the valid types are na (network address) and la (loopback address). If the socket field is null (::), the well known XNS echo socket will be used for the transmission and reception of echo packets. Use the la (loopback address) property to define names corresponding to a loopback address. Leave the network number and host address fields null (::) when defining entries with the local loopback property. A sample line for a name with the la (loopback address) property follows:

CCB3P0:la:03:00:::: CCB in slot 3, LAN option in port 0

Use the na (network address) property to define a name to address correspondence for any site that supports the XNS echo protocol. The port field should be left null (::). If the network number field is null, network 00000000 will be used. A sample line for a name with the na (network address) property follows:

payroll:na:03::00000000:080028000001:: reach payroll through slot 3

For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003683 Usage -t: *string* not defined in /etc/tctab

The name specified as the argument for the **-t** (named echo) **netecho** option was not found in the terminal concentrator definition file (/etc/tctab). Retry the **netecho** command using the global name of an NTC that is defined in the NTC definition file. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003684 Usage -s: cannot find an XNS Internet device installed at that slot

The **netecho** utility was not able to find a high performance Ethernet card that was properly configured, or the **netecho** utility was not able to find a CCB that has an XNS Internet device installed. If a LAN option card is installed and the ccbxns module has been downloaded, it is possible that the CCB or network software is not functioning properly. If the slot contains a high performance Ethernet option, make sure the /etc/xnscf file is set up correctly or is not present at all. Also make sure the **xnsd** daemon is running. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003685 Usage -s: cannot open *string* , error=*string*

The **netecho** or **NETECHO** utility was not able to open the device in the slot specified as the argument to the **-s** (slot) **netecho** option. If a local area network option card is installed on a CCB in the specified slot, and the ccbxns module has been downloaded, it is possible that that CCB or network software is not functioning properly. If a high performance Ethernet card is installed in the slot, then the /dev/xnsidp driver may not be working properly. Please contact your system administrator if either of these is the case. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003686 Could not get P0 and P1 net, status=*string*

The **netecho** utility was not able to retrieve information concerning the local network connection and its option ports from the device driver. If a local area network option card is installed on a CCB in the specified slot, and the ccbxns module has been downloaded, it is possible that the CCB or network software is not functioning properly. If a high performance Ethernet card is in the specified slot, the /dev/xnsidp driver may not be functioning properly. Please contact your system administrator if either of these is the case. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003687 Illegal hardware configuration: LAN option cards in Port 0 and Port 1 cannot be on the same network

The **netecho** utility has discovered an invalid hardware configuration. When a CCB has two local area network (LAN) option cards installed, it is imperative that they not be connected to the same physical network. Because Ethernet® is a half duplex transmission media, having two LAN option cards on the same CCB and attached to the same network does not improve performance. In fact, this configuration may cause unpredictable results when it is operating. This problem is severe, and you should contact your system administrator immediately. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation. (Ethernet is a registered trademark of Xerox Corporation.)

1003688 Usage -s: no XNS Internet device installed in the specified slot

The **netecho** or **NETECHO** utility has detected that no XNS internet device is installed in the specified slot. If a LAN option card is installed on a CCB in this slot and the ccbxns module has been downloaded, the CCB or network software may not be functioning properly. If a high performance Ethernet card is installed in this slot, the configuration information and/or the daemon process may have problems. Please contact your system administrator if either of these is the case. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003689 Usage -f: host address in alternate name file is not correct

The **netecho** utility has detected an invalid 48-bit host address for the name specified as the argument to the **-t** (named echo) option in the alternate name file specified as the argument for the **-f** (alternate name file) option. For entries with the la (loopback address) property, it is recommended that the host address field and network number field for the entry be left null (::). If these fields are not left null, **netecho** will verify their correctness and report this error if either is wrong. To correct the problem, edit the alternate name file and insert the correct host address and network number, or make the fields null. The format for the alternate name file follows:

name:type:slot:port:network number:host address:socket: comment

Individual lines in the file may not be longer than 128 characters. Note that the valid types are na (network address) and la (loopback address). If the socket field is null (::), the well known XNS echo socket will be used for the transmission and reception of echo packets. Use the la (loopback address) property to define names corresponding to a loopback address. Leave the network number and host address fields null (::) when defining entries with the local loopback property. An example line for a name with the

la (loopback address) property follows:

CCB3P0:la:03:00:::: CCB in slot 3, LAN option in port 0

Use the na (network address) property to define a name to address correspondence for any site which supports the XNS echo protocol. The port field should be left null (::). If the network number field is null, network 00000000 will be used. A sample line for a name with the na (network address) property follows:

payroll:na:03::00000000:080028000001:: reach payroll through slot 3

For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003690 Usage -p: no LAN option card in Port *string*

netecho has detected that no local area network (LAN) option card is installed in the port specified as the argument for the **-p** (port) **netecho** option or as specified in the alternate name file if the **-f** (alternate name file) **netecho** option is being used. Retry the **netecho** command and and specify the slot and port for a CCB with a LAN option card installed. If a LAN option card is installed in the specified port, the CCB or network software may not be functioning properly. Please contact your system administrator if this is the case. If the slot specified contains a high performance Ethernet card, specify either port 0 or no port at all. For more information on the **netecho** and **NETECHO** utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003691 Usage -f: network number in alternate name file is not correct

The **netecho** utility has detected an invalid 32-bit network number for the name specified as the argument to the **-t** (named echo) option in the alternate name file specified as the argument for the **-f** (alternate name file) option. For entries with the la (loopback address) property, it is recommended that the host address field and network number field for the entry be left null (::). If these fields are not left null, **netecho** will verify their correctness and report this error if either is wrong. To correct the problem, edit the alternate name file and insert the correct host address and network number, or make the fields null. The format for the alternate name file follows:

name:type:slot:port:network number:host address:socket: comment

Individual lines in the file may not be longer than 128 characters. Note that the valid types are na (network address) and la (loopback address). If the socket field is null (::), the well known XNS echo socket will be used for the transmission and reception of echo packets. Use the la (loopback address) property to define names corresponding to a loopback address. Leave the network number and host address fields null (::) when defining entries with the local loopback property. A sample line for a name with the la (loopback address) property follows:

CCB3P0:la:03:00:::: CCB in slot 3, LAN option in port 0

Use the na (network address) property to define a name to address correspondence for any site which supports the XNS echo protocol. The port field should be left null (::). If the network number field is null, network 00000000 will be used. A sample line for a name with the na (network address) property follows:

payroll:na:03::00000000:080028000001:: reach payroll through slot 3

For more information on the **netecho** and NETECHO utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003692 Socket allocation failed, status=*string*

The **netecho** or NETECHO utility was not able to open a socket for the transmission and reception of echo packets. This error is classified as a resource shortage, and should be temporary. Retry the **netecho** command at a later time. If the problem persists, the network software may not be functioning properly. Please contact your system administrator if this is the case. For more information on the **netecho** and NETECHO utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003693 Socket open failed, status=*string*

The **netecho** or NETECHO utility was not able to open the socket previously allocated. This error indicates problems in the network software and should be reported to your system administrator. For more information on the **netecho** and NETECHO utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003694 Usage -f: invalid alternate name file format

The **netecho** utility has detected an invalid alternate name file format. Edit the alternate name file with any editor and correct the problem. The format for the alternate name file follows:

name:type:slot:port:network number:host address:socket: comment

Individual lines in the file may not be longer than 128 characters. Note that the valid types are na (network address) and la (loopback address). If the socket field is null (::), the well known XNS echo socket will be used for the transmission and reception of echo packets. Use the la (loopback address) property to define names corresponding to a loopback address. Leave the network number and host address fields null (::) when defining entries with the local loopback property. A sample line for a name with the la (loopback address) property follows:

CCB3P0:la:03:00:::: CCB in slot 3, LAN option in port 0

Use the na (network address) property to define a name to address correspondence for any site that supports the XNS echo protocol. The port field should be left null (::). If the network number field is null, network 00000000 will be used. A sample line for a name with the na (network address) property follows:

payroll:na:03::00000000:080028000001:: reach payroll through slot 3

For more information on the **netecho** and NETECHO utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003695 Socket close failed, status=*string*

The **netecho** or NETECHO utility was not able to close the socket previously allocated and opened. This error indicates problems in the network software and should be reported to your system administrator. For more information on the **netecho** and NETECHO utilities, refer to the appropriate Texas Instruments System 1000 Series

MESSAGES()

documentation.

1003696 Echo complete for *string* packets

This message is an informative message printed by the **netecho** and NETECHO utilities preceding a normal termination. The value for packets should be equal to the number of echoes requested or the default of 10, unless the utility was interrupted by using Ctrl-c. For more information on the **netecho** and NETECHO utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003697 Total errors=*string*

This message is an informative message printed by the **netecho** and NETECHO utilities when errors were detected while the utilities were sending or receiving echo packets, or when verifying the validity of echo responses. This message is not printed when **netecho** or NETECHO terminates without errors. Additional messages will be printed that will detail the class of errors detected. For more information on the **netecho** and NETECHO utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003698 Total transmit errors=*string*

The **netecho** or NETECHO utility has detected errors associated with the transmission of echo packets. These errors may indicate problems with the network transmission media, the networking hardware, or network software. If the percentage of transmit errors to echoes is high or the problem persists on subsequent executions of the **netecho** or NETECHO utilities, contact your system administrator. For more information on the **netecho** and NETECHO utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003699 Total receive errors=*string*

The **netecho** or NETECHO utility has detected errors associated with the reception of echo packets. It may be normal to encounter a few receive errors because dropped packets and time-outs are counted in this category. If the percentage of receive errors to echoes is high or the problem occurs often, even under light system loading at both the source and target sites, contact your system administrator. For more information on the **netecho** and NETECHO utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003700 Total size errors=*string*

The **netecho** or NETECHO utility has received echo responses in which the size of the echo response is not identical to the echo packet originally sent. This error will occur when the echos are directed to a broadcast or multicast host address. If the problem persists, contact your system administrator. For more information on the **netecho** and NETECHO utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003701 Total data errors=*string*

The **netecho** or NETECHO utility has received echo responses in which the data in the echo response is not identical to the echo packet originally sent. If the problem persists, contact your system administrator. For more information on the **netecho** and NETECHO utilities, refer to the appropriate Texas Instruments System 1000 Series documentation.

MESSAGES()

reasonable values and retry the operation after redownloading the NTC. Note that third party add-on device drivers that use significant amounts of memory may impact the NTC buffer configuration that can be used.

1003821 No LAN option card exists on the CCB

There is no LAN option card on the communications carrier board. Thus, the 82586 LAN coprocessor device service routine won't be installed and scheduled. This is an informative message.

1003822 Resource error occurred: FD left=*string*, BD left=*string*

This is an informative message. The 82586 LAN coprocessor device service routine (DSR) detected that the 82586 has encountered a no-resource error, which means the 82586 receive unit runs out of memory resources and is discarding incoming frames. The memory resource is a group of receive buffers linked together by a list of Frame Descriptors (FD) and Buffer Descriptors (BD). When the 82586 receive unit detects the end of FD list or the end of BD list, an interrupt will be generated and the receive unit is set to be in the no-resource state. The 82586 LAN coprocessor DSR will try to recover from this situation by supplying new buffers, FDs, and BDs to the 82586 and restarting the receive unit. The **netstat** utility can be used to find out the information about the maximum number of FDs and BDs supplied and minimum number of FDs and BDs reached.

1003823 Port *string* time out

The 82586 LAN coprocessor device service routine (DSR) detected a possible chip lock-up situation due to the 82586 anomalies. The 82586 chip on the indicated port of the communications carrier board (CCB) or the network terminal concentrator (NTC) didn't respond to the control command issued by the driver, and the time delay counter has exhausted. The driver will try to reset and restart the 82586 automatically. If the same message appears continuously, redownload the CCB or NTC, or replace the faulty hardware.

1003824 Unknown adapter type *string* found on port *string*

An invalid adapter type was found on the indicated port of the communications carrier board or the network terminal concentrator. Find out the adapter type according to the indicated type code, and verify the adapter card in use.

1003825 Cannot recover from 82586 chip lock-up on port *string*

The 82586 LAN coprocessor device service routine (DSR) detected a possible chip lock-up situation on the indicated port. The recovery effort of the 82586 DSR failed. Redownload the communications carrier board or the network terminal concentrator. This may indicate a hardware problem on the option card.

1003826 Recovered from 82586 chip lock-up on port *string*

The 82586 LAN coprocessor device service routine (DSR) detected the possible chip lock-up situation on the indicated port due to the 82586 anomalies. The recovery effort of the 82586 DSR succeeded. The 82586 was reset and restarted, all the outstanding commands were executed, and the receiving operation was resumed.

MESSAGES()

1003827 Transmit failed.

The transmit operation failed, and a transmit error is returned from the LAN coprocessor 82586. The error encountered during transmission can be one of the following:

1. No Carrier Sense signal during transmission.
2. Loss of Clear-to-Send signal.
3. DMA underrun.
4. Number of collisions exceeding the maximum number of retries.

The transmit error statistics can be found by using the **netstat** utility.

1003828 Hardware initialization failed on port *string*.

The LAN hardware on the indicated port on the CCB is not successfully initialized for normal LAN operation. This error indicates that the LAN hardware is not functioning at all. Please replace the LAN option card or adapter card on the port, or contact your TI representative.

1003831 Invalid slot

The slot specified with the -s option is out of range of acceptable slots in the present configuration of the TI System 1500. A valid slot number should be in the range of 0 to 15 decimal.

1003832 Could not find NTC:*string*

The NTC specified with the **-t** option was not located in the terminal concentrator definition file, /etc/tctab file. **NETSTAT** tries to match the input NTC name with the sixth field in /etc/tctab. This message may indicate a configuration problem. NTCs that are going to be accessed by a TI System process must be defined and enabled in the network terminal concentrator definition file /etc/tctab. Add the required NTCs to this file in order to eliminate this error.

1003833 Could not open NTC:*string* errno:*string*

There was a failure to open the device file associated with the given NTC name. Consult the *TI System V Programmer's Reference* manual for an explanation of the error and possible corrections.

1003834 Option port *string* on slot *string* not responding, status=*string*

The inet function **netstat** failed to return acceptable data. The status returned in the hexadecimal error code corresponds to an inet error message.

1003835 No LAN option card installed in the specified slot: *string*

The **netstat** utility has detected that no local area network (LAN) option card is installed on the CCB in the specified slot. If a LAN option card is installed on this CCB, and the neta module has been downloaded, the CCB or network software may not be functioning properly. Please contact your system administrator if this is the case. For more information on the **netstat** utility, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003836 No operational network device could be found

netstat scanned every slot trying to open a LAN option board, but failed. If a LAN option card is installed on this CCB and the neta module has been downloaded, the CCB or network software may not be functioning properly. If high performance Ethernet cards are present, the configuration in /etc/xnscf may be wrong if the xnsd daemon is not running. Please contact your system administrator if this is the case. For more information on the **netstat** utility, refer to the appropriate Texas Instruments System 1000 Series documentation.

1003837 Cannot open NTC definition file, Error=*string*

An error has been encountered during an attempt to open the network terminal concentrator (NTC) definition file, /etc/tctab. Verify the NTC definition file exists. Consult the *TI System V Programmer's Reference* manual for an explanation of the error and possible corrections.

1003838 Usage: netstat [-s <slot>] [-t <tcname>] [-r]

-s This option allows the user to specify a single slot for **netstat** to attempt to open and display network statistics. With this option, only the specified slot will be examined.

-t This option allows the user to examine the network statistics on an NTC. The name input must match the name of the NTC in the sixth field of the /etc/tctab file. An NTC name must be specified with this option.

-r This option clears the network statistics for the examined network, after reading the statistics.

1003839 NTC: *string* is switched off in the NTC definition file

netstat was unable to report information because of the status of the requested TC. Before statistics can be returned, the NTC must be defined to be on in the second field of the correct NTC entry in the /etc/tctab file.

1003851 Maximum session limit (*string*) exceeded

An attempt has been made to exceed the system limit of SPP sessions. No more sessions may be established at this time. If this problem persists after other sessions have been terminated, a problem in the network software may be indicated. If this is the case, contact your customer support representative.

1003852 Error *string* opening IDP socket

The socket required to establish an SPP session could not be opened. The error code displayed should be investigated to determine the proper action to take.

1003853 No system packet available

A system resource shortage has occurred. This error indicates a problem with system memory usage. If this problem persists after downloading, contact your customer support representative.

1003854 Process could not be installed

The SPP process could not be installed. This error indicates a network software problem. If this problem persists after downloading, contact your customer support representative.

MESSAGES()

1003855 Error protocol packet (number=*string*) received

The SPP process received an error protocol packet. This is to be expected when only one end of an active session is downloaded. Packets being retransmitted to the recently downloaded end will be rejected, and the error packet will be generated.

1003856 Packet rejected

An SPP packet has failed validation checks for this session. The packet will be discarded. The source of the packet may be formatting its packets improperly. This should cause no real problem except for the overhead taken to receive and dispose of the packet.

1003857 Invalid IDP packet type *string* received

A packet other than SPP or ERROR type has been sent to a socket opened for SPP. The source of the packet may be formatting its packets improperly. This should cause no real problem except for the overhead taken to receive and dispose of the packet.

1003858 Transmit to an invalid SPP connection

An attempt has been made to send an SPP packet over a session that is not set up to handle requests for this connection ID. This may occur as a transient problem at times when a time-out has occurred. If this problem persists after downloading, contact your customer support representative.

1003859 Transmit to an unestablished SPP session

An attempt has been made to send an SPP packet over a session that is not established for this connection ID. This may occur as a transient problem at times when a time-out has occurred. If this problem persists after downloading, contact your customer support representative.

1003860 Transmit outside SPP allocation limit

This error could indicate a network software problem. If this problem persists after downloading, contact your customer support representative.

1003861 Null level 3 pointer for SPP transmit

This error could indicate a network software problem. If this problem persists after downloading, contact your customer support representative.

1003862 Timeout on SPP listen or connect

This condition will occur when one end of a connection is not ready to establish a session within the time-out period for a connection. This may occur as a transient problem until both ends of the connection are ready to communicate. If this problem persists after downloading, contact your customer support representative.

MESSAGES()

1004060 Can't execute *string* on *string*.

The **netexec** command failed because an error was encountered before the execution can be started on the remote file on the remote site. This is an informative message. Please refer to other messages to find more description about the error.

1004061 Can't get internet info on slot *string*, err=*string*.

The specified error was encountered when **netcp** attempted to get the internet routing information from the network device in the indicated slot. Please refer to the *TI System V Programmer's Reference* manual for an explanation of the error and possible corrective measures.

1004062 Can't establish a session with remote site.

The attempt to establish a session for **netcp** between the local system and a remote system was failed. This is an informative message.

1004063 The remote directory indicator is too long, *string*.

The directory indicator (i.e., / on TI System V and . on the TI990) is too long to be handled by **netcp**. Currently, the maximum length of the directory indicator supported by the **netcp** is 5 characters. This error may indicate that the network copy server running on the remote system is not functioning well. Please make sure you have the right version of the network copy server installed or contact your local TI representative for assistance.

1004064 Invalid packet received.

The packet received does not have the correct header information or the proper length. This error may indicate that either the network device driver or the network copy server is not functioning well. If the problem persists, contact your system administrator or your local TI representative for assistance.

1004065 Can't open remote file *string*.

The attempt to open the indicated file on a remote system failed. This is an informative message. Please refer to other messages to find more information about the error.

1004066 Invalid ID definition format in *string*.

The user ID/password definition file used by **netcp** is not in the right format. Please refer to the *TI System V User's Reference* manual to find detailed descriptions about the ID definition file format, and modify the indicated file accordingly.

1004067 Terminal I/O error encountered.

An error was encountered when **netcp** attempted to prompt for the user's password. This error may indicate that there is incompatible system software installed on your system. Please contact your system administrator if this problem persists.

1004068 Can't find uid/password definition for *string*.
The ID definition file for **netcp** does not exist or there is no user ID and password defined for the indicated site name can be found in the ID definition file. Please refer to the *TI System V User's Reference* manual to find detailed discussions about the ID definition file and set up the uid/password information in the file.

1004069 Can't have -i option when running in background mode.
The **i** option enables **netcp** to run in an interactive mode. It is an error to invoke this mode if **netcp** is running in background. Please issue the **netcp** command again without the **i** option or try to execute the same command in foreground.

1004070 File in use — *string*.
There are other active network copy sessions currently associated with the indicated file on the remote site. Please try the **netcp** command later.

1004071 *string* exists. Use -r (replace) or -a (append) option.
The indicated file exists, and there is no indication to overwrite it or to append it with the source file. Please issue the **netcp** command again with one of the options or with another file path name.

1004072 Open error encountered.
An error was encountered when the network copy server attempted to open a file. Please contact your system administrator if this problem persists.

1004073 Write error encountered.
An error was encountered when the network copy server attempted to write to a file. Please contact your system administrator if this problem persists.

1004074 Read error encountered.
An error was encountered when the network copy server attempted to read from a file. Please contact your system administrator if this problem persists.

1004075 Invalid TDT opcode.
This error should never happen. Make sure the network copy server installed on the remote system has the right version number. Contact your local TI representative if this problem persists.

1004076 Invalid session id.
This error should never happen. Make sure the network copy server installed on the remote system has the right version number. Contact your local TI representative if this problem persists.

MESSAGES()

1004077 File name is too long.

The length of the specified remote path name exceeds the maximum path name length limit on the remote system. Please verify your remote path name.

1004078 Session table full. Try later.

The session table of the network copy server running on the remote system is full. Currently, the maximum number of sessions allowed at one time is 20. Try the **netcp** command later. If the problem persists, the network copy server may not be functioning well. Contact your system administrator.

1004079 Invalid target. *string* is not a directory.

If there are multiple sources specified in the **netcp** command, the target has to be a directory. This error indicates that the specified target exists and it is not a directory.

1004080 No match.

No file can be found on the remote system by resolving the file name pattern matching characters specified in the remote path name. The file name matching characters on TI System V are *, ?, [..], etc.

1004081 Invalid file characteristics.

The remote file, which **netcp** attempted to copy from, carries a file characteristic that is not supported by **netcp**. Normally, this error indicates that the remote file has one of the special file characteristics on the remote system, such as program file, image file, or key indexed file on TI990. This is a warning message. The remote file is not copied.

1004082 Append incomplete.

An error was encountered when **netcp** attempted to append the source to the target. Normally, this error indicates that the data packets were out of order. Please try the **netcp** command again. If the problem persists, contact your local TI representative for assistance.

1004083 Record is too long.

A record in the source file is longer than the maximum record length supported by **netcp**. Currently, the maximum record length supported by the **netcp** is 4096 bytes. Verify your source file contents. This problem may be caused by copying a binary file as a text file.

1004084 Invalid user id and password.

The user ID and the password provided by the user are not valid for accessing the remote system. Verify that the user ID and the password have been assigned on the remote system and that they are specified correctly.

1004085 Bad packet format.

This error indicates that the packet sent from **netcp** was in a wrong format for the network copy server to process. This error should never happen. Please verify that **netcp** and the network copy server are the latest version. If the problem persists, contact your local TI representative for assistance.

1004086 Invalid input path name or system errors encountered.

The execution of the remote file can not be started because the remote file is not valid for execution or an error occurred when **netexec** attempted to start the execution. Verify that the remote file exists and it is executable.

1004087 Invalid listing path name.

The listing path name specified in the **netexec** command is not a valid file name or one of the directories in the path name does not exist.

1004088 *string* is a directory but *string* is not.

In directory copy or multiple sources copy, the target exists prior to the copy and the source and the target have incompatible file characteristics.

1004089 Request time-out.

The proper response was not received from the network copy server within the time-out limit. Currently, the time-out limit is 6 seconds for local network copy. This error may indicate that the network copy server on the remote site is not functioning or the network traffic is too busy. Verify that the remote system and the network copy server are both functioning. If the problem persists, contact your local TI representative for assistance.

1004090 Invalid Retry value is defined for option -y.

The option **y** followed by a decimal number defines the desired number of retries for each request sent by the client. This error indicates that there is no valid retry count for option **y**. Please issue the command again with the desired retry number specified.

1004091 Can't open any network device in any slot.

There are no high performance Ethernet cards nor is there a device named /dev/ccbXX/inet found on your local system, where XX is the slot number of the communications carrier board (CCB). Please make sure at least one CCB or high performance Ethernet card is installed and configured on your system and **netcp** or **netexec** has permission to access the inet device driver corresponding to that CCB or to /dev/xnsidp.

1004092 Odd logical record length.

Odd logical record length is not allowed on the remote system. Please issue **netcp** again with an even logical record length specified.

1004093 Directory is full.

The target directory on the remote system cannot be expanded any more to contain the new entry for the file/subdirectory that is to be copied to that directory by **netcp**. Please make sure the target directory on the remote system has the proper number of entries available before you issue **netcp** again.

1004101 Usage: tdts -[sv]
s Only start a server for the specified slot number.
v Display the version number only. No server will be started.

1004102 tdts: Error from signal system call=*string*.
The indicated error was encountered when the network copy server (**tdts**) attempted to use **signal**. Please refer to the *TI System V Programmer's Reference* manual for an explanation and possible corrective measures.

1004103 tdts: Error from shared memory creation=*string*.
The indicated error was encountered when the network copy server (**tdts**) attempted to create its shared memory segment. Please refer to the *TI System V Programmer's Reference* manual for an explanation and possible corrective measures.

1004104 tdts: Error from attaching shared segment=*string*.
The indicated error was encountered when the network copy server (**tdts**) attempted to attach its shared memory segment. Please refer to the *TI System V Programmer's Reference* manual for an explanation and possible corrective measures.

1004105 tdts: Error from fork=*string*.
The indicated error was encountered when the network copy server (tdts) attempted to fork a child. Please refer to the *TI System V Programmer's Reference* manual for an explanation and possible corrective measures.

1004106 tdts: Error *string* from allocating socket on slot *string*.
The indicated error was encountered when the network copy server (**tdts**) attempted to allocate a socket with the network device driver running on the indicated communications carrier board slot. Execute **prmsg** on the error number shown above for an explanation of the cause of the error.

1004107 tdts: Error *string* from opening socket on slot *string*.
The indicated error was encountered when the network copy server (**tdts**) attempted to open a socket with the network device driver running on the indicated communications carrier board slot. Try to start the server by entering the **tdts** command again. If the problem persists, please refer to the *TI System V Programmer's Reference* manual for an explanation of the error and possible corrective measures.

1004108 Error *string* from the inet device driver on slot *string*.
The indicated error was encountered while attempting to interface with the inet device driver running on the indicated communications carrier board. Please refer to *TI System V Programmer's Reference* manual for an explanation and possible corrective measures.

1004109 tdts: Device unattached, slot=*string*.
An unrecoverable error has occurred on the indicated communications carrier board (CCB) slot. The network device driver running on the board is not attached any more. Please contact your system administrator for CCB problems and get ready to redownload the CCB or reboot the system.

1004110 Pipe must be explicitly named to be opened
The indicated error occurred because a named pipe was encountered while trying to read or write a directory.

1004111 tdts: Semaphore semop error occurred, errno = *string*
The indicated error occurred because semop SET_ALL failed.

1004112 tdts: Semaphore semop unlock error occurred, errno = *string*.
The indicated error occurred because semop unlock failed. This error caused tdts tables to be in an unpredictable state, hence you must stop all tdts daemons, then restart them. Usually the tdts daemons die when this error occurs.

1004113 tdts: Semaphore semop lock error occurred, errno = *string*.
The indicated error occurred because semop lock failed. This error caused tdts tables to be in an unpredictable state, hence you must stop all tdts daemons, then restart them. Usually the tdts daemons die when this error occurs.

1004114 tdts: Semaphore semget error occurred, errno = *string*.
The indicated error occurred because semget failed.

1004200 Range endpoint too large.

1004201 Bad number.

1004202 ''\\digit'' out of range.

1004203 Illegal or missing delimiter.

1004204 No remembered search string.

1004205 \\(\\) imbalance.

1004206 Too many \\(.

1004207 More than 2 numbers given in \\{ \\}.

1004208 } expected after \\.

1004209 First number exceeds second in \\{ \\}.

1004210 [ ] imbalance.

1004211 Regular expression overflow.

1004212 Usage: grep -blcnsvi pattern file . . .

1004213 RE error *string* : *string*

1004608 To define a Function or its Name, strike any !Key or !Q to quit:

1004609 Enter function number [*string*] or key name [*string*] for *string*.

1004610 FE_read error=*string*. Aborting the editor.

1004611 Error executing show utility

1004612 show cannot display the requested file

1004613 "FE_read error=*string*. Aborting the editor

1004614 Error! Could not execute /bin/cp

1004615 Shell returned an error.

1004616 Find String — Enter string:

1004617 <*string*> Current=<*string*> Total=<*string*> Block=<*string*><*string*>

1004618 !Block, !Find, !Help, !Insert, !Key, !Position, !Quit, !Replace, !Show, !Tabs, !Update

1004619 The only way to change that key is by editing /etc/fecap.!

1004620 To change Cmd or Return, first assign two keys to the function.

1004621 String not found.

1004622 The tx utility cannot be run from the system console.

1004623 Append to file [<*string*>]? (!Yes/!No)

1004624 <File is locked by process id *string*. Can't replace or append.>

1004625 <No write permission to *string* >

1004626 Too many symbolic links were encountered in translating path.

1004627 Invalid symbolic link encountered.

1005600 Cannot fork a download child for CCB *string*, port *string*, error = *string*.

The download process (parent) is unable to create a child process for the indicated communications carrier board (CCB). Consult the *TI System V Programmer's Reference* manual for an explanation of the error and possible corrections.

1005601 Cannot open MTC definition file, error = *string*.

An error was encountered during an attempt to open the multidrop terminal concentrator (MTC) definition file, /etc/mtctab. If there are no MTCs defined or configured on the system, this is just an informative message that can be ignored. Verify the MTC configuration and consult the *TI System V Programmer's Reference* manual for an explanation of the error and possible corrections.

1005602 Downloading Multidrop Terminal Concentrator - *string*..

The download processing for the indicated multidrop terminal concentrator (MTC) has begun. This is an informative message.

1005603 Invalid MTC number specified in MTC definition file.

An invalid multidrop terminal concentrator (MTC) number has been encountered in the MTC definition file, /etc/mtctab. The valid range of the MTC number is 0 to 127. The MTC entry that contains the invalid MTC number is ignored by the download process, **mtcdl**. Valid format descriptions for the MTC definition file are discussed in the *TI System V Programmer's Reference* manual.

1005604 Signal system call error = *string*.

An error was encountered during an attempt to specify what to do upon receipt of a signal with the **signal** system call. Consult the *TI System V Programmer's Reference* manual for an explanation of the error and possible corrections.

1005605 Invalid MTC definition file.

An invalid field or an illegal character has been encountered in the MTC definition file, /etc/mtctab. The MTC entry that contains the invalid field is ignored by the download process, **mtcdl**. Valid format descriptions for the MTC definition file are discussed in the *TI System V Programmer's Reference* manual.

1005606 Cannot open the CPP device *string*, error = *string*, MTC *string*.

An error was encountered during an attempt to open the MTC command processor primary (CPP) device. Consult the *TI System V Programmer's Reference* manual for an explanation of the error and possible corrections.

1005607 Download file *string* error: *string*.

An error was encountered when reading the indicated download file. Consult the *TI System V Programmer's Reference* manual for an explanation of the error and possible corrections.

1005608 Mtcdl is started.

This is an informative message that is displayed on the system console to indicate that the MTC definition file (/etc/mtctab) is found and that the download daemon is started.

MESSAGES()

2006166 Cannot open L.sys file
The remote systems file, /usr/lib/uucp/L.sys, must exist and have read privileges. See the system administrator.

2006167 [*string*]
Format control message.

2006169 *string*
Format control message.

2006320 Usage: uname [-s -n -r -v -m -a]
Enter a valid option.

0x40060000 Correctable memory parity error detected at *string*, slot: *string*
A correctable memory parity error was detected at *string*. Check the CPU board to ensure the LED is no longer on, indicating the error has been corrected and cleared.

0x40060001 Correctable parity error at *string*, slot: *string*, mem exp: *string*, code: *string*
A correctable memory parity error was detected at address *string*. The slot, memory expansion number, and hardware code (including bank, ECC code, etc.) are indicated. Check the CPU board to ensure LED is no longer on, indicating the error has been corrected and cleared.

0x400C0000 Uncorrectable memory parity error detected at *string*
An uncorrectable memory parity error was detected at *string* in user space. Condition FATAL. The process receiving the error was killed and the page where it occurred was marked bad.

0x400C0001 Uncorrectable memory parity error detected at *string* slot *string*
An uncorrectable memory parity error due to hardware failure was detected. If the problem persists, call your customer service representative.

0x400C0002 A nonsupported instruction was attempted by a process
The application program attempted to use an instruction which is not supported by the hardware. Call your customer service representative for assistance.

0x400C0003 Uncorrectable parity error at *string*, slot: *string* mem exp: *string* code: *string*
An uncorrectable memory parity error due to hardware failure was detected. If the problem persists, call your customer service representative.

0x40190001 Out of swap space, or other exec error
The system is not configured with sufficient swap space to complete an **exec** system call, or the executable file is corrupted. The first condition can be checked by using the **pm** utility.

0x40190002 Parity error at physical addr *string*. Log full - WILL NOT REBOOT
A parity error has been detected and the number of parity errors exceeds the maximum number of parity error entries in NVRAM. The machine will NOT reboot. Please contact your service representative.

0x40190003 Parity error detected at physical addr = *string*.
A parity error has been detected and put in the NVRAM parity error log. Diagnostics will determine if it is a HARD error (memory addr. bad) or SOFT error (memory addr. may still be good). This page has been mapped out of memory. Since the maximum number of NVRAM parity error log entries has not been reached, this is not a serious problem.

0x40260001 Allocated inode found in i-freelist, dev *string* , i-number *string*

0x40260002 iaddress > 2^24

0x40290001 Bad Free Block, dev *string* , count *string*

0x40290002 No Space left in file system, dev *string*

0x40290003 Bad Block, dev *string* , bno *string*

0x40290004 Out of Inodes, dev *string*

0x40290005 File table overflow

0x40290006 Inode table overflow

0x40290007 Bitmap allocation error #*string*

0x40760000 bufcall: could not allocate stream event
This is an error that occurs if streams attempts to allocate a new event cell and there is insufficient memory to facilitate this operation.

0x40760001 strinit: odd value configured. Now set to *string*
The number of streams queues was set to an odd value. Only even values are allowed.

0x40760002 strinit: Cannot allocate stream data blocks.
This occurs if there is insufficient memory to satisfy the configuration that the user has specified for the number of data blocks and their respective sizes.

0x40760003 allocq: out of queues.
Insufficient number of streams queues to satisfy the operation.

0x40760004 sealloc: Not enough memory for page allocation.
Insufficient memory to satisfy the configuration specified.

MESSAGES()

0x41390016 Ethernet driver initialization failed on slot *string* due to TDR timeout.
The initialization of the Ethernet board on the indicated slot failed due to timeout on the INTEL 82596 TDR command. Please try the selftest on that board or contact your system administrator.

0x41390017 Ethernet driver initialization failed on slot *string* due to SETIA timeout.
The initialization of the Ethernet board on the indicated slot failed due to timeout on the INTEL 82596 SETIA command. Please try the selftest on that board or contact your system administrator.

0x41390018 The Ethernet board in slot *string* cannot recover from a chip lock-up.
The attempt of recovering from a chip lock-up detected earlier on the indicated Ethernet board failed. The driver cannot re-initialize the Ethernet board and resume the network accessibility. Please try the selftest on that board or contact your system administrator.

0x412C0010 Illegal command block
The controller has determined that the command block is invalid. If you have your own driver, check the command block you built. If you are using the standard driver, the controller probably has a hardware problem. Please try to reboot and try the command again. If this does not work, consult the controller manual.

0x412C0011 Power failure
The controller has identified a power fail condition. It will probably shut the system down in less than a second. When power is restored, please check all the file systems for damage.

0x412C0012 Error out status *string*
The controller reported this special event error. It is a hardware error and requires that the system be rebooted. If the problem does not go away, please consult your hardware manual as you probably have a hardware problem.

0x412C0013 Illegal Interrupt
The controller reported this special event error. It is a hardware error and requires that the system is rebooted. If the problem does not go away, please consult your hardware manual as you probably have a hardware problem.

0x412C0014 Invalid special event address
The special event address given to the controller in the **setup** command is not a valid interrupt address. The standard device driver gives the same address every time to the controller, which should never be invalid. If you are using your own device driver, please make sure that the address for the special events is a valid NuBus™ interrupt address. (NuBus is a trademark of Texas Instruments Incorporated.)

0x412C0015 MSC hardware or software error
The controller reported this special event error. It is a hardware error and requires that the system be rebooted. If the problem does not go away, please consult your hardware manual as you probably have a hardware problem.

0x412C0016 Invalid SCSI operation
The controller reported this special event error. It is a hardware error and requires that the system be rebooted. If the problem does not go away, please consult your hardware manual as you probably have a hardware problem.

0x412C0017 Command aborted with no NuBus™ updates
The controller reported this special event error. It is a hardware error and requires that the system be rebooted. If the problem does not go away, please consult your hardware manual as you probably have a hardware problem. (NuBus is a trademark of Texas Instruments Incorporated.)

0x412F0001 SPA not ATTACHED detected — PANIC imminent!!

0x412F0002 Counterfeit SPA detected — PANIC imminent!!

MESSAGES()

0x41300001 Tape EOM reached with all data transferred
The tape reached end of media (EOM) after transferring all the data. No action necessary. This is an informative message.

0x41330001 NuBus Watcher Latched addr = *string*, SNIF control register = *string*
The NuBus Watcher has been enabled and has latched an occurrence of an interesting event. The address and SNIF control register value define the event. This is an informative message.

0x41360000 through 0x41360005 **See page 198A.**

0x41390009 ntintr: unknown state *string*
The controller is in an unknown state. It needs to be reset by rebooting the machine. If this happens repeatedly, the controller has developed problems and needs service.

0x41390010 through 0x41390018 **See pages 198A and 198B.**

0x413C0000 Slot *string*, formatter *string*, unit *string*, slice *string*
DEVICE STATUS failed

The device status command that is issued when the device is opened either did not complete or had a device error. Check the device name that you were attempting to open. Try to open it again. If this does not work, reboot the machine and try again.

0x413C0001 Slot *string*, formatter *string*, unit *string*, slice *string*
Offline error

The device you were trying to access is offline. Check the hardware and make sure that it is online and ready and all connections are secure.

0x413C0002 Slot *string*, formatter *string*, unit *string*, slice *string*
Not a disk device

The device you were accessing is not considered to be a disk device, but the device number said to use the disk device driver to access it. Please check your device number and the device name to make sure they are correct.

0x413C0003 Slot *string*, formatter *string*, unit *string*, slice *string*
RESTORE failed

The **restore** command issued to the device at open time failed to complete. This indicates a hardware problem in the disk device. Attempt to reissue the command that failed. If this does not work, consult your hardware manual.

0x413C0004 Slot *string*, formatter *string*, unit *string*, slice *string*
Not a tape device

The device you were accessing is not considered to be a tape device, but the device number said to use the tape device driver to access it. Please check your device number and the device name to make sure they are correct.

0x41360000 A transceiver cable problem was detected on the Ethernet in slot *string*.
There is a transceiver problem detected on the indicated Ethernet connection. Please verify your Ethernet cables and transceivers to ensure proper network access.

0x41360001 An open link was detected on the Ethernet in slot *string*.
There is a termination problem detected on the indicated Ethernet connection. Please verify your Ethernet cables and terminators to ensure proper network access.

0x41360002 A short on the link was detected on the Ethernet in slot *string*.
There is a short on the link detected on the indicated Ethernet connection. Please verify your Ethernet cables and terminators to ensure proper network access.

0x41360003 An Ethernet chip lock-up was detected in slot *string*.
A possible INTEL 82596 chip lock-up on the indicated Ethernet board is detected by the driver. If a specific command cannot be completed by the chip in 3 seconds, a chip lock-up situation is determined by the driver, and it will try to recover from the lock-up by re-initializing the board.

0x41360004 The Ethernet board in slot *string* is recovered from chip lock-up.
The attempt of recovering from a chip lock-up detected earlier on the indicated Ethernet board is successfully done. The Ethernet board was re-initialized by the driver without any problem.

0x41360005 Slot *string*, formatter *string*, unit *string*, slice *string*
Repeating disk soft error
status = *string*, sector number = *string*
This is a hardware device error. A correctable media error has been verified to be repeatable. If the error persists, please refer to your device hardware manual and to your controller manual for further information. You may have a problem with your drive.

0x41390010 Port reset failed on the Ethernet board in slot *string*.
The attempt of a hardware reset function on the indicated Ethernet board failed. Please try the selftest on that board or contact your system administrator.

0x41390011 Ethernet driver initialization failed on slot *string* due to allocvec error.
The initialization of the Ethernet board on the indicated slot failed due to failures on allocating an interrupt vector.

0x41390012 Ethernet driver initialization failed on slot *string* due to knalloc error.
The initialization of the Ethernet board on the indicated slot failed due to failures on allocating memories.

0x41390013 Ethernet driver initialization failed on slot *string* due to port access error.
The initialization of the Ethernet board on the indicated slot failed due to failures on requesting the COMM bus arbitration access. Please try the selftest on that board or contact your system administrator.

0x41390014 Ethernet driver initialization failed on slot *string* due to ISCP timeout.
The initialization of the Ethernet board on the indicated slot failed due to timeout on the INTEL 82596 ISCP startup command. Please try the selftest on that board or contact your system administrator.

0x41390015 Ethernet driver initialization failed on slot *string* due to CONFIG timeout.
The initialization of the Ethernet board on the indicated slot failed due to timeout on the INTEL 82596 CONFIG command. Please try the selftest on that board or contact your system administrator.

0x413C00CA Slot *string*, formatter *string*, unit *string*, slice *string*
Media error
status=*string*, block number=*string*

This is a device hardware error. Try the command again. If this error persists, you may want to back up everything you can before reformatting the disk or throwing out the tape.

0x413C00CC Slot *string*, formatter *string*, unit *string*, slice *string*
Primary map failure
status=*string*, block number=*string*

This is a device hardware error. The controller was unable to retrieve the vendor map from the drive during a format or read defect map command. The drive either has no System 1500 vendor map or it has been destroyed. Reissue the command specifying the grown map. You should also check all cables and connectors.

0x413C00CD Slot *string*, formatter *string*, unit *string*, slice *string*
Grown map failure
status=*string*, block number=*string*

This is a device hardware error. The controller was unable to read the grown map from the drive during a format or read defect map command. The drive most likely has never been formatted. Format using either the vendor or FMT maps. You should also check all cables and connectors to the drive.

0x413C00CE Slot *string*, formatter *string*, unit *string*, slice *string*
Spare sector not found
status=*string*, block number=*string*

This is a device hardware error. The drive has too many localized defects during a **format** command. Try issuing the **format** command again specifying a larger number of spare sectors per zone. If the error persists, the number of defects will have to be reduced or the drive is not usable.

0x413C00FC Slot *string*, formatter *string*, unit *string*, slice *string*
Repeating disk hard disk
status = *string*, sector number = *string*

This is a hardward device error. A non-correctable media error has been verified to be repeatable. If the error persists, please refer to your device hardware manual and to your controller manual for further information. You most likely have a problem with your drive.

0x41490000 Slot *string*, formatter *string*, unit *string*, slice *string*
Unknown error code
status=*string*, block number=*string*

The controller has returned an error code that the system does not understand. Try the command again. If this doesn't solve the problem, try rebooting. If the error happens after rebooting, call your service representative.

0x41490001 MSC — Incorrect done address or spurious interrupt

The controller either has not done the done processing or has sent the driver an interrupt for a request that it never issued. If your I/O got an error, try the command again. If the problem persists, reboot. If the error recurs, the controller probably is having hardware difficulties.

0x414900FE Slot *string*, formatter *string*, unit *string*, slice *string*
Internal error
status=*string*, block number=*string*

The controller had an internal error. Contact your service representative if the problem persists. Try to execute the command again.

0x414900FF Slot *string*, formatter *string*, unit *string*, slice *string*
Lost interrupt
status=*string*, block number=*string*

The controller has never sent back an interrupt to the driver that said it finished executing the command. The controller may be confused. Try executing the command again. If this does not work, reboot the machine. If the problem persists, consult your hardware manual or your service representative.

0x414C0000 Slot *string*, formatter *string*, unit *string*, slice *string*
Unknown I/O error
status=*string*, block number=*string*

The error routine in the device driver could not match the error code it was given by the device. Try the command that caused the error again, and if this is repeatable, try rebooting the machine. If the problem persists, consult your hardware manual or your service representative.

0x414C0001 Formatter setup to disable/enable timeouts failed.

This error usually means that the tape drive is in a confused state. You should try to reissue the command, and if the error persists, the system must be rebooted before the tape can be accessed again.

0x414C0002 Command terminated abnormally

An **ioctl** command terminated abnormally. There should be another error listed before this one. Refer to that error for more information. Attempt the command again, and if the error persists, the system must be rebooted before the tape drive can be accessed successfully, again.

0x414C0003 NUPI setup to disable/enable timeouts failed

This error usually means that the tape drive is in a confused state. You should try to issue the command again, and if the error persists, the system must be rebooted before the tape can be accessed again.

0x414C00FE Slot *string*, formatter *string*, unit *string*, slice *string*
Internal error
status=*string*, block number=*string*

The controller had an internal error. Contact your service representative if the problem persists. Try to execute the command again.

MESSAGES()

0x41860010 All mirror bands for device *string* contain invalid data.
Neither mirror band could be updated to reflect the proper state of the partition entries. The mirror bands need to be repaired as soon as possible after fixing the hardware problems that caused the errors when writing the mirror bands. No further writes to the mirrored partition should be done until at least one mirror band is marked as GOOD and can be updated without error.

0x41860011 Alternate mirror band does not refer to default
Alternate will not be used - dev = *string*
The alternate mirror band does not point back to the default mirror band. Somehow the mirror bands are corrupted. Use **devadm** to repair the alternate entry by removing and redefining it.

0x41860012 Unable to allocate system memory for Open Mirror Table
The mirror driver could not allocate enough system memory to build the Open Mirror Table. Either some kernel data is corrupted or the system is out of memory. No mirrors can be opened until this memory can be allocated.

0x41860013 Mirrored swap device partitions do not match in size and swap will not be mirrored.
The two partitions that comprise the mirrored swap device are not the same size. This is only a warning. The system will continue to operate, but the swap device will not be mirrored. To correct the problem, use the **ptu** utility to make the two partitions the same size. You must then reboot in order for the swap device to be mirrored.

0x418C0000 Too many open mirrored file systems - internal table full.
There is an internal limit inside the mirror driver for the number of mirrors that can be open at any one time, and this limit has been reached.

0x418C0001 Error determining controller type of mirror band - dev = *string*
The device number for the mirror band does not seem to contain a valid slot number of a controller. If you have an alternate mirror band for this mirror, use the alternate path name. Otherwise, you should redefine your mirror band with **devadm** if you have moved the disk controller.

0x418C0002 Open error on mirror band device - dev = *string*
The open to the mirror band failed for some reason, such as the device was not ready or the partition could not be found. Check to see if a device error appears before this one. If you have an alternate mirror band, use the path name of the alternate to open the mirror.

0x418C0003 Error reading mirror band - dev = *string*
This error should have a preceding device error. See that error for more information on the actual problem. If you have an alternate mirror band for this mirror device, you may use that path name to open the mirror.

0x418C0004 Mirror band is not initialized - dev = *string*
An open attempt was made on a mirror band that was not initialized and does not contain entries for the partitions to be mirrored. **Devadm** must be used to set up the mirror band before it can be opened.

MESSAGES()

0x418C0005 No valid mirror bands. Unable to open dev *string*
Neither the default nor the alternate mirror bands were valid and therefore the open fails. Check the errors or warnings for the open of individual mirror bands to determine the exact problem. You will most likely need to set up the mirror bands again using **devadm**

0x418C0006 Both mirror entries marked BAD for dev *string*
Neither entry in the mirror band pointed to a partition in a valid state. It is possible that both opens to the partitions failed for some reason listed in previous errors, or the flags for both entries were marked as BAD. **Devadm** and **mkmirr** must be run to reestablish the mirror.

0x418C0007 One entry marked BAD and one ACTIVE. Unable to open dev *string*
One of the mirror band entries is marked BAD and one ACTIVE. The open fails because neither of the entries is marked GOOD and the driver does not know which one to use. **Devadm** must be used to change the state of one entry to GOOD and **mkmirr** must be run before the partition is again mirrored.

0x418C0008 Both mirror entries marked ACTIVE for dev *string*
Both entries in the mirror band are marked ACTIVE and the mirror driver cannot determine which to use. This is most likely a result of a crash condition while I/O was active for the mirror. You should change the state flag of one of the entries to GOOD, then run **mkmirr** to remirror the partitions.

0x418C0009 Entry sizes are not equal - Cannot open dev *string*
The sizes of the partitions composing the mirror must be equal or mirroring cannot take place. Please modify your partition sizes to be equal in length for both entries.

0x418C000A Device not found in open table - dev = *string*
A command was done to a mirrored device that the mirror driver does not believe is open. This typically suggests an internal mirror driver bug or corrupted kernel data. Try rebooting the machine.

0x418C000B Read to both mirror entries failed for device *string*
A read failed because both partitions composing the mirror received an error while attempting to complete the read. Check the device errors listed before this error for the cause of the read failures.

0x418C000C Write to both mirror entries failed for device *string*
Both writes to mirror entries failed, causing the write request from the OS to fail. Check the device errors listed before this error for the cause of the write failures.

0x418C000D Both mirror entries marked BAD in read for device *string*
Both mirror entries have a flag value of BAD so the read cannot complete. The mirror flags for one entry must be changed to GOOD before any reads can be done and **mkmirr** must be run before the partition can again be mirrored.

0x418C000E GET_LENGTH command needs open device
This is usually an internal driver error or an example of corrupted kernel data. The device passed to an internal driver routine was not found in the table of open devices. Attempt the command again, and if it fails, reboot.

Software Trouble Report
TI System V for the System 1500

Date: ___/___/___

1. **Customer ID Number** _____
2. **STR Number** _____

3. **Company name:** _____
   Address: _____
   City: _____ **State:** _____ **Zip:** _____
   Phone number: (_____) _____ – _____
   Contact person: _____
   If TIer: MSG ID: _____ **M/S:** _____ **Ext:** _____

4. **Please enter the name and release number of the software package for which the problem is being reported:** _____

5. **Please enter the release number of the operating system:** _____

6. **Description of the Problem** _____
   _____
   _____
   _____
   _____
   _____

7. **Please provide the following configuration information about your system:**

   Model number (1505, 1510, 1590, etc.): _____

Memory for each processor		**List the option boards for each CCB**	
		Option #1	**Option #2**
Processor #1 type _____	memory _____MB	CCB-1 _____	_____
Processor #2 type _____	memory _____MB	CCB-2 _____	_____
Processor #3 type _____	memory _____MB	CCB-3 _____	_____
Processor #4 type _____	memory _____MB	CCB-4 _____	_____
Processor #5 type _____	memory _____MB	CCB-5 _____	_____
Processor #6 type _____	memory _____MB	CCB-6 _____	_____
Processor #7 type _____	memory _____MB	CCB-7 _____	_____
Processor #8 type _____	memory _____MB	CCB-8 _____	_____

Indicate the type (MSC, NUPI, or NUPI-2) and number of disk controllers: _____

Is this a crash? (Y/N) _____

Note: If the problem being reported has resulted in a system crash, please provide the crash dump on magnetic tape. Label this tape with your name and address. In addition, please include the linked kernel on a separate tape when sending a crash dump.

Instructions:

1. The customer ID field is provided to allow you to internally track the STRs that you send to Texas Instruments.
2. The STR number is generated by Texas Instruments. When your STR is received and entered into the database, the STR number will be sent to the person listed as the contact person (described in the next step).
3. Please fill out the company name and address. Include the name of the contact person that the project can call upon for further assistance in identifying the problem.
4. Please name the software package that appears to be the cause of the problem. Be specific, e.g., COBOL System V, Operating System, or Utility. (If it is a utility, be sure to include its name.)
5. Please provide the release number of the operating system (e.g., 3.3.1).
6. Provide a detailed description of the problem. Attach any additional information that would help the sustaining group to identify the problem area. This information can include listings of programs that duplicate the problem, the mix of application software that exists on your system, applicable error messages, or any other information that may pertain to the problems that you are experiencing.
7. Please provide a complete description of your System 1500 hardware.

Mail this form to the applicable address listed below.

In the U.S. or outside Europe:

Attn: TI System V Sustaining
Texas Instruments
P.O. Box 149149 M/S 2078
Austin, TX 78714-9149

In Europe:

Attn: TI System V Sustaining
Texas Instruments France
B.P. 5 M/S 15
06270 Villeneuve-Loubet, France