NCAR/TN-187+IA
NCAR TECHNICAL NOTE

December 1981

A Guide to the Data Systems of the High Altitude Observatory's Coronal Dynamics Project

Frank Everts

HIGH ALTITUDE OBSERVATORY

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH
BOULDER, COLORADO

Table of Contents

Preface	v
Coronal Dynamics Data-Handling Procedures	1
General File System Structure	2
Running Production Commands for Mark III data	3
The Production Commands	6
An Overview of the Program Process	8
Making Film From Mark III Tapes Residing on the TBM	13
Tape Command Instructions for Volume Manipulation on the Cray	15
File Manipulation Commands for the CRAY	16
References	20

Preface

The following document describes the structure and operation of the Coronal Dynamics (C/D) Project's data system. The instrument system, based on the island of Hawaii, has been fully described by Fisher et al. (1981), and the text given here is a logical and natural extension of that work, aimed at C/D data users. The intent of this document is two-fold: First, there is the task of accurately specifying the software system at the end of the development phase. Secondly, this is also a user's manual for the C/D systems, and as such is the most important of the C/D experiment system's documents from the viewpoint of the scientific user.

This work was completed, to specification and on time, on 1 October 1981, bringing to a successful conclusion a four man-year software effort which was begun in January 1979. This work was performed as part of the development of the C/D experiment system and was supported by the National Center for Atmospheric Research with funding supplied by the National Science Foundation.

Richard Fisher
High Altitude Observatory
Project Scientist
Program Manager
Coronal Dynamics Project

CORONAL DYNAMICS DATA-HANDLING PROCEDURES

Two different forms of products are taken at Mauna Loa.

The first is 35mm film (Prominence Monitor data) of the sun as viewed in the H-alpha frequency spectrum. The film negatives are developed and checked for quality control in Hawaii, and any unusual events are noted. These films and notes are then stored in Dick Fisher's office.

The second form of data consists of digital images of the sun's corona as viewed in white light (Mark III coronameter data). These digital images are recorded on half-inch magnetic tape and processed in Boulder. The first step in processing the data is to archive these half-inch tapes onto two-inch mass store volumes.(Each two-inch tape contains about 200 half-inch datasets.) At the same time, observer's notes on the sun's activities and scan logs of the exact times the digital images were taken are filed in separate log books (kept at HAO in Boulder).

A process that sometimes takes place in parallel with archiving is direct examination of the data on the PDP 11/70 using a program residing in /u2/cordyn/mk3 called b. The major options of this program are to produce r scans (angle on the sun from its north pole remains constant), theta scans (fixed height above the sun's surface; angle varies from 0 to 360 degrees), and contour plots. Arithmetic and smoothing operations can be performed on the data, and output is in the form of either plots or printed values.

Once the half-inch data tapes have been archived on the TBM, several different processing paths are possible using the Cray-1.

The standard way to initially evaluate the data is to produce a gray-scale picture (corona viewing area mapped to a rectangular region) for the three data channels on one 35mm frame. Sample command files to do this kind of processing from the 11/70 are located in /u1/everts/cray/rout.

A set of programs designed to be more user-friendly (instead of efficient) and with more options can be accessed via /u2/cordyn/film. By editing a keyword data file, one has the options of producing geometrically correct pictures of the data, pictures of differences among the data, colored pictures, or electron masses for specified regions of interest. Utilities for merging datafile from various days and times are also available in this directory, as are the necessary routines to write a volume from the TBM (produced by the above programs) onto physical half-inch tape (currently the only means of accessing the Dicomed-black and white film , or the Comtal-color images) .

GENERAL FILE SYSTEM STRUCTURE

Most of the processing of data for the Mark III experiment is done by routines residing in either the file system /u1/everts or /u2/cordyn. I will describe the contents of these systems as of 1 September 1981.

I. Directories in /u1/everts

ban: A listing of what files are on the ATM tape (which contains rdatpe, wrtape source used by b program) together with a makefile to reconstruct tapcpy and tapcmp.

bin: A set of commands that I have found personally useful for archiving and recovering file systems, rewinding tapes from a terminal, extracting pertinent data from a large set of rje printouts, etc.

cfiles: A set of files and the necessary suporting tools to easily merge selected volumes from the TBM onto a single new volume, useful for long-term synoptic studies and events lasting over more than one tape. Also allows one to easily merge volumes produced by the general production routines onto a single volume for descent to a single physical tape.

cray: Contains the commands for easily generating Cray production jobs to create film or archive data tapes onto the TBM.

graph: Useful routines for inspecting a Cray matrix dump of a lot of data points on the graphics terminals.

mvn: Source for creating commands to inspect which volumes are on which TBM reels and to generate a move list if certain volumes must be moved. (Highly unlikely, as the necessary moves should have been done already).

rje: Two important subdirectories. One--rjecmnd--contains commands for generating an rje output of any file in the Cray system in an easily inspectable form and another command for finding out which volumes on the TBM are in danger of being purged. The other subdirectory--out--is the receptacle for rje output from programs generated by the routines in var.

s: Currently contains the modifications to the S Data Analysis system required to run on our machine. Should probably not be tackled until the user is very familiar with the Unix system.

taprd: Fortran programs for reading a Cray-written tape and producing an octal dump as it would appear on the 11/70. Useful for debugging Dicomed instruction problems, but probably not needed at this point in time.

var: Contains all of the sources and the makefiles for the Cray

Fortran routines to do most of the data analysis of the Mark III data tapes. This is probably where most of the modifications and additions will be developed for further data analysis. The production routines, which are accessed by /cray/rout commands, operate on a different set of Fortran programs designed for speed, but the var routines are not much slower and one could easily develop similar commands to operate on them. These are the current versions of the programs which most Mark III data users access by using the /u2/cordyn/film/film.rje file.

II. Directories in /u2/cordyn

apap: Apparently contains a draft of a paper. I was unsure whether this was still being used by Dick Fisher, so I left it alone.

mk3: Contains all the subroutine sources and a makefile for constructing an overlayed program to do inspection and manipulation of Mark III data tapes. Capabilities include plotting r and theta scans, making contour plots of pB-calibrated pictures, and performing arithemetic operations on r or theta scans. Art Poland left a write-up describing the general philosophy behind its construction.

film: Contains the rje files and commands for the unsophisticated user to access the Cray programs for Dicomed and Comtal picture construction, determination of coronal electron masses, and data tape manipulation. Detailed information on how to use these files is found in the notes "Tape Command Instructions and Making Film from Mark III Data."

RUNNING PRODUCTION COMMANDS FOR MARK III DATA.

The general procedures to follow in processing Coronal Dynamics data were outlined above (see Data-Handling Procedures) from a high-level view. Here we go into complete detail about the steps to be followed in producing preliminary film of coronameter data.

I. Transporting Tapes to the NCAR Computing Facility

When a box of tapes arrives, it is transported to room 288 and unpacked. The write rings are removed from the tapes, and the scan logs and observer logs packed in the tape carton are removed and inserted in chronological order into the blue program folders. The tapes are carried to the Computing Facility (usually it is easiest to use the SMM cart to do this), where they replace the last load of our tapes on the tape racks. These previously processed tapes are then returned to room 288 and placed in the tape racks there.

II. Archiving Tapes on the TBM

The first step in archiving physical tapes is to fill out a tape request form (available at the Computing Facility input counter),

listing the physical tapes to be read and requesting that the current MVN be mounted for writing (this can only be done at night).

On the 11/70, a file is constructed consisting of the asc commands (see Production Commands section below) for each tape. Currently tapes in uncompressed format to be archived are arbitrarily assigned a number-of-files parameter of 21 (this makes the construction of a file to do step III processing much easier), while the number of files on compressed-format tapes are listed exactly as found in the scan logs. A simple example of a short file (call it tmpasc) to do archiving would be:

```
asc v61981 21
asc v61982 21
asc v61983 83
asc v61984 62
```

After the above file is constructed, its mode is changed to 755 (via chmod 755 tmpasc) and then a remind command is issued so the commands in the file will be executed at an appropriate time. For example, to start tmpasc working at 1:00 a.m., sometime during the preceding working day, I would type

```
remind 1:00 -x
tmpasc
^D
```

The job would then automatically start execution at the appropriate time.

It is usually best to remove all the old prnt files in /dl/everts/rje (via rm prnt*) since that is where the results of the above runs will appear. Since normally there are a lot of prnt files to be examined, I use the command sift prnt > tmpl to search through the prnt files and place pertinent information in some file tmpl. Following the sift command with command arra tmpl tmp2 will then reformat the informationin in a useful manner. For example, after running tmpasc, one might use the sift and arra commands to produce a file tmp2 which in each line contains, among other things, the following information:

tape_label read_errors write_errors #files #records

The labels are listed in sorted order so one can easily check if a tape has not been successfully processed. Usually one must then search for the particular prnt file which describes what went wrong in processing the job. I usually print on the versatec a file of type tmp2 described above to keep as a reference for later stages of processing.

III. Producing Dicomed Volumes

Similar to step II above, a file is constructed to take the TBM data volumes and produce Dicomed volumes. An example of such a file (call it tmpdou) for the same tapes as above would be:

```
send doumd.rje
send arcmd.rje
sleep 1400
pic v61981 ffew81
pic v61982 ffew82
comp v61983 ffew83
comp v61984 ffew84
```

The first two lines send the Fortran programs to the Cray to do the processing, while the third pauses to ensure that the Fortran sources are there before execution begins. The fourth and fifth lines produce volumes (ffew81 ffew82) in Dicomed-readable form of uncompressed-format TBM volumes (v61981 v61982). Similarly, the sixth and seventh lines produce TBM Dicomed volumes of compressed-format TBM volumes.

As in step II processing, one must change the mode of the file tmpdou, rm the prnt files in /dl/everts/rje and issue a remind command to start executing the commands at an appropriate time. The results of the job runs are delivered to /dl/everts/rje and the information about successful or unsuccessful termination can be gathered into file tmpl by the command gather FFEW tmpl. Here FFEW is any pattern that uniquely identifes the Dicomed output volumes.

IV. Merging Dicomed Volumes to Produce Dicomed Tapes

Since the Dicomed volumes produced by step III do not fill up a full tape, one normally merges these volumes onto a label (for which there exists a tape that can be written on) that will fill up a 2400 ft. tape before proceeding to step V.

This is done by constructing a file (call it tmpvol) consisting of commands:

```
vol table1
vol table2
```

where table1 might contain, for example

```
v61040
ffew81 1
ffew82 1
end
```

Here v61040 is the volume on which the tape will be written, and ffew81 and ffew82 are Dicomed volumes. As a rule of thumb, four fast-scan uncompressed tape output volumes can be merged onto one tape-destined volume, while only one compressed tape output volume can be put

on one tape-destined volume. Much more information on the set-up of the vol command is found below in the section File Manipulation Commands for the Cray.

V. Producing Film

First, one must copy the volume on the TBM onto physical tape with the same label, using the command des v61040, for example. Then these physical tapes may be run on the Dicomed to produce film by submitting a card at the Computing Facility desk and requesting MAC 37, raster production.

PRODUCTION COMMANDS

This directory (/u1/everts/cray/rout) contains the shell commands for doing the present production work involved with the Mark III coronameter. These commands are constructed so that a log of the commands executed are echoed onto the file hist. This has proven very useful both for debugging and for keeping track of one's progress.

In general, the commands construct an rje file to run on the Cray or 7600 and send that file to be executed on the appropriate machine. Normally, the results of the batch run are automatically delivered to the directory /d1/everts/rje and labeled sequentially prnt#. Abnormal terminations usually generate a file too large to be handled in this manner, and one must specifically request the job seq# to be returned over the Modcomp link. (This is done via a rje wri seq# command). There are several commands found in /u1/everts/bin to search through a group of prnt files for significant data to identify what the particular job did. It would be useful to write a command similar to the info command of /u2/cordyn/film/rje to exactly identify what each prnt file contains.

These are the five major production commands contained in this directory:

asc: archive a copy of the half-inch data tape onto our private TBM volumes.

badtp: copy a tape with significant parity errors onto the TBM under a different volume name. (Requires significant peripheral processing time and generally necessitates an additional volnp run to rename the volume the same as the original half-inch tape).

pic: make a Dicomed volume which will produce on one frame a picture of all three channels simultaneously. Works only with uncompressed tapes.

comp: for compressed tapes--make a Dicomed volume which will produce on one frame a picture of all three channels simultaneously.

des: copy onto half-inch tape a volume from the TBM.

The general structure of all the production commands is very similar. A time-stamped entry of the command and its arguments is added to the hist file, a template rje file is then edited by an editor command to produce a temporary file, which is sent to the Modcomp at the same time the rje's transaction number is recorded, after which the temporary rje file is removed.

I. ASC--Archiving Tapes Onto the TBM

command structure: asc Tape_name n_files

interpretation: copy the first nfiles from physical tape with label Tape_name onto the TBM. If the Tape_name is one of those currently being archived, then the appropriate MVN volume is determined, and the tape will be archived there. Otherwise, the tape will be ascended to the TBM on the day_log MVN volume.

example: asc v67090 21

ASC is the most complicated of the production commands and is probably best understood by directly examining its constituent commands:

```
date >>hist
echo $0 $1 $2>> hist
casc $1 $2
fd2 + send asc$1.rje>> hist
sleep 120
rm asc$1.rje
```

The first line records the date on the log file hist, and the second line adds the name and parameters of this command. (In general, $0 is the command name, while $1 $2 ... $n, are the first through nth parameters). The third line invokes a c program which acts on the first and second parameters to the asc command--in this case Tape_name and n_files--and determines whether or not the Tape_name is one of those being archived, then selects the appropriate MVN volume for it to be archived onto. (The details of this selection can be found in the c source casc.c and changes can be simply made when the old archive volume is filled--which happens about every 180 tapes. A makefile exists to regenerate casc.) Casc then calls the appropriate editor script (either ted1 or ted1a) to modify the template rje file ascxx.rje to produce asc{Tape_name}.rje file. The fourth line sends this temporary rje file to the Modcomp and records its responses; the fifth line pauses for 120 seconds so as not to cause excessive queueing when a whole series of these commands are run; finally, the sixth line removes the temporary rje file so as not to clutter up the directory.

II. BADTP--Copying Tapes With Significant Party Errors

command structure: badtp Tape_name Vol_out n_files

interpretation: Copy the first n_files from half-inch tape with label Tape_name onto the TBM with label Vol_out.

example: badtp v61589 fft589 21

III. PIC and Comp--Constructing Dicomed Tapes From TBM Volumes

command structure: pic vol_data vol_dico
or
comp vol_data vol_dico

interpretation: Make a Dicomed format volume vol_dico from the dai volume vol_data residing on the tbm.
If vol_data is in uncompressed format use pic,
if vol_data is in compressed format use comp.

examples: pic v61935 ffev35
comp v61943 ffev43

IV. DES--Copy a TBM Volume Onto Physical Tape

command structure: des Tape_name

interpretation: copy the volume Tape_name on the TBM onto physical tape with the same label

example: des v61048

AN OVERVIEW OF THE PROGRAM PROCESS

This directory (/u1/everts/var) contains the Fortran source routines for the program process that does the majority of data processing for the Mark III instrument. Thoroughly debugged versions of this program are what the general user accesses via /u2/cordyn/film to produce the film or analytical output for the events of particular interest to him. Although this it not the program that is used for production runs by the commands pic and comp in /cray/rout, it is probably nearly as efficient and has been maintained to easily and invisibly accept the different data formats appearing in Mark III data tapes. For these reasons it is probably the preferred choice for enhancements to the analytical and pictorial processing of coronameter data. In addition, it should be fairly easy to modify the production commands pic and comp to operate using this program.

The file big in this directory is the current version of program process which appears in the PLIB of account 92420003 under the name of procss (note the spelling). A current source file is kept on the 11/70 so that one may easily use the CDC 7600 line editor to make small changes to the program without having to replace the entire file. An example of how this is done may be found in the rje file test.sav, which accesses the PLIB copy and replaces relevant subroutines by the current copies. When a sufficient number of changes have occurred to warrant a PLIB file replacement, the relevant subroutines are modified and big is remade by the command make big. (If additional subroutines have been added, then the makefile must be modified also.) Then the PLIB file is replaced by sending an rje job such as in drive.sav.

Process itself is designed to handle a variety of data processing jobs with as small a data deck set-up as possible. By a proper choice of keywords, one may operate on a data volume and do any of the following--(keyword in parenthesis):

1) produce color Comtal volumes (COMTAL)

2) produce Dicomed volumes with the correct geometry (RECTPOSI)

3) produce Dicomed volumes of difference frames with a base frame and the correct geometry (RECTPOSI)

4) calculate the electron masses contained in a specified angular sector (DENSPS)

5) calculate the differences in electron masses between a base frame and a series of other frames (DENSDF)

6) quickly produce a dicomed tape of all the channels on a given tape in polar coordinates (3STRPIC)

There are several sets of parameters which follow each keyword, and there are several volume set-up and disposal keywords not listed here. More information on these details can be found in the sections <u>Making Film from Mark III Tapes</u> and <u>Tape Command Instructions</u>.

Mention was made earlier of the makefile which may be used to update the program process. The makefile also serves as a useful documentaion aid in discovering the global structure of this program. A slightly modified copy of this makefile follows:

```
driver:  process.f4p comtal dens diffrt extrct.f4p
filskp.f4p flush.f4p frstcd.f4p
lastls.f4p mark nextcd.f4p rectps setkey.f4p setvr2.f4p
strpic.f4p tape valid.f4p which.f4p
cat process.f4p comtal dens diffrt extrct.f4p
filskp.f4p flush.f4p frstcd.f4p
lastls.f4p mark nextcd.f4p rectps setkey.f4p setvr2.f4p
strpic.f4p tape valid.f4p which.f4p
>driver
```

```
tape:  tapein.f4p dicout.f4p comout.f4p
cat tapein.f4p dicout.f4p comout.f4p  > tape

mark:  mark.f4p convrt.f4p draw.f4p
cat mark.f4p convrt.f4p draw.f4p > mark

diffrt:  diffrt.f4p diffm1.f4p
cat diffrt.f4p diffm1.f4p > diffrt

rectps:  rectps.f4p rect.f4p setind.f4p
cat rectps.f4p rect.f4p setind.f4p > rectps

comtal:  comtal.f4p comt.f4p wrtbyt.f4p
cat comtal.f4p comt.f4p wrtbyt.f4p > comtal

dens:  densps.f4p densdf.f4p dens.f4p setrot.f4p
setcal.f4p cal.f4p avecol.f4p
cat densps.f4p densdf.f4p dens.f4p setrot.f4p
setcal.f4p cal.f4p avecol.f4p > dens

diskwrit: dskwrt.f4p adjust.f4p bytswp.f4p dmpovr.f4p envir1.f4p
expand.f4p expcmp.f4p expunc.f4p exten.f4p
frstrc.f4p hdpick.f4p matfil.f4p nextrc.f4p norm.f4p
setmat.f4p
setovr.f4p setvr1.f4p swapd.f4p title.f4p title1.f4p tstovr.f4p
unpack.f4p wrtdsk.f4p xshift.f4p
cat  dskwrt.f4p adjust.f4p bytswp.f4p dmpovr.f4p
envir1.f4p
expand.f4p expcmp.f4p expunc.f4p exten.f4p
frstrc.f4p hdpick.f4p matfil.f4p nextrc.f4p norm.f4p
setmat.f4p
setovr.f4p setvr1.f4p swapd.f4p title.f4p title1.f4p tstovr.f4p
unpack.f4p wrtdsk.f4p xshift.f4p
> diskwrit

picture: dskpic.f4p init2.f4p move2.f4p rdmat.f4p wrtln2.f4p wtcmnd.f4p
cat dskpic.f4p init2.f4p move2.f4p rdmat.f4p wrtln2.f4p wtcmnd.f4p
> picture

utility: advan.f4p adwsh.f4p char.f4p dmp.f4p dmpmt.f4p
hist.f4p histm.f4p indr1.f4p negat.f4p numbr1.f4p
puto.f4p rlind.f4p
sethd.f4p writhd.f4p
cat  advan.f4p adwsh.f4p char.f4p dmp.f4p dmpmt.f4p
hist.f4p histm.f4p indr1.f4p numbr1.f4p negat.f4p
puto.f4p rlind.f4p
sethd.f4p writhd.f4p
> utility

big: driver diskwrit picture utility
cat  driver diskwrit picture utility > big
```

By looking at this makefile we see that the file big is the concatenation of the files driver, diskwrit, picture, and utility. Diskwrit itself is the concatenation of about 24 files with suffix .f4p.

Diskwrit is a relatively self-contained process which reads the next file from the input tape (assigned to logical unit number 4) and writes three files (one for each channel) on the selected output unit number; each file consists of a 100-word header record followed by a matrix (one column per record) of 128 by 720 q intensities reduced from the input tape. It is not necessary to specify the scan rate or whether the format is compressed or not since diskwrit will handle all cases correctly.

Picture will take a disk file of the form header record followed by a matrix of intensities and will write the commands onto the Dicomed output unit (lun 1) to construct a picture with the desired window size and intensity scaling.

Utility is a collection of subroutines for doing such things as interpolating from reals to integers, dumping selected parts of a matrix, looking at the header information, etc.

Finally, we come to the routines which constitute driver and are the heart of the Mark III Cray data processing. When isolated from the complexities of the Dicomed and data format reduction done in dskpic and diskwrit, these routines become much more easily understood.

To follow the program flow, let us examine the actions of the program in producing a tabulation of the electron masses in a given angular sector for a specified selection of files from a data tape vdata, and a required calibration tape, vcal.

Thus the data cards to the program might appear as:

```
tapein
vdata
setcal
vcal
    4
densps
   20    40
    2     3
end
```

The main program process sets some variables by calling setvr2, reads the first card--tapein--in routine frstcd and sets the variable nxtkey to 5, indicating that the fifth keyword has been selected.

Nextcd will proceed to the input and data conversion routines dictated by the choice of tapein as the keyword. That is, the next card (vdata) will be decoded and assigned to the variable volnam. Then setcal will be read in and recognized as another keyword, and will correctly set nxtkey to 12, after which return will be made to the main program process.

Since the key for the action tapein is 5, the subroutine tapein will be selected and executed by the computed goto in process. This cycle of interpreting data cards in nextcd until the next keyword is reached (and retained), setting parameters in the common comnd for use by the appropriate subroutine, and calling nextcd for the next data cards for the present keyword continues through the keywords setcal and densps until the keyword end is read, and the main program stops.

MAKING FILM FROM MARK III TAPES RESIDING ON THE TBM

This is a set of instructions for producing tapes to be used in the generation of film from Mark III data. Two different final film products are possible:

1) Dicomed black and white film

2) Comtal color images (which may be photographed directly from the CRT).

These instructions assume that the data tape is resident on the TBM as a single data set. If not, see Tape Command Instructions on how to produce such a data set.

The Cray image-processing routines to be used are keyword-driven from a set of data cards with the following general form

```
KEYWORD
ZERO OR MORE LINES OF PARAMETERS
```

Two of the more frequent parameters lines are CHANNEL NUMBER and FILE LIST. CHANNEL NUMBER selects which of the Mark III channels is to be used. Currently, channels 0 and 1 are working. FILE LIST is a list of one or more lines selecting the files on the input tape (in ascending order) from which pictures are to be made. Remember that for compressed tapes actual data begins wth file 2. FILE LIST is in 15i5 format, while CHANNEL NUMBER is in i5 format.

The following are examples of the most frequently used keyword sequences, with comments at the end of each sequence.

```
tapein
v61588
```
(Input will be taken from volume labeled v61588.)

```
setcal
v61590
   13
```
(Set up the calibration parameters using file 13 of volume v61590. This must be done after a tapein keyword.)

```
densps
   70   80
    1
    2    3    4    5    6
```
(Compute and print out the electron masses between 70 and 80 degrees for channel 1, pictures 2 through 6. Smallest angle must be first.)

```
densdf
  -50  -20
    1
```

```
    2
    2    3    4    5    6
```
(Compute and print out the differences in electron masses between pictures 2 and pictures 2 through 6, for angles between -50 and -20 degrees for channel 1.)

```
comtal
    1
    2    3    4    5    6    7    8    9   10   11   12   13   14   15   16
   17   19   20   21   22   23   24   25   26   27   28
```
(Produce Comtal pictures of files 2 through 17 and 19 through 28, channel 1 of the input tape.)

```
rectposi
    0
    3    4    5    6    7    8    9   10   11   12   13   14   15
```
(Produce Dicomed rectangular pictures of files 3 through 6 and 7 through 15, channel 0 of the input tape.)

```
rectdiff
    0
    3
    2    3    4    5    7    8    9   10   11   12   13   14   15
```
(Produce Dicomed rectangular difference pictures using file 3 as the base and differencing with files 2 through 6 and 7 through 15, channel 0 of the input tape.)

```
dicout
v61022
```
(Descend the output intended for the Dicomed to the TBM with volume label v61022.)

```
comout
v61021
```
(Descend the output intended for the Comtal to the TBM with volume label v61021.)

```
end
```
(This signals the end of the data cards.)

To access the cray routines from the 11/70:

1) edit the file "data" in directory /u2/cordyn/film to suit your specific needs

2) type the command "send film.rje"

3) An rje output of your cray run will appear in directory /u2/cordyn/film/rje and may be inspected to insure the run was error free.

4) Volumes descended to the TBM using dicout or comout may be copied onto physical tape using the des command. (see Tape Command Instructions.) Physical tapes may be run on the Dicomed to produce film by submitting a card at the Computing Facility desk and requesting MAC 37, raster production. Comtal tapes are run on the 30th St. Comtal facility.

TAPE COMMAND INSTRUCTIONS FOR VOLUME MANIPULATION ON THE CRAY

This describes three commands on the 11/70 useful for copying physical tapes to/from the TBM and for merging selected files from different volumes on the TBM to a single new volume.

I. Copying Physical Tape Onto TBM

command structure: dol Tape_name n_files
Copy the first n_files from physical tape with label Tape_name onto the TBM.

example: dol v61588 20

II. Copying TBM Onto Physical Tape

command structure: des Tape_name
Copy the volume Tape_name on the TBM onto physical tape with the same label.

example: des v61030

III. Merging Selected Files From Selected Volumes

command structure: volnp table where table is a file in the form

```
output_label
input_label1 file_list1
input_label2 file_list2
.
.
.
input_labeln file_listn
end
```

Merge onto the volume output_label selected files from input_label1 given by file_list1, followed by selected files from input_label2 given by file_list2,... followed by selected files from input_labeln given by file_listn. A file_list consists of numbers or intervals (number1-number2) separated by blanks.

example: volnp table
where table might contain

```
v61034
v61588 1 2 3-6 7 9-19
v61235 5 8-12
```

```
v61657 8 10 12 14 16
end
```

FILE MANIPULATION COMMANDS FOR THE CRAY

This directory (/ul/everts/cfiles) contains the shell command vol for doing file manipulation on the Cray. This command allows one to select files from several different datasets on the TBM and merge them onto a new TBM dataset. Vol has proven to be very useful for studying coronal events that span over several physical tapes, for developing synoptic studies of the slowly varying corona, and also for merging several short Dicomed volumes onto one full volume. A time-stamped log of the command and its parameters are echoed onto the file hist, similar to the log for production commands in /ul/everts/cray/rout. The basic structure of the command is also similar to the productions in rout. That is, vol constructs an rje file to run on the Cray and sends that file to be executed. The results of the batch run are normally automatically delivered to the directory /dl/everts/rje.

There are several major variants to the structure of the file table that is the only parameter to vol.

I. A Basic Example of Dataset Merging

command structure: vol table where table is a file in the form

```
output_label
input_label1 file_list1
input_label2 file_list2
.
.
.
input_labeln file_listn
end
```

interpretation: Merge onto the volume output_label selected files from input_label1 given by file_list1, followed by selected files from input_label2 given by file_list2,... followed by selected files from input_labeln given by file_listn. A file_list consists of numbers or intervals (number1-number2) separated by blanks.

example:

```
vol table
where table might contain
v61034
v61588 1-7 17-19
v61235 5 8-12
v61657 8 10 12 14 16
end
```

The above example would take the indicated files from the indicated volumes and merge them onto a new volume with label v61034. Thus, after the merge is complete, files 1 through 7 of v61034 would be identical with files 1 through 7 of v61588, while files 8 through 10 of v61034 would be the same as files 17-19 of v61588. Similarly, file 11 of v61034 would be identical to file 5 of v61235, file 12 of v61034 and file 8 of v61235 would be the same, and so on.

II. The Command in its Full Generality

The above example is of the type that will be used most often. When TBM copies of physical tapes ascended to the TBM (via the command asc, for example) are merged, table would appear as above. However, the possibility exists that one might want to merge tapes in a different format (i.e., Cray Transparent format rather than 7600 format) or store them on a different TBM MVN volume than the default day-log. To do these kinds of things additional switches are required in the parameter file that vol acts on.

command structure: vol table

where table is a file with several alternative flags on each line (flag choices are indicated by braced alternatives and

```
                    blanks are double quoted)

                    output_label {m | mvn_label | " "}{tb | " " }
                    input_label1 {n | " "} file_list1
                    input_label2 {n | " "} file_list2
                    .
                    .
                    .
                    input_labeln {n| " "} file_listn
                    end
```

interpretation: similar to the example given in
I - merge onto the volume output_label
selected files from
input_label1 given by
file_list1,followed by selected
files from input_label2 given by file_list2,...
followed by selected files from input_labeln
given by file_listn. A file_list consists of numbers
or intervals (number1-number2) separated by blanks.
The difference is that the
output_label has flags to indicate
mvn_label - descend the output volume to the TBM
volume with MVN identification mvn_label
m - descend the output volume to the TBM
but the program
will select the private MVN according to
a standardized scheme
" " - descend to the day_log MVN (the default)
tb - disposal is via the direct Cray link (Transparent
mode)
" " - disposal is via the 7600 (the default)
The input_label has flags to indicate
n - no conversion is to be done
" " - before processing an input data
set use the tbmconv
verb to convert it back into 7600 format (default)

example:

```
vol table
where table contains
ffepc0 t10381 tb
v61588 1-7 17-19
v61235 5 8-12
v61657 8 10 12 14 16
end
```

The above example would take the indicated files from the indicated volumes and merge them onto a new volume ffepc0. This volume would be disposed via the Cray direct link to our private MVN t10381. Since disposal is via the direct link, the volume would still be in Cray format.

```
    example:          vol  table                          where  table
contains                       v61602 m                          ff1602
1-21                      end
```

The above example would take the indicated files from the indicated volume and merge them onto a new volume v61602. This volume would be disposed via the 7600 to the appropriate private MVN (in this case t10365). Since disposal is via the 7600, this dataset would be in the same format as all our other datasets. This example indicates the structure of a table file that might be used in conjunction with the badtp command. For example, ff1602 might be the output volume from a previous run to read tape v61602 (which had substantial parity errors) onto the TBM with label ff1602.

References

Fisher, R. R., R. H. Lee, R. M. MacQueen, and A. I. Poland, 1981: Applied Optics 20, 1094.