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**Woods Hole
Oceanographic
Institution**

Transcription of 9-Track Tapes to CD-ROM

by

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December 1999

Technical Memorandum

Woods Hole Oceanographic Institution, Woods Hole, MA 02543

WHOI Tech.
Memo. 5-99
C.2

Transcription of 9-track Data Tapes to CD-ROM

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Abstract

The WHOI Marine Seismic community had about two thousand 9-track magnetic tapes in storage. The data stored were from marine experiments dating from the 1970's to 1990 and from computer models. The experiments included observations made with seafloor instruments and sondes in boreholes. These tapes were created on Digital Equipment Corporation (DEC) VAX/VMS and other older computer operating systems. The tapes needed to be read and put into a format that contemporary UNIX operating systems could read. This report documents the logistics of transcribing this information onto CD-ROM.

A search was made to find the best way to read and rewrite these 9-track tapes to new media that would have a longer shelf life and be readable on today's UNIX variants. As a result of this search, an outside company was hired to do these conversions. The tapes that were readable from this first group of 381 tapes selected for transcription are now on twenty-five CD-ROMs.

Overview

In mid 1998 the room occupied by the Seismic Groups' tapes was needed by CIS (Computer and Information Services). See e-mail from Hartley Hoskins of October 27, 1998, in Appendix A for the original proposal for this project. Since the tapes had to be moved and were not in a format we could read, it was decided to transcribe them to a long term archival medium that the current UNIX operating system variants could read and that would store in a smaller space. This would make these data and programs available again and substantially decrease the storage area needed. CD-ROM was thought to be the most useful medium for this conversion.

Initially it was thought that these tapes could be read with a WHOI in-house computer set-up. It was quickly seen this would involve a large investment in hardware and at least a man-year of time. Given the funds and time available for this job it was more reasonable to look for a third party company that specialized in doing this kind of work.

The candidate companies were identified using web search engines. The companies that seemed potentially able to do the job were interviewed by telephone. As a result of these phone calls, three (3) companies (Appendix B) were each sent up to 25 tapes to read and use as a basis for a bid for the whole set of tapes. After this test period, one company was selected and 381 tapes were sent to them for transcription (Appendix C). Due to budget constraints, only 381 tapes were sent.

There were numerous problems encountered in reading the tapes, but in the end, we ended up with data from 320 of the 381 tapes sent transcribed

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onto CD-ROM. Appendix D shows the tapes that went onto each CD-ROM and Appendix E shows a summary of the contents of each CD-ROM.

The following sections will discuss the process and outcome in greater detail.

WHOI In-House Conversion Considerations

A number of formats and programs were used to create the 9-track tapes. Most of these tapes were written on DEC VAXes using the VMS operating system. The VMS tapes were of two types. One type was created using the VMS BACKUP utility program, a DEC VMS proprietary program. The BACKUP utility creates "container" files called savesets. Savesets contain groups of files selected by the BACKUP user. Another type of tape was an ANSI-labeled format using the VMS copy utility. A lesser number of tapes were of a third type: unlabeled tapes. Various computers created these in the 1970s and 1980s for data exchange and from real time recording systems. A fourth type of tape was UNIX tar tapes. The 2000 tapes were varied and up to twenty-five years old. The tapes were written in four (4) different densities: 800, 1600, 3200, and 6250 bytes per inch (BPI). Most of the tapes were either 1600 or 6250 BPI.

The best solution for a WHOI in-house solution for reading the tapes was to use an existing DEC VAX Station. These computers run the Digital VMS operating system used to create many of the tapes. They can also run the WHOI in-house programs to read unlabeled tapes. There are some 9-track tape drives in various locations at WHOI, including the WHOI McLean Data Library, but none of them are fully operational. It was thought that a new tape drive with a robust hardware support contract was needed to do the transcriptions.

If a working VAX Station was available, we would still need a reliable tape drive. The number of different BPI levels of the tapes would also make it hard to find a single affordable tape drive to accomplish this task. This problem would be compounded with the need for a nearly full-time operator to process these tapes. This operator would also need a computer systems manager to keep the system running and solve problems with the computer as they happened. A few years ago Warren Sass transcribed about four hundred 9-track tapes for the National Marine Fisheries Service in Woods Hole. This job averaged about 5 hours per tape. The level of data integrity and security required for that job was a much higher level than needed for the current job. But even allowing for one to two hours per tape, this would take one to two man-years of time for the operator alone.

A rough calculation of some costs for in-house transcriptions using only salaries for the two people mentioned above, would be \$112,750 for one year. This does not include any hardware, software or supplies that might be

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needed. Also not included in this estimate is the time that would be spent by someone with knowledge about these tapes deciding on what tapes should be transcribed and what ones should be discarded after a few tries reading them. This estimate includes one year of a Research Assistant III to do the processing of the tapes and 2 months of a Research Associate III to act as a Systems Manager on the VMS platform used. If 2000 tapes were transcribed in the one (1) year time period, it would average out to more than \$56 per tape for labor alone. This does not compare very favorably to the costs we obtained from a third party companies as discussed below. It was decided that the in-house solution was too expensive an option in both time and money to pursue.

Third Party Company Search

After coming to the conclusion that running a WHOI in-house 9-track tape transcription facility would be inadequate and too costly, a search for a third party that specialized in data recovery of old or damaged tapes was started. This search was almost exclusively done on the World Wide Web using search engines. The three companies that bid were found using this web search.

Before sending out tapes for tests and bids, a Request for Quotation (RFQ) had to be put together. The discussion leading to the final RFQ (Appendix F) is documented in the E-mail excerpts for this project (Appendix A).

The following section provides a discussion of the final version of the RFQ to be met by the third party companies bidding for the job. Appendix B lists the three (3) companies we contacted to bid on the transcription job.

Discussion of the Transcription Request for Quotations

See Appendix F for the RFQ sent to the companies. A discussion of the RFQ follows. Appendix A has a series of e-mails used to create the RFQ discussed below.

Output Media Choice

The transcribed data needed to be readable on any computer running the UNIX operating system. We decided to have all of the tapes transcribed on to CD-ROMs in a format used across all the UNIX operating system variants. We asked that the CD-ROMs be written in either cdfs or high-sierra format. Not all CD-ROM formats work on UNIX operating systems. We also verified that cdfs and high-sierra are both readable on PC or Apple computers. This maximized the likely readability of the data on computers in the future.

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A major advantage of using CD-ROMs was that a CD-ROM could be mounted and read as a local disk. By doing this, the time involved in reading a tape onto a hard disk drive for further work is avoided. It also avoids over use and the subsequent potential for damage to tapes. Another problem with using tapes versus CD-ROMs for storing these data was the management of hard disk space used to temporarily store the tape's contents would be very time consuming.

UNIX computers control access to files by use of file accessibility (protection) settings. We asked that the file be made accessible only for reading and execution. Although at present, CD-ROMs can not be erased or overwritten, this could change. Since the data are logically archives, we wanted a second level of protection to avoid accidental loss of data.

To avoid the problem of having our data on old media, that loses its integrity, the CD-ROM was chosen. We anticipate using the CD-ROMs will minimize the likelihood of having to re-transcribe the data at a later date. The CD-ROM at present is thought to be the best option for long term storage of digital data.

The points below summarize the advantages of transcribing to CD-ROM.

- 1) They can be mounted as local file systems.
- 2) At present they can only be written to once and not overwritten.
- 3) They can be read by many different operating systems.
- 4) They have a long shelf life and minimal environmental storage needs.

Conversion Requirements

A large number of the tapes came from DEC VMS computers. DEC computers store binary data in Little Endian byte order, as opposed to Big Endian byte order used by most UNIX variants. We needed the data to be readable on non-DEC computers, thus the binary data needed to be byte swapped before being written to CD-ROM. This conversion from Little Endian to Big Endian is something that unfortunately did not happen in this transcription process. This issue is briefly addressed in Appendix G. Byte swapping can be accomplished using normal UNIX tools but it would be easier for the user not to need to use this utility when using the CD-ROMs in the future.

Any executable files that were on the tapes would not run on a different operating system so there was no need to save executable and object files. This also saved time and space in the transcription process.

Unlike most UNIX operating system variants, VMS lets the user save files of the same name as new files using a version number. Many of the archived files existed in multiple versions. It was felt that present users would not need anything but the most recent version and that even the original users would not be able to distinguish among the versions. As a result, we asked

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that only the most recent version of a file be saved and the version number of all files be removed from the file name.

Most UNIX users work using lower case and use upper case to denote special things. Since UNIX syntax is case sensitive, it was specified that all the filenames be in lower case. This same naming in lower case and not using versions was used in naming and creating directories. UNIX does not allow easy use of files whose names include spaces or other "special" characters, so all file names were to have no spaces or "special" characters in them.

E-mail from Warren Sass on December 28, 1998, in Appendix A, briefly talks about the differences between VMS end of lines (EOF) and how UNIX signals an EOF. This problem will have to be addressed with existing utilities when the CD-ROMs are used in the future.

It was not important that the owner and security information be preserved in this data set. None of the data are classified. This avoids the need for the data to preserve some special security keys and saved time and effort.

Output Naming Conventions

For ease in using the CD-ROMs we asked that each CD-ROM preserve the directory structure of the tapes that were transcribed to it and that the root directory be the name of the tape. This would be useful for correlation with the tape listings we have in books when looking for a specific file. In addition to the data being in a root directory named for the tape, we also asked that each Digital VMS BACKUP Saveset name be used as the next directory after the root tape directory. By doing this we could go to the right tape name and then the saveset from that tape that contained the file we wanted to get off of the CD-ROM. It was important to keep the original tape name, saveset names and directory structure on the tape with this many tapes being read at one time. If some scheme like this was not used to store the data, anyone looking for a specific file would need to search all of the CD-ROMs, or a lookup table would need to be created after all the CD-ROMs were written. Using the proposed structure would let us keep the original laboratory books and have an index of tapes and CD-ROMs to go with the books.

Handling "Bad" Tapes

A procedure was drafted to decide whether enough time had been spent trying to read a particular tape and move on to the next one. We requested that a maximum of three tries be made to read each tape. We would then discuss what to do with the tapes that could not be read in this first pass. We could then decide on a tape-by-tape basis whether the data were important enough to go to a full data recovery job on the tape. Full recovery services are available but are more expensive than the read and write routine we requested.

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Results

In December 1998, we contracted with On-Track Data International, Inc. of Eden Prairie, Minnesota. A total of 381 9-track tapes were shipped to them (Appendix D). A summary of the type of tape and the cost for transcription for each type are shown below:

<u>Quantity</u>	<u>Description</u>	<u>price/tape</u>	<u>Total</u>
179	ANSI Labeled		
	VAXcopy	\$25.00	\$4,475
148	VMSBackup	\$35.00	\$5,180
41	UNIX tar	\$25.00	\$1,025
13	Unlabeled	\$25.00	\$ 325
381			\$11,005

The Purchase Order was written not to exceed \$11,500 and the job was specified to be completed by 01/29/99. The difference in price according to tape format was a result of the tests that they had done in November and December. The prices on the UNIX tar and unlabeled tapes were to be confirmed as the job progressed since all three companies had found them difficult to read in the bidding phase.

On-Track was selected because of their willingness to keep in touch with us and their detailed questions about specifications. One of the other companies worked closely with us to meet our bid specifications but had trouble getting our data into the final format we needed. On-Track best met our bid specifications of the three companies. In fairness to the other two companies in the bidding process, the time was short for the bid tests. We decided that the company which did the best job in the bidding tests was probably in the long run going to be the best able to get the job done to our specifications.

On-Track had difficulty reading 32 of the tapes we sent (Appendix H). A break down of these tapes by category is:

Unlabeled	4
VAXcopy	4
UNIX tar	1
VMSBackup	23

On-Track requested \$150 per tape to analyze these tapes and another \$250 per tape to do a total recovery of them. We chose not to do this due to budget constraints. Therefore, we can not comment on how effective their recovery would have been.

Unfortunately, On-Track may not have fully comprehended the magnitude of the job and the delivery date began to be pushed back. We did not hold them to the delivery date since we were more concerned with having them do

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a thorough and careful job than a quick one. On-Track sent us test CD-ROMs and asked how well they had formatted the files and directories. In the bid phase they had done well getting the formats we wanted but when they went into production we had to work through the formats we requested all over again. To On-Track's credit, they did not send final versions of the data written to CD-ROM until we approved of the CD-ROM formats. This involved about 10 CD-ROMs being sent and us testing them out on our computers. The CD-ROM formats varied from Joliet, a special PC format, to cdfs, which was what we sought. We also had problems not being able to be read ASCII files properly. Data was lost and files were run together in an inconsistent way. By the end of all the testing we arrived at a format we could read and a structure and layout to the files and directories that was useful to us. The final CD-ROM format was ISO-9660 (long) which the UNIX variants, PC's and Mac's could all read.

In the final set of CD-ROMs that had the VMS Backup tapes' files On-Track did not provide the directory structure we requested. There was no second level directory for each Saveset; thus the files from different Savesets are merged. All of the files from these tapes were written in their original directories with only the tape name as the base directory. Because we asked for only a single version of a file, many files may have been lost due to this lack of use of the Saveset name as a directory. Perhaps the biggest problem in this is the uncertainty of whether or not we have the most recent version of a file from all of the tapes represented on that CD-ROM. If they pared down the filenames and versions in an order different from the chronological order in which the Savesets and tapes were written, then the most recent files could have been lost leaving us with data that could be an intermediate step in a that experiment. We have lost the ability to look up files from specific Savesets and the time periods those files represent are now less specific than we had hoped they would be.

The final set of CD-ROMs arrived in mid-September of 1999 (Appendix E). Not all the data were recovered. Of the 381 tapes sent out, 358 were put onto CD-ROM in some manner. Thirty-eight (38) of the tapes put onto CD-ROM ended up having no useable data form them (Appendix I). Twenty-three (23) of the tapes were never put on to CD-ROM at all (Appendix J). Thus, we were able to get data back from 320 tapes of the original 381 tapes sent out. As noted in the bid specifications, On-Track was to try several times to read the tapes and then move on to the next tape. We lost an unknown amount of data due to this process. Because the tapes were old this seemed to be a reasonable approach to take. Also, because these tapes had to be read to find out if they were good we had agreed to pay for reading them. We received back about 8.5 gigabytes of data on 25 CD-ROMs (Appendix C).

Compared to our estimate of \$56 per tape in labor only for an in-house facility, the cost of going to On-Track were quite competitive. The average cost per tape for the 381 sent is \$28.89. The cost per tape for the 320 that had data recovered is \$34.39. Clearly the On-Track solution was much

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cheaper especially considering that in-house hardware, software, and supplies were not included in the \$56 in-house rate.

Lessons Learned

After going through the process of trying to decide whether or not this was a successful and a cost-effective process, the first reaction is that a large amount of data was preserved that probably would have been lost. It also should be noted that the cost per tape for going to On-Track was less than doing the transcription with an in-house facility.

One of the main drawbacks of going outside WHOI was some loss of quality control. If we had done this job in-house, then we at least would have been able to make a much more informed decision about whether a data set was worth pursuing further. We gave On-Track a set of guidelines that covered the whole data set, but perhaps were not specific enough due to the large number and variety of tapes.

We also had a surprisingly bad success rate for UNIX tar tapes, which were the most recently written tapes. Of the 41 UNIX tar tapes sent 34 came back as empty (Appendix I). As yet, we have no explanation.

Further use of these data must address the need for a set of tools to translate the data from the VMS formatted files to a file format usable on UNIX. Many of the ASCII and binary files include VMS end of file information in the files returned. On-Track read the available files and rewrote them to CD-ROM. The transcription that was done was to copy the files as they are from tape to CD-ROM. It was not always possible to convert from VMS formats to a "normal" UNIX format. For binary files there is also the extra step of swapping bytes in each variable, since DEC computers write data differently from most UNIX variants (see Appendix G).

These were known problems fixable issues, and can be addressed at a later date. It was decided that the first order of business was to get the data off the 9-track tapes and onto a media that the UNIX computers could read, so we did not request On-Track to byte swap these files. On-Track's data transcription from 9-track to CD-ROM solved that first order problem. If the data were still on the 9-track tapes, they would be, in effect, lost. Now, happily, the data are available again.

Proposed Further Work

Having now worked through the logistics of the transcription and established a smooth working relation with the supplier, it is anticipated that

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additional tapes can be put onto CD-ROM. A list of proposed tapes for transcription in the coming year is being prepared. We will be requesting \$20,000 to continue this project.

The cost of copying CD-ROMs is relatively cheap. This makes these data affordably available to users here and elsewhere.

Acknowledgements

James Luyten provided Institution discretionary funds for this work. Thanks are due Michael LaGrassa for help in developing the RFQ and contract negotiations. Sue Vaughan helped with invoices. Ralph Stephen promoted this project and his encouraged us to persevere. Ellyn Montgomery kindly proofread this report.

Appendix A: E-Mails

Date: Tue, 27 Oct 1998 11:56:05 -0500
From: Hartley Hoskins <hhoskins@whoi.edu>
To: dlander@whoi.edu, tbolmer@whoi.edu, ddubois@whoi.edu,
binzina@whoi.edu, mlamont@whoi.edu, rstephen@whoi.edu,
rdetrick@whoi.edu, wcurry@whoi.edu, fheide@whoi.edu,
wsass@whoi.edu
Subject: Clark 128C tapes

The 2,050 9-track seismic data archive tapes stored in Clark 128C need to be moved from their present location to make way for the new network head-end; and, more importantly, need to be transcribed onto contemporary storage media to facilitate their future usefulness.

Ralph Stephen and Bob Detrick of G&G feel that much of the data is of continuing scientific usefulness, and that putting it on cataloged, more accessible media would facilitate its future use. With the guidance of Warren Sass, Tom Bolmer and Dave DuBois, we undertook planning a transcription capability.

It is believed that a majority of the tapes are VAX VMS backup tapes. Others are probably unlabeled tapes and ANSI-labeled tapes. Probably none have secure labels. Tapes are written at densities ranging from 800 to 6250 bpi. A 2400' 9-track written at 1600 bpi can hold about 46 Mbytes of information. The contents of a reel of tape can readily be read on to a disk or memory of contemporary machines.

There are two strategies for transcription: using a VMS machine or a Unix machine. Software capable of reading VMS backup tapes exists for both. WHOI has license rights to the DEC VAX software needed. Most of the Unix software is free but may not handle all of the VMS features. There are a number of configuration details involved. Sass suggests that use of a Micro-VAX to read the tapes would probably be somewhat more successful than a Unix box. He also noted that there are probably many tar tapes created by Unix machines that will need to be transcribed.

Having successfully physically read the data, the question then arises as to what re-formatting should be done. We probably do not want to simply make a copy of a VMS backup tape on other media, but rather to put the data in whatever open standards-based format will be useful to future users. Management of file directories is yet another level of complexity or sophistication.

The archive media for the transcribed data could be CD-ROMs, Exabyte or DAT cassettes. Each of these could hold several 9-track tapes. Which tapes to group on the larger new media requires editorial input. The transcription will result in a large reduction in the space to store the data and enhance its physical integrity.

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Sass transcribed about four hundred tapes for the National Marine Fisheries Service four years ago. He averaged about one tape per five hours, but these were secure labeled tapes, which involved additional work. One necessity that he identified was a good tape cleaner. The 9-track tape drive was the most frequent failing component. He suggests having at least two triple-density tape drives, and a service arrangement to repair them promptly.

The WHOI Archives has a comparable number of 9-track tapes with no means to read them. Melissa Lamont has two 9-track drives (Cyber and Kennedy; interface being determined). Bolmer has two tape drives with Q-bus interfaces that ran on old MicroVAXes. Sass has three MicroVAXs with SCSI buses, one of which could be made available for this project. There are probably other tape drives around the Institution; C.I.S. has none.

It is proposed that a tape transcription set-up be placed in the WHOI Archives. Our approach is that this should be an Archive resource, and that the Clark 128C tapes are an initial undertaking. Archives is willing to provide the working space and store the finished products. Archives is not agreeable to storing further data on degrading media that cannot be read here. On an on-going basis for the next couple of years, the proposed set-up could transcribe archive tapes, which could then be released. It could also provide copies of data from tapes in response to information and requests. Hopefully in three years, having transcribed the present store of tapes, it could be decommissioned.

It is to be anticipated that there will be other media transcription needs as storage technology evolve. It is a general observation that most digital storage media lasts longer than the equipment for writing and reading it.

The cost of the undertaking would include the following:

Equipment:

- a. two or three triple-density tape drives (on hand, but needing to be interfaced and tweaked up)
- b. one MicroVAX (on hand)
- c. SCSI disk drive (for temporary storage)
- d. one tape cleaner with supplies
- e. CD-ROM burner
- f. Exabyte cassette drive

Staffing:

- a. one part-time operator for six months (TBH)
- b. one system resource person (Warren Sass, \$46/hr)
- c. editorial input (Bolmer and DuBois)

We have determined that the task can be done, but at a yet undetermined expense, and identified the ingredients of the project. If everyone is in favor of doing this, it is proposed that a detailed budget be prepared to submit to Jim Luyten per his invitation.

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In the short term, temporary storage of the seismology group tapes can be arranged in a comparable climate-controlled area, but the stipulation is that there has to be a documentable flow of tapes out of this temporary area as it is planned for future renovations.

Please share your thoughts. Help us identify any equipment and other resources, and costs that you think would be involved in getting this job sufficiently defined and underway.

*****

Date: Sun, 01 Nov 1998 21:13:09 -0500
From: Hartley Hoskins <hhoskins@whoi.edu>
CC: binzina@whoi.edu, fheide@whoi.edu, tsilva@whoi.edu,
mlamont@whoi.edu,
tbolmer@whoi.edu, ddubois@whoi.edu, dladino@whoi.edu,
lbenway@whoi.edu,
wsass@whoi.edu
Subject: Moving tapes from Clark 128C

1. Tape transcription proposal:

I have had feedback from three of the ten addressees of my 10/27 E-mail on putting together an archive tape transcription capability; all were favorable so far. Bolmer's inspection of Archive's Cipher tape drive indicated that it was 1600 bpi only.

We are continuing to scout for other tape drives.

Melissa Lamont feels that it is futile for Archives to store digital materials without the ability to read them. Archives is presently shelving their digital and videotapes on the new roller cabinets in their tape room. Some space in the apparatus room can be created by re-arranging material presently in storage there and disposing of some items. It would be some weeks before the Clark 128C tapes could be moved to Archives.

2. Temporary tape storage:

Given that the new head-end installation work in Clark 128C needs to go forward, and a budget for the transcription activity is still in progress, it is proposed to move the tapes from Clark 128C to Clark 502 (the rear projection room behind Clark 507, adjacent to the microwave radio closet). This room is 13' x 14.5'. The width of the entrance door from passageway 500B is 30.5".

I met with Fritz Heide and Tim Silva of Graphic Services, titular proprietors of this room, and they are agreeable to its being used as temporary storage, with emphasis on "temporary". This space is slated for renovation, probably next year. Renovation will include replacing the 6'x12' ground glass panel facing into Clark 507.

Before moving the tapes in, some preparations are needed. There is a large unneeded counter (102"W x 52"D x 51"H) made of unistrut and plywood

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that needs to be dismantled. The electrical service to this counter needs to be disconnected. It is proposed to have the carpenters dismantle the counter, and electrician Karl Brown disconnect the electrical service.

Also presently stored in Clark 502 are:

- Four glass display cabinets (each 36"W x 14"D x 30"H)
- One gray metal cabinet (36"W x 21"D x 78"H).

There are four tape storage racks, with six shelves on each side; each holding fifty tapes. The four racks provide space for 2,400 tapes. Each cabinet is 48.5" wide by 79.5" high; the upright is 12" deep, with the tape hung it is 23" deep. The minimum footprint would be 49" by 92"; allowing a 12" access aisle to all shelves would enlarge the footprint to 49" by 140". This would fit nicely along the 13' west wall of the room, extending 49" into the room.

3. Schedule:

a. Preparation of transcription budget

For budgetary review purposes, it is proposed to rent two triple-density tape drives and a tape cleaner. If, in the meantime, we can assemble equipment here cost-effectively, we would use it instead.

b. The move:

If everyone is agreeable to temporarily storing the tapes in Clark 502, it is proposed to have the carpenters ready the space this week and move the tapes as soon as the space is ready. There is an empty tape rack in Clark 128, which can hold one rack (600 tapes); this will allow each rack's tapes to be hung temporarily while the rack is moved. It is proposed that this work can be completed before Richard Krishfield's sediment traps arrive back from sea the week of November 9th.

*****

Date: Wed, 04 Nov 1998 17:43:50 -0400
From: Michael Daniec <mdaniec@ndci.com>
To: tbolmer@whoi.edu
Subject: Re: VMS conversion prices

Tom:

Thank you for your inquiry regarding our data conversion services

National Data Conversion Institute converts documents and data between over 5,000 normally incompatible software, hardware and media formats

We can convert from any DEC VAX/VMS based media, including 9-track magnetic tapes (as well as TK-50/70/85, 8MM tape cartridges etc.)

We also handle just about any data formats coming from the VAX/VMS environment and can translate to PC based media and data formats such as ASCII files on CD-ROM or 8/4MM backup tapes, zip100 etc.

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To price a project of this nature we would normally need to establish additional relevant details including the size of the tapes (are they standard 2400' reels or smaller?) amount of data actually stored on the tapes (if not full), what density were the tapes written at, how were they created (VMS backup or copy command) etc.

Alternately, we would be happy to examine sample media free of charge and then finalize the associated pricing

Based on a quantity of several thousand 9-track tapes, we can probably offer you volume pricing which may run as low as \$15-\$35 per 9-track for a straight dump to PC based CD-ROM or Unix based tape cartridges such as 8MM or 4MM or DLT in the Unix TAR format (or CPIO or DD)

Most smaller conversions are performed within 24-48 hours of receipt of the source media, we can probably convert on the order of 40-50 tapes every 24 hour period of time

If you need any further information, please call me at (212) 463-7511 x707 or e-mail mdaniec@ndci.com

Michael Daniec
President - National Data Conversion Institute

Tom Bolmer wrote:

> I have a few thousand 9-track tapes I want to read to some current UNIX backup media. The bulk of the tapes are Vax/VMS Backup tapes or VaxLabeled tapes. What is your bulk price per tape? We are starting a search on how to read our old data tapes and not loss the data.
> Thanks for you information Tom Bolmer

*****

Date: Thu, 05 Nov 1998 14:59:10 -0500
From: Tom Bolmer <tbolmer@whoi.edu>
To: rstephen@whoi.edu, wsass@whoi.edu, ddubois@whoi.edu,
rdetrick@whoi.edu,
binzina@whoi.edu

Ralph/Hartley/Warren/Dave/Bob/Barbara;

These are a few ideas I have about getting the data off of the 9-track tapes. This is all I can contribute until 11/17. I hope this helps get things rolling in the next week or so.

Tom

Yesterday I did a short web search for 9-track tape duplication services. I got a phone call from two of them and the e-mail included below from one of

Transcription of 9-track Data Tapes to CD-ROM

them. I am coming around to thinking that this would be a viable method of getting the data off of tape onto something we can continue to read.

The problems of doing tapes here as I see it are:

- 1) The cost of getting and maintaining a 9-track system
- 2) The cost of a disk drive to transcribe onto
- 3) The cost of a backup system to write this new data onto
- 4) The cost of the backup media
- 5) The cost of operating and managing whatever system (probably VMS) we use
- 6) The man hours to just plain spin a 9-track tape and THEN spin some backup system

The advantages of doing it here are:

- 1) We do it and decide whether or not to keep trying or get rid of the tape decision
- 2) We don't rely on an unknown party
- 3) We do not have to ship the tapes out of WHOI

The advantages of going outside

- 1) They maintain all of the equipment for doing this.
- 2) We get CD-ROMs, which will store and be much more useful than any tape media could ever be.

The disadvantages of going outside:

- 1) They are unknown
- 2) How to make the decision of when to not keep trying to read a tape

I would like to suggest that we sent a set of perhaps 50+ tapes to one of these services as a test. This should not break the bank of this \$20,000 we have for tests. If it fails, we will have some money left to try another way.

I can not get a contract going, since I am leaving the 6th and will not be back in the office until the 17th of November. Some key questions of the company when we are setting up a contract would be:

- 1) Put onto to CD-ROM. The CD-ROM can be mounted as a file system on most systems now. There is no need to clean a disk off and read a tape on to a disk. The more the tape is spun the more chances of it not working any more. The CD-ROM stores small and is very quick to mount and change. I hear CD-ROM duplicating is a pretty cheap method if we want to be sure we have second copy.
- 2) We should ask for only the latest versions from VMS tapes
- 3) They should create a directory structure such that each tape and saveset is in a unique directory. It would be something like:
/tape_name/saveset_name/directories and data from tape. Warren did this for the 9-tracks he read for me a few years ago. It was very useful in figuring out what file came from what tape.

Transcription of 9-track Data Tapes to CD-ROM

- 4) Set up a system for how many times they should try to read a tape before they give up on it. I.e. hoe many retries do they perform. If they get 905 of the tape and then have problems when do they quit?
- 5) Be sure we are not liable for damaging their tape drivers with our data.
- 6) How would they handle foreign tapes? I.e. not tape not VaxLabeled copies or VMS backup tapes.

Tom Bolmer

*****

Date: Thu, 05 Nov 1998 11:26:39 -0500
From: "Ralph A. Stephen" <rstephen@whoi.edu>
To: "Bolmer, Tom" <tbolmer@whoi.edu>, "Warren J. Sass" <wsass@whoi.edu>,
"David L. DuBois" <ddubois@whoi.edu>,
Hartley Hoskins <hhoskins@whoi.edu>
CC: Robert Detrick <rdetrick@whoi.edu>, "Inzina, Barbara" <binzina@whoi.edu>
Subject: Archiving Seismic Data

Tom/Warren/Dave/Hartley,

I spoke with Jim Luyten yesterday afternoon regarding funds to transfer the archival seismic data from 9-track tape to a UNIX friendly medium. About \$20K could be available from overhead funds (not science money) for this archiving task. The money would have to be spent by December 31, 1998.

There will be no Lab O/H or G&A charged on salaries for this work. I took the liberty of preparing a preliminary budget. One month for each of Bolmer, Sass, DuBois and Hoskins comes to just under \$20,000.

The complete job will most likely cost more than \$20K, but this will be a start. We should prepare a memo for Jim, this week, outlining what we will do with the money. I have asked Tom and Hartley to prepare a work statement that we could use in the memo.

- The first step should be to address some of the unknowns outlined in Hartley's email of 27 October. Is there any point using the tape drives in McLean? Is the hardware and software in the OBS lab adequate for the job? Should we go outside WHOI to have the tapes transcribed? By Jan 1 we should be able to at least recommend a tested procedure for transcribing the data. If necessary we could purchase or lease hardware.
- Some effort should be expended to prepare an inventory of the data we have. Some of the tapes can be discarded without copying. Is some data more important than others. Personally I would like to see the Leg 102, Site

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417/418 reflection survey data transcribed early in the process. Tom will need some time to go over the archival finite difference code and models.

- As usual the bottom line would be firm at \$20K for this stage, but trade-offs between time actually spent by various participants is flexible. For now I do not mind being the point-of-contact for negotiating the budgets, work, etc.

Regards, Ralph.

*****

(NOTE THIS was edited 12/27/99 by STB to make it smaller)
(See apendix E for the full requirment list)

Date: Wed, 18 Nov 1998 17:18:52 -0500
From: system_wjs1@wjs.who.edu (Warren J. Sass)
To: tbolmer@who.edu, DDUBOIS@who.edu
Subject: Re: tape transcription questions

Transcription requirements for discussion 11/18/98 14:45

- 1) VAX/VMS ... are some "unlabeled" tapes included in this set of tapes.
- 2) The bulk of the tapes are 1600 or 6250 BPI 2400 foot tapes...
- 3) There are some 800 and a few 3200 BPI tapes...
- 4) Files on VMS BACKUP ...
- 5) We would prefer all files to have no version numbers and, if possible, all files be named with lower case letters, since we are going to UNIX based systems with these sets of data. The files should have read and execute privileges but no write privileges.
[WJS - Add the word "output" between "all" and "files" on first line. Who should be the file owner? And shouldn't the owner and/or root have write access? The data on CDROM is protected anyway; question is ease of use after data is copied from CDROM to disk.
- 6) We would like CD-ROM copies of these tapes...
- 7) We understand that we are sending old tapes and there could be problems. If needed, please clean the original tape once. After 3-5 tries you may stop trying to read a tape and put it aside for future discussion with us. Please preserve all data recovered up to the failure point. The number of retries must be discussed to come to an agreeable length of time to work with a tape.
[WJS - You also want to consider the possibility that they can get beyond a bad point, and even the possibility that they can go back and get previously bad data. If you view this as a

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contract of some sort, you might want to specify the exact algorithm they are to use. In any case, you might want to clarify the "3-5 tries" - from the start? on different drives"? Also, you might want to make the matter of cleaning more definite; for example, "we're willing to pay for a pre-processing cleaning per tape", or say "we want" instead of "we're willing to pay for"]

What is your normal liability for our tapes? ...

8) We assume we have no responsibility for ...

9) We will try to put external paper labels on tapes that do not have any external labels or are confusing as to what the labels are. We will also try to note which tapes are "unlabeled" and do our best to not how they were created.

[WJS - "external" -> "external"; "wil" -> "will"; "best to not" -> "best to note". If we can externally label all w/ "ANSI", "BACKUP", or "unlabeled", we should note that. It will make their job much easier and presumably drive down the cost. Ditto if we can tell them that we will externally label all non-6250 BPI tapes with the appropriate BPI. How an unlabeled tape is created should be irrelevant to their processing except for maximum record size. On the other hand, if the contents are, say, 80 byte records blocked 100:1, and you want the output deblocked, that's something else. My recommendation is NOT to ask them to do such things]

10) Would you please quote us the price for overnight ...

*****

Date: Tue, 24 Nov 1998 16:20:52 -0400
From: Michael Daniec <mdaniec@ndci.com>
To: tbolmer@whoi.edu
Subject: Re: get tapes?

Tom:

Yes, we did receive the tapes and are processing them

Boy, are they in a bad shape!! Is this how bad all of them will be?

MD

*****

Date: Tue, 24 Nov 1998 16:19:42 -0500
From: Tom Bolmer <tbolmer@whoi.edu>
To: mdaniec@ndci.com
Subject: tape quality

Transcription of 9-track Data Tapes to CD-ROM

Good chance they are like that, yes.

*****

Date: Fri, 11 Dec 1998 18:50:19 -0500
From: system_wjs1@wjs.who.edu (Warren J. Sass)
To: TBOLMER@who.edu
Subject: Reading /fal3/TAPES/nlrblld/*.bck

I ftped a few of those to my VMS box and was able to unpack them after an intermediate step or 2. Binary files were fine (turned out there were a few FOR095.DAT files, whose format I know!!), too.

The good news is that with the files unpacked, we can repack them, select, rename, convert floating point, blah, blah. The bad news is that you'd still need a medium to store them on.

*****

Date: Tue, 15 Dec 1998 14:31:28 -0500
From: Chan Lam <clam@ndci.com>
To: tbolmer@who.edu
Subject: Re: test data

Hi tom;

So far, we encountered 5 bad tapes, I need you to confirm the test we sent you is ok before we start writing CDs for the other tapes....

Chan

*****

Date: Wed, 16 Dec 1998 11:29:42 -0500
From: Tom Bolmer <tbolmer@who.edu>
To: Chan Lam <clam@ndci.com>
Subject: Re: test data

Chan;

Sorry to be so scatter brained. I've been in and out trying to sleep off a cold and communications are spotty. The CD-ROM with 2 tapes on it looked ok. I'd prefer to have only the latest version of the file and no version numbers at in the file names. If you can use ":" instead of ";" before the version number, then the UNIX system will let us work with the files normally. As it is now I must put the file name in quotes to do anything with them. ";" is not a valid Unix file name character. I also agree that we talked about that and that getting the data was first priority.

If you keep the set up of the root directory name being the tape label, then the saveset name as the next directory, and then files and directories in that

Transcription of 9-track Data Tapes to CD-ROM

saveset as they are on the tape that would be real helpful. That way all the data from a saveset are in that saveset and tape label's directory and able to be referenced. What I want to continue to avoid is having to do any untaring or unpacking of savesets. I would like to see these as individual files on the CD-ROM, which I can use as a local file system on my systems.

With that said I agree it is time to burn the rest of the CD-ROMs and send them along. Please also include any information about the bad tapes and which ones they were. Look forward to checking out the rest of the CDs.

Thanks,
Tom

*****

Date: Fri, 18 Dec 1998 14:05:53 -0500
From: system_wjs1@wjs.who.edu (Warren J. Sass)
To: tbolmer@who.edu
Subject: Re: [Fwd: got CD-ROM]

>>> Having to ftp those [backup savesets] to a VMS machine... is ...
>>> inefficient. Except that the tapes are read.

Not necessarily. We're after the files in the savesets, not the savesets themselves. I'm still not sure that BACKUP will use its recovery procedures on a disk copy of a bad saveset the way it will use them on the original tape version of that saveset.

This is just a comment - if they don't have BACKUP out there to read the tapes, nothing we can do about it.

*****

Date: Wed, 16 Dec 1998 13:23:59 -0500
From: Tom Bolmer <tbolmer@who.edu>
To: "Maryanne F. Pearcey" <mpearcey@who.edu>, ddubois@who.edu,
hhoskins@who.edu, wsass@who.edu, rstephen@who.edu
Subject: Archiving Seismic Data Account extension

Maryanne,

Is there a way we can extend account 53252 for a few more months into 1999?

I have sent about 20 tapes each to 3 different tape conversion vendors. They have sent back perhaps 40% of the test data we asked for on CD-ROMs. I am in contact with all of them and they are working to get me the rest of their test sets. After all of these sets are here we will go over what each company sent back and how usable that data set format is to us. We must look at how useable their CD-ROM formats are and how well they recovered data off of the tapes. Then we must make a contract for as many of the tapes as we can and mail them out to the companies. They have not been as fast as I had hoped in getting test sets back to us.

We are running out of time in this year to accomplish this. It is especially hard to mix this in with other work obligations we already have and then

Transcription of 9-track Data Tapes to CD-ROM

with the Xmas time. A few month extension would greatly facilitate our being able to do as thorough job as we can with this great opportunity made available to us.

Thanks for the help,
Tom

*****

Date: Tue, 22 Dec 1998 10:49:50 -0500
From: "Maryanne F. Pearcey" <mpearcey@whoi.edu>
To: sbolmer@whoi.edu
Subject: [Fwd: Extension for Archiving Seismic Data (53252)]

Hi Tom,

Here's a reply from Jim. As he states, just try to do as much as possible and we can re-evaluate in January.

Thanks-
Maryanne

*****

Date: Tue, 22 Dec 1998 10:40:16 -0500
From: James Luyten <jluyten@whoi.edu>
To: "Maryanne F. Pearcey" <mpearcey@whoi.edu>
Subject: Re: Extension for Archiving Seismic Data (53252)

The whole point was to do this in 98..... extension means next year's money. Please push to do as much as possible in 98, and re-evaluate in January when you know what will be left to do. Thanks & Merry Christmas.
Jim

*****

Date: Mon, 28 Dec 1998 17:19:23 -0500
From: Tom Bolmer <tbolmer@whoi.edu>
To: wsass@whoi.edu
Subject: check CD-ROM

Warren;

I just got another CD-ROM back from Minneapolis. It has file from savesets. They ignored the saveset names so the exact files from a specific saveset are hard to check. But much of the Fortran code Ralph was avter is there. So can you look at the Fortran code in areas on falcon like:

/cdrom/78124#1/nlrclb/find/ras1/chil

As I see it they have totally preserved the VAX files and therefore things don't wrap. When I do an od -c "file_name" | more I see things like:

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032 \0 that me think they are hard returns and that the file can be reparsed into a NORMAL ASCII file we can edit... Otherwise, they have really come up short. I am missing lots of files, if I compare the hard listings I have here and the files they sent back.

Thanks
Tom

*****

Date: Mon, 28 Dec 1998 18:56:41 -0500
From: system_wjs1@wjs.who.edu (Warren J. Sass)
To: tbolmer@who.edu
Subject: Re: check CD-ROM

>>> So can you look at the Fortran code in areas on falcon like:
>>> /cdrom/78124#1/nlrcb/find/ras1/chil
I looked at hyprep.for in that directory

>>> As I see it they have totally preserved the VAX files and therefore
>>> things don't wrap.

Kind of. What's "extra" in there are VMS record counts. That is, the format is something like

XXYYfortranline1AABBfortline2

etc. There's no wrap since there are no newlines in a "standard" VMS variable length record. XXYY represents 4 hex digits (2 bytes) that are the length of "fortranline1" (000C in this example). AABB represents 4 hex digits (2 bytes) that are the length of "fortline2" (0009). On a Unix box, the 2 bytes might be byte-swapped. I suspect so, but I didn't check.

Accordingly, a program can be written. (read byte 0; read byte 1; swap; form count; read bytes 2->count+2; write what you just read; write newline. A count of FFFF, if found, is EOF indicator).

Alternatively, the files can be ftped to a VAX (in binary mode), then EXCHANGE/NET'd to go from binary to "standard" variable record length, then re-ftp'd (which will change VMS variable record to Unix newline-terminated).

Another alternative involves tarring the relevant files before ftping to the VAX. On the VAX, they can be CONVERTed to newline-terminated after the EXCHANGE then re-tarred with others and the whole pile re-ftp'd to a Unix box.

To say confidently that we could do this for all files, though, I'd have to know more about how they "unBACKUP-ed" things. They either used some "unBACKUP" program, or they hacked their own. If the former, our success will depend on that program. I suspect, however, that they did NOT use a "standard" program, or you would have gotten your records readable right off the bat.

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It looks to me like they treated the tape as an ANSI labeled tape, removed the tape labels and ANSI blocking info, and gave you the "data blocks" from the ANSI tape. If so, I have doubts about the ability to reconstruct data if there were errors. On the other hand, they may not be recovering any files with errors. I still don't know, for example, where the BACKUP redundancy block(s) ended up. If unlucky, they'll show up in the middle of some data recovery.

It seems clear to me that you will not get usable data directly from these folks. It also seems clear that you won't get any marginal data - you'll get what comes off the tapes clean. If that's not satisfactory to you, then I'd get the tapes back, and (assuming you can find someplace to keep them!) recommend a custom approach - if not now, later. This, as we know, was the situation before this whole game began!

On the other hand, if what you are getting back is "sufficient", I think that it would be suitable to archive this stuff in its present, unusable form and leave the problem to the generation that is actually desperate enough to want the data. After all, why spend oodles of effort to work on the arbitrary 50% of the data we have if we're OK w/the fact that 50% was lost?

Anyway, that's an editorial comment. I think I could recover all the .FOR files in that directory, for example.

*****

Date: Tue, 19 Jan 1999 14:22 -0600
From: Chuck Crymble <CCrymble@ontrack.com>
To: tbolmer@whoi.edu
Cc: GJuaire@ontrack.com, CLund@ontrack.com
Subject: Tape List

Hi Tom,

Your project is progressing nicely. We are through the initial pass and are now addressing problem tapes. I have some questions that need to be answered before we start producing CD's.

How would you like the CDs organized? I understand the directory structure you requested; what I am wondering is how you want the CDs themselves organized. We can start at the top of your list and fill CD's one by one, organizing according to backup method or we can create CDs that relate to the groupings you used on the list. Do you have something else in mind? All CD's will have a label that designates which tapes were used to create the CD.

The next question concerns the directory structure:
Tape_Label\Saveset_Name\Data for the VAX Backup data. This presents a problem when the data spans tapes i.e. multiple tape labels associated to

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One saveset name. I intend on using the label of the first tape in the spanned set. If this is not appropriate, please let me know.

Lastly, I may have found a solution to address the badly degraded tapes. The solution is non-destructive but would require that we send the tapes off-site. After approval from you to proceed, we would send out one of your problem tapes as a sample. We would contact you with the results of the sample and pricing before proceeding with the remaining tapes. I need to know what your thoughts and/or concerns are before we proceed. Presently we are looking at having to do this too less than 10% of the tapes.

Look forward to hearing from you.

Best regards,
Chuck Crymble
ONTRACK Data International, Inc.

*****

Date: Wed, 20 Jan 1999 08:39:21 -0500
From: Tom Bolmer <tbolmer@whoi.edu>
To: Chuck Crymble <CCrymble@ontrack.com>
CC: GJuaire@ontrack.com, CLund@ontrack.com
Subject: CD-ROM organizations

Chuck;

I think you have it right. Putting tapes on CD-ROMs in the order of the lists is helpful for us. If possible, break the CD-ROMs at the breaks in tape types and gaps in the list I sent. You do not need to go to the extreme of a tape per CD-ROM. Fill them up as you can and organization lets you. For save sets that are on multi-volume sets of tape, putting the files under the first tape's name makes sense.

For the unlabeled tapes that have been hard to work with, let's try a few tapes and see how it goes. I am unclear as to what you need from me for signatures etc. for that part of the job. I think you should fax me or Michael LaGrassa the contract we need to sign for that part, again.

I talked with the Data Library, which has a lot of old, and unknown tapes about what I had arranged with you. They seemed interested and I will keep in touch with them about how this whole process works out for all of us. It is a great relief to have the tapes there and the transcribing on going.

Thanks,
Tom

*****

Date: Mon, 01 Mar 1999 14:11:24 -0500
From: Tom Bolmer <tbolmer@whoi.edu>
To: Casey Lund <CLund@ontrack.com>

Transcription of 9-track Data Tapes to CD-ROM

CC: ccrymble@ontrack.com, gjuaire@ontrack.com
Subject: Recent CD-ROM

Casey;

I just got back and looked at the recent CD-ROM. I can't mount it like the last ones on the UNIX system I have been using to check the data out. I just checked it on a 486 and I can mount it there. I need it to be some format that I can mount on a UNIX system like I did with the tests.

I noted that the directories on the CD-ROM are numbered and not named the same as the tape name. This is important for use when we access specific data sets from specific tapes. The CD-ROM needs to have the names of each tape on it. I also note that on the 486 there are multiple files all of the same name in the same directory. Now, maybe they are with version numbers and WINDOWZ cuts the rest of the name off but I can't tell. My UNIX systems won't like a bunch of files all with the same name.

Sorry about the delay. I got back Wed. night and the snow dump we had here closed us down Thursday and Friday I couldn't get out of my development. Some snow is a big deal here especially nearly 20". Cape Cod doesn't deal well with snow, especially that much. I am here and no plans to be gone for awhile.

Thanks,

Tom

*****

Date: Tue, 2 Mar 1999 14:18 -0600
From: Casey Lund <CLund@ontrack.com>
To: tbolmer@whoi.edu
Subject: Job 78124

Hi Tom,

We have the snag cleared up on our end and will ship out a new CD-ROM today.

Give me a call once you have had a chance to work with it. Email me if you have any questions.

Thanks,
Casey

*****

Date: Thu, 04 Mar 1999 09:38:42 -0500
From: Tom Bolmer <tbolmer@whoi.edu>
To: Casey Lund <CLund@ontrack.com>
CC: ccrymble@ontrack.com, gjuaire@ontrack.com
Subject: CD-ROM of 3/3/99

Transcription of 9-track Data Tapes to CD-ROM

Casey;

I got the CD-ROM late on 3/3 and couldn't mount it on the Sun Ultra 60 like I could the early test CD-ROMs. I took the CD-ROM up to my wife's SGI and it mounted fine.

The tape names are the base directories with the (VMS Saveset names in the next one...) which is good. There were no version numbers or files of the same name. The ASCII files I looked at did not wrap, which is great. This is just what I was looking for.

I think things look good except the CD-ROM format. What is different in the format now from what you sent in December? I have looked at it on an Apple running 8.1, WINDOWZ 95, and an SGI running IRIX all of which show everything right. I wanted to be able to go to all of these systems too, so that was a good test in and of itself except the Ultra 60.

Any ideas?

Tom

*****

Date: Thu, 4 Mar 1999 15:57 -0600
From: Chuck Crymble <CCrymble@ontrack.com>
To: tbolmer@whoi.edu
Cc: GJuaire@ontrack.com, CLund@ontrack.com
Subject: RE: CD-ROM of 3/3/99

Hi Tom,

The best way to proceed is to have you verify again that the original demo CD still works on your Sun Ultra 60. If all appears OK, we would like to have you send the original CD back here for our review. Please include the exact error message you received when you tried to mount the newest CD on the Sun Ultra 60. I am confident we will have this working for you shortly.

I expect to have a recommendation ready for you Tuesday concerning the badly aged tape.

Thanks,
Chuck Crymble

*****

Date: Thu, 04 Mar 1999 17:08:31 -0500
From: Tom Bolmer <tbolmer@whoi.edu>
To: Chuck Crymble <CCrymble@ontrack.com>
Subject: Re: CD-ROM of 3/3/99

Chuck;

It is not that simple. I get no error message from the SUN. I just don't get it mounted. SUN like many manufacturers has gone to doing things "for me"

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so I don't know what is going on. I get no error message. I took the two CD-ROMs I have from you in December and put them up on the Ultra 60 and they are fine for mounting. I had hoped, when I did that, to see the format and explicitly mount the CD-ROM using that format for the new CD-ROM.

I can try getting a December test out in the PM for you tomorrow.

Thanks for checking back in. It sure has me stumped.

Tom

*****

Date: Fri, 05 Mar 1999 17:11:31 -0500
From: Tom Bolmer <tbolmer@whoi.edu>
To: Casey Lund <CLund@ontrack.com>
Subject: return of CD-ROM

Casey;

I didn't get the CD-ROM out this AM and will have to try again on Monday. Missed the deadline. I did check the two December disks again and they mount fine on the Ultra 60 running Solaris 2.6. I have trouble on my Solaris 2.5 system with all CD-ROMs. I am using the 2.6 system, since that is the new OS and all my OS's will be that rev soon.

Tom

*****

Date: Fri, 12 Mar 1999 17:09:17 -0500
From: Tom Bolmer <tbolmer@whoi.edu>
To: Casey Lund <CLund@ontrack.com>
Subject: got both CD-ROMs

Casey;

I got the CD-ROMs 30 minutes ago. On the Solaris 2.6 system I can mount both CD-ROMs. Neither is perfect.

We would like to avoid any formats used only by and/or created by the evil empire (Microsoft). So let's forget Joliet. That had weird shortened names with version numbers truncated into it. Something like relfbat.dat;09 became relba09.dat. Besides we are a UNIX shop that avoids Microsoft as much as we can.

I was able to read the ISO-long. The list of files, with extents we knew were ASCII, looks good. BUT, the names have this name-version#.extent naming convention. Relfbat.dat;09 became relfbat-09.dat for some reason. I am not sure where the version number with a dash came from. I thought we had ironed out the naming conventions awhile ago. Anyway, without the funky names that ISO-long CD-ROM looks good on Solaris 2.6.

So the ISO-long and the naming conventions with no versions, (just send the highest number), looks good.

I hope this is the answer you needed. Thanks for the test.
Have a good weekend,

Transcription of 9-track Data Tapes to CD-ROM

Tom

*****

Date: Fri, 19 Mar 1999 17:47:13 -0500
From: Tom Bolmer <tbolmer@whoi.edu>
To: jclogg@ontrack.com
Subject: got next CD-ROM for Joclyn

Casey;

I got the last CD-ROM as Joslyn said. Hmm where to start. Same old Solaris problem I can't mount them. I can read it on Windowz 95, Mac OS 8.1, Digital Unix, and SGI IRIX. But, no luck on the Solaris systems. Windowz gives me a weird file name for *.for files. It must "know" how to parse them for me. They have no *.for extent but rather some symbol nbut that is not an issue since I hope not to use Windwoz. Digital Unix gives capitals and versions. The mac and SGI looked good.

I noted in the *.for files I looked at that some are complete and some are cut off. The complete ones have stuff in them in large white spaced areas. I suppose this is some kind of file for the rest of the 512 byte block. But, they seemed to pick up stuff from unrelated files in a non-coherent matter.

What happened to the last format I could read. Hope it is different from this.

Time to head out. Hope Jocelyn found out whose tape she had.

Thanks, Tom

*****

Date: Mon, 22 Mar 1999 11:48:51 -0500
From: Tom Bolmer <tbolmer@whoi.edu>
To: Casey Lund <CLund@ontrack.com>
CC: jclogg@ontrack.com
Subject: now I can read them

Casey;

After working with a UNIX systems guru this AM, we got the Solaris 2.6 system to read the latest CD-ROM. Still no joy on 2.5 but I guess I should just be happy with 2.6, since the 2.5 system will be 2.6 one of these days anyway.

Well, we now know that disk CAN now be read by alot of systems. That was the original hope.

Tom

*****

Date: Mon, 22 Mar 1999 13:46:38 -0500

Transcription of 9-track Data Tapes to CD-ROM

From: Tom Bolmer <tbolmer@whoi.edu>
To: Josalyn Clogg <JClogg@ontrack.com>
CC: Casey Lund <CLund@ontrack.com>
Subject: ASCII file problems

Josalyn;

Thanks for the response and sorry about butchering your name.

Once I got things up I did some more snooping. I found some things in ASCII files not complete or strange. It does seem like files are not complete or have parts of other files included.

In: /cdrom/78124#2/sas10/swir26jul.bck/swir/sas1 All of the *.for files look to be incomplete. They either start truncated or are truncated later on in the file and then might even have parts of other files included in them.

In: /cdrom/78124#2/sas9/lfas8mar.bck/lfas/sas1/code Many of the *.for files are not ASCII and many are only partially there.

I'd take a look at some of the *.for files on the CD-ROM. There seem to be problems.

Well at least I can read the disk now. We're getting closer.

Thanks,
Tom

*****

Date: Mon, 22 Mar 1999 11:12 -0600
From: Josalyn Clogg <JClogg@ontrack.com>
To: tbolmer@whoi.edu
Subject: RE: now I can read them

Good Morning Tom!

I am glad to hear that you have been able to read this disk! The engineer that worked on your disk is in our London office for two weeks, so I was trying to find an engineer to call you and assist you in making a new CD. Since you have been able to read the information, I will file the folder; however, if there is anything that we can do to help you please let me know!

Have a great day!
Thank You!
Josalyn

*****

Date: Wed, 14 Apr 1999 14:26:24 -0400

Transcription of 9-track Data Tapes to CD-ROM

From: Tom Bolmer <tbolmer@whoi.edu>
To: Casey Lund <CLund@ontrack.com>
Subject: Re: Damaged tape listing

Casey;

I need a bit of time to think about this. We have spent the money or at least have it encumbered to you. There is no new \$ for this. The other guy and I need to get to our bosses to see what they want. How are we doing on the budget so far?

Thanks for the list. It is actually much smaller than I thought it would be.

Nice to have my machine up and the grass getting green again.

Tom

From: Casey Lund <CLund@ontrack.com>
To: "smtp:tbolmer@whoi.edu" <tbolmer@whoi.edu>
Subject: FW: Damaged tape listing
Date: Mon, 19 Apr 1999 10:13:00 -0500

Hi Tom,

No problem, just let us no if this is something you want done. So far we have invoiced you for \$1,341.00. If you have any questions or need anything, just email.

Thanks,
Casey

*****

Date: Mon, 21 Jun 1999 09:44:15 -0400
From: Tom Bolmer <tbolmer@whoi.edu>
To: Chuck Crymble <CCrymble@ontrack.com>,
Casey Lund <CLund@ontrack.com>
Cc: GJuaire@ontrack.com, Hartley Hoskins <hhoskins@whoi.edu>,
ddubois@whoi.edu
Subject: CD-ROMs received 6/17/99

Chuck and Casey;

Thanks for the set of CD-ROMs received on 6/17/99. So far the set looks great.

As mentioned on the phone 6/18/99 with Casey, I have made a listing of them and checked it against the damaged list and the final list I think I sent to you with the job order. I have noted below ones from the damaged list, which you included in this set, and tapes that were VAXCopy tapes but not included in this CD-ROM set. I do not yet have a handle as to the percentage recovered from the "damaged" tapes.

There is alot of good data sent back which will be neat to have in a useable form (IE, we can GET to it!). It looks like we may be seeing an end to this. The people who paid for this are wondering when it will be done. I think I

Transcription of 9-track Data Tapes to CD-ROM

said in the Spring and unfortunately that ends today(ish, I never get the right instant for it). I'll pass the information along about what just came in and hopefully that will keep them happy. The money was from some pot left over from last year and the bean counters want to close things out neatly. Some things never change; but they did give me the money so we should keep moving forward.

Thanks for the last set and all the labels. Boy, someone must have had to work to get all the names on a few of the CD-ROMs. Very helpful for us to have them on there.

*****

Tapes listed on 4/14/99 as damaged and needing special attention but included on CD-ROMs received 6/17/99:

NLDR1
NLRBLA
WWDIG2
WWDIG3
WWDIG4

Tapes not included in the 6/17/99 set of CD-ROMs:

AVDOM1
AVRK40
AUG001
GEOS3A
GEOS3B
GEOS3C
NLFD1

*****

Thanks,
Tom

*****

From: CLund@ontrack.com
To: tbolmer@whoi.edu
Subject: RE: status of "damaged" tapes
Date: Fri, 10 Sep 1999 11:58:03 -0500

Hi Tom,

Everything is done and we are shipping out 15 CD ROMS today. They consist of 125 VMS backups and 39 Unix Tar backups.

Thanks for everything and I apologize for the delays.

Thank you,
Casey Lund

Transcription of 9-track Data Tapes to CD-ROM

*****

Date: Mon, 13 Sep 1999 17:38:34 -0400
From: Tom Bolmer <tbolmer@whoi.edu>
To: CLund@ontrack.com
Subject: CD-ROMs arrived
X-Mozilla-Status2: 00000000

Casey;

The CD-ROMs walked in this afternoon. It may a bit before I get to look at them. I am busy trying to neaten things up here in prep for maybe getting set for Floyd at week's end. We should know what's up by Wed. PM if we are in for it not.

Thanks for the package,
Tom

Appendix B: List Of Companies Asked to Bid

3 companies were chosen to do test of about 20 tapes each. We sent the tape to them requesting the data to be put onto CD-ROMs. The three companies were:

11/19/98   P.O.# V102870

National Data Conversion Institute
5 East 16th Street
New York City, NY 10003
Attn: Michael Daniec
Phone: 212-463-7511
Fax: 212-645-9327
<http://www.ndci.com>
info@ndci.com
25 tapes at \$20 each

2)   11/19/98   P.O.# V102869

Peripheral Manufacturing, Inc.
4775 Paris Street
Denver, Co. 80239
Attn: Ron Carboy
Phone: 303-371-8671
                     800-468-6888
Fax: 303-371-8643
<http://www.easy.net/peripheral/gsa.html>
periphman@easy.net
26tapes at \$24 each

3)   12/02/98   P.O.#

Ontrack Data Recovery, Inc.
6321 Bury Drive
Suites 13 – 21
Attn: GregJuaire
Eden Prairie, MN. 55346
Phone: 800-752-1333 Ext. 4143
Fax: 612-937-5750
<http://www.ontrack.com>
info@ontrack.com
20 tapes at \$25 each

Transcription of 9-track Data Tapes to CD-ROM

Appendix C: List of the Number of Tapes on each CD-ROM (Size included)

CD-ROM Name	SIZE in bytes	# tapes	# empty
78124_01	077702	12	
78124_02	079095	13	
78124_03	079279	8	
78124_04	048161	6	
78124_05	023539	6	
78124_06	044430	5	
78124_07	426320	51	
78124_08	429036	55	
78124_09	063754	15	1
78124_10	112027	6	
78124_11	503272	10	
78124_12	509325	7	
78124_13a	568306	13	
78124_13b	558867	9	
78124_13c	578908	8	
78124_14	431621	39	33
78124_15	443679	7	
78124_16	626703	10	2
78124_17_1	568609	13	
78124_17_2	094895	5	
78124_18	367312	21	1
78124_19	565984	12	
78124_20	555494	12	
78124_21a	567422	12	
78124_21b	174867	3	
	8498607	358	38

Appendix D: List of Tapes Sent

This is a list of tapes sent out for final conversion 12/30/98.

FMOORE01	1600	Unlabeled	2400'	
FMOORE11	1600	Unlabeled	2400'	
FMOORE12	1600	Unlabeled	2400'	
FMOORE13	1600	Unlabeled	2400'	
FMOORE14	1600	Unlabeled	2400'	
FMOORE15	1600	Unlabeled	2400'	
FMOORE16	1600	Unlabeled	2400'	
FMOORE17	1600	Unlabeled	2400'	
FMOORE18	1600	Unlabeled	2400'	
KITA1	1600	Unlabeled	2400'	
RR0501	800	VAXcopy	2400'	5/13/79
RR0502	1600	VAXcopy	2400'	5/10/79
RR0503	1600	VAXcopy	2400'	5/11/79
RR0504	1600	VAXcopy	2400'	5/10/79, 11/21/84
RR0505	1600	VAXcopy	2400'	5/13/79
RR0506	1600	VAXcopy	2400'	5/13/79
RR0507	1600	VAXcopy	2400'	5/10/79
RR0508	1600	VAXcopy	2400'	5/13/79
RR0509	1600	VAXcopy	2400'	6/18/79
RR0510	1600	VAXcopy	2400'	6/19/79
RR0511	1600	VAXcopy	2400'	6/23/79
AVKN02	800	VAXcopy	2400'	2/5/81
WROBH1	1600?	VAXcopy	2400'	2/14/79
WROBH2	1600?	VAXcopy	2400'	2/16/79
WROBH3	1600?	VAXcopy	2400'	2/20/79
WROBH4	1600?	VAXcopy	2400'	
WROBH5	1600?	VAXcopy	2400'	2/14/79
WROBH6	1600?	VAXcopy	2400'	
WROBH7	1600?	VAXcopy	2400'	
WROBH8	1600?	VAXcopy	2400'	
AVBH01	1600?	VAXcopy	2400'	
AVBH02	1600?	VAXcopy	2400'	
AVBH03	1600?	VAXcopy	2400'	
AVBH04	1600	VAXcopy	2400'	
AVBH05	1600	VAXcopy	2400'	
AVRZ12	1600	VAXcopy	2400'	4/8/81
AVRZ13	1600	VAXcopy	2400'	4/22/81
AVRZ14	1600	VAXcopy	2400'	4/28/81
AVRZ15	1600	VAXcopy	2400'	4/17/81

Transcription of 9-track Data Tapes to CD-ROM

AVRZ16	1600	VAXcopy	2400'	4/21/81
AVRZ17	800	VAXcopy	2400'	12/16/80
AVRZ18	1600	VAXcopy	2400'	2/13/80
AVRX01	1600	VAXcopy	2400'	5/29/84
AVRX02	1600	VAXcopy	2400'	5/31/84
AVRX05	1600	VAXcopy	2400'	5/20/80
AVRX06	1600	VAXcopy	2400'	6/4/84
AVRZ07	1600	VAXcopy	2400'	6/5/84
AVRX08	1600	VAXcopy	2400'	6/5/84 (NOTE: Most recent date is not always highest version number of file.)
FIX1L	1600	VAXcopy	2400'	3/4/84, 3/30/84
AVRX21	1600	VAXcopy	2400'	9/16/81
AVRX22	1600	VAXcopy	2400'	9/16/81
AVRX23	1600	VAXcopy	2400'	11/27/81
AVRX24	1600	VAXcopy	2400'	11/27/81
AVRX27	1600	VAXcopy	2400'	12/16/81
AVRX28	1600	VAXcopy	2400'	12/16/81
AVRZ31	1600	VAXcopy	2400'	12/2/85
AVRZ33	1600	VAXcopy	2400'	10/19/82
AVRZ34	1600	VAXcopy	2400'	10/19/82
AVRZ37	1600	VAXcopy	2400'	10/18/82
AVRZ38	1600	VAXcopy	2400'	8/13/82
AVRX41	1600	VAXcopy	2400'	9/22/80
AVRX42	1600	VAXcopy	2400'	9/4/81
AVRV43	1600	VAXcopy	2400'	9/4/81
AVRY44	1600	VAXcopy	2400'	12/30/81
AVRV45	800?	VAXcopy	2400'	9/2/81
AVRX46	800?	VAXcopy	2400'	9/22/80, 10/3/80
AVRX47	1600	VAXcopy	2400'	9/23/80
AVRX48	1600	VAXcopy	2400'	9/23/80
AVQAKE	1600?	VAXcopy	2400'	2/25/84
AVMIT2	1600	VAXcopy	2400'	8/16/82
AVMIT3	1600	VAXcopy	2400'	10/18/82, 10/21/83
ARCH01	1600	VAXcopy	2400'	7/18/83
ARCH02	1600	VAXcopy	2400'	7/18/83
ARCH03	1600	VAXcopy	2400'	7/18/83
ARCH04	1600	VAXcopy	2400'	7/18/83
ARCH05	1600	VAXcopy	2400'	7/18/83
ARCH06	1600	VAXcopy	2400'	7/21/83
ARCH07	1600	VAXcopy	2400'	7/21/83
ARCH08	1600	VAXcopy	2400'	7/20/83
ARCH09	1600	VAXcopy	2400'	7/21/83

Transcription of 9-track Data Tapes to CD-ROM

ARCH10	1600	VAXcopy	2400'	7/22/83
ARCH11	1600	VAXcopy	1200'	7/28/83
ARCH12	1600	VAXcopy	1200'	7/28/83
ARCH13	1600	VAXcopy	1200'	7/28/83
NLDM1	1600	VAXcopy	2400'	10/20/80
NLD4XL	1600	VAXcopy	2400'	8/14/81
NLD4X1	1600	VAXcopy	2400'	4/28/81
NLD4X2	800	VAXcopy	2400'	4/28/81
NLD4C3	1600	VAXcopy	2400'	11/25/80
NLD4X4	800	VAXcopy	2400'	5/13/81, 7/15/81?
NLD4C5	1600	VAXcopy	2400'	11/25/80
NLD4X6	800	VAXcopy	2400'	12/2/80
NLD4X8	800	VAXcopy	2400'	4/28/81
NLD4SW	1600	VAXcopy	2400'	6/26/81
AVDOM1	6250	VAXcopy	2400'	11/11/81
AVRK11	1600	VAXcopy	2400'	8/20/82
AVRK12	1600	VAXcopy	2400'	8/26/82, 1/2/83 (NOTE: No EOF at end of tape.)
AVRK13	1600	VAXcopy	2400'	8/19/83
AVRK14	1600	VAXcopy	2400'	9/16/92, 8/19/83
AVRKX4	1600?	VAXcopy	2400'	1/2/83
AVRK15	1600	VAXcopy	2400'	11/24/82, 8/17/83
AVRK16	1600?	VAXcopy	2400'	11/24/82, 1/3/83
AVRK17	1600	VAXcopy	2400'	1/13/83
AVRK18	1600?	VAXcopy	2400'	9/16/82
AVRK21	1600?	VAXcopy	2400'	8/23/82?
AVRK23	1600	VAXcopy	2400'	10/21/82?
AVRKX3	1600	VAXcopy	2400'	2/1/83?
AVRK25	1600	VAXcopy	2400'	8/24/82
AVRK26	1600	VAXcopy	2400'	8/24/82
AVRK28	1600	VAXcopy	2400'	5/2/83
AVRK31	1600?	VAXcopy	2400'	8/31/82
AVRK32	1600?	VAXcopy	2400'	9/1/82
AVRK33	1600?	VAXcopy	2400'	9/1/82
AVRK35	1600?	VAXcopy	2400'	3/18/83
AVRK36	1600?	VAXcopy	2400'	9/1/82
AVRK40	1600	VAXcopy	2400'	11/22/83
AVMIT4	1600	VAXcopy	2400'	11/5/82
AVRK89	1600?	VAXcopy	2400'	5/10/83
AVRK09	1600?	VAXcopy	2400'	1/28/83
AVRK69	1600?	VAXcopy	2400'	5/6/83, 12/20/83

Transcription of 9-track Data Tapes to CD-ROM

AVWALE	1600?	VAXcopy	2400'	2/27/84
AVRKAN	1600?	VAXcopy	2400'	10/21/82, 11/27/82
AVDD01	1600	VAXcopy	2400'	12/1/83
AVDD02	6250	VAXcopy	2400'	12/22/83
AVDD03	6250	VAXcopy	2400'	3/15/84, 5/24/85
DDIMGS	1600	VAXcopy	2400'	3/30/84, 5/4/84
AVSEIS	1600	VAXcopy	2400'	11/27/81
AVDOM2	1600	VAXcopy	2400'	1/5/82
AVDOM3	6250	VAXcopy	2400'	4/27/83
AVANTR	1600	VAXcopy	2400'	11/5/82
DHOW	1600	VAXcopy	2400'	10/1/83
KEMDAO	1600	VAXcopy	2400'	8/17/83
AVKANE	1600?	VAXcopy	2400'	8/19/80
AVKN01	1600?	VAXcopy	2400'	?
RC2912A	1600	VAXcopy	2400'	6/9/89 (3 FILES)
RC2912B	1600	VAXcopy	2400'	7/27/89 (4 FILES)
SWDIGS	1600	VAXcopy	2400'	3/26/87-12/20/88
GOLDBK	6250	VAXcopy	2400'	3/20/88
WWDIG1	6250	VAXcopy	2400'	7/87
WWDIG2	6250	VAXcopy	2400'	?/87
WWDIG3	6250	VAXcopy	2400'	8/87
WWDIG4	6250	VAXcopy	2400'	?/87
AUG001	1600	VAXcopy	2400'	
GEOS3A	800	VAXcopy	2400'	
GEOS3B	800	VAXcopy	2400'	
GEOS3C	800	VAXcopy	2400'	
KH001	800	VAXcopy	2400'	
NLBOS1	800	VAXcopy	2400'	
NLDR1	800	VAXcopy	1200'	
NLFDA1	800	VAXcopy	2400'	
NLFDA2	800	VAXcopy	2400'	
NLFD1	800	VAXcopy	1200'	
NLD2	800	VAXcopy	2400'	
NLCP1	800	VAXcopy	2400'	
NLRD1	800	VAXcopy	2400'	
NLRD2	800	VAXcopy	2400'	
NLRD3	800	VAXcopy	2400'	
NLRD4	800	VAXcopy	2400'	
NLRF1	800	VAXcopy	2400'	
NLRSLD	800	VAXcopy	2400'	
NLRSSL	1600	VAXcopy	2400'	
NLSAND	800	VAXcopy	2400'	
NLTF1	800	VAXcopy	2400'	
TY01	800	Unlabeled	1200'	
TY02	800	Unlabeled	1200'	

Transcription of 9-track Data Tapes to CD-ROM

TY03	800	Unlabeled	2400'
TY04	800	VAXcopy	1200'
TY0001	1600	VAXcopy	2400'
TY0002	800	VAXcopy	2400'
TY0003	800	VAXcopy	2400'
TY0004	800	VAXcopy	2400'
TY0005	800	VAXcopy	2400'
TY0006	800	VAXcopy	2400'
TY0007	800	VAXcopy	2400'
TY0008	800	VAXcopy	2400'
TY0009	800	VAXcopy	2400'
TY0010	800	VAXcopy	2400'
TY0011	800	VAXcopy	2400'
TYFDPG	800	VAXcopy	2400'
NLRALP	800	VAXCopy	2400'
NLRALQ	800	VAXCopy	2400'
NLRALR	800	VAXCopy	2400'
NLRALS	1600	VAXCopy	2400'
NLRALT	1600	VAXCopy	2400'
NLRALU	1600	VAXCopy	2400'
NLRALV	1600	VAXCopy	2400'
NLRALW	1600	VAXCopy	2400'
NLRALX	1600	VAXCopy	2400'
NLRALY	1600	VAXCopy	2400'
NLRALZ	1600	VAXCopy	2400'
NLRBLA	1600	VAXCopy	2400'
NLRBLB	1600	VAXCopy	2400'
NLRBLF	6250	VMSBackup	2400'
NLRBLH	6250	VMSBackup	2400'
NLRBLI	1600	VMSBackup	2400'
NLRBLJ	6250	VMSBackup	2400'
NLRBLK	6250	VMSBackup	2400'
NLRBLL	6250	VMSBackup	2400'
NLRBLM	6250	VMSBackup	2400'
NLRBLN	6250	VMSBackup	2400'
NLRBLO	6250	VMSBackup	2400'
NLRBLP	6250	VMSBackup	2400'
NLRBLQ	6250	VMSBackup	2400'
NLRBLR	6250	VMSBackup	2400'
NLRBLS	6250	VMSBackup	2400'
NLRBLT(I)	6250	VMSBackup	2400'
NLRBLT(II)	6250	VMSBackup	2400'
NLRCLD	6250	VMSBackup	2400'
NLRCLE	6250	VMSBackup	2400'
NLRCLF	6250	VMSBackup	2400'
NLRCLG	6250	VMSBackup	2400'

Transcription of 9-track Data Tapes to CD-ROM

NLRCLH(I)	6250	VMSBackup	2400'	
NLRCLH(II)	6250	VMSBackup	2400'	
NLRCLI	6250	VMSBackup	2400'	
NLRCLJ(I)	6250	VMSBackup	2400'	
NLRCLJ(II)	6250	VMSBackup	2400'	
NLRCLK	6250	VMSBackup	2400'	
NLRCLL	6250	VMSBackup	2400'	
NLRCLM	6250	VMSBackup	2400'	
NLRCLN	6250	VMSBackup	2400'	
NLRCLO	6250	VMSBackup	2400'	
NLRCLP	6250	VMSBackup	2400'	
NLRCLQ	6250	VMSBackup	2400'	
NLRCLQ(I)	6250	VMSBackup	2400'	
NLRCLQ(II)	6250	VMSBackup	2400'	
NLRCLR	6250	VMSBackup	2400'	
NLRCLS	6250	VMSBackup	2400'	
NLRCLT	6250	VMSBackup	2400'	
NLRCLU	6250	VMSBackup	2400'	
NLRCLV	6250	VMSBackup	2400'	
NLRCLW	6250	VMSBackup	2400'	
NLRCLX	6250	VMSBackup	2400'	
NLRCLY	6250	VMSBackup	2400'	
NLRCLZ	6250	VMSBackup	2400'	
NLRDLA	6250	VMSBackup	2400'	
NLRDLB	6250	VMSBackup	2400'	
NLRDLC	6250	VMSBackup	2400'	
RASC1	6250	VMSBackup	2400'	
STEPHEN	1600(??)	VMSBackup	2400'	Mary Hunt Code
TANGO	6250	VMSBackup	2400'	
NLRTAP	1600	VMSBackup	2400'	Basic.bck
FOUO	6250	TAR	2400'	
CONVEX	6250	UNIX tar	2400'	Ralph Code
CNT01	6250	UNIX tar	2400'	
CNT02	6250	UNIX tar	2400'	
CNT03	6250	UNIX tar	2400'	
CNT04	6250	UNIX tar	2400'	
CNT05	6250	UNIX tar	2400'	
CNT06	6250	UNIX tar	2400'	
CNT07	6250	UNIX tar	2400'	
CNT08	6250	UNIX tar	2400'	
CNT09	6250	UNIX tar	2400'	
CNT10	6250	UNIX tar	2400'	
CNT10A	6250	UNIX tar	2400'	
CNT11	6250	UNIX tar	2400'	
CNT12	6250	UNIX tar	2400'	
CNT13	6250	UNIX tar	2400'	
CNT14	6250	UNIX tar	2400'	

Transcription of 9-track Data Tapes to CD-ROM

CNT15	6250	UNIX tar	2400'	
CNT16	6250	UNIX tar	2400'	
CNT17(I)	6250	UNIX tar	2400'	
CNT17(II)	6250	UNIX tar	2400'	
CNT17(Misc)	6250	UNIX tar	2400'	
CNT18	6250	UNIX tar	2400'	
CNT19(A)	6250	UNIX tar	2400'	
CNT19(A2)	6250	UNIX tar	2400'	
CNT19(B)	6250	UNIX tar	2400'	
CNT19(hrz&vrt)	6250	UNIX tar	2400'	
CNT21	6250	UNIX tar	2400'	
CNT25	6250	UNIX tar	2400'	
CNT26	6250	UNIX tar	2400'	
CNT33	6250	UNIX tar	2400'	
CNT34	6250	UNIX tar	2400'	
CNT51	6250	UNIX tar	2400'	
CNT52	6250	UNIX tar	2400'	
CNT53	6250	UNIX tar	2400'	
CNS01(I)	6250	UNIX tar	2400'	0002-0462
CNS01(II)	6250	UNIX tar	2400'	0450-0526
CNS01(III)	6250	UNIX tar	2400'	0524-0978
CNS01(IV)	6250	UNIX tar	2400'	0970-1280
RC2607A(I)	6250	VMSBackup	2400'	3/17/86
RC2607B(II)	6250	VMSBackup	2400'	3/17/86
EW9102A(I)	6250	VMSBackup	2400'	11/5/91
EW9102B(II)	6250	VMSBackup	2400'	11/5/91
RC3001	3200	VMSBackup	2400'	1/27/89
TAPE000(I)	3200	VMSBackup	2400'	2/12/85
TAPE001(II)	3200	VMSBackup	2400'	2/12/85
TAPE002	3200	VMSBackup	2400'	2/15/85-3/5/85
TAPE003	3200	VMSBackup	2400'	3/26/85, 4/1/85
TAPE004	3200	VMSBackup	2400'	4/11/85
TAPE005	3200?	VMSBackup	2400'	8/5/85
TRANSITS	6250	VMSBackup	2400'	8/7/87
BOBD	6250	VMSBackup	2400'	11/6/87
ROBP	6250	VMSBackup	2400'	6/22/87
MARKC	3200?	VMSBackup	2400'	2/21/90
FML32	6250	VMSBackup	2400'	
FM1	6250	VMSBackup	2400'	
DUB1(I)	6250	VMSBackup	2400'	8/2/89 (IMAGE)
DUB102(II)	6250	VMSBackup	2400'	8/2/89
DUC1	6250?	VMSBackup	2400'	10/12/89 (IMAGE)
DUA0	6250	VMSBackup	2400'	7/27/89 (IMAGE)

Transcription of 9-track Data Tapes to CD-ROM

EPR	6250	VMSBackup	2400'	9/27/88
FREDM	6250	VMSBackup	2400'	
EPRSYN	6250?	VMSBackup	2400'	11/27/88
A022	6250	VMSBackup	2400'	1/12/87
J35DEC	6250	VMSBackup	2400'	4/29/91
RNR2DD	6250	VMSBackup	2400'	10/24/91
DAVIDD	6250	VMSBackup	2400'	5/23/91
JUFUAG	6250	VMSBackup	2400'	2/7/91
JUFUD1	6250	VMSBackup	2400'	6/11/89
JUFUD4	6250	VMSBackup	2400'	
AGJUFU	6250	VMSBackup	2400'	
JUFU07(I)	6250	VMSBackup	2400'	3/4/91, 3/26/91
		(NOTE: 2nd saveset continues on next tape.)		
JUFU02(II)	6250	VMSBackup	2400'	3/26/91
CAROBK	6250	VMSBackup	2400'	3/11/91
TOMOBK	6250	VMSBackup	2400'	12/9/92
TOMWW1(I)	6250	VMSBackup	2400'	12/10/92
TOMWW2(II)	6250	VMSBackup	2400'	12/10/92
RNR1P1(I)	6250	VMSBackup	2400'	2/9/93
RNR1P2(II)	6250	VMSBackup	2400'	2/9/93
RNR1P3(III)	6250	VMSBackup	2400'	2/9/93
RNR1P4(IV)	6250	VMSBackup	2400'	2/9/93
RNR3E1(I)	6250?	VMSBackup	2400'	2/15/91
RNR3E2(II)	6250?	VMSBackup	2400'	2/15/91
RNR3E3(III)	6250?	VMSBackup	2400'	2/15/91
RNR4J1	6250	VMSBackup	2400'	6/1/92
RNR5J1	6250?	VMSBackup	2400'	2/2/93, 2/4/93, 2/9/93
RNR6N1(I)	6250	VMSBackup	2400'	2/4/93
RNR6N2(II)	6250	VMSBackup	2400'	2/4/93
RNR6N3(III)	6250	VMSBackup	2400'	2/4/93
RNR604(IV)	6250	VMSBackup	2400'	2/4/93
CQR	6250	VMSBackup	2400'	9/30/88
GUME93	6250	VMSBackup	2400'	2/12/93
NOIZ01	6250	VMSBackup	2400'	9/17/87
EPRSYNA	6250	VMSBackup	2400'	10/18/88
DUB1A	6250	VMSBackup	2400'	4/24/89
MARK	3200	VMSBackup	2400'	7/14/88

Transcription of 9-track Data Tapes to CD-ROM

MARKB	3200	VMSBackup	2400'	1/4/89
MARKD	6250	VMSBackup	2400'	5/27/87, 9/3/87
CHIANG	1600	VMSBackup	2400'	9/23/86
RASTER	3200?	VMSBackup	2400'	2/21/90
RNR1M1	6250?	VMSBackup	2400'	6/4/92
KONG	6250	VMSBackup	2400'	6/7/91
JUFUKR	6250	VMSBackup	2400'	12/5/91
DTRR21(I)	6250	VMSBackup	2400'	10/22/91
DTRR22(II)	6250	VMSBackup	2400'	10/22/91
DTRR23(III)	6250	VMSBackup	2400'	10/22/91
DRT101	6250	VMSBackup	2400'	10/16/91
HDICK	1600	VMSBackup	2400'	
DDL DAT	6250	VMSBackup	2400'	8/15/85
GNGFA01(I)	6250	VMSBackup	2400'	5/25/84 (Image
		BACKUP?)		
GNGFA02(II)	6250	VMSBackup	2400'	5/25/84
SAS6	6250	VMSBackup	2400'	
SAS7	6250	VMSBackup	2400'	
SAS9	6250	VMSBackup	2400'	
SAS10	6250	VMSBackup	2400'	
SAS12	6250	VMSBackup	2400'	
SAS13	6250	VMSBackup	2400'	
SAS14	6250	VMSBackup	2400'	
SAS15	6250	VMSBackup	2400'	
SAS16	6250	VMSBackup	2400'	
TATA	6250	VMSBackup	2400'	
SASB	6250	VMSBackup	2400'	
SASE	6250	VMSBackup	2400'	
AIIO50	6250	VMSBackup	2400'	
AIIO61	6250	VMSBackup	2400'	
MHA	6250	VMSBackup(??)	2400'	
MHC	6250	VMSBackup(??)	2400'	
MHE	6250	VMSBackup(??)	2400'	
MHG	6250	VMSBackup(??)	2400'	
MHK	6250	VMSBackup(??)	2400'	
MHL	6250	VMSBackup(??)	2400'	
MHO	6250	VMSBackup(??)	2400'	
MHP	6250	VMSBackup(??)	2400'	
MHQ	6250	VMSBackup(??)	2400'	
MHR	6250	VMSBackup(??)	2400'	
MHS	6250	VMSBackup(??)	2400'	
MHT	6250	VMSBackup(??)	2400'	
MMH	6250	VMSBackup(??)	2400'	
DUMP1	6250	UNIX DUMP	2400'	
DUMP2	6250	UNIX DUMP	2400'	

Appendix E: Inventory of CD-ROMs Returned

CD-ROMs received on 6/17/99

Listings are from a Macintosh window organized by CD-ROM name showing the tapes transcribed onto the CD-ROM.

78124 1

AVKN02	VAXcopy	RR0501	RR0502	RR050
RR0504		RR0505	RR0506	RR0507
RR0508		RR0509	RR0510	RR0511

78124 2

WROBH8	VAXcopy	AVBH02	AVBH03	AVBH04
AVBH05		WROBH1	WROBH2	WROBH3
WROBH4		WROBH5	WROBH6	AVBH01
WROBH7				

78124 3

AVRZ12	VAXcopy	AVRZ13	AVRZ14	AVRZ15
AVRZ16		AVRZ17	AVRZ18	FIX1L

78124 4

AVRX01	VAXcopy	AVRX02	AVRX05	AVRX06
AVRX08		AVRX07		

78124 5

AVRX21	VAXcopy	AVRX22	AVRX23	AVRX24
AVRX27		AVRX28		

78124 6

AVRZ31	VAXcopy	AVRZ33	AVRZ34	AVRZ37
AVRZ38				

78124 7

ARCH01	VAXcopy	ARCH02	ARCH03	ARCH04
ARCH05		ARCH06	ARCH07	ARCH08
ARCH09		ARCH10	ARCH11	ARCH12
ARCH13		AVRK11	AVRK12	AVRK13
AVRK14		AVRK15	AVRK16	AVRK17
AVRK18		AVRK21	AVRK23	AVRK25
AVRK26		AVRK28	AVRK31	AVRK32
AVRK33		AVRK35	AVRK36	AVRKX3
AVRKX4		AVRV43	AVRV45	AVRX41
AVRX42		AVRX46	AVRX47	AVRX48
AVRY44		NLD4C3	NLD4C5	NLD4SW
NLD4X1		NLD4X2	NLD4X4	NLD4X6
NLD4X8		NLD4XL	NLDM1	

Transcription of 9-track Data Tapes to CD-ROM

78124 8

AVANTR
AVDOM2
AVMIT4
AVRKAN
DHOW
NLBOS1
NLFDA1
NLRALR
NLRALV
NLRALZ
NLRD2
NLRSLD
RC2912A
WWDIG2

VAXcopy

AVDD01
AVDOM3
AVRK09
AVSEIS
GOLDBK
NLCP1
NLFDA2
NLRALS
NLRALW
NLRBLA
NLRD3
NLRSSL
RC2912B
WWDIG3

AVDD02
AVKANE
AVRK69
AVWALE
KEMDAO
NLDR1
NLRALP
NLRALT
NLRALX
NLRBLB
NLRD4
NLSAND
SWDIGS
WWDIG4

AVDD03
AVKN01
AVRK89
DDIMGS
KH001
NLFD1
NLRALQ
NLRALU
NLRALY
NLRD1
NLRF1
NLTF1
WWDIG1

78124 9

AVMIT2
TY0002
TY0006
TY0010

VAXcopy

AVMIT3
TY0003
TY0007
TY0011

AVQAKE
TY0004
TY0008
TYFDPG

TY0001
TY0005
TY0009

CD-ROMs received 6/29/99

78124 10

```

AVDOM1
GEOS3A
    only file:
GEOS3B
    only file:
GEOS3C
    only file:
NLFD1AVRK40

```

VAXcopy

AVRK40
FOR020.DAT
FOR020.DAT
FOR020.DAT
NLFD1

CD-ROMs received on 9/14/99

78124 11

A022
DUB102(II)
FREDM

VMS Backup

CAROBK
DUC1
TOMOBK

DUA0
EPRDUB1(I)
EPRSYN

78124 12

CQR
RNR6N3(III)

VMS Backup

RNR604(IV)
TOMWW1(I)

RNR6N1(I)
TOMWW2(II)

RNR6N2(II)

78124 13a

NLRCLD
NLRCLH(I)
NLRCLJ(II)

VMS Backup

NLRCLE
NLRC LH(II)
NLRC LK

NLRCLF
NLRCLI
NLRCLL

NLRCLG
NLRCLJ(I)
NLRCLM

Transcription of 9-track Data Tapes to CD-ROM

NLRCLN

78124 13b

NLRCLQ
NLRCLQ(II)
NLRCLU

VMS Backup

NLRCLP
NLRCLR

NLRCLQ
NLRCLS

NLRCLQ(I)
NLRCLT

78124 13

NLRCLV
NLRCLZ

VMS Backup

NLRCLW
NLRDLA

NLRCLX
NLRDLB

NLRCLY
NLRDLC

78124 14

CNS01I
CNT01
CNT05
CNT09
CNT12
CNT16
CNT18
CNT19HRZ
CNT33
CNT53

UNIX tar

CNS01II
CNT02
CNT06
CNT10
CNT13
CNT17I
CNT19A
CNT21
CNT34
CONVEX

CNS01III
CNT03
CNT07
CNT10A
CNT14
CNT17II
CNT19A2
CNT25
CNT51
FOUO

CNS01IV
CNT04
CNT08
CNT11
CNT15
CNT17M
CNT19B
CNT26
CNT52

78124 15

EW9102A(I)
RC2607A(I)

VMS Backup

EW9102B(II)
RC2607B(II)

JUFU02(II)
RC3001

JUFU07(I)

78124 16

J35DEC
RNR1P4(IV)
RNR4J1

VMS Backup

RNR1P1(I)
RNR3E1(I)
RNR5J1

RNR1P2(II)
RNR3E2(II)

RNR1P3(III)
RNR3E3(III)

78124 17a

CHIANG
DUB1A
MARK
RNR1M1

VMS Backup

DTRR21(I)
EPRSYNA
MARKB

DTRR22(II)
GUME93
MARKD

DTRR23(III)
KONG
NOIZ01

78124 17b

DDLDAT
HDICK

VMS Backup

DRT101

GNGFA01(I)

GNGFA02(II)

78124 18

AGJUFU
JUFUD4
NLRBLK
NLRBLP
NLRBLT(I)
TANGO

VMS Backup

DAVIDD
NLRBLF
NLRBLL
NLRBLQ
NLRBLT(II)

JUFUAG
NLRBLI
NLRBLM
NLRBLR
NLRTAP

JUFUD1
NLRBLJ
NLRBLN
NLRBLS
RASC1

78124 19

VMS Backup

Transcription of 9-track Data Tapes to CD-ROM

BOBD
ROBP
TAPE003

FM1
TAPE000(I)
TAPE004

FML32
TAPE001(II)
TAPE005

MARKC
TAPE002
TRANSITS

78124 20

SAS10
SAS15
SAS9

VMS Backup

SAS12
SAS16
SASB

SAS13
SAS6
SASE

SAS14
SAS7
TATA

78124 21a

AII050
MHE
MHO

VMS Backup

AII061
MHG
MHP

MHA
MHK
MHQ

MHC
MHL
MHR

78124 21b

MHS

VMS Backup

MHT

MMH

**Appendix F: 9-track Tape Transcription Request for
Quotations**
Included in the bid package.

- 1) The tapes are 1200 or 2400-feet long, and written at 800, 1600, 3200 or 6250 bpi.
- 2) We do not know how full each tape is. As a guess, most of the tapes are 80+% full.
- 3) The majority are VMS Backup program tapes and VMS-written ANSI labeled tapes. There are some "unlabeled" tapes included in this sample set of tapes.
- 4) Files on VMS BACKUP and ANSI labeled tapes have version numbers associated with them. If more than one version of a file is found, only the highest version should be read and transcribed.
- 5) All output files should be named with lower case letters, since these data are going to be used UNIX-based systems.
- 6) We would prefer all output files to have no version numbers, if possible.
- 7). The files should have read and execute privileges but no write privileges.
- 8) Files should be transcribed on to CD-ROMs in cdfs or high-sierra CD-ROM formats. We would prefer a specific directory structure for these CD-ROMs. We are assuming that you will be able to get a number of complete 9-track tapes on one CD-ROM since you probably copy these files on to a hard disk as an intermediate step. Do not split tapes between CD-ROMs.
- 9) The directory structure preferred would be something like:

`/Tape_label_name/Backup_save_set_name_if_applicable/the_files_and_directories_as_they_are_on_the_tape/`

This structure will allow us to look up in the tape listings we have and determine what is on the CD-ROM and in the data. Please advise us if you have other ideas about this directory structure.

For "unlabeled" tapes we will put an external label on the tape. The files should be named in order using the external label as part of the name. An example here for a tape labeled abc might be:

abc_NNNN.dat where NNN is the number of the file on the tape with 0's padding the name. NNNN for file 45 would read:
abc_0045.dat

- 10) These tapes range in age from 6 to 20 years old. We anticipate that there may be some difficulties in reading them. Most of these tapes have only been written on once or twice. If needed, please clean the tape once. After

Transcription of 9-track Data Tapes to CD-ROM

three tries, stop trying to read a tape and put it aside for future discussion with us. Please preserve all data recovered up to the failure point.

11) What is your normal liability for our tapes? What is your policy if a tape is damaged in handling? We assume no responsibility for anything that happens to your tape drives, when reading our tapes.

12) We will put external paper labels on tapes that do not have any external labels or are confusing as to what the labels are. We will also try to note which tapes are "unlabeled" and do our best to note how they were created.

13) We would like to look at the CD-ROMs upon completion. The 9-track tapes can either be returned by surface, or upon our determining that the CD-ROM transcription is satisfactory, we are willing for you to dispose of the tapes. There is no proprietary or sensitive information on these tapes.

Appendix G: Brief Description of VMS File System

Date: Mon, 20 Dec 1999 01:53:01 -0500
From: system_wjs1@wjs.who.edu (Warren J. Sass)
To: tbolmer@who.edu
Subject: Re: endians

I covered a little bit more than you asked for. Hope it's useful.

=====

Several issues can impede the use of the data despite successful transcription from tape to CD.

1) CPU architecture related issues.

a) The VAX CPU and instruction set do not use the IEEE format for floating point data. They use a proprietary format that requires conversion for use on CPUs that use the IEEE format.

b) The VAX addressing scheme is "little endian"; that is, the first byte of a multi-byte datum contains the least significant bits of that datum. When a multi-byte datum is transferred byte-by-byte to a machine that uses a "big endian" scheme (first byte contains the most significant bits of the datum), byte reordering is necessary.

2) Issues related to the VMS file system

a) The VMS file system supports file organizations other than sequential. Any such files transcribed as sequential files would require further processing

b) Information on VMS systems is typically written through VMS' RMS (Record Management Services) facility. This facility allows the imposition of several types of logical structures on files by introducing control information into the file (and then removing it when the file is read using RMS). 2 of these logical structures are identical to the ones used by most UNIX systems. Unfortunately, the default VMS structure is not one of these. In such cases, the control information must be removed before further processing.

3) Issue related to VMS FORTRAN

VMS FORTRAN has its own special record structure to deal with an old 132 byte limit on physical record size. This structure is used by default when VMS FORTRAN programs write "unformatted" files. Data in such structures must be extracted before processing by non-VMS FORTRAN programs.

Appendix H: Tapes not Able to be Read

From: Casey Lund <CLund@ontrack.com>
To: "tbolmer@whoi.edu" <tbolmer@whoi.edu>
Subject: Damaged tapes listing
Date: Wed, 14 Apr 1999 12:33:00 -0500

Hi Tom,

Here is the scoop on the on the tapes that have severe damage and that require advanced data recovery techniques. The cost is \$150/tape to do the diagnosis and \$250/tape to do the recovery (total recovery cost of \$400/tape). The advanced diagnosis will provide a description of the amount of damaged data found on the tape. The flow is as follows:

We need you to identify the tapes in the following list that you would like a diagnosis done on. (\$150 each)

We will have the diagnosis done on those tapes and communicate the results to you. At that time you will communicate which of the diagnosed tapes you wishes to have recovered. (an additional \$250 each)

We will return the recovered data on CD.

Let me know if you have any questions.

Thanks,
Casey Lund

Here is the list of severely damaged tapes:

FMOORE10	FMOORE13	FMOORE14	
NLRBLA	NLRBLF	NLRBLH	NLRBLI
NLRBLJ	NLRBLK	NLRBLL	NLRBLM
NLRBLN			
NLRCLG	NLRCLI	NLRCLJ (II)	
NLDR1			
WWDIG2	WWDIG3	WWDIG4	
CNT14	KITA1	AGJUFU	DTRR21 (I)
RASTER	ROBP	BOBD	SASB
RC2607A(I)	RC3001	RNR4J1	GNGFA01(I)
GNGFA02(II)			

Appendix I: List of Tapes with no Data Returned

<i>CD-ROM</i>	<i>TAPE</i>	<i>TAPE TYPE</i>
78124_09	TY0011	UNIX TAR TAPE
78124_14	CNS01I	UNIX TAR TAPE
78124_14	CNS01III	UNIX TAR TAPE
78124_14	CNS01IV	UNIX TAR TAPE
78124_14	CNT01	UNIX TAR TAPE
78124_14	CNT02	UNIX TAR TAPE
78124_14	CNT03	UNIX TAR TAPE
78124_14	CNT04	UNIX TAR TAPE
78124_14	CNT05	UNIX TAR TAPE
78124_14	CNT06	UNIX TAR TAPE
78124_14	CNT07	UNIX TAR TAPE
78124_14	CNT08	UNIX TAR TAPE
78124_14	CNT09	UNIX TAR TAPE
78124_14	CNT10	UNIX TAR TAPE
78124_14	CNT11	UNIX TAR TAPE
78124_14	CNT12	UNIX TAR TAPE
78124_14	CNT13	UNIX TAR TAPE
78124_14	CNT14	UNIX TAR TAPE
78124_14	CNT15	UNIX TAR TAPE
78124_14	CNT16	UNIX TAR TAPE
78124_14	CNT17M	UNIX TAR TAPE
78124_14	CNT18	UNIX TAR TAPE
78124_14	CNT19A	UNIX TAR TAPE
78124_14	CNT19A2	UNIX TAR TAPE
78124_14	CNT19B	UNIX TAR TAPE
78124_14	CNT19HRZ	UNIX TAR TAPE
78124_14	CNT21	UNIX TAR TAPE
78124_14	CNT25	UNIX TAR TAPE
78124_14	CNT26	UNIX TAR TAPE
78124_14	CNT33	UNIX TAR TAPE
78124_14	CNT34	UNIX TAR TAPE
78124_14	CNT51	UNIX TAR TAPE
78124_14	CNT52	UNIX TAR TAPE
78124_14	CNT53	UNIX TAR TAPE
78124_15	RC2607A(I)	VAX/VMS BACKUP TAPE
78124_16	RNR1P3(III)	VAX/VMS BACKUP TAPE
78124_16	RNR1P4(IV)	VAX/VMS BACKUP TAPE
78124_18	NLRBLM	VAX/VMS BACKUP TAPE

Appendix J: List of Tapes Not on CD-ROM

The tapes listed below did not appear on any CD-ROM returned. It is assumed that these were mistakes and as of 12/14/99 must be checked into at On-Track.

TAPES MISSING:

FMOORE01	Damaged
FMOORE10	Not on original list but On-Track received
FMOORE11	
FMOORE12	
FMOORE13	Damaged
FMOORE14	Damaged
FMOORE15	
FMOORE16	
FMOORE17	
FMOORE18	
KITA1	Damaged
AUG01	
NLD2	Missing from original shipment, not sent
TY01	
TY02	
TY03	
TY04	
NLRBLO	
STEPHEN	
RASTER	
MHN	Not on original list but On-Track received
DUMP1	
DUMP2	