

# **CLUSTER/ONE MODEL A™**

CARTRIDGE TAPE SYSTEM

Product Number A-2401

System Manager's Guide

# **NESTAR**

NESTAR SYSTEMS, INCORPORATED

CLUSTER/ONE MODEL A (TM)

CARTRIDGE TAPE SYSTEM  
Product Number A-2401

SYSTEM MANAGER'S GUIDE

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## Cluster/One Model A Cartridge Tape System

1.0 General Information

The Model A-2401 is a high speed cartridge tape backup system for the Nestar Cluster/One Model A local computer network. The system consists of a tape drive and several utility programs. The A-2401 drive uses 1/4-inch, 450 foot tape cartridges, which hold over 20 Megabytes of formatted data.

The A-2401 tape drive operates in the "streaming" mode, recording 8000 bits per inch of data at 30,000 bytes per second, making it possible to write 20 megabytes of data onto one cartridge in less than 12 minutes. Operating from the Network File Server station, the tape drive requires less than 20 minutes to create and verify a backup tape for data on Nestar's 16.5 megabyte Winchester hard disk.

The streaming drive checks data as it is being recorded on tape. Checking is accomplished by a system of double tape heads: as one head writes the data, a second head reads and verifies the newly written data. If an error is detected, a signal is given to rewrite the block in question.

The A-2401 provides full backup and restore software for 16.5 MB and 33MB hard disks.

The Nestar Cartridge Tape System Utilities Version 1.0 (Licensed Program Product No. A-2804) consist of the programs TAPEDUMP, FORMAT, FILTRAN, FILDEBUG, and FILCHECK. TAPEDUMP is used to create backups of Cluster/One hard disks on the A-2401 cartridges, to restore that data to the hard disks, and to verify that tape and hard disk data are identical. The other utilities are provided for use in recovering from hard disk crashes and as a convenience to the Cluster/One user.

2.0 Installation and Startup

The A-2401 System consists of five pieces of equipment:

1. Drive unit with cord
2. Cable
3. A-2401 interface card for File Server Apple
4. Tape cartridges
5. 5.25" minifloppy disk NESTAR:

The Nestar Utility Program TAPEDUMP includes a test mode that will allow the new user to check this equipment at the

## INSTALLATION

time of installation, in order to assure that all components operate correctly. Both hardware and software must be installed before the checkout procedure is performed.

### 2.1 Hardware Installation

To install the A-2401 system hardware

1. Turn off the File Server Apple and insert the A-2401 Interface Card in slot #5. The card has two connectors on it: one at the end of one side, the other in the middle of the other side. The end connector is to be inserted in slot #5.
2. Attach the gray cable to the interface card with the red stripe toward the number "2" printed on the card in the middle of the top side.
3. Plug the other end of the cable into the back of the cartridge tape drive. The pins are polarized so that the cable will only plug in correctly. The red stripe on the edge of the cable should be on the outside, nearest the edge of the drive cabinet.
4. Having inserted the interface card and attached the connector cable to the A-2401 interface card and the tape drive, plug in the File Server Apple and the tape drive and turn on both. Apple and tape drive can be powered on/off in any sequence. The tape drive off/on switch is located on the back of the unit.
5. Insert a blank tape cassette into the tape drive unit, with the clear side up and the small drive wheel in towards the drive. A write-protect screw is located on the cassette, and must be turned away from the "Safe" position for a hard disk-to-tape dump to occur.
6. Verify that all hard disk controller interface cards (P/N 1018-1) are at Rev level C or higher. If any Rev A or Rev B disk controller cards are present, contact Nestar for assistance. Do NOT use the disk drive until the interface card is Rev C or higher. ("Rev A", "Rev B, or "Rev C" is printed in the middle of the card.)

## 2.2 Software Installation

In order to use the A-2401, the Nestar offline utility program TAPEDUMP must be available. The following procedure will place TAPEDUMP on the system disk.

1. Configure a user station to run under the Apple Pascal Operating System: Install an Apple Pascal Language Card in slot 0 and a 16-sector minidisk controller card in slot 5. Install a Nestar Interface Card in slot 6.

2. Boot the user station in Pascal by responding to the prompt at power on

VOLUME TO BOOT?

with /MAIN/SYSTEM/BOOT:NESTAR

3. From the Pascal command line, type F to enter the Filer.

4. Insert the A-2401 distribution 5.25" minifloppy named NESTAR: in the minidisk drive.

5. Type T to use the Filer's Transfer function. Respond to the prompt

TRANSFER WHAT FILE?

with NESTAR:TAPEDUMP.CODE <RETURN>. Respond to the prompt

TO WHERE?

with BOOT:TAPEDUMP.CODE <RETURN>. When the transfer has been completed, Q(uit) the Filer.

6. With this, the Nestar TAPEDUMP utility program has been installed on the system disk, residing with the other Nestar offline utilities. Section 4 describes how to use TAPEDUMP.

## 2.3 Startup

Boot the File Server Apple in the normal way. When prompted, press <escape> to avoid chaining to the Network File Server. Execute the Nestar offline utility TAPEDUMP by typing "X" from the command line and responding to the question EXECUTE WHAT FILE? with "TAPEDUMP".

START UP

TAPEDUMP is a Nestar offline utility program that runs in the File Server Apple. TAPEDUMP is used to create backups of Cluster/One hard disks on Nestar A-2401 cartridge tape cassettes, to restore that backup information to the hard disks, and to verify that hard disk data and tape data are identical.

A Nestar utility program label will appear

```
*****  
***   NESTAR TAPEDUMP PROGRAM   ***  
***           VERSION 1.0           ***  
*****
```

```
          COPYRIGHT 1981,  
          NESTAR SYSTEMS, INCORPORATED
```

```
----- TAPE DUMP/RESTORE UTILITY -----
```

Next a prompt is displayed:

```
IS TAPE CONTROLLER IN SLOT 5 (Y/N)?
```

If the tape controller card has not been installed in slot 5, answer "N" <Return> to the prompt. Power off the Apple and install the card as described in Section 2.1.

NOTE: Pressing <ESC><RETURN> to any prompt aborts the program.

When the answer "Y" <Return> is entered, a second prompt will appear

```
HARD DISK UNIT NUMBER (5 OR 6):
```

Enter the unit number of the disk to be dumped or restored. (Hard disk unit 5 has its controller card in slot 2; hard disk unit 6 has its controller card in slot 3.) The current date and time and a menu of choices will appear (If no clock/calendar card is present in the system, TAPEDUMP will ask for the date.)



02-JUN-1981 15:29:40

D(UMP TO TAPE)  
R(ESTORE TO DISK)  
V(ERIFY TAPE AND DISK)  
T(ENSION) TAPE  
C(CHECK HARDWARE)  
H(EADERS)  
Q(UIT)

WHICH?

#### 2.4 Installation Checkout

To verify that all hardware has been installed correctly and is operational, enter "C" <Return> to check the system. TAPEDUMP will execute a 30 minute test procedure that includes short and long dump/verify sequences. A moderate number of "soft" errors are acceptable during this procedure. The system logs them as they occur and corrects them automatically by rewriting and re-verifying the bits in question.

Should a permanent error be encountered, TAPEDUMP will return an error message and abort. If this happens, confirm that all hardware components have been installed properly. Clean the heads of the tape drive unit (see Section 5.1). Then rerun TAPEDUMP, first in T(ension Tape) mode to insure that tape tension is correct, and then in Check mode, using a different tape cartridge. If permanent errors recur, the system requires service.

If no permanent errors are encountered, TAPEDUMP returns the message

HARDWARE CHECK SUCCESSFUL

and redisplays the menu of options.

#### 3.0 Backup Strategy

To determine the frequency with which hard disk backups should be made at your installation, compare the cost of data replacement for a given time period with cost of backup tapes for the same period. Remember that for any computer system, data loss is increasingly probable as the system is used. Error-free periods of operation often cause system managers to overestimate the long-term reliability of their systems. Further, the most reliable system is susceptible to human error. Nestar strongly recommends that backups of all hard disks be made at least once a week.

## BACKUPS

### 4.0 Using TAPEDUMP to Make or Restore Backups

To use TAPEDUMP, install the A-2401 equipment as described in Section 2.2 and boot the system in the normal way. Avoid chaining to the Network File Server by pressing <ESC> when prompted; then execute TAPEDUMP by typing "X" and "TAPEDUMP".

As described in Section 2.2, the Nestar utility label for the program will appear, followed by the prompt

```
IS TAPE CONTROLLER IN SLOT 5 (Y/N)?
```

If the tape controller card has not been installed in slot 5, power off the Apple and install the card as described in Section 2.2.

NOTE: Pressing <ESC><RETURN> to any prompt aborts the program.

When the answer "Y"<Return> is entered, a second prompt will appear

```
HARD DISK UNIT NUMBER (5 OR 6):
```

Enter the unit number of the disk to be dumped or restored. If no clock/calendar card is present in the system, TAPEDUMP will ask for the date. The program then displays the date, time, and a menu:

```
D(UMP TO TAPE)
R(ESTORE TO DISK)
V(ERIFY TAPE AND DISK)
T(ENSION) TAPE
C(CHECK HARDWARE)
H(EADERS)
Q(UIT)
```

```
WHICH?
```

Respond with "D", "R", "V", "T", "C", "H" or "Q", followed by <Return>. Typing "Q" will exit the user from the program.

The hardware check option "C" is described in Section 2.3 This takes 30 minutes. The Tape Tension option "T" winds and rewinds the tape to adjust its tension. This takes 6 minutes, and should be done for tapes that have been in storage for more than a few weeks, or if a high error rate is occurring.

The Headers ("H") option displays information about hard disks 5 or 6, as specified above, and the backup tape cartridge. The format is

```
DISK "EXAMPLE", SIZE 63840 SECTORS
  LAST BACKUP WAS 04-JUN-1981 18:27:47
```

and, after asking if the tape is ready,

```
THIS IS TAPE #1 OF DISK "EXAMPLE"
  MADE ON 15-MAY-1981 11:53:27
```

The Verify ("V") option will cause TAPEDUMP to read the backup tape and disk simultaneously and compare their contents. A difference between the two will indicate that

1. the data on the disk has been changed or damaged since the dump to tape was made, or
2. there is something wrong with the tape copy.

The verify option may be employed to discover if a portion of the hard disk or cartridge contents has been changed or damaged.

The verify option is also available for use after the dump or restore has been completed, to assure the user that the procedure has been completed correctly and that the contents of the hard disk and tape are identical.

#### 4.1 Dumping From Hard Disk To Tape

Pressing "D"<Return> for dump in response to the prompt above causes TAPEDUMP to display

```
DISK "EXAMPLE", SIZE 63840 SECTORS
  LAST BACKUP WAS 04-JUN-1981 18:27:47
DO YOU WANT TO VERIFY IT (Y/N)?
```

Here, the source disk is named "EXAMPLE". The disk is 63840 sectors in size. Answering "Y"<Return> to the prompt will cause the program to compare tape and disk at the end of each tape, a procedure that will take about the same amount of time as the dump or restore itself (10 minutes for a 16.5 MB hard disk, 20 minutes for a 33 MB hard disk). Note that even if "N" is pressed, a dump can be verified by using the "V" command after it has been completed.

Whether "Y" or "N" is entered, TAPEDUMP next prompts

```
INSERT TAPE # 1 OF DISK "EXAMPLE"
```

## BACKUPS

IS TAPE READY (Y/N)?

For a 16.5 MB disk, only one tape will be necessary to complete the dump, since each tape can hold 20 MB. For a 33 MB hard disk, two tapes will be required.

A "N" to the prompt will cause the prompt to be repeated. Only when the reply is "Y" will TAPEDUMP execute the dump, displaying the words

DUMPING...

on the screen as it does so. The letters "D" and "T" will flash in the lower left-hand corner and across the top of the screen to signify read/write activity on the disk or tape.

If the write-protect screw on the tape cassette has been turned to "SAFE", no dump from disk to tape is possible and an error message will be returned:

TAPE IS WRITE PROTECTED

If a 33MB hard disk is being dumped, TAPEDUMP will prompt

THIS TAPE IS FULL  
REMOVE IT AND PUT IN ANOTHER ONE

after 20 MB has been dumped. Remove the cartridge and insert another, which will become tape #2 of the dump.

NOTE: The write-protect screw on the tape cartridge should be turned to SAFE immediately after a backup has been made.

If the "verify" option has been specified, the program will display

VERIFYING...

after the successful dump of each tape. If tape and hard disk data agree, TAPEDUMP will go on to the next tape or redisplay the option menu. If the V(erify) option was not selected earlier, it may be selected when the menu is redisplayed. To exit, type "Q".

To dump from another hard disk, quit and re-enter the program.

4.2 Restoring a Hard Disk From Tape

Responding to the prompt

```
D(UMP TO TAPE)
R(ESTORE TO DISK)
V(ERIFY TAPE AND DISK)
T(ENSION) TAPE
C(CHECK HARDWARE)
H(EADERS)
Q(UIT)
```

WHICH?

with "R" <RETURN> causes TAPEDUMP to display

```
DISK "EXAMPLE", SIZE 63840 SECTORS
  LAST BACKUP WAS 04-JUN-1981 18:27:47
DO YOU WANT TO VERIFY IT (Y/N)?
```

Again, selecting the verify option with a "Y" will cause TAPEDUMP to compare disk and tape after the restore is completed. Following the user's reply of "Y" or "N" the program prompts

```
INSERT TAPE #1 OF DISK "EXAMPLE"
IS TAPE READY (Y/N)?
```

Entering "N" will cause the prompt to be repeated. With a "Y", TAPEDUMP will verify that the tape is a dump of the disk and ask

```
OK TO RESTORE?
```

Error messages that may appear at this point are described below in Section 4.3. A "Y" causes the program to restore the contents of the cartridge tape to the designated hard disk (destroying any information already on the disk). As this is accomplished, the message

```
RESTORING...
```

will appear on the screen, together with the flashing characters "T" and "D" to indicate read/write activity on tape and disk. Two tape cartridges are required to hold the contents of a 33 MB hard disk. Completing a restore will take 10 minutes for a 16.5 MB hard disk and 20 minutes for a 33 MB disk. Verifying the restore will require approximately the same amount of time as the restore itself.

If the "verify" option has been specified, the program will display

## ERRORS

### VERIFYING...

after the successful restore from each tape. If tape and hard disk data agree, TAPEDUMP will go on to the next tape or redisplay the option menu. If the V(erify) option was not selected earlier, it may be selected when the menu is redisplayed. To exit, type "Q".

To restore to another hard disk, quit and re-enter the program.

Errors encountered during the verify procedure are discussed in Section 4.3.

### 4.3 Error Messages in TAPEDUMP

During the Restore procedure, one of three different error messages may appear on the screen after the user has responded to the question "IS TAPE READY?" with "Y".

1. THIS IS TAPE # 1 OF DISK "EXAMPLE"  
MADE ON 15-MAY-1981 11:53:27  
THIS IS A DUMP OF A DIFFERENT SIZE DISK
2. THIS IS THE WRONG TAPE NUMBER.
3. THE TAPE IS NOT A DUMP OF THIS DISK.

The first message is displayed if tape and disk sizes are not the same; the second if the #2 tape of a 33 MB hard disk dump is inserted for the restore before the #1 tape; the third if disk and tape have different names. Errors #1 and #2 are fatal, and the program will prompt for another tape. For error #3, TAPEDUMP will continue as described above in Section 4.2, asking

OK TO RESTORE (Y/N)?

If "Y", the name of the disk being restored will be changed to the name on the cartridge, if the two are different, and the data on the tape will be restored to the disk.

If, during the verify procedure, TAPEDUMP detects any difference between tape and disk data other than in their headers, the program will display a message like

```
*** TAPE ERROR:  
NO DATA DETECTED  
UNRECOVERABLE DATA ERROR  
BLOCK IN ERROR NOT FOUND
```

This error signifies that a blank space or unreadable data exists on the tape in a location where data is expected, and is most often encountered when a tape has been partially (or never) written. With this message, the TAPEDUMP program will abort.

#### 4.4 Recovering From a Catastrophic Hard Disk Crash

In the event that the system hard disk is inadvertently erased or reformatted, or should the portion of it containing the utility TAPEDUMP become unreadable, it will be necessary to restore the hard disk from the A-2401 backup tape cartridge. The FORMAT and TAPEDUMP utilities are provided on the Nestar distribution minifloppy named NESTAR: for this purpose.

To do so, remove the Network Card from the File Server Apple slot 6 and replace it with a 16 sector minidisk controller. Boot the Apple Pascal Operating System from an Apple minidisk, and then insert the Nestar minidisk NESTAR:

Using the Nestar offline utility FORMAT, by typing "X" and then "NESTAR:FORMAT", reformat the hard disk; then execute NESTAR:TAPEDUMP and restore the contents of the hard disk from a backup tape (Section 4.2).

For the user's convenience, the Nestar utilities FILCHECK, FILTRAN, and FILDEBUG are also included on the distribution minidisk NESTAR:.

### 5.0 Tape Care

With proper care, tape cartridges for the A-2401 (Nestar order number S-2401) have an expected life of 2000 passes.

Protect the cartridges from excessive heat, magnetic fields, moisture, and dust. Tape cartridges come housed in a protective plastic box and should be kept in this box when not in use. Always remove cartridges from the tape drive when not in use. This allows the plastic cover on the end of the cartridge to swing shut, protecting the magnetic tape from dust.

#### 5.1 Cleaning the Drive Heads

The drive has an integral tape cleaner, a vertical post to the right of the heads, that accumulates tape oxide particles. Post and heads should be cleaned regularly with a

## TAPE CARE

cotton swab dipped in alcohol. New tapes tend to shed oxide particles more than "used" tapes, so the drive should be cleaned more frequently when new tapes are used. Recommended cleaning intervals are once per 5 hours of use with new tapes (more frequently if excessive particles are seen on the tape cleaner), and once per 10 hours of use with tapes that have been used for more than 25 backups.

Do not use excessive force when cleaning the heads and post.

Note that the A-2401 uses 450 quad density tape cartridges, which are not the same as DC 300 standard cartridges. DC 300 tapes will not work in the A-2401 system. Order cartridges through Nestar Systems or another vendor of quality high-density cartridges.



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READERS COMMENT FORM

CLUSTER/ONE MODEL A  
NESTAR SYSTEMS, INCORPORATED

You are encouraged to use this form to communicate to Nestar any problems, bugs or suggestions associated with Nestar products. We would like your comments on improving the system itself, as well as this documentation.

Nestar installation location:

Submitter's name :

Address :

Nestar environment

Model A or Model One:

Hard disk size (if present):

Number of user stations:

Language used:

Type of application:

Description of problem or suggestion:

Please mail this form to:

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